EXHIBIT H

GEOLOGY

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

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H.1 INTRODUCTION

OAR 345-021-0010(1)(h) *Information from reasonably available sources regarding the geological and soil stability within the analysis area, providing evidence to support findings by the Council as required by OAR 345-022-0020:*

Response: This exhibit presents the results of a preliminary geologic and geotechnical assessment for the Perennial Wind Chaser Station (Station) and step-up substation. The other components of the Perennial Wind Chaser Station project (Project) will be assessed in an additional geotechnical investigation, as described in Section H.3. This exhibit was prepared using information from previously published geologic and seismic studies and preliminary site-specific geotechnical explorations. Detailed geotechnical design recommendations will be prepared in a separate report after additional subsurface explorations are completed. The following sections present information required under Oregon Administrative Rule (OAR) 345-021-0010(1)(h).

H.2 GEOLOGIC REPORT

OAR 345-021-0010(1)(h)(A) *A geologic report meeting the guidance in the Oregon Department of Geology and Mineral Industries open file report 00-04 "Guidelines for Engineering Geologic reports and Site-Specific Seismic Hazard Reports."*

Response: The geologic report that meets the general guidelines in open file report 00-04 is presented in Appendix H-1. This report was prepared by Perennial-WindChaser LLC's (Perennial's) geotechnical consultant, Shannon & Wilson, Inc. (S&W), of Lake Oswego, Oregon. The report summarizes S&W's preliminary geotechnical investigation of the Station and step-up substation site, which was performed in June, July, and August 2013. S&W also prepared a separate report responding to agency data requests that is presented in Appendix H-1. The following attachments are provided in this appendix:

- *Attachment H1, Preliminary Geotechnical Engineering Report, Perennial Wind Chaser Station, Hermiston, Oregon*;
- *Attachment H2, Preliminary Geotechnical Engineering Report, Perennial Wind Chaser Station, Step-up Substation, Umatilla, Oregon*;
- *Attachment H3, Documentation of Email Correspondence with DOGAMI Perennial Wind Chaser Station, Exhibit H Geology and Seismicity, OAR 345-021-0010(1)(H), Power-Generating Facility, Hermiston, Oregon, Step-up Substation, Umatilla, Oregon; and*
- *Attachment H4, Significant Historical Earthquakes Causing MMI III or Greater Intensity Shaking at the Facility Sites.*

H.3 SITE-SPECIFIC GEOLOGIC AND GEOTECHNICAL WORK

OAR 345-021-0010(1)(h)(B) *A description and schedule of site-specific geotechnical work that will be performed before construction for inclusion in the site certificate as conditions.*

Response: Preliminary geologic and geotechnical site characterization was completed at the Station and step-up substation site during the periods of June 5–15, 2013; July 9, 2013; and August 14–16, 2013. The preliminary site work included installation of 10 geotechnical borings, five dynamic cone penetrometer (DCP) tests, and two infiltration tests at the Station, and installation of two geotechnical borings, four DCP tests, and two infiltration tests at the step-up substation. Preliminary geotechnical reports, which include site-specific geotechnical explorations, are provided in Appendix H-1, Attachments H1 and H2. The reports include interpretation of subsurface conditions from explorations of the Station and step-up substation site, which were intended to provide a general understanding of site conditions. They provide preliminary recommendations based on general site conditions and are intended for use during preliminary design to estimate facility costs and provide sufficient information for site permitting. Additional site-specific geologic and geotechnical work will be performed in the final design phase, as outlined below.

The additional geotechnical investigation will include field explorations, laboratory testing, and engineering studies and recommendations. The field explorations will include additional borings for the final locations of the turbine/generators, access bridge, step-up substation transmission towers, and buried transmission cable. A shear wave velocity measurement will be performed at the Station and step-up substation site. Additional engineering evaluations will be performed based on the refined subsurface conditions. The additional engineering evaluations are:

- Refine or upgrade the seismic hazard evaluations and ground motion design parameters, including design response spectra.
- Estimate soil bearing capacity and settlement for the transformer foundation, transmission tower foundation, and other geotechnical evaluations based upon the final design layout and design loads.
- Develop geotechnical recommendations for trench excavation, shoring, and backfill of the buried transmission cable, as well as trenchless excavation techniques if required. Perennial has assumed that the embedment of the buried transmission cable is relatively shallow and that open trench excavation is the preferred construction method; however, trenchless excavation may be required to pass below existing railroad tracks.
- A final geotechnical design report will be completed for the final design and construction.

H.4 EVIDENCE OF CONSULTATION WITH THE OREGON DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES

OAR 345-021-0010(1)(h)(C) *Evidence of consultation with the Oregon Department of Geology and Mineral Industries regarding the appropriate site-specific geotechnical work that must be performed before submitting the application for the Department to determine that the application is complete.*

Response: During preparation of the geotechnical reports, S&W consulted with the Oregon Department of Geology and Mineral Industries (DOGAMI) to explain preliminary site-specific geologic explorations and evaluations performed at the Station and substation site as well as discuss available documentation reviewed. Consultation occurred by telephone on September 5, 2013, between an S&W engineering geologist, David Higgins, CEG and Bill Burns with DOGAMI. A follow-up email was sent to Mr. Burns on September 6, 2013, requesting any additional references that should be reviewed. He responded to the email on September 11, 2013. A copy of the email correspondence is provided in Appendix H-1, Attachment H3.

H.5 TRANSMISSION LINES

OAR 345-021-0010(1)(h)(D) *For all transmission lines, include a description of locations along the proposed route where applicant proposes to perform site-specific geotechnical work, including, but not limited to, railroad crossings, major road crossings, river crossings, dead ends, corners, and portions of the proposed route where geological reconnaissance and other site-specific studies provide evidence of existing landslides or marginally stable slopes that could be made unstable by the planned construction.*

Response*:* Power generated at the Station will be transmitted for distribution to customers by the approximately 12 miles of existing transmission infrastructure that connects the Hermiston Generating Plant (HGP) to the Bonneville Power Administration McNary Substation. The existing infrastructure currently supports both a 115-kilovolt (kV) and a 230-kV electric transmission line. The 115-kV line will be replaced with a new 230-kV line, which will then be tied in to the Station's onsite switchyard. This tie-in will require the installation of up to six new transmission poles. The Project route will separate from the existing line near the McNary Substation and will connect to a new 3-acre step-up substation, then interconnect to the McNary Substation by a 477-foot underground transmission cable.

The existing transmission infrastructure extending from the HGP to McNary Substation does not have a history of landslide activity, and utilizing this existing infrastructure will not increase the risk of landslides. For the installation of additional transmission infrastructure, including the erection of additional transmission poles and placement of underground transmission cable, further geotechnical work will be performed prior to installation based on final design layouts and design load, as described in Section H.3. The new buried transmission cable from the step-

up substation to McNary Substation will be constructed in an area that is relatively flat, making landslide activity unlikely. However, prior to construction of the new buried transmission cable, additional site-specific geologic reconnaissance will be carried out as described in Section H.3.

H.6 PIPELINES

OAR 345-021-0010(1)(h)(E) *For all pipelines that would carry explosive flammable or hazardous materials, a description of locations along the proposed route where the applicant proposes to perform site-specific geotechnical work, including, but not limited to, railroad crossings, major road crossings, river crossings, and portions of the proposed alignment where geological reconnaissance and other site-specific studies provide evidence of existing landslides or marginally stable slopes that could be made unstable by the planned construction.*

Response: A new 4.63-mile natural gas pipeline lateral will be constructed within the existing 50-foot natural gas line right-of-way that serves the HGP. The new lateral will interconnect with the Gas Transmission Northwest interstate natural gas system.

The existing HGP natural gas pipeline does not have a history of landslide activity, and utilizing the existing ROW will not increase the risk of landslides. As stated by S&W in Section 6.1 of Appendix H-1, geotechnical explorations are not routinely required for shallow gas pipelines in trenched excavations, and they do not anticipate that site-specific geotechnical work will be needed to evaluate the pipeline alignment. The new natural gas pipeline will be installed at a similar depth and will use similar construction techniques to the existing parallel gas line. S&W reviewed maps showing the location of the pipeline, and the topography is flat-lying agricultural landscape with no mapped landslides. Based on S&W's review of area mapping and surface observations near the pipeline, there are no known slope hazards. If trenchless excavation techniques are used to construct the natural gas pipeline below Westland A Canal and Highline Canal, it is S&W's recommendation that geotechnical borings be performed on each side of the canals during final design. The purpose of the borings will be to determine the minimum depth of the pipeline below the canal. In the opinion of S&W, trenchless excavation techniques are feasible and do not pose an elevated hazard.

H.7 SEISMIC HAZARD ASSESSMENT

OAR 345-021-0010(1)(h)(F) *An assessment of seismic hazards. For the purposes of this assessment, the maximum probable earthquake (MPE) is the maximum earthquake that could occur under the known tectonic framework with a 10 percent chance of being exceeded in a 50-year period. If seismic sources are not mapped sufficiently to identify the ground motions above, the applicant shall provide a probabilistic seismic hazard analysis to identify the peak ground accelerations expected at the site for a 500-year recurrence interval and a 5000-year recurrence interval. In the assessment, the applicant shall include:*

(i) Identification of the Maximum Considered Earthquake Ground Motion as shown for the site under the 2009 International Building Code.

Response:

The MPE is a ground motion that would have a 10-percent probability of being exceeded within a 50-year period (475-year return period). The probabilistic U.S. Geological Survey (USGS) seismic hazard deaggregation at each facility site for the peak ground acceleration (PGA) corresponding to the MPE and the Maximum Considered Earthquake (MConE) events are shown on Figures H3 and H4, respectively. Additional discussion of the MPE is included in Section 7.4.

The USGS (2002) probabilistic seismic hazard analysis results were used to develop the peak ground acceleration expected for each facility site for a 500-year and 5,000-year return period. The 500-year and 5,000-year PGA on Site Class B rock for each facility site are provided in Table H-1.

Table H-1 500- and 5,000-Year Earthquake Bedrock Peak Ground Accelerations

Site	Earthquake Recurrence Interval	Bedrock PGA
Generating Station	500-year (10% exceedance in 50 years)	0.08g
	5000-year (1% exceedance in 50 years)	0.25g
Step-Up Substation	500-year (10% exceedance in 50 years)	0.08g
	5000-year (1% exceedance in 50 years)	0.27g

Key:
g gravity acceleration
PGA peak ground acceleration

New construction that is designed according to the 2009 International Building Code (IBC) should be designed based on the MConE. Consistent with the ground motions provided in 2009 IBC, the probabilistic ground motions below are based on the USGS National Seismic Hazard Mapping project as derived from the 2002 USGS ground motion data (Frankel et al. 2002). The MConE ground motion has a 2 percent probability of being exceeded in 50 years (or a return period of 2,475 years). The subsurface explorations at both facility sites correspond to Site Class C (very dense soil and soft rock) according to 2009 IBC requirements. The recommended seismic design parameters for the MConE for each facility site are provided in Table H-2.

Table H-2 Seismic Design Parameters for the Maximum Considered Earthquake for Each Facility Site

Seismic Parameter	Site	
	Generating Station	Step-Up Substation
Recurrence Interval	2,475 years	
Site Class	C	
Peak Ground Acceleration at Bedrock	0.18g	0.19g
Mapped Short Period Spectral Acceleration, S_s	0.43g	0.45g
Mapped 1-second Period Spectral Acceleration, S_1	0.14g	0.14g
Site Coefficient, F_a	1.2	1.2
Site Coefficient, F_v	1.7	1.7
Response Short Period Spectral Acceleration, S_{MS}	0.52g	0.54g
Response 1-second Period Spectral Acceleration, S_{M1}	0.22g	0.23g
Design Short Period Spectral Response Acceleration, S_{DS}	0.35g	0.36g
Design 1-second Period Spectral Response Acceleration, S_{D1}	0.15g	0.15g

Key:
g gravity acceleration

(ii) Identification and characterization of all earthquake sources capable of generating median peak ground accelerations greater than 0.05g on rock at the site. For each earthquake source, the applicant shall assess the magnitude and minimum epicentral distance of the maximum credible earthquake (MCE);

Response: Earthquakes in the Pacific Northwest occur largely as a result of the collision between the Juan de Fuca plate and the North American plate. These two tectonic plates meet along a mega thrust fault called the Cascadia Subduction Zone (CSZ). The CSZ runs approximately parallel to the coastline from northern California to southern British Columbia. The compressional forces that exist between these two colliding plates cause the denser oceanic plate to descend, or subduct, beneath the continental plate. This process leads to contortion and faulting of both plates and volcanism along the Cascade Range.

Within the present understanding of the regional tectonic framework and historical seismicity, three broad earthquake sources have been identified. These three types of earthquakes and their maximum plausible earthquakes, as determined by the 2010 Oregon Structural Specialty Code, are as follows:

- Subduction Zone Interface (also referred to as Interplate) Earthquakes originate along the CSZ, which is located 25 miles (40 kilometers [km]) beneath the coastline. Paleoseismic evidence and historic tsunami studies indicate that the most recent subduction zone thrust

fault event occurred in the year 1700, probably ruptured the full length of the CSZ, and may have reached a Magnitude of 9.

- Deep-focus, Intraplate (also referred to as Intraslab) Earthquakes originate from within the subducting Juan de Fuca oceanic plate as a result of the downward bending and contortion of the plate. These earthquakes typically occur 28 to 38 miles (45 to 61 km) beneath the surface. Such events could be as large as Moment Magnitude 7.5. Examples of this type of earthquake include the 1949 Magnitude 7.1 Olympia earthquake, the 1965 Magnitude 6.5 earthquake between Tacoma and Seattle, and the 2001 Nisqually earthquake at Magnitude 6.8, slightly north of Olympia. Intraslab events have occurred frequently in Puget Sound, but historically are rare in Oregon.
- Shallow-focus Crustal Earthquakes are typically located within the upper 12 miles (19 km) of the continental crust and could be generated by contortion of the overriding North American plate beneath the project area. The largest known crustal earthquake in the Pacific Northwest is the 1872 North Cascades quake at Magnitude 7.4. Other examples include the 1993 Magnitude 5.6 Scotts Mill earthquake and Magnitude 6 Klamath Falls earthquake.

Shallow crustal faults and folds throughout Oregon and Washington have been located and characterized by the USGS. The USGS provides approximate fault locations and a detailed summary of the available fault information in the USGS Quaternary Fault and Fold Database (USGS 2013). The database defines four categories of faults, Classes A through D, based on evidence of tectonic movement known or presumed to be associated with faults that are thought to be sources of earthquakes greater than Magnitude 6 during the past 1.6 million years. For Class A and B faults, geologic evidence has been published that demonstrates the existence of Quaternary deformation and, therefore, the faults are correlated to a higher potential for earthquake generation. Class A faults are known or presumed to be associated with relatively large magnitude earthquakes (Magnitude 6 to 7). Faults defined as Class B exhibit uncertain or questionable geologic evidence of Quaternary deformation, or may not extend deep enough to be considered a source of significant earthquakes.

According to the USGS Oregon Fault and Fold database, there are Class A fault systems (a system has multiple fault segments) and Class B fault systems within approximately 75 to 100 kilometers (50 to 60 miles) of the project sites. Their names, general locations relative to the site, fault lengths, slip rates, and the times since their most recent deformation are summarized in Table H-3 for the Station and Table H-4 for the substation.

Table H-3 Quaternary Crustal Faults within a 47-Mile (75-km) Radius of the Station

Source	Fault Class	Epicentral Distance & Direction from Site (miles [km])	Fault Length (miles [km][3])	Maximum Magnitude	Rupture Area (km^2)	Most Recent Defor-mation	Slip Rate (mm/yr)
Columbia Hills Structures	B	20 km N	160	2,400[4]	7.5[5]	<1.6 Ma	<0.2
Rattlesnake-Wallula Fault System[1,2]	A	46 km NE	109	1,900	7.4	<15 Ka	0.05
Horse Heaven Hills (NW Trend)[1,2]	B	55 km NW	60	1,000	7.1	<1.6 Ma	0.03
Hite Fault System – Agency Section[2]	A	60 km E	28	400[4]	6.7[5]	<1.6 Ma	<0.2
Ukiah Valley[2]	A	70 SE	32	500[4]	6.8[5]	<750 Ka	<0.2
Hite Fault System – Thorn Hollow Section[2]	A	70 km E	44	660	6.9[5]	<130 Ka	0.04
Arlington-Shutler Butte fault[2]	A	75 km W	52	780[4]	7.0[5]	<750 Ka	<0.2
Hite Fault System – Hite Section[1,2]	A	90 km NE	88	1,300	7.3	<1.6 Ma	0.04
Saddle Mountain[1,2]	A	100 km N	90	1,600	7.4	<130 Ka	0.06

Notes:

[1] Source: USGS 2008 National Seismic Hazard Maps Fault Parameters database.

[2] Source: USGS 2013 Quaternary Fault and Fold Database.

[3] The fault length obtained from the USGS 2008 National Seismic Hazard Maps Fault Parameters database was preferred over the fault length obtained from the USGS 2013 Quaternary Fault and Fold Database.

[4] The rupture width was not provided in the USGS 2008 National Seismic Hazard Maps Fault Parameters database or the USGS 2013 Quaternary Fault and Fold Database. Therefore, a rupture width of 15 km was assumed based on other faults in the area to develop an estimate of rupture area.

[5] Mmax was not provided in the USGS 2008 National Seismic Hazard Maps Fault Parameters database for this source. Therefore, Mmax was based on an average of the mean maximum magnitudes determined from Wells and Coppersmith (1994) and Hanks and Bakun (2002, 2008).

Key:

E	east
Ka	kiloannum, or one thousand years
km	kilometers
km^2	square kilometers
Ma	megaanuum, or one million years
mm/yr	millimeters per year
N	north
NE	northeast
NW	northwest
SE	southeast
W	west

Table H-4 Quaternary Crustal Faults within a 47-Mile (75-km) Radius of the Step-up Substation

Name	Fault Class	Epicentral Distance & Direction from Site	Fault Length (km)[3]	Fault Area (km^2)	Maximum Magnitude	Most Recent Deformation	Slip Rate (mm/yr)
Columbia Hills Structures	B	5 km N	160	2,400[4]	7.5[5]	<1.6 Ma	<0.2
Horse Heaven Hills (NW Trend)[1,2]	B	50 km NW	60	1,000	7.1	<1.6 Ma	0.03
Rattlesnake-Wallula Fault System[1,2]	A	32 km NE	109	1,900	7.4	<15 Ka	0.05
Hite Fault System – Agency Section[2]	A	60 km E	28	400[4]	6.7[5]	<1.6 Ma	<0.2
Hite Fault System – Thorn Hollow Section[2]	A	70 km E	44	660	6.9[5]	<130 Ka	0.04
Arlington-Shutler Butte fault[2]	A	70 km W	52	780[4]	7.0[5]	<750 Ka	<0.2
Ukiah Valley[2]	A	80 SE	32	500[4]	6.8[5]	<750 Ka	<0.2
Hite Fault System – Hite Section[1,2]	A	90 km E	88	1,300	7.3	<1.6 Ma	0.04
Saddle Mountain[1,2]	A	90 km N	90	1,600	7.4	<130 Ka	0.06

Notes

[1] Source: USGS 2008 National Seismic Hazard Maps Fault Parameters database.

[2] Source: USGS 2013 Quaternary Fault and Fold Database.

[3] The fault length obtained from the USGS 2008 National Seismic Hazard Maps Fault Parameters database was preferred over the fault length obtained from the USGS 2013 Quaternary Fault and Fold Database.

[4] The fault width was not provided in the USGS 2008 National Seismic Hazard Maps Fault Parameters database or the USGS 2013 Quaternary Fault and Fold Database. Therefore, a fault width of 15 km was assumed based on other faults in the area to develop an estimate of fault area.

[5] Mmax was not provided in the USGS 2008 National Seismic Hazard Maps Fault Parameters database for this source. Therefore, Mmax was based on an average of the "maximum" magnitudes determined from: (1) the M-fault length and fault area equations developed by Wells and Coppersmith (1994), (2) M-fault area equations developed by Hanks and Bakun (2002, 2008), and (3) M-fault area equations developed by Ellsworth-B (Working Group on California Earthquake Probabilities 2002).

Key:

E	east
Ka	kiloannum, or one thousand years
km	kilometers
km^2	square kilometers
Ma	megaanuum, or one million years
mm/yr	millimeters per year
N	north
NE	northeast
NW	northwest
SE	southeast
W	west

The characteristic (typically termed "maximum") magnitude was determined based on the following order: (1) maximum magnitude as provided in the USGS 2008 National Seismic Hazard Maps Fault Parameters database or (2) an average of four magnitude-fault length and magnitude-fault area equations. These equations are: (a) the magnitude-fault length and fault area equations developed by Wells and Coppersmith (1994), (b) magnitude-fault area equations developed by Hanks and Bakun (2002, 2008), and (c) the magnitude-fault area equation developed by Ellsworth-B (Working Group on California Earthquake Probabilities, 2002). Other magnitude-fault length and fault area relationships are available; however, these are preferred as they have been most extensively used in the USGS 2008 National Seismic Hazard Maps and Pacific Northwest site-specific probabilistic seismic hazard analyses.

Tables H-5 and H-6 summarize the estimated characteristic maximum magnitudes and epicentral distances for the random unnamed crustal event from the USGS gridded hazard, Class A Quaternary crustal faults listed in Tables H-3 and H-4, intraslab, and CSZ interplate sources.

Table H-5 Maximum Credible Earthquake Source Magnitude and Epicentral Distance from the Station

Earthquake Source	Maximum Moment Magnitude	Epicentral Distance (miles [km])
Random Hazard (WUS Shallow Gridded)	5.0	11 [16]
Crustal	6.7 to 7.5	12 to 60 [20 to 100]
Intraslab	7.0	70 to 75 [110 to 120]
Interface	9.0	210 to 260 [340 to 420]

Key:
km kilometers
WUS Western United States

Table H-6 Maximum Credible Earthquake Source Magnitude and Epicentral Distance from the Step-up Substation

Earthquake Source	Maximum Moment Magnitude	Epicentral Distance (miles [km])
Random Hazard (WUS Shallow Gridded)	5.0	10 [16]
Crustal	6.7 to 7.5	3 to 55 [5 to 90]
Intraslab	7.0	70 to 75 [110 to 120]
Interface	9.0	210 to 260 [340 to 420]

Key:
km kilometers
WUS Western United States

(iii) A description of any recorded earthquakes within 50 miles of the site and of recorded earthquakes greater than 50 miles from the site that caused ground shaking at the site more intense than the Modified Mercalli III intensity. The applicant shall include the date of occurrence and a description of the earthquake that includes its magnitude and highest intensity and its epicenter location or region of highest intensity.

Response: The locations, approximate magnitude, and year of recorded earthquakes within 50 miles (80 km) of the Station and substation site are shown in Appendix H-1, Figure H5. A table summary of all recorded earthquakes that have caused ground shaking at the Station and step-up substation site more intense than the Modified Mercalli III intensity is provided in Appendix H-1, Attachment H4 and includes time of event, location, distance from site, magnitude, and estimated Modified Mercalli intensity.

(iv) Assessment of the median ground response spectrum from the MCE and the MPE and identification of the spectral accelerations greater than the design spectrum provided in the 2010 Oregon Structural Specialty Code. The applicant shall include a description of the probable behavior of the subsurface materials and amplification by subsurface materials and any topographic or subsurface conditions that could result in expected ground motions greater than those characteristic of the Maximum Considered Earthquake Ground Motion identified above.

Response: The deterministic MPE and MCE ground motion at each facility site resulting from an earthquake on the sources listed in Tables H-5 and H-6 were estimated using the maximum magnitude, minimum epicentral distance, and ground motion prediction equations (GMPE).

The deterministic MPE is based on a scenario earthquake mean magnitude and distance determined from the USGS seismic hazard deaggregation data for a 475-year return period ground motion at the sites (Appendix H-1, Figure H3). The MCE corresponds to the maximum earthquake and minimum distance that each potential seismic source is believed to be capable of producing. The maximum earthquake and minimum distance are shown in Tables H-5 and H-6. Figure H6 in Appendix H-1 presents the probabilistic MPE and deterministic MPE Site Class C ground motion based on the median ground motion provided by each of the five GMPE. Based on the deaggregation, the random crustal source parameters are used for the deterministic median MPE.

For the crustal sources, S&W computed the median ground motion response spectra shown in Attachment H-1, Figure H6 using the following GMPE, all with equal weight: Boore et al., (1997), Sadigh et al. (1997), Abrahamson and Silva (1997), Spudich et al., (1999), and Campbell and Bozorgnia (2003). The GMPE and weighting are consistent with the USGS 2008 National Seismic Hazard Maps. Figure H6 in Attachment H-1 presents the median MCE ground motion for the crustal sources based on the median ground motion provided by each of the five GMPE.

For the CSZ interface earthquake scenario and the given the large distance (> 60 km), S&W only used the Youngs et al. (1997) GMPE relation. Based on Frankel et al. (2002), S&W used the following weighting for the intraslab earthquake scenario: Youngs et al. (1997) 0.5 weight, Atkinson and Boore (2003, 2008) global relation 0.25 weight, and Atkinson and Boore (2003, 2008) Cascadia region relation 0.25 weight. This GMPE and weighting are consistent with the USGS 2008 National Seismic Hazard Maps. Figure H6 in Attachment H-1 presents the median MCE ground motion for the interface and intraslab sources based on the median ground motion provided by the GMPE and weighted as described above.

The IBC design response spectrum for the MConE (for Site Class C) and MPE for each facility site are presented in Attachment H-1, Figure H7. Based on Figure H6 in Appendix H-1, the MConE ground motion is exceeded at most periods by the median MCE crustal fault ground motion. However, S&W notes that the median MCE crustal fault corresponds to the Columbia Hills Structures. The Columbia Hills Structures are not included in the USGS 2008 National Seismic Hazard Maps Fault Parameters database and are considered a Class B fault. The Class B fault exhibits uncertain or questionable geologic evidence of Quaternary deformation. The deterministic MPE is less than the probabilistic MPE, as shown in Attachment H-1, Figure H6.

Amplification of ground motions can occur in deep, soft soil profiles or at sites located on top of an outcrop or basin. The proposed project site is relatively flat ground, and the explored subsurface conditions primarily consist of dense to very sand and gravel. These site conditions suggest that there is a low risk of amplification that would result in ground motions greater than those characteristic of the MConE identified in Table H-2.

(v) An assessment of seismic hazards expected to result from reasonably probable seismic events. As used in this rule, "seismic hazard" includes ground shaking, ground failure, landslide, lateral spreading, liquefaction, tsunami inundation, fault displacement and subsidence.

Response: An assessment of seismic hazards expected to result from reasonably probable seismic events is included in the Preliminary Geotechnical Engineering Reports provided in Attachments H1 and H2. Facilities will be designed to conform with current IBC code. By current code, the design seismic event will have a 2 percent probability of exceedence in 50 years, an event with a 2,475-year recurrence interval. Seismic hazards considered for the design seismic event include ground shaking, ground failure, landslide, lateral spreading, liquefaction, tsunami inundation, fault displacement, and subsidence.

Based on the location and topography of the Station and step-up substation site, preliminary site-specific geotechnical explorations, and preliminary geotechnical engineering evaluation, there is a low risk of seismically induced ground failure, landslide, lateral spreading, liquefaction, tsunami inundation, fault displacement, and subsidence at the Station and step-up substation site.

Liquefaction is not anticipated to be of concern at these sites because the subsurface soils, as outlined in Appendix H-1, in Section 7.0 of both Attachments H1 and H2, include dense sands and gravels and very stiff to hard cohesive soils, with relatively deep groundwater tables. This type of subsurface profile does not meet the criteria for liquefaction to occur and, therefore, liquefaction-induced lateral spreading would thus not pose a risk. Similarly, the soil makeup of these sites also suggests that deep subsidence (e.g., sinkholes) are very unlikely to occur. There is no risk of landslides as the topography of both sites is relatively flat with no nearby slopes. The risks of ground failure and fault displacement are low due to the fact that the Project sites are situated more than 12 miles from the nearest mapped fault, as explained in Section 7.0 of Appendix H-1. Tsunamis do not present a significant risk either, due to the distance of the sites to the nearest ocean.

Regional tectonic framework suggests that ground shaking is a potential seismic hazard. However, the Project's facilities will be designed to resist ground shaking from an event with a 2,475-year recurrence interval. All structures will be designed to Site Class C specifications, in accordance with the site classification criteria in the IBC, as discussed in response (*i*) and provided in Table H-2 of Section H.7.

As the upper 2 to 5 feet of soil at the Station site are composed primarily of wind-blown silty sand, or loess, equipment foundation sites will be prepared accordingly. Loess has been shown to be potentially collapsible or subject to strength loss, which can occur by wetting, vibrating, or subjecting the soil to higher than normal stresses. As the turbines, generators, and condenser are heavy, settlement-sensitive structures, the foundations for these pieces of equipment will be constructed to transfer load to the dense to very dense catastrophic flood deposits found directly beneath the loess layer. In order to achieve this, the loess will be removed and the excavation backfilled with structural fill. For lighter, less settlement-sensitive structures, such as the main power transformers, cooling tower, water storage tanks, and metal administrative building, the upper 3 feet of the loess will be removed and backfilled with structural fill before the foundations are laid. Further details pertaining to pavement design and subgrade foundation preparation for the Station are available in Appendix H-1, Attachment H1, Section 9.0.

Similar conditions are found at the step-up substation site, with the upper 2 to 2 and a half feet of soil being composed of reworked fine-grained alluvium silty sand. This material, like the loess found at the Station site, has also been found to be potentially collapsible or subject to strength loss. Excavation and subgrade preparation measures similar to those outlined for the Station site will be taken for the step-up substation equipment foundations. Further details pertaining to pavement design and subgrade foundation preparation for the step-up substation are available in Appendix H-1, Attachment H2, Section 9.0.

H.8 NON-SEISMIC GEOLOGIC HAZARDS

OAR 345-021-0010(1)(h)(G) *An assessment of soil-related hazards such as landslides, flooding and erosion which could, in the absence of a seismic event, adversely affect or be aggravated by the construction or operation of the facility.*

Response: Non-seismic geologic hazards for the Project, such as landslides and flooding, are not anticipated because the Station and step-up substation sites are flat and well above 100-year flood elevations. Hazards such as soil erosion, collapsing soils, high winds, and flash flooding will be considered. The Station and step-up substation site soils are classified as moderately erodible on United States Soil Conservation Service mapping. However, soil erosion is a low risk because the Station and step-up substation will generally be founded on gravel and bedrock, and most surfaces will be paved or covered by gravel. As discussed in the Preliminary Geotechnical Engineering Reports in Appendix H-1, Attachments H1 and H2, collapsible soils are a potential hazard at both facility sites. High winds are prevalent in the vicinity of the facilities, and site structures will be designed to resist high wind loads, as discussed in Section H.10. Flash floods are possible and could cause erosion of exposed soils. Station and step-up substation soil descriptions may be found in Section 7.0 of Appendix H-1, Attachments H1 and H2, respectively. A subsurface profile for the Station site is available in Appendix H-1, Attachment H1, Figure 4. A similar profile for the step-up substation may be found in Appendix H-1, Attachment H2, Figure 3. A discussion of potential impacts of construction on erosion is available in Exhibit I – Soils, Section I.5.

H.9 SEISMIC HAZARD MITIGATION

OAR 345-021-0010(1)(h)(H) *An explanation of how the applicant will design, engineer and construct the facility to avoid dangers to human safety from the seismic hazards identified in OAR 345-021-0010(1)(h)(F). The applicant shall include proposed design and engineering features, applicable construction codes, and any monitoring for seismic hazards.*

Response: The Project will be designed to meet seismic standards defined by current IBC code and resist ground shaking, as discussed in Section H.7, response (*v*). These measures will serve to safeguard the equipment and mitigate dangers to human safety from seismic hazards. Based on site-specific geotechnical explorations and preliminary geotechnical evaluation, the site has a low risk for other seismic hazards.

H.10 NON-SEISMIC HAZARD MITIGATION

OAR 345-021-0010(1)(h)(I) *An explanation of how the applicant will design, engineer and construct the facility to adequately avoid dangers to human safety presented by the hazards identified in OAR 345-021-0010(1)(h)(G).*

Response: Non-seismic geologic hazards such as landslides and flooding are not anticipated to be a risk for the Station or step-up substation. Recommendations for mitigation of collapsible soils are included in the Preliminary Geotechnical Engineering Reports in Appendix H-1, Attachments H1 and H2, Section 9.0. These measures are also discussed briefly in Section H.7, response (*v*) The Station and step-up substation will be designed to resist high wind loads in accordance with current construction codes. Erodible soils will be mitigated with site pavements and cover. Exposed soils will be vegetated to resist erosion, and drainage facilities will be installed to capture runoff. Area drainage can be conveyed to nearby surface gravel deposits with high infiltration potential. Grading and drainage facilities at the Station and step-up substation will be designed to accommodate runoff from flash floods.

H.11 REFERENCES

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APPENDIX H-1

Perennial Wind Chaser Station, Exhibit H Geology and Seismicity, OAR 345-021-0010(1)(H), Power Generating Facility, Hermiston, Oregon, Step-up Substation Umatilla, Oregon Revised July 25, 2014

Perennial Wind Chaser Station
Exhibit H Geology and Seismicity
OAR 345-021-0010(1)(H)
Power-Generating Facility
Hermiston, Oregon
Step-Up Substation
Umatilla, Oregon

Revised
July 25, 2014

SHANNON & WILSON, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Perennial Wind Chaser Station
Exhibit H Geology and Seismicity
OAR 345-021-0010(1)(H)
Power-Generating Facility
Hermiston, Oregon
Step-Up Substation
Umatilla, Oregon

Revised
July 25, 2014

SHANNON & WILSON, INC.

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The findings and recommendations in this revised report, dated July 25, 2014, supersede those provdied in all previous versions of this document.

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PERENNIAL WIND CHASER STATION
EXHIBIT H GEOLOGY AND SEISMICITY
OAR 345-021-0010(1)(H)
POWER-GENERATING FACILITY – HERMISTON, OREGON
STEP-UP SUBSTATION – UMATILLA, OREGON

1.0 INTRODUCTION

OAR 345-021-0010(1)(h) – Information from reasonably available sources regarding the geological and soil stability within the analysis area, providing evidence to support findings by the Council as required by OAR 345-022-0020, including:

1.1 Response

Perennial-Wind Chaser, LLC, (Perennial) is planning to construct a new 415-megawatt power-generating facility in Hermiston, Oregon, as part of the Wind Chaser Station Project. The location of the proposed generating facility is in an agricultural field located on the east side of Westland Road, approximately one-half mile north of I-84. In support of the power-generating facility, a Step-up Substation will be located in an agricultural field immediately south of the Bonneville Power Administration (BPA) McNary Substation in Umatilla, Oregon.

OAR 345-021-0010(1)(h) requires that the Application for Site Certificate (ASC) for the proposed facilities must provide information from reasonably available sources addressing geological and soil stability and provide evidence to support findings. The information provided within this Exhibit is intended to address the requirements of OAR 345-021-0010(1)(h)(A, B, C, D, E, F, G, H, I). Based on the evidence presented in this Exhibit, including the review of reasonably available geological and soil resources and Preliminary Geotechnical Engineering Reports provided for both site facilities, the facilities have a low risk of seismic, geologic, and soil hazards. The facilities can be designed and constructed to standards that adequately protect the facilities and the public from seismic, geologic, and soil hazards.

2.0 GEOLOGIC REPORT

OAR 345-021-0010(1)(h)(A) – A geologic report meeting the guidance in Oregon Department of Geology and Mineral Industries open file report 00-04 “Guidelines for Engineering Geologic reports and Site-Specific Seismic Hazard Reports.”

2.1 Response

The Oregon Department of Geology and Mineral Industries (DOGAMI) open file report 00-04 “Guidelines for Engineering Geologic reports and Site-Specific Seismic Hazard Report” was

reviewed, and Preliminary Geotechnical Engineering Reports have been provided for both facility sites following the requirements outlined by the DOGAMI report. The Preliminary Engineering Reports, including geologic reporting, are included in Attachments H1 and H2. Geologic maps of facility sites are shown in Figure H1. Soils maps of facility sites are shown in Figure H2.

DOGAMI open file report 00-04 requires a "Disclosure statement of geologist's financial interest, if any, in the project or client's organization." Shannon & Wilson, Inc., was retained by Burns & McDonnell to assist with development of the Exhibit H Geology and Seismicity report for the Perennial Wind Chaser Station project for the Perennial-Wind Chaser, LLC, organization. Neither Shannon & Wilson nor the author of this report has a financial interest in the project or organization.

DOGAMI open file report 00-04 requires discussion of "Other significant engineering geologic characteristics or concerns, such as fluctuating water table and the effects of proposed modification of future hydrologic processes." A discussion of current groundwater conditions is included in preliminary geotechnical engineering reports for both the Generating Facility and Step-Up Substation. In our opinion, the only potential significant impact on the hydrologic processes at either facility would be from a water supply well, if constructed. Geotechnical explorations encountered shallow groundwater within a gravel alluvium aquifer at the Generating Facility and did not encounter groundwater at the Step-Up Substation.

We understand that a groundwater pumping well with a proposed pumping rate of up to 5,000 gallons per day may be installed at the generating facility and that there will not be a pumping well at the substation. Many area agricultural wells tap the deep regional basalt aquifer that is not directly connected to the shallow gravel aquifer at the generating facility site. Groundwater was encountered 27 feet below the ground surface at the generating facility, and the gravel aquifer extends to the base of the borings, a minimum depth of 90 feet. The gravel aquifer is sufficient to supply 5,000 gallons of water a day with minimum impact on the aquifer and would not have a significant impact on area wells. The impact was estimated based on an evaluation of potential impact from groundwater pumping, summarized in a letter in Attachment H3. The actual impact would be determined during a drawdown test after the well was installed.

3.0 ADDITIONAL GEOTECHNICAL WORK

OAR 345-021-0010(1)(h)(B) – A description and schedule of site-specific geotechnical work that will be performed before construction for inclusion in the site certificate as conditions.

3.1 Response

Preliminary geotechnical reports, which include site-specific geotechnical explorations and engineering evaluations, are provided in Attachments H1 and H2. The reports include an interpretation of subsurface conditions from site explorations, which were intended to provide a general understanding of site conditions. Preliminary recommendations are provided based on general site conditions and are intended for use during preliminary design to estimate facility costs and provide sufficient information for site permitting.

During the final design phase, we recommend that additional geotechnical explorations and engineering evaluations should be performed prior to the construction of the proposed power-generating and substation facilities based upon the final design layout of the proposed facilities. The additional geotechnical explorations will include field explorations, laboratory testing, and engineering studies and recommendations. The field explorations will include additional borings for the final locations of turbine/generators, substation transmission towers, and a buried transmission cable. A shear wave velocity measurement will be performed at the proposed power-generating site. Additional engineering evaluations will be performed based upon the refined subsurface conditions. The additional engineering evaluations include the following:

- Refine or upgrade the seismic hazard evaluations and ground motion design parameters, including design response spectra.
- Estimate the soil bearing capacity and settlement for the transformer foundation, transmission tower foundation, and other geotechnical evaluations based upon the final design layout and design loads.
- Develop geotechnical recommendations for trench excavation, shoring, and backfill of the buried transmission cable, as well as trenchless excavation techniques, if required. We have assumed that the embedment of the buried transmission cable is relatively shallow, and open-trench excavation is the preferred construction method. However, trenchless excavation may be required to pass below exiting railroad tracks.
- A final geotechnical design report will be completed for the final design and construction.

4.0 EVIDENCE OF CONSULTATION WITH DOGAMI

OAR 345-021-0010(1)(h)(C) – Evidence of consultation with the Oregon Department of Geology and Mineral Industries regarding the appropriate site-specific geotechnical work that must be performed before submitting the application for the Department to determine that the application is complete.

4.1 Response

During preparation of this Exhibit, Shannon & Wilson consulted with Oregon Department of Geology and Mineral Industries (DOGAMI) to explain preliminary site-specific geologic explorations and evaluations performed at the facility sites, as well as discuss available documentation reviewed. Consultation occurred by telephone on September 5, 2013, between a Shannon & Wilson engineering geologist, David Higgins, CEG, and Bill Burns with DOGAMI. A follow-up email was sent to Bill Burns on September 6, 2013, requesting any additional references that may be suggested we review. Bill responded to the email on September 11, 2013. A copy of the email correspondence is provided in Attachment H4.

5.0 TRANSMISSION LINES

OAR 345-021-0010(1)(h)(D) – For all transmission lines, a description of locations along the proposed route where the applicant proposes to perform site-specific geotechnical work, including but not limited to railroad crossings, major road crossings, river crossings, dead ends, corners, and portions of the proposed route where geologic reconnaissance and other site-specific studies provide evidence of existing landslides or marginally stable slopes that could be made unstable by the planned construction.

5.1 Response

The transmission lines for the Perennial Wind Chaser Station project utilize existing infrastructure between the proposed generating facility and Step-Up Substation. Several new transmission structures are anticipated, connecting the generating facility east of Westland Road with existing infrastructure directly across the street on the west side of Westland Road. A proposed underground transmission line, at a few-hundred feet long, is anticipated to connect the proposed Step-Up Substation with the existing McNary Substation. The locations of new transmission structures for transmission lines exiting the proposed generating facility have not yet been determined. The proposed location of the underground transmission line between the Step-Up Substation and McNary Substation is shown in Attachment H2, Figure 2. As discussed in Section 3.1, additional geotechnical explorations and engineering evaluations may be needed prior to the construction of new transmission structures and the underground transmission line. The need for site-specific geotechnical explorations and the type of explorations will be determined based on geologic reconnaissance, once final locations for the transmission structures and the underground transmission line alignment are determined. Currently, we anticipate geotechnical explorations and additional engineering evaluations will be needed where the proposed underground transmission line crosses below the existing railroad tracks between the Step-Up and McNary Substations.

6.0 PIPELINES

OAR 345-021-0010(1)(h)(E) – For all pipelines that would carry explosive, flammable, or hazardous materials, a description of locations along the proposed route where the applicant proposes to perform site-specific geotechnical work, including but not limited to railroad crossings, major road crossings, river crossings, and portions of the proposed alignment where geologic reconnaissance and other site-specific studies provide evidence of existing landslides or marginally stable slopes that could be made unstable by the planned construction.

6.1 Response

A proposed natural gas pipeline will approach the power-generating facility from the south and enter the facility on the east side. The proposed natural gas pipeline will run parallel to an existing natural gas pipeline within existing right-of-way until it enters the generating facility boundary. Geotechnical explorations are not routinely required for shallow gas pipelines in trenched excavations, and we do not anticipate site-specific geotechnical work will be needed to evaluate the pipeline alignment. We assume that the new gas line will be installed at a similar depth and using similar construction techniques to the existing parallel gas line. We reviewed maps showing the location of the pipeline, and the topography is flat-lying agricultural landscape with no mapped landslides. Based on our review of area mapping and surface observations near the pipeline, there are no known slope hazards. If trenchless excavation techniques are used to construct the gas line below Westland A Canal and Highline Canal, we recommend geotechnical borings be performed on each side of the canals during final design. The purpose of the borings will be to determine the minimum depth of the pipeline below the canal. In our opinion, trenchless excavation techniques are feasible and do not pose an elevated hazard.

7.0 SEISMIC HAZARD ASSESSMENT

OAR 345-021-0010(1)(h)(F) – An assessment of seismic hazards. For the purposes of this assessment, the maximum probable earthquake (MPE) is the maximum earthquake that could occur under the known tectonic framework with a 10 percent chance of being exceeded in a 50-year period. If seismic sources are not mapped sufficiently to identify the ground motions above, the applicant shall provide a probabilistic seismic hazard analysis to identify the peak ground accelerations expected at the site for a 500-year recurrence interval and a 5,000-year recurrence interval. In the assessment, the applicant shall include:

(i) Identification of the Maximum Considered Earthquake Ground Motion as shown for the site under the 2009 International Building Code.

(ii) Identification and characterization of all earthquake sources capable of generating median peak ground accelerations greater than 0.05g on rock at the site. For each

earthquake source, the applicant shall assess the magnitude and minimum epicentral distance of the maximum credible earthquake (MCE).

(iii) A description of any recorded earthquakes within 50 miles of the site and of recorded earthquakes greater than 50 miles from the site that caused ground shaking at the site more intense than the Modified Mercalli III intensity. The applicant shall include the date of occurrence and a description of the earthquake that includes its magnitude and highest intensity and its epicenter location or region of highest intensity.

(iv) Assessment of the median ground response spectrum from the MCE and the MPE and identification of the spectral accelerations greater than the design spectrum provided in the 2010 Oregon Structural Specialty Code. The applicant shall include a description of the probable behavior of the subsurface materials and amplification by subsurface materials and any topographic or subsurface conditions that could result in expected ground motions greater than those characteristic of the Maximum Considered Earthquake Ground Motion identified above.

(v) An assessment of seismic hazards expected to result from reasonably probable seismic events. As used in this rule, "seismic hazard" includes ground shaking, ground failure, landslide, lateral spreading, liquefaction, tsunami inundation, fault displacement and subsidence.

7.1 Response (i)

The Maximum Probable Earthquake (MPE) is a ground motion that would have a 10-percent probability of being exceeded within a 50-year period (475-year return period). The probabilistic U.S. Geological Survey (USGS) seismic hazard deaggregation at each facility site for the peak ground acceleration (PGA) corresponding to the MPE and the Maximum Considered Earthquake (MConE) events are shown on Figures H3 and H4, respectively. Additional discussion of the MPE is included in Section 7.4.

The USGS (2002) probabilistic seismic hazard analysis results were used to develop the peak ground acceleration expected for each facility site for a 500-year and 5,000-year return period. The 500-year and 5,000-year PGA on Site Class B rock for each facility site are provided in Table H-1.

TABLE H-1: 500- AND 5,000-YEAR RETURN PERIOD GROUND MOTION PEAK GROUND ACCELERATIONS FOR SITE CLASS B ROCK

Site	Earthquake Return Period	PGA (g)
Generating Facility	500-year (10% exceedance in 50-yr)	0.08g
	5,000-year (1% exceedance in 50-yr)	0.25g
Substation	500-year (10% exceedance in 50-yr)	0.08g
	5,000-year (1% exceedance in 50-yr)	0.27g

Note: g = gravity acceleration

New construction that is designed according to the 2009 International Building Code (IBC) should be designed based on the MConE. Consistent with the ground motions provided in 2009 IBC, the probabilistic ground motions below are based on the USGS National Seismic Hazard Mapping project as derived from the 2002 USGS ground motion data (Frankel et al., 2002). The MConE ground motion has a 2-percent probability of being exceeded in 50 years (or a return period of 2,475 years). The subsurface explorations at both facility sites correspond to Site Class C (very dense soil and soft rock) according to 2009 IBC requirements. The recommended seismic design parameters for the MConE for each facility site are provided in Table H-2. The MConE design response spectrum is discussed in Section 7.4.

TABLE H-2: RECOMMENDED SEISMIC DESIGN GROUND MOTION PARAMETERS FOR IBC 2009 MAXIMUM CONSIDERED EARTHQUAKE

Seismic Parameter	Site	
	Generating Facility	Substation
Return Period	2,475 years	
Site Class	C	
Peak Ground Acceleration at Bedrock	0.18g	0.19g
Mapped Short Period Spectral Acceleration, S_s	0.43g	0.45g
Mapped 1-Second Period Spectral Acceleration, S_1	0.14g	0.14g
Site Coefficient, F_a	1.2	1.2
Site Coefficient, F_v	1.7	1.7
Response Short Period Spectral Acceleration, S_{MS}	0.52g	0.54g
Response 1-Second Period Spectral Acceleration, S_{M1}	0.22g	0.23g
Design Short Period Spectral Response Acceleration, S_{DS}	0.35g	0.36g
Design 1-Second Period Spectral Response Acceleration, S_{D1}	0.15g	0.15g

Note: g = gravity acceleration

7.2 Response (ii)

Earthquakes in the Pacific Northwest occur largely as a result of the collision between the Juan de Fuca plate and the North American plate. These two tectonic plates meet along a mega thrust fault called the Cascadia Subduction Zone (CSZ). The CSZ runs approximately parallel to the coastline from northern California to southern British Columbia. The compressional forces that

exist between these two colliding plates cause the denser oceanic plate to descend, or subduct, beneath the continental plate. This process leads to contortion and faulting of both plates and volcanism along the Cascade Range.

Within the present understanding of the regional tectonic framework and historical seismicity, three broad earthquake sources have been identified. The three types of earthquakes and the characteristic moment magnitudes, considered by the 2010 Oregon Structural Specialty Code (2010), are as follows:

- Subduction Zone Interface (also referred to as Interplate) Earthquakes originate along the CSZ, which is located 25 miles beneath the coastline. Paleoseismic evidence and historic tsunami studies indicate that the most recent subduction zone thrust fault event occurred in the year 1700, probably ruptured the full length of the CSZ, and may have reached a Magnitude 9.
- Deep-focus, Intraplate (also referred to as Intraslab) Earthquakes originate from within the subducting Juan de Fuca oceanic plate as a result of the downward bending and contortion of the plate. These earthquakes typically occur 28 to 38 miles beneath the surface. Such events could be as large as Moment Magnitude 7.5. Examples of this type of earthquake include the 1949 Magnitude 7.1 Olympia earthquake, the 1965 Magnitude 6.5 earthquake between Tacoma and Seattle, and the 2001 Nisqually (slightly north of Olympia) earthquake at Magnitude 6.8. Intraslab events have occurred frequently in Puget Sound but historically are rare in Oregon.
- Shallow-focus Crustal Earthquakes are typically located within the upper 12 miles of the continental crust and could be generated by contortion of the overriding North American plate beneath the project area. The largest known crustal earthquake in the Pacific Northwest is the 1872 North Cascades quake at Magnitude 7.4. Other examples include the 1993 Magnitude 5.6 Scotts Mill earthquake and 1993 Magnitude 6 Klamath Falls earthquake.

Shallow crustal faults and folds throughout Oregon and Washington have been located and characterized by the United States Geological Survey (USGS). The USGS provides approximate fault locations and a detailed summary of the available fault information in the USGS Quaternary Fault and Fold Database (USGS, 2013). The database defines four categories of faults, Classes A through D, based on evidence of tectonic movement known or presumed to be associated with faults which are thought to be sources of magnitude greater than 6 earthquakes during the past 1.6 million years. For Class A and B faults, geologic evidence has been published that demonstrates the existence of Quaternary deformation and, therefore, the faults are correlated to a higher potential for earthquake generation. Class A faults are known or presumed to be associated with relatively large-magnitude earthquakes (magnitude 6 to 7). Faults defined as

Class B exhibit uncertain or questionable geologic evidence of Quaternary deformation, or may not extend deep enough to be considered a source of significant earthquakes.

According to the USGS Oregon Fault and Fold database, there are Class A fault systems (a system has multiple fault segments) and Class B fault systems within approximately 75 to 100 kilometers (50 to 60 miles) of the project sites. Their names, general locations relative to the site, fault lengths, slip rates, and the times since their most recent deformation are summarized in Table H-3 for the generating facility and Table H-4 for the substation facility.

TABLE H-3: QUATERNARY CRUSTAL FAULTS WITHIN A 75-KM RADIUS OF THE PERENNIAL POWER GENERATING FACILITY

Name	Fault Class	Epicentral Distance & Direction from Site	Fault Length (km)[3]	Rupture Area (km^2)	Maximum Magnitude	Most Recent Deformation[6]	Slip Rate (mm/yr)
Columbia Hills Structures	B	20 km N	160	2,400[4]	7.5[5]	<1.6 Ma	<0.2
Rattlesnake-Wallula Fault System[1,2]	A	46 km NE	109	1,900	7.4	<15 Ka	0.05
Horse Heaven Hills (NW Trend)[1,2]	B	55 km NW	60	1,000	7.1	<1.6 Ma	0.03
Hite Fault System-Agency Section[2]	A	60 km E	28	400[4]	6.7[5]	<1.6 Ma	<0.2
Ukiah Valley[2]	A	70 SE	32	500[4]	6.8[5]	<750 Ka	<0.2
Hite Fault System-Thorn Hollow Section[2]	A	70 km E	44	660	6.9[5]	<130 Ka	0.04
Arlington-Shutler Butte fault[2]	A	75 km W	52	780[4]	7.0[5]	<750 Ka	<0.2
Hite Fault System-Hite Section[1,2]	A	90 km NE	88	1,300	7.3	<1.6 Ma	0.04
Saddle Mountain[1,2]	A	100 km N	90	1,600	7.4	<130 Ka	0.06

[1] Source: USGS 2008 National Seismic Hazard Maps Fault Parameters database.
[2] Source: USGS 2013 Quaternary Fault and Fold Database.
[3] The fault length obtained from the USGS 2008 National Seismic Hazard Maps Fault Parameters database was preferred over the fault length obtained from the USGS 2013 Quaternary Fault and Fold Database.
[4] The rupture width was not provided in the USGS 2008 National Seismic Hazard Maps Fault Parameters database or the USGS 2013 Quaternary Fault and Fold Database. Therefore, a rupture width of 15 km was assumed based on other faults in the area to develop an estimate of rupture area.
[5] Mmax was not provided in the USGS 2008 National Seismic Hazard Maps Fault Parameters database for this source. Therefore, Mmax was based on an average of the mean maximum magnitudes determined from Wells and Coppersmith (1994) and Hanks and Bakun (2002, 2008).
[6] Ka = "kiloannum" or thousand years; Ma = "megaannum" or million years.

TABLE H-4: QUATERNARY CRUSTAL FAULTS WITHIN A 75-KM RADIUS OF THE PERENNIAL POWER SUBSTATION FACILITY

Name	Fault Class	Epicental Distance & Direction from Site	Fault Length (km)[3]	Fault Area (km^2)	Maximum Magnitude	Most Recent Deformation[6]	Slip Rate (mm/yr)
Columbia Hills Structures	B	5 km N	160	2,400[4]	7.5[5]	<1.6 Ma	<0.2
Horse Heaven Hills (NW Trend)[1,2]	B	50 km NW	60	1,000	7.1	<1.6 Ma	0.03
Rattlesnake- Wallula Fault System[1,2]	A	32 km NE	109	1,900	7.4	<15 Ka	0.05
Hite Fault System- Agency Section[2]	A	60 km E	28	400[4]	6.7[5]	<1.6 Ma	<0.2
Hite Fault System- Thorn Hollow Section[2]	A	70 km E	44	660	6.9[5]	<130 Ka	0.04
Arlington-Shutler Butte fault[2]	A	70 km W	52	780[4]	7.0[5]	<750 Ka	<0.2
Ukiah Valley[2]	A	80 SE	32	500[4]	6.8[5]	<750 Ka	<0.2
Hite Fault System- Hite Section[1,2]	A	90 km E	88	1,300	7.3	<1.6 Ma	0.04
Saddle Mountain[1,2]	A	90 km N	90	1,600	7.4	<130 Ka	0.06

[1] Source: USGS 2008 National Seismic Hazard Maps Fault Parameters database.
[2] Source: USGS 2013 Quaternary Fault and Fold Database.
[3] The fault length obtained from the USGS 2008 National Seismic Hazard Maps Fault Parameters database was preferred over the fault length obtained from the USGS 2013 Quaternary Fault and Fold Database.
[4] The fault width was not provided in the USGS 2008 National Seismic Hazard Maps Fault Parameters database or the USGS 2013 Quaternary Fault and Fold Database. Therefore, a fault width of 15 km was assumed based on other faults in the area to develop an estimate of fault area.
[5] Mmax was not provided in the USGS 2008 National Seismic Hazard Maps Fault Parameters database for this source. Therefore, Mmax was based on an average of the "maximum" magnitudes determined from: (1) the M-fault length and fault area equations developed by Wells and Coppersmith (1994), (2) M-fault area equations developed by Hanks and Bakun (2002, 2008), and (3) M-fault area equations developed by Ellsworth-B (Working Group on California Earthquake Probabilities, 2002).
[6] Ka = "kiloannum" or thousand years; Ma = "megaannum" or million years.

The characteristic (typically termed "maximum") magnitude was determined based on the following order: (1) maximum magnitude as provided in the USGS 2008 National Seismic Hazard Maps Fault Parameters database or (2) an average of four magnitude-fault length and magnitude-fault area equations. These equations are: (a) the magnitude-fault length and fault area equations developed by Wells and Coppersmith (1994), (b) magnitude-fault area equations developed by Hanks and Bakun (2002, 2008), and (c) the magnitude-fault area equation developed by Ellsworth-B (Working Group on California Earthquake Probabilities, 2002). Other magnitude-fault length and fault area relationships are available; however, these are preferred as they have been most extensively used in the USGS 2008 National Seismic Hazard Maps and Pacific Northwest site-specific probabilistic seismic hazard analyses.

Tables H-5 and H-6 summarize the estimated characteristic maximum magnitudes and epicentral distances for the random unnamed crustal event from the USGS gridded hazard, Class A Quaternary crustal faults listed in Tables H-3 and H-4, intraslab, and CSZ interplate sources.

TABLE H-5: MCE SOURCE MAGNITUDE AND EPICENTRAL DISTANCE FROM GENERATING FACILITY

Earthquake Source	Maximum Moment Magnitude	Epicentral Distance (miles [km])
Random Hazard (WUS Shallow Gridded)	5.0	11 [16]
Crustal	6.7 to 7.5	12 to 60 [20 to 100]
Intraslab	7.0	70 to 75 [110 to 120]
Interface	9.0	210 to 260 [340 to 420]

TABLE H-6: MCE SOURCE MAGNITUDE AND EPICENTRAL DISTANCE FROM SUBSTATION FACILITY

Earthquake Source	Maximum Moment Magnitude	Epicentral Distance (miles [km])
Random Hazard (WUS Shallow Gridded)	5.0	10 [16]
Crustal	6.7 to 7.5	3 to 55 [5 to 90]
Intraslab	7.0	70 to 75 [110 to 120]
Interface	9.0	210 to 260 [340 to 420]

7.3 Response (iii)

The locations, approximate magnitude, and year of recorded earthquakes within 50 miles of facility sites are shown in Figure H5. A table summary of all recorded earthquakes that have caused ground shaking at facility sites more intense than the Modified Mercalli III intensity is provided in Attachment H5 and includes time of event, location, distance from site, magnitude and estimated Modified Mercalli intensity.

7.4 Response (iv)

The deterministic “MPE” and MCE ground motion at each facility site resulting from an earthquake on the sources listed in Tables H-5 and H-6 was estimated using the maximum magnitude, minimum epicentral distance, and ground motion prediction equations (GMPE).

The deterministic “MPE” is based on a scenario earthquake mean magnitude and distance determined from the USGS seismic hazard deaggregation data for a 475-year return period ground motion at the sites (Figure H3). The MCE corresponds to the maximum earthquake and minimum distance that each potential seismic source is believed to be capable of producing. The maximum earthquake and minimum distance are shown in Tables H-5 and H-6. Figure H6

presents the probabilistic MPE and deterministic "MPE" Site Class C ground motion based on the median ground motion provided by each of the five GMPE. Based on the deaggregation, the random crustal source parameters are used for the deterministic median MPE.

For the crustal sources, we computed the median ground motion response spectra shown in Figure H6 using the following GMPE, all with equal weight: Boore et al., (1997), Sadigh et al. (1997), Abrahamson and Silva (1997), Spudich et al., (1999), and Campbell and Bozorgnia (2003). These GMPE and weighting are consistent with the USGS 2008 National Seismic Hazard Maps. Figure H6 presents the median MCE ground motion for the crustal sources based on the median ground motion provided by each of the five GMPE.

For the Cascadia Subduction Zone interface earthquake scenario and the given the large distance (> 60 km), we only used the Youngs et al. (1997) GMPE relation. Based on Frankel et. al (2002), we used the following weighting for the intraslab earthquake scenario: Youngs et al. (1997) 0.5 weight, Atkinson and Boore (2003, 2008) global relation 0.25 weight, and Atkinson and Boore (2003, 2008) Cascadia region relation 0.25 weight. This GMPE and weighting are consistent with the USGS 2008 National Seismic Hazard Maps. Figure H6 presents the median MCE ground motion for the interface and intraslab sources based on the median ground motion provided by the GMPE and weighted as described above.

The IBC design response spectrum for the MConE (for Site Class C) and MPE are presented in Figure H7 for each facility site. Based on Figure H6, the MConE ground motion is exceeded at most periods by the median MCE crustal fault ground motion. However, we note that the median MCE crustal fault corresponds to the Columbia Hills Structures. The Columbia Hills Structures is not included in the USGS 2008 National Seismic Hazard Maps Fault Parameters database and is considered a Class B fault. The Class B fault exhibits uncertain or questionable geologic evidence of Quaternary deformation. The deterministic MPE is less than the probabilistic MPE as shown in Figure H6.

Amplification of ground motions can occur in deep, soft soil profiles or at sites located on top of an outcrop or basin. The proposed project site is relatively flat ground, and the explored subsurface conditions primarily consist of dense to very sand and gravel. These site conditions suggest that there is a low risk of amplification that would result in ground motions greater than those characteristic of the MConE identified in Table H-2.

7.5 Response (v)

An assessment of seismic hazards expected to result from reasonably probable seismic events is included in the Preliminary Geotechnical Engineering Reports in Attachments H1 and H2.

Facilities should be designed to current IBC code. By current code, the design ground motion will have a 2-percent probability of exceedence in 50 years (2,475-year return period). Seismic hazards considered for the design seismic event include ground shaking, ground failure, landslide, lateral spreading, liquefaction, tsunami inundation, fault displacement, and subsidence.

Based on location and topography of facility sites, preliminary site-specific geotechnical explorations, and preliminary geotechnical engineering evaluations, there is a low risk of seismically induced ground failure, landslide, lateral spreading, liquefaction, tsunami inundation, fault displacement and subsidence. Considering regional tectonic framework, ground shaking is a potential seismic hazard. However, site facilities will be designed to resist ground shaking due to a ground motion with a 2-percent probability of being exceeded in 50 years.

8.0 NONSEISMIC GEOLOGICAL HAZARDS

OAR 345-021-0010(1)(h)(G) – An assessment of soil-related hazards such as landslides, flooding, and erosion which could, in the absence of a seismic event, adversely affect or be aggravated by the construction or operation of the facility.

8.1 Response

Nonseismic geologic hazards for site facilities such as landslides and flooding are not anticipated because facility sites are flat and well above 100-year flood elevations. Hazards such as soil erosion, collapsing soils, high winds, and flash flooding should be considered. Both the generating and substation facility site soils are classified as moderately erodible on United States Soil Conservation Service mapping. However, soil erosion is a low risk because site facilities will generally be founded on gravel and bedrock, and most surfaces will be paved or covered by gravel. As discussed in our Preliminary Geotechnical Engineering Reports in Attachments H1 and H2, collapsible soils are a potential hazard at both facility sites. High winds are prevalent in the vicinity of facilities, and site structures will be designed to resist high wind loads. Flash floods are possible and could cause erosion of exposed soils.

9.0 SEISMIC HAZARD MITIGATION

OAR 345-021-0010(1)(h)(H) – An explanation of how the applicant will design, engineer, and construct the facility to avoid dangers to human safety from the seismic hazards identified in paragraph (F). The applicant shall include proposed design and engineering features, applicable construction codes, and any monitoring for seismic hazards.

9.1 Response

The site facilities will be designed to meet seismic standards defined by current IBC code and resist ground shaking. Based on site-specific geotechnical explorations and preliminary geotechnical evaluations, the site has a low risk for other seismic hazards.

10.0 NONSEISMIC HAZARD MITIGATION

OAR 345-021-0010(1)(h)(I) – An explanation of how the applicant will design, engineer, and construct the facility to adequately avoid dangers to human safety presented by the hazards identified in paragraph (G).

10.1 Response

Nonseismic geologic hazards for site facilities such as landslides and flooding are not anticipated. Recommendations for mitigation of collapsible soils are included in our Preliminary Geotechnical Engineering Reports in Attachments H1 and H2. Site facilities will be designed to resist high wind loads in accordance with current construction codes. Erodible soils will be mitigated with site pavements and cover. Exposed soils should be vegetated to resist erosion, and drainage facilities should be installed to capture runoff. Area drainage can be conveyed to near-surface gravel deposits with high infiltration potential. Site grading and drainage facilities can also be designed to accommodate runoff from flash floods.

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David J. Higgins, CEG
Senior Principal | Engineering Geologist

DJH/RPP/RAM:amn

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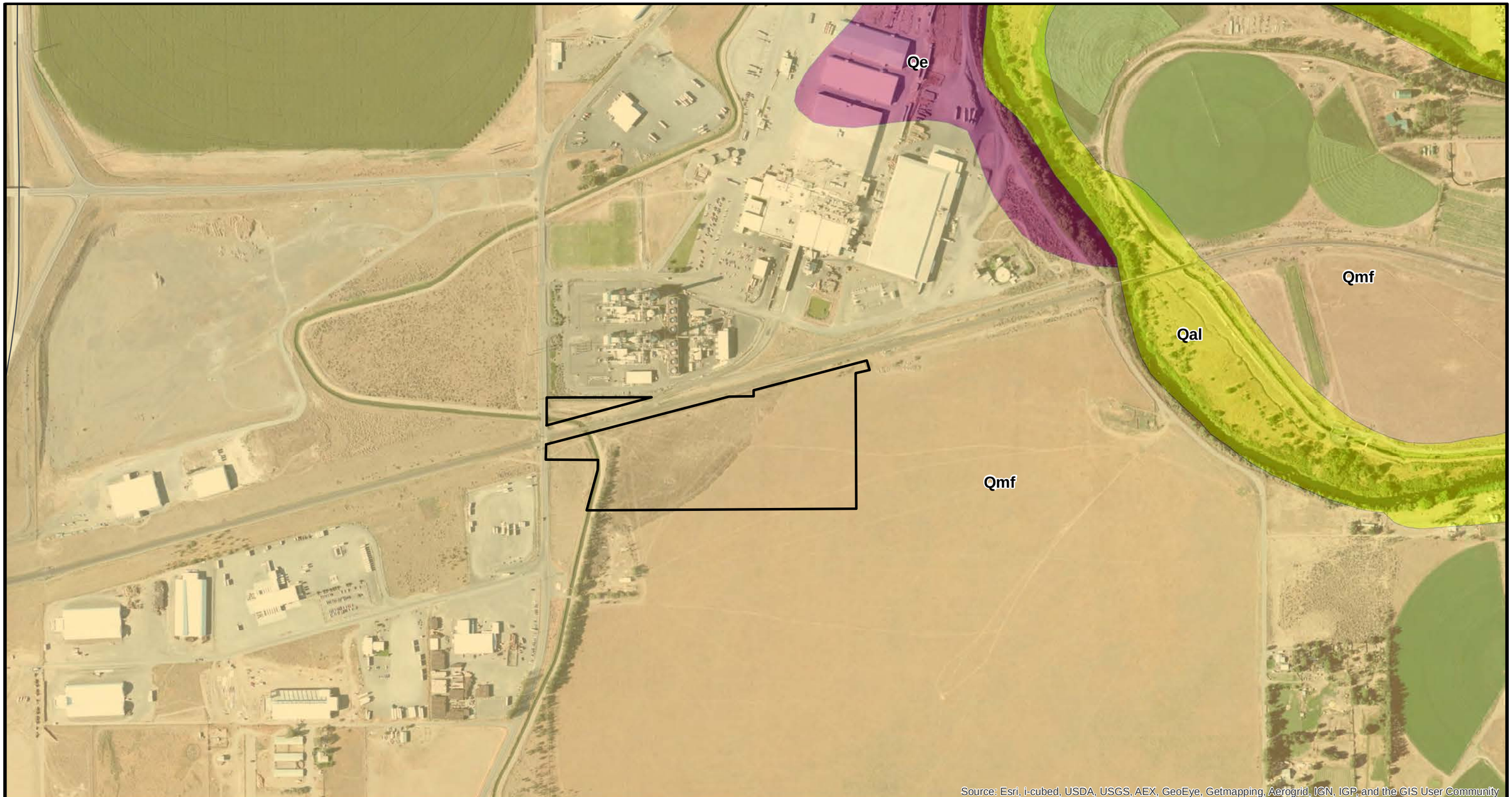

LEGEND

GEOLOGY

Qal - Alluvium

Qe - Eolian Sand and Ash

Qmf - Missoula Flood Deposits

Project Site

N W E S

0 250 500 1,000 Feet

Perennial Wind Chaser Station
Power-Generating Facility
Hermiston, Oregon

GEOLOGY MAP

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FIG. H1
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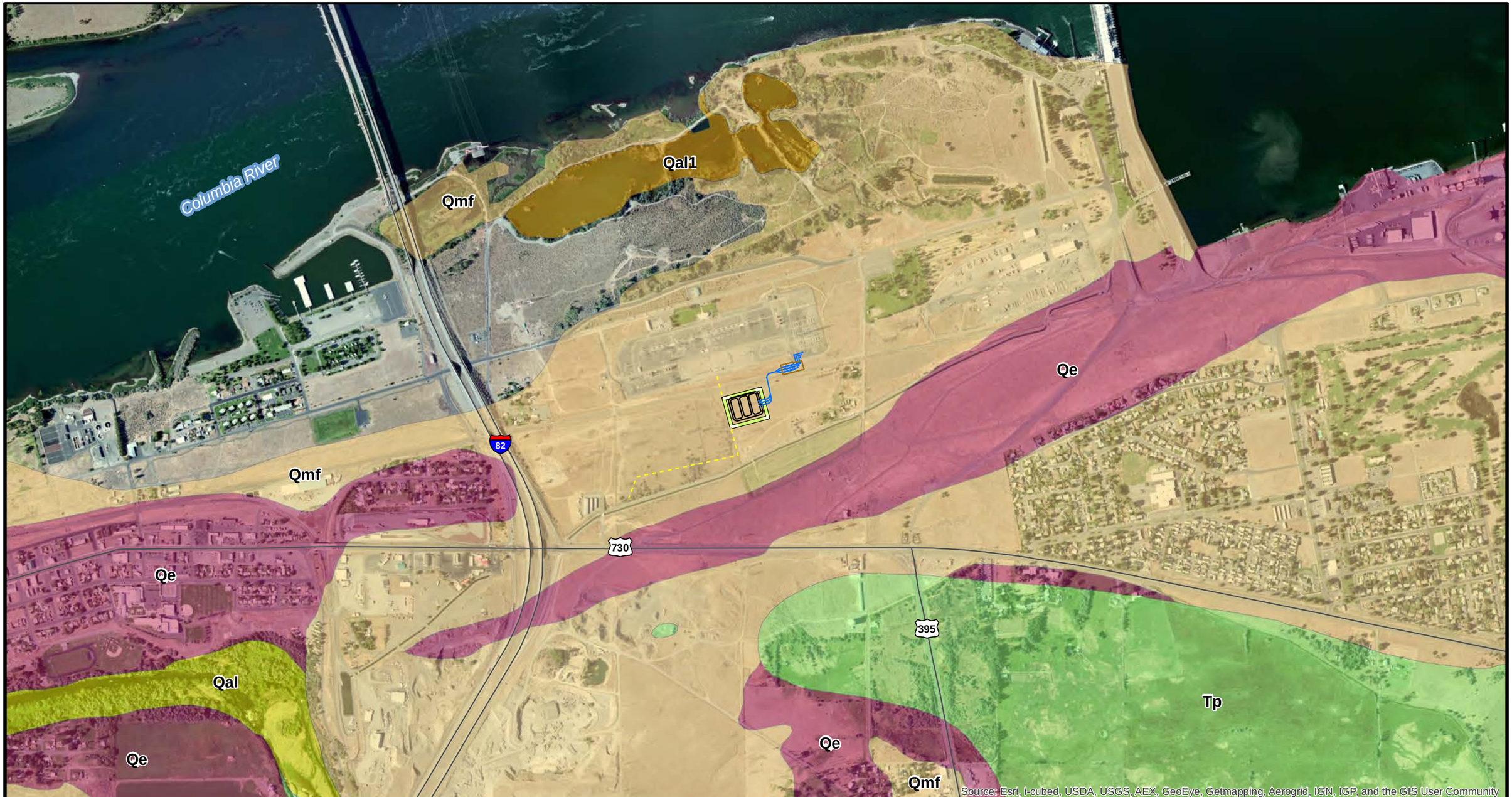

LEGEND

GEOLOGY

- Qal - Alluvium
- Qal1 - Alluvium
- Qe - Eolian Sand and Ash
- Qmf - Missoula Flood Deposits
- Tp - Pomona Basalt

- Step-Up Substation Boundary
- Existing McNary Electrical Interconnection
- Proposed Underground Transmission Line
- Proposed Riser Structure Fenced Area
- A A' Location and Designation of Profile

NOTES

1. Project features were georeferenced from Burns and McDonnell figure.
2. Designations are approximate.

0 500 1,000 2,000 Feet

Perennial Wind Chaser Station
Step-Up Substation
Umatilla, Oregon

GEOLOGY MAP

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FIG. H1
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LEGEND

SOILS

- **75B** Quincy Loamy Fine Sand, 0 to 5 Percent Slopes, Moderate Erodibility
- **75E** Quincy Loamy Fine Sand, 5 to 25 Percent Slopes, Severe Erodibility
- **126A** Xerofluvents, 0 to 3 Percent Slopes, Slight Erodibility

Project Site

N W E S

0 200 400 800 Feet

Perennial Wind Chaser Station
Power-Generating Facility
Hermiston, Oregon

SOILS MAP

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FIG. H2
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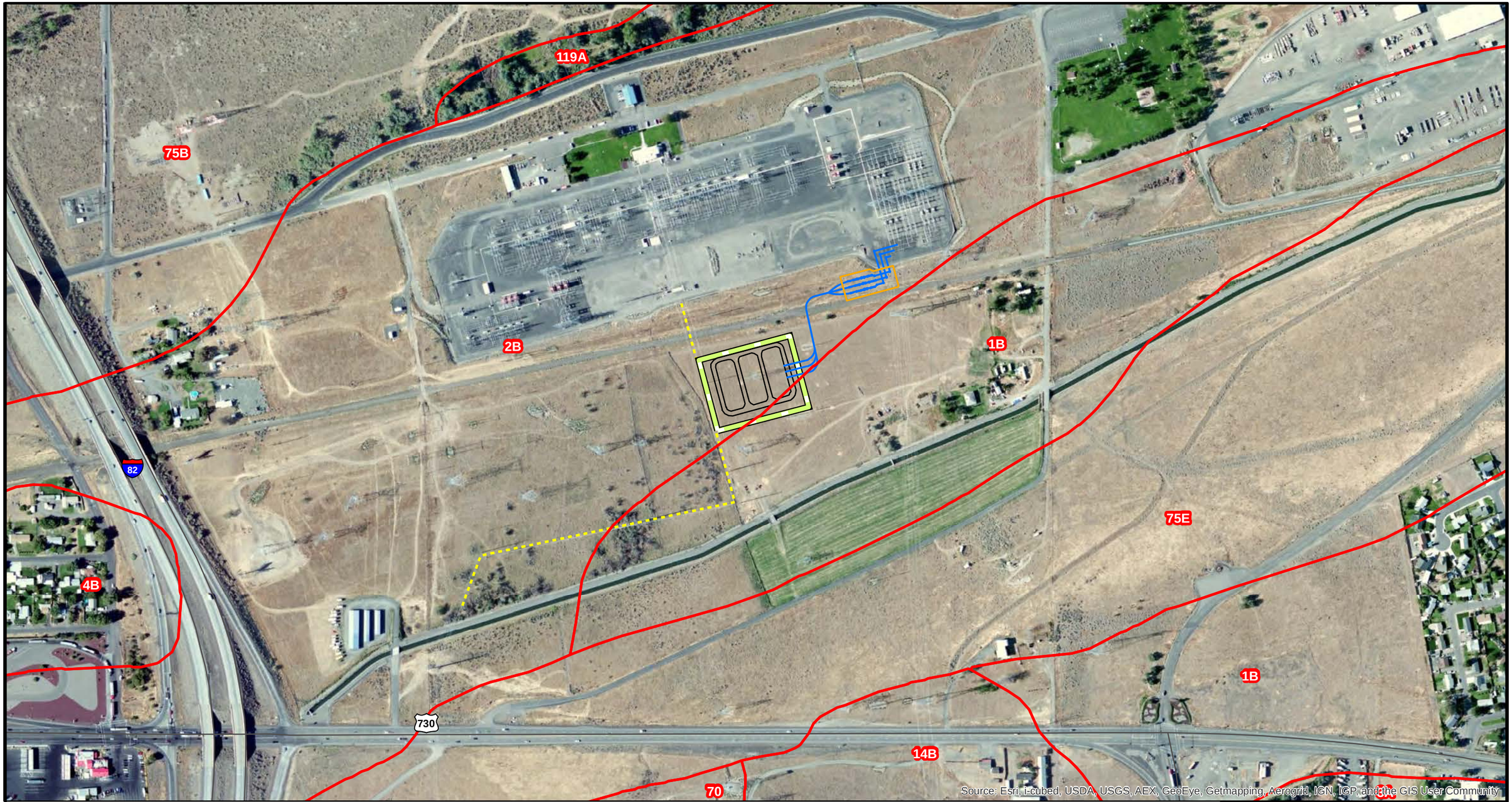

LEGEND

SOILS

- **2B** Adkins Fine Sandy Loam, Gravelly Substratum, 0 to 5 Percent Slopes, Moderate Erodibility
- **1B** Adkins Fine Sandy Loam, 0 to 5 Percent Slopes, Moderate Erodibility
- **75B** Quincy Loamy Fine Sand, 0 to 5 Percent Slopes, Moderate Erodibility
- **75E** Quincy Loamy Fine Sand, 5 to 25 Percent Slopes, Severe Erodibility
- **14B** Burbank Loamy Fine Sand, 0 to 5 Percent Slopes, Slight Erodibility

- Step-Up Substation Boundary
- Existing McNary Electrical Interconnection
- Proposed Underground Transmission Line
- Proposed Riser Structure Fenced Area
- A A' Location and Designation of Profile

NOTES

Project features were georeferenced from Burns and McDonnell figure.

0 200 400 800 Feet

Perennial Wind Chaser Station
Step-Up Substation
Umatilla, Oregon

SOILS MAP

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FIG. H2
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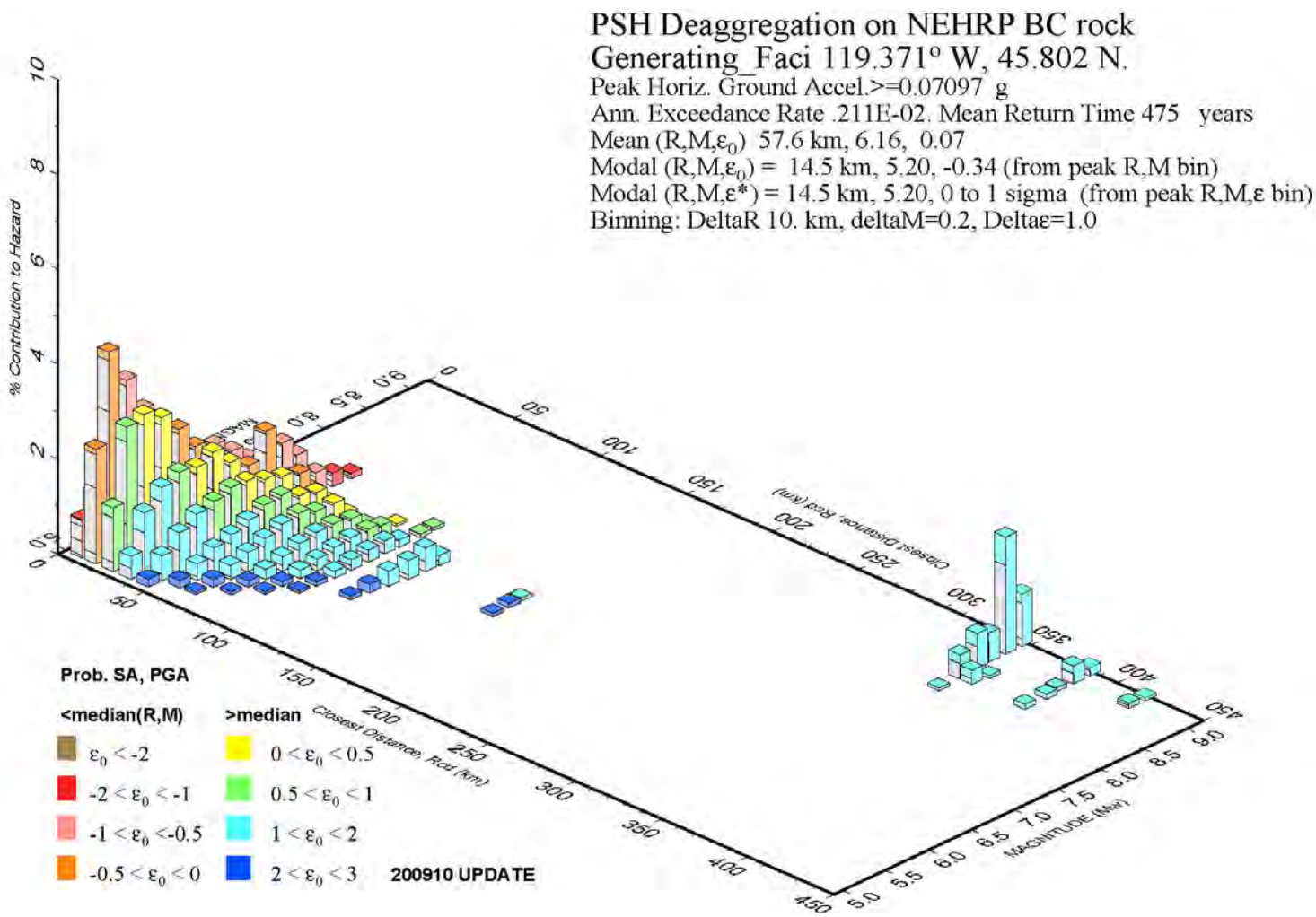

Perennial Wind Chaser Station
Power–Generating Facility
Hermiston, Oregon

PROBABILISITC USGS SEISMIC HAZARD DEAGGREGATION FOR 475-YEAR EVENT (MPE)

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FIG. H3
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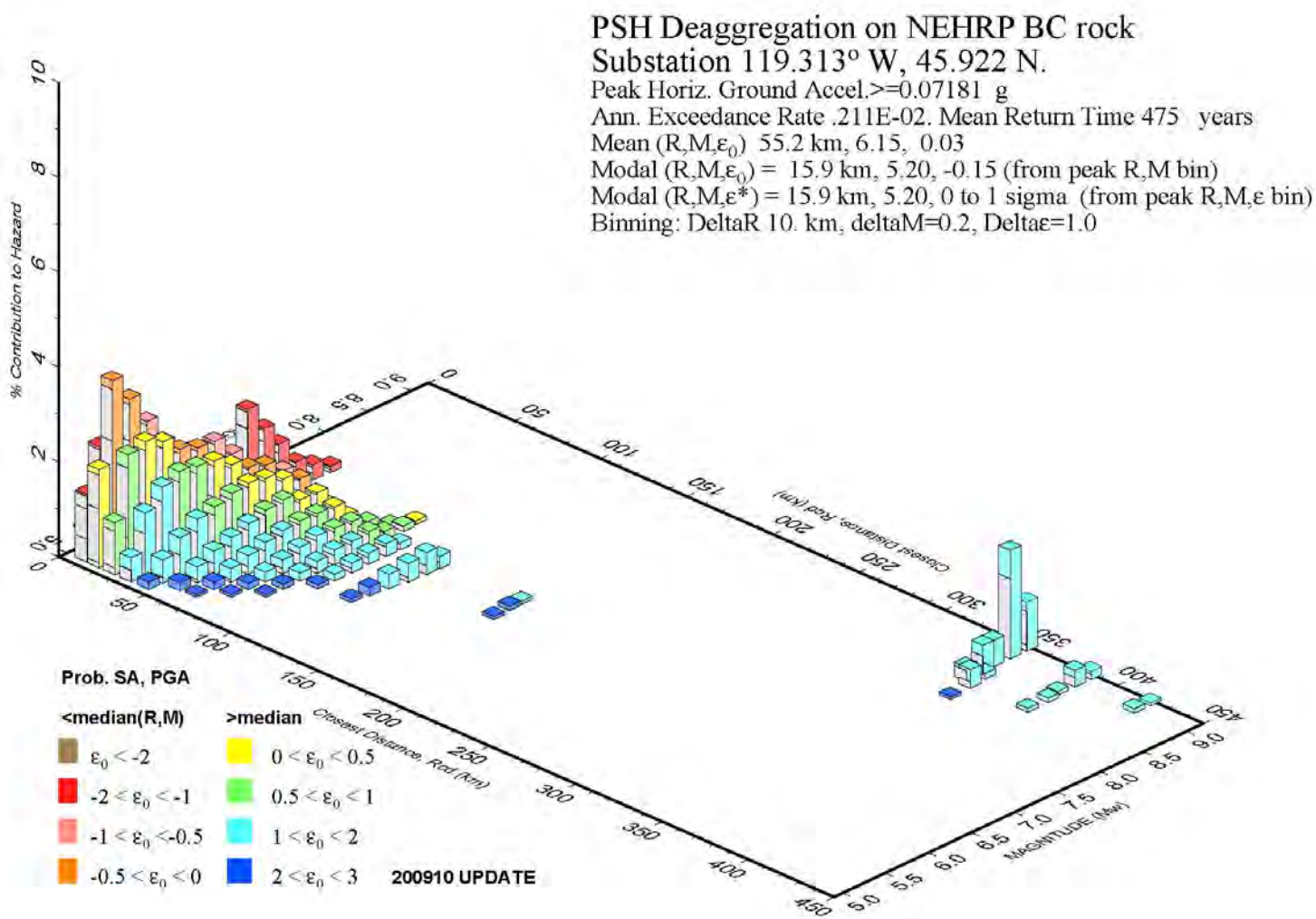
FIG. H3



Perennial Wind Chaser Station
Step-Up Substation
Umatilla, Oregon

PROBABLISITC USGS SEISMIC HAZARD DEAGGREGATION FOR 475-YEAR EVENT (MPE)

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FIG. H3
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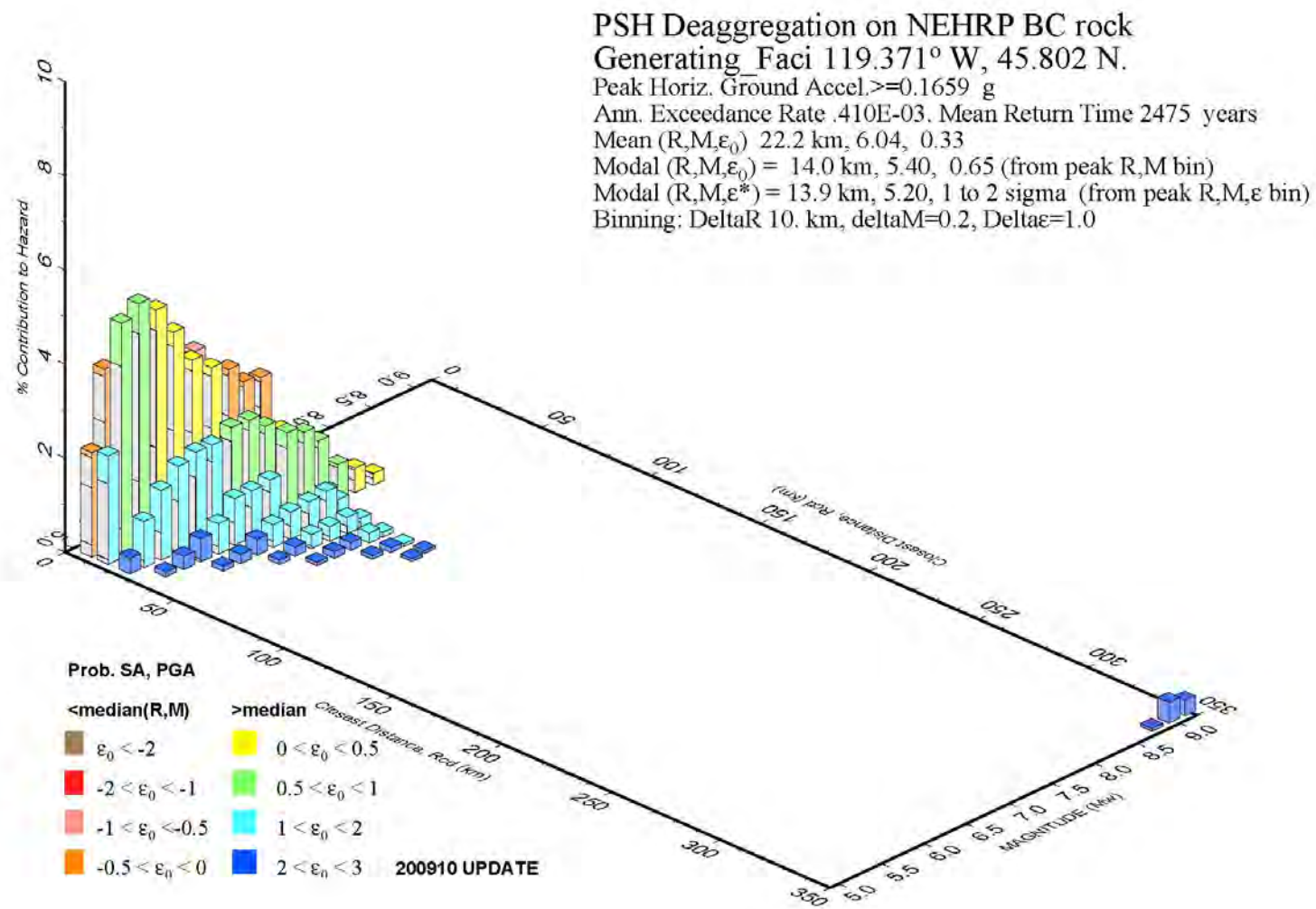
FIG. H3



Perennial Wind Chaser Station
Power–Generating Facility
Hermiston, Oregon

PROBABILISITC USGS SEISMIC HAZARD DEAGGREGATION FOR 2,475-YEAR EVENT (MConE)

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FIG. H4
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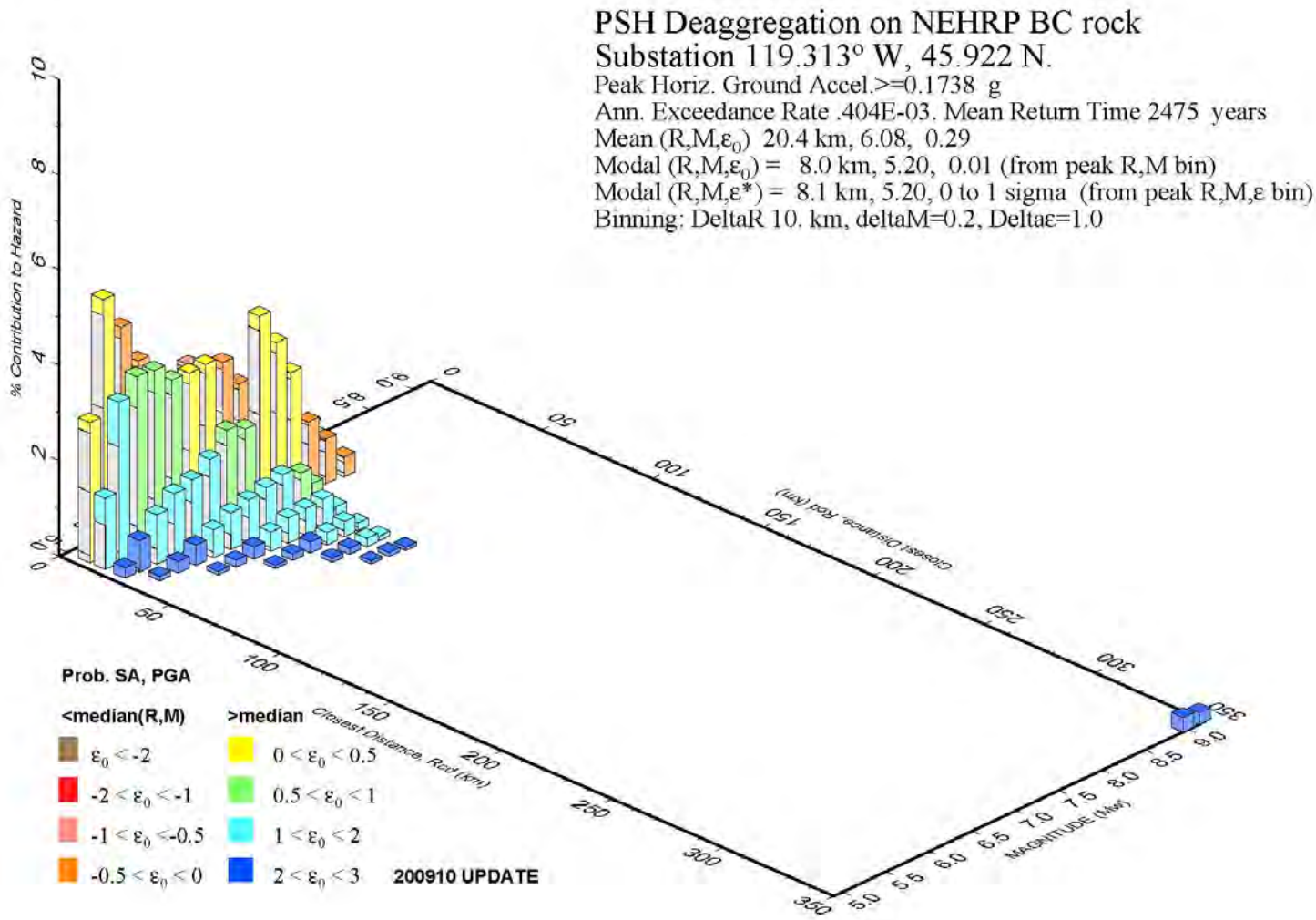
FIG. H4



Perennial Wind Chaser Station
Step-Up Substation
Umatilla, Oregon

PROBABLISITC USGS SEISMIC HAZARD DEAGGREGATION FOR 2,475-YEAR EVENT (MConE)

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FIG. H4
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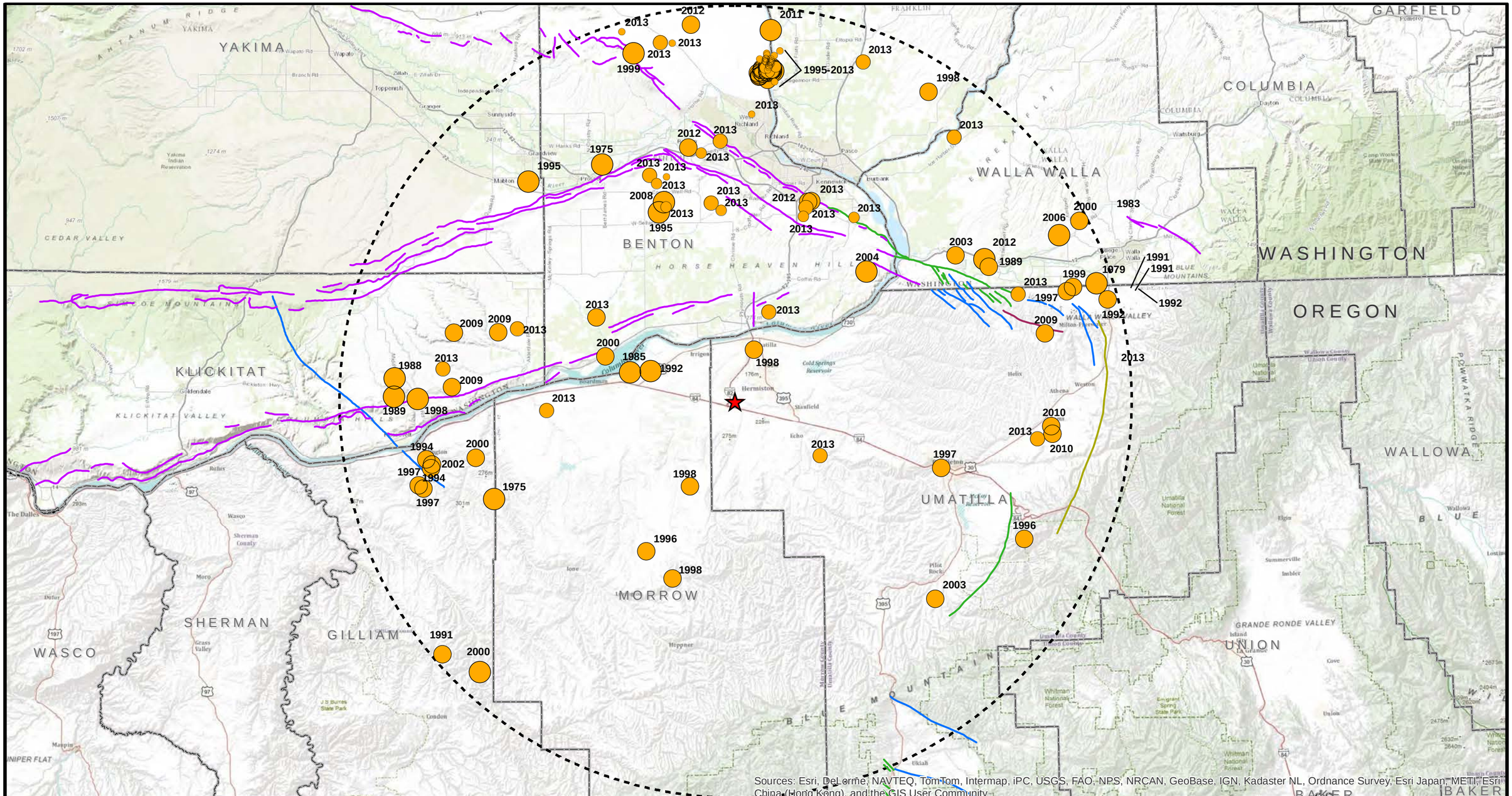
FIG. H4



LEGEND

EARTHQUAKE MAGNITUDE

- 0.1 - 0.7
- 0.71 - 1.0
- 1.0- 2.0
- 2.1 - 3.0
- 3.1 - 3.9

QUATERNARY FAULTS (AGE)

- <1,600,000
- <130,000
- <15,000
- <750,000
- Class B

- Project Site
- 50-Mile Radius

NOTES

1. Faults were obtained through the USGS Quaternary Fault and Fold Database for the United States, 2010.
2. Earthquake Data obtained through the USGS Earthquake Catalog.

0 6 12 24 Miles

Perennial Wind Chaser Station
Power-Generating Facility
Hermiston, Oregon

HISTORICAL EARTHQUAKES AND QUATERNARY FAULTS

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FIG. H5
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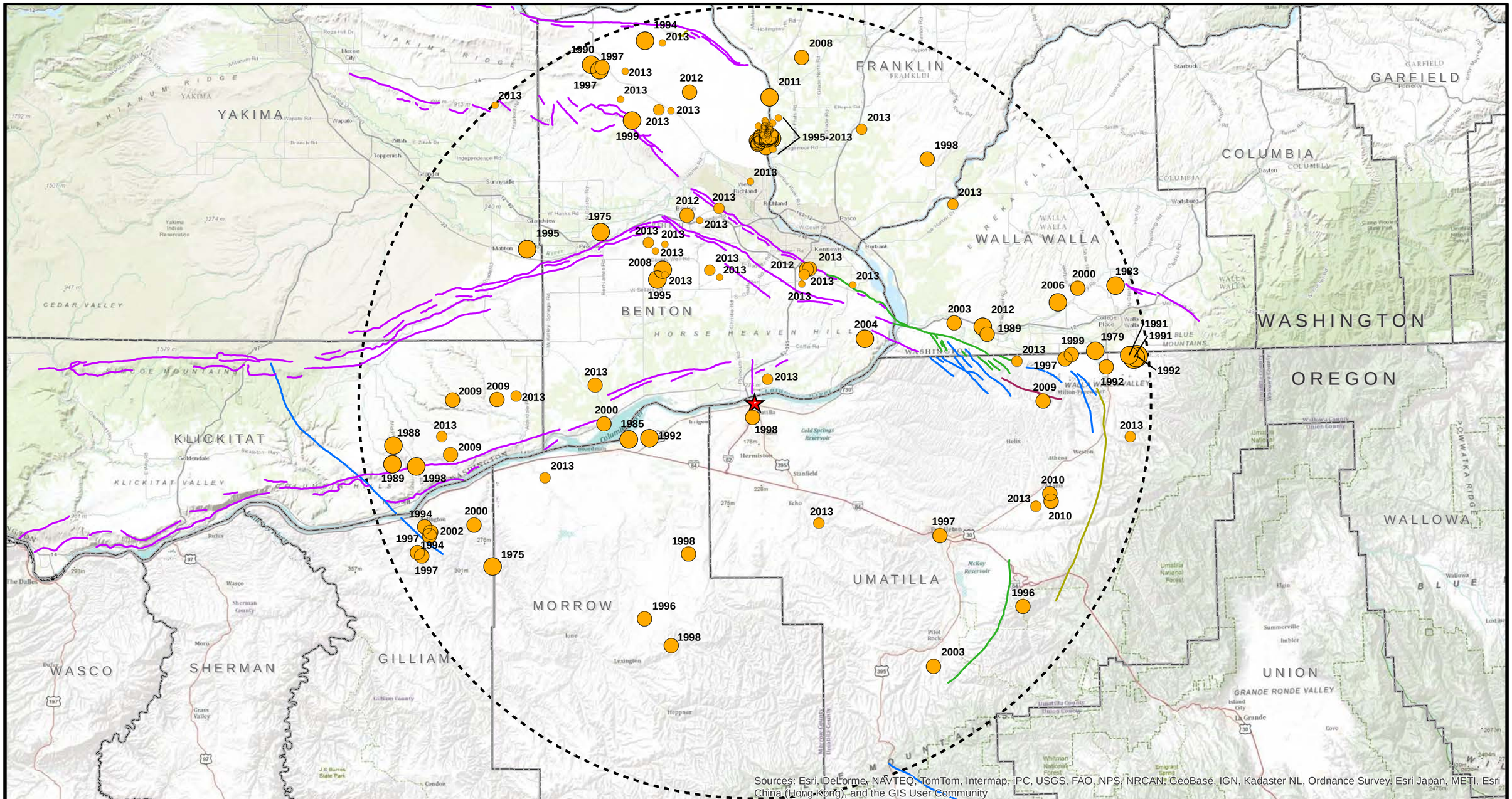

LEGEND

EARTHQUAKE MAGNITUDE

- 0.1 - 1.0
- 1.1 - 2.0
- 2.1- 3.0
- 3.1 - 4.0
- 4.1 - 4.3

QUATERNARY FAULTS (AGE)

- <1,600,000
- <130,000
- <15,000
- <750,000
- Class B

- Project Site
- 50-Mile Radius

NOTES

1. Faults were obtained through the USGS Quaternary Fault and Fold Database for the United States, 2010.
2. Earthquake Data obtained through the USGS Earthquake Catalog.

0 6 12 24 Miles

Perennial Wind Chaser Station
Step-Up Substation
Umatilla, Oregon

HISTORICAL EARTHQUAKES AND QUATERNARY FAULTS

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FIG. H5
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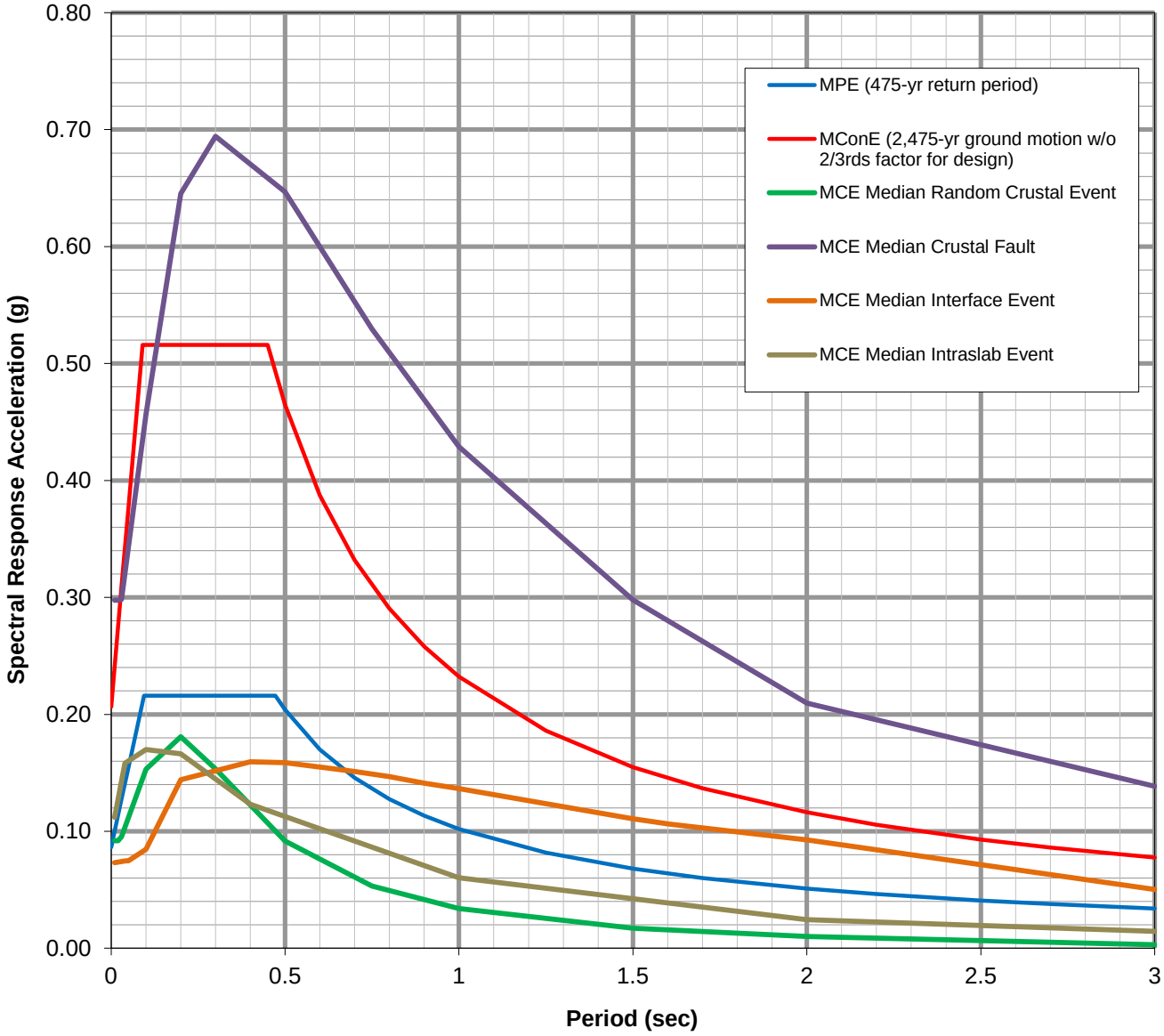

For comparison with the MCE ground motions, the 2/3rds factor typically applied to the design MConE ground motion is not included on the above plot

Perennial Wind Chaser Station
Power-Generating Facility
Hermiston, Oregon

DETERMINISTIC MEDIAN MPE AND MCE GROUND MOTIONS

November 2013 | 24-1-03794-001

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FIG. H6
Page 1 of 2

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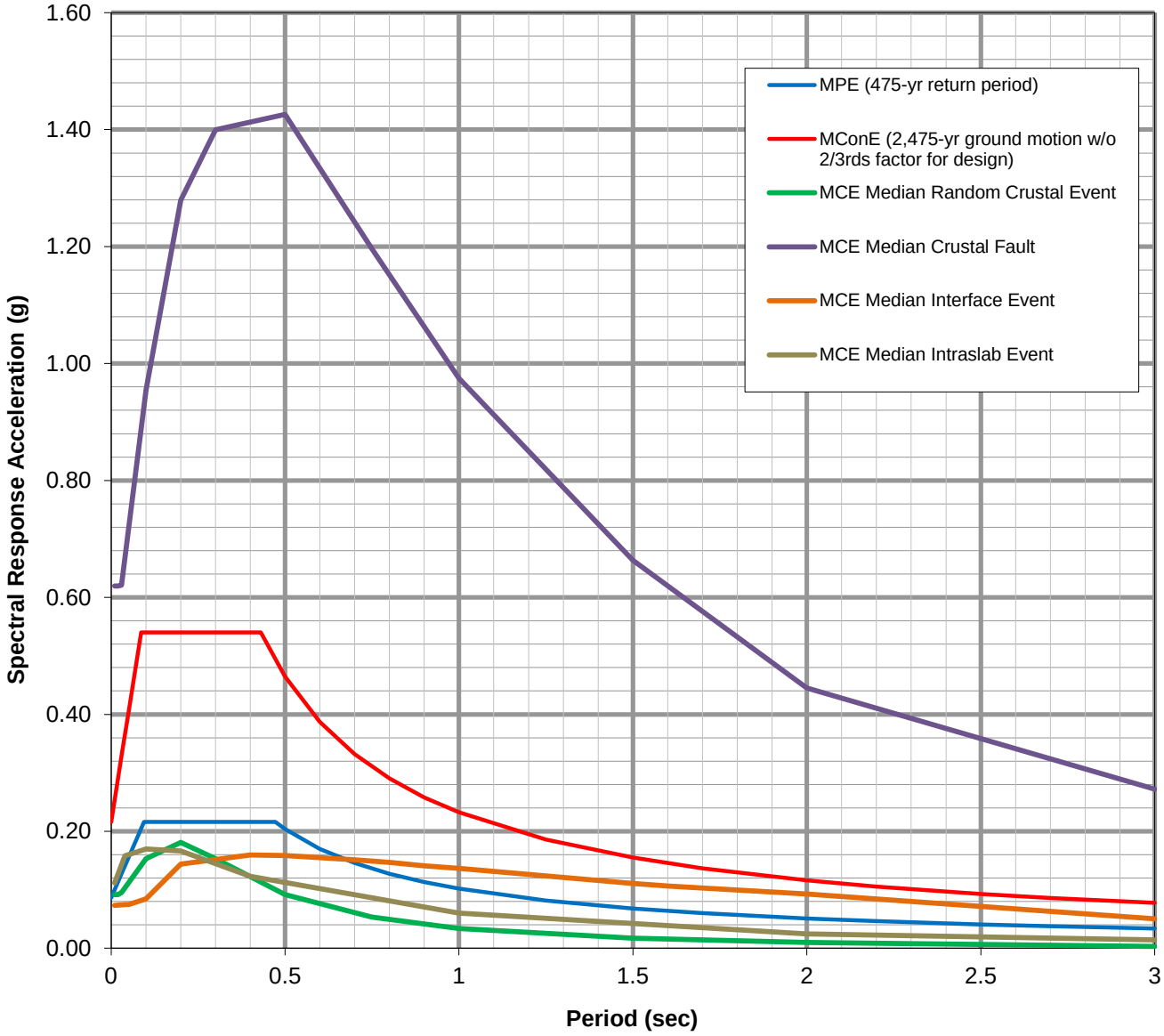

For comparison with the MCE ground motions, the 2/3rds factor typically applied to the design MConE ground motion is not included on the above plot

Perennial Wind Chaser Station
Set-up Substation
Hermiston, Oregon

DETERMINISTIC MEDIAN MPE AND MCE GROUND MOTIONS

November 2013 | 24-1-03794-001

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FIG. H6
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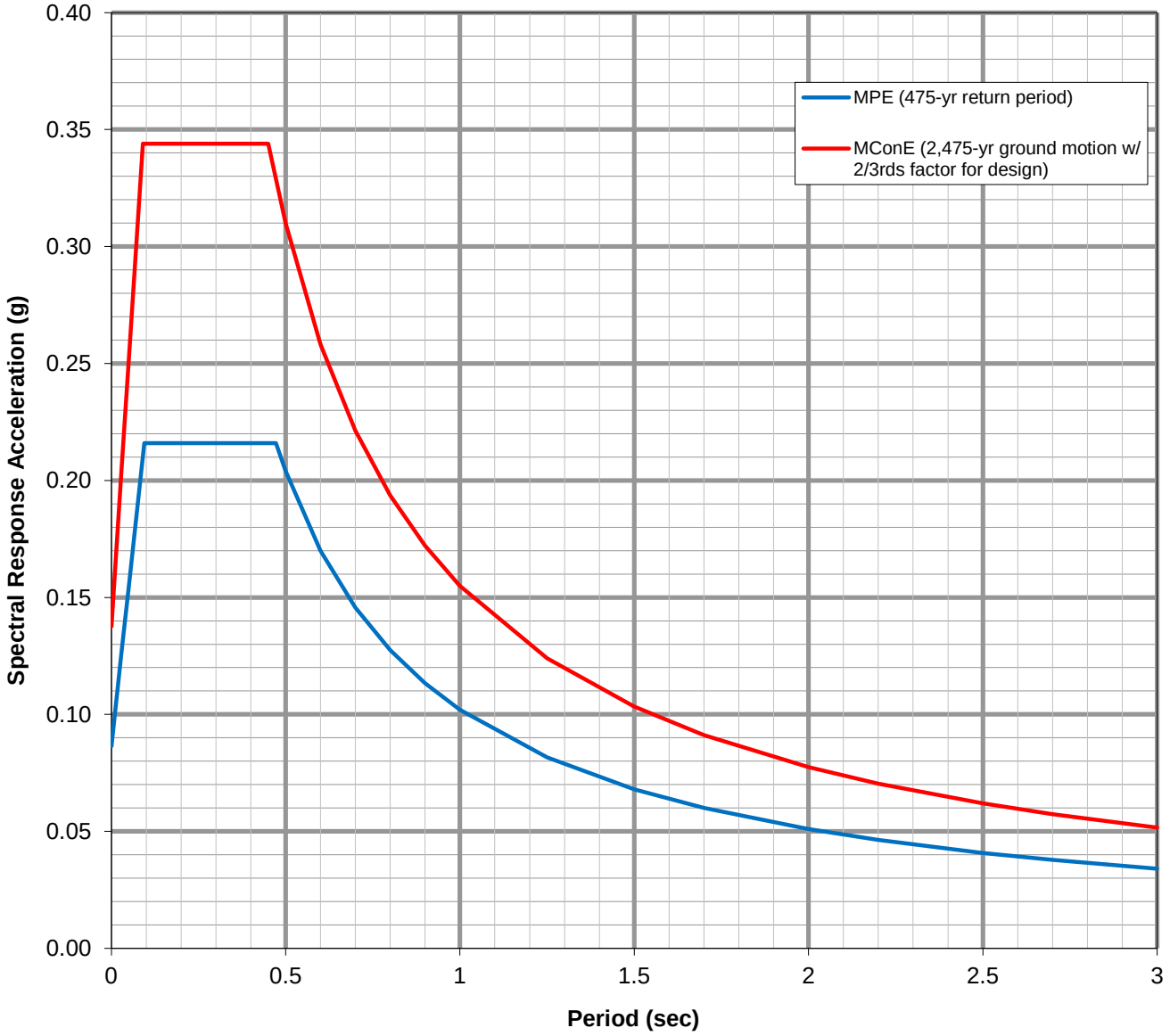

Perennial Wind Chaser Station
Power-Generating Facility
Hermiston, Oregon

RECOMMENDED 2009 IBC HORIZONTAL RESPONSE SPECTRUM

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FIG. H7
Page 1 of 2

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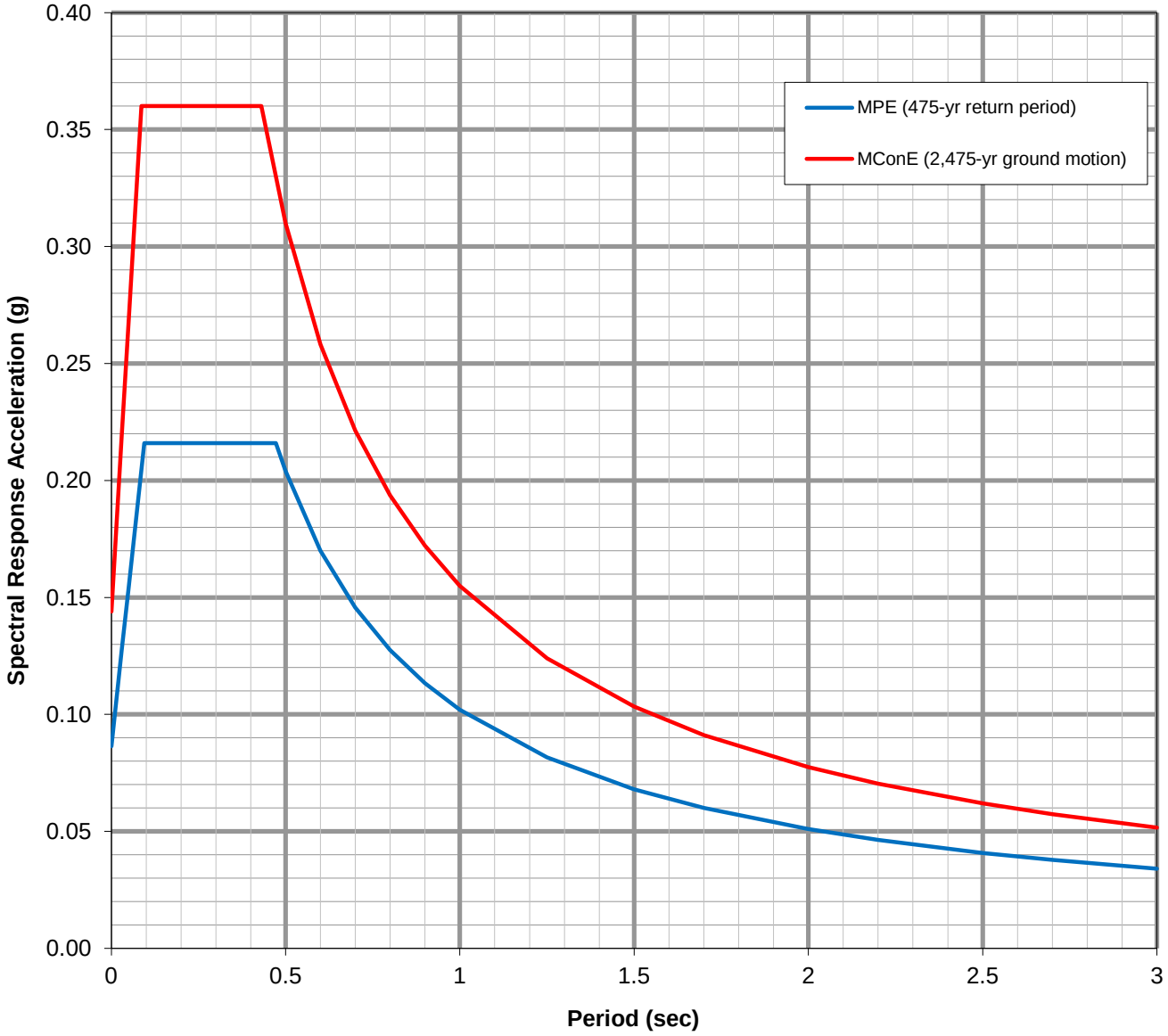

Perennial Wind Chaser Station
Step-up Substation
Umatilla, Oregon

RECOMMENDED 2009 IBC HORIZONTAL RESPONSE SPECTRUM

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FIG. H7
Page 2 of 2

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ATTACHMENT H1

PRELIMINARY GEOTECHNICAL ENGINEERING REPORT FOR GENERATING FACILITY

Preliminary Geotechnical Engineering Report
Perennial Wind Chaser Station
Hermiston, Oregon

November 19, 2013

SHANNON & WILSON, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Preliminary Geotechnical Engineering Report
Perennial Wind Chaser Station
Hermiston, Oregon

November 19, 2013

SHANNON & WILSON, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

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24-1-03794-001

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5 Lateral Pressure Distribution and Resultant Location
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C Photograph Log
D Important Information About Your Geotechnical/Environmental Report

PRELIMINARY GEOTECHNICAL ENGINEERING REPORT
PERENNIAL WIND CHASER STATION
HERMISTON, OREGON

1.0 INTRODUCTION

Perennial-Wind Chaser LLC is planning to construct a new 415-megawatt power-generating facility in Hermiston, Oregon, as part of the Perennial Wind Chaser Station project. The proposed generating facility will include gas turbine generators, stacks, transformers, pipe racks, cooling tower, water treatment facilities, compressors, tanks, a 230-kilovolt switchyard, a stormwater pond, a control and administration building, and, potentially, an onsite septic facility. The location of the proposed generating facility is in an agricultural field located on the east side of Westland Road approximately a half mile north of I-84, as shown on Vicinity Map, Figure 1.

Shannon & Wilson, Inc., is providing preliminary geotechnical engineering services for the project under subcontract to Burns & McDonnell Engineering Company, Inc. This Draft Preliminary Geotechnical Engineering Report presents our field exploration and laboratory test data, as well as the results of our preliminary geotechnical engineering evaluations for the design of the proposed generating facility. This report was prepared in general accordance with the Oregon State Board of Geologist Examiners Guidelines for Engineering Geologic Reports and Site-Specific Seismic Hazard Reports.

2.0 PROJECT UNDERSTANDING

2.1 Site Description

The proposed generation facility site is immediately south of the existing Hermiston Generating Station, which operates independently of the proposed facility. The proposed site is separated from the existing station to the north by Union Pacific Railroad tracks. The west side of the site is bordered by the Westland A Canal. Additional agricultural fields lay to the south and east. Site topography is relatively flat, sloping down very gently to the east, dropping approximately 0.7 feet every 100 feet. The site is currently vegetated by tall grass with a line of trees parallel to and on the east side of the canal. There are a few small piles of basalt boulders up to about three feet in diameter scattered throughout the site. These boulders were likely derived from near-surface gravel deposits.

2.2 Plant Components

The Site Plan, Figure 2, shows the proposed location and configuration of the various facility components, as provided to us by Burns & McDonnell Engineering Company, Inc. We

understand that the site will be accessed from Westland Road with a small bridge spanning the canal. We also understand the final layout of the proposed facility and final site grades have not yet been determined and that foundation loads are currently unknown. As shown on Figure 2, the 400-megawatt power-generating facility will contain the following major components:

- Four Combustion Turbines and Generators
- Four Exhaust Stacks
- Two Turbine Control Centers
- Two Transformers
- Two Secondary Transformers
- Two Auxiliary Transformers
- Cooling Tower
- Gas Compressors
- Four Water Tanks
- 230 kV Switchyard
- Control and Administration Building including Water Treatment Facility
- Pipe Racks
- Stormwater Detention Pond
- Septic Tank and Drain Field
- Entrance Road Bridge
- Roadways

3.0 GEOLOGY AND SEISMICITY

3.1 Regional Geology

The project site is located within the Umatilla Basin, a broad lowland that is part of the Deschutes-Columbia Plateau geomorphic province. Evolution of the Columbia Plateau is described by Reidel and others (1989). The Deschutes-Columbia Plateau is floored at depth by basalt bedrock of the Columbia River Basalt Group (CRBG). The CRBG were erupted in the middle Miocene epoch, between about 17 and 6 million years ago, from fissure vents near the Idaho border. The CRBG consists of six formations, 14 members, and more than 150 individual flow units. Total thickness of the basalt section is greater than 15,000 feet in the Tri-Cities area to the north, and the section thins to a tapered edge against the flanks of the Blue Mountains to the southeast. The CRBG section is estimated at about 5,000 feet thick in the Umatilla Basin, although no borings are known to have penetrated to that depth.

As the basalt flows were being erupted, tectonic stress began building in the earth's crust, eventually producing many broad folds and faults across the newly forming basalt plateau. The down-warps, or basins, that formed on the basalt surface were filled by sediments eroded from

the adjacent uplands and deposited by in-flowing streams along with an influx of air-fall volcanic ash. In the Umatilla Basin, these late Miocene to early Pliocene age (about 6 to 4 million year-old) sedimentary deposits were largely derived from the Blue Mountains to the south, although during this period the ancestral Umatilla River watershed may have included a large area south of the Blue Mountains axis (Smith and others, 1989). These Pliocene sediments were deposited as alluvial fans and north-flowing stream channel deposits and defined by Farooqui and others (1981) as the Alkali Canyon Formation. The Alkali Canyon Formation is exposed lying above the CRBG at higher elevations to the south (Walker, 1973; Madin and Geitgey, 2007) where they rise above the level of the Pleistocene flood deposits (described below). The Alkali Canyon Formation probably thins toward the north, but it is likely present locally in the Hermiston area where it hasn't been eroded away by the Umatilla River and Pleistocene catastrophic flood episodes.

During the high ice periods of the Pleistocene epoch, catastrophic flooding of glacial Lake Missoula deposited sand and gravel over the older deposits in the Umatilla Basin. Glacial Lake Missoula was impounded behind an ice dam which blocked the mouth of the Clark Fork in western Montana. At least 40, and by some counts (Waitt, 1980) up to about 90, times the lake level was able to overcome the ice and the lake emptied catastrophically, flooding the Columbia River system and back-flooding up tributary stream canyons along its path. The floodwater pooled temporarily in the wide Umatilla Basin forming a lake that for a short period of time was up to 400 feet deep. The high-velocity flood waters initially scoured their way into the basin, then as the flood waters deepened, a tremendous bed load of coarse gravel migrated into the basin filling the flood channels at lower elevations, while in succession, finer gravel and then sand mantled progressively higher topography. As the flood flow waned, silt was deposited out of suspension in the slack water. Then, slowly over a period of several days, the flood waters quietly receded. The process probably recurred at intervals of at least several decades between about 18,000 and 15,000 years ago (Allen and others, 2009).

Since the last flood event, the surface of the Umatilla Basin has been modified by strong easterly winds which have reworked the sand and silt deposited by the Missoula floods along with an influx of wind-blown silt ("loess") eroded from the Palouse of southeastern Washington. Other modifications have included erosion and re-deposition of the older sediments along the channel of the Umatilla River and its tributaries.

3.2 Seismic Setting

Earthquakes in the Pacific Northwest occur largely as a result of the collision between the Juan de Fuca plate and the North American plate. These two tectonic plates meet along a mega thrust

fault called the Cascadia Subduction Zone (CSZ). The CSZ runs approximately parallel to the coastline from northern California to southern British Columbia. The compressional forces that exist between these two colliding plates cause the denser oceanic plate to descend, or subduct, beneath the continental plate. This process leads to contortion and faulting of both plates and volcanism along the Cascade Range.

Shallow crustal faults and folds throughout Oregon and Washington have been located and characterized by the United States Geological Survey (USGS). The USGS provides approximate fault locations and a detailed summary of the available fault information in the USGS Quaternary Fault and Fold Database (USGS, 2013). The database defines four categories of faults, Classes A through D, based on evidence of tectonic movement known or presumed to be associated with large earthquakes during Quaternary time (less than 1.8 million years ago). For Fault Class A and B faults, geologic evidence has been published that demonstrates the existence of Quaternary deformation and, therefore, the faults are correlated to a higher potential for earthquake generation. Class A faults are known or presumed to be associated with relatively large magnitude earthquakes (moment magnitude [Mw] of 6 to 7). Faults defined as Class B exhibit equivocal geologic evidence of Quaternary deformation, or may not extend deep enough to be considered a source of significant earthquakes.

According to the USGS' Oregon Fault and Fold database, there are two Class A fault systems (a system has multiple fault segments) and two Class B fault systems within approximately 75 kilometers (47 miles) of the project site. Their names, general locations relative to the site, slip rates, and the times since their most recent deformation are summarized in Table 1.

TABLE 1: QUATERNARY FAULTS WITHIN A 75-KM RADIUS OF THE PERENNIAL POWER SITE

Name	Fault Class	Distance and Direction from Site	Most Recent Deformation*	Slip Rate
Hite System – Agency Section	A	58 km East southeast	<1.6 Ma	<0.2 mm/yr
Hite System – Thorn Hollow Section	A	70 km East	<130 Ka	<0.2 mm/yr
Wallula Fault System	A	44 km East northeast	<15 Ka	<0.2 mm/yr
Columbia Hill Structures	B	20 km North	<1.6 Ma	<0.2 mm/yr
Horse Heaven Hills Structures	B	35 km North northwest	<1.6 Ma	<0.2 mm/yr

* Ka = "kiloannum" or thousand years; Ma = "megaannum" or million years.

4.0 FIELD EXPLORATIONS

Shannon & Wilson, Inc., explored the subsurface conditions at the site with ten (10) geotechnical borings, five (5) dynamic cone penetrometer (DCP) tests, and two (2) infiltration tests. The borings, designated B-1 through B-10, were drilled between June 5 and June 14, 2013, by

Hardcore Drilling, Inc., of Dundee, Oregon. A Shannon & Wilson geologist located the borings, collected soil samples, and logged the materials encountered during drilling. The DCP tests, designated DCP-1 through DCP-5, were conducted to estimate parameters for pavement design. The infiltration tests, designated INT-1 and INT-2, were conducted to estimate infiltration capacity for potential stormwater management design and onsite septic facilities. The DCPs and infiltration tests were performed by a Shannon & Wilson geologist on July 9, 2013. The locations of the borings, DCPs, and infiltration tests were measured in the field using a handheld GPS unit. Approximate exploration locations are shown on the Exploration Plan, Figure 3. Details of the exploration program, including boring logs, descriptions of the techniques used to advance and sample the borings, and DCP and infiltration test procedures and results are presented in Appendix A.

5.0 LABORATORY TESTING

Laboratory tests were performed on selected samples from the borings to determine basic index and engineering properties of the soils encountered. The laboratory testing program included moisture content analyses, particle-size analyses, Atterberg Limits tests, and corrosivity testing. Laboratory testing was performed in general accordance with applicable ASTM International (ASTM), American Association of State Highway and Transportation Officials (AASHTO), and United States Environmental Protection Agency (EPA) standard test procedures. Results of the laboratory tests and a brief description of the testing procedures are presented in Appendix B.

6.0 PHOTOGRAPHS OF THE SITE

Site conditions were documented in photographs taken at each field exploration location. A Photograph Log is presented in Appendix C.

7.0 SUBSURFACE CONDITIONS

We grouped the materials encountered in our field explorations into four (4) geotechnical units, as described below. Our interpretation of the subsurface conditions is based on the borings and regional geologic information from published sources. The geotechnical units are as follows:

- *Loess*: Medium dense to dense Silty SAND to SAND, trace silt (SM, SP-SM, and SP).
- *Catastrophic Flood Deposits – Gravel Facies*: Dense to very dense Sandy GRAVEL, trace silt with cobbles and boulders (GP).
- *Catastrophic Flood Deposits – Fine-grained Facies*: Very stiff to hard SILT to Sandy SILT and Clayey SILT with sand to trace sand (ML and MH).
- *Catastrophic Flood Deposits – Sand Facies*: Dense to very dense Silty SAND to SAND, trace silt (SM, SP-SM, and SP)

These generalized geotechnical units have been defined by their geologic and engineering properties and their distribution in the subsurface. The units and their inter-relationships are shown on the Geologic Profile A-A', Figure 4. The location of the profile is shown on the Exploration Plan, Figure 3. The profile is interpretive, and variations in subsurface conditions may exist between the locations of the borings. Contacts between the units may be more gradational than shown in the profiles and in the boring logs in Appendix A.

7.1 Loess

Loess is wind-blown sediment. The unit was encountered in all borings from the ground surface to depths ranging from about 2 to 5 feet. The Loess generally consists of medium dense to dense gray and brown Silty SAND to SAND, trace silt (SM, SP-SM, and SP). It is typically dry and micaceous with nonplastic fines, fine to medium sand, and occasional organics. The wind-blown silty fine sand may be considered a collapsible soil, based on our local experience. Collapsible soil usually has a relative high porosity and a correspondingly low unit weight. Soil collapse can occur by wetting under a moderate normal stress, through vibration, or by subjecting the soil to higher normal stresses without wetting it. Standard Penetration Test (SPT) N-values in the unit ranged from 11 to 39 blows per foot (bpf) and averaged 22 bpf. Natural moisture content analyses ranged from 3 to 18 percent, and averaged 10 percent. Fines contents determined by sieve analyses ranged from 19 to 25 percent and averaged 23 percent by dry weight. A single Atterberg Limits test found one specimen to be nonplastic.

7.2 Catastrophic Flood Deposits

The Catastrophic Flood Deposits are gravel, sand, and fine-grained sediment deposited by the Missoula Floods. We grouped them into three facies based on their grain sizes: Gravel Facies, Fine-grained Facies, and Sand Facies. The different depositional facies reflect changing energy levels in the dynamic flood environment and are described in greater detail below.

7.2.1 Gravel Facies

Gravel Facies deposits were encountered directly below the Loess in all borings. The unit was fully penetrated in borings B-1 through B-6, with encountered thicknesses ranging from about 14 to 41 feet. Additional five- to seven-foot thick layers were observed, interbedded with other units below. Borings B-7 through B-10 were terminated in the Gravel Facies, with a maximum penetration of about 58 feet. The Gravel Facies unit generally thickens to the east across the site. In general, the unit consists of dense to very dense Sandy GRAVEL, trace silt, with cobbles and boulders (GP). Five- to ten-foot thick layers of Silty GRAVEL with sand and Gravelly SAND (GM and SP) were also encountered within the unit. Fines are typically

nonplastic, sand is typically fine to coarse, and gravel is typically fine to coarse and rounded to subangular. Difficult drilling conditions, including mud loss and borehole instability, were observed in the Gravel Facies in several borings. Drill action consistent with the presence of cobbles and boulders was observed. The largest boulder encountered during drilling was estimated to be at least 2.5 feet in diameter. About 40 percent of the SPTs attempted in the unit met refusal, where more than 50 blows were required to drive the sampler through a six-inch interval. The non-refusal SPT N-values ranged from 7 to 87 bpf and averaged 54 bpf. A single natural moisture content analysis indicated 14 percent moisture.

7.2.2 Fine-Grained Facies

Fine-grained Facies deposits were encountered below the Gravel Facies in borings B-1 through B-6 and ranged in thickness from about 13 to 32 feet. In B-1 and B-2, five-foot thick interbeds of Sand Facies Deposits were observed within the Fine-grained Facies. In B-1, an additional bed of Fine-grained Facies deposits was observed at a depth of 80 feet. The Fine-grained Facies generally consists of very stiff to hard gray to brown SILT to Sandy SILT and Clayey SILT with sand to trace sand (ML and MH). The unit is typically moist and micaceous with low to medium plasticity fines and fine sand. SPT N-values in the unit ranged from 21 to 65 bpf and averaged 43 bpf. Natural moisture content analyses ranged from 36 to 56 percent, and averaged 47 percent. Fines contents determined by sieve analyses ranged from 53 to 90 percent and averaged 80 percent by dry weight. Atterberg Limits tests indicated plasticity indices ranging from 0 to 12 percent, averaging 5 percent.

7.2.3 Sand Facies

Sand Facies deposits were encountered in boring B-1 through B-6, interbedded with and below the Fine-grained and Gravel Facies deposits. In general, the Sand Facies consists of dense to very dense gray and brown Silty SAND to SAND, trace silt (SM, SP-SM, and SP). The unit is typically moist and micaceous, with nonplastic to low plasticity fines and fine to medium sand. One out of 17 SPTs attempted in the unit met refusal, where more than 50 blows were required to drive the sampler through a six-inch interval. The non-refusal SPT N-values ranged from 36 to 85 bpf and averaged 64 bpf. Natural moisture content analyses ranged from 29 to 45 percent, and averaged 36 percent.

7.3 Groundwater

To estimate the depth to groundwater, boring B-1 was flushed with clean water and left open with a tremie pipe inserted to the bottom after drilling. The hole was open from June 5 through June 14, 2013. The water level in the hole was measured every day from June 10 through June 14, when it was backfilled. The measured water level in the open hole remained at 27.6 feet below ground surface from June 10 through June 14. In our opinion, this value likely represents the general depth to groundwater at the site at the time the explorations were performed. Groundwater levels should be expected to fluctuate seasonally and with changes in precipitation, land use, and other factors. In general, we expect groundwater levels in this area to be at a seasonal high during the winter and late spring and at a seasonal low during the late summer and early fall.

8.0 SITE-SPECIFIC SEISMIC HAZARD EVALUATION

In accordance with the site classification criteria in the International Build Code (IBC, 2012), we recommend using a Site Class C for designing structures at this site. The following paragraphs describe required seismically-related hazard evaluations on site.

Strong Ground Motions: The maximum considered earthquake (MCE) ground motions at the bedrock level were obtained from the United States Geological Survey's (USGS) Earthquake Hazards Program – 2008 interactive deaggregation website. The ground motions are based on a probabilistic hazard analysis performed by the USGS and the seismic site classification of the project site. Table 2 provides recommendation seismic design parameters.

TABLE 2: RECOMMENDED SEISMIC DESIGN PARAMETERS

Seismic Parameter	Recommended Value
Site Class	C
Short Period Spectral Acceleration, S_s	0.43g
1-Second Period Spectral Acceleration, S_1	0.13g
Site Factor, F_v	1.67
Site Factor, F_a	1.20
Short Period Damped Acceleration, S_{DS}	0.34g
1-Second Period Damped Acceleration, S_{D1}	0.15g
Seismic Design Category	D

Note: g = gravity acceleration

Fault Rupture: The project site lies more than 12 miles from the nearest mapped fault. It is our opinion that the risk of fault rupture at the site is low.

Other Hazards: Due to the location and geography of the site, it is our opinion that the risk for liquefaction, lateral spread, landsliding, tsunami, or seiche at the site is very low.

9.0 CONCLUSIONS AND RECOMMENDATIONS

9.1 General Conclusions

The borings drilled at the site indicate that the project site is mantled by a relatively thin layer of Loess overlying dense to very dense Catastrophic Flood Deposits - Gravel Facies, and the stiff to hard Fine-grained Facies. The following general conclusions are presented based on the results of our engineering analyses and evaluations.

- The upper 2 to 5 feet of wind-blown silty sand (Loess) is potentially collapsible or subject to strength loss based on our local project experience. Collapse or loss of strength of the soil can occur either by wetting, vibrating, or subjecting the soil to higher normal stresses.
- Most project structures can be supported by shallow foundations; such as mat foundations, ring foundations, and spread footings. Based on our evaluations, it is more economical to use shallow foundations than to use deep foundations, such as driven steel H-piles or pipe piles.
- Turbines and generators, including the Combustion Turbines and Generators, and the Condenser, are the heavy, settlement-sensitive structures. The foundations for these critical structures should transfer load to the dense to very dense Catastrophic Flood Deposits encountered at a depth ranging from 2 to 5 feet. Therefore, all wind-blown silty sand should be completely removed and the excavation backfilled with structural fill. Structural fill, such as the compacted crushed rock or native soil mixed with fly ash/cement, can be used beneath a mat foundation.
- Other structure foundations, for typically lighter, less sensitive structures, such as Main Power Transformers, Cooling Tower, Water Storage Tanks, and Metal Buildings, may be founded within the lower portions of the wind-blown deposit (Loess), where present. The upper 3 feet of Loess from the existing ground surface should be removed and replaced with structural fill. Also, the remaining wind-blown deposit should be pre-wetted and compacted. Detailed design recommendations are provided in the following sections.

9.2 Foundation Subgrade Preparation and Earthwork

9.2.1 Foundation Subgrade Preparation

Excavation and subgrade preparation recommendations are provided in the following paragraphs for the various structures. We understand that the design subgrade elevations may vary for the proposed structures. Therefore, we present herein two different subgrade

preparation approaches for the two groups of the structures. The first group includes turbines and generators (heavy, settlement-sensitive structures). The second group includes other structures that are typically lighter weight, less sensitive structures, such as Main Power Transformers, Cooling Tower, Water Storage Tanks, and Metal Buildings. Excavation and subgrade preparation requirements for the above two groups of structures are described in the following paragraphs.

Turbines/Generators Subgrade Preparation – Foundation excavations should extend to the top of the dense to very dense Catastrophic Flood Deposits at the depths ranging 2 to 5 feet below the existing ground surface, and graded to provide a smooth soil surface. Prior to placement of structural fill, the underlying subgrade should be compacted by several coverages of a large smooth drum roller with a minimum static weight of 10,000 pounds, initially operating in the vibratory mode. Following compaction, proof-rolling should be accomplished while operating the drum roller in the static mode. Any loose of soft materials encountered should be removed and replaced with compacted structural fill.

Other Structures Subgrade Preparation – Foundation excavations should extend to a minimum design grade of three (3) feet below existing grade, or to the top of the dense to very dense Catastrophic Flood Deposits, and graded to provide a smooth soil surface. Subgrade preparation and conditioning steps for locations where the Catastrophic Flood Deposits are not encountered are: (1) saturate (pre-wet) the remaining wind-blown silty sand layer with a soaking system operating for an estimated 4 to 6 hours; (2) within one hour of stopping sprinkling, grade to a level surface and compact with at least three coverages of a large smooth drum roller with a minimum static weight of 10,000 pounds and a dynamic force of at least 38,000 foot-pounds operating in the vibratory mode; and (3) proof-roll the compacted surface with a final coverage of the roller operating in the static mode and observe subgrade to detect unsuitable performance during observations by a Shannon & Wilson representative. Any loose or soft materials encountered should be removed and replaced with compacted structural fill. If Catastrophic Flood Deposits are encountered within upper three feet, the subgrade should be prepared as recommended for the Turbines/Generators, above.

9.2.2 Cut and Fill Slopes

We recommend that permanent cut and fill slopes on the site should be no steeper than 2 Horizontal:1 Vertical (2H:1V). Temporary cut slopes will be required for the proposed turbines/generator foundations and buried pipelines or utilities. We recommend that the temporary cut slope inclination be 1.5H:1V or flatter.

The contractor and subcontractor should be aware of and familiar with applicable local, state, and federal safety regulations, including the current OSHA Excavation and Trench Safety Standards, and OSHA Health and Safety Standards for Excavations, 29 CFR Part 1926, or successor regulations. Construction site safety should be the sole responsibility of the contractor, who also is solely responsible for the means, methods, and sequencing of construction operations. We are providing the following information solely as a service to our client. Under no circumstances should the information provided herein be interpreted to mean that Shannon & Wilson is assuming responsibility for construction site safety or the contractor's activities; such responsibility is not being implied and should not be inferred.

9.2.3 Structural Fill

After the partial or complete removal of the wind-blown silty sand layer, compacted structural fill should be used to establish foundation bearing grades. Prior to beginning structural fill placement, the foundation excavation subgrades should be prepared as recommended above. Crushed rock should consist of ¾-inch minus angular rock base aggregate, in accordance with Oregon Department of Transportation (ODOT) Standard Specifications for Construction (2008), Section 02630. In addition to the ODOT requirements, material passing the No. 200 sieve shall not exceed 5 percent by weight using a washed sieve analysis, ASTM D1140. We recommend that the backfill material placed to establish foundation bearing grades be compacted to at least 92 percent of its modified Proctor maximum dry density, determined in accordance with ASTM D1557.

An alternative structural fill is fly ash/cement/soil mix. We understand that the material and placement requirements for fly ash/cement/soil mix will be specified by the project civil engineers, if this option is pursued. We believe that the native silty sand is suitable for use with a fly ash or cement admixture.

The native excavated soil may also be used as structural fill underneath certain spread footings and mat foundations, but the native excavated soil should not be used as structural fill under the mat foundations of the heavy, settlement-sensitive turbines/generators.

Free-draining crushed rock should be used within the ring foundations under the water storage tanks. The preferred material for the free-draining rock is crushed rock coarse aggregate, ¾- to ¼-inch, in accordance with Oregon Department of Transportation (ODOT) Standard

Specifications for Construction (2008), Section 00430.11. Alternatively, concrete sand satisfying ASTM C33 would be acceptable.

9.3 Foundation Design Recommendations

9.3.1 General

The subsurface conditions revealed by the borings indicate that the ground surface across the site is underlain by 2 to 5 feet of wind-blown silty sand which, in turn, is underlain by the Catastrophic Flood Deposits. The allowable settlements for the proposed structures are not known at this time. In the preliminary design, based upon our similar project and local geologic experiences, we recommend excavation depths for the wind-blown silty sand and foundation subgrade preparation for two types of structures: one is for the settlement-sensitive heavy structures, the other is for relatively lightweight structures. In all cases, the width of any foundation element should not be less than 24 inches. Based on discussion with the City of Hermiston Public Works Department, a frost depth of 2 feet is used in the Hermiston area for foundation design. Therefore, foundations should be embedded a minimum depth of 24 inches, measured from the top of the floor slab or lowest adjacent finished grade to the base of the foundation. The following paragraphs present geotechnical design recommendations for two types of structures and include soil allowable bearing capacity, estimated settlement, and foundation excavation and backfill requirements.

9.3.2 Settlement-Sensitive Heavy Structures

For Combustion Turbines and Generators and other settlement-sensitive heavy structures, we recommend complete removal of the wind-blown silty sand layer to an estimated depth of 2 to 5 feet and replacement with a well-graded, clean, crushed rock structural fill, or a fly ash/cement soil mix structural fill. Subgrade preparation should include compaction and proof-rolling as previously described in Section 9.2.1. Due to the sensitivity of foundations to long-term settlement and the possible migration of the crushed rock fill into the native soil, a non-woven geotextile is recommended between the structural fill and the native soil subgrade as a separation layer.

We recommend that an allowable bearing pressure of 5,000 psf be used to proportion the mat foundations for the Turbines/Generators with a factor of safety (FS) of 3. For earthquake loading, this bearing capacity can be increased by one-third (33 percent). The estimated total elastic settlement is less than 0.5 inch. This settlement will occur immediately upon equipment

loading. The total long-term settlement, defined as after beginning of operation, is estimated to be in the range of 0.1 to 0.2 inches. The differential settlement is dependent on the variability of the underlying dense to very deposit and the rigidity of the mat foundation and cannot be quantified. We recommend using a subgrade modulus of 300 pci for foundation design regardless of foundation dimensions. In addition to our model, we are assuming in all cases that the minimum crushed rock thickness under the mat foundations is 12 inches.

9.3.3 Light Weight Structures

To limit settlement to an acceptable level, we recommend excavating the upper wind-blown silty sand to a depth of 3 feet below the existing ground surface or to the top of the Catastrophic Flood Deposit later and backfilling to the foundation grade with structural fill. Subgrade preparation should be performed as described in Section 9.2.1. To limit total settlement to less than 1 inch, an allowable static bearing pressure of 3,500 psf can be used for foundation design with a FS of 3. For earthquake loading, this bearing capacity can be increased by one-third (33 percent). A subgrade modulus of 150 pci is recommended for foundation design regardless of foundation dimensions if a 6-inch-thick leveling course is used.

9.4 Lateral Earth Pressure on Embedded Walls

9.4.1 General

Lateral earth pressures on retaining walls depend on the type of wall (i.e., yielding or non-yielding), the type and method of placement of backfill against the wall, the magnitude of surcharge weight on the ground surface adjacent to the wall, the slope of the backfill, and the design criteria (static or seismic condition). Our opinion is that the embedded walls for the typical underground structures should be designed as non-yielding walls and for seismic loading conditions. Lateral earth pressures for the embedded walls have been analyzed assuming backfill material is an imported, free-draining crushed rock.

Groundwater at the project site is much lower than the existing ground surface and we recommend that the walls be backfilled with free-draining rock. Therefore, we assume that no hydrostatic pressure is against embedded walls. Although permanent surcharge loading above grade has not been identified at this time, we have included surcharge lateral pressures in case such loads are identified in the future. Also, we have assumed lateral pressures that may be induced during compaction of backfill materials.

9.4.2 Backfill Material and Compaction

We recommend that the backfill material placed against the wall be compacted at least to 90 percent of its modified Proctor maximum dry density, determined in accordance with ASTM D1557. Heavy compaction equipment should not be allowed closer than 5 feet to the embedded wall to limit inducing high lateral earth pressures.

9.4.3 Lateral Earth Pressure

The static lateral earth pressure on the embedded walls consists of two components: the static earth pressure, and static surcharge pressure. We recommend the at-rest lateral static earth pressure equal to 50H pounds per square foot (psf) be used for design. We assume that surcharge loads, q, acting on the ground surface adjacent to the embedded walls can produce 0.4q psf uniform rectangular distribution lateral pressure on the wall.

For the seismic loading condition, based on the heights of the walls and the backfill materials, we recommend using the Mononobe-Okabe equation. For the seismic loading, we recommend an additional lateral earth pressure of 14 psf with an inverted triangular distribution be applied to the wall.

The distributions and resultants of these lateral pressures are shown on Figure 5. The recommendations presented above are independent of other structural considerations including wall stiffness, load factoring, and crack control.

9.4.4 Lateral Resistance

The lateral loads on the proposed structures, including lateral earth pressures, earthquakes, and wind can be resisted by sliding resistance of the foundation and partial soil passive pressure, which is assumed to be about 50 percent of full soil passive pressure. We recommend that an allowable coefficient of sliding resistance, f, equal to 0.45, and an allowable partial soil passive pressure, 180d psf (where d is depth of the embedment of the bottom of foundation), be used for design of sliding and overturning resistance.

9.5 Trench Backfilling

The engineering conclusions and recommendations for the buried underground pipeline trench backfilling are presented below. Our recommendations for trench backfilling consist of two different approaches. One is for trenches in non-structural areas, the other is for trenches in

settlement-sensitive areas, such as the embedded pipe below the foundations. Also, in each trench backfill approach, the trench materials consist of three zones, designated: pipe bedding, pipe zone, and trench backfill. The definitions of these three zones are shown in Figure 6.

9.5.1 Trench Materials for Typical Non-Structural Areas

As shown in Figure 6, the pipe zone is defined from the bottom of the pipe to a distance of 12 inches above the top of the pipe. The trench backfill is defined as the backfill between the ground surface and the pipe zone. For the typical yard piping in non-structural locations, the native sandy soil is acceptable for bedding material. The selected native excavation soil also can be used for both the pipe zone and the trench backfill zone. All pieces of gravel and particles larger than 1 inch in diameter should be removed from the pipe zone. Loose lifts should not exceed 8 inches and should be compacted to at least 85 percent of ASTM D1557 (modified Proctor). The lifts should be placed the full width of the trench and be brought up equally on each side of pipe to maintain balanced loading on the pipe wall. Particular care should be taken in placing the initial lift on the underside of the pipe to provide a solid backing and prevent lateral movement during backfilling and compaction.

9.5.2 Trench Materials for Settlement-Sensitive Areas

Where the trench is within the loading influence zone of a settlement-sensitive foundation, the native sandy soil is acceptable for bedding material. However, for the pipe zone and the trench backfill zone, we recommend that native materials not be used. Instead, for the pipe zone we recommend the use of either well-graded clean crushed rock or controlled density fill (CDF). CDF is composed of sand or fine gravel not exceeding ½-inch maximum size with portland cement, fly ash, admixtures and water as binding materials to create a flowable backfill material. Admixtures should be used as necessary to produce flowability without segregation. The unconfined compressive strength of the material should be between 50 and 250 psi at 28 days, per ASTM D4832. In placing CDF, care needs to be exercised to not float the pipe. If crushed rock is used, the material should be placed in loose lifts not exceeding 8 inches and compacted to 90 percent of ASTM D1557 (modified Proctor). The lifts should be placed the full width of the trench and be brought up equally on each side of pipe to maintain balanced loading on the pipe wall. Particular care should be taken in placing the initial lift on the underside of the pipe to provide a solid backing and prevent lateral movement during backfill and compaction.

For the trench backfill above the pipe zone, we recommend using crushed rock. CDF is not recommended in this zone because a “hard spot” could be created, resulting in an uneven subgrade modulus condition.

9.5.3 Floor Slab

For floor slab subgrade preparation, we recommend excavating the upper wind-blown silty sand to a depth of 3 feet below the existing ground surface or to the top of the Catastrophic Flood Deposit and backfilling with structural fill. The structural fill may consist of clean, well-graded crushed rock or native sandy/silty soil. If native soil is used as structural fill in the floor slab areas, we recommend a minimum 8 inches of clean crushed rock with less than 2 percent passing Sieve No. 200 be placed beneath the floor slab as a capillary break between subgrade and slab. The structural backfill should be compacted at least to 90 percent of its modified Proctor maximum dry density, determined in accordance with ASTM D1557. We recommend a subgrade modulus of 150 pci be used for floor slab design.

9.6 Pavement Design

9.6.1 General

We assume that the new pavement for the access road and parking lot will consist primarily of asphalt concrete (AC) pavement. It is our understanding Portland cement concrete (PCC) pavement may be used in some areas as an alternative. The 2011 ODOT Pavement Design Guide (OPDG) recommends a minimum 20-year design life for AC pavement. The pavement is designed using the 2011 OPDG and the 1993 AASHTO Guide for Design of Pavement Structures procedures. Subgrade preparation, pavement and base rock materials, and installation should be in accordance with the 2008 ODOT Oregon Standard Specifications for Construction (OSSC).

9.6.2 Traffic Analysis for AC Pavement

Traffic data was not provided for our pavement design; however we understand the pavement design is intended to be preliminary and for permitting purposes only. An Average Daily Traffic (ADT) of 500 vehicles, with 5 percent trucks, was assumed. In addition, a yearly growth rate of 2 percent was assumed.

ODOT truck conversion factors for two-way AC pavement were used to determine design equivalent single axle load (ESALs). The design ESALs over the design life was calculated to be approximately 503,000 ESALs.

