EXHIBIT F
PROPERTY OWNERSHIP

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

TABLE OF CONTENTS

OAR 345-021-0010(1)(f) *A list of the names and mailing addresses of all owners of record, as shown on the most recent property tax assessment roll, of property located within or adjacent to the site boundary as defined in OAR 345-001-0010. The applicant shall submit an updated list of property owners as requested by the Department before the Department issues notice of any public hearing on the application for a site certificate as described in 345-015-0220. In addition to incorporating the list in the application for a site certificate, the applicant shall submit the list to the Department in an electronic format approved by the Department. Property adjacent to the site boundary means property that is:*

(A) *Within 100 feet of the site boundary where the site, corridor or micrositing corridor is within an urban growth boundary.*

(B) *Within 250 feet of the site boundary where the site, corridor or micrositing corridor is outside an urban growth boundary and not within a farm or forest zone.*

(C) *Within 500 feet of the site boundary where the site, corridor or micrositing corridor is within a farm or forest zone.*

F.1 PROPERTY OWNER NOTIFICATION

Response: OAR 345-001-0010(55) 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." Under this definition, the site boundary is the perimeter of the Boardman Solar Energy Facility (Facility) property, which covers approximately 798 acres and encompasses the photovoltaic solar facility, collection system, generator step-up transformer and substation, 115-kilovolt transmission line, point of interconnection, control house, operations and maintenance building, service roads, an access road, and temporary facilities such as a staging area and batch plant.

The entire area within and surrounding the Facility site boundary is zoned exclusive farm use by Morrow and Gilliam counties. Pursuant to OAR 345-021-0010(1)(f)(C), property owner notification is required within 500 feet of the Facility site boundary. OAR 345-021-0010(1)(f)(A) and (B) are not applicable to the Facility. In addition to the required 500-foot notification, Boardman Solar Energy LLC (Applicant) has elected to notify property owners adjacent to Facility tax lots to ensure adequate public awareness and provide opportunity to comment.

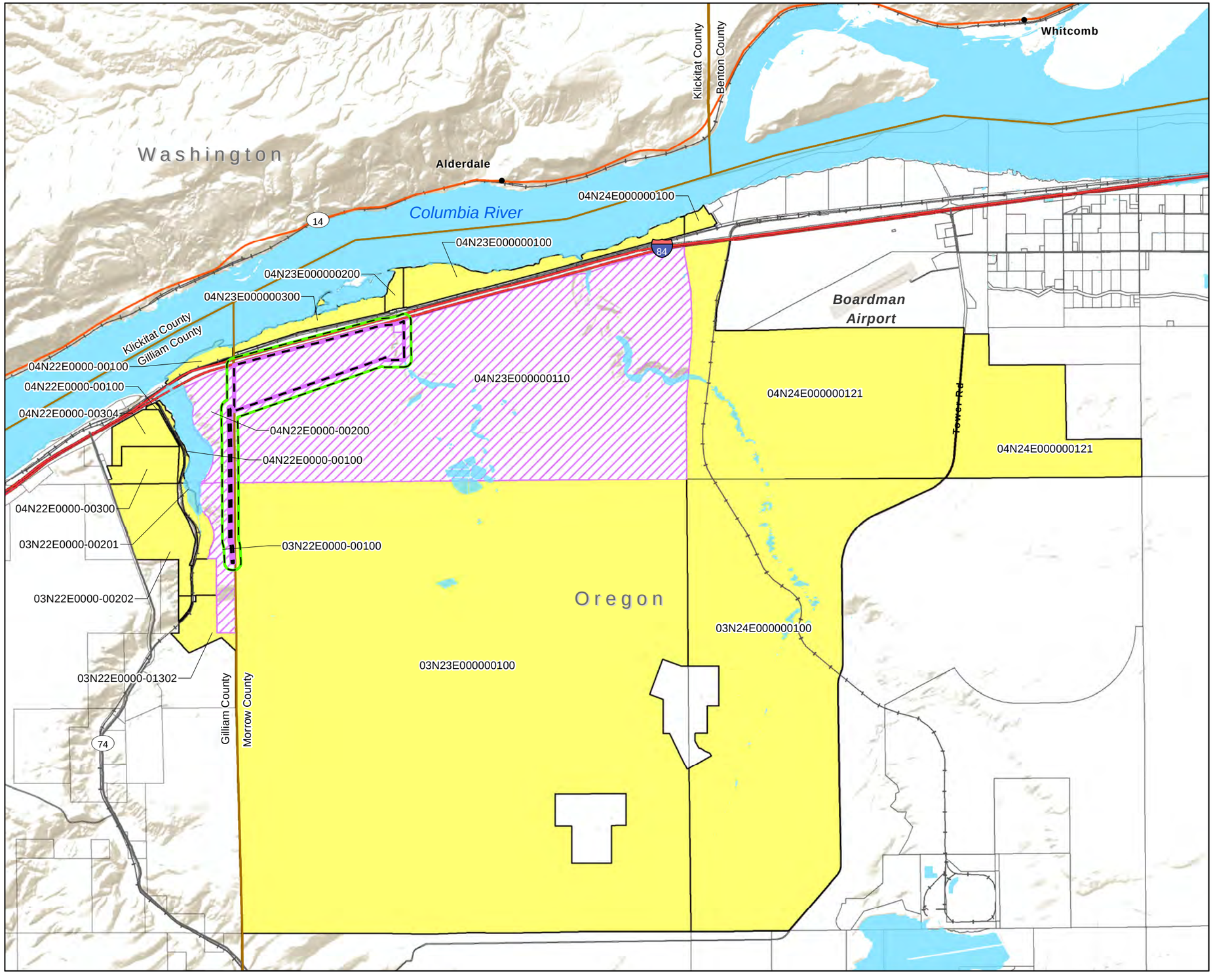
A list of the names and mailing addresses of all owners of record, as shown on the most recent property tax assessment rolls for Morrow and Gilliam counties, of property located within 500 feet of the site boundary, and a separate, non-rule-required list of properties adjacent to Facility tax lots are included as Attachments F-1 and F-2. The Applicant has also submitted these lists in electronic format acceptable for the production of mailing labels.

In addition to the land ownership lists, Figure F-1 shows the tax lot identification numbers of properties within 500 feet of the Facility and adjacent to Facility tax lots.

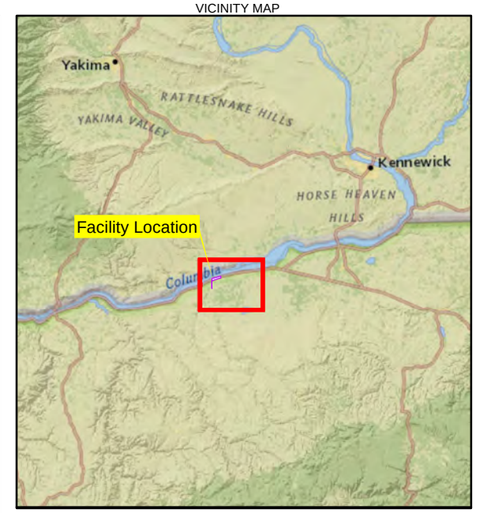
F.2 SUMMARY

On the basis of the information presented above, the Applicant has satisfied the requirements of OAR 345-021-0010(1)(f).

Figure



VICINITY MAP



LEGEND

- Facility Site Boundary
- 500 feet from Facility Site Boundary
- Water
- Facility Tax Lot Used for Notification of Adjacent Owners
- Adjacent Tax Lot

Notes:

1. In addition to property owners within 500 feet, the Applicant has identified adjacent owners for purposes of notification.
2. Morrow County data was obtained on August 30, 2017 and Gilliam County data was obtained on August 24, 2017.

