SCZO § *3.7* NATURAL *HAZARDS COMBINING ZONE (NH)*

In any Zone that is combined with the (NH) Combining Zone, the requirements and standards of this Section shall apply in addition to those set forth in the primary zone, provided that if a conflict occurs, the more restrictive provisions shall govern.

Response: Portions of the underground collection system and the southern most portion of the 230kV transmission line will be located within the NH Zone (see Figure K-1) and are addressed under the NH zone criteria, below.

1. *Purpose - The purpose of the (NH) Combining Zone is to promote and protect the public health, safety and general welfare and to minimize potential losses by providing guidelines for development in hazard areas. Development limitations are applicable to developments in areas of surface water accumulations and high groundwater, unstable or fragile soils, geological hazards, and steep slopes, generally those of 30 percent or greater.*

Response: As described below, the project components within the NH zone comply with the purpose this zone as well as the underlying F-1 land use designation.

2. *Uses Permitted Outright - In a Zone with which the (NH) Zone is combined, the following uses are the only uses permitted outright, and these uses are permitted as such if so permitted by the underlying primary zone.*

   (a) *Agricultural uses conducted without locating a structure, except for boundary fences, and, so restricted as to prevent destruction of vegetation sufficient to cause or increase erosion hazards, and so restricted as to prevent the contamination of surface or ground waters.*

   (b) *Industrial or commercial uses that do not require a structure other than surfacing at ground level such as a loading and/or parking area, or that requires only temporary structures that will not necessitate ground excavation for placement or impede surface water flows.*

   (c) *Recreational uses that require no permanent structures, alteration of natural geology, or vegetation removal without immediate replacement.*

   (d) *Portions of a residential use that do not contain buildings such as a lawn, garden, parking or play area, or a related use thereof that does not require excavation or alteration of the natural geology, or vegetation removal without immediate replacement.*

Response: All project components are permitted as a conditional use within the F-1 zone, including the project components that will be located within the NH Zone. Project components (collector system and transmission line) within the NH zone are not permitted outright because both components will require excavation, and in the case of the 230 kV transmission line, will require between 2 and 5 100 to 110 foot poles to be located within the NH zone. A pole is considered a structure under the SCZO definition, which identifies a structure as an "edifice or building of any kind…which requires location on the ground…"

3. Conditional Uses - In any Zone with which the (NH) Zone is combined, all uses permitted by the primary Zone, except those set forth in Subsection (2) above, shall be permitted only as Conditional Uses and subject to the provisions of this Zone and the primary Zone. Said permits shall be processed in accordance with the provisions set forth for a Conditional Use, or as set for by this Ordinance.

Response: All project components are permitted as a conditional use within the F-1 zone, including the project components that will be located within the NH Zone. The project complies the SCZO conditional use standards and supplemental development standards, all of which are described in Section K.4 and K.5 of Exhibit K.

4. Permit for Use or Development in a (NH) Zone - No person shall construct, reconstruct, or install a use or development unless a permit therefore has been received, except for those uses permitted as Outright by Subsection (2) of this Section. Except for the improvement of an existing structure which is less than substantial as determined by a Certified Building Official or the County upon appeal, no permit shall be issued unless the use or development will be determined to be reasonably safe from the applicable hazard, and otherwise in compliance with the provisions of this Section, the Zone, this Ordinance and other applicable regulations.

Response: No construction will occur until the applicant is given written notice of approval of the project application.

5. Application Requirements for a Use in a (NH) Zone - An application for a use or development in a Zone with which the (NH) Zone is combined, shall be accompanied by the following:

(a) Site Investigation Report: An application for a use or development in a (NH) Zone requires a site investigation report for the subject-affected area. The site investigation report shall provide information on the site of the proposed use or development and

surrounding and adjacent lands that are most likely to be affected thereby. Unless the County determines that specific items are not required, the report shall include the information described in this Subsection, together with appropriate identification of information sources and the date of the information. The approved site investigation report may be required to be referenced in the deed and other documents of sale, and may be required to be recorded with the deed of record.