9.6.3 Dynamic Cone Penetration Test Results

We performed five Dynamic Cone Penetration (DCP) tests for the project. The DCP is a device widely used to estimate in-situ strength properties of subgrade soils. We used the DCP standard test method (ASTM D6951-03) to estimate subgrade resilient modulus (M_r) per the OPDG. Based on the DCP blows, we established a DCP index value. We correlated the DCP index value to subgrade resilient modulus using the correlation between DCP index and M_r provided in the OPDG and the AASHTO Guide for Design of Pavement Structures. DCP logs showing correlated M_r profiles for each test are attached in Appendix A. We used selected DCP test results as input for pavement design.

9.6.4 Subgrade

The anticipated subgrade soil for on-grade pavement consists primarily of medium dense silty sand. The subgrade preparation should be completed in accordance with ODOT specifications. Based on the ODOT OSSC, the subgrade should be compacted to a minimum density of 95 percent of the maximum dry density (AASHTO T-99) for the upper 12 inches of subgrade soil. After site clearing/grubbing and/or grading (cut), and prior to placement of fill or pavement material, we recommend that the subgrade be inspected to identify any soft or weak spots. The subgrade inspection should consist of proof-rolling the subgrade with a fully loaded dump truck and testing selected locations with a nuclear density gauge. Soft or weak spots should be overexcavated and replaced with compacted granular material. We recommend that a non-woven geotextile be used between soil subgrade and base aggregate to separate and minimize subgrade fines pumping into the base rock.

For subgrade prepared and improved in accordance with the recommendations provided in this report, a M_r value of 6,000 psi can be used for AC pavement design. Alternatively, the AC pavement may be designed using a California Bearing Ratio (CBR) value of 4.

9.6.5 AC Pavement Design Parameters

The following additional assumptions should be reviewed by the design team to evaluate their suitability for this project. Changes in the assumptions will affect the corresponding pavement section recommendations.

- Subgrade Resilient Modulus (psi) = 6,000
- Design Life: 20 years for new AC pavement
- Standard Deviation = 0.49
- Loss of Serviceability = 1.7 (initial = 4.2, terminal = 2.5)
- Reliability: 75 Percent
- Drainage Coefficient = 1.0 (good)

9.6.6 AC Pavement Section Recommendations

Based on pavement design parameters listed above, the recommended AC pavement section for the access road and parking lot is shown in Table 3.

TABLE 3: RECOMMENDED AC PAVEMENT SECTION

Pavement Thickness (inches)	Base Aggregate (inches)
6	8

These thicknesses are to be the minimum acceptable and are on the assumption that construction will be completed during dry weather. The pavement should be constructed after the successful preparation of the site. Construction of pavement when subgrade soils are wet will require an increased thickness of crushed rock base or stabilized subgrade.

The required AC mix design level, gradation and binder grade is a Level 2, ½-inch dense with PG 64-28 binder. Asphalt grade is selected based on Table J-5 of the OPDG for rural roadway with ESAL less than 1 million. All aggregate material should meet the requirements of Section 02630 of ODOT Standard Specifications.

9.6.7 PCC Pavement

The 2011 ODOT Pavement Design Guide (OPDG) recommends a minimum 30-year design life for AC pavement. We recommend that a modulus of subgrade reaction (k) of 200 pound per cubic inch (pci) to be used for PCC pavement design.

10.0 LIMITATIONS

The analyses, conclusions, and recommendations contained in this report are based upon site conditions as they presently exist and further assume that the borings are representative of subsurface conditions throughout the site, i.e., the subsurface conditions everywhere are not significantly different from those disclosed by the field explorations.

If, during construction, subsurface conditions different from those encountered in the field explorations are observed or appear to be present beneath excavations, we should be advised at once so that we can review these conditions and reconsider our recommendations where necessary. If there is a substantial lapse of time between the submission of this report and start of work at the site, or if conditions have changed due to natural causes or construction operations at or adjacent to the site, it is recommended that this report be reviewed to determine the applicability of these conclusions and recommendations, considering the changed conditions and the elapsed time.

We recommend that Shannon & Wilson review the geotechnical portions of the plans and specifications, especially those parts that address bridge foundations, retaining walls, embankments, and earthwork to determine if they are consistent with our recommendations.

This report is prepared for the exclusive use of Burns & McDonnell Engineering Company, Inc., for the preliminary design and permitting of the Perennial Power Wind Chaser Project in Hermiston, Oregon. Unanticipated soil conditions are commonly encountered and cannot fully be determined by merely taking soil samples from geotechnical borings. Such unexpected conditions frequently require that additional expenditures be made to attain properly constructed projects. This report is not as a warranty of subsurface conditions described in this report. Shannon & Wilson has prepared the attached, “Important Information About Your Geotechnical Engineering Report,” to assist you and others in understanding the use and limitations of our reports. This attachment is presented in Appendix D of this report.

Please note that the scope of our services did not include any environmental assessment or evaluation regarding the presence or absence of hazardous or toxic materials in the soil, surface water, groundwater, or air, on or below or around the project site.

SHANNON & WILSON, INC.

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E 2026
ENGINEERING GEOLOGIST

Expires: 12/31/13

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EXPIRES: 12/31/14

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DJH:AAH:RPP/aeh

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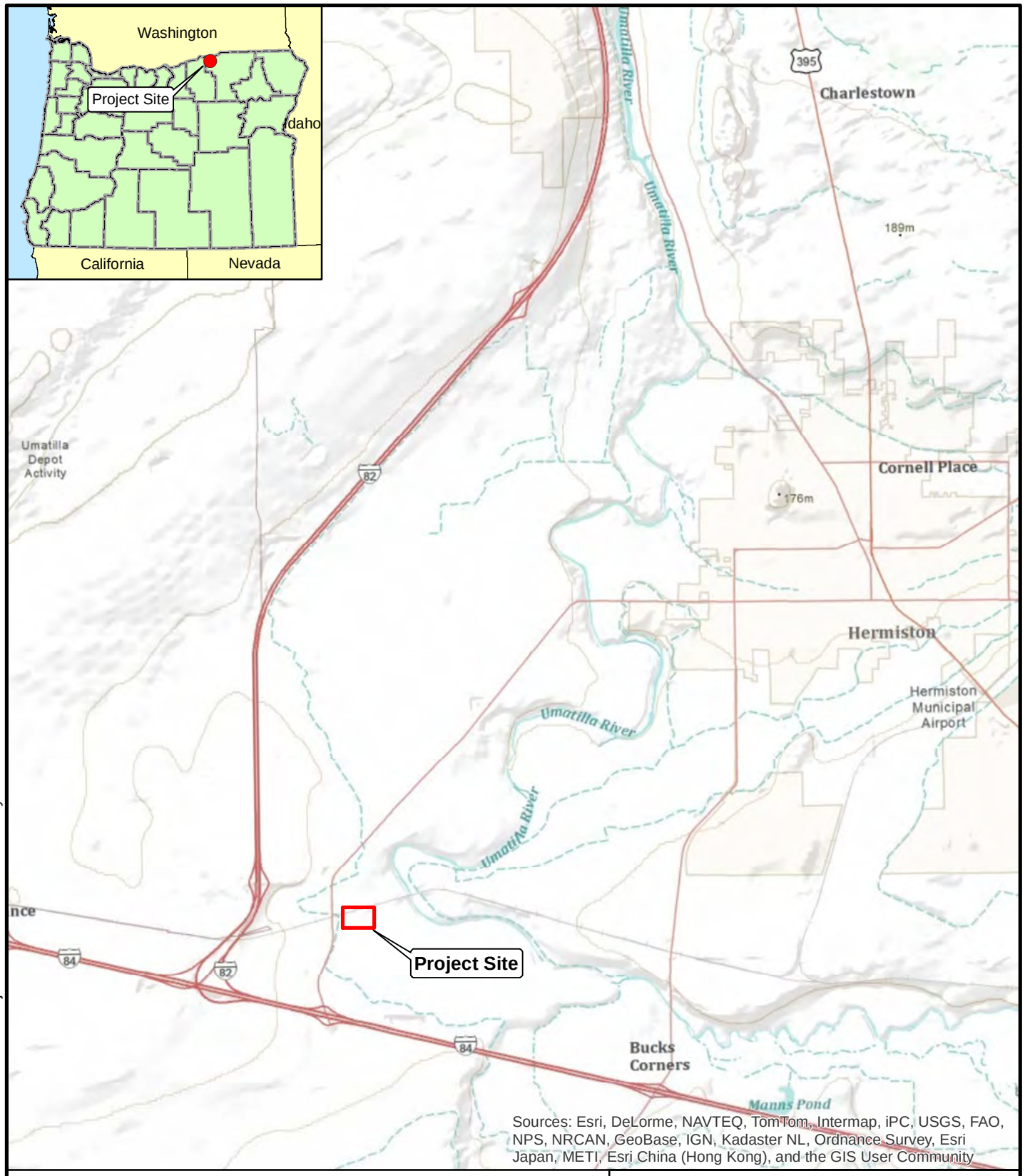

N
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0 1 2 Miles

Perennial Wind Chaser Station
Hermiston, Oregon

VICINITY MAP

November 2013 24-1-03794-001

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FIG. 1

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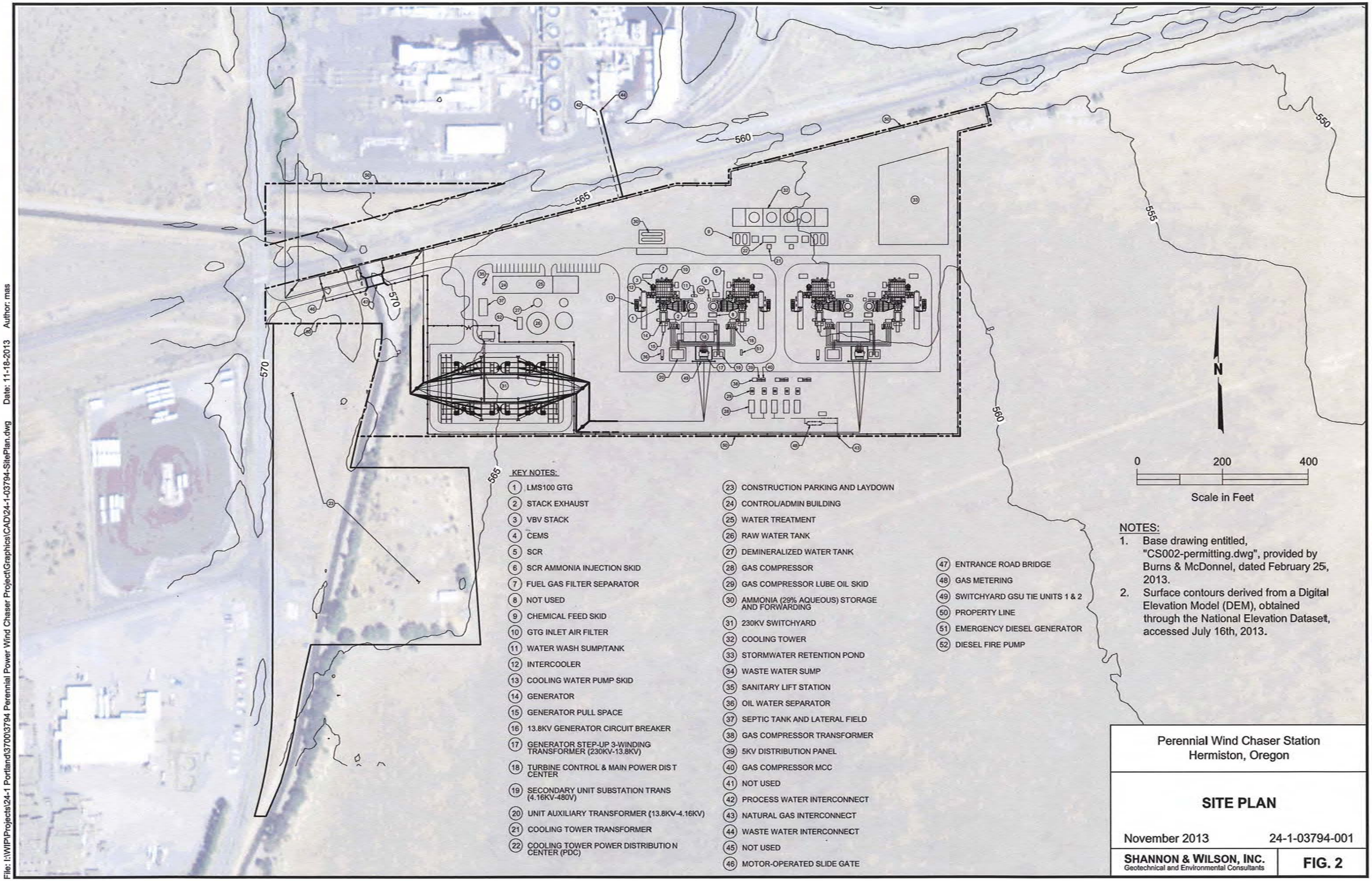

KEY NOTES:

1. LMS100 GTG
2. STACK EXHAUST
3. VBV STACK
4. CEMS
5. SCR
6. SCR AMMONIA INJECTION SKID
7. FUEL GAS FILTER SEPARATOR
8. NOT USED
9. CHEMICAL FEED SKID
10. GTG INLET AIR FILTER
11. WATER WASH SUMP/TANK
12. INTERCOOLER
13. COOLING WATER PUMP SKID
14. GENERATOR
15. GENERATOR PULL SPACE
16. 13.8KV GENERATOR CIRCUIT BREAKER
17. GENERATOR STEP-UP 3-WINDING TRANSFORMER (230KV-13.8KV)
18. TURBINE CONTROL & MAIN POWER DIS T CENTER
19. SECONDARY UNIT SUBSTATION TRANS (4.16KV-480V)
20. UNIT AUXILIARY TRANSFORMER (13.8KV-4.16KV)
21. COOLING TOWER TRANSFORMER
22. COOLING TOWER POWER DISTRIBUTIO N CENTER (PDC)
23. CONSTRUCTION PARKING AND LAYDOWN
24. CONTROL/ADMIN BUILDING
25. WATER TREATMENT
26. RAW WATER TANK
27. DEMINERALIZED WATER TANK
28. GAS COMPRESSOR
29. GAS COMPRESSOR LUBE OIL SKID
30. AMMONIA (29% AQUEOUS) STORAGE AND FORWARDING
31. 230KV SWITCHYARD
32. COOLING TOWER
33. STORMWATER RETENTION POND
34. WASTE WATER SUMP
35. SANITARY LIFT STATION
36. OIL WATER SEPARATOR
37. SEPTIC TANK AND LATERAL FIELD
38. GAS COMPRESSOR TRANSFORMER
39. 5KV DISTRIBUTION PANEL
40. GAS COMPRESSOR MCC
41. NOT USED
42. PROCESS WATER INTERCONNECT
43. NATURAL GAS INTERCONNECT
44. WASTE WATER INTERCONNECT
45. NOT USED
46. MOTOR-OPERATED SLIDE GATE
47. ENTRANCE ROAD BRIDGE
48. GAS METERING
49. SWITCHYARD GSU TIE UNITS 1 & 2
50. PROPERTY LINE
51. EMERGENCY DIESEL GENERATOR
52. DIESEL FIRE PUMP

NOTES:

1. Base drawing entitled, "CS002-permitting.dwg", provided by Burns & McDonnel, dated February 25, 2013.
2. Surface contours derived from a Digital Elevation Model (DEM), obtained through the National Elevation Dataset, accessed July 16th, 2013.

Perennial Wind Chaser Station
Hermiston, Oregon

SITE PLAN

November 2013 | 24-1-03794-001

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FIG. 2

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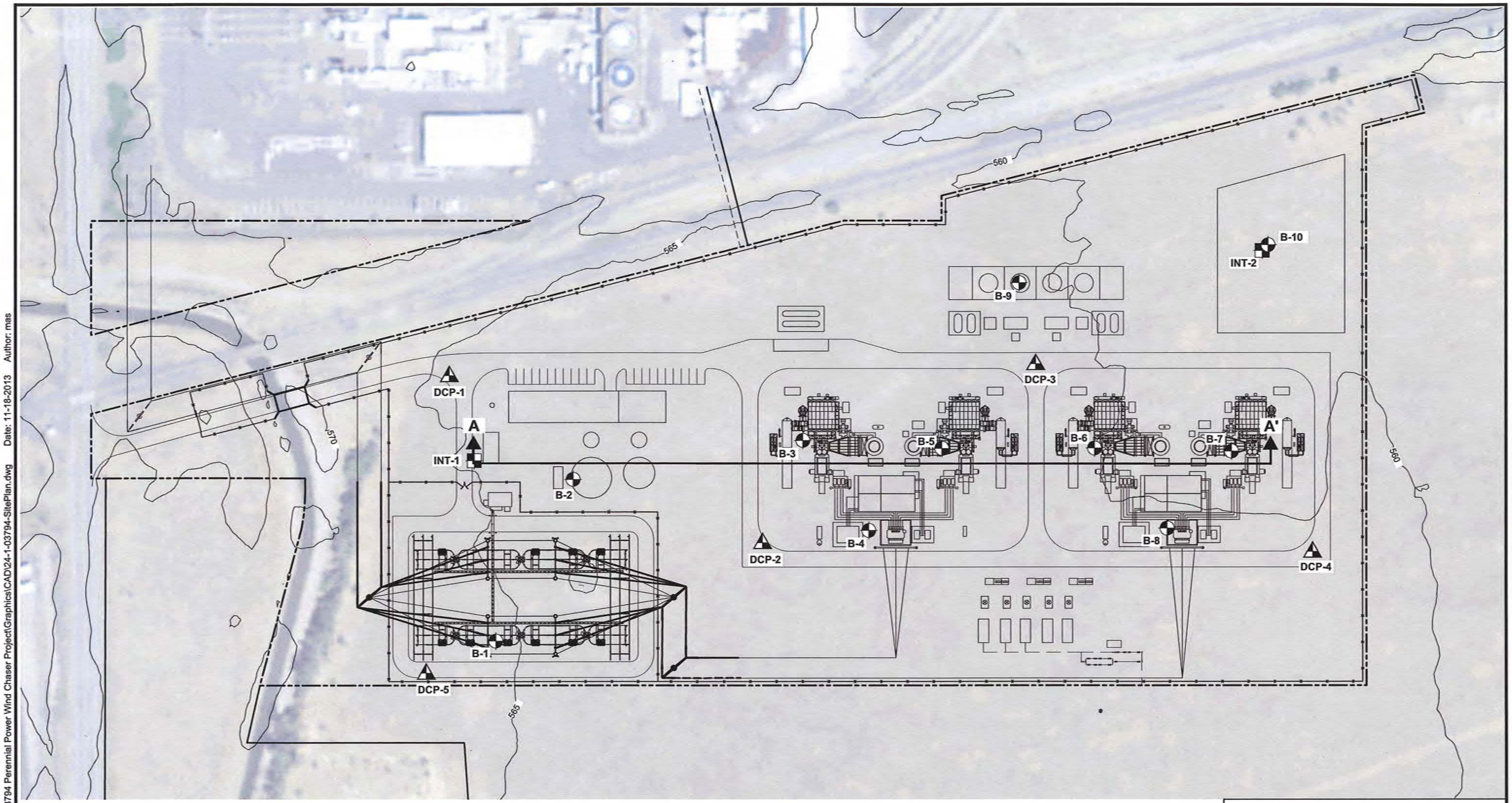

EXPLANATION

B-1 Location and Designation of Boring

INT-1 Location and Designation of Infiltration Test

DCP-1 Location and Designation of Dynamic Cone Penetrometer

A A' Location and Designation of Profile

NOTES:

1. Base drawing entitled, "CS002-permitting.dwg", provided by Burns & McDonnel, dated February 25, 2013.
2. Surface contours derived from a Digital Elevation Model (DEM), obtained through the National Elevation Dataset, accessed July 16th, 2013.

0 120 240

Scale in Feet

N

Perennial Wind Chaser Station
Hermiston, Oregon

EXPLORATION PLAN

November 2013 24-1-03794-001

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FIG. 3

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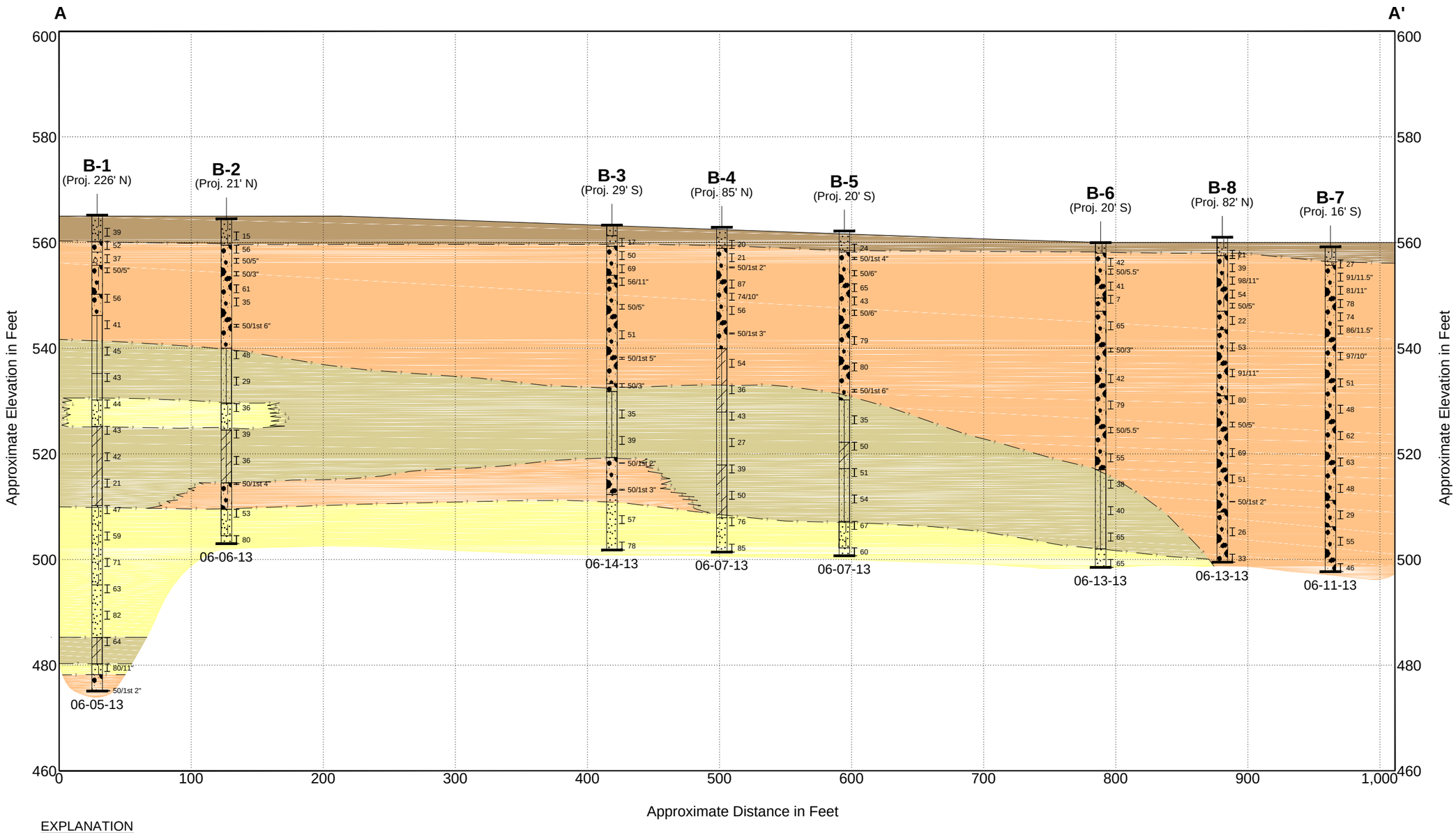
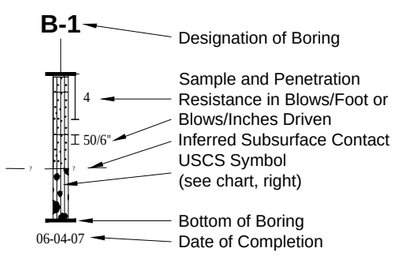


EXPLANATION



Loess

Catastrophic Flood Deposits

Gravel Facies

Sand Facies

Fine-grained Facies

NOTE

This subsurface profile is generalized from materials observed in soil borings. Variations may exist between profile and actual conditions.

0 80 160

Horizontal Scale in Feet

0 20 40

Vertical Scale in Feet

Vertical Exaggeration = 4X

Perennial Wind Chaser Station
Hermiston, Oregon

PROFILE A-A'

November 2013 24-1-03794-001

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FIG. 4

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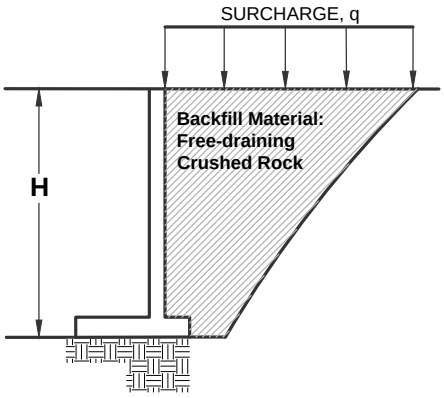
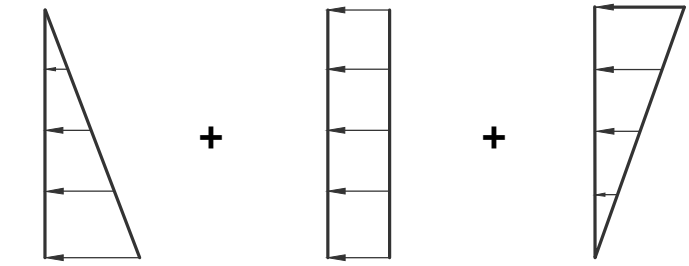
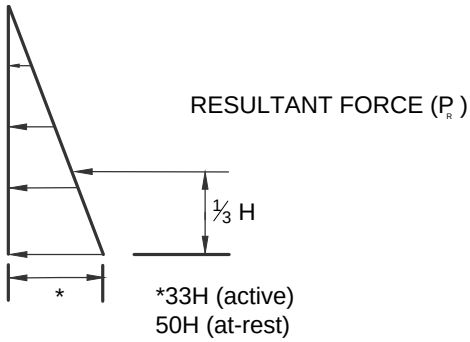
TOTAL LATERAL PRESSURE





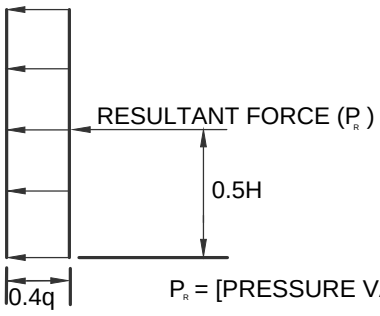
STATIC BACKFILL COMPONENT | STATIC SURCHARGE COMPONENT | SEISMIC BACKFILL COMPONENT

STATIC BACKFILL COMPONENT



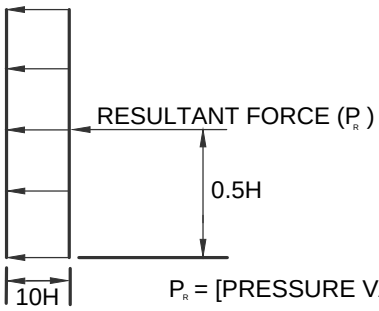
P_R = [PRESSURE VALUE] x $\frac{H}{2}$

STATIC SURCHARGE COMPONENT



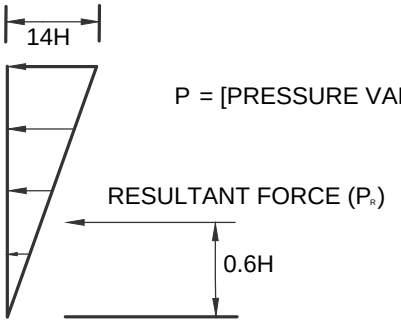
P_R = [PRESSURE VALUE] x $\frac{H}{2}$

COMPACTION INDUCED COMPONENT



P_R = [PRESSURE VALUE] x $\frac{H}{2}$

SEISMIC BACKFILL COMPONENT



P = [PRESSURE VALUE] x $\frac{H}{2}$

Perennial Wind Chaser Station
Hermiston, Oregon

LATERAL PRESSURE DISTRIBUTION AND RESULTANT LOCATION

November 2013 24-1-03794-001

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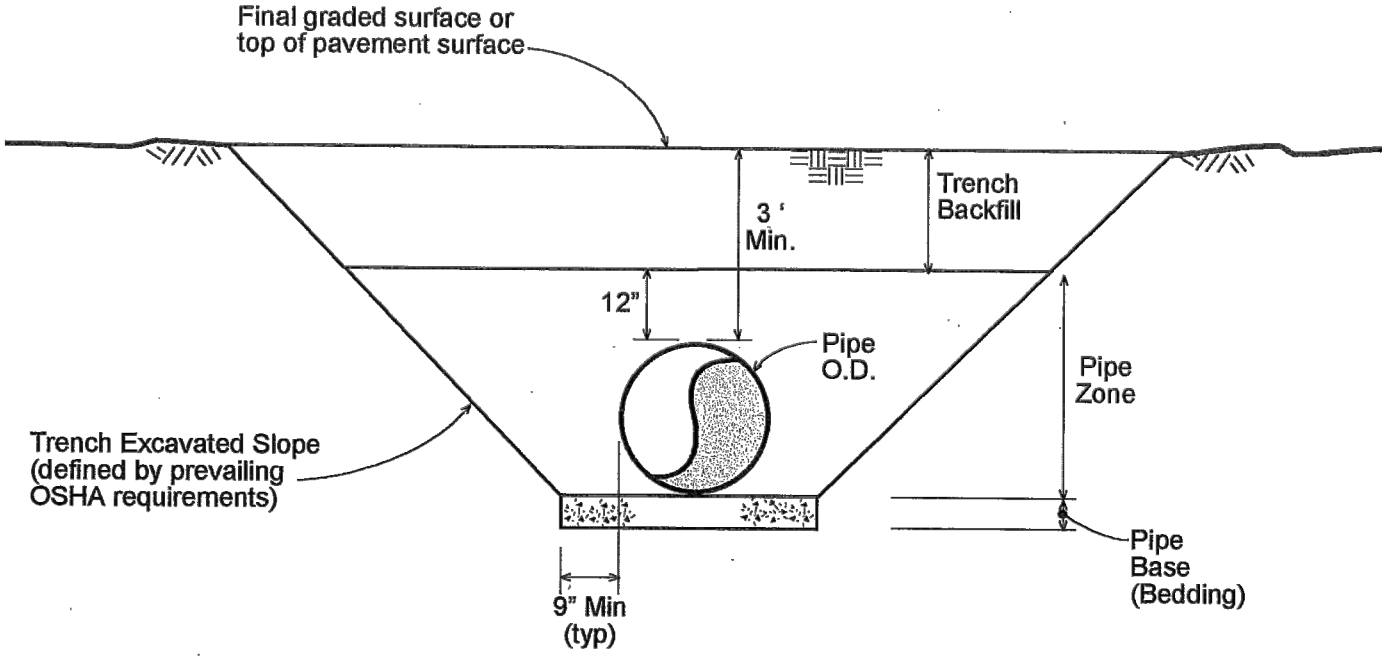
FIG. 5

File: I:\WIP\Projects\24-1 Portland\3700\3794 Perennial Power Wind Chaser Project\Graphics\CAD\24-1-03794-SitePlan.dwg Date: 11-18-2013 Author: mas



Perennial Wind Chaser Station
Hermiston, Oregon

TRENCH BACKFILL TERMINOLOGY

November 2013 24-1-03794-001

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FIG. 6

File: I:\WIP\Projects\24-1 Portland\3700\3794 Perennial Power Wind Chaser Project\Graphics\CAD\24-1-03794-SitePlan.dwg Date: 11-18-2013 Author: mas

APPENDIX A

FIELD EXPLORATIONS

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APPENDIX A

FIELD EXPLORATIONS

A.1 GENERAL

Shannon & Wilson, Inc., explored subsurface conditions at the project site with ten (10) geotechnical borings, five (5) dynamic cone penetrometer (DCP) tests, and two (2) infiltration tests. The borings were designated B-1 through B-10 and ranged in depth from 31 to 90.1 feet below the ground surface (bgs). The DCP tests were designated DCP-1 through DCP-5 and ranged in depth from 2.3 to 5.4 feet bgs. The infiltration tests were designated INT-1 and INT-2 and ranged in depth from 1.5 to 2.0 feet bgs. The locations of the completed borings, DCPs, and infiltration tests were measured in the field using a handheld GPS unit. Approximate exploration locations are shown on the Exploration Plan, Figure 3. Exploration coordinates, elevations, depths, and other data are presented on the Exploration Summary, Table A1. This appendix describes the techniques used to advance and sample the borings and presents logs of the materials encountered during drilling. It also presents DCP and infiltration testing procedures and results.

A.2 BORINGS

A.2.1 Drilling

Borings B-1 through B-10 were drilled between June 5 and June 14, 2013. The borings were drilled using two CME-75 truck-mounted drill rigs provided and operated by Hardcore Drilling, Inc., of Dundee, Oregon. The two drill rigs were exchanged on June 12, 2013, due to a mechanical problem with the first rig. Boring B-1 was started using hollow stem auger drilling techniques so that the groundwater depth could be discerned, but the augers met refusal in the gravel deposits, above the groundwater table. Boring B-1 was then completed using mud rotary drilling techniques, flushed with water, and left open for several days in order to observe the approximate groundwater level. Borings B-2 through B-10 were drilled using mud-rotary drilling techniques. Shannon & Wilson representatives were present during the explorations to locate the borings, observe the drilling, collect soil samples, and log the materials encountered.

A.2.2 Disturbed Sampling

Disturbed samples were collected in the borings, typically at 2.5- to 5-foot depth intervals, using a standard 2-inch outside diameter (O.D.) split spoon sampler in conjunction with Standard Penetration Testing. In a Standard Penetration Test (SPT), ASTM D1586, the

sampler is driven 18 inches into the soil using a 140-pound hammer dropped 30 inches. The number of blows required to drive the sampler the last 12 inches is defined as the standard penetration resistance, or N-value. The SPT N-value provides a measure of in-situ relative density of cohesionless soils (silt, sand, and gravel), and the consistency of cohesive soils (silt and clay). All disturbed samples were visually identified and described in the field, sealed to retain moisture, and returned to our laboratory for additional examination and testing.

SPT N-values can be significantly affected by several factors, including the efficiency of the hammer used. Two different automatic hammer systems were used for the borings performed at the site. Automatic hammers generally have higher energy transfer efficiencies than cathead driven hammers. Based on information we received from Hardcore Drilling, Inc., the energy efficiency of the hammer used on borings B-1, B-2, B-4, B-5, and B-7 was measured at 72 percent in February 2013, and the energy efficiency of the hammer used on borings B-3, B-6, B-8, and B-9 was measured at 85.1 percent in January 2013. In boring B-10, the drill rig and automatic hammer system were changed during drilling. Samples S-1 through S-3 were taken using the hammer with 72 percent energy efficiency and samples S-4 through S-9 were taken using the hammer with 85.1 percent energy efficiency. Hammer efficiencies for each of the borings are presented in Table A1. All N-values presented in this report are in blows per foot, as counted in the field. No corrections of any kind have been applied.

An SPT was considered to have met refusal where more than 50 blows were required to drive the sampler 6 inches. If refusal was encountered in the first six-inch interval (for example, 50 for 1.5”), the count is reported as 50/1st 1.5”. If refusal was encountered in the second six-inch interval (for example, 48, 50 for 1.5”), the count is reported as 50/1.5”. If refusal was encountered in the last six-inch interval (for example, 39, 48, 50 for 1.5”), the count is reported as 98/7.5”.

A.2.3 Undisturbed Sampling

Undisturbed samples were collected in 3-inch O.D. thin-wall Shelby tubes which were pushed into the undisturbed soil at the bottoms of boreholes hydraulically. The soils exposed at the ends of the tubes were examined and described in the field. After examination, the ends of the tubes were sealed to preserve the natural moisture of the samples. The sealed tubes were stored in the upright position and care was taken to avoid shock and vibration during their transport and storage in our laboratory.

A.2.4 Borehole Abandonment

After drilling, boring B-1 was flushed with water and left open with a tremie pipe inserted for several days in order to observe the natural groundwater level. After the groundwater level was recorded, it was backfilled with bentonite cement grout. All other boreholes were backfilled with bentonite cement grout or bentonite chips in accordance with Oregon Water Resource Department regulations. No wells or other instruments were installed in the boreholes.

A.2.5 Material Descriptions

Soil samples were described and identified visually in the field in general accordance with ASTM D2488, Standard Practice for Description and Identification of Soils (Visual-Manual Procedure). The specific terminology used is defined in the Soil Description and Log Key, Figure A1. Consistency, color, relative moisture, degree of plasticity, peculiar odors and other distinguishing characteristics of the samples were noted. Once transported to our laboratory, the samples were re-examined, various classification tests were performed, and the field descriptions and identifications were modified where necessary. We refined our visual-manual soil descriptions and identifications based on the results of the laboratory tests, using elements of the Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System), ASTM D2487. However, ASTM D2487 was not followed in full because it requires that a suite of tests be performed to fully classify a single sample.

A.2.6 Logs of Borings

Summary logs of borings are presented in Figures A2 through A11. Soil descriptions and interfaces on the logs are interpretive, and actual changes may be gradual. The left-hand portion of the boring logs gives our description, identification, and geotechnical unit designation for the soils encountered in the boring. The right-hand portion of the boring logs shows a graphic log, sample locations and designations, groundwater information, and a graphical representation of N-values, natural water contents, sample recovery, Atterberg limits, and fines content.

A.3 DYNAMIC CONE PENETROMETER (DCP) TESTING

A Shannon & Wilson geologist performed five (5) dynamic cone penetrometer (DCP) tests, designated DCP-1 through DCP-5, on July 9, 2013. The approximate locations of the DCPs are shown on the Exploration Plan, Figure 3. The DCP is a device widely used to determine in-situ strength properties of base materials and subgrade soils. The tests were performed in general accordance with ASTM D6951, Standard Test Method for the Use of the Dynamic Cone Penetrometer in Shallow Pavement Applications. The four main components of the DCP include

the cone, rod, anvil, and hammer. The cone is attached to one end of the DCP rod while the anvil and hammer are attached to the other end. Energy is applied to the cone tip through the rod by dropping the 17.64-pound hammer a distance of 22.6 inches against the anvil. The diameter of the cone is 0.16 inch larger than the rod to ensure that only tip resistance is measured. The number of blows required to advance the cone into the subsurface materials is recorded. The DCP index is the ratio of the depth of penetration to the number of blows of the hammer. This can be correlated to a variety of material properties, including California Bearing Ratio (CBR) and Resilient Modulus. The DCP test data and the resulting Subgrade Resilient Modulus versus depth plots, developed in accordance with the ODOT Pavement Design Guide (2011), are presented in Figure A12 through Figure A16.

A.4 INFILTRATION TESTING

A Shannon & Wilson geologist performed two (2) infiltration tests, designated INT-1 and INT-2, on July 9, 2013. The approximate locations of the infiltration tests are shown on the Exploration Plan, Figure 3. The test was performed in general accordance with the Encased Falling Head Test method, described in the 2008 Portland Stormwater Management Manual, Appendix F2. At each test location, a hole was excavated to a depth between 1.5 and 2.0 feet below the ground surface using a post-hole digger. A six-inch inside diameter polyvinyl chloride (PVC) casing was then inserted and embedded six inches into the bottom of the hole to create a six-inch soil plug. Water was added to the casing to presoak the soil. After the initial pre-soak, testing was performed by adding additional water to the casing and periodically measuring the depth to water from the top of the casing. Infiltration test data are presented in Table A2 and Table A3.

TABLE A1: EXPLORATION SUMMARY

Exploration Designation	Date Started	Date Completed	Northing[1] (ft)	Easting[1] (ft)	Elevation[2] (ft)	Total Depth[3] (ft)	Driller/ Excavator[4]	Equipment	Hammer Efficiency[5] (%)
B-1	6/5/2013	6/5/2013	780334	8490173	565.2	90.1	Hardcore	CME-75 (102)	72.0
B-2	6/6/2013	6/6/2013	780539	8490271	564.5	61.5	Hardcore	CME-75 (102)	72.0
B-3	6/13/2013	6/14/2013	780589	8490563	563.3	61.5	Hardcore	CME-75 (103)	85.1
B-4	6/6/2013	6/7/2013	780475	8490646	562.9	61.5	Hardcore	CME-75 (102)	72.0
B-5	6/7/2013	6/7/2013	780579	8490739	562.2	61.5	Hardcore	CME-75 (102)	72.0
B-6	6/12/2013	6/13/2013	780579	8490933	560.0	61.5	Hardcore	CME-75 (103)	85.1
B-7	6/10/2013	6/11/2013	780575	8491107	559.2	61.5	Hardcore	CME-75 (102)	72.0
B-8	6/13/2013	6/13/2013	780477	8491025	561.0	61.5	Hardcore	CME-75 (103)	85.1
B-9	6/12/2013	6/12/2013	780789	8490838	560.5	40.4	Hardcore	CME-75 (103)	85.1
B-10	6/11/2013	6/12/2013	780837	8491154	558.7	31.0	Hardcore	CME-75 (102 / 103)	72.0 / 85.1
DCP-1	7/9/2013	7/9/2013	780671	8490114	564.9	5.4	S&W	DCP	N/A
DCP-2	7/9/2013	7/9/2013	780459	8490511	563.5	3.8	S&W	DCP	N/A
DCP-3	7/9/2013	7/9/2013	780686	8490859	560.6	2.5	S&W	DCP	N/A
DCP-4	7/9/2013	7/9/2013	780448	8491210	560.3	2.3	S&W	DCP	N/A
DCP-5	7/9/2013	7/9/2013	780293	8490084	565.5	2.9	S&W	DCP	N/A
INT-1	7/9/2013	7/9/2013	780563	8490146	564.9	1.5	S&W	hand tools	N/A
INT-2	7/9/2013	7/9/2013	780830	8491147	558.7	2.0	S&W	hand tools	N/A

1) Horizontal datum is NAD 83, Oregon State Plane North, US feet.
2) Elevation is that of the ground surface at the time of drilling, estimated from surface contours generated using a 10 meter digital elevation model. The vertical datum is NAVD 88.
3) Depths are in feet below the ground surface at the time of drilling.
4) Hardcore = Hardcore Drilling, Inc.; S&W = Shannon & Wilson, Inc.
5) Reported energy efficiency of automatic hammers used for the Standard Penetration Test (SPT). SPT N-values presented in this report are in blows per foot, as counted in the field. No corrections of any kind have been applied.

TABLE A2: INFILTRATION TEST INT-1 DATA

Trial	Time	Depth to Water Below Top of Casing (feet)	Head Over Soil (feet)	Elapsed Time (minutes)	Change in Water Level (feet)	Infiltration Rate (inches/hour)
Pre-Soak	1029	0.92	1.28	N/A	N/A	N/A
	1042	1.17	1.03	13	0.25	13.8
	1108	1.49	0.71	26	0.32	8.9
	1148	1.82	0.38	40	0.33	5.9
	1214	1.97	0.23	26	0.15	4.2
	1245	2.09	0.11	31	0.12	2.8
#1	1247	0.95	1.25	N/A	N/A	N/A
	1313	1.25	0.95	26	0.3	8.3
	1334	1.44	0.76	21	0.19	6.5
	1350	1.56	0.64	16	0.12	5.4
	1436	1.82	0.38	46	0.26	4.1
	1501	1.93	0.27	25	0.11	3.2
#2	1503	1.03	1.17	N/A	N/A	N/A
	1523	1.19	1.01	20	0.16	5.8
	1546	1.35	0.85	23	0.16	5.0
	1606	1.48	0.72	20	0.13	4.7
	1626	1.59	0.61	20	0.11	4.0
	1646	1.69	0.51	20	0.1	3.6
	1721	1.83	0.37	35	0.14	2.9

Date Performed = 7/9/2013

Hole Depth Below Ground Surface = 1.5 feet

Total Casing Length = 2.7 feet

Casing Stickup = 0.7 feet

Soil Plug in Casing (below bottom of hole) = 0.5 feet

Casing Inside-Diameter = 0.5 feet

N/A = not applicable

TABLE A3: INFILTRATION TEST INT-2 DATA

Trial	Time	Depth to Water Below Top of Casing (feet)	Head Over Soil (feet)	Elapsed Time (minutes)	Change in Water Level (feet)	Infiltration Rate (inches/hour)
Pre-Soak	1039	1.08	1.62	N/A	N/A	N/A
	1110	1.32	1.38	31	0.24	5.6
	1120	1.37	1.33	10	0.05	3.6
	1146	1.50	1.20	26	0.13	3.6
	1217	1.66	1.04	31	0.16	3.7
	1241	1.73	0.97	24	0.07	2.1
#1	1243	0.97	1.73	N/A	N/A	N/A
	1315	1.16	1.54	32	0.19	4.3
	1330	1.24	1.46	15	0.08	3.8
	1419	1.42	1.28	49	0.18	2.6
	1432	1.53	1.17	13	0.11	6.1
	1454	1.62	1.08	22	0.09	2.9
#2	1456	0.97	1.73	N/A	N/A	N/A
	1518	1.08	1.62	22	0.11	3.6
	1540	1.18	1.52	22	0.1	3.3
	1600	1.28	1.42	20	0.1	3.6
	1620	1.37	1.33	20	0.09	3.2
	1640	1.45	1.25	20	0.08	2.9
	1700	1.53	1.17	20	0.08	2.9

Date Performed = 7/9/2013

Hole Depth Below Ground Surface = 2.0 feet

Total Casing Length = 3.2 feet

Casing Stickup = 0.7 feet

Soil Plug in Casing (below bottom of hole) = 0.5 feet

Casing Inside-Diameter = 0.5 feet

N/A = not applicable

Shannon & Wilson, Inc. (S&W), uses a soil description system modified from the Unified Soil Classification System (USCS). Elements of the USCS and other definitions are provided on this and the following page. Soil identifications are based on visual-manual procedures (ASTM D2488) unless otherwise noted.

S&W OREGON SOIL CONSTITUENT DEFINITIONS

CONSTITUENTS[2]	FINE-GRAINED SOILS (50% or more fines)[1]	COARSE-GRAINED SOILS (less than 50% fines)[1]
Major All capital letters	CLAY or SILT based on behavior	SAND or GRAVEL based on weight
Modifying (Secondary) Precede major constituent	if fine-grained, silty or clayey based on behavior	if fine-grained, > 12% silty or clayey
	if coarse-grained, > 27% sandy or gravelly	if coarse-grained, > 27% sandy or gravelly
Minor Follow major constituent	> 12% - 27% with sand or with gravel	if fine-grained, 5% - 12% with silt or with clay
		if coarse-grained, > 12% - 27% with sand or with gravel

[1] All percentages are by weight
[2] The order of terms is: modifying MAJOR with minor

CEMENTATION DEFINITIONS

Weak	Crumbles or breaks with handling or slight finger pressure
Moderate	Crumbles or breaks with considerable finger pressure
Strong	Will not crumble or break with finger pressure

ABBREVIATIONS

ATD	At Time of Drilling
Elev.	Elevation
ft	feet
FeO	Iron Oxide
MgO	Magnesium Oxide
HSA	Hollow Stem Auger
I.D.	Inside Diameter
in	inches
lbs	pounds
N	Blows for second two 6-inch increments
N_E	N, corrected for hammer energy
NA	Not applicable or not available
NP	Nonplastic
O.D.	Outside diameter
PID	Photo-ionization detector
ppm	parts per million
PVC	Polyvinyl Chloride
SPT	Standard Penetration Test
USCS	Unified Soil Classification System
q_u	Unconfined Compressive Strength

PARTICLE SIZE DEFINITIONS

DESCRIPTION	SIEVE NUMBER AND/OR SIZE
FINES	< #200 (0.08 mm)
SAND	
- Fine	#200 to #40 (0.08 to 0.4 mm)
- Medium	#40 to #10 (0.4 to 2 mm)
- Coarse	#10 to #4 (2 to 5 mm)
GRAVEL	
- Fine	#4 to 3/4 inch (5 to 19 mm)
- Coarse	3/4 to 3 inches (19 to 76 mm)
COBBLES	3 to 12 inches (76 to 305 mm)
BOULDERS	> 12 inches (305 mm)

RELATIVE DENSITY / CONSISTENCY

COHESIONLESS SOILS		COHESIVE SOILS	
N_E, SPT, BLOWS/FT.	RELATIVE DENSITY	N_E, SPT, BLOWS/FT.	RELATIVE CONSISTENCY
0 - 4	Very loose	Under 2	Very soft
4 - 10	Loose	2 - 4	Soft
10 - 30	Medium dense	4 - 8	Medium stiff
30 - 50	Dense	8 - 15	Stiff
Over 50	Very dense	15 - 30	Very stiff
		Over 30	Hard

WELL AND OTHER SYMBOLS

Bentonite Cement Grout	Surface Cement Seal
Bentonite Grout	Asphalt or Cap
Bentonite Chips	Slough
Silica Sand	Bedrock
PVC Screen	Fill
Pressure Transducer	

PLASTICITY

PLASTICITY ADJECTIVE	PLASTICTY INDEX (PI) RANGE
Nonplastic	0 - 4
Low Plasticity	>4 - 10
Medium Plasticity	>10 - 20
High Plasticity	>20 - 40
Very High Plasticity	>40

Perennial Wind Chaser Station
Hermiston, Oregon

SOIL DESCRIPTION AND LOG KEY

November 2013 24-1-03794-001

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FIG. A1
Sheet 1 of 2

POST_07_BORING_CLASS1_CRC 24-1-03794-HERMISTON.GPJ SWNEW.GDT 11/18/13

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)
(Modified from US Army Corps of Engineers Tech Memo 3-357)

MAJOR DIVISIONS			GROUP/GRAPHIC SYMBOL	TYPICAL DESCRIPTION
COARSE-GRAINED SOIL *(more than 50% retained on No. 200 sieve)*	Gravel *(more than 50% of coarse fraction retained on No. 4 sieve)*	Gravel or Gravel with silt or clay	GW GW-GM GW-GC	GRAVEL, GRAVEL with sand, sandy GRAVEL, GRAVEL with silt or clay
			GP GP-GM GP-GC	GRAVEL, GRAVEL with sand, sandy GRAVEL, GRAVEL with silt or clay
		Silty Gravel or Clayey Gravel	GM	Silty GRAVEL, silty GRAVEL with sand, sandy silty GRAVEL
			GC	Clayey GRAVEL, clayey GRAVEL with sand, sandy clayey GRAVEL
	Sand *(50% or more of coarse fraction passes the No. 4 sieve)*	Sand or Sand with silt or clay	SW SW-SM SW-SC	SAND, SAND with gravel, gravelly SAND, SAND with silt or clay
			SP SP-SM SP-SC	SAND, SAND with gravel, gravelly SAND, SAND with silt or clay
		Silty Sand or Clayey Sand	SM	Silty SAND, silty SAND with gravel, gravelly silty SAND
			SC	Clayey SAND, clayey SAND with gravel, gravelly clayey SAND
FINE-GRAINED SOIL *(50% or more passes the No. 200 sieve)*	Silt and Clay *(liquid limit less than 50)*	Inorganic	ML	Nonplastic to medium plasticity SILT or clayey SILT; with sand and/or gravel to sandy or gravelly
			CL	Low to very high plasticity silty CLAY or CLAY; with sand and/or gravel to sandy or gravelly
		Organic	OL	Nonplastic to very high plasticity organic SILT, clayey SILT, silty CLAY, or CLAY; with sand and/or gravel to sandy or gravelly
	Silt and Clay *(liquid limit 50 or more)*	Inorganic	MH	Nonplastic to very high plasticity SILT or clayey SILT; with sand and/or gravel to sandy or gravelly
			CH	High to very high plasticity CLAY; with sand and/or gravel to sandy or gravelly
		Organic	OH	Nonplastic to very high plasticity organic SILT, clayey SILT, or CLAY; with sand and/or gravel to sandy or gravelly
HIGHLY-ORGANIC SOIL	Primarily organic matter, dark in color, has organic odor		PT	Peat and other highly organic soils (see ASTM D4427)

NOTE: No. 4 size = 4.75 mm = approx. 0.2 in; No. 200 size = 0.075 mm = approx. 0.003 in

Additional Symbols		This symbol is used to indicate the presence of cobbles and/or boulders.
		Gray shading, when combined with another symbol, indicates cementation.

NOTES

1. Solid lines on the logs are used to group materials with similar characteristics. The groupings shown are an interpretation of the conditions encountered and actual transitions may be more gradational than shown.
2. Dual symbols (symbols separated by a hyphen, i.e., SP-SM, SAND with silt) are used for coarse-grained soils with 10 percent fines or when the liquid limit and plasticity index values plot in the CL-ML area of the plasticity chart.
3. Borderline symbols (symbols separated by a slash, i.e., CL/ML and GW/SW) indicate that the soil may fall into one of two possible basic groups.
4. The soil graphics above represent the various USCS identifications (i.e., GP, SM, etc.) and may be augmented with additional symbology to represent differences within USCS designations. Sandy SILT (ML), for example, may be accompanied by the ML soil graphic with sand grains added.

Perennial Wind Chaser Station
Hermiston, Oregon

SOIL DESCRIPTION AND LOG KEY

November 2013 24-1-03794-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A1
Sheet 2 of 2

POST_07_BORING_CLASS2_CRC 24-1-03794-HERMISTON.GPJ SWNEW.GDT 11/18/13

Total Depth:	90.1 ft.	Northing:	~ 780,334 ft.	Drilling Method:	HSA and Mud Rotary	Hole Diam.:	8 - 5 in.
Top Elevation:	~ 565 ft.	Easting:	~ 8,490,173 ft.	Drilling Company:	Hardcore Drilling	Rod Type:	NWJ
Vert. Datum:	NAD88	Station:	~	Drill Rig Equipment:	CME-75	Hammer Type:	Automatic
Horiz. Datum:	NAVD88	Offset:	~	Other Comments:	Hammer Efficiency = 72%		

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.

Dense gray and brown silty SAND, trace gravel; dry; nonplastic fines; fine sand; coarse rounded gravel; micaceous. (SM)

LOESS

Very dense gray and brown sandy GRAVEL with silt and COBBLES and BOULDERS; dry; nonplastic fines; fine sand; fine to coarse rounded gravel. (GP-GM)

CATASTROPHIC FLOOD DEPOSITS GRAVEL FACIES

Dense gray gravelly SAND; dry; fine sand; fine to coarse rounded gravel. (SP)

Very dense gray silty GRAVEL with sand; dry; nonplastic fines; fine sand; fine to coarse rounded gravel. (GM)

Very dense gray sandy GRAVEL; dry; fine to coarse rounded sand; fine to coarse rounded gravel. (GP)

Lost drilling mud circulation at 15.0 feet.

Hard brown SILT, trace sand; moist; low plasticity; fine sand; micaceous. (ML)

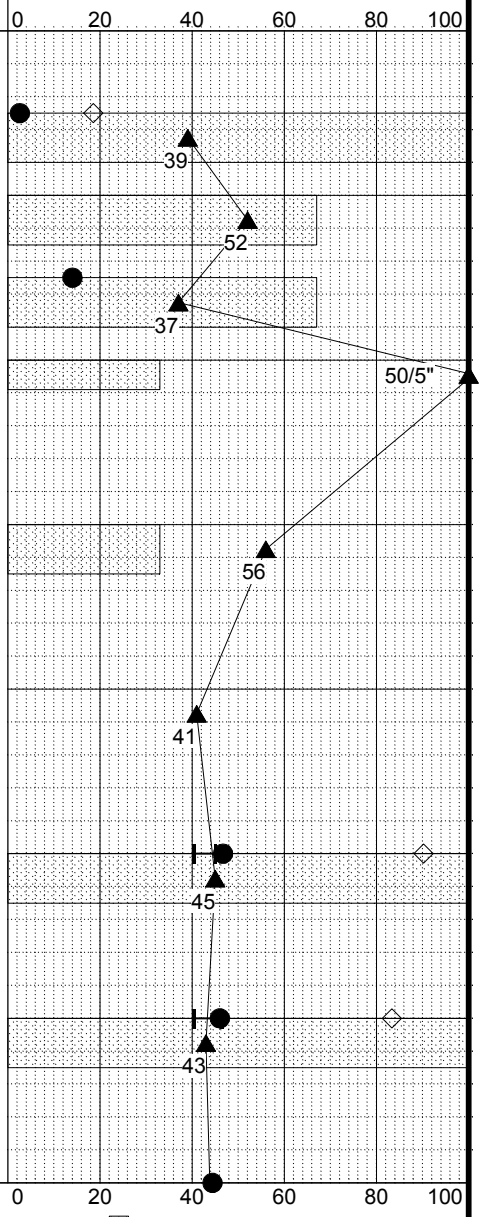
CATASTROPHIC FLOOD DEPOSITS FINE-GRAINED FACIES

Hard brown SILT with sand; moist; low plasticity; fine sand; micaceous. (ML)

Elev.	Depth (ft.)
560.2	5.0
558.2	7.0
555.7	9.5
550.2	15.0
546.2	19.0
535.2	30.0

Samples: S-1, S-2, S-3, S-4, S-5, S-6 *, S-7, S-8

Ground Water: 6/14/2013



CONTINUED NEXT SHEET

LEGEND

* Sample Not Recovered

Standard Penetration Test

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. Group symbol is based on visual-manual identification and selected lab testing.
4. The hole location and elevation should be considered approximate.

Perennial Wind Chaser Station
Hermiston, Oregon

LOG OF BORING B-1

November 2013 24-1-03794-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A2
Sheet 1 of 3

REV 3

MASTER_LOG_E 24-1-03794-HERMISTON.GPJ SHAN_WIL.GDT 11/18/13 Log: DJH Rev: CKS Typ: MAS

Total Depth:	90.1 ft.	Northing:	~ 780,334 ft.	Drilling Method:	HSA and Mud Rotary	Hole Diam.:	8 - 5 in.
Top Elevation:	~ 565 ft.	Easting:	~ 8,490,173 ft.	Drilling Company:	Hardcore Drilling	Rod Type:	NWJ
Vert. Datum:	NAD88	Station:	~	Drill Rig Equipment:	CME-75	Hammer Type:	Automatic
Horiz. Datum:	NAVD88	Offset:	~	Other Comments:	Hammer Efficiency = 72%		

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.

Elev. Depth (ft.)	Soil Description
530.2 / 35.0	Dense brown silty SAND; moist; low plasticity fines; fine sand; micaceous. (SM)
	CATASTROPHIC FLOOD DEPOSITS SAND FACIES
525.2 / 40.0	Hard brown clayey SILT with sand to sandy clayey SILT; moist; medium plasticity; fine sand; micaceous. (MH)
	CATASTROPHIC FLOOD DEPOSITS FINE-GRAINED FACIES
	Grades to very stiff at 50.0 feet
510.2 / 55.0	Dense gray silty SAND, moist; nonplastic fines; fine sand; micaceous. (SM)
	CATASTROPHIC FLOOD DEPOSITS SAND FACIES
	Grades to very dense at 60.0 feet.

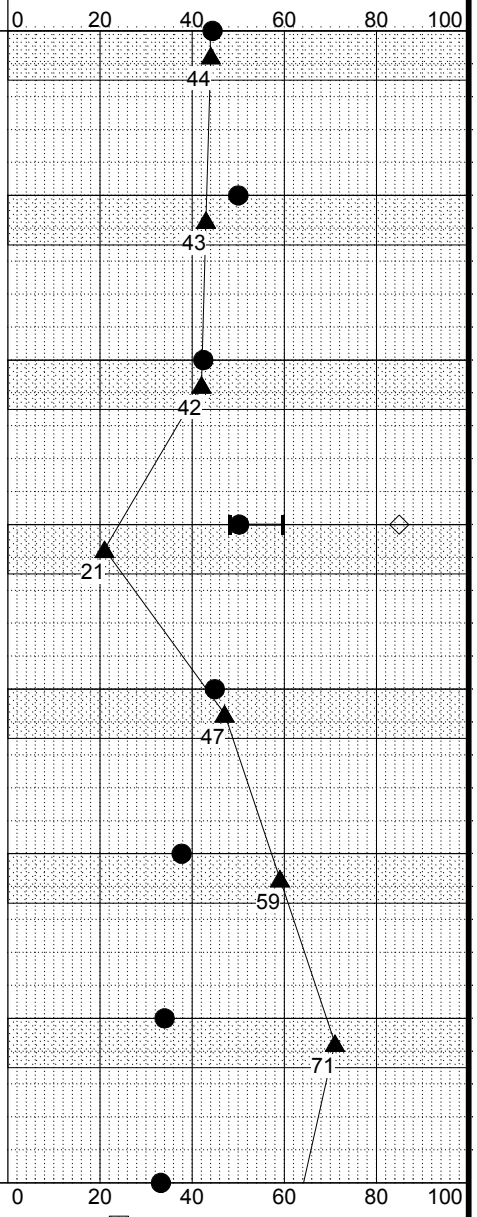
Samples: S-9, S-10, S-11, S-12, S-13, S-14, S-15

Ground Water

Depth, ft.

PENETRATION RESISTANCE, N (blows/ft.)

▲ Hammer Wt. & Drop: 140 lbs / 30 inches



CONTINUED NEXT SHEET

LEGEND

* Sample Not Recovered

Standard Penetration Test

Recovery (%)

◇ % Fines (<0.075mm)

● % Water Content

Plastic Limit — Liquid Limit

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. Group symbol is based on visual-manual identification and selected lab testing.
4. The hole location and elevation should be considered approximate.

Perennial Wind Chaser Station
Hermiston, Oregon

LOG OF BORING B-1

November 2013 | 24-1-03794-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A2
Sheet 2 of 3

REV 3

MASTER_LOG_E 24-1-03794-HERMISTON.GPJ SHAN_WIL.GDT 11/18/13 Log: DJH Rev: CKS Typ: MAS

Total Depth:	90.1 ft.	Northing:	~ 780,334 ft.	Drilling Method:	HSA and Mud Rotary	Hole Diam.:	8 - 5 in.
Top Elevation:	~ 565 ft.	Easting:	~ 8,490,173 ft.	Drilling Company:	Hardcore Drilling	Rod Type:	NWJ
Vert. Datum:	NAD88	Station:	~	Drill Rig Equipment:	CME-75	Hammer Type:	Automatic
Horiz. Datum:	NAVD88	Offset:	~	Other Comments:	Hammer Efficiency = 72%		

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.

Very dense gray SAND, trace silt; moist to wet; fine sand; micaceous. (SP)

CATASTROPHIC FLOOD DEPOSITS
SAND FACIES

Hard gray and brown SILT, trace sand; moist; low plasticity; fine sand; micaceous. (ML)

CATASTROPHIC FLOOD DEPOSITS
FINE-GRAINED FACIES

Very dense brown silty SAND; moist; nonplastic fines; fine sand; micaceous. (SM)

CATASTROPHIC FLOOD DEPOSITS
SAND FACIES

Very dense sandy GRAVEL; moist ; fine to coarse rounded sand; fine to coarse rounded gravel. (GP)

Lost drilling mud circulation at 87.0 feet.

CATASTROPHIC FLOOD DEPOSITS
GRAVEL FACIES

Completed - June 5, 2013

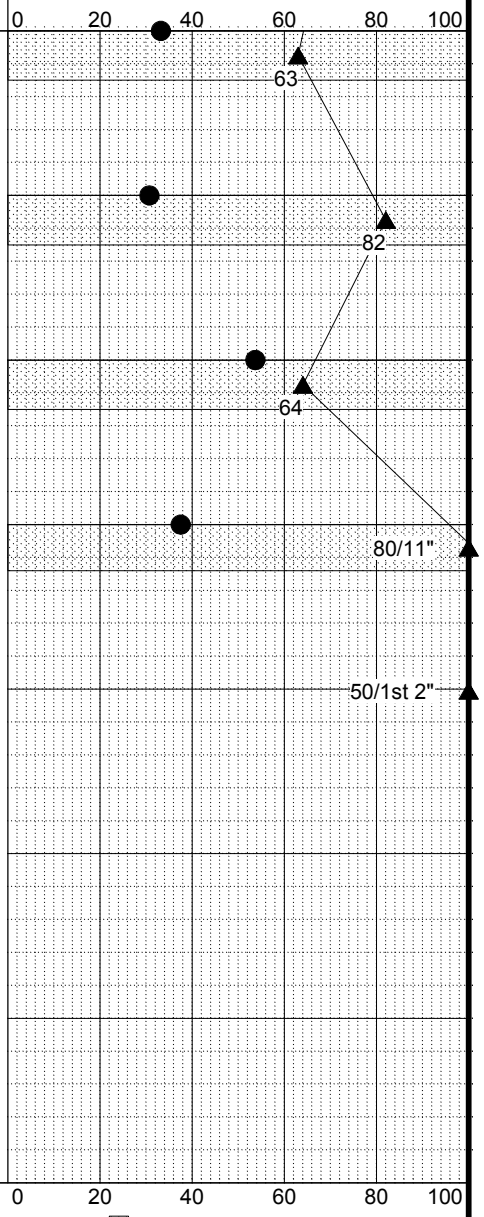
Elev.	Depth (ft.)
495.2	70.0
485.2	80.0
480.2	85.0
478.2	87.0
475.1	90.1

Symbol | Samples | Ground Water | Depth, ft.

S-16, S-17, S-18, S-19, S-20 *

PENETRATION RESISTANCE, N (blows/ft.)

▲ Hammer Wt. & Drop: *140 lbs / 30 inches*



LEGEND

* Sample Not Recovered

Standard Penetration Test

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. Group symbol is based on visual-manual identification and selected lab testing.
4. The hole location and elevation should be considered approximate.

Perennial Wind Chaser Station
Hermiston, Oregon

LOG OF BORING B-1

November 2013 24-1-03794-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A2
Sheet 3 of 3

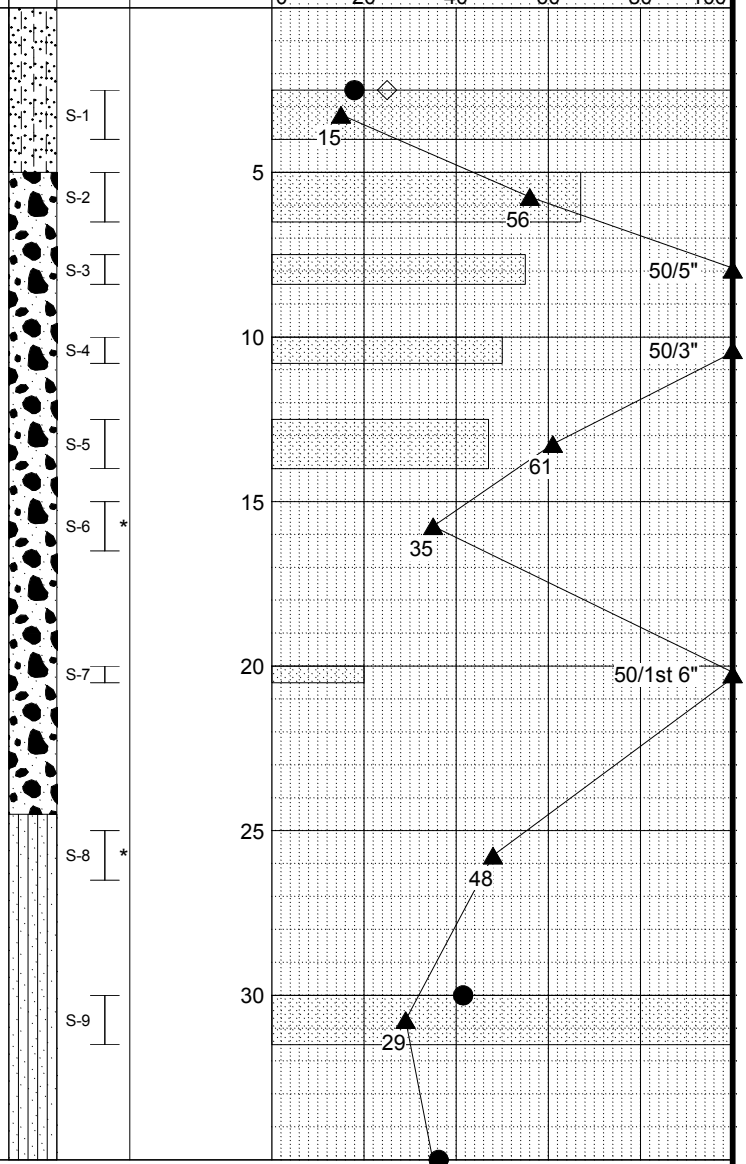
REV 3

MASTER_LOG_E 24-1-03794-HERMISTON.GPJ SHAN_WIL.GDT 11/18/13 Log: DJH Rev: CKS Typ: MAS

Total Depth:	61.5 ft.	Northing:	~ 780,539 ft.	Drilling Method:	Mud Rotary	Hole Diam.:	5 in.
Top Elevation:	~ 565 ft.	Easting:	~ 8,490,271 ft.	Drilling Company:	Hardcore Drilling	Rod Type:	NWJ
Vert. Datum:	NAD88	Station:	~	Drill Rig Equipment:	CME-75	Hammer Type:	Automatic
Horiz. Datum:	NAVD88	Offset:	~	Other Comments:	Hammer Efficiency = 72%		

SOIL DESCRIPTION *Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.*	Elev. Depth (ft.)
Medium dense brown silty SAND; dry; nonplastic fines; fine sand; micaceous. (SM) **LOESS**	
Dense to very dense gray sandy GRAVEL with COBBLES and BOULDERS; dry; fine to coarse rounded sand; fine to coarse rounded gravel. (GP) *Drilling mud loss from 5.0 to 24.5 feet.* **CATASTROPHIC FLOOD DEPOSITS GRAVEL FACIES**	559.5 5.0
Very stiff to hard gray and brown sandy SILT; moist; low plasticity; fine sand; micaceous. (ML) **CATASTROPHIC FLOOD DEPOSITS FINE-GRAINED FACIES**	540.0 24.5

Symbol | Samples | Ground Water | Depth, ft.



CONTINUED NEXT SHEET

LEGEND

* Sample Not Recovered

Standard Penetration Test

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. Group symbol is based on visual-manual identification and selected lab testing.
4. The hole location and elevation should be considered approximate.

Perennial Wind Chaser Station
Hermiston, Oregon

LOG OF BORING B-2

November 2013 | 24-1-03794-001

SHANNON & WILSON, INC.
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FIG. A3
Sheet 1 of 2

REV 3

MASTER_LOG_E 24-1-03794-HERMISTON.GPJ SHAN_WIL.GDT 11/18/13 Log: DJH Rev: CKS Typ: MAS

Total Depth:	61.5 ft.	Northing:	~ 780,539 ft.	Drilling Method:	Mud Rotary	Hole Diam.:	5 in.
Top Elevation:	~ 565 ft.	Easting:	~ 8,490,271 ft.	Drilling Company:	Hardcore Drilling	Rod Type:	NWJ
Vert. Datum:	NAD88	Station:	~	Drill Rig Equipment:	CME-75	Hammer Type:	Automatic
Horiz. Datum:	NAVD88	Offset:	~	Other Comments:	Hammer Efficiency = 72%		

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.

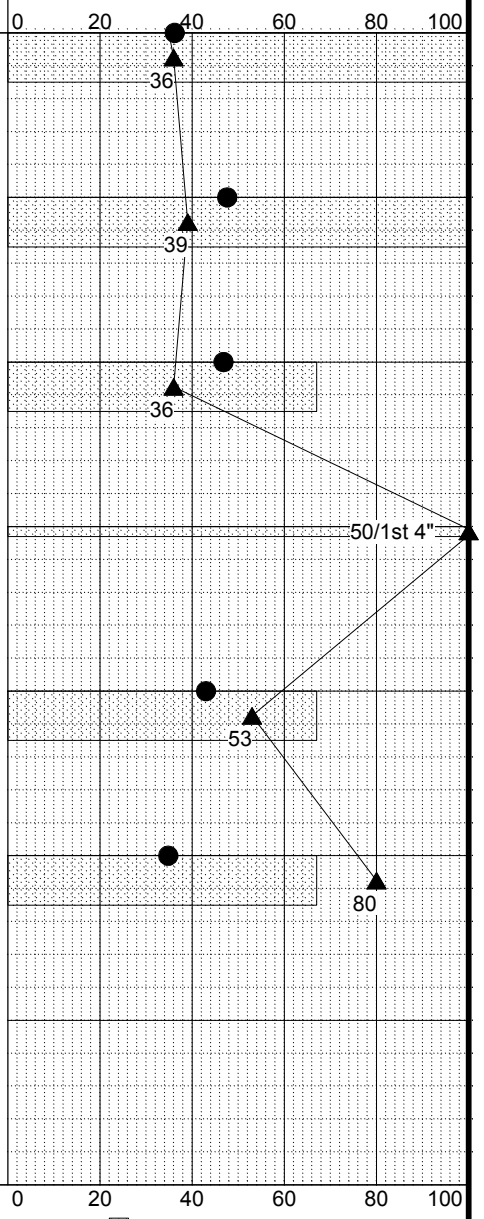
Soil description	Elev. / Depth (ft.)	Samples
Dense brown silty SAND; moist; nonplastic fines; fine sand; micaceous. (SM)	529.5 / 35.0	S-10
CATASTROPHIC FLOOD DEPOSITS SAND FACIES		
Hard brown clayey SILT with sand; moist; medium plasticity; fine sand; micaceous. (MH)	524.5 / 40.0	S-11
CATASTROPHIC FLOOD DEPOSITS FINE-GRAINED FACIES		S-12
Very dense gray and brown silty sandy GRAVEL; moist; low plasticity fines; fine to coarse rounded sand; fine to coarse rounded gravel. (GM)	514.5 / 50.0	S-13
CATASTROPHIC FLOOD DEPOSITS GRAVEL FACIES	509.5 / 55.0	S-14
Very dense gray silty SAND; moist; low plasticity fines; fine sand; micaceous. (SM)		
CATASTROPHIC FLOOD DEPOSITS SAND FACIES	504.5 / 60.0	S-15
Very dense gray SAND with silt; wet; nonplastic fines; fine sand; micaceous. (SM-SP)	503.0 / 61.5	

Completed - June 6, 2013

Ground Water

PENETRATION RESISTANCE, N (blows/ft.)

▲ Hammer Wt. & Drop: 140 lbs / 30 inches



LEGEND

* Sample Not Recovered

Standard Penetration Test

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. Group symbol is based on visual-manual identification and selected lab testing.
4. The hole location and elevation should be considered approximate.

Perennial Wind Chaser Station
Hermiston, Oregon

LOG OF BORING B-2

November 2013 24-1-03794-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A3
Sheet 2 of 2

REV 3

MASTER_LOG_E 24-1-03794-HERMISTON.GPJ SHAN_WIL.GDT 11/18/13 Log: DJH Rev: CKS Typ: MAS

Total Depth:	61.5 ft.	Northing:	~ 780,589 ft.	Drilling Method:	Mud Rotary	Hole Diam.:	5 in.
Top Elevation:	~ 563 ft.	Easting:	~ 8,490,563 ft.	Drilling Company:	Hardcore Drilling	Rod Type:	NWJ
Vert. Datum:	NAD88	Station:	~	Drill Rig Equipment:	CME-75	Hammer Type:	Automatic
Horiz. Datum:	NAVD88	Offset:	~	Other Comments:	Hammer Efficiency = 85.1%		

SOIL DESCRIPTION

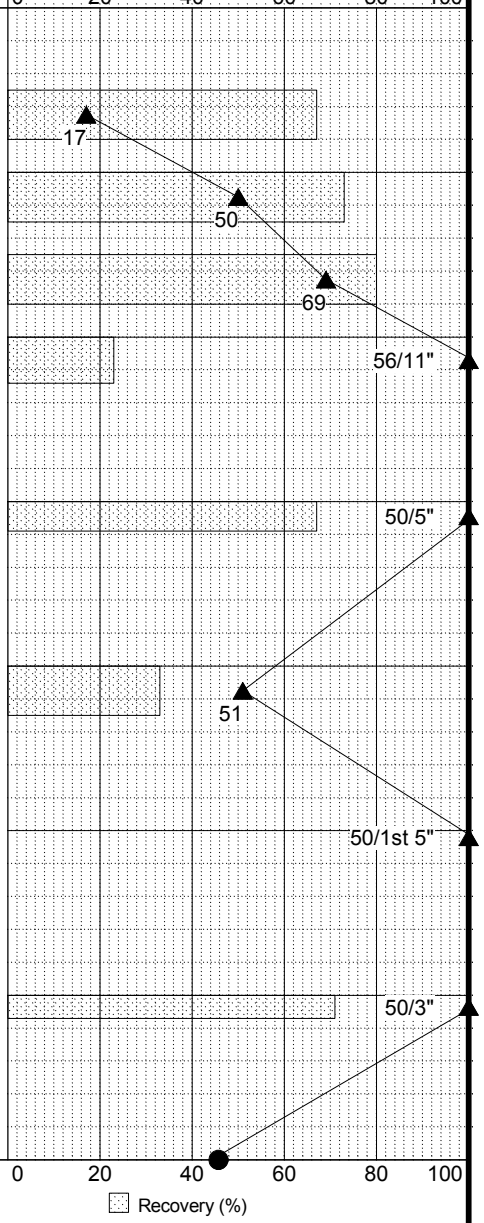
Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.

Description	Elev. / Depth (ft.)
Medium dense brown silty SAND; dry; nonplastic fines; fine to medium sand; micaceous; occasional roots in upper 6 inches. (SM)	561.3 / 2.0
LOESS	559.3 / 4.0
Medium dense gray SAND, trace silt and gravel; dry; medium to coarse sand; subrounded gravel. (SP)	
CATASTROPHIC FLOOD DEPOSITS SAND FACIES	553.8 / 9.5
Very dense gray-brown sandy GRAVEL, trace silt; dry to moist; fine to coarse sand; rounded to subangular gravel; slight iron-oxide staining. (GP)	552.3 / 11.0
CATASTROPHIC FLOOD DEPOSITS GRAVEL FACIES	
Medium dense to very dense gray-brown sandy GRAVEL, trace silt; moist; fine to coarse sand; rounded to subangular gravel. (GP)	
Approximately 250 gallons drilling mud loss from 9.5 to 11.0 feet.	
Very dense gray-brown sandy GRAVEL, trace silt with COBBLES and BOULDERS; moist to wet; fine to coarse sand; rounded to subangular gravel; scattered cobbles and occasional small boulders. (GP)	
Drilling mud loss from 11.0 to 20.0 feet.	
Small boulder at 11.5 feet.	
Cobbles at 18.0 feet.	
Cobbles at 23.5 feet.	533.3 / 30.0
Very dense gray and brown sandy GRAVEL with silt; moist; nonplastic fines; fine to medium sand; rounded to subangular gravel; micaceous. (GM-GP)	531.8 / 31.5

Symbol | Samples | Ground Water | Depth, ft.

PENETRATION RESISTANCE, N (blows/ft.)

▲ Hammer Wt. & Drop: *140 lbs / 30 inches*



CONTINUED NEXT SHEET

LEGEND

* Sample Not Recovered

Standard Penetration Test

● % Water Content

Plastic Limit ├──┤ Liquid Limit

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. Group symbol is based on visual-manual identification and selected lab testing.
4. The hole location and elevation should be considered approximate.

Perennial Wind Chaser Station
Hermiston, Oregon

LOG OF BORING B-3

November 2013 | 24-1-03794-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A4
Sheet 1 of 2

REV 3

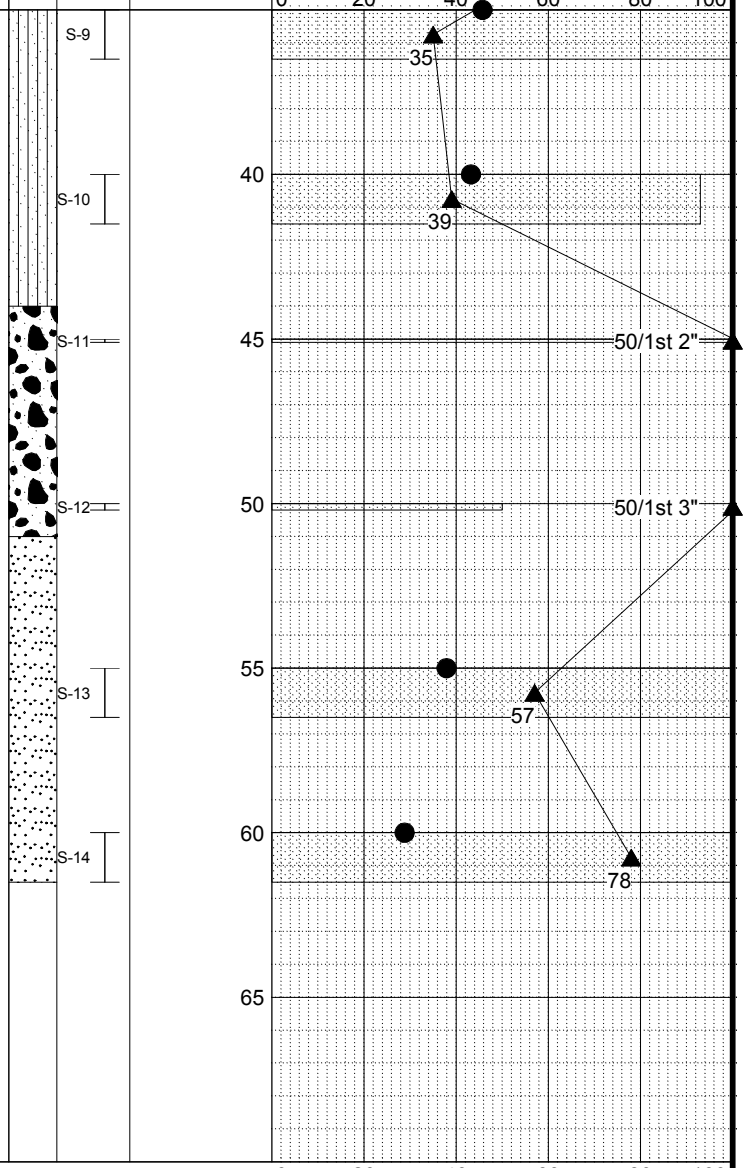
Rev: CKS Typ: MAS Log: CKS

MASTER_LOG_E 24-1-03794-HERMISTON.GPJ SHAN_WIL.GDT 11/18/13

Total Depth:	61.5 ft.	Northing:	~ 780,589 ft.	Drilling Method:	Mud Rotary	Hole Diam.:	5 in.
Top Elevation:	~ 563 ft.	Easting:	~ 8,490,563 ft.	Drilling Company:	Hardcore Drilling	Rod Type:	NWJ
Vert. Datum:	NAD88	Station:	~	Drill Rig Equipment:	CME-75	Hammer Type:	Automatic
Horiz. Datum:	NAVD88	Offset:	~	Other Comments:	Hammer Efficiency = 85.1%		

SOIL DESCRIPTION *Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.*	Elev. Depth (ft.)
Hard brown sandy SILT; moist; low plasticity; fine sand; micaceous; faintly stratified with layers of hard SILT, trace sand. (ML) **CATASTROPHIC FLOOD DEPOSITS FINE-GRAINED FACIES**	
Very dense brown sandy GRAVEL with silt to silty GRAVEL with sand; wet; fine to medium sand; rounded to subangular gravel. (GM-GP/GM) **CATASTROPHIC FLOOD DEPOSITS GRAVEL FACIES**	*519.3* 44.0
Very dense tan-brown SAND, trace silt; wet; fine to medium sand; micaceous; stratified with scattered gray or brown-gray layers and occasional interbeds of silty SAND. (SP) **CATASTROPHIC FLOOD DEPOSITS SAND FACIES**	*512.3* 51.0
Completed - June 14, 2013	*501.8* 61.5

Symbol | Samples | Ground Water | Depth, ft.



LEGEND

* Sample Not Recovered

Standard Penetration Test

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. Group symbol is based on visual-manual identification and selected lab testing.
4. The hole location and elevation should be considered approximate.

Perennial Wind Chaser Station
Hermiston, Oregon

LOG OF BORING B-3

November 2013 24-1-03794-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A4
Sheet 2 of 2

REV 3

MASTER_LOG_E 24-1-03794-HERMISTON.GPJ SHAN_WIL.GDT 11/18/13 Log: CKS Rev: CKS Typ: MAS

Total Depth:	61.5 ft.	Northing:	~ 780,475 ft.	Drilling Method:	Mud Rotary	Hole Diam.:	5 in.
Top Elevation:	~ 563 ft.	Easting:	~ 8,490,646 ft.	Drilling Company:	Hardcore Drilling	Rod Type:	NWJ
Vert. Datum:	NAD88	Station:	~	Drill Rig Equipment:	CME-75	Hammer Type:	Automatic
Horiz. Datum:	NAVD88	Offset:	~	Other Comments:	Hammer Efficiency = 72%		

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.

Medium dense gray SAND, trace silt; dry; nonplastic fines; fine sand; micaceous. (SP)

LOESS

558.9 / 4.0

Very dense gray and brown sandy GRAVEL, trace silt with COBBLES and BOULDERS; dry; nonplastic fines; fine to coarse rounded sand; fine to coarse rounded gravel. (GP)

Drilling mud loss from 4.0 to 23.0 feet.

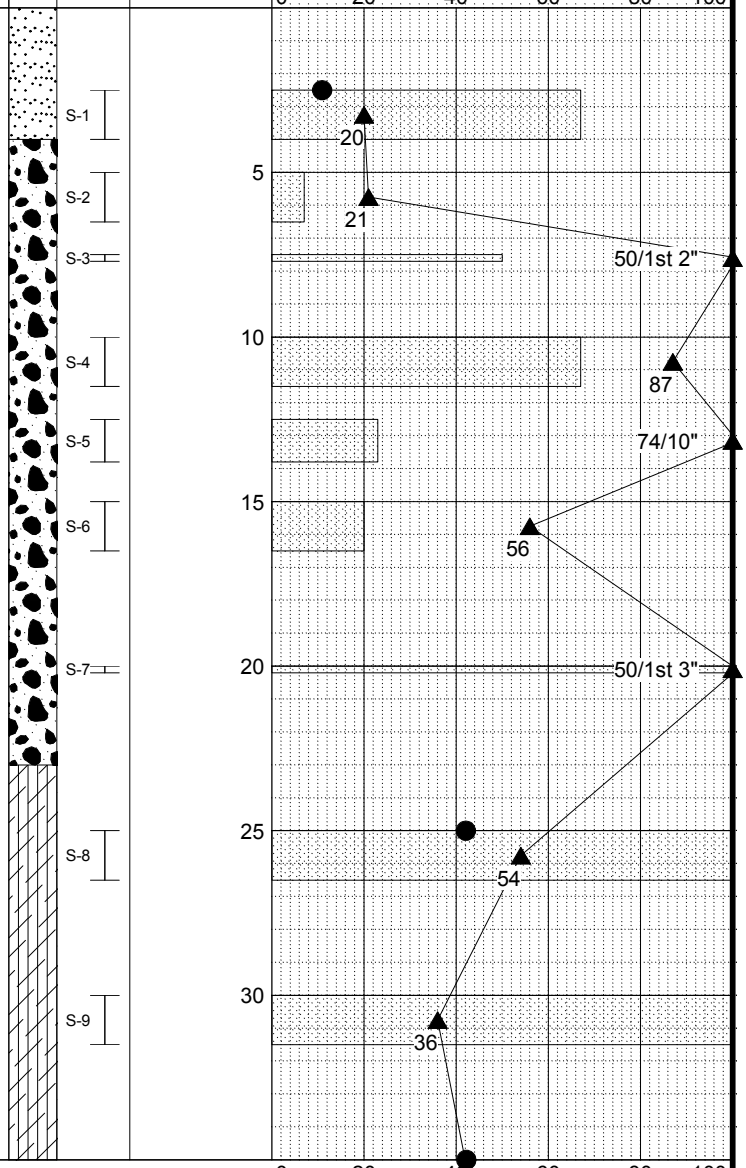
Bore hole caved, approximately 60 gallons of drilling mud loss from 5.0 to 6.0 feet.

CATASTROPHIC FLOOD DEPOSITS
GRAVEL FACIES

539.9 / 23.0

Hard brown clayey SILT, trace sand; moist; low to medium plasticity; fine sand; micaceous. (MH)

CATASTROPHIC FLOOD DEPOSITS
FINE-GRAINED FACIES



CONTINUED NEXT SHEET

LEGEND

* Sample Not Recovered

Standard Penetration Test

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. Group symbol is based on visual-manual identification and selected lab testing.
4. The hole location and elevation should be considered approximate.

Perennial Wind Chaser Station
Hermiston, Oregon

LOG OF BORING B-4

November 2013 | 24-1-03794-001

SHANNON & WILSON, INC.
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FIG. A5
Sheet 1 of 2

REV 3

MASTER_LOG_E 24-1-03794-HERMISTON.GPJ SHAN_WIL.GDT 11/18/13 Log: DJH Rev: CKS Typ: MAS

Total Depth:	61.5 ft.	Northing:	~ 780,475 ft.	Drilling Method:	Mud Rotary	Hole Diam.:	5 in.
Top Elevation:	~ 563 ft.	Easting:	~ 8,490,646 ft.	Drilling Company:	Hardcore Drilling	Rod Type:	NWJ
Vert. Datum:	NAD88	Station:	~	Drill Rig Equipment:	CME-75	Hammer Type:	Automatic
Horiz. Datum:	NAVD88	Offset:	~	Other Comments:	Hammer Efficiency = 72%		

SOIL DESCRIPTION

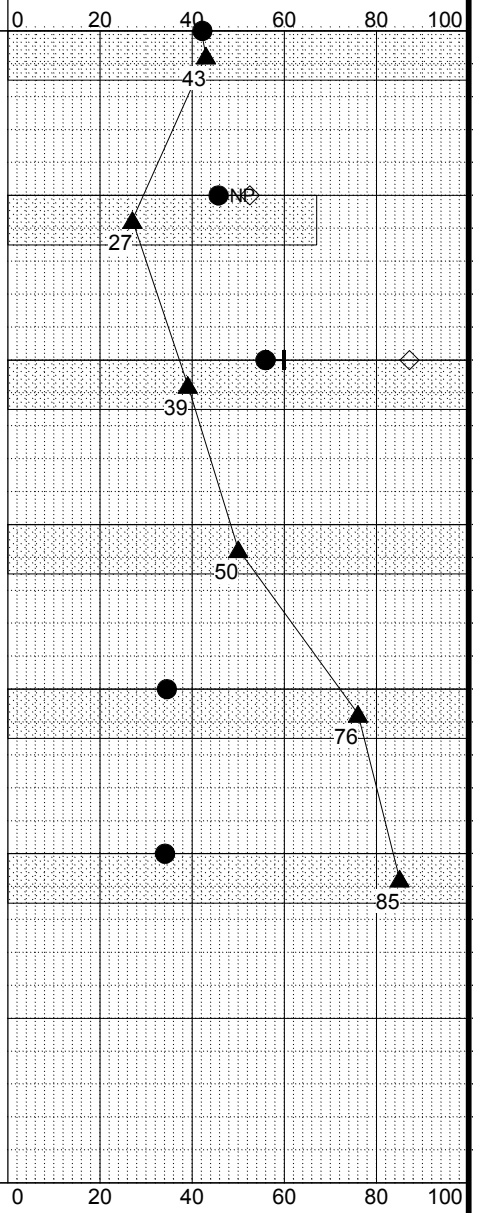
Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.

Soil Description	Elev. Depth (ft.)
Dense to medium dense brown sandy SILT; moist; nonplastic; fine sand; micaceous. (ML)	527.9 / 35.0
CATASTROPHIC FLOOD DEPOSITS FINE-GRAINED FACIES	
Hard yellow, brown, and gray clayey SILT with sand; moist; low to medium plasticity; fine sand. (MH)	517.9 / 45.0
Very dense gray SAND with silt; moist; nonplastic fines; fine sand; micaceous. (SP-SM)	507.9 / 55.0
CATASTROPHIC FLOOD DEPOSITS SAND FACIES	
Completed - June 7, 2013	501.4 / 61.5

Symbol | Samples: S-10, S-11, S-12, S-13, S-14, S-15 | Ground Water | Depth, ft.

PENETRATION RESISTANCE, N (blows/ft.)

▲ Hammer Wt. & Drop: 140 lbs / 30 inches



LEGEND

* Sample Not Recovered

Standard Penetration Test

Recovery (%)

◇ % Fines (<0.075mm)

● % Water Content

Plastic Limit ├──┤ Liquid Limit

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. Group symbol is based on visual-manual identification and selected lab testing.
4. The hole location and elevation should be considered approximate.

Perennial Wind Chaser Station
Hermiston, Oregon

LOG OF BORING B-4

November 2013 | 24-1-03794-001

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FIG. A5
Sheet 2 of 2

REV 3

Rev: CKS Typ: MAS Log: DJH

MASTER_LOG_E 24-1-03794-HERMISTON.GPJ SHAN_WIL.GDT 11/18/13

Total Depth:	61.5 ft.	Northing:	~ 780,579 ft.	Drilling Method:	Mud Rotary	Hole Diam.:	5 in.
Top Elevation:	~ 562 ft.	Easting:	~ 8,490,739 ft.	Drilling Company:	Hardcore Drilling	Rod Type:	NWJ
Vert. Datum:	NAD88	Station:	~	Drill Rig Equipment:	CME-75	Hammer Type:	Automatic
Horiz. Datum:	NAVD88	Offset:	~	Other Comments:	Hammer Efficiency = 72%		

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.

Medium dense gray SAND with silt; dry; nonplastic fines; fine sand; micaceous. (SP-SM)

LOESS

558.2 / 4.0

Dense to very dense gray and brown sandy GRAVEL with silt and COBBLES and BOULDERS; dry; nonplastic fines; fine to coarse rounded sand; fine to coarse rounded gravel; micaceous. (GP-GM)

CATASTROPHIC FLOOD DEPOSITS
GRAVEL FACIES

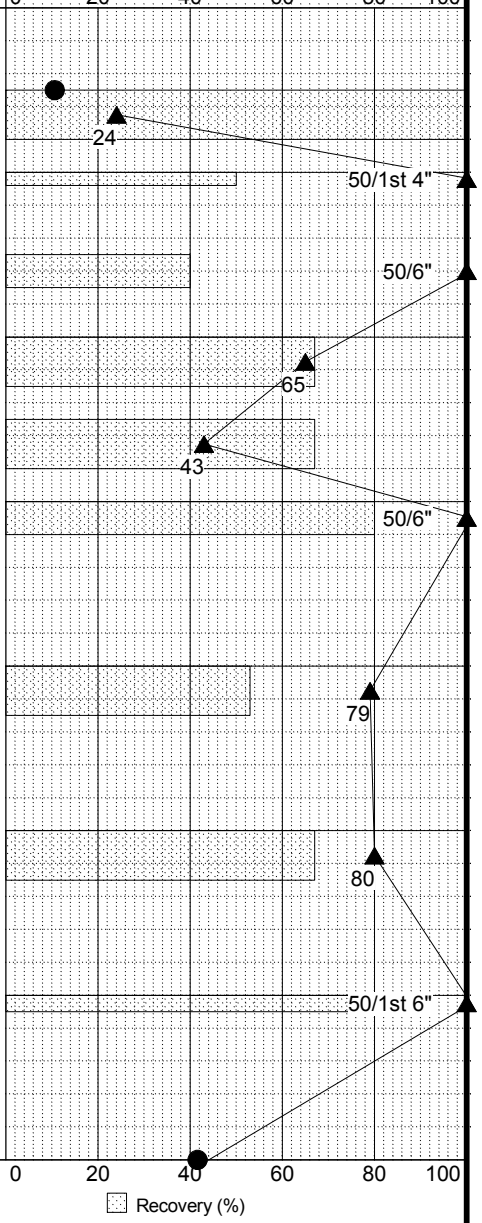
530.2 / 32.0

Hard brown sandy SILT; moist. (ML)

CATASTROPHIC FLOOD DEPOSITS
FINE-GRAINED FACIES

CONTINUED NEXT SHEET

Elev. Depth (ft.) | Symbol | Samples | Ground Water | Depth, ft.



LEGEND

* Sample Not Recovered

Standard Penetration Test

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. Group symbol is based on visual-manual identification and selected lab testing.
4. The hole location and elevation should be considered approximate.

Perennial Wind Chaser Station
Hermiston, Oregon

LOG OF BORING B-5

November 2013 | 24-1-03794-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A6
Sheet 1 of 2

REV 3

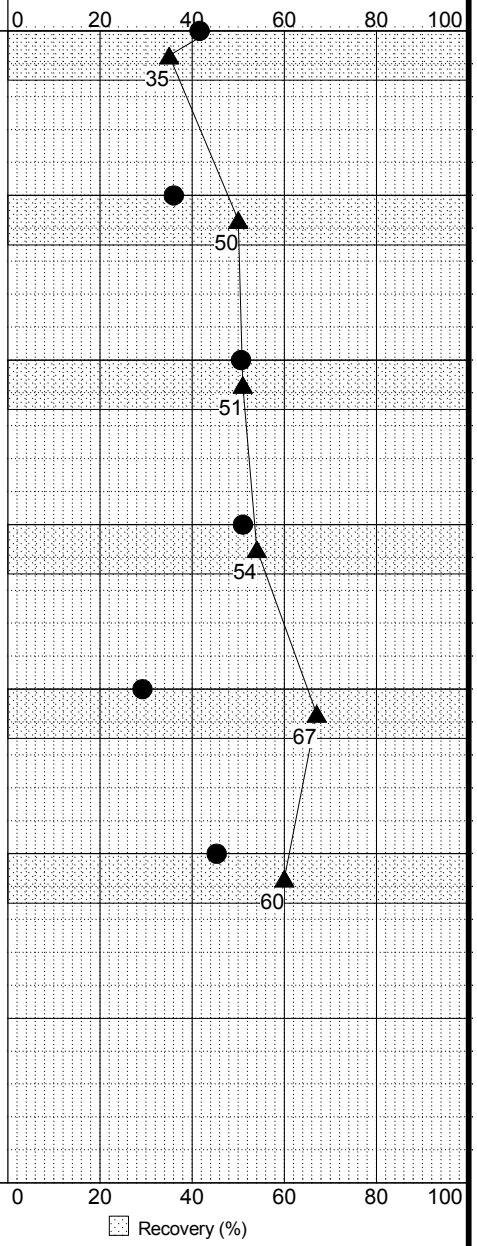
MASTER_LOG_E 24-1-03794-HERMISTON.GPJ SHAN_WIL.GDT 11/18/13 Log: DJH Rev: CKS Typ: MAS

Total Depth:	61.5 ft.	Northing:	~ 780,579 ft.	Drilling Method:	Mud Rotary	Hole Diam.:	5 in.
Top Elevation:	~ 562 ft.	Easting:	~ 8,490,739 ft.	Drilling Company:	Hardcore Drilling	Rod Type:	NWJ
Vert. Datum:	NAD88	Station:	~	Drill Rig Equipment:	CME-75	Hammer Type:	Automatic
Horiz. Datum:	NAVD88	Offset:	~	Other Comments:	Hammer Efficiency = 72%		

SOIL DESCRIPTION *Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.*	Elev. Depth (ft.)	Symbol	Samples	Ground Water	Depth, ft.
Continued: Hard brown sandy SILT; moist; low plasticity; fine sand; micaceous. (ML)			S-10		
CATASTROPHIC FLOOD DEPOSITS **FINE-GRAINED FACIES**					
Hard brown sandy clayey SILT; moist; low to medium plasticity; fine sand; micaceous. (MH)	522.2 40.0		S-11		40
Hard brown and gray sandy SILT; moist; low plasticity; fine sand; micaceous. (ML)	517.2 45.0		S-12		45
			S-13		50
Very dense gray silty SAND; moist; nonplastic fines; fine sand; micaceous. (SM)	507.2 55.0		S-14		55
CATASTROPHIC FLOOD DEPOSITS **SAND FACIES**					
Very dense gray SAND, trace silt; moist; fine sand; micaceous. (SP)	502.2 60.0		S-15		60
	500.7 61.5				
Completed - June 7, 2013					65

PENETRATION RESISTANCE, N (blows/ft.)

▲ Hammer Wt. & Drop: 140 lbs / 30 inches



LEGEND

* Sample Not Recovered

Standard Penetration Test

● % Water Content

Plastic Limit ├──┤ Liquid Limit

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. Group symbol is based on visual-manual identification and selected lab testing.
4. The hole location and elevation should be considered approximate.

Perennial Wind Chaser Station
Hermiston, Oregon

LOG OF BORING B-5

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SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A6
Sheet 2 of 2

REV 3

MASTER_LOG_E 24-1-03794-HERMISTON.GPJ SHAN_WIL.GDT 11/18/13 Log: DJH Rev: CKS Typ: MAS

Total Depth:	61.5 ft.	Northing:	~ 780,579 ft.	Drilling Method:	Mud Rotary	Hole Diam.:	5 in.
Top Elevation:	~ 560 ft.	Easting:	~ 8,490,933 ft.	Drilling Company:	Hardcore Drilling	Rod Type:	NWJ
Vert. Datum:	NAD88	Station:	~	Drill Rig Equipment:	CME-75	Hammer Type:	Automatic
Horiz. Datum:	NAVD88	Offset:	~	Other Comments:	Hammer Efficiency = 85.1%		

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.

Elev. Depth (ft.) | Symbol | Samples | Ground Water | Depth, ft.

PENETRATION RESISTANCE, N (blows/ft.)

▲ Hammer Wt. & Drop: *140 lbs / 30 inches*

Medium dense brown silty SAND; dry; nonplastic fines; fine to medium sand; micaceous. (SM)

558.0 / 2.0

LOESS

Dense to very dense gray-brown sandy GRAVEL, trace silt with COBBLES and BOULDERS; dry to moist; fine to coarse sand; rounded to subangular gravel; occasional cobbles or small boulders. (GP)

12-inch-diameter cobble at 2.0 feet

CATASTROPHIC FLOOD DEPOSITS

549.5 / 10.5

GRAVEL FACIES

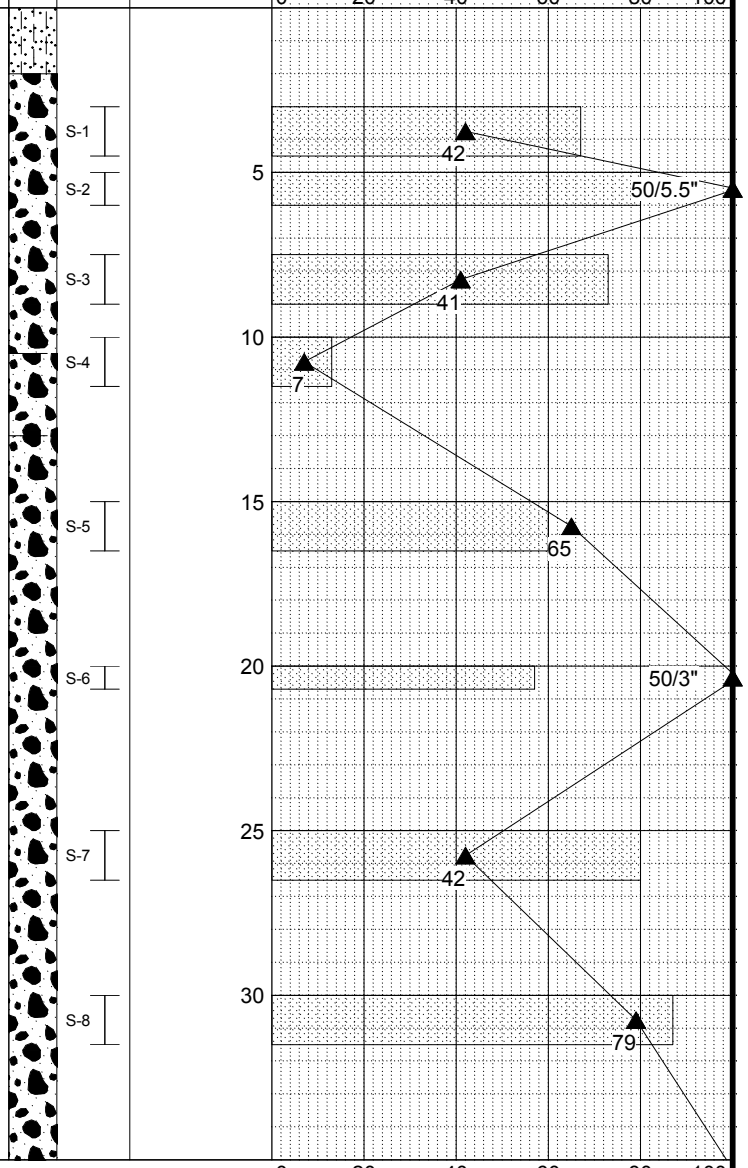
Borehole caving in from 10.0 to 12.5 feet.

547.0 / 13.0

Loose gray-brown sandy GRAVEL, trace silt; moist; fine to coarse sand; rounded to subangular gravel. (GP)

Lost drilling mud circulation at 10.5 feet.

Dense to very dense gray-brown sandy GRAVEL, trace silt; fine to coarse sand; rounded to subangular gravel; slight iron-oxide staining; occasional layers of sandy GRAVEL with silt. (GP)



CONTINUED NEXT SHEET

LEGEND

* Sample Not Recovered

Standard Penetration Test

Recovery (%)

● % Water Content

Plastic Limit ├──┤ Liquid Limit

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. Group symbol is based on visual-manual identification and selected lab testing.
4. The hole location and elevation should be considered approximate.

Perennial Wind Chaser Station
Hermiston, Oregon

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FIG. A7
Sheet 1 of 2

REV 3

MASTER_LOG_E 24-1-03794-HERMISTON.GPJ SHAN_WIL.GDT 11/18/13 Log: CKS Rev: CKS Typ: MAS

Total Depth:	61.5 ft.	Northing:	~ 780,579 ft.	Drilling Method:	Mud Rotary	Hole Diam.:	5 in.
Top Elevation:	~ 560 ft.	Easting:	~ 8,490,933 ft.	Drilling Company:	Hardcore Drilling	Rod Type:	NWJ
Vert. Datum:	NAD88	Station:	~	Drill Rig Equipment:	CME-75	Hammer Type:	Automatic
Horiz. Datum:	NAVD88	Offset:	~	Other Comments:	Hammer Efficiency = 85.1%		

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.

Elev. Depth (ft.) | Symbol | Samples | Ground Water | Depth, ft.

PENETRATION RESISTANCE, N (blows/ft.)

▲ Hammer Wt. & Drop: 140 lbs / 30 inches

Continued:

Dense to very dense gray-brown sandy GRAVEL, trace silt; fine to coarse sand; rounded to subangular gravel; slight iron-oxide staining; occasional layers of sandy GRAVEL with silt. (GP)

CATASTROPHIC FLOOD DEPOSITS
GRAVEL FACIES

517.0
43.0

Hard and dense interbedded tan and brown-tan SILT, trace sand, sandy SILT and silty SAND; wet; low plasticity fines; fine to medium sand; micaceous; stratified. (ML/SM)

CATASTROPHIC FLOOD DEPOSITS
FINE-GRAINED FACIES

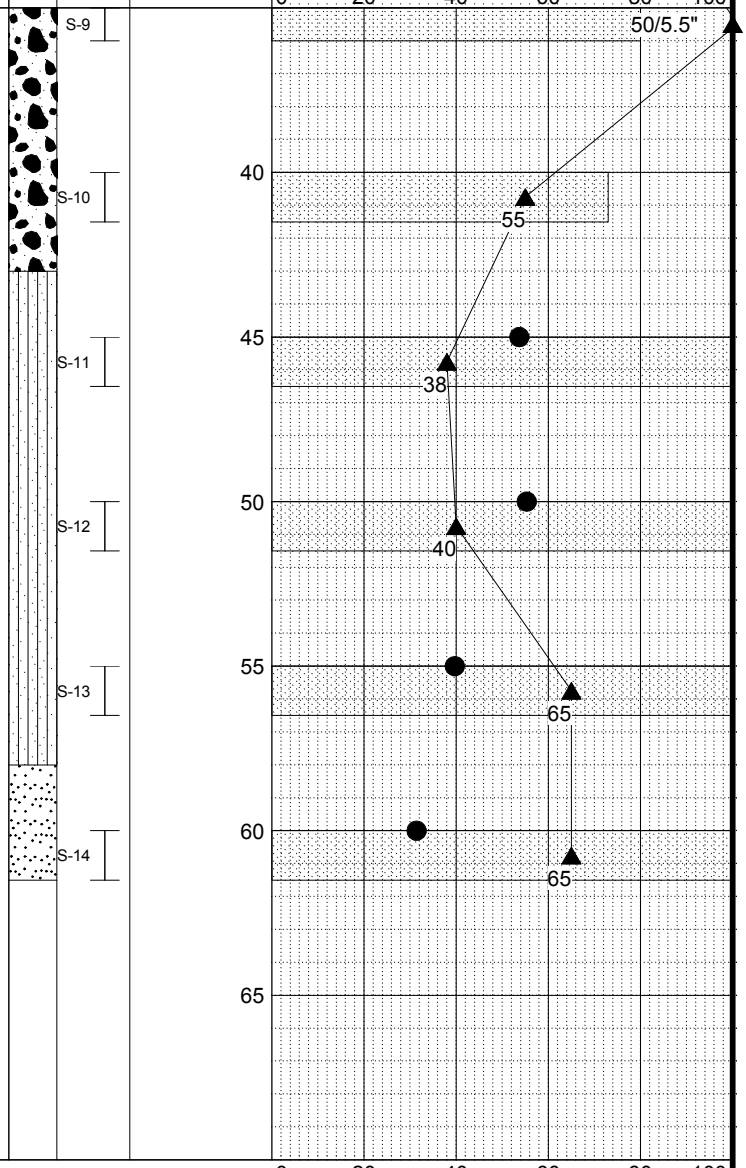
502.0
58.0

Very dense tan-brown SAND, trace silt; moist; fine to medium sand; micaceous; homogeneous. (SP)

CATASTROPHIC FLOOD DEPOSITS
SAND FACIES

498.5
61.5

Completed - June 13, 2013



LEGEND

* Sample Not Recovered

Standard Penetration Test

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. Group symbol is based on visual-manual identification and selected lab testing.
4. The hole location and elevation should be considered approximate.

Perennial Wind Chaser Station
Hermiston, Oregon

LOG OF BORING B-6

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FIG. A7
Sheet 2 of 2

REV 3

MASTER_LOG_E 24-1-03794-HERMISTON.GPJ SHAN_WIL.GDT 11/18/13 Log: CKS Rev: CKS Typ: MAS

Total Depth:	61.5 ft.	Northing:	~ 780,575 ft.	Drilling Method:	Mud Rotary	Hole Diam.:	5 in.
Top Elevation:	~ 559 ft.	Easting:	~ 8,491,107 ft.	Drilling Company:	Hardcore Drilling	Rod Type:	NWJ
Vert. Datum:	NAD88	Station:	~	Drill Rig Equipment:	CME-75	Hammer Type:	Automatic
Horiz. Datum:	NAVD88	Offset:	~	Other Comments:	Hammer Efficiency = 72%		

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.

Medium dense brown silty SAND, trace gravel; dry; nonplastic to low plasticity fines; fine to medium sand; fine gravel; occasional rootlets. (SM)

LOESS

Elev. 555.7 / Depth 3.5

Dense to very dense gray-brown sandy GRAVEL, trace silt; moist; fine to coarse sand; rounded to subangular gravel; slight iron-oxide staining. (GP)

CATASTROPHIC FLOOD DEPOSITS
GRAVEL FACIES

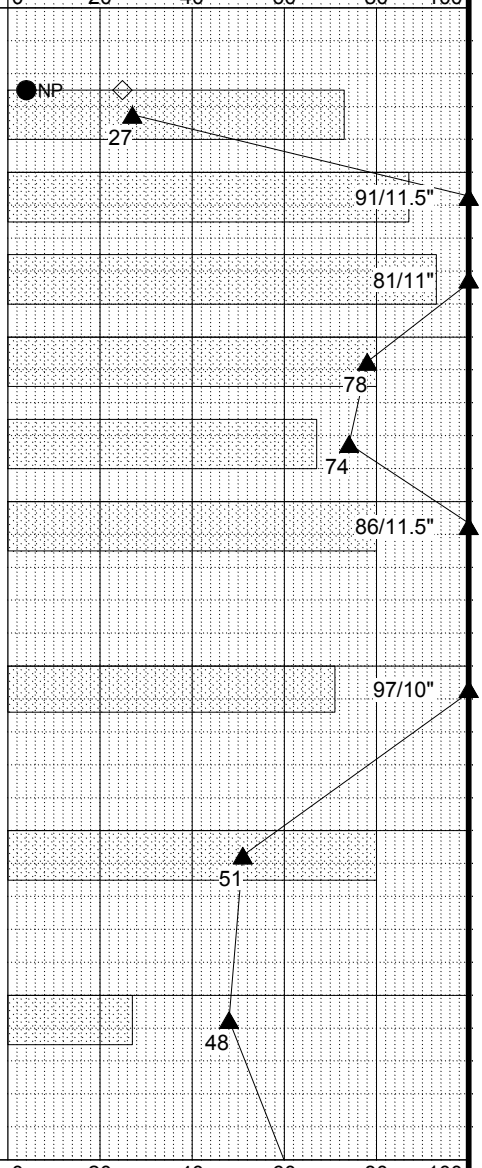
Samples: S-1, S-2, S-3, S-4, S-5, S-6, S-7, S-8, S-9

Ground Water

Depth, ft.

PENETRATION RESISTANCE, N (blows/ft.)

▲ Hammer Wt. & Drop: *140 lbs / 30 inches*



CONTINUED NEXT SHEET

LEGEND

* Sample Not Recovered

Standard Penetration Test

Recovery (%)

◇ % Fines (<0.075mm)

● % Water Content

Plastic Limit ├──┤ Liquid Limit

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. Group symbol is based on visual-manual identification and selected lab testing.
4. The hole location and elevation should be considered approximate.

Perennial Wind Chaser Station
Hermiston, Oregon

LOG OF BORING B-7

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SHANNON & WILSON, INC.
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FIG. A8
Sheet 1 of 2

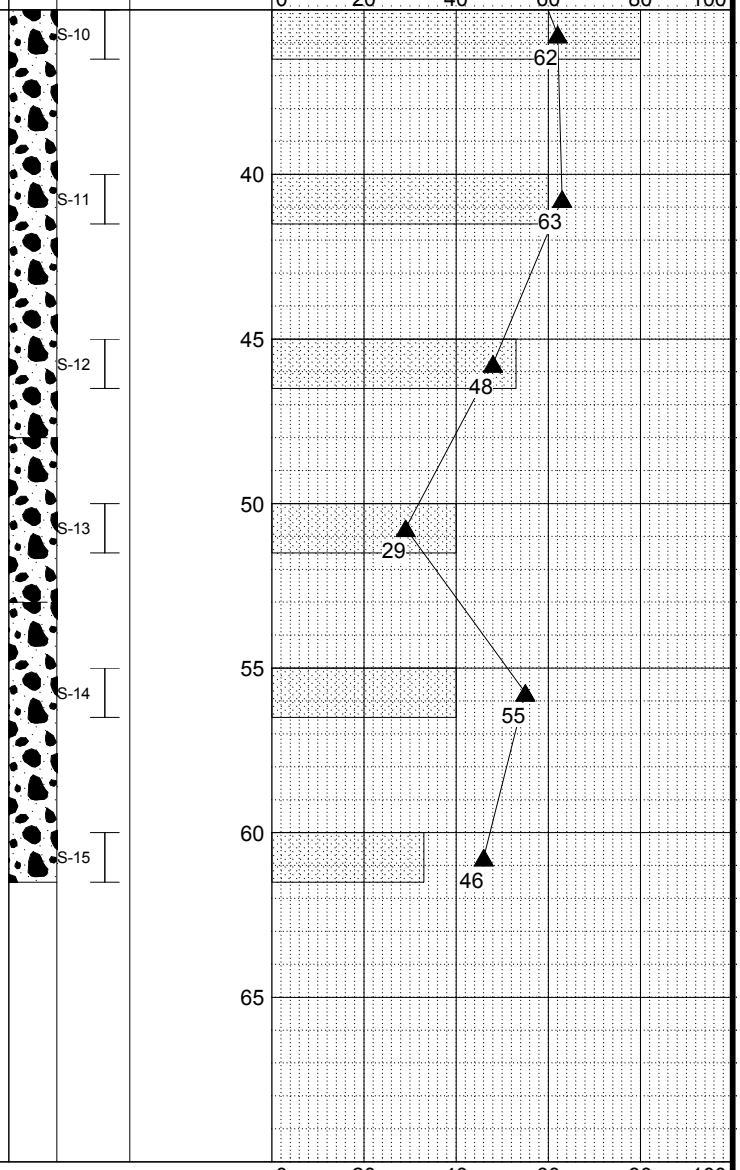
REV 3

MASTER_LOG_E 24-1-03794-HERMISTON.GPJ SHAN_WIL.GDT 11/18/13 Log: CKS Rev: CKS Typ: MAS

Total Depth:	61.5 ft.	Northing:	~ 780,575 ft.	Drilling Method:	Mud Rotary	Hole Diam.:	5 in.
Top Elevation:	~ 559 ft.	Easting:	~ 8,491,107 ft.	Drilling Company:	Hardcore Drilling	Rod Type:	NWJ
Vert. Datum:	NAD88	Station:	~	Drill Rig Equipment:	CME-75	Hammer Type:	Automatic
Horiz. Datum:	NAVD88	Offset:	~	Other Comments:	Hammer Efficiency = 72%		

SOIL DESCRIPTION	Elev. Depth (ft.)
Continued: Dense to very dense gray-brown sandy GRAVEL, trace silt; moist; fine to coarse sand; rounded to subangular gravel; slight iron-oxide staining. (GP)	
CATASTROPHIC FLOOD DEPOSITS GRAVEL FACIES	
Grades to wet at 45.0 feet.	
Medium dense gray sandy GRAVEL, trace silt; wet; medium to coarse sand; rounded to subrounded gravel. (GP)	511.2 / 48.0
Dense to very dense gray-brown sandy GRAVEL, trace silt; wet; fine to coarse sand; rounded to subangular gravel. (GP)	506.2 / 53.0
Completed - June 11, 2013	497.7 / 61.5

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.



LEGEND

* Sample Not Recovered

Standard Penetration Test

Recovery (%)

◇ % Fines (<0.075mm)

● % Water Content

Plastic Limit — Liquid Limit

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. Group symbol is based on visual-manual identification and selected lab testing.
4. The hole location and elevation should be considered approximate.

Perennial Wind Chaser Station
Hermiston, Oregon

LOG OF BORING B-7

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SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A8
Sheet 2 of 2

REV 3

Log: CKS Rev: CKS Typ: MAS

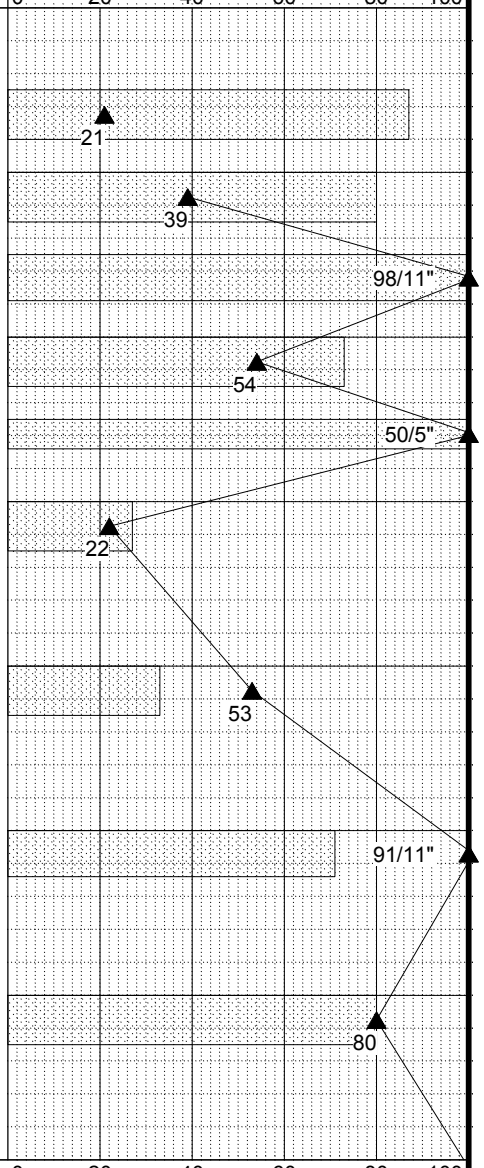
MASTER_LOG_E 24-1-03794-HERMISTON.GPJ SHAN_WIL.GDT 11/18/13

Total Depth:	61.5 ft.	Northing:	~ 780,477 ft.	Drilling Method:	Mud Rotary	Hole Diam.:	5 in.
Top Elevation:	~ 561 ft.	Easting:	~ 8,491,025 ft.	Drilling Company:	Hardcore Drilling	Rod Type:	NWJ
Vert. Datum:	NAD88	Station:	~	Drill Rig Equipment:	CME-75	Hammer Type:	Automatic
Horiz. Datum:	NAVD88	Offset:	~	Other Comments:	Hammer Efficiency = 85.1%		

SOIL DESCRIPTION	Elev. Depth (ft.)	Symbol	Samples	Ground Water	Depth, ft.
Medium dense brown silty SAND; dry; nonplastic fines; fine to medium sand; micaceous. (SM)					
LOESS	557.5 / 3.5		S-1a, S-1b		
Dense to very dense gray-brown silty GRAVEL with sand grading to sandy GRAVEL, trace silt; dry to moist; fine to coarse sand; rounded to subangular gravel; slight iron-oxide staining. (GP)			S-2, S-3		5
CATASTROPHIC FLOOD DEPOSITS GRAVEL FACIES			S-4, S-5		10
Medium dense gray-brown sandy GRAVEL, trace silt with COBBLES; moist; fine to coarse sand; subrounded to subangular gravel; occasional cobbles. (GP)	547.0 / 14.0		S-6		15
Very dense gray-brown sandy GRAVEL, trace silt; moist; fine to coarse sand; subrounded to subangular gravel; slight iron-oxide staining. (GP)	543.5 / 17.5		S-7		20
Drilling mud loss from 25.0 to 30.0 feet.			S-8		25
Very dense gray-brown sandy GRAVEL with silt; moist to wet; nonplastic fines; fine to coarse sand; rounded to subangular gravel; micaceous. (GP-GM)	531.0 / 30.0		S-9		30

PENETRATION RESISTANCE, N (blows/ft.)

▲ Hammer Wt. & Drop: *140 lbs / 30 inches*



CONTINUED NEXT SHEET

LEGEND

* Sample Not Recovered

Standard Penetration Test

● % Water Content

Plastic Limit ├──┤ Liquid Limit

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. Group symbol is based on visual-manual identification and selected lab testing.
4. The hole location and elevation should be considered approximate.

Perennial Wind Chaser Station
Hermiston, Oregon

LOG OF BORING B-8

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SHANNON & WILSON, INC.
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FIG. A9
Sheet 1 of 2

REV 3

MASTER_LOG_E 24-1-03794-HERMISTON.GPJ SHAN_WIL.GDT 11/18/13 Log: CKS Rev: CKS Typ: MAS

Total Depth:	61.5 ft.	Northing:	~ 780,477 ft.	Drilling Method:	Mud Rotary	Hole Diam.:	5 in.
Top Elevation:	~ 561 ft.	Easting:	~ 8,491,025 ft.	Drilling Company:	Hardcore Drilling	Rod Type:	NWJ
Vert. Datum:	NAD88	Station:	~	Drill Rig Equipment:	CME-75	Hammer Type:	Automatic
Horiz. Datum:	NAVD88	Offset:	~	Other Comments:	Hammer Efficiency = 85.1%		

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.

Elev. Depth (ft.) | Symbol | Samples | Ground Water | Depth, ft.

PENETRATION RESISTANCE, N (blows/ft.)

▲ Hammer Wt. & Drop: 140 lbs / 30 inches

Continued:

Very dense gray-brown sandy GRAVEL with silt; moist to wet; nonplastic fines; fine to coarse sand; rounded to subangular gravel; micaceous. (GP-GM)

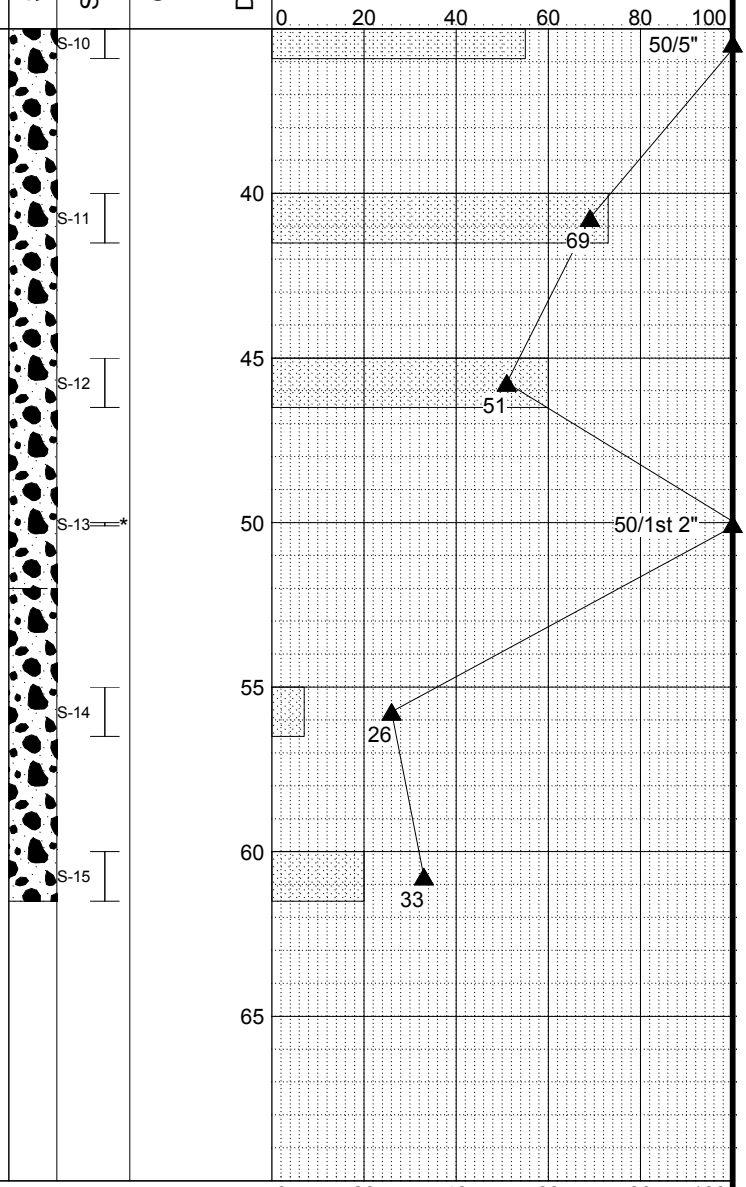
CATASTROPHIC FLOOD DEPOSITS
GRAVEL FACIES

509.0
52.0

Medium dense grading to dense gray-brown sandy GRAVEL, trace silt; wet; fine to coarse sand; rounded to subangular gravel. (GP)

499.5
61.5

Completed - June 13, 2013



LEGEND

* Sample Not Recovered

Standard Penetration Test

● % Water Content

Plastic Limit ├──┤ Liquid Limit

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. Group symbol is based on visual-manual identification and selected lab testing.
4. The hole location and elevation should be considered approximate.

Perennial Wind Chaser Station
Hermiston, Oregon

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SHANNON & WILSON, INC.
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FIG. A9
Sheet 2 of 2

REV 3

MASTER_LOG_E 24-1-03794-HERMISTON.GPJ SHAN_WIL.GDT 11/18/13 Log: CKS Rev: CKS Typ: MAS

Total Depth:	40.4 ft.	Northing:	~ 780,789 ft.	Drilling Method:	Mud Rotary	Hole Diam.:	5 in.
Top Elevation:	~ 561 ft.	Easting:	~ 8,490,838 ft.	Drilling Company:	Hardcore Drilling	Rod Type:	NWJ
Vert. Datum:	NAD88	Station:	~	Drill Rig Equipment:	CME-75	Hammer Type:	Automatic
Horiz. Datum:	NAVD88	Offset:	~	Other Comments:	Hammer Efficiency = 85.1%		

SOIL DESCRIPTION

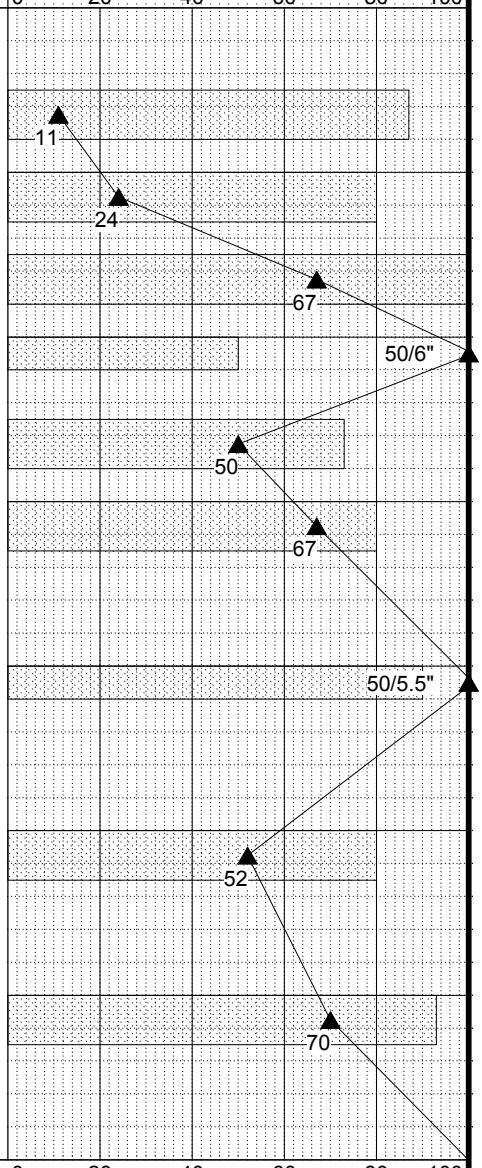
Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.

Elev. Depth (ft.)	Soil Description
	Medium dense brown silty SAND; dry; nonplastic fines; fine to medium sand; micaceous; occasional rootlets. (SM) **LOESS**
556.0 / 4.5	Medium dense gray sandy GRAVEL, trace silt; dry to moist; fine to coarse sand; rounded to subangular gravel. (GP)
553.5 / 7.0	Very dense gray-brown sandy GRAVEL, trace silt with COBBLES; moist; fine to coarse sand; rounded to subangular gravel; slight iron-oxide staining; occasional cobbles. (GP) **CATASTROPHIC FLOOD DEPOSITS GRAVEL FACIES** *Drilling mud loss from 15.0 to 20.0 feet.*
528.5 / 32.0	Very dense brown gravelly SAND with to trace silt grading to sandy GRAVEL, trace silt; wet. (GP)

Symbol | Samples | Ground Water | Depth, ft.

PENETRATION RESISTANCE, N (blows/ft.)

▲ Hammer Wt. & Drop: *140 lbs / 30 inches*



CONTINUED NEXT SHEET

LEGEND

* Sample Not Recovered

Standard Penetration Test

Recovery (%)

● % Water Content

Plastic Limit — Liquid Limit

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. Group symbol is based on visual-manual identification and selected lab testing.
4. The hole location and elevation should be considered approximate.

Perennial Wind Chaser Station
Hermiston, Oregon

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FIG. A10
Sheet 1 of 2

REV 3

MASTER_LOG_E 24-1-03794-HERMISTON.GPJ SHAN_WIL.GDT 11/18/13 Log: CKS Rev: CKS Typ: MAS

Total Depth:	40.4 ft.	Northing:	~ 780,789 ft.	Drilling Method:	Mud Rotary	Hole Diam.:	5 in.
Top Elevation:	~ 561 ft.	Easting:	~ 8,490,838 ft.	Drilling Company:	Hardcore Drilling	Rod Type:	NWJ
Vert. Datum:	NAD88	Station:	~	Drill Rig Equipment:	CME-75	Hammer Type:	Automatic
Horiz. Datum:	NAVD88	Offset:	~	Other Comments:	Hammer Efficiency = 85.1%		

SOIL DESCRIPTION	Elev. Depth (ft.)	Symbol	Samples	Ground Water	Depth, ft.	PENETRATION RESISTANCE, N (blows/ft.) ▲ Hammer Wt. & Drop: 140 lbs / 30 inches
Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.						
Continued: Very dense brown gravelly SAND with to trace silt grading to sandy GRAVEL, trace silt; wet; fine to medium sand grading to fine to coarse sand; rounded to subrounded gravel; slight dark-brown staining. (GP)			S-10			50/1st 4"
CATASTROPHIC FLOOD DEPOSITS GRAVEL FACIES	520.1 40.4		S-11		40	50/1st 5"
Completed - June 12, 2013					45	
					50	
					55	
					60	
					65	

0 20 40 60 80 100

Recovery (%)

LEGEND

* Sample Not Recovered

Standard Penetration Test

● % Water Content

Plastic Limit ├──┤ Liquid Limit

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. Group symbol is based on visual-manual identification and selected lab testing.
4. The hole location and elevation should be considered approximate.

Perennial Wind Chaser Station
Hermiston, Oregon

LOG OF BORING B-9

November 2013 24-1-03794-001

SHANNON & WILSON, INC.
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FIG. A10
Sheet 2 of 2

REV 3

MASTER_LOG_E 24-1-03794-HERMISTON.GPJ SHAN_WIL.GDT 11/18/13 Log: CKS Rev: CKS Typ: MAS

Total Depth:	31 ft.	Northing:	~ 780,837 ft.	Drilling Method:	Mud Rotary	Hole Diam.:	5 in.
Top Elevation:	~ 559 ft.	Easting:	~ 8,491,154 ft.	Drilling Company:	Hardcore Drilling	Rod Type:	NWJ
Vert. Datum:	NAD88	Station:	~	Drill Rig Equipment:	CME-75	Hammer Type:	Automatic
Horiz. Datum:	NAVD88	Offset:	~	Other Comments:	Hammer Efficiency = 72.0% (0-10ft); 85.1% (10-31ft)		

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.

Very dense brown silty SAND; dry; nonplastic fines; fine to medium sand; occasional rootlets; micaceous. (SM)

LOESS

555.7 3.0

Dense gray-brown sandy GRAVEL, trace silt with COBBLES and BOULDERS; moist; fine to coarse sand; rounded to subangular gravel; occasional cobbles and small boulders; slight iron-oxide staining. (GP)

CATASTROPHIC FLOOD DEPOSITS

GRAVEL FACIES

549.2 9.5

Dense to very dense gray-brown sandy GRAVEL, trace silt with COBBLES and BOULDERS; moist; fine to coarse sand; rounded to subangular gravel; scattered cobbles; occasional boulders. (GP)

Drilling mud loss from 12.5 to 15.0 feet.

BOULDER from 18.0 to 20.5 feet.

Cobble layer and lost drilling mud circulation at 24.0 feet.

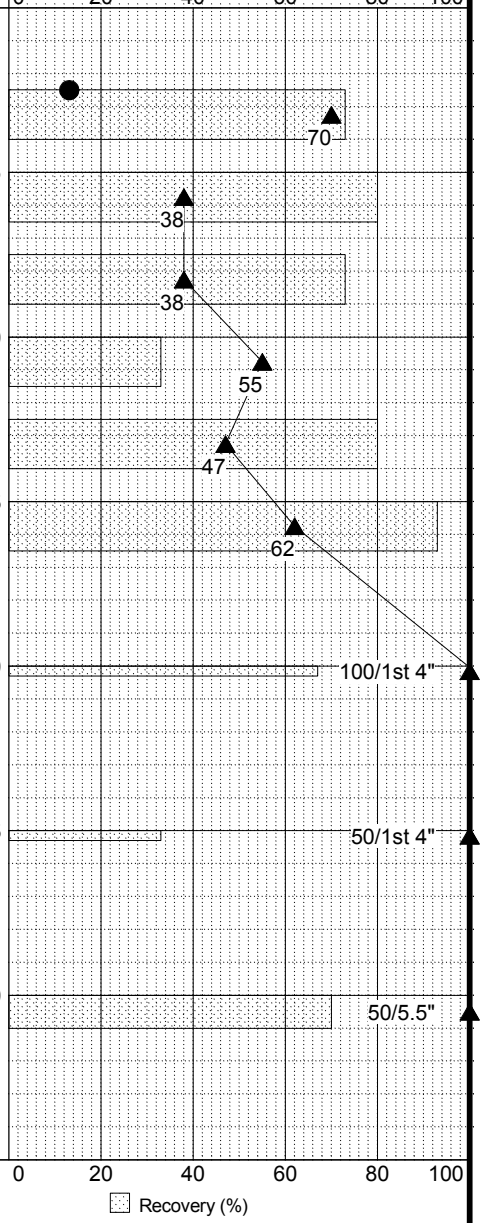
527.7 31.0

Completed - June 12, 2013

Elev. Depth (ft.) | Symbol | Samples | Ground Water | Depth, ft.

PENETRATION RESISTANCE, N (blows/ft.)

▲ Hammer Wt. & Drop: *140 lbs / 30 inches*



LEGEND

* Sample Not Recovered

Standard Penetration Test

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. Group symbol is based on visual-manual identification and selected lab testing.
4. The hole location and elevation should be considered approximate.

Perennial Wind Chaser Station
Hermiston, Oregon

LOG OF BORING B-10

November 2013 24-1-03794-001

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FIG. A11

REV 3

MASTER_LOG_E 24-1-03794-HERMISTON.GPJ SHAN_WIL.GDT 11/18/13 Log: CKS Rev: CKS Typ: MAS

DCP TEST DATA

Project: *Perennial Power* **Date:** *9-Jul-13*

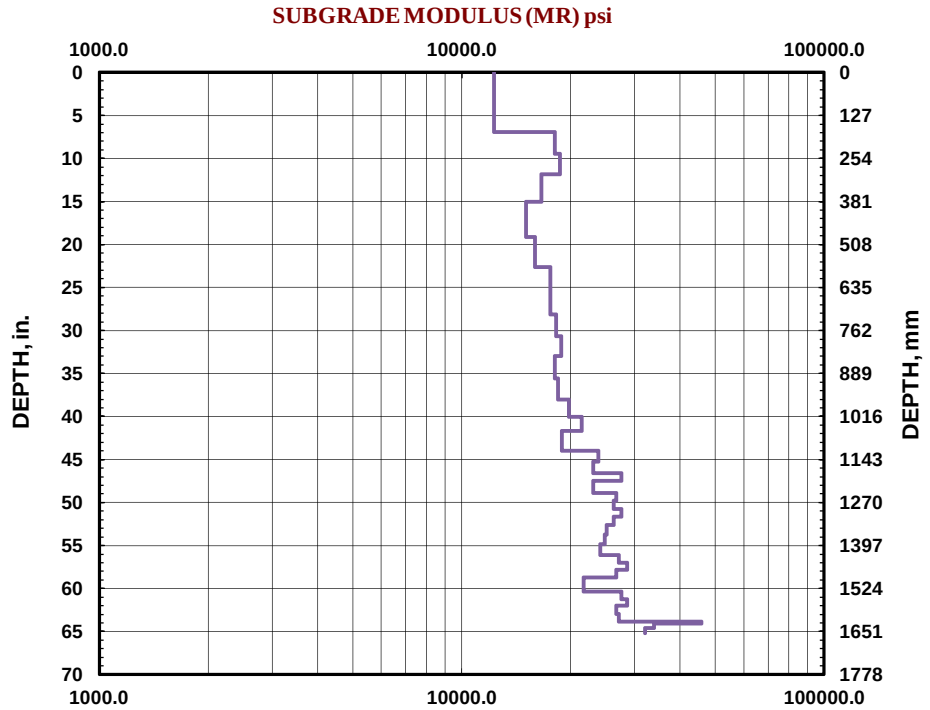
Location: *DCP-1* **Soil Type(s):** *SM*

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
0	0	1
5	175	1
5	240	1
5	300	1
5	381	1
5	485	1
5	575	1
5	645	1
5	715	1
5	779	1
5	838	1
5	903	1
5	965	1
5	1017	1
5	1059	1
5	1117	1
5	1149	1
5	1184	1
5	1206	1
5	1241	1
5	1265	1
5	1290	1
5	1312	1
5	1337	1
5	1365	1
5	1394	1
5	1425	1
5	1448	1
5	1468	1
5	1492	1
5	1533	1
5	1555	1
5	1575	1
5	1599	1
5	1622	1
5	1628	1
5	1641	1
5	1656	1

Based on approximate interrelationships of MR (ODOT PAVEMENT DESIGN GUIDE 2011)



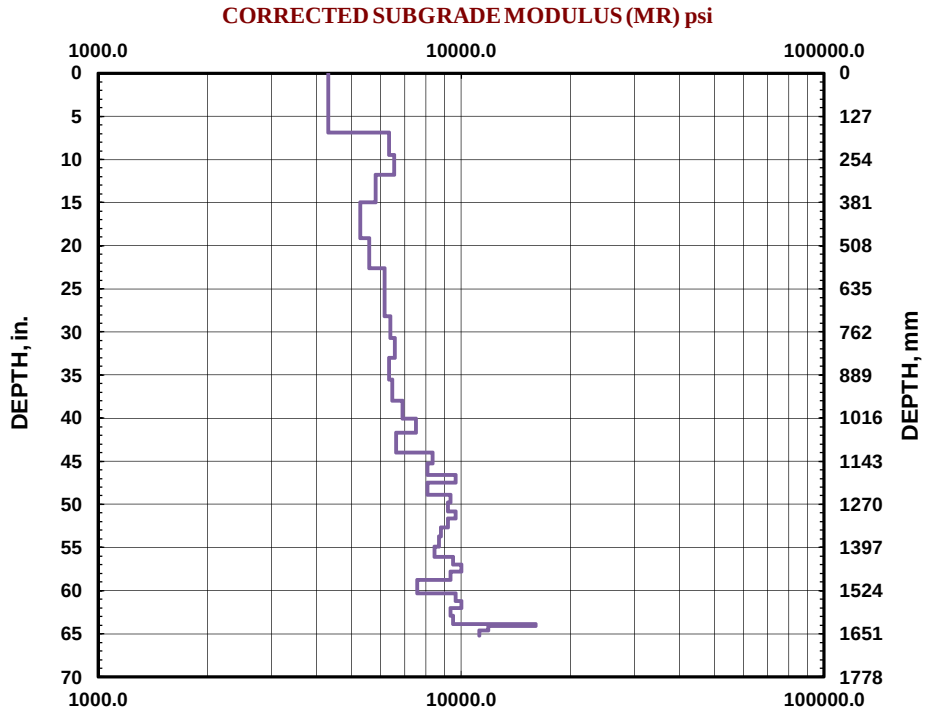


FIG. A12

DCP TEST DATA

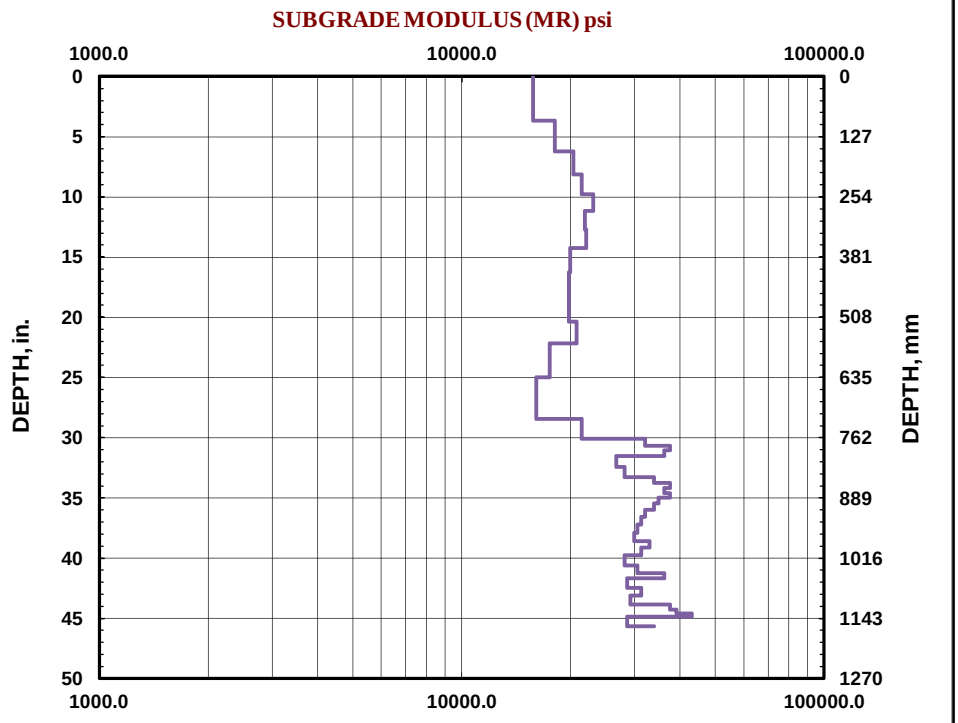
Project: *Perennial Power* **Date:** *9-Jul-13*

Location: *DCP-2* **Soil Type(s):** *SM*

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
0	0	1
5	93	1
5	158	1
5	206	1
5	248	1
5	283	1
5	323	1
5	362	1
5	413	1
5	465	1
5	517	1
5	563	1
5	634	1
5	722	1
5	764	1
5	779	1
5	789	1
5	800	1
5	824	1
5	845	1
5	858	1
5	868	1
5	879	1
5	889	1
5	901	1
5	914	1
5	929	1
5	945	1
5	962	1
5	980	1
5	994	1
5	1010	1
5	1031	1
5	1048	1
5	1059	1
5	1079	1
5	1095	1
5	1114	1
5	1124	1
5	1133	1
5	1140	1
5	1160	1
5	1173	1



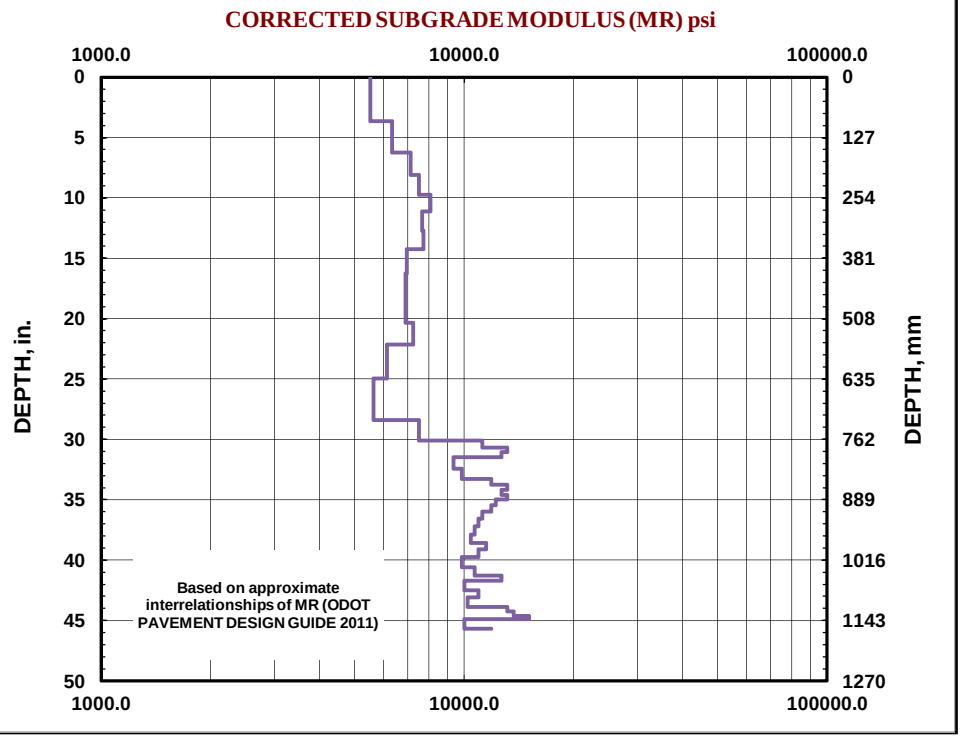


FIG. A13

DCP TEST DATA

Project: *Perennial Power* **Date:** *9-Jul-13*

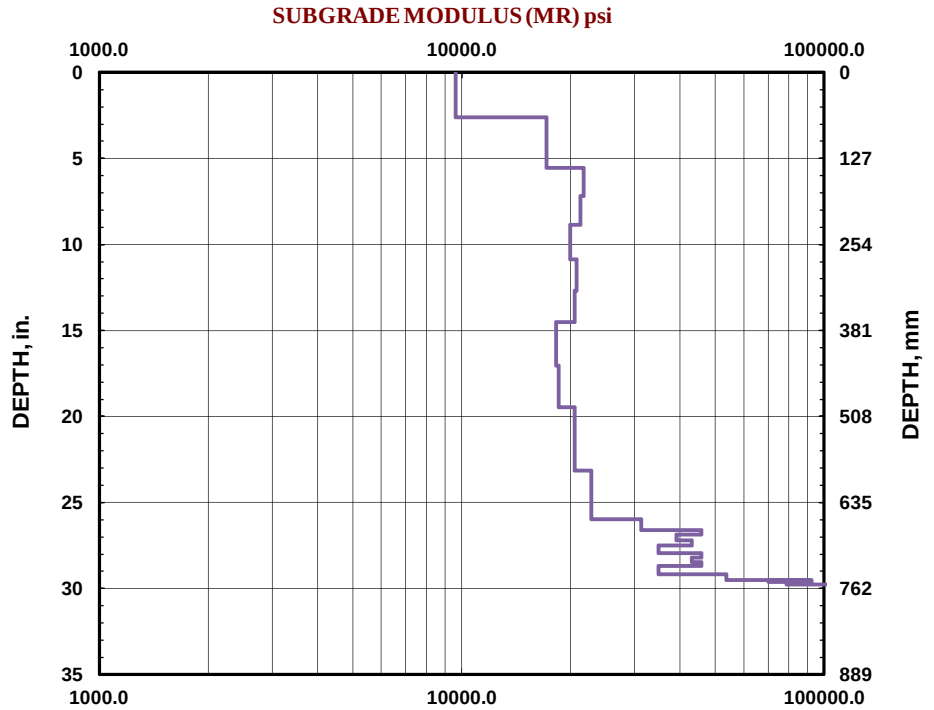
Location: *DCP-3* **Soil Type(s):** *SM*

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
0	0	1
1	66	1
5	141	1
5	182	1
5	225	1
5	276	1
5	322	1
5	369	1
5	433	1
5	494	1
5	541	1
5	588	1
5	624	1
5	660	1
5	676	1
5	682	1
5	691	1
5	698	1
5	710	1
5	716	1
5	723	1
5	729	1
5	741	1
5	745	1
5	749	1
5	750	1
5	752	1
5	753	1
10	756	1
10	757	1
10	758	1

Based on approximate interrelationships of MR (ODOT PAVEMENT DESIGN GUIDE 2011)



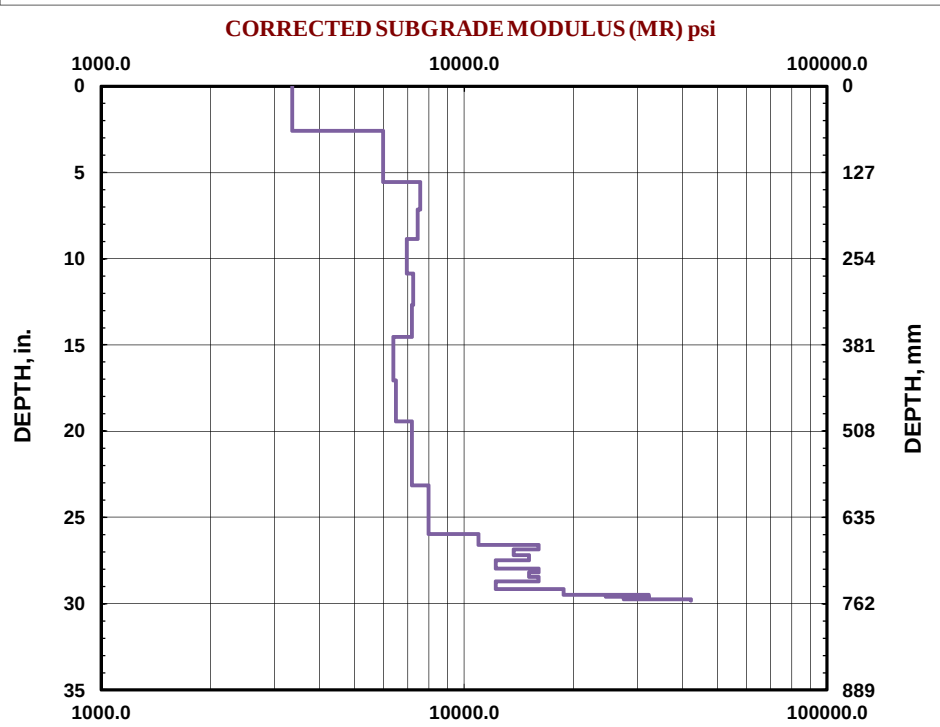


FIG. A14

DCP TEST DATA

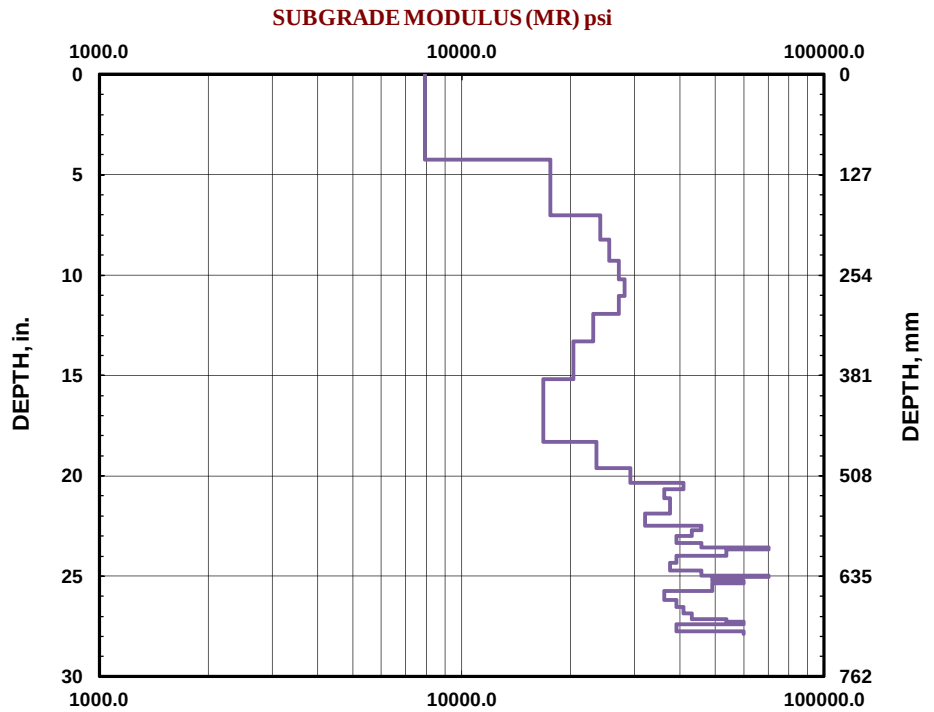
Project: *Perennial Power* **Date:** *9-Jul-13*

Location: *DCP-4* **Soil Type(s):** *SM*

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
0	0	1
1	108	1
5	178	1
5	209	1
5	236	1
5	259	1
5	280	1
5	303	1
5	338	1
5	386	1
5	465	1
5	498	1
5	517	1
5	525	1
5	536	1
5	546	1
5	556	1
5	571	1
5	577	1
5	584	1
5	593	1
5	599	1
5	601	1
5	605	1
5	609	1
5	618	1
5	628	1
5	634	1
5	636	1
5	641	1
5	644	1
5	649	1
5	654	1
5	665	1
5	674	1
5	682	1
5	689	1
5	693	1
5	696	1
5	705	1
5	708	1



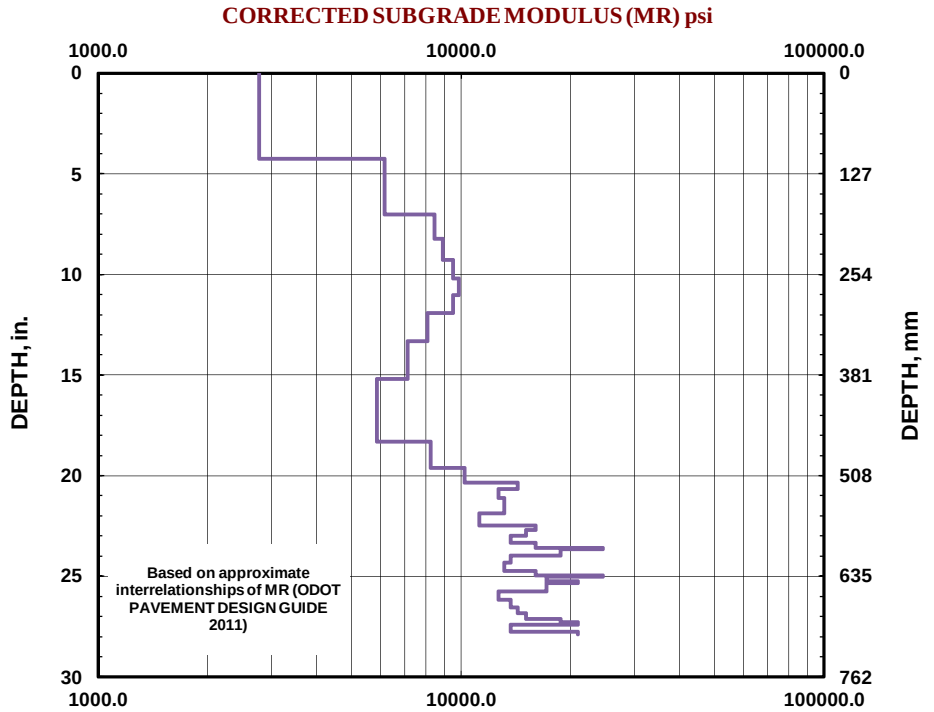


FIG. A15

DCP TEST DATA

Project: *Perennial Power* **Date:** *9-Jul-13*

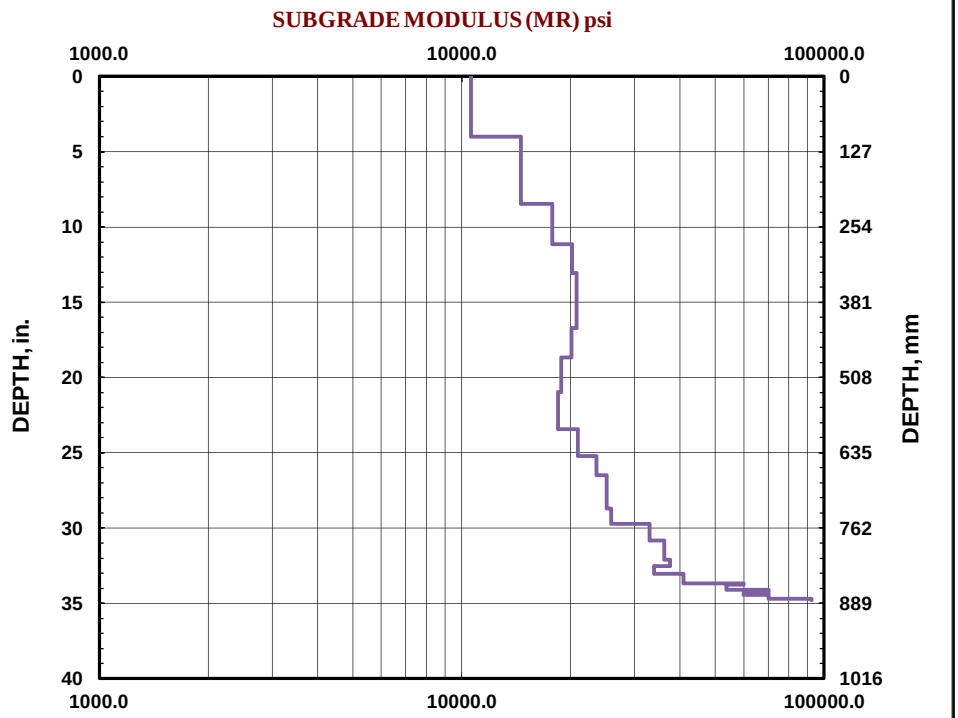
Location: *DCP-5* **Soil Type(s):** *SM*

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
0	0	1
2	102	1
5	215	1
5	283	1
5	332	1
5	378	1
5	424	1
5	474	1
5	533	1
5	595	1
5	640	1
5	673	1
5	701	1
5	729	1
5	755	1
5	769	1
5	783	1
5	794	1
5	805	1
5	816	1
5	826	1
5	839	1
5	847	1
5	855	1
5	858	1
5	862	1
5	866	1
5	868	1
5	870	1
5	872	1
5	875	1
5	877	1
5	879	1
5	881	1
5	882	1
5	883	1

Based on approximate interrelationships of MR (ODOT PAVEMENT DESIGN GUIDE 2011)



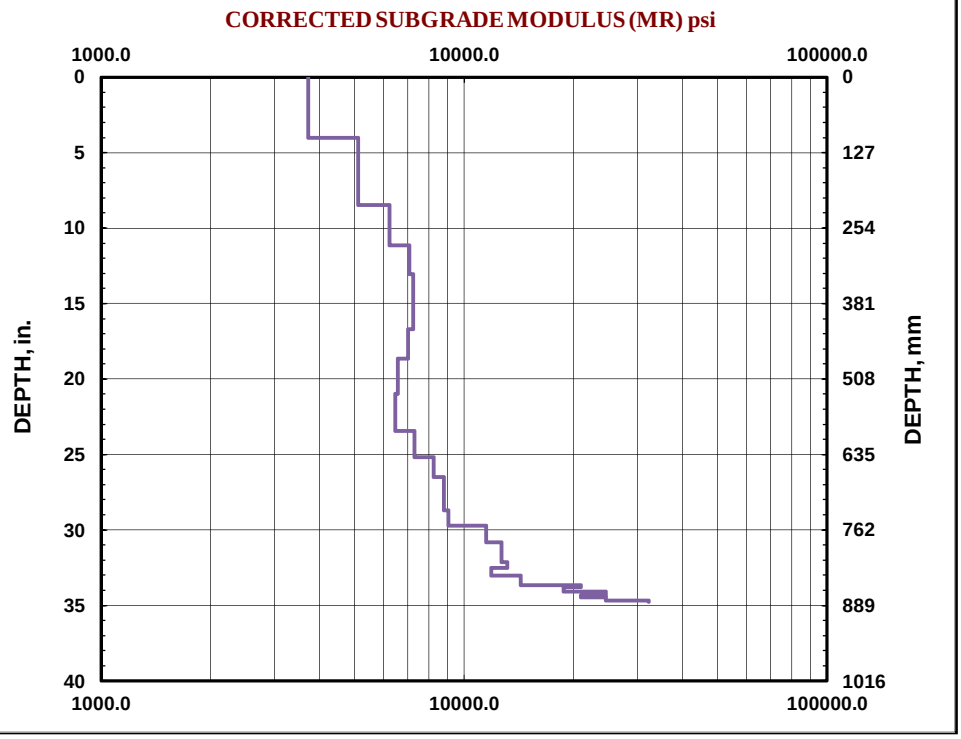


FIG. A16

APPENDIX B

LABORATORY TESTING

TABLE OF CONTENTS

B.1 GENERAL B-1

B.2 SOIL TESTING B-1
B.2.1 Moisture (Natural Water) Content B-1
B.2.2 Atterberg Limits B-2
B.2.3 Particle-Size Analyses B-2
B.2.4 Corrosivity Testing B-2

FIGURES

B1 Atterberg Limits Results
B2 Grain Size Distribution

ATTACHMENTS

Specialty Analytical Testing Report (dated June 27, 2013)

APPENDIX B

LABORATORY TESTING

B.1 GENERAL

The soil samples obtained during the field explorations were described and identified in the field in general accordance with the Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), ASTM D2488. The specific terminology used is presented in Appendix A, Figure A1. The samples were then reviewed in the laboratory. The physical characteristics of the samples were noted and the field descriptions and identifications were modified where necessary in accordance with terminology presented in Appendix A, Figure A1. Representative samples were selected for various laboratory tests. We refined our visual-manual soil descriptions and identifications based on the results of the laboratory tests, using elements of the Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System), ASTM D2487. The refined descriptions and identifications were then incorporated into the Logs of Borings, presented in Appendix A. Note that ASTM D2487 was not followed in full, because it requires that a suite of tests be performed to fully classify a single sample.