Service Layer Credits: Sources: Esri, USGS, NOAA
Content may not reflect National Geographic's current map policy.
Sources: National Geographic, Esri, DeLorme, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P

N

0 7,000 14,000

Feet

FIGURE F-1
Property Owner Notification Map
Boardman Solar Energy Facility
Application for Site Certificate
Morrow and Gilliam Counties, Oregon

Invenergy
ch2m

Attachment F-1
Land Ownership Within 500 Feet of Facility Site Boundary

ATTACHMENT F-1

Land Ownership within 500 Feet of Facility Site Boundary

Boardman Solar Energy Facility, Application for Site Certificate

Map Tax Lot	First Name	Last Name	Name 2	Company/Organization	C/O-Attn.	Address	City	State	Zip Code
Gilliam County									
03N22E0000-00100				BAIC INC.	MARTIN MYERS	75906 THREEMILE ROAD	BOARDMAN	OR	97818
04N22E0000-00200				BAIC INC.	THREEMILE CANYON FARMS LLC (DBA)	75906 THREEMILE ROAD	BOARDMAN	OR	97818
Morrow County									
03N23E000000100				THREEMILE CANYON FARMS, LLC	MR MARTIN MYERS	75906 THREEMILE ROAD	BOARDMAN	OR	97818
04N23E000000110				THREEMILE CANYON FARMS, LLC	MR MARTIN MYERS	75906 THREEMILE ROAD	BOARDMAN	OR	97818

Source: Gilliam County Assessor, Obtained August 24, 2017; Morrow County Assessor, Obtained August 30, 2017

Attachment F-2
Land Ownership Adjacent to Facility
Tax Lots (Beyond 500 Feet of Facility Site Boundary)

ATTACHMENT F-2

Land Ownership Adjacent to Facilty Tax Lots (Beyond 500 Feet of Facility Site Boundary)

Boardman Solar Energy Facility, Application for Site Certificate

Map Tax Lot	First Name	Last Name	Name 2	Company/Organization	C/O-Attn.	Address	City	State	Zip Code
Gilliam County									
03N22E0000-00201				USA		UNDETERMINED PARTY_ADDRESS	UNDETERMINED CITY		
03N22E0000-00202				THREEMILE CANYON FARMS LLC		75906 THREEMILE ROAD	BOARDMAN	OR	97818
03N22E0000-01302	JUDITH A.	HARRIS				76044 SULLIVAN ROAD	IONE	OR	97843
04N22E0000-00100				USA		UNDETERMINED PARTY_ADDRESS	UNDETERMINED CITY		
04N22E0000-00300				WF INC		PO BOX 1136	NEWBERG	OR	97132
04N22E0000-00304	GREG G.	GRIFFITH	KELLY G. GRIFFITH			76768 HWY 74	IONE	OR	97843
Morrow County									
03N23E000000100				THREEMILE CANYON FARMS, LLC	MR MARTIN MYERS	75906 THREEMILE RD	BOARDMAN	OR	97818
03N24E000000100				THREEMILE CANYON FARMS, LLC	MR MARTIN MYERS	75906 THREEMILE RD	BOARDMAN	OR	97818
04N23E000000200				USA					
04N23E000000300				USA					
04N23E000000100				THREEMILE CANYON FARMS, LLC	MR MARTIN MYERS	75906 THREEMILE RD	BOARDMAN	OR	97818
04N24E000000100				THREEMILE CANYON FARMS, LLC	MR MARTIN MYERS	75906 THREEMILE RD	BOARDMAN	OR	97818
04N24E000000121				INLAND LAND CO, LLC	JENSEN, DAVID R	75906 THREEMILE RD	BOARDMAN	OR	97818

Source: Gilliam County Assessor, Obtained August 24, 2017; Morrow County Assessor, Obtained August 30, 2017

EXHIBIT G
MATERIALS ANALYSIS
OAR 345-021-0010(1)(g)

TABLE OF CONTENTS

This Exhibit provides an inventory of the industrial materials proposed for use during Boardman Solar Energy Facility (Facility) construction and operation, and a description of how the Applicant plans to manage hazardous and nonhazardous substances.

G.1 INDUSTRIAL MATERIALS ANALYSIS AND INVENTORY

OAR 345-021-0010(1)(g) *A materials analysis including:*

OAR 345-021-0010(1)(g)(A) *An inventory of substantial quantities of industrial materials flowing into and out of the proposed facility during construction and operation.*

Response: The primary industrial materials to be used during Facility construction and operation are rock and gravel aggregate, water, concrete, steel, and assorted electrical equipment, along with smaller quantities of other materials, including fuels and oils. Table G-1 presents an inventory of materials flowing into and out of the Facility during construction. Table G-2 presents an inventory of materials flowing into and out of the Facility during operation.

Construction will include land clearing, minimal grading, installation of concrete foundations for inverter and transformer pads, erection of an operations and maintenance (O&M) building and a control house building, installation of electrical controls and associated components, and construction of a new 900-foot private access road and various private service roads within the Facility perimeter fence. During construction, temporary trailers and storage facilities will be required and most materials not in use will be stored in the temporary staging area. Industrial materials flowing into the Facility include fuels and lubricants associated with construction equipment, paints, and solvents. These materials will be stored within the temporary staging area. Oils, lubricants, paints, and solvents will be stored within covered containers such as work trailers and conex boxes to prevent incidental spills or drips from reaching the environment. Fuels will be stored in mobile, double-walled tanks to be parked in the construction staging area. The primary location for fueling will occur offsite at local gas stations, and the mobile tanks will only be used to fuel equipment that cannot travel offsite (such as excavators). Onsite refueling will occur only within the staging areas. The quantity of petroleum products stored onsite at any time will be below 1,320 gallons. Oils will be installed in transformers, approximately 650 gallons in each pad-mounted transformer and approximately 10,000 gallons in the GSU transformer.

The major categories of material that will be flowing into the Facility site are rock and gravel to be used in road and parking area construction, water (used for dust suppression and concrete production), and the solar photovoltaic modules, mounting racks, and trackers. In addition, either aggregate for concrete or concrete will be brought into the Facility site.

For the proposed new 900-foot private access road, improvements to 600 feet of the existing access road from Threemile Canyon Road to the Willow Creek Wildlife Area to accommodate construction and operations of the Facility, and various private service roads within the Facility perimeter fence, the Facility will require approximately 40,287 tons of aggregate consisting of rock and gravel. Gravel will be obtained from a local commercial gravel source. As described in Exhibit O, approximately 9 million gallons of water (30,000 to 50,000 gallons per day) will be used for dust suppression during construction and approximately 700,000 gallons of water will be used for the production of concrete. If water alone does not sufficiently address wind erosion or visible dust, the use of additives may be employed. Dust suppression additives will be chosen based on low environmental and human toxicity, such as polyacrylamide (PAM) or magnesium chloride. Both PAM and magnesium chloride are state and local agency-approved dust

suppression best management practices, and are widely recognized in the construction industry as low-toxicity dust suppression additives.

The solar photovoltaic modules each will consist of 72 cells and 355 watts of polycrystalline. Each module measures approximately 6.4 by 3.3 feet and will be placed on a rack with 10 to 30 other modules and mounted approximately 4 feet off the ground on a single-axis tracker. Modules will be installed along with the rest of the components to form 30 2.5-megawatt module blocks. Mounting racks will be constructed of galvanized steel. Each tracker will be supported by steel posts; post depth will vary depending on soil conditions. If soil conditions require it, concrete foundations will be used, and for the purposes of this analysis, it was assumed that they will be used.

During operation, the Facility will use small amounts of paints, lubrication oils, transformer oil, and aqueous nonpetroleum based solvents. Aqueous nonpetroleum solvents are water-based cleaners that have less than 5 percent volatile organic compounds. They clean by heat, agitation, or soap action rather than by dissolution.