Response: The Golden Hills Application for Site Certificate (ASC) evaluates all land within the project lease area and vicinity and provides the necessary information to comply with the standards set forth in the NH Zone. The lease area is shown in Figure K-1 of the ASC. Exhibit H of the ASC provides analysis of the geologic conditions of the project lease area, including the area within the NH Zone.

Exhibit H of the ASC was completed using the following tools for analysis:

1. A detailed office study and geologic field reconnaissance to preliminarily evaluate seismic and non-seismic related hazards.
2. A review of publications including topographic maps, aerial photos, geologic maps, professional publications, and soil surveys to identify potential subsurface soil and bedrock conditions, bedrock depth and lithology, and structural attitude of faults within the Project.
3. A field reconnaissance along the proposed wind turbine corridors, new access road alignments, power collection system corridors, substations, overhead transmission lines, temporary laydown areas, and existing state and county roads designated for improvements. The field reconnaissance concentrated on identifying geologic hazards, particularly in areas of concern identified during the review of geologic literature.
4. A seismic hazard analysis to establish earthquake ground motion parameters suitable for use in design of the proposed facilities. Amplification factors at the Project were based on a review of existing geologic information and information collected during the site reconnaissance.

Analysis Results

The work conducted and described in Exhibit H of the ASC suggests that project transmission lines do not cross (nor are near) areas that show gross indicators of landslide (recent, historic, and ancient) activity or marginal stability.

The underground collectors for the Project within the NH zone will be placed underground. Native soil and bedrock stability concerns at cuts, fills and culvert crossings will be addressed during future, site-specific

geotechnical studies planned during the design phase of the Project. This future work will include development of design and construction recommendations that minimize the potential for destabilizing marginally stable slopes and minimize the potential for stream erosion at stream crossings.

(b) Background Data in Report. At a minimum, the Site Investigation Report shall contain the following background information:

1) A general analysis of the affected site and general area's topography and geology, including faults, folds, geologic and engineering geologic units, and any soils, rock and structural details important to the engineering or geological interpretations and the their relative activity.

Response: Topographic and geologic conditions/hazards within the Project were evaluated by reviewing available reference materials (including publications and State logs of water wells), reviewing topographic and geologic maps, and aerial photos, and conducting a field reconnaissance of the proposed project area. Prior to construction, explorations, testing, and engineering analysis will be conducted for final design purposes.

Topography

The open rolling hills and steeper narrow canyons within the Project range in surface elevation from about 1,100 feet on the northern edge to about 1,900 feet on the rolling hills near the southern edge of the project area. Regionally, the ground surface generally slopes down the north.

Much of the project area ground surface gradient is very flat with a typical range of about 1 to 5 percent in the open rolling hills and near the crest of ridges. There are areas where the slopes approach 10 percent. The gradient with the side slopes of the rolling hills and narrower ridges is generally controlled by near-surface geology (i.e., loess or basalt) and typically ranges from 5 to 10 percent, with some areas approaching 20 to 25 percent and isolated steeper areas (especially where basalt bedrock is exposed at the ground surface).

Geologic Features

All of Sherman County is located within the Deschutes-Columbia River Plateau in north-central Oregon. The project area is located in the Columbia Plateau physiographic province. The province is predominantly a volcanic plateau covering over 63,000 square miles in Oregon, Washington and Idaho. Mountains surround the plateau on all sides; the Okanogan Highlands are located to the

north, the Cascade Range to the west, and the Blue Mountains in Oregon to the south and east. In Oregon, the province surface gently descends northerly towards the Columbia River.

The bedrock that underlies much of the region began erupting approximately 24 million years ago as immense outpourings of basalt. During this time, the voluminous flows of the Columbia River Basalt Group erupted from volcanic vents located in central and northeast Oregon, southeast Washington and Idaho. These eruptions created a massive "flood basalt" province.