The soil testing program included moisture content analyses, Atterberg Limits tests, particle-size analyses, and analytical testing for corrosivity potential. The testing procedures from our laboratory program are summarized in the following paragraphs. Analytical testing for corrosivity potential was performed by Specialty Analytical of Clackamas, Oregon. All other test procedures were performed by Shannon & Wilson, Inc., in accordance with applicable ASTM International (ASTM) standards.

B.2 SOIL TESTING

B.2.1 Moisture (Natural Water) Content

Natural moisture content determinations were performed in accordance with ASTM D2216 on selected soil samples. The natural moisture content is a measure of the amount of moisture in the soil at the time the explorations are performed, and is defined as the ratio of the weight of water to the dry weight of the soil, expressed as a percentage. The results of the moisture content determinations are presented graphically in the Logs of Borings in Appendix A.

B.2.2 Atterberg Limits

Atterberg limits were determined on selected samples in accordance with ASTM D4318. This analysis yields index parameters of the soil that are useful in soil identification, as well as in a number of analyses, including liquefaction analysis. An Atterberg limit test determines a soil's liquid limit (LL) and plastic limit (PL). These are the maximum and minimum moisture contents at which the soil exhibits plastic behavior. A soil's plasticity index (PI) can be determined by subtracting PL from LL. The LL, PL, and PI of tested samples are presented on the Atterberg Limits Results, Figure B1. The results are also shown graphically in the Logs of Borings in Appendix A. For the purposes of soil description, we use the term nonplastic to refer to soils with a PI range of 0 to 4, low plasticity for soils with a PI range of >4 to 10, medium plasticity for soils with a PI range of >10 to 20, high plasticity for soils with a PI range of >20 to 40, and very high plasticity for soils with a PI greater than 40.

B.2.3 Particle-Size Analyses

Particle-size analyses were conducted on selected samples to determine their grain-size distributions. Grain-size distributions were determined by sieve analysis in accordance with ASTM D422. A wet sieve analysis was performed to determine a percentage (by weight) of the sample passing the No. 200 (0.075 mm) sieve. The material retained on the No. 200 sieve was shaken through a series of sieves to determine the distribution of the plus No. 200 fraction. Results of the particle-size analyses are presented on Figure B2, Grain Size Distribution. For all particle-size analyses, the percentage of material passing the No. 200 sieve is also shown graphically in the Logs of Borings in Appendix A.

B.2.4 Corrosivity Testing

Analytical testing was performed on a composite sample comprised of selected near-surface samples to determine the corrosivity potential of the soil at the site. The corrosivity test suite included chloride concentration, soil pH, oxidation-reduction potential, soil resistivity, sulfate concentration, and sulfide concentration. Analytical testing was performed by Specialty Analytical of Clackamas, Oregon. Their testing report is attached to the end of this appendix.

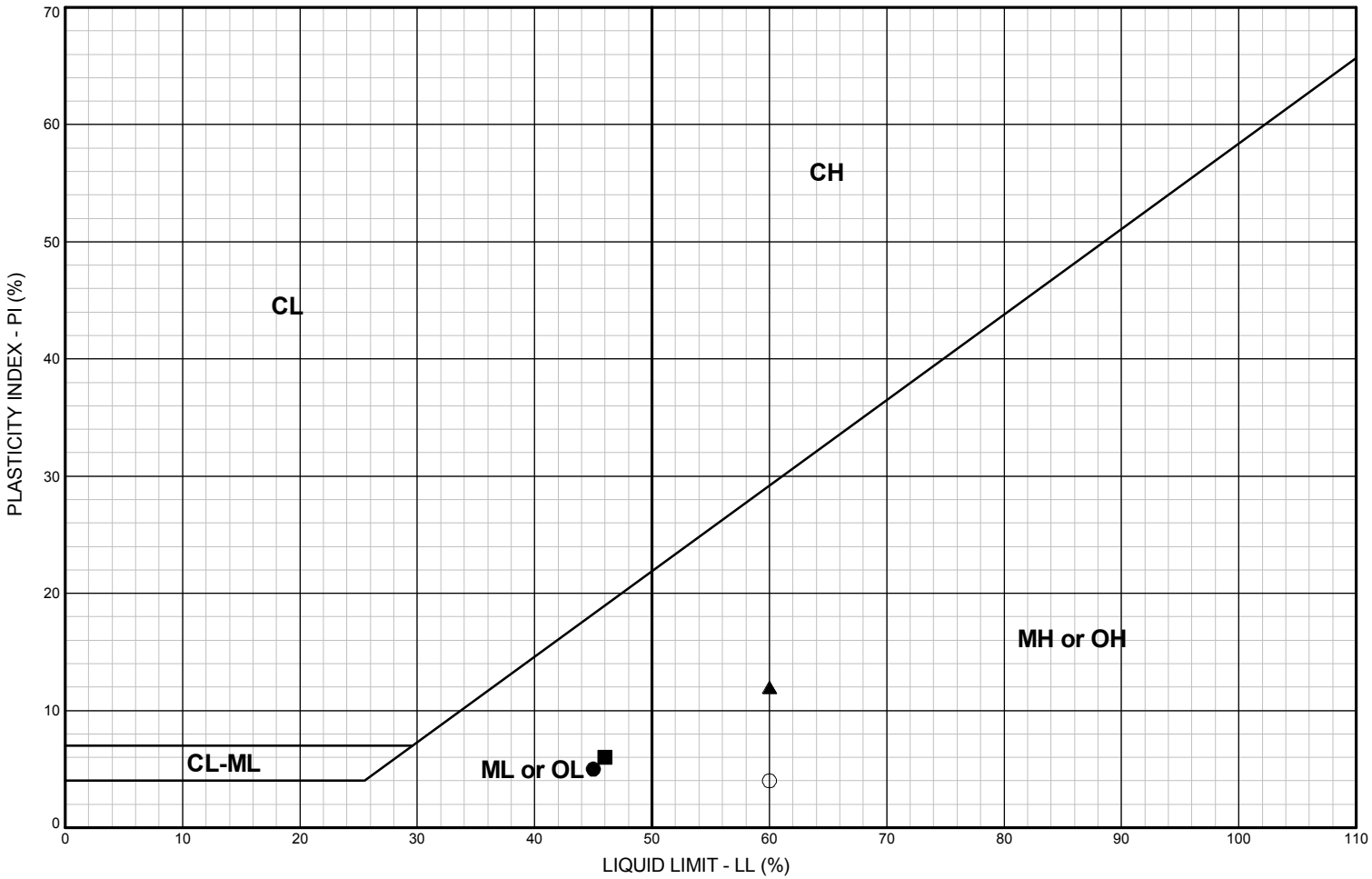
The corrosion potential of a soil is primarily evaluated by comparing the measured pH, resistivity, and sulfate and chloride concentration to the values from those in Fang (1991) and Tomlison (1987) as specified by AASHTO LFRD Bridge Design Specifications (6th Edition 2012).

Soil pH is a measurement of the hydrogen ion activity of the soil. Soil pH is reported in Standard Units (S.U.) on a scale ranging from 0 to 14, with 7 being neutral. Soils with a pH less

than 7 are considered acidic and soils with a pH greater than 7 are considered alkaline. According to the AASHTO specifications, soils with a pH less than 5.5 and soils with a pH between 5.5 and 8.5 that also have high organic content are considered potentially corrosive. Soil pH of the composite sample was 8.34 and little organic matter was observed in the tested sample. Based on pH, the sample does not appear to be corrosive.

Resistivity (expressed as ohms-centimeter or ohms-cm) is the numerical expression of the ability of a soil to impede the transmission of an electrical current. Resistivity is the inverse of conductivity and is dependent on the presence of ions, their concentrations, mobility, and valence, as well as soil moisture and temperature. The AASHTO specifications state that effects of corrosion and deterioration shall be considered if resistivity values are less than 2,000 ohms-cm. The resistivity of the composite sample was 5,000 ohms-cm. Based on resistivity, the composite sample does not appear to be corrosive.

Sulfate and chloride concentrations were measured in the soil sample. Sulfates can be converted to sulfides by naturally occurring bacteria. Sulfides, when allowed to oxidize, will produce sulfuric acid, which is highly corrosive. Chlorides will also chemically react and facilitate dissolution reactions with metals and concrete. According to the AASHTO specifications, the soil is considered corrosive if the concentration of chloride is greater than 100 parts per million (ppm) or the concentration of sulfate is greater than 1,000 ppm. Chloride concentrations in the composite sample were 4.08 ppm, sulfate concentrations were 37.8 ppm, and sulfide concentrations were below the laboratory method reporting limits. Based on the chloride, sulfate, and sulfide concentrations, the composite sample does not appear to be corrosive.



NOTES

1) Atterberg limits tests were performed in general accordance with ASTM D4318 unless otherwise noted in the report.

2) Plasticity adjectives used in sample descriptions correspond to plasticity index as follows:
- Nonplastic (0 - 4%)
- Low Plasticity (>4 - 10%)
- Medium Plasticity (>10 - 20%)
- High Plasticity (>20 - 40%)
- Very High Plasticity (>40%)

BORING AND SAMPLE NO.	DEPTH (feet)	GROUP SYMBOL	SAMPLE DESCRIPTION	LL %	PL %	PI %	NAT. W.C. %	FINES %
● B-1, S-7	25.0	ML	SILT, trace sand, low plasticity	45	40	5	47	90
■ B-1, S-8	30.0	ML	SILT with sand, low plasticity	46	40	6	46	83
▲ B-1, S-12	50.0	MH	Clayey SILT with sand, medium plasticity	60	48	12	50	85
B-4, S-11	40.0	ML	Sandy SILT, nonplastic	NP	NP	NP	46	53
○ B-4, S-12	45.0	MH	Clayey SILT with sand, low plasticity	60	56	4	56	87
B-7, S-1	2.5	SM	Silty SAND, trace gravel, nonplastic	NP	NP	NP	4	25

Perennial Wind Chaser Station
Hermiston, Oregon

ATTERBERG LIMITS RESULTS

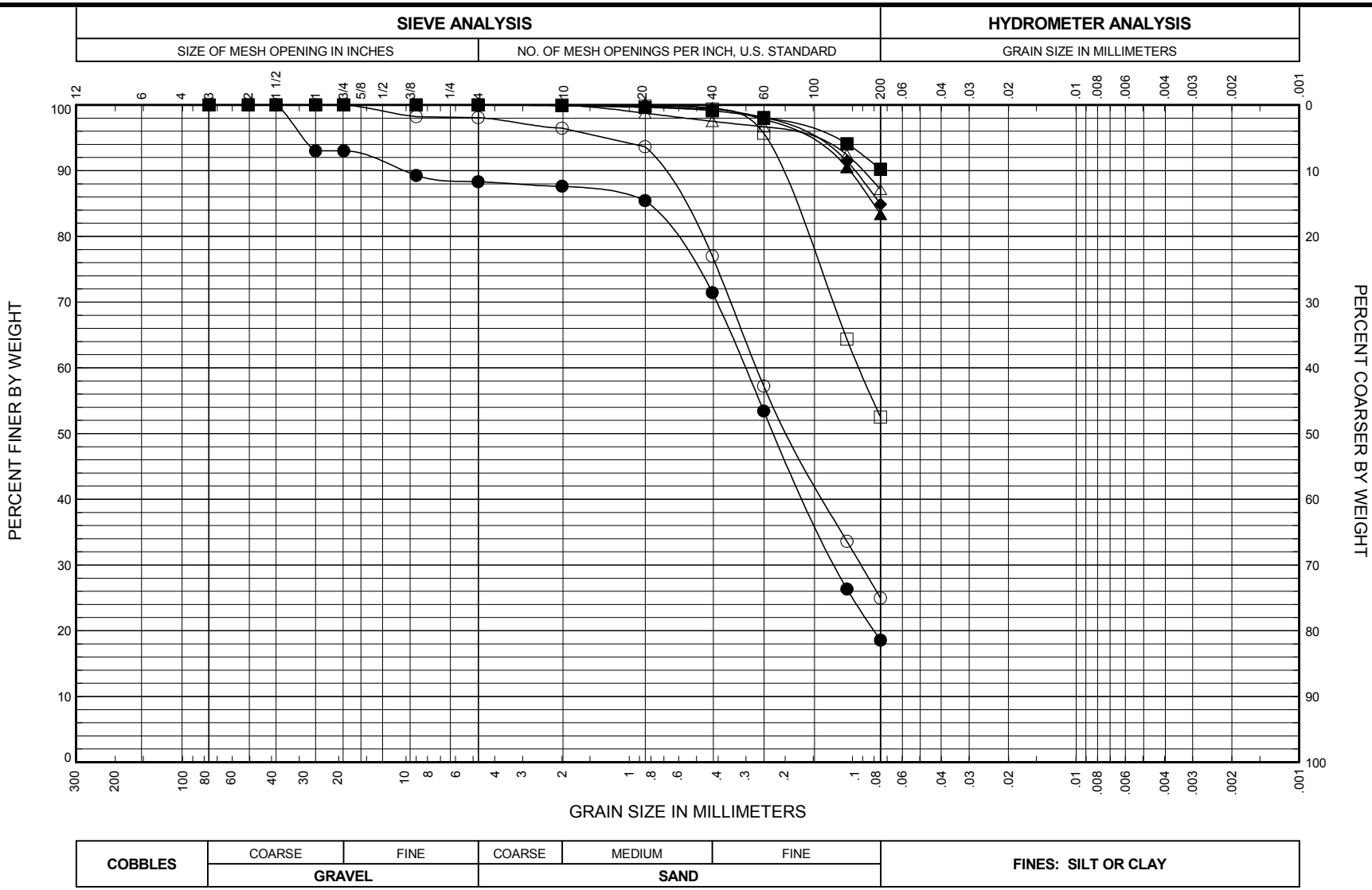
November 2013 24-1-03794-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. B1

FIG. B1

ATT_MAIN 24-1-03794-HERMISTON.GPJ SHAN WIL.GDT 11/18/13



NOTES:
1) Sieve and hydrometer analyses were performed in general accordance with ASTM D422 unless otherwise noted in the report.
2) Particles retained on the 3-inch (76.2 mm) sieve are noted in the sample descriptions, but are not included in sieve analyses unless otherwise noted in the report.

BORING AND SAMPLE NO.	DEPTH (feet)	GROUP SYMBOL	SAMPLE DESCRIPTION	GRAVEL %	SAND %	FINES %	NAT. W.C. %	DRY DENSITY PCF
● B-1, S-1	2.5	SM	Silty SAND, trace gravel	12	70	19	3	
■ B-1, S-7	25.0	ML	SILT, trace sand, low plasticity	0	10	90	47	
▲ B-1, S-8	30.0	ML	SILT with sand, low plasticity	0	17	83	46	
◆ B-1, S-12	50.0	MH	Clayey SILT with sand, medium plasticity	0	15	85	50	
○ B-2, S-1	2.5	SM	Silty SAND	2	73	25	18	
□ B-4, S-11	40.0	ML	Sandy SILT, nonplastic	0	47	53	46	
△ B-4, S-12	45.0	MH	Clayey SILT with sand, low plasticity	0	13	87	56	

Perennial Wind Chaser Station
Hermiston, Oregon

GRAIN SIZE DISTRIBUTION

November 2013 24-1-03794-001

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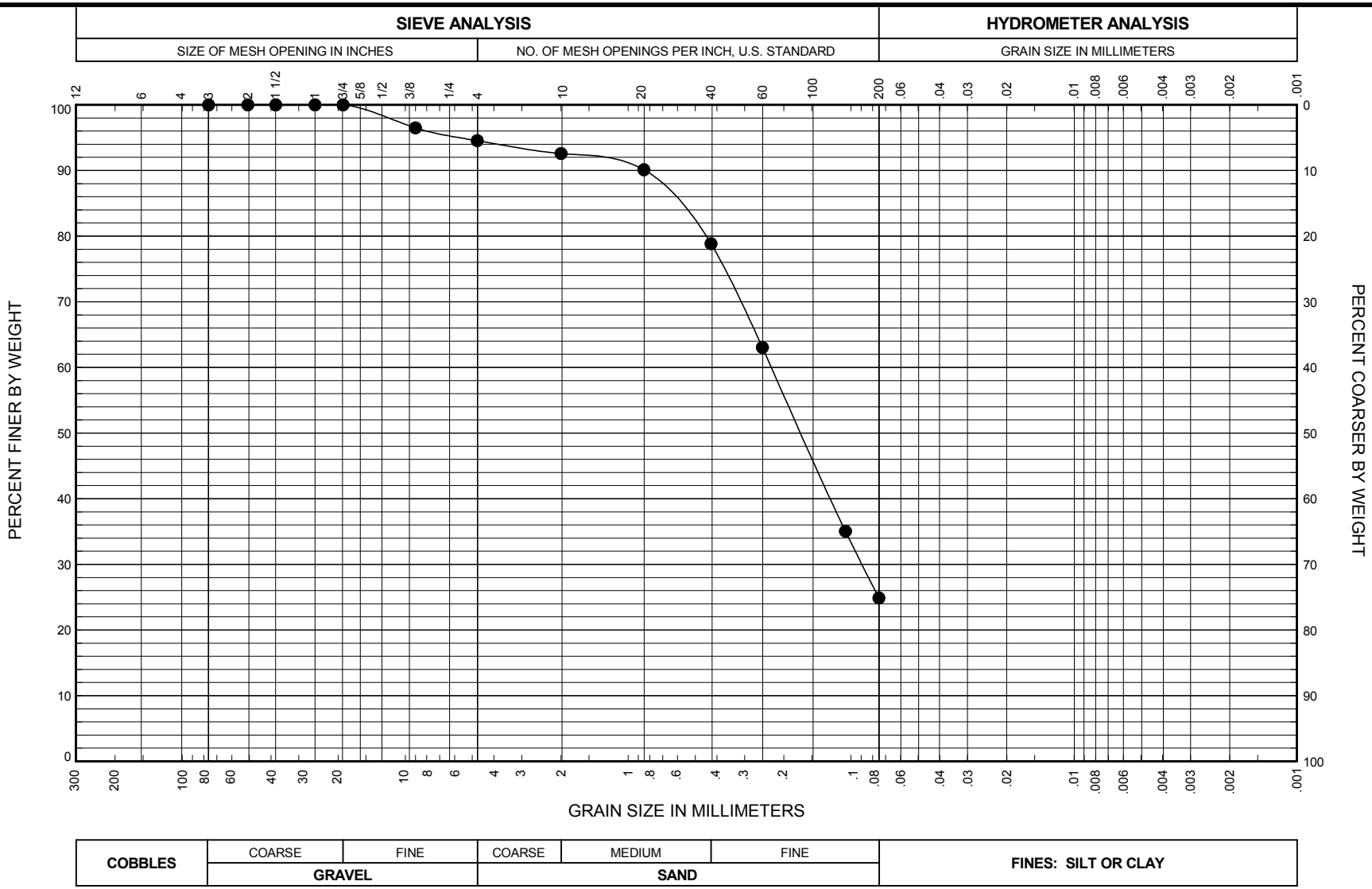
FIG. B2
Sheet 1 of 2

FIG. B2

GSA MAIN 24-1-03794-HERMISTON.GPJ SHAN WIL.GDT 11/18/13



NOTES:
1) Sieve and hydrometer analyses were performed in general accordance with ASTM D422 unless otherwise noted in the report.
2) Particles retained on the 3-inch (76.2 mm) sieve are noted in the sample descriptions, but are not included in sieve analyses unless otherwise noted in the report.

GSA MAIN 24-1-03794-HERMISTON.GPJ SHAN WIL.GDT 11/18/13

BORING AND SAMPLE NO.	DEPTH (feet)	GROUP SYMBOL	SAMPLE DESCRIPTION	GRAVEL %	SAND %	FINES %	NAT. W.C. %	DRY DENSITY PCF
● B-7, S-1	2.5	SM	Silty SAND, trace gravel, nonplastic	5	70	25	4	

Perennial Wind Chaser Station
Hermiston, Oregon

GRAIN SIZE DISTRIBUTION

November 2013 24-1-03794-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. B2
Sheet 2 of 2

FIG. B2

Specialty Analytical

11711 SE Capps Road, Ste B
Clackamas, Oregon 97015
TEL: 503-607-1331 FAX: 503-607-1336
Website: www.specialtyanalytical.com

June 27, 2013

David Higgins
Shannon & Wilson
3990 SW Collins Way
Ste. 100
Lake Oswego, OR 97035

TEL: (503) 223-6147
FAX (503) 223-6140

RE: Perennial Power / 24-1-03794-001

Dear David Higgins: Order No.: 1306108

Specialty Analytical received 5 sample(s) on 6/18/2013 for the analyses presented in the following report.

There were no problems with the analysis and all data for associated QC met EPA or laboratory specifications, except where noted in the Case Narrative, or as qualified with flags. Results apply only to the samples analyzed. Without approval of the laboratory, the reproduction of this report is only permitted in its entirety.

If you have any questions regarding these tests, please feel free to call.

Sincerely,

Marty French
Lab Director

Specialty Analytical

Date Reported: 27-Jun-13

CLIENT: Shannon & Wilson
Collection Date: 6/18/2013
Project: Perennial Power / 24-1-03794-001
Lab ID: 1306108-001
Client Sample ID: Composite
Matrix: SOIL

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
CHLORIDE ION IN SOIL		**D512**				Analyst: **AT**
Chloride	4.08	1.50		mg/Kg	1	6/24/2013 1:45:00 PM
PH OF SOIL		**D4972**				Analyst: **JRC**
pH	8.34	0		pH Units	1	6/20/2013 1:55:00 PM
OXIDATION-REDUCTION POTENTIAL		**M2580B**				Analyst: **JRC**
Oxidation-Reduction Potential	284	0		Eh	1	6/20/2013 2:15:00 PM
SOIL RESISTIVITY		**T288-91**				Analyst: **JRC**
Minimum Soil Resistivity	5000	1.00		ohm-cm	1	6/21/2013 10:40:00 AM
SULFATE IN SOIL		**D516**				Analyst: **AT**
Sulfate	37.8	1.50		mg/Kg	1	6/24/2013 1:45:00 PM
SULFIDE		**SW9030**				Analyst: **AT**
Sulfide	ND	20.0		mg/Kg	1	6/24/2013 10:00:00 AM

QC SUMMARY REPORT

WO#: **1306108**

Specialty Analytical

27-Jun-13

Client: Shannon & Wilson

Project: Perennial Power / 24-1-03794-001 **TestCode:** **CL_ASTM_S**

Sample ID: **MB-R10284** SampType: **MBLK** TestCode: **CL_ASTM_S** Units: **mg/Kg** Prep Date: RunNo: **10284**

Client ID: **PBS** Batch ID: **R10284** TestNo: **D512** Analysis Date: **6/24/2013** SeqNo: **130184**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	ND	1.50									

Sample ID: **LCS-R10284** SampType: **LCS** TestCode: **CL_ASTM_S** Units: **mg/Kg** Prep Date: RunNo: **10284**

Client ID: **LCSS** Batch ID: **R10284** TestNo: **D512** Analysis Date: **6/24/2013** SeqNo: **130185**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	28.3	1.50	30.00	0	94.5	80	120				

Sample ID: **CCV** SampType: **CCV** TestCode: **CL_ASTM_S** Units: **mg/Kg** Prep Date: RunNo: **10284**

Client ID: **CCV** Batch ID: **R10284** TestNo: **D512** Analysis Date: **6/24/2013** SeqNo: **130188**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	14.0	0.500	15.00	0	93.2	90	110				

Qualifiers:

B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
O	RSD is greater than RSDlimit	R	RPD outside accepted recovery limits	S	Spike Recovery outside accepted reco

QC SUMMARY REPORT

WO#: **1306108**

Specialty Analytical

27-Jun-13

Client: Shannon & Wilson

Project: Perennial Power / 24-1-03794-001 **TestCode:** **PH_ASTM**

Sample ID: **1306108-001ADUP** SampType: **DUP** TestCode: **PH_ASTM** Units: **pH Units** Prep Date: RunNo: **10225**

Client ID: **Composite** Batch ID: **R10225** TestNo: **D4972** Analysis Date: **6/20/2013** SeqNo: **129581**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
pH	8.34	0						8.340	0	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
O	RSD is greater than RSDlimit	R	RPD outside accepted recovery limits	S	Spike Recovery outside accepted reco

QC SUMMARY REPORT

WO#: **1306108**

Specialty Analytical

27-Jun-13

Client: Shannon & Wilson

Project: Perennial Power / 24-1-03794-001 **TestCode:** **REDOX**

Sample ID: **1306108-001ADUP** SampType: **DUP** TestCode: **REDOX** Units: **Eh** Prep Date: RunNo: **10226**

Client ID: **Composite** Batch ID: **R10226** TestNo: **M2580B** Analysis Date: **6/20/2013** SeqNo: **129584**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Oxidation-Reduction Potential	290	0						284.0	2.09	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
O	RSD is greater than RSDlimit	R	RPD outside accepted recovery limits	S	Spike Recovery outside accepted reco

QC SUMMARY REPORT

WO#: **1306108**

Specialty Analytical

27-Jun-13

Client: Shannon & Wilson

Project: Perennial Power / 24-1-03794-001 **TestCode:** **SO4_ASTM_S**

Sample ID: **MB-R10285** SampType: **MBLK** TestCode: **SO4_ASTM_** Units: **mg/Kg** Prep Date: RunNo: **10285**

Client ID: **PBS** Batch ID: **R10285** TestNo: **D516** Analysis Date: **6/24/2013** SeqNo: **130189**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	ND	1.50									

Sample ID: **LCS-R10285** SampType: **LCS** TestCode: **SO4_ASTM_** Units: **mg/Kg** Prep Date: RunNo: **10285**

Client ID: **LCSS** Batch ID: **R10285** TestNo: **D516** Analysis Date: **6/24/2013** SeqNo: **130190**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	29.1	1.50	30.00	0	97.0	70	130				

Sample ID: **CCV** SampType: **CCV** TestCode: **SO4_ASTM_** Units: **mg/Kg** Prep Date: RunNo: **10285**

Client ID: **CCV** Batch ID: **R10285** TestNo: **D516** Analysis Date: **6/24/2013** SeqNo: **130193**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	14.7	0.500	15.00	0	98.0	90	110				

Qualifiers:

B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
O	RSD is greater than RSDlimit	R	RPD outside accepted recovery limits	S	Spike Recovery outside accepted reco

QC SUMMARY REPORT

WO#: **1306108**

Specialty Analytical

27-Jun-13

Client: Shannon & Wilson

Project: Perennial Power / 24-1-03794-001

TestCode: **SULFIDE_S**

Sample ID: **1306108-001ADUP** SampType: **DUP** TestCode: **SULFIDE_S** Units: **mg/Kg** Prep Date: RunNo: **10283**

Client ID: **Composite** Batch ID: **R10283** TestNo: **SW9030** Analysis Date: **6/24/2013** SeqNo: **130183**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide	ND	20.0						0	0	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
O	RSD is greater than RSDlimit	R	RPD outside accepted recovery limits	S	Spike Recovery outside accepted reco

KEY TO FLAGS

Rev. May 12, 2010

A This sample contains a Gasoline Range Organic not identified as a specific hydrocarbon product. The result was quantified against gasoline calibration standards

A1 This sample contains a Diesel Range Organic not identified as a specific hydrocarbon product. The result was quantified against diesel calibration standards.

A2 This sample contains a Lube Oil Range Organic not identified as a specific hydrocarbon product. The result was quantified against a lube oil calibration standard.

A3 The result was determined to be Non-Detect based on hydrocarbon pattern recognition. The product was carry-over from another hydrocarbon type.

A4 The product appears to be aged or degraded diesel.

B The blank exhibited a positive result great than the reporting limit for this compound.

CN See Case Narrative.

D Result is based from a dilution.

E Result exceeds the calibration range for this compound. The result should be considered as estimate.

F The positive result for this hydrocarbon is due to single component contamination. The product does not match any hydrocarbon in the fuels library.

G Result may be biased high due to biogenic interferences. Clean up is recommended.

H Sample was analyzed outside recommended holding time.

HT At clients request, samples was analyzed outside of recommended holding time.

J The result for this analyte is between the MDL and the PQL and should be considered as estimated concentration.

K Diesel result is biased high due to amount of Oil contained in the sample.

L Diesel result is biased high due to amount of Gasoline contained in the sample.

M Oil result is biased high due to amount of Diesel contained in the sample.

MC Sample concentration is greater than 4x the spiked value, the spiked value is considered insignificant.

MI Result is outside control limits due to matrix interference.

MSA Value determined by Method of Standard Addition.

O Laboratory Control Standard (LCS) exceeded laboratory control limits, but meets CCV criteria. Data meets EPA requirements.

Q Detection levels elevated due to sample matrix.

R RPD control limits were exceeded.

RF Duplicate failed due to result being at or near the method-reporting limit.

RP Matrix spike values exceed established QC limits; post digestion spike is in control.

S Recovery is outside control limits.

SC Closing CCV or LCS exceeded high recovery control limits, but associated samples are non-detect. Data meets EPA requirements.

* The result for this parameter was greater that the maximum contaminant level of the TCLP regulatory limit.

APPENDIX C

PHOTOGRAPH LOG

Boring B-1 Location

Boring B-2 Location

Perennial Wind Chaser Station
Hermiston, Oregon

PHOTOGRAPH LOG

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FIG. C1
Page 1 of 8

File: I:\WIP\Projects\24-1 Portland\3700\3794 Perennial Power Wind Chaser Project\Field Explorations\field photos\07_09_2013\Photos.indd Date: 11-19-13 Author: AMN

Boring B-3 Location

Boring B-4 Location

Perennial Wind Chaser Station
Hermiston, Oregon

PHOTOGRAPH LOG

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FIG. C1

File: I:\WIP\Projects\24-1 Portland\3700\3794 Perennial Power Wind Chaser Project\Field Explorations\field photos\07_09_2013\Photos.indd Date: 11-19-13 Author: AMN

Boring B-5 Location

Boring B-6 Location

Perennial Wind Chaser Station
Hermiston, Oregon

PHOTOGRAPH LOG

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FIG. C1
Page 3 of 8

File: I:\WIP\Projects\24-1 Portland\3700\3794 Perennial Power Wind Chaser Project\Field Explorations\field photos\07_09_2013\Photos.indd Date: 11-19-13 Author: AMN

Boring B-7 Location

Boring B-8 Location

Perennial Wind Chaser Station
Hermiston, Oregon

PHOTOGRAPH LOG

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FIG. C1

File: I:\WIP\Projects\24-1 Portland\3700\3794 Perennial Power Wind Chaser Project\Field Explorations\field photos\07_09_2013\Photos.indd Date: 11-19-13 Author: AMN

Boring B-9 Location

Boring B-10 and Infiltation Test INT-2 Location

Perennial Wind Chaser Station
Hermiston, Oregon

PHOTOGRAPH LOG

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FIG. C1

File: I:\WIP\Projects\24-1 Portland\3700\3794 Perennial Power Wind Chaser Project\Field Explorations\field photos\07_09_2013\Photos.indd Date: 11-19-13 Author: AMN

Dynamic Cone Penetrometer DCP-1 Location

Dynamic Cone Penetrometer DCP-2 Location

Perennial Wind Chaser Station
Hermiston, Oregon

PHOTOGRAPH LOG

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FIG. C1

File: I:\WIP\Projects\24-1 Portland\3700\3794 Perennial Power Wind Chaser Project\Field Explorations\field photos\07_09_2013\Photos.indd Date: 11-19-13 Author: AMN

Dynamic Cone Penetrometer DCP-3 Location

Dynamic Cone Penetrometer DCP-4 Location

Perennial Wind Chaser Station
Hermiston, Oregon

PHOTOGRAPH LOG

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FIG. C1

File: I:\WIP\Projects\24-1 Portland\3700\3794 Perennial Power Wind Chaser Project\Field Explorations\field photos\07_09_2013\Photos.indd Date: 11-19-13 Author: AMN

Dynamic Cone Penetrometer DCP-5 Location

Infiltration Test INT-1 Location

Perennial Wind Chaser Station
Hermiston, Oregon

PHOTOGRAPH LOG

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FIG. C1

File: I:\WIP\Projects\24-1 Portland\3700\3794 Perennial Power Wind Chaser Project\Field Explorations\field photos\07_09_2013\Photos.indd Date: 11-19-13 Author: AMN

APPENDIX D

IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL/ENVIRONMMENTAL REPORT

Important Information About Your Geotechnical/Environmental Report

CONSULTING SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND FOR SPECIFIC CLIENTS.

Consultants prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your consultant prepared your report expressly for you and expressly for the purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the consultant. No party should apply this report for any purpose other than that originally contemplated without first conferring with the consultant.

THE CONSULTANT'S REPORT IS BASED ON PROJECT-SPECIFIC FACTORS.

A geotechnical/environmental report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. Depending on the project, these may include the general nature of the structure and property involved; its size and configuration; its historical use and practice; the location of the structure on the site and its orientation; other improvements such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask the consultant to evaluate how any factors that change subsequent to the date of the report may affect the recommendations. Unless your consultant indicates otherwise, your report should not be used: (1) when the nature of the proposed project is changed (for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one, or chemicals are discovered on or near the site); (2) when the size, elevation, or configuration of the proposed project is altered; (3) when the location or orientation of the proposed project is modified; (4) when there is a change of ownership; or (5) for application to an adjacent site. Consultants cannot accept responsibility for problems that may occur if they are not consulted after factors, which were considered in the development of the report, have changed.

SUBSURFACE CONDITIONS CAN CHANGE.

Subsurface conditions may be affected as a result of natural processes or human activity. Because a geotechnical/environmental report is based on conditions that existed at the time of subsurface exploration, construction decisions should not be based on a report whose adequacy may have been affected by time. Ask the consultant to advise if additional tests are desirable before construction starts; for example, groundwater conditions commonly vary seasonally.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes, or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical/environmental report. The consultant should be kept apprised of any such events, and should be consulted to determine if additional tests are necessary.

MOST RECOMMENDATIONS ARE PROFESSIONAL JUDGMENTS.

Site exploration and testing identifies actual surface and subsurface conditions only at those points where samples are taken. The data were extrapolated by your consultant, who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your consultant can work together to help reduce their impacts. Retaining your consultant to observe subsurface construction operations can be particularly beneficial in this respect.

A REPORT'S CONCLUSIONS ARE PRELIMINARY.

The conclusions contained in your consultant's report are preliminary because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Actual subsurface conditions can be discerned only during earthwork; therefore, you should retain your consultant to observe actual conditions and to provide conclusions. Only the consultant who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations based on those conclusions are valid and whether or not the contractor is abiding by applicable recommendations. The consultant who developed your report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

THE CONSULTANT'S REPORT IS SUBJECT TO MISINTERPRETATION.

Costly problems can occur when other design professionals develop their plans based on misinterpretation of a geotechnical/environmental report. To help avoid these problems, the consultant should be retained to work with other project design professionals to explain relevant geotechnical, geological, hydrogeological, and environmental findings, and to review the adequacy of their plans and specifications relative to these issues.

BORING LOGS AND/OR MONITORING WELL DATA SHOULD NOT BE SEPARATED FROM THE REPORT.

Final boring logs developed by the consultant are based on interpretation of field logs (assembled by site personnel), field test results, and laboratory and/or office evaluation of field samples and data. Only final boring logs and data are customarily included in geotechnical/environmental reports. These final logs should not, under any circumstances, be redrawn for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process.

To reduce the likelihood of boring log or monitoring well misinterpretation, contractors should be given ready access to the complete geotechnical engineering/environmental report prepared or authorized for their use. If access is provided only to the report prepared for you, you should advise contractors of the report's limitations, assuming that a contractor was not one of the specific persons for whom the report was prepared, and that developing construction cost estimates was not one of the specific purposes for which it was prepared. While a contractor may gain important knowledge from a report prepared for another party, the contractor should discuss the report with your consultant and perform the additional or alternative work believed necessary to obtain the data specifically appropriate for construction cost estimating purposes. Some clients hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes that aggravate them to a disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY.

Because geotechnical/environmental engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, consultants have developed a number of clauses for use in their contracts, reports and other documents. These responsibility clauses are not exculpatory clauses designed to transfer the consultant's liabilities to other parties; rather, they are definitive clauses that identify where the consultant's responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your report, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to your questions.

The preceding paragraphs are based on information provided by the
ASFE/Association of Engineering Firms Practicing in the Geosciences, Silver Spring, Maryland

ATTACHMENT H2

PRELIMINARY GEOTECHNICAL ENGINEERING REPORT FOR STEP-UP SUBSTATION

Preliminary Geotechnical Engineering Report
Perennial Wind Chaser Station
Step-Up Substation
Umatilla, Oregon

November 19, 2013

SHANNON & WILSON, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Preliminary Geotechnical Engineering Report
Perennial Wind Chaser Station
Step-Up Substation
Umatilla, Oregon

November 19, 2013

SHANNON & WILSON, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Excellence. Innovation. Service. Value
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24-1-03794-001

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2 Site Plan
3 Profile A-A’

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B Laboratory Testing
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PRELIMINARY GEOTECHNICAL ENGINEERING REPORT
PERENNIAL WIND CHASER STATION
STEP-UP SUBSTATION
UMATILLA, OREGON

1.0 INTRODUCTION

Perennial-Wind Chaser LLC is planning to construct a new 415-megawatt power-generating facility in Hermiston, Oregon, as part of the Perennial Wind Chaser Station project. In support of the proposed power-generating facility a Step-up Substation will be constructed immediately south of Bonneville Power Administration (BPA) McNary Substation in Umatilla, Oregon. The proposed Step-up Substation is located in an agricultural field north and west of Scaplehorn Road and 2,500 feet east of I-82, as shown on the Vicinity Map, Figure 1. The step-up substation is separated from McNary Substation by a railroad bed.

Shannon & Wilson, Inc. is providing preliminary geotechnical engineering services for the project under subcontract to Burns & McDonnell Engineering Company, Inc. This Preliminary Geotechnical Engineering Report presents our field exploration and laboratory test data, as well as the results of our preliminary geotechnical engineering evaluations for the design of the proposed substation facility. This report was prepared in general accordance with the Oregon State Board of Geologist Examiners Guidelines for Engineering Geologic Reports and Site-Specific Seismic Hazard Reports.

2.0 PROJECT UNDERSTANDING

2.1 Site Description

The proposed Step-up Substation facility site is immediately south of the center portion of the existing BPA McNary Substaion, which operates independently of the proposed facility. The proposed site is in the north central portion of a large agricultural field bordered on the north by a railroad bed, on the south by a concrete lined canal, on the east by Scaplehorn Road, and on the west by I-82. The site is within the historic flood plain of both the Umatilla River 1 mile to the west and Columbia River a half mile to the north. Site topography is generally flat and it is currently vegetated by tall grass. There are multiple wooden 230 kV and metal 500 kV transmission towers within the proposed footprint of the substation. The transmission towers carry power lines 40 to 60 feet above the ground surface to McNary Substation. There is an abandoned residential compound in the southeast corner of the field that we understand is owned by BPA and will likely be demolished. Isolated basalt boulders up to about four feet in diameter are scattered throughout the surface of the site. These boulders were likely derived from near-surface gravel deposits.

2.2 Substation Components

The Site Plan, Figure 2, shows the proposed location and configuration of the Step-up Substation, as provided to us by Burns & McDonnell Engineering Company, Inc. We understand that the preferred site access has not yet been established but we assume access will use the existing dirt road from Brownell Ditch Road to the south. We also understand the final layout of the proposed facility and final site grades have not yet been determined and that foundation loads are currently unknown. We assume that substation components will consist of transmission towers, a buried transmission cable, transformers associated disconnect switches and circuit breakers, tie-in structure, underground termination structures and adding gravel to the existing dirt roadways.

3.0 GEOLOGY AND SEISMICITY

3.1 Regional Geology

The project site is located within the Umatilla Basin; a broad lowland that is part of the Deschutes-Columbia Plateau geomorphic province. Evolution of the Columbia Plateau is described by Reidel and others (1989). The Deschutes-Columbia Plateau is floored at depth by basalt bedrock of the Columbia River Basalt Group (CRBG). The CRBG were erupted in the middle Miocene epoch, between about 17 and 6 million years ago, from fissure vents near the Idaho border. The CRBG consists of six formations, 14 members, and more than 150 individual flow units. Total thickness of the basalt section is greater than 15,000 feet in the Tri-Cities area to the north, and the section thins to a tapered edge against the flanks of the Blue Mountains to the southeast. The CRBG section is estimated at about 5,000 feet thick in the Umatilla Basin, although no borings are known to have penetrated to that depth.

As the basalt flows were being erupted, tectonic stress began building in the earth's crust, eventually producing many broad folds and faults across the newly forming basalt plateau. The down-warps, or basins, that formed on the basalt surface were filled by sediments eroded from the adjacent uplands and deposited by in-flowing streams along with an influx of air-fall volcanic ash. In the Umatilla Basin, these late Miocene to early Pliocene age (about 6 to 4 million year-old) sedimentary deposits were largely derived from the Blue Mountains to the south, although during this period the ancestral Umatilla River watershed may have included a large area south of the Blue Mountains axis (Smith and others, 1989). These Pliocene sediments were deposited as alluvial fans and north-flowing stream channel deposits and defined by Farooqui and others (1981) as the Alkali Canyon Formation. The Alkali Canyon Formation is exposed lying above the CRBG at higher elevations to the south (Walker, 1973; Madin and Geitgey, 2007) but is not present at the project site where it has been eroded away by the nearby Umatilla and Columbia Rivers.

During the high ice periods of the Pleistocene epoch, catastrophic flooding of glacial Lake Missoula deposited sand and gravel over the older deposits in the Umatilla Basin. Glacial Lake Missoula was impounded behind an ice dam which blocked the mouth of the Clark Fork in western Montana. At least 40, and by some counts (Waitt, 1980) up to about 90, times the lake level was able to overcome the ice and the lake emptied catastrophically, flooding the Columbia River system and back-flooding up tributary stream canyons along its path. The floodwater pooled temporarily in the wide Umatilla Basin forming a lake that for a short period of time was up to 400 feet deep. The high-velocity flood waters initially scoured their way into the basin, then as the flood waters deepened, a tremendous bed load of coarse gravel migrated into the basin filling the flood channels at lower elevations, while in succession, finer gravel and then sand mantled progressively higher topography. As the flood flow waned, silt was deposited out of suspension in the slack water. Then, slowly over a period of several days, the flood waters quietly receded. The process probably recurred at intervals of at least several decades between about 18,000 and 15,000 years ago (Allen and others, 2009).

Since the last flood event, the surface of the Umatilla Basin has been modified by strong easterly winds which have reworked the sand and silt deposited by the Missoula floods along with an influx of wind-blown silt ("loess") eroded from the Palouse of southeastern Washington. Other modifications have included erosion and re-deposition of sediments within the floodplain of the Umatilla and Columbia River and their tributaries.

3.2 Seismic Setting

Earthquakes in the Pacific Northwest occur largely as a result of the collision between the Juan de Fuca plate and the North American plate. These two tectonic plates meet along a mega thrust fault called the Cascadia Subduction Zone (CSZ). The CSZ runs approximately parallel to the coastline from northern California to southern British Columbia. The compressional forces that exist between these two colliding plates cause the denser oceanic plate to descend, or subduct, beneath the continental plate. This process leads to contortion and faulting of both plates and volcanism along the Cascade Range.

Shallow crustal faults and folds throughout Oregon and Washington have been located and characterized by the United States Geological Survey (USGS). The USGS provides approximate fault locations and a detailed summary of the available fault information in the USGS Quaternary Fault and Fold Database (USGS, 2013). The database defines four categories of faults, Classes A through D, based on evidence of tectonic movement known or presumed to be associated with large earthquakes during Quaternary time (less than 1.8 million years ago). For Fault Class A and B faults, geologic evidence has been published that demonstrates the existence of Quaternary deformation and, therefore, the faults are correlated to a higher potential for earthquake

generation. Class A faults are known or presumed to be associated with relatively large magnitude earthquakes (moment magnitude [Mw] of 6 to 7). Faults defined as Class B exhibit equivocal geologic evidence of Quaternary deformation, or may not extend deep enough to be considered a source of significant earthquakes.

According to the USGS' Oregon Fault and Fold database, there are two Class A fault systems (a system has multiple fault segments) and two Class B fault systems within approximately 75 kilometers (47 miles) of the project site. Their names, general locations relative to the site, slip rates, and the times since their most recent deformation are summarized in Table 1.

TABLE 1: QUATERNARY FAULTS WITHIN A 75-KM RADIUS OF THE PERENNIAL POWER SITE

Name	Fault Class	Distance and Direction from Site	Most Recent Deformation*	Slip Rate
Hite System – Agency Section	A	61 km Southeast	<1.6 Ma	<0.2 mm/yr
Wallula Fault System	A	32 km East northeast	<15 Ka	<0.2 mm/yr
Columbia Hill Structures	B	5 km North	<1.6 Ma	<0.2 mm/yr
Horse Heaven Hills Structures	B	22 km North northwest	<1.6 Ma	<0.2 mm/yr
Rattlesnake Hills	B	30 km North northwest	<1.6 Ma	<0.2 mm/yr

* Ka = "kiloannum" or thousand years; Ma = "megaannum" or million years.

4.0 FIELD EXPLORATIONS

Shannon & Wilson, Inc., explored the subsurface conditions at the site with two (2) geotechnical borings, four (4) dynamic cone penetrometer (DCP) tests, and two (2) infiltration tests. The borings, designated ST-B-1 and ST-B-2, were drilled between August 14 and August 16, 2013, by Hardcore Drilling, Inc., of Dundee, Oregon. A Shannon & Wilson geologist located the borings, collected soil samples, and logged the materials encountered during drilling. The DCP tests, designated ST-DCP-1 through ST-DCP-4, were conducted to estimate parameters for pavement design. The infiltration tests, designated ST-INT-1 and ST-INT-2, were conducted to estimate infiltration capacity for potential stormwater management facility design. The DCPs and infiltration tests were performed by a Shannon & Wilson geologist between August 14 and August 16, 2013. The locations of the borings, DCPs, and infiltration tests were measured in the field using a handheld GPS unit. Approximate exploration locations are shown on the Site Plan, Figure 2. Details of the exploration program, including boring logs, descriptions of the techniques used to advance and sample the borings, and DCP and infiltration test procedures and results are presented in Appendix A.

5.0 LABORATORY TESTING

Laboratory tests were performed on selected samples from the borings to determine basic index and engineering properties of the soils encountered. The laboratory testing program included moisture content analyses, particle-size analyses, Atterberg Limits tests, and corrosivity testing. Laboratory testing was performed in general accordance with applicable ASTM International (ASTM), American Association of State Highway and Transportation Officials (AASHTO), and United States Environmental Protection Agency (EPA) standard test procedures. Results of the laboratory tests and a brief description of the testing procedures are presented in Appendix B.

6.0 PHOTOGRAPHS OF THE SITE

Site conditions were documented in photographs taken at each geotechnical boring exploration location. A Photograph Log is presented in Appendix C.

7.0 SUBSURFACE CONDITIONS

We grouped the materials encountered in our field explorations into five (5) geotechnical units, as described below. Our interpretation of the subsurface conditions is based on the borings and regional geologic information from published sources. The geotechnical units are as follows:

- *Fine-grained Alluvium*: Loose to Medium dense Silty SAND (SM).
- *Catastrophic Flood Deposits – Gravel Facies*: Very dense Sandy GRAVEL to GRAVEL, trace silt with cobbles and boulders (GP).
- *Catastrophic Flood Deposits – Fine-grained Facies*: Medium dense/stiff to very stiff SILT to SILT with sand (ML).
- *Catastrophic Flood Deposits – Sand Facies*: Medium dense to dense silty SAND to SAND, with varying amounts of silt and gravel (SM, SW-SM, and SP).
- *Columbia River Basalt Group*: Very low to medium high strength BASALT bedrock.

These generalized geotechnical units have been defined by their geologic and engineering properties and their distribution in the subsurface. The units and their inter-relationships are shown on the Geologic Profile A-A', Figure 3. The location of the profile is shown on the Site Plan, Figure 2. The profile is interpretive, and variations in subsurface conditions may exist between the locations of the borings. Contacts between the units may be more gradational than shown in the profile and in the boring logs in Appendix A.

7.1 Reworked Fine-Grained Alluvium

The unit was deposited by the Columbia and Umatilla Rivers within the floodplain and reworked by high winds. It was encountered in all borings from the ground surface to depths ranging from about 2 to 2.5 feet. The Fine-grained Alluvium generally consists of loose to medium dense

Silty SAND (SM). It is typically dry to moist and micaceous with nonplastic fines, fine sand, and occasional organics. The silty fine sand may be considered a collapsible soil, based on our local experience. Collapsible soil usually has a relative high porosity and a correspondingly low unit weight. Soil collapse can occur by wetting under a moderate normal stress, through vibration, or by subjecting the soil to higher normal stresses without wetting it. Natural moisture content analysis performed on one sample was 2 percent. A fines content determined by sieve analyses was 30 percent by dry weight.

7.2 Catastrophic Flood Deposits

The Catastrophic Flood Deposits are gravel, sand, and fine-grained sediment deposited by the Missoula Floods. We grouped them into three facies based on their grain sizes: Gravel Facies, Fine-grained Facies, and Sand Facies. The different depositional facies reflect changing energy levels in the dynamic flood environment and are described in greater detail below.

7.2.1 Gravel Facies

Gravel Facies deposits were encountered directly below the Fine-grained Alluvium in all borings. The unit was fully penetrated in both borings, with encountered thicknesses ranging from about 5 to 21 feet. The Gravel Facies unit thickens to the east across the site. In general, the unit consists of very dense Sandy GRAVEL to GRAVEL, trace silt with cobbles and boulders (GP). Fines are typically nonplastic, sand is typically fine to coarse, and gravel is typically fine to coarse and rounded to subrounded. Difficult drilling conditions, including mud loss and borehole instability, were observed in the Gravel Facies. Drill action consistent with the presence of cobbles and boulders was observed. About 44 percent of the SPTs attempted in the unit met refusal, where more than 50 blows were required to drive the sampler through a six-inch interval. The non-refusal SPT N-values ranged from 58 to 66 bpf and averaged 63 bpf.

7.2.2 Fine-Grained Facies

A Fine-grained Facies deposit was encountered below the Gravel Facies in borings ST-B-2 and was about 10 feet thick. The Fine-grained Facies consists of medium dense/stiff to very stiff SILT to SILT with sand (ML). The unit is typically moist to wet and micaceous nonplastic to low plasticity fines. SPT N-values in the unit ranged from 12 to 19 bpf and averaged 16 bpf. Natural moisture content analyses of one sample tested was 35 percent. Fines content determined by one sieve analyses was 99 percent by dry weight. An Atterberg Limits test indicated the plasticity index was 3 percent.

7.2.3 Sand Facies

Sand Facies deposits were encountered in both borings, below the Gravel Facies in ST-B-1 and the Fine-grained Facies in ST-B-2. In general, the Sand Facies consists of medium dense to dense silty SAND to SAND, with varying amounts of silt and gravel (SM, SW-SM, and SP). The unit is typically dry to moist and micaceous, with nonplastic fines. SPT N-values in the unit ranged from 26 to 48 bpf and averaged 38 bpf. Natural moisture content analyses was 17 percent in both of the two samples tested. Fines content determined by two sieve analyses was 8 and 17 percent by dry weight.

7.2.4 Columbia River Basalt Group

The Columbia River Basalt bedrock was encountered at the base of both borings. In general, this unit consists of very low to medium high strength (R1-R3), dark brown and gray-brown to gray, slightly to moderately vesicular, slightly to highly weathered BASALT with very close to moderately close medium spaced rough undulating joints with varying amounts of iron-oxide staining, calcite mineralization, and brown clayey infilling. Overall, core recovery ranged from 52 to 100 percent and averaged 77 percent. Rock quality designation (RQD) ranged from 0 to 73 percent, and averaged 15 percent.

7.3 Groundwater

To estimate the depth to groundwater, boring ST-B-2 was flushed with clean water and left open with a tremie pipe inserted to the bottom after drilling. The hole was open from August 15 through August 16, 2013. We attempted to measure the groundwater level in the hole August 16 and the hole was dry. There was not groundwater present in the alluvial overburden or bedrock to the base of the boring. In our opinion, up to a few feet of groundwater may be perched over the surface of the bedrock during the winter season. Groundwater levels should be expected to fluctuate seasonally and with changes in precipitation, land use, and other factors. In general, we expect groundwater levels in this area to be at a seasonal high during the winter and late spring and at a seasonal low during the late summer and early fall.

8.0 SITE-SPECIFIC SEISMIC HAZARD EVALUATION

In accordance with the site classification criteria in the International Build Code (IBC, 2012), we recommend using a Site Class C for designing structures at this site. The following paragraphs describe required seismically-related hazard evaluations on site.

Strong Ground Motions: The maximum considered earthquake (MCE) ground motions at the bedrock level were obtained from the United States Geological Survey's (USGS) Earthquake Hazards Program – 2008 interactive deaggregation website. The ground motions are based on a probabilistic hazard analysis performed by the USGS and the seismic site classification of the project site. Table 2 provides recommendation seismic design parameters.

TABLE 2: RECOMMENDED SEISMIC DESIGN PARAMETERS

Seismic Parameter	Recommended Value
Site Class	C
Peak Ground Acceleration at Bedrock	0.17g
Peak Ground Acceleration at Ground Surface	0.21g
Short Period Spectral Acceleration, S_s	0.41g
1-Second Period Spectral Acceleration, S_1	0.13g
Site Factor, F_v	1.7
Site Factor, F_a	1.2
Short Period Damped Acceleration, S_{DS}	0.33g
1-Second Period Damped Acceleration, S_{D1}	0.15g
Seismic Design Category	D

Note: g = gravity acceleration

Fault Rupture: The project site lies more than 3 miles from the nearest Class B mapped fault and approximately 20 miles from the nearest Class A mapped fault. It is our opinion that the risk of fault rupture at the site is low.

Other Hazards: Due to the location, geography, and subsurface conditions of the site, it is our opinion that the risk for liquefaction, lateral spread, landsliding, tsunami, or seiche at the site is very low.

9.0 CONCLUSIONS AND RECOMMENDATIONS

9.1 General Conclusions

The borings drilled at the site indicate that the project site is mantled by a relatively thin layer of reworked fine-grained alluvium overlying very dense Catastrophic Flood Deposits - Gravel Facies, the medium dense to dense Sand Facies, and stiff to very stiff Fine-grained Facies. Catastrophic Flood Deposit Facies overly very low to medium high strength Columbia River Basalt Group bedrock at a depth of 25 to 37 feet. The following general conclusions are presented based on the results of our engineering analyses and evaluations.

- The 2 to 2.5 feet thick reworked fine-grained alluvium silty sand is potentially collapsible or subject to strength loss based on our local project experience. Collapse or loss of strength of the soil can occur either by wetting, vibrating, or subjecting the soil to higher normal stresses.

Most project structures, such as transformers and associated disconnect switches and circuit breakers, can be supported by shallow foundations; such as mat foundations and spread footings.

- Transmission Towers (if needed) typically are supported by drilled piers due to relatively large lateral load. Alternatively the transmission towers can be supported by a spread footing on top of the dense to very dense alluvial sandy gravel with use of micropiles or anchor tiedowns to develop the lateral resistance through a force couple. The preferred type of foundation will be selected based on the transmission tower types and design loads. At this time, the transmission tower design information is not available. Therefore, the foundation recommendations for the transmission towers are not included in this report.

9.2 Foundation Subgrade Preparation and Earthwork

9.2.1 Foundation Subgrade Preparation

Excavation and subgrade preparation recommendations are provided in the following paragraphs for the various structures including transformers, control buildings, and transmission towers. Foundation excavations should extend to the top of the dense to very dense Catastrophic Flood Deposits Gravel Facies at the depths ranging 2 to 3 feet below the existing ground surface, and graded to provide a smooth soil surface. Prior to placement of structural fill, the underlying Catastrophic Flood Deposits Gravel Facies subgrade should be compacted by several passes of a smooth drum roller with a minimum static weight of 10,000 pounds. Following compaction, proof-rolling should be accomplished while operating the drum roller in the static mode. Any loose of soft materials encountered should be removed and replaced with compacted structural fill.

9.2.2 Cut and Fill Slopes

We recommend that permanent cut and fill slopes on the site should be no steeper than 2 Horizontal to 1 Vertical (2H:1V). Temporary cut slopes may be required for foundations and buried transmission cables or other utilities. We recommend that the temporary cut slope inclination be 1.5H:1V or flatter.

The contractor and subcontractor should be aware of and familiar with applicable local, state, and federal safety regulations, including the current OSHA Excavation and Trench Safety Standards, and OSHA Health and Safety Standards for Excavations, 29 CFR Part 1926, or successor regulations. Construction site safety should be the sole responsibility of the contractor, who also is solely responsible for the means, methods, and sequencing of construction operations. We are providing the following information solely as a service to our client. Under no circumstances should the information provided herein be interpreted to mean that Shannon & Wilson is assuming responsibility for construction site safety or the contractor's activities; such responsibility is not being implied and should not be inferred.

9.2.3 Structural Fill

After the partial or complete removal of the reworked fine-grained alluvium silty sand layer, compacted structural fill should be used to establish foundation bearing grades. Prior to beginning structural fill placement, the foundation excavation subgrades should be prepared as recommended above. Crushed rock should consist of ¾-inch minus angular rock base aggregate, in accordance with Oregon Department of Transportation (ODOT) Standard Specifications for Construction (2008), Section 02630. In addition to the ODOT requirements, material passing the No. 200 sieve shall not exceed 5 percent by weight using a washed sieve analysis, ASTM D1140. We recommend that the backfill material placed to establish foundation bearing grades be compacted to at least 92 percent of its modified Proctor maximum dry density, determined in accordance with ASTM D1557.

An alternative structural fill is fly ash/cement/soil mix. We understand that the material and placement requirements for fly ash/cement/soil mix will be specified by the project civil engineers, if this option is pursued. We believe that the native reworked fine-grained alluvium silty sand is suitable for use with a fly ash or cement admixture.

The native excavated soil with no material passing a 3-inch screen may also be used as structural fill underneath lightly loaded spread footings and mat foundations for transformers or control buildings, but the native excavated soil should not be used as structural fill under the relatively heavy loaded (vertical and lateral) foundations, such as the transmission towers.

9.3 Foundation Design Recommendations

9.3.1 General

The subsurface conditions revealed by the borings indicate that the ground surface across the site is underlain by 2 to 3 feet of reworked alluvial silty sand which, in turn, is underlain by the Catastrophic Flood Deposits. The allowable settlements for the proposed structures are not known at this time. In the preliminary design, based upon our similar project and local geologic experiences, we recommend that the reworked alluvial silty sand be excavated out, and the spread footings should be founded on the dense to very dense alluvial sandy gravel. In all cases, the width of any foundation element should not be less than 24 inches. Based on discussion with the City of Hermiston Public Works Department, a frost depth of 2 feet is used in the Hermiston area for foundation design. Therefore, foundations should be embedded a minimum depth of 24 inches, measured from the top of the floor slab or lowest adjacent finished grade to the base of the foundation. The following paragraphs present geotechnical recommendations for foundation design include soil allowable bearing capacity, estimated settlement, and foundation excavation and backfill requirements.

9.3.2 Spread Footings for Transformers and other Structures

We recommend complete removal of the reworked alluvial silty sand layer to an estimated depth of 2 to 3 feet and replacement with a well-graded, clean, crushed rock structural fill, or a fly ash/cement soil mix structural fill. Subgrade preparation should include compaction and proof-rolling as previously described in Section 9.2.1. We recommend that an allowable bearing pressure of 5,000 psf be used to proportion the spread footings with a factor of safety (FS) of 3. For earthquake loading, this bearing capacity can be increased by one-third (33 percent). The estimated total elastic settlement is less than 0.5 inch. This settlement will occur immediately upon equipment loading. The differential settlement may be approximate 0.25 inch. We recommend using a subgrade modulus of 300 pci for foundation design regardless of foundation dimensions.

9.3.3 Drilled Shaft Foundations for Laterally Loaded Structures

We recommend using drilled shaft foundations to support the laterally loaded structures and equipment, such as bus supports, A-frames, deadends, and lightning masts. Typically the drilled shaft design including diameter and length will be controlled by the lateral loads of the proposed structures and equipments, as well as the subsurface soil conditions. We understand that the design loads of the proposed structures and equipments are unknown at this time.

Further the locations of these structures and equipments have not yet been determined. Therefore, the detail design of the drilled shaft foundations will be performed during the final design phase based upon the additional geotechnical explorations and design information including locations and design lateral loads.

9.4 Floor Slab

For floor slab subgrade preparation, we recommend excavating at least the upper reworked fine-grained alluvial silty sand to a depth of 12 inches below the existing ground surface and backfilling with structural fill. The structural fill may consist of clean, well-graded crushed rock or native sandy/silty soil. If native soil is used as structural fill in the floor slab areas, we recommend a minimum 8 inches of clean crushed rock with less than 2 percent passing Sieve No. 200 be placed beneath the floor slab as a capillary break between subgrade and slab. The structural backfill should be compacted at least to 90 percent of its modified Proctor maximum dry density, determined in accordance with ASTM D1557. We recommend a subgrade modulus of 150 pci be used for floor slab design.

9.5 Buried Transmission Cable

A buried transmission cable is planned to extend from the new Step-up Substation to the existing McNary Substation to the north as shown in Figure 2. The cable depth and final alignment has not yet been determined. The cable will need to cross under existing railroad tracks. Ownership of the railroad and whether or not it is in use is not known. Neither of the existing borings was performed at the proposed location of the buried transmission cable. However, based on surface topography we assume subsurface conditions to be similar to those encountered in the borings. Potential installation methods may include either trenching or trenchless excavation techniques or a combination of both. In our experience trenchless installation methods are typically required when crossing below railroad tracks. Trenches may be excavated using a temporary cut slope inclination of 1.5H:1V or flatter or excavated vertically using shoring or conventional trench shields. Trenchless techniques may include horizontal directional drilling or pipe ramming.

For open trenches the transmission cable zone and bedding should consist of imported, ¾-inch minus crushed aggregate. Compaction should be at least 90 percent of ASTM D1557. Above the transmission cable zone, where trenches pass below foundations, floor slabs, or pavements we recommend trench backfilled be in accordance with structural fill recommendations. In open areas the native excavated soil with no material passing a 3-inch screen may also be used as

trench backfill above the transmission cable zone. In open areas trench backfill should be compacted to at least 90 percent of ASTM D1557.

10.0 LIMITATIONS

The analyses, conclusions, and recommendations contained in this report are based upon site conditions as they presently exist and further assume that the borings are representative of subsurface conditions throughout the site, i.e., the subsurface conditions everywhere are not significantly different from those disclosed by the field explorations.

If, during construction, subsurface conditions different from those encountered in the field explorations are observed or appear to be present beneath excavations, we should be advised at once so that we can review these conditions and reconsider our recommendations where necessary. If there is a substantial lapse of time between the submission of this report and start of work at the site, or if conditions have changed due to natural causes or construction operations at or adjacent to the site, it is recommended that this report be reviewed to determine the applicability of these conclusions and recommendations, considering the changed conditions and the elapsed time.

We recommend that Shannon & Wilson review the geotechnical portions of the plans and specifications, especially those parts that address foundations, retaining walls, embankments, and earthwork to determine if they are consistent with our recommendations.

This report is prepared for the exclusive use of Burns & McDonnell Engineering Company, Inc., for the preliminary design and permitting of the Perennial Power Wind Chaser Project, Step-up Substation in Umatilla, Oregon. We recommend additional explorations be performed once final layout of the substation is determined. Unanticipated soil conditions are commonly encountered and cannot fully be determined by merely taking soil samples from geotechnical borings. Such unexpected conditions frequently require that additional expenditures be made to attain properly constructed projects. This report is not as a warranty of subsurface conditions described in this report. Shannon & Wilson has prepared the attached, “Important Information About Your Geotechnical Engineering Report,” to assist you and others in understanding the use and limitations of our reports. This attachment is presented in Appendix D of this report.

Please note that the scope of our services did not include any environmental assessment or evaluation regarding the presence or absence of hazardous or toxic materials in the soil, surface water, groundwater, or air, on or below or around the project site.

SHANNON & WILSON, INC.

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DJH:AAH:RPP/aeh

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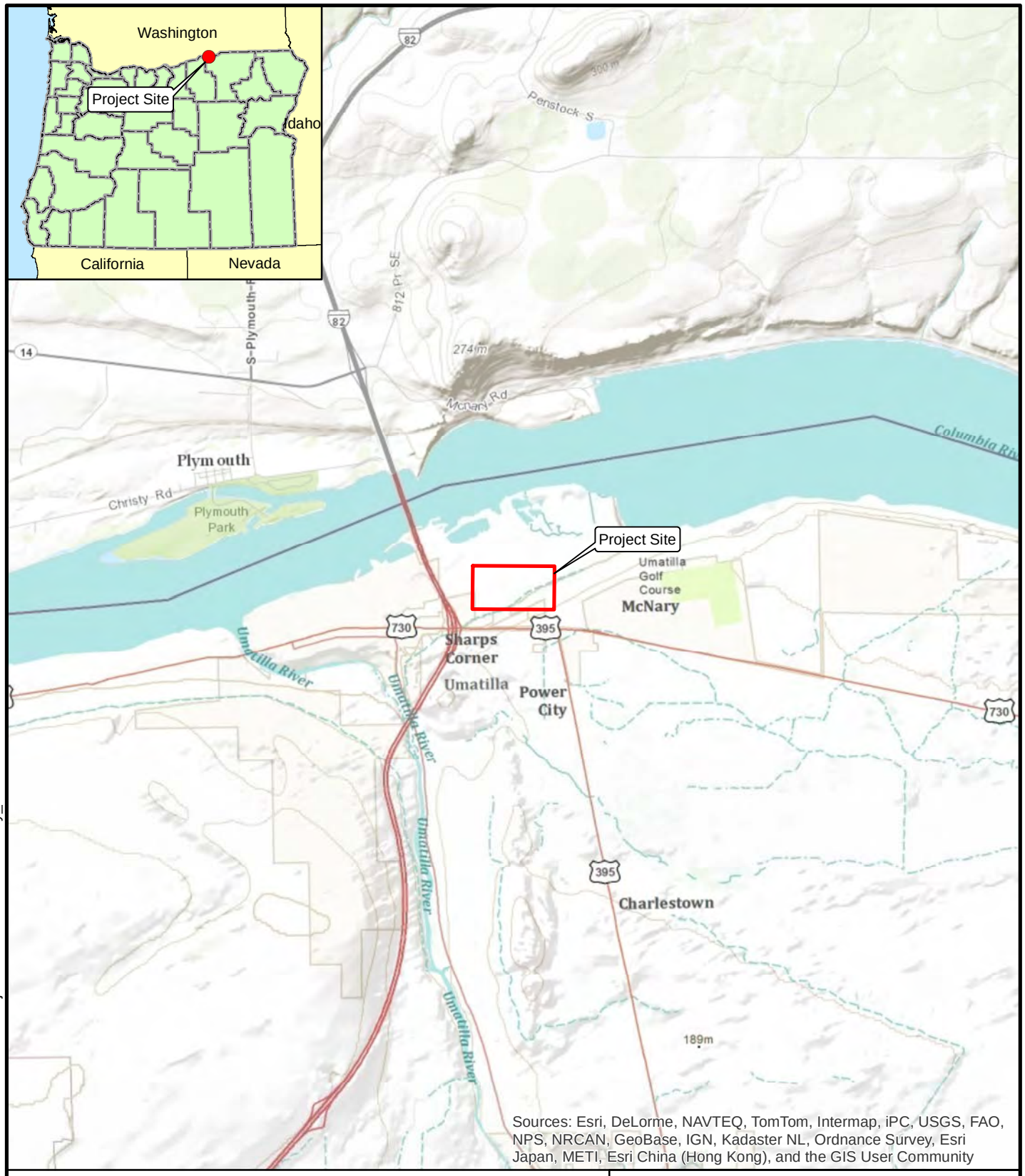

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Perennial Wind Chaser Station
Step-Up Substation
Umatilla, Oregon

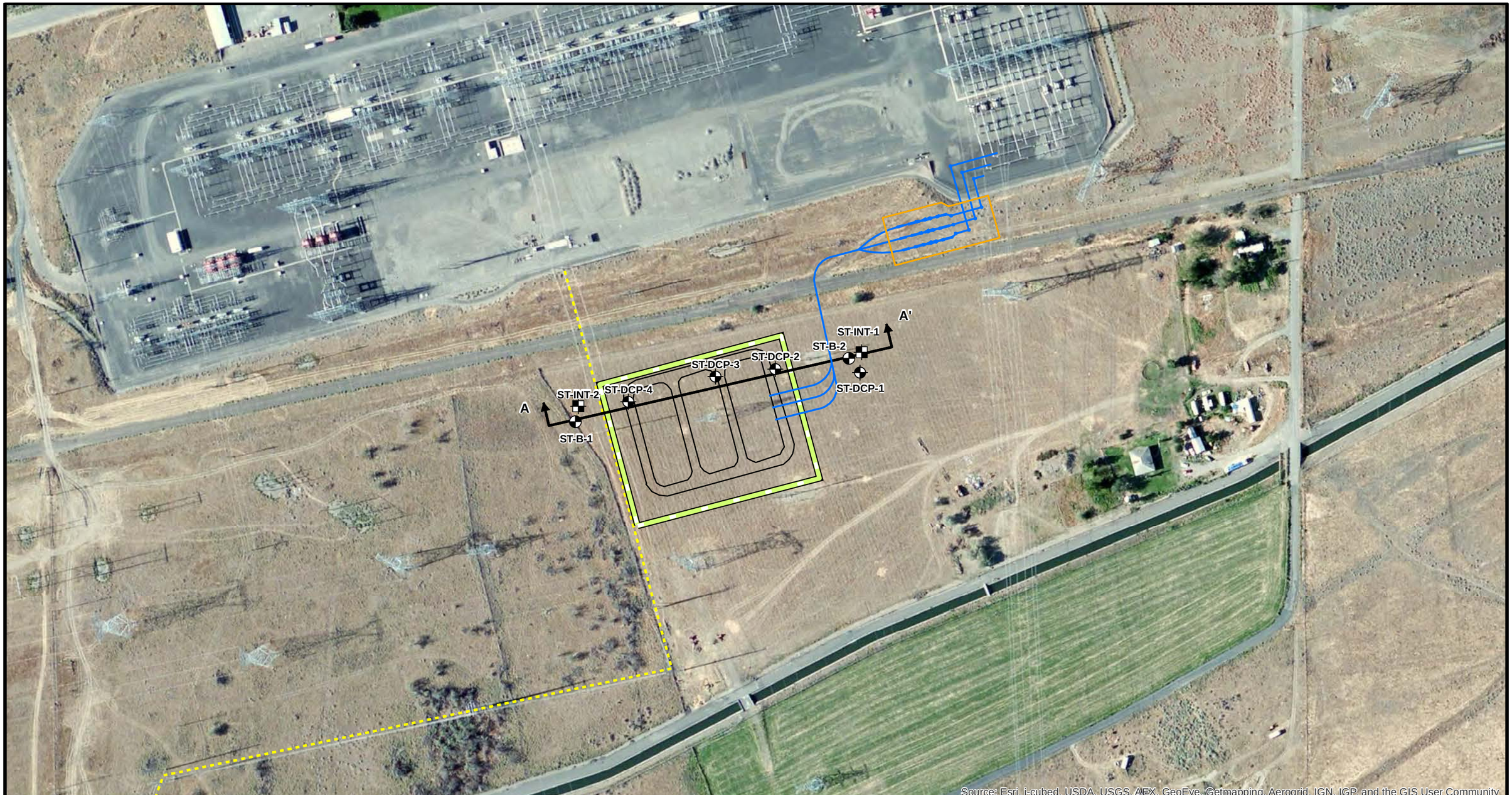
VICINITY MAP

November 2013 24-1-03794-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. 1

Path: T:\Projects\24-1\3794 Perennial Power Wind Chaser Project\Avmxd\Umatilla\Vicinity_Umatilla.mxd 11/18/2013 ath



LEGEND

- Location and Designation of Boring
- Location and Designation of Dynamic Cone Penetrometer
- Location and Designation of Infiltration Test
- Step-Up Substation Boundary
- Existing McNary Electrical Interconnection
- Proposed Underground Transmission Line
- Proposed Riser Structure Fenced Area
- A A' Location and Designation of Profile

NOTES

1. Project features were georeferenced from Burns and McDonnell figure.
2. Designations are approximate.

0 100 200 400 Feet

Perennial Wind Chaser Station
Step-Up Substation
Umatilla, Oregon

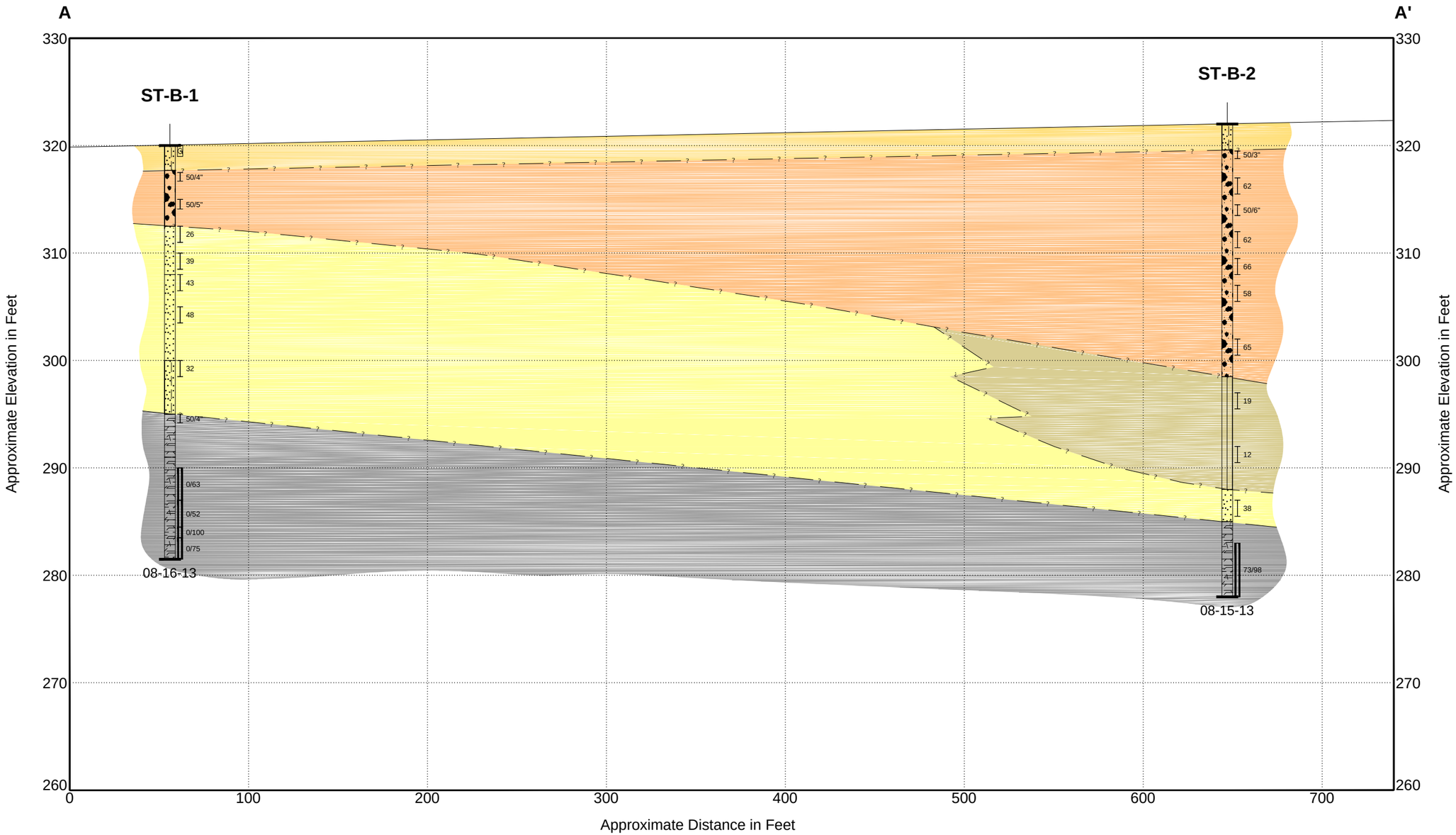
SITE PLAN

November 2013 24-1-03794-001

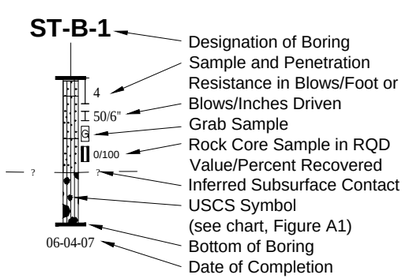
SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. 2

T:\Projects\24-1\3794 Perennial Power Wind Chaser Project\Avmxd\Umatilla\Umatilla.mxd 11/19/2013 ath



EXPLANATION



Fine-Grained Alluvium

Catastrophic Flood Deposits

- Gravel Facies
- Sand Facies
- Fine-grained Facies

Columbia River Basalt Group

NOTE

This subsurface profile is generalized from materials observed in soil borings. Variations may exist between profile and actual conditions.

0 60 120

Horizontal Scale in Feet

0 10 20

Vertical Scale in Feet

Vertical Exaggeration = 6X

Perennial Wind Chaser Station
Step-Up Substation
Umatilla, Oregon

PROFILE A-A'

November 2013 24-1-03794-001

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FIG. 3

Filename: I:\WI\Projects\24-1 Portland\3700\3794 Perennial Power Wind Chaser Project\Graphics\CAD\24-1-03794-SitePlan.dwg Layout: UmatillaPROFILE A Date: 11-18-2013 Login: mas

APPENDIX A

FIELD EXPLORATIONS

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APPENDIX A

FIELD EXPLORATIONS

A.1 GENERAL

Shannon & Wilson, Inc., explored subsurface conditions at the project site with two (2) geotechnical borings, four (4) dynamic cone penetrometer (DCP) tests, and two (2) infiltration tests. The borings were designated ST-B-1 and ST-B-2 and ranged in depth from 38.5 to 44.0 feet below the ground surface (bgs). The DCP tests were designated ST-DCP-1 through ST-DCP-4 and ranged in depth from 1.1 to 2.7 feet bgs. The infiltration tests were designated ST-INT-1 and ST-INT-2 and ranged in depth from 1.0 to 2.5 feet bgs. The locations of the completed borings, DCPs, and infiltration tests were measured in the field using a handheld GPS unit. Approximate exploration locations are shown on the Site Plan, Figure 2. Exploration coordinates, elevations, depths, and other data are presented on the Exploration Summary, Table A1. This appendix describes the techniques used to advance and sample the borings and presents logs of the materials encountered during drilling. It also presents DCP and infiltration testing procedures and results.

A.2 BORINGS

A.2.1 Drilling

Borings ST-B-1 and ST-B-2 were drilled between August 14 and August 16, 2013. The borings were drilled using a track-mounted CME-850 drill rig provided and operated by Hardcore Drilling, Inc., of Dundee, Oregon. Both borings were started using mud rotary drilling techniques. Where rock was encountered, the borings were then advanced and continuously sampled using HQ triple-tube wireline coring techniques. A Shannon & Wilson representative was present during the explorations to locate the borings, observe the drilling, collect soil and rock samples, and log the materials encountered.

A.2.2 Disturbed Sampling

Disturbed samples were collected in the borings, typically at 2.5- to 5-foot depth intervals, using a standard 2-inch outside diameter (O.D.) split spoon sampler in conjunction with Standard Penetration Testing. In a Standard Penetration Test (SPT), ASTM D1586, the sampler is driven 18 inches into the soil using a 140-pound hammer dropped 30 inches. The number of blows required to drive the sampler the last 12 inches is defined as the standard penetration resistance, or N-value. The SPT N-value provides a measure of in-situ relative

density of cohesionless soils (silt, sand, and gravel), and the consistency of cohesive soils (silt and clay). All disturbed samples were visually identified and described in the field, sealed to retain moisture, and returned to our laboratory for additional examination and testing.

SPT N-values can be significantly affected by several factors, including the efficiency of the hammer used. One automatic hammer system was used for both borings performed at the site. Automatic hammers generally have higher energy transfer efficiencies than cathead driven hammers. Based on information we received from Hardcore Drilling, Inc., the energy efficiency of the hammer used on site was measured at 83.9 percent in January 2013. All N-values presented in this report are in blows per foot, as counted in the field. No corrections of any kind have been applied.

An SPT was considered to have met refusal where more than 50 blows were required to drive the sampler 6 inches. If refusal was encountered in the first six-inch interval (for example, 50 for 1.5”), the count is reported as 50/1st 1.5”. If refusal was encountered in the second six-inch interval (for example, 48, 50 for 1.5”), the count is reported as 50/1.5”. If refusal was encountered in the last six-inch interval (for example, 39, 48, 50 for 1.5”), the count is reported as 98/7.5”.

A.2.3 Continuous Coring

Continuous HQ-wireline coring was used in both borings to sample and advance through rock. Core samples were visually described in the field, then boxed for transport to our laboratory for further examination. The rock core recovery (presented graphically on the boring logs) was calculated by dividing the length of core recovered in the barrel by the length of the total drilled run. This ratio is expressed as a percent.

The rock quality designation (RQD), also presented graphically on the boring logs, is a modified core recovery percentage including only the total length of the specimens of intact rock more than four inches in length, divided by the total length of the core run. The smaller pieces are considered to be the result of close jointing, fracturing, or weathering in the rock mass and are excluded from the determination. Difficulties such as distinguishing natural fractures in the rock core from mechanical breaks due to drilling operations restrict the use of the RQD in evaluating in situ rock properties. However, it does provide a subjective estimate of rock mass quality and a comparison of rock quality in the borings.

A.2.4 Borehole Abandonment

After drilling, boring ST-B-2 was flushed with water and left open overnight in order to observe the natural groundwater level. The following morning, the hole was dry to its total depth

of 44 feet. Both borings were backfilled with bentonite cement grout or bentonite chips in accordance with Oregon Water Resource Department regulations. No wells or other instruments were installed in the boreholes.

A.2.5 Material Descriptions

In the field, soil samples were described and identified visually in general accordance with ASTM D2488 Standard Practice for Description and Identification of Soils (Visual-Manual Procedure). Consistency, color, relative moisture, degree of plasticity, peculiar odors, and other distinguishing characteristics of the samples were noted. The rock core was described based on International Society for Rock Mechanics rock description methods. Once returned to the laboratory, soil and rock samples were re-examined, various standard classification tests were performed, and field descriptions and identifications were modified as necessary. We refined our visual-manual soil descriptions and identifications based on the results of the laboratory tests, using elements of the Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System), ASTM D2487. However, ASTM 2487 was not followed in full, because it requires that a suite of tests be performed to classify a single sample. The specific terminology used in the soil and rock descriptions is defined in the Soil Description and Log Key, Figure A1, and the Rock Classification and Log Key, Figure A2.

A.2.6 Logs of Borings

Summary logs of borings are presented in Figures A3 and A4. Photographs of the rock core obtained from the borings are presented in Figures A5 and A6. Material descriptions and interfaces on the logs are interpretive, and actual changes may be gradual. The left-hand portion of the boring logs gives our description, identification, and geotechnical unit designation for the material encountered in the boring. The right-hand portion of the boring logs shows a graphic log, sample locations and designations, groundwater information, and a graphical representation of N-values, natural water contents, sample recovery, RQD, Atterberg limits, and fines content.

A.3 DYNAMIC CONE PENETROMETER (DCP) TESTING

A Shannon & Wilson geologist performed four (4) dynamic cone penetrometer (DCP) tests, designated ST-DCP-1 through ST-DCP-4, on August 14, 2013. The approximate locations of the DCPs are shown on the Site Plan, Figure 2. The DCP is a device widely used to determine in-situ strength properties of base materials and subgrade soils. The tests were performed in general accordance with ASTM D6951, Standard Test Method for the Use of the Dynamic Cone Penetrometer in Shallow Pavement Applications. The four main components of the DCP include the cone, rod, anvil, and hammer. The cone is attached to one end of the DCP rod while the

anvil and hammer are attached to the other end. Energy is applied to the cone tip through the rod by dropping the 17.64-pound hammer a distance of 22.6 inches against the anvil. The diameter of the cone is 0.16 inch larger than the rod to ensure that only tip resistance is measured. The number of blows required to advance the cone into the subsurface materials is recorded. The DCP index is the ratio of the depth of penetration to the number of blows of the hammer. This can be correlated to a variety of material properties, including California Bearing Ratio (CBR) and Resilient Modulus. The DCP test data and the resulting Subgrade Resilient Modulus versus depth plots, developed in accordance with the ODOT Pavement Design Guide (2011), are presented in Figure A7 through Figure A10.

A.4 INFILTRATION TESTING

A Shannon & Wilson geologist performed two (2) infiltration tests, designated ST-INT-1 and ST-INT-2, between August 14 and August 16, 2013. The approximate locations of the infiltration tests are shown on the Site Plan, Figure 2. The tests were performed in general accordance with the Encased Falling Head Test method, described in the 2008 Portland Stormwater Management Manual, Appendix F2. At each test location, a hole was excavated to a depth between 1.0 and 2.5 feet below the ground surface using a post-hole digger. A six-inch inside diameter polyvinyl chloride (PVC) casing was then inserted and embedded six inches into the bottom of the hole to create a six-inch soil plug. Water was added to the casing to presoak the soil. After the initial pre-soak, testing was performed by adding additional water to the casing and periodically measuring the depth to water from the top of the casing. Infiltration test data are presented in Table A2 and Table A3.

TABLE A1: EXPLORATION SUMMARY

Exploration Designation	Date Started	Date Completed	Northing[1] (ft)	Easting[1] (ft)	Elevation[2] (ft)	Total Depth[3] (ft)	Driller/ Excavator[4]	Equipment	Hammer Efficiency[5] (%)
ST-B-1	8/15/13	8/16/13	824559	8504029	320	38.5	Hardcore	CME-850 track rig	83.9
ST-B-2	8/14/15	8/15/13	824691	8504605	322	44.0	Hardcore	CME-850 track rig	83.9
ST-DCP-1	8/14/13	8/14/13	824661	8504628	322	2.6	S&W	DCP	N/A
ST-DCP-2	8/14/13	8/14/13	824669	8504450	321	1.1	S&W	DCP	N/A
ST-DCP-3	8/14/13	8/14/13	824653	8504325	321	1.7	S&W	DCP	N/A
ST-DCP-4	8/14/13	8/14/13	824600	8504141	320	2.7	S&W	DCP	N/A
ST-INT-1	8/14/13	8/15/13	824704	8504632	321	1.0	S&W	hand tools	N/A
ST-INT-2	8/15/13	8/16/13	824590	8504036	320	2.5	S&W	hand tools	N/A

1) Horizontal datum is NAD 83, Oregon State Plane North, US feet.
2) Elevation is that of the ground surface at the time of drilling, estimated from the USGS National Elevation Dataset.
3) Depths are in feet below the ground surface at the time of drilling.
4) Hardcore = Hardcore Drilling, Inc.; S&W = Shannon & Wilson, Inc.
5) Reported energy efficiency of automatic hammers used for the Standard Penetration Test (SPT). SPT N-values presented in this report are in blows per foot, as counted in the field. No corrections of any kind have been applied.

TABLE A2: INFILTRATION TEST ST-INT-1 DATA

Trial	Time	Depth to Water Below Top of Casing (feet)	Head Over Soil (feet)	Elapsed Time (minutes)	Change in Water Level (feet)	Infiltration Rate (inches/hour)
Pre-Soak	1020	2.88	0.52	N/A	N/A	N/A
	1042	3.15	0.25	22	0.27	8.8
#1	1352	2.51	0.89	N/A	N/A	N/A
	1403	2.73	0.67	11	0.22	14.4
	1417	2.95	0.45	14	0.22	11.3
	1429	3.12	0.28	12	0.39	23.4
	1438	3.24	0.16	9	0.12	9.6
	1449	3.36	0.04	11	0.12	7.9
	1458	3.48	-0.08	9	0.12	9.6
#2	0732	2.35	1.05	N/A	N/A	N/A
	0741	2.49	0.91	9	0.14	11.2
	0750	2.62	0.78	9	0.13	10.4
	0803	2.77	0.63	13	0.15	8.3
	0811	2.86	0.54	8	0.09	8.1
	0821	2.97	0.43	10	0.35	25.2
	0834	3.11	0.29	13	0.14	7.8
	0846	3.22	0.18	12	0.11	6.6
	0856	3.31	0.09	10	0.09	6.5

Date Performed = 8/14/2013 to 8/15/2013
Hole Depth Below Ground Surface = 1.0 feet
Total Casing Length = 3.9 feet
Casing Stickup = 2.4 feet
Soil Plug in Casing (below bottom of hole) = 0.5 feet
Casing Inside-Diameter = 0.5 feet
N/A = not applicable

TABLE A3: INFILTRATION TEST ST-INT-2 DATA

Trial	Time	Depth to Water Below Top of Casing (feet)	Head Over Soil (feet)	Elapsed Time (minutes)	Change in Water Level (feet)	Infiltration Rate (inches/hour)
Pre-Soak	performed overnight		N/A	N/A	N/A	N/A
#1	0919	2.50	1.00	N/A	N/A	N/A
	0930	2.95	0.55	11	0.45	29.5
	0936	3.19	0.31	6	0.24	28.8
	0943	3.42	0.08	7	0.23	23.7
	0945	3.50	0.00	2	0.08	28.8
#2	0956	2.48	1.02	N/A	N/A	N/A
	1007	2.93	0.57	11	0.45	29.5
	1014	3.17	0.33	7	0.24	24.7
	1020	3.33	0.17	6	0.16	19.2
	1025	3.48	0.02	5	0.15	21.6

Date Performed = 8/15/2013 to 8/16/2013
Hole Depth Below Ground Surface = 2.5 feet
Total Casing Length = 4.0 feet
Casing Stickup = 1.0 feet
Soil Plug in Casing (below bottom of hole) = 0.5 feet
Casing Inside-Diameter = 0.5 feet
N/A = not applicable

Shannon & Wilson, Inc. (S&W), uses a soil description system modified from the Unified Soil Classification System (USCS). Elements of the USCS and other definitions are provided on this and the following page. Soil identifications are based on visual-manual procedures (ASTM D2488) unless otherwise noted.

S&W OREGON SOIL CONSTITUENT DEFINITIONS

CONSTITUENTS[2]	FINE-GRAINED SOILS (50% or more fines)[1]	COARSE-GRAINED SOILS (less than 50% fines)[1]
Major All capital letters	CLAY or SILT based on behavior	SAND or GRAVEL based on weight
Modifying (Secondary) Precede major constituent	if fine-grained, silty or clayey based on behavior	if fine-grained, > 12% silty or clayey
	if coarse-grained, > 27% sandy or gravelly	if coarse-grained, > 27% sandy or gravelly
Minor Follow major constituent	> 12% - 27% with sand or with gravel	if fine-grained, 5% - 12% with silt or with clay
		if coarse-grained, > 12% - 27% with sand or with gravel

[1] All percentages are by weight
[2] The order of terms is: modifying MAJOR with minor

CEMENTATION DEFINITIONS

Weak	Crumbles or breaks with handling or slight finger pressure
Moderate	Crumbles or breaks with considerable finger pressure
Strong	Will not crumble or break with finger pressure

ABBREVIATIONS

ATD	At Time of Drilling
Elev.	Elevation
ft	feet
FeO	Iron Oxide
MgO	Magnesium Oxide
HSA	Hollow Stem Auger
I.D.	Inside Diameter
in	inches
lbs	pounds
N	Blows for second two 6-inch increments
N_E	N, corrected for hammer energy
NA	Not applicable or not available
NP	Nonplastic
O.D.	Outside diameter
PID	Photo-ionization detector
ppm	parts per million
PVC	Polyvinyl Chloride
SPT	Standard Penetration Test
USCS	Unified Soil Classification System
q_u	Unconfined Compressive Strength

PARTICLE SIZE DEFINITIONS

DESCRIPTION	SIEVE NUMBER AND/OR SIZE
FINES	< #200 (0.08 mm)
SAND	
- Fine	#200 to #40 (0.08 to 0.4 mm)
- Medium	#40 to #10 (0.4 to 2 mm)
- Coarse	#10 to #4 (2 to 5 mm)
GRAVEL	
- Fine	#4 to 3/4 inch (5 to 19 mm)
- Coarse	3/4 to 3 inches (19 to 76 mm)
COBBLES	3 to 12 inches (76 to 305 mm)
BOULDERS	> 12 inches (305 mm)

RELATIVE DENSITY / CONSISTENCY

COHESIONLESS SOILS		COHESIVE SOILS	
N_E, SPT, BLOWS/FT.	RELATIVE DENSITY	N_E, SPT, BLOWS/FT.	RELATIVE CONSISTENCY
0 - 4	Very loose	Under 2	Very soft
4 - 10	Loose	2 - 4	Soft
10 - 30	Medium dense	4 - 8	Medium stiff
30 - 50	Dense	8 - 15	Stiff
Over 50	Very dense	15 - 30	Very stiff
		Over 30	Hard

WELL AND OTHER SYMBOLS

Bentonite Cement Grout	Surface Cement Seal
Bentonite Grout	Asphalt or Cap
Bentonite Chips	Slough
Silica Sand	Bedrock
PVC Screen	Fill
Pressure Transducer	

PLASTICITY

PLASTICITY ADJECTIVE	PLASTICTY INDEX (PI) RANGE
Nonplastic	0 - 4
Low Plasticity	>4 - 10
Medium Plasticity	>10 - 20
High Plasticity	>20 - 40
Very High Plasticity	>40

Perennial Wind Chaser Station
Step-Up Substation
Umatilla, Oregon

SOIL DESCRIPTION AND LOG KEY

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FIG. A1
Sheet 1 of 2

POST_07_BORING_CLASS1_CRC 24-1-03794-UMATILLA.GPJ SWNEW.GDT 11/18/13

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)
(Modified from US Army Corps of Engineers Tech Memo 3-357)

MAJOR DIVISIONS			GROUP/GRAPHIC SYMBOL	TYPICAL DESCRIPTION
COARSE-GRAINED SOIL *(more than 50% retained on No. 200 sieve)*	Gravel *(more than 50% of coarse fraction retained on No. 4 sieve)*	Gravel or Gravel with silt or clay	GW GW-GM GW-GC	GRAVEL, GRAVEL with sand, sandy GRAVEL, GRAVEL with silt or clay
			GP GP-GM GP-GC	GRAVEL, GRAVEL with sand, sandy GRAVEL, GRAVEL with silt or clay
		Silty Gravel or Clayey Gravel	GM	Silty GRAVEL, silty GRAVEL with sand, sandy silty GRAVEL
			GC	Clayey GRAVEL, clayey GRAVEL with sand, sandy clayey GRAVEL
	Sand *(50% or more of coarse fraction passes the No. 4 sieve)*	Sand or Sand with silt or clay	SW SW-SM SW-SC	SAND, SAND with gravel, gravelly SAND, SAND with silt or clay
			SP SP-SM SP-SC	SAND, SAND with gravel, gravelly SAND, SAND with silt or clay
		Silty Sand or Clayey Sand	SM	Silty SAND, silty SAND with gravel, gravelly silty SAND
			SC	Clayey SAND, clayey SAND with gravel, gravelly clayey SAND
FINE-GRAINED SOIL *(50% or more passes the No. 200 sieve)*	Silt and Clay *(liquid limit less than 50)*	Inorganic	ML	Nonplastic to medium plasticity SILT or clayey SILT; with sand and/or gravel to sandy or gravelly
			CL	Low to very high plasticity silty CLAY or CLAY; with sand and/or gravel to sandy or gravelly
		Organic	OL	Nonplastic to very high plasticity organic SILT, clayey SILT, silty CLAY, or CLAY; with sand and/or gravel to sandy or gravelly
	Silt and Clay *(liquid limit 50 or more)*	Inorganic	MH	Nonplastic to very high plasticity SILT or clayey SILT; with sand and/or gravel to sandy or gravelly
			CH	High to very high plasticity CLAY; with sand and/or gravel to sandy or gravelly
		Organic	OH	Nonplastic to very high plasticity organic SILT, clayey SILT, or CLAY; with sand and/or gravel to sandy or gravelly
HIGHLY-ORGANIC SOIL	Primarily organic matter, dark in color, has organic odor		PT	Peat and other highly organic soils (see ASTM D4427)

NOTE: No. 4 size = 4.75 mm = approx. 0.2 in; No. 200 size = 0.075 mm = approx. 0.003 in

Additional Symbols		This symbol is used to indicate the presence of cobbles and/or boulders.
		Gray shading, when combined with another symbol, indicates cementation.

NOTES

1. Solid lines on the logs are used to group materials with similar characteristics. The groupings shown are an interpretation of the conditions encountered and actual transitions may be more gradational than shown.
2. Dual symbols (symbols separated by a hyphen, i.e., SP-SM, SAND with silt) are used for coarse-grained soils with 10 percent fines or when the liquid limit and plasticity index values plot in the CL-ML area of the plasticity chart.
3. Borderline symbols (symbols separated by a slash, i.e., CL/ML and GW/SW) indicate that the soil may fall into one of two possible basic groups.
4. The soil graphics above represent the various USCS identifications (i.e., GP, SM, etc.) and may be augmented with additional symbology to represent differences within USCS designations. Sandy SILT (ML), for example, may be accompanied by the ML soil graphic with sand grains added.

Perennial Wind Chaser Station
Step-Up Substation
Umatilla, Oregon

SOIL DESCRIPTION AND LOG KEY

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FIG. A1
Sheet 2 of 2

POST_07_BORING_CLASS2_CRC 24-1-03794-UMATILLA.GPJ SWNEW.GDT 11/18/13

BASED ON INTERNATIONAL SOCIETY FOR ROCK MECHANICS (ISRM) ROCK CLASSIFICATION METHODS [R]

STRATIGRAPHIC STRUCTURE TERMS

MASSIVE - Rock without significant structure

BEDDED - Regular layering from sedimentation

FISSILE - Tendency to break along laminations

FOLIATED - Parallel arrangement or distribution of minerals

for metamorphic rocks:
SCHISTOSE - Parallel arrangement of tabular minerals giving a planar fissility

GNEISSOSE - Segregation of minerals into bands

CLEAVAGE - Tendency to split along secondary, planar textures or structures

ROCK STRENGTH

DESCRIPTION	DESIGNATION	APPROXIMATE UNCONFINED COMPRESSIVE STRENGTH (psi)	FIELD IDENTIFICATION
(use soil description)	R0	28-100	Indented by thumb nail
Very Low Strength	R1	100 - 1,000	Crumbles under firm blows with point of geology pick, can be peeled with a pocket knife
Low Strength	R2	1,000 to 4,000	Can be peeled with a pocket knife with difficulty, shallow indentation made by firm blows of geology pick
Moderate Strength	R3	4,000 to 8,000	Cannot be scraped or peeled with a pocket knife, specimen can be fractured with a single firm blow of geology hammer
Medium High Strength	R4	8,000 to 16,000	Specimen requires more than one blow with a geology hammer to fracture it
High Strength	R5	16,000 to 32,000	Specimen requires many blows of geology hammer to fracture it
Very High Strength	R6	>32,000	Specimen can only be chipped with a geology pick

VESCULARITY

Slightly Vesicular	1 to 10%
Moderately Vesicular	10 to 30%
Highly Vesicular	30 to 50%
Scoriaceous	>50%

JOINT ROUGHNESS

SMALL SCALE	INTERMEDIATE SCALE
Rough	Stepped
Smooth	Undulating
Slickensided	Planar

WEATHERING

TERM	DESCRIPTION
Fresh	No visible signs of rock material weathering: perhaps slight discoloration on major discontinuity surfaces.
Slightly Weathered	Slight penetration of discoloration away from fracture. Fractures may contain thin filling.
Moderately Weathered	Partial to complete discoloration away from fracture. Rock not friable except for poorly cemented rock. Fractures may contain thick filling.
Highly Weathered	All rock is discolored. Rock is friable except for poorly cemented rock. Corestones may be present.
Completely Weathered	All rock is decomposed and/or disintegrated to soil. The original mass is still largely intact.

DISCONTINUITY TERMS

FRACTURE - Collective term for any natural break excluding shears, shear zones, and faults

JOINT (JT) - Planar break with little or no displacement

FOLIATION JOINT (FJ) or BEDDING JOINT (BJ) - Joint along foliation or bedding

INCIPIENT JOINT (IJ) or INCIPIENT FRACTURE (IF) - Joint or fracture not evident until wetted and dried; breaks along existing surface

RANDOM FRACTURE (RF) - Natural, very irregular fracture that does not belong to a set

BEDDING PLANE SEPARATION or PARTING - A separation along bedding after extraction from stress relief or slaking

FRACTURE ZONE (FZ) - Planar zone of broken rock without gouge

MECHANICAL BREAK (MB) - Breaks due to drilling or handling; drilling break (DB), hammer break (HB)

SHEAR (SH) - Surface of differential movement evident by presence of slickensides, striations, or polishing

SHEAR ZONE (SZ) - Zone of gouge and rock fragments bounded by planar shear surfaces

FAULT (FT) - Shear zone of significant extent; differentiation from shear zone may be site-specific

STRUCTURE SPACING TERMS

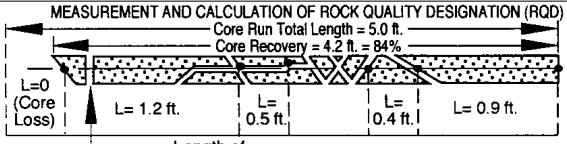
STRATIGRAPHIC	SPACING	DISCONTINUITY *
Very Thick (massive)	More than 10 ft.	Very Wide
Thick	3 ft. - 10 ft.	Wide
Medium	1 ft. - 3 ft.	Moderately Close
Thin	2 in. - 1 ft.	Close
Very Thin (laminated)	Less than 2 in.	Very Close

* Refers to apparent spacing along core axis unless measured orthogonal to discontinuity; should then report for each set

[R] *Reference: Brown, E.T., ed., 1981, Rock Characterization Testing and Monitoring ISRM Suggested methods. New York, International Society for Rock Mechanics (ISRM).*

NOTE: Unconfined Compressive Strength (UCS) on Log of Boring estimated from point load tests.

MEASUREMENT AND CALCULATION OF ROCK QUALITY DESIGNATION (RQD)



$$RQD = \frac{\sum \text{Length of Core Pieces} > 4\text{ in.}}{\text{Total Core Run Length}} \times 100\% \quad RQD = \frac{1.2 + 0.5 + 0.4 + 0.9}{5.0} \times 100\% \quad RQD = 60\%$$

Perennial Wind Chaser Station
Step-Up Substation
Umatilla, Oregon

ROCK CLASSIFICATION AND LOG KEY

November 2013 24-1-03794-001

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FIG. A2

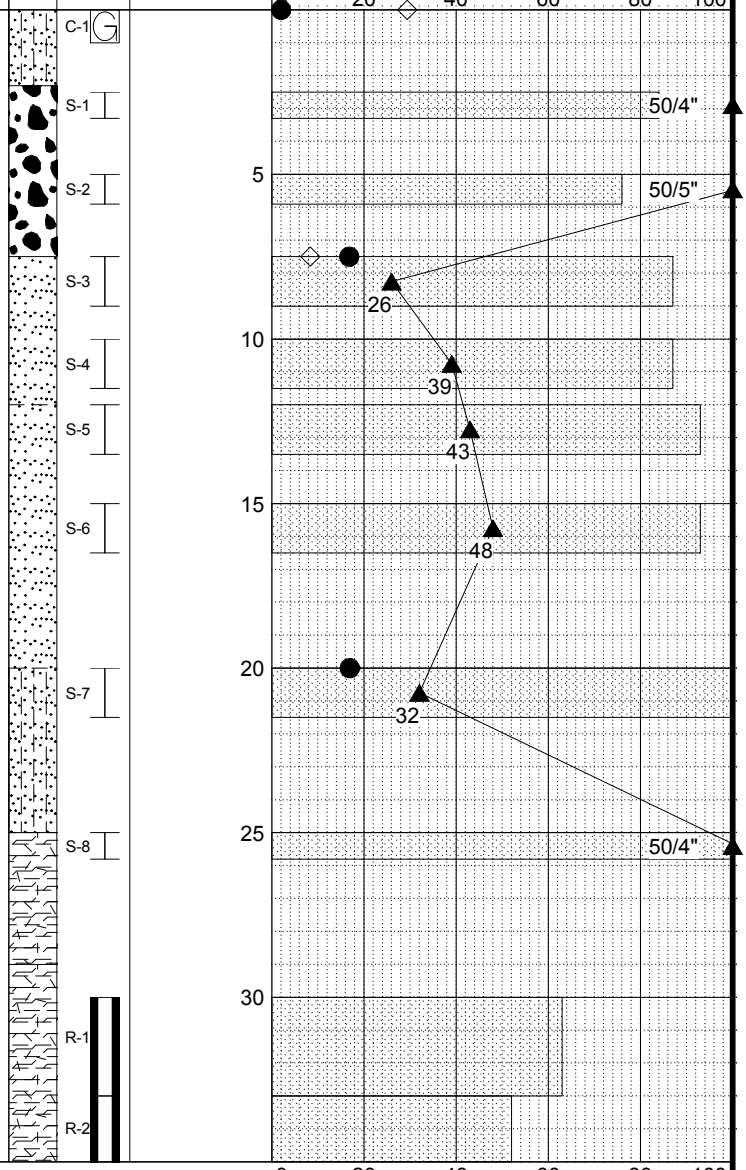
Total Depth:	38.5 ft.	Northing:	~ 824,559 ft.	Drilling Method:	Mud Rotary / HQ Core	Hole Diam.:	5 in.
Top Elevation:	~ 320 ft.	Easting:	~ 8,504,029 ft.	Drilling Company:	Hardcore Drilling	Rod Type:	NWJ
Vert. Datum:	NAD 83	Station:	~	Drill Rig Equipment:	CME-850 track	Hammer Type:	Automatic
Horiz. Datum:	NAVD 88	Offset:	~	Other Comments:	Hammer Efficiency = 83.9%		

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.

Elev. Depth (ft.)	Description
	Loose to medium dense brown silty SAND; dry to moist; nonplastic fines; fine sand; micaceous. (SM)
317.7 / 2.3	**REWORKED FINE-GRAINED ALLUVIUM**
	Very dense gray-brown GRAVEL with sand, trace silt with cobbles and boulders; dry to moist; fine to coarse rounded to subrounded sand; rounded to subrounded gravel; scattered cobbles; occasional boulders. (GP)
312.5 / 7.5	*Large cobble from 3.3 to 4.0 feet.*
	CATASTROPHIC FLOOD DEPOSITS GRAVEL FACIES
308.0 / 12.0	Medium dense to dense gray SAND with silt, trace gravel; dry to moist; nonplastic fines; fine to medium sand; rounded to subrounded gravel; micaceous. (SW-SM)
	Dense gray SAND with gravel, trace silt; moist; nonplastic fines; fine to coarse sand; rounded to subrounded gravel. (SP)
	CATASTROPHIC FLOOD DEPOSITS SAND FACIES
300.0 / 20.0	Dense gray silty SAND; moist; nonplastic fines; fine to medium sand; micaceous. (SM)
295.0 / 25.0	WEATHERED BASALT: very low to moderate strength (R1-R3), orange-brown and dark brown, fine grained; slightly vesicular; moderate iron-oxide staining; moderately to highly weathered; remolds to sandy GRAVEL, trace silt.
291.0 / 29.0	**COLUMBIA RIVER BASALT GROUP**
	BASALT: moderate strength (R3), gray-brown and gray, fine grained; moderately vesicular; undulating, rough, very close to closely

CONTINUED NEXT SHEET



LEGEND

- * Sample Not Recovered
- Grab Sample
- Standard Penetration Test
- Rock Core

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. Group symbol is based on visual-manual identification and selected lab testing.
4. The hole location and elevation should be considered approximate.

Perennial Wind Chaser Station
Step-Up Substation
Umatilla, Oregon

LOG OF BORING ST-B-1

November 2013 | 24-1-03794-001

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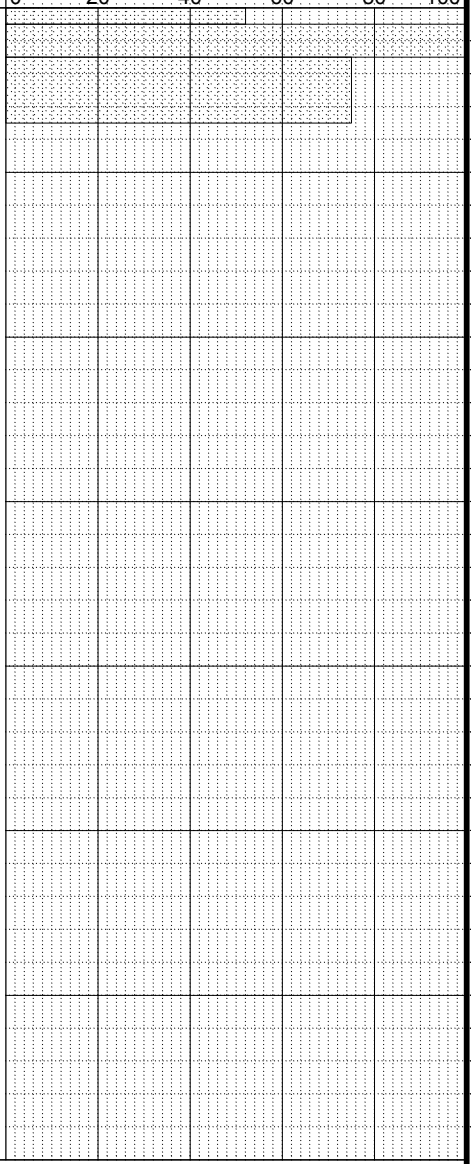
FIG. A3
Sheet 1 of 2

REV 3

MASTER_LOG_E 24-1-03794-UMATILLA.GPJ SHAN_WIL.GDT 11/18/13
Log: DJH Rev: AAH Typ: MAS

Total Depth:	38.5 ft.	Northing:	~ 824,559 ft.	Drilling Method:	Mud Rotary / HQ Core	Hole Diam.:	5 in.
Top Elevation:	~ 320 ft.	Easting:	~ 8,504,029 ft.	Drilling Company:	Hardcore Drilling	Rod Type:	NWJ
Vert. Datum:	NAD 83	Station:	~	Drill Rig Equipment:	CME-850 track	Hammer Type:	Automatic
Horiz. Datum:	NAVD 88	Offset:	~	Other Comments:	Hammer Efficiency = 83.9%		

SOIL DESCRIPTION *Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.*	Elev. Depth (ft.)	Symbol	Samples	Ground Water	Depth, ft.	PENETRATION RESISTANCE, N (blows/ft.) ▲ Hammer Wt. & Drop: 140 lbs / 30 inches 0 20 40 60 80 100
spaced, low to high (0°-90°) angle joints with orange-brown and brown staining and 1- to 3-mm-thick brown clayey joint coating; slightly to moderately weathered.			R-3 R-4			
	281.5 38.5					
Completed - August 16, 2013					40 45 50 55 60 65	



LEGEND

- * Sample Not Recovered
- Grab Sample
- Standard Penetration Test
- Rock Core

Recovery (%) RQD (%)
◇ % Fines (<0.075mm)
● % Water Content
Plastic Limit — Liquid Limit

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. Group symbol is based on visual-manual identification and selected lab testing.
4. The hole location and elevation should be considered approximate.

Perennial Wind Chaser Station
Step-Up Substation
Umatilla, Oregon

LOG OF BORING ST-B-1

November 2013 24-1-03794-001

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Geotechnical and Environmental Consultants

FIG. A3
Sheet 2 of 2

REV 3

MASTER_LOG_E 24-1-03794-UMATILLA.GPJ SHAN_WIL.GDT 11/18/13 Log: DJH Rev: AAH Typ: MAS

Total Depth:	44 ft.	Northing:	~ 824,691 ft.	Drilling Method:	Mud Rotary / HQ Core	Hole Diam.:	5 in.
Top Elevation:	~ 322 ft.	Easting:	~ 8,504,605 ft.	Drilling Company:	Hardcore Drilling	Rod Type:	NWJ
Vert. Datum:	NAD 83	Station:	~	Drill Rig Equipment:	CME-850 track	Hammer Type:	Automatic
Horiz. Datum:	NAVD 88	Offset:	~	Other Comments:	Hammer Efficiency = 83.9%		

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.

Loose to medium dense brown silty SAND; dry; nonplastic fines; fine sand; micaceous. (SM)

REWORKED FINE-GRAINED ALLUVIUM

Elev. 319.6 / Depth 2.4

Very dense gray-brown sandy GRAVEL, trace silt with cobbles and boulders; moist; fine to coarse rounded to subrounded sand; rounded to subrounded gravel; scattered cobbles; occasional to scattered boulders. (GP)

CATASTROPHIC FLOOD DEPOSITS
GRAVEL FACIES

Elev. 298.5 / Depth 23.5

Medium dense/stiff to very stiff brown SILT to SILT with sand; wet; nonplastic to low plasticity fines; fine sand; micaceous. (ML)

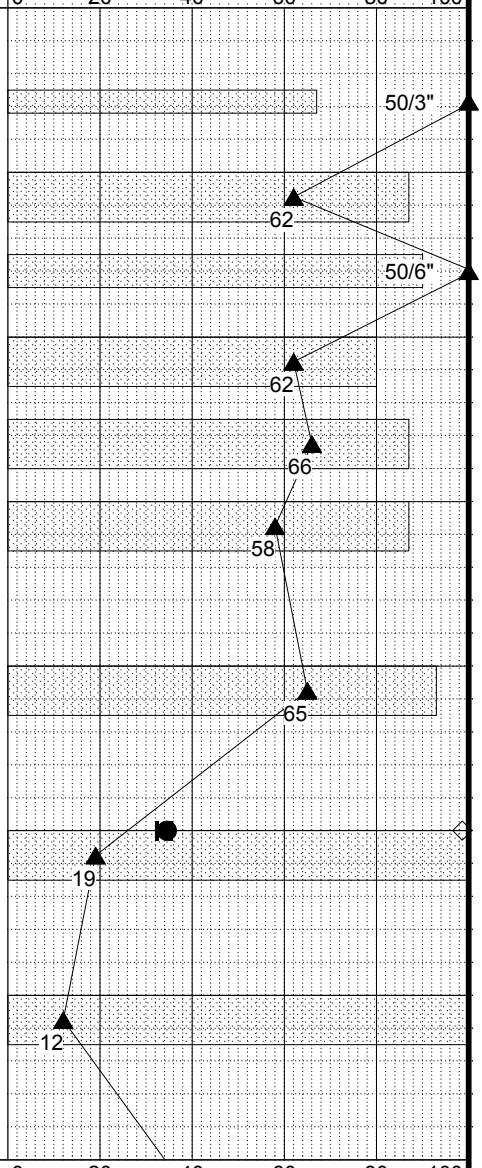
CATASTROPHIC FLOOD DEPOSITS
FINE-GRAINED FACIES

Elev. 288.0 / Depth 34.0

Symbol | Samples: S-1, S-2, S-3, S-4, S-5, S-6, S-7, S-8, S-9 | Ground Water | Depth, ft.

PENETRATION RESISTANCE, N (blows/ft.)

▲ Hammer Wt. & Drop: 140 lbs / 30 inches



CONTINUED NEXT SHEET

LEGEND

- * Sample Not Recovered
- Standard Penetration Test
- Rock Core

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. Group symbol is based on visual-manual identification and selected lab testing.
4. The hole location and elevation should be considered approximate.

Perennial Wind Chaser Station
Step-Up Substation
Umatilla, Oregon

LOG OF BORING ST-B-2

November 2013 | 24-1-03794-001

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FIG. A4
Sheet 1 of 2

REV 3

MASTER_LOG_E 24-1-03794-UMATILLA.GPJ SHAN_WIL.GDT 11/18/13 Log: DJH Rev: AAH Typ: MAS

Total Depth:	44 ft.	Northing:	~ 824,691 ft.	Drilling Method:	Mud Rotary / HQ Core	Hole Diam.:	5 in.
Top Elevation:	~ 322 ft.	Easting:	~ 8,504,605 ft.	Drilling Company:	Hardcore Drilling	Rod Type:	NWJ
Vert. Datum:	NAD 83	Station:	~	Drill Rig Equipment:	CME-850 track	Hammer Type:	Automatic
Horiz. Datum:	NAVD 88	Offset:	~	Other Comments:	Hammer Efficiency = 83.9%		

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.

Dense gray-brown SAND with gravel, trace silt; wet; fine to medium sand; fine to coarse rounded to subrounded gravel; micaceous. (SP)

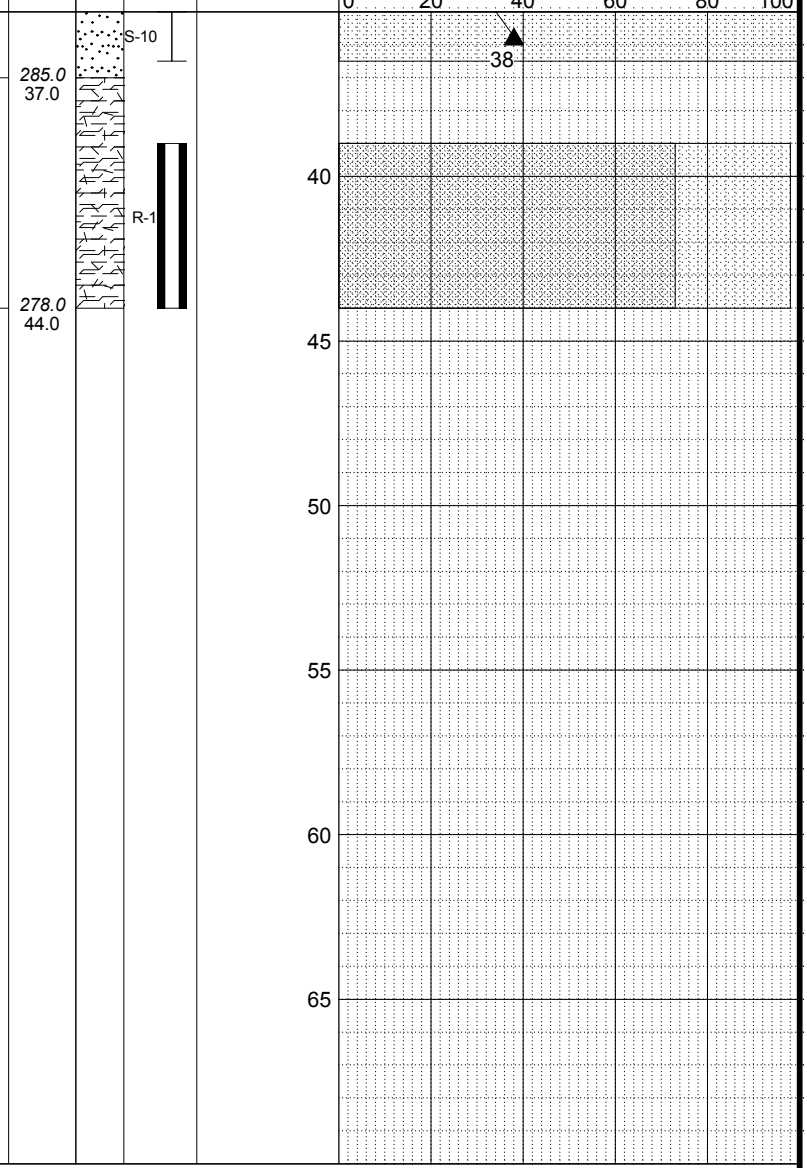
CATASTROPHIC FLOOD DEPOSITS SAND FACIES

BASALT: moderate to medium high strength (R3-R4), gray, fine grained; aphanitic; slightly vesicular; undulating, rough, closely to moderately close spaced, low to moderate (0°-60°) and high (70°-90°) angle, open and numerous healed joints with green-black and white secondary mineral infilling and joint coating; fresh to slightly weathered.

COLUMBIA RIVER BASALT GROUP

Thin, <1-mm-thick, iron-oxide coating and secondary pyrite joint coating from 43.5 to 44.0 feet.

Completed - August 15, 2013



LEGEND

- * Sample Not Recovered
- Standard Penetration Test
- Rock Core

Recovery (%) RQD (%)
◇ % Fines (<0.075mm)
● % Water Content
Plastic Limit — Liquid Limit

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. Group symbol is based on visual-manual identification and selected lab testing.
4. The hole location and elevation should be considered approximate.

Perennial Wind Chaser Station
Step-Up Substation
Umatilla, Oregon

LOG OF BORING ST-B-2

November 2013 24-1-03794-001

SHANNON & WILSON, INC.
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FIG. A4
Sheet 2 of 2

REV 3

MASTER_LOG_E 24-1-03794-UMATILLA.GPJ SHAN_WIL.GDT 11/18/13 Log: DJH Rev: AAH Typ: MAS

Perennial Wind Chaser Station
Step-Up Substation
Umatilla, Oregon

BORING ST-B-1
CORE PHOTOGRAPHS

November 2013 24-1-03794-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A5

File: I:\WIP\Projects\24-1 Portland\3700\3794 Perennial Power Wind Chaser Project\Graphics\CAD\ST Core and Site Photos.dwg Date: 11-18-2013 Author: mas

Perennial Wind Chaser Station
Step-Up Substation
Umatilla, Oregon

BORING ST-B-2
CORE PHOTOGRAPHS

November 2013 24-1-03794-001

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FIG. A6

File: I:\WIP\Projects\24-1 Portland\3700\3794 Perennial Power Wind Chaser Project\Graphics\CAD\ST Core and Site Photos.dwg Date: 11-18-2013 Author: mas

DCP TEST DATA

Project: *Perennial Power* **Date:** *14-Aug-13*

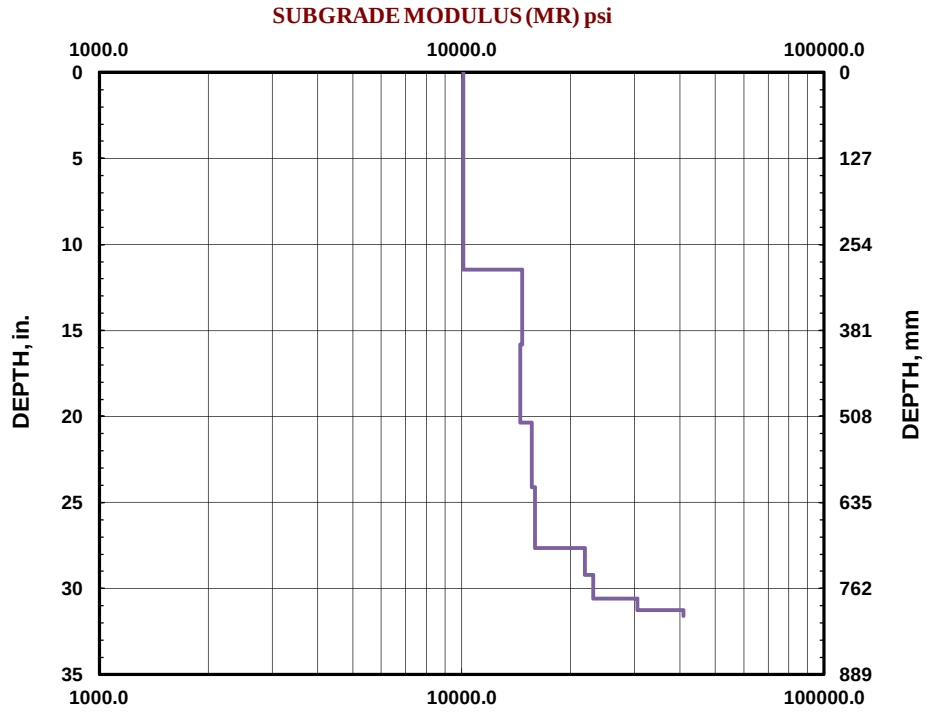
Location: *ST-DCP-1* **Soil Type(s):** *SM*

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
0	0	1
5	291	1
5	402	1
5	517	1
5	612	1
5	702	1
5	742	1
5	777	1
5	794	1
5	802	1

Based on approximate interrelationships of MR (ODOT PAVEMENT DESIGN GUIDE 2011)



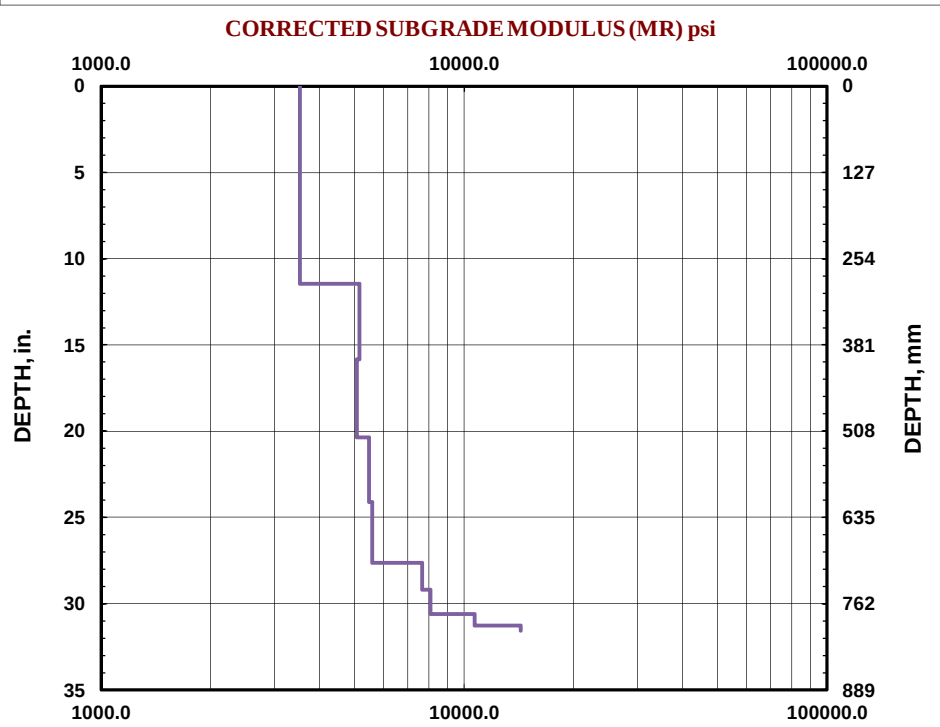


FIG. A7

DCP TEST DATA

Project: *Perennial Power* **Date:** *14-Aug-13*

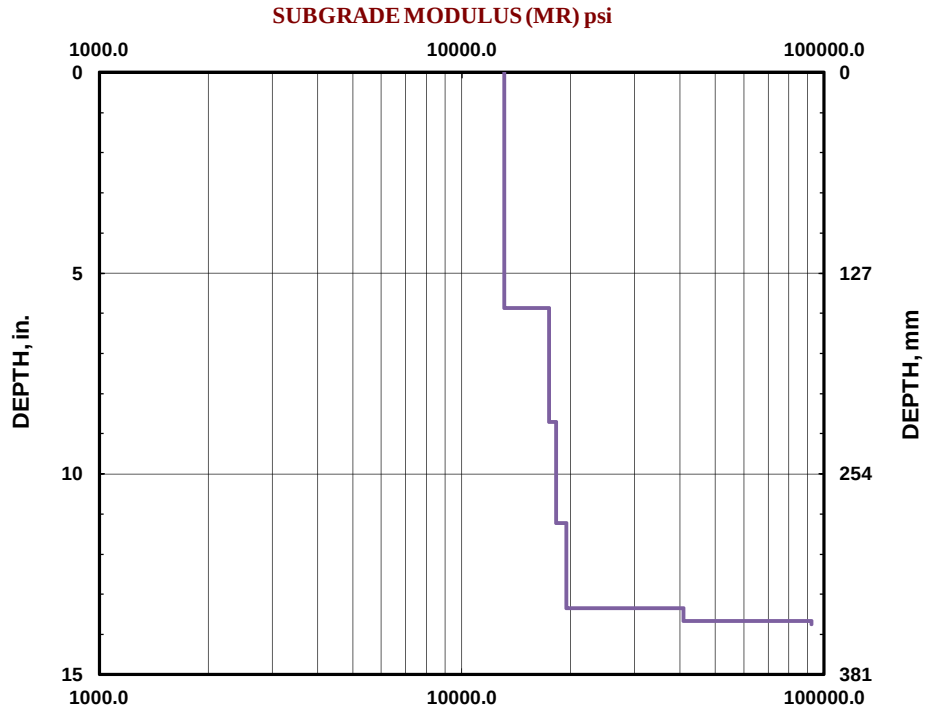
Location: *ST-DCP-2* **Soil Type(s):** *SM*

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
0	0	1
5	149	1
5	221	1
5	285	1
5	339	1
5	347	1
5	348	1
5	349	1

Based on approximate interrelationships of MR (ODOT PAVEMENT DESIGN GUIDE 2011)



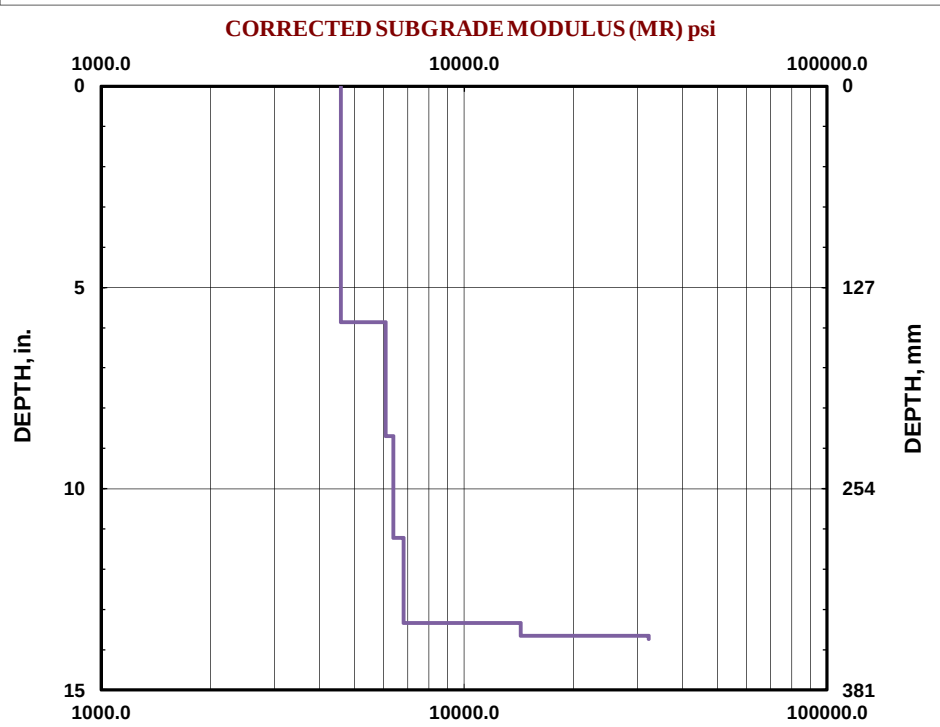


FIG. A8

DCP TEST DATA

Project: *Perennial Power* **Date:** *14-Aug-13*

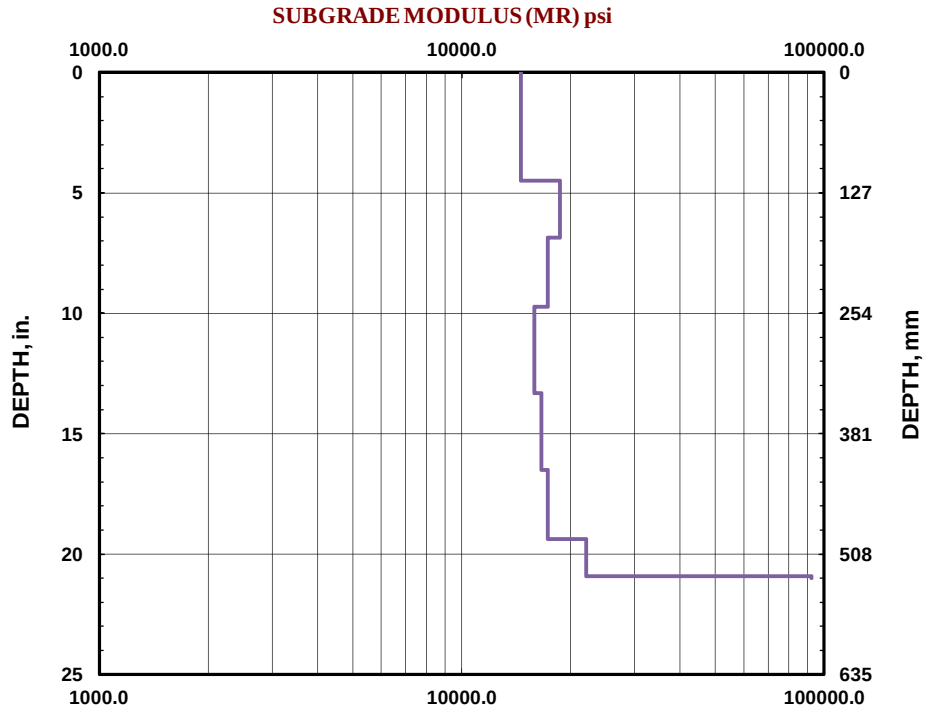
Location: *ST-DCP-3* **Soil Type(s):** *SM*

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
0	0	1
5	114	1
5	174	1
5	247	1
5	338	1
5	419	1
5	492	1
5	531	1
5	532	1
5	533	1

Based on approximate interrelationships of MR (ODOT PAVEMENT DESIGN GUIDE 2011)



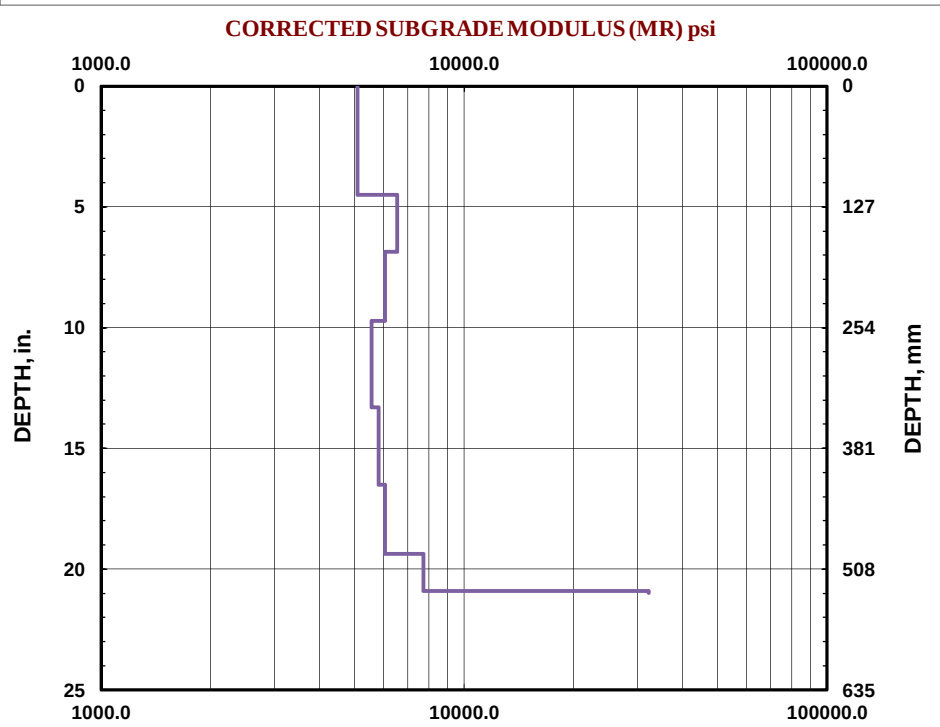


FIG. A9

DCP TEST DATA

Project: *Perennial Power* **Date:** *14-Aug-13*

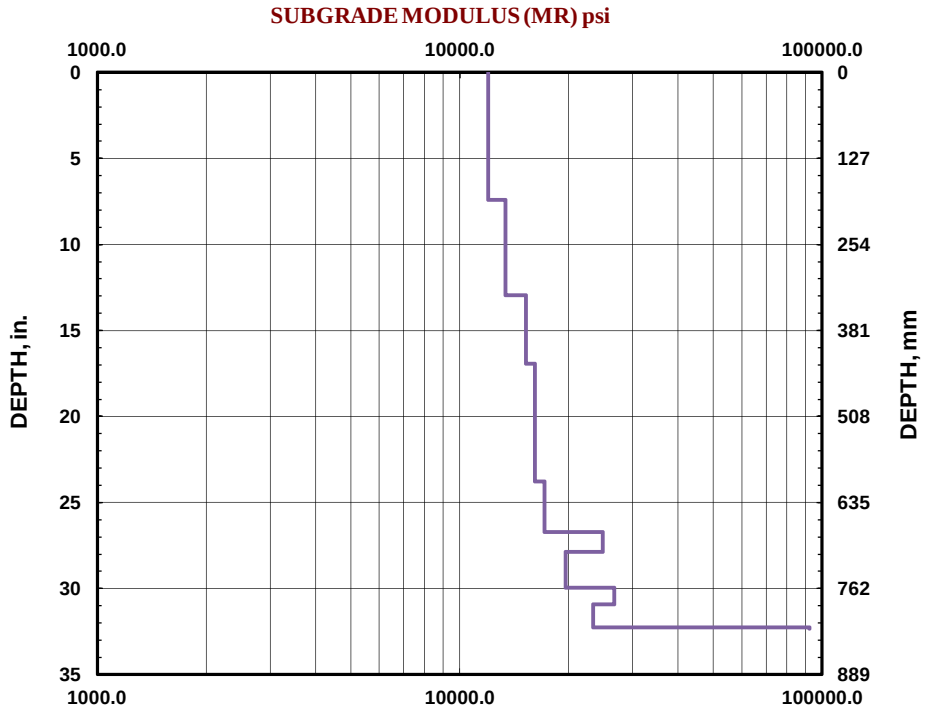
Location: *ST-DCP-4* **Soil Type(s):** *SM*

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
0	0	1
5	188	1
5	329	1
5	430	1
5	517	1
5	604	1
5	679	1
5	708	1
5	761	1
5	785	1
5	819	1
5	820	1
5	821	1

Based on approximate interrelationships of MR (ODOT PAVEMENT DESIGN GUIDE 2011)



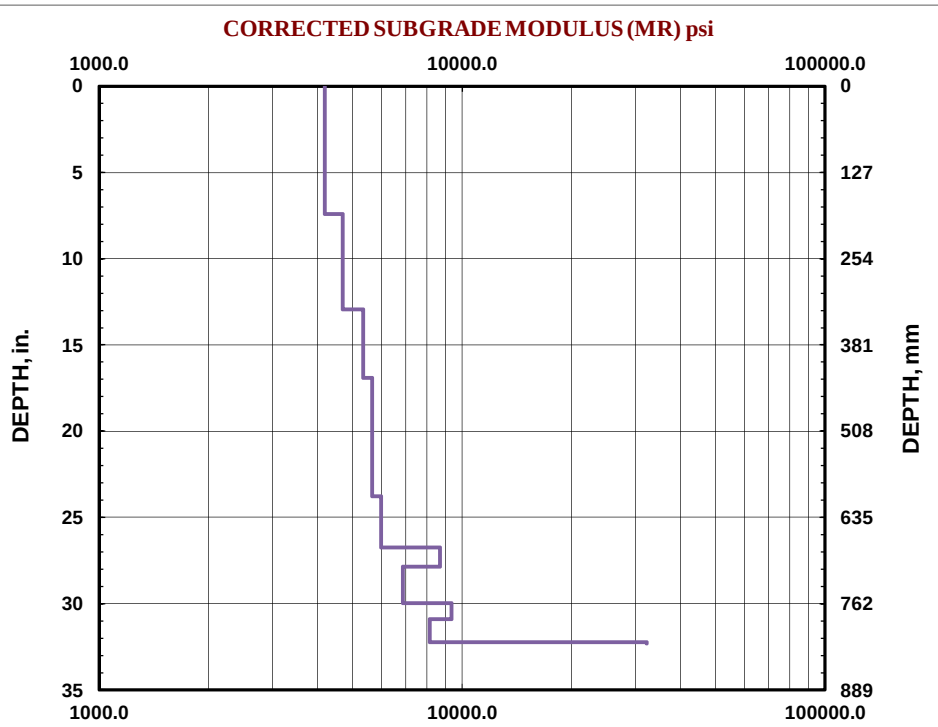


FIG. A10

APPENDIX B

LABORATORY TESTING

TABLE OF CONTENTS

B.1 GENERAL B-1

B.2 SOIL TESTING B-1
B.2.1 Moisture (Natural Water) Content B-1
B.2.2 Atterberg Limits B-2
B.2.3 Particle-Size Analyses B-2
B.2.4 Corrosivity Testing B-2

FIGURES

B1 Atterberg Limits Results
B2 Grain Size Distribution

ATTACHMENTS

Specialty Analytical Testing Report (dated August 28, 2013)

APPENDIX B

LABORATORY TESTING

B.1 GENERAL

The soil samples obtained during the field explorations were described and identified in the field in general accordance with the Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), ASTM D2488. The specific terminology used is presented in Appendix A, Figure A1. The samples were then reviewed in the laboratory. The physical characteristics of the samples were noted and the field descriptions and identifications were modified where necessary in accordance with terminology presented in Appendix A, Figure A1. Representative samples were selected for various laboratory tests. We refined our visual-manual soil descriptions and identifications based on the results of the laboratory tests, using elements of the Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System), ASTM D2487. The refined descriptions and identifications were then incorporated into the Logs of Borings, presented in Appendix A. Note that ASTM D2487 was not followed in full, because it requires that a suite of tests be performed to fully classify a single sample.