Table G-1. Inventory of Materials to be Used During Facility Construction

Material/Chemical	Purpose	Estimated Quantity Used During Construction	Ultimate Disposition
Construction			
Rock/gravel aggregate	Road construction material: Approximately 1,089 tons for construction of a new 900-foot private access road Approximately 44 tons of material for improving 600 feet of access road from Threemile Canyon Road to Willow Creek Wildlife Area Approximately 38,484 tons for construction of private Facility service roads Approximately 670 tons for a parking area and service yard	40,287 tons	Permanent installation until the useful life of the Facility has expired
Water	Dust suppression	Approximately 9 million gallons of water (30,000 to 50,000 gallons per day) will be used for dust suppression	Evaporation or seepage into the ground
Water	Incorporation into concrete	Approximately 700,000 gallons of water may be required if concrete foundations are used to construct the Facility	Chemically bonded into concrete during curing. Permanent installation until useful life of the Facility has expired.
Concrete	Foundations for O&M building and control house building	240 cubic yards	Permanent installation until useful life of the Facility has expired.
Concrete (if needed)	Foundations for solar module trackers	20,000 cubic yards (maximum)	Permanent installation – to remain onsite below grade after

Table G-1. Inventory of Materials to be Used During Facility Construction

Material/Chemical	Purpose	Estimated Quantity Used During Construction	Ultimate Disposition
			decommissioning of the Facility.
Solar photovoltaic modules, steel mounting racks, and steel trackers	30 module blocks for solar power generation. Each module consists of 72 cells and 355 watts of polycrystalline on a steel mounting rack and single-axis steel tracker.	73,125 steel mounting posts	Permanent installation until useful life of the Facility has expired.
115-kilovolt electrical cable	One 2.1-mile-long overhead transmission line	One 2.1-mile-long overhead transmission line	Permanent installation until useful life of the Facility has expired.
Transmission poles and associated structures	Connection of the Facility substation to the point of interconnection	2.1 miles of transmission line with 400-foot spacing (27 poles)	Permanent installation until useful life of the Facility has expired.
34.5-kilovolt electrical cable	Solar photovoltaic underground collection cables	3.3 miles	Permanent installation until useful life of the Facility has expired.
Generator step-up transformer	Solar power generation	(1) transformer	Permanent installation until useful life of the Facility has expired.
Paint	Prime and finish painting	50 gallons	Unused paint to be recycled
Fuel	Stored onsite in double-walled containers, and used for construction vehicles	Up to 500 gallons	Consumed by construction vehicles
Heavy, medium, and light lubrication oils	Heavy and light equipment lubrication	50 gallons	Lubricants to be recycled
Transformer oil	Generator step-up and pad mount transformers	(31) transformers	Used solvent to be disposed of at an appropriate facility
Aqueous nonpetroleum-based solvents	Cleaning of equipment	20 gallons	Unused solvent to be recycled if possible, or disposed of at an appropriate facility

Table G-2. Inventory of Materials to be Used During Facility Operation

Material/Chemical	Purpose	Estimated Quantity Used During Operation	Ultimate Disposition
Light lubrication oil	Small equipment lubrication	50 gallons	Lubricants to be recycled
Transformer oil	Generator step-up and pad mount transformers	(31) transformers	Used solvent to be disposed of at an appropriate facility
Water	Cleaning solar modules	250,000 gallons per wash, for a total of 0.5 million gallons per year	Evaporation and infiltration into the ground

Table G-2. Inventory of Materials to be Used During Facility Operation

Material/Chemical	Purpose	Estimated Quantity Used During Operation	Ultimate Disposition
Water	Office use in the O&M building	165 gallons per day	Onsite septic system
Aqueous nonpetroleum-based solvents	General cleaner	50 gallons	Unused solvent to be recycled if possible, or disposed of at an appropriate facility

G.2 HAZARDOUS SUBSTANCES

OAR 345-021-0010(1)(g)(B) *The applicant's plans to manage hazardous substances during construction and operation, including measures to prevent and contain spills.*

Response: During Facility construction and operation, it is expected that a minimal amount of hazardous materials will be generated. Hazardous materials are expected to consist of paint, spent lubrication oils, and solvents, as listed in Tables G-1 and G-2.

The hazardous materials required for Facility construction and maintenance will be stored in accordance with U.S. Environmental Protection Agency and U.S. Occupational Safety and Health Administration regulations, as applicable. Safety data sheets of each hazardous material will be stored onsite. Facility personnel will receive guidelines and will be trained on the handling, storage, transport, and disposal of hazardous materials.

The Facility will develop a hazardous materials spill prevention program. Hazardous materials will be stored inside and hazardous material containment and cleanup kits will be maintained and available onsite to minimize the impact resulting from a spill.

Disposal practices for hazardous waste materials will follow applicable regulations and will depend on the type of waste. Paints, oil, and solvents will be disposed of during the Morrow County annual household hazardous waste event, or will be transported to Arlington Landfill.

G.3 NONHAZARDOUS WASTE MATERIALS

OAR 345-021-0010(1)(g)(C) *The applicant's plans to manage non-hazardous waste materials during construction and operation.*

Response: Solid waste generated during construction will include general construction debris such as scrap steel and packing materials from delivery of components, waste concrete, and excavated soil. Excavated soil will be used onsite as fill or transported offsite for disposal. Construction material and office recycling programs will be implemented to the extent practical to reduce the volume of material that will be disposed of as solid waste. General construction debris will be collected by a local contractor and transported to either Finley Buttes or Arlington Landfill.

Waste concrete will be disposed of as solid waste, recycled, or used onsite as fill. Concrete truck chutes will be washed out in a dedicated area onsite, where the concrete will be allowed to harden.

During construction, portable toilets will be provided for onsite sanitary waste management. The portable toilets will be maintained by a local contractor. Construction of the Facility will

include a septic tank to manage operation sewage and wastewater onsite. Water for the Facility will be trucked in and stored in an aboveground water tank.

Sanitary wastewater will be disposed of and treated using an onsite septic system and drain field. Washwater that contains no added cleaning solutions from solar panel and equipment washing will be discharged by evaporation and seepage into the ground. Nonhazardous solid waste generated during operation will be recycled or disposed of as municipal waste, as described in Exhibit V.

G.4 SUMMARY

On the basis of the information presented above, the Applicant has satisfied the requirements of OAR 345-021-0010(1)(g).

EXHIBIT H
GEOLOGY AND SEISMICITY

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

TABLE OF CONTENTS

TABLES

FIGURES

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:*

Response: Section H.1 defines the analysis area of the Boardman Solar Energy Facility (Facility). Sections H.2 through H.9 provide information from reasonably available sources regarding the geological and soil stability within the analysis area. Section H.10 provides a summary of Exhibit H findings.

H.1 ANALYSIS AREA

The analysis area for structural standards (Exhibit H) is the area within the site boundary. "Site boundary" as defined in OAR 345-001-0010(55) means "*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*." In this Exhibit, Boardman Solar Energy LLC (Applicant) equates the term "site boundary" with the analysis area.

H.2 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."*

Response: Topographic and geologic conditions/hazards within the Facility site boundary were evaluated by reviewing available reference materials (such as topographic maps, geologic maps, and aerial photographs) and conducting a field reconnaissance of the proposed Facility area. The findings are described in the following sections. Subsurface explorations, testing, and engineering analysis will be conducted prior to design and construction.

H.2.1 Topographic Setting

The Facility is located approximately 15 miles west of Boardman, Oregon. The site is located on the Columbia Plateau physiographic province, which consists of a large plateau formed by a series of basalt flows. The top of the plateau tends to be relatively flat, but has been dissected by ephemeral streams into steep-sided canyons.

Interstate 84 borders the northern part of the site. The Columbia River flows westward north of the interstate, but has been stilled by Dalles Dam into Lake Umatilla. The Willow Creek canyon borders the western side of the site and Threemile Canyon borders the eastern side of the site. These drainages flow northward toward the Columbia River. The lower part of the Willow Creek canyon is under water and is an estuary of Lake Umatilla.

Site drainage is in a generally northward direction, towards the Columbia River. The side slopes of Willow Canyon, near the proposed transmission line route, are as much as 40 percent, with locally steeper areas.

Elevations within the Facility site boundary range from approximately 400 feet to 450 feet above mean sea level.

H.2.2 Regional Geologic Setting

The Facility site is located within the Columbia Plateau physiographic province. This province was formed by a series of layered basalt flows extruded from vents (located mainly in southeastern Washington and northeastern Oregon) during the Miocene epoch (between 7 and 16 million years before present) (Swanson et al., 1979). Collectively, these basalt flows are known as the Columbia River Basalt Group. These flood basalts cover an area of over

200,000 cubic kilometers (km^3) in Washington, Oregon, and western Idaho with a total estimated volume of over 224,000 km^3 (Hooper et al., 2002; Camp et al., 2003).