The Grande Ronde Basalt and Frenchman Springs and Priest Rapids members, of the Wanapum Basalt, are all part of the Columbia River Basalt Group (CRBG) that comprises the volcanic bedrock in most of the area. The Grande Ronde Basalt is the oldest of the three basalt types and also has the most extensive surface exposure in this study area. The Grande Ronde Basalt consists of fine-grained basalt with a total thickness up to several thousand feet. Quaternary loess (i.e., wind blown silt) deposits cover most of the bedrock in the Project. In general, basalt bedrock is only exposed at the ground surface in valley walls, road cuts, and rock pits.

Near the end of the last major Ice Age about 15,000 years ago, large lakes formed behind massive ice dams in western Montana. When these dams repeatedly failed (on the order of about 40 times), the torrential "Missoula Floods" repeatedly poured massive amounts of water and debris down the Columbia Plateau. These floods continued for about 2,000 years.

Flood elevations likely reached as high as about 1,100 feet above mean sea level (amsl) in the vicinity of the Project. Where side canyons or tributaries enter the Columbia River, the flood waters flowed back into them. Just north of the Project, the lower elevations of the canyons show topographic evidence suggesting scouring by the ebb and flood of the "Missoula Floods".

The massive outpourings scoured the surface of the Columbia Plateau bedrock and also deposited silt, sand, gravel, and cobbles/boulders. After the Missoula Floods, stream and some wind-related depositional and erosive processes continued to dominate the geology of the Columbia Plateau. Alluvium, alluvial fans, and landslides have formed in incised valleys while deposits of wind blown sand and silt (i.e., loess) have formed on top of the basalt bedrock.

Based on the results of this study, the loess covers the underlying basalt bedrock throughout much of the project area. Topographic maps, geologic maps, logs of water wells, and the site reconnaissance indicates that the loess deposit ranges up to about

40 feet thick (averaging about 15 feet). This deposit overlies the basalt bedrock and appears to thin or not exist within the steeper areas along the sides of relatively narrow ridges and within drainageways found throughout the project area (i.e., where basalt bedrock is exposed).

Logs of water wells, native exposures of basalt bedrock, and basalt quarry exposures indicate that the basalt generally is variably fractured, is fresh to slightly weathered, possesses very close to wide joint spacing, and has a variable hardness (generally ranging from medium hard to hard). Where observed, the contacts between layers of basalt show limited or no signs of a distinct weathered soil horizon.

Soils

A relatively thin veneer of soil exists throughout most of the project study area. The soil principally consists of silty loam formed from weathering of loess (i.e., wind-blown silt and fine sand). Where the loess deposit thins, there are variable amounts of weathered rock fragments derived from basalt bedrock that underlies the loess. Where basalt bedrock is exposed at the ground surface, the soil consists of very gravelly/cobbly loamy sand with boulders.

2) Location and approximate depths of seasonal surface water accumulations and groundwater tables, and location and direction of all watercourses, including intermittent flows.

Response: The site topography generally consists of rolling hills, with shallow bedrock depths and a deep groundwater table. Exhibit J (Wetlands) identifies all wetlands, streams and riparian areas in the vicinity of the project. These include Locust Grove Canyon, China Hollow, Mud Hollow, Spanish Hollow, and Grass Valley Canyon. These major drainage features are all tributaries of the Columbia River and considered jurisdictional waters. Of these only Grass Valley Canyon is within the NH Zone. The Grass Valley Canyon heads eastward and continues out of the wetland analysis area to join the John Day River north to the Columbia River.

During June site visits, water was observed in and Grass Valley Canyon. Depth of water in the Grass Valley drainage during the site visit was approximately _____inches.

Comment [WAD1]: Who did the wetlands work? Maybe they know this?

3) A history of soil and water related problems on the site and adjacent lands, which may be derived from discussions with local residents and officials and the study of old photographs, reports and newspaper files.

Response: An analysis of the entire project site, including areas outside of the NH zone, was completed as part of Golden Hills ASC. Exhibit H of the ASC indicates that the Project components have been sited to avoid potential geologic hazard areas that could become destabilized by a seismic event**.** In addition, rock is present at shallow depths, and the groundwater table is deep. Considering these site conditions, the potential for earthquake-induced landslides, lateral spreading, liquefaction and settlement/subsidence at the site are low. Moreover, Exhibit H also concludes that non-seismic geologic hazards, including slope instability and landslides, are not geologic hazards that will impact the project due to site conditions.