The soil testing program included moisture content analyses, Atterberg Limits tests, particle-size analyses, and analytical testing for corrosivity potential. The testing procedures from our laboratory program are summarized in the following paragraphs. Analytical testing for corrosivity potential was performed by Specialty Analytical of Clackamas, Oregon. All other test procedures were performed by Shannon & Wilson, Inc., in accordance with applicable ASTM International (ASTM) standards.

B.2 SOIL TESTING

B.2.1 Moisture (Natural Water) Content

Natural moisture content determinations were performed in accordance with ASTM D2216 on selected soil samples. The natural moisture content is a measure of the amount of moisture in the soil at the time the explorations are performed, and is defined as the ratio of the weight of water to the dry weight of the soil, expressed as a percentage. The results of the moisture content determinations are presented graphically in the Logs of Borings in Appendix A.

B.2.2 Atterberg Limits

Atterberg limits were determined on a selected sample in accordance with ASTM D4318. This analysis yields index parameters of the soil that are useful in soil identification, as well as in a number of analyses, including liquefaction analysis. An Atterberg limits test determines a soil's liquid limit (LL) and plastic limit (PL). These are the maximum and minimum moisture contents at which the soil exhibits plastic behavior. A soil's plasticity index (PI) can be determined by subtracting PL from LL. The LL, PL, and PI of tested samples are presented on the Atterberg Limits Results, Figure B1. The results are also shown graphically in the Logs of Borings in Appendix A. For the purposes of soil description, we use the term nonplastic to refer to soils with a PI range of 0 to 4, low plasticity for soils with a PI range of >4 to 10, medium plasticity for soils with a PI range of >10 to 20, high plasticity for soils with a PI range of >20 to 40, and very high plasticity for soils with a PI greater than 40.

B.2.3 Particle-Size Analyses

Particle-size analyses were conducted on selected samples to determine their grain-size distributions. Grain-size distributions were determined by sieve analysis in accordance with ASTM D422. A wet sieve analysis was performed to determine a percentage (by weight) of the sample passing the No. 200 (0.075 mm) sieve. For one sample, only the percent passing the No. 200 sieve was determined. For the others, the material retained on the No. 200 sieve was shaken through a series of sieves to determine the distribution of the plus No. 200 fraction. Results of the particle-size analyses are presented on Figure B2, Grain Size Distribution. For all particle-size analyses, the percentage of material passing the No. 200 sieve is also shown graphically in the Logs of Borings in Appendix A.

B.2.4 Corrosivity Testing

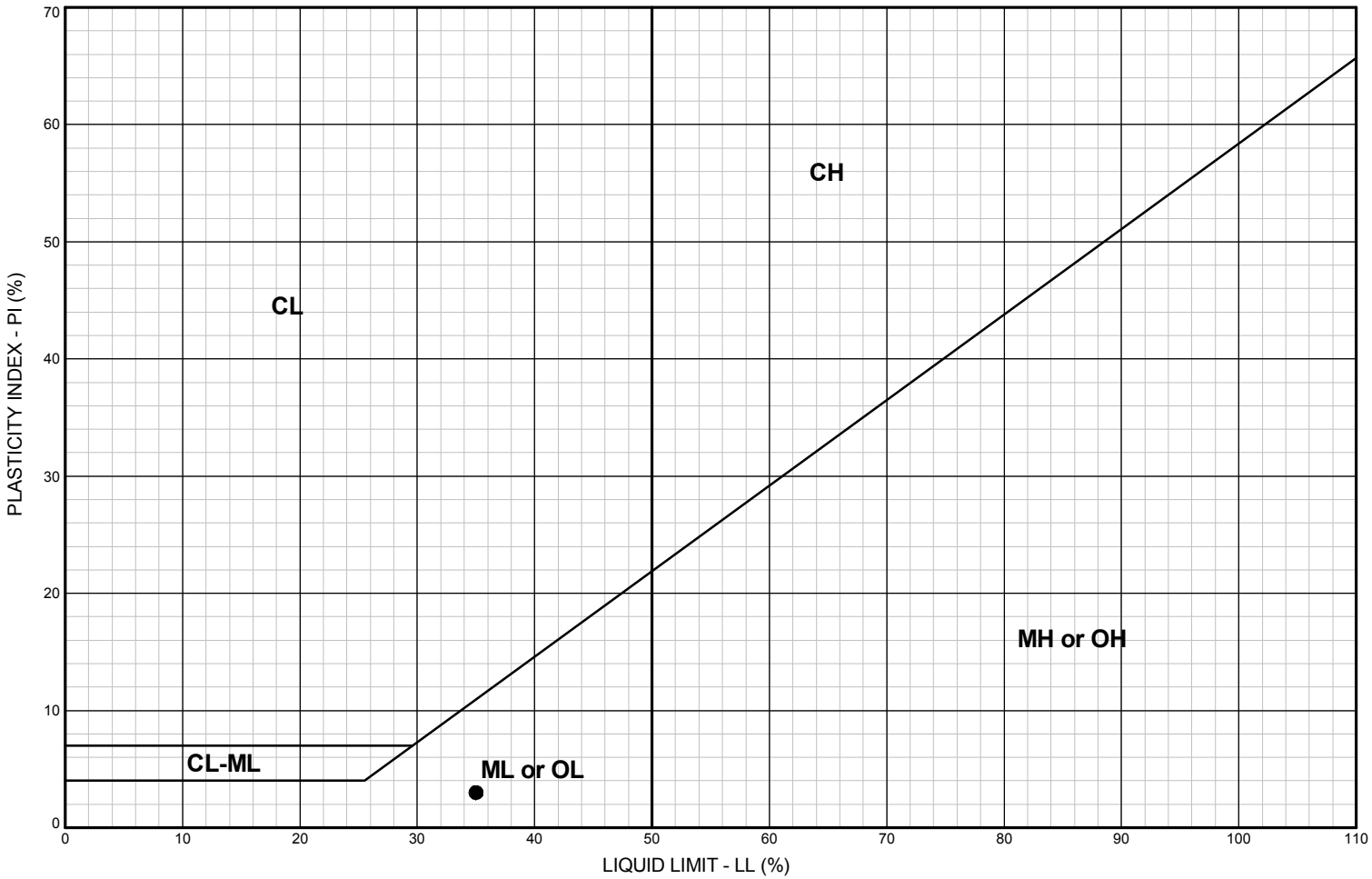
Analytical testing was performed on one near-surface sample and one composite sample (comprised of selected samples between 2.5 and 16.5 feet depth) to determine the corrosivity potential of the soil at the site. The corrosivity test suite included chloride concentration, soil pH, oxidation-reduction potential, soil resistivity, sulfate concentration, and sulfide concentration. Analytical testing was performed by Specialty Analytical of Clackamas, Oregon. Their testing report is attached to the end of this appendix.

The corrosion potential of a soil is primarily evaluated by comparing the measured pH, resistivity, and sulfate and chloride concentration to the values from Fang (1991) and Tomlison (1987) as specified by AASHTO LFRD Bridge Design Specifications (6th Edition 2012).

Soil pH is a measurement of the hydrogen ion activity of the soil. Soil pH is reported in Standard Units (S.U.) on a scale ranging from 0 to 14, with 7 being neutral. Soils with a pH less than 7 are considered acidic and soils with a pH greater than 7 are considered alkaline. According to the AASHTO specifications, soils with a pH less than 5.5 and soils with a pH between 5.5 and 8.5 that also have high organic content are considered potentially corrosive. Soil pH of the tested samples ranged from 7.52 to 8.74, and little organic matter was observed in the tested samples. Based on pH, the samples do not appear to be corrosive.

Resistivity (expressed as ohms-centimeter or ohm-cm) is the numerical expression of the ability of a soil to impede the transmission of an electrical current. Resistivity is the inverse of conductivity and is dependent on the presence of ions, their concentrations, mobility, and valence, as well as soil moisture and temperature. The AASHTO specifications state that effects of corrosion and deterioration shall be considered if resistivity values are less than 2,000 ohm-cm. The resistivity of the tested samples ranged from 4,550 to 9,900 to ohm-cm. Based on resistivity, the tested samples do not appear to be corrosive.

Sulfate and chloride concentrations were measured in the soil samples. Sulfates can be converted to sulfides by naturally occurring bacteria. Sulfides, when allowed to oxidize, will produce sulfuric acid, which is highly corrosive. Chlorides will also chemically react and facilitate dissolution reactions with metals and concrete. According to the AASHTO specifications, soil is considered corrosive if the concentration of chloride is greater than 100 parts per million (ppm) or the concentration of sulfate is greater than 1,000 ppm. Chloride concentrations in the tested samples ranged from 8.04 to 10.4 ppm, sulfate concentrations ranged from 8.58 to 83.1 ppm, and sulfide concentrations were at or below the laboratory method reporting limits. Based on the chloride, sulfate, and sulfide concentrations, the tested samples do not appear to be corrosive.



NOTES

1) Atterberg limits tests were performed in general accordance with ASTM D4318 unless otherwise noted in the report.

2) Plasticity adjectives used in sample descriptions correspond to plasticity index as follows:
- Nonplastic (0 - 4%)
- Low Plasticity (>4 - 10%)
- Medium Plasticity (>10 - 20%)
- High Plasticity (>20 - 40%)
- Very High Plasticity (>40%)

BORING AND SAMPLE NO.	DEPTH (feet)	GROUP SYMBOL	SAMPLE DESCRIPTION	LL %	PL %	PI %	NAT. W.C. %	FINES %
● ST-B-2, S-8	25.0	ML	SILT, nonplastic	35	32	3	35	99

Perennial Wind Chaser Station
Step-Up Substation
Umatilla, Oregon

ATTERBERG LIMITS RESULTS

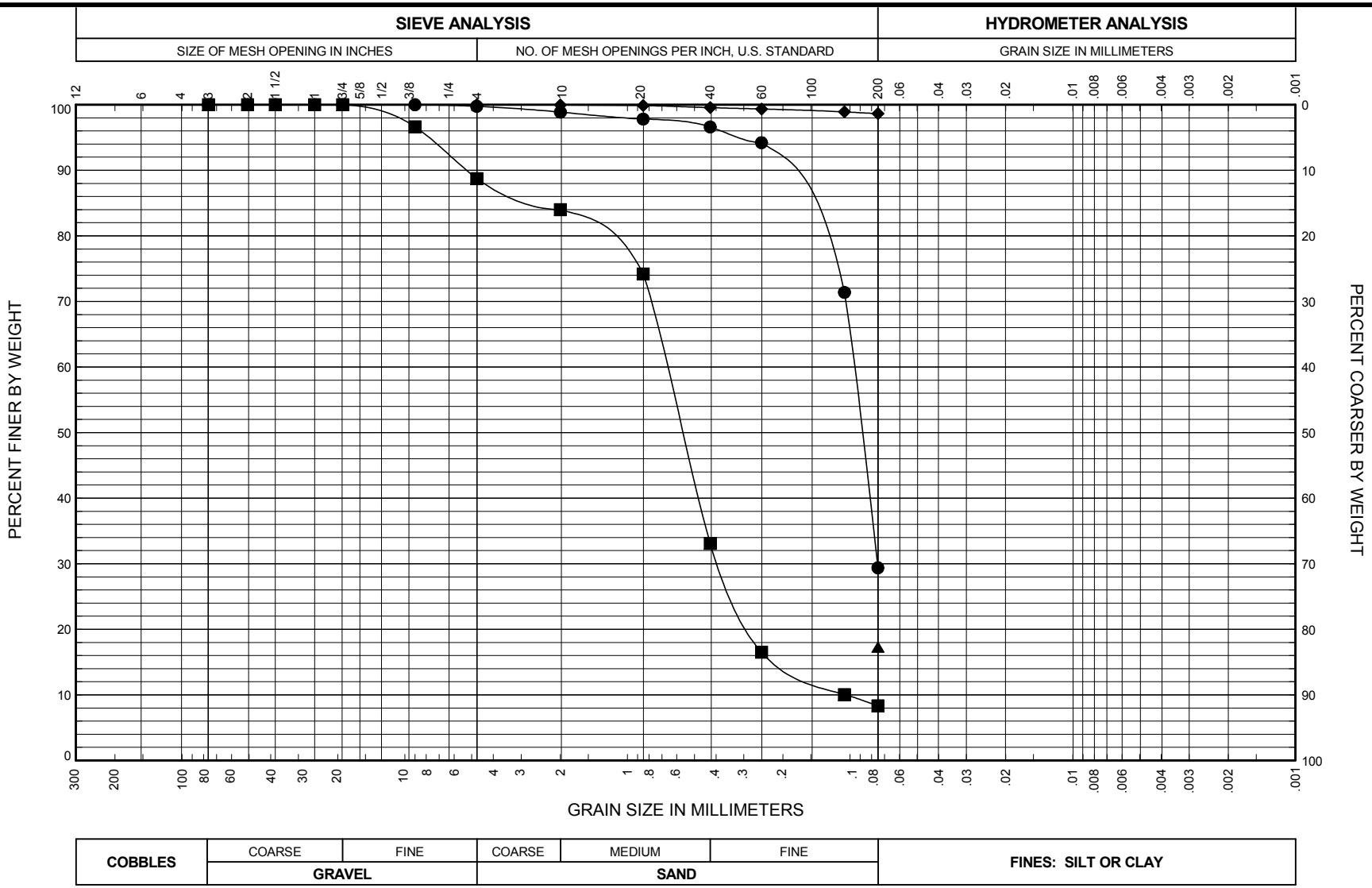
November 2013 24-1-03794-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. B1

FIG. B1

ATT_MAIN 24-1-03794-UMATILLA.GPJ SHAN WIL.GDT 11/18/13



NOTES:
1) Sieve and hydrometer analyses were performed in general accordance with ASTM D422 unless otherwise noted in the report.
2) Particles retained on the 3-inch (76.2 mm) sieve are noted in the sample descriptions, but are not included in sieve analyses unless otherwise noted in the report.

GSA_MAIN 24-1-03794-UMATILLA.GPJ SHAN_WIL.GDT 11/18/13

BORING AND SAMPLE NO.	DEPTH (feet)	GROUP SYMBOL	SAMPLE DESCRIPTION	GRAVEL %	SAND %	FINES %	NAT. W.C. %	DRY DENSITY PCF
● ST-B-1, C-1	0.0	SM	Silty SAND	0	70	29	2	
■ ST-B-1, S-3	7.5	SW-SM	SAND with silt, trace gravel	11	80	8	17	
▲ ST-B-1, S-7	20.0	SM	Silty SAND	-	-	17	17	
◆ ST-B-2, S-8	25.0	ML	SILT, nonplastic	0	1	99	35	

Perennial Wind Chaser Station
Step-Up Substation
Umatilla, Oregon

GRAIN SIZE DISTRIBUTION

November 2013 24-1-03794-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. B2

FIG. B2

Specialty Analytical

11711 SE Capps Road, Ste B
Clackamas, Oregon 97015
TEL: 503-607-1331 FAX: 503-607-1336
Website: www.specialtyanalytical.com

August 28, 2013

David Higgins
Shannon & Wilson
3990 SW Collins Way
Ste. 100
Lake Oswego, OR 97035

TEL: (503) 223-6147
FAX (503) 223-6140

RE: Perennial Power / 24-1-03794-001

Dear David Higgins: Order No.: 1308125

Specialty Analytical received 5 sample(s) on 8/20/2013 for the analyses presented in the following report.

There were no problems with the analysis and all data for associated QC met EPA or laboratory specifications, except where noted in the Case Narrative, or as qualified with flags. Results apply only to the samples analyzed. Without approval of the laboratory, the reproduction of this report is only permitted in its entirety.

If you have any questions regarding these tests, please feel free to call.

Sincerely,

Marty French
Lab Director

Specialty Analytical

Date Reported: 28-Aug-13

CLIENT: Shannon & Wilson
Collection Date: 8/15/2013
Project: Perennial Power / 24-1-03794-001
Lab ID: 1308125-001
Client Sample ID: ST-B-1, C-1, 0-2'
Matrix: SOIL

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
CHLORIDE ION IN SOIL		**D512**				Analyst: **JRC**
Chloride	8.04	1.50		mg/Kg	1	8/22/2013 11:05:00 AM
PH OF SOIL		**D4972**				Analyst: **AT**
pH	7.52	0		pH Units	1	8/21/2013 4:20:00 PM
OXIDATION-REDUCTION POTENTIAL		**M2580B**				Analyst: **JRC**
Oxidation-Reduction Potential	310	0		Eh	1	8/21/2013 2:00:00 PM
SOIL RESISTIVITY		**T288-91**				Analyst: **AT**
Minimum Soil Resistivity	9900	1.00		ohm-cm	1	8/22/2013 2:00:00 PM
SULFATE IN SOIL		**D516**				Analyst: **AT**
Sulfate	8.58	1.50		mg/Kg	1	8/22/2013 11:05:00 AM
SULFIDE		**SW9030**				Analyst: **JRC**
Sulfide	2.00	2.00		mg/Kg	1	8/23/2013 10:00:00 AM

Specialty Analytical

Date Reported: 28-Aug-13

CLIENT: Shannon & Wilson
Collection Date: 8/20/2013 2:33:46 PM
Project: Perennial Power / 24-1-03794-001
Lab ID: 1308125-005
Client Sample ID: Composite
Matrix: SOIL

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
CHLORIDE ION IN SOIL		**D512**				Analyst: **JRC**
Chloride	10.4	1.50		mg/Kg	1	8/22/2013 11:20:00 AM
PH OF SOIL		**D4972**				Analyst: **AT**
pH	8.74	0		pH Units	1	8/21/2013 4:25:00 PM
OXIDATION-REDUCTION POTENTIAL		**M2580B**				Analyst: **JRC**
Oxidation-Reduction Potential	275	0		Eh	1	8/21/2013 2:30:00 PM
SOIL RESISTIVITY		**T288-91**				Analyst: **AT**
Minimum Soil Resistivity	4550	1.00		ohm-cm	1	8/22/2013 2:15:00 PM
SULFATE IN SOIL		**D516**				Analyst: **AT**
Sulfate	83.1	7.50		mg/Kg	5	8/22/2013 11:50:00 AM
SULFIDE		**SW9030**				Analyst: **JRC**
Sulfide	2.00	2.00		mg/Kg	1	8/23/2013 10:20:00 AM

QC SUMMARY REPORT

WO#: **1308125**

Specialty Analytical

28-Aug-13

Client: Shannon & Wilson

Project: Perennial Power / 24-1-03794-001

TestCode: **CL_ASTM_S**

Sample ID: **LCS** SampType: **LCS** TestCode: **CL_ASTM_S** Units: **mg/Kg** Prep Date: RunNo: **11133**

Client ID: **LCSS** Batch ID: **R11133** TestNo: **D512** Analysis Date: **8/22/2013** SeqNo: **141453**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	31.5	1.50	30.00	0	105	80	120				

Sample ID: **MBLK** SampType: **MBLK** TestCode: **CL_ASTM_S** Units: **mg/Kg** Prep Date: RunNo: **11133**

Client ID: **PBS** Batch ID: **R11133** TestNo: **D512** Analysis Date: **8/22/2013** SeqNo: **141454**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	ND	1.50									

Sample ID: **1308125-005AMS** SampType: **MS** TestCode: **CL_ASTM_S** Units: **mg/Kg** Prep Date: RunNo: **11133**

Client ID: **Composite** Batch ID: **R11133** TestNo: **D512** Analysis Date: **8/22/2013** SeqNo: **141457**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	25.0	1.50	15.00	10.35	97.8	75	125				

Sample ID: **1308125-005AMSD** SampType: **MSD** TestCode: **CL_ASTM_S** Units: **mg/Kg** Prep Date: RunNo: **11133**

Client ID: **Composite** Batch ID: **R11133** TestNo: **D512** Analysis Date: **8/22/2013** SeqNo: **141458**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	25.0	1.50	15.00	10.35	97.4	75	125	25.02	0.240	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
O	RSD is greater than RSDlimit	R	RPD outside accepted recovery limits	S	Spike Recovery outside accepted reco

QC SUMMARY REPORT

WO#: **1308125**

Specialty Analytical

28-Aug-13

Client: Shannon & Wilson

Project: Perennial Power / 24-1-03794-001

TestCode: **CL_ASTM_S**

Sample ID: **CCV** SampType: **CCV** TestCode: **CL_ASTM_S** Units: **mg/Kg** Prep Date: RunNo: **11133**

Client ID: **CCV** Batch ID: **R11133** TestNo: **D512** Analysis Date: **8/22/2013** SeqNo: **141459**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	47.3	1.50	45.00	0	105	90	110				

Qualifiers:

B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
O	RSD is greater than RSDlimit	R	RPD outside accepted recovery limits	S	Spike Recovery outside accepted reco

QC SUMMARY REPORT

WO#: **1308125**

Specialty Analytical

28-Aug-13

Client: Shannon & Wilson

Project: Perennial Power / 24-1-03794-001

TestCode: **PH_ASTM**

Sample ID: **1308125-005ADUP** SampType: **DUP** TestCode: **PH_ASTM** Units: **pH Units** Prep Date: RunNo: **11131**

Client ID: **Composite** Batch ID: **R11131** TestNo: **D4972** Analysis Date: **8/21/2013** SeqNo: **141429**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
pH	8.75	0						8.740	0.114	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
O	RSD is greater than RSDlimit	R	RPD outside accepted recovery limits	S	Spike Recovery outside accepted reco

QC SUMMARY REPORT

WO#: **1308125**

Specialty Analytical

28-Aug-13

Client: Shannon & Wilson

Project: Perennial Power / 24-1-03794-001

TestCode: **REDOX**

Sample ID: **1308125-001ADUP** SampType: **DUP** TestCode: **REDOX** Units: **Eh** Prep Date: RunNo: **11113**

Client ID: **ST-B-1, C-1, 0-2'** Batch ID: **R11113** TestNo: **M2580B** Analysis Date: **8/21/2013** SeqNo: **141176**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Oxidation-Reduction Potential	300	0						309.7	3.02	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
O	RSD is greater than RSDlimit	R	RPD outside accepted recovery limits	S	Spike Recovery outside accepted reco

QC SUMMARY REPORT

WO#: **1308125**

Specialty Analytical

28-Aug-13

Client: Shannon & Wilson

Project: Perennial Power / 24-1-03794-001 **TestCode:** **SO4_ASTM_S**

Sample ID: **LCS** SampType: **LCS** TestCode: **SO4_ASTM_** Units: **mg/Kg** Prep Date: RunNo: **11134**

Client ID: **LCSS** Batch ID: **R11134** TestNo: **D516** Analysis Date: **8/22/2013** SeqNo: **141460**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	30.8	1.50	30.00	0	103	70	130				

Sample ID: **MBLK** SampType: **MBLK** TestCode: **SO4_ASTM_** Units: **mg/Kg** Prep Date: RunNo: **11134**

Client ID: **PBS** Batch ID: **R11134** TestNo: **D516** Analysis Date: **8/22/2013** SeqNo: **141461**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	ND	1.50									

Sample ID: **1308125-005AMS** SampType: **MS** TestCode: **SO4_ASTM_** Units: **mg/Kg** Prep Date: RunNo: **11134**

Client ID: **Composite** Batch ID: **R11134** TestNo: **D516** Analysis Date: **8/22/2013** SeqNo: **141463**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	90.0	7.50	15.00	83.10	46.0	65	135				SMC

Sample ID: **CCV** SampType: **CCV** TestCode: **SO4_ASTM_** Units: **mg/Kg** Prep Date: RunNo: **11134**

Client ID: **CCV** Batch ID: **R11134** TestNo: **D516** Analysis Date: **8/22/2013** SeqNo: **141464**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	47.0	1.50	45.00	0	104	90	110				

Qualifiers:

B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
O	RSD is greater than RSDlimit	R	RPD outside accepted recovery limits	S	Spike Recovery outside accepted reco

QC SUMMARY REPORT

WO#: **1308125**

Specialty Analytical

28-Aug-13

Client: Shannon & Wilson

Project: Perennial Power / 24-1-03794-001

TestCode: **SO4_ASTM_S**

Sample ID: **1308125-005AMSD** SampType: **MSD** TestCode: **SO4_ASTM_** Units: **mg/Kg** Prep Date: RunNo: **11134**

Client ID: **Composite** Batch ID: **R11134** TestNo: **D516** Analysis Date: **8/22/2013** SeqNo: **141466**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	90.6	7.50	15.00	83.10	50.0	65	135	90.00	0.664	20	SMC

Sample ID: **CCV** SampType: **CCV** TestCode: **SO4_ASTM_** Units: **mg/Kg** Prep Date: RunNo: **11134**

Client ID: **CCV** Batch ID: **R11134** TestNo: **D516** Analysis Date: **8/22/2013** SeqNo: **141467**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	47.1	1.50	45.00	0	105	90	110				

Qualifiers:

B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
O	RSD is greater than RSDlimit	R	RPD outside accepted recovery limits	S	Spike Recovery outside accepted reco

QC SUMMARY REPORT

WO#: **1308125**

Specialty Analytical

28-Aug-13

Client: Shannon & Wilson

Project: Perennial Power / 24-1-03794-001

TestCode: **SULFIDE_S**

Sample ID: **1308125-005ADUP** SampType: **DUP** TestCode: **SULFIDE_S** Units: **mg/Kg** Prep Date: RunNo: **11154**

Client ID: **Composite** Batch ID: **R11154** TestNo: **SW9030** Analysis Date: **8/23/2013** SeqNo: **141628**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide	2.00	2.00						2.000	0	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
O	RSD is greater than RSDlimit	R	RPD outside accepted recovery limits	S	Spike Recovery outside accepted reco

KEY TO FLAGS

Rev. May 12, 2010

A This sample contains a Gasoline Range Organic not identified as a specific hydrocarbon product. The result was quantified against gasoline calibration standards

A1 This sample contains a Diesel Range Organic not identified as a specific hydrocarbon product. The result was quantified against diesel calibration standards.

A2 This sample contains a Lube Oil Range Organic not identified as a specific hydrocarbon product. The result was quantified against a lube oil calibration standard.

A3 The result was determined to be Non-Detect based on hydrocarbon pattern recognition. The product was carry-over from another hydrocarbon type.

A4 The product appears to be aged or degraded diesel.

B The blank exhibited a positive result great than the reporting limit for this compound.

CN See Case Narrative.

D Result is based from a dilution.

E Result exceeds the calibration range for this compound. The result should be considered as estimate.

F The positive result for this hydrocarbon is due to single component contamination. The product does not match any hydrocarbon in the fuels library.

G Result may be biased high due to biogenic interferences. Clean up is recommended.

H Sample was analyzed outside recommended holding time.

HT At clients request, samples was analyzed outside of recommended holding time.

J The result for this analyte is between the MDL and the PQL and should be considered as estimated concentration.

K Diesel result is biased high due to amount of Oil contained in the sample.

L Diesel result is biased high due to amount of Gasoline contained in the sample.

M Oil result is biased high due to amount of Diesel contained in the sample.

MC Sample concentration is greater than 4x the spiked value, the spiked value is considered insignificant.

MI Result is outside control limits due to matrix interference.

MSA Value determined by Method of Standard Addition.

O Laboratory Control Standard (LCS) exceeded laboratory control limits, but meets CCV criteria. Data meets EPA requirements.

Q Detection levels elevated due to sample matrix.

R RPD control limits were exceeded.

RF Duplicate failed due to result being at or near the method-reporting limit.

RP Matrix spike values exceed established QC limits; post digestion spike is in control.

S Recovery is outside control limits.

SC Closing CCV or LCS exceeded high recovery control limits, but associated samples are non-detect. Data meets EPA requirements.

* The result for this parameter was greater that the maximum contaminant level of the TCLP regulatory limit.

Shannon & Wilson, Inc.
503-210-4781

Job Name:
Perennial Power

13081275

LABORATORY TESTING PROGRAM

JOB. NO. 24-1-03794-001 PREPARED BY David Higgins

DATE 8/20/13 DUE DATE ACKNOWLEDGED BY [signature] 8/20/13

	BORING NUMBER	SAMPLE NUMBER	DEPTH IN FEET	VISUAL CLASSIFICATION	WATER CONTENT	ATTERBERG LIMITS	MECHANICAL ANALYSIS	HYDROMETER	COMBINED ANALYSES	Qu	IN-PLACE δ	MIN. & MAX. δ	Chloride 0512	pH 0497 21	Resistivity T288	Sulfate 0516	Redox	Sulfide
8/15/2013 2 Jars ✱	ST-B-1	C-1	0-2'										/	/	/	/	/	/
8/15/2013 ✱	ST-B-1	5-1	2.5'-3.3'										/	/	/	/	/	/
✱	ST-B-1	5-5	12'-13.5'										/	/	/	/	/	/
✱	ST-B-1	5-6	15'-16.5'										/	/	/	/	/	/

CONSOLIDATION (1)

COMPACTION (2)

TRIAXIAL (3)

REMARKS

✱ Composite Sample of Silty SAND

✱ Composite Sample of Gravel

Two testing suites
one of:
✱ Silty sand
one of:
✱ Gravel

(1) SPECIFY LOADING PROCEDURE (2) SPECIFY STANDARDS (3) SPECIFY TESTING PROCEDURE

APPENDIX C

PHOTOGRAPH LOG

Boring ST-B-1 Location

Boring ST-B-2 Location

Perennial Wind Chaser Station
Step-Up Substation
Umatilla, Oregon

PHOTOGRAPH LOG

November 2013 24-1-03794-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. C1

File: I:\WIP\Projects\24-1 Portland\3700\3794 Perennial Power Wind Chaser Project\Graphics\CAD\ST Core and Site Photos.dwg Date: 11-18-2013 Author: mas

APPENDIX D

IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL/ENVIRONMMENTAL REPORT

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

Attachment to and part of Report: 24-1-03794-001
Preliminary Geotechnical Engineering Report:
Perennial Power Wind Chaser Project
Step-Up Substation
Date: October 2013
To: Burns & McDonnell Engineering Company, Inc.
Attn: Robert Hawkins

Important Information About Your Geotechnical/Environmental Report

CONSULTING SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND FOR SPECIFIC CLIENTS.

Consultants prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your consultant prepared your report expressly for you and expressly for the purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the consultant. No party should apply this report for any purpose other than that originally contemplated without first conferring with the consultant.

THE CONSULTANT'S REPORT IS BASED ON PROJECT-SPECIFIC FACTORS.

A geotechnical/environmental report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. Depending on the project, these may include the general nature of the structure and property involved; its size and configuration; its historical use and practice; the location of the structure on the site and its orientation; other improvements such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask the consultant to evaluate how any factors that change subsequent to the date of the report may affect the recommendations. Unless your consultant indicates otherwise, your report should not be used: (1) when the nature of the proposed project is changed (for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one, or chemicals are discovered on or near the site); (2) when the size, elevation, or configuration of the proposed project is altered; (3) when the location or orientation of the proposed project is modified; (4) when there is a change of ownership; or (5) for application to an adjacent site. Consultants cannot accept responsibility for problems that may occur if they are not consulted after factors, which were considered in the development of the report, have changed.

SUBSURFACE CONDITIONS CAN CHANGE.

Subsurface conditions may be affected as a result of natural processes or human activity. Because a geotechnical/environmental report is based on conditions that existed at the time of subsurface exploration, construction decisions should not be based on a report whose adequacy may have been affected by time. Ask the consultant to advise if additional tests are desirable before construction starts; for example, groundwater conditions commonly vary seasonally.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes, or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical/environmental report. The consultant should be kept apprised of any such events, and should be consulted to determine if additional tests are necessary.

MOST RECOMMENDATIONS ARE PROFESSIONAL JUDGMENTS.

Site exploration and testing identifies actual surface and subsurface conditions only at those points where samples are taken. The data were extrapolated by your consultant, who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your consultant can work together to help reduce their impacts. Retaining your consultant to observe subsurface construction operations can be particularly beneficial in this respect.

A REPORT'S CONCLUSIONS ARE PRELIMINARY.

The conclusions contained in your consultant's report are preliminary because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Actual subsurface conditions can be discerned only during earthwork; therefore, you should retain your consultant to observe actual conditions and to provide conclusions. Only the consultant who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations based on those conclusions are valid and whether or not the contractor is abiding by applicable recommendations. The consultant who developed your report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

THE CONSULTANT'S REPORT IS SUBJECT TO MISINTERPRETATION.

Costly problems can occur when other design professionals develop their plans based on misinterpretation of a geotechnical/environmental report. To help avoid these problems, the consultant should be retained to work with other project design professionals to explain relevant geotechnical, geological, hydrogeological, and environmental findings, and to review the adequacy of their plans and specifications relative to these issues.

BORING LOGS AND/OR MONITORING WELL DATA SHOULD NOT BE SEPARATED FROM THE REPORT.

Final boring logs developed by the consultant are based on interpretation of field logs (assembled by site personnel), field test results, and laboratory and/or office evaluation of field samples and data. Only final boring logs and data are customarily included in geotechnical/environmental reports. These final logs should not, under any circumstances, be redrawn for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process.

To reduce the likelihood of boring log or monitoring well misinterpretation, contractors should be given ready access to the complete geotechnical engineering/environmental report prepared or authorized for their use. If access is provided only to the report prepared for you, you should advise contractors of the report's limitations, assuming that a contractor was not one of the specific persons for whom the report was prepared, and that developing construction cost estimates was not one of the specific purposes for which it was prepared. While a contractor may gain important knowledge from a report prepared for another party, the contractor should discuss the report with your consultant and perform the additional or alternative work believed necessary to obtain the data specifically appropriate for construction cost estimating purposes. Some clients hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes that aggravate them to a disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY.

Because geotechnical/environmental engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, consultants have developed a number of clauses for use in their contracts, reports and other documents. These responsibility clauses are not exculpatory clauses designed to transfer the consultant's liabilities to other parties; rather, they are definitive clauses that identify where the consultant's responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your report, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to your questions.

The preceding paragraphs are based on information provided by the
ASFE/Association of Engineering Firms Practicing in the Geosciences, Silver Spring, Maryland

ATTACHMENT H3

EVALUATION OF POTENTIAL IMPACT FROM GROUNDWATER PUMPING FOR GENERATING FACILITY

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

ALASKA
CALIFORNIA
COLORADO
FLORIDA
MISSOURI
OREGON
WASHINGTON
WISCONSIN

July 25, 2014

Mr. Robert J. Hawkins, Jr., PE
Burns & McDonnell Engineering Company, Inc.
9400 Ward Parkway
Kansas City, Missouri 64114

RE: PERENNIAL WIND CHASER STATION
EVALUATION OF POTENTIAL IMPACT FROM GROUNDWATER PUMPING
POWER-GENERATING FACILITY
HERMISTON, OREGON

INTRODUCTION

The purpose of this evaluation is to estimate the potential radial drawdown effects of pumping one on-site well at the power-generating facility and the impacts to other existing supply wells. This letter summarizes our evaluation and finings and is supplemental to the findings in our Preliminary Geotechnical Engineering Report, Perennial Wind Chaser Station, dated November 19, 2013.

LOCAL GEOLOGY AND HYDROGEOLOGY

Our interpretation of the subsurface conditions is based on the borings and regional geologic information from published sources. We grouped the materials encountered in our field explorations into four geologic units, downward from land surface as described below.

- **Loess:** Medium-dense to dense silty sand to sand, trace silt (SM, SP-SM, and SP).
- **Catastrophic Flood Deposits – Gravel Facies:** Dense to very dense sandy gravel, trace silt with cobbles and boulders (GP).
- **Catastrophic Flood Deposits – Fine-Grained Facies:** Very stiff to hard silt to sandy silt and clayey silt with sand to trace sand (ML and MH).
- **Catastrophic Flood Deposits – Sand Facies:** Dense to very dense silty sand to sand, trace silt (SM, SP-SM, and SP).

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These generalized geologic units have been defined by their geologic and engineering properties and their distribution in the subsurface. The units and their inter-relationships are shown on the Geologic Profile A-A', Figure 4, in Shannon & Wilson's 2013 Preliminary Geotechnical Engineering Report. The location of the profile is shown on the Exploration Plan, Figure 3, of our November 19, 2013 report. The profile is interpretive, and variations in subsurface conditions may exist between the locations of the borings. Contacts between the units may be more gradational than shown in the profiles and in the boring logs in Appendix A.

CONCEPTUAL MODEL

We developed a conceptual hydrogeologic model, consisting of three discrete layers, as follows.

- **Layer 1** – Consists of the first two geological units (loess and catastrophic flood deposits – gravel facies), described above. The layer thickness is 32.5 feet. We assigned a horizontal hydraulic conductivity of 7.5 feet/day (low case) and 15 feet/day (high case).
- **Layer 2** – Consists of the third geological unit (catastrophic flood deposits – clayey silt) described above. The layer thickness is 17.5 feet. We assigned a horizontal hydraulic conductivity of 0.1 feet/day. Layer 2 is a confining layer that separates the upper aquifer from the basalt aquifer.
- **Layer 3** – Consists of the fourth geological units (catastrophic flood deposits – sand facies and basalt formation) described above. Although the total thickness of Layer 3 is unknown, we assumed a thickness of 30 feet. We assigned a horizontal hydraulic conductivity of 10 feet/day (low case) and 20 feet/day (high case).

ANALYSIS AND RESULTS

We developed a basic 3-D groundwater flow model to simulate these units and pumping. All modeled layers were horizontal. The depth to groundwater was set at 27 feet below surface. We inserted one well and assigned a pumping rate to Layer 3. We simulated the proposed pumping rate of 5,000 gpd (or 3.5 gpm) and ran the model to steady-state (long-term). The predicted maximum drawdown at the pumped well would be between 1.5 and 3 feet (assuming a 100-percent efficient well), and the distance to a drawdown of 0.5 feet would be between 250 and 850 feet.

For a sensitivity analysis, we increased the pumping rate to 10,000 gpd (7.0 gpm). For this case, the maximum drawdown at the pumped well ranged between would be 2.7 and 4.4 feet, and the distance to a drawdown of 0.5 feet would be between 900 and 2,000 feet.

Figure 1 shows the locations of the project site, the maximum radius of influence for the 5,000 gpd case (500 feet), the maximum radius of influence for the 10,000 gpd case (2,000 feet), and the existing water rights in the area (from Oregon Department of Water Resource's online database mapping tool).

The search shows no water rights within the 850-foot zone, and one water right within the 2,000-foot zone. The priority date for this water rights (owned by E.T. Johnson, ID T8066) is 1968. The permit consists of pumping up to 1.77 cubic foot per second (or 800 gpm) for irrigation use from a 190-foot-deep well completed in the basalt. Therefore, the capacity of this permitted well far exceeds that planned for the Wind Chaser project. We do not have operational drawdown information for the Johnson well. However, it is unlikely that the radial drawdown created by pumping the Wind Chaser well would have a significant impact on the operation of the Johnson well.

SHANNON & WILSON, INC.

David J. Higgins, CEG
Associate | Engineering Geologist

SDT/LIM:DJH/amn

Attachments: Figure 1, Water Rights Map and Potential Pumping Radius of Influence

850-ft radius of influence

Project Site

2,000-ft max. radius of influence

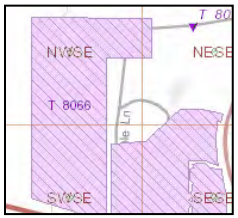
4N27E

4N28E

Switch Basemap

Measurement

Source: http://apps.wrd.state.or.us/apps/gis/wr/Default.aspx



Water right place of diversion And use area (shaded)

0 1,000 2,000

Scale in Feet

Perennial Power Holdings, Inc.
Wind Chaser Station Project
Hermiston, Oregon

WATER RIGHTS MAP AND POTENTIAL PUMPING RADIUS OF INFLUENCE

July 2014 24-1-03794

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. 1

ATTACHMENT H4

DOCUMENTATION OF EMAIL CORRESPONDENCE WITH DOGAMI

Eric Paslack

From: David Higgins
Sent: Wednesday, September 11, 2013 6:11 PM
To: Eric Paslack
Subject: Fwd: Perennial Power proposed generating facility and substation

Sent from my iPhone

Begin forwarded message:

From: Bill Burns <bill.burns@dogami.state.or.us>
Date: September 11, 2013, 5:55:23 PM PDT
To: David Higgins <DJH@shanwil.com>
Cc: Mark Ethen <mark.ethen@dogami.state.or.us>
Subject: RE: Perennial Power proposed generating facility and substation

Hi David. It was nice talking with you about this project. Please call or email me with any questions. Bill

Bill Burns, MS, CEG
Engineering Geologist
Oregon Department of Geology and Mineral Industries
800 NE Oregon Street, Portland, OR 97232
(971) 673-1538
bill.burns@dogami.state.or.us
http://www.oregongeology.org/

From: David Higgins [mailto:DJH@shanwil.com]
Sent: Friday, September 06, 2013 10:58 AM
To: Bill Burns
Subject: Perennial Power proposed generating facility and substation

Bill,

Thank you for the phone call yesterday and discussing with me the proposed Perennial Power generating facility in Hermiston and substation in Umatilla.

The purpose of our phone call was to meet the requirements of OAR 345-021-0010(1)(h)(c). We discussed available geologic mapping and literature in the area as well as explorations that we have performed for the generating facility and the substation.

Please provide references for area geologic studies you mentioned in our conversation that you suggested we review.

Thank you,

SHANNON & WILSON, INC.

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ATTACHMENT H5

SIGNIFICANT HISTORICAL EARTHQUAKES CAUSING MMI III OR GREATER-INTENSITY SHAKING AT THE FACILITY SITES

ATTACHMENT H4

Significant Historical Earthquakes Causing MMI III or Greater Intensity Shaking at the Generating Facility Site

Year	Date	Latitude	Longitude	Distance (mi)	Magnitude	Estimated MMI [1]
1975	6/28	46.238	-119.712	34	3.7	III
1975	7/1	45.628	-120.002	33	3.5	III
1985	2/10	45.858	-119.644	14	3.7	IV
1988	9/29	45.850	-120.260	43	3.5	III
1992	8/7	45.860	-119.590	11	3.9	V
2006	12/20	46.095	-118.513	46	3.4	III
2008	5/18	46.168	-119.550	27	3.7	III
2011	9/4	46.409	-119.263	42	3.7	III
2011	10/15	46.480	-119.262	47	3.4	III

1) MMI is estimated at the facility, not the epicenter

ATTACHMENT H4

Significant Historical Earthquakes Causing MMI III or Greater Intensity Shaking at the Step-up Substation Site

Year	Date	Latitude	Longitude	Distance (mi)	Magnitude	Estimated MMI [1]
1975	6/28	46.238	-119.712	29	3.7	III
1975	7/1	45.628	-120.002	39	3.5	III
1985	2/10	45.858	-119.644	17	3.7	IV
1988	9/29	45.850	-120.260	46	3.5	III
1991	11/28	45.990	-118.317	48	4.3	III
1992	7/14	45.993	-118.309	48	4.1	III
1992	8/7	45.860	-119.590	14	3.9	V
2006	12/20	46.095	-118.513	40	3.4	III
2008	5/18	46.168	-119.550	20	3.7	IV
2011	9/4	46.409	-119.263	34	3.7	III
2011	10/15	46.480	-119.262	39	3.4	III

1) MMI is estimated at the facility, not the epicenter

EXHIBIT I

SOILS

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

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APPENDICES

Appendix I-1 USDA – Natural Resources Conservation Service Land Capability Classification System

Appendix I-2 NPDES 1200-C Permit Application and DEQ Acknowledgement Letter

I.1 INTRODUCTION

OAR 345-021-0010(1)(i) *Information from reasonably available sources regarding soil conditions and uses in the analysis area, providing evidence to support findings by the Council as required by OAR 345-022-0022.*

Response: To issue a site certificate, the Energy Facility Siting Council must find that the design, construction, and operation of a facility, taking into account mitigation, are unlikely to result in a significant adverse impact to soils. This exhibit describes the potential impacts and the measures that Perennial-WindChaser LLC (Perennial) intends to utilize to minimize the impacts anticipated to result from the construction and operation of the Perennial Wind Chaser Station project (Project).

I.2 SUMMARY

This exhibit discusses the major soil types found within the Site Boundary of the Project. The impacts expected from construction and operation of the Project are those typically associated with large construction projects, including the potential for erosion of exposed soils during excavation and grading operations. Perennial intends to minimize these impacts through implementation of best management practices. The Project features and areas impacted are outlined in Table I-1.

Table I-1 Permanent and Temporary Areas Impacted by the Perennial Wind Chaser Station Project

Project Feature	Notes	Acres Impacted	
		Temporary	Permanent
Energy Facility Site	Power station and switchyard-Permanent disturbance	--	19.97
Construction Laydown and Parking (located outside of Energy Facility Site boundary)	Temporary impact area	5.11	--
Underground Natural Gas Line	Temporary impact 4.63 miles, 50 feet wide	28.06	--
Initial tie-in Transmission Poles (two new towers)	2 towers, 0.23 acre each	0.46	--
Underground 500-kV Cable	Temporary impact area (477 by 50 feet wide)	0.55	--
Step-up substation	Step-up voltage to the BPA's McNary Substation	--	3.0

Table I-1 Permanent and Temporary Areas Impacted by the Perennial Wind Chaser Station Project

Project Feature	Notes	Acres Impacted	
		Temporary	Permanent
Risers within McNary Substation/USACE lands	Permanent disturbance	--	0.51
Underground Process Water Line	Temporary impact area (208 feet by 50 feet)	0.24	--
Underground Reclaimed Water Line	Temporary impact area (538 feet by 50 feet)	0.62	--
T-Line Tie-in to Substation	(100 x 11 feet)	0.03	--
Step-up Substation Road Upgrade	Gravel on existing access road (12 feet by 800 feet long)	0.22	--
T-Line Reconductoring[1]	12 stringing sites (50 feet by 100 feet)	1.38[1]	--
	Subtotal	36.67	23.48
	TOTAL[2]	**60.15**	

Notes:

[1] Locations of up to 12 stringing sites (50ft X 100ft each) associated with the transmission line reconductoring have not been determined. No excavating, grading, or other soil disturbance will occur at these sites; potential disturbances will primarily result from vehicles driving on grass, shrubs, and other vegetation.

Key:

BPA Bonneville Power Administration
kV kilovolt
USACE United States Army Corps of Engineers

In all, 23.48 acres will be permanently affected by the Project, and 36.67 acres will be temporarily affected. Note that the locations of up to 12 stringing sites (50 by 100 feet each, 1.38 acres total) associated with the reconductoring of the transmission line from the Hermiston Generating Plant (HGP) to the McNary Substation for the Project have not been determined. However, no excavating, grading, or other soil disturbance will occur at these sites; potential disturbances will result primarily from vehicles driving on grass, shrubs, and other vegetation.

I.3 MAJOR SOIL TYPES

OAR 345-021-0010(1)(i)(A) *Identification and description of the major soil types in the analysis area.*

Response: The Analysis Area for this exhibit includes all areas within the Site Boundary where soil disturbance will potentially occur as a result of constructing and operating the Project. It does not include the portions of the existing transmission line to be reconductored. The locations of work areas (stringing sites) associated with reconductoring have not been determined. No excavation, grading, or other soil disturbing activities will occur during reconductoring activities.

Within the Analysis Area, Perennial has identified four soil series, which contain a total of 7 soil phases. Soil classes were identified using the Natural Resources Conservation Service (NRCS) soil survey program. The NRCS soil survey describes soil conditions in the upper 5 feet of soil and classifies land capability classes (LCCs) and subclasses.

Figures I-1a through I-1p illustrate the locations of major soil types within the Analysis Area for this exhibit. In addition, for informational purposes only, these figures include the major soil types within the transmission line right-of-way (not a part of the analysis area for this exhibit). Appendix I-1 provides definitions of the various LCCs and subclasses. Soil types are described below, with the map number in parenthesis corresponding to NRCS maps. All soil series descriptions were taken from the NRCS website (https://soilseries.sc.egov.usda.gov).

Adkins fine sandy loam, 0 to 5 percent slopes (map number 1B). This deep, well-drained soil type is formed in upland, eolian deposits. Approximately 12.29 acres of this soil type are present within the Site Boundary. Of the 12.29 acres, 0.36 are in permanent impact areas and 11.93are in temporary impact areas. From 0 to 24 inches, the soil consists of a brown, very fine, sandy loam that contains few very fine and fine roots. From 24 to 42 inches, the soil consists of a pale brown, very fine, sandy loam that contains few very fine roots. From 42 to 60 inches, the soil consists of a light brownish gray, very fine, sandy loam that contains few fine roots. The soil has moderate permeability and slow to rapid runoff. The LCC when non-irrigated is IVe. The LCC class when irrigated is IIe.

Adkins fine sandy loam, gravelly substratum, 0 to 5 percent slopes (map number 2B). This deep, well-drained soil type is formed in upland, eolian deposits, overlying a gravelly alluvium. Approximately 3.75 acres of this soil type are present within the Site Boundary. Of the 3.75 acres, 3.15 acres are in permanent impact areas and 0.6 acres are in temporary impact areas. From 0 to 35 inches, the soil consists of a brown to pale brown very fine sandy loam that contains few very fine and fine roots. From 35 to 60 inches, the soil consists of a pale brown to light grayish brown, very gravelly fine sandy loam that contains few very fine roots. The soil has moderate permeability and slow to rapid runoff. The LCC class when non-irrigated is IVe. The LCC class when irrigated is IIe.

Quincy fine sand, 0 to 5 percent slopes (map number 74B). This very deep, excessively drained soil type is formed in sands on dunes and terraces. Approximately 0.62 acres of this soil type are present within the Site Boundary. All 0.62 acres are in temporary impact areas. From 0 to 60 inches, the soil consists of grayish brown fine sand that is loose and contains fine roots. The soil has very rapid to rapid permeability and very slow to moderate runoff. The LCC class when non-irrigated is VIIe. The LCC class when irrigated is IVe.

Quincy loamy fine sand, 0 to 5 percent slopes (map number 75B). This very deep, excessively drained soil type is formed in sands on dunes and terraces. Approximately 3.01 acres of this soil type are present within the Site Boundary. All 3.01 acres are in temporary impact

areas. From 0 to 4 inches, the soil consists of a grayish brown, loamy, fine sand that is loose and contains fine roots. From 4 to 60 inches, the soil consists of a grayish brown fine sand that is loose and contains fine roots. The soil has very rapid to rapid permeability and very slow to moderate runoff. The LCC class when non-irrigated is VIIe. The LCC class when irrigated is IVe.

Quincy loamy fine sand, 5 to 25 percent slopes (map number 75E). This very deep, excessively drained soil type is formed in sands on dunes and terraces. Approximately 4.04 acres of this soil type are present within the Site Boundary. All 4.04 acres are in temporary impact areas. From 0 to 4 inches, the soil consists of a grayish brown, loamy, fine sand that is loose and contains fine roots. From 4 to 60 inches, the soil consists of a grayish brown fine sand that is loose and contains fine roots. The soil has very rapid to rapid permeability and very slow to moderate runoff. The LCC class when non-irrigated is VIIe. The LCC class when irrigated is IVe.

Quincy loamy fine sand, gravelly substratum, 0 to 5 percent slopes (map number 76B). This very deep, excessively drained soil type is formed in sands on dunes and terraces. Approximately 34.19acres of this soil type are present within the Site Boundary. Of the 34.19 acres, 19.97 acres are in permanent impact areas and 14.22 acres are in temporary impact areas. From 0 to 60 inches, the soil consists of a grayish brown loamy, fine sand that is loose and contains fine roots. The soil has very rapid to rapid permeability and very slow to moderate runoff. The LCC class when non-irrigated is VIIe. The LCC class when irrigated is IVe.

Pits, gravel (map number 70). This map unit consists of excavated areas of waterworn gravel, commonly mixed with sand or other soil material. Approximately 0.87 acres of this soil type are present within the Site Boundary. All 0.87 acres are in temporary impact areas. Most of these areas are being mined for sand and gravel and support little vegetation. The pits that are abandoned support vegetation only in areas where soil material has accumulated. These areas occur within other units that consist of soils that have a gravelly substratum, such as the Quincy and Adkins soils. They also occur along the major drainage ways. Since the areas of sand and gravel offer little support for vegetation, it is necessary to fill them with soil material in order to reclaim them.

Table I-2 Soil Map Units in the Analysis Area

NRCS Soils Map Units	NRCS Map Number	Permanent Impact Acres	Temporary Impacts Acres	Total Acres
Adkins fine sandy loam, 0 to 5 percent slopes	1B	0.36	11.93	12.29
Adkins fine sandy loam, gravelly substratum, 0 to 5 percent slopes	2B	3.15	0.60	3.75
Quincy fine sand, 0 to 5 percent	74B	--	0.62	0.62

Table I-2 Soil Map Units in the Analysis Area

NRCS Soils Map Units	NRCS Map Number	Permanent Impact Acres	Temporary Impacts Acres	Total Acres
slopes				
Quincy loamy fine sand, 0 to 5 percent slopes	75B	--	3.01	3.01
Quincy loamy fine sand	75E	--	4.04	4.04
Quincy loamy fine sand, gravelly substratum, 0 to 5 percent slopes	76B	19.97	14.22	34.19
Pits, gravel	70	--	0.87	0.87
Undetermined soil types (stringing sties associated with transmission line reconductoring)[1,2]	--	--	1.38	1.38
Total Acres		**23.48**	**36.67**	**60.15**

Notes:

[1] The locations of up to 12 stringing sites (50feet X 100feet each) associated with the transmission line reconductoring have not been determined, and soil types are therefore not reported in the table. No excavating, grading, or other soil disturbance will occur at these sites; potential disturbances will primarily result from vehicles driving on grass, shrubs, and other vegetation

[2] Based on Figures I-1a through I-1p, the most common major soils present in the existing transmission line right-of-way are: Burbank loamy fine sand, 0-5 percent slopes; and Quincy loamy fine sand, gravelly substratum, 0-5 percent slopes.

Key:

NRCS Natural Resources Conservation Service

I.4 LAND USES

OAR 345-021-0010(1)(i)(B) *Identification and description of current land uses in the analysis area, such as growing crops, that require or depend on productive soils.*

Response: The Project is expected to impact approximately 60.15 acres of land. See Table I-1 for areas of land impacted by Project features.

The predominant land use categories in the Analysis Area, as defined by the United States Geological Survey Gap Analysis Program, are classified as Agricultural Vegetation (59.8%), Developed & Other Human Use (15.8%), and Semi-Desert (21.3%). Minor land use categories are classified as Introduced & Semi Natural Vegetation (2.3%), Open Water (0.2%), and Shrubland & Grassland (0.6%). Land uses within these areas include existing industrial uses, farm and agricultural uses, and limited natural resource areas, which include designated wetlands in the proximity of the Project. The Station will be located adjacent to an existing power plant, the HGP, which is operated by an associated firm of Perennial, and a railroad track runs between the two power plants, and along an agricultural processing plant, a cattle stockyard, and a large FedEx freight distribution center. Wetlands identified in the area are described in Exhibit J –

Jurisdictional Wetlands. United States Geological Survey land use categories for the Project area are shown in Figure I-2 (United States Geological Survey, Gap Analysis Program. May 2011. National Land Cover, Version 2. Downloaded July 2014). Figures I-1a through I-1p show the locations of soil types within the Analysis Area for this exhibit.

I.5 POTENTIAL ADVERSE IMPACTS

OAR 345-021-0010(1)(i)(C) *Identification and assessment of significant potential adverse impact to soils from construction, operation and retirement of the facility, including, but not limited to, erosion and chemical factors such as salt deposition from cooling towers, land application of liquid effluent, and chemical spills.*

Response: Potential adverse impacts are expected to occur to soils in the Project Site. During construction, potential impacts could result from removal of topsoil, wind erosion, or water erosion; potential contamination from oil or other spills from construction equipment; and, possibly, construction debris. The erosion hazard for soils found within the Site Boundary ranges from slight to moderate. Perennial's contractor for the Project will follow the requirements of the National Pollutant Discharge Elimination System (NPDES) for construction activities (NPDES 1200-C) to minimize impacts. The 1200-C permit requires development of a detailed Erosion and Sediment Control (ESC) Plan. A copy of the 1200-C permit submitted to the Oregon Department of Environmental Quality (DEQ), including revisions requested by DEQ, is contained in Appendix I-2. Appendix I-2 also contains a letter from DEQ to the Oregon Department of Energy in fulfillment of the requirements of Oregon Administrative Rule (OAR) 345-021-0000(7).

Construction activities will increase the risk of invasive weeds by allowing the transport of invasive weeds on construction equipment and along the natural gas pipeline or by allowing invasive weeds to re-vegetate disturbed areas. A Revegetation and Noxious Weed Control Plan has been developed to minimize potential expansion of invasive weeds resulting from construction disturbances; a copy is included in Exhibit P – Fish and Wildlife Habitat as Appendix P-2. The Umatilla County Weed Control Board has reviewed and approved this plan prior to the start of construction, in accordance with State Noxious Weed Laws (Oregon Revised Statutes [ORS] ORS 569.390and County Ordinance 2000-05).[1]

Application of specific herbicides may be needed to control noxious weeds. Improper application of herbicides or off-label use of herbicides (i.e., those not approved for a specific use or habitat) has the potential to impact soils by degrading soil quality or rendering soils unusable for farming practices, native vegetation, or wildlife. Perennial will evaluate the need to use

[1] Phone communication on November 13, 2013 with Dan Durfey, Umatilla County Weed Control Officer.

herbicides for weed control on a site-specific basis and will coordinate with individual landowners prior to application of specific herbicides. If herbicide applications are used to treat weed populations, a licensed contractor will be used to prescribe specific treatments and to apply chemicals. Proposed noxious weed control measures, including the use of herbicides, are included in the project Revegetation and Noxious Weed Control Plan (Exhibit P – Fish and Wildlife Habitat, Appendix P-2).

During operation, potential impacts could result from stormwater runoff, cooling tower plume impacts, sanitary sewage, and chemical or other hazardous materials. Soils at the Station will primarily be covered by impermeable surfaces, and stormwater runoff will be diverted to a lined stormwater detention basin. Stormwater collected in the basin will be allowed to infiltrate into the ground under the basin through gravity and natural drainage. Areas exposed to industrial activity will be routed through an oil/water separator before being routed to the basin. No stormwater will be discharged from the Station. Exhibit Z – Cooling Tower summarizes estimated plume impacts from the proposed cooling tower. The results of the analysis indicate that no potential adverse impacts warranting mitigation from cooling tower operation are expected; see Exhibit Z– Cooling Tower for information regarding salt deposition. Sanitary sewage will be piped to a permitted sanitary waste system at the Station. Chemical or other hazardous materials will be handled, stored, and monitored as outlined in Exhibit G – Materials Analysis and will comply with applicable laws and regulations.

Retirement of the Station will consist primarily of the dismantling and removal of equipment and structures. Potential adverse impacts to soils from the demolition work will be similar to those identified for plant construction. These include potential soil erosion and potential oil or hazardous materials spills. Methods of minimizing or mitigating these potential hazards are discussed in the next section.

I.6 MITIGATION MEASURES

OAR 345-021-0010(1)(i)(D) *A description of any measures the applicant proposes to avoid or mitigate adverse impact to soils.*

Response: During construction of the Project, the contractor, as part of the construction contract, will be required to take all measures necessary to ensure soil protection, including, but not limited to, erosion control with silt fences or similar methods. These measures are described in a Project-specific ESC Plan submitted to DEQ as part of complete applications for a 1200-C permit (Station site and substation site). Erosion and sediment control measures include the following (more detail can be found in Appendix I-2):

- Phase clearing and grading to the maximum extent practical to prevent exposed, inactive areas from becoming a source of erosion.

- Identify, mark, and protect (by fencing or other means) critical riparian areas and vegetation, including important trees and associated rooting zones and vegetation areas to be preserved. Identify vegetative buffer zones between the Site and sensitive areas, and other areas to be preserved.
- Preserve existing vegetation when practical and re-vegetate open areas. Re-vegetate open areas when practical before and after grading or construction.
- Erosion and sediment control measures, including perimeter sediment control, must be in place before vegetation is disturbed and must remain in place and be maintained, repaired, and promptly implemented following procedures established for the duration of construction, including protection for active storm drain inlets and catch basins and appropriate non-stormwater pollution controls
- Apply temporary and/or permanent soil stabilization measures immediately on all disturbed areas as grading progresses and for all roadways including gravel roadways.
- Establish material and waste storage areas and other non-stormwater controls.
- Use best management practices to prevent or minimize stormwater exposure to pollutants from spills, vehicle and equipment fueling, maintenance and storage, other cleaning and maintenance activities, and waste handling activities.
- Use water, a soil-binding agent, or other dust control techniques as needed to avoid wind-blown soil.
- The application rate of fertilizers used to reestablish vegetation must follow the manufacturer's recommendations to minimize nutrient releases to surface waters.
- Temporarily stabilize soils at the end of the shift before holidays and weekends, if needed.
- Construction activities must avoid or minimize excavation and creation of bare ground during wet weather.
- Sediment barrier: remove trapped sediment before it reaches specified heights and before barrier removal.
- Catch basins and sediment basins are to be cleaned before retention capacity has been reduced by 50 percent.
- Significant sediment that has left the construction site must be cleaned up within 24 hours. Vacuuming or dry sweeping and material pickup must be used to clean up released sediments.
- Intentional washing of sediment into storm sewers or drainage ways is prohibited.

- The entire site must be temporarily stabilized using vegetation or a heavy mulch layer, temporary seeding, or other method should all construction activities cease for 30 days or more.
- Provide temporary stabilization for any portion of the Site where construction activities cease for 14 days or more with a covering of blown straw and a tackifier, loose straw, or an adequate covering of compost mulch until work resumes on that portion of the Site.
- Provide permanent erosion control measures on all exposed areas. Do not remove temporary sediment control practices until permanent vegetation or other cover of exposed areas is established.

Submittal of Material Safety Data Sheets for all hazardous chemicals to be used or stored by the contractor at or around the job site will be required. These submittals will be sent to the Local Emergency Planning Committee and local fire department. To avoid potential adverse impacts to soil, operation of the Station will employ the mitigation methods as described below and also those found in Exhibit G – Materials Analysis. In general, operation of the Project will involve standard operating practices and techniques that are not expected to have adverse impacts on the soil.

A Spill Prevention Control and Countermeasure Plan will be prepared for use when the Project commences operations. This plan will provide for containment of oil spills and their prevention. Other types of releases to the soils are managed by a prepared Emergency Response Plan and, if necessary, a Risk Management Plan submitted to the U.S. Environmental Protection Agency. Submittal of Material Safety Data Sheets for all hazardous chemicals to be used or stored by Perennial will also be required. These submittals will also be sent to the Local Emergency Planning Committee and local fire department.

Facility Retirement:
During facility retirement, the demolition contractor will be required to adhere to the same stringent requirements set forth in the original plant construction, including erosion control, handling of hazardous materials, and containment and clean-up of spills.

Project Construction:
During construction, ESC measures will be geared toward containing soil within the Project Site footprint. Construction boundaries will be clearly marked, and construction equipment will only operate within the construction boundaries. ESC measures proposed for the NPDES 1200-C permit include, but are not limited to, sediment fences, straw wattles, bio-filter bags, permanent and temporary mulching, permanent and temporary seeding, sediment traps and/or basins, rock check dams or gravel filter berms, gravel construction entrance(s), and revegetation with native species as required.

Station site construction activities will include clearing and grubbing, grading and fill, utility excavation and installation, building construction, and paving or graveling travel lanes and parking areas. Site perimeter sediment control measures will include sediment fences, straw wattles, and bio-filter bags. Gravel construction entrance(s) and construction laydown areas will be constructed prior to clearing and grubbing and earthwork operations for the Station site. Soil stockpiles may require mulch and/or plastic sheeting to reduce erosion from rain and wind.

To minimize wind erosion and dust from exposed soil surfaces, application of water and/or mulch may also be required. Stormwater runoff will be directed away from construction areas and into sediment retention/detention basins to minimize offsite runoff. Prolonged periods of wet weather may necessitate limiting the size or extent of disturbed areas, confining vehicles or operations to specified areas, or using temporary gravel or hay mulches. Revegetation of heavily compacted soils may require tilling, disking, and/or rototilling prior to revegetating. All temporarily disturbed areas will be revegetated with seed. The access road and construction laydown areas may require the addition of graded aggregate to stabilize existing roads for construction vehicles and equipment mixes appropriate for the area and mulch applied to retain moisture and prevent erosion.

The overall strategy for construction of the transmission inter-ties, substation, and natural gas pipeline is to minimize the area of disturbance. Transmission tower construction involves access to the sites via existing roads where possible and clearing and grubbing limited to tower foundations or drilling locations for poles. Construction of the natural gas pipeline and the underground electrical line will be contained within a 50-foot-wide area along the length of structures. In addition to silt fences, straw wattles and bio-filter bags may also be used. Since these are biodegradable, they can be left in place after final stabilization is achieved. The natural gas and underground electrical line right-of-way after construction will be graded to the original contours and replanted to landowner specifications.

A Revegetation and Noxious Weed Control Plan has been developed to minimize potential expansion of invasive weeds resulting from construction disturbances; a copy is included in Exhibit P – Fish and Wildlife Habitat as Appendix P-2. The Umatilla County Weed Control Board has reviewed and approved this plan prior to the start of construction, in accordance with State Noxious Weed Laws (ORS 570.535 and County Ordinance 2000-05).

Project Operation:

During operation of the Station, all runoff from impermeable and permeable surfaces will be directed into a detention basin similar to the system used at the HGP. Stormwater from industrial areas of the Station will be routed to an oil/water separator prior to the stormwater being routed to the basin. Since the actual footprint of the transmission towers and the step-up substation not associated with the transformer will be very small, stormwater runoff will be

allowed to run off naturally. Stormwater associated with the transformer will collect in the transformer oil spill collection basin and be allowed to evaporate.

I.7 MONITORING PROGRAM

OAR 345-021-0010(1)(i)(E) *The applicant's proposed monitoring program, if any, for adverse impact to soils during construction and operation.*

Response: Perennial's construction contractor will perform monitoring as required by applicable permits and the ESC Plan to ensure that no significant potential adverse impacts to soils occur. During construction, ESC measures will require the area to be inspected weekly at the active construction site, and every two weeks on inactive sites. Both active and inactive sites will be inspected at least daily during periods when 0.5 inches or more rain has fallen in a 24-hour period.

ESC measures will be maintained by removing trapped sediment when storage capacity has been reduced by 50 percent and placed in an upland area. This soil material, if any, will be used in final landscaping of the Station site. The ESC Plan will include measures to ensure that compliance will be effective, implemented, and monitored.

After construction is complete, the area surrounding the Station will be landscaped, and other disturbed areas will be returned to their original contours and revegetated. Disturbed areas will be monitored quarterly in the first year to determine the success of the revegetation efforts. The details of the monitoring procedures and definition of success are addressed in the Revegetation and Noxious Weed Control Plan (Exhibit P – Fish and Wildlife Habitat, Appendix P-2).

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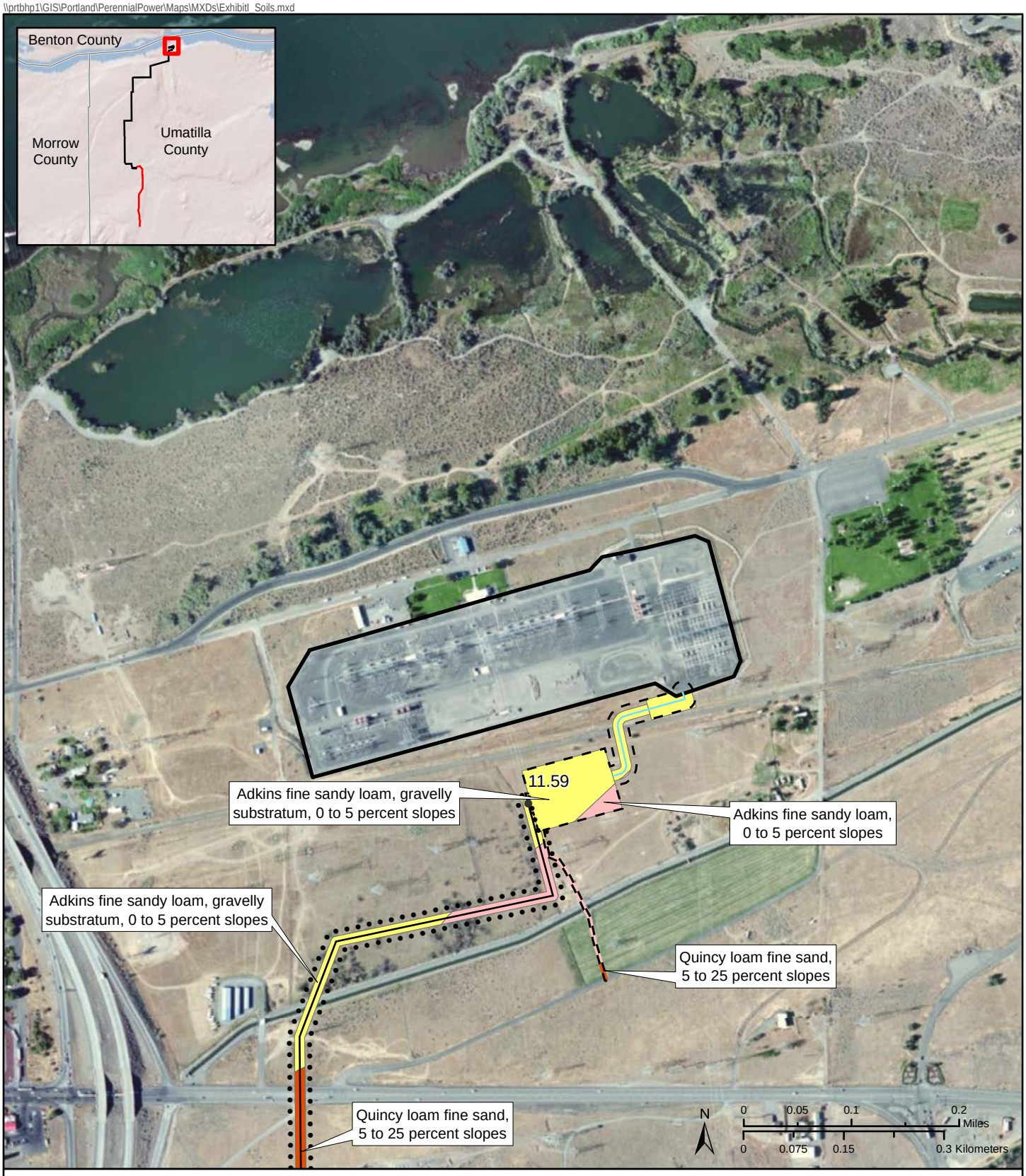

Mileposts
Natural Gas Pipeline
Existing Transmission Line
Underground Transmission Line
BPA McNary Substation
Analysis Area for this Exhibit
Existing Transmission Line Right-of-Way Boundary (not part of analysis area for this exhibit)

SSURGO Soils
Adkins fine sandy loam, 0 to 5 percent slopes
Adkins fine sandy loam, gravelly substratum, 0 to 5 percent slopes
Adkins fine sandy loam, gravelly substratum, 5 to 25 percent slopes
Burbank loamy fine sand, 0 to 5 percent slopes
Quincy fine sand, 0 to 5 percent slopes
Quincy loamy fine sand, 0 to 5 percent slopes
Quincy loamy fine sand, 5 to 25 percent slopes
Quincy loamy fine sand, gravelly substratum, 0 to 5 percent slopes
Xerofluvents, 0 to 3 percent slopes
Xerollic Durorthids, 30 to 60 percent slopes
Pits, gravel
Water

Source: SSURGO Soils 2012

Figure I-1a

SSURGO Soils

Perennial Wind Chaser Station

July 2014

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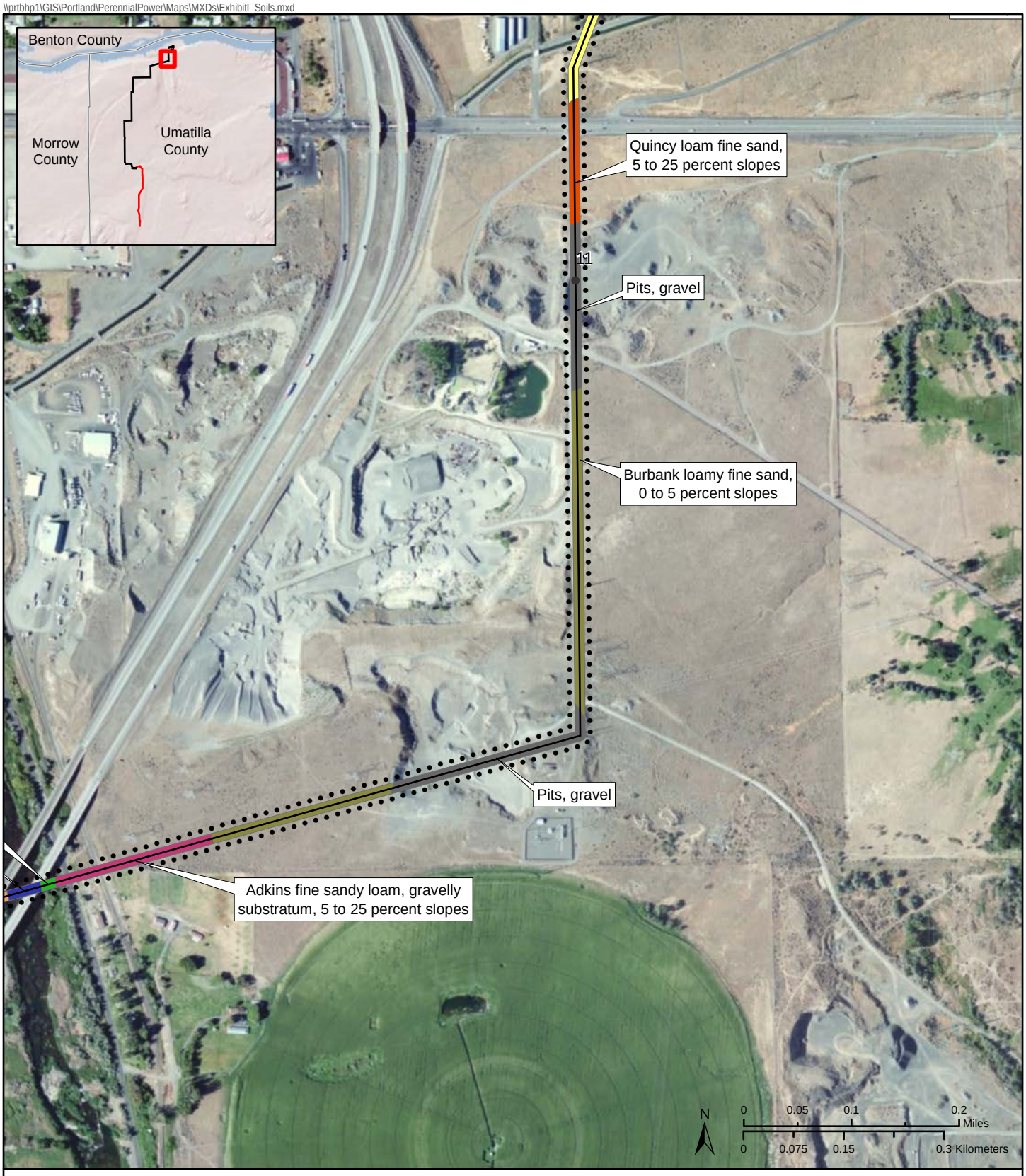

Mileposts

Natural Gas Pipeline

Existing Transmission Line

Analysis Area for this Exhibit

Existing Transmission Line Right-of-Way Boundary (not part of analysis area for this exhibit)

SSURGO Soils

Adkins fine sandy loam, 0 to 5 percent slopes

Adkins fine sandy loam, gravelly substratum, 0 to 5 percent slopes

Adkins fine sandy loam, gravelly substratum, 5 to 25 percent slopes

Burbank loamy fine sand, 0 to 5 percent slopes

Quincy fine sand, 0 to 5 percent slopes

Quincy loamy fine sand, 0 to 5 percent slopes

Quincy loamy fine sand, 5 to 25 percent slopes

Quincy loamy fine sand, gravelly substratum, 0 to 5 percent slopes

Xerofluvents, 0 to 3 percent slopes

Xerollic Durorthids, 30 to 60 percent slopes

Pits, gravel

Water

Source: SSURGO Soils 2012

Figure I-1b

SSURGO Soils

Perennial Wind Chaser Station

July 2014

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Mileposts
Natural Gas Pipeline
Existing Transmission Line
Analysis Area for this Exhibit
Existing Transmission Line Right-of-Way Boundary (not part of analysis area for this exhibit)

SSURGO Soils

Adkins fine sandy loam, 0 to 5 percent slopes
Adkins fine sandy loam, gravelly substratum, 0 to 5 percent slopes
Adkins fine sandy loam, gravelly substratum, 5 to 25 percent slopes
Burbank loamy fine sand, 0 to 5 percent slopes
Quincy fine sand, 0 to 5 percent slopes
Quincy loamy fine sand, 0 to 5 percent slopes
Quincy loamy fine sand, 5 to 25 percent slopes
Quincy loamy fine sand, gravelly substratum, 0 to 5 percent slopes
Xerofluvents, 0 to 3 percent slopes
Xerollic Durorthids, 30 to 60 percent slopes
Pits, gravel
Water

Source: SSURGO Soils 2012

Figure I-1c

SSURGO Soils

Perennial Wind Chaser Station

July 2014

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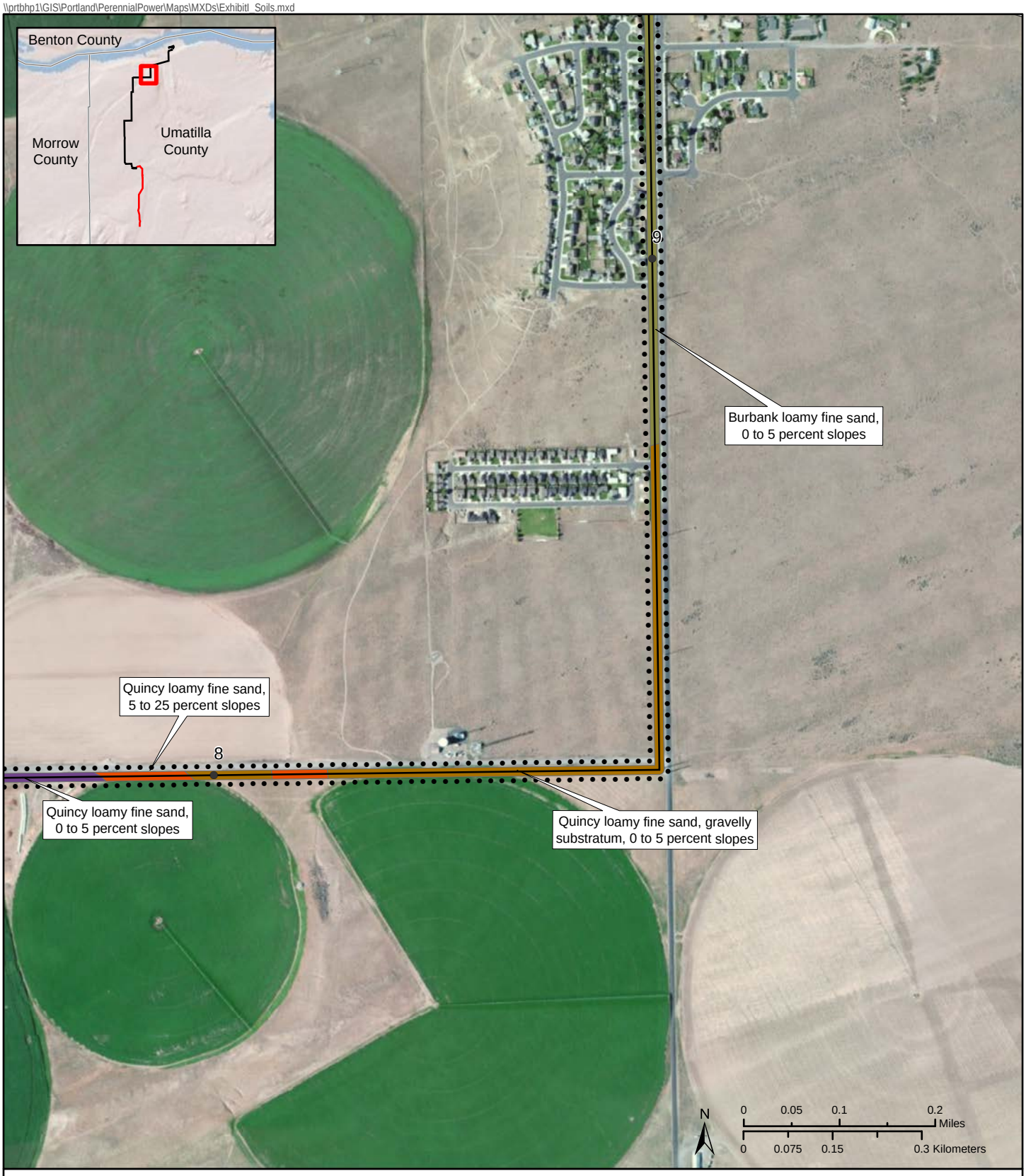

Mileposts
Natural Gas Pipeline
Existing Transmission Line
Analysis Area for this Exhibit
Existing Transmission Line Right-of-Way Boundary (not part of analysis area for this exhibit)

SSURGO Soils

Adkins fine sandy loam, 0 to 5 percent slopes
Adkins fine sandy loam, gravelly substratum, 0 to 5 percent slopes
Adkins fine sandy loam, gravelly substratum, 5 to 25 percent slopes
Burbank loamy fine sand, 0 to 5 percent slopes
Quincy fine sand, 0 to 5 percent slopes
Quincy loamy fine sand, 0 to 5 percent slopes
Quincy loamy fine sand, 5 to 25 percent slopes
Quincy loamy fine sand, gravelly substratum, 0 to 5 percent slopes
Xerofluvents, 0 to 3 percent slopes
Xerollic Durorthids, 30 to 60 percent slopes
Pits, gravel
Water

Source: SSURGO Soils 2012

Figure I-1d

SSURGO Soils

Perennial Wind Chaser Station

July 2014

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Mileposts
Natural Gas Pipeline
Existing Transmission Line
Analysis Area for this Exhibit
Existing Transmission Line Right-of-Way Boundary (not part of analysis area for this exhibit)

SSURGO Soils

Adkins fine sandy loam, 0 to 5 percent slopes
Adkins fine sandy loam, gravelly substratum, 0 to 5 percent slopes
Adkins fine sandy loam, gravelly substratum, 5 to 25 percent slopes
Burbank loamy fine sand, 0 to 5 percent slopes
Quincy fine sand, 0 to 5 percent slopes
Quincy loamy fine sand, 0 to 5 percent slopes
Quincy loamy fine sand, 5 to 25 percent slopes
Quincy loamy fine sand, gravelly substratum, 0 to 5 percent slopes
Xerofluvents, 0 to 3 percent slopes
Xerollic Durorthids, 30 to 60 percent slopes
Pits, gravel
Water

Source: SSURGO Soils 2012

Figure I-1e

SSURGO Soils

Perennial Wind Chaser Station

July 2014

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- Mileposts
- Natural Gas Pipeline
- Existing Transmission Line
- Analysis Area for this Exhibit
- Existing Transmission Line Right-of-Way Boundary (not part of analysis area for this exhibit)

SSURGO Soils

- Adkins fine sandy loam, 0 to 5 percent slopes
- Adkins fine sandy loam, gravelly substratum, 0 to 5 percent slopes
- Adkins fine sandy loam, gravelly substratum, 5 to 25 percent slopes
- Burbank loamy fine sand, 0 to 5 percent slopes
- Quincy fine sand, 0 to 5 percent slopes
- Quincy loamy fine sand, 0 to 5 percent slopes
- Quincy loamy fine sand, 5 to 25 percent slopes
- Quincy loamy fine sand, gravelly substratum, 0 to 5 percent slopes
- Xerofluvents, 0 to 3 percent slopes
- Xerollic Durorthids, 30 to 60 percent slopes
- Pits, gravel
- Water

Source: SSURGO Soils 2012

Figure I-1f

SSURGO Soils

Perennial Wind Chaser Station

July 2014

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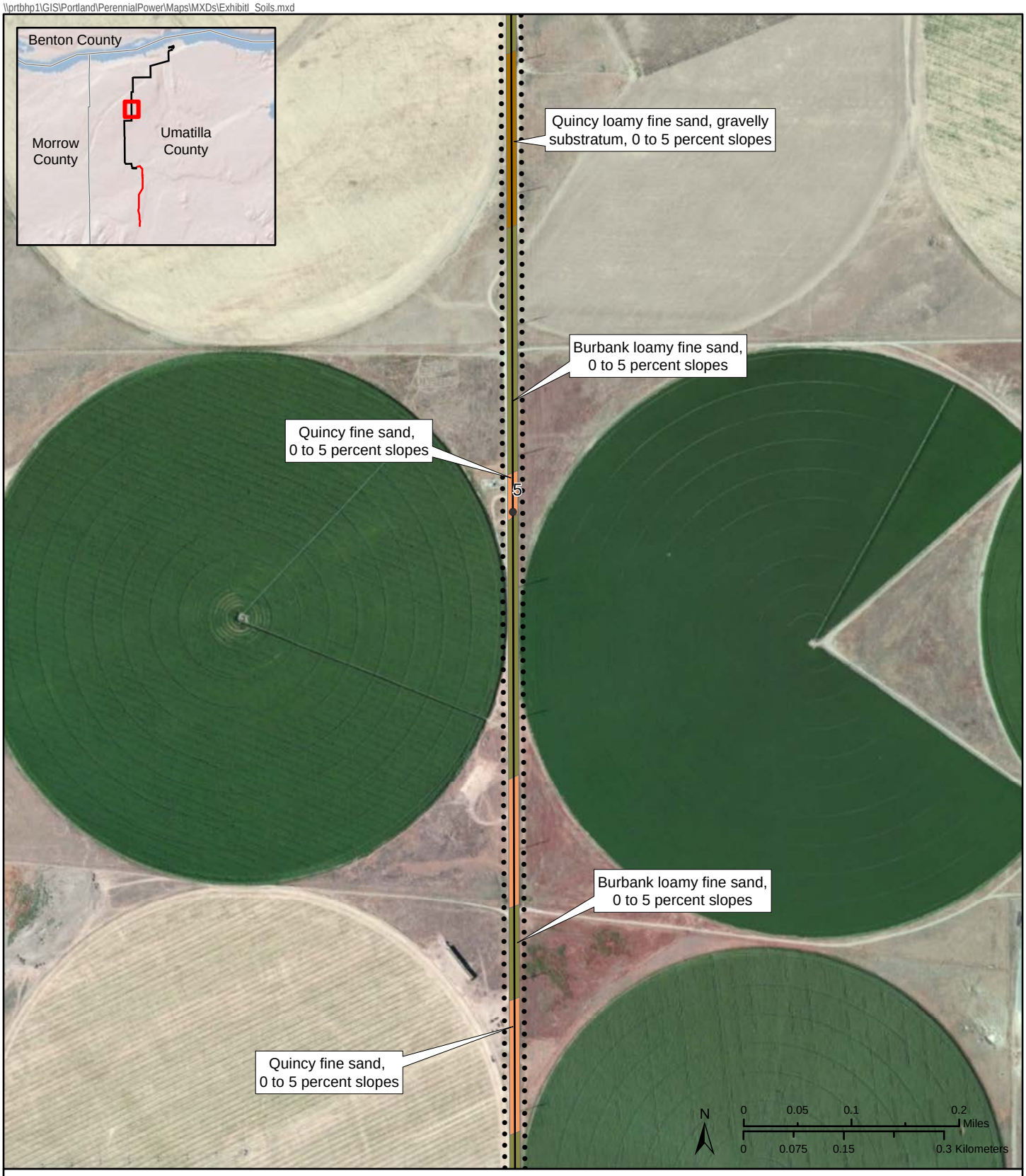

Mileposts
Natural Gas Pipeline
Existing Transmission Line
Analysis Area for this Exhibit
Existing Transmission Line Right-of-Way Boundary (not part of analysis area for this exhibit)

SSURGO Soils

Adkins fine sandy loam, 0 to 5 percent slopes
Adkins fine sandy loam, gravelly substratum, 0 to 5 percent slopes
Adkins fine sandy loam, gravelly substratum, 5 to 25 percent slopes
Burbank loamy fine sand, 0 to 5 percent slopes
Quincy fine sand, 0 to 5 percent slopes
Quincy loamy fine sand, 0 to 5 percent slopes
Quincy loamy fine sand, 5 to 25 percent slopes
Quincy loamy fine sand, gravelly substratum, 0 to 5 percent slopes
Xerofluvents, 0 to 3 percent slopes
Xerollic Durorthids, 30 to 60 percent slopes
Pits, gravel
Water

Source: SSURGO Soils 2012

Figure I-1g

SSURGO Soils

Perennial Wind Chaser Station

July 2014

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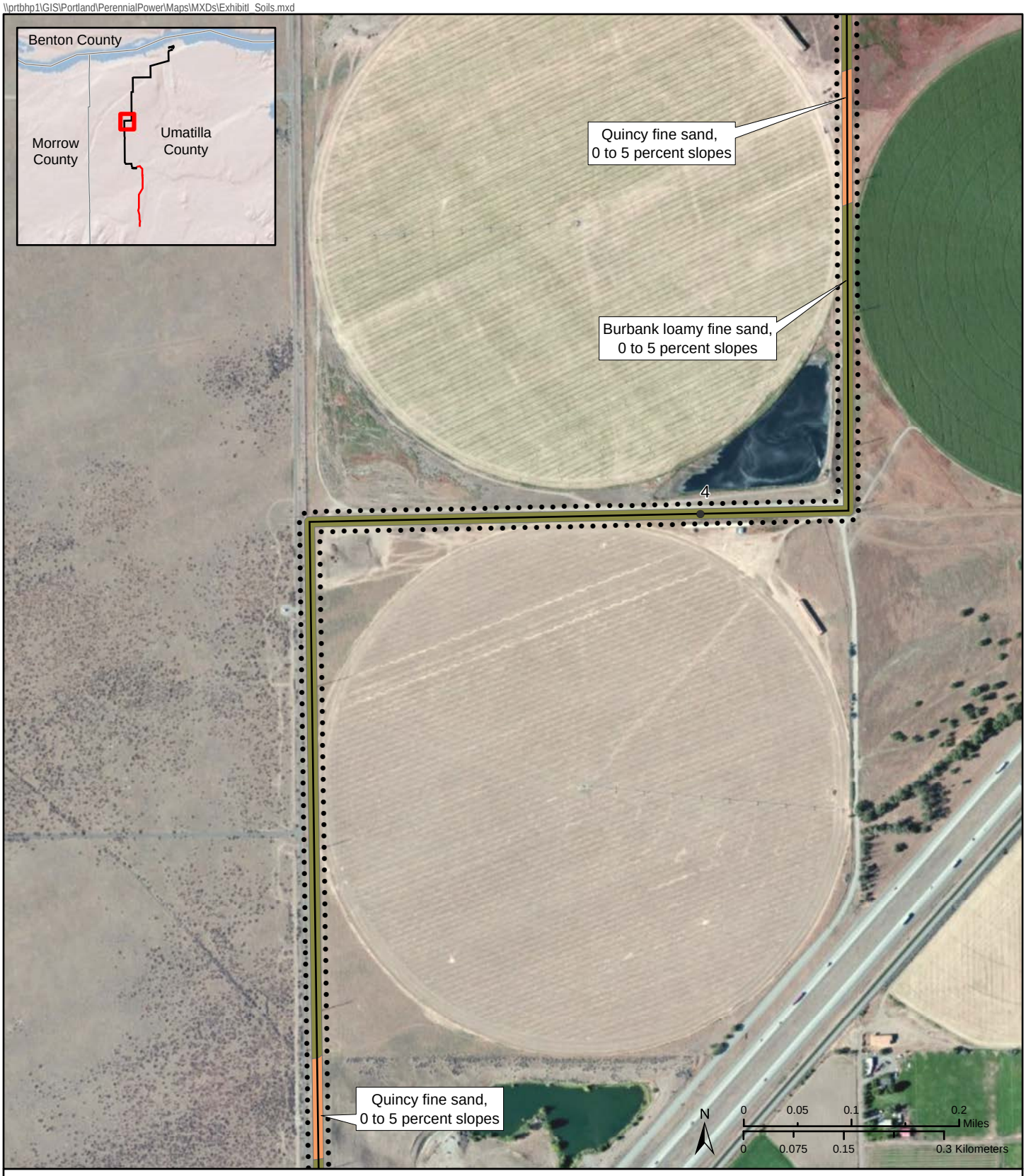

Mileposts
Natural Gas Pipeline
Existing Transmission Line
Analysis Area for this Exhibit
Existing Transmission Line Right-of-Way Boundary (not part of analysis area for this exhibit)

SSURGO Soils

Adkins fine sandy loam, 0 to 5 percent slopes
Adkins fine sandy loam, gravelly substratum, 0 to 5 percent slopes
Adkins fine sandy loam, gravelly substratum, 5 to 25 percent slopes
Burbank loamy fine sand, 0 to 5 percent slopes
Quincy fine sand, 0 to 5 percent slopes
Quincy loamy fine sand, 0 to 5 percent slopes
Quincy loamy fine sand, 5 to 25 percent slopes
Quincy loamy fine sand, gravelly substratum, 0 to 5 percent slopes
Xerofluvents, 0 to 3 percent slopes
Xerollic Durorthids, 30 to 60 percent slopes
Pits, gravel
Water

Source: SSURGO Soils 2012

Figure I-1h

SSURGO Soils

Perennial Wind Chaser Station

July 2014

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Mileposts

Natural Gas Pipeline

Existing Transmission Line

Analysis Area for this Exhibit

Existing Transmission Line Right-of-Way Boundary (not part of analysis area for this exhibit)

SSURGO Soils

Adkins fine sandy loam, 0 to 5 percent slopes

Adkins fine sandy loam, gravelly substratum, 0 to 5 percent slopes

Adkins fine sandy loam, gravelly substratum, 5 to 25 percent slopes

Burbank loamy fine sand, 0 to 5 percent slopes

Quincy fine sand, 0 to 5 percent slopes

Quincy loamy fine sand, 0 to 5 percent slopes

Quincy loamy fine sand, 5 to 25 percent slopes

Quincy loamy fine sand, gravelly substratum, 0 to 5 percent slopes

Xerofluvents, 0 to 3 percent slopes

Xerollic Durorthids, 30 to 60 percent slopes

Pits, gravel

Water

Source: SSURGO Soils 2012

Figure I-1i

SSURGO Soils

Perennial Wind Chaser Station

July 2014

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Mileposts
Natural Gas Pipeline
Existing Transmission Line
Analysis Area for this Exhibit
Existing Transmission Line Right-of-Way Boundary (not part of analysis area for this exhibit)

SSURGO Soils

Adkins fine sandy loam, 0 to 5 percent slopes
Adkins fine sandy loam, gravelly substratum, 0 to 5 percent slopes
Adkins fine sandy loam, gravelly substratum, 5 to 25 percent slopes
Burbank loamy fine sand, 0 to 5 percent slopes
Quincy fine sand, 0 to 5 percent slopes
Quincy loamy fine sand, 0 to 5 percent slopes
Quincy loamy fine sand, 5 to 25 percent slopes
Quincy loamy fine sand, gravelly substratum, 0 to 5 percent slopes
Xerofluvents, 0 to 3 percent slopes
Xerollic Durorthids, 30 to 60 percent slopes
Pits, gravel
Water

Source: SSURGO Soils 2012

Figure I-1j

SSURGO Soils

Perennial Wind Chaser Station

July 2014

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Mileposts
Natural Gas Pipeline
Existing Transmission Line
Analysis Area for this Exhibit
Existing Transmission Line Right-of-Way Boundary (not part of analysis area for this exhibit)

SSURGO Soils

Adkins fine sandy loam, 0 to 5 percent slopes
Adkins fine sandy loam, gravelly substratum, 0 to 5 percent slopes
Adkins fine sandy loam, gravelly substratum, 5 to 25 percent slopes
Burbank loamy fine sand, 0 to 5 percent slopes
Quincy fine sand, 0 to 5 percent slopes
Quincy loamy fine sand, 0 to 5 percent slopes
Quincy loamy fine sand, 5 to 25 percent slopes
Quincy loamy fine sand, gravelly substratum, 0 to 5 percent slopes
Xerofluvents, 0 to 3 percent slopes
Xerollic Durorthids, 30 to 60 percent slopes
Pits, gravel
Water

Source: SSURGO Soils 2012

Figure I-1k

SSURGO Soils

Perennial Wind Chaser Station

July 2014

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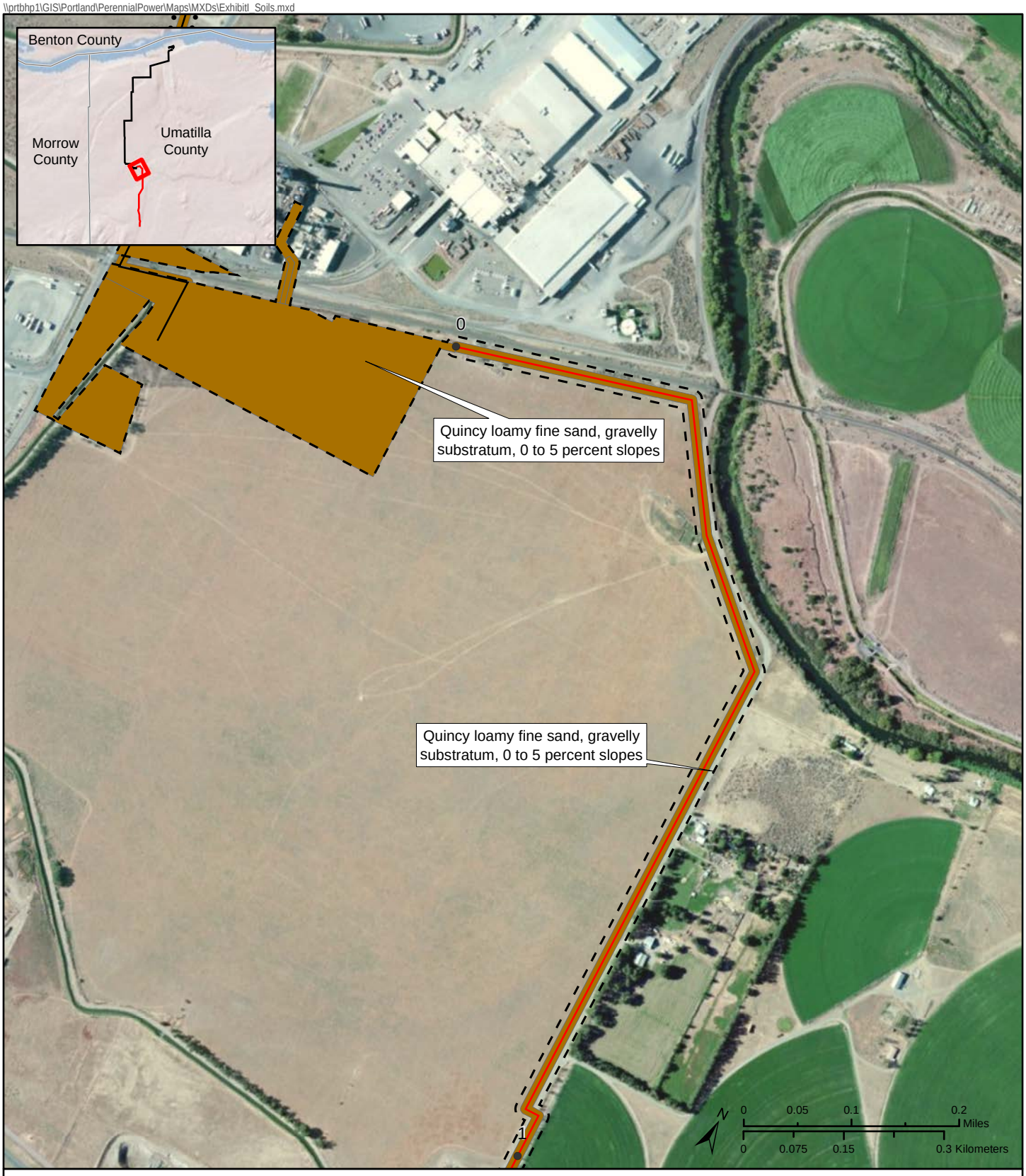

- Mileposts
- Natural Gas Pipeline
- Existing Transmission Line
- Analysis Area for this Exhibit
- Existing Transmission Line Right-of-Way Boundary (not part of analysis area for this exhibit)

SSURGO Soils

- Adkins fine sandy loam, 0 to 5 percent slopes
- Adkins fine sandy loam, gravelly substratum, 0 to 5 percent slopes
- Adkins fine sandy loam, gravelly substratum, 5 to 25 percent slopes
- Burbank loamy fine sand, 0 to 5 percent slopes
- Quincy fine sand, 0 to 5 percent slopes
- Quincy loamy fine sand, 0 to 5 percent slopes
- Quincy loamy fine sand, 5 to 25 percent slopes
- Quincy loamy fine sand, gravelly substratum, 0 to 5 percent slopes
- Xerofluvents, 0 to 3 percent slopes
- Xerollic Durorthids, 30 to 60 percent slopes
- Pits, gravel
- Water

Source: SSURGO Soils 2012

Figure I-1l

SSURGO Soils

Perennial Wind Chaser Station

July 2014

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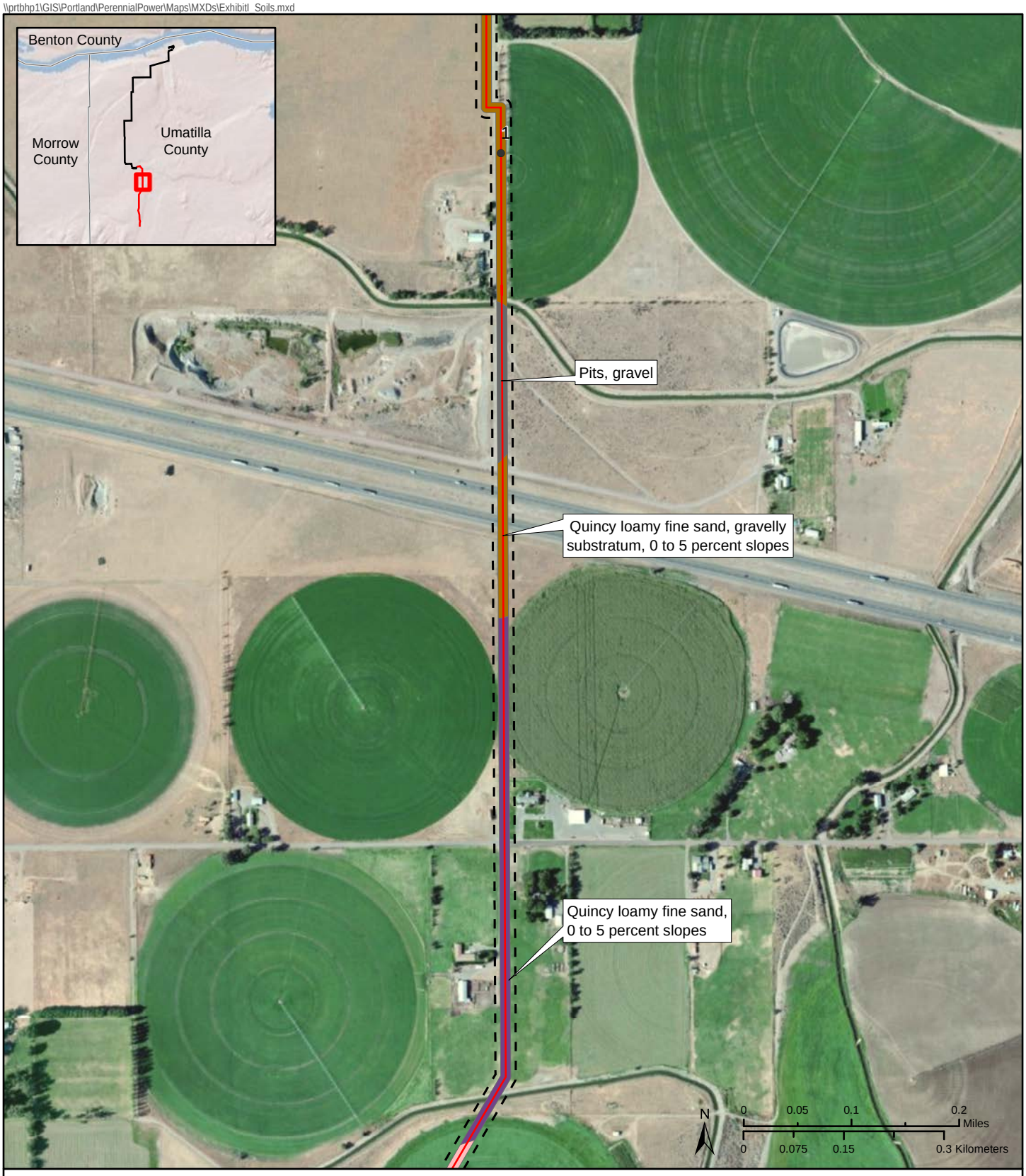

- Mileposts
- Natural Gas Pipeline
- Analysis Area for this Exhibit

SSURGO Soils

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- Adkins fine sandy loam, gravelly substratum, 0 to 5 percent slopes
- Adkins fine sandy loam, gravelly substratum, 5 to 25 percent slopes
- Burbank loamy fine sand, 0 to 5 percent slopes
- Quincy fine sand, 0 to 5 percent slopes
- Quincy loamy fine sand, 0 to 5 percent slopes
- Quincy loamy fine sand, 5 to 25 percent slopes
- Quincy loamy fine sand, gravelly substratum, 0 to 5 percent slopes
- Xerofluvents, 0 to 3 percent slopes
- Xerollic Durorthids, 30 to 60 percent slopes
- Pits, gravel
- Water

Source: SSURGO Soils 2012

Figure I-1m

SSURGO Soils

Perennial Wind Chaser Station

July 2014

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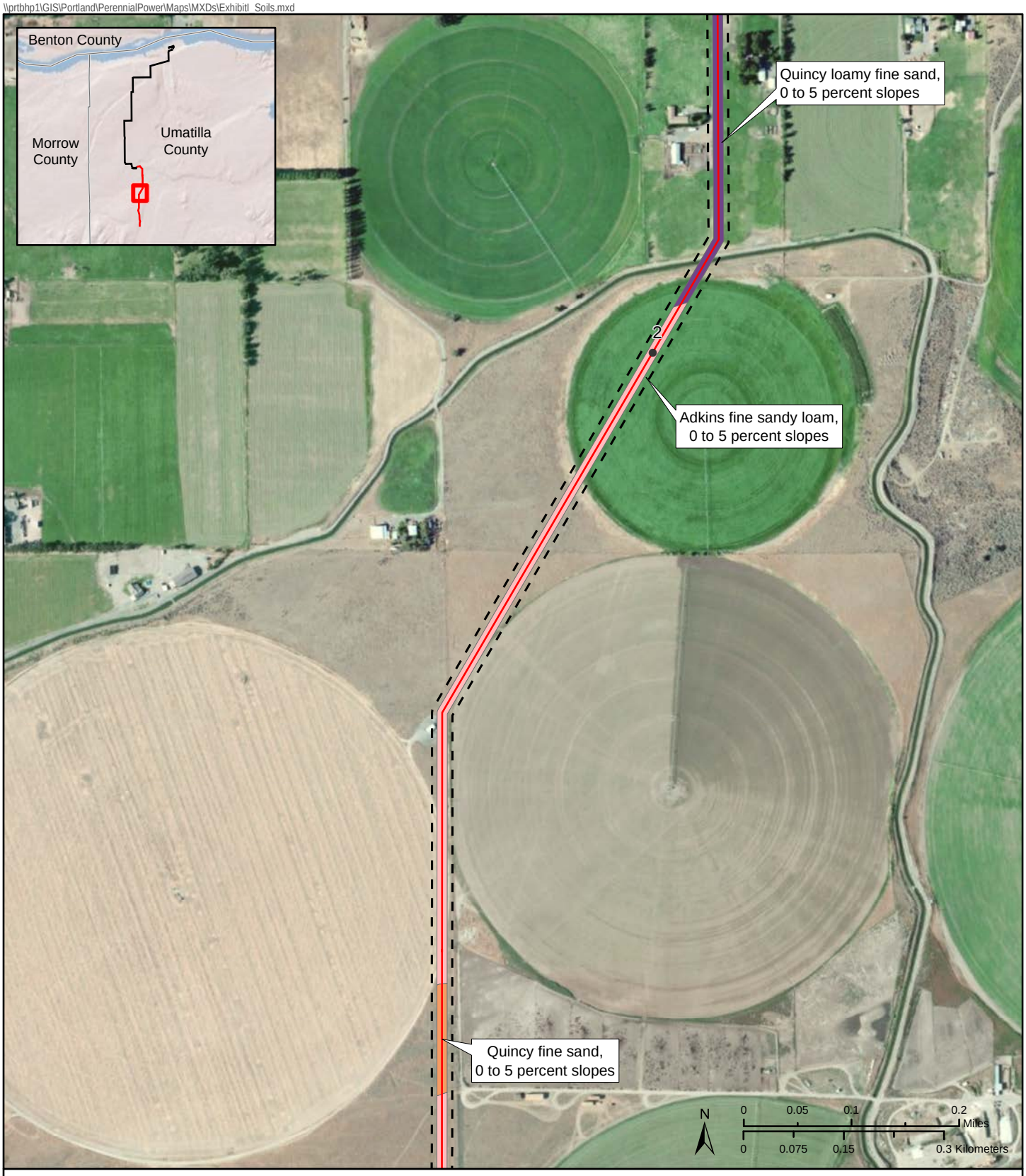

- Mileposts
- Natural Gas Pipeline
- Analysis Area for this Exhibit

SSURGO Soils

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- Adkins fine sandy loam, gravelly substratum, 0 to 5 percent slopes
- Adkins fine sandy loam, gravelly substratum, 5 to 25 percent slopes
- Burbank loamy fine sand, 0 to 5 percent slopes
- Quincy fine sand, 0 to 5 percent slopes
- Quincy loamy fine sand, 0 to 5 percent slopes
- Quincy loamy fine sand, 5 to 25 percent slopes
- Quincy loamy fine sand, gravelly substratum, 0 to 5 percent slopes
- Xerofluvents, 0 to 3 percent slopes
- Xerollic Durorthids, 30 to 60 percent slopes
- Pits, gravel
- Water

Source: SSURGO Soils 2012

Figure I-1n

SSURGO Soils

Perennial Wind Chaser Station

July 2014

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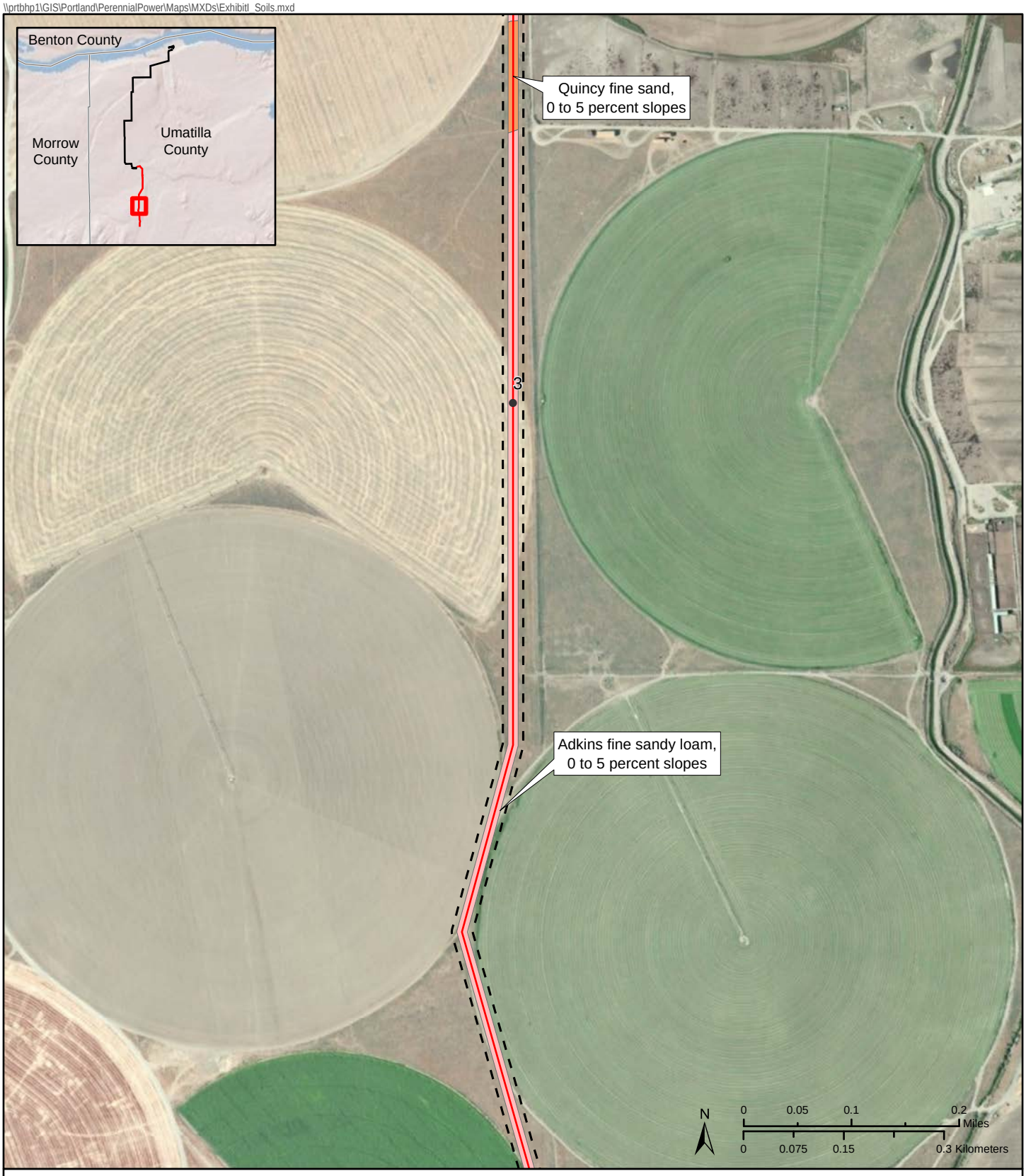

- Mileposts
- Natural Gas Pipeline
- Analysis Area for this Exhibit

SSURGO Soils

- Adkins fine sandy loam, 0 to 5 percent slopes
- Adkins fine sandy loam, gravelly substratum, 0 to 5 percent slopes
- Adkins fine sandy loam, gravelly substratum, 5 to 25 percent slopes
- Burbank loamy fine sand, 0 to 5 percent slopes
- Quincy fine sand, 0 to 5 percent slopes
- Quincy loamy fine sand, 0 to 5 percent slopes
- Quincy loamy fine sand, 5 to 25 percent slopes
- Quincy loamy fine sand, gravelly substratum, 0 to 5 percent slopes
- Xerofluvents, 0 to 3 percent slopes
- Xerollic Durorthids, 30 to 60 percent slopes
- Pits, gravel
- Water

Source: SSURGO Soils 2012

Figure I-1o

SSURGO Soils

Perennial Wind Chaser Station

July 2014

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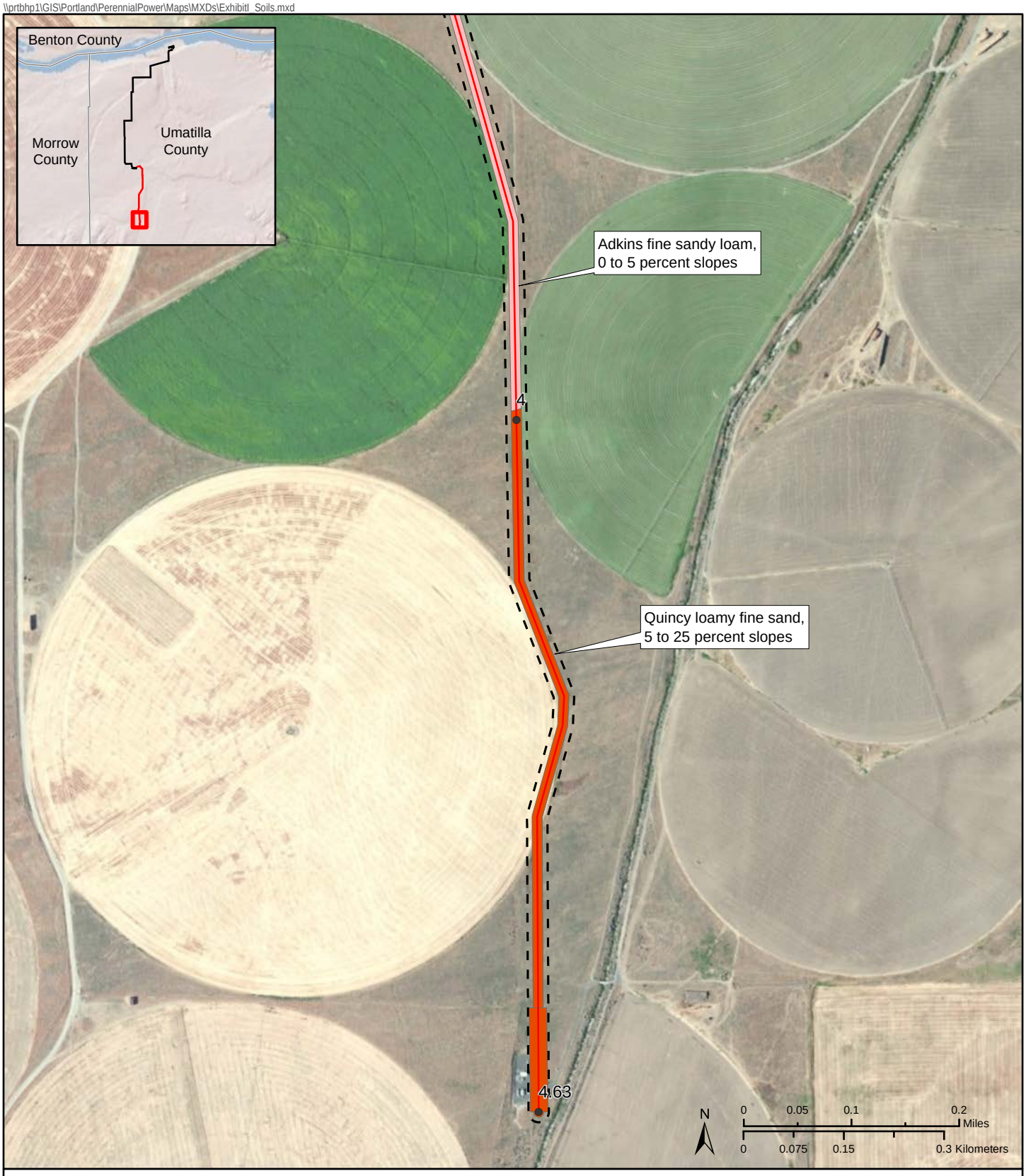

Mileposts
Natural Gas Pipeline
Analysis Area for this Exhibit

SSURGO Soils

- Adkins fine sandy loam, 0 to 5 percent slopes
- Adkins fine sandy loam, gravelly substratum, 0 to 5 percent slopes
- Adkins fine sandy loam, gravelly substratum, 5 to 25 percent slopes
- Burbank loamy fine sand, 0 to 5 percent slopes
- Quincy fine sand, 0 to 5 percent slopes
- Quincy loamy fine sand, 0 to 5 percent slopes
- Quincy loamy fine sand, 5 to 25 percent slopes
- Quincy loamy fine sand, gravelly substratum, 0 to 5 percent slopes
- Xerofluvents, 0 to 3 percent slopes
- Xerollic Durorthids, 30 to 60 percent slopes
- Pits, gravel
- Water

Source: SSURGO Soils 2012

Figure I-1p

SSURGO Soils

Perennial Wind Chaser Station

July 2014

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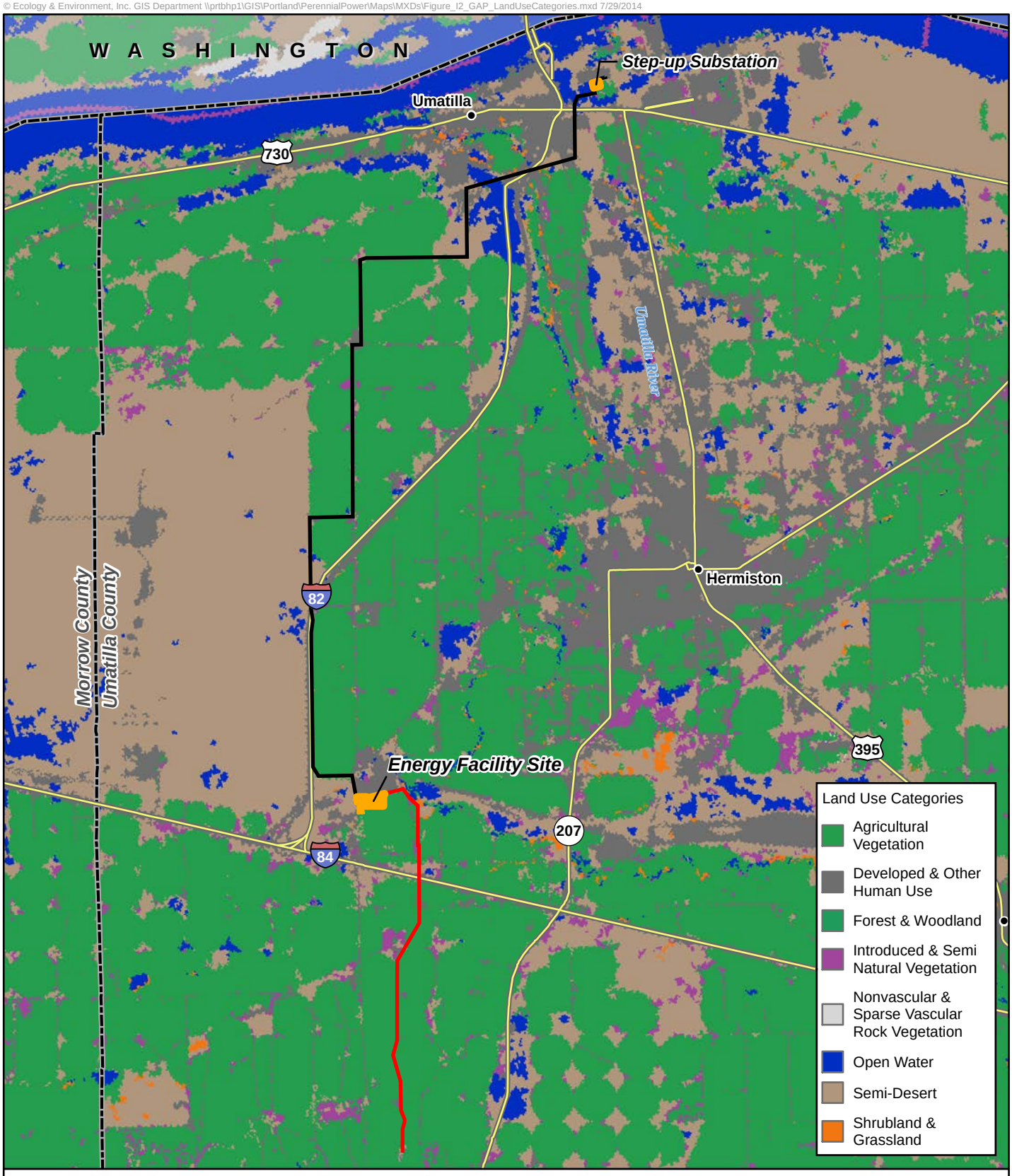

Energy Facility Site & Step-up Substation
Natural Gas Pipeline
Existing Transmission Line
City
Major Roads
County Boundary

N
0 0.5 1 2 Miles
0 0.5 1 2 Kilometers

Sources: ESRI 2010, USGS GAP 2011

Figure I-2

GAP Land Use Categories

Perennial Wind Chaser Station

July 2014

APPENDIX I-1

USDA – Natural Resources Conservation Service
Land Capability Classification System

Land Capability Classification

(a) Definition

Land capability classification is a system of grouping soils primarily on the basis of their capability to produce common cultivated crops and pasture plants without deteriorating over a long period of time.

(b) Classes

Land capability classification is subdivided into capability class and capability subclass nationally. Some states also use a capability unit.

(c) Significance

Land capability classification has value as a grouping of soils. National Resource Inventory information, Farmland Protection Policy Act, and many field office technical guides have been assembled according to these classes. The system has been adopted in many textbooks and has wide public acceptance. Some state legislation has used the system for various applications. Users should reference Agriculture Handbook No. 210 for a listing of assumptions and broad wording used to define the capability class and capability subclass.

(d) Application

All map unit components, including miscellaneous areas, are assigned a capability class and subclass. Agriculture Handbook No. 210 provides general guidance, and individual state guides provide assignments of the class and subclass applicable to the state. Land capability units can be used to differentiate subclasses at the discretion of the state. Capability class and subclass are assigned to map unit components in the national soil information system.

(e) Categories

(1) Capability Class

(i) Definition. Capability class is the broadest category in the land capability classification system. Class codes I (1), II (2), III (3), IV (4), V (5), VI (6), VII (7), and VIII (8) are used to represent both irrigated and nonirrigated land capability classes.

(ii) Classes and definitions.

Class I (1) soils have slight limitations that restrict their use.

Class II (2) soils have moderate limitations that reduce the choice of plants or require moderate conservation practices.

Class III (3) soils have severe limitations that reduce the choice of plants or require special conservation practices, or both.

Class IV (4) soils have very severe limitations that restrict the choice of plants or require very careful management, or both.

Class V (5) soils have little or no hazard of erosion but have other limitations, impractical to remove, that limit their use mainly to pasture, range, forestland, or wildlife food and cover.

Class VI (6) soils have severe limitations that make them generally unsuited to cultivation and that limit their use mainly to pasture, range, forestland, or wildlife food and cover.

Class VII (7) soils have very severe limitations that make them unsuited to cultivation and that restrict their use mainly to grazing, forestland, or wildlife.

Class VIII (8) soils and miscellaneous areas have limitations that preclude their use for commercial plant production and limit their use to recreation, wildlife, or water supply or for esthetic purposes.

(2) Capability Subclass

(i) Definition. Capability subclass is the second category in the land capability classification system. Class codes e, w, s, and c are used for land capability subclasses.

(ii) Subclasses and definitions.
Subclass e is made up of soils for which the susceptibility to erosion is the dominant problem or hazard affecting their use. Erosion susceptibility and past erosion damage are the major soil factors that affect soils in this subclass.

Subclass w is made up of soils for which excess water is the dominant hazard or limitation affecting their use. Poor soil drainage, wetness, a high water table, and overflow are the factors that affect soils in this subclass**.**

Subclass s is made up of soils that have soil limitations within the rooting zone, such as shallowness of the rooting zone, stones, low moisture-holding capacity, low fertility that is difficult to correct, and salinity or sodium content.

Subclass c is made up of soils for which the climate (the temperature or lack of moisture) is the major hazard or limitation affecting their use.

(iii) Application. The subclass represents the dominant limitation that determines the capability class. Within a capability class, where the kinds of limitations are essentially equal, the subclasses have the following priority: e, w, s, and c. Subclasses are not assigned to soils in capability class I (1) and subclass "e" is not used in class V (5).

(3) Capability unit

(i) Definition. Capability unit is the first category listed in the land capability classification system. It is a grouping of one or more individual soil mapping units having similar potentials and continuing limitations or hazards.

(ii) Application. Use of this category and definition of codes are state options. Valid entries in NASIS are integers ranging from 1 to 99.

APPENDIX I-2

NPDES 1200-C Permit Application and DEQ Acknowledgement Letter

ecology and environment, inc.
Global Environmental Specialists
333 SW Fifth Avenue, Suite 600
Portland, Oregon 97204
Tel: (503) 248-5600, Fax: (503) 248-5577

January 6, 2014

Ms. Krista Ratliff
Oregon DEQ – Eastern Region
700 SE Emigrant Avenue, Suite 330
Pendleton, Oregon 97801

Re: Application for National Pollutant Discharge Elimination System 1200-C Permit
Perennial Wind Chaser Station

Dear Ms. Ratliff:

Enclosed please find the application for a new NPDES 1200-C General Permit submitted by Ecology and Environment, Inc. on behalf of our client Perennial-WindChaser LLC, for the development of the proposed Perennial Wind Chaser Station energy production facility located in Umatilla County. Enclosed here within is the completed and signed NPDES 1200-C permit application form, the project Erosion and Sediment Control Plan (prepared by Burns and McDonnell, Inc.), the Perennial Wind Chaser Station Revegetation and Noxious Weed Control Plan, and a check to Oregon DEQ in amount of $1,676 for the permit application fee.

The Perennial Wind Chaser Station is a proposed natural gas fuel simple-cycle generating plant producing up to 415 megawatts of electrical power. As such, it is subject to Energy Facility Siting Council (EFSC) jurisdiction and must obtain a site certificate from EFSC for an "energy facility" as defined in ORS 469.300(11)(a)(A) and its "related or supporting facilities" as defined in ORS 469.300(24). However, the federally delegated NPDES 1200-C Permit is outside EFSC jurisdiction. The applicant is obtaining a land use determination from EFSC under ORS 469.504(B). Pursuant to ORS 469.378, therefore, DEQ must satisfy the requirement of ORS 197.180 for a land use compatibility statement by conditioning the approval of the NPDES permit on a determination by EFSC that the energy facility satisfies the applicable requirements of ORS 197.180.

The Erosion and Sediment Control Plan (ESCP) drawings associated with this permit application have been prepared based on the level of detail currently available. Perennial-WindChaser LLC recognizes that updated ESCP drawings may be required once detailed construction plans are available; and that a public notice and permit decision will not be made by DEQ until a construction start date is determined. The application is being submitted at this time to satisfy EFSC requirements to obtain a letter from DEQ stating that DEQ has received the preliminary application and, at the appropriate time, DEQ anticipates being able to issue permit coverage for the Perennial Wind Chaser Station energy production facility.

If you have any questions or need additional information, please contact me at (503) 248-5600 x4615, or JThornton@ene.com; or Megan Higgins x6103, or MHiggins@ene.com.

Sincerely,

James Thornton

James Thornton
Project Manager
© Ecology and Environment, Inc. 2014

DEQ USE ONLY
File #:
Application #:
LLID/RM:
River Mile:
Legal Name Confirmed: ☐
Notes:

DEPARTMENT OF ENVIRONMENTAL QUALITY
APPLICATION FOR NEW NPDES GENERAL PERMIT 1200-C

For stormwater discharges to surface waters from construction activities disturbing one acre or more that do not meet automatic coverage requirements.*

DEQ USE ONLY
Date Received:
Amount: $
Check Name:
Check #:
Deposit #:
Receipt #:
Notes:

*A project *may* be eligible for "automatic coverage" under NPDES general permit 1200-CN if stormwater *does not* discharge to a water body with a TMDL or 303(d) listing for sediment or turbidity *and* it meets one of the following criteria (see 1200-CN at http://www.deq.state.or.us/wq/wqpermit/docs/general/npdes1200cn/1200CNPermit.pdf):

1) Disturbs less than one acre and is located in Gresham, Troutdale, or Wood Village.
2) Disturbs less than five acres and is located in Albany, Corvallis, Eugene, Milwaukie, Multnomah Co. (unincorporated areas), Springfield, West Linn, or Wilsonville.
3) Disturbs less than five acres and is within the jurisdictions of Clackamas Co. Water Environment Services [Gladstone, areas within Clackamas Co. Service Dist. #1 (excluding Happy Valley), and areas within the Surface Water Management Agency of Clackamas Co. (including Rivergrove)], Clean Water Services (Banks, Beaverton, Cornelius, Durham, Forest Grove, Hillsboro, King City, North Plains, Sherwood, Tigard, Tualatin, and Washington Co. within Urban Growth Boundary), or Rogue Valley Sewer Services (Central Point, Phoenix, Talent, and portions of Jackson Co. in NPDES MS4 permit area).

Please answer all questions.

A. PROJECT INFORMATION

1. Perennial-WindChaser LLC
Applicant (entity legally responsible for permit)

David Daley
Contact Name (if different from applicant)

600 Third Avenue, Suite 30 F
Address

New York | New York | 10016
City | State | Zip

(936) 447-4927 | david.daley@perennialpower.net
Telephone | E-Mail Address

2. Invoicing information (person or entity legally responsible for payment of annual fee invoice; not a third party independent of the applicant)

Invoice Contact Name (if different from applicant)

Address

City | State | Zip

Telephone | E-Mail Address

3. Burns & McDonell
Architect/Engineering Firm (Erosion & Sediment Control Plan)

Ms. Clarice Kinsella, P.E.
Project Manager

(816) 333-9400 | ckinsella@burnsmcd.com
Telephone | E-Mail Address

4. Applicant's Designated Erosion and Sediment Control Inspector

Company Name

Telephone | E-Mail Address

5. Perennial Wind Chaser Station

Name of Project

NO ADDRESS (next to 878145 Westland Rd.)

Address or Cross Street

Hermiston	Oregon	97838
City	State	Zip

Umatilla

County

6. Nature of Construction Activity

- ☐ Single Family (SIC Code 1521)
- ☐ Multi-Family Residential (SIC Code 1522)
- ☐ Commercial (SIC Code 1542)
- ☐ Industrial (SIC Code 1541)
- ☐ Highway (SIC Code 1611)
- ☐ Utilities (SIC Code 1623): _____
- ☒ Other (include SIC Code): 4911

7. Approximate location of center of site:

Latitude: 45.802167

Longitude: -119.370111

For assistance: DEQ Location Tool at http://deqgisweb.deq.state.or.us/llid/llid.html

8. Project Size:

Total Site Acreage (acres): 141.19 acres

Total Disturbed Area (acres): 59.96 acres

9. Stormwater runoff during construction will flow to:

- ☑ Infiltration device(s)
- ☐ Creek/Stream (provide name):
- ☑ Ditch (provide name of receiving stream for ditch):
- ☐ Municipal storm sewer or drainage system (provide name of receiving stream for system):
- ☑ Other: the building of a detention pond at the power plant site will be among the first activities conducted, along with grading the site toward the pond. Any stormwater flowing from the site could flow into Umatilla River. The substation site will have berms. Any stormwater flowing from the substation could flow into Columbia River.

10. Stormwater runoff during construction discharges directly to or through a storm sewer or drainage system that discharges to a water body with a Total Maximum Daily Load (TMDL) or 303(d) listing for turbidity or sedimentation? ☒ YES ☐ NO

For assistance: DEQ Lookup Tool at http://deq12.deq.state.or.us/tmdl/default.aspx or DEQ Map/Table at http://deq12.deq.state.or.us/tmdl/default.aspx

B. LAND USE COMPATIBILITY STATEMENT

Submit a DEQ Land Use Compatibility Statement (LUCS) form that has been completed by the local land use authority with this application. Attach the *original* LUCS and, if applicable, written findings by the local authority. DEQ will not process the application unless the local land use authority indicates on the LUCS form that the project is compatible with the local acknowledged comprehensive plan and land use regulations.

A copy of this form may be found at http://www.deq.state.or.us/pubs/permithandbook/generallucs.pdf

C. SIGNATURE OF LEGALLY AUTHORIZED REPRESENTATIVE

The legally authorized representative *must* sign the application.

I hereby certify that the information contained in this application is true and correct to the best of my knowledge and belief. In addition, I agree to pay all permit fees required by Oregon Administrative Rules 340-045. This includes a compliance determination fee invoiced annually by DEQ to maintain the permit.

Mr. Shigenobu Hamada

Name of Legally Authorized Representative (Type or Print)

President, Perennial Power Holdings, Inc.

Title

S. Hamada

Signature of Legally Authorized Representative

2013 / 9 / 20

Date

APPLICATION AND FEE SUBMITTAL

To authorize permit registration, the following must be completed and submitted to the appropriate DEQ regional office or DEQ Agent (see list of offices in application instructions, pp. 3-4):

- ☐ DEQ application form signed by the Legally Authorized Representative and meeting the signature requirements below.
- ☐ DEQ LUCS by local land use authority indicating the activity is compatible with local acknowledged comprehensive plan and land use regulations. Include the Findings if so stated on the LUCS.
- ☐ Stormwater Erosion and Sediment Control Plan Narrative, if applicable.
- ☐ Stormwater Erosion and Sediment Control Plan Drawings; full-sized hard copy and electronic PDF files.
- ☐ Effective 11/1/12, the fee for a new application is $1,629 payable to Oregon DEQ and you must submit it with this application. Please note that DEQ will also invoice you for an annual fee of $826 if your project needs permit coverage for more than a year. These fees are subject to change; please visit http://www.deq.state.or.us/wq/wqpermit/stminfo.htm for current fees. If you are sending your application to a DEQ Agent, check with the DEQ Agent for appropriate fees and make check payable to the DEQ Agent.

Application Instructions

A. PROJECT INFORMATION

1. Enter the legal name of the applicant. Permit coverage will be issued to this entity. This is the person, business, public organization, or other entity responsible for ensuring that erosion and sediment controls are in place and in working order through the life of the project.
   - The name must be a legal, active name registered with the Oregon Department of Commerce, Corporation Division in Salem at 503-378-4752 or http://egov.sos.state.or.us/br/pkg_web_name_srch_inq.login, unless otherwise exempted by their rules. If the name of the applicant is not registered with the Corporation Division and the applicant is a business entity, attach legal documents that verify the entity's existence with the application. The applicant may not use an assumed business name.
   - Permit coverage may be transferred from one party to another. For example, a developer may apply for a permit and then transfer the permit to a contractor. Transfer forms are available from DEQ or at http://www.deq.state.or.us/wq/stormwater/constappl.htm.
2. Provide invoice contact information for billing of DEQ annual permit fee if different from the applicant in #1 above. This is the person or entity legally responsible for payment of the annual fee invoice, not a third party independent of the applicant.
3. Provide contact information for the Architect or Consulting Engineer who designed the Erosion and Sediment Control Plan (ESCP).
4. Provide information on the Erosion and Sediment Control Inspector. This is not a DEQ or DEQ Agent inspector; this is an inspector employed by the applicant. If the inspector has not been selected yet, please provide the name of consultant who prepared the ESCP and their ESC certification. When the inspector is selected, submit to DEQ or to the DEQ Agent, the name, contact information, training and experience (see condition A.12.b.iii of the 1200-C).
5. Provide the common name of the project (for example, the name of the subdivision), the location of the site with respect to crossroads in the area, and, if available, a street address.
6. Check the box that best describes the nature of the construction activity. If "other" is selected, describe the use and include a Standard Industrial Classification Code (visit http://www.osha.gov/pls/imis/sicsearch.html for codes).
7. Enter latitude and longitude for the approximate center of the site (DEQ Location Tool at http://deqgisweb.deq.state.or.us/llid/llid.html or at http://deqapp1/website/lit/data.asp).
8. Provide information on the project size as indicated (based on the total project and not just a single phase).
9. Indicate where stormwater runoff during construction will flow. Use your best judgment to determine the name of the receiving water body.
10. Indicate whether stormwater runoff during construction will discharge directly to or through a storm sewer or drainage system that discharges to a Total Maximum Daily Load (TMDL) or 303(d) listed water body for turbidity or sedimentation. To make this determination, the following tools are available on DEQ's website:
    - Map and table: http://www.deq.state.or.us/WQ/TMDLs/basinmap.htm
    - Lookup tool: http://deq12.deq.state.or.us/tmdl/default.aspx

B. LAND USE COMPATIBILITY STATEMENT

Complete as indicated.

C. SIGNATURE OF LEGALLY AUTHORIZED REPRESENTATIVE

DEFINITION OF LEGALLY AUTHORIZED REPRESENTATIVE:

Please also provide the information requested in brackets *[ ]*

- **Corporation** - president, secretary, treasurer, vice-president, or any person who performs principal business functions; or a manager of one or more facilities that is authorized in accordance to corporate procedure to sign such documents.
- **Partnership** - General partner *[list of general partners, their addresses, and telephone numbers]*.
- **Sole Proprietorship** - Owner(s) *[each owner must sign the application]*.
- **City, County, State, Federal, or other Public Facility** - Principal executive officer or ranking elected official.
- **Limited Liability Company** - Member *[articles of organization]*.
- **Trusts** – Acting trustee *[list of trustees, their addresses, and telephone numbers]*.

(please see 40 CFR §122.22 for more detail, if needed)

APPLICATION AND FEE SUBMITTAL

Submit this application, Narrative Parts I, II & III (if applicable), LUCS, Erosion and Sediment Control Plan(2 full-sized hard copies and 1 PDF copy), and the applicable fee to the appropriate DEQ regional office or DEQ Agent listed below. Contact the appropriate DEQ regional office or DEQ Agent for the best way to submit the electronic version of the ESCP.

- If you are in an area serviced by a DEQ Agent, check with the DEQ Agent for appropriate fees and make check payable to the DEQ Agent.
- If you are sending your application to DEQ, the fee for a new application is $1,629 payable to the Oregon DEQ. Please note that DEQ will also invoice you for an annual fee of $826 if your project needs permit coverage for more than a year. These fees are subject to change; visit http://www.deq.state.or.us/wq/wqpermit/stminfo.htm for current fees.

DEQ Northwest Region 2020 SW 4th Avenue, Suite 400 Portland, OR 97201-4987 503-229-5438 or 1-800-452-4011	**DEQ Western Region** 165 East 7th Avenue, Suite 100 Eugene, OR 97401 541-687-7326 or 1-800-452-4011	**DEQ Eastern Region** 700 SE Emigrant Avenue, Suite 330 Pendleton, OR 97801 541-278-4605 or 1-800-452-4011
City of Eugene 99 W. 10th Avenue Eugene, OR 97401 541-722-5519	**City of Hermiston** 215 Gladys Avenue Hermiston, OR 97838 541-667-5025	**City of Troutdale** 342 SW 4th Street Troutdale, OR 97060 503-674-7270
Clean Water Services 2550 SW Hillsboro Highway Hillsboro, OR 97123 503-681-5101 *Includes Banks, Beaverton, Cornelius, Durham, Forest Grove, Gaston, Hillsboro, King City, North Plains, Sherwood, Tigard, Tualatin, and portions of Washington Co.*	**Rogue Valley Sewer Services** 138 West Vilas Road, PO Box 3130 Central Point, OR 97502 541-353-4594 *Includes Central Point, Phoenix, Talent, White City and portions of Jackson Co.*	**Clack Co. Water Environmental Services** 150 Beavercreek Road, Suite 430 Oregon City, OR 97045 503-742-4567 *Unincorporated Clackamas County and areas within the Cities of Rivergrove and Gladstone*

PERENNIAL WIND CHASER STATION
EROSION AND SEDIMENT CONTROL

Umatilla County, Oregon

September 2013

55745

Erosion and Sediment Control Plans

DWG. NO.	TITLE
CS009	VICINITY MAP, SITE MAP, AND NOTES
CS010	EROSION AND SEDIMENT CONTROL NOTES AND LEGEND
CS011	GAS TURBINE GENERATOR SITE PLAN
CS012	GAS TURBINE GENERATOR ROUGH GRADING - EROSION AND SEDIMENT CONTROL PLAN
CS013	NOT USED
CS014	STEP-UP TRANSFORMER SITE PLAN
CS015	STEP-UP TRANSFORMER SITE PLAN ROUGH GRADING - EROSION AND SEDIMENT CONTROL PLAN
CS016	NOT USED
CS017	GAS PIPELINE SITE PLAN AND EROSION AND SEDIMENT CONTROL PLAN - SHEET 1
CS018	GAS PIPELINE SITE PLAN AND EROSION AND SEDIMENT CONTROL PLAN - SHEET 2
CS019	GAS PIPELINE SITE PLAN AND EROSION AND SEDIMENT CONTROL PLAN - SHEET 3
CS020	GAS PIPELINE SITE PLAN AND EROSION AND SEDIMENT CONTROL PLAN - SHEET 4
CS021	GAS PIPELINE SITE PLAN AND EROSION AND SEDIMENT CONTROL PLAN - SHEET 5
CS022	GAS PIPELINE SITE PLAN AND EROSION AND SEDIMENT CONTROL PLAN - SHEET 6
CS023	GAS PIPELINE SITE PLAN AND EROSION AND SEDIMENT CONTROL PLAN - SHEET 7
CS024	GAS PIPELINE SITE PLAN AND EROSION AND SEDIMENT CONTROL PLAN - SHEET 8
CS025	GAS PIPELINE SITE PLAN AND EROSION AND SEDIMENT CONTROL PLAN - SHEET 9
CS026	GAS PIPELINE SITE PLAN AND EROSION AND SEDIMENT CONTROL PLAN - SHEET 10
CS027	GAS PIPELINE SITE PLAN AND EROSION AND SEDIMENT CONTROL PLAN - SHEET 11
CS028	GAS PIPELINE SITE PLAN AND EROSION AND SEDIMENT CONTROL PLAN - SHEET 12
CS029	NOT USED
CS030	NOT USED
CS031	NOT USED
CS032	EROSION AND SEDIMENT CONTROL DETAILS - SHEET 1
CS033	EROSION AND SEDIMENT CONTROL DETAILS - SHEET 2
CS034	EROSION AND SEDIMENT CONTROL DETAILS - SHEET 3

PRELIMINARY - NOT FOR CONSTRUCTION

no.	date	by	ckd	description	no.	date	by	ckd	description

Burns & McDonnell SINCE 1898

Cover - Index

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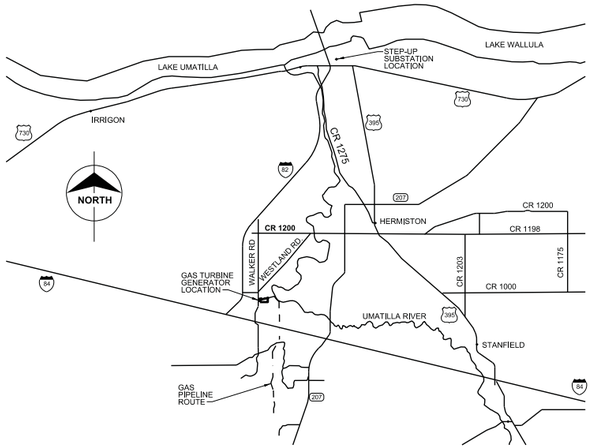
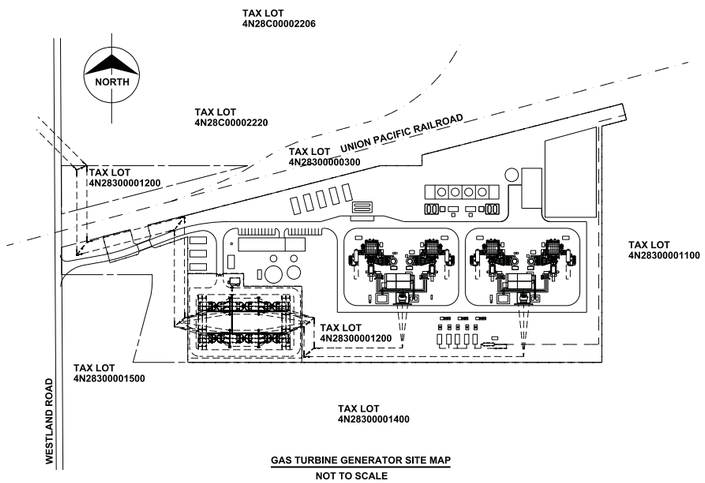
12/27/2013



VICINITY MAP
NOT TO SCALE



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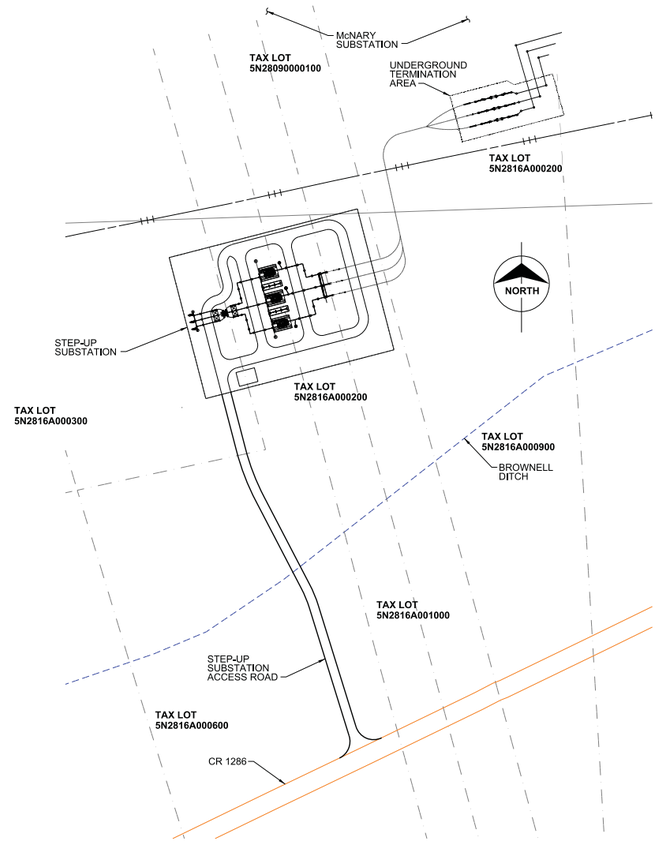
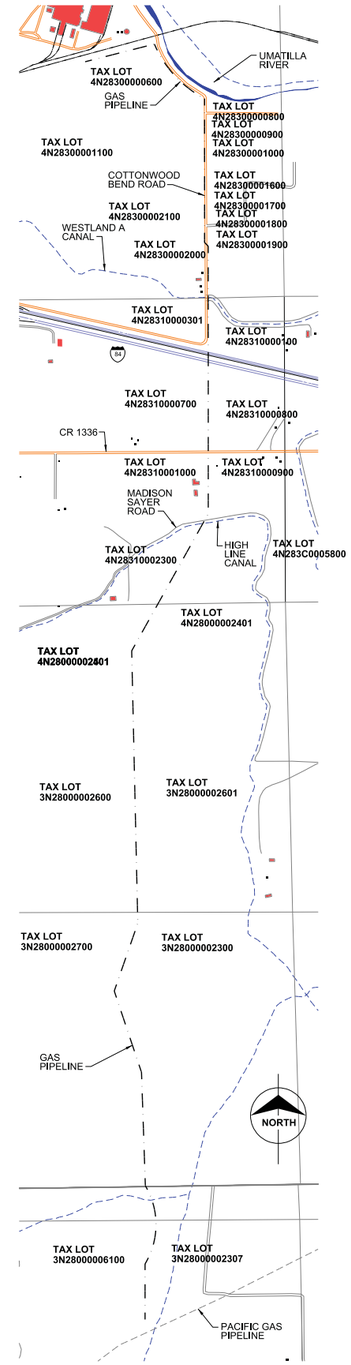
NOT TO SCALE



STEP-UP SUBSTATION SITE MAP
NOT TO SCALE



GAS PIPELINE ROUTE SITE MAP
NOT TO SCALE

PROJECT LOCATION - GAS TURBINE GENERATOR SITE

NEAR THE CROSSING OF WESTLAND ROAD
AND THE UNION PACIFIC RAILROAD TRACK,
UMATILLA COUNTY, OREGON.
LATITUDE - 45.8021° N
LONGITUDE - 119.3684° W

PROPERTY DESCRIPTION - GAS TURBINE GENERATOR SITE

TAX LOT 1200 (UMATILLA COUNTY
TAX MAP 4N 28 30) LOCATED IN THE
NW 1/4 OF SECTION 30, TOWNSHIP 4
NORTH, RANGE 28 EAST, WILLAMETTE
MERIDAN, UMATILLA, OREGON.

ATTENTION EXCAVATORS:

OREGON LAW REQUIRES YOU TO FOLLOW RULES ADOPTED BY THE OREGON UTILITY NOTIFICATION CENTER. THOSE RULES ARE SET FORTH IN OAR 952-001-0010 THROUGH OAR 952-001-0090. YOU MAY OBTAIN COPIES OF THESE RULES FROM THE CENTER BY CALLING 503 232-1987. IF YOU HAVE ANY QUESTIONS ABOUT THE RULES, YOU MAY CONTACT THE CENTER. YOU MUST NOTIFY THE CENTER AT LEAST TWO BUSINESS DAYS, BEFORE COMMENCING AN EXCAVATION. CALL 503 246-6699.

PROJECT LOCATION - STEP-UP TRANSFORMER SUBSTATION SITE

SOUTH OF THE McNARYSUBSTATION,
NORTH OF BROWNELL DITCH, AND
EAST OF INTERSTATE 82,
UMATILLA COUNTY, OREGON.
LATITUDE - 45.9222° N
LONGITUDE - 119.3122° W

PROPERTY DESCRIPTION - STEP-UP TRANSFORMER SUBSTATION SITE

TAX LOT 200 (UMATILLA COUNTY
TAX MAP 5N 28 16A) LOCATED IN THE
NE 1/4 OF SECTION 16, TOWNSHIP 5
NORTH, RANGE 28 EAST, WILLAMETTE
MERIDAN, UMATILLA, OREGON.