At the end of the most recent glaciation, massive outburst floods (the Missoula Floods) poured down the Columbia River. Elevations of floodwaters reached over 1,000 feet in the vicinity of the Facility site. The floods both scoured the bedrock in the area and deposited silt, sand, gravel, and boulders. Ice-rafted "erratics," i.e. boulders of distant origin transported by the great floods, provide evidence of inundation and maximum prehistoric flood heights. Granite and quartzite boulders sitting on top of shallow basalt outcrops were observed on the site, providing evidence of inundation by floodwaters. Wind reworked the sandy and silty material into a mantle of loess.

A geologic map of the Facility site vicinity, adapted using geographic information systems (GIS) and Oregon Department of Geology and Mineral Industries (DOGAMI) resources (Ma et al., 2009) is presented in Figure H-1.

H.2.3 Site Geologic Setting

Figure H-1 shows a map of the geology in the vicinity of the Facility site, adapted using GIS and a DOGAMI geologic data compilation (Ma et al., 2009). The following descriptions of the geologic units found in the area are summarized from Madin and Geitgey (2007); Walker (1973) and Swanson et al. (1981).

H.2.3.1 Surficial Geologic Units

Surficial geologic units in the vicinity of the Facility consist primarily of windblown loess deposits. Loess is comprised of massive, wind-deposited quartzose fine sand and silt. It mantles much of the upland surfaces and hillslopes of the Deschutes Plateau. Because this unit is thin or absent within the Facility site boundary, it is not shown on the geologic map.

Based on observations from the site visit, the loess is typically tan to light brown and composed of silt-sized particles. The thickness of the loess appears to be somewhat discontinuous across most of the area within the Facility site boundary and, where present, forms a thin mantle overlying the basalt. Terracon (2016) notes that the loess ranges from 1.5 to 5 feet thick, based on their subsurface investigation.

H.2.3.2 Bedrock Geologic Units

The Elephant Mountain member of the Saddle Mountains basalt formation underlies the entire Facility site. The Elephant Mountain member is approximately 10.5 billion years old and is comprised of one to three flows that transition from normal to reverse polarity. It is described as "nonporphyritic and it is generally fine grained" and is characterized by relatively high titanium content. This basalt unit is exposed in quarries on the east and southwest sides of the Facility site boundary. In addition, several exposures were observed cropping out on the surface across the Facility site. This basalt unit is dark gray but weathers brown and, commonly, into spheroidal shapes.

H.2.3.3 Structural Geology

No potentially active faults have been mapped within the site area (Weldon et al., 2002). Based on site observations and geologic mapping, the basalt flows that underlie the site are flat-lying. Geologic structure is not expected to impact or influence the construction and operation of the site.

H.2.3.4 Groundwater/Springs

Regional groundwater is deep across the vicinity of the Facility site because of its elevation above the Columbia River and the tributaries downcutting to meet the Columbia River that dissect the plateau. However, shallow perched zones of groundwater appear to exist, as

indicated by springs and wetlands observed in the quarries and also a wetland area in the eastern part of the Facility site.

H.3 SITE-SPECIFIC 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:

H.3.1 Geotechnical Review

Existing published information was reviewed and used to characterize the current geologic conditions and potential seismic hazards in the vicinity of the Facility site. These materials included local, state, and federal government aerial photography, site photographs, published geologic maps, and geotechnical data reports.

For this Application for Site Certificate, a seismic hazard assessment was conducted to characterize seismicity in the vicinity of the Facility site and evaluate potential seismic impacts. This work was based on the potential for regional and local seismic activity as described in the existing scientific literature, and on subsurface soil and groundwater conditions within the Facility site boundary based on geotechnical subsurface investigations. The seismic hazard assessment included the following tasks:

1. Detailed review of literature and databases
2. Compilation and evaluation of existing subsurface data obtained for the vicinity of the Facility site; these data were used to characterize the subsurface soils and construct a subsurface profile
3. Identification of the potential seismic events appropriate for the site and characterization of those events in terms of a series of design events
4. Based on the characteristics of the subsurface soils and design earthquakes, preparation of conclusions and recommendations that included:
    a) Specific seismic events that might have a significant effect on the area within the Facility site boundary
    b) The potential for seismic energy amplification within the Facility site boundary
    c) A site-specific acceleration response spectrum for the area within the Facility site boundary
    d) The potential for earthquake-induced fault displacement, landslides, liquefaction, settlement, and subsidence

H.3.2 Geotechnical Data Report

The following report describing the geologic conditions for the area within the Facility site boundary was reviewed for pertinent information:

- Geotechnical Investigation: *Geotechnical Summary Report, Boardman, Oregon Solar Project, Morrow County, Oregon* (Terracon, 2016). Terracon conducted a geotechnical investigation in 2016 for the Facility. This report contains information on subsurface conditions (including groundwater and corrosion hazard) and a basic review of the Facility's geologic setting. The report also provides a preliminary assessment of site hazards and anticipated foundation conditions.

Josh Butler, P.E., and Greg Warren, P.G. (CH2M) conducted work for this Exhibit. Mr. Butler and Mr. Warren have prepared numerous Energy Facility Siting Council and industrial siting applications for energy facilities throughout Oregon, Washington, Wyoming, California, and Colorado. In addition, they have conducted many geotechnical investigations and evaluations, and have prepared data and design reports for various energy facilities (including wind, geothermal, and solar projects).

H.3.3 Additional Geotechnical Work

At an appropriate stage in the development, additional subsurface explorations must be completed to confirm the anticipated soil conditions and provide final design recommendations. The final design geotechnical investigation will consist primarily of the following tasks:

- Reviewing available data from previous geotechnical explorations in the vicinity of the Facility site
- Reviewing available geologic information from published sources
- Conducting a geotechnical field exploration within the Facility site boundary, including soil borings, test pits, infiltration tests, and possibly geophysical testing
- Collecting additional soil samples for classification and laboratory testing and conducting laboratory tests on selected soil samples, if necessary

Geotechnical analyses will be used to calculate bearing capacity of the soils, conduct stability analyses, and provide engineering recommendations for construction of the structures.

H.4 EVIDENCE OF CONSULTATION WITH 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: While preparing this Exhibit, CH2M consulted DOGAMI publications and other guideline documents from the Oregon State Board of Geologist Examiners (2014).

In November 2016, a CH2M geotechnical engineer spoke with Bill Burns at DOGAMI (Burns, 2016, personal communication). They discussed the general details of the analysis area terrain and geology, any geologic concerns that DOGAMI might have, and CH2M's recommendations for geotechnical exploration prior to construction. Discussion focused on hazards related to ground shaking, landslide potential, and soil conditions at the site.

H.5 TRANSMISSION LINES AND PIPELINES

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.*

Response: The 115-kilovolt overhead transmission line from the Facility substation to the point of interconnection will be approximately 2.1 miles long, depending on the routing to the Bonneville Power Administration line-tap location. The transmission line will have a new 100-foot-wide right-of-way and will be adjacent to an existing transmission line right-of-way. Steel monopoles will support the overhead transmission line. The monopoles will range from

70 to 135 feet in height and will be spaced approximately 400 feet apart, depending on the specific pole type chosen and site conditions. The transmission line will run across flat-lying basalt with a thin or discontinuous cover of loess. Observations during the geologic reconnaissance indicated that the alignment is stable and numerous large transmission towers have been constructed in the vicinity of the Facility site.

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.*

Response: The Facility does not have a pipeline. Therefore, this provision is not applicable.

H.6 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.

H.6.1 Maximum Considered Earthquake Ground Motion

Response: The 2016 U.S. Geological Survey (USGS) National Seismic Hazard Mapping project (USGS, 2016a) developed ground motions using a probabilistic seismic hazard analysis that covered the area within the Facility site boundary. Though these motions are not considered site-specific, they provide a reasonable estimate of the ground motions within the Facility site boundary. Based on the USGS data, the 500-year and 5,000-year earthquakes have bedrock peak ground accelerations of 0.08g and 0.27g, respectively, where "g" is the acceleration of gravity.