A detailed design geotechnical investigation will be conducted prior to the start of construction for the entire project, including those components within the NH Zone. This design study will include exploratory test drilling at key locations where site improvements are proposed. Where needed to enhance understanding of subsurface soil/rock conditions in some areas and provide details on bulk shear wave velocity and other properties, down-hole and surface geophysical studies will be conducted. As needed, field resistivity and other non-destructive geophysical testing will be conducted.

4) The extent of the surface soil formation and its relationship to the vegetation of the site, the activity of the landform, and the locations on the site and surrounding areas.

Response: Exhibits I and J of the ASC describes all soils with the project vicinity and identify general use categories (i.e. wheat/barley production, grazing etc.) recommended for those soils types. Additionally Exhibit H provides a description of soils. Vegetation in the vicinity of Grass Valley is generally intermediate wheatgrass. Data points used to determine the plant communities and locations (see Exhibit J, attachment J-1, Data Points N1 and N2) identified reed canary grass, cattails, and intermediate wheatgrass in areas along the creek in Grass Valley and intermediate wheatgrass on upland areas.

5) The following ground photographs of the site and surrounding areas with information showing the scale and date of photographs and their relationship to the topographic map and profiles:

A. A view of the general area.
B. The site of the proposed development.
C. Any features which are important to the interpretation of the hazard potential of the site,

including all sites of erosion, surface or groundwater accumulations, or accretion.

Response: Ground photos are not currently available for the project, although the Golden Hills ASC and supporting documentation provides extensive information for the entire project site, including areas within the NH Zone. Project area maps using USGS information are included in Exhibit H of the ASC. Furthermore, a detailed design geotechnical investigation will be conducted prior to the start of construction for the entire project, including those components within the NH Zone. This study will include a detailed study of all project components, including those within the NH Zone.

(c) *Topography Map. A topography base map at a scale of not more than 1:100 with a contour interval of 2 feet shall be prepared identifying the following features and accompanied by references to the source(s) and date(s) of information used.*

1) Position of lot lines.
2) Boundaries of the property.
3) Each geological feature classification type.
4) Areas of open ground and the boundaries and species identification of major plant communities.
5) Any springs, streams, marshy areas, standing bodies of water, intermittent waterways, drainage ways, and high groundwater areas with highest annual levels.
6) Cut terraces, erosion scarps, and areas exhibiting significant surface erosion due to improper drainage and runoff concentration.
7) Geological information, including lithologic and structural details important to engineering and geologic interpretations.

Response: The Golden Hills ASC provides much of this information. Exhibit C identifies lot lines and the project's lease area; Exhibit H provides detailed site and geology maps, and Exhibit J identifies water bodies. Furthermore, a detailed design geotechnical investigation will be conducted prior to the start of construction for the entire project, including those components within the NH Zone. This study will include a detailed study of all project components, including those within the NH Zone.

(d) *Subsurface Analysis. If upon initial investigation if it appears there are critical areas where the establishment of geologic conditions at specific depths is required, a subsurface analysis obtained by drilling holes, well logs, and other geophysical techniques shall be conducted, or caused to be conducted by a*

qualified expert, by the person responsible for the site, and investigation report to include the following data as appropriate:

1) The lithology and compaction of all subsurface horizons to bedrock.

2) The depth, width, slope and bearing of all horizons containing significant amounts of silt and clay and any other subsurface layers which could reduce the infiltration of surface waters.

Response: A detailed design geotechnical investigation will be conducted prior to the start of construction for the entire project, including those components within the NH Zone. This design study will include exploratory test drilling at key locations where site improvements are proposed. Where needed to enhance understanding of subsurface soil/rock conditions in some areas and provide details on bulk shear wave velocity and other properties, down-hole and surface geophysical studies will be conducted. As needed, field resistivity and other non-destructive geophysical testing will be conducted to evaluate bulk properties.