PROJECT LOCATION - GAS PIPELINE SITE

BEGINNING EAST OF THE CROSSING OF WESTLAND ROAD
AND THE UNION PACIFIC RAILROAD TRACK AND GOING
EAST AND SOUTH TO THE PACIFIC GAS PIPELINE
COMPRESSOR STATION SOUTH OF INTERSTATE 84
AND WEST OF ROUTE 207, UMATILLA COUNTY, OREGON.
LATITUDE - 45.8033° N LONGITUDE - 119.3657° W TO
LATITUDE - 45.8041° N LONGITUDE - 119.3610° W TO
LATITUDE - 45.8015° N LONGITUDE - 119.3577° W TO
LATITUDE - 45.7817° N LONGITUDE - 119.3580° W TO
LATITUDE - 45.7753° N LONGITUDE - 119.3631° W TO
LATITUDE - 45.7435° N LONGITUDE - 119.3629° W

PROPERTY DESCRIPTION - GAS PIPELINE SITE

UMATILLA COUNTY TAX MAPS 3N28
AND 4N 28C LOCATED IN THE
SECTIONS 6, 7, AND 18 TOWNSHIP 3
NORTH, RANGE 28 EAST AND
SECTIONS 30 AND 31 TOWNSHIP 4
NORTH, RANGE 28E, WILLAMETTE
MERIDAN, UMATILLA, OREGON.

PRELIMINARY - NOT FOR CONSTRUCTION

no.	date	by	ckd	description

Burns & McDonnell SINCE 1898

date	detailed
SEPTEMBER 12, 2013	R. SEDLACEK
designed	checked
R. SEDLACEK	

PERENNIAL WIND CHASER STATION

UMATILLA COUNTY, OREGON

VICINITY MAP AND SITE MAPS

project 55745 | contract

drawing **CS009** | rev. –

sheet of sheets

file 55745CS009.DGN

Scale For Microfilming: Millimeters / Inches

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LEGEND

NEW | EXISTING

- RAILROAD
- ROADS
- 750 CONTOURS 750
- ✳ TOP OF SLOPE
- ✳ TOE OF SLOPE
- EXISTING TREE
- EXISTING TREE TO BE REMOVED
- SEDIMENT BARRIER (PERIMETER)
- SEDIMENT BARRIER (INTERIOR)
- ORANGE CONSTRUCTION FENCE
- SEDIMENT TRAP
- CHECK DAM
- CONSTRUCTION ENTRANCE
- DIVERSION DIKE
- DIVERSION SWALE
- DIVERSION DIKE/SWALE
- INLET PROTECTION
- SEDIMENT MAT
- TEMPORARY SLOPE DRAIN
- ROCK FILTER BERM
- TEMPORARY SLOPE STABILIZATION MEASURES
- DRAINAGE FLOW DIRECTION
- ST CULVERT W/END SECTIONS
- STORM SEWER
- CRUSHED ROCK BASE
- RIPRAP
- ASPHALT
- CRUSHED ROCK AREA SURFACING
- CONCRETE
- TOPSOIL AND SEEDING
- DEMOLITION
- FENCES
- PROPERTY LINE
- STRUCTURES
- SURVEY MONUMENTS

✳ TOP OR TOE OF SLOPE TO MATCH EXIST. GRADE UNLESS AN ELEVATION OR SLOPE IS INDICATED.

ALL SYMBOLS ARE STANDARD WITHOUT RESPECT TO CONTRACTS.

Scale For Microfilming: Millimeters / Inches

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STANDARD EROSION AND SEDIMENT CONTROL PLAN (ESCP) DRAWING NOTES:

1. HOLD A PRE-CONSTRUCTION MEETING OF PROJECT CONSTRUCTION PERSONNEL THAT INCLUDES THE INSPECTOR TO DISCUSS EROSION AND SEDIMENT CONTROL MEASURES AND CONSTRUCTION LIMITS. (SCHEDULE A.8.c.I.(3)
2. ALL INSPECTIONS MUST BE MADE IN ACCORDANCE WITH DEQ 1200-C PERMIT REQUIREMENTS.
3. INSPECTION LOGS MUST BE KEPT IN ACCORDANCE WITH DEQ 1200-C PERMIT REQUIREMENTS.
4. RETAIN A COPY OF THE ESCP AND ALL REVISIONS ON SITE AND MAKE IT AVAILABLE ON REQUEST TO DEQ, AGENT, OR THE LOCAL MUNICIPALITY. DURING INACTIVE PERIODS OF GREATER THAN SEVEN (7) CONSECUTIVE CALENDAR DAYS, RETAIN THE ESCP AT THE CONSTRUCTION SITE OR AT ANOTHER LOCATION (SCHEDULE B.2.A)
5. ALL PERMIT REGISTRANTS MUST IMPLEMENT THE ESCP. FAILURE TO IMPLEMENT ANY OF THE CONTROL MEASURES OR PRACTICES DESCRIBED IN THE ESCP IS A VIOLATION OF THE PERMIT (SEE SCHEDULE A.8.A.)
6. THE ESCP MEASURES SHOWN ON THIS PLAN ARE MINIMUM REQUIREMENTS FOR ANTICIPATED SITE CONDITIONS. DURING THE CONSTRUCTION PERIOD, UPGRADE THESE MEASURES AS NEEDED TO COMPLY WITH ALL APPLICABLE LOCAL, STATE, AND FEDERAL EROSION AND SEDIMENT CONTROL REGULATIONS. (SCHEDULE A.8.c.II.(1)(C))
7. SUBMISSION OF ALL ESCP REVISIONS IS NOT REQUIRED. SUBMITTAL OF THE ESCP REVISIONS IS ONLY UNDER SPECIFIC CONDITIONS. SUBMIT ALL NECESSARY REVISIONS TO DEQ OR AGENT. (SCHEDULE A.12.c.iii)
8. PHASE CLEARING AND GRADING TO THE MAXIMUM EXTENT PRACTICAL TO PREVENT EXPOSED INACTIVE AREAS FROM BECOMING A SOURCE OF EROSION. (SCHEDULE A.8.c.II.(1)(d))
9. IDENTIFY, MARK, AND PROTECT (BY FENCING OFF OR OTHER MEANS) CRITICAL RIPARIAN AREAS AND VEGETATION INCLUDING IMPORTANT TREES AND ASSOCIATED ROOTING ZONES, AND VEGETATION AREAS TO BE PRESERVED. IDENTIFY VEGETATIVE BUFFER ZONES BETWEEN THE SITE AND SENSITIVE AREAS (e.g., WETLANDS), AND OTHER AREAS TO BE PRESERVED, ESPECIALLY IN PERIMETER AREAS (SCHEDULE A.9.c.I.(1) & (2))
10. PRESERVE EXISTING VEGETATION WHEN PRACTICAL AND RE-VEGETATE OPEN AREAS. RE-VEGETATE OPEN AREAS WHEN PRACTICAL BEFORE AND AFTER GRADING OR CONSTRUCTION. IDENTIFY THE TYPE OF VEGETATIVE SEED MIX USED. (SCHEDULE A.7.B.b.iii(1) AND A.7.b.iii(3))
11. EROSION AND SEDIMENT CONTROL MEASURES INCLUDING PERIMETER SEDIMENT CONTROL MUST BE IN PLACE BEFORE VEGETATION IS DISTURBED AND MUST REMAIN IN PLACE AND BE MAINTAINED, REPAIRED, AND PROMPTLY IMPLEMENTED FOLLOWING PROCEDURES ESTABLISHED FOR THE DURATION OF CONSTRUCTION, INCLUDING PROTECTION FOR ACTIVE STORM DRAIN INLETS AND CATCH BASINS AND APPROPRIATE NON-STORMWATER POLLUTION CONTROLS. (SCHEDULE A.7.d.I AND a.8.c.)
12. ESTABLISH CONCRETE TRUCK AND OTHER CONCRETE EQUIPMENT WASHOUT AREAS BEFORE BEGINNING CONCRETE WORK. (SCHEDULE A.8.c.I.(6))
13. APPLY TEMPORARY AND/OR PERMANENT SOIL STABILIZATION MEASURES IMMEDIATELY ON ALL DISTURBED AREAS AS GRADING PROGRESSES AND FOR ALL ROADWAYS INCLUDING GRAVEL ROADWAYS. (SCHEDULE A.8.c.ii(2))
14. ESTABLISH MATERIAL AND WASTE STORAGE AREAS, AND OTHER NON-STORMWATER CONTROLS. (SCHEDULE A.8.c.I.(7))
15. PREVENT TRACKING OF SEDIMENT ONTO PUBLIC OR PRIVATE ROADS USING BMP'S SUCH AS: GRAVELED (OR PAVED) EXITS AND PARKING AREAS, GRAVEL ALL UNPAVED ROADS LOCATED ONSITE, OR USE AN EXIT TIRE WASH. THESE BMP'S MUST BE IN PLACE PRIOR TO LAND DISTURBING ACTIVITIES. (SCHEDULE A.7.d.II.(1) AND A.8.c.I.(4))
16. WHEN TRUCKING SATURATED SOILS FROM THE SITE, EITHER USE WATER-TIGHT TRUCK OR DRAIN LOADS ON SITE. (SCHEDULE A.7.d.II.(3))
17. USE BMP'S TO PREVENT OR MINIMIZE STORMWATER EXPOSURE TO POLLUTANTS FROM SPILLS: VEHICLE AND EQUIPMENT FUELING, MAINTENANCE, AND STORAGE; OTHER CLEANING AND MAINTENANCE ACTIVITIES; AND WASTE HANDLING ACTIVITIES. THESE POLLUTANTS INCLUDE FUEL, HYDRAULIC FLUID, AND OTHER OILS FROM VEHICLES AND MACHINERY, AS WELL AS DEBRIS, LEFTOVER PAINTS, SOLVENTS, AND GLUES FROM CONSTRUCTION OPERATIONS. (SCHEDULE A.7.e.I.(2))
18. IMPLEMENT THE FOLLOWING BMP'S WHEN APPLICABLE: WRITTEN SPILL PREVENTION AND RESPONSE PROCEDURES, EMPLOYEE TRAINING ON SPILL PREVENTION AND PROPER DISPOSAL PROCEDURES, SPILL KITS IN ALL VEHICLES, REGULAR MAINTENANCE SCHEDULE FOR VEHICLES AND MACHINERY, MATERIAL DELIVERY AND STORAGE CONTROLS, TRAINING AND SIGNAGE, AND COVERED STORAGE AREAS FOR WASTE AND SUPPLIES. (SCHEDULE A.7.a.III)
19. USE WATER, SOIL-BINDING AGENT OR OTHER DUST CONTROL TECHNIQUE AS NEEDED TO AVOID WIND-BLOWN SOIL. (SCHEDULE A.7.b.ii)
20. THE APPLICATION RATE OF FERTILIZERS USED TO REESTABLISH VEGETATION MUST FOLLOW MANUFACTURER'S RECOMMENDATIONS TO MINIMIZE NUTRIENT RELEASES TO SURFACE WATERS. EXERCISE CAUTION WHEN USING TIME-RELEASE FERTILIZERS WITHIN ANY RIPARIAN ZONE. (SCHEDULE A.9.b.iii)
21. IF A STORMWATER TREATMENT SYSTEM (FOR EXAMPLE, ELECTRO-COAGULATION, FLOCCULATION, FILTRATION, ETC.) FOR SEDIMENT OR OTHER POLLUTANT REMOVAL IS EMPLOYED, SUBMIT AN OPERATION AND MAINTENANCE PLAN (INCLUDING SYSTEM SCHEMATIC, LOCATION OF SYSTEM, LOCATION OF INLET, LOCATION OF DISCHARGE, DISCHARGE DISPERSION DEVICE DESIGN, AND A SAMPLING PLAN AND FREQUENCY) BEFORE OPERATING THE TREATMENT SYSTEM. OBTAIN PLAN APPROVAL BEFORE OPERATING THE TREATMENT SYSTEM. OPERATE AND MAINTAIN THE TREATMENT SYSTEM ACCORDING TO MANUFACTURER'S SPECIFICATIONS. (SCHEDULE A.9.d)
22. TEMPORARILY STABILIZE SOILS AT THE END OF THE SHIFT BEFORE HOLIDAYS AND WEEKENDS, IF NEEDED. THE REGISTRANT IS RESPONSIBLE FOR ENSURING THAT SOILS ARE STABLE DURING RAIN EVENTS AT ALL TIMES OF THE YEAR. (SCHEDULE a.7.b.)
23. AT THE END OF EACH WORKDAY SOIL STOCKPILES MUST BE STABILIZED OR COVERED, OR OTHER BMP'S MUST BE IMPLEMENTED TO PREVENT DISCHARGES TO SURFACE WATERS OR CONVEYANCE SYSTEMS LEADING TO SURFACE WATERS. (SCHEDULE A.7.e.II.(2))
24. CONSTRUCTION ACTIVITIES MUST AVOID OR MINIMIZE EXCAVATION AND CREATION OF BARE GROUND DURING WET WEATHER. (SCHEDULE A.7.a.i)
25. SEDIMENT FENCE: REMOVE TRAPPED SEDIMENT BEFORE IT REACHES ONE THIRD OF THE ABOVE GROUND FENCE HEIGHT AND BEFORE FENCE REMOVAL. (SCHEDULE A.9.c.i)
26. OTHER SEDIMENT BARRIERS (SUCH AS BIOBAGS): REMOVE SEDIMENT BEFORE IT REACHES TWO INCHES DEPTH ABOVE GROUND HEIGHT AND BEFORE BMP REMOVAL. (SCHEDULE A.9.c.II)
27. CATCH BASINS: CLEAN BEFORE RETENTION CAPACITY HAS BEEN REDUCED BY FIFTY PERCENT. SEDIMENT BASINS AND SEDIMENT TRAPS: REMOVE TRAPPED SEDIMENTS BEFORE DESIGN CAPACITY HAS BEEN REDUCED BY FIFTY PERCENT AND AT THE COMPLETION OF THE PROJECT. (SCHEDULE A.9.c.II & IV)
28. WITHIN 24 HOURS, SIGNIFICANT SEDIMENT THAT HAS LEFT THE CONSTRUCTION SITE, MUST BE REMEDIATED. INVESTIGATE THE CAUSE OF THE SEDIMENT RELEASE AND IMPLEMENT STEPS TO PREVENT A RECURRENCE OF THE DISCHARGE WITHIN THE SAME 24 HOURS. ANY IN-STREAM CLEAN UP OF SEDIMENT SHALL BE PERFORMED ACCORDING TO THE OREGON DIVISION OF STATE LANDS REQUIRED TIMEFRAME. (SCHEDULE A.9.b.I)
29. THE INTENTIONAL WASHING OF SEDIMENT INTO STORM SEWERS OR DRAINAGE WAYS MUST NOT OCCUR. VACUUMING OR DRY SWEEPING AND MATERIAL PICKUP MUST BE USED TO CLEANUP RELEASED SEDIMENTS. (SCHEDULE A.9.b.I)
30. THE ENTIRE SITE MUST BE TEMPORARILY STABILIZED USING VEGETATION OR A HEAVY MULCH LAYER, TEMPORARY SEEDING, OR OTHER METHOD SHOULD ALL CONSTRUCTION ACTIVITIES CEASE FOR 30 DAYS OR MORE. (SCHEDULE A.7.f.I)
31. PROVIDE TEMPORARY STABILIZATION FOR THAT PORTION OF THE SITE WHERE CONSTRUCTION ACTIVITIES CEASE FOR 14 DAYS OR MORE WITH A COVERING OF BLOWN STRAW AND A TACKIFIER, LOOSE STRAW, OR AN ADEQUATE COVERING OF COMPOST MULCH UNTIL WORK RESUMES ON THAT PORTION OF THE SITE. (SCHEDULE A.7.f.II)
32. PROVIDE PERMANENT EROSION CONTROL MEASURES ON ALL EXPOSED AREAS. DO NOT REMOVE TEMPORARY SEDIMENT CONTROL PRACTICES UNTIL PERMANENT VEGETATION OR OTHER COVER OF EXPOSED AREAS IS ESTABLISHED. HOWEVER, DO REMOVE ALL TEMPORARY EROSION CONTROL MEASURES AS EXPOSED AREAS BECOME STABILIZED, UNLESS DOING SO CONFLICTS WITH LOCAL REQUIREMENTS. PROPERLY DISPOSE OF CONSTRUCTION MATERIALS AND WASTE, INCLUDING SEDIMENT RETAINED BY TEMPORARY BMP'S. (SCHEUDLE A.7.b.II(2) AND A.8.c.II)

LOCAL AGENCY-SPECIFIC EROSION CONTROL NOTES

1. OWNER OR DESIGNATED PERSON SHALL BE RESPONSIBLE FOR PROPER INSTALLATION AND MAINTENANCE OF ALL EROSION AND SEDIMENT CONTROL MEASURES, IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL REGULATIONS.
2. PRIOR TO ANY LAND DISTURBING ACTIVITIES, THE BOUNDARIES OF THE CLEARING LIMITS, VEGETATED BUFFERS, AND ANY SENSITIVE AREAS SHOWN ON THE PLANS SHALL BE CLEARLY DELINEATED IN THE FIELD. DURING THE CONSTRUCTION PERIOD, NO DISTURBANCE IS PERMITTED BEYOND THE CLEARING LIMITS. THE OWNER/PERMITTEE MUST MAINTAIN THE DELINEATION FOR THE DURATION OF THE PROJECT. NOTE: VEGETATED CORRIDORS TO BE DELINEATED WITH ORANGE CONSTRUCTION FENCE OR APPROVED EQUAL.
3. PRIOR TO ANY LAND DISTURBING ACTIVITIES, THE BMP'S THAT MUST BE INSTALLED ARE A GRAVEL CONSTRUCTION ENTRANCE, PERIMETER SEDIMENT CONTROL, AND INLET PROTECTION. THESE BMP'S MUST BE MAINTAINED FOR THE DURATION OF THE PROJECT.
4. IF VEGETATIVE SEED MIXES ARE SPECIFIED, SEEDING MUST TAKE PLACE NO LATER THAN SEPTEMBER 1. THE TYPE AND PERCENTAGES OF SEED IN THE MIX MUST BE IDENTIFIED ON THE PLANS.
5. ALL PUMPING OF SEDIMENT LADEN WATER SHALL BE DISCHARGED OVER AN UNDISTURBED, PREFERABLY VEGETATED AREA, AND THROUGH A SEDIMENT CONTROL BMP, IE FILTER BAG.
6. THE ESC PLAN MUST BE KEPT ON SITE. ALL MEASURES SHOWN ON THE PLAN MUST BE INSTALLED PROPERLY TO ENSURE THAT SEDIMENT OR SEDIMENT LADEN WATER DOES NOT ENTER A SURFACE WATER SYSTEM, ROADWAY, OR OTHER PROPERTIES.
7. THE ESC MEASURES SHOWN ON THIS PLAN ARE MINIMUM REQUIREMENTS FOR ANTICIPATED SITE CONDITIONS. DURING THE CONSTRUCTION PERIOD, THESE MEASURES SHALL BE UPGRADED AS NEEDED TO COMPLY WITH ALL APPLICABLE LOCAL, STATE, AND FEDERAL EROSION CONTROL REGULATIONS. CHANGES TO THE APPROVED ESC PLAN MUST BE SUBMITTED IN THE FORM OF AN ACTION PLAN TO DEQ PER THE 1200 C PERMIT.
8. IN AREAS SUBJECT TO WIND EROSION, APPROPRIATE BMP'S MUST BE USED WHICH MAY INCLUDE THE APPLICATION OF FINE WATER SPRAYING, PLASTIC SHEETING, MULCHING, OR OTHER APPROVED MEASURES.
9. ALL EXPOSED SOILS MUST BE COVERED DURING THE WET WEATHER PERIOD.

DEVELOPER

DEVELOPER: PERENNIAL WINDCHASER LLC
CONTACT:
ADDRESS

PHONE:
FAX:

ENGINEER

ENGINEER: BURNS & McDONNELL ENGINEERING COMPANY
CONTACT:
ADDRESS: 9400 WARD PARKWAY KANSAS CITY MO 64114

PHONE:
FAX:

SURVEYOR

SURVEYOR:
CONTACT:
ADDRESS:

PHONE:
FAX:

NARRATIVE DESCRIPTIONS

EXISTING SITE CONDITIONS

FIELD/PASTURE

DEVELOPED CONDITIONS

4 UNIT SIMPLE CYCLE COMBUSTION TURBINE GENERATING STATION

NATURE OF CONSTRUCTION ACTIVITY AND ESTIMATED TIME TABLE

CLEARING
BRIDGE CONSTRUCTION
MASS GRADING
FOUNDATION AND UNDERGROUND INSTALLATION
EQUIPMENT ERECTION
FINISH GRADING AND PAVING
TOTAL COMBUSTION TURBINE SITE: 19.97 ACRES
TOTAL SUBSTATION AREA: 4.06 ACRES
TOTAL GAS PIPELINE AREA: 28.06 ACRES
MISCELLANEOUS AREAS: 8.97 ACRES
TOTAL DISTURBED AREA: 61.06 ACRES

SOIL CLASSIFICATION

COMBUSTION TURBINE SITE:
76B - QUINCY LOAMY FINE SAND, GRAVELLY SUBSTRATUM, 0 TO 5 PERCENT SLOPES
ON-SITE SOILS HAVE A SLIGHT EROSION POTENTIAL.
FILL MATERIAL WILL BE IMPORTED FROM OFF-SITE.
SUBSTATION SITE:
1B - ADKINS FINE SANDY LOAM, 0 TO 5 PERCENT SLOPES.
1B - ADKINS FINE SANDY LOAM, GRAVELLY SUBSTRATUM, 0 TO 5 PERCENT SLOPES.
ON-SITE SOILS HAVE A MODERATE EROSION POTENTIAL.
FILL MATERIAL WILL BE IMPORTED FROM OFF-SITE.
GAS PIPELINE:
1B - ADKINS FINE SANDY LOAM, 0 TO 5 PERCENT SLOPES.
74B - QUINCY FINE SAND, 0 TO 5 PERCENT SLOPES.
75B - QUINCY LOAMY FINE SAND, 0 TO 5 PERCENT SLOPES.
75E - QUINCY LOAMY FINE SAND, 5 TO 25 PERCENT SLOPES.
76B - QUINCY LOAMY FINE SAND, GRAVELLY SUBSTRATUM, 0 TO 5 PERCENT SLOPES.
ALL SOILS HAVE SLIGHT TO MODERATE EROSION POTENTIAL EXCEPT 75E WHICH HAS SEVERE EROSION POTENTIAL.

RECEIVING WATER BODY:

NEAREST WATER BODY:
COMBUSTION TURBINE SITE - UMATILLA RIVER
SUBSTATION SITE - COLUMBIA RIVER
GAS PIPELINE - UMATILLA RIVER

PERMITTEE'S SITE INSPECTOR:

NAME:
COMPANY/AGENCY:
PHONE:
CELL PHONE:
FAX:
E-MAIL:
DESCRIPTION OF EXPERIENCE:

BMP MATRIX FOR CONSTRUCTION PHASES

REFER TO DEQ GUIDANCE MANUAL FOR COMPREHENSIVE LIST OF AVAILABLE BMP'S

BMP	YEAR																							
	MONTH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
PIPE SLOPE DRAIN																									
ENERGY DISSIPATERS																									
TEMPORARY DIVERSION DIKE																									
TEMPORARY SEED AND PLANTING																									
PERMANENT SEEDING AND PLANTING									X	X															
MYCORRHIZAE/BIOFERTILIZER																									
MULCHES (SPECIFY TYPE)																									
CONSTRUCTION ENTRANCE		X	X	X	X	X	X	X	X																
COMPOST BLANKETS																									
COMPOST SOCKS																									
COMPOST BERM																									
SOIL TACKIFIERS																									
SODDING VEGETATIVE BUFFER STRIPS																									
SEDIMENT FENCING		X	X	X	X	X	X	X	X																
EROSION CONTROL BLANKET & MATS (SPECIFY TYPE)																									
EARTH DIKES (STABILIZED)																									
DRAINAGE SWALES																									
ROCK OUTLET PROTECTION																									
SEDIMENT TRAP																									
STRAW WATTLES (LOOSE COMPACTION RICE STRAW)																									
STORM DRAIN INLET PROTECTION						X	X	X	X	X															
TEMPORARY OR PERMANENT SEDIMENTATION BASINS																									
UNPAVED ROADS GRAVELED OR OTHER BMP ON THE ROAD				X	4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
DEWATERING (TREATMENT LOCATION, SCHEMATIC, & SAMPLING PLAN REQUIRED)																									
PAVING OPERATION CONTROLS																							X	X	X
CONCRETE TRUCK WASHOUT				X	X	X	X	X	X																

THE PERMITTEE IS REQUIRED TO MEET ALL THE CONDITIONS OF THE 1200C PERMIT. THIS ESCP AND GENERAL CONDITIONS HAVE BEEN DEVELOPED TO FACILITATE COMPLIANCE WITH THE 1200C PERMIT REQUIREMENTS. IN CASE OF DISCREPANCIES OR OMISSIONS, THE 1200C PERMIT REQUIREMENTS SUPERCEDE REQUIREMENTS OF THIS PLAN

RATIONALE STATEMENT

A COMPREHENSIVE LIST OF AVAILABLE BEST MANAGEMENT PRACTICES (BMP) OPTIONS BASED ON DEQ'S GUIDANCE MANUAL HAS BEEN REVIEWED TO COMPLETE THIS EROSION AND SEDIMENT CONTROL PLAN. SOME OF THE ABOVE LISTED BMP'S WERE NOT CHOSEN BECAUSE THEY WERE DETERMINED TO NOT EFFECTIVELY MANAGE EROSION CONDITIONS, INCLUDING SOIL CONDITIONS TOPOGRAPHIC CONSTRAINTS, ACCESSIBILITY TO THE SITE, AND OTHER RELATED CONDITIONS. AS THE PROJECT PROGRESSES AND THERE IS A NEED TO REVISE THE ESC PLAN, AN ACTION PLAN WILL BE SUBMITTED.

INITIAL

INSPECTION FREQUENCY

SITE CONDITION	MINIMUM FREQUENCY
1. ACTIVE PERIOD	DAILY WHEN STORMWATER RUNOFF, INCLUDING RUNOFF FROM SNOWMELT IS OCCURING. AT LEAST ONCE EVERY TWO (2) WEEKS REGARDLESS IF STORMWATER RUNOFF IS OCCURING.
2. PRIOR TO THE SITE BECOMING INACTIVE OR IN ANTICIPATION OF SITE INACCESSIBILITY.	ONCE TO ENSURE THAT EROSION AND SEDIMENT CONTROL MEASURES ARE IN WORKING ORDER. ANY NECESSARY MAINTENANCE AND REPAIR MUST BE MADE PRIOR TO LEAVING THE SITE.
3. INACTIVE PERIODS GREATER THAN FOURTEEN (14) CONSECUTIVE CALENDAR DAYS.	ONCE EVERY TWO (2) WEEKS.
4. PERIODS DURING WHICH THE SITE IS INACCESSIBLE DUE TO INCLEMENT WEATHER.	IF PRACTICAL, INSPECTIONS MUST OCCUR DAILY AT A RELEVANT AND ACCESSIBLE DISCHARGE POINT OR DOWNSTREAM LOCATION.

* HOLD A PRE-CON MEETING OF PROJECT CONSTRUCTION PERSONNEL THAT INCLUDES THE EC INSPECTOR.
* ALL INSPECTIONS MUST BE MADE IN ACCORDANCE WITH DEQ 1200C PERMIT REQUIREMENTS.
* INSPECTION LOGS MUST BE KEPT IN ACCORDANCE WITH DEQ 1200C PERMIT REQUIREMENTS.
* REVISIONS TO THE APPROVED ESC PLAN MUST BE SUBMITTED TO DEQ OR AGENT IN ACCORDANCE WITH CURRENT 1200C PERMIT.

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PERENNIAL WIND CHASER STATION

UMATILLA COUNTY, OREGON

EROSION AND SEDIMENT CONTROL NOTES AND LEGEND

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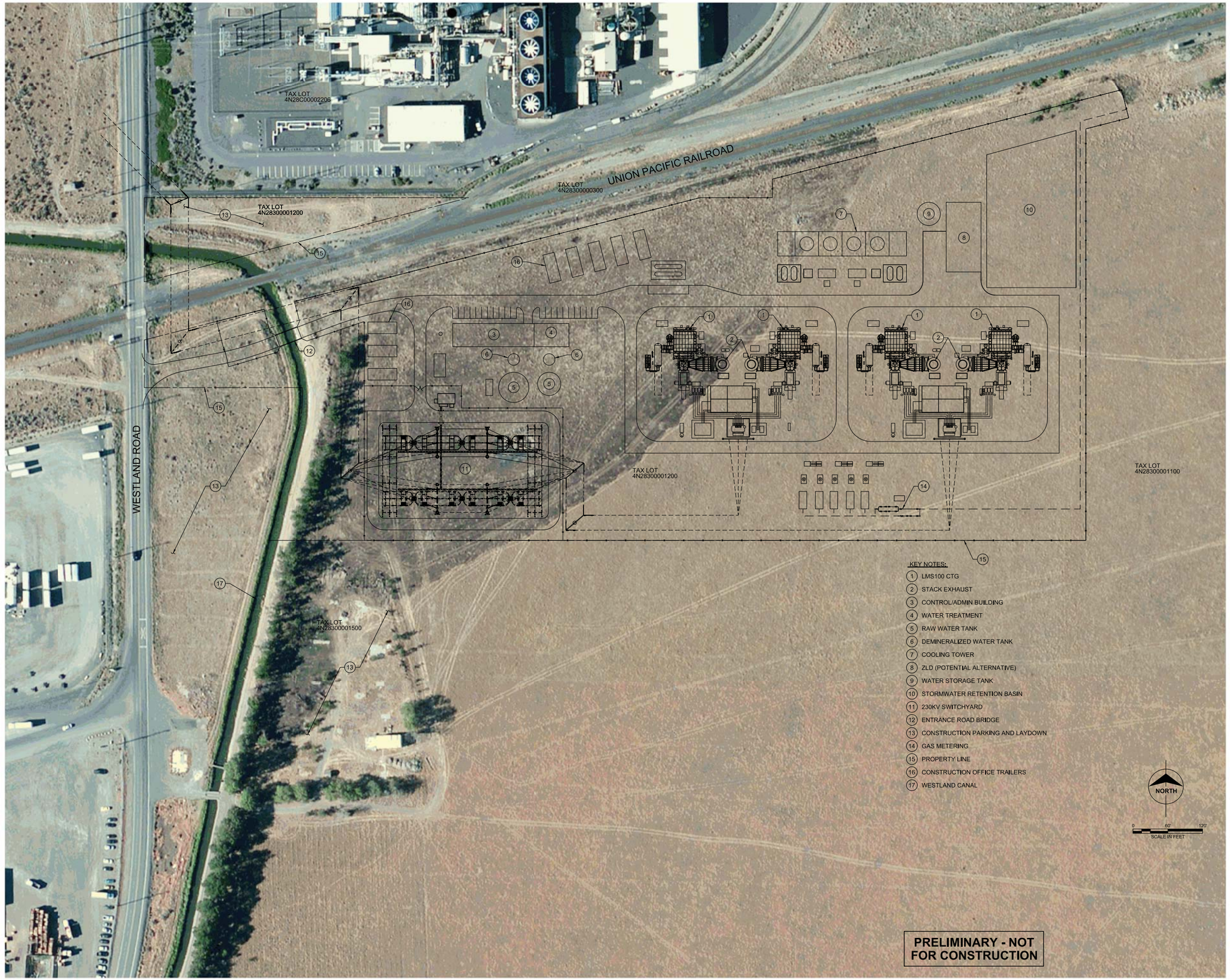

KEY NOTES:

1. LMS100 CTG
2. STACK EXHAUST
3. CONTROL/ADMIN BUILDING
4. WATER TREATMENT
5. RAW WATER TANK
6. DEMINERALIZED WATER TANK
7. COOLING TOWER
8. ZLD (POTENTIAL ALTERNATIVE)
9. WATER STORAGE TANK
10. STORMWATER RETENTION BASIN
11. 230KV SWITCHYARD
12. ENTRANCE ROAD BRIDGE
13. CONSTRUCTION PARKING AND LAYDOWN
14. GAS METERING
15. PROPERTY LINE
16. CONSTRUCTION OFFICE TRAILERS
17. WESTLAND CANAL

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UMATILLA COUNTY, OREGON

GAS TURBINE GENERATOR SITE PLAN

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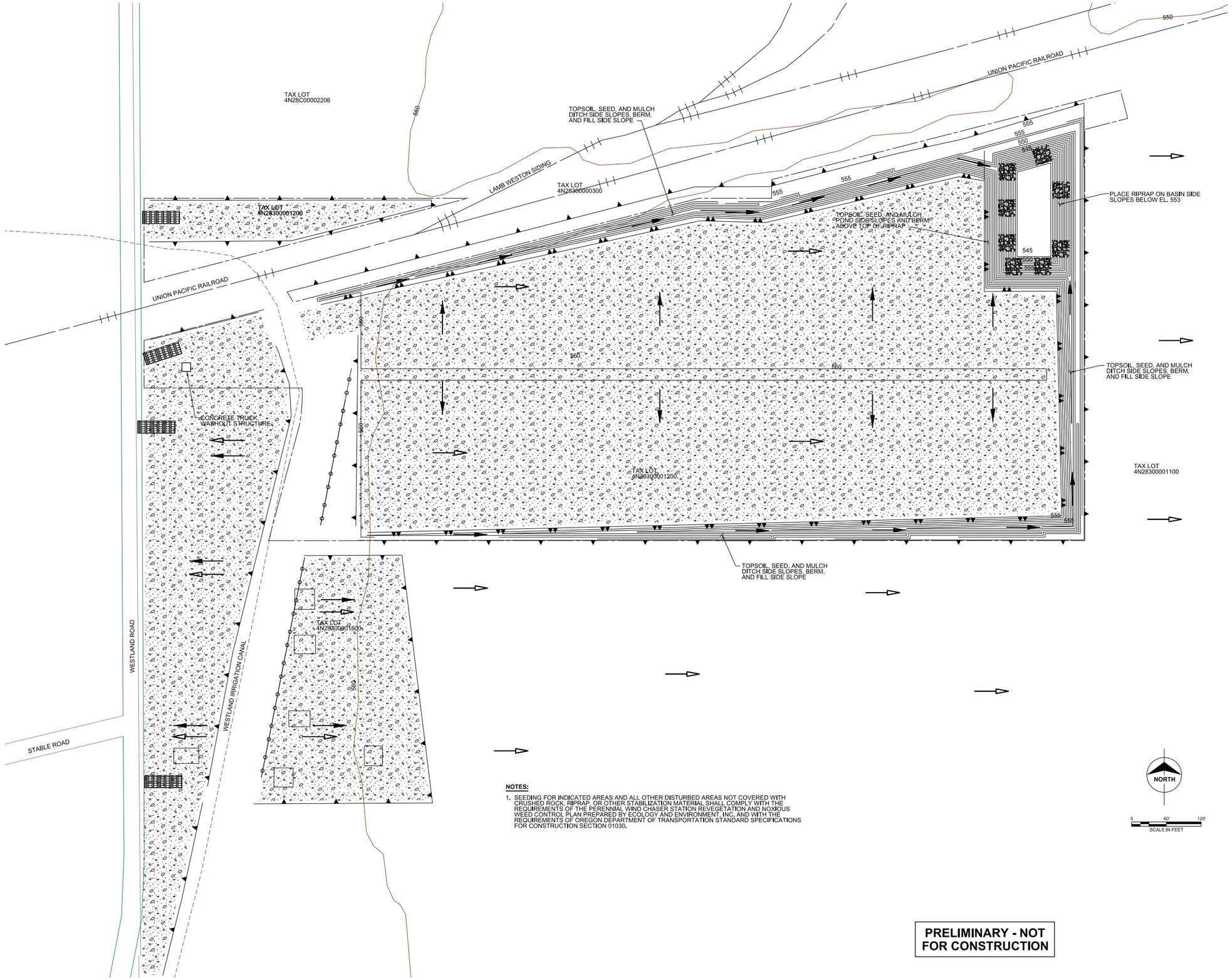

NOTES:

1. SEEDING FOR INDICATED AREAS AND ALL OTHER DISTURBED AREAS NOT COVERED WITH CRUSHED ROCK, RIPRAP, OR OTHER STABILIZATION MATERIAL SHALL COMPLY WITH THE REQUIREMENTS OF THE PERENNIAL WIND CHASER STATION REVEGETATION AND NOXIOUS WEED CONTROL PLAN PREPARED BY ECOLOGY AND ENVIRONMENT, INC. AND WITH THE REQUIREMENTS OF OREGON DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR CONSTRUCTION SECTION 01030.

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PERENNIAL WIND CHASER STATION

UMATILLA COUNTY, OREGON

ROUGH GRADING - EROSION AND SEDIMENT CONTROL PLAN

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PERENNIAL WIND CHASER STATION

UMATILLA COUNTY, OREGON

STEP-UP TRANSFORMER SITE PLAN

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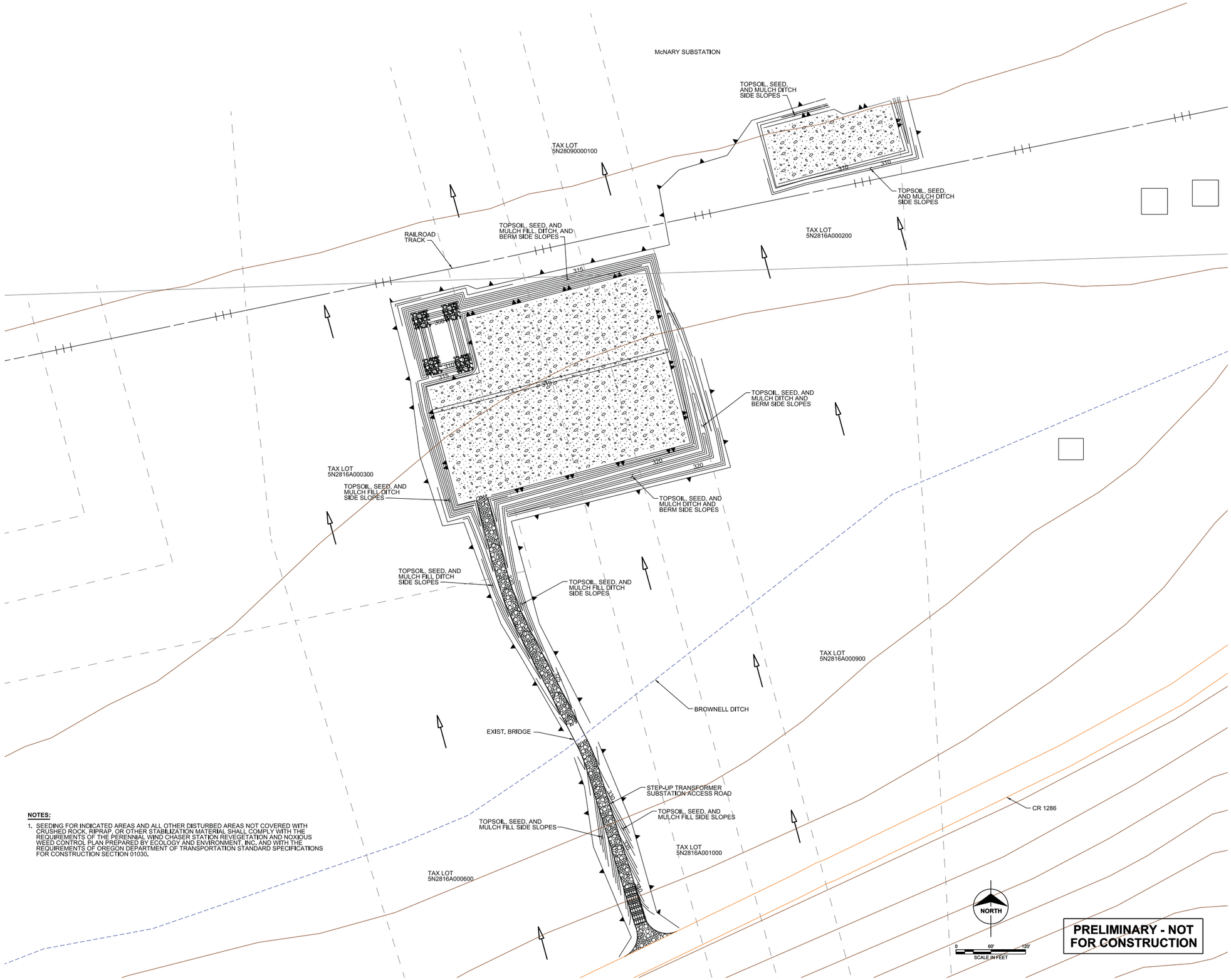

NOTES:

1. SEEDING FOR INDICATED AREAS AND ALL OTHER DISTURBED AREAS NOT COVERED WITH CRUSHED ROCK, RIPRAP, OR OTHER STABILIZATION MATERIAL SHALL COMPLY WITH THE REQUIREMENTS OF THE PERENNIAL WIND CHASER STATION REVEGETATION AND NOXIOUS WEED CONTROL PLAN PREPARED BY ECOLOGY AND ENVIRONMENT, INC. AND WITH THE REQUIREMENTS OF OREGON DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR CONSTRUCTION SECTION 01030.

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PERENNIAL WIND CHASER STATION

UMATILLA COUNTY, OREGON

STEP-UP TRANSFORMER SITE ROUGH GRADING PLAN AND EROSION AND SEDIMENT CONTROL PLAN

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NOTES:

1. SEEDING FOR INDICATED AREAS AND ALL OTHER DISTURBED AREAS NOT COVERED WITH CRUSHED ROCK, RIPRAP, OR OTHER STABILIZATION MATERIAL SHALL COMPLY WITH THE REQUIREMENTS OF THE PERENNIAL WIND CHASER STATION REVEGETATION AND NOXIOUS WEED CONTROL PLAN PREPARED BY ECOLOGY AND ENVIRONMENT, INC. AND WITH THE REQUIREMENTS OF OREGON DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR CONSTRUCTION SECTION 01030.

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PERENNIAL WIND CHASER STATION

UMATILLA COUNTY, OREGON

GAS PIPELINE SITE PLAN AND EROSION AND SEDIMENT CONTROL PLAN SHEET 1

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NOTES:

1. SEEDING FOR INDICATED AREAS AND ALL OTHER DISTURBED AREAS NOT COVERED WITH CRUSHED ROCK, RIPRAP, OR OTHER STABILIZATION MATERIAL SHALL COMPLY WITH THE REQUIREMENTS OF THE PERENNIAL WIND CHASER STATION REVEGETATION AND NOXIOUS WEED CONTROL PLAN PREPARED BY ECOLOGY AND ENVIRONMENT, INC, AND WITH THE REQUIREMENTS OF OREGON DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR CONSTRUCTION SECTION 01030.

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PERENNIAL WIND CHASER STATION

UMATILLA COUNTY, OREGON

GAS PIPELINE SITE PLAN AND EROSION AND SEDIMENT CONTROL PLAN SHEET 2

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PERENNIAL WIND CHASER STATION

UMATILLA COUNTY, OREGON

GAS PIPELINE PLAN AND
EROSION AND SEDIMENT CONTROL PLAN
SHEET 3

project	contract
55745	

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PERENNIAL WIND CHASER STATION

UMATILLA COUNTY, OREGON

GAS PIPELINE SITE PLAN AND EROSION AND SEDIMENT CONTROL PLAN SHEET 4

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UMATILLA COUNTY, OREGON

GAS PIPELINE SITE PLAN AND EROSION AND SEDIMENT CONTROL PLAN SHEET 5

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UMATILLA COUNTY, OREGON

GAS PIPELINE SITE PLAN AND EROSION AN SEDIMENT CONTROL PLAN SHEET 6

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UMATILLA COUNTY, OREGON

GAS PIPELINE SITE PLAN AND EROSION AND SEDIMENT CONTROL PLAN SHEET 7

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NOTES:

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UMATILLA COUNTY, OREGON

GAS PIPELINE SITE PLAN AND EROSION AND SEDIMENT CONTROL PLAN SHEET 8

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UMATILLA COUNTY, OREGON

GAS PIPELINE SITE PLAN AND EROSION AND SEDIMENT CONTROL PLAN SHEET 9

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PERENNIAL WIND CHASER STATION

UMATILLA COUNTY, OREGON

GAS PIPELINE SITE PLAN AND EROSION AND SEDIMENT CONTROL PLAN SHEET 10

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NOTES:

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UMATILLA COUNTY, OREGON

GAS PIPELINE SITE PLAN AND EROSION AND SEDIMENT CONTROL PLAN SHEET 11

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PERENNIAL WIND CHASER STATION

UMATILLA COUNTY, OREGON

GAS PIPELINE SITE PLAN AND EROSION AND SEDIMENT CONTROL PLAN
SHEET 12

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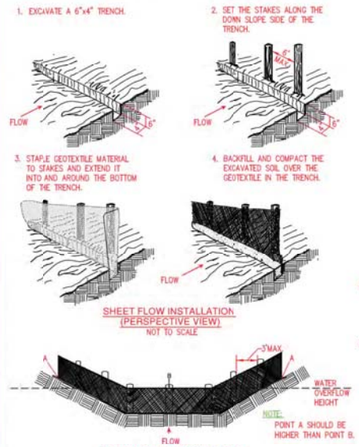
SEDIMENT FENCE



SOURCE: MODIFIED FROM VA. DCR, 1992

SEDIMENT FENCE NOTES:

A) INSTALLATION:

1. THE HEIGHT OF SEDIMENT FENCE SHALL BE A MINIMUM OF 16 INCHES ABOVE THE ORIGINAL GROUND SURFACE AND SHALL NOT EXCEED 34 INCHES ABOVE THE GROUND SURFACE.
2. THE FABRIC SHALL BE PURCHASED IN A CONTINUOUS ROLL CUT TO THE LENGTH OF THE BARRIER TO AVOID THE USE OF JOINTS. WHEN JOINTS ARE UNAVOIDABLE, FILTER CLOTH SHALL BE SECURELY SPLICED TOGETHER ONLY AT SUPPORT POSTS, WITH A MAX 6-INCH OVERLAP.
3. DIG A TRENCH AT LEAST 6 INCHES DEEP AND 4 INCHES WIDE ALONG THE FENCE ALIGNMENT.
4. DRIVE POSTS AT LEAST 24 INCHES INTO THE GROUND ON THE DOWNSLOPE SIDE OF THE TRENCH. SPACE POSTS A MAXIMUM OF 6 FEET APART.
5. EXTRA-STRENGTH SEDIMENT FENCE FABRIC SHALL BE USED. POSTS FOR THIS TYPE OF FABRIC SHALL BE PLACED A MAXIMUM OF 6 FEET APART. THE SEDIMENT FABRIC SHALL BE FASTENED SECURELY TO THE UPSLOPE SIDE OF THE POSTS USING A MINIMUM OF ONE INCH LONG, HEAVY-DUTY WIRE STAPLES OR TIE-WIRES, AND EIGHT INCHES OF THE FABRIC SHALL BE EXTENDED INTO THE TRENCH. THE FABRIC SHALL NOT BE STAPLED TO EXISTING TREES.
6. PLACE THE BOTTOM 1 FOOT OF FABRIC IN THE MINIMUM-OF-6-INCH DEEP TRENCH, LAPPING TOWARD THE UPSLOPE SIDE. BACKFILL WITH COMPACTED EARTH OR GRAVEL.
7. IF A SEDIMENT FENCE IS TO BE CONSTRUCTED ACROSS A DITCH LINE OR SWALE, IT MUST BE OF SUFFICIENT LENGTH TO ELIMINATE ENDFLOW, AND THE PLAN CONFIGURATION SHALL RESEMBLE AN ARC OR HORSESHOE, PLACED ON A CONTOUR, WITH THE ENDS ORIENTED UPSLOPE. EXTRA-STRENGTH SEDIMENT FABRIC SHALL BE USED WITH A MAXIMUM 3-FOOT SPACING OF POSTS.
8. TO REDUCE MAINTENANCE, EXCAVATE A SHALLOW SEDIMENT STORAGE AREA IN THE UPSLOPE SIDE OF THE FENCE. PROVIDE GOOD ACCESS IN AREAS OF HEAVY SEDIMENTATION FOR CLEAN OUT AND MAINTENANCE.
9. SEDIMENT FENCES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFUL PURPOSE, BUT NOT BEFORE THE UPSLOPE AREA HAS BEEN PERMANENTLY STABILIZED.

B) TROUBLESHOOTING:

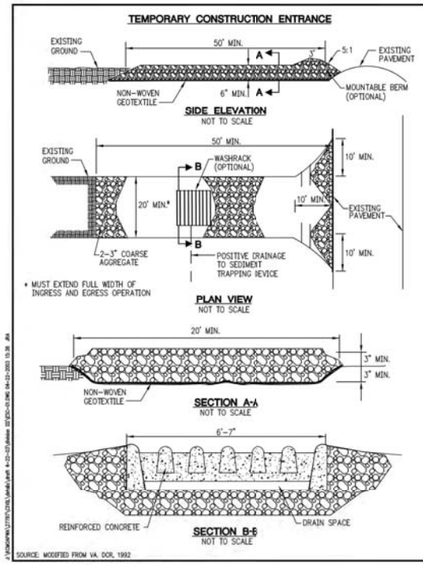
1. DETERMINE THE EXACT LOCATION OF UNDERGROUND UTILITIES, BEFORE FENCE INSTALLATION SO UTILITIES ARE NOT DISTURBED.
2. GRADE ALIGNMENT OF FENCE AS NEEDED TO PROVIDE A BROAD, NEARLY LEVEL AREA UPSTREAM OF FENCE TO ALLOW SEDIMENT COLLECTION AREA.

C) INSPECTION MAINTENANCE:

1. INSPECT SEDIMENT FENCES AT LEAST ONCE A WEEK AND AFTER EACH RAINFALL. MAKE ANY REQUIRED REPAIRS IMMEDIATELY.
2. SHOULD THE FABRIC OF A SEDIMENT FENCE COLLAPSE, TEAR, DECOMPOSE, OR BECOME INEFFECTIVE, REPLACE IT PROMPTLY.
3. REMOVE SEDIMENT DEPOSITS AS NECESSARY TO PROVIDE ADEQUATE STORAGE VOLUME FOR THE NEXT RAIN AND TO REDUCE PRESSURE ON THE FENCE. AVOID DAMAGING OR UNDERMINING THE FENCE DURING CLEANOUT. SEDIMENT ACCUMULATION SHOULD NOT EXCEED 1/3 THE HEIGHT OF THE FENCE.
4. REMOVE ALL FENCING MATERIALS AND UNSTABLE SEDIMENT DEPOSITS, AND BRING THE AREA TO GRADE AND STABILIZE IT AFTER THE CONTRIBUTING DRAINAGE AREA HAS BEEN PROPERLY AND COMPLETELY STABILIZED.

AMERICAN PUBLIC WORKS ASSOCIATION
APWA KANSAS CITY METROPOLITAN CHAPTER
SEDIMENT FENCE
STANDARD DRAWING NUMBER ESC-18 ADOPTED

TEMPORARY CONSTRUCTION ENTRANCE



SOURCE: MODIFIED FROM VA. DCR, 1992

TEMPORARY CONSTRUCTION ENTRANCE ROAD

A) INSTALLATION:

1. AVOID LOCATING ON STEEP SLOPES OR AT CURVES ON PUBLIC ROADS. IF POSSIBLE, LOCATE WHERE PERMANENT ROADS WILL EVENTUALLY BE CONSTRUCTED.
2. REMOVE ALL VEGETATION AND OTHER UNSUITABLE MATERIAL FROM THE FOUNDATION AREA, GRADE, AND CROWN FOR POSITIVE DRAINAGE.
3. IF SLOPE TOWARDS THE PUBLIC ROAD EXCEEDS 2%, CONSTRUCT A 6- TO 8-INCH HIGH RIDGE WITH 3H:1V SIDE SLOPES ACROSS THE FOUNDATION APPROXIMATELY 15 FEET FROM THE EDGE OF THE PUBLIC ROAD TO DIVERT RUNOFF AWAY FROM IT.
4. INSTALL PIPE UNDER THE ENTRANCE IF NEEDED TO MAINTAIN DRAINAGE DITCHES ALONG PUBLIC ROADS.
5. PLACE STONE TO DIMENSIONS AND GRADE AS SHOWN ON PLANS. LEAVE SURFACE SMOOTH AND SLOPED FOR DRAINAGE.
6. DIVERT ALL SURFACE RUNOFF AND DRAINAGE FROM THE ENTRANCE TO A SEDIMENT CONTROL DEVICE.
7. IF WET CONDITIONS ARE ANTICIPATED, PLACE GEOTEXTILE FABRIC ON THE GRADED FOUNDATION TO IMPROVE STABILITY.

B) TROUBLESHOOTING:

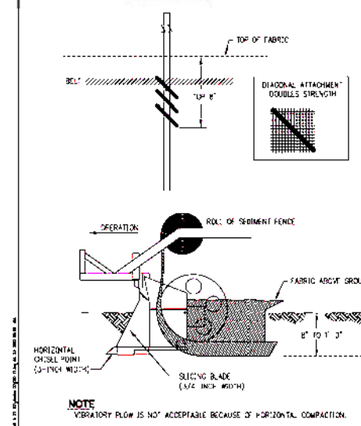
1. CONSULT WITH A QUALIFIED DESIGN PROFESSIONAL IF ANY OF THE FOLLOWING OCCUR:
   a. INADEQUATE RUNOFF CONTROL TO THE EXTENT THAT SEDIMENT WASHES ONTO PUBLIC ROAD – INSTALL DIVERSIONS OR OTHER RUNOFF CONTROL MEASURES.
   b. SMALL STONE, THIN PAD, OR ABSENCE OF GEOTEXTILE FABRIC RESULTS IN RUTS AND MUDDY CONDITIONS AS STONE IS PRESSED INTO SOIL – INCREASE STONE SIZE OR PAD THICKNESS OR ADD GEOTEXTILE FABRIC.
   c. PAD TOO SHORT FOR HEAVY CONSTRUCTION TRAFFIC – EXTEND PAD BEYOND THE MINIMUM 50-FOOT LENGTH AS NECESSARY.

C) INSPECTION AND MAINTENANCE:

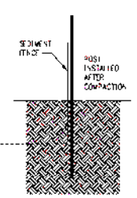
1. INSPECT STONE PAD AND SEDIMENT DISPOSAL AREA WEEKLY AND AFTER 1/2-INCH OR GREATER STORM EVENTS.
2. RESHAPE PAD AS NEEDED FOR PROPER DRAINAGE AND RUNOFF CONTROL.
3. TOPDRESS WITH CLEAN 2-AND 3-INCH STONE AS NEEDED.
4. IMMEDIATELY REMOVE MUD OR SEDIMENT TRACKED OR WASHED ONTO PUBLIC ROAD. REPAIR ANY BROKEN ROAD PAVEMENT IMMEDIATELY.
5. REMOVE ALL TEMPORARY ROAD MATERIALS FROM AREAS WHERE PERMANENT VEGETATION WILL BE ESTABLISHED.

AMERICAN PUBLIC WORKS ASSOCIATION
APWA KANSAS CITY METROPOLITAN CHAPTER
TEMPORARY CONSTRUCTION ENTRANCE
STANDARD DRAWING NUMBER ESC-03 ADOPTED

SEDIMENT FENCE INSTALLATION SLICING METHOD

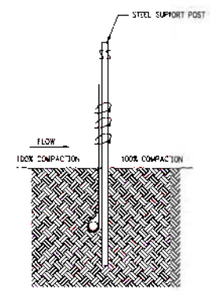


NOTE
VIBRATORY PLOW IS NOT ACCEPTABLE BECAUSE OF HORIZONTAL COMPACTION.



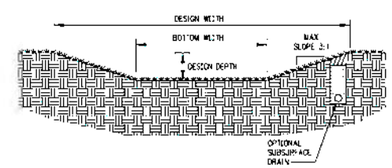
SEDIMENT FENCE INSTALLATION SLICING METHOD NOTES:

1. LIMIT PONDING HEIGHT TO 24"
2. ATTACH FABRIC TO UPSTREAM SIDE OF POST.
3. DRIVE OVER EACH SIDE OF SEDIMENT FENCE 2 TO 4 TIMES WITH DEVICE EXERTING 60 PSI OR GREATER AFTER MATERIAL IS SLICED INTO THE GROUND
4. SPACE POSTS A MAX OF 7' ON OPEN RUNS AND 4' ON POOLING AREAS.
5. SINK POSTS AS FAR BELOW GROUND AS FABRIC ABOVE GROUND



AMERICAN PUBLIC WORKS ASSOCIATION
APWA KANSAS CITY METROPOLITAN CHAPTER
SEDIMENT FENCE INSTALLATION SLICING METHOD
STANDARD DRAWING NUMBER ESC-11 ADOPTED

TRAPEZOIDAL GRASS-LINED CHANNEL



TRAPEZOIDAL GRASS-LINED CHANNEL NOTES:

A) CONSTRUCTION SPECIFICATIONS:

1. REMOVE ALL TREES, BRUSH, STUMPS, AND OTHER OBJECTIONABLE MATERIAL FROM THE FOUNDATION AREA.
2. EXCAVATE THE CHANNEL AND SHAPE IT TO MEET LINES AND DIMENSIONS ON THE PLANS PLUS A 0.2-FT OVERCUT AROUND THE CHANNEL PERIMETER TO ALLOW FOR BULKING DURING SEEDBED PREPARATIONS AND SOD BUILDUP.
3. REMOVE AND PROPERLY DISPOSE OF ALL EXCESS SOIL SO THAT SURFACE WATER MAY ENTER THE CHANNEL FREELY.
4. THE PROCEDURE USED TO ESTABLISH GRASS IN THE CHANNEL WILL DEPEND UPON THE SEVERITY OF THE CONDITIONS AND SELECTION OF SPECIES. PROTECT THE CHANNEL WITH MULCH OR A ROLLED EROSION CONTROL PRODUCT SUFFICIENT TO WITHSTAND ANTICIPATED VELOCITY AND SHEAR STRESS DURING THE ESTABLISHMENT PERIOD.

B) INSPECTION AND MAINTENANCE:

1. CHECK THE DEVICE AFTER EVERY 1/2 INCH OR GREATER RAINFALL EVENT. IMMEDIATELY MAKE REPAIRS. CHECK THE CHANNEL OUTLET AND ALL ROAD CROSSINGS FOR BANK STABILITY AND EVIDENCE OF PIPING OR SCOUR HOLES. REMOVE ALL SIGNIFICANT SEDIMENT ACCUMULATIONS TO MAINTAIN THE DESIGN CARRYING CAPACITY. KEEP THE GRASS IN A HEALTHY, VIGOROUS CONDITION AT ALL TIMES SINCE IT IS THE PRIMARY EROSION PROTECTION FOR THE CHANNEL.

NOTES:

1. SIDE SLOPES SHOULD BE 3H:1V OR FLATTER.
2. USE MULCH, EROSION CONTROL BLANKETS, TURF REINFORCEMENT MAT, OR OTHER APPROPRIATE PRACTICES AS SPECIFIED IN THE DESIGN PLAN.
3. CHANNELS SHOULD EMPTY INTO SEDIMENT TRAPS, DETENTION/RETENTION BASINS, OR STABLE OUTLETS.
4. USE A SUBSURFACE DRAIN IN AREAS WITH SEASONALLY HIGH WATER TABLES OR SEEPAGE PROBLEMS.

AMERICAN PUBLIC WORKS ASSOCIATION
APWA KANSAS CITY METROPOLITAN CHAPTER
TRAPEZOIDAL GRASS-LINED CHANNEL
STANDARD DRAWING NUMBER ESC-30 ADOPTED

SOURCE: MODIFIED FROM MDNR, 1998

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PERENNIAL WIND CHASER STATION

UMATILLA COUNTY, OREGON

EROSION AND SEDIMENT CONTROL DETAILS - SHEET 1

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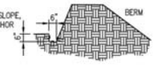
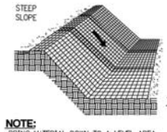
EROSION CONTROL BLANKET

NOTE:
ON SHALLOW SLOPES, PROTECTIVE EROSION CONTROL BLANKETS MAY BE APPLIED ACROSS THE SLOPE.

NOTE:
WHERE THERE IS A BERM AT THE TOP OF THE SLOPE, BRING THE MATERIAL OVER THE BERM AND ANCHOR IT BEHIND THE BERM.

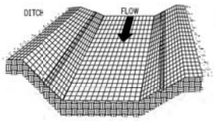




NOTE:
ON STEEP SLOPES, APPLY PROTECTIVE BLANKET PERPENDICULAR TO THE DIRECTION OF FLOW AND ANCHOR SECURELY.

TOP OF SLOPE BLANKET ANCHOR SLOT

NOTE:
BRING MATERIAL DOWN TO A LEVEL AREA BEFORE TERMINATING THE INSTALLATION.



NOTE:
IN DITCHES, APPLY PROTECTIVE COVERING PARALLEL TO THE DIRECTION OF FLOW. USE CHECK SLOTS AS REQUIRED. AVOID JOINING MATERIAL IN THE CENTER OF THE DITCH IF AT ALL POSSIBLE. FOLLOW BLANKET MANUFACTURER'S RECOMMENDATIONS FOR ALLOWABLE VELOCITY AND SHEAR STRESS.

EROSION CONTROL BLANKET NOTES (1 OF 2):

A) SITE PREPARATION:

AFTER SITE HAS BEEN SHAPED AND GRADED, PREPARE A FRIABLE SEEDBED RELATIVELY FREE FROM CLODS AND ROCKS (ORE THAN 1 1/2 INCHES IN DIAMETER AND ANY FOREIGN MATERIAL THAT WILL PREVENT UNIFORM CONTACT OF THE PROTECTIVE COVERING WITH THE SOIL SURFACE.

B) PLANTING:

LIME, FERTILIZE, AND SEED IN ACCORDANCE WITH SEEDING OR PLANTING PLAN. WHEN USING JUTE MESH ON A SEEDED AREA, APPLY APPROXIMATELY ONE HALF THE SEED AFTER LAYING THE MAT. THE PROTECTIVE COVERING CAN BE LAID OVER SPROUTED AREAS WHERE SMALL GRASS PLANTS HAVE BEEN INSERTED INTO THE SOIL. WHERE GROUND COVERS ARE TO BE PLANTED, LAY THE PROTECTIVE COVERING FIRST AND THEN PLANT THROUGH THE MATERIAL AS PER PLANTING PLAN.

C) LAYING AND STAPLING:

IF INSTRUCTIONS HAVE BEEN FOLLOWED, ALL NEEDED CHECK SLOTS WILL HAVE BEEN INSTALLED, AND THE PROTECTIVE COVERING WILL BE LAID ON A FRIABLE SEEDBED FREE FROM CLODS, ROCKS, ROOTS, ETC. THAT MIGHT IMPEDE GOOD CONTACT.

1. START LAYING THE PROTECTIVE COVERING FROM THE TOP OF THE CHANNEL OR SLOPE AND UNROLL DOWN-GRADE. ALLOW TO LAY LOOSELY ON SOIL; DO NOT STRETCH.
2. UPSLOPE ENDS OF THE BLANKET SHOULD BE BURIED IN AN ANCHOR SLOT NO LESS THAN 6-INCHES DEEP. TAMP EARTH FIRMLY OVER THE MATERIAL. WHEN TOP IS RELATIVELY FLAT, EXTEND BLANKET ABOUT 40 INCHES AWAY FROM SLOPE. STAPLE THE MATERIAL AT A MINIMUM OF EVERY 12 INCHES ACROSS THE TOP END.
3. EDGES OF THE MATERIAL SHALL BE STAPLED EVERY 3 FEET. WHERE MULTIPLE WIDTHS ARE LAID SIDE BY SIDE, THE ADJACENT EDGES SHALL BE OVERLAPPED A MINIMUM OF 6 INCHES AND STAPLED TOGETHER.
4. STAPLES SHALL BE PLACED DOWN THE CENTER, STAGGERED WITH THE EDGES AT 3-FOOT INTERVALS.

D) TROUBLESHOOTING:

CONSULT WITH A QUALIFIED DESIGN PROFESSIONAL, IF ANY OF THE FOLLOWING OCCUR:

1. MOVEMENT OF THE BLANKET OR EROSION UNDER THE BLANKET IS OBSERVED.
2. VARIATIONS IN TOPOGRAPHY ON SITE INDICATE EROSION CONTROL MAT WILL NOT FUNCTION AS INTENDED; CHANGES IN PLAN MAY BE NEEDED, OR A BLANKET WITH A SHORTER OR LONGER LIFE MAY BE NEEDED.
3. DESIGN SPECIFICATIONS FOR SEED VARIETY, SEEDING DATES, OR EROSION CONTROL MATERIALS CANNOT BE MET; SUBSTITUTION MAY BE REQUIRED. UNAPPROVED SUBSTITUTIONS COULD RESULT IN FAILURE TO ESTABLISH VEGETATION.

E) MAINTENANCE & INSPECTION

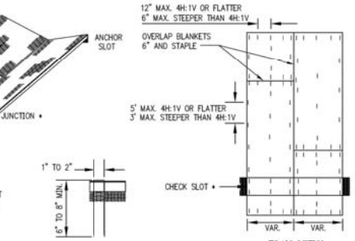
INSPECT CONTROLS AFTER EACH RAIN EVENT OF 1/2 INCH OR GREATER, AND EVERY 7 DAYS UNTIL VEGETATION IS ESTABLISHED, FOR EROSION OR UNDERMINING BENEATH THE NETTING, BLANKETS, OR MATS. IF ANY AREA SHOWS EROSION, PULL BACK THAT PORTION OF THE MATERIAL, ADD SOIL, TAMP DOWN, AND RESEED; RESECURE THE MATERIAL IN PLACE. IF NETTING, BLANKETS OR MATS BECOME DISLOCATED OR DAMAGED, REPAIR OR REPLACE AND RESECURE IMMEDIATELY.

SOURCE: MODIFIED FROM VA. DCR, 1992

AMERICAN PUBLIC WORKS ASSOCIATION
APWA KANSAS CITY METROPOLITAN CHAPTER
EROSION CONTROL BLANKET SHEET 1 OF 2
STANDARD DRAWING NUMBER ESC-04 ADOPTED:

EROSION CONTROL BLANKET INSTALLATION FOR CHANNELS

NOTE:
* JUNCTION: OVERLAP TOP BLANKET 6 INCHES MINIMUM AND STAPLE EVERY 6 INCHES ACROSS.



NOT TO SCALE

NOTE:
STAPLE FORMED FROM NO.11 STEEL WIRE.
MIN. 8" STAPLE LENGTH FOR SANDY SOIL.
MIN. 6" STAPLE LENGTH FOR OTHER SOIL.

PLAN VIEW STAPLING DIAGRAM

NOT TO SCALE

NOTE:
* CHECK SLOTS AT MIN. 50' INTERVALS; NOT REQUIRED WITH ALL COMBINATION BLANKETS

NOTE:
APPROXIMATELY 200 STAPLES ARE REQUIRED PER 100 SQ. YDS. OF MATERIAL ROLL. ANCHOR SLOTS, JUNCTION SLOTS, AND CHECK SLOTS TO BE BURIED 6" TO 12" DEEP.

ANCHOR SLOT

EROSION CONTROL BLANKET NOTES (2 OF 2):

F) STAPLES:

STAPLES FOR ANCHORING BLANKET SHALL BE NO. 11-GAUGE WIRE OR HEAVIER. THEIR LENGTH SHALL BE A MINIMUM OF 6 INCHES. A LARGER STAPLE WITH A LENGTH OF UP TO 12 INCHES SHALL BE USED ON LOOSE, SANDY, OR UNSTABLE SOILS.

G) JOINING PROTECTIVE COVERINGS:

OVERLAP THE END OF THE PREVIOUS ROLL A MINIMUM OF 6 INCHES AND STAPLE. STAPLE ACROSS THE END OF THE ROLL JUST BELOW THE ANCHOR SLOT AND ACROSS THE MATERIAL EVERY 6 INCHES.

H) TERMINAL END:

AT THE POINT AT WHICH THE MATERIAL IS DISCONTINUED, OR WHERE THE PROTECTIVE COVERING MEETS A STRUCTURE OF SOME TYPE, STAPLE A MINIMUM OF EVERY 12 INCHES.

I) FINAL CHECK:

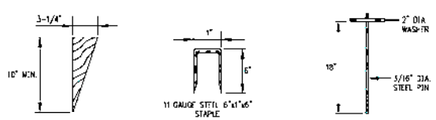
THESE INSTALLATION CRITERIA MUST BE ADHERED TO:

1. ALL DISTURBED AREAS ARE SEEDED.
2. PROTECTIVE BLANKET IS IN UNIFORM CONTACT WITH THE SOIL.
3. ALL LAP JOINTS ARE SECURE.
4. ALL STAPLES ARE DRIVEN FLUSH WITH THE GROUND.

SOURCE: MODIFIED FROM VA. DCR, 1992

AMERICAN PUBLIC WORKS ASSOCIATION
APWA KANSAS CITY METROPOLITAN CHAPTER
EROSION CONTROL BLANKET SHEET 2 OF 2
STANDARD DRAWING NUMBER ESC-05 ADOPTED:

STAKES, STAPLES, AND PINS



1. STAKE SEE NOTE 1

2. STAPLE SEE NOTE 2

3. PIN SEE NOTE 3

STAKES, STAPLES, AND PINS FOR INSTALLATION OF ROLLED EROSION CONTROL PRODUCTS

NOT TO SCALE

STAKES, STAPLES, AND PINS NOTES:

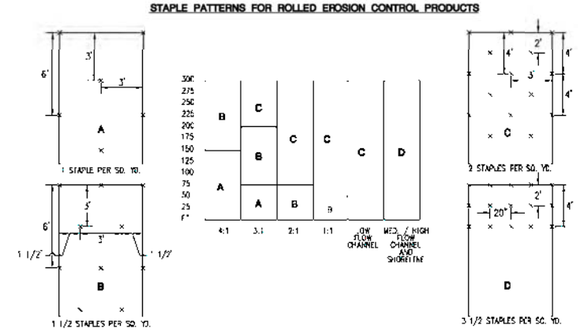
GENERAL NOTES:

1. STAKES SHALL BE 1x4 TRIANGULAR SURVEY STAKES A MINIMUM OF 10" IN LONG.
2. STAPLES SHALL BE 11 GAUGE STEEL A MINIMUM OF 1" WIDE BY 6" IN LONG. A 2"x8" STAPLE MAY BE REQUIRED IN CERTAIN SOIL CONDITIONS.
3. STEEL PINS SHALL BE 3/16 DIAMETER BY 18" IN LONG WITH A 2" DIAMETER WASHER ON TOP. (SEE ILLUSTRATION.)
4. ANCHORING METHODS AND RECOMMENDATIONS VARY BY MANUFACTURERS. THE EXPECTATION OF HIGH VELOCITIES SHOULD DICTATE THE USE OF MORE SUBSTANTIAL ANCHORING.

SOURCE: MODIFIED FROM VA. DCR, 1992

AMERICAN PUBLIC WORKS ASSOCIATION
APWA KANSAS CITY METROPOLITAN CHAPTER
STAKES, STAPLES, AND PINS
STANDARD DRAWING NUMBER ESC-06 ADOPTED:

STAPLE PATTERNS FOR ROLLED EROSION CONTROL PRODUCTS



GENERAL STAPLE PATTERN GUIDE AND RECOMMENDATIONS FOR ROLLED EROSION CONTROL PRODUCTS

NOT TO SCALE

NOTE:
FOR OPTIMUM RESULTS, THESE RECOMMENDED STAPLE PATTERN GUIDES MUST BE FOLLOWED UNLESS OTHERWISE DICTATED BY THE MANUFACTURER. SUGGESTED ANCHORING METHODS VARY BY MANUFACTURER. THIS CHART SHOWS HOW SLOPE LENGTHS AND GRADIENTS AFFECT STAPLING PATTERNS.

SOURCE: MODIFIED FROM VA. DCR, 1992

AMERICAN PUBLIC WORKS ASSOCIATION
APWA KANSAS CITY METROPOLITAN CHAPTER
STAPLE PATTERNS FOR ROLLED EROSION CONTROL PRODUCTS
STANDARD DRAWING NUMBER ESC-07 ADOPTED:

PRELIMINARY - NOT FOR CONSTRUCTION

no.	date	by	ckd	description

Burns & McDonnell SINCE 1898

date SEPTEMBER 27, 2013	detailed R. SEDLACEK
designed R. SEDLACEK	checked

PERENNIAL WIND CHASER STATION

UMATILLA COUNTY, OREGON

EROSION AND SEDIMENT CONTROL DETAILS - SHEET 2

project 55745	contract
drawing **CS033**	rev. –
sheet	of sheets

file 55745CS033.DGN

Scale For Microfilming Millimeters Inches

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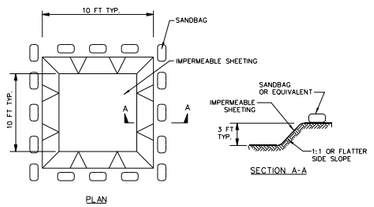
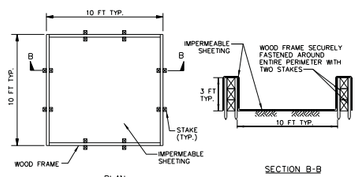
DETAIL H-6 ONSITE CONCRETE WASHOUT STRUCTURE

STANDARD SYMBOL
CWS



EXCAVATED WASHOUT STRUCTURE



WASHOUT STRUCTURE WITH WOOD PLANKS

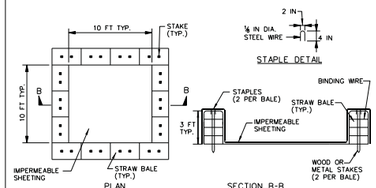
1 OF 2

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL H-6 ONSITE CONCRETE WASHOUT STRUCTURE

STANDARD SYMBOL
CWS



NOTE: CAN BE TWO STACKED BALES OR PARTIALLY EXCAVATED TO REACH 3 FT DEPTH

WASHOUT STRUCTURE WITH STRAW BALES

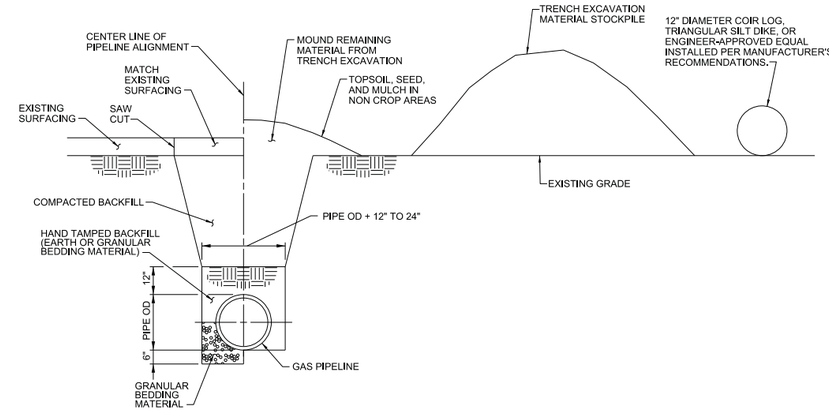
CONSTRUCTION SPECIFICATIONS

1. LOCATE WASHOUT STRUCTURE A MINIMUM OF 50 FEET AWAY FROM OPEN CHANNELS, STORM DRAIN INLETS, SENSITIVE AREAS, WETLANDS, BUFFERS AND WATER COURSES AND AWAY FROM CONSTRUCTION TRAFFIC.
2. SIZE WASHOUT STRUCTURE FOR VOLUME NECESSARY TO CONTAIN WASH WATER AND SOLIDS AND MAINTAIN AT LEAST 4 INCHES OF FREEBOARD. TYPICAL DIMENSIONS ARE 10 FEET X 10 FEET X 3 FEET DEEP.
3. PREPARE SOIL BASE FREE OF ROCKS OR OTHER DEBRIS THAT MAY CAUSE TEARS OR HOLES IN THE LINER. FOR LINER, USE 10 MIL OR THICKER UV RESISTANT, IMPERMEABLE SHEETING, FREE OF HOLES AND TEARS OR OTHER DEFECTS THAT COMPROMISE IMPERMEABILITY OF THE MATERIAL.
4. PROVIDE A SIGN FOR THE WASHOUT IN CLOSE PROXIMITY TO THE FACILITY.
5. KEEP CONCRETE WASHOUT STRUCTURE WATER TIGHT. REPLACE IMPERMEABLE LINER IF DAMAGED (E.G., RIPPED OR PUNCTURED). EMPTY OR REPLACE WASHOUT STRUCTURE THAT IS 75 PERCENT FULL, AND DISPOSE OF ACCUMULATED MATERIAL PROPERLY. DO NOT REUSE PLASTIC LINER. WET-VACUUM STORED LIQUIDS THAT HAVE NOT EVAPORATED AND DISPOSE OF IN AN APPROVED MANNER. PRIOR TO FORECASTED RAINSTORMS, REMOVE LIQUIDS OR COVER STRUCTURE TO PREVENT OVERFLOWS. REMOVE HARDENED SOLIDS, WHOLE OR BROKEN UP, FOR DISPOSAL OR RECYCLING. MAINTAIN RUNOFF DIVERSION AROUND EXCAVATED WASHOUT STRUCTURE UNTIL STRUCTURE IS REMOVED.

2 OF 2

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION



ROAD CROSSING **CROSS COUNTRY**

PIPE TRENCH
NOT TO SCALE

PRELIMINARY - NOT FOR CONSTRUCTION

no.	date	by	ckd	description

Burns & McDonnell SINCE 1898

date	detailed
SEPTEMBER 27, 2013	R. SEDLACEK
designed	checked
R. SEDLACEK	

PERENNIAL WIND CHASER STATION

UMATILLA COUNTY, OREGON

EROSION AND SEDIMENT CONTROL DETAILS - SHEET 3

project	contract
55745	

drawing **CS034** rev. –

sheet of sheets

file 55745CS034.DGN

Scale For Microfilming Millimeters Inches

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Oregon

John A. Kitzhaber, Governor

Department of Environmental Quality
Eastern Region Bend Office
475 NE Bellevue Drive, Suite 110
Bend, OR 97701
(541) 388-6146
FAX (541) 388-8283
TTY 711

February 6th, 2014

Andrea Goodwin, JD
Energy Facility Siting Analyst
Oregon Department of Energy
395 E. Highland Avenue
Hermiston, OR 97838

Re: Confirmation of Permit Application for Perennial Power Holdings, Inc.
1200-C Construction Stormwater Permit
Umatilla Counties

Dear Ms. Goodwin:

On January 7th, 2014, the Department of Environmental Quality (DEQ) received a National Pollutant Discharge Elimination System (NPDES) 1200-C permit application for stormwater discharge from the proposed construction Perennial Wind Chaser Station. The application was submitted to Jackie Ray, Eastern Region Water Quality Permit Coordinator, in DEQ's Pendleton office. Payment for the permit application was processed by Ms. Ray on January 7th, 2014.

Now that payment has been received, the permit application is complete with the exception of a site certification from the Oregon Department of Energy (ODOE) and submittal of a final Erosion and Sediment Control Plan (ESCP). The permit will be issued once a final ESCP meets the permit requirements and pending the determination by the Energy Facility Siting Council Final Order.

I have reviewed the submitted documents and I expect that DEQ will be able to issue the NPDES 1200-C construction stormwater permit for Perennial Wind Chaser Station within 30 days of receiving the site certificate from ODOE and upon review of the final version of the ESCP.

Should you have any questions about the content of this letter, please contact me at 541-633-2033 or ratliff.krista@deq.state.or.us.

Sincerely,

Krista Ratliff

Krista Ratliff
Natural Resource Specialist, Stormwater
DEQ - Eastern Regiou
475 NE Bellevue Dr., Suite #110
Bend, OR 97701

EXHIBIT J

JURISDICTIONAL WETLANDS
OAR 345-021-0010(1)(j)

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Appendix J-1 Wetland Delineation Report

Appendix J-2 DSL Concurrence Letter

J.1 INTRODUCTION

OAR 345-021-0010(1)(j) *Information based on literature and field study, as appropriate, about waters of this state, as defined under ORS 196.800.*

Response: This exhibit identifies and describes existing waters of the state or waters of the United States based on desktop analysis and field surveys conducted by Ecology and Environment Inc. (E & E) in 2013, within the Perennial Wind Chaser Station project (Project) Site Boundary.

As defined by ORS 141-090-0020(32), "Study Area means the area that was investigated for the presence of waters of this state (e.g., usually a portion of a tax lot(s), parcel or other legally defined geographic area)." The study area for this exhibit is defined as the location of all Project components where surface disturbing activities will occur during construction or operation. These areas include the Perennial Wind Chaser Station (Station), the temporary laydown area, the step-up substation and associated underground transmission cable, and the natural gas pipeline right-of-way (ROW) (Figure J-1). The study area does not include the existing transmission line ROW because the Project will not involve surface disturbing activities during construction or operation of this facility. Rather, the Umatilla Electric Cooperative 115-kilovolt (kV) lines within the existing ROW from the Hermiston Generating Plant to Bonneville Power Administration's McNary Substation will be replaced with the Station's 230-kV lines. To replace the 115-kV lines with 230-kV lines will involve rubber tired vehicles transporting materials and personnel along the existing ROW as well as machinery and vehicles (i.e., bucket trucks and cranes) necessary to remove and replace the lines. It is not anticipated that ground disturbing activities (i.e., digging, placing fill on ROW, or using tracked vehicles) will be necessary as part of this Project.

Appendix J-1 contains the revised Wetland Delineation Report submitted to the Oregon Department of State Lands (DSL) on May 14, 2014 (supersedes the original December 19, 2013 submission). On July 17, 2014, the DSL issued a letter of concurrence for the revised Wetland Delineation Report. Approved wetland delineation maps that were appended to the concurrence letter have been incorporated into the revised Wetland Delineation Report in Appendix J-1. The letter of concurrence is presented in Appendix J-2.

Wetland Report Delineation Report Figures A-1 and A-2 show the Project location and the delineation study area, respectively, and Figures A-3a through A-3d show the tax lots in relation to the delineation study area.

The following information was reviewed prior to conducting field surveys:

- United States Geological Survey 7.5-minute topographic maps;
- National Wetlands Inventory (NWI) digital data;

- Soil Survey of Umatilla County;
- National Cooperative Soil Survey's web soil survey;
- National Hydrography Dataset (NHD) digital data;
- Aerial imagery; and
- Precipitation data from National Oceanic and Atmospheric Administration.

The literature review of the above-referenced existing information identified no NWI-mapped wetlands within the study area. No hydric soils are mapped in the study area, and no springs are mapped on the topographic maps. Three canals were identified from aerial imagery and topographic maps. Wetland Delineation Report Figures A-5a through A-5p show the Project features in relation to mapped NWI wetlands, and NHD data.

Field surveys of the study area were conducted on May 9 and August 1, 2013. E & E biologists followed methodologies described in the *1987 U.S. Army Corps of Engineers Wetland Delineation Manual* and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region*. The lateral extent of federal jurisdiction of waterbodies under Section 404 of the Clean Water Act (CWA) is delineated by the ordinary high water mark (OHWM). For this project, the OHWM of waterbodies within the study area was determined using the guidelines provided in *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the United States*. The Wetland Delineation Report (Appendix J-1) presents survey results, including the location of delineated wetlands and waterbodies in Figures A-4a to A-4d. Soil types present in the Project area are shown in Wetland Delineation Report Figures A-6a to A-6d.

J.2 POTENTIAL WATERS OF THE STATE OR WATERS OF THE UNITED STATES

OAR 345-021-0010(1)(j)(A) *A description of all areas within the site boundary that might be waters of this state and a map showing the location of these features.*

Response: The site boundary for this Project is equivalent to the study area as defined in Section J.1 of this exhibit. A summary description of the waters of the state or waters of the United States located within the study area is provided in Table J-1 below. The Wetland Delineation Report is attached as Appendix J-1. This report presents the datasheets, maps, and photo logs for the wetlands and waterbodies located within the study area in accordance to the specifications discussed during an early DSL consultation conference call with Lynne McAllister and Jevra Brown that took place on June 21, 2013. The report was submitted, for concurrence, to the DSL on December 19, 2013. Comments and a request for additional data were issued by DSL on April 15, 2014, and Perennial provided a revised Delineation Report on May 14, 2014 (Appendix J-1).

There are no wetlands and three waterbodies are located within the study area, as shown in the summary table below.

Table J-1 Summary of Waters of the State within the Study Area

Waterbody ID/Name	Approximate Mile Post	Waterbody Type	Flow Type	Crossing Method	Approximate Impact Acreage
SS-001-001 High Line Canal	1.9	Canal	Intermittent	Bore under canal	0
SS-001-002 Westland A Canal	1.15	Canal	Intermittent	Bore under canal	0
SS-001-003 Westland A Canal	0.00/Station and Temporary Laydown Area	Canal	Intermittent	Bridge over canal	0

J.2.1 SS-001-001 High Line Canal

Waterbody SS-001-001, named High Line Canal, is an intermittent canal flowing west. This canal is located at approximate mile post (MP) 1.9 along the natural gas pipeline. The canal is characterized by a stream bed width of 25 feet and 2- to 3-foot bank heights, above the OHWM. The bank slopes are steep and average between 46 and 60 degrees. Substrate material is sand, with a depth of water measured at over 37 inches deep during the May 9, 2013, site visit. The proposed construction method for this canal is to bore under the canal with no disturbance occurring within or adjacent to the channel. The entrance and exit pits for boring under the canal will be located far enough away from the canal to not disturb the canal or the area adjacent to the canal. The boring will also be deep enough to not disturb the bottom of the canal. The field datasheet, representative photos, and feature location map are included in Appendix J-1.

J.2.2 SS-001-002 Westland A Canal First Crossing

Waterbody SS-001-002, named Westland A Canal, is an intermittent canal flowing west. This canal is located at approximate MP 1.15 along the natural gas pipeline ROW. The canal is characterized by a stream bed width of 24 feet and 3-foot bank heights, above the OHWM. The bank slopes are steep and average between 46 and 60 degrees. Substrate material is sand, with a depth of water measured at over 37 inches deep during the May 9, 2013, site visit. The proposed construction method for this canal is to bore underneath, with no disturbance occurring within or adjacent to the channel. The entrance and exit pits for boring under the canal will be located far enough away from the canal to not disturb the canal or the area adjacent to the canal. The boring will also be deep enough to not disturb the bottom of the canal. The field datasheet, representative photos, and feature location map are included in Appendix J-1.

J.2.3 SS-001-003 Westland A Canal Second Crossing

Waterbody SS-001-003, the second Project crossing of the Westland A Canal, is an intermittent canal flowing north. This canal is located at approximate MP 0.00. The canal is characterized by a stream bed width of 25 feet and 3- to 4-foot bank heights, above the OHWM. The bank slopes are steep and average between 61 and 90 degrees. Substrate material is sand, with a depth of water measured at over 37 inches deep during the May 2013 site visit. The proposed construction method for this canal is to build a bridge over the top of the banks, with no disturbance occurring within or adjacent to the channel. The field datasheet, representative photos, and feature location map are included in Appendix J-1.

J.3 ANALYSIS OF POTENTIAL IMPACTS TO WATERS OF THE STATE OR WATERS OF THE UNITED STATES

OAR 345-021-0010(1)(j)(B) *An analysis of whether construction or operation of the proposed facility would adversely affect any waters of this state.*

Response: The Project will have no impact on any of the three waters of the state located within the study area, as shown in Table J-1. All three waterbodies are canals with intermittent flow, controlled by the local irrigation districts or local landowners. Per correspondence with the Westland Irrigation District, all three canals are dewatered seasonally (manually diverted) and used only for irrigation.[1] Field observations additionally indicate that the canals do not likely provide any spawning, rearing, or food-producing areas for fish within the study area. During construction, the Project will have no impact on any of the three waterbodies because one waterbody will be crossed by a bridge, and two will be crossed by underground bore or horizontal directional drill methods. No disturbance will occur above the OHWM or within the associated riparian areas. No removal or fill will occur below the OHWM, as determined by field surveys, during construction or operation of the Project. If unforeseen circumstances limit the use of bore or horizontal directional drill methods, the trenching method would be utilized in coordination with the irrigation district.

[1] Don Wardwell (Ecology and Environment, Inc.) phone interview with Westland Irrigation District on September 11, 2013.

J.4 DESCRIPTION OF SIGNIFICANT POTENTIAL IMPACTS TO EACH WATER FEATURE

OAR-345-021-0010(1)(j)(C) *A description of the significance of potential adverse impacts to each feature identified including the nature and amount of material the applicant would remove from or place in the waters.*

Response: As described above, no removal or fill will occur in any of the waters of the state within the study area during construction or operation of the Project. Therefore, the Project will have no significant impacts to waters of the state.

J.5 EXPLANATION OF WHY A REMOVAL-FILL AUTHORIZATION WOULD NOT BE REQUIRED, IF APPLICABLE

OAR 345-021-0010(1)(j)(D) *If the proposed facility would not need a removal-fill authorization, an explanation of why no such authorization is required for the construction and operation of the proposed facility.*

Response: Perennial-WindChaser LLC (Perennial) does not anticipate the need for a removal-fill authorization because the Project will have no temporary or permanent impact on waters of the state or waters of the United States as a result of its construction or operation. No wetlands are located within the study area; therefore, the Project will have no impacts on wetlands. Three waterbodies are located within the study area; however, no removal-fill will occur in these waterbodies, and impacts to these waterbodies will be avoided by one bridged crossing and two bored crossings.

J.6 EVIDENCE THAT REMOVAL-FILL PERMITS CAN BE ISSUED

OAR 345-021-0010(1)(j)(E) *If the proposed facility would need a removal-fill authorization, information to support a determination by the Council that the Oregon Department of State Lands should issue a removal-fill permit, including information in the form required by the Department of State Lands under OAR Chapter 141 Division 85.*

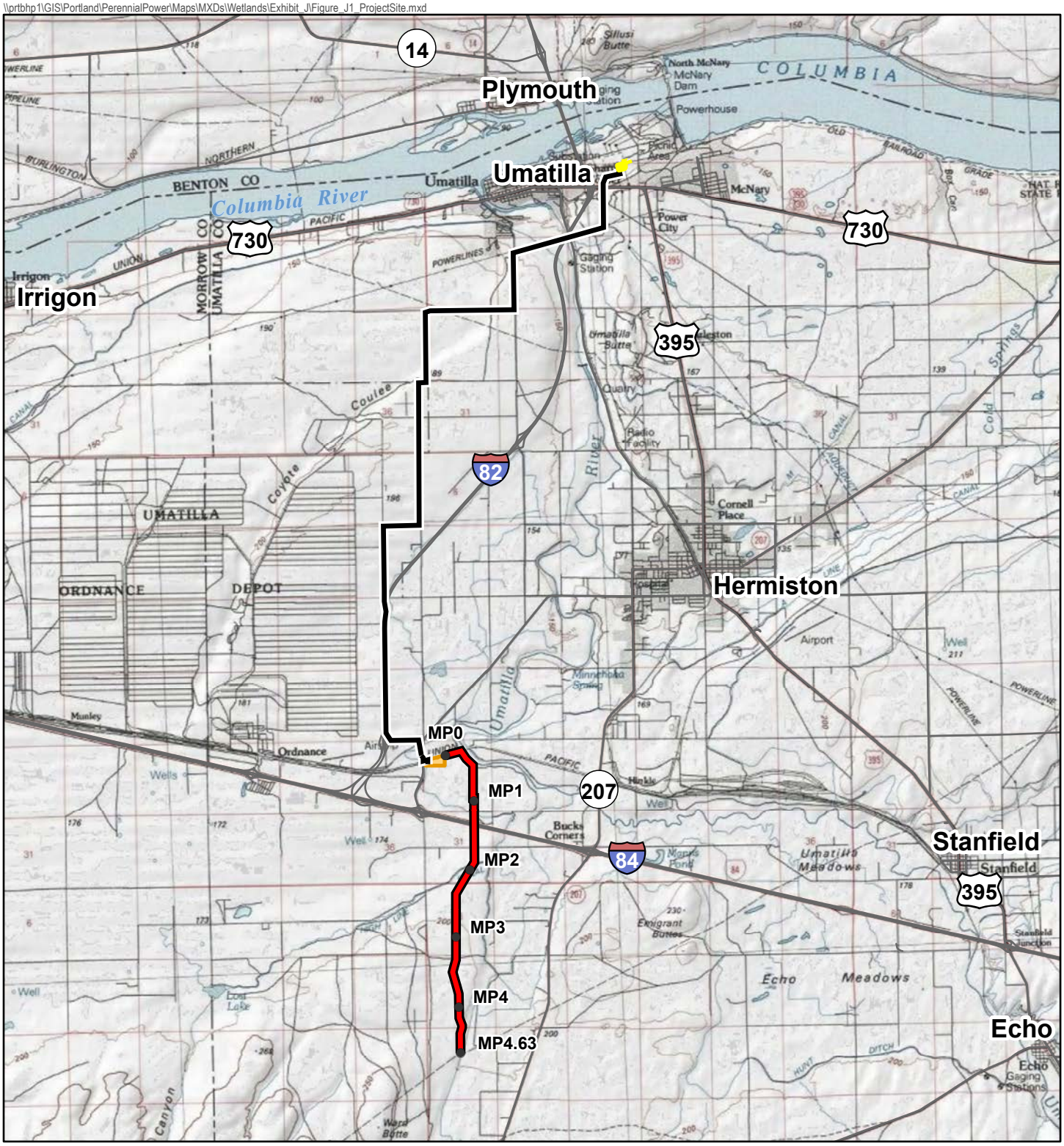
Response: Perennial does not anticipate the need for a removal-fill authorization and thus will not apply for a removal-fill authorization.

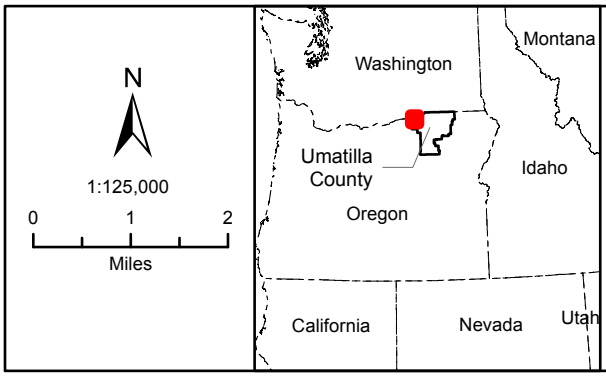
J.7 MITIGATION FOR IMPACTS TO WATER FEATURES

OAR 345-021-0010(1)(j)(F) *A description of proposed actions to mitigate adverse impacts to the features identified and the applicant's proposed monitoring program, if any, for such impacts.*

Response: Perennial has designed the Project to bridge over or bore under the three waterbodies within the study area. In addition, best management practices will be utilized during and after construction to prevent and minimize sedimentation. Construction and operation of the Project are not anticipated to impact any waters of the state or waters of the United States. There will be no removal-fill and no significant adverse impacts to waters of the state or waters of the United States within the study area. Therefore, no compensatory mitigation or monitoring will be necessary.

\\prtbhp1\GIS\Portland\PerennialPower\Maps\MXDs\Wetlands\Exhibit_J\Figure_J1_ProjectSite.mxd





Project Features

- Mileposts
- Existing Transmission Line -(outside the Study Area)
- Natural Gas Pipeline
- Perennial Wind Chaser Station
- Underground Transmission Line and Step-up Substation

Source: ESRI 2010

Figure J-1

Project Site

Perennial Wind Chaser Station and Its Associated Facilities

Coordinate System: NAD 1983 State Plane Oregon North FIPS 3601 (Intl Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Note:
1. Field Data Accurate to +/- 1 meter

APPENDIX J-1

Wetland Delineation Report

Wetland Delineation Report
Perennial Wind Chaser Station

May 2014

Prepared for:

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List of Abbreviations and Acronyms

BMPs	Best Management Practices
CGWA	Critical Ground Water Area
E & E	Ecology and Environment, Inc.
GPS	global positioning system
HGP	Hermiston Generating Plant
kV	kilovolt
MP	milepost
NRCS	Natural Resources Conservation Service
NWI	National Wetland Inventory
OHWM	ordinary high water mark
Perennial	Perennial-WindChaser LLC
Project	Perennial Wind Chaser Station project
survey area	Perennial Wind Chaser Station site, temporary laydown area, step-up substation and underground transmission line site, and natural gas pipeline right-of-way
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service

Executive Summary

This report presents the results of a delineation of waters of the United States that may be temporarily and/or permanently affected during the construction and operation of the Perennial Wind Chaser Station project (referred to herein as the Project). The Project, proposed by Perennial-WindChaser LLC, comprises a natural gas combustion turbine electrical generating plant (referred to herein as the Station) and an associated transmission line and natural gas pipeline in western Umatilla County, near Hermiston, Oregon. The delineation was performed to determine the presence of wetlands and waterbodies within the boundaries of potential disturbance resulting from construction of the Project. It was also performed to generate information necessary to support a Preliminary Jurisdictional Determination and potential application for a Nationwide Permit 12, regulated under Section 404 of the Clean Water Act, and other state applications.

The Project Site is located approximately 3 miles southwest of Hermiston, Oregon, near the existing Hermiston Generating Plant in Umatilla County, Oregon. The site currently consists of open farmland and other heavy and light industrial uses. The Station will have a peak generating capacity of up to 415 megawatts, produced by four simple-cycle generating blocks. Its estimated operation is an equivalent of 4,400 hours annually at full load, thus enabling the balancing and supplementing of energy generated from wind facilities within the grid.

The Project comprises the following components:

- New natural gas combustion turbine electrical generating plant (Station);
- Temporary laydown area;
- New step-up substation and underground transmission line;
- Natural gas pipeline;
- Upgrades to existing transmission line conductors; and
- New transmission line tie-in.

The jurisdictional delineation of waters of the United States for the Project was performed by Ecology and Environment, Inc. within almost the entirety of the Project Site Boundary, including the Station site, temporary laydown area, step-up substation and underground transmission line site, and natural gas pipeline right-

of-way ("survey area"). Oregon Administrative Rule (OAR) 345-001-0010 defines Site boundary as "the perimeter of the site of a proposed energy facility, its related or supporting facilities, all temporary laydown and staging areas and all corridors and micrositing corridors proposed by the applicant." For the purposes of this wetlands delineation report, the study area, the location of all Project components where surface disturbing activities will occur during construction or operation, includes all project features within the Project Site Boundary with the exception of the existing transmission line ROW. The study area does not include the existing transmission line ROW because the reconductoring of the transmission line is not expected to result in any ground disturbance due to the fact that there will only be equipment on the ground. No excavation or earth moving of any type is expected; therefore, this area was not surveyed. A tie-in length to connect the Project with the existing Hermiston Generating Plant line (estimated to be approximately 0.49 acres) was not identified at the time of the August survey and will be surveyed at a later date. Surveys were conducted May 9 and August 1, 2013, and found no wetlands and three waterbodies located within the Site Boundary. All three waterbodies are man-made canals controlled by the managing local irrigation districts or local landowners.

1 Landscape Setting and Land Use

This report presents the results of delineation of waters of the United States that may be temporarily and/or permanently affected during the construction and operation of the Perennial Wind Chaser Station project (referred to herein as the Project). The Project, proposed by Perennial-WindChaser LLC (Perennial) comprises a natural gas combustion turbine electrical generating plant (referred to herein as the Station) and an associated transmission line and natural gas pipeline in western Umatilla County, near Hermiston, Oregon (Figure A-1). The delineation was performed to determine the presence of wetlands and waterbodies within the boundaries of potential disturbance resulting from installation of the Project. It was also performed to generate information necessary to support a Preliminary Jurisdictional Determination and potential application for a Nationwide Permit 12, regulated under Section 404 of the Clean Water Act and other state applications. Nationwide Permit 12 authorizes discharge of dredged material associated with activities for construction (excavation, backfill, or bedding); maintenance; and repair of utility lines and associated facilities, including pipelines, provided that the activity meets the terms of the Nationwide 12 Permit and additional specific conditions stipulated by the permit.

The Project will be located approximately 3 miles southwest of Hermiston, Oregon, near the existing Hermiston Generating Plant (HGP) in Umatilla County, Oregon. The Station site is located in Township 4 North, Range 28 East, Willamette Meridian. The Site currently consists of open farmland and other heavy and light industrial uses.

The natural gas pipeline lateral will carry natural gas from an existing Gas Transmission Northwest (GTN) interstate pipeline to the Station site. The 4.63-mile lateral, to be operated by the Cascade Natural Gas Corporation, will tap the GTN pipeline south of the Station site. The existing transmission line will be connected to the existing Bonneville Power Administration McNary Substation via a new step-up substation (230 kilovolts [kV] to 500 kV) and underground transmission line located near the existing line. The Station will have a peak generating capacity of up to 415 megawatts, produced by four simple-cycle generating blocks. Its estimated operation is an equivalent of 4,400 hours annually at full load, thus enabling the balancing and supplementing of energy generated from wind facilities within the grid.

Total acreage for the Project Site is approximately 202 acres, consisting of 141.29 acres of land that will not be impacted during construction (transmission line, access roads, etc.); approximately 20 acres for the Station site; 28.06 acres for the natural gas pipeline; 3 acres for the step-up substation; and 0.55 acres for the underground transmission line. In total, approximately 36.58 acres will be used for temporary construction purposes. Acreages of component footprints are approximations; size of facilities could vary.

1.1 Landscape Setting

The Project Site is located in the Columbia Plateau ecoregion and Umatilla Plateau subdivision. The following description of this ecoregion has been adapted from Thorson et al. (2012): The Columbia Plateau is an arid sagebrush steppe and grassland that is flanked by moister, predominantly forested, mountainous ecoregions. The Umatilla Plateau is underlain by basalt and thin layers of loess deposits. Where loess deposits are thick, cultivation of winter wheat or irrigated alfalfa and barley is common. Rangeland dominates more rugged areas where loess deposits are thinner or nonexistent. In uncultivated areas, moisture levels are generally high enough to support grasslands of bluebunch wheatgrass (*Pseudoroegneria spicata*) and Idaho fescue (*Festuca idahoensis*).

The predominant land types within the Project Site Boundary are classified as cultivated crops and shrub/scrub, and the terrain is essentially flat. Adjacent land uses include existing utility facilities (HGP), industrial uses (Lamb Weston and Riverpointe Farms agricultural processing facilities), railway tracks, and farm uses. Dominant plant species documented during biological field surveys include cheatgrass (*Bromus tectorum*), tumblemustard (*Sisymbrium altissimum*), common fiddleneck (*Amsinckia intermedia*), Russian thistle (*Salsola kali*), squirrel tail (*Elymus elymoides*), scotch thistle (*Onopordum acanthium*), green rabbitbrush (*Chrysothamnus viscidiflorus*), sagebrush (*Artemisia spp*.), gray rabitbrush (*Ericameria nauseosa*), quackgrass (*Elymus repens*), cereal rye grass (*Secale cereal*), and sandberg's bluegrass (*Poa secunda*).

1.1.1 Waterbody Crossing and Water Resources

Three intermittent canals are located within the Site Boundary (Table 1-1). Two of the canals will be crossed by the natural gas pipeline; the third canal, located along the western edge of the Station site, will be crossed by a newly constructed bridge and an existing bridge through the temporary laydown area.A description of these canals is provided in Section 1.5 of this report, and maps, datasheets, and photo logs are provided in Attachments A, B, and C. No other surface waters are located within the Project survey area, and the Project will not cross any Source Water Protection areas.

Table 1-1 Summary of Waters of the State within the Project Site Boundary

Waterbody ID/Name	Approximate Mile Post	Waterbody Type	Flow Type	Crossing Method	Approximate Impact Acreage
SS-001-001 High Line Canal	1.9	Canal	Intermittent	Bore under canal	0
SS-001-002 Westland A Canal	1.15	Canal	Intermittent	Bore under canal	0
SS-001-003 Westland A Canal	0.00/Station and Tempo-rary Laydown Area	Canal	Intermittent	Bridge over canal	0

The Project will cross two Critical Ground Water Areas (CGWAs). The existing transmission line crosses the Butter Creek and Ordance Basalt CGWAs; however, no ground disturbance is proposed along this transmission line. The facility site and beginning of the natural gas pipeline are located within the Ordance Basalt CGWA, and the remainder of the natural gas pipeline is located within the Butter Creek CGWA. In addition, four groundwater wells were identified within the Site Boundary. Table 1-2 list the wells' proximity to the Project, and Figure 1-1 shows the location of the Project in relation to the CGWAs and groundwater wells.

Table 1-2 Groundwater Wells Within or Near the Project Site Boundary

ID	Latitude	Longitude	Nearest Project Feature	Distance from Project Feature (Feet)	Comment
Well 1	45.79012	-119.35632	natural gas pipeline	74	East of pipeline
Well 2	45.80325	-119.3679	energy facility site	77	North of substation
Well 3	45.80646	-119.3755	energy facility site	1809	NW of substation (close to transmission as well)
Well 4	45.92343	-119.30766	step-up substation	796	NE of the Step-up substation

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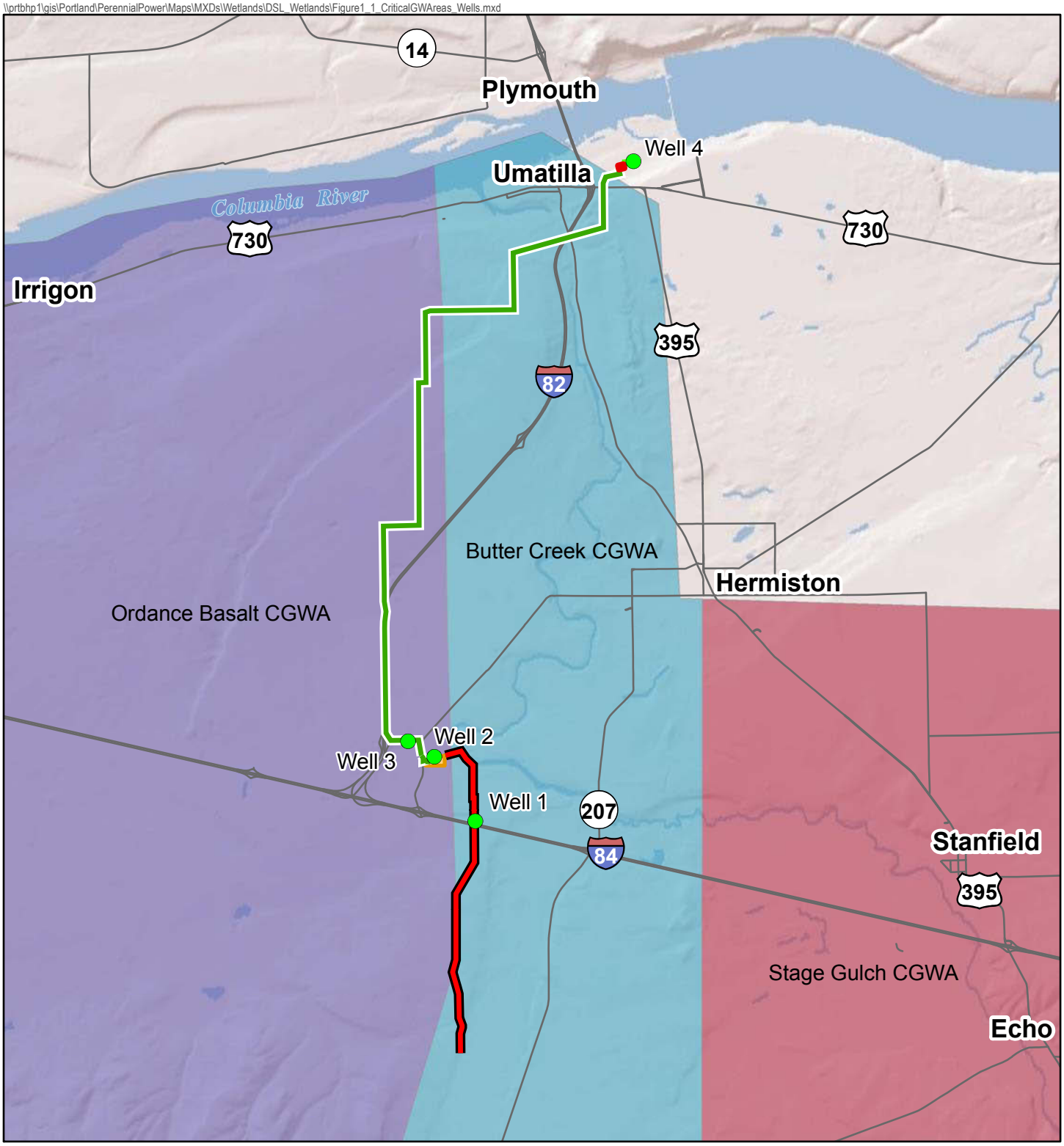

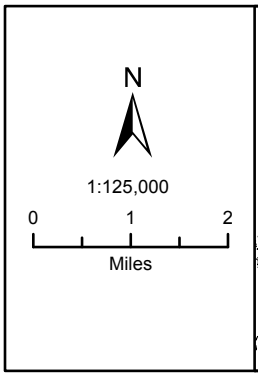

Project Features
- Natural Gas Pipeline
- 500-kV Transmission Line Connection
- Existing Transmission Line
- Perennial Wind Chaser Station
- Step-up Substation

CGWA Boundaries
- Butter Creek
- Ordance Basalt
- Stage Gulch
- Groundwater Wells

Source: ESRI 2010

Figure 1-1

Critical Groundwater Areas and Groundwater Wells

Perennial Wind Chaser Station and Its Associated Facilities

Perennial Wind Chaser Station

Coordinate System: NAD 1983 State Plane Oregon North FIPS 3601 (Intl Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Note:
1. Field Data Accurate to +/- 1 meter

1.1.2 Geologic Setting

The Project Site lies within the Columbia Basin physiographic province, east of the Cascade Mountain Range and just south of the Columbia River (Regional Ecosystem Office 1993). The geology of the Columbia River plateau consists of older volcanic formations overlain by the Columbia River Basalt Group, a series of flood basalt flows that erupted during the Miocene period in eastern Washington and flowed west, many ending along the Oregon coast. Thickness of individual basalt flows varies from 50 feet to 200 feet (Brown 1979).

Overlying the Columbia River Basalts are younger sedimentary and volcanic geologic units consisting of alluvium, landslides, river terrace deposits, catastrophic flood deposits, and loess deposits (Brown 1979). Because these sediments are highly susceptible to erosion, outcrops are rare, though they can be found in areas underneath a protective cap of younger volcanics (Brown 1979).

Geologic units that will be crossed by the Project include Gaciofluvial, Lacustrine, and Pediment sedimentary deposits (Pleistocene) and Wanapum Basalt (middle Miocene). There are two faults near the Site, one approximately 2 miles northwest and one approximately 4.4 miles southeast.

1.1.3 Local Soil Types

Soils underlying the Site (Table 1-3) were identified from the U.S. Department of Agriculture soils database (USDA 2013) with soil unit descriptions obtained from The *Umatilla County Area Soil Survey* (Johnson and Makison 1988). Soil maps of the project area are included in Attachment A, Figures A-5a through A-5d. Table 1-3 describes the soil units present within the Site Boundary.

Table 1-3 Soil Units within the Project Site

Soil Map Unit	Description
Adkins fine sandy loam, 0 to 5 percent slopes	This deep, well-drained soil is on strath terraces of the Columbia River. The surface layer is brown fine sandy loam about 4 inches thick. The subsoil is pale brown fine sandy loam about 8 inches thick. The substratum to a depth of 60 inches or more is light brownish gray and pale brown fine sandy loam. Permeability of this Adkins soil is moderate.
Adkins fine sandy loam, gravelly substratum, 0 to 5 percent slopes	This deep, well-drained soil is on strath terrace scarps of the Columbia River. The surface layer is brown fine sandy loam about 4 inches thick. The subsoil is pale brown fine sandy loam about 8 inches thick. The substratum to a depth of 60 inches or more is light brownish gray and pale brown fine sandy loam. Permeability of this Adkins soil is moderate.
Adkins fine sandy loam, gravelly substratum, 5 to 25 percent slopes	This deep, well-drained soil is on strath terraces of the Columbia River. It formed in gravelly alluvial deposits mantled by eolian sand. The surface layer is grayish brown fine sandy loam about 4 inches thick. The subsoil is brown fine sandy loam about 15 inches thick. The upper 26 inches of the substratum is brown fine sandy loam, and the lower part to a depth of 60 inches or more is grayish brown very gravelly fine sandy loam. Permeability of this Adkins soil is moderately rapid.

Table 1-3 Soil Units within the Project Site

Soil Map Unit	Description
Burbank loamy fine sand, 0 to 5 percent slopes	This deep, excessively drained soil is on strath terraces of the Columbia River. It formed in gravelly alluvial deposits mantled by eolian sand. The surface layer is brown loamy fine sand about 6 inches thick. The upper 19 inches of the underlying material is brown loamy fine sand, the next 5, inches is light brownish gray very gravelly loamy fine sand, and the lower part to a depth of 60 inches or more is dark gray extremely gravelly sand. Permeability of this Burbank soil is rapid to a depth of 30 inches and very rapid below this depth.
Pits, gravel	These area excavated areas of gravel, commonly mixed with sand or other soil material. Most of these areas are being mined for sand and gravel and support little vegetation. The pits that are abandoned support vegetation only in those areas in which soil material has accumulated. These areas occur within other units that consist of soils that have a gravelly substratum, such as the Quincy and Adkins soils. They also occur along the major drainage ways within the survey area.
Quincy fine sand, 0 to 5 percent slopes	This is a deep, excessively drained soil is on strath terraces of the Columbia River. The surface layer is grayish brown fine sand about 4 inches thick. The upper 23 inches of the substratum is grayish brown loamy fine sand, the next 12 inches is gray fine sand, and the lower part to a depth of 60 inches or more is light brownish gray fine sand. In some areas the surface layer is loamy fine sand or sand. Permeability of this Quincy soil is rapid.
Quincy loamy fine sand, 0 to 5 percent slopes	This is a deep, excessively drained soil is on strath terraces of the Columbia River. The surface layer is grayish brown loamy fine sand about 4 inches thick. The upper 23 inches of the substratum is grayish brown loamy fine sand, the next 12 inches is gray fine sand, and the lower part to a depth of 60 inches or more is light brownish gray fine sand. In some areas the surface layer is fine sand or sand. Permeability of this Quincy soil is rapid.
Quincy loamy fine sand, 5 to 25 percent slopes	This is a deep, excessively drained soil is on strath terraces of the Columbia River. The surface layer is grayish brown loamy fine sand about 4 inches thick. The upper 23 inches of the substratum is grayish brown loamy fine sand, the next 12 inches is gray fine sand, and the lower part to a depth of 60 inches or more is light brownish gray fine sand. In some areas the surface layer is fine sand or sand. Permeability of this Quincy soil is rapid.
Quincy loamy fine sand, gravelly substratum, 0 to 5 percent slopes	This is a deep, excessively drained soil is on strath terraces of the Columbia River. The surface layer is grayish brown loamy fine sand about 4 inches thick. The upper 23 inches of the substratum is grayish brown loamy fine sand, the next 14inches is gray fine sand, and the lower part to a depth of 60 inches or more is light brownish gray very gravelly fine sand. Depth to the gravelly substratum ranges from 40 to 60 inches. In some areas the surface layer is fine sand. Permeability of this Quincy soil is rapid.

Table 1-3 Soil Units within the Project Site

Soil Map Unit	Description
Xerofluvents, 0 to 3 percent slopes	This is a deep, somewhat poorly drained to excessively drained soils are on flood plains. The characteristics of Xerofluvents are variable. The surface layer ranges from loamy sand to very cobbly loam or silt loam. The underlying layer ranges from extremely gravelly or extremely cobbly sand to very cobbly or very gravelly loam. Permeability of these Xerofluvents is moderate to very rapid.
Xerollic Durorthids, 30 to 60 percent slopes	These are shallow to moderately deep, well drained soils are on terrace scarps. The surface layer ranges from fine sandy loam to very cobbly silt loam. The underlying layer ranges from very gravelly loam to very fine sandy loam. A cemented hardpan is at a depth of 10 to 40 inches. Permeability of these Xerollic Durorthids is moderate to a depth of 10 to 40 inches and very slow below this depth.

1.2 Site Alterations

All three waterbodies documented within the Site Boundary are man-made canals controlled by the managing local irrigation districts or local landowners. In addition, the natural landscape has been converted to farmland.

1.3 Precipitation Data and Analysis

In Pendleton, Oregon, approximately 29 miles southwest of the Project, the average annual precipitation is 12.76 inches per year (NOAA 2013). The Pendleton Airport station was selected for analysis because it is the nearest reliable weather station to the Project area.

Table 1-4 shows monthly precipitation data at Pendleton Airport in Umatilla County for the three months prior to the field surveys in May and August 2013.

Table 1-4 Daily Precipitation Totals for Pendleton Regional Airport, Umatilla County, Oregon (February 2013 through August 2013)

Date	February	March	April	May*	June	July	August*
Precipitation (in inches)							
1	0.00	0.00	0.00	0.00	0.00	0.00	0.22
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	T	0.00	0.00	0.00	0.00	T
4	0.00	0.00	0.18	0.00	0.00	0.00	0.00
5	T	0.08	T	0.00	0.00	0.00	0.00
6	T	0.12	0.07	0.00	0.00	0.00	0.00
7	T	0.00	0.14	0.00	0.00	T	0.00
8	0.00	0.00	T	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	T
10	0.00	0.05	0.02	0.00	0.00	0.00	0.00
11	0.00	T	0.00	0.00	0.00	0.01	0.00
12	0.00	0.00	0.04	0.00	0.00	0.00	0.00
13	0.00	0.00	0.00	0.13	T	0.00	0.00
14	0.00	T	0.00	0.00	T	0.00	0.00
15	0.00	0.00	0.09	T	0.00	0.00	0.00
16	T	0.04	0.00	0	T	0.05	0.02
17	0.00	0.00	0.00	0.00	T	0.00	0.00
18	T	0.00	0.01	T	0.03	0.00	0.00
19	0.01	0.02	0.37	0.00	0.04	0.00	0.00
20	0.00	0.12	0.00	0.00	T	0.00	0.00
21	T	T	0.03	0.36	0.13	0.00	0.0
22	0.10	T	0.00	0.22	T	0.00	T
23	0.00	0.00	0.00	0.00	0.22	0.00	0.00
24	0.00	0.00	T	0.18	0.19	0.00	0.00
25	0.07	0.00	0.00	0.00	0.18	0.00	0.08
26	0.00	T	0.00	0.02	0.09	0.00	0.00
27	0.00	0.07	T	0.11	0.00	0.00	0.00
28	0.21	0.03	T	0.06	0.00	0.00	0.00
29	--	0.00	0.00	0.10	0.00	0.00	0.00
30	--	0.00	T	0.00	0.00	0.00	0.00
31	--	0.00	--	0.00	--	0.00	0.00
Total	**0.39**	**0.53**	**0.95**	**1.18**	**0.88**	**0.06**	**0.32**

Source: NOAA 2013
* = Indicates survey month.
T – Values indicate a Trace value was recorded.

The observed 2013 precipitation and the 29-year average for the Project area are summarized in Table 1-5, below. Based on this analysis of WETS table data, precipitation conditions preceding surveys in May were considered dryer than normal, and conditions preceding the August survey were all considered "normal," except for July which was drier than normal.

Table 1-5 Comparison of Observed Rainfall to 29-Year Precipitation Averages for Survey Months and Three Months Prior; Pendleton, Oregon

Month	Observed for Month 2013 (Inches)[a]	29-Year Average for Month (Inches)[b]	Condition (using 30%-70% "Normal"[a] range)[c]
February	0.39	1.22	Dry
March	0.53	1.26	Dry
April	0.96	1.13	Dry
May[d]	1.18	1.22	Normal
June	0.88	0.78	Normal
July	0.06	0.41	Dry
August[d]	0.32	0.56	Normal

[a] NOAA 2013
[b] NRCS NWCC 2002
[c] Using 1997 NRCS procedure per USACE Wetland Delineation Manual Guidance (Environmental Laboratory 1987)
[d] Indicates a month in which surveys were conducted

Fieldwork was completed approximately two months prior to the end of the Water Year. To-date, monthly precipitation averaged 82 percent of the WETS table Water Year averages for February through August, and are summarized in Table 1-6.

Table 1-6 Observed Water Year Data with Percent of Average for Survey Months and Three Months Prior; Pendleton, Oregon

Month	2013 Water Year to Date (inches)[a]	29-Year Average Water Year (Inches)[b]	Percent of Average to Date
February	5.82	6.77	86%
March	6.35	8.03	79%
April	7.31	9.16	80%
May[c]	8.49	10.38	82%
June	9.37	11.16	84%
July	9.43	11.57	82%
August[c]	9.75	12.13	80%

[a] NOAA 2013
[b] NRCS NWCC 2013
[c] Indicates a month in which surveys were conducted.

2 Methods

Wetland and waterbody surveys of the Project Site were performed on May 9 and August 1, 2013, by Ecology and Environment, Inc. (E & E). The areas surveyed included the Station site, temporary laydown area, step-up substation and underground transmission line site, and new natural gas pipeline right-of-way (survey area). The reconductoring of the transmission line is not expected to result in any ground disturbance; therefore, this area was not surveyed. A tie-in length to connect the Project with the existing HGP line (estimated to be approximately 1,000 feet) has not yet been determined and will be surveyed at a later date.

Surveyors used the routine on-site determination methods outlined in the U.S. Army Corps of Engineers' (USACE) *Wetland Delineation Manual* (Environmental Laboratory 1987) and the *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (USACE 2008). According to these manuals, the identification of wetlands is based on a three-factor approach involving indicators of hydrophytic vegetation, hydric soil, and wetland hydrology. The Arid West Supplement covers all of the surveyed area, which is classified by the USACE as the Columbia/Snake Rivers Plateau. According to the Arid West Supplement for this subregion, the climate is semi-arid, with average annual temperatures of 40 to 49 degrees Fahrenheit in much of the area and average annual precipitation in lowland areas ranging from 6 to 20 inches (USACE 2008).

All waterways were identified based on the presence of a defined bed and bank. Where waterbodies were present, the centerline was recorded as a line feature and the banks as point features. Additional measurements included stream width, depth, and ordinary high water mark (OHWM). The OHWM was determined using the guidelines provided in *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the United States* (Lichvar and McColley 2008). Biologists also noted flow type, direction of flow, presence of water, name of feature (if named), presence of plant or wildlife species, potential presence of fish, and presence of runs, pools, or riffles. Data collected for waterbody delineations were recorded on global positioning system (GPS) units, in field log books, and on standardized data sheets (Attachment B).

Prior to engaging in field work, E & E staff reviewed background reference materials to familiarize personnel with the Project Site. These materials included

ortho-aerial photographs, U.S. Geological Survey topographic maps, National Wetland Inventory (NWI) (USFWS 2012), National Hydrography Dataset (USDA-NRCS May 2013), National Cooperative Soil Survey's web soil survey (USDA February 2013), and Soil Survey of the Umatilla County (Johnson and Makinson 2013).

Site-specific methods included surveying the area within the facility site boundary, a 25-foot buffer on either side of centerline for the 4.63-mile natural gas pipeline, and the step-up substation boundary, including a 50-foot buffer on either side of the centerline for the associated underground transmission line that ties into the McNary Substation (Figure A-2 and series A-3). Surveyors utilized field maps, including hydric soils maps, NWI maps, and topography maps, while in the field. Soil pits were dug in areas containing hydrophytic vegetation, different vegetation communities, and low areas to check for the presence of hydric soils. Weather during the 2013 field surveys was generally clear, with daily temperatures in the high 70s to low 90s Fahrenheit.

3 Wetlands and Other Non-Wetland Waters

3.1 Wetlands

No wetlands were identified during field surveys. An observation point was recorded at the lowest part of the step-up substation boundary and was determined to be non-wetland (XW-003-001, summarized in Table 3-1). The maps, datasheets, and photographs for this observation point are included in Attachments A, B, and C. Figure A-3a in Attachment A provides a detailed view of this location.

Table 3-1 Observation Summary

Feature ID	Observation	Reason for Sample	Tax Map Number
XW-003-001	Non wetland. Fallow agricultural field on loose, sandy-silt soil. No wetland indicators present.	Sample was collected in topographically lowest part of step-up station boundary. No green signature observed on aerials.	5N2816A000200

3.2 Other Jurisdictional Waters of the U.S.

Three waterbodies were documented during the field surveys. All three are man-made canals controlled by the managing local irrigation districts or local landowners. Summaries of the three canals are provided below.

The Umatilla River comes close to the study area at MP 0.3, however field surveys confirmed that the OHWM is located more than 50 feet away. Additionally, the mapped NHD line at MP 4.2 was investigated and is documented in table 3-2, and the Photolog (Attachment C).

Table 3-2 Observation Summary

Feature ID	Observations	Reason for sample	Tax Map Number
XS-001-001	Non-stream. Low area on edge of crop circle dominated by cheatgrass and kochia. Loose, sandy-silt soil. No stream bed or bank, and no wetland indicators present.	Sample was collected in topographic low, on mapped NHD line. Green signature present on aerials.	3N28000002300

3.2.1 SS-001-001

SS-001-001, named High Line Canal, is an intermittent canal flowing west. This canal is located at approximate milepost (MP) 1.9 along the proposed natural gas pipeline. The canal is characterized by a stream bed width of 25 feet with bank heights of 2 to 3 feet bank above the OHWM. The bank slopes are steep and average between 46 and 60 degrees. Substrate material is sand, with a depth of water measured to be over 37 inches deep during the May 2013 site visit. The proposed construction method for this canal is to bore under the canal with no disturbance occurring within or adjacent to the channel. The entrance and exit pits for boring under the canal will be located far enough away from the canal to not disturb the canal or the area adjacent to the canal. The boring will also be deep enough to not disturb the bottom of the canal. The maps, field datasheet, and representative photos, for this feature are included in Attachments A, B, and C. Refer to detailed Figure A-3d in Attachment A.

3.2.2 SS-001-002

SS-001-002, named Westland A Canal, is an intermittent canal flowing west. This canal is located at approximate MP 1.15 along the proposed natural gas pipeline. The canal is characterized by a stream bed width of 24 feet with bank heights of 3 feet above the OHWM. The bank slopes are steep, averaging between 46 and 60 degrees. Substrate material is sand, with a depth of water measured to be over 37 inches deep during the May 2013 site visit. The proposed construction method for this canal is to bore underneath, with no disturbance occurring within or adjacent to the channel. The entrance and exit pits for boring under the canal will be located far enough away from the canal to not disturb the canal or the area adjacent to the canal. The boring will also be deep enough to not disturb the bottom of the canal. The maps, field datasheet, and representative photos, for this feature are included in Attachments A, B, and C. Refer to detailed Figure A-3c in Attachment A.

3.2.3 SS-001-003

SS-001-003, the second Project crossing of the Westland A Canal, is an intermittent canal flowing north. This canal is located at approximate MP 0.00. The canal is characterized by a stream bed width of 25 feet with bank heights 3 to

4 feet above the OHWM. The bank slopes are steep, averaging between 61 and 90 degrees. Substrate material is sand, with a depth of water measured to be over 37 inches deep during the May 2013 site visit. The proposed construction method for this canal is to build a bridge over the top of the banks, with no disturbance occurring within or adjacent to the channel. The maps, field datasheet, and representative photos for this feature are included in Attachments A, B, and C. Refer to detailed Figure A-3b in Attachment A.

3.3 Deviation from LWI or NWI

No NWI-mapped wetlands are intersected by or within the survey area, and no Local Wetland Inventory was available (refer to Attachment A, Map series index A-2, and detailed Figures A-4a through 4d

3.4 Mapping Method

E & E used a Trimble GPS unit to map wetland and waterbody boundaries in the Project area in addition to desktop analysis based on field observations. The submeter-accurate GPS data were exported to a database format using ArcView and edited before linking with a geographic information system. All maps were created by E & E using these digitized data.

4 Disclaimer

This report documents the investigation, best professional judgment and conclusions of the investigator. It is correct and complete to the best of my knowledge. It should be considered a Preliminary Jurisdictional Determination of wetlands and other waters and used at your own risk unless it has been reviewed and approved in writing by the Oregon Department of State Lands in accordance with OAR 141-090-0005 through 141-090-0055.

5 Results and Conclusions

Field surveys found three man-made canals, and no wetlands, within the Project's Site Boundary. Table 5-1 summarizes these features.

Table 5-1 Summary of Delineated Features

Feature ID	Feature Type	Flow Type	Maximum OHWM Width	Tax Lot ID / Map Number(s)
SS-001-001	Irrigation Canal	Intermittent	25 feet	118284/ 4N28310001200
SS-001-002	Irrigation Canal	Intermittent	31 feet	135657/ 4N28310000100; 162547/ 4N28310000301
SS-001-003	Irrigation Canal	Intermittent	30 feet	118221/ 4N28300001500; 118231/ 4N28300001100; 118227/ 4N28300001200

If impacts are expected to occur to any wetland or stream feature as a result of future modifications to the Project design, further analysis may be required, including functional assessments.

6 References

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A Maps

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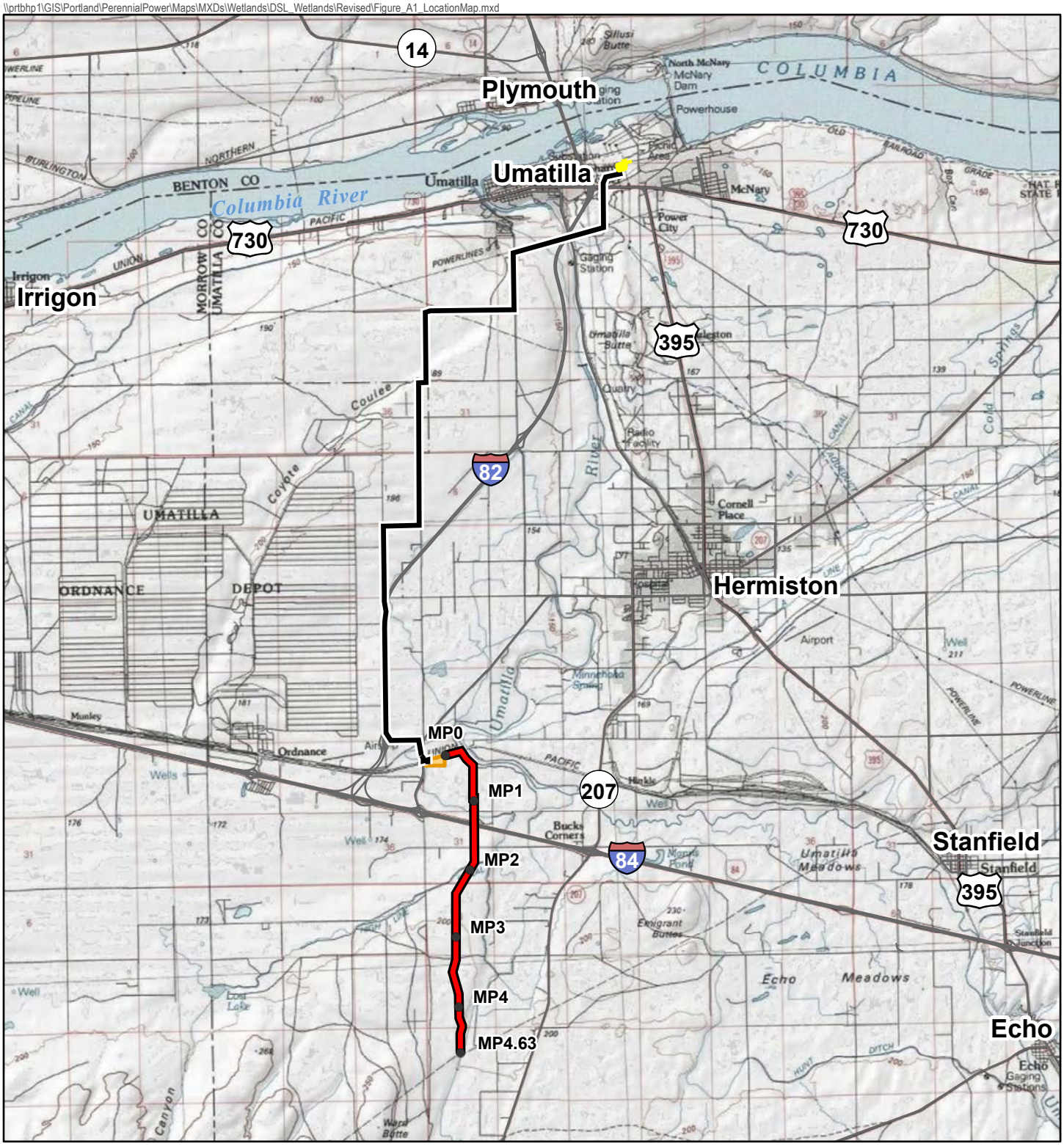

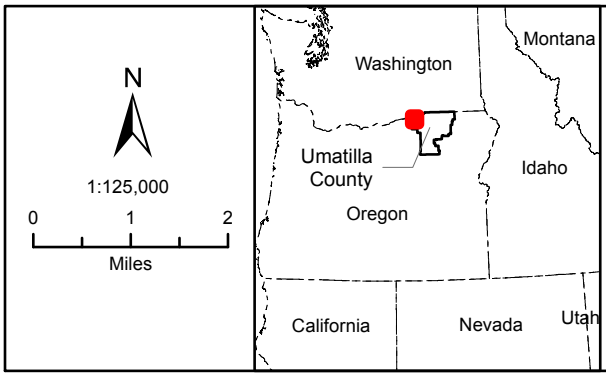

Project Features

- Mileposts
- Existing Transmission Line -(outside the Study Area)
- Natural Gas Pipeline
- Perennial Wind Chaser Station
- Underground Transmission Line and Step-up Substation

Source: ESRI 2010

Figure A-1
WD 2013-0415
Location Map

Perennial Wind Chaser Station and Its Associated Facilities

Coordinate System: NAD 1983 State Plane Oregon North FIPS 3601 (Intl Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Note:
1. Field Data Accurate to +/- 1 meter

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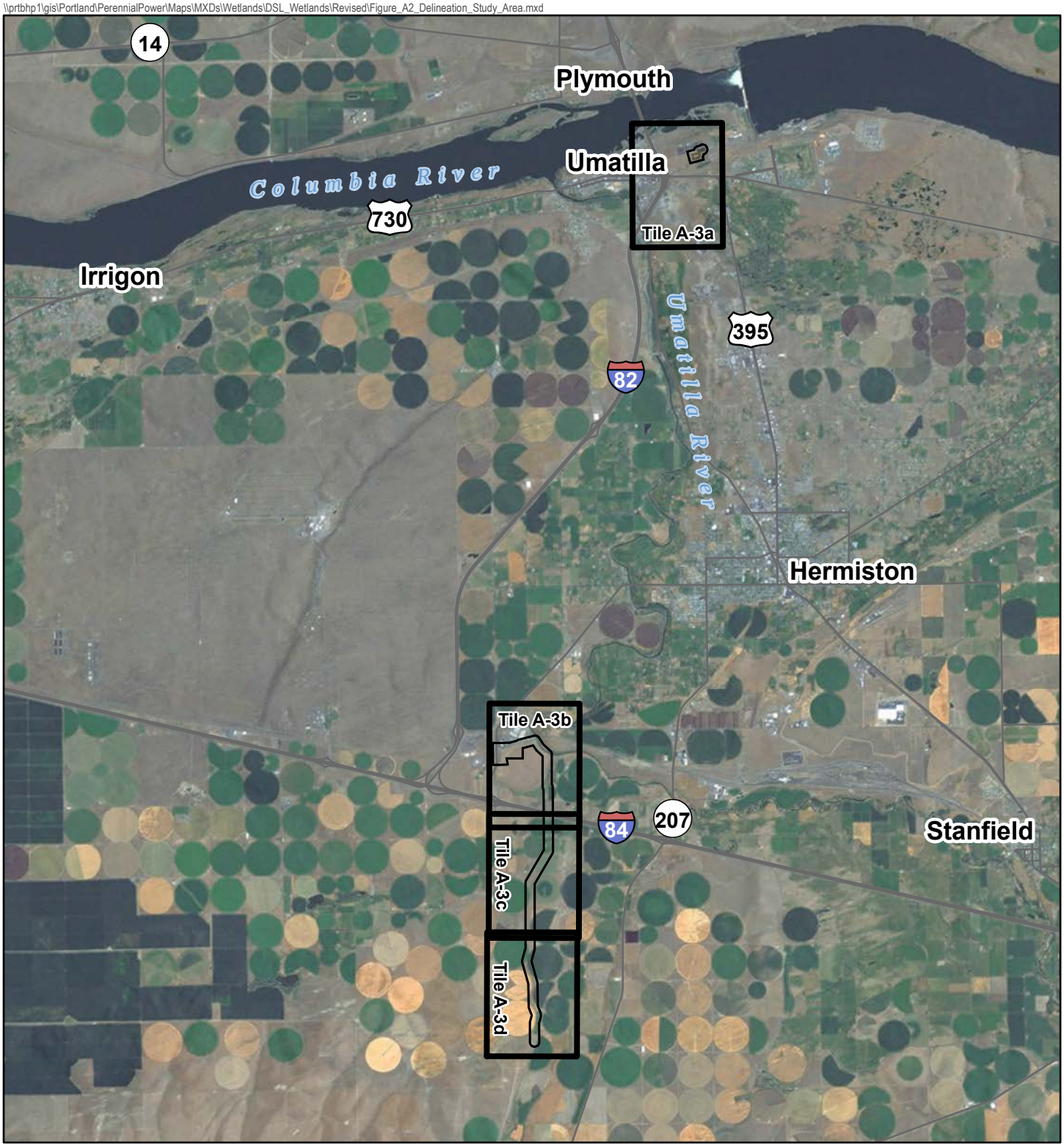

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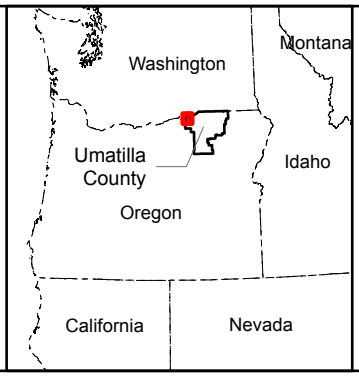

Project Features

Study Area

Source: ESRI Imagery 2010

Figure A-2

Delineation Study Area

Perennial Wind Chaser Station and Its Associated Facilities

Coordinates System: NAD 1983 State Plane Oregon North FIPS 3601 (Intl Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Note: 1. Field Data Accurate to +/- 1 meter

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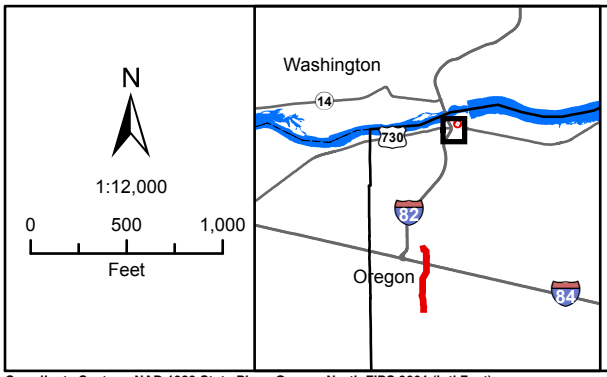

Project Features

- Study Area
- BPA McNary Substation
- Tax Lots

Figure A-3a
WD 2013-0415
Tax Lots and Tile Guide
Index Map

Perennial Wind Chaser
Station and Its
Associated Facilities

Source: ESRI Imagery 2010, Umatilla County Taxlots 2012

Coordinate System: NAD 1983 State Plane Oregon North FIPS 3601 (Intl Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Note:
1. Field Data Accurate to +/- 1 meter

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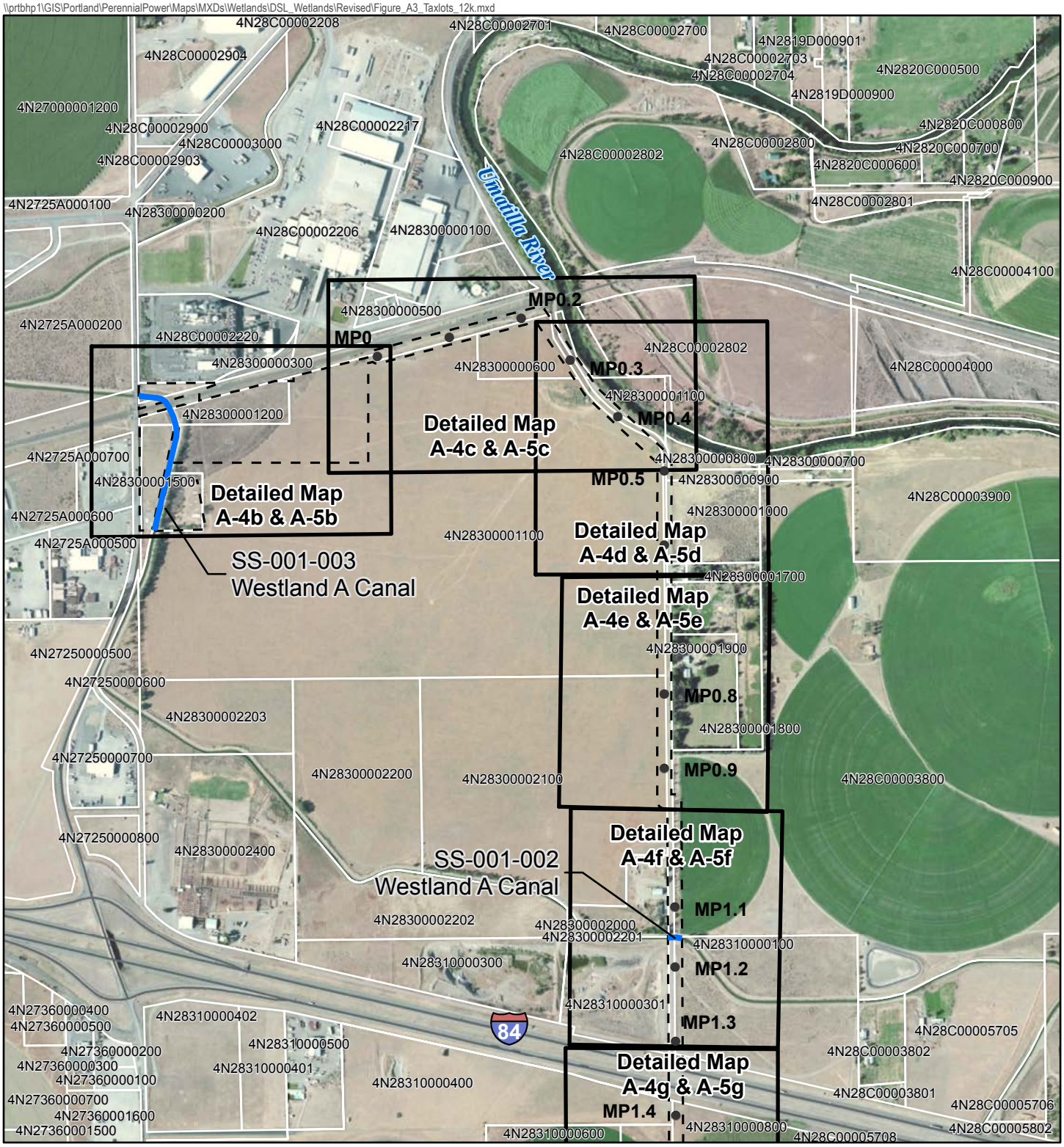

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Feet

Project Features

Study Area

Mileposts

Tax Lots

2013 Data

Delineated Stream

Source: ESRI Imagery 2010, Umatilla County Taxlots 2012

Figure A-3b
WD 2013-0415
Tax Lots and Tile Guide
Index Map

Perennial Wind Chaser
Station and Its
Associated Facilities

Coordinate System: NAD 1983 State Plane Oregon North FIPS 3601 (Intl Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Note:
1. Field Data Accurate to +/- 1 meter

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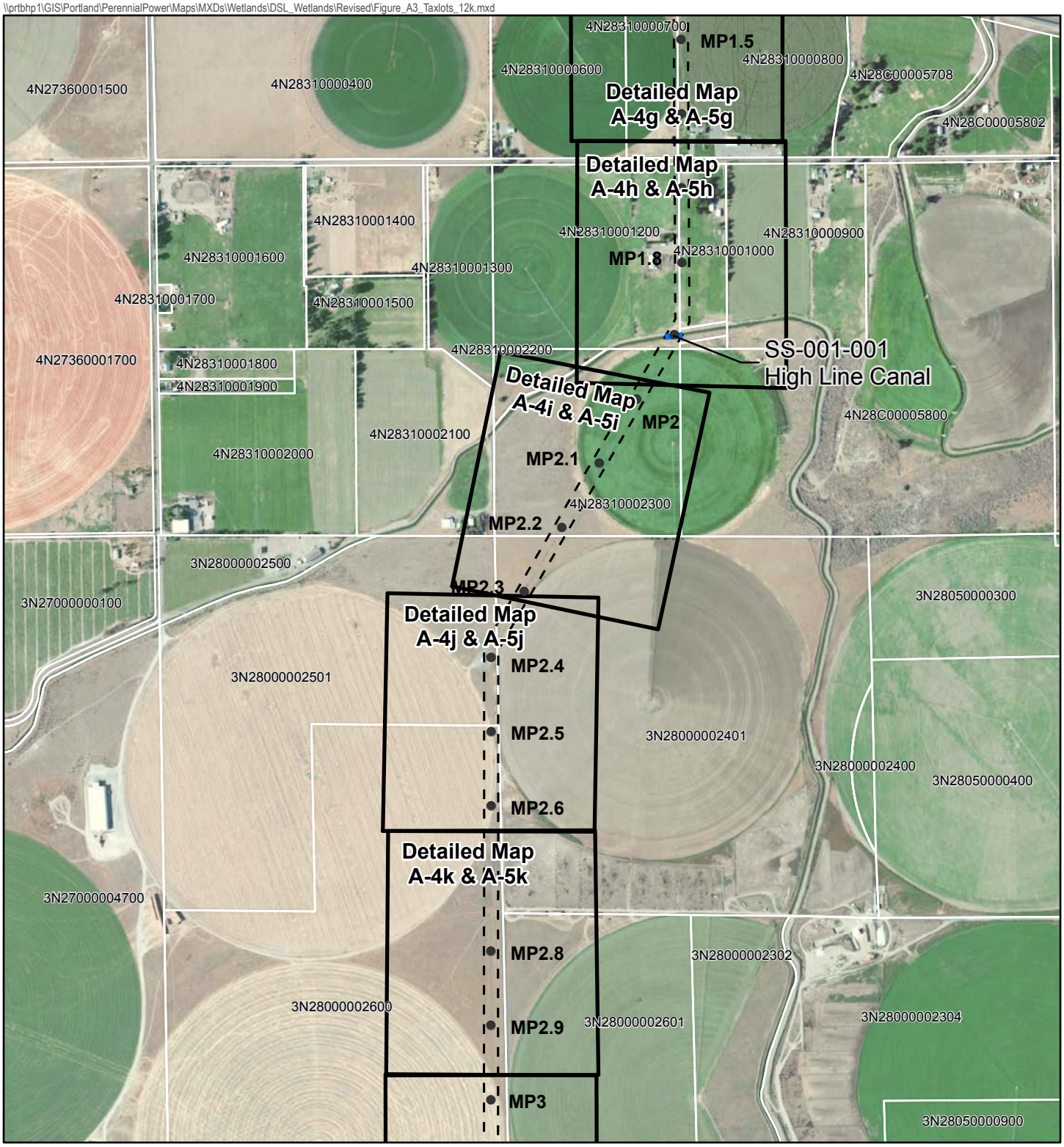

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Feet

Project Features

Study Area

Mileposts

Tax Lots

2013 Data

Delineated Stream

Source: ESRI Imagery 2010, Umatilla County Taxlots 2012

Figure A-3c
WD 2013-0415
Tax Lots and Tile Guide
Index Map

Perennial Wind Chaser
Station and Its
Associated Facilities

Coordinate System: NAD 1983 State Plane Oregon North FIPS 3601 (Intl Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Note:
1. Field Data Accurate to +/- 1 meter

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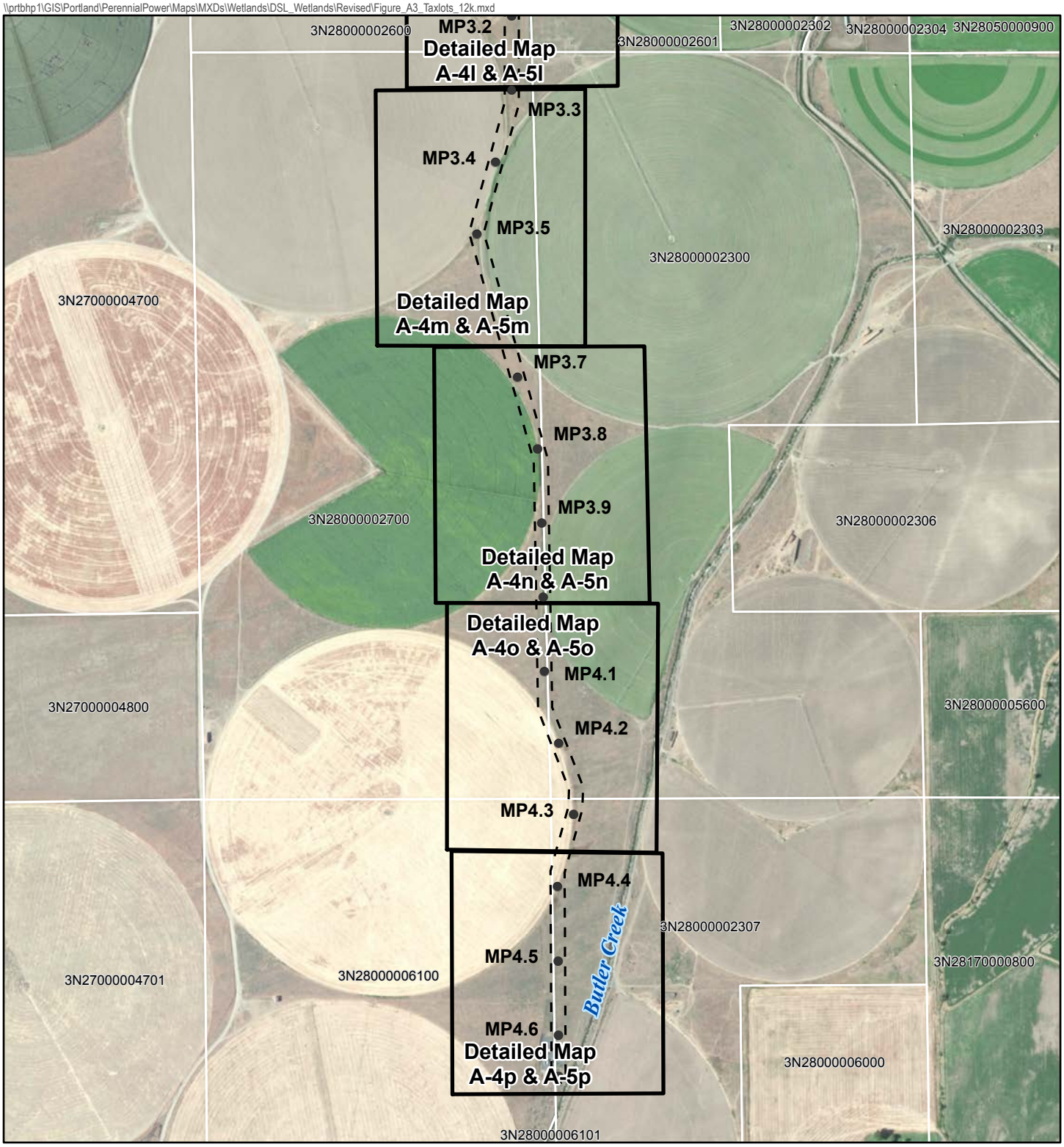

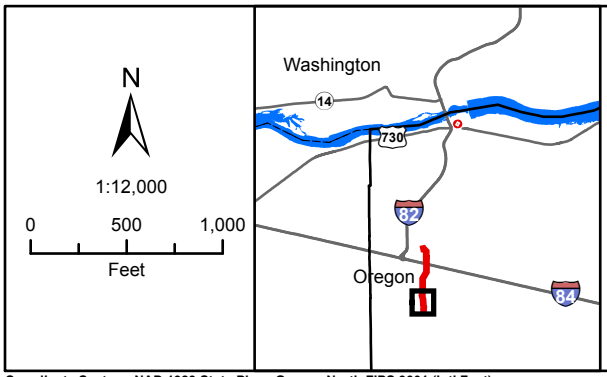

Project Features

- Study Area
- Mileposts
- Tax Lots

Figure A-3d
WD 2013-0415
Tax Lots and Tile Guide
Index Map

Perennial Wind Chaser
Station and Its
Associated Facilities

Source: ESRI Imagery 2010, Umatilla County Taxlots 2012

Coordinate System: NAD 1983 State Plane Oregon North FIPS 3601 (Intl Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Note:
1. Field Data Accurate to +/- 1 meter