For new construction, the site should be designed for the maximum considered earthquake, according to the International Building Code (International Code Council, 2009; referenced as IBC) as amended by the Oregon Structural Specialty Code (International Code Council and State of Oregon, 2014; OSSC). This code adheres to the 2015 National Earthquake Hazards Reduction Program Seismic Design Provisions (Federal Emergency Management Agency, 2015), and the 2016 USGS Seismic Hazard Mapping project (USGS, 2016a). This event has a 2-percent probability of exceedance in 50 years (or an approximately 2,475-year return period). For the Facility, this event has an estimated peak ground acceleration (PGA) of 0.18g at the bedrock surface based on the USGS Seismic Hazard Mapping project. This value of PGA on rock is an average representation of the acceleration for all potential seismic sources (crustal, intraplate, or subduction) mapped as active at the time of the study (USGS, 2016a).

Seismic design parameters were developed in accordance with the IBC. Based on existing subsurface information (including a preliminary review of borings drilled for adjacent facilities, geologic mapping, and nearby well logs), the Facility will be conservatively designed for Site Class B (S_B; rock profile), according to IBC requirements. Once site-specific geotechnical subsurface information is collected, the actual site class determination may improve or worsen.

Final site class determination cannot be made until further site exploration is performed. Table H-1 summarizes the current recommended seismic design parameters for the Maximum Considered Earthquake (MConE) event.

Table H-1. Seismic Design Parameters—Maximum Considered Earthquake

Site Class	Controlling Earthquake Magnitude	Peak Horizontal Ground Acceleration on Bedrock	Soil Amplification Factor, Fa	Peak Horizontal Ground Acceleration at Ground Surface
S_B (475-year return)	6.0	0.08g	1.00	0.08g
S_B (2,475-year return)	6.0	0.19g	1.00	0.19g

Notes: Earthquake magnitude in this table is a mean representation of all known seismic sources. The peak ground acceleration is assumed to be roughly 40 percent of the 0.2-second spectral acceleration, following the recommendations of the IBC.

Fa = sail amplification factor

g = acceleration from gravity

10-Percent Exceedance in 50 Years (475-Year Return Interval):

- Short period (0.2-second) spectral response acceleration at the ground surface, S_{MS} = 0.19g for Site Class S_B
- 1-second period spectral response acceleration at the ground surface, S_{M1} = 0.06g for Site Class S_B

2-Percent Exceedance in 50 Years (2,475-Year Return Interval):

- Short period (0.2-second) spectral response acceleration at the ground surface, S_{MS} = 0.46g for Site Class S_B
- 1-second period spectral response acceleration at the ground surface, S_{M1} = 0.15g for Site Class S_B

The design spectral response accelerations, S_{DS}, for both the short period and the 1-second period are determined by multiplying the MConE spectral response accelerations (S_{MS} and S_{M1}) by a factor of 2/3.

H.6.2 Earthquake Sources

(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: The potential seismic hazards in the vicinity of the Facility site result from three seismic sources: Cascadia Subduction Zone (CSZ) interplate events, CSZ intraslab events, and crustal events (Geomatrix, 1995).

Two of the potential seismic sources, interplate and intraslab events, are related to the subduction of the Juan de Fuca plate beneath the North American plate. Interplate events are caused by the frictional interface between these two tectonic plates. Intraslab events, which originate within the subducting Juan de Fuca plate, are generally associated with normal faulting that results from bending stresses built up within the plate as it is subducted beneath the North American plate. The combination of these factors is often referred to as the CSZ source mechanism. The CSZ is located beneath western Oregon, Washington, and British Columbia. The two source mechanisms associated with the CSZ are currently thought to be capable of

producing maximum earthquakes with moment magnitudes of approximately 9.0 and 7.2 for the interplate and intraslab events, respectively (Geomatrix, 1995; USGS, 2016a, 2016b).

Earthquakes caused by movements along crustal faults, generally in the upper 10 to 15 miles of the earth's crust, result in the third seismic source mechanism. In the vicinity of the Facility site, earthquakes occur within the crust of the North American tectonic plate when built-up stresses near the surface are released through fault rupture.

No potentially active faults are mapped within the Facility site boundary (Figure H-2). A number of late-Quaternary-age faults are mapped in the vicinity of the Facility site, as shown in Figure H-2. The fault that presents the largest potential for seismic contribution to the Facility is the Mill Creek fault (Lidke and Bucknam, 2002). This is the only late-Quaternary-age fault (<15,000 years old) mapped within 50 miles of the Facility site boundary. Other middle-Quaternary-age faults (<750,000 years old) in the area include the Arlington-Shutler Butte fault and the Horse Heaven Hills fault (Personius and Lidke, 2003).

Table H-2 summarizes information about the Mill Creek fault, which has the most recent rupture history.

Table H-2. Summary of Potentially Active Faults

Fault	Distance to Facility (miles)a	Fault Length (miles)	Most Recent Movement (years before present)	Slip-Rate Category
Mill Creek Fault	40	12	approx. 700 to 7,000	<0.2 mm/year

[a] Closest mapped distance to Facility

Note:

mm = millimeter

The PGA within the Facility site boundary resulting from a seismic event on one of these source mechanisms was estimated using information the USGS developed in its seismic hazard mapping database (USGS, 2016a). This information includes estimated PGA at a theoretical soft rock/stiff soil interface for different probabilities of exceedance. The USGS database also provides the seismic deaggregation information for the seismic hazard, including estimates of the mean earthquake moment magnitude and mean epicentral distance associated with a given probability of exceedance at a given location.

The Maximum Probable Earthquake (MPE) is considered to be an earthquake that has a 10-percent probability of exceedance in 50 years (a nominal 475-year recurrence interval). The MConE is considered to be an earthquake with a nominal 2,475-year recurrence interval (a 2-percent probability of exceedance in 50 years). Figures H-3 and H-4 show the probabilistic seismic hazard deaggregation for the MPE and MConE events, respectively.

The Maximum Credible Earthquake (MCE), is the maximum event that each source is believed to be capable of producing. To provide an estimate of the MCE events from each principal source mechanism, the maximum moment magnitude for each fault was estimated using the relationship developed by Wells and Coppersmith (1994), which relates magnitude to fault length (USGS, 2016a) and distance from the Facility site boundary. These analysis parameters were summarized for the potentially active fault near the Facility site boundary (shown in Table H-2). In addition to these estimated magnitudes for crustal faults, Table H-3 summarizes the magnitudes for the random, unnamed crustal event from the USGS gridded hazard and from the CSZ intraslab and interplate events.

Table H-3. Maximum Considered Earthquake Source Characterization Parameters

Earthquake Source	Maximum Moment Magnitude	Epicentral Distance (miles [km])
Random Hazard (Shallow Gridded WUS)	5.9	9 [15]
Crustal	6.0 to 6.6	9 to 40 [15 to 65]
Intraslab	7.2	>165 [>260]
Interplate	9.0	>192 [>310]

Notes: The magnitudes for all crustal events are determined from the fault length/distance by Wells and Coppersmith (1994).

km = kilometer

WUS = Western United States gridded (random) crustal source

H.6.3 Recorded Earthquakes

(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: Figure H-2 displays the location, approximate magnitude, and year of all recorded earthquakes within 50 miles of the Facility site boundary. These historical seismic events have been grouped by magnitude, and are displayed using different-sized icons based on the strength of the event. Because of the high number of events in the vicinity of the Facility site, several of the icons overlap in the figure.