Soil and rock samples obtained during explorations will be utilized to evaluate soil and rock characteristics in a laboratory. Such testing will include an array of tests including some or all of the following: index tests to identify general characteristics, shear and compressive tests, soil modulus tests for pavement design, thermal conductivity, and a series of tests to evaluate corrosion potential.

Geotechnical engineering analysis of the field and laboratory data will be conducted. Design recommendations will be prepared to address a myriad of design and construction considerations including geotechnical aspects related to foundations, site grading, utilities, roadways, and improvements to existing infrastructure (e.g., roads, culverts, bridges).

(e) Development Proposal. The site investigation report shall include the following information on the proposed development as applicable:

1) Plans and profiles showing the position and height of each structure, paved areas, and areas where cut and fill is required for construction.

2) The percent and location of the surface of the site, which will be covered by impermeable surfaces.

3) A stabilization program for the development describing:

A. How much of the site will be exposed during construction and what measures will be taken to reduce erosion and soil movement during construction.

B. A revegetation plan designed to return open soil areas, both preexisting and newly created, to a stable condition as soon as possible following construction and the period of time during which revegetated areas will receive revegetation maintenance.

C. Areas to be protected from vegetation loss or ground water pollution shall be identified and means for protection described.

Response: Exact locations for the transmission lines and underground collector facilities have not been determined, therefore, plan and profile drawings have not yet been completed. Transmission towers will likely be single pole towers approximately 100 to 110 feet tall. Transmission towers will be embedded in the ground and backfilled with concrete. Assuming five transmission towers will be located within the NH Zone, approximately 500 ft^2 of new impervious surface would be created, affecting a very small percentage of land within the NH Zone. Underground collector lines will not add any additional impervious surface No other impervious surface will be created within the NH Zone.

Construction of the transmission towers will require approximately 100 ft^2 per tower. Construction areas will be minimized to the greatest extent practicable by limiting staging areas to areas outside of the NH Zone. Staging areas are shown in Figure K-1.

Areas affected during construction will be revegetated after construction is completed. As described in Exhibit I of the ASC, the Project will also comply with the NPDES 1200-C permit requirements by implementing the erosion control plan submitted with the ASC.

(f) Conclusions in the Site Investigation:

1) The site investigation report shall contain conclusions stating the following:

A. How the intended use of the land is compatible with the natural conditions; and

B. Any existing or potential hazards noted during the investigation.

2) Mitigating recommendations for specific areas of concern shall be included.

3) Conclusions shall be based on data included in the report, and the sources of information and facts relied upon shall be specifically referenced.

Response: The detailed design geotechnical investigation to be conducted prior to the start of construction will address the conclusions described under this criterion.

6. Standards for Building Construction in NH Zone

(a) Building construction shall only be approved under conditions that do not adversely affect geological stability, surface or ground waters, or vegetation.

(b) The grading of land and the orientation and design of buildings shall avoid creating conditions that will cause erosion or accretion of soil, or surface and ground water contamination. Where there is some risk of these conditions occurring, a Qualified Geological or Hydrological Expert, whichever is applicable, shall certify that the design and control measures will comply with this standard.

(c) Construction work shall be scheduled and conducted to avoid erosion, and temporary stabilization measures may be needed until permanent installations are accomplished.

Response: The detailed design geotechnical investigation to be conducted prior to the start of construction will address the conclusions described under this criterion. Coordination with Sherman County prior to construction will ensure that these standards are met.

7. Standards for an Access Route in a NH Zone - An access route within a (NH) Zone shall comply with the following provisions:

(a) A road or street shall be stabilized by planking, gravel or pavement as deemed necessary; and

(b) Roadways shall be built without installation of excessive fill, diversion of water, or excessive cuts unless the site investigation determines that such conditions will not be detrimental to the area or create unwarranted maintenance problems or additional hazards.

Response: The detailed design geotechnical investigation to be conducted prior to the start of construction will address the conclusions described under this criterion. Coordination with Sherman County prior to construction will ensure that these standards are met