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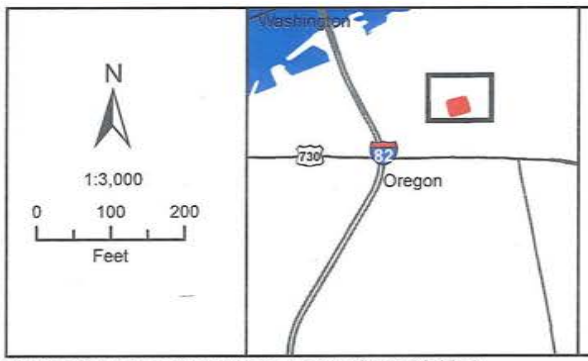

Project Features
- Mileposts
- Photo Direction
- Photo Point
- Study Area
- Taxlots

2013 Data
- Sample Point

Source: ESRI Imagery 2010

DSL WD # 13-0415

Approval Issued 7/17/2014

Approval Expires 7/17/2019

Figure A-4a

Wetland Delineation

Perennial Wind Chaser Station and Its Associated Facilities

Coordinate System: NAD 1983 State Plane Oregon North FIPS 3601 (Intl Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Note:
1. Field Data Accurate to +/- 1 meter

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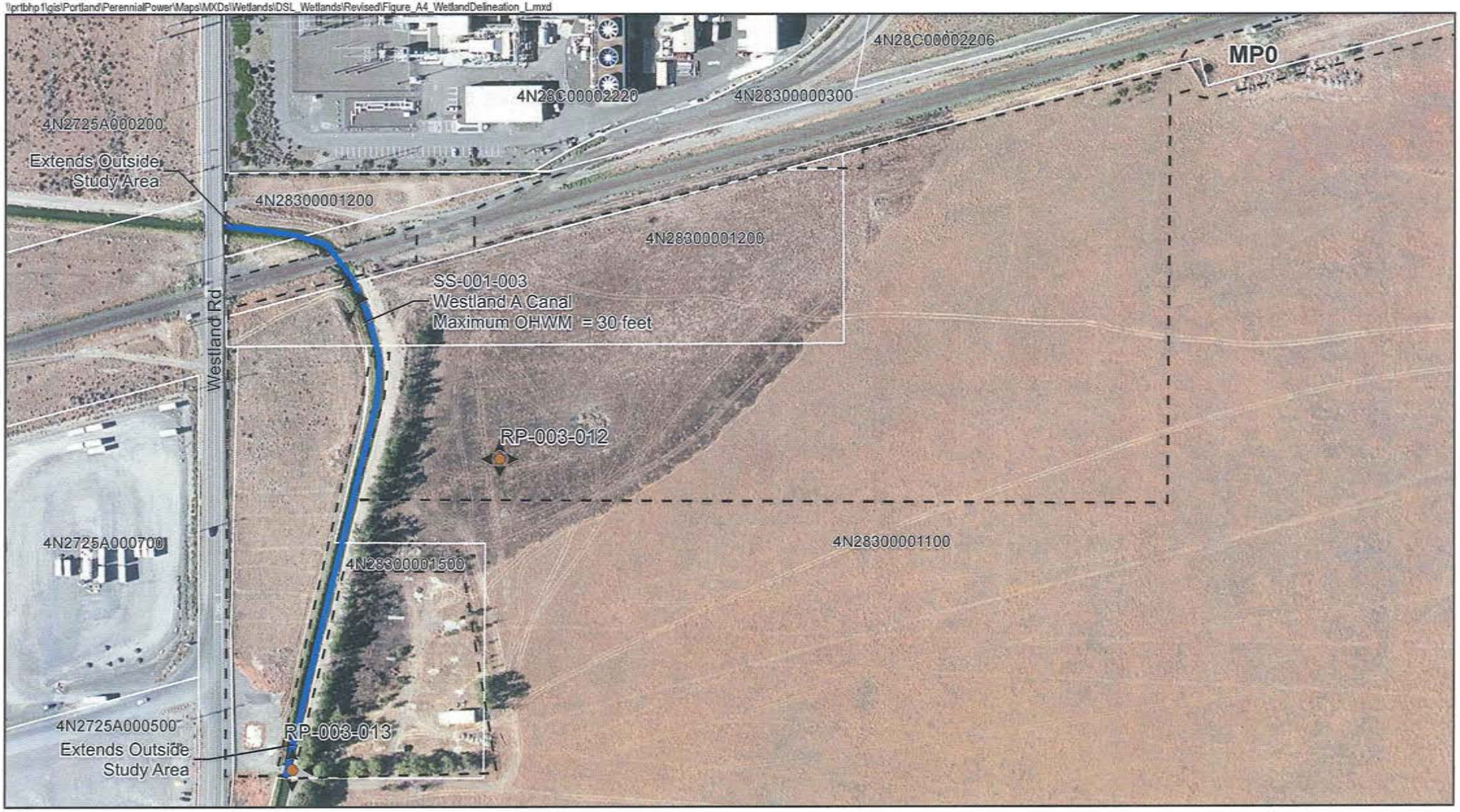

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Feet

Project Features
- Mileposts
- Photo Direction
- Photo Point
- Study Area
- Taxlots

2013 Data
- Delineated Streams

Source: ESRI Imagery 2010

DSL WD # 13-0415

Approval Issued 7/17/2014

Approval Expires 7/17/2019

Figure A-4b

Wetland Delineation

Perennial Wind Chaser Station and Its Associated Facilities

Coordinate System: NAD 1983 State Plane Oregon North FIPS 3601 (Intl Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Note:
1. Field Data Accurate to +/- 1 meter

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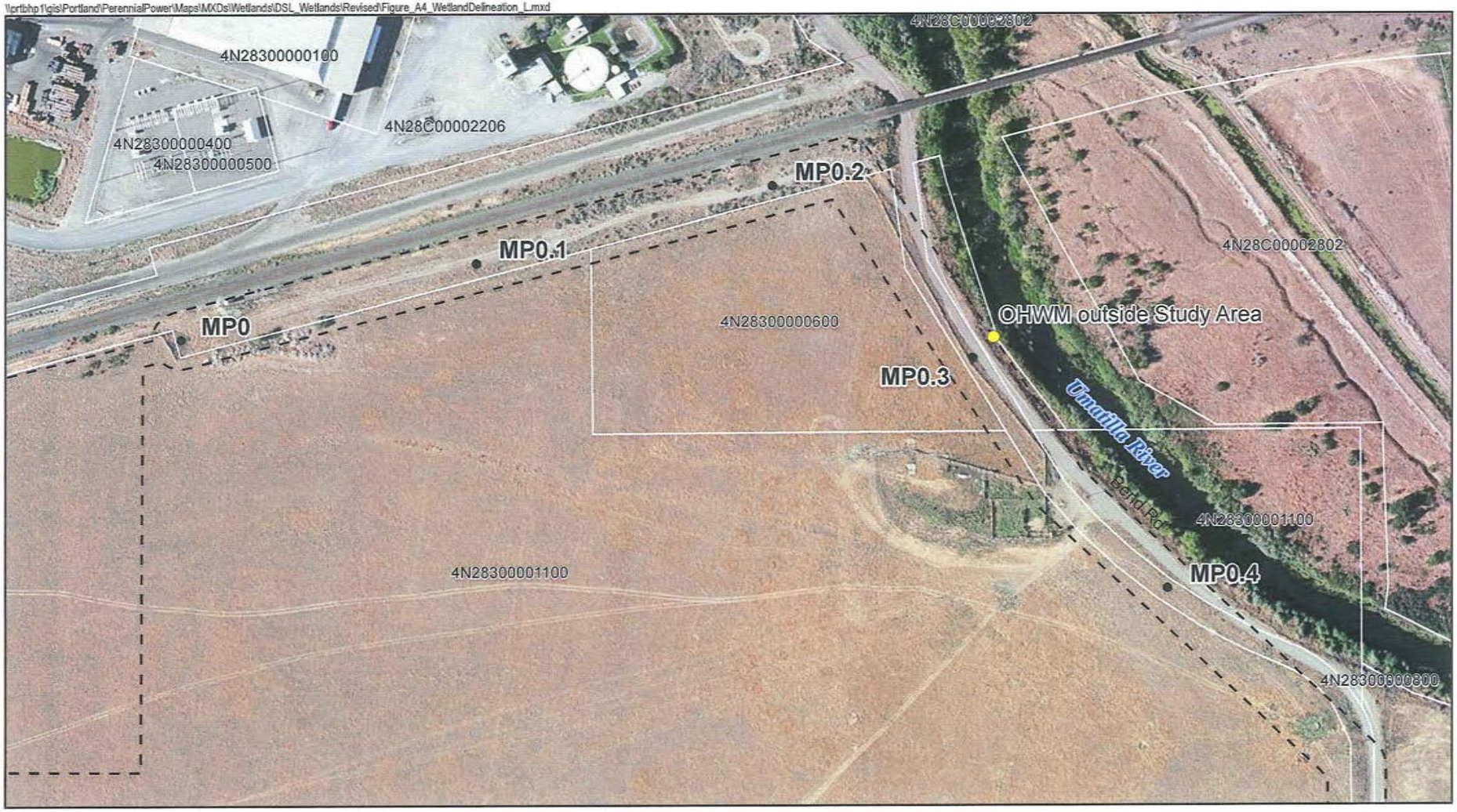

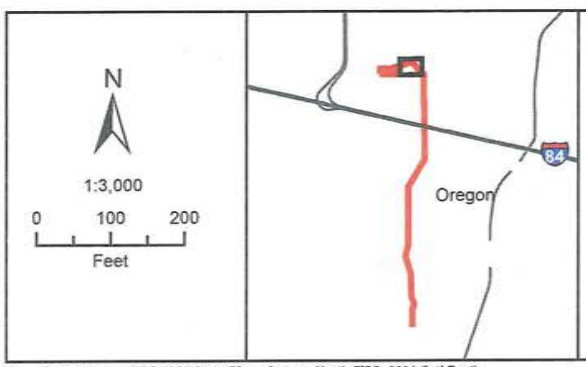

Project Features
- Mileposts
- Photo Direction
- Photo Point
- Study Area
- Taxlots

2013 Data
- Investigation Point

Source: ESRI Imagery 2010

DSL WD # 13-0415

Approval Issued 7/17/2014

Approval Expires 7/17/2019

Figure A-4c

Wetland Delineation

Perennial Wind Chaser Station and Its Associated Facilities

Coordinate System: NAD 1983 State Plane Oregon North FIPS 3601 (Intl Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Note:
1. Field Data Accurate to +/- 1 meter

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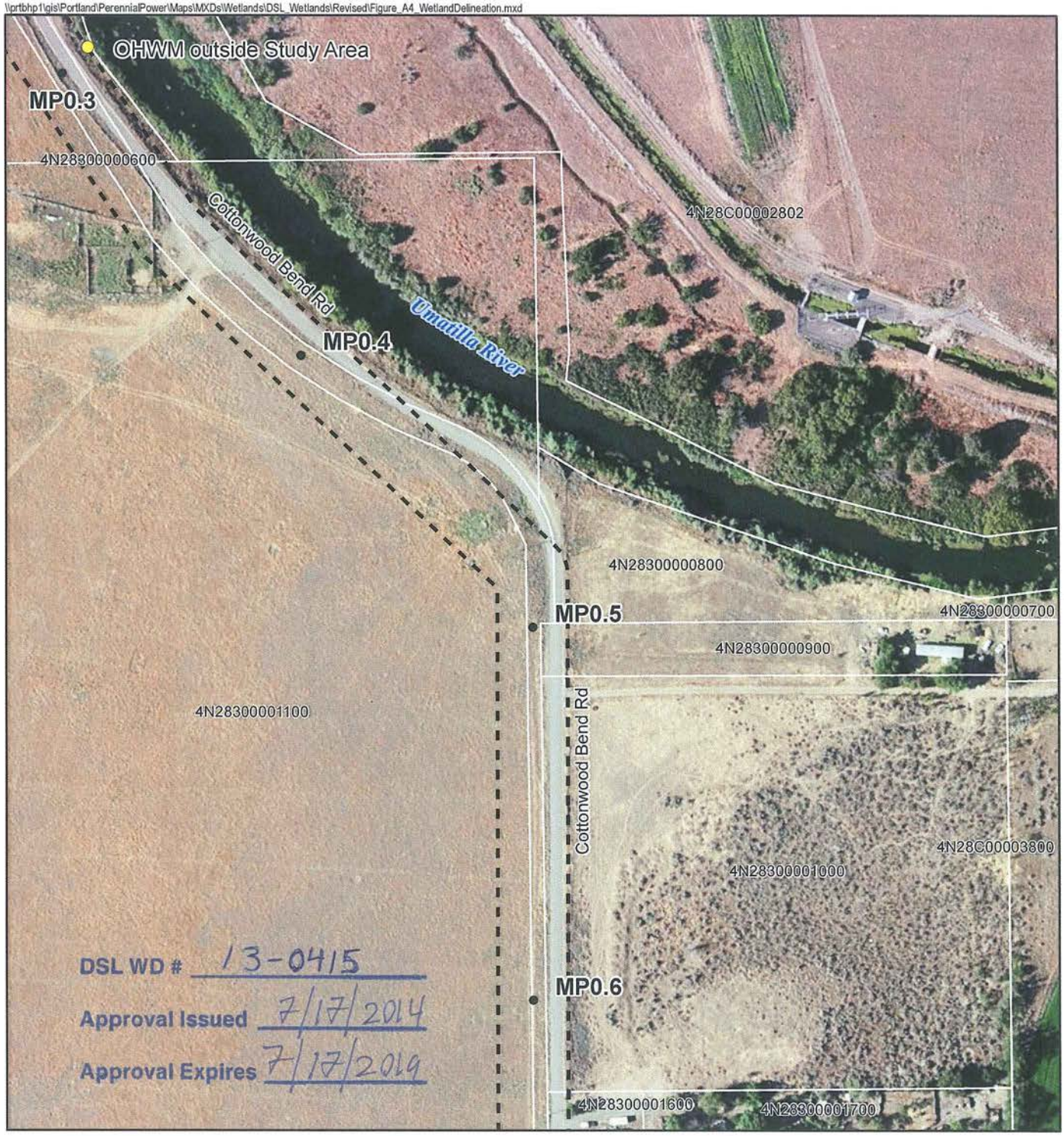

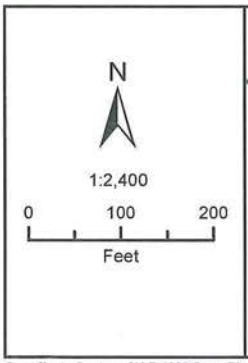

Project Features
- Mileposts
- Photo Direction
- Study Area
- Taxlots

2013 Data
- Investigation Point

Source: ESRI Imagery 2010

Figure A-4d

Wetland Delineation

Perennial Wind Chaser Station and Its Associated Facilities

Coordinate System: NAD 1983 State Plane Oregon North FIPS 3601 (Intl Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Note:
1. Field Data Accurate to +/- 1 meter

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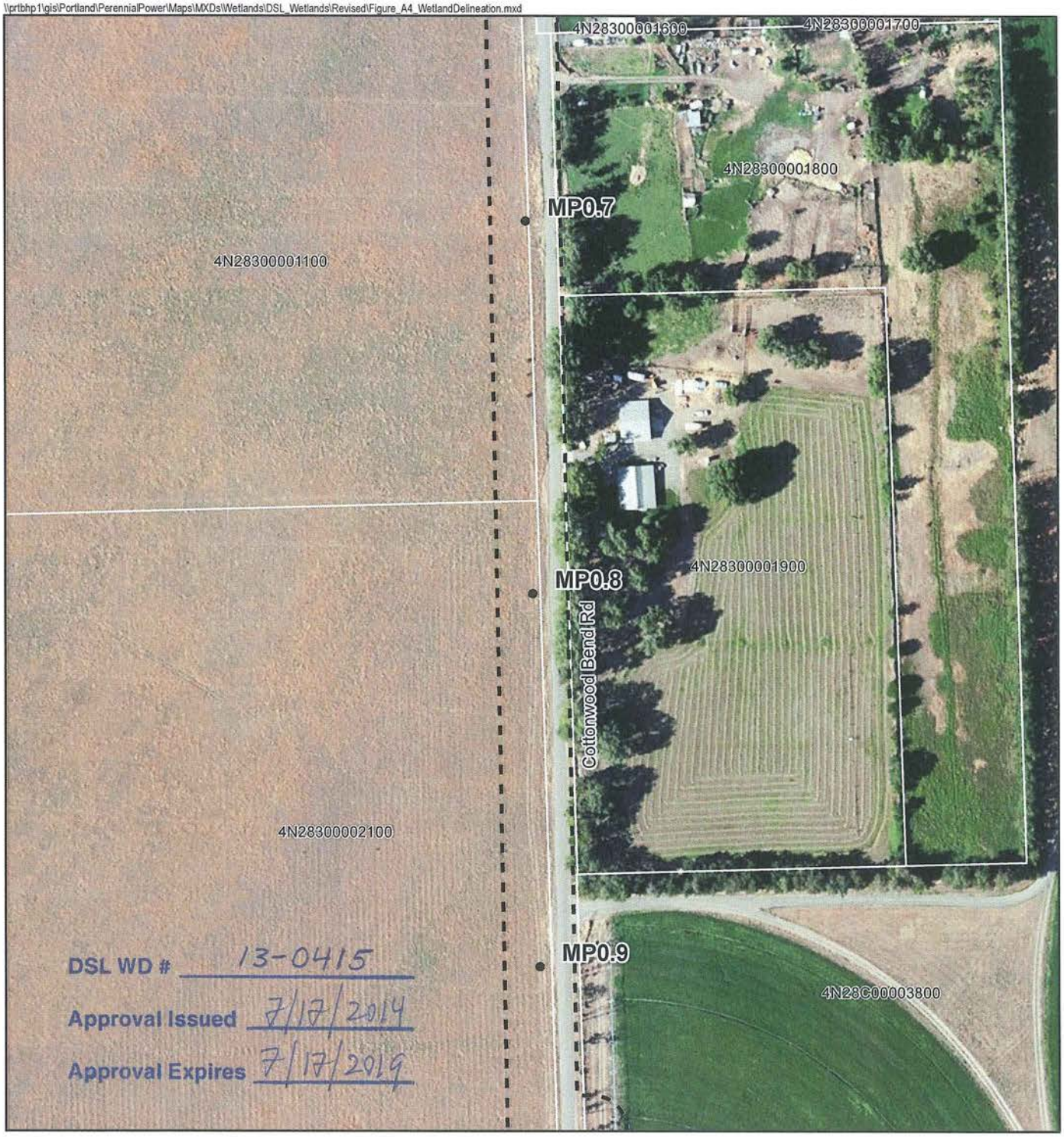

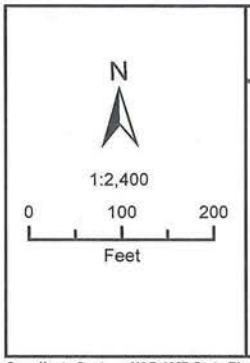

Project Features
- Mileposts
- Photo Direction
- Study Area
- Taxlots

Source: ESRI Imagery 2010

Figure A-4e

Wetland Delineation

Perennial Wind Chaser Station and Its Associated Facilities

Coordinate System: NAD 1983 State Plane Oregon North FIPS 3601 (Intl Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Note:
1. Field Data Accurate to +/- 1 meter

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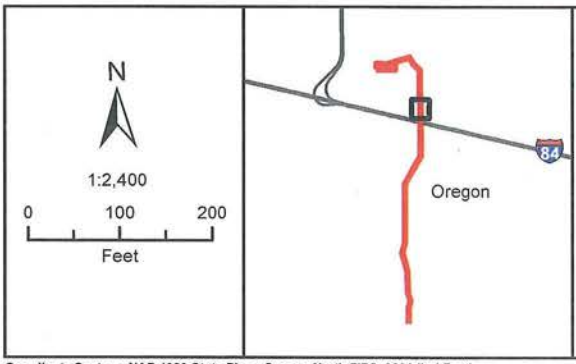

Project Features
- Mileposts
- Photo Direction
- Study Area
- Taxlots

2013 Data
- Delineated Streams

Source: ESRI Imagery 2010

Figure A-4f

Wetland Delineation

Perennial Wind Chaser Station
and Its Associated Facilities

Coordinate System: NAD 1983 State Plane Oregon North FIPS 3601 (Intl Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Note:
1. Field Data Accurate to +/- 1 meter

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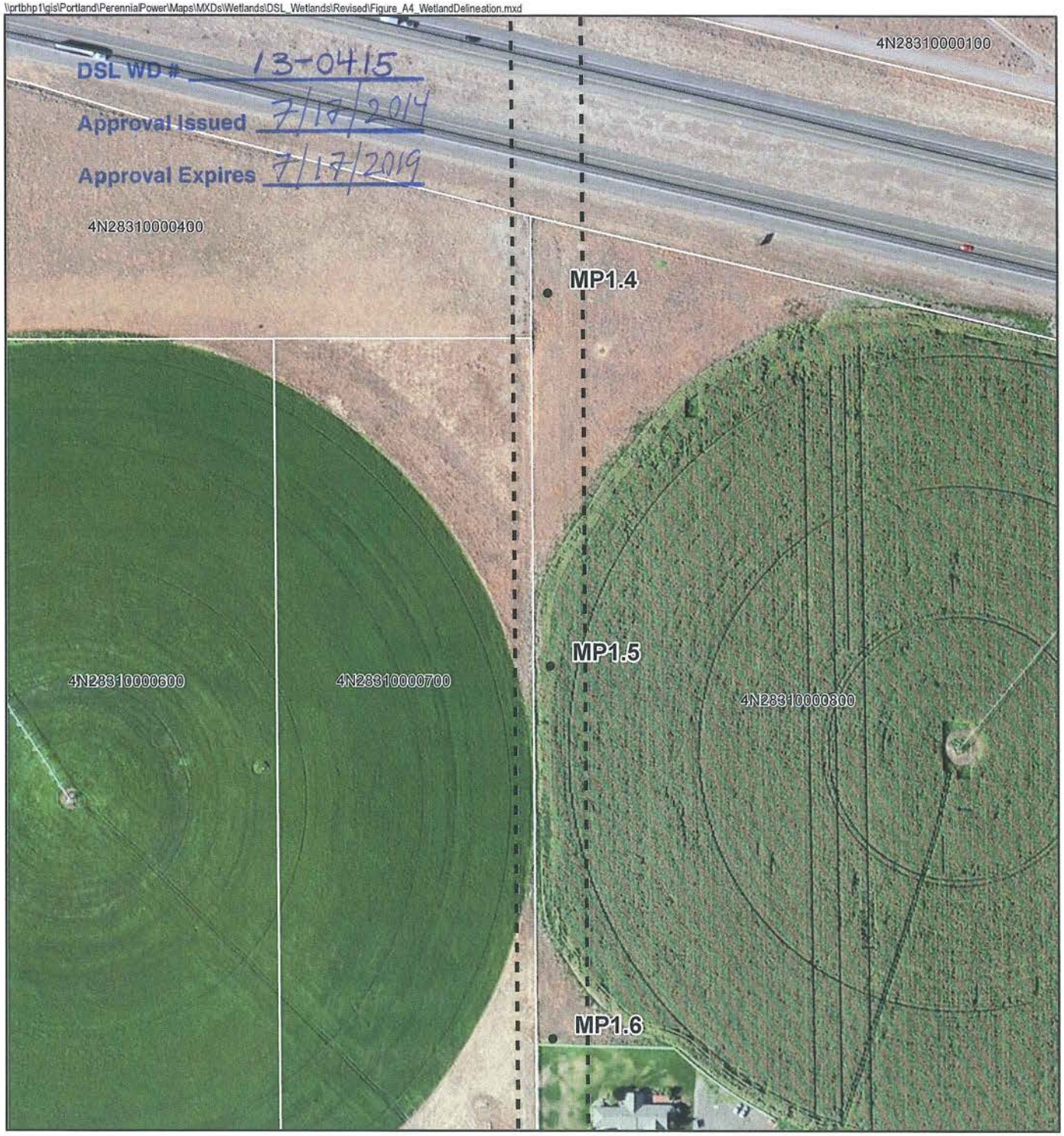

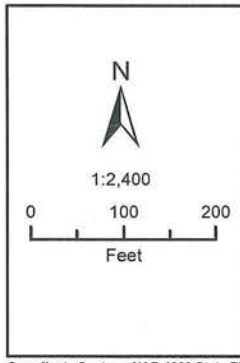

Project Features
- Mileposts
- Photo Direction
- Study Area
- Taxlots

Source: ESRI Imagery 2010

Figure A-4g

Wetland Delineation

Perennial Wind Chaser Station and Its Associated Facilities

Coordinate System: NAD 1983 State Plane Oregon North FIPS 3601 (Intl Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Note:
1. Field Data Accurate to +/- 1 meter

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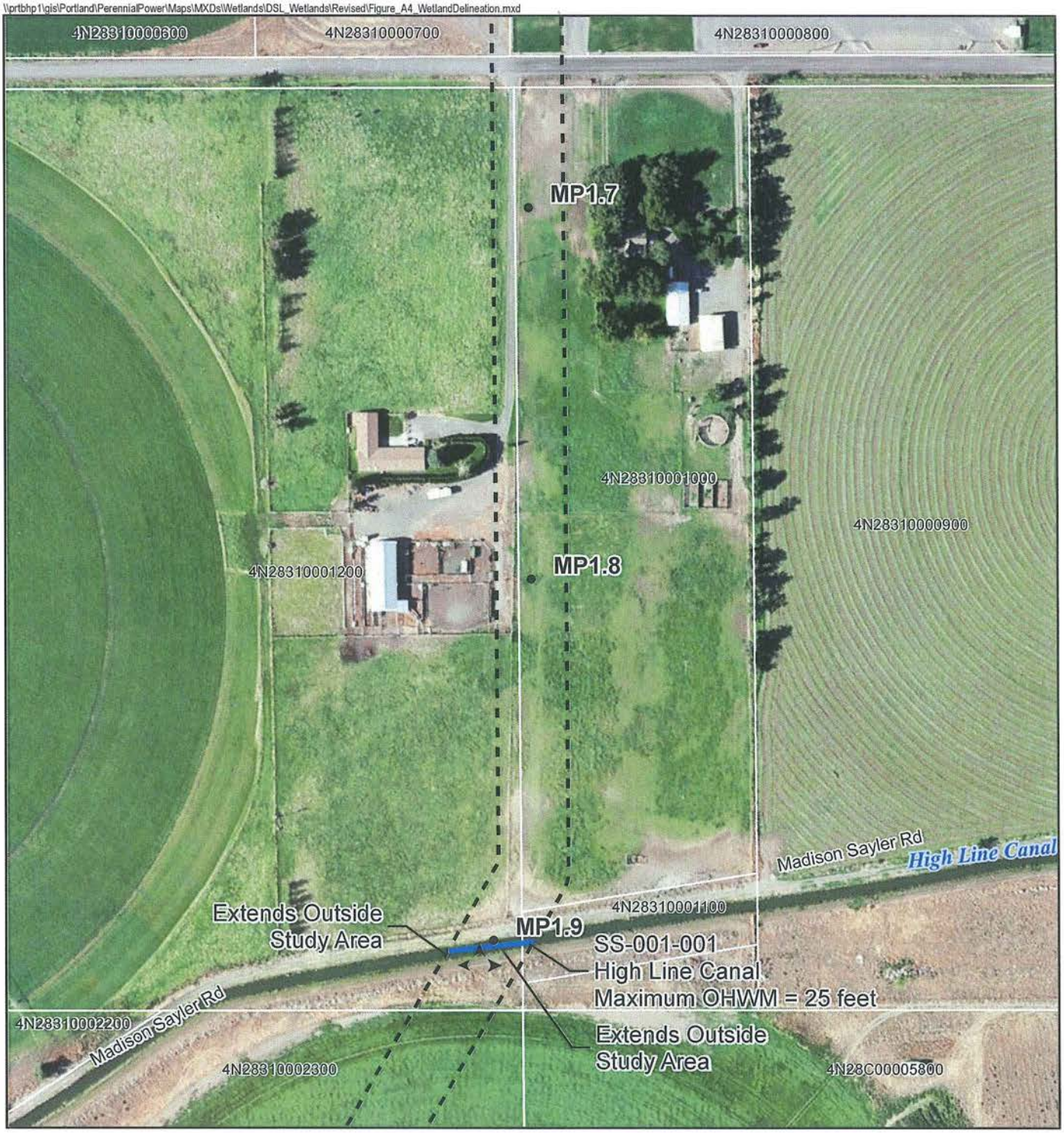

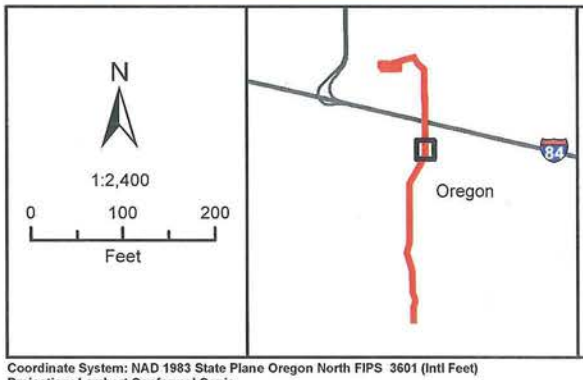

Project Features
- Mileposts
- Photo Direction
- Study Area
- Taxlots

2013 Data
- Delineated Streams

Source: ESRI Imagery 2010

Figure A-4h

Wetland Delineation

Perennial Wind Chaser Station
and Its Associated Facilities

DSL WD # 13-0415

Approval Issued 7/17/2014

Approval Expires 7/17/2019

Coordinate System: NAD 1983 State Plane Oregon North FIPS 3601 (Intl Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Note:
1. Field Data Accurate to +/- 1 meter

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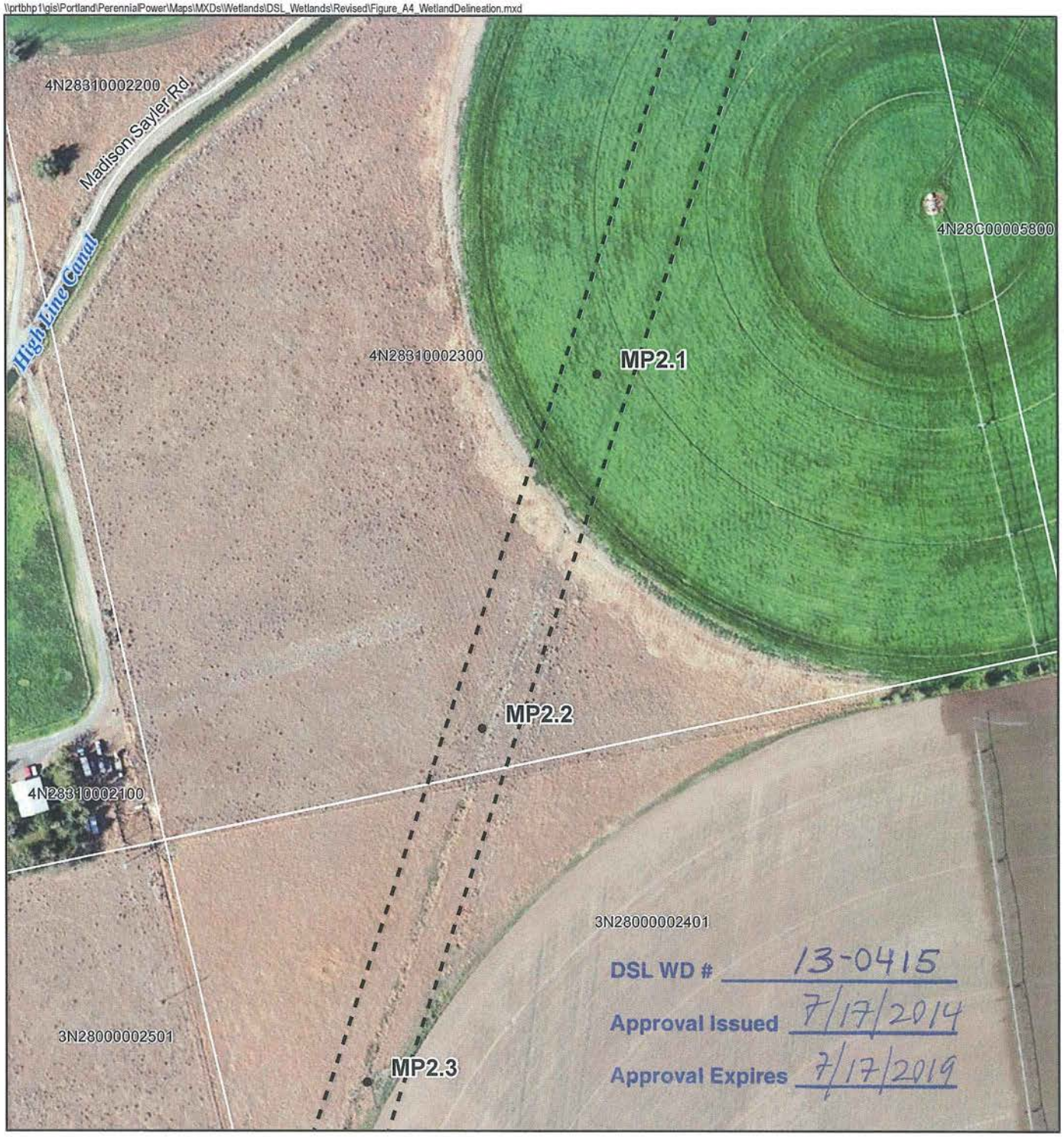

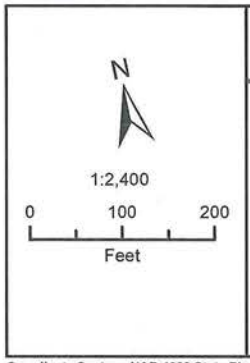

Project Features
- Mileposts
- Photo Direction
- Study Area
- Taxlots

Source: ESRI Imagery 2010

Figure A-4i

Wetland Delineation

Perennial Wind Chaser Station and Its Associated Facilities

Coordinate System: NAD 1983 State Plane Oregon North FIPS 3601 (Intl Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Note:
1. Field Data Accurate to +/- 1 meter

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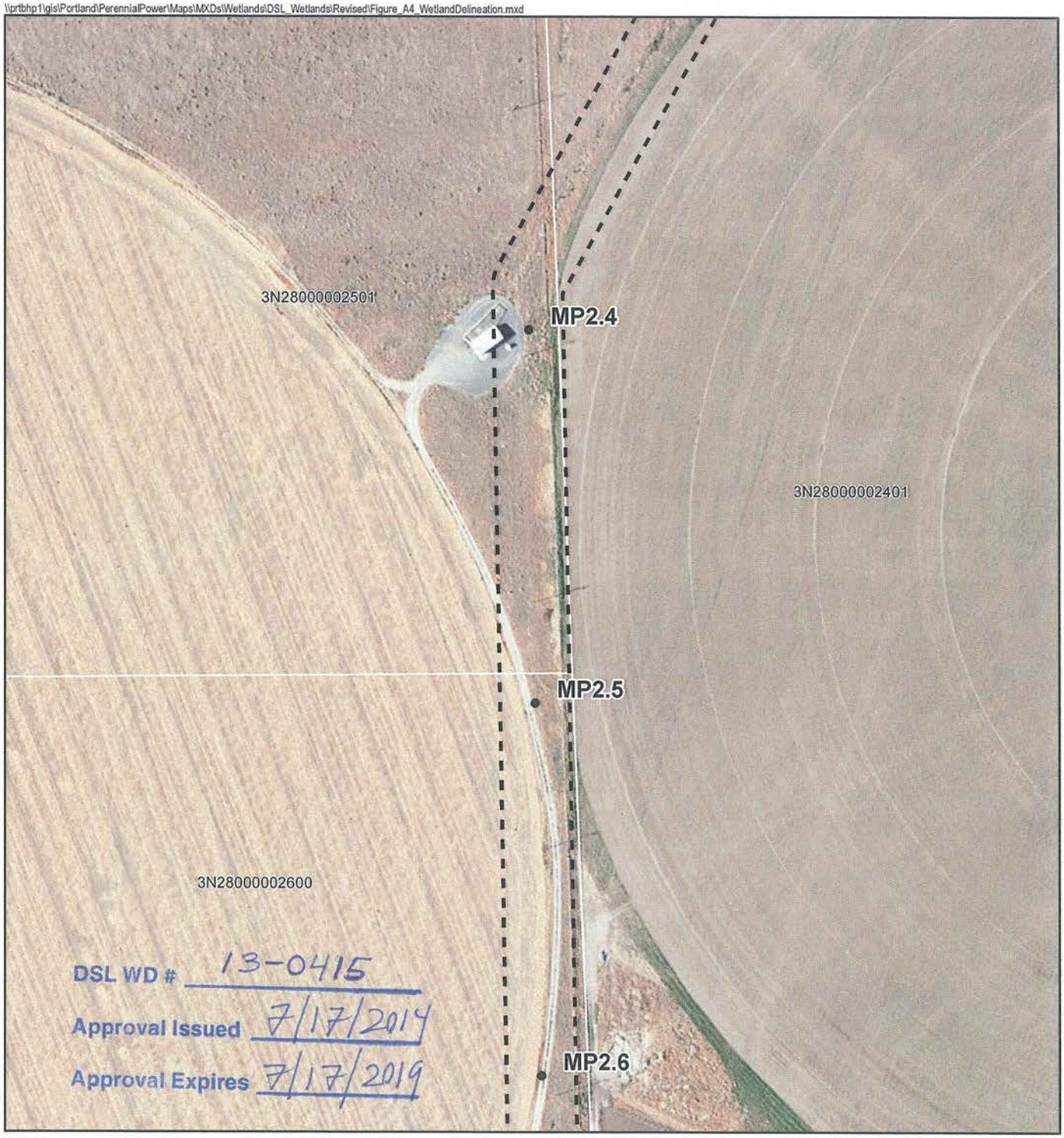

N

1:2,400

0 100 200

Feet

Project Features

- Mileposts
- Photo Direction
- Study Area
- Taxlots

Source: ESRI Imagery 2010

Figure A-4j

Wetland Delineation

Perennial Wind Chaser Station and Its Associated Facilities

Coordinate System: NAD 1983 State Plane Oregon North FIPS 3601 (Intl Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Note:
1. Field Data Accurate to +/- 1 meter

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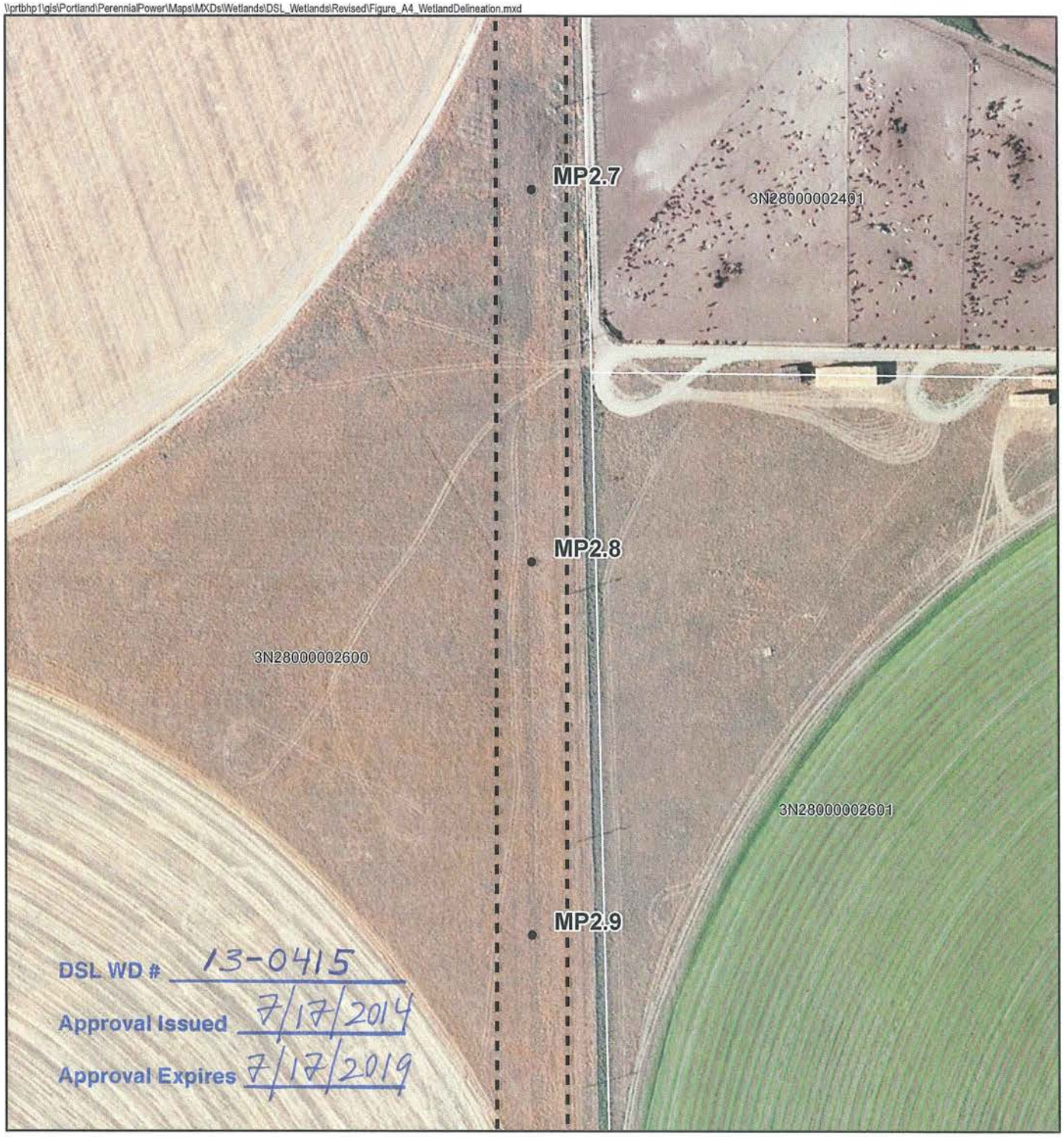

N

1:2,400

0 100 200

Feet

Project Features

- Mileposts
- Photo Direction
- Study Area
- Taxlots

Source: ESRI Imagery 2010

Figure A-4k

Wetland Delineation

Perennial Wind Chaser Station and Its Associated Facilities

Coordinate System: NAD 1983 State Plane Oregon North FIPS 3601 (Intl Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Note:
1. Field Data Accurate to +/- 1 meter

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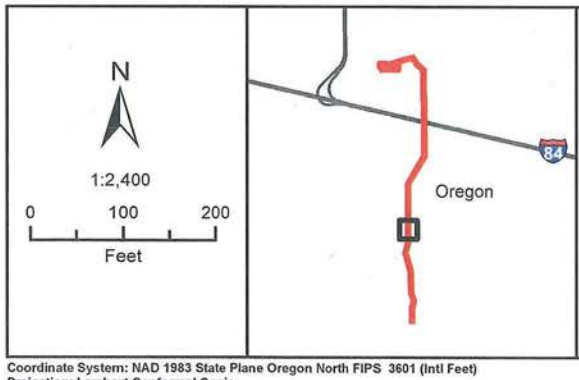


Project Features
- Mileposts
- Photo Direction
- Study Area
- Taxlots

Source: ESRI Imagery 2010

Figure A-4I

Wetland Delineation

Perennial Wind Chaser Station and Its Associated Facilities

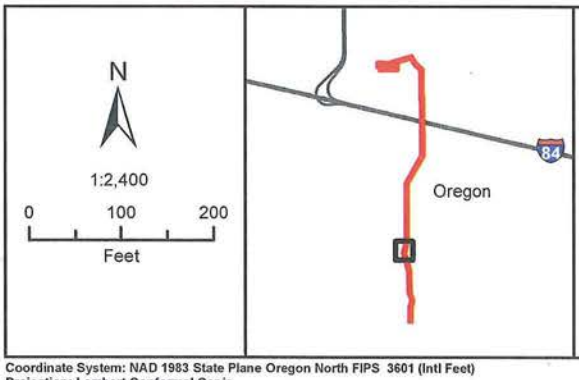
Coordinate System: NAD 1983 State Plane Oregon North FIPS 3601 (Intl Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Note:
1. Field Data Accurate to +/- 1 meter

\\prtbhp1\gis\Portland\PerennialPower\Maps\MXDs\Wetlands\DSL_Wetlands\Revised\Figure_A4_WetlandDelineation.mxd

DSL WD # 13-0415

Approval Issued 7/17/2014

Approval Expires 7/17/2019



Project Features
- Mileposts
- Photo Direction
- Study Area
- Taxlots

Source: ESRI Imagery 2010

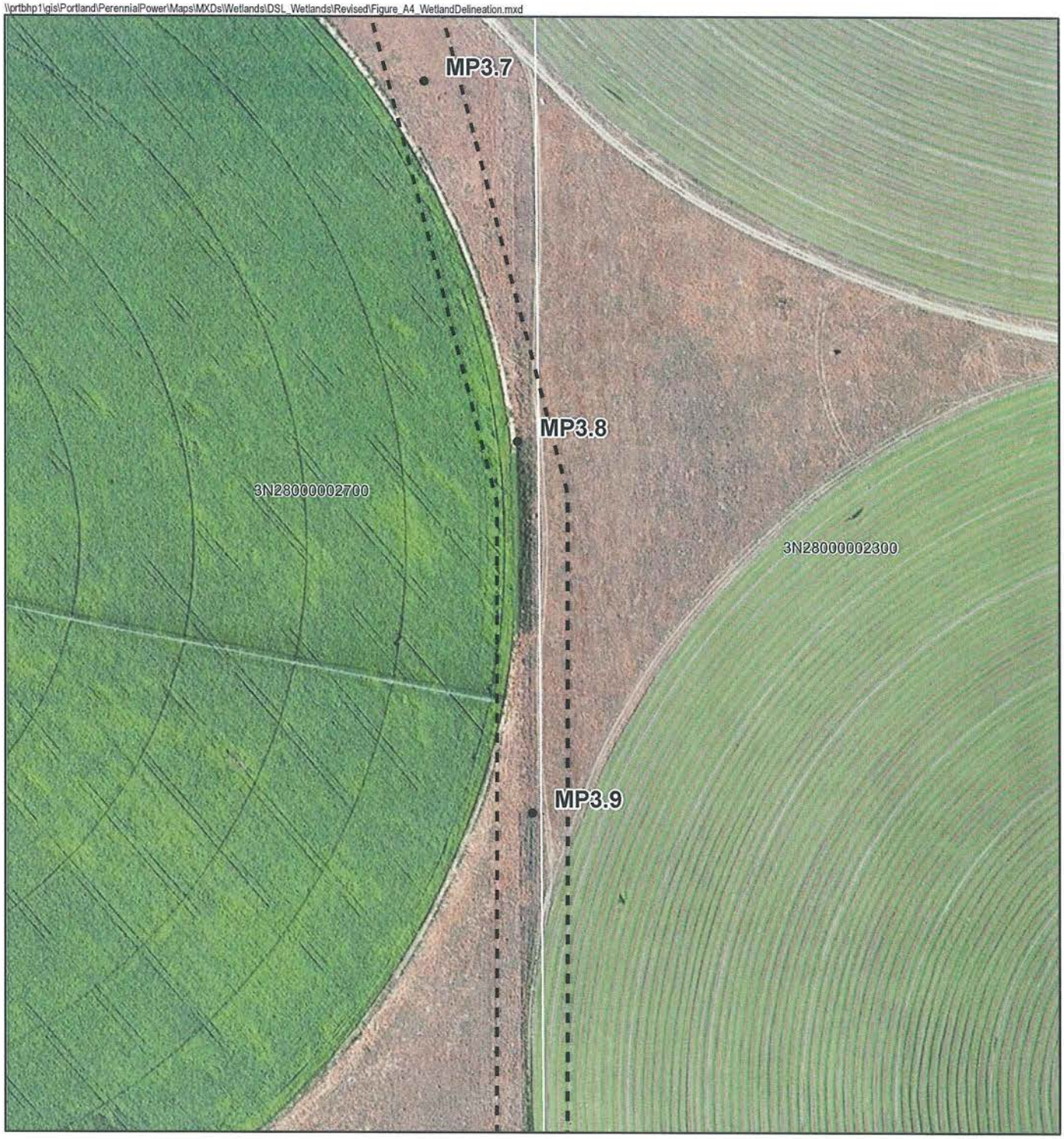
Figure A-4m

Wetland Delineation

Perennial Wind Chaser Station and Its Associated Facilities

Coordinate System: NAD 1983 State Plane Oregon North FIPS 3601 (Intl Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Note:
1. Field Data Accurate to +/- 1 meter

\\prtbhp1\gis\Portland\PerennialPower\Maps\MXDs\Wetlands\DSL_Wetlands\Revised\Figure_A4_WetlandDelineation.mxd



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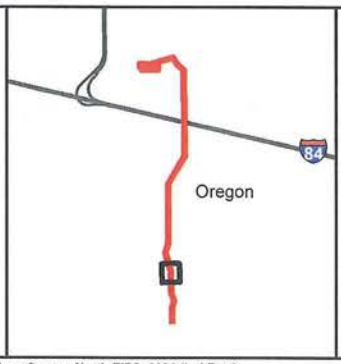
Feet



Project Features

- Mileposts
- Photo Direction
- Study Area
- Taxlots

Source: ESRI Imagery 2010

Figure A-4n

Wetland Delineation

Perennial Wind Chaser Station
and Its Associated Facilities

DSL WD # 13-0415

Approval Issued 7/17/2014

Approval Expires 7/17/2019

Coordinate System: NAD 1983 State Plane Oregon North FIPS 3601 (Intl Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Note:
1. Field Data Accurate to +/- 1 meter

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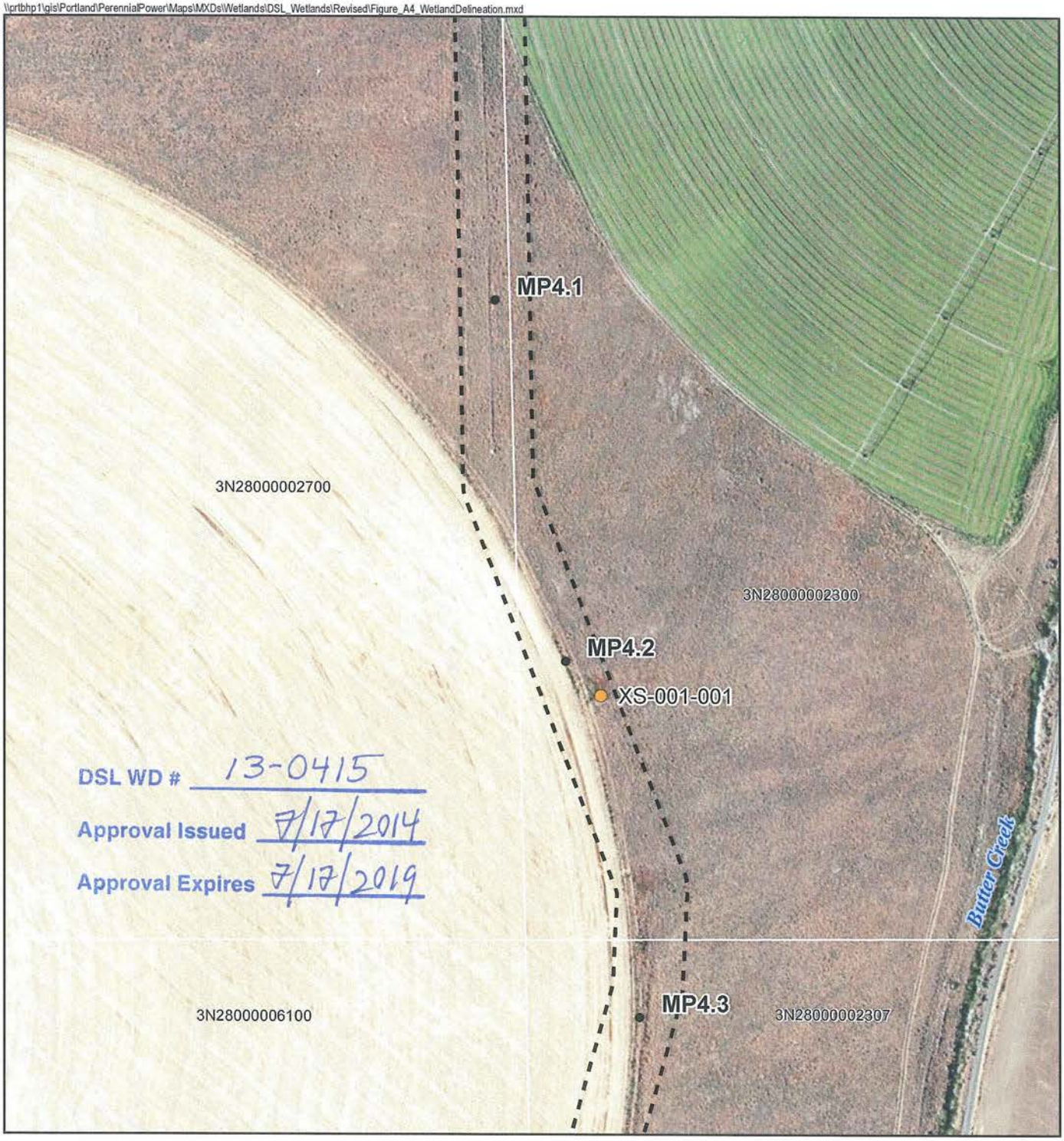
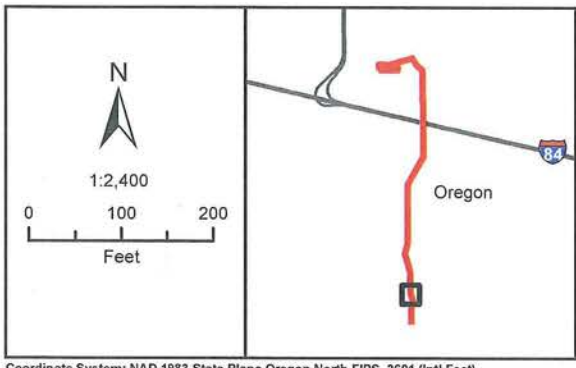




Project Features
- Mileposts
- Photo Direction
- Study Area
- Taxlots

2013 Data
- Sample Point

Source: ESRI Imagery 2010

Figure A-4o

Wetland Delineation

Perennial Wind Chaser Station and Its Associated Facilities

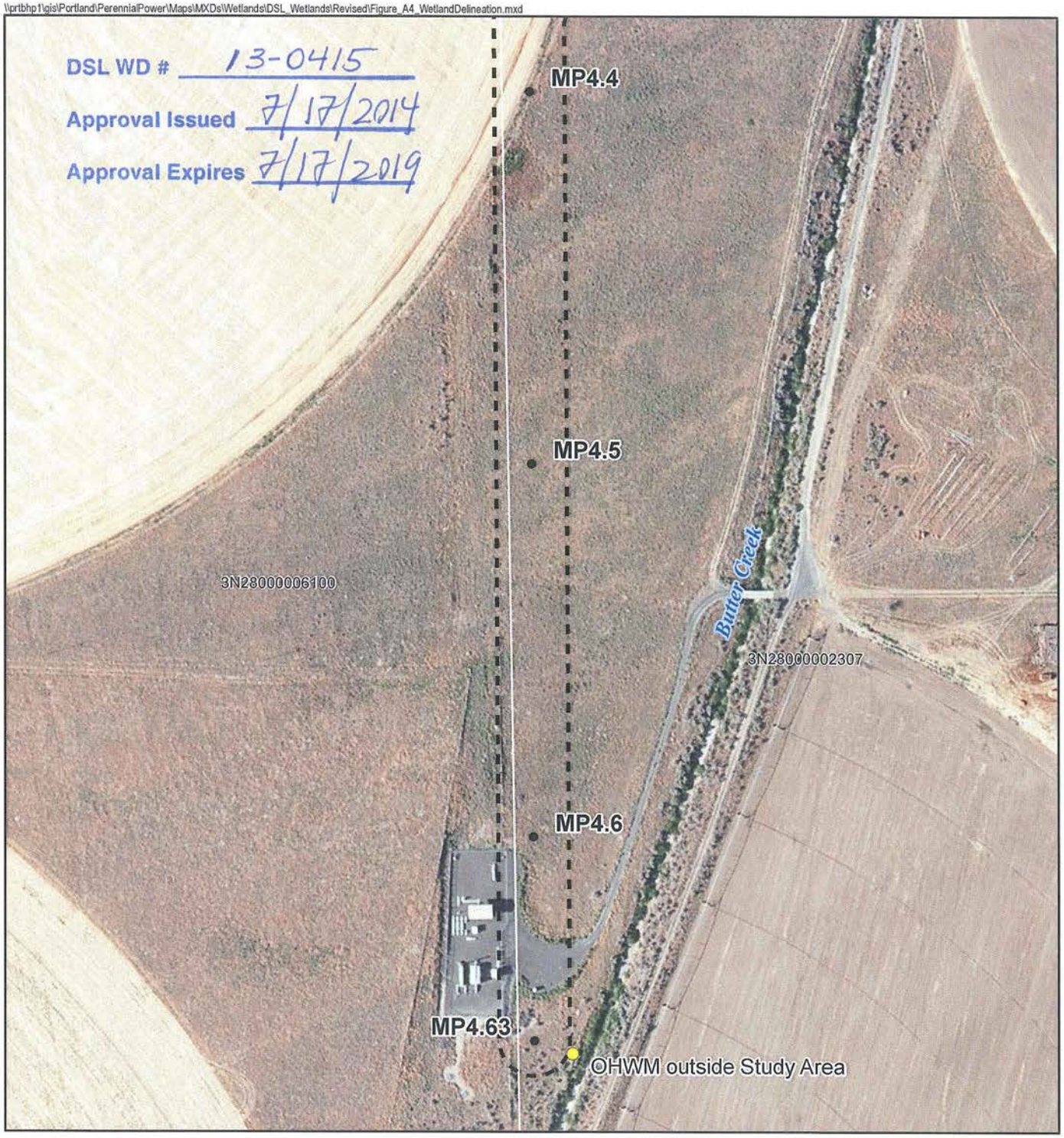
Coordinate System: NAD 1983 State Plane Oregon North FIPS 3601 (Intl Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Note:
1. Field Data Accurate to +/- 1 meter

\\prtbhp1\gis\Portland\PerennialPower\Maps\MXDs\Wetlands\DSL_Wetlands\Revised\Figure_A4_WetlandDelineation.mxd

DSL WD # 13-0415

Approval Issued 7/17/2014

Approval Expires 7/17/2019



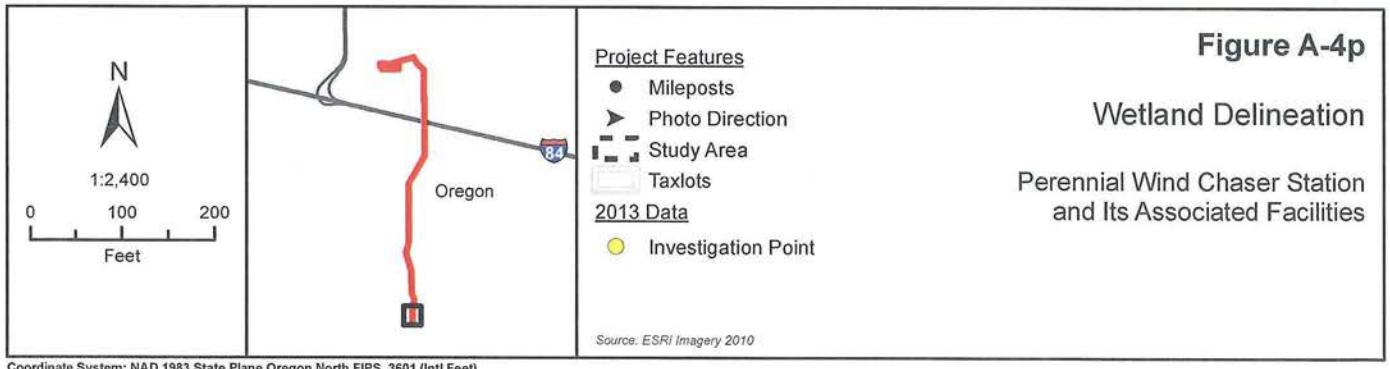


Figure A-4p

Wetland Delineation

Perennial Wind Chaser Station and Its Associated Facilities

Coordinate System: NAD 1983 State Plane Oregon North FIPS 3601 (Intl Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Note:
1. Field Data Accurate to +/- 1 meter

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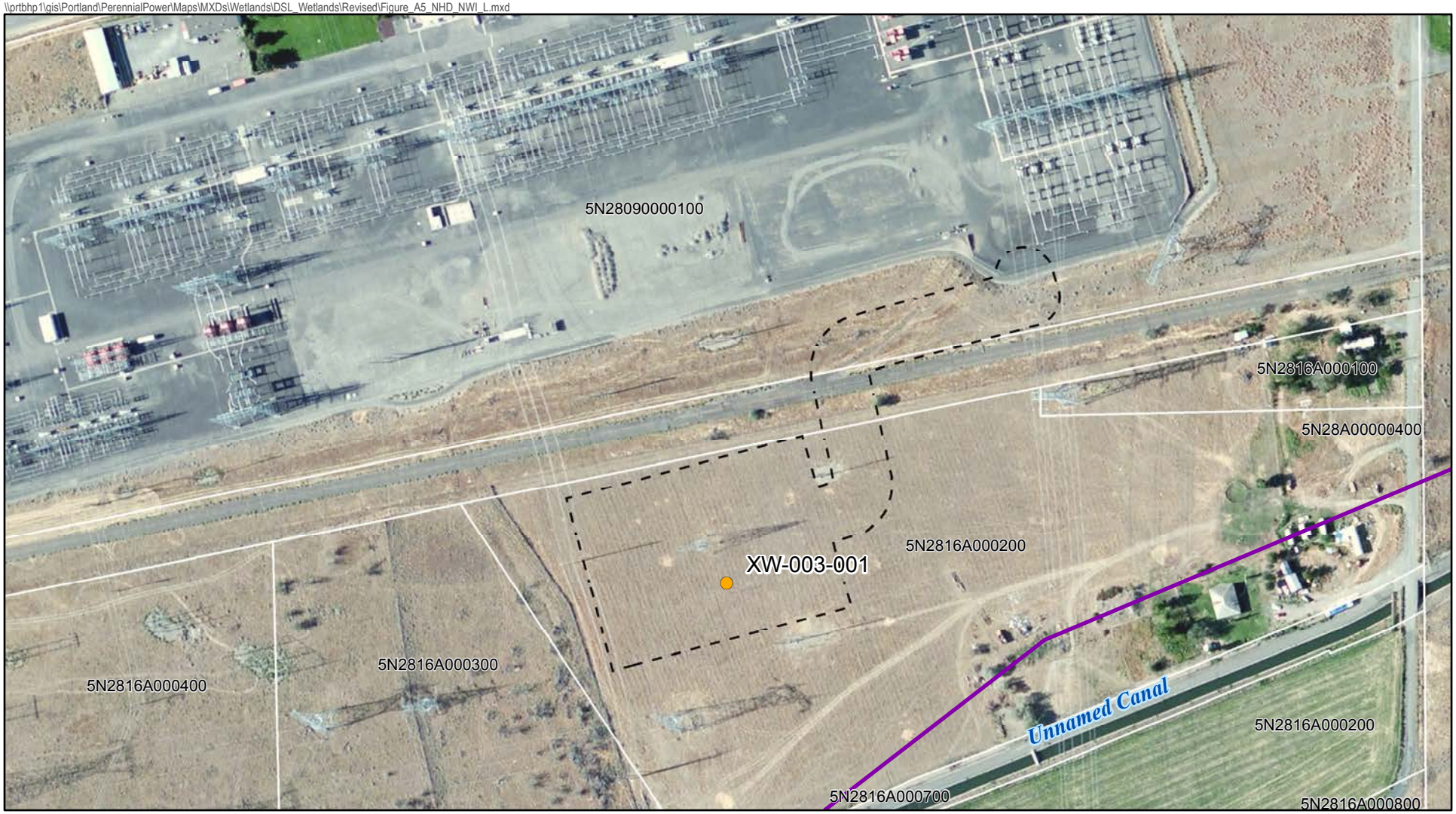
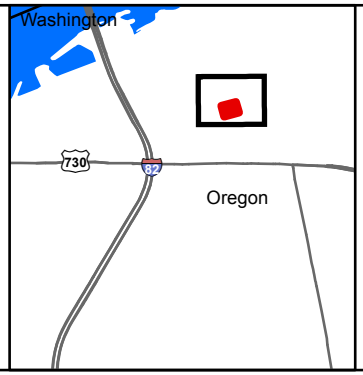


N

1:3,000

0 100 200

Feet



Project Features

- Mileposts
- Photo Direction
- Photo Point
- Study Area
- Taxlots

2013 Data

- Sample Point
- NHD Streams

Source: ESRI Imagery 2010

Figure A-5a

NWI and NHD

Perennial Wind Chaser Station
and Its Associated Facilities

Coordinate System: NAD 1983 State Plane Oregon North FIPS 3601 (Intl Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Note:
1. Field Data Accurate to +/- 1 meter

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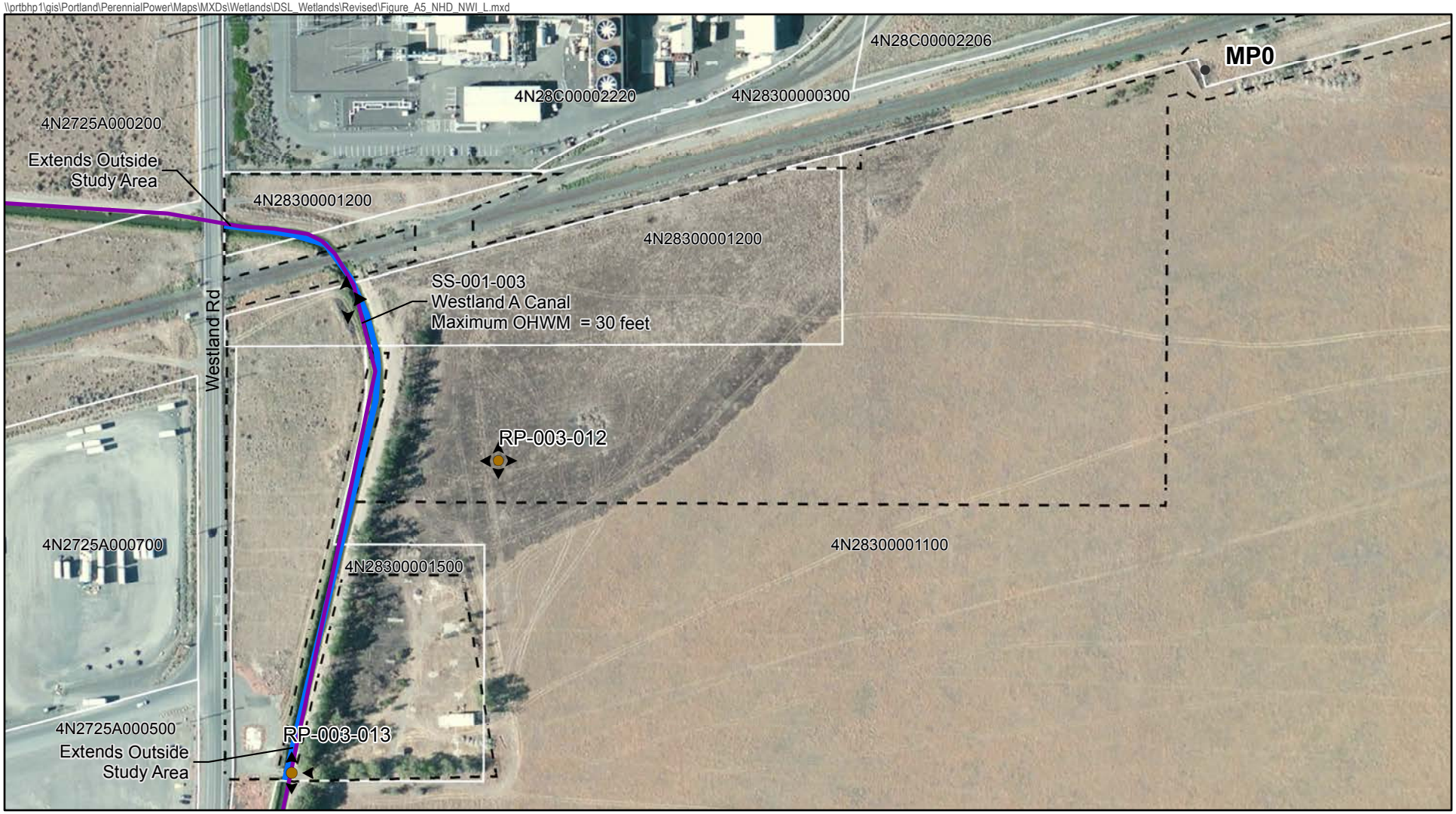
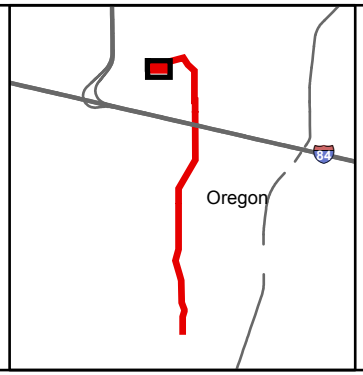


N

1:3,000

0 100 200

Feet



Project Features

- Mileposts
- Photo Direction
- Photo Point
- Study Area
- Taxlots

2013 Data

- Delineated Streams
- NHD Streams

Source: ESRI Imagery 2010

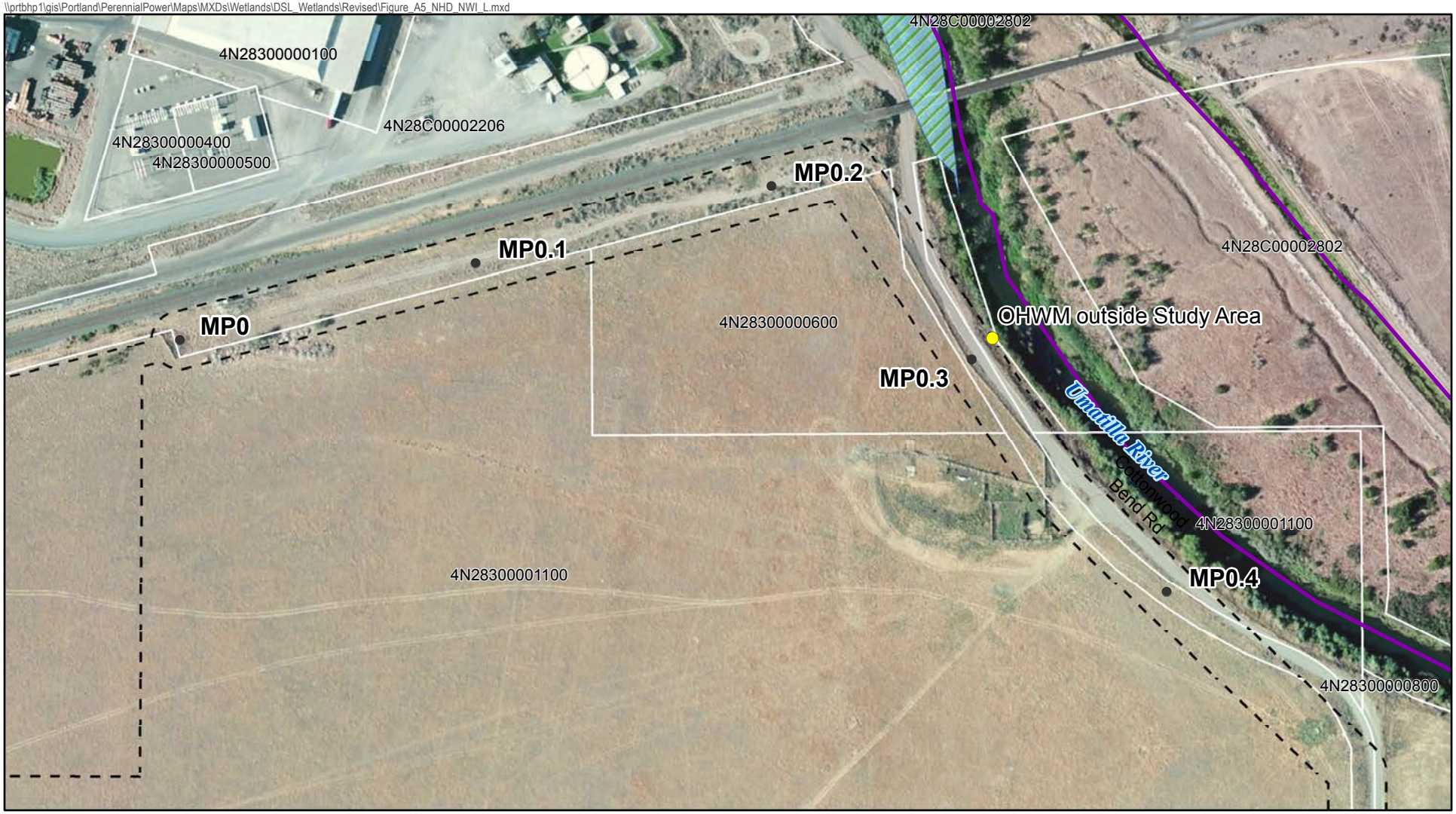
Figure A-5b

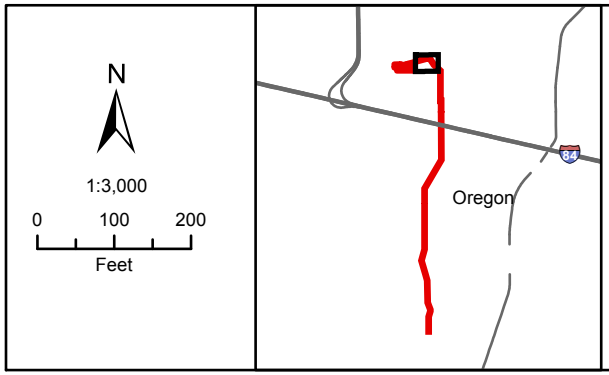
NWI and NHD

Perennial Wind Chaser Station
and Its Associated Facilities

Coordinate System: NAD 1983 State Plane Oregon North FIPS 3601 (Intl Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Note:
1. Field Data Accurate to +/- 1 meter

\\prtbhp1\gis\Portland\PerennialPower\Maps\MXDs\Wetlands\DSL_Wetlands\Revised\Figure_A5_NHD_NWI_L.mxd





Project Features
- Mileposts
- Photo Direction
- Photo Point
- Study Area
- Taxlots

2013 Data
- Investigation Point
- NHD Streams
- NWI Wetlands

Source: ESRI Imagery 2010

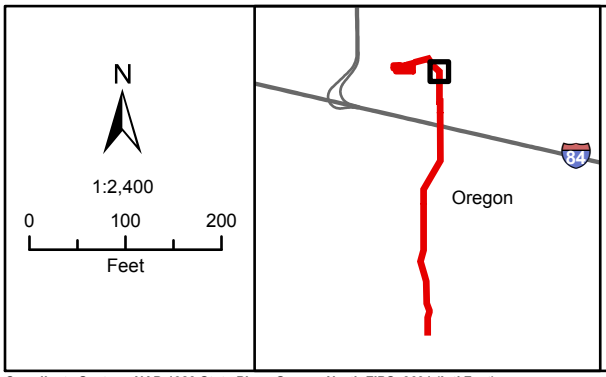
Figure A-5c

NWI and NHD

Perennial Wind Chaser Station
and Its Associated Facilities

Coordinate System: NAD 1983 State Plane Oregon North FIPS 3601 (Intl Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Note:
1. Field Data Accurate to +/- 1 meter

\\prtbhp1\gis\Portland\PerennialPower\Maps\MXDs\Wetlands\DSL_Wetlands\Revised\Figure_A5_NHD_NWI.mxd



Project Features
- Mileposts
- Photo Direction
- Study Area
- Taxlots

2013 Data
- Investigation Point
- NHD Streams

Source: ESRI Imagery 2010

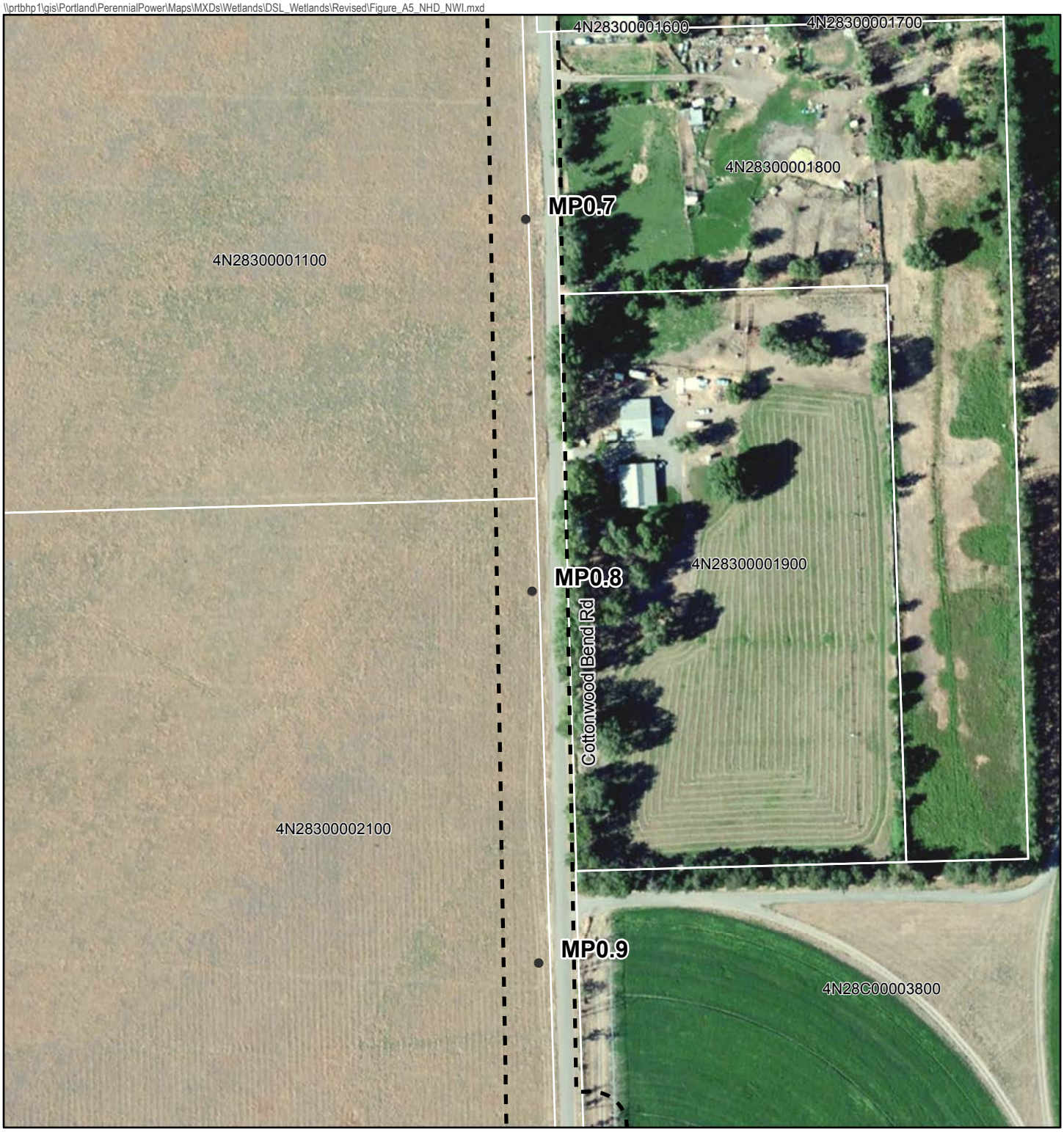
Figure A-5d

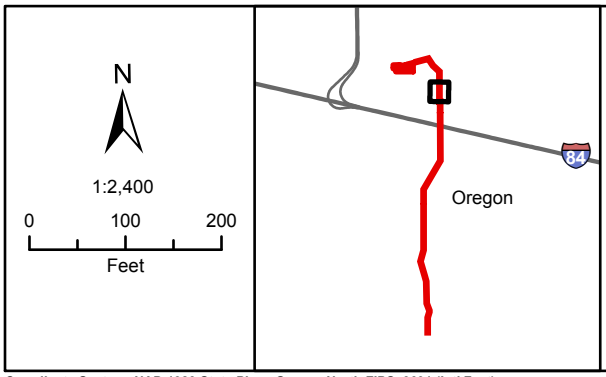
NWI and NHD

Perennial Wind Chaser Station
and Its Associated Facilities

Coordinate System: NAD 1983 State Plane Oregon North FIPS 3601 (Intl Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Note:
1. Field Data Accurate to +/- 1 meter

\\prtbhp1\gis\Portland\PerennialPower\Maps\MXDs\Wetlands\DSL_Wetlands\Revised\Figure_A5_NHD_NWI.mxd





Project Features
- Mileposts
- Photo Direction
- Study Area
- Taxlots

Source: ESRI Imagery 2010

Figure A-5e

NWI and NHD

Perennial Wind Chaser Station
and Its Associated Facilities

Coordinate System: NAD 1983 State Plane Oregon North FIPS 3601 (Intl Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Note:
1. Field Data Accurate to +/- 1 meter

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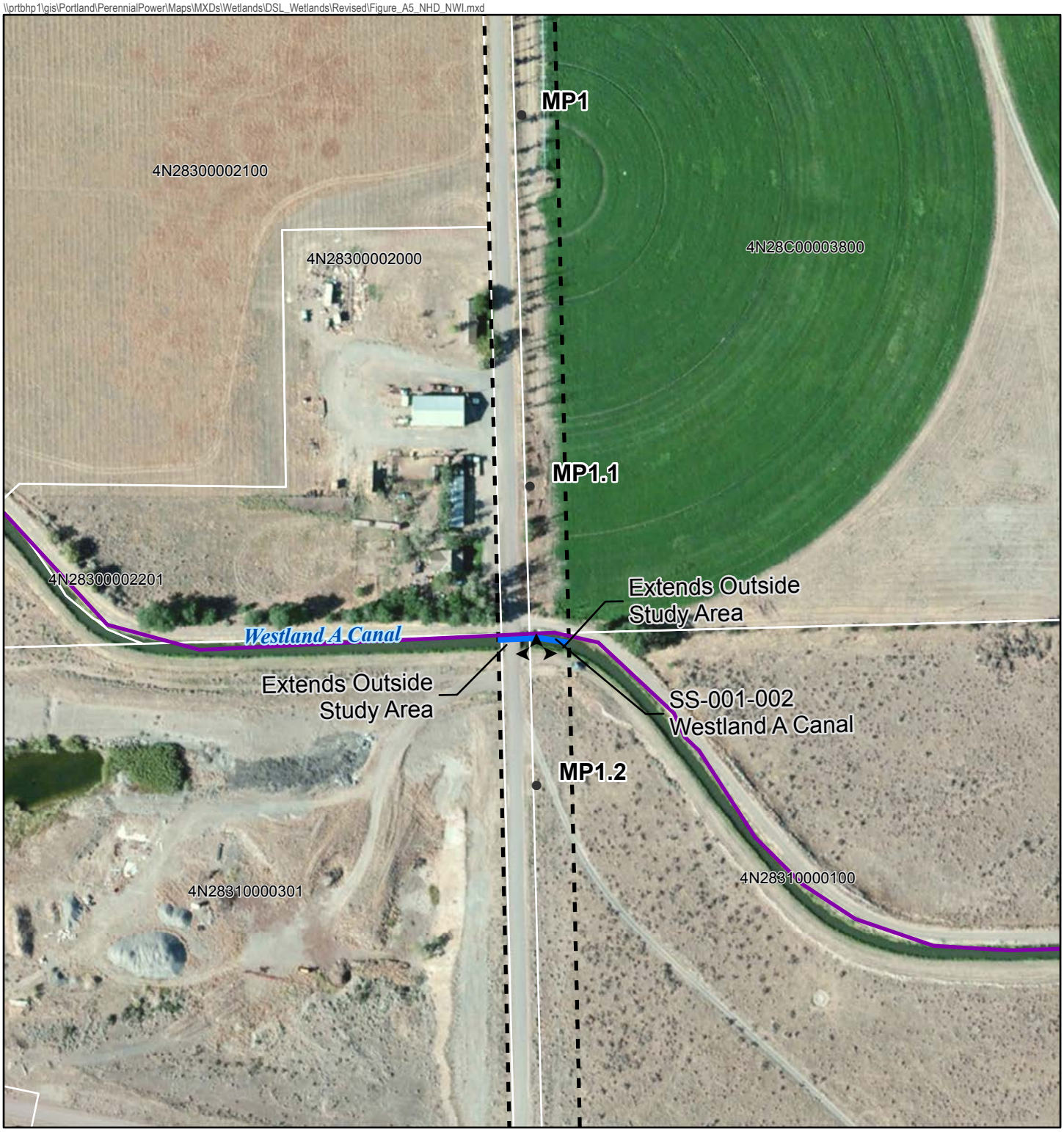

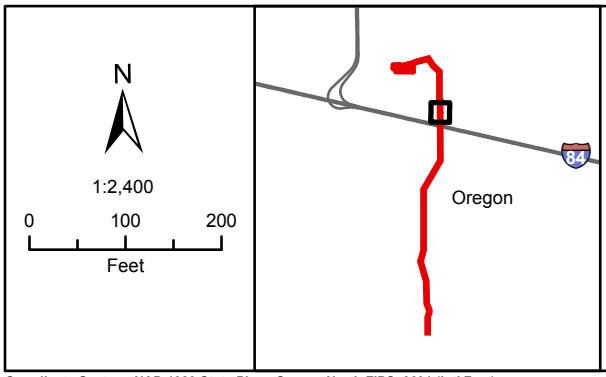

Project Features
- Mileposts
- Photo Direction
- Study Area
- Taxlots

2013 Data
- Delineated Streams
- NHD Streams

Source: ESRI Imagery 2010

Figure A-5f

NWI and NHD

Perennial Wind Chaser Station
and Its Associated Facilities

Coordinate System: NAD 1983 State Plane Oregon North FIPS 3601 (Intl Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Note:
1. Field Data Accurate to +/- 1 meter

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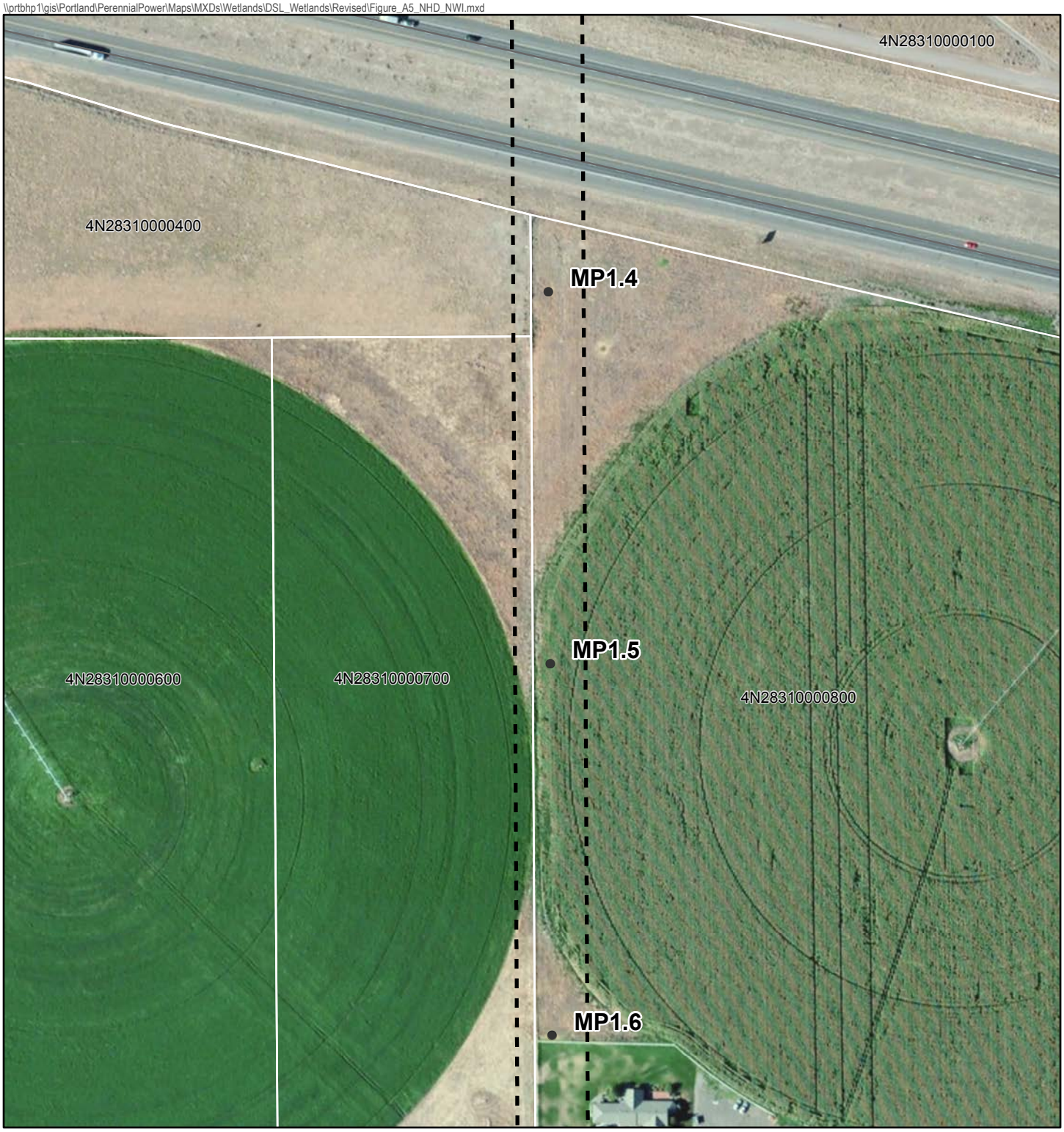

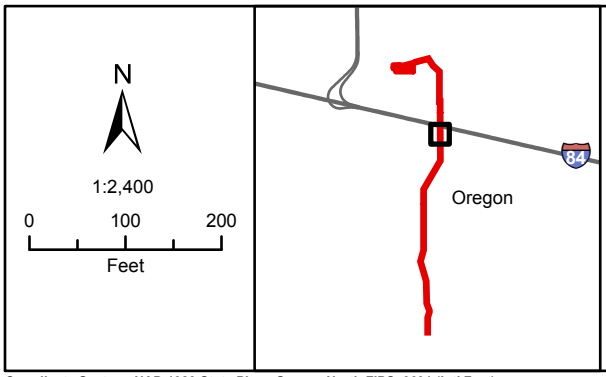

Project Features
- Mileposts
- Photo Direction
- Study Area
- Taxlots

Figure A-5g

NWI and NHD

Perennial Wind Chaser Station
and Its Associated Facilities

Source: ESRI Imagery 2010

Coordinate System: NAD 1983 State Plane Oregon North FIPS 3601 (Intl Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Note:
1. Field Data Accurate to +/- 1 meter

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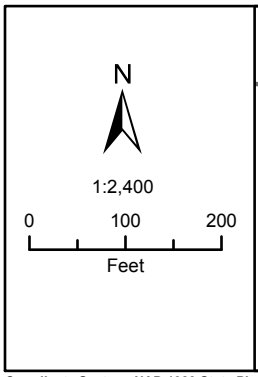

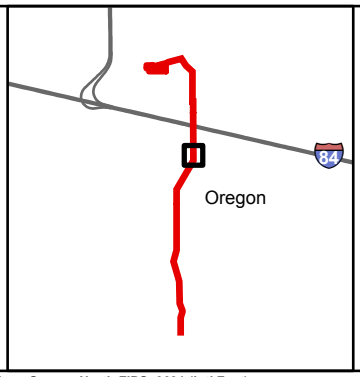

Project Features
- Mileposts
- Photo Direction
- Study Area
- Taxlots

2013 Data
- Delineated Streams
- NHD Streams

Source: ESRI Imagery 2010

Figure A-5h

NWI and NHD

Perennial Wind Chaser Station
and Its Associated Facilities

Coordinate System: NAD 1983 State Plane Oregon North FIPS 3601 (Intl Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Note:
1. Field Data Accurate to +/- 1 meter

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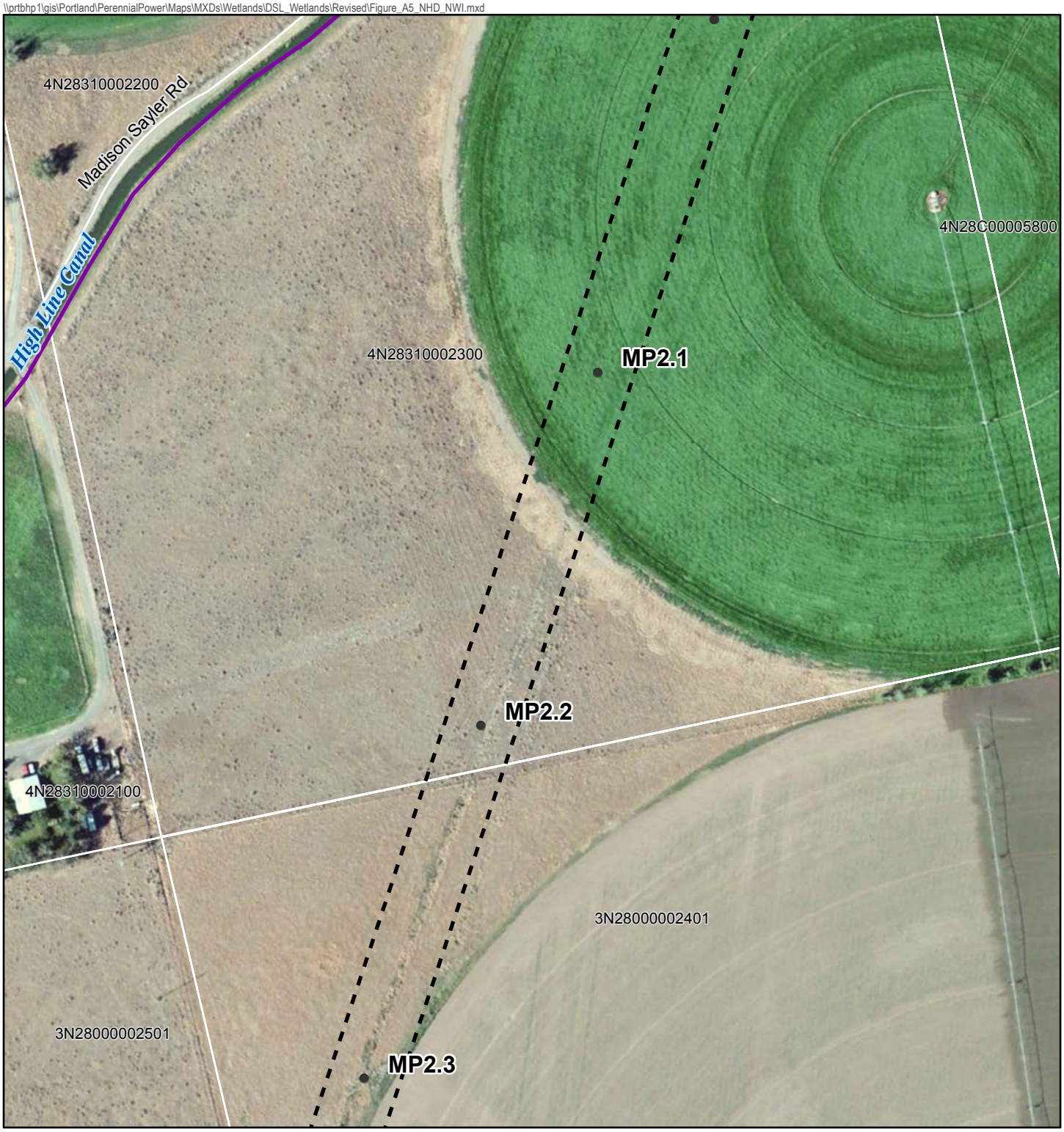

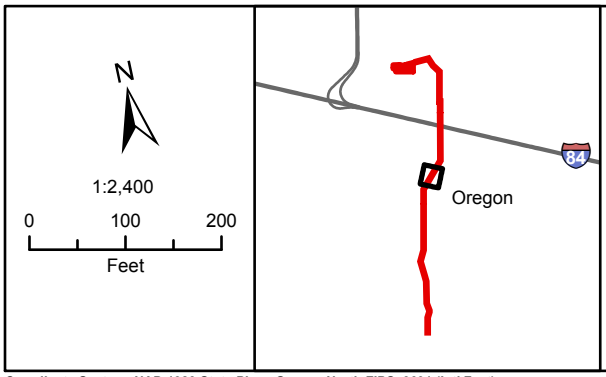

Project Features
- Mileposts
- Photo Direction
- Study Area
- Taxlots
- NHD Streams

Figure A-5i

NWI and NHD

Perennial Wind Chaser Station
and Its Associated Facilities

Source: ESRI Imagery 2010

Coordinate System: NAD 1983 State Plane Oregon North FIPS 3601 (Intl Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Note:
1. Field Data Accurate to +/- 1 meter

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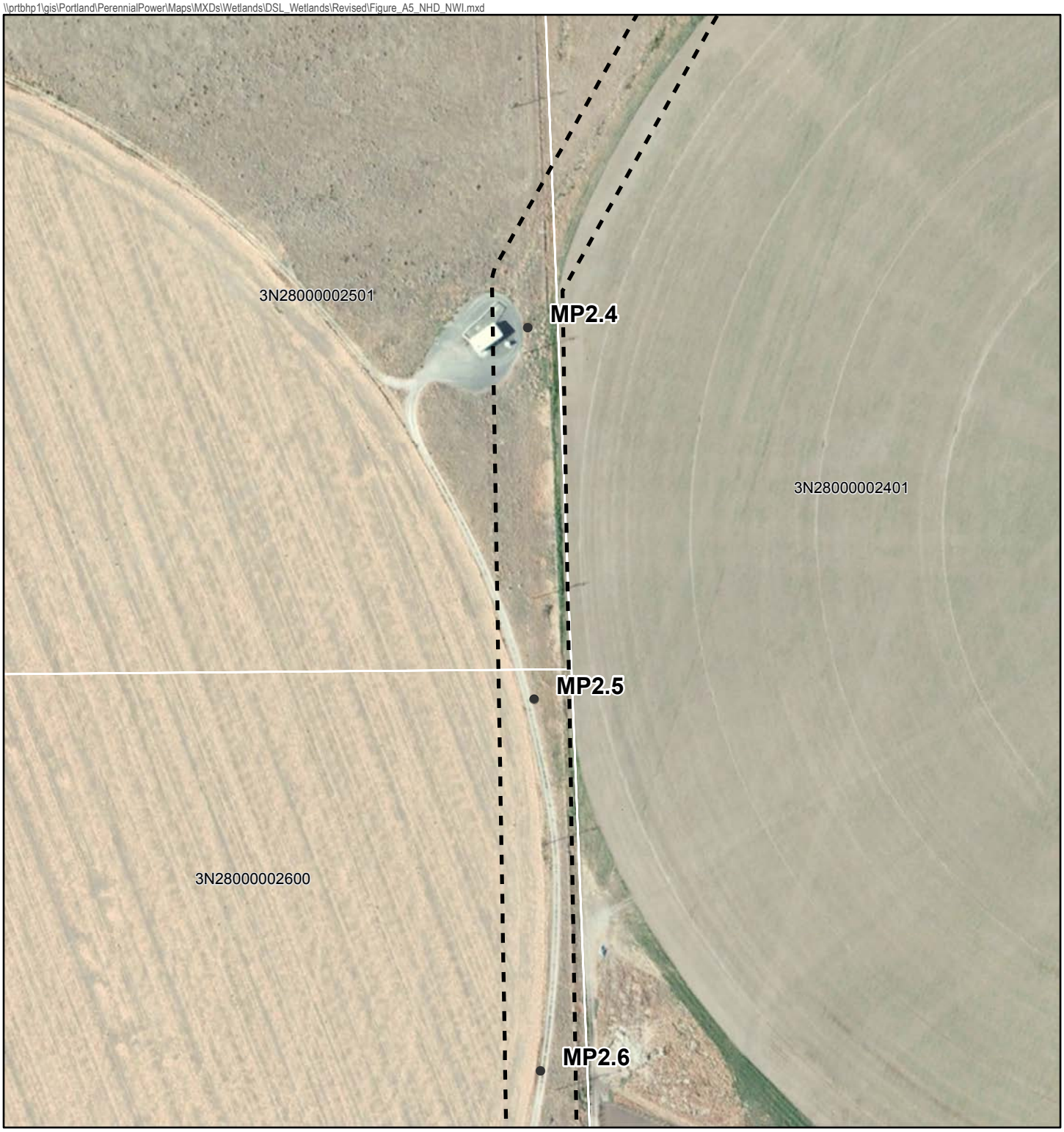

N

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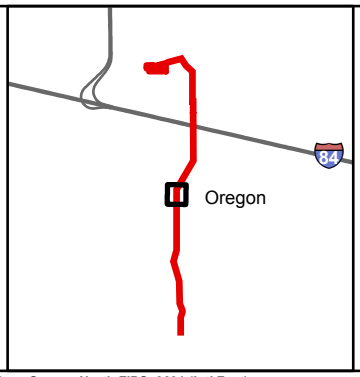
0 100 200

Feet



Project Features

- Mileposts
- Photo Direction
- Study Area
- Taxlots

Figure A-5j

NWI and NHD

Perennial Wind Chaser Station
and Its Associated Facilities

Source: ESRI Imagery 2010

Coordinate System: NAD 1983 State Plane Oregon North FIPS 3601 (Intl Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Note:
1. Field Data Accurate to +/- 1 meter

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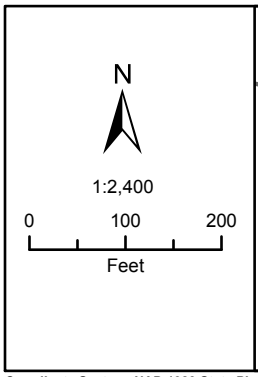

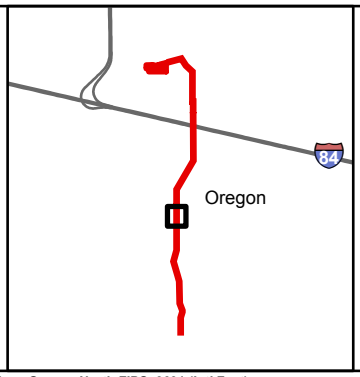

Project Features
- Mileposts
- Photo Direction
- Study Area
- Taxlots

Figure A-5k

NWI and NHD

Perennial Wind Chaser Station
and Its Associated Facilities

Source: ESRI Imagery 2010

Coordinate System: NAD 1983 State Plane Oregon North FIPS 3601 (Intl Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Note:
1. Field Data Accurate to +/- 1 meter

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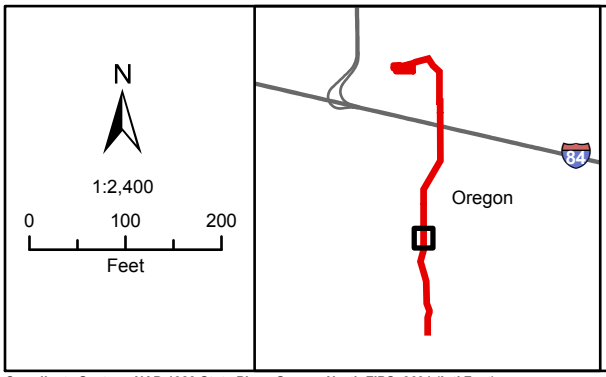

Project Features
- Mileposts
- Photo Direction
- Study Area
- Taxlots

Source: ESRI Imagery 2010

Figure A-5l

NWI and NHD

Perennial Wind Chaser Station
and Its Associated Facilities

Coordinate System: NAD 1983 State Plane Oregon North FIPS 3601 (Intl Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Note:
1. Field Data Accurate to +/- 1 meter

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Figure A-5m

NWI and NHD

Perennial Wind Chaser Station
and Its Associated Facilities

Coordinate System: NAD 1983 State Plane Oregon North FIPS 3601 (Intl Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Note:
1. Field Data Accurate to +/- 1 meter

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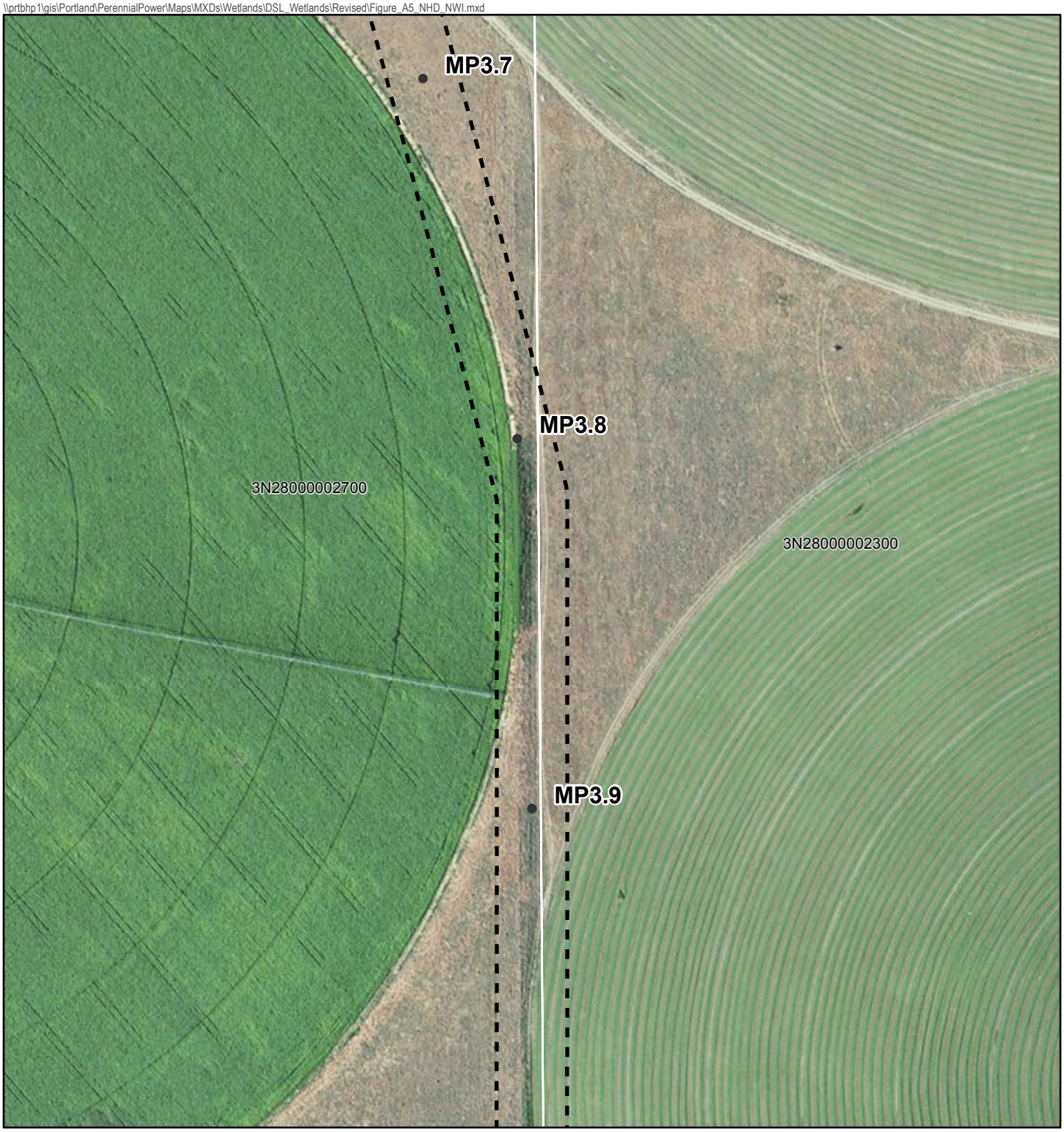

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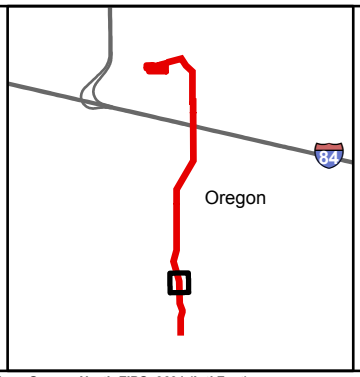
Feet



Project Features

- Mileposts
- Photo Direction
- Study Area
- Taxlots

Figure A-5n

NWI and NHD

Perennial Wind Chaser Station
and Its Associated Facilities

Source: ESRI Imagery 2010

Coordinate System: NAD 1983 State Plane Oregon North FIPS 3601 (Intl Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Note:
1. Field Data Accurate to +/- 1 meter

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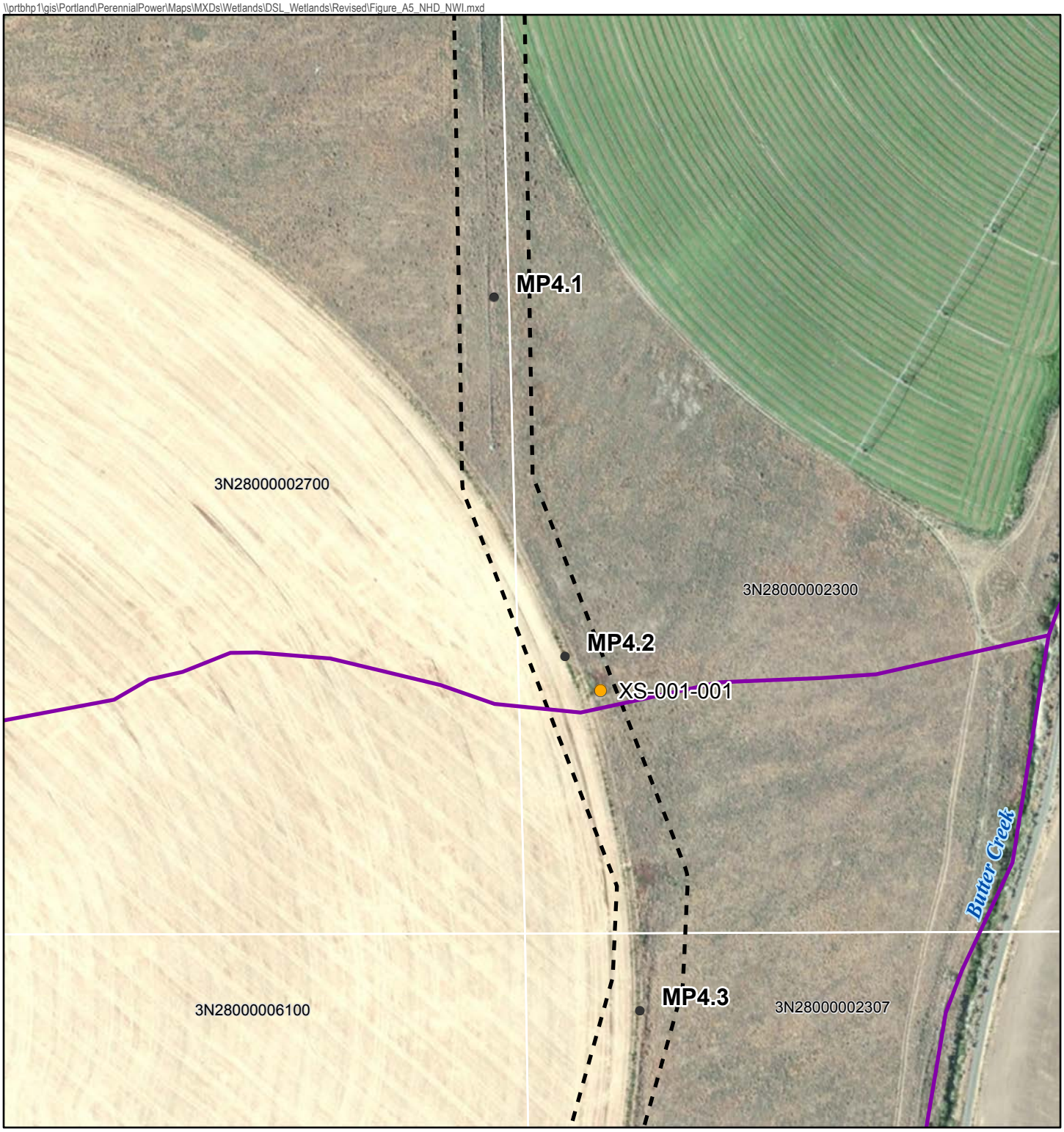

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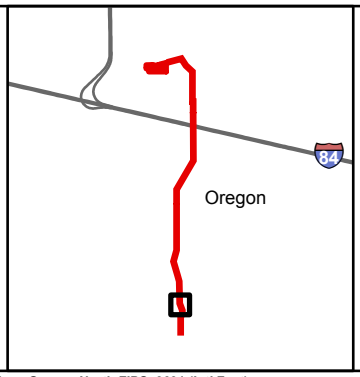
Feet



Project Features

- Mileposts
- Photo Direction
- Study Area
- Taxlots

2013 Data

- Sample Point
- NHD Streams

Source: ESRI Imagery 2010

Figure A-5o

NWI and NHD

Perennial Wind Chaser Station
and Its Associated Facilities

Coordinate System: NAD 1983 State Plane Oregon North FIPS 3601 (Intl Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Note:
1. Field Data Accurate to +/- 1 meter

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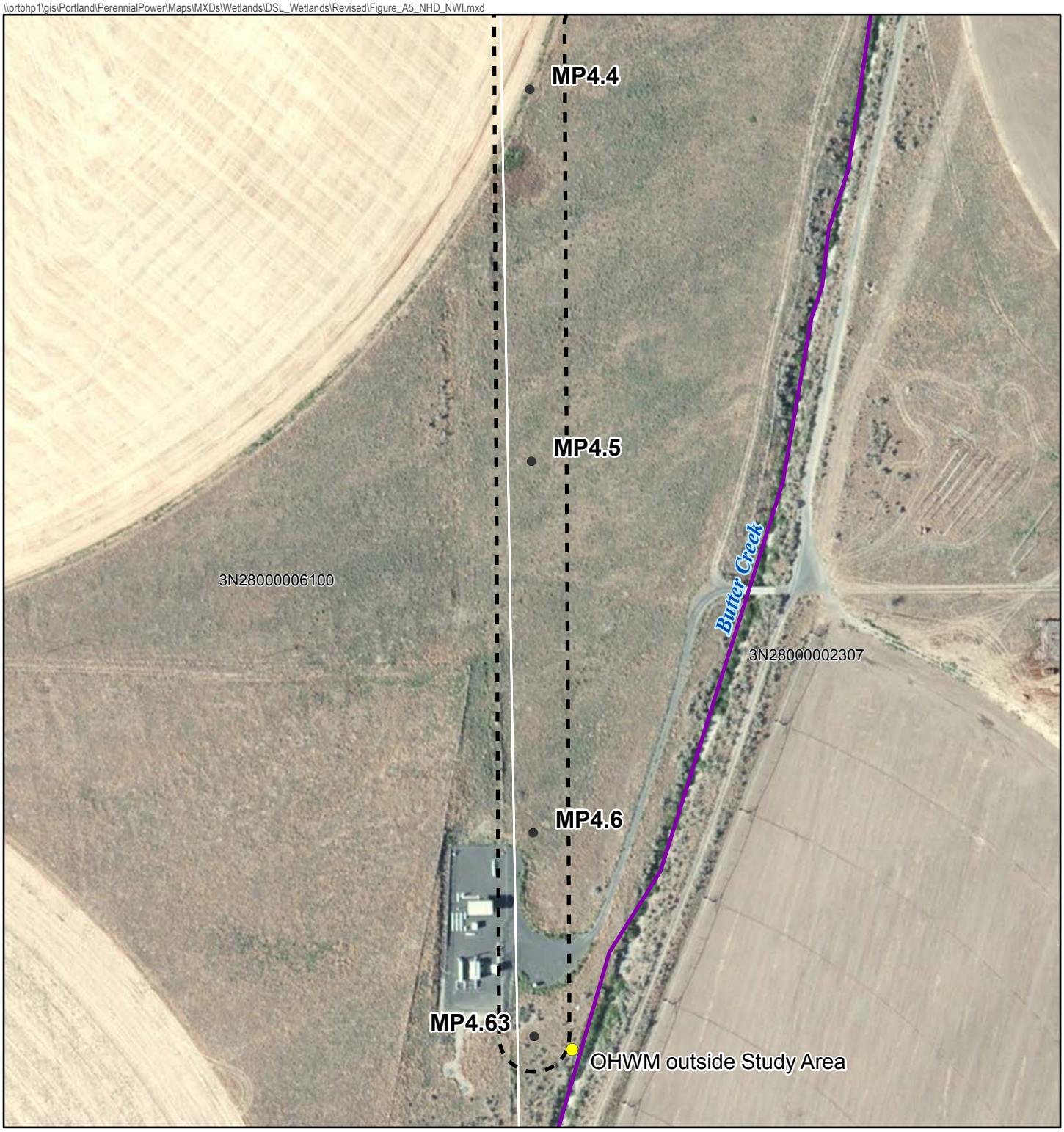

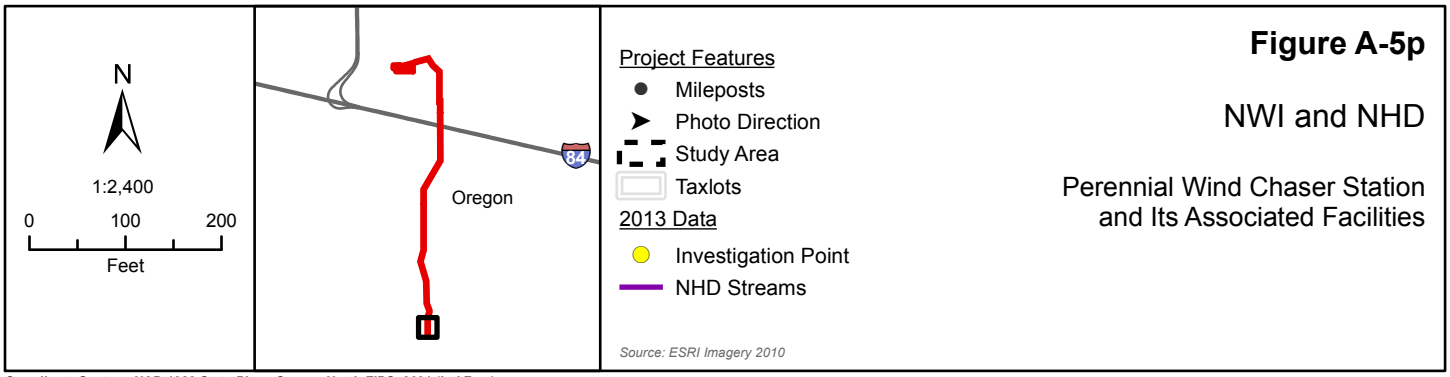

Figure A-5p

NWI and NHD

Perennial Wind Chaser Station
and Its Associated Facilities

Coordinate System: NAD 1983 State Plane Oregon North FIPS 3601 (Intl Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Note:
1. Field Data Accurate to +/- 1 meter

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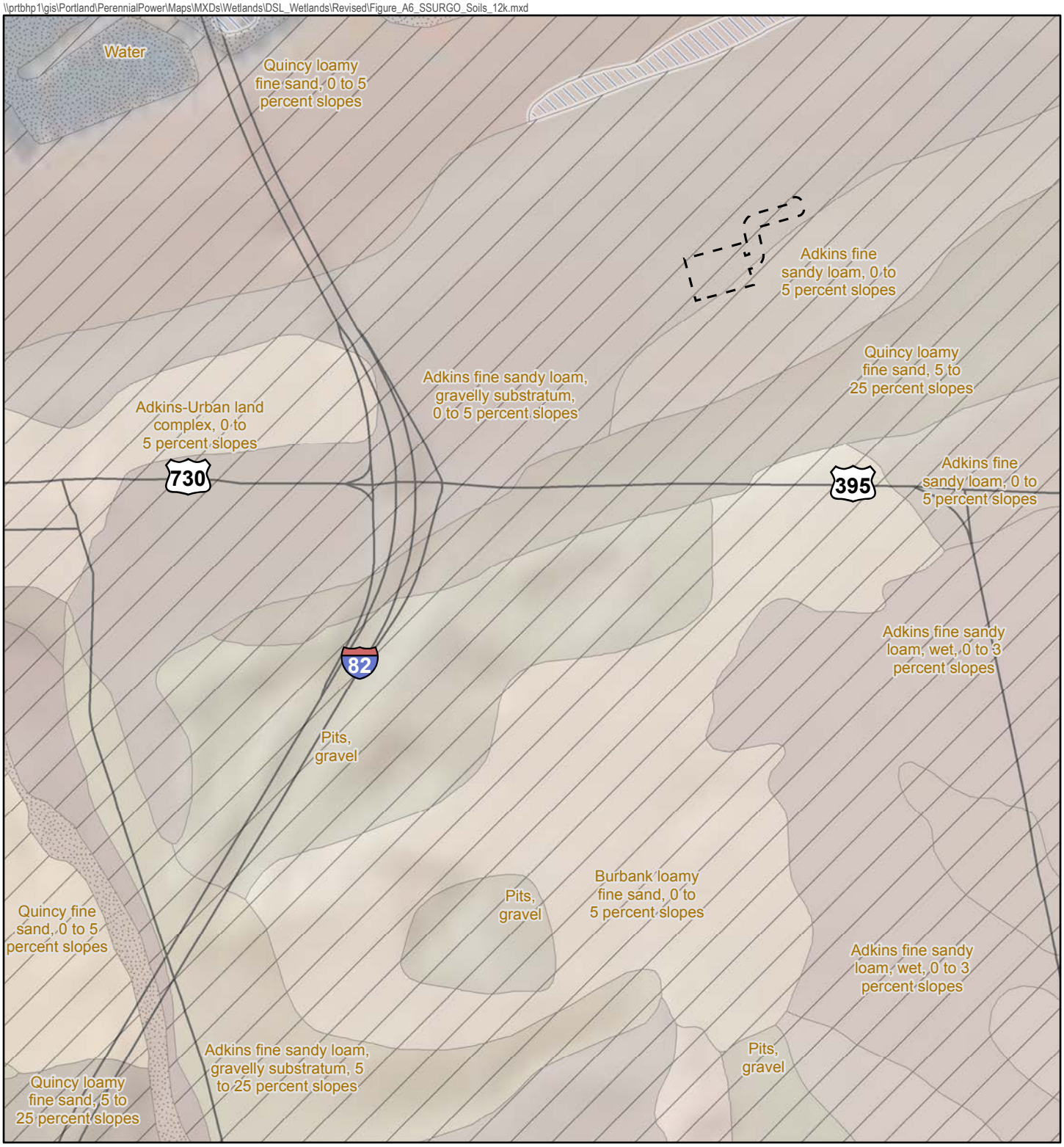

N

1:12,000

0 500 1,000

Feet

Project Features

Study Area

SSURGO Soils

Hydric Soils

Not Hydric

Unranked

Hydric

Source: SSURGO 2012

Figure A-6a

County Soil Survey

Perennial Wind Chaser Station and Its Associated Facilities

Coordinate System: NAD 1983 State Plane Oregon North FIPS 3601 (Intl Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Note:
1. Field Data Accurate to +/- 1 meter

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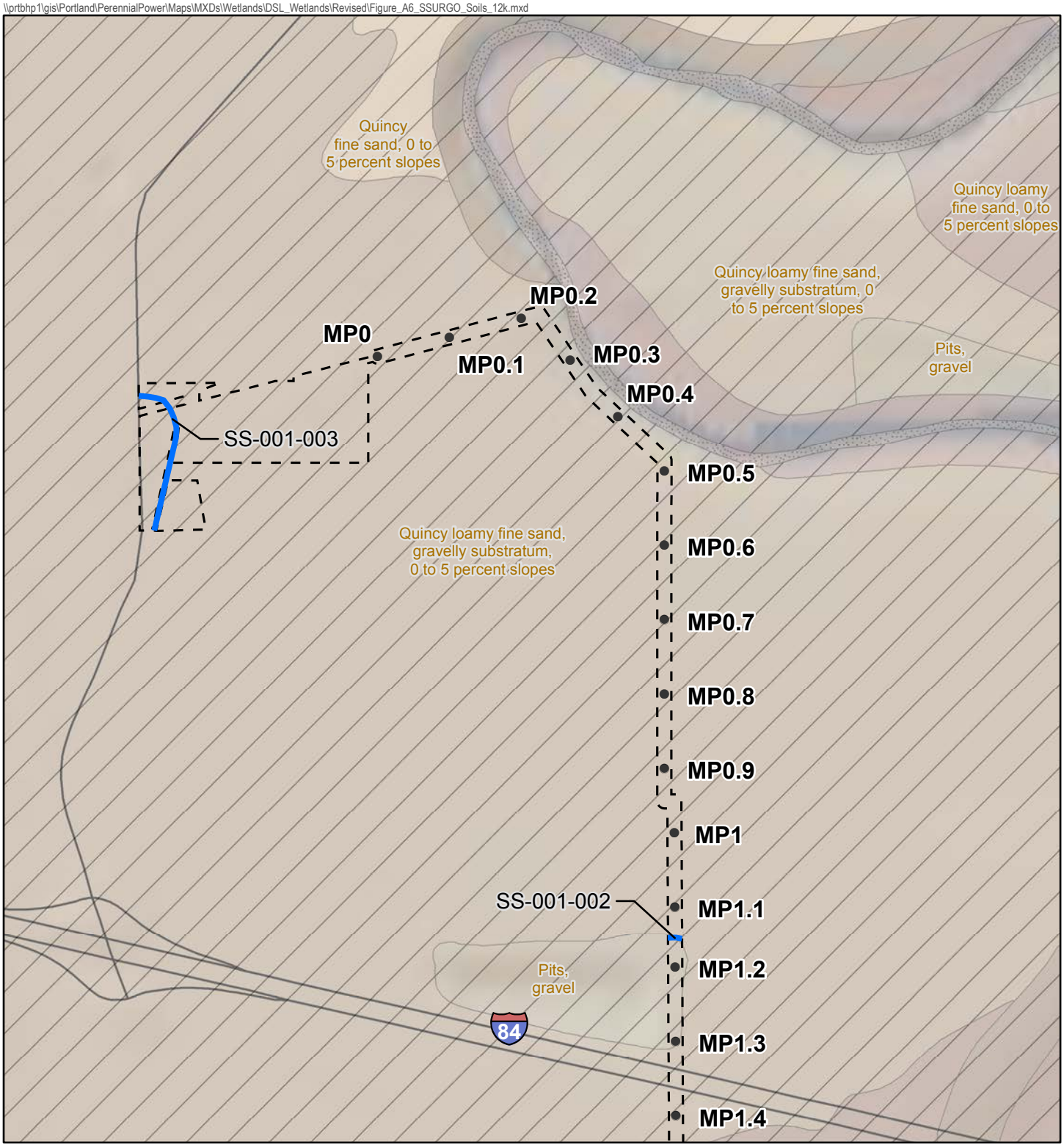

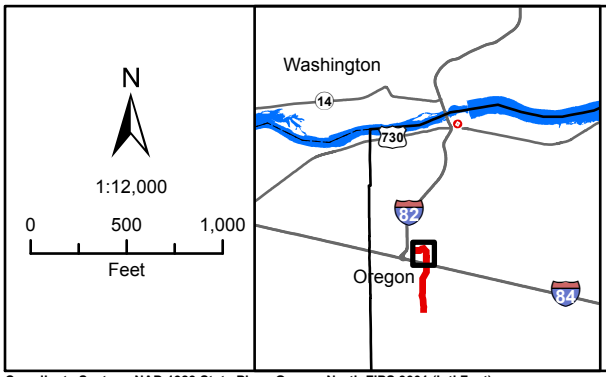

Project Features
- Mileposts
- Study Area

Water Features
- Delineated Stream

SSURGO Soils

Hydric Soils
- Not Hydric
- Unranked

Source: SSURGO 2012

Figure A-6b

County Soil Survey

Perennial Wind Chaser
Station and Its
Associated Facilities

Coordinate System: NAD 1983 State Plane Oregon North FIPS 3601 (Intl Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Note:
1. Field Data Accurate to +/- 1 meter

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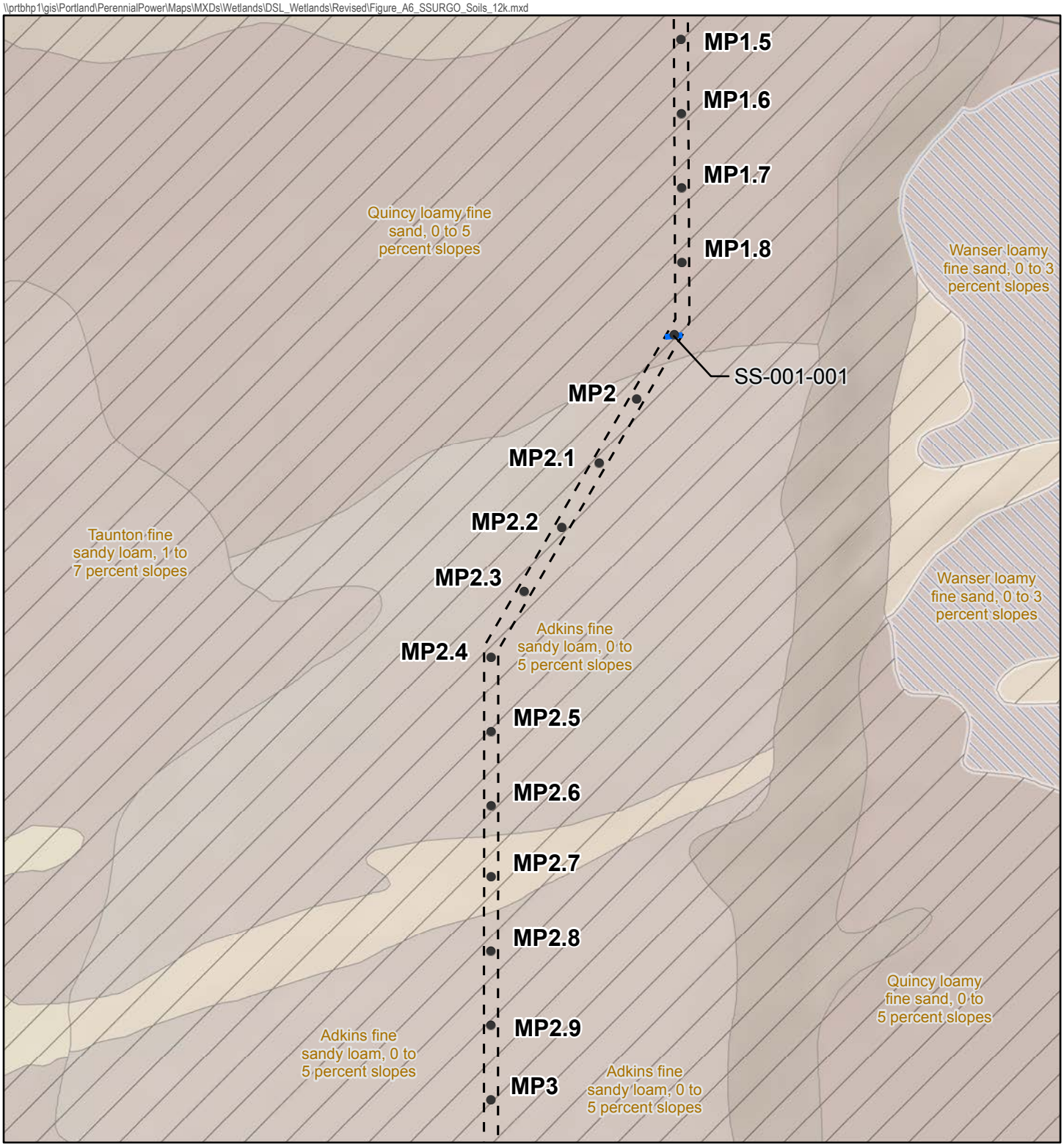

N

1:12,000

0 500 1,000

Feet

Project Features

- Mileposts
- Study Area

Water Features

- Delineated Stream

SSURGO Soils

Hydric Soils

- Not Hydric
- Hydric

Source: SSURGO 2012

Figure A-6c

County Soil Survey

Perennial Wind Chaser Station and Its Associated Facilities

Coordinate System: NAD 1983 State Plane Oregon North FIPS 3601 (Intl Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Note:
1. Field Data Accurate to +/- 1 meter

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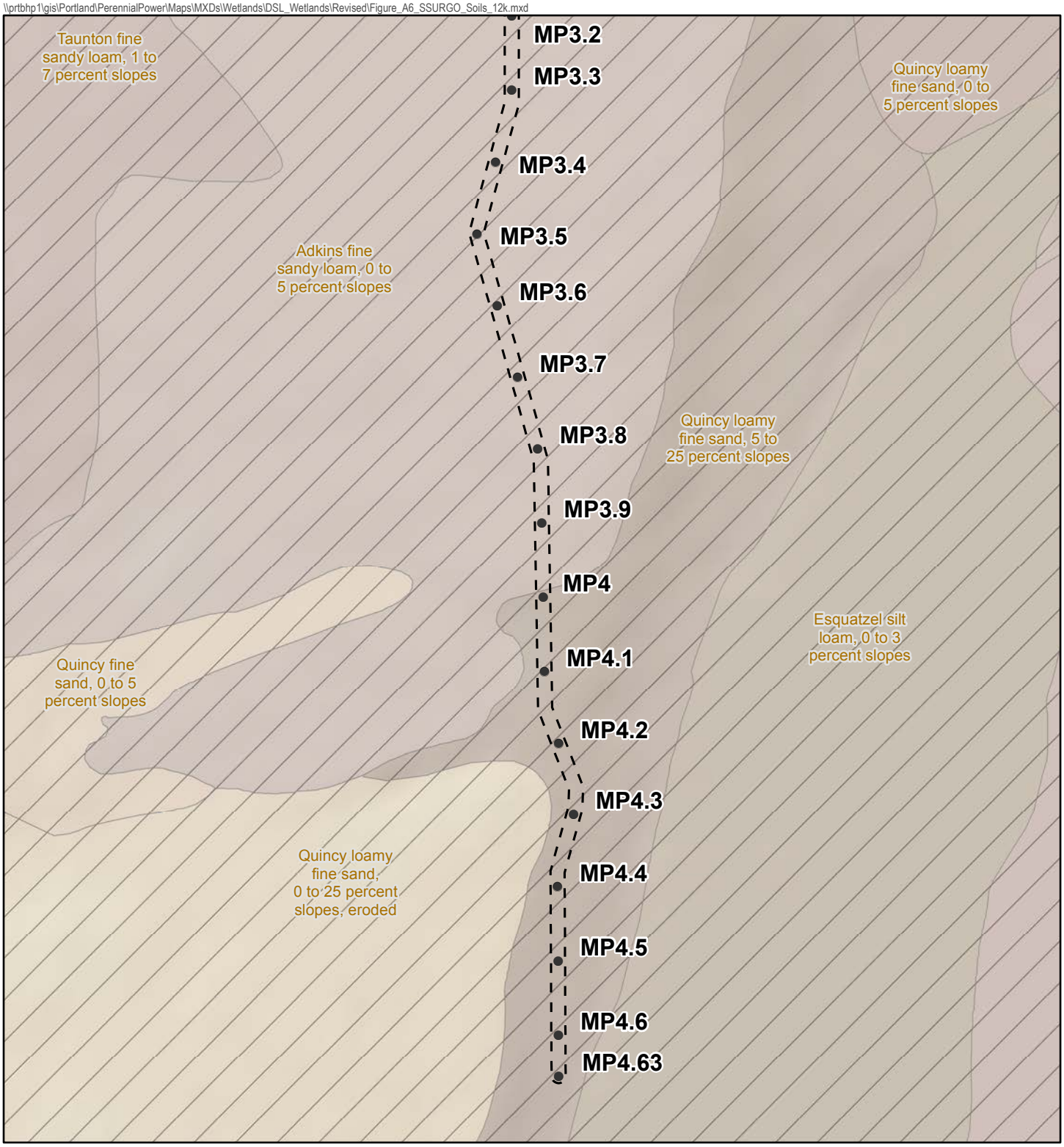

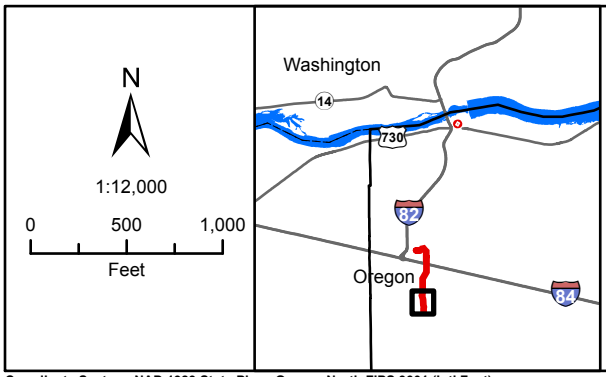

Project Features
- Mileposts
- Study Area

SSURGO Soils

Hydric Soils
- Not Hydric

Source: SSURGO 2012

Figure A-6d

County Soil Survey

Perennial Wind Chaser Station and Its Associated Facilities

Coordinate System: NAD 1983 State Plane Oregon North FIPS 3601 (Intl Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Note:
1. Field Data Accurate to +/- 1 meter

B Datasheets

Data Sheets

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Perennial step-up station City/County: Umatilla co. Sampling Date: 8-1-13

Applicant/Owner: Perennial State: OR Sampling Point: KW-003-001

Investigator(s): C. Kenny, D. Wardwell Section, Township, Range: 4N, 28E, 030

Landform (hillslope, terrace, etc.): Flat Local relief (concave, convex, none): None Slope (%): 0%

Subregion (LRR): B Lat: 45°55'19.41 Long: -119°18'43.95 Datum: NAD83

Soil Map Unit Name: Adkins fine sandy loam, gravel substratum 0-5% slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No ✓ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No ✓	**Is the Sampled Area within a Wetland?** Yes ____ No ✓
Hydric Soil Present?	Yes ____	No ✓	
Wetland Hydrology Present?	Yes ____	No ✓	

Remarks: Rainfall significantly below average this year. Sample pit located in center of step-up station footprint. Habitat – fallow agricultural field on loose, sandy-silt soil which shows evidence of recent tilling.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: —)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	____ = Total Cover		

Sapling/Shrub Stratum (Plot size: —)			
1.			
2.			
3.			
4.			
5.			
	____ = Total Cover		

Herb Stratum (Plot size: 5)			
1. Bromus tectorum	10	N	UPL
2. Sisymbrium altissimum	40	Y	FACU
3. Amsinckia intermedia	10	N	UPL
4. Salsola kali	5	N	UPL
5. Elymus elymoides	15	N	FACU
6.			
7.			
8.			
	80 = Total Cover		

Woody Vine Stratum (Plot size: —)			
1.			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum 20 % Cover of Biotic Crust —

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 0 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	____	x 1 = ____
FACW species	____	x 2 = ____
FAC species	____	x 3 = ____
FACU species	____	x 4 = ____
UPL species	____	x 5 = ____
Column Totals:	____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ___ Dominance Test is >50%
- ___ Prevalence Index is ≤3.0[1]
- ___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No ✓

Remarks:

PHOTOS: 1912 N, 1913 E, 1914 W, 1915 S.

Hydrophytic vegetation not present.

SOIL

Sampling Point: XW-003-001

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 3/2	100	–	–	–	–	SANDY LOAM	SILTY, DRY

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: –

Depth (inches): –

Hydric Soil Present? Yes ___ No ✓

Remarks: Soil dry, powdery. moistened to color in munsell.
Hydric soils not present.
Soils tilled. Fallow agricultural field.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___

Water Table Present? Yes ___ No ✓ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ___

Wetland Hydrology Present? Yes ___ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: No hydrology present.

STREAM ID: SS -001-001

STREAM DATA

☒ ROW ☐ Project Facility STATE OR
☐ Access Road ☐ Staging/Storage Area PROJECT Perennial Wind Chaser Station

County: Umatilla

Date: 5-9-13

Stream Name: ☐ UNNAMED ☐ NAMED:

Stream Type: ☐ STREAM ☒ DITCH/CANAL High Line Canal

Observers: D. Wardwell, M. Alexander

CHARACTERISTICS

Water Present: ☒ yes ☐ no

Flow Type: ☐ Perennial ☒ Intermittent ☐ Ephemeral *see notes.

Stream Flow Direction: West

Width (ft) (water's edge to water's edge): 20

Width (ft) (bank to bank): 25
(above OHWM; use OHWM Criteria below)

CHARACTERISTICS

Substrate Type
- ☐ Bedrock
- ☐ Gravel
- ☒ Sand
- ☐ Silt
- ☐ Cobbles
- ☐ Clay
- ☐ Concrete
- ☐ Other

Probed Stream Depth
- ☐ N/A
- ☐ 0 – 6"
- ☐ 7 – 12"
- ☐ 13 – 24"
- ☐ 25 – 36"
- ☒ 37"+

Water Clarity
- ☐ Clear
- ☒ Discolored
- ☐ Oily Film
- ☐ Other

STREAM BANK HEIGHT AND SLOPE

Left Bank* Height (ft): 3'
Slope: ☐ 0-30º (4:1) ☐ 31-45º (3:1) ☒ 46-60º (2:1) ☐ 61-90º (1:1)

Right Bank* Height (ft): 2'
Slope: ☐ 0-30º (4:1) ☐ 31-45º (3:1) ☒ 46-60º (2:1) ☐ 61-90º (1:1)

Height (ft) (OHWM from stream bed): ~2.5
*Direction when facing downstream

Evidence of Erosion: ☐ yes ☒ no

☐ Sloughing ☐ Undercutting ☐ Impact from Cattle

☐ Other:

Top of Bank Characteristics
Width (ft) Highest Bank to Highest Bank: N/A

Highest Left Bank Height*:
Highest Left Bank Slope*:
Highest Right Bank Height*:
Highest Right Bank Slope*:
*Direction when facing downstream

ASSOCIATED HABITAT

Riparian Vegetation
☐ yes
☒ no
If yes, list:

Width of riparian corridor (ft): ~~35' total~~

Stream Fringe (5' or less including both banks)

☐ yes, width (ft):
☒ no
If yes, list :

Aquatic Vegetation
☐ yes
☒ no
If yes, list:

ASSOCIATED SPECIES

Aquatic Organisms
☐ yes
☒ no
If yes, list:

Riparian/Terrestrial Organisms
☒ yes
☐ no
If yes, list: • Red winged Black-bird • Great Blue Heron

Stream has potential for fish presence
☒ yes
☐ no

T&E Species
☐ yes, list ID:
☒ no

OHWM Criteria – Ordinary High Water Mark

- ☒ clear, natural line impressed on bank
- ☐ changes in character of soil
- ☐ shelving
- ☐ vegetation matted down, bent or absent
- ☐ leaf litter disturbed or washed away
- ☐ sediment deposition
- ☐ water staining
- ☐ presence of litter and debris
- ☐ destruction of terrestrial vegetation
- ☐ presence of wrack line
- ☐ sediment sorting
- ☐ scour
- ☐ abrupt change in plant community
- ☐ other (list):

Discontinuous OHWM: ☐ yes ☒ no

Geometry: ☐ Meandering ☒ Relatively Straight

Presence of: ☐ run ☐ pools ☐ riffles

Is the stream/tributary:
☐ natural
☒ manmade – Explain: Irrigation ditch/canal
☐ man-altered – Explain:

NOTES:

Photos taken from left bank: Across (N) 0559.jpg; Down (W) 0554.jpg; Up (E) 0552.jpg

Per correspondance with Westland Irrigation district canals are dewatered seasonally. Only used for irrigation.

Stream banks were logged by:
RP-001-002 (South bank)
RP-001-003 (center of stream X-316687.83 Y-507245.24)
RP-001-004 (North bank)

14:AW5907_T0714-03/16/09-D1

STREAM ID: SS - 001-002

STREAM DATA

☒ ROW ☐ Project Facility STATE OR
☐ Access Road ☐ Staging/Storage Area PROJECT Perennial Wind Chaser Station

County: Umatilla

Date: 5-9-13

Stream Name: ☐ UNNAMED ☐ NAMED:

Stream Type: ☐ STREAM ☒ DITCH/CANAL Westland A Canal

Observers: D. Wardwell, M. Alexander

CHARACTERISTICS

Water Present: ☒ yes ☐ no

Flow Type: ☐ Perennial ☒ Intermittent ☐ Ephemeral *see notes

Stream Flow Direction: West

Width (ft) (water's edge to water's edge): 24'

Width (ft) (bank to bank): 31'
(above OHWM; use OHWM Criteria below)

CHARACTERISTICS

Substrate Type
- ☐ Bedrock
- ☐ Gravel
- ☒ Sand
- ☐ Silt
- ☐ Cobbles
- ☐ Clay
- ☐ Concrete
- ☐ Other

Probed Stream Depth
- ☐ N/A
- ☐ 0 – 6"
- ☐ 7 – 12"
- ☐ 13 – 24"
- ☐ 25 – 36"
- ☒ 37"+

Water Clarity
- ☐ Clear
- ☒ Discolored
- ☐ Oily Film
- ☐ Other

STREAM BANK HEIGHT AND SLOPE

Left Bank* Height (ft): 3'

Slope: ☐ 0-30º (4:1) ☐ 31-45º (3:1) ☐ 46-60º (2:1) ☐ 61-90º (1:1)

Right Bank* Height (ft): 3'

Slope: ☐ 0-30º (4:1) ☐ 31-45º (3:1) ☐ 46-60º (2:1) ☐ 61-90º (1:1)

Height (ft) (OHWM from stream bed): 6' +
*Direction when facing downstream

Evidence of Erosion: ☐ yes ☒ no

☐ Sloughing ☐ Undercutting ☐ Impact from Cattle

☐ Other:

Top of Bank Characteristics
Width (ft) Highest Bank to Highest Bank: N/A

Highest Left Bank Height*:
Highest Left Bank Slope*:
Highest Right Bank Height*:
Highest Right Bank Slope*:
*Direction when facing downstream

ASSOCIATED HABITAT

Riparian Vegetation
☐ yes
☒ no
If yes, list:

Width of riparian corridor (ft): ~~35' total~~ 0

Stream Fringe (5' or less including both banks)

☐ yes, width (ft):
☒ no
If yes, list :

Aquatic Vegetation
☐ yes
☒ no
If yes, list:

ASSOCIATED SPECIES

Aquatic Organisms
☐ yes
☒ no
If yes, list:

Riparian/Terrestrial Organisms
☐ yes
☒ no
If yes, list:

Stream has potential for fish presence
☒ yes
☐ no

T&E Species
☐ yes, list ID:
☒ no

OHWM Criteria – Ordinary High Water Mark

- ☒ clear, natural line impressed on bank
- ☐ changes in character of soil
- ☐ shelving
- ☐ vegetation matted down, bent or absent
- ☐ leaf litter disturbed or washed away
- ☐ sediment deposition
- ☐ water staining
- ☐ presence of litter and debris
- ☐ destruction of terrestrial vegetation
- ☐ presence of wrack line
- ☐ sediment sorting
- ☐ scour
- ☐ abrupt change in plant community
- ☐ other (list):

Discontinuous OHWM: ☐ yes ☒ no

Geometry: ☐ Meandering ☒ Relatively Straight

Presence of: ☐ run ☐ pools ☐ riffles

Is the stream/tributary:
☐ natural
☒ manmade – Explain: Irrigation ditch / canal
☐ man-altered – Explain:

NOTES:

Photos from left bank: Across (N) 0554.jpg; Down (W) 0555.jpg; Up (E) 0556.jpg

Per correspondence with Westland Irrigation district, canal is dewatered seasonally. Only used for irrigation.

Bank Points – RP-001-005 South bank
RP-001-006 Center of stream
X: 316755.04
Y: 5073641.22
RP-001-007 North bank

14:AW5907_T0714-03/16/09-D1

STREAM ID: SS- 001-003

STREAM DATA

☐ ROW ☒ Project Facility STATE OR
☐ Access Road ☐ Staging/Storage Area PROJECT Perennial Wind Chaser Station

County: Umatilla

Date: 5-9-13

Stream Name: ☐ UNNAMED ☐ NAMED:

Stream Type: ☐ STREAM ☒ DITCH/CANAL Westland A Canal

Observers: D. Wardwell, M. Alexander

CHARACTERISTICS

Water Present: ☒ yes ☐ no

Flow Type: ☐ Perennial ☒ Intermittent ☐ Ephemeral

Stream Flow Direction: North

Width (ft) (water's edge to water's edge): 25'

Width (ft) (bank to bank): 30'
(above OHWM; use OHWM Criteria below)

CHARACTERISTICS

Substrate Type
- ☐ Bedrock
- ☐ Gravel
- ☒ Sand
- ☐ Silt
- ☐ Cobbles
- ☐ Clay
- ☐ Concrete
- ☐ Other

Probed Stream Depth
- ☐ N/A
- ☐ 0 – 6"
- ☐ 7 – 12"
- ☐ 13 – 24"
- ☐ 25 – 36"
- ☒ 37"+

Water Clarity
- ☐ Clear
- ☒ Discolored
- ☐ Oily Film
- ☐ Other

STREAM BANK HEIGHT AND SLOPE

Left Bank* Height (ft): 3'

Right Bank* Height (ft): 4'

Slope: ☐ 0-30º (4:1) ☐ 31-45º (3:1) ☐ 46-60º (2:1) ☒ 61-90º (1:1)

Slope: ☐ 0-30º (4:1) ☐ 31-45º (3:1) ☐ 46-60º (2:1) ☒ 61-90º (1:1)

Height (ft) (OHWM from stream bed): 7'+
*Direction when facing downstream

Evidence of Erosion: ☐ yes ☒ no

☐ Sloughing ☐ Undercutting ☐ Impact from Cattle

☐ Other:

Top of Bank Characteristics
Width (ft) Highest Bank to Highest Bank:
Highest Left Bank Height*:
Highest Left Bank Slope*:
Highest Right Bank Height*:
Highest Right Bank Slope*:
*Direction when facing downstream
N/A

ASSOCIATED HABITAT

Riparian Vegetation
☐ yes
☒ no
If yes, list:

Width of riparian corridor (ft):

Stream Fringe (5' or less including both banks)
☒ yes, width (ft): 1'
☐ no
If yes, list:
- Phalaris arundinaceae on west bank.
- Juncus sp.

Aquatic Vegetation
☐ yes
☐ no
If yes, list:

ASSOCIATED SPECIES

Aquatic Organisms
☐ yes
☒ no
If yes, list:

Riparian/Terrestrial Organisms
☐ yes
☒ no
If yes, list:

Stream has potential for fish presence
☒ yes
☐ no

T&E Species
☐ yes, list ID:
☒ no

OHWM Criteria – Ordinary High Water Mark

- ☒ clear, natural line impressed on bank
- ☐ changes in character of soil
- ☐ shelving
- ☐ vegetation matted down, bent or absent
- ☐ leaf litter disturbed or washed away
- ☐ sediment deposition
- ☐ water staining
- ☐ presence of litter and debris
- ☐ destruction of terrestrial vegetation
- ☐ presence of wrack line
- ☐ sediment sorting
- ☐ scour
- ☐ abrupt change in plant community
- ☐ other (list):

Discontinuous OHWM: ☐ yes ☒ no

Geometry: ☐ Meandering ☒ Relatively Straight

Presence of: ☐ run ☐ pools ☐ riffles

Is the stream/tributary:
☐ natural
☒ manmade – Explain: Irrigation ditch/canal.
☐ man-altered – Explain:

NOTES:

photos from left bank:
- ACROSS (E) 0560.JPG
- DOWN (N) 0561.JPG
- UP (S) 0562.JPG

Per correspondence with Westland Irrigation district, the canal is seasonally dewatered & only used for irrigation.

Bank Points: RP-001-008 LEFT BANK
RP-001-009 RIGHT BANK
RP-001-010 - Center X: 315718.19
Y: 5074818.28

14:AW5907_T0714-03/16/09-D1

C Photo Log

Photo Log

SS-001-001 looking across canal to the north.

SS-001-001 facing downstream to the west.

SS-001-001 facing upstream to the east.

SS-001-002 looking across canal.

SS-001-002 facing downstream.

SS-001-002 facing upstream.

SS-001-003 looking east across canal.

SS-001-003 facing downstream to the north.

SS-001-003 facing upstream to the south.

XW-003-001 looking north – shovel shows pit location. No feature present.

XW-003-001 looking east – shovel shows pit location. No feature present.

XW-003-001 looking west – shovel shows pit location. No feature present.

XW-003-001 looking south – shovel shows pit location. No feature present.

RP-003-012 looking north – no feature present.

RP-003-012 looking east – no feature present. Piled boulders & debris visible top left of image.

RP-003-012 looking south – no feature present.

RP-003-012 looking west – no feature present.

XS-001-001 (45.749285, -119.362318), Date 5/9/2013: Facing north. Small depression, *Bromus tectorum* slightly greener than in the surrounding area. Stand of Kochia weed to the east (right). No stream or wetland characteristics present.

XS-001-001 (45.749285, -119.362318), Date 5/9/2013: Facing north. Small depression, *Bromus tectorum* slightly greener than in the surrounding area. Stand of Kochia weed to the east (right). No stream or wetland characteristics present.

XS-001-001 (45.749285, -119.362318), Date 5/9/2013: Facing northeast, showing gradient down to lower elevation, along the NHD line. No stream or wetland characteristics present.