Figure H-2 provides a summary of all recorded earthquakes known to have caused Modified Mercalli Intensity (MMI) III shaking intensity or greater within the Facility site boundary, regardless of epicentral distance from the Facility site boundary. For reference, an intensity of MMI III is associated with shaking that is "noticeable indoors, but may not be recognized as an earthquake." An intensity of MMI V is "felt by nearly everyone; many awakened." (USGS, 2013). The largest recorded earthquake within 50 miles (80 kilometers [km]) of the Facility site boundary was the magnitude 4.2 event that occurred in 2010 approximately 42 miles (69 km) northwest of the Facility site boundary (USGS, 2016b). This earthquake caused intensity MMI III shaking within the Facility site boundary. The greatest historical event known for the area is the January 26, 1700, Cascadia megathrust earthquake, which occurred along North America's west coast between Vancouver Island and northern California (USGS, 2005). This is the only event with an estimated intensity of MMI V within the Facility site boundary. Several other significant historical events that occurred more than 50 miles from the site (1949, 1965, 1980, 1992, and 2001) may have resulted in an intensity of MMI III within the Facility site boundary, with magnitudes ranging from 6.8 to 7.2. These events were located in Oregon and Washington.

Information in Table H-3 was developed by screening information from earthquake databases provided by DOGAMI (Madin, 1994), Berg and Baker (1963), and the USGS Earthquake Hazards Program, Earthquake Search Databases (USGS, 2016b). For earthquakes that were reported in terms of magnitude, a relationship between PGA and MMI (Kramer, 1996; Wald et al., 1999) was used to define a PGA associated with an MMI III event. A distance-attenuation relationship then was used to determine the combination of earthquake magnitude and distance producing an intensity of MMI III at the Facility. The Abrahamson & Silva 2008 next generation attenuation

(NGA) model was used to develop the magnitude-distance information (Campbell et al., 2009) for seismic events in the northwest United States capable of producing accelerations at the Facility strong enough to cause MMI III intensity shaking.

H.6.4 Median Ground Response Spectrum

(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: Figure H-5 compares the USGS-derived, IBC 2009/American Society of Civil Engineers 7 design spectral response accelerations for the MConE and MPE (for Site Class B), with the MCE spectral response occurring on the CSZ source mechanisms and on the crustal fault identified in Table H-2, and using the inputs summarized in Table H-3. The NGA model inputs for the crustal fault sources are summarized in Table H-3, and are based on the magnitude-distance relationship developed by Wells and Coppersmith (1994). For the CSZ sources, the geometric characterization is based on the modeling done by McCrory et al. (2006). Weighting of each of these models mimics the 2008 USGS National Seismic Hazards Mapping scheme (USGS, 2008). An epicentral depth of 20 km is used for the interpolate source, and a 50-km depth is used for the intraslab source. Figure H-5 compares the response on the bedrock surface between the design spectra and the median response spectra from the principal sources. Therefore, all plots in Figure H-5 are presented at the bedrock surface (or the B/C Site Class boundary identified within the IBC, where no site-specific amplification is applied to spectral accelerations).

H.6.5 Seismic Hazards Expected to Result from Seismic Events

(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: For facilities designed to the current IBC and OSSC guidelines for Site Class B, the design seismic event will have a 2-percent chance of exceedance in the next 50 years (or an event with an approximate 2,475-year recurrence interval). For this event, the Facility will be designed for no life-threatening structural damage from either the vibrational response of the structure or from secondary hazards associated with ground movement or failure (such as landslides, lateral spreading, liquefaction, fault displacement, or subsidence). It is generally assumed that if significant structural damage can be prevented, the risk to human safety will be minimal.

Seismic hazards associated with a design seismic event could potentially include ground shaking and instability from landslides or subsurface movement. Impacts on the Facility from these hazards are anticipated to be low, as discussed below.

Potential for Fault Displacements. The probability of a fault displacement within the Facility site boundary is considered to be nonexistent because of the absence of known or mapped potentially active faults in the immediate area and, particularly, within the Facility site boundary. Unknown faults could exist, or new fault ruptures could form during a significant seismic event, but the likelihood of either occurrence is low based on the lack of active faults identified during previous geologic investigations.

Potential for Ground Shaking. Ground shaking is expected within the Facility site boundary given the seismic setting. However, the probability of damage to structures from ground shaking is considered to be low because the seismic hazard potential is relatively low and, based on preliminary information, the area within the Facility site boundary is likely classified as Site Class B (International Code Council, 2009;). Facility components will be designed for the seismic potential of the area. Little or no structural damage is anticipated from MMI III intensity shaking, which is the predominant level of ground shaking anticipated within the Facility site boundary based on the historical record. Higher intensity shaking (MMI IV or MMI V) is not anticipated to cause significant damage to the Facility components. For comparison, MMI VII shaking is considered to result in "negligible damage in buildings of good design and construction." The period of historical record (1700 to present) is relatively brief from a geologic standpoint, and larger events (including greater intensity shaking) within the Facility site boundary are a possibility. Based on the historical record from 1700 to present, no earthquakes at the Facility site would have resulted in MMI VII intensity shaking.

Liquefaction Potential. Based on review of existing reports and subsurface information within the Facility site boundary, and site observations that indicate discontinuous loess and shallow and/or exposed bedrock within the Facility site boundary, liquefaction potential is estimated to be nonexistent because of the lack of groundwater or saturated sediments, coupled with the relatively low ground-shaking potential within the Facility site boundary.

Behavior of Subsurface Materials. Risk of landslides or seismically induced landslides within the Facility site boundary is anticipated to be low because of the flat terrain of the site and shallow, stable bedrock. Slopes within the Facility site boundary are generally less than 5 percent. No landslides have been mapped or were observed within the Facility site boundary.

Adverse Effects from Groundwater or Surface Water. The Facility site lies on thin silty soils overlying basalt. In the areas previously explored by drilling (Terracon, 2016), no groundwater was identified within the Facility site boundary. Although the Facility site lies near the Columbia River, flood hazard potential from the Columbia River or surface water is anticipated to be nonexistent because no major surficial drainage pathways exist within the Facility site boundary. Tsunami hazard is anticipated to be nonexistent.

Because of the potential for seismic-induced hazards within the Facility site boundary, mitigation measures to address these hazards in the siting, design, and construction of the Facility are necessary in order to protect against ground shaking and instability. The design of the Facility components can readily accommodate the level of seismic energy described in Section H.7.4, Median Ground Response Spectrum.

H.7 NONSEISMIC HAZARD ASSESSMENT

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: Nonseismic geologic hazards in the Columbia Plateau region typically include landslides, volcanic eruptions, collapsing soils, and erosion potential. The area within the Facility site boundary consists of relatively flat-lying basalt with a very thin or absent cover of loess. The solar array, roads, and transmission line will be constructed on the flat-lying part within the Facility site boundary and will avoid steep side slopes and drainages that could potentially be subject to landslides and soil creep. A discussion of potential geologic hazards is presented below.

H.7.1 Landslides

DOGAMI released a publication series called Statewide Landslide Information Database for Oregon, Release 2 (SLIDO-2) (Burns et al., 2014). The purpose of this document was to establish a statewide database of previously mapped landslide-related features. The landslide-related features in this report include landslides, debris flows or alluvial fans, and colluvium or talus. The document also estimated landslide susceptibility. The primary sources of this historical landslide information are geologic reports and geologic hazard studies published by the USGS, DOGAMI, and, to a lesser extent, regional studies published by U.S. National Forests and thesis studies in the state. The landslide database from Burns et al. (2011), which is compiled in GIS format, was used to overlay landslide susceptibility on Figure H-1.

Additionally, DOGAMI's LiDAR database was referenced to evaluate the GIS information and the landslide potential at the Facility site vicinity. Irregular topography appears on the LiDAR imagery on the east side of Willow Creek canyon. During the site visit, anthropomorphic disturbance such as quarries and roads were observed in this area. Ancient slumps landslides that could be related to the Missoula Floods may be present in this vicinity. The transmission line alignment follows along the edge of Willow Creek canyon, but the poles will be constructed on the flat plateau, thus avoiding the potentially steeper slopes. No morphologically young landslides or slumps or instability were observed in this vicinity during the site visit.

Figure H-1 shows the landslide susceptibility from the SLIDO database, based on slope angles. Moderate landslide susceptibility is indicated along the slopes of Threemile Canyon and the Willow Creek drainage. The field reconnaissance confirmed the lack of landslide terrain within the Facility site boundary. Steep canyon walls and low cliffs are present along Threemile Canyon. Rockfalls and talus were observed at the base of the cliffs. Some of the steep slopes are remnants of old quarries. None of the Facility components (roads/support structures/solar arrays) will be located on or near the steep cliffs along Threemile Canyon.