APPENDIX J-2

DSL Concurrence Letter

Oregon
John A. Kitzhaber,MD, Governor

Department of State Lands
1645 NE Forbes Rd., Suite 112
Bend, OR 97701
(541) 388-6112
FAX (541) 388-6480
www.oregonstatelands.us

State Land Board

John A. Kitzhaber, MD
Governor

Kate Brown
Secretary of State

Ted Wheeler
State Treasurer

July 17, 2014

Perennial-WindChaser, LLC
Attn: Shigenobu Hamada, Member
600 Third Ave, Suite 30 F
New York, NY 10016

Re: Wetland Delineation Report for a Portion of the Perennial-WindChaser Station Project, Umatilla County; Townships 3N, 4N and 5N Range 28E portions of multiple sections and tax lots; WD #2013-0415

Dear Mr. Hamada:

The Department of State Lands has reviewed the wetland delineation report prepared by Ecology and Environment, Inc. for the site referenced above. Please note that the study area includes only a portion of the tax lots described above (see the attached map). Based upon the information presented in the report, and additional information submitted upon request, we concur with the waterway boundaries as mapped in revised Figures A-4a through A-4p of the report. Please replace all copies of the preliminary wetland maps with these final Department-approved maps. Within the study area, three waterways were identified. Based on information provided by the Westland Irrigation District, the waterways are all canals operated and maintained for the sole purpose of irrigation and are dewatered during the non-irrigation season; therefore, they are exempt per OAR 141-085-0515 (9) and not subject to the permit requirements of the state Removal-Fill Law.

This concurrence is for purposes of the state Removal-Fill Law only. Federal or local permit requirements may apply as well. The Army Corps of Engineers will review the report and make a determination of jurisdiction for purposes of the Clean Water Act at the time that a permit application is submitted. We recommend that you attach a copy of this concurrence letter to both copies of any subsequent joint permit application to speed application review.

This concurrence is based on information provided to the agency. The jurisdictional determination is valid for five years from the date of this letter, unless new information necessitates a revision. Circumstances under which the Department may change a determination are found in OAR 141-090-0045 (available on our web site or upon request). In addition, laws enacted by the legislature and/or rules adopted by the Department may result in a change in jurisdiction; individuals and applicants are subject to the regulations that are in effect at the time of the removal-fill activity, or complete

permit application. The applicant, landowner, or agent may submit a request for reconsideration of this determination in writing within six months of the date of this letter.

Thank you for having the site evaluated. Please phone me at 503-986-5232 if you have any questions.

Sincerely,

Peter Ryan, PWS
Wetland Specialist

Approved by Kathy Verble
Kathy Verble, CPSS
Acting Wetlands Program Manager

Enclosures

ec: Ilja Nieuwenhuizen, Ecology and Environment, Inc.
Umatilla County Planning Department
Shelly Lynch, Corps of Engineers (LaGrande office)
Heidi Hartman, DSL
Andrea Goodwin, ODOE

WETLAND DELINEATION / DETERMINATION REPORT COVER FORM

This form must be included with any wetland delineation report submitted to the Department of State Lands for review and approval. A wetland delineation report submittal is not "complete" unless the fully completed and signed report cover form and the required fee are submitted. Attach the form to the front of an unbound report and submit to: **Oregon Department of State Lands, 775 Summer Street NE, Suite 100, Salem, OR 97301-1279**

Mail a copy of the completed form with payment of the required report review fee to: **Oregon Department of State Lands, P.O. Box 4395, Unit 18, Portland, OR 97208-4395.**

For new credit card payment option, see DSL web site.

☒ Applicant ☐ Owner Name, Firm and Address: **Perennial-WindChaser LLC** **600 Third Ave, Suite 30 F** **New York, NY 10016**	Business phone # **(212) 207-0720** Mobile phone # (optional) FAX # E-mail: **Shigenobu.Hamada@perennialpower.net**
☒ Authorized Legal Agent, Name and Address: **Shigenobu Hamada** **Member** **Perennial-WindChaser LLC** **600 Third Ave, Suite 30 F** **New York, NY 10016**	Business phone # **(212) 207-0720** FAX # Mobile phone # E-mail: **Shigenobu.Hamada@perennialpower.net** ?

RECEIVED DEC 23 2013 DEPARTMENT OF STATE LANDS

I either own the property described below or I have legal authority to allow access to the property. I authorize the Department to access the property for the purpose of confirming the information in the report, after prior notificati[redacted]

Typed/Printed Name: **Shigenobu Hamada** Signature: [redacted]

Date: Special instructions regarding site access: **Please call David Daley at (936) 447-4927 for site access**

Project and Site Information (for latitude & longitude, use centroid of site or start & end points of linear project)

Project Name: **Perennial Wind Chaser Station**	Latitude: **45.802167** Longitude: **-119.370111**
Proposed Use: **Construction and operation of up to four General Electric natural gas–fired combustion turbine generators, for a 415MW natural gas fired power plant, including transmission line, gas pipeline and step-up substation.**	Tax Map # **4N28**
Project Street Address (or other descriptive location): **NO ADDRESS (next to 878145 Westland Rd)**	Township **4 N** Range **28 E** Section **030** QQ **NW** Tax Lot (s) **StationTax lot – 4N28300001200** **Step-up Substation Tax lot – 5N2816A000200** **Southern end of natural gas pipeline Tax lot – 3N28000002307**
City: **Hermiston** County: **Umatilla**	Waterway: -- River Mile: -- NWI Quad(s): **USGS 1:24,000 Quad ID o45119g3, Hermiston, Oregon**

Wetland Delineation Information

Wetland Consultant Name, Firm and Address: **Megan Higgins** **Ecology & Environment, Inc.** **333 SW 5th Ave, Suite 600** **Portland, OR 97204**	Phone # **(503) 248-5600** Mobile phone # FAX # **(503) 248-5577** E-mail: **mhiggins@ene.com**

The information and conclusions on this form and in the attached report are true and correct to the best of my knowledge.

Consultant Signature: Date: **11-27-2013**

Primary Contact for report review and site access is ☒ Consultant ☐ Applicant/Owner ☐ Authorized Agent

Wetland/Waters Present? ☒ Yes ☐ No | Study Area size: **141.29** Total Wetland Acreage: **0**

Check Box Below if Applicable: **Fees:** KV

☐ R-F permit application submitted	☒ Fee payment submitted **$ 388**
☐ Mitigation bank site	☐ Fee ($100) for resubmittal of rejected report
☐ Wetland restoration/enhancement project (not mitigation)	Name of Payor:
☐ Industrial Land Certification Program Site	

Other Information:

	Y	N	
Has previous delineation/application been made on parcel?	☐	☒	If known, previous DSL #
Does LWI, if any, show wetland or waters on parcel?	☐	☒	

For Office Use Only

DSL Reviewer: CS ~~Fee Paid Date: / /~~ DSL WD # 2013-0415

Date Delineation Received: 12 / 23 / 13 DSL Project # DSL Site #

Scanned: ☒ Final Scan: ☐ DSL WN # DSL App. #

For Office Use Only

DSL Reviewer: _____	Fee Paid Date: ____ / ____ / ____	DSL WD # 2013-0415
Date Delineation Received: ___ / ___ / ___	DSL Project # _____	DSL Site # _____
Scanned: ☐ Final Scan: ☐	DSL WN # _____	DSL App. # _____

EXHIBIT K

LAND USE (STATEWIDE PLANNING GOALS)
OAR 345-021-0010(1)(k)

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K.1 INTRODUCTION

OAR 345-021-0010(1)(k) *Exhibit K. Information about the proposed facility's compliance with the statewide planning goals adopted by the Land Conservation and Development Commission, providing evidence to support a finding by the Council as required by OAR 345-022-0030. The applicant shall state whether the applicant elects to address the Council's land use standard by obtaining local land use approvals under ORS 469.504(1)(a) or by obtaining a Council determination under ORS 469.504(1)(b). An applicant may elect different processes for an energy facility and a related or supporting facility but may not otherwise combine the two processes. Once the applicant has made an election, the applicant may not amend the application to make a different election. In this subsection, "affected local government" means a local government that has land use jurisdiction over any part of the proposed site of the facility.*

Response: Perennial-WindChaser LLC (Perennial) elects to utilize the "Path B" route to compliance, by which the Energy Facility Siting Council (Council), with the recommendations of Special Advisory Groups, makes the decision of compliance with the statewide planning goals and local "applicable substantive criteria." Oregon Administrative Rule (OAR) 345-022-0030(3) further provides that, as used in the rule, the term "applicable substantive criteria" refers to "criteria from the affected local government's acknowledged comprehensive plan and land use ordinances that are required by the statewide planning goals and that are in effect on the date the applicant submits the application."

K.2 SUMMARY

This exhibit identifies the applicable federal, state, Umatilla County, and City of Umatilla land use regulations and standards and demonstrates how the Perennial Wind Chaser Station project (Project)[1] meets them. Pursuant to ORS 469.504(1)(b)(A) and OAR 345-022-0030(3), the land use regulations relevant to the application are those in effect on the date that the applicant submitted the Application for a Site Certificate (ASC). Following issuance of the site certificate by the Council, and upon the submittal of proper applications and fees, the local jurisdictions issue their respective permits in accordance with the site certificate. Local jurisdictions would retain enforcement authority over their permits. ORS 469.401(3).

Perennial is seeking authorization to construct a new natural gas–fired facility, the Perennial Wind Chaser Station (Station), and related or supporting facilities, including a natural gas lateral pipeline line, transmission facilities, and a step-up substation. Perennial proposes to construct

[1] In this application, "Project" refers to the Perennial Wind Chaser Station, plus all related or supporting facilities, such as the natural gas pipeline, the associated transmission line and the step-up substation.

and operate up to four General Electric LMS100 (or equivalent) natural gas–fired turbines in open cycle, which will produce up to approximately 415 megawatts of electric power.

The Energy Facility Site is located approximately 3 miles southwest of the City of Hermiston, in the northwest quarter of Section 30, Township 4 North, Range 28 East in Umatilla County, Oregon (see Exhibit C – Location for location maps). The Station will be accessed via Westland Road, which provides access to Interstate Highways 82 (I-82) and 84 (I-84).

The Station will be sited in an area of slightly less than 20 acres, adjacent to the Hermiston Generating Plant (HGP). The Union Pacific railroad track will separate the HGP facility from the Station. Figure K-1 provides an overview of the Energy Facility Site[2] (all figures are provided at the end of this exhibit). When constructed, the Station will be located within a fenced area consisting of 19.97 acres, including a 0.9-acre stormwater detention basin. Figure K-2 provides a more detailed view of the Energy Facility Site.

Natural gas will be delivered to the Site through a new 12- to 18-inch lateral natural gas pipeline that will be constructed and operated by Cascade Natural Gas Corporation (CNG). The natural gas pipeline, to be located completely within the right-of-way (ROW) of the existing HGP pipeline, will extend 4.63 miles to the south of the Station, where it will connect with an existing meter station situated next to the main Gas Transmission Northwest (GTN) interstate natural gas pipeline. Modifications at the meter station will be conducted by GTN under its blanket Federal Energy Regulatory Commission (FERC) agreement and connect the new lateral pipeline to the main GTN pipeline. Because the metering station is part of GTN's interstate gas pipeline system, land use approval for any modifications to the metering station is not being sought as part of this application.

Power generated at the Station will be delivered to the McNary Substation by the existing 115/230-kilovolt (kV) transmission line that services the HGP to the McNary Substation. The 115-kV Umatilla Electric Cooperative (UEC) portion of the line will be reconductored with 230-kV line to service the Station. The transmission line will primarily utilize existing transmission towers along the transmission line ROW running from HGP to the McNary Substation. Six new towers may be required at the south end of the corridor to connect the transmission line to the Station. At the north end of the corridor, the Station portion of the transmission line will connect to a new step-up substation prior to entering the McNary Substation. This step-up substation will be sited on about 3 acres owned by the Bonneville Power Administration (BPA) near the McNary Substation. An approximately 477-foot-long underground electrical line will connect the step-up substation with the McNary Substation.

[2] In this application, "Energy Facility Site" refers to the area occupied by the Station, switchyard, and temporary laydown area.

The Energy Facility Site is currently clear of any significant structures or vegetation and is used for dryland agricultural purposes. The Energy Facility Site will be leveled, with any topsoil stockpiled for reuse at the conclusion of construction. Elevation will be established to minimize any materials that need to be permanently stockpiled or that need to be brought in to support construction. It is anticipated that, except for structures with high overturning moments, spread footing and slab on grade foundations will be used to support the Station equipment and buildings.

Vehicular access to the Station from Westland Road requires construction of a new bridge over the Westland A Canal located within the Site Boundary. The new bridge will be set back from the canal so as to avoid impacts on the canal's structural integrity, capacity and historical values.

Temporary office facilities, construction parking, and construction laydown areas will be established adjacent to the Station. Areas disturbed during construction will be seeded and returned to their native state or agricultural use after construction is complete.

K.3 LOCAL LAND USE APPROVAL

OAR 345-021-0010(1)(k)(B) *If the applicant elects to obtain local land use approvals:*

(i) Identify the affected local government(s) from which land use approvals will be sought.

(ii) Describe the land use approvals required in order to satisfy the Council's land use standard.

(iii) Describe the status of the applicant's application for each land use approval.

(iv) Provide an estimate of time for issuance of local land use approvals.

Response: This rule is not applicable, as Perennial elects to utilize the "Path B" route to compliance, by which the Council, with the recommendations of Special Advisory Groups, makes the decision of compliance with the statewide planning goals and local "applicable substantive criteria."

K.4 COUNCIL DETERMINATION ON LAND USE

OAR 345-021-0010(1)(k)(C) *If the applicant elects to obtain a Council determination on land use:*

(i) Identify the affected local government(s).

(ii) Identify the applicable substantive criteria from the affected local government's acknowledged comprehensive plan and land use regulations that are required by the statewide planning goals and that are in effect on the date the application is submitted and describe how the proposed facility complies with those criteria.

(iii) Identify all Land Conservation and Development Commission administrative rules, statewide planning goals and land use statutes directly applicable to the facility under ORS 197.646(3) and describe how the proposed facility complies with those rules, goals and statutes.

(iv) If the proposed facility might not comply with all applicable substantive criteria, identify the applicable statewide planning goals and describe how the proposed facility complies with those goals.

(v) If the proposed facility might not comply with all applicable substantive criteria or applicable statewide planning goals, describe why an exception to any applicable statewide planning goal is justified, providing evidence to support all findings by the Council required under ORS 469.504(2).

Response: The Station will be located in Umatilla County. Umatilla County has an acknowledged comprehensive plan and zoning ordinances. The Energy Facility Site and natural gas pipeline will be located entirely in unincorporated Umatilla County.

The transmission line will located entirely within Umatilla County; it also crosses the City of Umatilla en route to the McNary Substation. The step-up substation and the underground line will be located entirely within unincorporated Umatilla County, within the City of Umatilla's Urban Growth Area (UGA), but outside the city limits.

In order to facilitate review and comment, this exhibit is organized on a jurisdictional basis for each level of government that has or may have land use standards or criteria with which the Project must comply. The jurisdictions are addressed in the following order: Umatilla County, City of Umatilla, State of Oregon, and federal land management plans.

This exhibit addresses compliance with local land use standards. Perennial has elected to demonstrate compliance with the land use standards through a determination made by the Council, pursuant to Oregon Revised Statutes (ORS) 469.504(1)(b). The Council has implemented this ORS provision through OAR 345-022-0030(2)(b), which requires the Council to determine that:

A. The proposed facility complies with applicable substantive criteria as described in section (3) and the facility complies with any Land Conservation and Development Commission

administrative rules and goals and any land use statutes directly applicable to the facility under ORS 197.646(3);

B. *For a proposed facility that does not comply with one or more of the applicable substantive criteria as described in section (3), the facility otherwise complies with the statewide planning goals or an exception to any applicable statewide planning goal is justified under section (4); or*

C. *For a proposed facility that the Council decides, under sections (3) or (6), to evaluate against the statewide planning goals, the proposed facility complies with the statewide planning goals or that an exception to any applicable statewide planning goal is justified under section (4).*

Applicable standards from the various jurisdictions are printed in italics, followed by Perennial's statement of how the Project will comply with the standard.

Table K-1 below summarizes the applicable land use regulations addressed in this exhibit.

Table K-1 Wind Chaser Station Applicable Land Use Regulations

Jurisdiction	Exhibit K Section	Applicable Provisions
Umatilla County	K.5.1.1	UCDC §§ 152.055, 152.056, 152.059, 152.060, 152.615, 152.617, 152.061, 152.063
	K.5.1.2	UCDC §§ 152.301, 152.303,152.304, 152.305, 152.306, 152.615, 152.616
	K.5.1.3	UCDC §§ 152.281, 152.283, 152.245, 152.285, 152.286, 152.615, 152.616
	K.5.1.4	UCDC § 152.612
	K.5.1.5	UCDC §§ 152.010, 152.011, 152.016, 152.017, 152.018, 152.545, 152.56, 152.562
	K.5.2	Umatilla County Transportation System Plan
	K.5.3	Umatilla County Comprehensive Plan Policies: Citizen Involvement Recommended Policies: 1, 5; Agriculture Recommended Policies: 1, 8, 17; Open Space, Scenic and Historic Areas, and Natural Areas Policies: 1(a), 5(a & b), 6(a), 8(a), 9(a), 10(c, d & e), 20(b)(1-8), 23(a), 24(a), 26, 37, 38(a-c), 39(a), 42(a); Air, Land, Water Qualities Policies: 1, 7, 8; Natural Hazards Policies: 1, 4; Recreational Needs Policies: 1; Economy of the County Policies: 1, 4, 8(a-f); Public Facilities and Services Policies: 1(a-d), 2, 9, 19; Transportation Policies: 18, 20; Energy Conservation Policies: 1
	K.5.4	1972 UCZO

Table K-1 Wind Chaser Station Applicable Land Use Regulations

Jurisdiction	Exhibit K Section	Applicable Provisions
	K.5.4.1	UCZO §§ 3.010, 3.12, 3.014, 3.016
	K.5.4.2	UCZO §§ 3.020, 3.024, 3.026
	K.5.4.3	UCZO §§ 3.140, 3.144, 3.146
	K.5.4.4	UCZO §§ 3.070, 3.072, 3.073
	K.5.4.5	UCZO §§ 7.010, 7.020, 7.040
City of Umatilla	K.6.1	Umatilla, Oregon City Code §§ 10-6-1, 10-6-2, 10-3A-3, 10-3B-3, 10-4A-3, 10-12-1, 10-12-2
	K.6.2	City of Umatilla Comprehensive Land Use Plan: §§ 1.0 - 14.0
State of Oregon	K.7.1.1	OAR 660-033-0090; OAR 660-033-0100; OAR 660-033-0120; OAR 660-033-0130; ORS 215.296(1)
	K.7.1.2	ORS 215.275
	K.7.2	Statewide Land Use Goals 1-14
United States	K.7.3	OAR 345-021-0010(1)(k)(D)

Key:
OAR Oregon Administrative Rules
ORS Oregon Revised Statutes
UCDC Umatilla County Development Coad
UCZO Umatilla County Zoning Ordinance

K.5 UMATILLA COUNTY

The Energy Facility Site, the natural gas pipeline, the transmission ROW, and the step-up substation and underground line will be located entirely within Umatilla County. The locations of each portion of the Project are shown in Figures K-3 through K-8 of this exhibit. The Energy Facility Site and natural gas pipeline will be located completely within unincorporated Umatilla County, while the transmission line ROW includes sections within unincorporated Umatilla County, as well as areas within the City of Umatilla UGA and the City of Umatilla proper. The step-up substation and underground line are located in Umatilla County, within the City of Umatilla UGA, but outside the city limits. The City of Umatilla UGA is subject to the 1972 Umatilla County Zoning Ordinance under a Joint Management Agreement between the City and County, as discussed in Section K.5.4.

K.5.1 Umatilla County Development Code

Surrounding Land Uses and Land Compatibility

The Energy Facility Site will be located on acreage currently under the ownership of Liberated L&E LLC, and for which Perennial currently holds an option to purchase.

The Energy Facility Site will contain fenced areas enclosing the Station's buildings, structures, and a stormwater detention basin. The predominant land types in this area are classified as cultivated crops and shrub/scrub, and the terrain is essentially flat. Adjacent land uses include existing utility facilities (HGP), industrial uses (Lamb Weston and Riverpointe Farms agricultural processing facilities), railway tracks, and farm uses.

Project Description within Umatilla County

The Energy Facility Site will be located approximately 3 miles southwest of Hermiston, Oregon, near the existing HGP in Umatilla County, Oregon.

The Energy Facility Site is located in Township 4 North, Range 28 East, Section 30, Willamette Meridian. The natural gas pipeline is located Township 4 North, Range 28 East and Township 3 North, Range 28 East, Willamette Meridian. The transmission line will be located in Township 4 North, Range 28 East; Township 4 North, Range 27 East; Township 5 North, Range 28 East; and Township 5 North, Range 27 East, Willamette Meridian. The step-up substation will be located in Township 5 North, Range 28 East, Section 16, Willamette Meridian.

Zoning

The Energy Facility Site will be located on land zoned Exclusive Farm Use (EFU) under the Umatilla County Development Code (UCDC).

The natural gas pipeline will be located east and south of the Station, on Umatilla County EFU-zoned land.

The transmission line portion of the Project will be located primarily on land zoned EFU and within the existing UEC transmission line ROW running generally north to the McNary Substation. The transmission line will only be located outside the existing ROW at the south end as needed to facilitate connection to the Station, and at the north end as needed to connect to a new step-up transformer and to the McNary Substation. The existing ROW also crosses small portions of lands zoned Light Industrial (LI) and Rural Tourist Commercial (RTC) under the current UCDC.

Within the City of Umatilla's UGA, the transmission line crosses lands regulated under the Umatilla County 1972 Zoning Ordinance and within the following land zones: Exclusive Farm Zone (F-1), General Rural Zone (F-2), Heavy Industrial Zone (M-2) and Rural Residential Zone (R-1). These areas are addressed separately in Section K.5.4. Zoning for the portions of the transmission line within the City of Umatilla is addressed separately in Section K.6.

The step-up substation and underground line would be located on lands zoned Exclusive Farm Zone (F-1), and are regulated under the 1972 Umatilla County Zoning Ordinance. The step-up substation and underground line are addressed in Section K.5.4.

Exclusive Farm Use

The purpose of the EFU designation as noted in Umatilla County's Comprehensive Plan is to protect the agricultural element of the County's economic base. The comprehensive plan does recognize non-farm development in areas designated as EFU, such as non-farm dwellings, commercial uses accessory to farm uses, and energy facilities.

Furthermore, under UCDC § 152.059(C) "utility facilities necessary for public service" are specifically permitted within EFU zones, while "commercial utility facilities for the purposes of generating power for public use by sale" are allowed as a conditional use under UCDC § 152.060(F). The reconductored portions of the existing transmission line are permitted outright under UCDC § 152.056 (J) as the "[m]aintenance or minor betterment of existing transmission lines and facilities of utility companies and agencies."

Light Industrial

The purpose of the LI designation, as noted in the comprehensive plan, is to expand and diversify the economic base of the county by providing areas for industrial use that are less intensive and less offensive than heavy industrial uses. The transmission line crosses LI-zoned lands and is compatible with existing and potential uses of the immediate area and adjacent lands.

"Utility facilities" such as the transmission line are authorized in LI zones as a conditional use under UCDC § 152.303(16).

Rural Tourist Commercial

The purpose of the RTC designation is to permit the continuation and expansion of existing uses and to provide rural scale tourism-related employment uses. The transmission line crosses one undeveloped area zoned RTC near the I-82 and Lamb Road interchange. The transmission line is located within an existing power corridor and will utilize existing transmission towers in the RTC-zoned lands, and therefore will have no impact on the potential future development of this area for tourist services.

K.5.1.1 Exclusive Farm Use

Soil Classifications

Table K-2 summarizes the soil classification for the Energy Facility Site based on the Natural Resources Conservation Service (NRCS) classification and mapping. This is delineated in Exhibit I – Soils.

Table K-2 Wind Chaser Station Soils Classification, Umatilla County

NRCS Soil Class	Map Code	Classification(s)	Energy Facility Site Acreage
Quincy loamy fine sand, gravelly substratum, 0 to 5 percent slopes	76B	Not prime farmland	Energy facility site footprint: 19.97 acres
		IVe (irrigated)	Temporary areas: 7.5 acres
		VIIe (non-irrigated)	

Key:
NRCS Natural Resources Conservation Service

EFU, EXCLUSIVE FARM ZONE

§ 152.055 DESCRIPTION AND PURPOSE. *The purposes of the EFU, Exclusive Farm Use Zone, are to preserve and maintain agricultural lands for farm use, including range and grazing uses, consistent with existing and future needs for agricultural products, forest and open spaces; to conserve and protect scenic resources; to maintain and improve the quality of air, water and land resources of the county and to establish criteria and standards for farm and non-farm uses and related and supportive uses which are deemed appropriate. It is also the purpose of this use zone to provide the automatic farm use valuation for farms, which qualify under the provisions of ORS Chapter 308.*

Response: While the Station, natural gas pipeline, and transmission line are sited in large part on EFU lands, the Project will comply with all requirements of the Statewide Planning Goals as implemented through the UCDC. As detailed below, the Station is planned to be sited on less than 20 acres of EFU lands, but in an area that does not contain high-value farmland and is located adjacent to existing utility, industrial, and railway facilities. Temporary laydown areas will not be permanently impacted but will be reclaimed to native vegetation or agricultural use upon completion of construction. The natural gas pipeline and the transmission line each are located almost entirely within existing ROWs and are not expected to have any permanent impacts on agricultural lands.

§ 152.056 USES PERMITTED OUTRIGHT. *In an EFU zone, the following uses and their accessory uses are permitted without a zoning permit, pursuant to § 152.007*

(J) Maintenance or minor betterment of existing transmission lines and facilities of utility companies and agencies.

Response: The reconductored portions of the existing transmission line are permitted outright under UCDC § 152.056 (J) as the "[m]aintenance or minor betterment of existing transmission

lines and facilities of utility companies and agencies."3 Reconductoring the line is a minor betterment that will upgrade the line from 115 kV to 230 kV. This analysis only applies to the reconductored portion of the line. Approximately 12 restringing sites will be needed to facilitate the reconductoring. With each site approximately 50 by 100 feet, the total area impacted by the reconductoring activities will be approximately 1.38 acres. Temporary disturbance at these sites will be similar to permitted maintenance activities and will include minor impacts to vegetation from vehicle traffic. New transmission towers are permitted as "utility facilities necessary for public service" under UCDC § 152.059, discussed immediately below.

§ 152.059 LAND USE DECISIONS. *In an EFU zone the following uses may be permitted through a land use decision via administrative review (§ 152.769) and subject to the applicable criteria found in §152.617. Once approval is obtained a zoning permit (§ 152.025) is necessary to finalize the decision.*

(C) Utility facilities necessary for public service, including wetland waste treatment systems but not including commercial facilities for the purpose of generating electrical power for public use by sale or transmission or communication towers over 200 feet in height. A utility facility necessary for public service may be established as provided in ORS 215.275 and in § 152.617 (II) (7).

Response: The natural gas pipeline, the transmission line, and the step-up substation and underground line will be "utility facility[ies] necessary for public service" under ORS 215.275. Compliance with UCDC § 152.617(II) is specifically discussed below on pages K-19 to K-21, while ORS 215.275 is discussed further below in Section K.7.1.2. The Energy Facility Site will be a "commercial utility facilities for the purposes of generating power for public use by sale," allowed as a conditional use under UCDC § 152.060(F), and discussed separately below in the response to UCDC § 152.617(I)(C).

Natural Gas Pipeline/Transmission Line

UCDC § 152.050 incorporates the requirements of ORS 215.275 which establishes the exclusive criteria for approving commercial utility facilities necessary for public service. In Brentmar v. Jackson County, 321 Or 481 (1995), the Oregon Supreme Court held that "a county may not enact or apply legislative criteria of its own that supplement those found in ORS 215.213(1) and 215.283(1)" (321 Or at 498). The Oregon Land Use Board of Appeals (LUBA) recently confirmed that under Brentmar, a county may only apply the criteria of ORS 215.275 to a "utility facility necessary for public service." WKN Chopin, LLC v. Umatilla County, LUBA No. 2012-016 (July 11, 2012). Under Brentmar, Umatilla County may only apply the criteria to a use permitted under ORS 215.283(1) that would apply under ORS 215.275, and may not apply

[3] For equivalent analysis of a prior proposal to reconductor the UEC transmission line, see Attachment B, Final Order, Umatilla Generating Project (Sept. 14, 2001), p. 15.

additional standards. This section responds to the criteria under ORS 215.275 for the natural gas pipeline and the transmission line, and is briefly reiterated in Section K.7.1.2. A detailed response for the step-up substation is provided in Section K.7.1.2.

According to ORS 215.275(1), a utility facility established under ORS 215.283(1)(c) is necessary for public service if the facility "must be sited in an exclusive farm use zone in order to provide the service." As discussed below, the natural gas pipeline, transmission line, and step-up substation and underground line must be sited in the EFU zone so that the energy facility can be connected to the natural gas supply and the electrical grid, and operate as a utility facility. Thus, the natural gas pipeline and the transmission line meet the statutory requirements for "utility facilit[ies] necessary for public service" under ORS 215.275, and are each permitted uses under ORS 215.283 that "may be established in any area zoned for exclusive farm use." The step-up substation is not in the EFU zone, and so is discussed separately further below in Section K.7.1.2.

To demonstrate that a utility facility is necessary under ORS 215.283(1)(c), ORS 215.275(2) and (3) requires that an applicant must show that reasonable alternatives have been considered and that the facility must be sited in an EFU zone due to one or more of the following factors:

(2) a. Technical and engineering feasibility;

b. The proposed facility is locationally dependent. A utility facility is locationally dependent if it must cross lands in one or more areas zoned for exclusive farm use in order to achieve a reasonably direct route or to meet unique geographical needs that cannot be satisfied on other lands;

c. Lack of available urban and non-resource lands;

d. Availability of existing rights-of-way;

e. Public health and safety; and

f. Other requirements of state or federal agencies.

(3) Costs associated with any of the factors listed in subsection (2) of this section may be considered, but cost alone may not be the only consideration in determining that a utility facility is necessary for public service. Land costs shall not be included when considering alternative locations for substantially similar utility facilities. The Land Conservation and Development Commission shall determine by rule how land costs may be considered when evaluating the siting of utility facilities that are not substantially similar.

Natural Gas Pipeline

The existing natural gas pipeline ROW provides the most direct route between the Energy Facility Site and the GTN interstate gas pipeline. Any alternatives routes would be longer and would still need to cross EFU-zoned lands.

Transmission Line

Similarly, there is no alternative route from the Energy Facility Site to the McNary Substation that does not cross EFU-zoned lands, while alternative routes to different substations in the region not only would need to cross EFU-zoned lands, but would also require construction of new transmission towers along all or a portion of the transmission route. Use of the existing transmission line ROW will minimize the Project's impact on EFU-zoned lands.

Based on the factors in ORS 215.275(2) and (3), as discussed below, it is necessary to site the natural gas pipeline and large portions of the transmission line on EFU lands. Therefore, they are "utility facilities necessary for public service" within the meaning of ORS 215.283(1)(d).

(2) a. Technical and engineering feasibility;

Response:

Natural Gas Pipeline/Transmission Line

The continued use of existing ROWs for both the natural gas pipeline and transmission line ROWs demonstrates that these are technically feasible routes for siting the pipeline and transmission line, respectively. Other routes may also be feasible but would require new ROW, with greater associated impacts to property owners and existing land uses, including agriculture.

b. The proposed facility is locationally dependent. A utility facility is locationally dependent if it must cross lands in one or more areas zoned for exclusive farm use in order to achieve a reasonably direct route or to meet unique geographical needs that cannot be satisfied on other lands;

Response:

Natural Gas Pipeline

The purpose of the lateral natural gas pipeline is to supply natural gas from the existing GTN interstate natural gas pipeline to the Station. The GTN interstate pipeline runs generally along an east-west axis slightly less than 5 miles south of the Station. The natural gas pipeline will utilize an existing natural gas pipeline easement that connects the GTN interstate pipeline to the HGP, located adjacent to the Station. There is no alternate route to deliver natural gas to the Station

that will avoid EFU lands. Therefore, the natural gas pipeline is locationally dependent. The pipeline will minimize impacts on EFU lands by utilizing the existing natural gas pipeline ROW.

Transmission Line

The purpose of the transmission line is to transmit electricity from the Station to the electrical grid. To do so, the transmission line must physically connect to the grid. EFU lands lie between the Station and the McNary Substation and all other substations in proximity to the Station. In other words, there is no alternative route—direct or indirect—that could avoid EFU lands entirely. Therefore, these transmission facilities are locationally dependent. The transmission line will minimize impacts on EFU lands by utilizing the existing transmission line ROW and transmission towers from the HGP to the vicinity of the McNary Substation.

c. Lack of available urban and non-resource lands;

Response: The vast majority of Umatilla County is composed of rural resource lands. A linear facility such as a natural gas pipeline or transmission line likely would have to be located entirely within an urban growth boundary (UGB) to avoid resource lands. Even assuming that the Station could be located elsewhere, the fact that rural resource lands dominate the land use of Umatilla County would make it virtually impossible to site a new generating facility without having a transmission line or pipeline on EFU lands.

Natural Gas Pipeline

Given the route of the existing GTN natural gas pipeline through rural Umatilla County, there is no feasible way to site a natural gas facility such that a lateral pipeline would avoid resource lands. The Project route is entirely within the existing CNG ROW between the GTN interstate pipeline and the HGP, minimizing the impact of the pipeline on resource lands.

Transmission Line

The existence of the Hermiston to McNary transmission ROW affords an opportunity to connect to the regional grid without establishing a new transmission corridor over resource lands. Thus, the proposed route will minimize the impact of new transmission facilities on resource lands.

d. Availability of existing rights-of-way;

Response:

Gas Line/Transmission Line

Availability of existing ROW for the natural gas pipeline and the transmission line is a key consideration. Use of the HGP natural gas pipeline ROW and the Hermiston to McNary

transmission corridor largely eliminates the need for additional ROW and, therefore, the impact on agricultural land.

e. Public health and safety; and

Response:

Natural Gas Pipeline

As noted, the entire length of the natural gas pipeline not within the Energy Facility Site boundary will be located within an existing ROW. The impacts to public health and safety will be minimal because the natural gas pipeline will comply with the federal safety natural gas pipeline safety standards of 49 Code of Federal Regulations Part 192. In addition, the pipeline ROW traverses minimally occupied EFU land, which reduces the potential for public health and safety impacts.

Transmission Line

Within the EFU Zone, the transmission line will be located almost entirely within an existing ROW. The impacts to public health and safety will be minimal, as the new line will utilize existing transmission towers already in use. Further, the new transmission line will comply with the Council standards of OAR 345-024-0090, Siting Standards for Transmission Lines in regard to standards for electrical fields, as discussed in Exhibit AA – Electric and Magnetic Fields.

f. Other requirements of state or federal agencies.

Response: As noted in this and all associated exhibits, all applicable requirements of state or federal agencies will have been met at the time of construction for both the natural gas pipeline and the transmission line.

(3) Costs associated with any of the factors listed in subsection (2) of this section may be considered, but cost alone may not be the only consideration in determining that a utility facility is necessary for public service. Land costs shall not be included when considering alternative locations for substantially similar utility facilities. The Land Conservation and Development Commission shall determine by rule how land costs may be considered when evaluating the siting of utility facilities that are not substantially similar.

Response:

Natural Gas Pipeline

Costs of developing the natural gas pipeline along the proposed route are anticipated to be significantly lower than any alternative alignment. The cost savings result from the proposed alignment being direct and located within an existing ROW, not from the fact that the ROW is on land zoned for EFU.

Transmission Line

Costs of developing the new transmission facilities along the proposed route are anticipated to be significantly lower than any alternative alignment. The cost savings results from the proposed alignment being direct and located within an existing transmission line ROW and from utilization of existing infrastructure, not from the fact that the ROW is on land zoned for EFU.

§ 152.060 CONDITIONAL USES PERMITTED.

In an EFU zone the following uses may be permitted conditionally via administrative review (§ 152.769), subject to the requirements of this section, the applicable criteria in § 152.061, §§ 152.610 through 152.615, 152.617 and §§ 152.545 through 152.562. A zoning permit is required following the approval of a conditional use pursuant to § 152.025.

(F) Commercial utility facilities for the purpose of generating power for public use by sale as provided in § 152.617 (I) (C).

Response:

Perennial Wind Chaser Station

The Energy Facility Site is considered a commercial utility facility for the purpose of generating power for public use by sale, and may be permitted conditionally under the requirements set forth below.

§ 152.617 STANDARDS FOR REVIEW: CONDITIONAL USES AND LAND USE DECISIONS ON EFU AND GF ZONED LANDS.

The following standards shall apply for review by the Planning Director or designated planning authority of the specific conditional uses and land use decisions listed below:

(I) EFU AND GF ZONE CONDITIONAL USES

(C) Commercial Utility Facilities. Commercial utility facilities for the purposes of generating and distributing power for public use by sale. Such facilities shall include,

but are not limited to, electrical substations, power trams, water storage tanks, sewage disposal facilities, water treatment facilities, towers or transmitting facilities for radar and television, and dams. This does not include Wind Power Generation Facility (See specific criteria, Section 152.616 (HHH), or local distribution lines for sewer, water, gas, telephone, and power and similar minor facilities.

Response: The Energy Facility Site is a "commercial utility facility for the purposes of generating and distributing power for public use by sale."

These uses are allowed provided that:

(1) Facility is designed to minimize conflicts with scenic values and adjacent forest, farming and recreational uses as outlined in policies of the Comprehensive Plan;

Response: The Energy Facility Site is designed to minimize conflicts with the scenic values and various uses outlined in the specific policies of the Umatilla County Comprehensive Plan and the UCDC and discussed throughout this exhibit.

Conflicts with scenic values will be minimized by siting the Station adjacent to the existing HGP. As described in Exhibit R – Scenic Resources, the building's height and location will have no significant adverse impact on documented important scenic and aesthetic values. The visual impact of the Station will be minimized by its location approximately 4 miles southwest from Hermiston and approximately 8 miles from the Columbia River in an area currently utilized for energy generation and transmission and other industrial uses. Potential visual impacts will also be minimized by painting the buildings and structures using subdued, earth-toned colors to reduce visual contrast and glare; using on-demand lighting and shielding and directive devices for lighting, while adequately addressing security and safety; and using a dark-colored coating on the perimeter fence or otherwise using a style and color that is low glare and blends with the surrounding landscape. The plume from the cooling towers is not expected to generate significant visual impact due to ambient weather conditions and cloud cover, as discussed in Exhibit Z – Cooling Tower.

There are no forest or recreational uses adjacent to the Energy Facility Site, and thus there is no potential for conflict with such uses. The potential for conflict with adjacent farm uses is minimized by compliance with conditional use standards for the Station that ensure no "significant change in farm or forest practices on surrounding lands" or significant increase in the cost of accepted farm practices (UCDC § 152.061(A), (B)).

The surrounding agricultural land utilizes center pivot irrigation, and accepted farm practices include soil preparation, sowing, fertilizing, pest and weed management, and harvesting. Necessary inputs are assumed to be labor, fertilizer, electricity, and water. The development of the Energy Facility Site will not change these accepted farm practices or affect the availability or

costs of the necessary inputs. Specifically, the Station will not physically interfere with the ability to irrigate, fertilize, or harvest crops on surrounding center-pivot fields. The physical improvements and operations of the Station will not interfere with the ability to provide fertilizer, irrigation water, pesticides, or other necessary crop inputs and will not affect the costs of these inputs, which depend upon contractual arrangements and market conditions unaffected by the development of the Station. Neither the Station nor any of its related and supporting facilities will impair the ability of workers to access surrounding farmlands. As described in Exhibit Z, cooling tower drift will have no impact on the quality or productivity of soils on surrounding farmlands, as the rate of deposition of salts on the nearest crops is expected to be much below the threshold at which stress symptoms are shown.

The development of the Energy Facility Site will not have long-term impacts on surrounding farmlands, cause a significant change in accepted farm practices, or affect the costs of inputs to the established agricultural practices. Less than 20 acres of EFU land will be required for the Energy Facility Site.

> *(2) Facility be of a size and design to help reduce noise or other detrimental effects when located adjacent to farm, forest and grazing dwellings(s) or a recreational residential zone;*

Response: This provision is inapplicable because there are no farm, forest, or grazing dwellings or recreational residential zones adjacent to the Energy Facility Site.

> *(3) Facility be fenced when located adjacent to dwelling(s) or a Mountain Recreational or Forest Residential Zone and landscaping, buffering and/or screening be provided*;

Response: This provision is inapplicable because no dwellings, Mountain Recreational Zones, or Forest Residential Zones are adjacent to the Station; however, as discussed above, the Energy Facility Site will be fully fenced.

The Energy Facility Site will be fully fenced to prevent unauthorized access to the Station. Landscaping or other screening is unnecessary at the Energy Facility Site. Given the similar utility nature of the HGP located north of the Station, as well as the intervening railroad ROW, landscaping or screening is unnecessary on the north side of the Station. Given the industrial zoning to the west of the facility across Westland Road, landscaping or screening is unnecessary on the west side of the Station. Given the minimal occupation and use of the dry farmland located south and east of the Station, landscaping or screening is unnecessary on the south and east sides of the Station. No landscaping or screening is proposed for the Energy Facility Site.

> *(4) Facility does not constitute an unnecessary fire hazard and consideration be made of minimum fire safety measures if located in a forested area, which can include, but is not limited to:*

(a) The site be maintained free of litter and debris;

(b) Use of non-combustible or fire retardant treated materials for structures and fencing;

(c) Removal of all combustible materials within 30 feet of structures.

Response: The Station will be kept free of litter and debris and maintained clear of combustible materials within 30 feet of structures (except as may be required for Station operations). Non-combustible or fire retardant treated materials will be used for structures and fencing. The direct delivery of natural gas through the pipeline will eliminate the need to store combustible natural gas onsite. The Station will also include a fire detection and protection system to further reduce the risk of fire.

(5) Major transmission towers, poles and similar gear shall consider locations within or adjacent to existing rights-of way in order to take the least amount of timber land out of production and maintain the overall stability and land use patterns of the area, and construction methods consider minimum a soil disturbance to maintain water quality;

Response: Although the transmission line is a permitted use within the EFU zone, not a conditional use, the transmission line will be located within the existing ROW in the EFU Zone, and will utilize existing infrastructure to the extent feasible, minimizing soil disturbance and water quality impacts.

(6) Facility shall not alter accepted timber management operations on adjacent forest land;

Response: This provision is inapplicable because there is no forest land adjacent to the Station.

(7) Facility shall adequately protect fish and wildlife resources by meeting minimum Oregon State Department of Forestry regulations;

Response: This provision is inapplicable because there are no timber, forest, or potential forest lands at or near the Energy Facility Site.

(8) Access roads or easements be improved to the County's Transportation Plan standards and follow grades recommended by the Public Works Director;

Response: The Energy Facility Site is generally flat, and will be graded flatter if needed. The access point and all internal access roads and parking areas will be paved. The driveway access road will be improved as required to conform to the requirements of the Umatilla County Transportation Plan and will follow grades recommended by the Public Works Director. Perennial has recently submitted an application for a County access permit for the access point.

(9) Road construction be consistent with the intent and purposes set forth in the Oregon Forest Practices Act or the 208 Water Quality Program to minimize soil disturbance and help maintain water quality;

Response: There are no forest lands or natural waterways on the Energy Facility Site. Construction operations will be conducted in a manner consistent with the intent and purposes of the 208 Water Quality Program so as to minimize soil disturbance and prevent the discharge of sediment or pollutants into the onsite Westland irrigation canal on the Site, or to the Umatilla River approximately one-quarter mile east of the Energy Facility Site.

(10) Complies with other conditions deemed necessary.

Response: Perennial will comply with all conditions of the site certificate, which will contain all conditions deemed necessary by the Council for the Project's compliance with all land use regulations and mitigation of all other Project impacts.

§ 152.617 (II) EFU AND GF ZONE LAND USE DECISIONS

(7) Utility Facility Necessary for Public Service.

(a) Demonstrate that reasonable alternatives have been considered and that the facility must be sited in an exclusive farm use zone due to one or more of the following factors:

(1) Information provided in the technical and engineering feasibility;

(2) The proposed facility is locationally dependent. (It must cross land in one or more areas zoned for exclusive farm use in order to achieve a reasonably direct route or to meet unique geographical needs that cannot be satisfied on other lands.)

(A) Show a lack of available urban and non-resource lands;

(B) Due to availability of existing rights of way.

(C) Due to public health and safety concerns; and

(D) Show it must meet other requirements of state and federal agencies.

(b) Costs associated with any of the factors listed above may be considered, but cost alone, including the cost of land, may not be the only consideration in determining that a utility facility is necessary for public service.

Response: The natural gas pipeline and the transmission line are both "utilities necessary for public service." The necessary demonstration is provided in the above discussion regarding compliance with UCDC § 152.059 and ORS 215.275.

(c) The owner of a utility facility approved under this section shall be responsible for restoring, as nearly as possible, to its former condition any agricultural land and associated improvements that are damaged or otherwise disturbed by the siting, maintenance, repair or reconstruction of the facility.

Response:

Natural Gas Pipeline

As discussed in Exhibit I – Soils, Perennial will segregate topsoil excavated during pipeline construction and will restore any agricultural land disturbed by the siting, maintenance, repair or reconstruction of the natural gas pipeline. Minimal long-term impacts are expected, as shown by the limited visible impacts from the existing HGP pipeline. The HGP pipeline route cannot be discerned from the ground, and the existing above-ground metering and shut-off facilities at the connection between the HGP pipeline and the GTN interstate pipeline provide the only visible evidence of the existing underground pipeline.

Transmission Line

As discussed in Exhibit I – Soils, any topsoil excavated during construction of new transmission towers, step-up substation and underground line will be segregated, and Perennial will restore any agricultural land disturbed by the siting, maintenance, repair, or reconstruction of the transmission line. Minimal long-term impacts are expected because the transmission line will utilize existing transmission tower infrastructure along the vast majority of the proposed transmission ROW. Approximately 1.38 acres total at an estimated 12 restringing sites along the transmission ROW may be temporarily disturbed through vehicle traffic impacts, including vegetation damage and minor soil compression. No digging or soil removal will be needed for the reconductoring operations. Three transmission towers will be constructed in the EFU zone at the Energy Facility Site, as shown on Figure K-2.

(d) Mitigate and minimize the impacts of the proposed facility, if any, on surrounding lands devoted to farm use in order to prevent a significant change in accepted farm practices or a significant increase in the cost of farm practices on surrounding farmlands.

Response:

Natural Gas Pipeline

The development of the natural gas pipeline along the existing ROW will not have long-term impacts on surrounding farmlands, cause a significant change in accepted farm practices, or affect the costs of inputs to the established agricultural practices. The surrounding agricultural land utilize center pivot irrigation, and accepted farm practices include soil preparation, sowing,

fertilizing, pest and weed management, and harvesting. Necessary inputs are assumed to be labor, fertilizer, electricity, and water. The development of the Energy Facility Site will not change these accepted farm practices or affect the availability or costs of the necessary inputs. Specifically, the natural gas pipeline will be buried below-ground to sufficient depth so as not to physically interfere with the ability to irrigate, fertilize or harvest crops on surrounding center-pivot fields. After construction is completed, the pipeline ROW will be returned to agricultural production without change from pre-construction conditions. The physical improvements and operations of the natural gas pipeline will not interfere with the ability to provide fertilizer, irrigation water, pesticides, or other necessary crop inputs, and will not affect the costs of these inputs, which depend upon contractual arrangements and market conditions unaffected by the development of the Station. Because the natural gas pipeline will be buried, it will not impair the ability of workers to access surrounding farmlands.

While the metering station is not subject to land use approval as part of this application, modifications to the existing aboveground metering facilities will not change the footprint of the existing facilities or physically interfere with the operations of any center-pivot systems, and the ability of land owners to obtain the inputs necessary for irrigation, fertilization, pesticide application, and crop harvesting on surrounding lands will not be impacted by the operations of the metering station.

Transmission Line

The development of the transmission line along the existing ROW will not have long-term impacts on surrounding farmlands, cause a significant change in accepted farm practices, or affect the costs of inputs to the established agricultural practices. The surrounding agricultural lands utilize center pivot irrigation, and accepted farm practices include soil preparation, sowing, fertilizing, pest and weed management, and harvesting. Necessary inputs are assumed to be labor, fertilizer, electricity, and water. The reconductored transmission line will not change these accepted farm practices or affect the availability or costs of the necessary inputs. Aside from three new towers on the portion of the Energy Facility Site located south of the railroad, the reconductored transmission line will have the same footprint as the existing line within the EFU zone, so there will be no impact on surrounding farmlands from the reconductoring activity.

Specifically, the transmission line will not physically interfere with the ability to irrigate, fertilize or harvest crops on surrounding center-pivot fields. The transmission line will not interfere with the ability to provide fertilizer, irrigation water, pesticides or other necessary crop inputs, or affect the costs of these inputs, which depend upon contractual arrangements and market conditions unaffected by the development of the Station. The transmission line will not impair the ability of workers to access surrounding farmlands. The height of the reconductored transmission line will not be changed from current conditions, so farm machinery or airplane crop duster operations will not be impacted by the reconductoring of the transmission line. The

potential for a change of practices associated with the ROW, such as from electrical impacts, potential for conflicts with aerial spraying, and potential for spread of invasive species due to construction, is very limited because the transmission line will utilize existing ROW and existing infrastructure, which will mitigate and minimize any additional impacts, and because of the mitigation measures proposed by Perennial in the Project's Revegetation and Noxious Weed Control Plan (Appendix P-2 of Exhibit P – Fish and Wildlife Habitat).

> *(e) Any proposed extension of a sewer system as defined by OAR 660-011-0060(1)(f) in an exclusive farm use zone shall be subject to the provisions of OAR 660-011-0060.*

Response: No extension of a sewer system is required to serve the transmission line or the natural gas pipeline, which are utility facilities necessary for public service.

> *(f) The provisions of this section do not apply to interstate natural gas pipelines and associated facilities authorized by and subject to regulation by the Federal Energy Regulatory Commission.*

Response: This provision is inapplicable because the new natural gas pipeline is not an interstate natural gas pipeline.

§ 152.061 STANDARDS FOR ALL CONDITIONAL USES.

The following limitations shall apply to all conditional uses in an EFU zone. Uses may be approved only where such uses:

(A) Will not force a significant change in accepted farm or forest practices on surrounding lands devoted to farm or forest use; and

Response: There are no forest practices conducted on lands at the Energy Facility Site or on surrounding lands. As discussed above in the response to UCDC §§ 152.617(I)(C)(1) and (6), the development of the Energy Facility Site will not force any significant change in accepted farm practices on surrounding lands.

(B) Will not significantly increase the cost of accepted farm or forest practices on lands devoted to farm or forest use.

Response: There are no forest practices conducted on lands surrounding the Energy Facility Site, and thus there will be no impact on the cost of accepted forest practices on any lands devoted to forest use. As discussed below in the response to UCDC §§ 152.617(I)(C)(1) and (6), the development of the Energy Facility Site will not significantly increase the cost of accepted farm practices on lands devoted to farm use.

§ 152.063 DEVELOPMENT STANDARDS.

In the EFU zone, the following dimensional and development standards shall apply:

(A) Minimum parcel frontage. A parcel shall have a minimum street or road frontage of 30 feet.

Response:

Energy Facility Site

This provision is inapplicable because no new parcels will be created as a result of the Project; however, the Energy Facility Site will have street frontage of 82 feet on Westland Road, significantly in excess of 30 feet.

Natural Gas Pipeline/Transmission Line

This provision is inapplicable because no new parcels will be created along the natural gas pipeline or transmission line routes.

(B) Front yard setbacks. All buildings shall be set back from front property lines and side or rear property lines adjoining county roads, public roads, state highways, or public or private access easements as follows:

(1) At least 30 feet from the property line or easement boundary; or

(2) At least 60 feet from the center line of the road, highway, or easement, whichever is greater.

(C) Side and rear yard setbacks. Except as provided in division (B) above, the following standards shall apply for side and rear yard setbacks:

(1) The minimum yard setback for farm or non-farm dwellings shall be 20 feet.

(2) The minimum yard setback for accessory buildings or structures, for both farm and non-farm uses, shall be five feet, except as otherwise provided in applicable conditions of approval, or as constrained by division (D) below.

(3) Special minimum yard setbacks may be established for an approved conditional use to protect the public health, safety and welfare and to mitigate possible adverse impacts to adjacent land uses.

Response:

Energy Facility Site

At slightly less than 20 acres, the Energy Facility Site is sufficiently large to permit all setback requirements to be met, as depicted in Figure K-2.

Natural Gas Pipeline

"Setbacks" under the UCDC apply only with reference to "buildings," which are a particular type of "structure."

> ***§ 152.003. SETBACK.*** *The open yard space on a lot between any building and a lot line or a line defining an access easement or road ROW.*
>
> ***§ 152.003. BUILDING.*** *A structure built for the support, shelter or enclosure of person, animals, chattels, or property of any kind. For the purposes of this chapter, a canopy is not a building.*
>
> ***§ 152.003. STRUCTURE****. Something constructed or built and having a fixed base on, or fixed connection to, the ground or another structure. Any constructed or erected object which requires location on the ground or is attached to something located on the ground. Structures include but are not limited to buildings, decks, fences, signs, towers, cranes, flagpoles, antennas, smokestacks, earth formations and overhead transmission lines. Structures do not include paved areas.*

The setback requirements do not apply to the natural gas pipeline because it will be completely underground, and therefore not a "structure" or a "building." Modifications at the meter station will be conducted by GTN under its blanket FERC agreement and will connect the new lateral pipeline to the main GTN pipeline. Because the metering station is part of GTN's interstate gas pipeline system, land use approval for any modifications to the metering station is not being sought as part of this application.

Transmission Line

Three transmission towers will be constructed in the EFU zone, all on the Energy Facility Site. See Figure K-2. These new transmission towers will comply with all applicable setback requirements.

(D) Distance maintained from aggregate mining operations. A dwelling shall not be located within 500 feet of an existing aggregate mining operation unless the owner of the property of the proposed dwelling:

(1) Obtains a written release from the adjacent mining operation allowing a closer setback; and

(2) Waives his or her rights to remonstrate against normal aggregate mining activities allowed by permits issued under this chapter.

Response: This provision is inapplicable because no dwellings are proposed as part of the Project.

(E) Stream setback. To permit better light, air, vision, stream pollution control, to protect fish and wildlife areas, and to preserve the natural scenic amenities and vistas along the streams, lakes, and wetlands, and to prevent construction in flood prone areas along streams not mapped as part of the National Flood Insurance Program, the following setbacks shall apply:

(1) All sewage disposal installations such as septic tanks and drainfields shall be set back from the mean water line or mark along all streams, lakes or wetlands a minimum of 100 feet, measured at right angles to the high water line or mark. In those cases where practical difficulties preclude the location of the facilities at a distance of 100 feet, and the DEQ sanitarian finds that a chosen location will not endanger health, the Planning Director may permit the location of these facilities closer to the stream, lake, or wetland, but in no case closer than 50 feet.

Response: As discussed in Exhibit V – Solid Waste and Wastewater, a new septic system and leach field will be constructed as part of the Project on the Energy Facility Site and located more than 100 feet from any waterways. The high water line of the closest waterway to the Energy Facility Site, the Umatilla River, is over one-quarter mile from the Energy Facility Site, meeting applicable setback requirements.

(2) All structures, buildings or similar permanent fixtures shall be set back from the high water line along all streams, lakes or wetlands a minimum of 100 feet measured at right angles to the high water line or mark, except that this setback can be reduced to 20 feet if all of the following criteria are met:

(a) The parcel contains one acre or less; and

(b) It can be shown with photographs and maps that due to topography the proposed building will be located outside of a flood-prone area; and

(c) Location of the proposed building in compliance with the 100 foot setback would be inconvenient and inefficient with respect to the location of existing buildings on the property or due to topographic constraints.

Response:

Energy Facility Site

The Energy Facility Site is over one-quarter mile from the high water line of the closest waterway, the Umatilla River. All structures, buildings or similar permanent fixtures will comply with the 100-foot setback requirement.

Natural Gas Pipeline

The natural gas pipeline will be within 100 feet of the Umatilla River along Cottonwood Bend Road, however, no above-ground structures, buildings or other permanent fixtures associated with the gas pipeline will be located within 100 feet of the Umatilla River or other waterways.

Transmission Line

The transmission line will cross the Umatilla River, but not in any areas zoned EFU. The transmission line does not come within 100 feet of any waterway in lands zoned EFU.

(F) Other development standards. All development shall be subject to the regulations contained in §§ 152.010 through 152.017, §§ 152.545 through 152.562, and to the exceptions standards of §§ 152.570 through 152.577, including but not limited to: vision clearance, signs, off street parking, access, fences, wetland drainage, and maintenance, removal and replacement of riparian vegetation.

Response: Compliance with these other development standards is discussed below.

K.5.1.2 Light Industrial

The transmission line ROW crosses about 1,600 feet of land zoned LI on the west side of Westland Road directly west of the Station and will possibly require the construction of three new transmission poles. Transmission facilities are allowed in LI-zoned lands as conditional uses. Umatilla County's *Response to Amended Notice of Intent* dated September 23, 2013, indicated that "[n]o land use permit is required to co-locate and upgrade the transmission line;" however, Perennial will apply for an appropriate land use permit if requested. As described below, the three potential new poles and the reconductored transmission line meet all conditional use requirements.

§ 152.301 PURPOSE.

The LI Light Industrial Zone is designed to provide areas for industrial use that are less intensive than heavy industrial uses, and are less offensive to adjacent land uses, and are compatible with certain commercial uses. It is designed to help the county expand and diversify

its economic base. The LI Zone is appropriate for areas near major transportation facilities which are generally suited for industry and include highways, railroads, and waterways.

Response: The portion of the transmission line located within LI-zoned lands runs along Westland Road, near I-82, existing railroad tracks, the HGP, the Lamb Weston industrial food processing plant, and the proposed Station. See Figure K-6. There are existing power transmission lines in the area. The proposed transmission line is consistent with existing land use patterns and will enable the development of the Station, thereby expanding and diversifying the economic base of the County.

§ 152.303 CONDITIONAL USES PERMITTED; GENERAL CRITERIA.

(A) In a LI Zone, the following uses and their accessory uses are permitted, conditionally, subject to the requirements of §§ 152.610 through 152.616, and upon the issuance of a zoning permit:

> *(16) Utility facility as provided in § 152.616 (CCC);*

Response: UCDC § 152.003 defines "utility facility" as follows:

> *Any major **UTILITY FACILITY** structure owned or operated by a public, private or cooperative electric, fuel, communication, sewage or water company for the generation, transmission, distribution or processing of its productions or for the disposal of cooling water, waste or by-products, and including power transmission lines, major trunk pipelines, power substations, dams, water towers, sewage lagoon, sanitary landfills and similar facilities, but excluding sewer, water, gas, telephone and power local distribution lines and similar minor facilities allowed in any zone.*

This definition specifically includes "power transmission lines," and thus the transmission line is a "utility facility" allowed in LI-zoned lands as a conditional use.

§ 152.616 STANDARDS FOR REVIEW OF CONDITIONAL USES AND LAND USE DECISIONS.

The following standards shall apply for review by the Planning Director or designated planning authority of the specific conditional uses and land use decisions listed below:

(CCC) Utility facility.

(1) The facility is designed to minimize conflicts with scenic values and adjacent recreational residential, forest, grazing and farm uses as outlined in policies of the Comprehensive Plan;

Response: The transmission line is designed to minimize conflicts with the scenic values and various uses outlined in the specific policies of the Umatilla County Comprehensive Plan and the UCDC and discussed throughout this exhibit.

Conflicts with scenic values will be minimized by siting the transmission line in an existing transmission corridor and adjacent to the existing HGP. As noted previously, the transmission line will generally utilize existing towers. The three new towers that may be required in the LI-zoned area will be of a similar height and appearance to the existing transmission towers in the area, and will be located within the existing ROW.

There is no potential for conflict with such uses because there are no recreational residential, grazing, or forest uses adjacent to the portion of the transmission line in the LI-zoned lands. The potential for conflict between the portion of the transmission line within the LI-zoned lands and nearby farm uses is minimized by the location of the reconductored line and any new transmission towers within the existing ROW for the power corridor. The reconductored line will not be any visibly different from the existing line, and the two or three new towers needed in the LI zone will be within existing ROW and adjacent to other similar transmission infrastructure.

(2) The facility be of a size and design to help reduce noise or other detrimental effects when located adjacent to recreational residential dwellings;

Response: This provision is not applicable because there are no recreational residential dwellings adjacent to the portion of the transmission line within the LI-zoned lands.

(3) The facility may be required to be fenced, landscaped or screened;

Response: Fencing, landscaping, or screening is impracticable because of the linear nature of the transmission line. The reconductored transmission line will be visually indistinguishable from the existing transmission line, so no fencing, landscaping or screening should be required. The two new transmission towers west of Westland Road will be located within the existing ROW for the transmission corridor and will be constructed in such a manner as to prevent unauthorized entry or access. The single transmission tower to be located east of Westland Road is situated between the HGP and the railroad line. It would be impractical to provide fencing, screening or landscaping to address the limited visual impacts of this structure.

(4) The facility does not materially alter the stability of the overall land use pattern of the area;

Response: The facility will not materially alter the overall land use pattern of the area because the area already includes industrial plants and utility power generation facilities, as well as an electrical power transmission ROW. The use of existing transmission towers will further minimize any impact on overall land use patterns. The three new transmission towers will have

no effect on existing land use patterns. The proposed tower east of Westland Road is on a small, unused parcel fragment between the railroad line and the HGP, while the towers proposed west of Westland Road are within the existing transmission ROW.

(5) The facility does not constitute an unnecessary fire hazard, and consideration be made for minimum fire safety measures which can include, but are not limited to:

(a) The site be maintained free of litter and debris;

(b) Using non-combustible or fire retardant treated materials for structures and fencing;

(c) Clearing site of all combustible materials within 30 feet of structures;

Response: The transmission line ROW will continue to be maintained by UEC free of litter, debris, and combustible materials, and to ensure that trees or other vegetation do not grow to become a fire hazard. Any structures or fencing will be constructed or non-combustible materials. There have been no reported problems with UEC's maintenance of the existing line, and current practices should continue to be sufficient to minimize the fire hazard associated with the transmission line. Perennial will maintain the site around the transmission tower to be constructed to the east of Westland Road free of litter, debris, and combustible materials.

(6) Major transmission tower, poles and similar gear shall consider locations within or adjacent to existing rights of way in order to take the least amount of timberland out of production and maintain the overall stability and land use patterns of the area, and construction methods consider minimum soil disturbance to maintain water quality;

Response: No timberland is located along the existing transmission line ROW or will be affected by the transmission line. The reconductored transmission line is located within the existing ROW within the LI Zone and will utilize existing infrastructure to the extent feasible, thereby maintaining the stability and land use patterns in the area, minimizing soil disturbance and protecting water quality.

(7) The facility shall adequately protect fish and wildlife resources by meeting minimum Oregon State Department of Forestry regulations;

Response: This provision is inapplicable because there are no timber, forest, or potential forest lands near the portion of the transmission line located on LI-zoned lands.

(8) Access roads or easements be improved to a standard and follow grades recommended by the Public Works Director;

Response: No improvement to permanent access roads is required because existing access roads provide sufficient access to permit necessary construction activities associated with the potentially three new power poles in the LI zone, the reconductoring of the transmission line, and all intermittent and temporary maintenance activities that will be required.

(9) Road construction be consistent with the intent and purposes set forth in the Oregon Forest Practices Act or the 208 Water Quality Program to minimize soil disturbance and help maintain water quality;

Response: There are no forest lands or natural waterways on the portion of the transmission corridor located on LI-zoned lands. The use of existing transmission towers where feasible will minimize soil disturbance, and any construction operations will be conducted in compliance with a National Pollution Discharge Elimination System (NPDES) 1200-C permit and associated Erosion and Sediment Control Plan to maintain water quality.

(10) Land or construction clearing shall be kept to a minimum to minimize soil disturbances and help maintain water quality;

Response: There may be three new transmission towers constructed in the LI zone. If these new towers are required, construction operations will be conducted in such a manner as to maintain water quality and in compliance with a NPDES 1200-C permit and the Erosion and Sediment Control Plan attached in Exhibit I – Soils, Appendix I-2. The use of existing transmission towers generally reduces the need for new construction and will minimize required laydown area and soil disturbance. A total of approximately 1.38 acres over an estimated 12 restringing sites may be temporarily disturbed during the reconductoring operations, but as noted above, such activities will be conducted in compliance with the NPDES permit and Erosion and Sediment Control Plan.

(11) Complies with other conditions as deemed necessary provided in § 152.615.

Response: Compliance with the requirements of UCDC § 152.615 is discussed below.

§ 152.615 ADDITIONAL CONDITIONAL USE PERMIT RESTRICTIONS.

In addition to the requirements and criteria listed in this subchapter, the Hearings Officer, Planning Director or the appropriate planning authority may imposing the following conditions upon a finding that circumstances warrant such additional restrictions:

(A) Limiting the manner in which the use is conducted, including restricting hours of operation and restraints to minimize such environmental effects as noise, vibration, air pollution, water pollution, glare or odor;

Response: The general conditional use criteria noted above are applicable to the small portion of the transmission line located within the LI-zoned land. Given the existing industrial and utility facilities in the vicinity, no appreciable noise impacts are expected. No other environmental impacts, such as vibration, air pollution, water pollution, glare, or odor are anticipated.

The environmental effects on soils (Exhibit I), fish, and wildlife (Exhibit P); threatened and endangered species (Exhibit Q); and wetlands (Exhibit J), as well as impacts from noise emissions (Exhibit X) and cooling tower drift (Exhibit Z), have been evaluated in their respective exhibits of this ASC. The transmission line within the LI zone will comply with all substantive requirements related to each of the environmental factors.

(B) Establishing a special yard, other open space or lot area or dimension;

Response: The transmission line will be located in an existing power transmission ROW, so no yard or open space requirements are applicable.

(C) Limiting the height, size, or location of a building or other structure;

Response: The transmission line will generally be placed on existing transmission towers. Construction of three new towers may be required within the LI zone. If needed, the new tower will be of approximately the same height as existing towers in the area, thereby limiting any adverse visual effect of the new transmission line.

(D) Designating the size, number, location and nature of vehicle access points;

Response: No permanent vehicle access points are required for the transmission line within the LI zone. Reconductoring, installation of up to three new power poles, and necessary temporary and intermittent maintenance activities can be accomplished through use of the existing railway ROW access point just south of the railway tracks along Westland Road, or through use of Generator Road.

(E) Increasing the required street dedication, roadway width or improvements within the street right of way;

Response: It is not anticipated that the Project will require improvements to County transportation facilities.

(F) Designating the size, locating, screening, drainage, surfacing or other improvement of a parking or loading area;

Response: No parking facilities are required because access to the transmission corridor will only be necessary for temporary and intermittent maintenance activities. Sufficient space for temporary parking is available within the ROW.

(G) Limiting or otherwise designating the number, size, location, height and lighting of signs;

Response: No new signage is anticipated to be need along the existing transmission line ROW. To the extent that any new signage is needed, it will be limited to meeting public safety notice requirements.

(H) Limiting the location and intensity of outdoor lighting and requiring its shielding;

Response: No outdoor lighting will be utilized along the ROW within the LI Zone.

(I) Requiring diking, screening, landscaping or other methods to protect adjacent or nearby property and designating standards for installation and maintenance;

Response: The nearest uses to the transmission line within the LI zone are other transmission lines, as well as the HGP and the Lamb Weston food processing facility, uses of an industrial nature. Therefore, the transmission line will not need to be visually screened from these adjacent uses. In any event, given the height and linear nature of the transmission line, screening or landscaping would be impracticable.

(J) Designating the size, height, location and materials for a fence;

Response: Fencing is impracticable and should not be required because the transmission line is a linear facility approximately 12.5 miles long.

(K) Protecting and preserving existing trees, vegetation, water resources, air resources, wildlife habitat, or other natural resources;

Response: The LI-zoned land is already partially developed with existing transmission lines and adjacent paved parking lots. There are no trees or natural water resources in the area impacted by the transmission line. The reconductored line will utilize existing transmission towers to facilitate the required crossing of the Westland Irrigation District Canal located within the LI zone, and so will have no impact on water resources in the canal. Impact to natural resources will be minimized by siting the transmission line within an existing transmission line ROW and utilizing existing transmission towers wherever feasible.

(L) Parking area requirements as listed in §§ 152.560 through 152.562 of this chapter.

Response: No parking facilities will required at the transmission line because no permanent employees will be stationed at this portion of the Project, and only intermittent and temporary access will be required for maintenance purposes.

§ 152.303

(B) The following general criteria shall be used to review all conditional uses listed in the LI Zone, notwithstanding any other criteria listed in this chapter for a particular use:

(1) The use will be compatible with other uses allowed in a LI Zone;

Response: Transmission line is compatible with the light industrial uses—such as food products manufacturing, trucking terminals, welding, blacksmithing, or equipment storage yards—specifically allowed in the LI zone (UCDC § 152.302). There are already transmission lines in the LI-zoned area where the new transmission line will be sited, and no future use of the currently unoccupied lands will be precluded by the new transmission line.

(2) The use will be in conformance with policies listed in the text of the Comprehensive Plan;

Response: See Section K.5.3 for a discussion of conformance with the Umatilla County Comprehensive Plan.

(3) The use would not have an adverse impact on existing industrial uses in that it would not be incompatible with the noise, dust, vibrations and odors that may emanate from or be caused by the existing adjacent industrial uses.

Response: The newly reconductored transmission line will have minimal noise impacts and will have no long-term impacts on existing adjacent industrial uses. Noise, dust, vibrations, or odors from existing industrial uses will not affect the transmission line.

§ 152.304 LIMITATIONS ON USE.

(A) All business, commercial and industrial activities, and storage allowed in an LI, Light Industrial, Zone shall be conducted wholly within a building or shall be screened from view from adjacent public roads or surrounding properties in farm, residential or commercial zones, unless the entire activity is conducted more than 500 feet from said surrounding property or road. Outdoor storage of farm and forest products or equipment shall not be subject to this limitation;

Response: This provision is inapplicable because no business, commercial, or industrial activities will occur within the LI-zoned lands as a result of the development of the transmission line.

(B) All off-street loading areas shall be screened from view if adjoining properties are in a residential zone;

Response: This provision is inapplicable because there are no residential-zoned properties adjacent to the LI-zoned areas, and the transmission line will not include off-street loading areas.

(C) All noise, vibration, dust, odor, smoke, appearance or other objectionable factors involved in any activity shall comply with appropriate state and federal regulations

Response: Reconductoring of the transmission line and the installation of up to three new power poles will have a minor impact and will comply with all appropriate state and federal regulations related to noise, vibration, dust odor, smoke, or appearance. Once constructed, the transmission line will have no impact on these factors.

§ 152.305 DESIGN REVIEW.

(A) An application for a zoning permit for a use permitted in § 152.302 of this chapter shall be accompanied by a site plan.

(B) The Planning Director or his authorized agent shall review the site plan for completeness and compliance with the following requirements:

(1) The site plan shall consist of the following:

(a) An accurate map showing property lines, dimensions, and location of buildings on the property, both existing and proposed;

(b) Drawn at a scale no smaller than 1" = 100';

(c) Access points to county or state roads;

(d) Names of the owner and developer of the site.

Response: Prior to construction, Perennial will submit an application for a zoning permit for the portion of the transmission line located within the LI zone. This application will include a site plan meeting all applicable requirements.

(2) The Planning Director or his authorized agent may require landscaping around the building(s) or the property lines to insure conformance with county policies;

Response: No county policies require landscaping around the transmission line, and such requirements would be impracticable given the height and length of the linear facilities.

(3) Applicable standards listed in this chapter for access, parking lots and spaces, off-street parking and loading requirements, setbacks, signs, vision clearance, and other standards which may now or hereafter be enacted.

Response: Compliance with applicable access, parking, setbacks, signs, vision clearance, and other standards is discussed in Section K.5.2.

§ 152.306 DIMENSIONAL STANDARDS.

In an LI zone, the following dimensional standards shall apply:

(A) Lot size. The minimum lot size shall be one acre unless written proof the Department of Environmental Quality is provided which shows that an approvable subsurface disposal system can be located on less than one acre;

(B) Minimum lot width. The minimum average lot width shall be 100 feet with a minimum of 25 feet fronting on a dedicated county or public road or state highway;

Response: These provisions are inapplicable because no new lots are to be created within the LI zone.

(C) Setback requirements. The minimum setback requirements shall be as follows:
(1) Front yard: 20 feet, except if the front yard area is used for off-street parking space, then the front yard shall be a minimum of 40 feet;
(2) Side yard: 20 feet;
(3) Rear yard: 20 feet;
(4) The minimum side and rear yard setbacks may be modified upon the request of a property owner, pursuant to § 152.625 through 152.630. Under no circumstance shall the setback requirements be modified when the reduced setback would adjoin residentially zoned property.

Response: Up to three new transmission towers will be constructed in the existing ROW within the LI zone. These new transmission towers will comply with all applicable setback requirements. See Figure K-6.

(D) Stream setback. To permit better light, air, vision, stream or pollution control, protect fish and wildlife areas, and to preserve the natural scenic amenities and vistas along the streams, lakes and wetlands, the following setbacks shall apply:

(1) All sewage disposal installations, such as septic tanks and septic drainfields, shall be setback from the mean high-water line or mark along all streams, lakes or wetlands a minimum of 100 feet, measured at right angles to the high-water line or mark. In those cases where practical difficulties preclude the location of the facilities at a distance of 100 feet and the DEQ finds that a closer location will not endanger health, the Planning Director may permit the location of these facilities closer to the stream, lake or wetland, but in no case closer than 50 feet.

Response: This provision is inapplicable because no sewage disposal facilities are to be located within the LI zone.

(2) All structures, buildings or similar permanent fixtures shall be set back from the high-water line along all streams, lakes or wetlands a minimum of 100 feet measured at right angles to the high-water line or mark.

Response: All transmission towers within the LI zone are set back more than 100 feet from the high water line or mark of all streams, lakes, or wetlands. The Umatilla River is the closest natural waterway and is over one-half mile from any transmission towers within the LI zone.

K.5.1.3 Rural Tourist Commercial

The transmission line ROW and transmission line cross a small portion of land zoned as RTC located in Township 4 N, Range 27 E, Section 25, at the southwest corner of Westland Road and Lamb Road. This area is located between I-82 and the HGP. The reconductored transmission line will utilize existing transmission towers on the RTC-zoned land.

§ 152.281 PURPOSE.

The RTC Rural Tourist Commercial Zone is designed to serve the traveling public along major traffic corridors or at appropriate recreational locations outside unincorporated communities and urban growth boundaries. Facilities may include service stations, eating establishments or over-night accommodations. The RTC Zone is appropriate along major interstate interchanges as discussed in the Comprehensive Plan. This zone is applied to commercial lands outside unincorporated communities and urban growth boundaries for which an exception to Goal 14 has not been approved.

The intent of the Rural Tourist Commercial Zone is to permit the continuation and expansion of existing uses and to provide rural scale tourism-related employment uses.

Response: The RTC zone is located near the Lamb Road I-82 interchange, but there are no developed tourist facilities in the area. There will be no lasting impact on future development designed to serve the travelling public because the transmission line will be located within an existing transmission line corridor and utilize existing transmission towers within the RTC zone.

§152.283 CONDITIONAL USES PERMITTED.

In an RTC Zone, the following uses and their accessory uses are permitted subject to the requirements of §§152.610 through 152.616 and 152.284 through 152.286 of this chapter, and upon the issuance of a zoning permit:

(D) Utility facility as provided in § 152.616 (CCC);

Response: As discussed previously in the response to UCDC § 152.303, the existing transmission line is a utility facility. Utility facilities are allowed as a conditional use in RTC-

zoned lands. Umatilla County's *Response to Amended Notice of Intent* dated September 23, 2013, indicated that "[n]o land use permit is required to co-locate and upgrade the transmission line;" however, Perennial will apply for an appropriate land use permit if requested. As described below, the reconductored transmission line meets all conditional use requirements.

§ 152.616 STANDARDS FOR REVIEW OF CONDITIONAL USES AND LAND USE DECISIONS.

The following standards shall apply for review by the Planning Director or designated planning authority of the specific conditional uses and land use decisions listed below:

(CCC) Utility facility.

(1) The facility is designed to minimize conflicts with scenic values and adjacent recreational residential, forest, grazing and farm uses as outlined in policies of the Comprehensive Plan;

Response: The transmission line is designed to minimize conflicts with the scenic values and various uses outlined in the specific policies of the Comprehensive Plan and the UCDC, and discussed throughout this exhibit.

Conflicts with scenic values will be minimized by siting the transmission line in an existing transmission line ROW and adjacent to the existing HGP. Within the RTC zone, the transmission line will utilize only existing towers.

There is no potential for conflict with such uses because there are no recreational residential, grazing or forest uses adjacent to the portion of the transmission line in the RTC-zoned lands. The potential for conflict with nearby farm uses is minimized because the transmission line will utilize existing transmission towers, which will be reconductored with the new 230-kV line.

(2) The facility be of a size and design to help reduce noise or other detrimental effects when located adjacent to recreational residential dwellings;

Response: This provision is not applicable because there are no recreational residential dwellings adjacent to the portion of the transmission line within the RTC-zoned lands.

(3) The facility may be required to be fenced, landscaped or screened;

Response: Fencing, landscaping, or screening is not required because the transmission line is located in an area already utilized for a transmission corridor. Fencing, landscaping, or screening would be impracticable because of the height and linear nature of the transmission line.

(4) The facility does not materially alter the stability of the overall land use pattern of the area;

Response: The facility will not materially alter the overall land use pattern of the area because the area already includes industrial and utility power generation facilities, as well as an electrical power transmission line ROW. Moreover, in the RTC zone, Perennial will merely reconductor an existing transmission line with a new 230 kV line, and so no new transmission towers will be constructed in the RTC zone.

(5) The facility does not constitute an unnecessary fire hazard, and consideration be made for minimum fire safety measures which can include, but are not limited to:

(a) The site be maintained free of litter and debris;

(b) Using non combustible or fire retardant treated materials for structures and fencing;

(c) Clearing site of all combustible materials within 30 feet of structures;

Response: The transmission line ROW will continue to be maintained by UEC free from litter, debris or combustible materials within 30 feet of structures, and to ensure that trees or other vegetation do not grow to become a fire hazard. No new construction will occur within the RTC zone, but the existing power poles that will be used by the reconductored line are constructed of non-combustible or fire retardant treated materials.

(6) Major transmission tower, poles and similar gear shall consider locations within or adjacent to existing rights of way in order to take the least amount of timberland out of production and maintain the overall stability and land use patterns of the area, and construction methods consider minimum soil disturbance to maintain water quality;

Response: In the RTC zone, the transmission line will be located within the existing transmission line ROW and will utilize existing transmission towers, eliminating the potential for soil disturbance and protecting water quality.

(7) The facility shall adequately protect fish and wildlife resources by meeting minimum Oregon State Department of Forestry regulations;

Response: This provision is inapplicable because there are no timber, forest, or potential forest lands near the portion of the transmission line located on RTC-zoned lands.

(8) Access roads or easements be improved to a standard and follow grades recommended by the Public Works Director;

Response: No improvement to permanent access roads is required because existing access roads provide sufficient access to the transmission line corridor to permit the intermittent and temporary maintenance activities that will be required.

(9) Road construction be consistent with the intent and purposes set forth in the Oregon Forest Practices Act or the 208 Water Quality Program to minimize soil disturbance and help maintain water quality;

Response: There are no forest lands or natural waterways on the portion of the transmission line ROW located on RTC-zoned lands, and no road construction will take place within the RTC zone.

(10) Land or construction clearing shall be kept to a minimum to minimize soil disturbances and help maintain water quality;

Response: No new transmission towers will be constructed within the RTC zone. Laydown area will only be required to the minimum extent needed to reconductor the existing towers with a new 230-kV line.

(11) Complies with other conditions as deemed necessary provided in § 152.615.

Response: Compliance with the requirements of UCDC § 152.615 is discussed below.

§ 152.615 ADDITIONAL CONDITIONAL USE PERMIT RESTRICTIONS.

In addition to the requirements and criteria listed in this subchapter, the Hearings Officer, Planning Director or the appropriate planning authority may impose the following conditions upon a finding that circumstances warrant such additional restrictions:

(A) Limiting the manner in which the use is conducted, including restricting hours of operation and restraints to minimize such environmental effects as noise, vibration, air pollution, water pollution, glare or odor;

Response: The general conditional use criteria noted above are applicable to the small portion of the transmission line located within RTC-zoned land. Given the existing industrial and utility facilities in the vicinity, no appreciable noise impacts are expected. No other environmental impacts, such as vibration, air pollution, water pollution, glare, or odor are anticipated from placing new 230-kV conductors on the existing towers.

(B) Establishing a special yard, other open space or lot area or dimension;

Response: No yard or open space requirements are needed, because the transmission line within the RTC-zoned lands will be located in an existing transmission line ROW and will utilize existing transmission towers.

(C) Limiting the height, size or location of a building or other structure;

Response: No new transmission towers will be constructed on RTC-zoned lands because the portion of the transmission line located in RTC-zoned lands will be sited on existing transmission towers.

(D) Designating the size, number, location and nature of vehicle access points;

Response: No permanent vehicle access points are required for the transmission line. Temporary and intermittent maintenance activities can be accomplished through use of the existing Generation Road, which is accessed from Lamb Road.

(E) Increasing the required street dedication, roadway width or improvements within the street right of way;

Response: It is not anticipated that improvements to County transportation facilities will be required for the transmission line in the RTC zone.

(F) Designating the size, location, screening, drainage, surfacing or other improvement of a parking or loading area;

Response: No parking facilities are required because access to the transmission line ROW will only be necessary for temporary and intermittent maintenance activities. Sufficient space for temporary parking is available within the ROW.

(G) Limiting or otherwise designating the number, size, location, height and lighting of signs;

Response: Signage will be limited to meeting public safety notice requirements.

(H) Limiting the location and intensity of outdoor lighting and requiring its shielding;

Response: No outdoor lighting will be utilized along the transmission line ROW.

(I) Requiring diking, screening, landscaping or other methods to protect adjacent or nearby property and designating standards for installation and maintenance.

Response: The nearest uses to the transmission line within the RTC-zoned lands are other transmission lines, as well as the HGP and other uses of an industrial nature. Therefore, the transmission line will not be visually screened from these adjacent uses.

(J) Designating the size, height, location and materials for a fence;

Response: Fencing is impracticable and should not be required because of the height and linear nature of the transmission line.

(K) Protecting and preserving existing trees, vegetation, water resources, air resources, wildlife habitat, or other natural resources;

Response: The RTC-zoned land is already developed, with existing transmission lines and an adjacent paved parking lot. There are no trees in the area impacted by the transmission line. The reconductored line will utilize existing transmission towers to facilitate the required crossing of the Westland Irrigation District Canal located within the LI zone, and so will have no impact on water resources in the canal. Impact to vegetation or other natural resources will be minimized by siting the transmission line within an existing power transmission corridor and utilizing existing transmission towers.

(L) Parking area requirements as listed in §§ 152.560 through 152.562 of this chapter.

Response: No parking facilities are required for the transmission line because no permanent employees will be based at the Station, and only intermittent and temporary access is required for maintenance purposes.

§ 152.284 LIMITATIONS ON USES.

In the RTC Zone, the following limitations on uses shall apply:

(A) Outside storage areas shall be screened with a site-obscuring fence so that the area shall not be exposed to view from the traveling public and surrounding properties;

(B) Storage of scrap or salvage materials shall be prohibited.

(C) Except as provided in Paragraphs D and E of this Section, buildings shall not exceed 3,500 square feet of floor space.

(D) Motels and hotels that existed on July 1, 2005 may expand up to 35 units or up to 50% of the number of existing units, whichever is larger, with no limitation on square footage.

(E) Structures that existed on July 1, 2005 may expand to a building size of 4,500 square feet or to a size that is 50% larger than the building size that existed on July 1, 2005, whichever is larger.

(F) Notwithstanding the size limitations for structures contained in this chapter, a lawfully approved or lawfully constructed structure existing as of July 1, 2005 shall not be considered

a non-conforming use, and in the event the structure is destroyed or substantially damaged, the structure may be restored to its prior lawfully approved size.

Response: No materials will be stored on the portion of the transmission line ROW located within RTC-zoned lands. No other provisions of this section are applicable because no buildings will be constructed within the portion of the transmission line ROW located within RTC-zoned lands.

§ 152.285 DESIGN REVIEW.

(A) An application for a zoning permit for a use permitted in §152.282 or §152.283 of this chapter shall be accompanied by a site plan.

(B) The Planning Director or authorized agent shall review the site plan for completeness and compliance with the following requirements:

(1) The site plan shall consist of the following:

(a) An accurate map showing property lines, dimensions and location of buildings on the property, both existing and proposed;

(b) Drawn at a scale no smaller than 1" = 100';

(c) Access points to county or state roads;

(d) Names of the owner and developer of the site.

Response: Umatilla County's Response to Amended Notice of Intent dated September 23, 2013, indicated that "[n]o land use permit is required to co-locate and upgrade the transmission line;" however, if requested, Perennial will submit an application to Umatilla County for a zoning permit for the portion of the transmission line within the RTC zone. If such an application is submitted, it shall include a site plan meeting all applicable requirements.

(2) The Planning Director or authorized agent may require landscaping around the building(s) or the property lines to insure conformance with county policies;

Response: No county policies require landscaping around the transmission line, and such requirements would be impracticable given the height and length of the linear facilities.

(3) Applicable standards listed in this chapter for access, parking lots and spaces, off-street parking and loading requirements, setbacks, signs, vision clearance, and other standards which may now or hereafter be enacted.

Response: Compliance with applicable access, parking, setbacks, signs, vision clearance, and other standards is discussed in Section K.5.2.

§152.286 DIMENSIONAL STANDARDS.

In an RTC Zone, the following dimensional standards shall apply:

> *(A) Lot size. The minimum lot size shall be one acre unless written proof from the Department of Environmental Quality is provided that shows that an approvable subsurface disposal system can be located on less than one acre;*
>
> *(B) Minimum lot width. The minimum average lot width shall be 100 feet with a minimum of 25 feet fronting on a dedicated county or public road or state highway;*

Response: The lot size provisions are inapplicable because no new lots will be created as part of the transmission line ROW in the RTC zone.

> *(C) Setback requirements. No building shall be located closer than 20 feet from a property line, except on the street/road side of a corner lot used for a side yard the setback shall be 55 feet from the center line of the road, highway, or easement, or 25 feet from the property line, whichever is greater. The minimum side and rear yard setbacks may be modified upon the request of a property owner, pursuant to § 152.625 through 152.630. Under no circumstance shall the setback requirements be modified when the reduced setback would adjoin residentially zoned property.*

Response: These setback provisions are inapplicable because no new transmission towers or other buildings will be constructed within the transmission line ROW in RTC-zoned lands.

> *(D) Stream setback. To permit better light, air, vision, stream or pollution control, protect fish and wildlife areas, and to preserve the natural scenic amenities and vistas along the streams, lakes or wetlands, the following setbacks shall apply:*
>
> > *(1) All sewage disposal installations, such as septic tanks and septic drainfields, shall be set back from the mean high-water line or mark along all streams, lakes or wetlands a minimum of 100 feet measured at right angles to the high water line or mark. In those cases where practical difficulties preclude the location of the facilities at a distance of 100 feet and the DEQ finds that a closer location will not endanger health, the Hearings Officer may permit the location of these facilities closer to the stream, lake or wetland, but in no case closer than 50 feet;*
> >
> > *(2) All structures, buildings or similar permanent fixtures shall be set back from the high-water line or mark along all streams, lakes or wetlands a minimum of 100 feet measured at right angles to the high-water line or mark.*

Response: No new sewage disposal facilities will be constructed within RTC-zoned lands. No new transmission towers will be constructed within the RTC zone and existing towers in the zone are more than 100 feet from any streams, lakes or wetlands.

K.5.1.4 Zoning Permits

§ 152.612 PROCEDURE FOR TAKING ACTION ON A CONDITIONAL USE OR LAND USE DECISION APPLICATION.

(D) An applicant granted a conditional use permit or land use decision must obtain a County zoning permit for each tax lot before commencing construction.

Response: Before commencing construction of the Project, Perennial will obtain a zoning permit for each tax lot where new construction occurs (Energy Facility Site, step-up substation, natural gas pipeline, and new transmission towers) outside of the City of Umatilla limits.

Since the Energy Facility Site and the step-up substation require conditional use permits, Perennial will obtain a zoning permit for each tax lot on which these facilities are located: 4 N 28 30 1200 and 5N 28 16A 0200, respectively. Where new transmission towers may be required on lands zoned as LI under the UCDC (tax lot 4 N 27 25 0200), the transmission line also requires a conditional use permit. A zoning permit will be obtained for each tax lot where new transmission towers will be constructed in these zones. In the EFU zone, the natural gas pipeline and all new transmission towers are permitted as land use decisions as "utility facilities necessary for public service" under UCDC § 152.059, and Perennial will obtain a zoning permit for each tax lot crossed by the pipeline or where new transmission towers are constructed.

In the EFU zone, the reconductored portions of the existing transmission line are permitted outright under UCDC § 152.056 (J) as the "[m]aintenance or minor betterment of existing transmission lines and facilities of utility companies and agencies." Umatilla County's *Response to Amended Notice of Intent* dated September 23, 2013 indicated that "[n]o land use permit is required to co-locate and upgrade the transmission line;" therefore, for areas crossed only by the reconductored transmission line, Perennial will apply for zoning permits only if requested.

K.5.1.5 General Provisions

§ 152.010 ACCESS TO BUILDINGS; PRIVATE DRIVEWAYS AND EASEMENTS.

(A) Every building hereafter erected or moved shall be on a lot that abuts a public street or a recorded easement. All structures shall be so located on lots as to provide safe and convenient access for servicing, fire protection, and required off-street parking. In commercial and industrial zones, access points shall be minimized. To accomplish this, access shall be limited to one every 200 feet and shall be reviewed during the design

review stage or the conditional use hearing. If necessary to accomplish this, driveways may be shared between two lots.

Response:

Energy Facility Site

The western edge of the Energy Facility Site, located on tax lot 4 N 28 30 1200, abuts Westland Road. To the north of the Energy Facility Site's access point on Westland Road, the closest access point is the HGP driveway, located over 600 feet away. To the south of the Energy Facility Site's access point on Westland Road, the closest access point is Westport Lane, located over 600 feet away.

Natural Gas Pipeline

As discussed previously, the natural gas pipeline is not a "structure" because it is located entirely underground. Any accessory above-ground structures necessary to facilitate, manage, and meter the connection of the natural gas pipeline to the GTN interstate pipeline are permitted under GTN's FERC agreement and are beyond the scope of this application. For the Council's information, however, such facilities shall be sited within the existing fence line of facilities used to serve the HGP pipeline, so as to provide convenient access for servicing, fire protection, and parking.

Transmission Line

New transmission towers shall be constructed on tax lots 4N 28 30 1200 and possibly also in tax lot 4N 27 25A 0200, which each abut a public street. All new transmission towers will be constructed so as to be safely and conveniently accessible for maintenance, servicing, and fire protection. Off-street parking within the existing transmission line ROW is sufficient to meet parking needs for intermittent maintenance activities.

Step-Up Substation/Underground Line

The step-up substation and underground line will be built on tax lot 5N 28 16A 0200, which abuts a public street, Scaplehorn Road. The substation and underground line will be constructed as to be safely and conveniently accessible for maintenance, servicing, and fire protection. As discussed below, an existing dirt driveway from the step-up substation site south to Scaplehorn Road will be improved with gravel. During operations, approximately one vehicle trip per month may be needed to access the step-up substation for maintenance.

(B) Private driveways and easements that enter onto a public or county road or state or federal highway shall be constructed of at least similar if not the same material as the public or county road or state or federal highway to protect the edge of the road from

rapid deterioration. The improvements shall extend at least 25 feet back from the edge of the existing travel lane surface.

Response:

Energy Facility Site

The driveway access to Westland Road will be fully paved and will comply with all relevant requirements of the Umatilla County Transportation Plan. Perennial has recently submitted an application for a County access permit for the access point.

Natural Gas Pipeline/Transmission Line

This provision is inapplicable because no new private driveways or easements shall be constructed to access any roadways from the natural gas pipeline or transmission line.

Step-Up Substation/Underground Line

An existing dirt driveway and access on Scaplehorn Road (County Road 1286) will be updated and improved with gravel to allow for access to the step-up substation.

§ 152.011 VISION CLEARANCE.

Vision clearance areas shall be provided with the following distance establishing the size of the vision clearance area:

(A) In an Agricultural or Residential Zone, the minimum distance shall be 30 feet or, at intersections including an alley, 10 feet;

(B) In all other zones the minimum distance shall be 15 feet or, at intersections including an alley, 10 feet, except when the angle of intersection between streets is less than 30º the distance shall be 25 feet;

(C) The vision clearance area shall not contain any planting, wall, structure, or obstruction of any kind exceeding two and one-half feet in height measured from the grade of the street centerline.

Response:

Energy Facility Site

Westland Road at the access point to the Energy Facility Site is flat and straight with clear visibility. The vision clearance area will be maintained free of any visual obstructions. The

existing railroad crossing barrier is more than 30 feet from the access point and will not obstruct the view of drivers entering or exiting from the Energy Facility Site.

Natural Gas Pipeline/Transmission Line

This provision is inapplicable because no new roadway access points will be constructed as part of these related or supporting facilities.

Step-Up Substation/Underground Line

Scaplehorn Road at the access point to the step-up substation is flat and straight with clear visibility. The vision clearance area will be maintained free of any visual obstructions. There are no existing or planned obstructions that will impact the view of drivers entering or exiting from the Energy Facility Site.

§ 152.016 RIPARIAN VEGETATION; WETLAND DRAINAGE.

(A) The following standards shall apply for the maintenance, removal and replacement of riparian vegetation along streams, lakes and wetlands which are subject to the provisions of this chapter:

(1) No more of a parcel's existing vegetation shall be cleared from the setback and adjacent area than is necessary for uses permitted with a zoning permit, accessory buildings, and/or necessary access.

(2) Construction activities in and adjacent to the setback area shall occur in such a manner so as to avoid unnecessary excavation and/or removal of existing vegetation beyond that required for the facilities indicated in subdivision (A)(1) above. Where vegetation removal beyond that allowed in subdivision (A)(1) above cannot be avoided, the site shall be replanted during the next replanting season to avoid water sedimentation. The vegetation shall be of indigenous species in order to maintain the natural character of the area.

(3) A maximum of 25% of existing natural vegetation may be removed from the setback area.

Response:

Energy Facility Site

This provision is inapplicable because there is no existing riparian vegetation along streams, lakes, or wetlands in the setback area or elsewhere on the Energy Facility Site.

Natural Gas Pipeline

This provision is inapplicable because there is no existing riparian vegetation along streams, lakes or wetlands in the natural gas pipeline ROW.

Transmission Line

No riparian vegetation will be removed in the transmission line ROW because the transmission line will generally use existing ROW and transmission towers. No access to the Umatilla River riparian area is anticipated to be needed to effectuate the crossing of the transmission line as the new line will utilize existing towers that are set back from the riparian area.

Step-Up Substation/Underground Line

This provision is inapplicable because there is no existing riparian vegetation along streams, lakes or wetlands at the step-up substation or underground line location.

(4) The following uses and activities are excepted from the above standards:

(a) Commercial forest practices regulated by the Oregon Forest Practices Act, being ORS 527.610 et seq.;

(b) Vegetation removal necessary to provide water access for a water dependent use;

(c) Removal of dead or diseased vegetation that poses a safety or health hazard;

(d) Removal of vegetation necessary for the maintenance or replacement of structural shoreline stabilization.

Response:

Energy Facility Site

This provision is inapplicable because there is no existing riparian vegetation along streams, lakes, or wetlands in the setback area or elsewhere on the Energy Facility Site.

Natural Gas Pipeline

This provision is inapplicable because there is no existing riparian vegetation along streams, lakes, or wetlands in the natural gas pipeline ROW.

Transmission Line

This provision is inapplicable because no riparian vegetation will be removed along the transmission line ROW.

Step-Up Substation/Underground Line

This provision is inapplicable because there is no existing riparian vegetation along streams, lakes or wetlands at the step-up substation or underground line location.

(5) In cases of zoning permits, land use actions which require site plan review or conditions for approval, and which are subject to provisions of this division, the review body shall prepare findings and address the maintenance, removal and replacement of riparian vegetation.

Response:

Energy Facility Site

This provision is inapplicable because there is no riparian vegetation along streams, lakes, or wetlands at the Energy Facility Site.

Natural Gas Pipeline

This provision is inapplicable because there is no riparian vegetation along streams, lakes, or wetlands in the natural gas pipeline ROW.

Transmission Line

This provision is inapplicable because no riparian vegetation will be removed along the transmission line ROW.

Step-Up Substation/Underground Line

This provision is inapplicable because there is no existing riparian vegetation along streams, lakes or wetlands at the step-up substation or underground line location.

(B) Minor drainage improvements necessary to ensure effective drainage on surrounding agricultural lands shall be coordinated with the Oregon Department of Fish and Wildlife and Soil and Water Conservation District. Existing drainage ditches may be cleared to original specifications without review.

Response:

Energy Facility Site

This provision is inapplicable because surrounding agricultural lands are engaged in dryland farming, and topography indicates that such lands drain away from the Energy Facility Site. To the extent that minor drainage improvements may be required due to onsite grading, Perennial

will coordinate with the Oregon Department of Fish and Wildlife (ODFW) and Umatilla County Soil and Water Conservation District (SWCD).

Natural Gas Pipeline

This provision is inapplicable because the construction of the natural gas pipeline is not anticipated to alter drainage patterns on surrounding agricultural lands. To the extent that minor drainage improvements may be required, Perennial will coordinate with the ODFW and SWCD.

Transmission Line

This provision is inapplicable because the construction of the transmission line is not anticipated to alter drainage patterns on surrounding agricultural lands. To the extent that minor drainage improvements may be required, Perennial will coordinate with the ODFW and SWCD.

Step-Up Substation/Underground Line

This provision is inapplicable because the construction of the step-up substation and underground line is not anticipated to alter drainage patterns on surrounding agricultural lands. To the extent that minor drainage improvements may be required, Perennial will coordinate with the ODFW and SWCD.

§152.017 CONDITIONS FOR DEVELOPMENT PROPOSALS.

(A) The proposed use shall not impose an undue burden on the public transportation system. Any increase meeting the definition of significant change in trip generation constitutes an undue burden.

Response: The Project will not impose an undue burden on the public transportation system. "Significant change in trip generation is defined in UCDC § 152.003:

> ***SIGNIFICANT CHANGE IN TRIP GENERATION***. *A change in the use of the property, including land, structures or facilities, or an expansion of the size of the structures or facilities causing an increase in the trip generation of the property exceeding: (1) for gravel surfaced County roads, 30 vehicles of less than 10,000 pounds Gross Vehicle Weight (GVW) and/or 20 vehicles of greater than 10,000 pounds GVW; (2) for paved County roads, 75 vehicles of less than 10,000 GVW; and (3) for State paved Highways, 150 vehicles of 10,000 pounds GVW or less and/or 100 vehicles of greater than 10,000 pounds GVW.*

The Energy Facility Site will be accessed by Westland Road, a paved county road. Approximately 20 daily one-way vehicle trips are expected to be generated by the operation of the Station, as described in Exhibit U – Public Services, Appendix U-1. Eight employees are

expected to generate 16 daily trips, while a daily average of 2 deliveries or visitors will generate 4 additional daily trips. The gas pipeline, transmission line, and step-up substation will only require intermittent access for maintenance and repairs, and so will not generate daily vehicle traffic.

(B) For developments likely to generate a significant increase in trip generation, applicant shall be required to provide adequate information, such as a traffic impact study or traffic counts, to demonstrate the level of impact to the surrounding system. The scope of the impact study shall be coordinated with the providers of the transportation facility. Proposals that meet the requirements in §152.019(B) are subject to §152.019(C), Traffic Impact Analysis Requirements.

(C) The applicant or developer may be required to mitigate impacts attributable to the project. Types of mitigation may include such improvements as paving, installation or contribution to traffic signals, construction of sidewalks, bikeways, accessways or paths. The determination of impact or effect should be coordinated with the providers of affected transportation facilities.

(D) Dedication of land for roads, transit facilities, sidewalks, bikeways, paths, or accessways may be required where the existing transportation system will be impacted by or is inadequate to handle the additional burden caused by the proposed use.

Response: The estimated 200 to 225 personnel required during construction would have a limited impact on the congestion of I-84, I-82, and Westland Road. The development of the Project will have minor traffic impacts in the City of Umatilla during construction, but will have no permanent impacts on the City's transportation system. As detailed in the Traffic Impact Analysis included as Appendix U-1, all of the study intersections and critical movements operate acceptably during the weekday a.m. and p.m. peak hours. At the peak of the construction period, the projected construction effort is estimated to generate approximately 196 trip ends during each of the weekday a.m. and p.m. peak hours. During normal operations, the Station is estimated to generate approximately 8 and 12 trip ends during the a.m. and p.m. peak hours of a typical weekday, respectively. No measurable traffic impacts are expected from the construction or operations of the transmission line, gas line, or step-up substation.

§ 152.018 ACCESS MANAGEMENT AND STREET CONNECTIVITY:

(A) The intent of this code is to manage access to land development while preserving the flow of traffic in terms of safety, capacity, functional classification, and level of service. Major roadways, including highways, arterials, and collectors serve as the primary network for moving people and goods. These transportation corridors also provide access to businesses and homes and have served as the focus for commercial and residential development. If access points are not properly designed, these roadways will

be unable to accommodate the needs of development and retain their primary transportation function. This code balances the right of reasonable access to private property with the right of the citizens of Umatilla County and the State of Oregon to safe and efficient travel. To achieve this policy intent, state and local roadways have been categorized in the Transportation System Plan by function and classified for access purposes based upon their level of importance and function. Regulations have been applied to these roadways for the purpose of reducing traffic accidents, personal injury, and property damage attributable to poorly designed access systems, and to thereby improve the safety and operation of the roadway network. This will protect the substantial public investment in the existing transportation system and reduce the need for expensive remedial measures. These regulations also further the orderly layout and use of land, protect community character, and conserve natural resources by promoting well-designed road and access systems and discouraging the unplanned subdivision of land.

(B) This section shall apply to all arterials and collectors within the County and to all properties that abut these roadways.

(C) This section is adopted to implement the access management policies of the County as set forth in the Transportation System Plan.

(D) Proposed access within the I-82/US 730 Interchange Management Area Plan (IAMP) Management Area, shall be consistent with Section 7, Access Management Plan, of the IAMP.

(E) Corner Clearance

(1) Corner clearance for connections shall meet or exceed the minimum connection spacing requirements for that roadway.

(2) New connections shall not be permitted within the functional area of an intersection as defined by the connection spacing standards of this ordinance, unless no other reasonable access to the property is available.

(3) Where no other alternatives exist, the County may allow construction of an access connection along the property line farthest from the intersection. In such cases, directional connections (i.e. right in/out, right in only, or right out only) may be required.

Response:

Energy Facility Site

The access point to the Energy Facility Site will be located on the east side of Westland Road, just south of the railroad ROW. The proposed driveway for the Energy Facility Site would be approximately 250 feet south of the nearest driveway. This driveway appears to be a seldom-used access point for maintenance vehicles to access the drainage canal. The nearest driveway of consequence to the north is the Hermiston Generating Plant Access, which is approximately 670 feet from the proposed site access. To the south, the nearest access point is Westport Lane, which is located approximately 580 feet from the proposed site-access driveway. These distances comply with the corner clearance standards of the Umatilla County Transportation Plan and minimize opportunities for potential traffic conflict.

Natural Gas Pipeline/Transmission Line

These provisions are inapplicable because the natural gas pipeline and transmission line are not expected to generate more than minimal, intermittent traffic demand and do not require additional access points.

Step-Up Substation/Underground Line

The access point to the step-up substation will be located on the north side of Scaplehorn Road at an existing dirt driveway access which will be upgraded to meet County standards. The proposed driveway for the step-up substation would be more than 1000 feet to the east and west of the nearest driveways. These distances comply with the corner clearance standards of the Umatilla County Transportation Plan and minimize opportunities for potential traffic conflict.

(F) Joint Use Driveways and Cross Access.

(1) Adjacent commercial or office properties identified as major traffic generators (generating more than 400 daily trips as defined by the Institute of Transportation Engineers Trip Generation Manual), shall provide a cross access drive and pedestrian access to allow circulation between sites.

(2) A system of joint use driveways and cross access easements shall be established wherever feasible and shall incorporate the following:

(a) A continuous service drive or cross access corridor extending the entire length of each block served to provide for driveway separation consistent with the access management classification system and standards.

(b) A design speed of 10 mph and a maximum width of 20 feet to accommodate two-way travel aisles designated to accommodate automobiles, service vehicles, and loading vehicles

(c) Stub-outs and other design features to make it visually obvious that the abutting properties may be tied in to provide cross-access via a service drive.

(d) A unified access and circulation system plan for coordinated or shared parking areas is encouraged.

(3) Shared parking areas shall be permitted a reduction in required parking spaces if peak demands do not occur at the same time periods.

(4) Pursuant to this section, property owners shall:

(a) Record an easement with the deed allowing cross access to and from other properties served by the joint use driveways and cross access or service drive;

(b) Record an agreement with the deed that remaining access rights along the roadway will be dedicated to Umatilla County and pre-existing driveways will be closed and eliminated after construction of the joint-use driveway;

(c) Record a joint maintenance agreement with the deed defining maintenance responsibilities of property owners.

(5) Umatilla County may reduce required separation distance of access points where they prove impractical, provided all of the following requirements are met:

(a) Joint access driveways and cross access easements are provided in accordance with this section.

(b) The site plan incorporates a unified access and circulation system in accordance with this section.

(c) The property owner enters into a written agreement with the county, recorded with the deed, that pre-existing connections on the site will be closed and eliminated after construction of each side of the joint use driveway (6) Umatilla County may modify or waive the requirements of this section where the characteristics or layout of abutting properties would make the development of a unified or shared access and circulation system impractical.

Response:

Energy Facility Site

These provisions are inapplicable because there are no major traffic generators adjacent to the Energy Facility Site.

Natural Gas Pipeline/Transmission Line

These provisions are inapplicable because the natural gas pipeline, transmission line, step-up substation and underground line are not expected to generate more than minimal, intermittent traffic demand, and do not require additional driveway access.

Step-Up Substation/Underground Line

These provisions are inapplicable because there are no major traffic generators adjacent to the step-up substation. There is no need for joint access to the McNary Substation because that facility is located across a railroad line from the step-up substation and is accessed from Third Street, not from Scaplehorn Road.

(G) Access Connection and Driveway Design.

(1) Driveways shall meet the following standards:

(a) If the driveway is a one way in or one way out drive, then the driveway shall be a minimum width of 10 feet and shall have appropriate signage designating the driveway as a one way connection.

(b) For two-way access, each lane shall have a minimum width of 10 feet.

Response:

Energy Facility Site

The vehicle access point will be sized with two lanes at least 10 feet wide to allow for vehicles and truck traffic to enter and exit the Energy Facility Site. As discussed below, due to the relatively narrow property frontage in combination with the existing guard rail located at the railroad crossing gate, the permanent site-access driveway cannot be designed to accommodate truck movements to or from the north. Therefore, all truck movements to the Station will be directed to enter the site from the south (i.e. from the I-84/Westland Road interchange). Additionally, all trucks exiting the site will be directed to turn left out of the driveway onto southbound Westland Road (towards I-84).

Natural Gas Pipeline/Transmission Line

This provision is inapplicable because no new driveway access points are required for the natural gas pipeline or transmission line.

Step-Up Substation/Underground Line

The upgraded vehicle access point will be sized with two lanes at least 10 feet wide to allow for vehicles and truck traffic to enter and exit the step-up substation.

(2) Driveway approaches must be designed and located to provide an exiting vehicle with an unobstructed view. Construction of driveways along acceleration or deceleration lanes and tapers shall be avoided due to the potential for vehicular weaving conflicts.

Response:

Energy Facility Site

The existing clear sight lines at the access point will be maintained providing exiting vehicles with unobstructed view of traffic along Westland Road. There is no potential for vehicular weaving conflicts because there are no acceleration or deceleration lanes in the vicinity of the access point.

Natural Gas Pipeline/Transmission Line

This provision is inapplicable because no new driveway access points are required for the natural gas pipeline or transmission line.

Step-Up Substation/Underground Line

The existing clear sight lines at the access point will be maintained providing exiting vehicles with unobstructed view of traffic along Scaplehorn Road. There is no potential for vehicular weaving conflicts because there are no acceleration or deceleration lanes in the vicinity of the access point.

(3) The length of driveways shall be designed in accordance with the anticipated storage length for entering and exiting vehicles to prevent vehicles from backing into the flow of traffic on the public street or causing unsafe conflicts with on-site circulation.

Response:

Energy Facility Site

The driveway and internal access roads shall be designed to provide sufficient length and width for vehicles to safely enter, exit, and circulate throughout the Energy Facility Site. As detailed in the Traffic Impact Analysis attached as Appendix U-1, due to the relatively narrow property frontage in combination with the existing guard rail located at the railroad crossing gate, the permanent site-access driveway cannot be designed to accommodate truck movements to or from the north. Therefore, all truck movements to the Station will be directed to enter the site from the south (i.e. from the I-84/Westland Road interchange). Additionally, all trucks exiting the site will be directed to turn left out of the driveway onto southbound Westland Road (towards I-84).

Natural Gas Pipeline/Transmission Line/

This provision is inapplicable because no new driveway access points or internal roads are required for the natural gas pipeline or transmission line.

Step-Up Substation/Underground Line

The driveway and internal access roads shall be designed to provide sufficient length and width for vehicles to safely enter, exit, and circulate throughout the step-up substation. Since only intermittent and limited access to the step-up substation will be needed for maintenance and operations, and the driveway from Scaplehorn Road to the step-up substation is more than 600 feet long, vehicles accessing the step-up substation will not back up onto Scaplehorn Road.

(H) Nonconforming Access Features.

(1) Legal access connections in place as of September 15, 2002 that do not conform with the standards herein are considered nonconforming features and shall be brought into compliance with applicable standards under the following conditions: When new access permits are requested; Change in use, enlargements, or improvements that will increase trip generation.

Response: This provision is inapplicable because there are no existing non-conforming access connections.

§ 152.545 ZONING PERMIT REQUIRED TO ERECT, MOVE, OR ALTER SIGNS; EXEMPTIONS; PERMITTED SIGNS.

(A) No sign shall hereafter be erected, moved, or structurally altered without a zoning permit, except for a Type 1 and Type 3 sign, and without being in conformity with the provisions of this chapter. Official signs of the state, county or municipalities are exempt from all provisions of

this chapter. All signs shall be on the same lot as the subject matter of the sign, except as specifically allowed otherwise.

(B) Allowed signs in the various zones are indicated by the following tables (for types of signs, see § 152.546):

Zone	***Types Allowed***
EFU-10, EFU-20, EFU-40, EFU, GF	*1, 2, 3, 4, 5, 6*

Response:

Energy Facility Site

As the Station will not generally be open to the public, signage will be limited to wayfinding for deliveries and general site circulation, and will comply with all Umatilla County requirements.

Natural Gas Pipeline/Transmission Line/Step-Up Substation/Underground Line

Signage will be limited to meeting public safety notice requirements and will comply with all Umatilla County, state, and federal requirements.

§ 152.560 OFF-STREET PARKING REQUIREMENTS.

(A) Each use shall provide the following minimum off-street parking spaces. Each parking space shall be a minimum of nine feet wide and 20 feet in length.

(B) Off-street parking requirements.

(10) Industrial uses: one space per 200 square feet of public space, plus one space per employee.

(11) Conditional uses: additional spaces may be required by the Hearings Officer in the approval of a conditional use.

Response:

Energy Facility Site

The Station will meet the required parking requirements for industrial uses. As noted in the response to UCDC § 152.017 in Section K.5.1.5 above, the Station will employ approximately 6 to 8 permanent staff. There will be no public space at the Station. As shown on the Detailed Facility Site Plan, Figure K-2, the Station site area will include a parking area for at least 10

standard cars and one handicapped vehicle. Therefore, the standard for industrial uses comparable to the Station use will be met.

Natural Gas Pipeline/Transmission Line/Step-Up Substation/Underground Line

No permanent parking spaces will be required for the natural gas pipeline, transmission line, step-up substation or underground line because these facilities include no public spaces, nor will they be regularly staffed by employees. The natural gas pipeline and transmission line ROWs, and the substation site provide sufficient off-street space for parking as needed for construction operations, routine maintenance, or repairs.

§ 152.562 ADDITIONAL OFF-STREET PARKING AND LOADING REQUIREMENTS.

(A) Should the owner or occupant of a lot or building change the use to which the lot or building is put, thereby increasing off-street parking or loading requirements, it shall be a violation of this chapter to begin such altered use until the required increase in off-street parking or loading is provided;

Response:

Energy Facility Site

Parking facilities will be developed during construction of the Station, and the Station will not begin operations until such parking facilities are provided.

Natural Gas Pipeline/Transmission Line

This provision is inapplicable because the development of the natural gas pipeline and transmission line will not change the current use of the already existing ROWs, and no increased parking or loading requirements are expected.

Step-Up Substation/Underground Line

This provision is inapplicable because the step-up substation only requires parking for intermittent access which can be provided within the step-up substation site boundary.

(B) Requirements for types of buildings and uses not specifically listed herein shall be determined by the Planning Commission or Hearings Officer, based upon the requirements of comparable uses listed;

Response:

Energy Facility Site

The parking needs of the Station are comparable to those of an industrial facility, and sufficient parking will be provided to meet the standards required for industrial facilities, as discussed above.

Natural Gas Pipeline/Transmission Line

No permanent parking is required, and the ROW areas provide sufficient space for temporary parking during construction and intermittent maintenance activities.

Step-Up Substation/Underground Line

No permanent parking is required, and the substation site provides sufficient space for temporary parking during construction and intermittent maintenance activities.

(C) In the event several uses occupy a single structure or parcel of land, the total requirements for off-street parking shall be the sum of the requirements of the several uses computed separately;

Energy Facility Site

Sufficient parking will be provided at the Energy Facility Site to meet the facility's needs. The Energy Facility Site parcel has no other uses. To the extent that additional off-street parking may be required for adjacent agricultural uses, such parking facilities are available on the adjacent lands.

Natural Gas Pipeline/Transmission Line

No permanent parking is required, and the ROW areas provide sufficient space for temporary parking during construction and intermittent maintenance activities. To the extent that additional off-street parking may be required for adjacent agricultural uses, such parking facilities are available on the adjacent lands.

Step-Up Substation/Underground Line

No permanent parking is required, and the substation site provides sufficient space for temporary parking during construction and intermittent maintenance activities. To the extent that additional off-street parking may be required for adjacent agricultural uses, such parking facilities are available on the adjacent lands.

(D) Owner of two or more uses, structures or parcels of land may agree to utilize jointly the same parking and loading spaces when the hours of operation do not overlap, provided that satisfactory legal evidence is presented to the Planning Director in the form of deeds, leases, or contracts to establish the joint use;

Response: This provision is inapplicable because no joint parking or loading facilities are to be developed as part of the Project.

(E) Off-street parking spaces for dwellings shall be located on the same lot with the dwelling. Other required parking spaces shall be located no farther than 500 feet from the building or use they are required to serve, measured in a straight line from the building;

Response: This provision is inapplicable because no dwellings are to be developed as part of the Project.

(F) Required parking spaces shall be available for the parking of operable passenger automobiles of residents, customers, patrons and employees only, and shall not be used for storage of vehicles or materials or for the parking of trucks used in conducting the business or use;

Response:

Energy Facility Site

The parking spaces at the Energy Facility Site will not be used for storage of vehicles or materials or for truck parking, but will be available for operable passenger automobiles of Station employees or authorized visitors only.

Natural Gas Pipeline/Transmission Line

No permanent parking is required, and the ROW areas provide sufficient space for temporary parking during construction and intermittent maintenance activities.

Step-Up Substation/Underground Line

No permanent parking is required, and the substation site provides sufficient space for temporary parking during construction and intermittent maintenance activities.

(G) Unless otherwise provided, required parking and loading spaces shall not be located in a required yard;

Response:

Energy Facility Site

No parking or loading spaces will be provided in the setback areas for the Energy Facility Site. No other yard areas are required for commercial utility facilities.

Natural Gas Pipeline/Transmission Line

No permanent parking is required, and there are no yard requirements applicable to the natural gas pipeline or transmission line.

Step-Up Substation/Underground Line

No permanent parking is required, and the substation site provides sufficient space for temporary parking during construction and intermittent maintenance activities.

(H) Plans shall be submitted as provided in § 152.767 of this chapter;

Response: Prior to construction, Perennial will apply for a zoning permit from Umatilla County for the Station and will include site plans demonstrating compliance with all county parking requirements.

(I) Design requirements for parking lots:

(1) Areas used for standing and maneuvering of vehicles shall have paved surfaces maintained adequately for all weather use and so drained as to avoid flow of water across public sidewalks;

Response: The access point, driveway, internal roads, and parking spaces at the Station will all be paved. Stormwater runoff occurring during construction activities of the Station and associated activities would be managed as required by a NPDES 1200-C permit issued by the Oregon Department of Environmental Quality (DEQ). Stormwater runoff during operation of the Station will be collected in a detention basin and allowed to percolate into the ground, and not run across public sidewalks. Any stormwater that could be contaminated with oil will first pass through an oil/water separator to remove the oil before being routed to the basin.

(2) Except for parking to serve residential use, parking and loading areas adjacent to residential use shall be designed to minimize disturbance of residents by the erection between the uses of a sight obscuring fence of not less than five feet in height except where vision clearance is required;

Response: This provision is inapplicable because there are no residential uses adjacent to the Station or its parking facilities.

(3) Parking spaces along the outer boundaries of a parking lot shall be contained by a curb at least four inches high and set back a minimum of four and one-half feet from the property line, or by a bumper rail;

Response: Required curb or bumper rail facilities and setbacks will be provided at the Station, as shown in the site plan in Figure K-2.

(4) Artificial lighting which may be provided shall not create or reflect glare in a residential zone or on any adjacent dwelling;

Response: This provision is inapplicable because there are no residential zones or dwellings adjacent to the Station or its parking facilities.

(5) Service drives to off-street parking areas of four or more spaces shall be clearly and permanently marked and defined through use of rails, fences, walls, or other barriers or markers on frontage not occupied by service drives;

Response: There will be only a single driveway access point to the Station, which will be clearly and permanently marked and defined through perimeter fencing and signage.

(6) Service drives shall have a minimum vision clearance area bounded by the driveway centerline, the street right-of-way line, and a straight line joining said lines 20 feet from their intersection.

Response: Westland Road at the access point to the Energy Facility Site is flat and straight, with clear visibility. Similarly, Scaplehorn Road at the access point to the step-up substation is flat and straight, with clear visibility. These vision clearance areas will be maintained free of any visual obstructions.

K.5.2 Umatilla County Transportation System Plan

Umatilla County's Transportation System Plan is implemented through the County Development Code. As described above in Section K.5.1.5, the Project will comply with all relevant requirements, including the Access Management provisions of UCDC § 152.018.

Energy Facility Site

As detailed in the Traffic Impact Analysis included as Appendix U-1, the Energy Facility Site is not expected to have a significant impact on the adjacent roadway traffic operations upon build-out. Furthermore, during the construction phase, all study intersections will continue to operate within the applicable performance standards and targets. The Energy Facility Site is estimated to generate approximately 8 and 12 trip ends during the a.m. and p.m. peak hours of a typical weekday, respectively. At the peak of the construction period, the projected construction effort

is estimated to generate approximately 196 trip ends during each of the weekday a.m. and p.m. peak hours.

Intersection sight distances are adequate at both the permanent and temporary (construction-related) proposed site access intersections. A truck turning path analysis found that the proposed permanent site access driveway design will accommodate truck ingress and egress movements without impacting the existing guard rail at the railroad crossing, provided that all truck movements are made to/from the south (i.e. via the I-84/Westland Road interchange).

Natural Gas Pipeline

There will be no permanent traffic impacts from the construction of the natural gas pipeline. To the extent that mitigation of temporary construction-related traffic impacts is required, simple travel demand management measures such as carpooling, construction worker shift staggering, and temporary traffic control measures can reduce these impacts. Such measures will be adopted as needed based on consultation with the Oregon Department of Transportation and Umatilla County Public Works.

Transmission Line

There will be no permanent traffic impacts from the construction of the transmission line. To the extent that mitigation of temporary construction-related traffic impacts is required, simple travel demand management measures such as carpooling, construction worker shift staggering, and temporary traffic control measures can reduce these impacts. Such measures will be adopted as needed based on consultation with the entities listed above.

Step-up Substation/Underground Line

There will be no permanent traffic impacts from the construction of the step-up substation or underground line. To the extent that mitigation of temporary construction-related traffic impacts is required, simple travel demand management measures such as carpooling, construction worker shift staggering, and temporary traffic control measures can reduce these impacts. Such measures will be adopted as needed based on consultation with the entities listed above.

K.5.3 Comprehensive Plan Policies

Citizen Involvement Recommended Policies

1. Provide information to the public on planning issues and programs, and encourage continuing citizen input to planning efforts.

Response: Compliance with the Council's citizen involvement procedures for review of the ASC requires the provision of information to the public and opportunities for citizen

involvement. The Council's procedures will ensure a public hearing on the Draft Proposed Order and the opportunity for a contested case.

5. *Through appropriate media, encourage those County residents' participation during both city and County deliberation proceedings.*

Response: The Council's public notice requirements will ensure notification of affected residents of the Project proposal and will provide opportunities for comment and other public involvement through direct mail and media publications.

Agriculture Recommended Policies

1. *Umatilla County will protect, with Exclusive Farm Use zoning pursuant to ORS 215, lands meeting the definition of farmland in this plan and designated as Agricultural on the Comprehensive Plan Map*

Response:

Energy Facility Site

The Energy Facility Site is allowed as a conditional use in the EFU. Less than 20 acres of EFU lands will be used for the Energy Facility Site, and adjacent farmland will not be impacted, as discussed above in Section K.5.1.1. Given the excess of farmland in relation to available irrigation water supplies in Umatilla County, the siting of the Energy Facility Site on EFU lands will have no ultimate impact on the agricultural productivity of Umatilla County farmland. The Station will comply with all conditional use requirements, as discussed above in Section K.5.1.1.

Natural Gas Pipeline

As noted, ORS 215.283 identifies the land uses permitted in EFU zones. ORS 215.283(1)(c) provides that "utility facilities necessary for public service" are allowed in EFU lands. Because the natural gas pipeline qualifies as a utility facility necessary for public service, it is allowed in EFU-zoned lands pursuant to the criteria of ORS 215.275, as detailed in Section K.5.1.1.

Because the natural gas pipeline will be located underground and within the existing HGP ROW, the pipeline will not interfere with agricultural activities. Existing agricultural uses will not undergo any constraints that do not already exist due to the current pipeline in the ROW.

Transmission Line

As noted, ORS 215.283 identifies the uses permitted in EFU zones. ORS 215.283(1)(c) provides that "utility facilities necessary for public service" are allowed in EFU lands. Because the

transmission line qualifies as a utility facility necessary for public service, it is allowed in EFU-zoned lands pursuant to the criteria of ORS 215.275.

As a result of the ground clearance and location of the transmission line ROW within the existing UEC transmission line ROW and utilization of existing transmission towers, the transmission line will not interfere with agricultural activities. Existing agricultural uses will not undergo any constraints that do not already exist due to the current transmission line in the corridor.

Step-up Substation/Underground Line

As noted, ORS 215.283 identifies the uses permitted in EFU zones. ORS 215.283(1)(c) provides that "utility facilities necessary for public service" are allowed in EFU lands. As detailed below in Section K.7.1.2, because the step-up substation qualifies as a utility facility necessary for public service, it is allowed in EFU-zoned lands pursuant to the criteria of ORS 215.275.

The step-up substation will occupy approximately 3 acres of farmland, within a transmission corridor already occupied by various transmission facilities. The adjacent underground line will be similarly located adjacent to the McNary Substation in an area heavily developed with power transmission infrastructure. As a result, the step-up substation and underground line will have a minor impact on agricultural activities. Active agricultural uses on surrounding lands will not undergo any constraints that do not already exist due to the existing transmission infrastructure in the area.

8. The county shall require appropriate procedures/ standards/policies be met in the Comprehensive Plan and Development Ordinance when reviewing non-farm uses for compatibility with agriculture.

Response:

Energy Facility Site

Under UCDC § 152.060, "commercial utility facilities for the purpose of generating power for public use by sale," such as the Station, may be allowed in EFU lands as a conditional use. As previously discussed, the Station will comply with all conditional use requirements.

Natural Gas Pipeline/Transmission Line/Step-up Substation/Underground Line

ORS 215.275 establishes the exclusive criteria for approving commercial utility facilities necessary for public service. In Brentmar v. Jackson County, 321 Or 481 (1995), the Oregon Supreme Court held that "a county may not enact or apply legislative criteria of its own that supplement those found in ORS 215.213(1) and 215.283(1)" (321 Or at 498). The Oregon Land Use Board of Appeals (LUBA) recently confirmed that under Brentmar, a county may only apply the criteria of ORS 215.275 to a "utility facility necessary for public service." WKN

Chopin, LLC v. Umatilla County, LUBA No. 2012-016 (July 11, 2012). Under Brentmar, Umatilla County may only apply the criteria to a use permitted under ORS 215.283(1) that would apply under ORS 215.275, and may not apply additional standards. A response to the criteria under ORS 215.275 for the natural gas pipeline and the transmission line is in the response to UCDC § 152.059 in section K.5.1.1 of this exhibit. A response for the step-up substation is provided in Section K.7.1.2.

17. Continue to encourage timber management to occur on lower elevation seasonal grazing as permitted in the Exclusive Farm Use Zone.

Response: This provision is inapplicable because there are no timber resources in the vicinity of the Station, the natural gas pipeline, or the transmission line.

Open Space, Scenic and Historic Areas, and Natural Areas Policies

1. (a) The County shall maintain this resource by limiting development mainly to existing built up areas,

Response:

Energy Facility Site

There are no inventoried Significant Natural Areas or Significant Scenic Areas on the Energy Facility Site. The location of the Energy Facility Site, adjacent to the HGP, a railroad ROW, and other industrial uses minimizes the impact of the Station on open space, scenic, and historic areas, and natural areas.

As described more fully in Exhibit S – Cultural Resources, field data collected during the archaeological survey for the Project indicated that no buildings over 45 years in age were located within the Analysis Area, defined for Exhibit S – Cultural Resources by the Project Order as the "area within the site boundary." The total area encompassed by the site boundary or Analysis Area, including the Energy Facility Site, the gas line, the transmission line, the step-up substation, and the underground line, is approximately 202.35 acres. The archaeological survey crew documented all historic-period engineering structures (canals, railroads, and transmission lines) in the Analysis Area over 45 years in age, then an architectural historian evaluated and recorded these structures on State Historic Protection Office historic resource clearance forms.

The archaeological survey identified two historic-period structures on the Project Site: the Westland Irrigation District A Canal and the Union Pacific Railroad (UPRR) Messner-Minkle railway line. As noted in Section K.2, vehicular access to the Station from Westland Road requires construction of a new bridge over the Westland A Canal located within the Site Boundary. The bridge supports will be set back from the canal so as to avoid impacts on the canal's structural integrity, capacity or historical values.

The UPRR Messner-Hinkle segment crosses the Site in two locations: at the electrical transmission interconnection line and at the process water and wastewater interconnection lines, as shown on Figure K-9. Construction of the Project will not directly impact the railroad because the Project can be built by boring under the railroad grade. No modifications will be made to the ballast, rails, or ties, nor will the Project detract from the railroad's character-defining features (alignment, construction materials, and design).

Natural Gas Pipeline

There are no inventoried Significant Natural Areas or Significant Scenic Areas along the route of the natural gas pipeline. Moreover, the underground location of the pipeline within the existing HGP ROW minimizes the impact of the pipeline on open space, scenic and historic areas, and natural areas. The natural gas pipeline will be bored under the two irrigation canals crossed by the pipeline, minimizing impact on the historic values associated with these canals.

Transmission Line

There are no inventoried Significant Natural Areas or Significant Scenic Areas along the route of the transmission line. Moreover, the location of the transmission line within the existing UEC transmission line ROW and use of existing transmission towers minimizes the impact of the transmission line on open space, scenic and historic areas, and natural areas.

As noted in Exhibit S – Cultural Resources, the existing transmission line crosses the West Extension Irrigation District canal; however, since the Project only proposes reconductoring the existing electrical transmission line, the canal will not be affected by the transmission line.

Portions of the BPA McNary-Boardman No. 1 Transmission Line and the BPA McNary-Coyote Springs No. 1 Transmission Line cross the proposed overhead electrical transmission line. The McNary-Boardman No. 1 Line and the McNary-Coyote Springs No. 1 Line were determined to be eligible for listing in the National Register of Historic Places (NRHP) during the cultural resource survey for the BPA's Port of Morrow Land Acquisition project (Emerson 2012). However, the Project will not impact these BPA resources.

Step-up Substation/Underground Line

As discussed in Exhibit S – Cultural Resources, existing transmission tower number 1/1 on the BPA McNary-Boardman No. 1 Line is located within the step-up substation site; however, the construction of the step-up substation will have no impact on the historic values of these BPA resources. There are no inventoried Significant Natural Areas or Significant Scenic Areas along the route of the underground line. Moreover, the location of the step-up substation and underground line within the existing UEC transmission line ROW and in an area already

occupied by other transmission facilities minimizes the impact of the transmission line on open space, scenic and historic areas, and natural areas.

5. *(a) The County shall maintain rural agricultural lands, Development shall be of low density to assure retention of upland game habitat,*

   (b) Land uses should maintain the vegetation along stream banks, fence rows, woodlots, etc. Research ways to reduce harassment and loss of upland game by free roaming dogs and cats.

Response:

Energy Facility Site

The County Development Code allows the Energy Facility Site to be located within EFU-zoned lands subject to certain conditions that protect rural agricultural lands. There is limited vegetation existing upon the Energy Facility Site, which will be cleared during the construction process. The row of trees along the Westland irrigation canal will be preserved to the extent feasible, consistent with construction and operational requirements. The Energy Facility Site will be fenced and free roaming dogs and cats will be excluded, thereby limiting potential impacts on upland game.

Natural Gas Pipeline/Transmission Line

As utility facilities necessary for public service, the natural gas pipeline and transmission line are permitted within EFU-zoned lands. The natural gas pipeline will be below ground and therefore will have no permanent impact on upland game habitat. The transmission line minimizes impact to vegetation by utilizing existing ROWs and existing transmission towers. Any areas impacted during construction activities will be reseeded and returned to native vegetation or agricultural production upon completion of construction. Wetland impacts are discussed in Exhibit J – Jurisdictional Wetlands.

Step-up Substation/Underground Line

As utility facilities necessary for public service, the step-up substation and underground line are permitted within exclusive agricultural zoned lands. The step-up substation will occupy about 3 acres of lands in an area used for agricultural uses and already occupied by other transmission facilities. There are no fence rows, woodlots, or riparian vegetation in the vicinity of the step-up substation or underground line. Given agricultural use and infrastructure development in the area, the step-up substation site does not serve as upland game habitat. Moreover, no hunting is permitted on the BPA and BLM properties on which the substation and underground line will be located.

6. (a) Developments or land uses that require drainage, channelization, filling or excessive removal of riparian vegetation in sensitive waterfowl areas should be identified.

Response: As described in the response to UCDC § 152.016 in Section K.5.1.1 above, the development of the Energy Facility Site and the natural gas pipeline are not expected to have any impact on riparian areas. No drainage, channelization, filling or removal of riparian vegetation will occur along the transmission line ROW or at the step-up substation/underground line site.

8. (a) Setbacks shall be established to protect significant and other wetlands.

Response: As described in section K.5.1.1 above, the Station meets the stream and wetland setback requirements of UCDC § 152.063(E)(2). There are no wetlands in the natural gas pipeline ROW or at the step-up substation site, and utilization of existing transmission towers will avoid any impact of the transmission line on wetlands in the transmission corridor.

9. (a) The County shall encourage land use practices which protect and enhance significant wetlands.

Response: As described in section K.5.1.1 above, the Station meets the stream and wetland setback requirements of UCDC § 152.063(E)(2). No wetlands will be impacted by the construction or operation of the Station. There are no wetlands in the natural gas pipeline ROW or at the step-up substation site, and utilization of existing transmission towers will avoid any impact of the transmission line on wetlands in the ROW.

10. (c) Compatible land use shall maintain the riparian vegetation along streams in the floodplain. Stream bank vegetation shall be maintained along streams outside of the floodplain by utilizing appropriate setbacks.

Response: As described in section K.5.1.1, above, the Station meets the stream and wetland setback requirements of UCDC § 152.063(E)(2). No wetlands will be impacted by the construction or operation of the Station. There are no wetlands in the natural gas pipeline ROW or at the step-up substation site, and utilization of existing transmission towers will avoid any impact of the transmission line on wetlands in the transmission line ROW.

(d) Development or land use that requires channelization, excessive removal of streamside vegetation, alteration of stream banks and filling into stream channels shall be restricted in order to maintain streams integrity.

Response: As described above, the development of the Station, the natural gas pipeline, and the step-up substation are not expected to have any impact on riparian areas, including streams. No drainage, channelization, filling, or removal of riparian vegetation will occur along the transmission line ROW.

(e) New roads, bridges and access rights-of-way shall be designed to avoid channel capacity, and minimize removal of shoreline vegetation.

Response:

Energy Facility Site

The planned bridge to be constructed across the existing Westland Irrigation District canal will be designed to prevent any impact on the capacity of the canal and to minimize removal of vegetation along the canal. The bridge supports will be set back from the canal so as to avoid impacts on the canal's structural integrity or capacity. The internal roads on the site will have no impact on any riparian areas, stream capacity or shoreline vegetation because there are no natural streams, or riparian or shoreline vegetation on the Energy Facility Site.

Natural Gas Pipeline

No new roads, bridges or access ROWs are planned as part of the natural gas pipeline. The gas line is located across Cottonwood Road and over 50 feet from the Umatilla River shoreline. The pipeline will be designed and constructed so as to have no impacts to the channel capacity of the Umatilla River or shoreline vegetation.

Transmission Line

No shoreline vegetation is expected to be removed. To the extent that such removal may be necessary, use of the existing UEC transmission ROW and transmission towers will minimize removal of shoreline vegetation. No new roads, bridges or access ROWS are expected as part of the transmission line.

Step-up Substation/Underground Line

There are no waterways or riparian vegetation in the vicinity of the step-up substation or underground line, so the construction of the substation will have no impacts on channel capacity or riparian vegetation.

20. (a) Developments of potentially high visual impacts shall address and mitigate adverse visual effects in their permit application, as outlined in the Development Ordinance standards.

Response: The analysis conducted for this exhibit found that the Project will have no significant adverse impact on documented important scenic and aesthetic values within the 10-mile Scenic Resources Analysis Area.

Energy Facility Site

A visual impact study was prepared to assess potential impacts on visual resources, and no significant adverse visual impacts from the Station were identified. The Station will be located within an area of existing industrial and large-scale commercial agricultural uses and adjacent to an existing gas-fired power plant of similar size and character; its visual impact will be moderately low. See Exhibit R – Scenic Resources for further discussion of visual impacts.

Although no significant adverse impacts have been identified, visual impacts will be reduced by implementation of the following measures, as discussed in Exhibit R – Scenic Resources:

- Use of dull finishes or subdued, grey-toned colors for all structures at the Station to reduce visual contrast and glare;
- Use of on-demand lighting and shield and direct lighting downward and inward wherever possible at the Station, while adequately addressing security and safety requirements to minimize lighting and illumination visible from surrounding areas;
- Use of a dark-colored coating on perimeter fences, or otherwise use of a style and color of fencing or walls that is low glare and blends with the surrounding landscape for the Station.

Transmission Line

A visual impact study was prepared to assess potential impacts on visual resources, and no significant adverse visual impacts from the transmission line were identified. Because new transmission facilities for the Project will consist primarily of upgrading conductors on existing structures that will remain in place, the visual impact of new transmission facilities will be negligible to low. New poles or structures will only be needed at the initial connection, connecting structure, step-up transformer, risers, and underground line, all located areas with existing transmission facilities adjacent to the HGP or the McNary Substation. This will minimize the transmission line's potential impacts on scenic resources and open spaces. See Exhibit R – Scenic Resources for further discussion of visual impacts.

Although no significant adverse impacts have been identified, visual impacts will be reduced by the use of non-specular conductors for the new transmission line, as discussed in Exhibit R – Scenic Resources.

Natural Gas Pipeline

A visual impact study was prepared to assess potential impacts on visual resources, and no significant adverse visual impacts from the natural gas pipeline were identified. The pipeline

will be located underground in the existing natural gas pipeline ROW used by the HGP. See Exhibit R – Scenic Resources for further discussion of visual impacts.

Step-up Substation/Underground Line

A visual impact study was prepared to assess potential impacts on visual resources, and no significant adverse visual impacts from the step-up substation or underground n line were identified. The step-up substation will be located adjacent to the existing McNary Substation in an area with pre-existing power transmission infrastructure. This will minimize the step-up substation's and underground line's potential impacts on scenic resources and open spaces. See Exhibit R – Scenic Resources for further discussion of visual impacts.

Although no significant adverse impacts have been identified, visual impacts will be reduced by implementation of the following measures, as discussed in Exhibit R – Scenic Resources:

- Use of dull finishes or subdued, grey-toned colors for all structures at the new step-up substation to reduce visual contrast and glare;
- Use of on-demand lighting and shield and direct lighting downward and inward wherever possible at the new step-up substation, while adequately addressing security and safety requirements to minimize lighting and illumination visible from surrounding areas;
- Use of a dark-colored coating on perimeter fences, or otherwise use of a style and color of fencing or walls that is low glare and blends with the surrounding landscape for the new step-up substation.

(b) It is the position of the County that the Comprehensive Plan designations and zoning already limit scenic and aesthetic conflicts by limiting land uses or by mitigating conflicts through ordinance criteria. However, to address any specific, potential conflicts, the County shall insure special consideration of the following when reviewing a proposed change of land use:

1. Maintaining natural vegetation whenever possible.

<u>Response</u>:

Energy Facility Site

There is limited natural vegetation existing at the Energy Facility Site. The primary vegetative feature is the existing row of trees along the Westland Irrigation District canal. This row of trees will be preserved to the extent feasible, consistent with construction and operational requirements. Areas disturbed during construction would be seeded and returned to their natural state or agricultural use after construction is complete.

Natural Gas Pipeline

Impacts to natural vegetation from the natural gas pipeline will be minimized because the natural gas pipeline ROW is located within an existing ROW through developed agricultural lands. Areas disturbed during construction will be seeded and returned to their natural state or agricultural use after construction is complete.

Transmission Line

Impacts to natural vegetation from the transmission line will be minimized because the transmission line ROW is located mostly within an existing ROW and will utilize existing transmission towers for almost the entire route. A total of approximately 1.38 acres over 12 restringing sites are expected to be temporarily disturbed during reconductoring. Areas disturbed during construction will be seeded and returned to their natural state or agricultural use after construction is complete.

Step-up Substation/Underground Line

Impacts to natural vegetation from the step-up substation and underground line will be minimized because it will be located within an existing power corridor on lands currently used for agricultural uses. Areas disturbed during construction will be seeded and returned to their natural state or agricultural use after construction is complete.

2. Landscaping areas where vegetation is removed and erosion might result.

Response:

Energy Facility Site

There is limited natural vegetation at the Energy Facility Site. The primary vegetative feature is the existing row of trees along the Westland Irrigation District canal. This row of trees will be preserved to the extent feasible, consistent with construction and operational requirements. Areas disturbed during construction will be seeded and returned to their natural state or agricultural use after construction is complete.

Natural Gas Pipeline

Impacts to natural vegetation from the natural gas pipeline will be minimized because the pipeline ROW is located within an existing ROW through developed agricultural lands. No natural vegetation will be disturbed by the natural gas pipeline. Areas disturbed during construction will be seeded and returned to their natural state or agricultural use after construction is complete.

Transmission Line

Impacts to natural vegetation from the transmission line will be minimized because the transmission line ROW is located mostly within an existing ROW and will utilize existing transmission towers. Areas disturbed during construction and not converted to permanent uses as part of the Station will be seeded and returned to their natural state or agricultural use after construction is complete.

Step-up Substation/Underground Line

Impacts to natural vegetation from the step-up substation and underground line will be minimized because it will be located within an existing power corridor on lands used for agricultural uses. Areas disturbed during construction will be seeded and returned to their natural state or agricultural use after construction is complete.

3. Screening unsightly land uses, preferably with natural vegetation or landscaping.

Response: See above discussion of mitigation efforts used to minimize visual impacts of the Project. See Exhibit R – Scenic Resources for detailed analysis of visual impacts upon scenic resources.

4. Limiting rights-of-way widths and numbers of roads interesting scenic roadways to the minimum needed to safely and adequately serve the uses to which they connect.

Response: This provision is inapplicable because no roads or driveways will be constructed that intersect with scenic roadways.

5. Limiting signs in size and design so as not to distract from the attractiveness of the area.

Response:

Energy Facility Site

As the Station will not generally be open to the public, signage will be limited to way-finding for deliveries and general site circulation.

Natural Gas Pipeline/Transmission Line/Step-up Substation/Underground Line

Signage will be limited to required public safety warnings.

6. Siting Developments to be compatible with surrounding area developments and recognizing the natural chrematistics or the location.

Response:

Energy Facility Site

The Station will be compatible with the surrounding utility, industrial, and railway land uses. The location, adjacent to Westland Road and near I-82 and I-84, is appropriate for this type of utility facility.

Natural Gas Pipeline

The natural gas pipeline will be buried, and located within an existing ROW. All new above-ground facilities will be adjacent to similar existing facilities.

Transmission Line

The transmission line ROW will be located within the existing UEC ROW for the majority of its length. Further, no new visual impacts will result because the new line will generally utilize the existing transmission towers in the ROW. The new towers required at the north and south ends of the line will be of similar height and structural style as existing towers in these areas.

Step-up Substation/Underground Line

The step-up substation and underground line will be located within an existing power corridor on lands used for agricultural uses. The surrounding area is heavily occupied by other power transmission infrastructure, so the step-up substation will be compatible with the surrounding developments and not impair the natural chrematistics of the area.

> *7. Limiting excavation and filling only to those areas where alteration of the natural terrain is necessary and re-vegetating such areas as soon as possible.*

Response:

Energy Facility Site

The Energy Facility Site is generally flat, and the site will be further leveled only to the extent necessary for site development.

Natural Gas Pipeline

Excavation will be required to bury the natural gas pipeline along the length of the ROW, except where it will be bored under road and canal crossings. The disturbed areas will be returned to prior grade, and cultivated areas will be returned to agricultural production.

Transmission Line

Significant excavation and filling are not expected to be necessary because the transmission line ROW is located mostly within an existing transmission corridor, and the Project will utilize existing transmission towers. To extent that such activities occur, impacted areas will be quickly revegetated.

Step-up Substation/Underground Line

The step-up substation site is generally flat, and the site will be further leveled only to the extent necessary for site development.

> *8. Protection vistas and other views which are important to be recognized because of their limited number and importance to the visual attractiveness of the area.*

Response: See Exhibit R – Scenic Resources for detailed analysis of visual impacts upon scenic resources.

22. The County shall cooperate with state agencies and other historical organizations to preserve historic buildings and sites, cultural areas, and archeological sites and artifacts.

Response: See Exhibit S – Cultural Resources for detailed information about historic, cultural, and archaeological resources. In summary, no archaeological sites have been identified, and Perennial will take reasonable measures to avoid physical damage to the alignment, construction materials, and design of the five NRHP-eligible historic-period resources: Westland Irrigation District Canals, West Extension Irrigation Canal, Union Pacific Railroad Messner-Hinkle Segment, BPA McNary-Boardman No.1 Line, and BPA McNary-Coyote Springs No.1 Line. Impacts to the historic transmission lines will be prevented by avoiding the existing BPA facilities by passing underneath or around them. Impacts to the railroad alignment will be minimized through the use of boring to cross the resource. The Project will require four crossings of irrigation canals (two gas line borings, one reconstructed bridge, and one transmission line crossing), which will be constructed so as to minimize impacts on these resources.

23. (a) Umatilla County shall encourage and cooperate in developing a detailed county-wide historic site inventory.

Response: See Exhibit S – Cultural Resources for detailed information about historic, cultural, and archaeological resources.

24. (a) Umatilla County shall protect significant historical and cultural sites from land use activities which diminish their value as historical resources.

Response: See Exhibit S – Cultural Resources for detailed information about historic, cultural, and archaeological resources.

26. The County shall cooperate with the Tribe, Oregon State Historic picking, Preservation Office, and others involved in concern identifying and protecting Indian cultural areas and archeological sites.

Response: See Exhibit S – Cultural Resources for detailed information about historic, cultural, and archaeological resources.

37. The County shall ensure compatible interim uses provided through Development Ordinance standards, and where applicable consider agriculturally designated land as open space for appropriate and eventual resource or energy facilities use.

Response: Given the location of the Station adjacent to the existing HGP, a railway line, and other industrial uses, the development of the Station on EFU lands is allowed as a conditional use and fully compliant with the standards of the UCDC.

38. (a) The County shall encourage mapping of future agencies sites, ensure their protection from conflicting adjacent land uses, and required reclamation plans.

(b) Aggregate and mineral exploration, extraction, and reclamation shall be conducted in conformance with the regulations of the Department of Geology and Mineral Industries.

(c) The County Development Ordinance shall include conditional use standards and other provisions to limit or mitigate conflicting uses between aggregate sites and surrounding land uses.

39. (a) The County shall strictly enforce state and county development standards pertaining to gravel extraction/processing uses through appropriate agencies; whether new operations or expansions of existing sites.

Response: No inventoried aggregate sites will be affected by the Project. There are no inventoried aggregate sites at the Energy Facility Site or along the natural gas pipeline route. There are several inventoried aggregate resource sites along the transmission line ROW in T. 5 N, R. 28, S 16; however, the transmission line will not affect current or future extraction of aggregate resources because it will utilize existing transmission towers in the vicinity of the identified aggregate resources.

42. (a) Encourage development of alternative sources of energy.

Response: The design and location of the Station will help to balance the fluctuating load from regional wind power, which should help to stabilize the electric power grid in the area and encourage further renewables development.

Air, Land, Water Qualities Policies

1. *Discharges from existing and future developments shall not exceed applicable environmental standards.*

Response: Wastewater sources from the operation of the Station include stormwater, cooling tower blowdown, sanitary wastewater, turbine water injection, neutralized demineralized water treatment wastes, and combustion turbine wash water wastes.

Stormwater runoff occurring during Station construction and associated activities will be managed as required by a NPDES 1200-C permit issued by the DEQ. Stormwater runoff during operation of the Station will be collected in a detention basin and allowed to percolate into the ground. Any stormwater that could be contaminated with oil would first pass through an oil/water separator to remove the oil before being routed to the basin.

Neutralized demineralized wastewater from the onsite water treatment system will be used as turbine water injection for nitrogen oxide emission control. It is anticipated that cooling tower blowdown will be routed to the HGP for reuse as process water in that facility and subsequent reuse at the adjacent Lamb Weston agricultural processing plant. In the event that Perennial is unable to negotiate appropriate agreements with HGP and Lamb Weston authorizing those facilities to accept blowdown water from the Wind Chaser Station, Perennial will utilize a ZLD system for onsite management of its wastewater, as detailed in Exhibit V – Solid Waste and Wastewater.

Sanitary waste from the Station's 6 to 8 employees will be disposed of through a new sanitary leach field system to be constructed on the Energy Facility Site. Combustion turbine water wash will be collected in a holding tank, tested to determine the concentrations of the constituents present, and trucked offsite for disposal at an approved facility.

The transmission line, natural gas pipeline, and step-up substation will not discharge pollutants to surface water or groundwater during operation.

See Exhibit V – Solid Waste and Wastewater for detailed information regarding Project discharges.

7. *Consider cumulative noise impacts and compatibility of future developments, including the adoption of appropriate mitigating requirements of plan updates.*

Response: See Exhibit X – Noise for detailed information regarding noise impacts. Due to the Station's distance from the residential receptors, and the noise control measures to be installed, there would not be an increase in noise level greater than 10 A-weighted decibels (dBA) above the lowest-measured background L_{50}[4] for each receptor, as required by the Oregon Department of Environmental Quality (DEQ) Regulations contained in Oregon Administrative Rule (OAR) 340-035-0035.

8. Recognize that protection of existing wells has priority over development proposals requiring additional subsurface sewage disposal.

Response: The construction of the new sanitary septic leach field at the Energy Facility Site, for the disposal of waste generated by the Station's 6 to 8 employees, will not impact any existing wells. Compliance with all DEQ constructions, operations and setback requirements will ensure the protection of existing wells. While the exact location of the septic system on the Energy Facility Site has not yet been determined, the closest well to the Energy Facility Site, Lamb Weston's backup supply well authorized under water rights Certificate No. 62004, is over 350 feet from the boundary of the Energy Facility Site.

Natural Hazards Policies

1. The County will endeavor, through appropriate regulations and cooperation with applicable governmental agencies, to protect life and property from natural hazards and disasters found to exist in Umatilla County.

4. Active earthquake fault lines have not been conclusively identified in the County.

Response: See Exhibit H – Geology for information regarding the geological and soil stability within the Analysis Area.

Recreational Needs Policies

1. Encourage and work with local, state, federal agencies and private enterprise to provide recreational areas and opportunities to citizens and visitors to the County.

Response: See Exhibit T – Recreation for detailed information regarding impacts to recreational opportunities and resources.

Economy of the County Policies

1. Encourage diversification within existing and potential resource-based industries.

[4] L_{50} refers to the sound level is exceeded 50 percent of the time.

Response: The Project will have an economic development impact on Umatilla County, generating temporary construction jobs and permanent utility operations and maintenance jobs. The Project will have no measurable impact on the existing agricultural economy or other potential resource-based industries. The Energy Facility Site is less than 20 acres in size, less than 0.002% of Umatilla County cropland. The step-up substation site is about 3 acres in size. The transmission line will be located within an existing ROW for the vast majority of its length and will utilize existing transmission towers, thereby minimizing impacts on adjacent land uses and existing or potential resource-based industries. The natural gas pipeline will follow existing ROW for its entire length, similarly reducing the need for additional ROW and concomitant impacts on resource-based industries. No impacts on aggregate mining, timber harvesting or other resource-based industries will be caused by the Project.

4. Participate in selected economic development programs and projects applicable to the County desired growth.

Response: The development of the Project will help to stabilize the electrical grid and promote further development of wind energy in Umatilla County, while having a minimal impact on the existing agricultural economy of the region. The Project will not hinder the achievement of any County economic development programs or projects applicable to the County desired growth.

8. Evaluate economic development proposals upon the following:

Will the proposal:

a. increase or decrease available [water] supplies?

Response: Water service to the Energy Facility Site will be provided by the Port of Umatilla, who currently has a large, underutilized water right authorizing the use of 155 cubic feet per second (cfs) of Columbia River water. Permit No. 49497. Currently, the Port of Umatilla utilizes less than 20 cfs of its 155 cfs municipal water right. The Station will utilize approximately 1,300 gallons per minute (gpm), or 2.9 cfs, representing about 2% of the unused remainder. Thus, sufficient quantities of water are available to meet the needs of the Project as well as other existing and reasonably anticipated needs, and the Station's water use will have no impact on the availability of water supplies.

b. improve or degrade qualities?

Response: The Project will have no impact on water quality. As discussed in Exhibit V – Solid Waste and Wastewater, the Energy Facility Site will utilize a new onsite septic system and leach field to treat and dispose of sanitary wastewater. Cooling tower blowdown water will be reclaimed and routed to the HGP for reuse as process water for that facility or treated onsite through a Zero Liquid Discharge (ZLD) system. There will be no direct discharge of water to surface or groundwater, so there will be no impact on water quality.

c. balance withdrawal with recharge rates?

Response: This provision is inapplicable because the Project will not withdraw groundwater for its water supply.

d. be a beneficial use?

Response: Beneficial use is defined by Oregon Water Resource regulations as the "Reasonably efficient use of water without waste for a purpose consistent with the laws and the best interests of the people of the state." OAR 690-250-0010(3). The Port of Umatilla's Permit No. 49497 is for "municipal water use," defined by regulation as "the delivery and use of water through the water service system of a municipal corporation for all water uses usual and ordinary to such systems," specifically including "industrial water use." OAR 690-300-0010(29). "Industrial water use" includes water used for "non-hydroelectric power production." OAR 690-300-0010(25). Water use at the Energy Facility Site will be reasonably efficient, utilizing approximately 1,300 gallons per day, and serves the best interests of the state by enabling the development of necessary load-balancing electrical production. Thus, the use of the Port's municipal water right for power production purposes is a "beneficial use" fully consistent with state law.

e. have sufficient quantities available to meet needs of the proposed project and other existing and [reasonably] anticipated needs?