The colluvium, scree, and talus deposits that mantle the Willow Creek canyon walls on the western Facility site boundary and along the transmission line alignment may be subject to slow downhill movement or creep. SLIDO rates this area as "moderate to high" landslide susceptibility (Figure H-1). These are generally considered low hazard areas but could potentially be subject to soil creep or shallow soil slumping. However, as previously noted, the transmission line will be constructed on the flat bench above the slopes, parallel to an existing transmission line, thus avoiding areas of potential slope movement.

H.7.2 Volcanic Eruptions

The Pacific Northwest region is home to a large number of active volcanoes along the Cascade Mountain Range. The closest ones to the Facility are provided below, with distances from each mountain to the Facility site boundary:

- Mount St. Helens— 110 miles
- Mount Rainier—110
- Mount Jefferson—120
- Mount Adams—80
- Mount Hood—90

Impacts on the Facility from volcanic activity can be either direct or indirect. Direct impacts include the effects of lava flows, blast, ash fall, and avalanches of volcanic products (Waldron, 1989). Indirect effects include mudflows, flooding, and sedimentation (Waldron, 1989).

Mount St. Helens is the most active volcano in the Cascade Mountains. Mount St. Helen's high frequency of eruptions during the recent geologic past and its two eruptive episodes of the past

three decades indicate a high probability of renewed eruptive activity. The May 18, 1980, eruption was the most economically destructive volcanic event in U.S. history (Driedger et al., 2010).

Because of the distance to potentially active volcanoes, no direct or indirect impacts of volcanic activity are expected to occur within the Facility site boundary, due to the distance to the volcanoes. Impacts are usually restricted to within 50 miles of the erupting volcano. However, depending on the prevailing wind direction at the time of a volcanic eruption and the source of the eruption; ash fallout in the region surrounding the Facility may occur.

H.7.3 Soil Erosion Potential

The soils within the Facility site boundary could be subject to wind and water erosion, particularly when the vegetation is removed. Data from the Natural Resources Conservation Service (NRCS, 2008) indicate that the predominant silt loam soils within the Facility site boundary, the Prosser silt loam and Prosser-Rock outcrop, have an erodibility rating of 0.55, which indicates relatively high water erosion potential. However, the Morrow County (Hosler, 1984) and Gilliam County (Hosler, 1983) soil surveys describe the Prosser silt loam as having a "slight" hazard of erosion. The Taunton soil units have an erodibility rating of 0.49, which indicates moderate erosion potential.

Wind Erodibility Groups (WEGs) consist of soils that have similar properties (primarily textural classes) that affect their resistance to soil blowing if cultivated or disturbed. The groups are used to predict the susceptibility of soil to blowing and the amount of soil lost as a result of blowing. The Prosser silt loam soils are assigned to a WEG of 5, which means these soils are expected to have moderate wind erosion potential. However, the Gilliam County soil survey describes these soils as having a "high hazard of soil blowing." The fine-sandy Taunton soils are assigned to a WEG of 2, which indicates high potential for wind erosion. The Gilliam County soil survey states "the hazard of soil blowing is high" for these soils.

No areas of soil erosion or runoff were observed during the site visit. Soil data indicate that the potential for wind and water erosion within the Facility site boundary is generally moderate or high. Because of steady, relatively high wind speeds, and brief but intense rainfall events, areas of vegetation removal could potentially expose soils to accelerated water and wind erosion during construction until they are stabilized. Excavations for roads or other Facility structures could also temporarily expose the excavated spoils to wind and water erosion during construction. Mitigation measures to account for the high wind erosion (fugitive dust abatement) are described in Exhibit I.

H.7.4 Collapsing Soils/Piping

Silty soils with little or no plasticity can be subject to collapsing or piping when they are wetted. Loess in the vicinity of the Facility site is typically silty in composition, and therefore it could be subject to piping or collapse. Piping can have a detrimental effect on embankments or foundations constructed on loess.

The solar structures will be supported by steel posts; post depth will vary depending on soil conditions but are typically 8 feet below the surface. If soil conditions require it, concrete foundations will be used. The geotechnical report noted that silt ranges from 1.5 to 7.5 feet thick. The site visit observations indicated that the silt is generally very thin or absent and shallow rock is exposed over much of the area within the Facility site boundary. Soil collapse or piping potential is anticipated to be low or nonexistent. Assuming steel posts are used, they will be driven into bedrock and soil collapse will not affect the structures.

H.8 PROPOSED 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.*

Response: The State of Oregon uses 2012 IBC (International Code Council, 2012), with current amendments by the OSSC and local agencies. Pertinent design codes as they relate to geology, seismicity, and near-surface soil are contained in IBC Chapter 16, Section 1613, with slight modifications by the current amendments of the State of Oregon and local agencies. The Facility will be designed to meet or exceed the minimum standards required by these design codes.

The flat terrain and basalt bedrock that underlie the area within the Facility site boundary are not expected to be prone to seismically induced landslides. No structures will be built on steep slopes that could be prone to instability, thus avoiding potential impacts.

H.9 PROPOSED NONSEISMIC HAZARD MITIGATION

OAR 345-021-0010(1)(h)(I) *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.*

Response: Nonseismic geologic hazards and impacts are anticipated to be minimal. Typical mitigation measures for nonseismic hazards include the following:

- Avoiding potential hazards
- Conducting subsurface investigations to characterize the soils to adequately plan and design appropriate mitigation measures
- Creating detailed geologic hazard maps to aid in laying out facilities
- Providing warnings in the event of hazards
- Purchasing insurance to cover the Facility in the event of a hazard

The subsequent sections discuss specific mitigation measures and best management practices (BMPs) for potential nonseismic geologic and soil hazards.

H.9.1 Landslide Mitigation

The solar modules and roads, including the access road and service roads, will be situated on flat-lying areas and avoid steep slopes. The transmission line will be supported on poles properly constructed on the flat top of the plateau within an alignment adjacent to an existing transmission line.

H.9.2 Volcanic Eruption Mitigation

The USGS has established a Volcano Hazards Program Notification Service that consists of advisories, watches, and warnings (USGS, 2016c). The alert-notification system has been standardized and the goals are to accomplish the following:

1. Communicate a volcano's status clearly to nonvolcanologists.
2. Help emergency response organizations determine proper mitigation measures.
3. Prompt people and businesses at risk to seek additional information and take appropriate actions.

In the event of a volcanic eruption that could damage or affect Facility components, the Facility will be shut down until safe operating conditions returned. If an eruption occurred during construction, a temporary shutdown will most likely be required to protect equipment and human health.

H.9.3 Soil Erosion Mitigation

To reduce the potential for soil erosion, a detailed construction stormwater pollution prevention plan (SWPPP) will be developed for the Facility. The SWPPP will include both structural and nonstructural BMPs. Examples of structural BMPs include the installation of silt fences or other physical controls to divert flows from exposed soils, or otherwise limit runoff and pollutants from exposed areas within the Facility site boundary. Examples of nonstructural BMPs include management practices such as implementation of materials handling, disposal requirements, and spill prevention methods.

Because roads, solar modules, and other Facility components will be engineered, they will be subject to the requirements of a National Pollutant Discharge Elimination System (NPDES) stormwater construction permit. The Applicant's application for a NPDES stormwater construction permit is attached to Exhibit I and includes an erosion and sediment control plan.

In addition, Exhibit I contains a comprehensive list of mitigation measures to avoid wind and water erosion and soil impacts.

H.9.1 Collapsing Soils/Piping Mitigation

If localized areas of soils with collapsing or settling potential are identified during construction, these soils will be mitigated by overexcavating the soils and replacing them with compacted structural fill; placing impermeable material around the foundations to prevent wetting or saturation; or placing the foundations deeper on a stable bearing layer (such as basalt rock).