Response: Currently, the Port of Umatilla utilizes less than 20 cfs of its 155 cfs municipal water right. The Station will utilize approximately 1,300 gpm, or 2.9 cfs, representing about 2% of the unused remainder. Thus, sufficient quantities of water are available to meet the needs of the Project as well as other existing and reasonably anticipated needs.

f. reduce other use opportunities and if so will the loss be compensated by other equal opportunities?

Response: No other water use opportunities will be reduced or precluded by the Energy Facility Site's use of Port of Umatilla water because the Port's water right is currently significantly under-utilized.

Public Facilities and Services Policies

1. *The county will control land development in a timely, orderly, and efficient manner by requiring that public facilities and services be consistent with established levels of rural needs consistent with the level of service requirements listed on pages J-27 and J-28 of the Technical Report. Those needs are identified as follows:*

   a. *Fire protection shall be provided consistent with Policies 8, 9, 10.*

b. Police protection shall be provided consistent with Policy 7.

c. Surface. Water Drainage-Roadside drainage shall be maintained and plans for drainage shall be required in multiple use areas.

d. Roads shall be maintained or improved to standards adopted by the County Road Department which are consistent with nationally accepted standards that correlate traffic to desired road conditions.

Response: See Exhibit U – Public Services for detailed analysis of the Project's impacts on public facilities and services. In summary, there are no expected measurable impacts associated with the gas line, the transmission line, or the step-up substation, while the impacts associated with the Energy Facility Site are minor. While there may be a short-term impact on police and fire services during construction, no permanent adverse impact to service providers is expected. The Station will employ only six to eight people, so new offsite demand for police and fire services will be minimal.

Perennial will construct the Station to prevent stormwater from leaving the Site. This will be achieved by grading the Site and installing stormwater detention soil berms around the Station and a stormwater detention basin. No impact to drainage along the gas line ROW, transmission line ROW, or step-up substation is expected.

The Traffic Impact Analysis included as Exhibit U – Public Services, Appendix U-1 indicates that traffic level of service and vehicle-to-capacity ratio will remain at or above all relevant agency standards on all studied intersection through the construction and operations phases.

2. Require that domestic water and sewage disposal systems for rural areas be provided and maintained at levels appropriate for rural use only. Rural services are not to be developed to support urban uses.

9. Require adequate water supplies for fire fighting as part of significant new developments in rural areas in coordination with the appropriate rural fire district.

19. Where feasible, all utility lines and facilities shall be located on or adjacent to existing public or private rights-of-way so as to avoid dividing existing farm or forest units; and transmission lines should be located within existing corridors as much as possible.

Response: Water service to the Energy Facility Site will be provided by the Port of Umatilla, and will only require extending water lines across the UPRR alignment from the adjacent HGP. Perennial will not use the water line extension to support additional residential or commercial development.

Adequate water for firefighting will be provided by the Port of Umatilla system, and the Energy Facility Site will have an onsite fire protection system, as well as fire hydrants.

The entire length of the natural gas pipeline and the majority of the transmission line will be located within existing ROWs. The only new transmission towers will be at the south end of the ROW connecting the transmission line to the Station and will not divide existing farm or forest units. A new step-up substation and an underground transmission line will be needed adjacent to the McNary Substation. New wastewater and water lines will connect the Energy Facility Site to adjacent utility and industrial uses and will not divide existing farm or forest units.

Transportation Policies

18. The County will review right-of-way acquisitions and proposals for transmission lines and pipelines so as to minimize adverse impacts on the community.

Response: The vast entire length of the natural gas pipeline and the majority of the transmission line will be located within existing ROWs, minimizing adverse impacts on the community. The pipeline will be located entirely within the existing HGP ROW. New transmission line ROW may be needed to cross the UPRR line from the Energy Facility Site and across Westland Road to the adjacent LI-zoned lands. The limited nature of the new ROWs and their location adjacent to existing uses of a similar nature minimizes the impact of any new ROW.

20. Request larger industrial and commercial development proposals, consider sponsoring car pooling programs.

Response: The Station will require approximately 6 to 8 full time employees during operations. A carpooling program is not needed because the Station will not cause significant impacts to traffic congestion.

Energy Conservation Policies

1. Encourage rehabilitation/weatherization of older structures and the utilization of locally feasibly renewable energy resources through use of tax and permit incentives

Response: The design and location of the Station will provide excellent load shaping of the irregular wind-generated electricity produced in the region, which should help to stabilize the electric power grid in the area and encourage further renewables development.

K.5.4 1972 Umatilla County Zoning Ordinance

As depicted in Figure K-10, the transmission line crosses several areas that are within the City of Umatilla UGA. The step-up substation and underground line are entirely within the UGA. The UGA is the area inside the City's UGB but outside the city limits. Property within the UGA has

a "UGB Plan Designation" on the City of Umatilla Plan Map, but that designation only reflects the intended land use designation for the property when it is annexed to the City, and does not regulate the current use of the lands. Section 2.2.150 of the City's Comprehensive Plan states that the City and County will enter into a cooperative agreement with respect to the City's UGB, and there is a Joint Management Agreement pursuant to which the City and County cooperate in managing the UGA. The Joint Management Agreement indicates that it is the 1972 Umatilla County Zoning Ordinance that is in effect for the UGA.

Thus, land use within the UGA is governed by the provisions of the 1972 Umatilla County Zoning Ordinance, not the current Development Code. The transmission line crosses several zones within the UGA: F-1, F-2, M-2, and R-1, as depicted in the map in Figure K-10. The step-up substation and underground line are entirely within the F-1 zone. This section discusses compliance with the land use provisions of the 1972 Zoning Ordinance in these areas within the UGA.

K.5.4.1 Exclusive Farm Zone (F-1)

Section 3.010 DESCRIPTION AND PURPOSE

The F-1 Exclusive Farm Zone is designed to maintain the agricultural economy of the county by reserving farmland for exclusive agricultural use. It is directly related to certain tax provisions in Oregon Statutes and has been taken from ORS 215.203 and 215.213. Please see Addenda for further explanation.

Response: The transmission line will utilize an existing transmission ROW through the F-1 zoned lands, as depicted in Figure K-10. This ROW is located in an existing transmission easement that runs to the McNary Substation, and the transmission line will utilize existing transmission towers along the length of the line. A new connecting structure and step-up substation will be constructed in an area with an already-high density of existing power lines and transmission towers. The new step-up substation will be constructed on approximately 3 acres. An underground line will connect the step-up substation with the McNary Substation. The step-up substation and underground line will be located entirely within the F-1 zone of the UGA. A new ROW will be obtained from BPA for the step-up substation location and the portion of the underground line on BPA property. The McNary Substation and the immediately surrounding lands located north of the railroad line are owned by the U.S. Bureau of Land Management, but managed by the Army Corps of Engineers. Perennial is coordinating with these entities to obtain a ROW for the portion of the underground line north of the railroad tracks and the underground termination structure needed to connect the step-up substation with the McNary Substation. See Exhibit F – Property Owners, including Table F-1 for property ownership information.

Section 3.012 USES PERMITTED OUTRIGHT

In an F-1 Zone, the following uses and their accessory uses are permitted upon the issuance of a zoning permit:

> *(5) Utility facilities necessary for public service except commercial facilities for the purpose of generating power for public use by sale.*

Response: As discussed previously in the response to UCDC § 152.059 in Section K.5.1.1, the existing transmission line is a utility facility necessary for public service and therefore is permitted outright upon the issuance of a zoning permit. However, no new transmission towers will be constructed in the F-1 zone, and Umatilla County's *Response to Amended Notice of Intent* dated September 23, 2013 indicates that "[n]o land use permit is required to co-locate and upgrade the transmission line." Perennial will apply for zoning permits for the reconductored portion of the transmission line only if requested.

As discussed below in Sections K.7.1.1 and K.7.1.2, the connecting structure, step-up substation, risers, and underground line are utility facilities necessary for public service, and therefore are permitted outright upon the issuance of a zoning permit.

Section 3.014 DIMENSIONAL STANDARDS

In an F-1 Zone, the following dimensional standards shall apply:

> *(1) Minimum Lot Area: 19 acres for a principal dwelling unit.*

Response: The 19-acre minimum lot size is inapplicable because there are no dwelling units associated with the transmission line or the step-up substation.

> *(2) Setback: No building shall be located closer than 20 ft. from a property line abutting a street or road.*

The Project will comply with all setback requirements in the F-1 zone. No new transmission towers will be constructed in the F-1 zone, and any buildings associated with the step-up substation will be set back more than 20 feet from any property line abutting a street or road.

> *(3) Minimum Lot Area for Nonfarm Uses: As determined by the Department of Environmental Quality to be necessary for the protection of public health.*

Response: BPA owns the property on which the step-up substation and a portion of the underground line will be sited, and BLM owns the property on which the remainder of the underground line and the underground termination structure are to be located; therefore, the local zoning restrictions are inapplicable to the step-up substation and underground line. Further, no

new lots will be created, so this provision does not apply. Nonetheless, the siting of the substation on a 23.99-acre lot is sufficient to provide all buffering needed to protect public health from the noise, electromagnetic field, and other potential impacts from the step-up substation. The area surrounding the step-up substation site is currently unoccupied and has numerous other transmission towers and lines associated with the McNary Substation. There are no current dwellings within 1,500 feet of the step-up substation site.

Section 3.016 SIGNS

In an F-1 Zone, the following signs are permitted upon the issuance of a zoning permit: type 2, 3, 4, 5, and 6.

Response: New signs will be limited to those meeting public safety notice requirements.

K.5.4.2 General Rural Zone (F-2)

Section 3.020 DESCRIPTION AND PURPOSE

The F-2 General Rural Zone is intended to apply to farmlands that would not be appropriate for an F-1 Exclusive Farm Use classification. It is designed to maintain the openness and rural nature of the country-side, and to provide areas which are appropriate for most kinds of typical rural development. It also allows the Planning Commission to attach special conditions to certain uses that have a potentially detrimental effect on neighboring lands.

Response: The transmission line traverses F-2-zoned land located to the east of I-82 in an existing transmission line ROW. The transmission line will utilize existing transmission towers within the F-2 zoned lands, thereby minimizing any potential impacts on the openness and rural nature of the area.

Section 3.024 CONDITIONAL USES

In an F-2 Zone, the following uses and their accessory uses are permitted subject to the requirements of Section 7.010 through 7.040 inclusive and upon issuance of a zoning permit:

(14) Utility facility;

> ***Section 1.090 DEFINITIONS***
>
> *(63) Utility Facility: Any major structure owned or operated by a public, private or cooperative electric, fuel, communication, sewage or water company for the generation, trans-mission, distribution or processing of its productions or for the disposal of cooling water, waste or by-products, and including power transmission lines, major trunk pipelines, power substations, dams, water towers, sewage lagoons, sanitary landfills and*

similar facilities, but excluding sewer, water, gas, telephone and power local distribution lines and similar minor facilities allowed in any zone.

Response: Power transmission lines and substations are specifically defined as "utility facilities" and are allowed as a conditional use on F-2 zoned lands. Umatilla County's *Response to Amended Notice of Intent* dated September 23, 2013, however, indicated that "[n]o land use permit is required to co-locate and upgrade the transmission line." Perennial will only apply for a conditional use permit for the reconductored transmission line if requested. As described below, the reconductored transmission line meets all conditional use requirements.

Section 3.026 DIMENSIONAL STANDARDS

In an F-2 Zone, the following dimensional standards shall apply:

(1) Minimum Lot Area: 19 acres for a principal dwelling unit.

(2) Minimum Lot Area for All Other Uses: As determined by the Department of Environmental Quality to be necessary for the protection of public health;

(3) Setback: No building shall be located closer than 20 feet from a property line abutting a street or road;

(4) Conditional Uses: Additional dimensional standards may be required by the Planning Commission in approving a conditional use, as provided in Article 7.

Response: The lot area requirements are inapplicable because no new lots or dwellings will be created on F-2 zoned lands. The setbacks are also inapplicable because no new buildings or transmission towers will be constructed in the F-2 zone.

K.5.4.3 Heavy Industrial Zone (M-2)

Section 3.140 DESCRIPTION AND PURPOSE

The M-2 Heavy Industrial Zone is designed to provide for industrial development where potential nuisances will have a minimum negative effect on adjacent property. It is appropriate for areas near major transportation facilities which are suitable for all types of industrial development.

Response: The transmission line crosses M-2 zoned lands, located entirely within the existing transmission corridor and UEC easement. The reconductored transmission line will not interfere with any existing industrial uses or pose a nuisance to adjacent uses.

Section 3.144 CONDITIONAL USES

In an M-2 Zone the following uses and their accessory uses are permitted, subject to the requirements of Sections 7.010 through 7.040 inclusive and upon the issuance of a zoning permit:

> *(13) Utility facility;*

Response: As discussed previously, power transmission lines are specifically defined as "utility facilities" and are allowed as a conditional use on M-2 zoned lands; however, Umatilla County's *Response to Amended Notice of Intent* dated September 23, 2013 indicated that "[n]o land use permit is required to co-locate and upgrade the transmission line." Perennial will only apply for a conditional use permit for the reconductored line if requested. As described below, the reconductored transmission line meets all conditional use requirements.

Section 3.146 DIMENSIONAL STANDARDS

In an M-2 Zone the following dimensional standards shall apply:

> *(1) Minimum Lot Area: As determined by the Department of Environmental Quality to be necessary for the protection of public health;*
>
> *(2) Setback: No building shall be located closer than 30 feet from a lot line except by a ruling of the Planning Commission upon the request of a property owner;*
>
> *(3) Conditional Uses: Additional dimensional standards may be required by the Planning Department in approving a conditional use as provided by Article 7.*

Response: The lot area requirements are inapplicable because no new lots or dwellings will be created in M-2 zoned lands. The setbacks are also inapplicable because no new buildings or transmission towers will be constructed in the M-2 zone. because the transmission line will utilize existing transmission towers within the M-2 zone.

K.5.4.4 Agricultural Residential Zone (R-1)

Section 3.070 DESCRIPTION AND PURPOSE

The R-1 Agricultural-Residential Zone is designed to provide for very low density residential development along with a continuation of farm uses. Acreage tracts are required because utilities will not be available in the foreseeable future. Conflicting business and industrial uses are excluded.

Response: The existing transmission line crosses a small stretch of R-1 zoned land, including the Umatilla River and lands immediately adjacent to the river; however, there are currently no

transmission towers in the R-1 zone because the necessary towers are located in the immediately adjacent zones. While the reconductored transmission line will cross lands zoned R-1, existing towers already in existence in the immediately adjacent zones will continue to serve the reconductored line, so no existing or new transmission towers need to be located on the R-1 zoned lands. The reconductored transmission line will further not impact the lands in the R-1 zone because the lands crossed have previously been developed as I-82, or are located within the Umatilla River. The R-1 zoned land crossed by the transmission line is located entirely within the existing ROW and UEC easement. Aside from potential temporary construction impacts, there will be no impacts on the R-1 zoned lands because the transmission line will simply replace an existing UEC 115-kV line already in existence above the R-1 zoned lands.

Section 3.072 CONDITIONAL USES

In an R-1 Zone the following uses and their accessory uses are permitted, subject to the requirements of Sections 7.010 through 7.040 inclusive, and upon the issuance of a zoning permit.

> *(6) Utility facility;*

Response: As discussed previously, power transmission lines are specifically defined as "utility facilities" and are allowed as a conditional use on R-1 zoned lands; however, Umatilla County's *Response to Amended Notice of Intent* dated September 23, 2013, indicated that "[n]o land use permit is required to co-locate and upgrade the transmission line." Perennial will apply for a conditional use permit for the reconductored transmission line only if requested. As described below, the reconductored transmission line meets all conditional use requirements. UCDC §§ 7.030 and 7.035 are not addressed herein because they relate to time limits for initiating construction and re-filing conditional use permit applications. These are not substantive standards or procedures related to the approval of a Conditional Use Permit, and the Council need not consider these requirements.

Section 3.073 DIMENSIONAL STANDARDS

In an R-1 Zone, the following dimensional standards shall apply:

> *(1) Minimum Lot Area for Residential Use: 4 acres;*
>
> *(2) Minimum Lot Area for Nonresidential Use: As determined by the Department of Environmental Quality to be necessary for the protection of public health;*
>
> *(3) Setback: No building shall be located closer than 20 ft. from a lot line.*

Response: The lot area requirements are inapplicable because no new lots or dwellings will be created in R-1 zoned lands. The setbacks are also inapplicable because no new buildings or transmission towers will be constructed in the R-1 zone.

K.5.4.5 Article 7, Conditional Uses

Section 7.010 REGARDING CONDITIONAL USES

Conditional uses listed in this ordinance may be permitted, enlarged, or altered upon authorization by the Hearings Officer in accordance with the standards and procedures set forth in Sections 7.010 through 7.040 inclusive.

Response: Under ORS 469.504(1)(b), the Council will determine the Project's compliance with the applicable approval standards for a conditional use. As noted above and described below, the reconductored transmission line meets all conditional use requirements. UCDC §§ 7.030 and 7.035 are not addressed herein because they relate to time limits for initiating construction and re-filing conditional use permit applications. These are not substantive standards or procedures related to the approval of a Conditional Use Permit, and the Council need not consider these requirements.

Section 7.020 PROCEDURE FOR TAKING ACTION ON A CONDITIONAL USE APPLICATION

The procedure for taking action on a conditional use application shall be as follows:

> *(1) A property owner or the Planning Commission may initiate a request for a conditional use by filing an application with the secretary of the Planning Commission, using forms prescribed pursuant to Section 10.030.*

Response: Upon approval of the ASC, Perennial will submit a completed application form to Umatilla County for a conditional use permit for the transmission line, along with the appropriate fee. Under "Path B," Perennial has the burden of demonstrating to the Council, not to the City, that all approval criteria are met.

> *(2) Within 60 days of receipt of the application, the Hearings Officer of the county shall hold a hearing and take action thereon. Applicant shall be given written notice of the decision by the Planning Director or the secretary of the Planning Commission within five days of the decision,*

Response: These procedures do not apply, given that Perennial has elected for a "Path B" determination by the Council.

> *(3) A Conditional Use Permit shall not be approved unless the proposed use of the land would be in compliance with the Umatilla County Comprehensive Plan.*

Response: Compliance with the Umatilla County Comprehensive Plan is discussed previously in Section K.5.3.

(4) An applicant granted a conditional use permit must also obtain a zoning permit before commencing construction.

Response: Perennial will not begin construction until it has applied for and obtained a zoning permit for the step-substation.

Section 7.040 SUGGESTED STANDARDS GOVERNING CONDITIONAL USES

In addition to the standards of the zone in which the conditional use is located and the general standards of this ordinance, the Hearings Officer shall consider the following additional requirements:

(1) Conditional uses, generally:

(a) Yards: In an F-2, F-4, F-5, R-2, R-3 and R-4 Zone, yards may be at least two-thirds the height of the principal structure. In any zone additional yard requirements may be imposed.

Response: The transmission line crosses F-2 zoned lands, but these provisions are inapplicable because no new structures will be constructed within the F-2 zone, and it is inappropriate to apply "yard" requirements to a linear ROW.

(b) Limitations on access to property and on openings to buildings:

(14) Radio, television tower, utility station, or substation:

(a) In a residential zone, all equipment storage on the site may be within an enclosed building;

Response: The small portion of R-1 zoned lands crossed by the transmission line are either located in the Umatilla River or within the ROW of I-82. Perennial will not store any equipment within the R-1 zone.

(b) The use may be fenced and provided with landscaping;

Response: Security fencing will be provided around the step-up substation, but landscaping in this area is inappropriate because the area around the substation site is unoccupied except for other utility facilities, including transmission towers and the McNary Substation.

(c) The minimum lot size for a public utility facility may be waived on finding that the waiver will not result in noise or other detrimental effect to adjacent property;

Response: BPA owns the property on which the step-up substation and a portion of the underground line will be sited, and BLM owns the property on which the remainder of the underground line and the underground termination structure are to be located; therefore, the local zoning restrictions are preempted by federal law and inapplicable to the step-up substation and underground line. Further, no new lots will be created, so this provision does not apply. Nonetheless, the siting of the substation on a 23.99-acre lot is sufficient to provide all buffering needed to protect public health from the noise, EMF and other potential impacts from the step-up substation. The area surrounding the step-up substation site is currently unoccupied and has numerous other transmission towers and lines associated with the McNary Substation. Currently, there are no dwellings within 1,500 feet of the step-up substation site. Given the existing concentration of transmission lines and the nearby McNary Substation, the step-up substation is not expected to result in significant noise or other detrimental effects to adjacent property.

> *(d) Transmission towers, poles, overhead wires, pumping stations, and similar gear shall be so located, designed, and installed as to minimize their conflict with scenic values,*

Response: The majority of the transmission line will be located within an existing ROW and utilize existing transmission towers that will be reconductored with the new line, thereby preventing any impact on scenic values. A new connecting structure and step-up substation will be required in the vicinity of the McNary Substation, along with an underground line. The step-up substation's location near the McNary Substation in an area with existing transmission facilities similarly minimizes any impact from that facility on scenic resources. Further detail regarding impacts on scenic resources may be found in Exhibit R – Scenic Resources.

K.6 CITY OF UMATILLA

K.6.1 City of Umatilla Zoning

The transmission line crosses City of Umatilla lands zoned Neighborhood Commercial (NC), Single Family Residential (R1), and Multi-Family Residential (R2). The transmission line is permitted as a "Community Service" use, which is a conditional use in each of these zones.

Community Service (CS)

10-6-1: COMMUNITY SERVICES USES:

The purpose of this Chapter is to provide a procedure and standards for the review of special uses which, by reason of their public convenience, necessity, unusual character, technical need or effect on the neighborhood, may be appropriate in any district but not suitable for listing within the other sections of this Title.

The following uses may be approved as Community Services uses:

Utility facility, including generating facilities, substations, telephone switching stations, and other facilities required for the transmission of power or communications.

Response: The transmission line is required for the transmission of power and is a "utility facility." As a utility facility, the transmission line may be approved as a Community Service use.

10-6-2: PROCEDURE:

Community Services uses shall be considered a Type III review process.

A. Application: All Community Services uses shall be reviewed as conditional uses according to the procedures and criteria of Chapters 12 and 14 of this Title. Plans shall be submitted for the site that identify the location of the use, building, parking area, landscaping, screening, and any other features on the site. The applicant shall submit a narrative that explains why the use is necessary for the community and why the particular site best serves the community. The narrative shall also consider impacts upon surrounding uses and possible mitigating measures, including, but not limited to, the location of parking, effects of off-site parking, traffic generation, street access points, buffering and screening, noise, illumination controls, structure height, hours of operation, crime prevention, design elements such as scale, structural design, form and materials, signage, and any other impacts unique to the specific use.

The approval of a Community Services use is for a specific use. Any change or expansion of an approved use shall be subject to the review procedures of this Chapter.

Response: The Project location, provided as Exhibit C – Location, identifies the location of the transmission line (see also Figures K-3 through K-6). No parking is required for the transmission line because access to the transmission line is only required for temporary and intermittent maintenance activities. Given the linear nature of the transmission line located entirely within an existing ROW, and the use of existing transmission towers, no visual impact will result from the transmission line that requires mitigation through landscaping or screening. The use is necessary for the community because there is no feasible route to transmit power from the Energy Facility Site to the McNary Substation without crossing the City of Umatilla. Utilization of the existing ROW and existing transmission towers within the City limits minimizes the impact of the transmission line and best serves community interests. By using the existing ROW and towers, the transmission line will have no long-term visual, noise, traffic, parking, access, or lighting impacts on the community. No new structures will be constructed

within the City of Umatilla limits, and any new signage will be minimal and limited to provided required public safety notification.

Neighborhood Commercial (NC)

10-4A-3: CONDITIONAL USES PERMITTED:

Community Services uses as provided by Chapter 6 of this Title.

Residential, Single Family (R1)

10-3A-3: CONDITIONAL USES PERMITTED:

The following primary uses and their accessory uses may be permitted when authorized in accordance with the requirements of Chapter 12 of this Title:

Community Services uses as provided by Chapter 6 of this Title.

Residential, Multi-Family (R2)

10-3B-3: CONDITIONAL USES PERMITTED:

The following uses and their accessory uses may be permitted subject to the provisions of Chapter 12 of this Title:

Community Services uses as provided by Chapter 6 of this Title.

Response: The transmission line is a Community Service use permitted as a conditional use in the NC, R1, and R2 zones of the City of Umatilla.

10-12-1: AUTHORIZATION TO GRANT OR DENY:

A conditional use listed in this Title, may be permitted, denied, enlarged or altered upon authorization of the Planning Commission in accordance with the criteria and standards of this Chapter and Type III procedures in Chapter 14 of this Title. Site review is required for conditional uses.

A. Approval Criteria: The applicant shall carry the burden of proof in demonstrating that the following review criteria are satisfied, in addition to any specific criteria and standards in this Chapter, other applicable chapters of this Title, and this Code. If any of the following criteria and other applicable standards cannot be satisfied by requiring conditions with the approval, the use shall be denied:

1. Applicable Plans: The conditional use application complies with applicable policies of the Umatilla City Comprehensive Plan.

Response: Compliance with the Umatilla City Comprehensive Plan is discussed below in Section K.6.2.

2. Code Provisions: The proposal complies with all applicable provisions of this Code, including, but not limited to, provisions of this Chapter, the base district, and site review, as well as any other applicable provisions of this Code.

Response: The transmission line will comply with all applicable provisions of the Umatilla City Code and is permitted as a conditional use in the R1, R2, and NC zones.

3. Use Characteristics: If the proposed use is a community service, application shall include evidence to demonstrate that the proposed use is needed within the community to provide a social or technical benefit.

Response: The existing transmission line ROW passes through the City of Umatilla. Use of this ROW and of UEC transmission towers eliminates or mitigates all impacts of the transmission line to the local community. As discussed above, the transmission line is a utility facility defined as a Community Service use in the Umatilla City Code. The transmission line is needed to connect the Station to the regional electric grid, providing a social and technical benefit by allowing for the development of the Station in a location that will provide load shaping benefits to balance wind-generated electricity produced along the Columbia River, helping to stabilize the electric power grid in the area and making the area more attractive for further renewables development.

4. Site Characteristics: The site is appropriate for the proposed use, considering, but not limited to, the following factors: neighboring land use, adequacy of transportation facilities and access, site size and configuration, adequacy of public facilities.

Response: The entire length of the reconductored transmission line through the City of Umatilla will be located within an existing ROW and utilize existing transmission towers. A small portion of the R1 and R2 zones crossed by the transmission line is developed with single-family homes, but all houses are set back from the existing transmission corridor along Powerline Road (County Road 1225). The NC zone crossed by the transmission line is currently undeveloped. Existing or potential future neighboring land uses in the NC, R1, and R2 zones will not be affected by the reconductored transmission line, which will have no different visual or auditory effect than the transmission lines currently in place. The use of the existing transmission towers will eliminate any transportation and access impacts and public facilities requirements.

5. Impacts On The Neighborhood: Potential impacts on neighboring properties shall be identified. Mitigating measures shall be identified for unavoidable adverse impacts.

Response: The entire length of the transmission line through the City of Umatilla will be located within an existing ROW and utilize existing transmission towers, preventing any potential long-term impact on neighboring properties. Reconductoring activities will be conducted within the ROW. The reconductored transmission line will comply with all Council standards for transmission lines, including the provisions of OAR 345-024-0090, which require alternating current electric fields not to exceed 9 kV per meter at 1 meter above the ground surface in areas accessible to the public, and induced currents to be as low as reasonably achievable.

6. Impacts On The Community: Potential impacts on the community shall be identified, including, but not limited to, public facilities, land supply within the particular zoning district, impact on housing, etc. Potential benefits of a proposed use may outweigh potential impacts, but such benefits and impacts should be identified. Unavoidable adverse impacts should be mitigated to the extent possible.

Response: The entire length of the transmission line through the City of Umatilla will be located within an existing transmission line ROW and utilize existing transmission towers, preventing any potential long-term impact on the community. The supply of land within the R1, R2, and RC zones will not be affected by the transmission line because no new transmission towers will be constructed, nor will the transmission ROW be expanded within the limits of the City of Umatilla.

B. Conditions Of Approval: Conditions of approval for mitigating measures shall be clearly related to the identified impact or impacts. If complex conditions of approval are considered necessary, this is an indication that the proposed use may not be appropriate for the proposed site. Conditions of approval may include, but are not limited to, the following:

1. Increasing the required lot size or yard dimension.

Response: This provision is inapplicable because no additional transmission towers will be constructed within the City of Umatilla, and no new lots will be created.

2. Limiting the height, size, or location of the building or use.

Response: This provision is inapplicable because no new buildings will be constructed as part of the transmission line. The transmission line will utilize existing transmission towers within the limits of the City of Umatilla.

3. Controlling the location and number of vehicle access points.

Response: No new vehicle access points will be required because the transmission line will be located entirely within an existing ROW and utilize existing transmission towers within the limits of the City of Umatilla.

4. Increasing the street width and requiring street improvements.

Response: No transportation impacts are anticipated that would need to be mitigated by street improvements because the transmission line will be located entirely within an existing ROW and utilize existing transmission towers within the limits of the City of Umatilla.

5. Increasing or decreasing the number of required off-street parking spaces.

Response: The transmission line will be located entirely within an existing ROW, will utilize existing transmission towers within the limits of the City of Umatilla, and will not require or affect off-street parking. No off-street parking spaces are required because the transmission line only requires temporary and intermittent maintenance activities along a lengthy linear infrastructure facility, and sufficient parking area is available within the ROW to satisfy these temporary needs.

6. Limiting the number, size, location, and lighting of signs.

Response: Since the transmission line will be located entirely within an existing ROW and utilize existing transmission towers within the limits of the City of Umatilla, signage will be limited to that necessary to meet required public safety notice requirements.

7. Requiring diking, fencing, screening, landscaping, or other facilities designed to protect adjacent or nearby properties.

Response: The newly reconductored transmission line will be located within an existing ROW and utilize existing transmission towers within the limits of the City of Umatilla. Thus, the reconductored transmission line will have no visual impact distinguishable from current conditions, and no diking, fencing, screening, or landscaping are required.

8. Designating sites for open space.

Response: The newly reconductored transmission line will have no long-term impact on open space. No new open space needs to be designated to mitigate the impact of the reconductored transmission line because the transmission line will be located within an existing ROW and utilize existing transmission towers within the limits of the City of Umatilla.

C. Existing Conditional Use: Any conditional use existing prior to the effective date of this Title, and classified in this Title as a conditional use, shall not be changed with respect to the

use, site, or structure, unless the change conforms with the current requirements for conditional use.

Response: The reconductored transmission line will not change the use, site, or structure of any existing conditional uses because it will be located within an existing ROW and utilize existing transmission towers within the limits of the City of Umatilla.

10-12-2: STANDARDS GOVERNING CONDITIONAL USES:

In addition to the standards of the district in which the conditional use is located and the other standards of this Title, the following criteria and standards shall apply to the specifically identified conditional use:

D. Utilities, Storage Tanks, And Towers For Transmission Of Radio Waves For Cellular Communications And Similar Facilities: The Planning Commission shall determine that the proposed site is located to best serve the intended area and that impacts on surrounding properties and appropriate mitigating measures are identified. Such facilities shall be located, designed, and installed with regard for aesthetic values.

Response: The transmission line location was selected to maximize use of the existing ROW and transmission towers and to reduce the need for construction of new transmission tower facilities. There will be no impact on aesthetic values within the R1, R2, or NC zones because no new transmission towers are to be constructed within the limits of the City of Umatilla.

K.6.2 City of Umatilla Comprehensive Plan

SECTION 1.0 CITIZEN INVOLVEMENT GOAL

To promote a program that facilitates the flow of information and ideas between the City and its residents and insures the opportunity for citizen involvement in the planning process.

Response: Notification of nearby property owners, as well as the general public and the opportunity for involvement will be provided through the Council's public notice and public hearing process.

SECTION 2.0 LAND USE PLANNING GOAL

To provide a process and basis for decisions and actions related to the existing and future uses of the land, and insure the orderly development of the City of Umatilla.

Response: The Council's process provides the statutorily mandated process for any approval decision regarding the transmission line, as governed by the Oregon laws and regulations governing energy facilities and their related and supporting facilities.

SECTION 3.0 AGRICULTURAL LANDS GOAL

To maintain agricultural lands consistent with the need for agricultural products.

Response: The transmission line does not cross any agricultural lands within the City of Umatilla.

SECTION 5.0 NATURAL RESOURCES, SCENIC AND HISTORIC AREAS, AND OPEN SPACES GOAL

To protect and enhance through proper use and development the open spaces, scenic and historic areas, and natural resources of the area.

Response: The use of the existing transmission line ROW and transmission towers will avoid any new impact on open spaces, scenic and historic areas, and the natural resources of the area.

SECTION 6.0 AIR, WATER AND LAND RESOURCES QUALITY GOAL

To maintain and improve the quality of the air, water, and land in the Umatilla area.

Response: The use of the existing transmission line ROW and transmission towers will minimize any impact on the air, water, and land in the Umatilla area.

SECTION 7.0 AREAS SUBJECT TO NATURAL DISASTERS AND HAZARDS GOAL

To protect life and property from natural disasters and hazards.

Response: The use of the existing transmission line ROW and transmission towers will minimize any increased risk to life or property from natural disasters and hazards.

SECTION 8.0 RECREATIONAL NEEDS GOAL

To provide programs and facilities to meet the recreational needs of area residents and visitors.

Response: The use of the existing transmission line ROW and transmission towers will avoid any new impact on the recreational opportunities for residents and visitors to the City of Umatilla.

SECTION 9.0 ECONOMIC DEVELOPMENT GOAL

To provide for the economic diversification and stability of the area.

Response: Reconductoring the transmission line will provide temporary construction jobs within the City of Umatilla. More importantly, the transmission line is essential to the development of

the Station, which will serve to balance wind power generated along the Columbia River, promoting a stable electric power grid and further renewables development in the area.

SECTION 10.0 HOUSING GOAL

To increase the supply of housing commensurate with population growth, and the peoples' needs.

Response: The use of the existing transmission line ROW and transmission towers will minimize any impact on the housing supply in the City of Umatilla.

SECTION 11.0 PUBLIC FACILITIES AND SERVICES GOAL

To coordinate and arrange for the provision of public facilities and services in an efficient, orderly, and timely manner.

Response: The use of the existing transmission line ROW and transmission towers will minimize any impact on the public facilities and services in the City of Umatilla.

SECTION 12.0 TRANSPORTATION GOAL

To develop and encourage a safe, convenient and economic transportation system.

Response: The development of the Project will have minor traffic impacts in the City of Umatilla during construction, but will have no permanent impacts on the City's transportation system. The construction of the Energy Facility Site and the step-up substation will occur outside the city limits and are not expected to have measurable traffic impacts within the City of Umatilla. The reconductoring of the transmission line within the city limits may have minor, temporary impacts on traffic in the immediate vicinity of reconductoring operations. There will be no long-term impacts on traffic in the City of Umatilla.

SECTION 13.0 ENERGY CONSERVATION GOAL
To conserve energy.

Response: The transmission line does not directly affect energy conservation; however, development of the transmission line is essential to the development of the Station, which will provide load balancing for variable wind generated electricity, supporting a stable electric power grid and encouraging further renewables development in the area.

SECTION 14.0 URBANIZATION GOAL

To provide for an orderly and efficient transition from rural to urban land use.

Response: By using the existing power corridor and transmission towers, Perennial will avoid any impact on the rate of urbanization in the City of Umatilla

K.7 STATE OF OREGON

As demonstrated in the sections above, the Project will comply with all applicable provisions of the local government land use regulations and comprehensive plans in effect on the date of the application submittal. OAR 345-022-0030(2)(b)(A) also requires an energy facility to comply with new or amended statewide planning goals, Oregon Department of Land Conservation and Development (LCCD) administrative rules, and land use statutes that are directly applicable to the Project under ORS 197.646(3). This section addresses those requirements. In addition, this section includes a review of the Project's general compliance with the Statewide Planning Goals, although Section K.5.4 addresses the more specific goals incorporated into the Umatilla County Comprehensive Plan.

K.7.1 Directly Applicable Administrative Rules and Statutes

K.7.1.1 Farm Rules

OAR 660-033-0130(17) provides, with respect to "high-value farmland":

> *A power generation facility shall not preclude more than 12 acres from use as a commercial agricultural enterprise unless an exception is taken pursuant to OAR chapter 660, division 4.*

OAR 660-033-0130(22) provides with respect to all other farmland:

> *A power generation facility shall not preclude more than 20 acres from use as a commercial agricultural enterprise unless an exception is taken pursuant to ORS 197.732 and OAR chapter 660, division 4.*

Response: These standards apply only to the portion of the Project that is a "power generation facility." The "Energy Facility Site," sited on less than 20 acres, is the Project's "power generation facility," as no other portion of the Project will generate electrical power. The gas line, transmission improvements, step-up substation, and underground line that will relate to or support the Station are covered under distinct standards of the EFU zone as "utility facilities necessary for public service" and are separately addressed in the response to OAR 660-033-0120 below.

The soils on the Energy Facility Site are illustrated in Exhibit I – Soils, Figure I-1l, and a breakdown of the soil types and acreages within Umatilla County EFU zoning is shown in Table

K-2, in Section K-5.1.1. None of the soils are classified as prime, unique, or Class I or II if not irrigated. The soils are Class IV if irrigated.

As discussed in Section K.5.1, the Energy Facility Site will permanently occupy just under 20 acres of EFU land. While a portion of the Energy Facility Site was previously irrigated, the soil type precludes classification as "high value farmland," as described in Table K-2.

OAR 660-033-0020(8) defines "high-value farmland":

> *"High-Value Farmland" means land in a tract composed predominantly of soils that are:*
>
> > *(A) Irrigated and classified prime, unique, Class I or II; or*
> >
> > *(B) Not irrigated and classified prime, unique, Class I or II.*

OAR 660-033-0020(9) defines "irrigated":

> *"Irrigated" means watered by an artificial or controlled means, such as sprinklers, furrows, ditches, or spreader dikes. An area or tract is "irrigated" if it is currently watered, or has established rights to use water for irrigation, including such tracts that receive water for irrigation from a water or irrigation district or other provider. For the purposes of this division, an area or tract within a water or irrigation district that was once irrigated shall continue to be considered "irrigated" even if the irrigation water was removed or transferred to another tract.*

Response: The power generation portion of the Project will occupy under 20 acres of EFU land at full build-out, which will thereby be precluded from use as a commercial agricultural enterprise.

While a portion of the Station site was previously irrigated, all of the land to be occupied by the facility is Class IV soil if irrigated and therefore is not "high value farmland," as defined in OAR 660-033-002(8). The total Station site is under 20 acres; thus, it will meet the applicable requirement that not more than 20 acres of EFU lands be precluded from use as a commercial agricultural enterprise.

OAR 660-033-0020(2) defines "commercial agricultural enterprise":

> *(a) "Commercial Agricultural Enterprise" consists of farm operations that will:*
>
> > *(A) Contribute in a substantial way to the area's existing agricultural economy; and*
> >
> > *(B) Help maintain agricultural processors and established farm markets.*

(b) When determining whether a farm is part of the commercial agricultural enterprise, not only what is produced, but how much and how it is marketed shall be considered. These are important factors because of the intent of Goal 3 to maintain the agricultural economy of the state.

Response:

Energy Facility Site

The development of the Station on less than 20 acres of EFU lands will not preclude the land from contributing in a substantial way to the area's existing agricultural economy because the soil type and lack of irrigation water already preclude highly productive agriculture on the lands. To the extent that irrigation water could be shifted from other lands currently irrigated to the Energy Facility Site, this would not lead to any increased agricultural production, and productivity would remain limited by the poor soil conditions. Even assuming the land is a "commercial agricultural enterprise," the Energy Facility Site will affect less than 20 acres.

The Station site is on land zoned EFU. Within the EFU designation, areas are classified as having high-value or non-high-value farmland. The Energy Facility Site contains no lands that are considered "high value farmland."

As a result, the following sections of OAR 660 are applicable:

OAR 660-033-0090 ***Uses on High-Value and Non High-Value Farmland***

(1) Uses on land identified as high-value farmland and uses on land not identified as high value farmland shall be limited to those specified in OAR 660-033-0120. Except as provided for in section (2) of this rule, counties shall apply zones that qualify as exclusive farm use zones under ORS chapter 215 to "agricultural land" as identified under OAR 660-033-0030 which includes land identified as high-value farmland and land not identified as high-value farmland.

Response: See response to OAR 660-033-0120, below.

OAR 660-033-0100 *Minimum Parcel Size Requirements*

1. Counties shall establish minimum sizes for new parcels for land zoned for exclusive farm use. For land not designated rangeland, the minimum parcel size shall be at least 80 acres. For land designated rangeland, the minimum parcel size shall be at least 160 acres.

Response: The Project will not involve the creation of new parcels; therefore, this criterion is not applicable.

OAR 660-033-0120 *Uses Authorized on Agricultural Lands*

The specific development and uses listed in Table 1 [of the LCDC rule] are permitted in the areas that qualify for the designation pursuant to this division. All uses are subject to the general provisions, special conditions, additional restrictions and exceptions set forth in this division. The abbreviations used within the schedule shall have the following meanings:

1. *A -- Use may be allowed. Authorization of some uses may require notice and the opportunity for a hearing because the authorization qualifies as a land use decision pursuant to ORS Chapter 197. Minimum standards for uses in the table that include a numerical reference are specified in OAR 660-033-0130. Counties may prescribe additional limitations and requirements to meet local concerns as authorized by law.*

2. *R -- Use may be approved, after required review. The use requires notice and the opportunity for a hearing. Minimum standards for uses in the table that include a numerical reference are specified in OAR 660-033-0130. Counties may prescribe additional limitations and requirements to meet local concerns as authorized by law.*

3. ** -- Use not permitted.*

4. *# -- Numerical references for specific uses shown on the chart refer to the corresponding section of OAR 660-033-0130. Where no numerical reference is noted for a use on the chart, this rule does not establish criteria for the use.*

Response:

Transmission Line

Table 1, which is part of the LCDC rule, includes "utility facilities necessary for public service" among the uses allowed on both high-value and other farmland, provided it complies with the standards listed in the following section. The table further stipulates that transmission towers cannot exceed 200 feet. The Project's transmission line qualifies as a use necessary for public service because in order to transmit electricity from the new energy facility to a regional switchyard, it will be necessary to cross agricultural land.

While the transmission line will require the construction of new towers on lands zoned EFU and LI under the UCDC, none of the towers will exceed 200 feet. Table 1, discussed below, identifies OAR 660-033-0130(16) as the applicable standard of the towers constructed in the EFU zone. As discussed below, OAR 660-033-0130(16) is identical to ORS 215.275.

Step-up Substation

Table 1, which is part of the LCDC rule, includes "utility facilities necessary for public service" among the uses allowed on both high-value and other farmland, provided it complies with the standards listed in the following section. The step-up substation qualifies as a use necessary for public service because it is necessary to the transmission of electricity from the new Station to the McNary Substation. The step-up substation will be located in the F-1 zoned lands adjacent to the McNary Substation, which minimizes the length of 500-kV transmission necessary to connect to the McNary Substation. Table 1 identifies OAR 660-033-0130(16) as the applicable standard. As discussed below, OAR 660-033-0130(16) is identical to ORS 215.275. Compliance with the standards in ORS 215.275 is discussed in Section K.7.1.2 below.

Natural Gas Pipeline

Table 1, which is part of the LCDC rule, includes "utility facilities necessary for public service" among the uses allowed on both high-value and other farmland, provided it complies with the standards listed in the following section. The natural gas pipeline qualifies as a use necessary for public service because in order to transmit natural gas from the existing CNG natural gas pipeline to the new energy facility, it is necessary to cross agricultural land. Table 1 identifies OAR 660-033-0130(16) as the applicable standard. As discussed below, OAR 660-033-0130(16) is identical to ORS 215.275.

Energy Facility Site

Under Table 1, the Station falls within the category of "commercial utility facilities for the purpose of generating power for public use by sale, not including wind power generation facilities or photovoltaic solar power generation facilities." Table 1 identifies OAR 660-033-0130(5) and (17) as the applicable standards on high-value farmland, and OAR 660-033-0130(5) and (22) as the applicable standards on all other farmland. OAR 660-033-0130(17) and (22) are the 12-acre and 20-acre limits, previously discussed. Compliance with OAR 660-033-0130(5) is discussed below.

OAR 660-033-0130 *Minimum Standards Applicable to the Schedule of Permitted and Conditional Uses*

> *The following standards apply to uses listed in OAR 660-033-0120 where the corresponding section number is shown on the chart for a specific use under consideration. Where no numerical reference is indicated on the chart, this division does not specify any minimum review or approval criteria. Counties may include procedures and conditions in addition to those listed in the chart as authorized by law:*
>
> > *OAR 660-033-0130 (5)*

Response: As discussed above, the Station will be a "commercial utility facility for the purpose of generating power for public use by sale, not including wind power generation facilities or photovoltaic solar power generation facilities" and is subject to the requirements of OAR 660-033-0130(5) on all EFU-zoned land.

OAR 660-033-0130(5) requires that the proposed use be reviewed under ORS 215.296.

ORS 215.296(1)

> *A use allowed under ORS 215.213(2) or 215.283(2) may be approved only where the local governing body or its designee finds that the use will not:*
>
> *1. Force a significant change in accepted farm or forest practices on surrounding lands devoted to farm or forest use; or 2. Significantly increase the cost of accepted farm or forest practices on lands devoted to farm or forest use.*

Response:

Energy Facility Site/Transmission Line/Natural Gas Pipeline

Compliance with this provision is discussed previously in Section K.5.1.1 in the response to UCDC §§ 152.617(I)(c), 152.617(II)(7)(d), and 152.061.

Step-Up Substation/Underground Line

The construction of the step-up substation and underground line will not have long-term impacts on surrounding farmlands, cause a significant change in farm practices, or affect the costs of inputs to the established agricultural practices. Approximately 3 acres of land used for farming will be occupied by the step-up substation and precluded from future farming use. The surrounding agricultural lands are tractor farmed row crops, and accepted farm practices include soil preparation, sowing, fertilizing, pest and weed management, and harvesting. Necessary inputs are assumed to be labor, fertilizer, electricity, and water. Adjacent farming practices have adapted to an area that includes a high concentration of power transmission towers and overhead lines. The development of the step-up substation and underground line will not change these accepted farm practices or affect the availability or costs of the necessary inputs.

Specifically, the step-up substation will not physically interfere with the ability to irrigate, fertilize, or harvest crops on surrounding fields. The physical improvements and operations of the step-up substation or underground line will not interfere with the ability to operate necessary farm equipment on surrounding lands or to provide fertilizer, irrigation water, pesticides, or other necessary crop inputs and will not affect the costs of these inputs, which depend upon contractual arrangements and market conditions unaffected by the development of the Station. Neither the Station nor any of its related and supporting facilities will impair the ability of workers to access

surrounding farmlands. No center pivot irrigation or other systems will be impacted by the step-up substation. Farmlands disturbed during the construction of the underground line will be restored and returned to agricultural production. Future agricultural production will not be impacted by the presence of the underground line, which will be buried to a sufficient depth so as to avoid interference with agricultural practices.

K.7.1.2 ORS 215.275

In 1999, the legislature enacted ORS 215.275 into law to clarify when a utility facility is "necessary for public service," as that phrase is used in 215.283(1)(c). Subsequent to the passage of this law, any applicant wishing to site a utility facility on EFU lands pursuant to ORS 215.283(1)(c) must establish that the facility is in fact "necessary for public service" according to the standards set forth in ORS 215.275. The accompanying administrative rule, OAR 660-033-130(16) mimics the provisions of ORS 215.275.

ORS 215.275 (2)

According to ORS 215.275(1), a utility facility established under ORS 215.283(1)(c) is necessary for public service if the facility "must be sited in an exclusive farm use zone in order to provide the service." To demonstrate that a utility facility is necessary under ORS 215.283(1)(c), ORS 215.275(2) requires an applicant to show that reasonable alternatives have been considered and that the facility must be sited in an EFU zone due to a set of defined factors.

Response:

Transmission Line/Natural Gas Pipeline

UCDC § 152.059 incorporates the requirements of ORS 215.275 and was previously addressed in Section K.5.1.1. Based on the factors in ORS 215.275(2), as discussed above, it is necessary to site the natural gas pipeline and large portions of the transmission line on EFU lands. Therefore, they are "utility facilities necessary for public service" within the meaning of ORS 215.283(1)(d).

Step-Up Substation

a. *Technical and engineering feasibility;*

The step-up substation is necessary to step up the 230kV power generated by the Station to the 550-kV power needed to connect to the McNary Substation. Step-up substations are commonly used and are technically feasible to perform this function.

b. *The proposed facility is locationally dependent. A utility facility is locationally dependent if it must cross lands in one or more areas zoned for exclusive farm use in*

order to achieve a reasonably direct route or to meet unique geographical needs that cannot be satisfied on other lands;

It is necessary to site the step-up substation close to the McNary Substation to provide a reasonably direct connection between the two. This also reduces the need for a lengthy new 550-kV high voltage transmission line, which would require new transmission towers and potentially new transmission line ROW between the two substations. Such new facilities would necessarily cross lands zoned for exclusive farm use. There are no potential locations for the substation adjacent to the McNary Substation and within the existing ROW that are not zoned as farmland. Therefore, the step-up substation is locationally dependent.

c. Lack of available urban and non-resource lands;

The majority of Umatilla County is composed of rural resource lands, and the area along the existing transmission line ROW in the vicinity of the McNary Substation is zoned for resource lands. The step-up substation site is located within the "Public Facility Plan" designation for the City of Umatilla Plan Map. The heavy concentration of utility services in the area, including the McNary Substation and various transmission facilities, limits the area's potential for use as resource lands. The City of Umatilla lands crossed by the transmission corridor are zoned for residential or neighborhood commercial uses, as described in Section K.6.1, and are less appropriate for substation development than the chosen site.

d. Availability of existing rights-of-way;

Response: Availability of existing ROW for the transmission line and the step-up substation is a key consideration. Use of the Hermiston to McNary transmission line ROW largely eliminates the need for additional ROW and, therefore, the impact on agricultural land. The step-up substation will be sited in the existing transmission line ROW adjacent to the McNary Substation, minimizing the impact on productive agricultural land.

e. Public health and safety; and

Response: The step-up substation will be located in an area already used for utility purposes, including power transmission. The impacts to public health and safety will be minimal, as no residential or other high-occupancy uses will be located near the new substation.

f. Other requirements of state or federal agencies.

Response: As noted in this and all associated exhibits, all applicable requirements of state or federal agencies will have been met at the time of construction for the step-up substation.

(3) Costs associated with any of the factors listed in subsection (2) of this section may be considered, but cost alone may not be the only consideration in determining that a utility

facility is necessary for public service. Land costs shall not be included when considering alternative locations for substantially similar utility facilities. The Land Conservation and Development Commission shall determine by rule how land costs may be considered when evaluating the siting of utility facilities that are not substantially similar.

Response: Costs of developing the new step-up substation at the proposed location are anticipated to be significantly lower than any alternative alignment. The cost savings results from the proposed location being within an existing utility corridor, and from minimizing the need to construct new transmission towers and a lengthy and costly 550-kV line, not from the fact that the corridor is on land zoned for EFU.

ORS 215.275 (4) and (5)

(4) The owner of a utility facility approved under ORS 215.213 (1)(c) or 215.283 (1)(c) shall be responsible for restoring, as nearly as possible, to its former condition any agricultural land and associated improvements that are damaged or otherwise disturbed by the siting, maintenance, repair or reconstruction of the facility. Nothing in this section shall prevent the owner of the utility facility from requiring a bond or other security from a contractor or otherwise imposing on a contractor the responsibility for restoration.

Response: Perennial will comply with ORS 215.275(4) through the mitigation and restoration commitments described in the ASC. At the Energy Facility Site and the step-up substation, lands may be permanently removed from potential agricultural production; however, any other disturbed agricultural lands will be restored and returned to agricultural production after construction activities are completed. This includes construction laydown areas, the transmission line ROW and the gas line ROW. Prior to construction of the Project, Perennial will consult with the ODFW and Oregon Department of Agriculture to determine if a monitoring program for threatened and endangered species is warranted. The proposed Revegetation and Noxious Weed Control Plan is provided in Appendix P-2 of Exhibit P – Fish and Wildlife Habitat. These measures would be implemented to ensure that the EFU land is restored, as nearly as possible, to its former condition. No long-term impact on agricultural land is anticipated from the construction, maintenance, repair, or reconstruction of the natural gas pipeline or transmission facilities.

(5) The governing body of the county or its designee shall impose clear and objective conditions on an application for utility facility siting under ORS 215.213 (1)(c) or 215.283 (1)(c) to mitigate and minimize the impacts of the proposed facility, if any, on surrounding lands devoted to farm use in order to prevent a significant change in accepted farm practices or a significant increase in the cost of farm practices on the surrounding farmlands.

Response: Perennial will comply with all conditions of the site certificate, which will include all conditions necessary to mitigate and minimize the Project's impacts on surrounding farm lands.

Natural Gas Pipeline

The development of the natural gas pipeline along the existing ROW will not have long-term impacts on surrounding farmlands, cause a significant change in accepted farm practices, or affect the costs of inputs to the established agricultural practices. The surrounding agricultural lands utilize center pivot irrigation, and accepted farm practices include soil preparation, sowing, fertilizing, pest and weed management, and harvesting. Necessary inputs are assumed to be labor, fertilizer, electricity, and water. The development of the Energy Facility Site will not change these accepted farm practices or affect the availability or costs of the necessary inputs. Specifically, the natural gas pipeline will be buried below-ground to sufficient depth so as not to physically interfere with the ability to irrigate, fertilize, or harvest crops on surrounding center-pivot fields. After construction is completed, the pipeline ROW will be returned to agricultural production without change from pre-construction conditions. The physical improvements and operations of the natural gas pipeline will not interfere with the ability to provide fertilizer, irrigation water, pesticides, or other necessary crop inputs and will not affect the costs of these inputs, which depend upon contractual arrangements and market conditions unaffected by the development of the Station. Because the natural gas pipeline will be buried, it will not impair the ability of workers to access surrounding farmlands.

Transmission Line

The development of the transmission line along the existing ROW will not have long-term impacts on surrounding farmlands, cause a significant change in accepted farm practices, or affect the costs of inputs to the established agricultural practices. The surrounding agricultural uses utilize center pivot irrigation, and accepted farm practices include soil preparation, sowing, fertilizing, pest and weed management, and harvesting. Necessary inputs are assumed to be labor, fertilizer, electricity, and water. The reconductored transmission line will not change these accepted farm practices, or affect the availability or costs of the necessary inputs. Aside from three new towers on the Energy Facility Site, the reconductored transmission line will have the same footprint as the existing line within the EFU zone, so there will be no impact on surrounding farmlands from the reconductoring activity.

Specifically, the transmission line will not physically interfere with the ability to irrigate, fertilize or harvest crops on surrounding center-pivot fields. The transmission line will not interfere with the ability to provide fertilizer, irrigation water, pesticides or other necessary crop inputs, and will not affect the costs of these inputs, which depend upon contractual arrangements and market conditions unaffected by the development of the Station. The transmission line will not impair the ability of workers to access surrounding farmlands. The height of the reconductored transmission line will not be changed from current conditions, so farm machinery or airplane

crop duster operations will not be impacted by the reconductoring of the transmission line. The potential for a change of practices associated with the ROW, such as from electrical impacts, potential for conflicts with aerial spraying, and potential for spread of invasive species due to construction, is very limited because the transmission line will utilize existing ROW and existing infrastructure, which will mitigate and minimize any additional impacts, and because of the mitigation measures proposed by Perennial in the Project's Revegetation and Noxious Weed Control Plan (Appendix P-2 of Exhibit P – Fish and Wildlife Habitat).

Step-up Substation

The construction of the step-up substation and underground line will not have long-term impacts on surrounding farmlands, cause a significant change in farm practices, or affect the costs of inputs to the established agricultural practices. Approximately 3 acres of land used for farming will be occupied by the step-up substation and precluded from future farming use. The surrounding agricultural lands are tractor farmed row crops, and accepted farm practices include soil preparation, sowing, fertilizing, pest and weed management, and harvesting. Necessary inputs are assumed to be labor, fertilizer, electricity, and water. Adjacent farming practices have adapted to an area that includes a high concentration of power transmission towers and overhead lines. The development of the step-up substation and underground line will not change these accepted farm practices, or affect the availability or costs of the necessary inputs.

Specifically, the step-up substation will not physically interfere with the ability to irrigate, fertilize, or harvest crops on surrounding fields. The physical improvements and operations of the step-up substation or underground line will not interfere with the ability to operate necessary farm equipment on surrounding lands, or to provide fertilizer, irrigation water, pesticides or other necessary crop inputs, and will not affect the costs of these inputs, which depend upon contractual arrangements and market conditions unaffected by the development of the Station. Neither the Station nor any of its related and supporting facilities will impair the ability of workers to access surrounding farmlands. No center pivot irrigation or other systems will be impacted by the step-up substation. Farmlands disturbed during the construction of the underground line will be restored and returned to agricultural production. Future agricultural production will not be impacted by the presence of the underground line, which will be buried to a sufficient depth so as to avoid interference with agricultural practices.

The potential for a change of practices on lands adjacent to the step-up substation, such as from electrical impacts, potential for conflicts with aerial spraying, and potential for spread of invasive species due to construction, is very limited because the step-up substation is located in an existing ROW in an area with existing transmission infrastructure. Mitigation measures proposed by Perennial in the Revegetation and Noxious Weed Control Plan (Appendix P-2 of Exhibit P – Fish and Wildlife Habitat) will further minimize any potential impact on adjacent farming practices.

(6) The provisions of subsections (2) to (5) of this section do not apply to interstate natural gas pipelines and associated facilities authorized by and subject to regulation by the Federal Energy Regulatory Commission.

Response: This provision is inapplicable because the Project is not an interstate natural gas pipeline or associated facility.

K.7.2 Statewide Land Use Goals

This section provides a discussion of conformance with the Statewide Planning Goals, to the extent that the Council finds that there are "applicative substantive criteria" under OAR 345-022-0030(3) or are necessary for a determination under OAR 345-022-0030(2)(b)(B).

Goal 1—Citizen Involvement

To develop a citizen involvement program that insures the opportunity for citizens to be involved in all phases of the planning process.

Response: The Project proposal does not directly affect opportunities for citizen involvement. The Council's procedures for reviewing an ASC ensure a public notice and public hearing on the Draft Proposed Order, and opportunity for a contested case.

Goal 2 Land Use Planning

To establish a land use planning process and policy framework as a basis for all decision and actions related to use of land and to assure an adequate factual base for such decisions and actions.

Response: The state statute requires that the Council find a project consistent with the Statewide Planning Goals. Therefore, the approval of the Station must be substantively consistent with Oregon's land use planning system.

Goal 3 Agricultural Lands

To preserve and maintain agricultural lands. Agricultural lands shall be preserved and maintained for farm use, consistent with existing and future needs for agricultural products, forest and open space and with the state's agricultural land use policy expressed in ORS 215.243 and 215.700.

Response: As discussed above in Section K.7.1, the Project complies with all statutes and rules related to the management and protection of agricultural lands. The Energy Facility Site is located on less than 20 acres of non-high-value farmland, while the related and supporting facilities are all "utility facilities necessary for public service" permitted on agricultural lands.

Given the abundance of farmland in Umatilla County, as compared to irrigation water availability, the Project will not cause any meaningful long-term impact on agricultural production.

Goal 4 Forest Lands

To conserve forest lands by maintaining the forest land base and to protect the state's forest economy by making possible economically efficient forest practices that assure the continuous growing and harvesting of forest tree species as the leading use on forest land consistent with sound management of soil, air, water, and fish and wildlife resources and to provide for recreational opportunities and agriculture.

Response: This goal is not applicable, as there are no areas zoned for forest land or other forest lands in the Project Site.

Goal 5 Natural Resources, Scenic and Historic Areas, and Open Spaces

To protect natural resources and conserve scenic and historic areas and open spaces. Local governments shall adopt programs that will protect natural resources and conserve scenic, historic, and open space resources for present and future generations. These resources promote a healthy environment and natural landscape contributes to Oregon's livability.

Response:

Habitat

Exhibit P – Fish and Wildlife Habitat of this application addresses fish and wildlife species and habitat and describes the wildlife habitat types and state sensitive and/or federal species of concern that occur or potentially occur within the defined Project Analysis Area. Wildlife and wildlife habitat are very limited within the Energy Facility Site, as the surrounding area is already disturbed with a railroad track and other industrial facilities. There is little wildlife habitat along the route of the natural gas pipeline which will run through developed farmlands. The transmission line also runs in an existing ROW through developed areas, including farmland, industrial areas, and residential areas, and along roadways. No new transmission towers are required in the vicinity of the Umatilla River, which will be crossed utilizing existing transmission towers. There is limited wildlife or wildlife habitat at the step-up substation site, which is in an area heavily developed for power transmission and agricultural uses. As described in detail in Exhibit P – Fish and Wildlife Habitat, mitigation measures will be employed to avoid significant potential adverse impacts on the species and habitat. The mitigation measures fully comply with the ODFW's fish and wildlife habitat mitigation goals.

Wetlands

As explained in detail in Exhibit J – Jurisdictional Wetlands, no natural wetland areas were identified in the area of study. The Project will require four crossings of irrigation canals (two gas line borings, one bridge, and one transmission line crossing), as well as a single transmission line crossing of the Umatilla River. The use of existing ROW and infrastructure will eliminate any permanent impacts to riparian areas or wetlands. No fill or removal is expected to occur in wetlands due to Project construction or maintenance, and wetland features will be avoided by construction traffic. No significant impacts to wetlands are anticipated. To the extent necessary, mitigation measures will be employed to limit the impact of construction activities and the reconductoring operation.

Energy Facility Site

There are no water features on the Energy Facility Site.

Natural Gas Pipeline

There are no natural water features or wetlands on the natural gas pipeline route; however, the pipeline will cross under two constructed irrigation canals. The pipeline will be bored under the two canals to avoid any potential impacts on the canals.

Transmission Line

The existing transmission line crosses an irrigation canal and the Umatilla River, but the reconductored crossings will utilize existing transmission towers set back from the canal and the river respectively and any associated riparian areas. There will be no impact to riparian areas or wetlands.

Step-Up Substation

There are no water features on the step-up substation site.

Historic and Cultural Areas

For a detailed analysis of effects on historic and cultural resources, see Exhibit S – Cultural Resources. This section summarizes the impacts of the analysis on the visual impacts of the Project.

As discussed in Exhibit S – Cultural Resources, an archaeological and historic resource survey was prepared for the Project. Eight cultural resources were identified: one pre-contact isolate (12/2052-1) and seven historic-period resources. The pre-contact resource—an isolated cryptocrystalline silicate flake (12/2052-1) was found in a shovel test in the Station site. As an

isolated artifact, it does not have the potential to contribute important information to the study of the area's prehistory and is not eligible for listing in the NRHP. No additional archaeological work is required for the pre-contact isolate.

Of the seven historic-period structures identified during the survey, five are recommended as eligible for listing in the NRHP. Portions of the natural gas pipeline and the electrical transmission interconnection line will cross two of the Westland Irrigation District Canals, and a portion of the overhead electric transmission line will cross the West Extension Irrigation Canal. The Westland Irrigation District Canals and the West Extension Irrigation Canal are part of a larger historic-period irrigation system and are recommended as eligible for listing in the NRHP under Criterion A for their association with the irrigation of arid lands of the region during the early twentieth century. A portion of the NRHP-eligible UPRR mainline between Messner and Hinkle is located within the Project Site Boundary, next to the Station and temporary laydown area, and is crossed by the electrical transmission interconnection line and water and wastewater interconnection lines. A transmission tower (1/1), which is a portion of the NRHP-eligible BPA McNary-Boardman No. 1 Line, is located in the proposed step-up substation site. A portion of the overhead electrical transmission line also will cross the BPA's NRHP-eligible McNary-Boardman No. 1 Line and McNary-Coyote Springs No. 1 Line. The Project will not impact the integrity of setting for these five resources, as the area already has existing transmission lines, stations, and pipelines. The Project also will not impact the character-defining features (alignment, construction materials, and design) of these five NRHP-eligible resources.

Scenic Resources/Open Space

For a detailed analysis of the Projects effects on scenic resources, see Exhibit R – Scenic Resources. This section summarizes the impacts of the analysis on the visual impacts of the Project.

The analysis conducted for this exhibit found that the Project will have no significant adverse impact on documented important scenic and aesthetic values within the 10-mile Analysis Area. The Energy Facility Site will be located within an area of existing industrial and large-scale commercial agricultural uses and adjacent to an existing natural gas–fired power plant of similar size and character; its visual impact will be moderately low. The new step-up substation will be located adjacent to an existing large substation, and its visual impact also will be moderately low. Because new transmission facilities for the Project will consist primarily of upgrading conductors on existing structures that will remain in place, the visual impact of new transmission facilities will be negligible to low.

Energy Facility Site

The Project is anticipated to have some impacts on visual resources but will not result in significant adverse impacts to visual quality within the Analysis Area.

The Station will be located approximately 4 miles southwest of Hermiston, Oregon, adjacent to the existing HGP, a 474-megawatt natural gas–fueled power plant, in an area dominated by industrial land uses. The Station, including all electrical generating equipment, switchyard, buildings, other structures, and a stormwater detention basin, will occupy approximately 20 acres. Visible features of the Station will comprise a complex of large metal structures, including four combustion turbine generator (CTG) structures, four exhaust stacks, a mechanical draft cooling tower, a water treatment building and water tanks, a control and administration building, generators and auxiliary transformers, a detention basin, and a 230-kV switchyard. The structures will range in height from 25 to 155 feet and will be constructed of metal. Buildings will have metal siding and roofs.

The most prominent structures will be the CTG structures, exhaust stacks, cooling tower, and metal building housing the water treatment facility and control and administration facilities. The four CTG air intake structures for each will measure 40 by 42 feet wide and about 45 feet high. The four exhaust stacks will each measure 17 feet in diameter and extend 45 feet above the top of the CTG structures. The full height of the stacks above grade will be 90 feet. The mechanical draft cooling tower will consist of up to four cells, each topped with a bell- or cone-shaped housing, and will measure 40 by 165 feet, with a height of 40 feet. The metal structure housing the water treatment and control and administration facilities will measure 40 by 200 feet, with a height of 20 feet.

Other visible features of the Station include various support structures, a 0.9-acre detention basin in the northeast corner of the Project Site that would be potentially visible from elevated ground in the vicinity, and a chain-link security fence along the Site's perimeter.

Potential visual impacts of the Station will be minimized by painting the buildings and structures using subdued, earth-toned colors to reduce visual contrast and glare; using on-demand lighting and shielding and directive devices for lighting, while adequately addressing security and safety; and using a dark-colored coating on the perimeter fence or otherwise using a style and color that is low glare and blends with the surrounding landscape.

Natural Gas Pipeline

An underground gas delivery pipeline will extend approximately 5 miles south from the Station. This pipeline will be located primarily within the existing natural gas pipeline ROW for the neighboring HGP. Modifications to the existing metering station at the south end of the gas line are permitted under GTN's FERC agreement and are not part of the current application.

Transmission Line

The proposed new transmission line will be an upgrade and reconductoring of an existing 115-kV line to a 230-kV line over a distance of approximately 6 miles from the Station north to the

McNary Substation. With the exception of short connections at both ends, the upgrade will use the existing steel monopole transmission structures and will require placement of four new structures. Existing transmission structures are approximately 95 feet in height. Connections for the transmission line to the Station in the south and the McNary Substation in the north will extend outside of the existing transmission ROW for distances of approximately 1,000 feet at each end. Because the new transmission line will consist primarily of reconductoring the existing line and will require minimal new structures for short distances adjacent to the Station and McNary Substation, visual impacts of the new transmission line will be minimal. Potential visual impacts will be minimized by using non-specular conductors for the new line.

Step-Up Substation/Underground Line

The step-up substation and underground line that will be built for the Project will be located adjacent to and immediately south of the existing McNary Substation. The step-up substation will be located on an undeveloped parcel. The step-up substation will consist of tall metal structures, transformers, and other industrial utility elements. Because the step-up substation will consist of structures and elements similar to those of the adjacent McNary Substation, visual contrast and resulting impacts will be minimized by ensuring that the structures use dull finishes or subdued, earth-toned colors to reduce visual contrast and glare; using on-demand lighting and shielding and directive devices for lighting, while adequately addressing security and safety; and using a dark-colored coating on the perimeter fence, or otherwise using a style and color that is low glare and blends with the surrounding landscape.

Goal 6 Air, Water and Land Resources Quality

To maintain and improve the quality of the air, water and land resources of the state.

Response: Information regarding the Project's impacts on air, water, and land resource quality is provided below.

Air Quality

Perennial will meet applicable requirements under the Clean Air Act through a separate permitting process with the DEQ. As noted in Exhibit Y – Carbon Dioxide Emissions, the Council's carbon dioxide emissions standards will be met through compliance with the monetary path payment requirement of OAR 345-024-0710.

Water Quality

As noted in Exhibit O – Water Use, water usage for the Station is divided into two components: construction and operation. During construction, Perennial anticipates using approximately 2.3 million gallons of water from the Port of Umatilla's existing water system. During operation, the

Station, under annual average conditions, will use approximately 1,300 gallons per minute of non-potable water from the Port of Umatilla system.

As described in Exhibit V – Solid Waste and Wastewater, the Project includes a water treatment facility to treat process wastewater. Wastes produced during operation of the Station will include neutralized demineralized water treatment wastes, sanitary wastes, cooling tower blowdown, turbine water injection, and combustion turbine wash wastes. Cooling tower blowdown will be routed to the HGP or managed onsite through a ZLD system. Sanitary waste from the Station's 5 to 10 employees will be disposed of through a new sanitary leach field system to be constructed on the Energy Facility Site. Combustion turbine water wash will be collected in a holding tank, tested to determine the concentrations of the constituents present, and trucked offsite for disposal at an approved facility.

No significant impacts to the quality of surface water or groundwater resources are anticipated as a result of the construction and operation of the Project.

Goal 7 Areas Subject to Natural Hazards

To protect people and property from natural hazards.

Response: No natural hazards have been identified at the proposed Energy Facility Site. Exhibit H – Geology references additional findings regarding seismic and soil suitability.

Goal 8 Recreational Needs

To satisfy the recreational needs of the citizens of the state and visitors and, where appropriate, to provide for the siting of necessary recreational facilities including destination resorts.

Response: For a detailed analysis of impacts on recreational needs, see Exhibit T – Recreation. The Project Site Boundary is approximately 8 miles from the Columbia River and within 0.3 miles of the Umatilla River. Most of the recreational activities in the vicinity of the Project (including hiking, fishing, hunting, and boating) are concentrated along the Columbia River and associated wildlife areas. These include the following:

- Power City State Wildlife Area 8: miles
- Cold Spring National Wildlife Refuge: 9 miles
- Umatilla National Wildlife Refuge: 11 miles
- Coyote Springs State Wildlife Area: 12 miles
- Hat Rock State Park 12 miles

No county recreational facilities are noted in the near vicinity of the Site. Informal recreational opportunities near the Site occur along the Umatilla River, which flows east of the Site. The river provides fishing, hiking, and wildlife viewing. Recreational use of the nearby Oxbow Property, which is managed by the U.S. Bureau of Reclamation, requires a special permit. The Oxbow Property is located approximately 3 miles to the northeast of the Site.

Construction and operation of the Project are not expected to have a significant negative impact on recreational activities.

Goal 9 Economic Development

To provide adequate opportunities throughout the state for a variety of economic activities vital to the health, welfare, and prosperity of Oregon's citizens.

Response: The Project is expected to create a strong economic development presence in the region. This is a result of the proposed location of the Station, which takes advantage of the use of existing facilities and infrastructure near the Station site (including the HGP to McNary transmission line and associated ROW). The Project will also provide employment opportunities during construction of the facility, as well as permanent full time staffing over the life of the Project. This will also expand and diversify the County's economic base and will support the development of additional intermittent renewable energy resources in the region, such as wind power. The Station is expected to operate for at least 30 years, providing a stable contribution to the County's economy.

Goal 10 Housing

To provide for the housing needs of citizens of the state.

Response: The expected construction workforce for the Station and associated activities is approximately 200 to 225 peak personnel. Construction personnel will likely rely on available community housing and/or lodging because of the location of the Station; some personnel may be able to commute from their permanent residences. There is sufficient temporary housing or lodging available in the community to meet expected demands.

After construction, it is anticipated that 6 to 8 personnel would be utilized to operate and maintain the plant. Consultation regarding potential impacts to housing is planned with the Oregon Housing and Community Services, East Region.

No significant adverse impacts are expected.

Goal 11 Public Facilities and Services

To plan and develop a timely, orderly and efficient arrangement of public facilities and services to serve as a framework for urban and rural development.

Response: As noted in the response to Goal 9, Economic Development, the Project takes advantage of existing infrastructure in the immediate vicinity of the site—this includes energy distribution facilities in the form of the Hermiston Generating to McNary transmission line, as well as transportation access to the Site, using Westland Road, I-82, and 84. As described in detail in Exhibit U – Public Services, sewage collection and treatment, water supplies, stormwater facilities, solid waste disposal, and police and fire service facilities, as well as health care, public education, housing, and traffic would not be adversely affected.

Goal 12 Transportation

To provide and encourage a safe, convenient and economic transportation system.

Response:

Energy Facility Site

As detailed in the Traffic Impact Analysis included as Exhibit U – Public Services, Appendix U-1, the Energy Facility Site is not expected to have a significant impact on the adjacent roadway traffic operations upon build-out. Furthermore, during the construction phase, all study intersections will continue to operate within the applicable performance standards and targets. The Energy Facility Site is estimated to generate approximately 8 and 12 trip ends during the a.m. and p.m. peak hours of a typical weekday, respectively. At the peak of the construction period, the projected construction effort is estimated to generate approximately 196 trip ends during each of the weekday a.m. and p.m. peak hours.

Intersection sight distances are adequate at both the permanent and temporary (construction-related) proposed site access intersections. A truck turning path analysis found that the proposed permanent site access driveway design will accommodate truck ingress and egress movements without impacting the existing guard rail at the railroad crossing, provided that all truck movements are made to/from the south (i.e. via the I-84/Westland Road interchange).

Natural Gas Pipeline

There will be no permanent traffic impacts from the construction of the natural gas pipeline. To the extent that mitigation of temporary construction-related traffic impacts is required, simple travel demand management measures such as carpooling, construction worker shift staggering, and temporary traffic control measures can reduce these impacts. Such measures will be adopted as needed based on consultation with the entities listed above.

Transmission Line

No permanent traffic impacts will result from the reconductoring of the transmission line. To the extent that mitigation of temporary construction-related traffic impacts is required, simple travel demand management measures such as carpooling, construction worker shift staggering, and temporary traffic control measures can reduce these impacts. Such measures will be adopted as needed based on consultation with the entities listed above.

Step-up Substation

No permanent traffic impacts will result from the construction of the step-up substation. To the extent that mitigation of temporary construction-related traffic impacts is required, simple travel demand management measures such as carpooling, construction worker shift staggering, and temporary traffic control measures can reduce these impacts. Such measures will be adopted as needed based on consultation with the entities listed above.

Goal 13 Energy Conservation

To conserve energy.

Response: The purpose of the Project is to generate power for use by Pacific Northwest industrial, municipal, commercial, and residential users. The design and location of the Station will provide excellent load balancing for wind power produced along the Columbia River, which should help to stabilize the electric power grid in the area and foster further renewables development. The Station will be a highly efficient natural gas–fired open cycle combustion-turbine generating facility, using state of the art equipment. By using an area adjacent to an existing utility facility and by using an existing ROW for the natural gas pipeline and transmission line, the Station has been planned and designed to minimize environmental impacts.

Mitigation of specific impacts has been addressed within the applicable ASC exhibits.

Goal 14 Urbanization

To provide for an orderly and efficient transition from rural to urban land use, to accommodate urban population and urban employment inside urban growth boundaries, to ensure efficient use of land, and to provide for livable communities.

Response: The Station will be located outside of a UGB. The development of the Station (as a utility) will not encourage additional residential or commercial developments outside of the UGB, primarily because the development of the Station is designed to provide for regional electrical provision, not local service in the surrounding rural area.

Goal 15 Willamette River Greenway

Goal 16 Estuarine Resources

Goal 17 Coastal Shorelands

Goal 18 Beaches and Dunes

Goal 19 Ocean Resources

The Station, natural gas pipeline, transmission line, and step-up substation will not be located within the areas of the Willamette River or those along the Oregon Coast or coastline. Therefore, Goals 15 through 19 are not applicable to this ASC.

K.8 FEDERAL LAND MANAGEMENT PLANS

OAR 345-021-0010(1)(k)(D) *If the proposed facility will be located on federal land:*

(i) Identify the applicable land management plan adopted by the federal agency with jurisdiction over the federal land.

(ii) Explain any differences between state or local land use requirements and federal land management requirements;

(iii) Describe how the proposed facility complies with the applicable federal land management plan;

(iv) Describe any federal land use approvals required for the proposed facility and the status of application for each required federal land use approval;

(v) Provide an estimate of time for issuance of federal land use approvals; and

(vi) If federal law or the land management plan conflicts with any applicable state or local land use requirements, explain the differences in the conflicting requirements, state whether the applicant requests Council waiver of the land use standard described under OAR 345-021-0010(1)(k)(B) and (C) of this subsection and explain the basis for the waiver.

Response: The Station will not be located on lands under federal land use jurisdiction. However, the step-up substation and a portion of both the transmission line and the underground line are located on property controlled by BPA. The remainder of the underground line and the underground termination structure are located on property owned by BLM and controlled by the U.S. Army Corps of Engineers. Neither BPA, BLM, nor the U.S. Army Corps of Engineers have a federal land management plan that would be applicable to the Project.

K.9 REFERENCES

Emerson, Stephen. 2012. Cultural Resources Survey for the Bonneville Power Administration's Port of Morrow Land Acquisition Project, Morrow County, Oregon. Archaeological and Historical Services, Eastern Washington University. Short Report No. 1140. Submitted to Bonneville Power Administration.

Sorte, B., Mary Corp, Clive Kaiser, and Randall Mills. 2009. Minimum Parcel Size for Viable Adaptive Farms in Umatilla County: An Economic Analysis. Oregon State University Extension Service and Agricultural & Resource Economics Department - Rural Studies Program (Nov. 2009).

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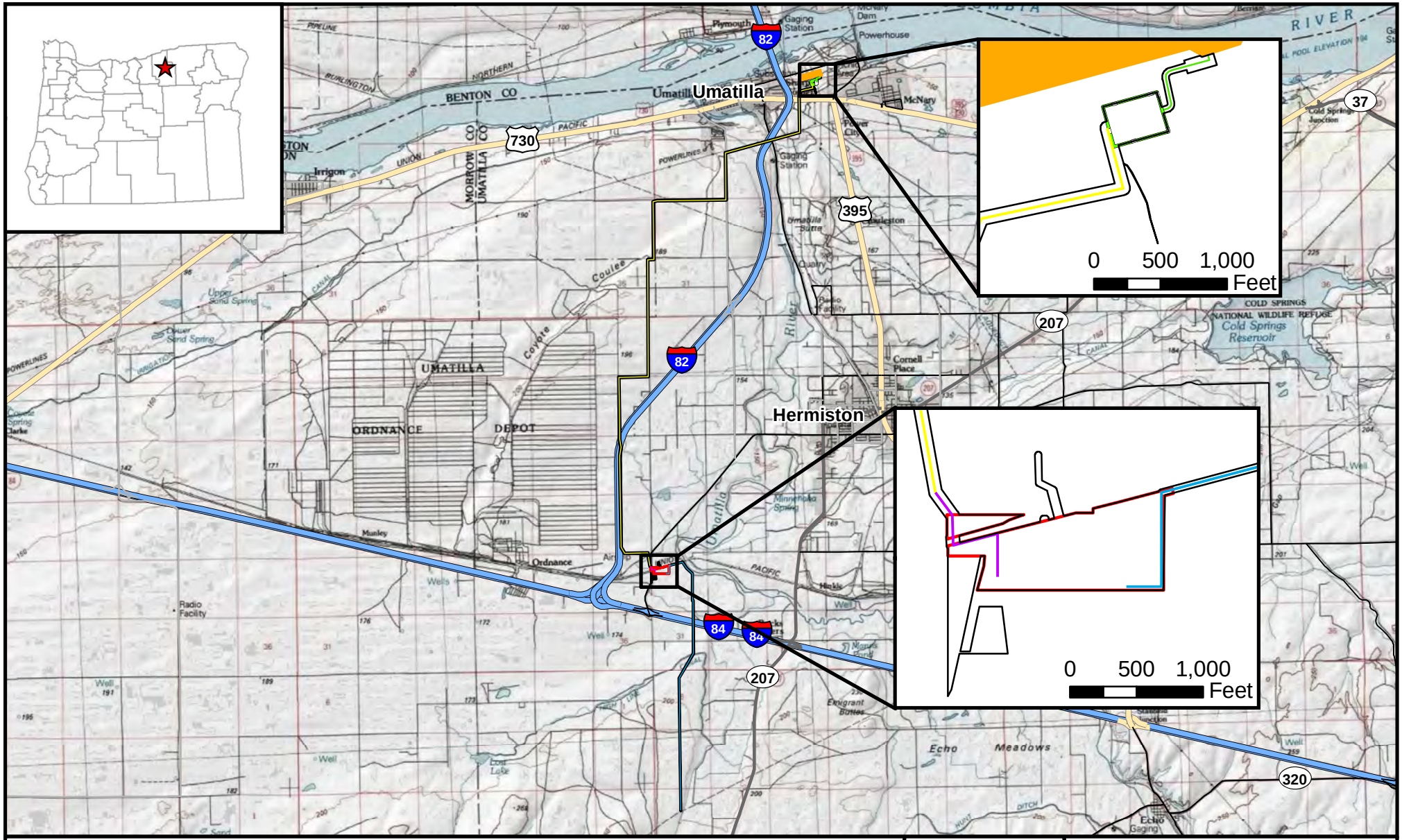

NORTH

0 6,000 12,000 Feet

Scale: 1 Inch = 12,000 Feet

Legend

- Site Boundary
- Energy Facility Site
- McNary Substation
- Step-up Substation Boundary
- Existing Transmission Line
- Proposed Transmission Line
- Prposed Underground Transmission Line
- Proposed Gas Line

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Figure K-1
Project Overview
Perennial Wind Chaser Station
Umatilla County, Oregon

Source: Umatilla Co. (2011), ORMAP (2012); USDA (2012); ESRI (2013) ; and Burns & McDonnell (2014)

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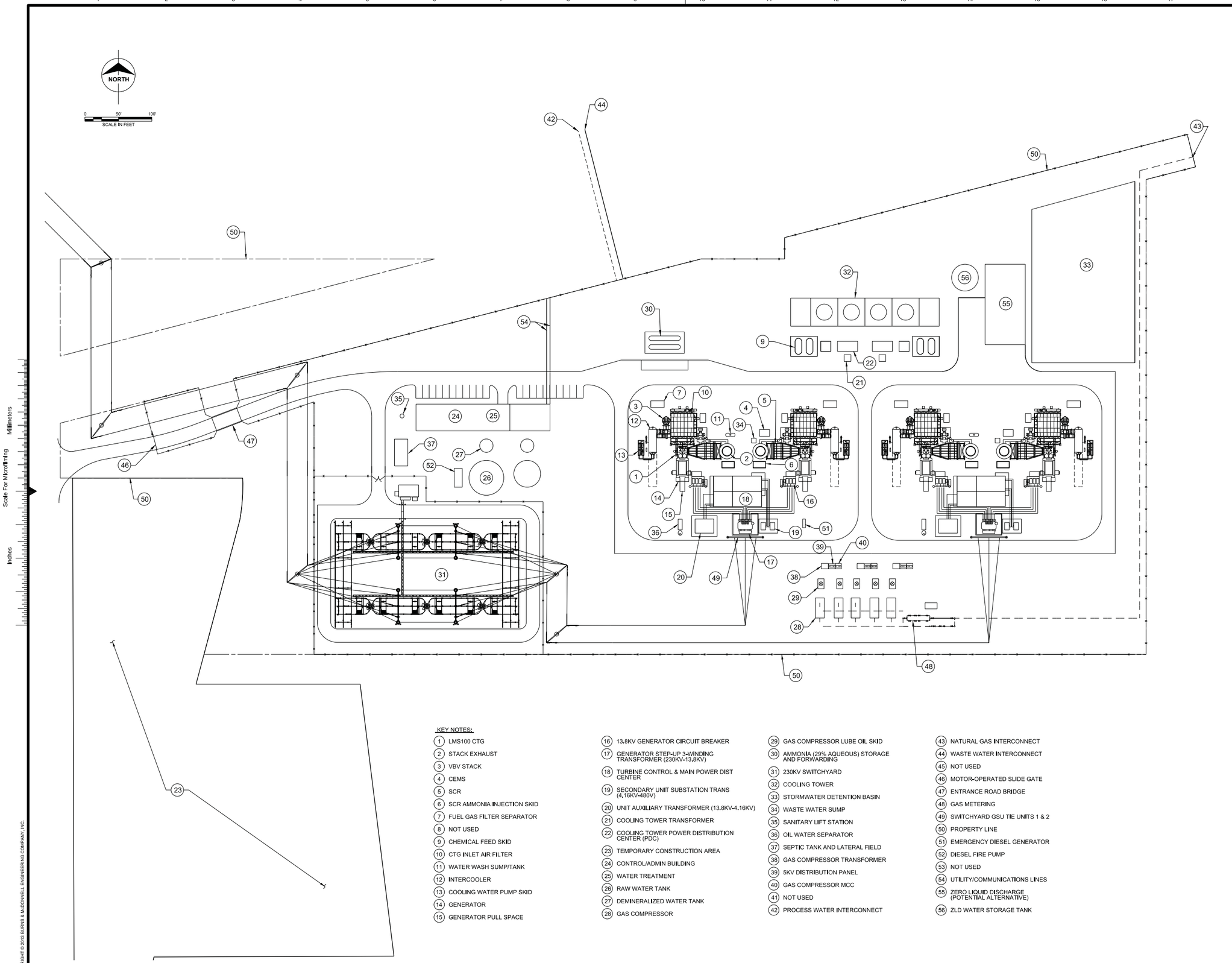

KEY NOTES:

1. LMS100 CTG
2. STACK EXHAUST
3. VBV STACK
4. CEMS
5. SCR
6. SCR AMMONIA INJECTION SKID
7. FUEL GAS FILTER SEPARATOR
8. NOT USED
9. CHEMICAL FEED SKID
10. CTG INLET AIR FILTER
11. WATER WASH SUMP/TANK
12. INTERCOOLER
13. COOLING WATER PUMP SKID
14. GENERATOR
15. GENERATOR PULL SPACE
16. 13.8KV GENERATOR CIRCUIT BREAKER
17. GENERATOR STEP-UP 3-WINDING TRANSFORMER (230KV-13.8KV)
18. TURBINE CONTROL & MAIN POWER DIST CENTER
19. SECONDARY UNIT SUBSTATION TRANS (4.16KV-480V)
20. UNIT AUXILIARY TRANSFORMER (13.8KV-4.16KV)
21. COOLING TOWER TRANSFORMER
22. COOLING TOWER POWER DISTRIBUTION CENTER (PDC)
23. TEMPORARY CONSTRUCTION AREA
24. CONTROL/ADMIN BUILDING
25. WATER TREATMENT
26. RAW WATER TANK
27. DEMINERALIZED WATER TANK
28. GAS COMPRESSOR
29. GAS COMPRESSOR LUBE OIL SKID
30. AMMONIA (29% AQUEOUS) STORAGE AND FORWARDING
31. 230KV SWITCHYARD
32. COOLING TOWER
33. STORMWATER DETENTION BASIN
34. WASTE WATER SUMP
35. SANITARY LIFT STATION
36. OIL WATER SEPARATOR
37. SEPTIC TANK AND LATERAL FIELD
38. GAS COMPRESSOR TRANSFORMER
39. 5KV DISTRIBUTION PANEL
40. GAS COMPRESSOR MCC
41. NOT USED
42. PROCESS WATER INTERCONNECT
43. NATURAL GAS INTERCONNECT
44. WASTE WATER INTERCONNECT
45. NOT USED
46. MOTOR-OPERATED SLIDE GATE
47. ENTRANCE ROAD BRIDGE
48. GAS METERING
49. SWITCHYARD GSU TIE UNITS 1 & 2
50. PROPERTY LINE
51. EMERGENCY DIESEL GENERATOR
52. DIESEL FIRE PUMP
53. NOT USED
54. UTILITY/COMMUNICATIONS LINES
55. ZERO LIQUID DISCHARGE (POTENTIAL ALTERNATIVE)
56. ZLD WATER STORAGE TANK

no.	date	by	ckd	description

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date AUGUST 6, 2013	detailed R. SEDLACEK
designed R. SEDLACEK	checked

PERENNIAL WIND CHASER STATION

UMATILLA COUNTY, OREGON

DETAILED FACILITY SITE PLAN

project | contract

drawing **FIGURE K-2** rev.

sheet of sheets

file

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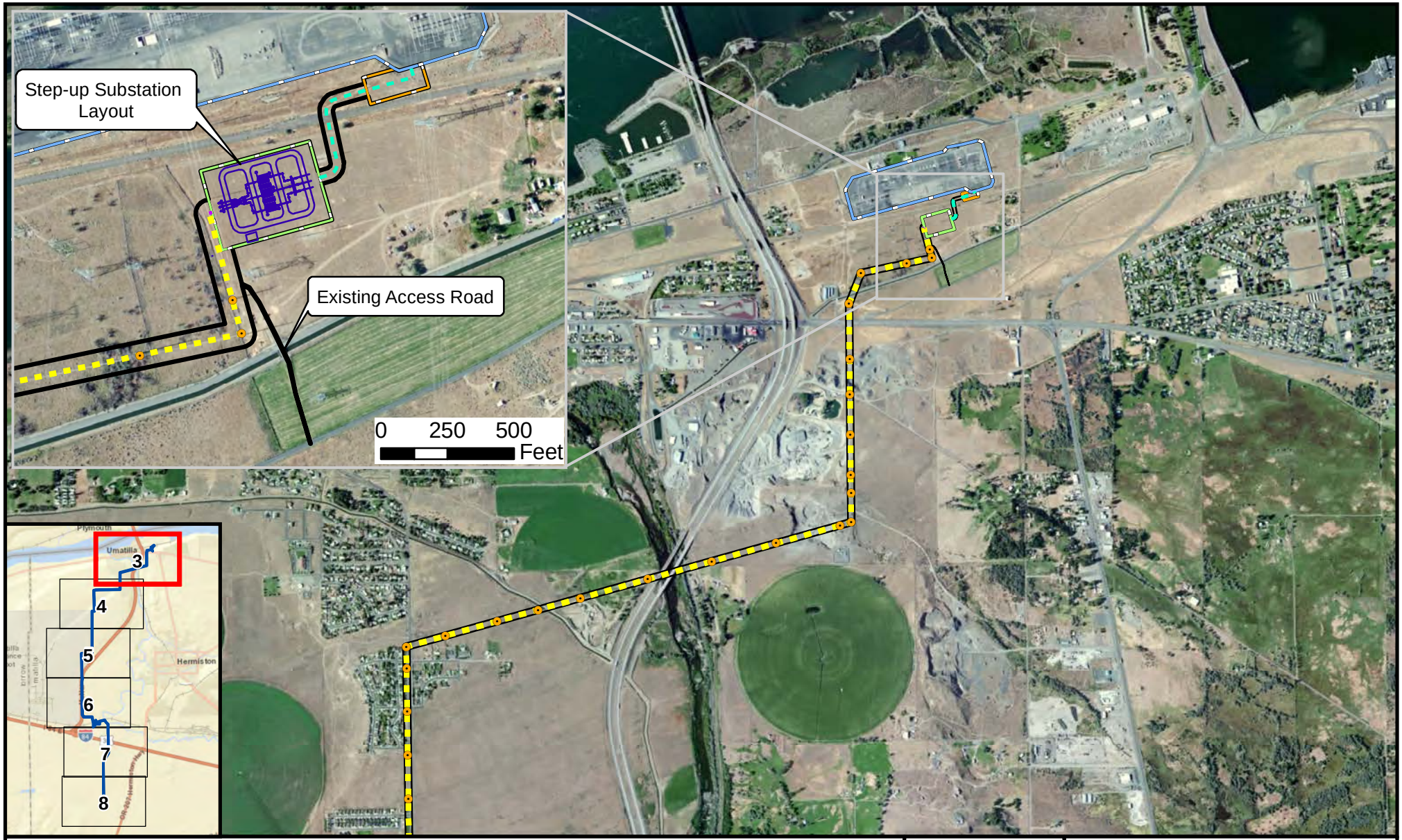

NORTH

0 1,000 2,000
Feet

Scale: 1 Inch = 2,000 Feet

Legend

- Energy Facility Site
- Site Boundary
- McNary Substation
- Step-up Substation Boundary
- Existing Transmission Line
- Proposed Transmission Line
- Proposed Underground Transmission Line
- Proposed Riser Structure Fenced Area
- Proposed Gas Line
- Existing Transmission Structure
- Proposed Transmission Structure

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Figure K-3
Project Overview
Perennial Wind Chaser Station
Umatilla County, Oregon

Source: Umatilla Co. (2011), ORMAP (2012); Bing Maps (2013); ESRI (2012/2013) ; and Burns & McDonnell (2014)

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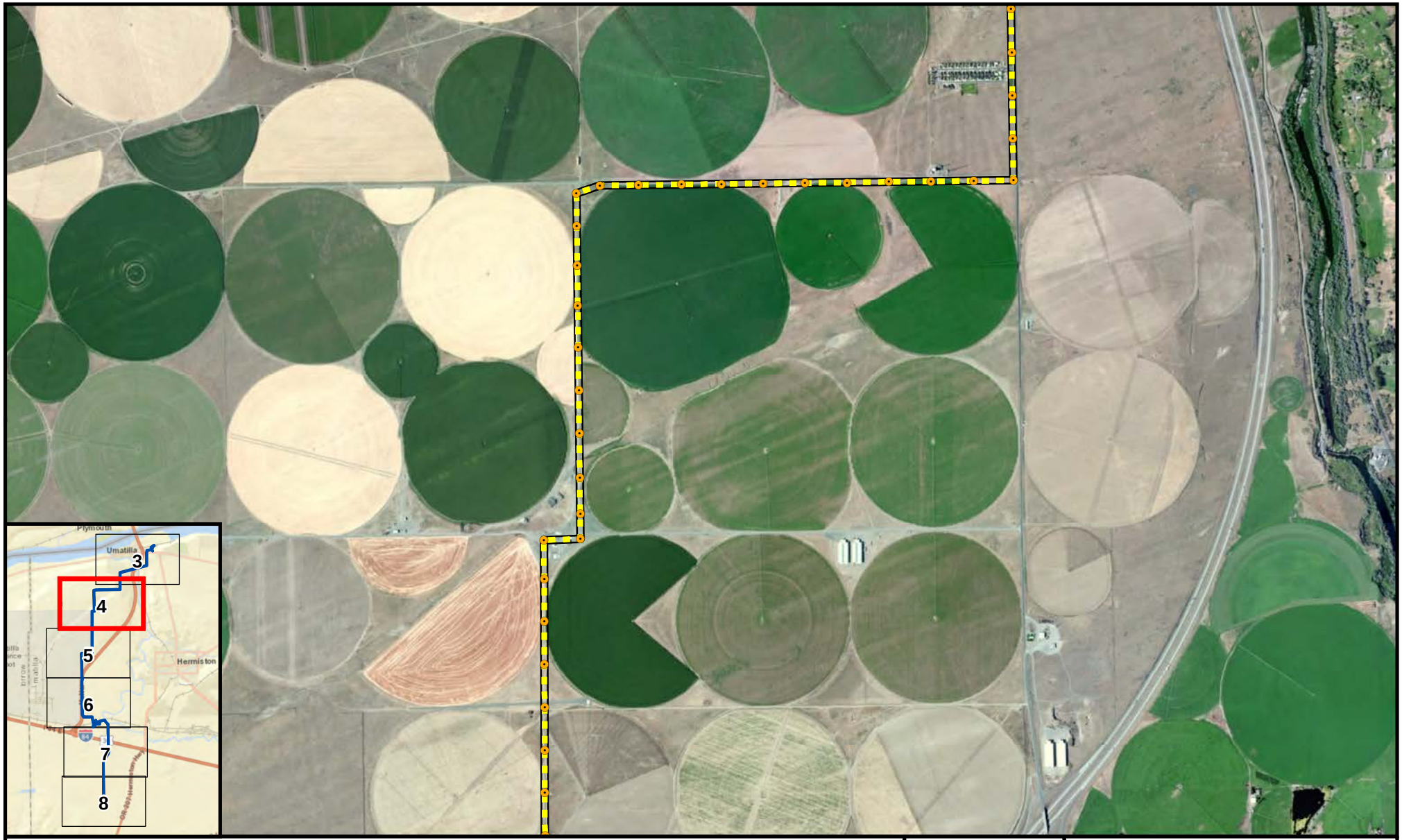

NORTH

0 1,000 2,000 Feet

Scale: 1 Inch = 2,000 Feet

Legend

- Energy Facility Site
- Site Boundary
- McNary Substation
- Step-up Substation Boundary
- Existing Transmission Line
- Proposed Transmission Line
- Proposed Underground Transmission Line
- Proposed Riser Structure Fenced Area
- Proposed Gas Line
- Existing Transmission Structure
- Proposed Transmission Structure

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Figure K-4
Project Overview
Perennial Wind Chaser Station
Umatilla County, Oregon

Source: Umatilla Co. (2011), ORMAP (2012); Bing Maps (2013); ESRI (2012/2013) ; and Burns & McDonnell (2014)

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NORTH

0 1,000 2,000 Feet

Scale: 1 Inch = 2,000 Feet

Legend

- Energy Facility Site
- Site Boundary
- McNary Substation
- Step-up Substation Boundary
- Existing Transmission Line
- Proposed Transmission Line
- Proposed Underground Transmission Line
- Proposed Riser Structure Fenced Area
- Proposed Gas Line
- Existing Transmission Structure
- Proposed Transmission Structure

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Figure K-5
Project Overview
Perennial Wind Chaser Station
Umatilla County, Oregon

Source: Umatilla Co. (2011), ORMAP (2012); Bing Maps (2013); ESRI (2012/2013) ; and Burns & McDonnell (2014)

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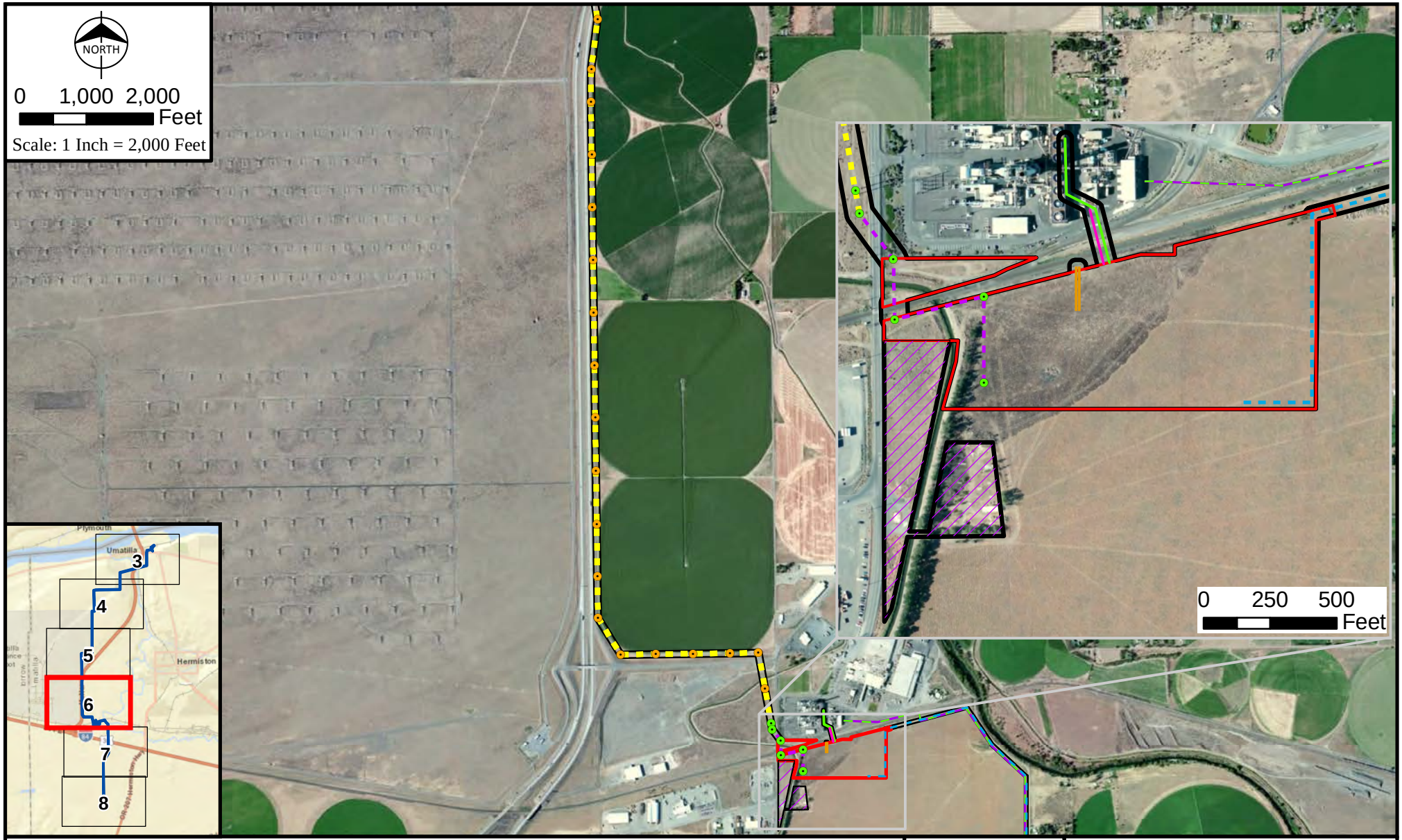

Legend

- Energy Facility Site
- Site Boundary
- McNary Substation
- Step-up Substation Boundary
- Temporary Construction Area
- Proposed Riser Structure Fenced Area
- Existing Transmission Structure
- Proposed Transmission Structure
- Existing Transmission Line
- Proposed Transmission Line
- Proposed Gas Line
- Proposed Underground Transmission Line
- Proposed Utility Line
- Proposed Process Water Interconnect
- Proposed Reclaimed Water Interconnect
- Existing Cascade Gasline (Approximate Location)
- Existing GTN Gasline (Approximate Location)

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Figure K-6
Project Overview
Perennial Wind Chaser Station
Umatilla County, Oregon

Source: Umatilla Co. (2011), ORMAP (2012); Bing Maps (2013); ESRI (2012/2013) ; and Burns & McDonnell (2014)

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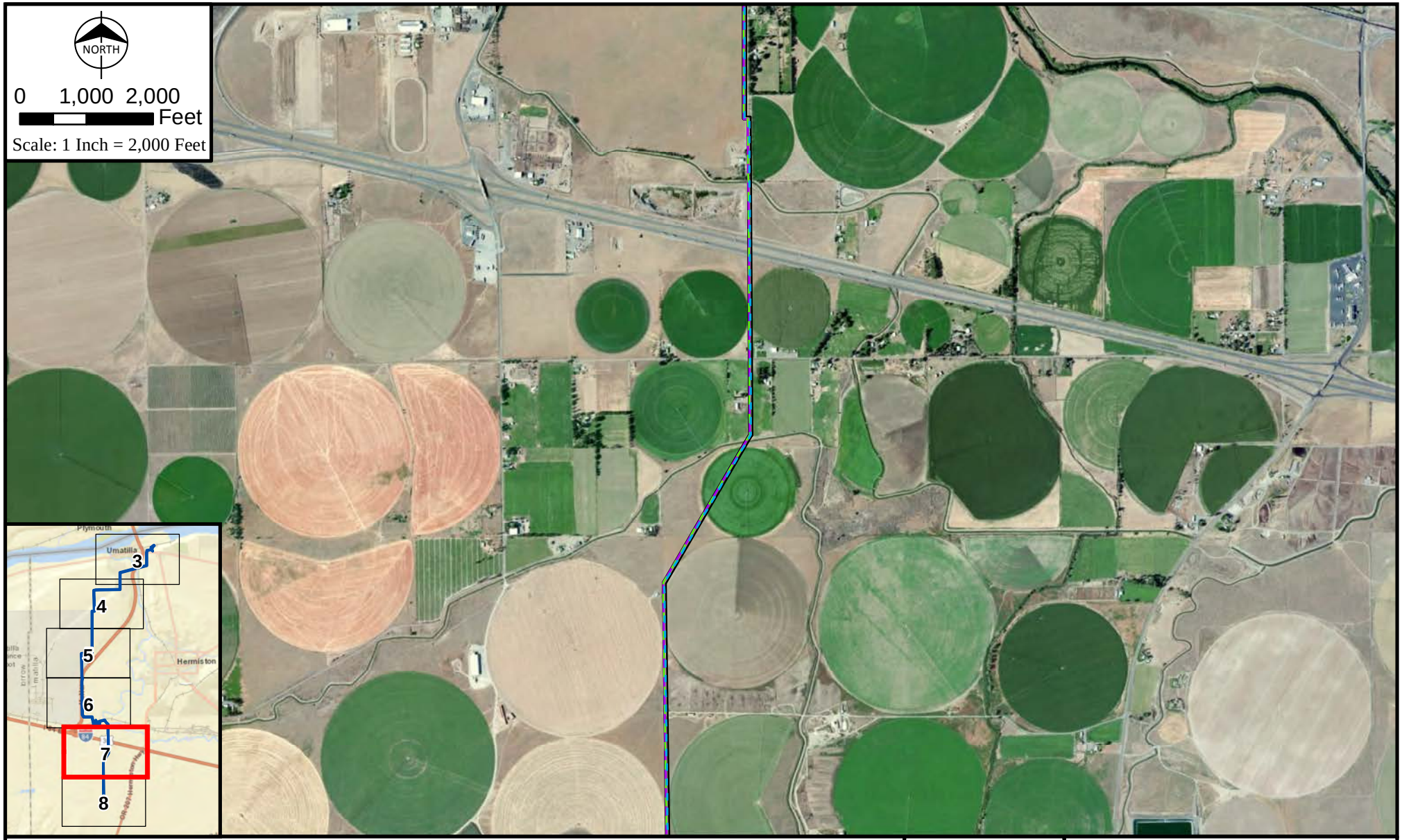

Legend

- Energy Facility Site
- Site Boundary
- McNary Substation
- Step-up Substation Boundary
- Temporary Construction Area
- Proposed Riser Structure Fenced Area
- Existing Transmission Structure
- Proposed Transmission Structure
- Existing Transmission Line
- Proposed Transmission Line
- Proposed Gas Line
- Proposed Underground Transmission Line
- Proposed Utility Line
- Proposed Process Water Interconnect
- Proposed Reclaimed Water Interconnect
- Existing Cascade Gasline (Approximate Location)
- Existing GTN Gasline (Approximate Location)

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Figure K-7
Project Overview
Perennial Wind Chaser Station
Umatilla County, Oregon

Source: Umatilla Co. (2011), ORMAP (2012); Bing Maps (2013); ESRI (2012/2013) ; and Burns & McDonnell (2014)

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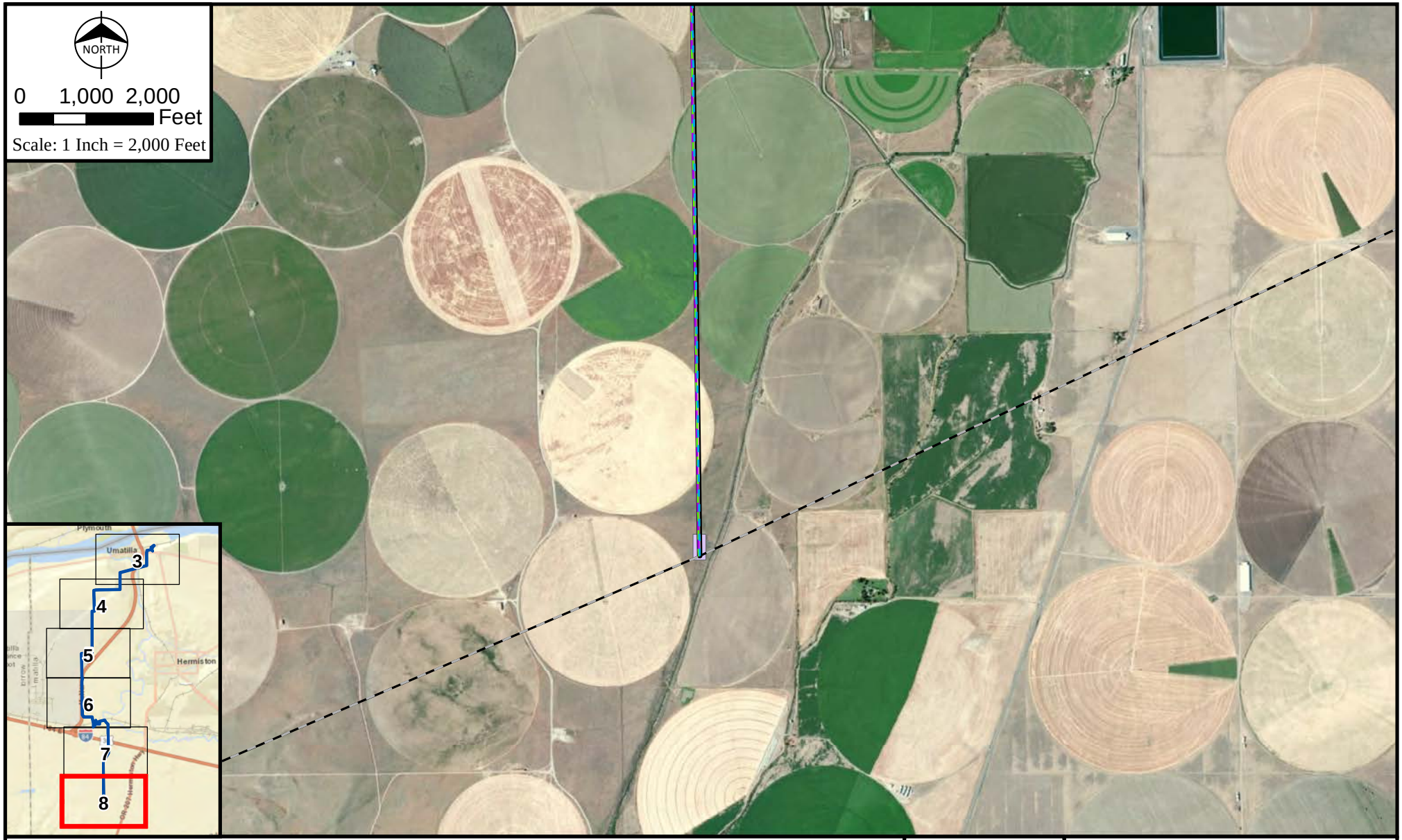

Legend

- Energy Facility Site
- Site Boundary
- McNary Substation
- Step-up Substation Boundary
- Temporary Construction Area
- Proposed Riser Structure Fenced Area
- Metering Station
- Existing Transmission Structure
- Proposed Transmission Structure
- Existing Transmission Line
- Proposed Transmission Line
- Proposed Gas Line
- Proposed Underground Transmission Line
- Proposed Utility Line
- Proposed Process Water Interconnect
- Proposed Reclaimed Water Interconnect
- Existing Cascade Gasline (Approximate Location)
- Existing GTN Gasline (Approximate Location)

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Figure K-8
Project Overview
Perennial Wind Chaser Station
Umatilla County, Oregon

Source: Umatilla Co. (2011), ORMAP (2012); Bing Maps (2013); ESRI (2012/2013) ; and Burns & McDonnell (2014)

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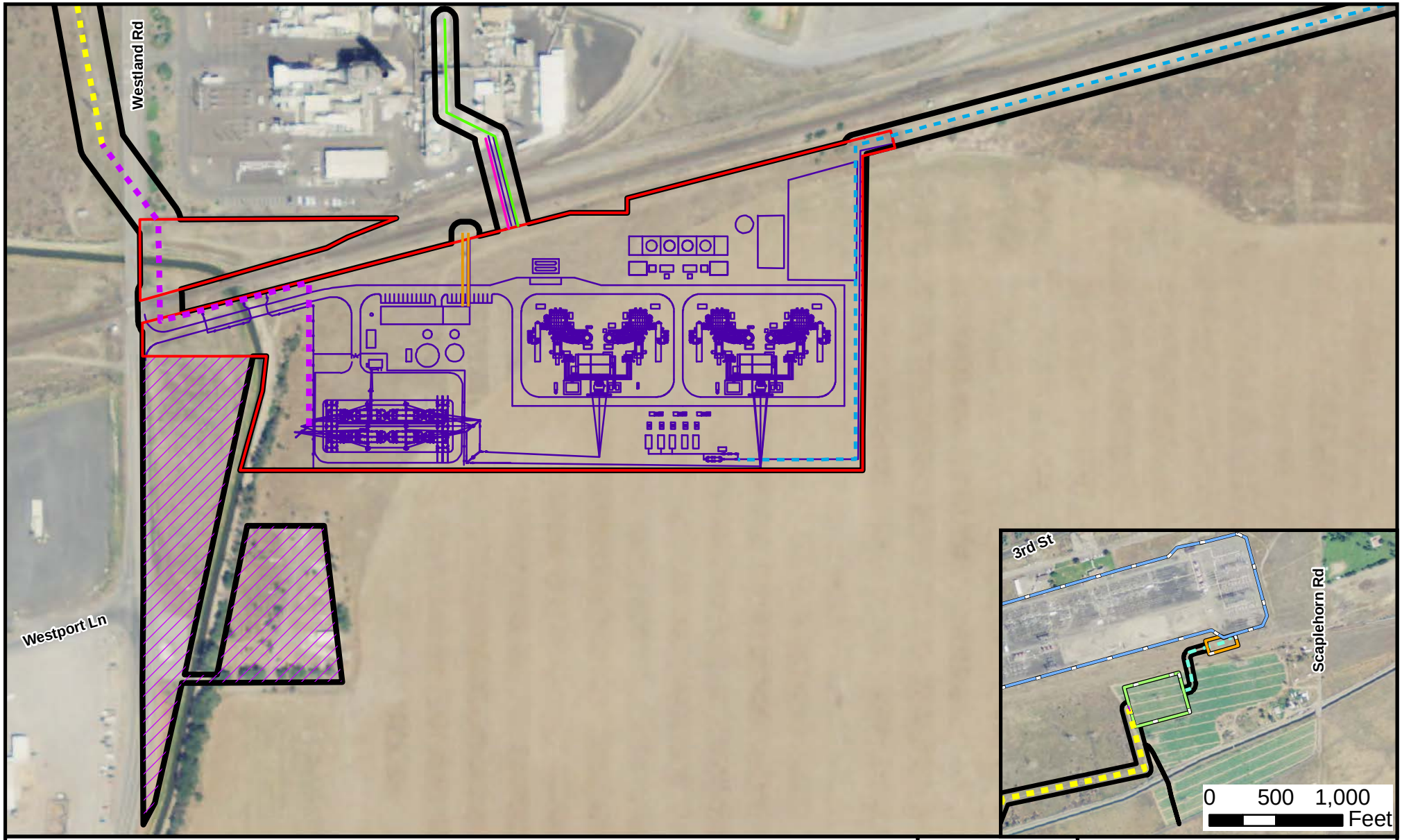

NORTH

0 150 300 Feet

Scale: 1 Inch = 500 Feet

Legend

- Site Boundary
- Energy Facility Site
- Step-up Substation Boundary
- McNary Substation
- Proposed Riser Structure Fenced Area
- Proposed Process Water Interconnect
- Proposed Reclaimed Water Interconnect
- Existing Transmission Line
- Proposed Transmission Line
- Proposed Underground Transmission Line
- Proposed Gas Line
- Proposed Utility Line
- Temporary Construction Area

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Figure K-9
Simplified Site Plan
Perennial Wind Chaser Station
Umatilla County, Oregon

Source: Umatilla Co. (2011), ORMAP (2012); USDA (2012); ESRI (2013) ; and Burns & McDonnell (2013)

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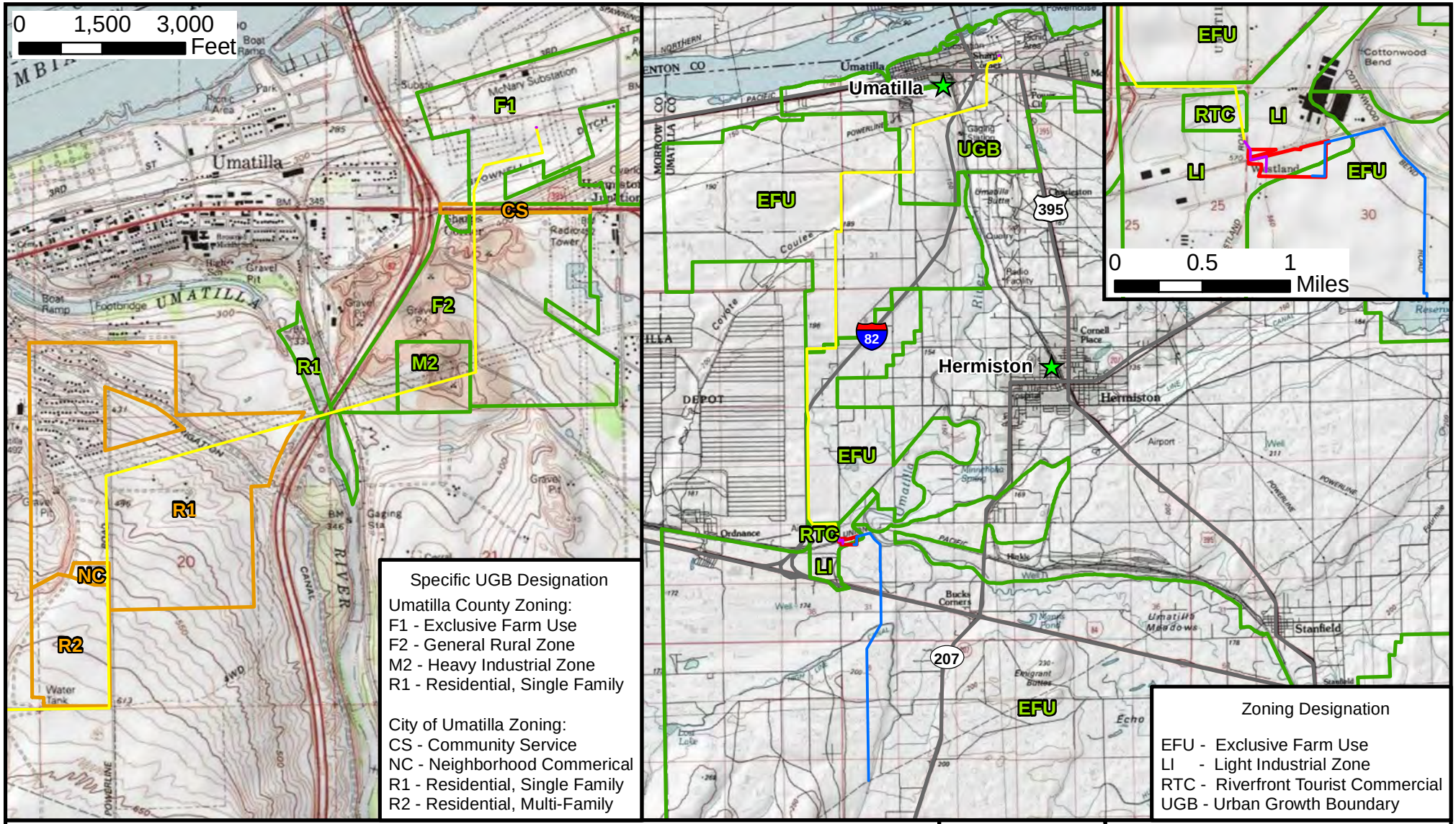

NORTH

0 1.5 3 Miles

Legend

- Energy Facility Site
- Highway
- City/Town
- Existing Transmission Line
- Proposed Transmission Line
- Proposed Gas Line
- County Zoning Boundary
- City Zoning Boundary

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Figure K-10
Zoning Classification & Topography
Perennial Wind Chaser Station
Umatilla County, Oregon

Source: Umatilla Co., ORMAP, ESRI & Burns and McDonnell

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EXHIBIT L

PROTECTED AREAS

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

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L.3 MAP OF PERENNIAL WIND CHASER STATION LOCATION IN RELATION TO PROTECTED AREAS.....L-3

L.4 POTENTIAL IMPACTS.....L-3

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Figure L-2 Protected Lands and Viewshed from the Energy Facility Site

Figure L-3 Protected Lands and Viewshed from the Step-up Substation

L.1 INTRODUCTION

The Energy Facility Siting Council's (Council) standards for energy facility site certificates include guidelines for "protected areas" (Oregon Administrative Rules [OAR] 345-022-0040). OAR 345-022-0040(1) identifies protected areas as those "designated under federal or state statutes or regulations," including, but not limited to, national parks, national monuments, and wilderness areas. There are 16 categories of protected areas.

To issue a site certificate, the Council must find that a project's design, construction, and operation are not likely to result in significant adverse impacts to protected areas (OAR 345-022-0040(1)).

A project's site boundary typically includes "the perimeter of the site of a proposed energy facility, its related or supporting facilities, all temporary laydown and staging areas and all corridors and micrositing corridors proposed by the applicant (OAR 345-001-0010(55))." However, OAR 345-022-0040(3) indicates that "the provisions of section (1) do not apply to transmission lines or natural gas pipeline routes within 500 feet of an existing utility right-of-way containing at least one transmission line with a voltage rating of 115 kilovolts or higher or containing at least one natural gas pipeline of 8 inches or greater diameter that is operated at a pressure of 125 psig [pounds per square inch gage]."

This exhibit provides information regarding the potential impacts of the Perennial Wind Chaser Station project (Project), proposed by Perennial-WindChaser LLC (Perennial) on protected areas. The Project's associated transmission line and natural gas pipeline developments are located within existing utility rights-of-way and both fall under OAR 345-022-0040(3); therefore, those two project components are not subject to the provisions of OAR-345-022-0040(1).

For a detailed site description of the project components, see Exhibit C – Location, Figures C-1 through C-9. As such, the site boundary considered in this analysis of Protected Lands will include the Energy Facility Site and the step-up substation located adjacent to the Bonneville Power Administration's McNary Substation. According to the Amended Project Order issued by the Oregon Department of Energy (ODOE) on September 30, 2013, the "Analysis Area" for Project impacts to protected areas includes the area within the site boundary and 20 miles from the site boundary.

L.2 LIST OF PROTECTED AREAS WITHIN ANALYSIS AREA

OAR 345-021-0010 (1)(l)(A) *A list of the protected areas within the analysis area showing the distance and direction from the proposed facility and the basis for protection by reference to a specific subsection under OAR 345-022-0040(1).*

Response: Table L-1 lists each protected area, and its distance (in miles) and direction from both the Energy Facility Site and the step-up substation. Table L-1 includes only protected areas located within the Analysis Area.

Table L-1 Distance of Protected Areas from the Energy Facility Site and Step-up Substation

Protected Area[1]	Distance (miles) and Direction from the Energy Facility Site	Distance (miles) and Direction from the Step-up Substation
(d) National and state wildlife refuges		
Umatilla National Wildlife Refuge	9.43 NW	7.9 W
Cold Springs National Wildlife Refuge	9.57 NE	7.58 SW
McNary National Wildlife Refuge	14.26 NW	9.3 E
(f) National and state fish hatcheries		
Irrigon Hatchery	11.33 NW	11.14 SW
Umatilla Hatchery	11.64 NW	11.38 W
(h) State parks and waysides		
Hat Rock State Park	11.9 NE	6.54 E
(m) Agriculture experimental stations		
Hermiston Agriculture Research and Extension Center	4.01 NE	7.43 SE
(o) Bureau of Land Management Areas Of Critical Environmental Concern		
Oregon Trail Area of Critical Environmental Concern	5.85 SE	13.57 SE
(p) State wildlife areas and managements areas		
Coyote Springs Wildlife Area	12.9 NW	16.32 SW
Irrigon Wildlife Area	7.6 N	1.98 SW
Power City Wildlife Area	7.01 NE	1.58 SE

Note:

[1] There are no protected areas meeting the following criteria under OAR 345-022-0040(1): (a), (b), (c), (e), (g), (i), (j), (k), (l), and (n).

Key:

N	North
NE	Northeast
NW	Northwest
SE	Southeast
SW	Southwest
W	West

L.3 MAP OF PERENNIAL WIND CHASER STATION LOCATION IN RELATION TO PROTECTED AREAS

OAR 345-021-0010 (1)(l)(B) *A map showing the location of the proposed facility in relation to the protected areas listed in OAR 345-022-0040 located within the analysis area.*

Response**:** Figure L-1 illustrates the locations of the protected areas within the Analysis Area.

L.4 POTENTIAL IMPACTS

OAR 345-021-0010 (1)(l)(C) *A description of significant potential impacts of the proposed facility, if any, on the protected areas including, but not limited to, potential impacts such as:*

(i) Noise resulting from facility construction or operation;

(ii) Increased traffic resulting from facility construction or operation;

(iii) Water use during facility construction or operation;

(iv) Wastewater disposal resulting from facility construction or operation;

(v) Visual impacts of facility structures or plumes, if any;

(vi) Visual impacts from air emissions resulting from facility construction or operation, including, but not limited to, impacts on Class 1 Areas as described in OAR 340-204-0050.

Response**:** The majority of the listed protected areas are located at least 4 miles from the Project. The evaluation of all sites within the Analysis Area, described below, shows no significant potential impacts on the protected areas identified in Table L-1. Detailed impacts from noise, traffic, water use, and wastewater disposal, as well as visual impacts from Project-related structures and air emissions, are described below.

(i) Noise resulting from facility construction or operation;

Response**:** As part of the noise assessment described in Exhibit X – Noise, noise monitoring data were collected at the residences nearest to the proposed Station at the Energy Facility Site and step-up substation (or "noise sensitive property"). "Noise-sensitive property" is defined by noise standards promulgated by the Oregon Department of Environmental Quality (DEQ) and contained in OAR Chapter 340, Division 35 as "real property normally used for sleeping, or normally used as schools, churches, hospitals, or public libraries. Property used in industrial or agricultural activities is not noise-sensitive property unless it meets the foregoing criteria in more than an incidental manner."

As noted in Exhibit X – Noise, the modeling predicted noise level contributions of the Station operation are expected to be no more than 10 A-weighted decibels (dBA) above the lowest hourly average measured at 77935 Cottonwood Bend Road (also known as Underpass Road) approximately 2,970 feet southeast of the proposed Station and at 78401 Cottonwood Bend Road approximately 3,300 feet northeast of the proposed Station. Likewise, the predicted noise level contributions of the step-up substation operation are expected to be no more than 10 dBA above the lowest hourly average measured at the 30221 Scapelhorn Road residence, 958 feet to the east of the center of the step-up substation site.

The estimated noise level due to Station construction at the nearest noise sensitive residence approximately 3,000 feet from the center of the site is 54.4 dBA. Since the Hermiston Agriculture Research and Extension Center is the closest protected area to the Project, at 4.01 miles, and is not considered to be noise sensitive property, noise from construction and operation is not expected to have a significant potential impact on other identified protected areas. Furthermore, noises originating from construction sites are exempt from the DEQ Noise Control Regulations (OAR 340, Division 35), and construction sound levels were estimated "for informational purposes" only.

(ii) Increased traffic resulting from facility construction or operation;

Response: Figure L-1 shows the major roads immediately adjacent to or near protected areas in the analysis area, which are:

- US Route 730 – immediately adjacent to McNary Wildlife Refuge, Hat Rock State Park, and Irrigon Wildlife Area; and 1.9 miles southwest of Irrigon Hatchery, and 0.65 mile southwest of Umatilla National Wildlife Refuge;
- US Route 395 – immediately adjacent to Power City Wildlife Area;
- Interstate 84 – immediately adjacent to Coyote Springs Wildlife Area;
- Interstate 82 – 1.2 miles east of Irrigon Wildlife Area; and
- Washington State Route 14 – immediately adjacent to Umatilla National Wildlife Refuge

The primary roads providing access to the Station site during the construction and operations phases will be Interstate 84, Interstate 82, Westland Road, and Lamb Road. These roads currently provide access for numerous active facilities in the immediate vicinity of the Project, including a 123-bay FedEx freight terminal, the Lamb Weston Hermiston Facility, the Hermiston Generating Plant (HGP), and a cattle stock yard.

A traffic study analyzing impacts related to the construction and operation of the Project (see Appendix U-1 of Exhibit U – Public Services) found that:

- At the expected peak of construction in 2016, the Station would generate approximately 196 total trips at AM and PM peak traffic hours.
- During operation, the Station would generate eight total trips at AM peak hours and 12 total trips at PM peak hours.
- Based on the traffic analysis, all of the intersections in the vicinity of the Station will continue to operate acceptably throughout the construction and operations phases.

The primary road providing access to the step-up substation will be U.S. Route 730. The traffic study did not provide any analysis of traffic conditions in the vicinity of the step-up substation. However, the construction effort for this facility will be substantially less than for the Station, and no full-time jobs will be supported by this facility alone during the operations phase. Impact on local traffic can therefore be expected to be substantially less than the impact generated by the Station.

Traffic generated during construction and operation of the Project will be concentrated at the intersections of Interstate 82 and 84 and Westland Road and Lamb Road. Beyond the vicinity of the Project, traffic will become widely dispersed. However, even considering the worst case scenario that all peak construction traffic of 196 vehicles would drive the same route adjacent to a protected area, it would result in a very minor increase in traffic. For example, based on the latest Oregon Department of Transportation and Washington State Department of Transportation data on Average Annual Daily Traffic (AADT) (ODOT 2012a, 2012b; WSDOT 2013), if all 196 additional vehicle trips occurred on the same road, the Project would have the following impacts:

- Interstate 82 would see an increase of 1.1% (based on an AADT of 17,900 vehicles).
- Interstate 84 would see an increase of 1.1% (based on an AADT of 18,000 vehicles).
- U.S. Route 730 would see an increase of 2% (based on an AADT of 9,800 vehicles).
- U.S Route 395 would see an increase of 0.9% (based on an AADT OF 20,100 vehicles).
- Washington State Route 14 would see an increase of 4.2% (based on an AADT of 4,700 vehicles).

As a result, the traffic generation potential of the Project during both the construction and operations phases is very limited relative to existing traffic on major roads in the Analysis Area, including roads immediately adjacent to protected areas.

(iii) Water use during facility construction or operation;

Response**:** As discussed in Exhibit O – Water Use, the Project will obtain water from the Port of Umatilla under an existing water right. Perennial will obtain potable water supplied either by a new well installed on the property or by treating some of the water from the Port. Perennial

anticipates using approximately 2.3 million gallons during the construction period. A majority of the water will be used in the later phases of construction to support commissioning activities. Potable water demand will be less than 5,000 gallons per day (gpd).

The major uses of water during operation of the Project will be cooling tower makeup water and nitrogen oxide (NO_X) injection. Water will also be used for demineralized water production, potable water, and service water (see Table O-1 of Exhibit O – Water Use which shows the amount of water the Project is expected to need during operation under annual average [1,319 gpm] and summer conditions [1,637 gpm]).

The Port has the capacity and the permits to supply the water need for the construction and operation of the Project; specifically, the Port has an existing surface water right under Permit No. S-49497 for municipal use. Well water usage is expected to be below 5,000 gpd; thus, a groundwater permit will not be necessary. No permits are needed, nor are any permits required to be transferred or modified to supply the water needs of the Project. Therefore, water use by the Project is not expected to have any significant potential impact on protected areas.

(iv) Wastewater disposal resulting from facility construction or operation;

Response: A complete description of wastewater generation and disposal is provided in Exhibit V – Solid Waste and Wastewater. In summary:

- During construction, wastewater will be generated through (a) stormwater, (b) washing trucks and equipment, (c) testing and commissioning, and (d) human waste.
    - Stormwater and wash water will be directed to the onsite stormwater detention basin. Prior to discharge into the basin, stormwater will flow through an oil/water separator.
    - Wastewater generated during testing and commissioning will be either trucked offsite for processing and disposal or routed to the HGP to supplement its cooling tower makeup water demand.
    - Human waste will be collected in portable toilets whose contents will be transported to licensed sewage treatment plant.
- During operations, wastewater will be generated from (a) process water, including primarily cooling tower blow-down, (b) wash water from occasional sump cleanouts and combustion turbine washing, and (c) sanitary waste.
    - Wastewater from process water will be routed to the HGP cooling tower basins as makeup water for that facility's cooling towers. Wastewater from the HGP is routed to Lamb Weston for land application under its Water Pollution Control Facility (WPCF) Permit. Should the Station not be able to send reclaimed water to the HGP for reuse, then Perennial proposes to use a zero liquid discharge

system (ZLD), as described in Appendix V-1 to Exhibit V. In this case, process water would be recycled and reclaimed onsite. Perennial is discussing this option because Lamb Weston's WPCF permit is currently being renewed by DEQ, and Lamb Weston has not been able to consent to the Project potentially sending reclaimed water to the HGP.

- Wash water from sump cleanouts is deemed nonhazardous and would be transported by a wastewater vendor to the Oil Re-Refining Company of Oregon, Inc. for treatment and disposal.
- Sanitary waste would be collected and treated in an onsite septic field, as described in Appendix V-2 to Exhibit V.

There will be no discharges to waterways or in the vicinity of protected areas (see Table L-1); therefore, no protected areas will be impacted by wastewater disposal resulting from facility construction or operation.

(v) Visual impacts of facility structures or plumes, if any;

Response: As discussed in Exhibit R – Scenic Resources, there are no federal, tribal, state, or county land management plans that identify significant visual or aesthetic sites within a 10-mile radius of the Project (the required Analysis Area for Exhibit R– Scenic Resources, OAR 345-001-0010[57]).

An analysis of the potential visual effects of the construction and operation of all Project-related facilities, including the Station, new step-up substation, and natural gas pipeline facilities was conducted on July 26, 2013, to determine whether the Project would affect any other scenic or aesthetic resources within the 10-mile Analysis Area. The process for analyzing visual quality and scenic resources included the following steps:

1. Reviewing documentation for applicable federal, tribal, state, and local planning policies;
2. Reviewing the site plans, aerial photographs, and maps of the area surrounding the Project;
3. Nominating potential key observation points (KOPs) from site plans, aerial photographs, and maps;
4. Evaluating and photographing KOPs in the field;
5. Assessing visual sensitivity of the KOPs based on the types of users, the amount of use, the amount of public interest, and the adjacent land uses;
6. Determining scenic quality based on landform, vegetation, water, color, adjacent scenery, scarcity of the scenic resource, and existing cultural modifications; and
7. Identifying opportunities for mitigation of any impacts that may be caused by construction or operation of the facility.

The most prominent visible features of the Project will be the 90-foot emission stacks, a 40-foot cooling tower, and approximately 656-foot plumes generated by the cooling towers. These features will be similar to the emission stacks, cooling towers, and plumes generated by the adjacent HGP. However, unlike the HGP, the Project will not have large heat recovery steam generators that add bulk and height to power plants which are on the order of 100 feet with the stack measuring approximately 150-175 feet. Rather, the Station will have a selective catalytic reduction/carbon monoxide catalyst structure, which could resemble a short heat recovery steam generator resulting in less bulk and height.

Figures L-2 and L-3 depict a 20-mile radius viewshed analysis showing areas potentially visible from the top of the 90-foot emissions stacks at the Energy Facility Site (L-2) and from the top of the 20-foot step-up substation (L-3). Based on this analysis:

- The emission stacks belonging to the Station at the Energy Facility Site would potentially be visible from portions of the Oregon Trail Area of Critical Environmental Concern, the Hermiston Agriculture Research and Extension Center, the Cold Springs National Wildlife Refuge, Hat Rock State Park, and McNary National Wildlife Refuge.
- The step-up substation would potentially be visible from portions of the Umatilla National Wildlife Refuge, the Irrigon Wildlife Area, and the Irrigon and Umatilla Hatcheries.

However, it should be noted that this analysis takes into account topography and height of structures only. It is in fact unlikely that the Station and sub-station would generate any significant visual impact to these areas because, as is visible in Figures T-2 and T-3 in Exhibit T – Recreation:

- The HGP and Lamb-Weston Facilities are located adjacent to and directly to the north and west of the Energy Facility Site and would partially obscure views from those directions. In addition, the 90-foot emissions stacks at the Energy Facility Site would not constitute a new visual impact from most directions, as they would be located adjacent to the 150–175 feet stacks belonging to the HGP.
- The step-up substation will be located adjacent to and directly to the south of the much larger McNary Substation, blocking views from the north, north-east, and north-west. Urban development in the city of Umatilla would likely block views from points to the west and southwest, including the protected areas cited above.

Cooling tower plumes may occasionally be visible or partially visible from the identified protected areas nearest to the Station (e.g., Hermiston Agriculture Research and Extension Center). Visual impacts of the Station's cooling tower plumes are discussed in detail in Exhibit Z – Cooling Tower.

These plumes generally will be visible during the same time periods and under the same weather conditions as those emanating from the neighboring HGP, and they will occur primarily during the late fall and winter months, when cloud cover is often present. The combined impact of the cooling tower plumes of the HGP and the Station is also reviewed in Exhibit Z – Cooling Tower. The occurrence of long visible plumes is expected to be minimal due to ambient weather conditions and cloud cover; therefore, it is highly unlikely that plumes emanating from the cooling towers would have a significant visual impact on protected areas. No potential significant adverse impacts warranting mitigation from the cooling tower operation are expected

(vi) Visual impacts from air emissions resulting from facility construction or operation, including, but not limited to, impacts on Class I Areas as described in OAR 340-204-0050.

Response: Visual impacts are discussed in Exhibit R – Scenic Resources.

Perennial must obtain a Prevention of Significant Deterioration (PSD)/Air Contaminant Discharge Permit (ACDP) from the Oregon Department of Environment Quality (DEQ) before constructing or operating the Project. The Oregon DEQ's air permitting process will ensure that air emissions from the Station will not result in a significant adverse visual impact to any Class I areas.

The 20-mile Analysis Area surrounding the Station does not include any of the Class I PSD Areas described in OAR 340-204-0050. The nearest Class I Area to the Station, the Eagle Cap Wilderness Area, is located over 133 miles from the Station. Perennial addresses these visual impacts to Class I Areas in Section 6.16 of its PSD/ACDP application. A copy of the application is included in Exhibit E – Permits.

The PSD/ACDP also addresses the Project's visual impacts upon the Columbia River Gorge National Scenic Area, which is located at its nearest distance about 121 miles away. This negligible impact is addressed in Section 6.18 of the PSD/ACDP. In summary, because of the distance and the low level of air emissions, the Station will have a negligible visual impact on Class 1 and the Columbia River Gorge.

L.5 REFERENCES

ODOT (Oregon Department of Transportation). 2012a.*Traffic Flow Map 2012: Oregon State Highway System*. http://www.oregon.gov/ODOT/TD/TDATA/tsm/docs/Flow_Map_2012.pdf Accessed June 25, 2014.

_____. 2012b. *2012 Traffic Volumes on State Highways*. Page 81 (Umatilla-Stanfield Highway). http://www.oregon.gov/ODOT/TD/TDATA/tsm/docs/TVT_2012.pdf. Accessed June 27, 2014.

WSDOT (Washington State Department of Transportation). 2013. *2013 Annual Traffic Report*. In cooperation with the United States Department of Transportation Federal Highway Administration. Page 89 (State Route no. 014). Accessed on 6/27/2014. http://www.wsdot.wa.gov/mapsdata/travel/pdf/Annual_Traffic_Report_2013.pdf

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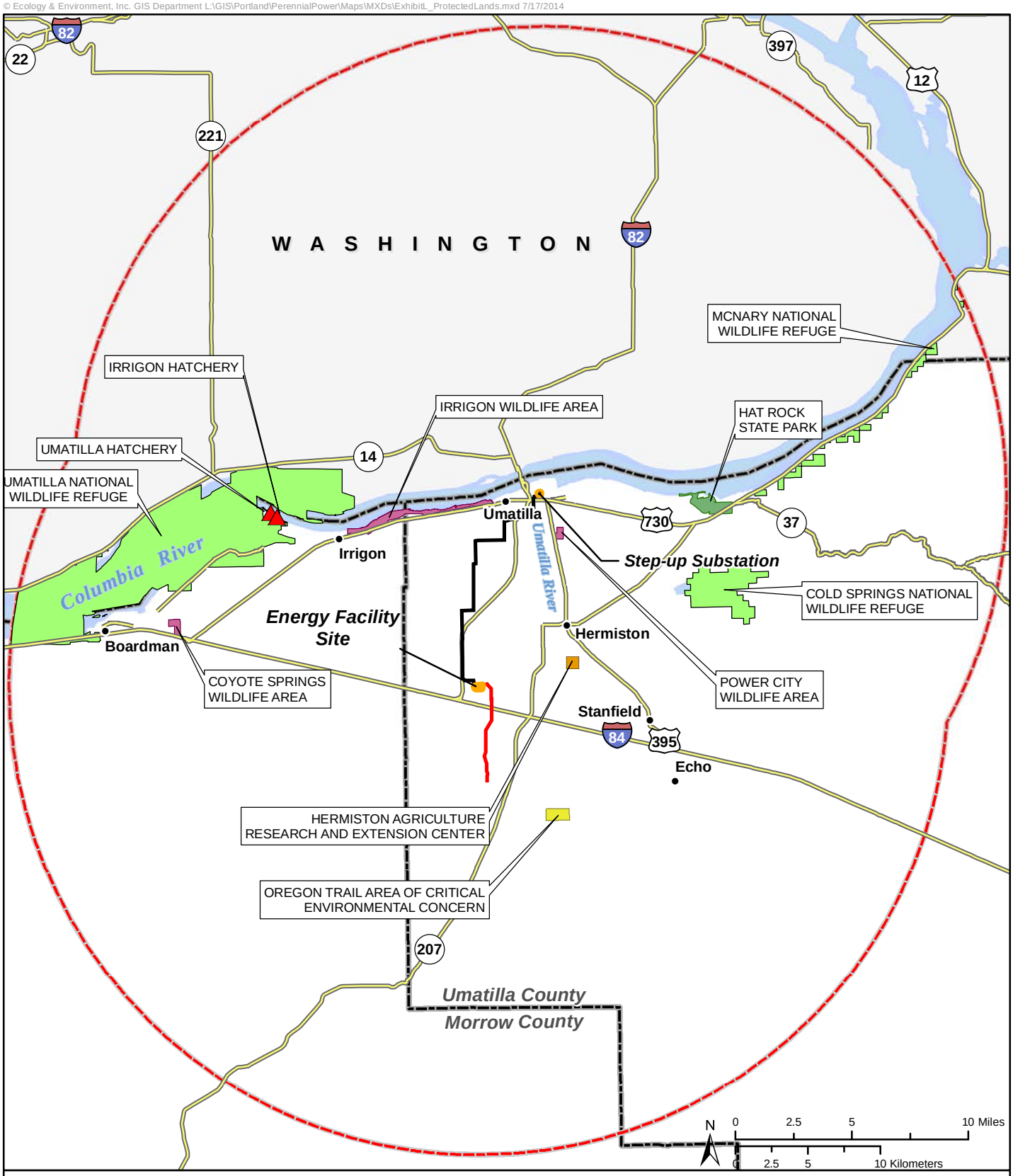

Energy Facility Site & Step-up Substation
Natural Gas Pipeline
Existing Transmission Line
Analysis Area (20-mile Radius)
City
Major Roads
County Boundary

Protected Lands
Agricultural Experimental Station
Fish Hatchery
State Wildlife Areas
National Wildlife Refuge
Oregon State Parks
BLM Area of Critical Environmental Concern

Sources: ESRI 2010

Figure L-1

Protected Lands within 20 Miles of the Site Boundary

Perennial Wind Chaser Station

July 2014

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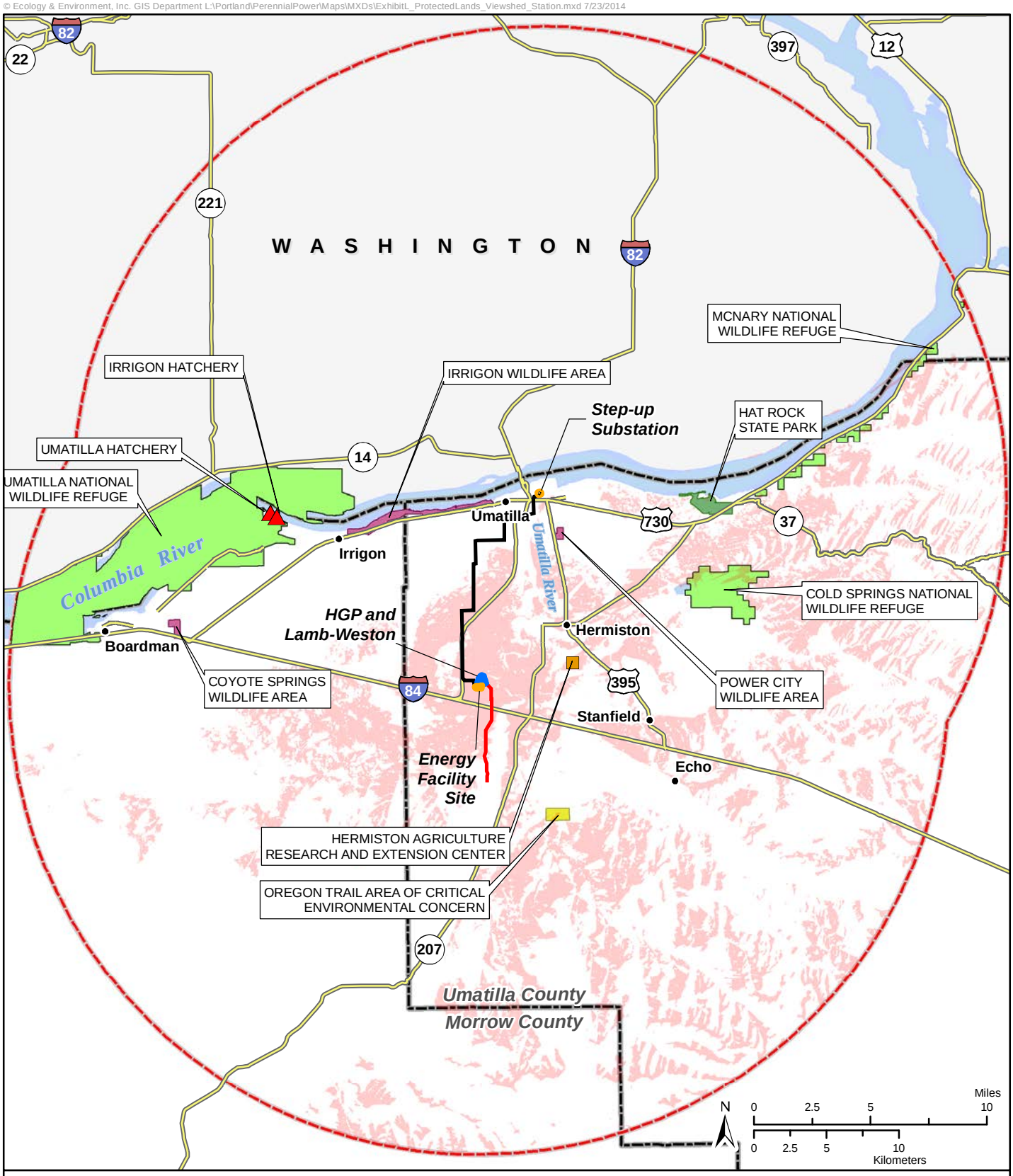

Energy Facility Site & Step-up Substation
Natural Gas Pipeline
Existing Transmission Line
Analysis Area (20-mile Radius)
City
Major Roads
County Boundary

Sources: ESRI 2010

Raw Viewshed from Top of 90-foot Stack at Wind Chaser Station

Protected Lands

Agricultural Experimental Station
Fish Hatchery
State Wildlife Areas
National Wildlife Refuge
Oregon State Parks
BLM Area of Critical Environmental Concern

Figure L-2

Protected Lands and Viewshed from the Energy Facility Site

Perennial Wind Chaser Station

July 2014

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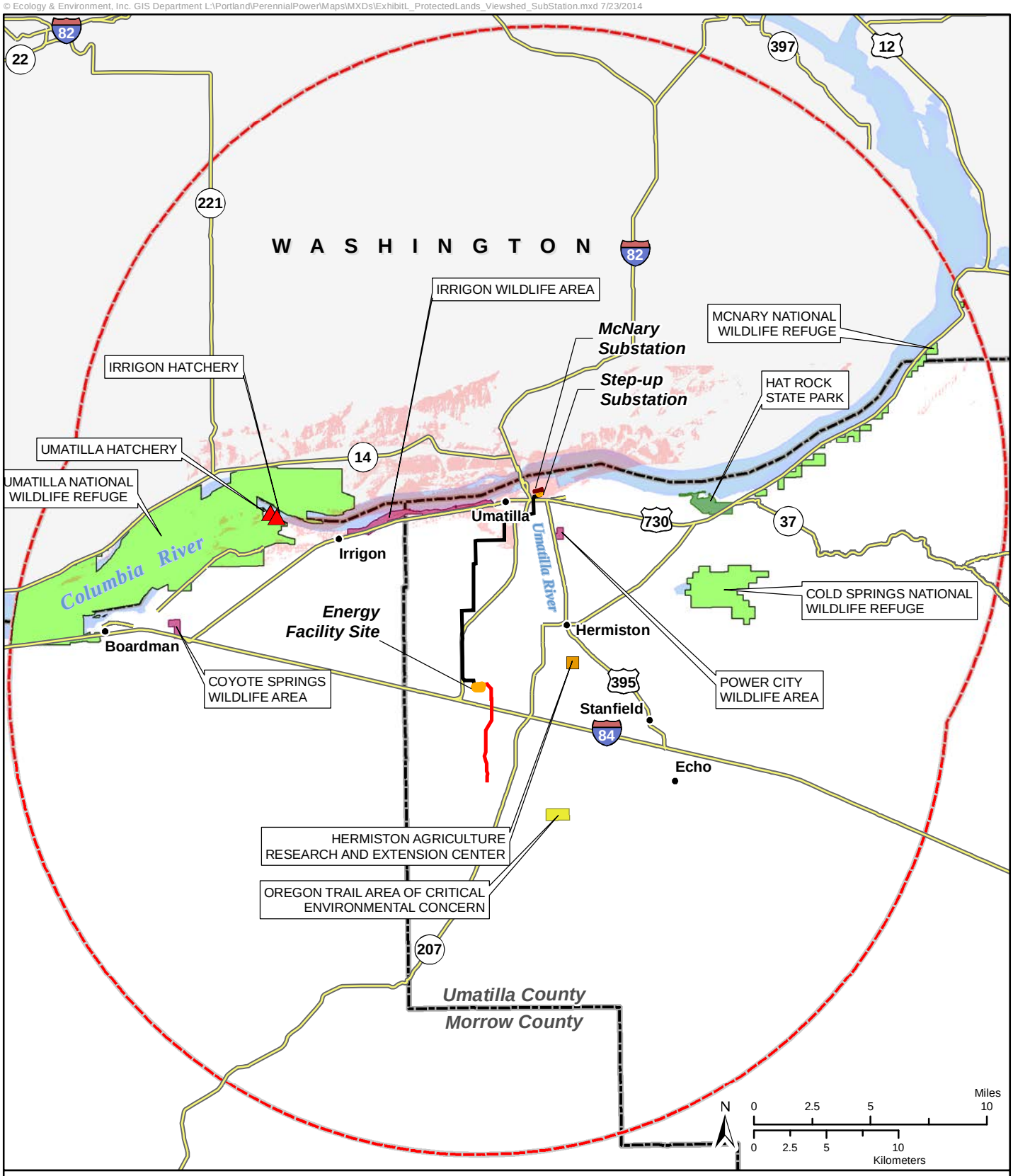

Energy Facility Site & Step-up Substation
Natural Gas Pipeline
Existing Transmission Line
Analysis Area (20-mile Radius)
City
Major Roads
County Boundary

Raw Viewshed from Top of 20-foot Substation

Protected Lands
Agricultural Experimental Station
Fish Hatchery
State Wildlife Areas
National Wildlife Refuge
Oregon State Parks
BLM Area of Critical Environmental Concern

Sources: ESRI 2010

Figure L-3

Protected Lands and Viewshed from the Step-up Substation

Perennial Wind Chaser Station

July 2014