H.10 SUMMARY

The risk of seismic hazards to human safety at the Facility is considered low. The Applicant has adequately characterized the area within the Facility site boundary and surrounding vicinity in accordance with OAR 345-022-0020(1)(a) and has considered seismic events and amplification for the Facility's specific subsurface profile. The Facility will consist of components such as new and improved roadways, solar module blocks, an operations and maintenance (O&M) building, a control house, and a transmission line. No facilities other than the O&M building will be continually staffed. In general, the area historically has been used for winter and spring cattle grazing and is sparsely populated. The probability of a large seismic event occurring while the Facility is occupied is much lower for the majority of the Facility, which results in minimal risk to human safety over the majority of the Facility area and along the transmission line alignment. The risk to human safety is slightly higher at the O&M building, which is required to be designed to current seismic standards for structural safety.

Further, by adhering to IBC requirements, the Applicant has demonstrated that the Facility can be designed, engineered, and constructed to avoid dangers to human safety in case of a design seismic event. These IBC standards require that, for the design seismic event, the factors of safety used in the Facility design exceed certain values. For example, in the case of slope design, a factor of safety of at least 1.1 is normally required during the evaluation of seismic stability. This factor of safety is introduced to account for uncertainties in the design process and to ensure that performance is acceptable. Given the relatively low level of risk for the Facility, adherence to the IBC requirements will ensure that appropriate protection measures for human safety are followed.

The Applicant has provided appropriate site-specific information and demonstrated (in accordance with OAR 345-022-0020[1][c]) that the construction and operation of the Facility, in the absence of a seismic event, will not adversely affect or aggravate the geological or soil conditions within the Facility site boundary or surrounding vicinity. The risks posed by nonseismic geologic hazards are considered to be low because the Facility can be designed to avoid or minimize the hazards of landslides, rockfall, soil erosion, and volcanic eruptions. Erosion hazards resulting from soil and wind action will be minimized with the implementation of an engineered erosion control plan.

Finally, the Applicant has demonstrated that the Facility can be designed, engineered, and constructed to avoid dangers to human safety resulting from the geological and soil hazards within the Facility site boundary, pursuant to OAR 345-022-0020(1)(d). Accordingly, given the relatively small risks these hazards pose to human safety, standard methods of practice (including implementation of the current IBC) will be adequate for the design and construction of the Facility.

H.11 REFERENCES

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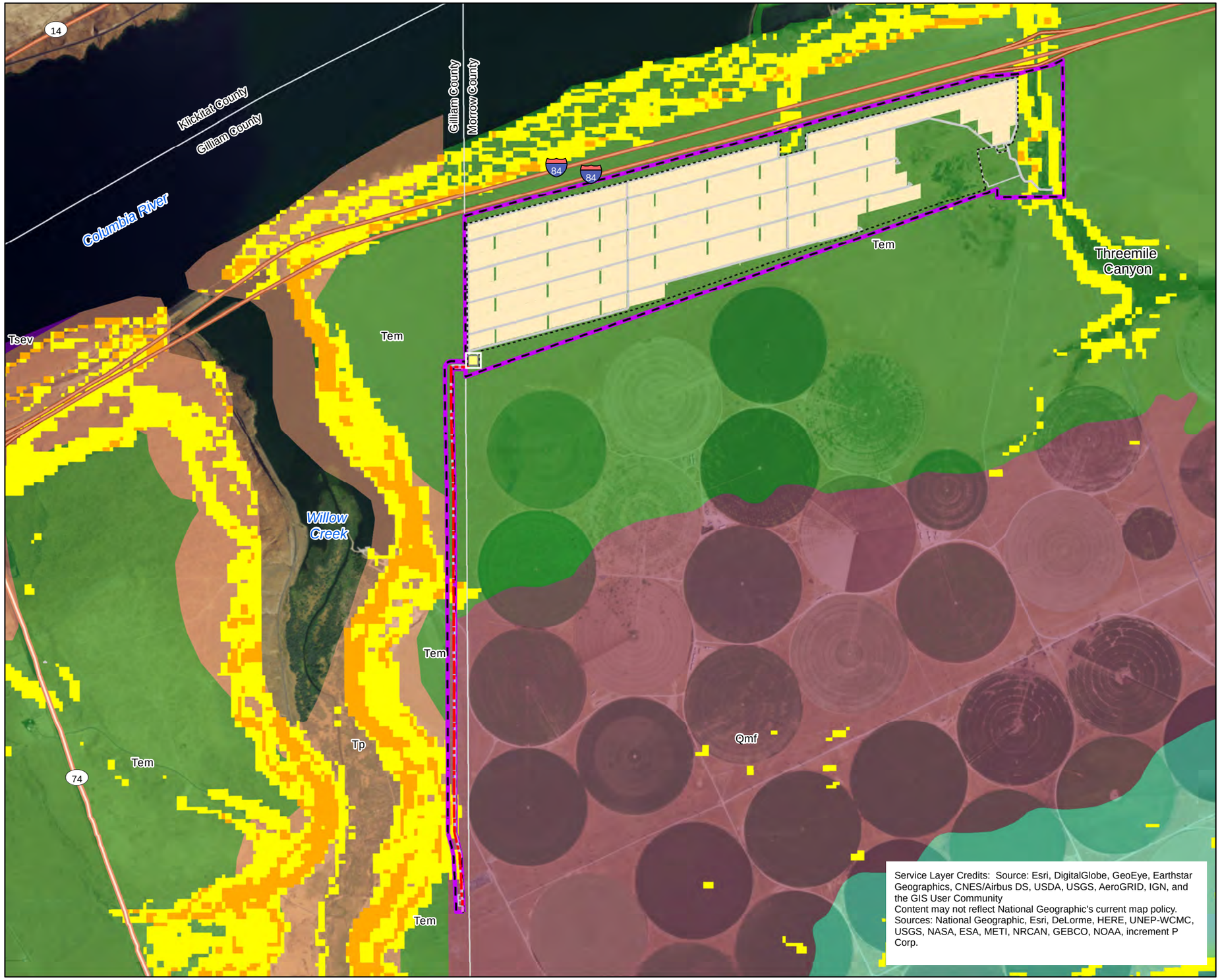
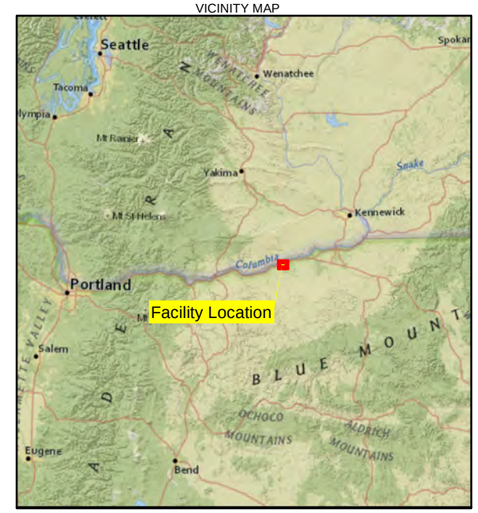
Figures



VICINITY MAP



LEGEND

- Facility Site Boundary
- Substation
- Facilty Module Blocks
- Facility Transmission Line
- Facility Perimeter Fence
- Facility Service Roads
- County

Geology Types

- Qe - Eolian sand and ash
- Qmf - Missoula Flood deposits
- Tem - Elephant Mountain Member
- Tp - Pomona Member
- Tsev - Volcaniclastic deposits

Landslide Susceptibility

- Low - Landsliding Unlikely
- Moderate - Landsliding Possible
- High - Landsliding Likely
- Very High - Existing Landslide

Source:
1. Oregon Geologic Data Compilation (OGDC) - Release 6 Issued by the Oregon Department of Geology & Mineral Industries (DOGAMI) 2015
2. Statewide Landslide Information Database for Oregon (SLIDO) Oregon Department of Geology and Mineral Industries December 29, 2014

0 2,000 4,000
Feet

N

FIGURE H-1
Geology Map
Boardman Solar Energy Facility
Application for Site Certificate
Morrow and Gilliam Counties, Oregon

Invenergy
ch2m

VICINITY MAP

LEGEND

- Facility Site Boundary
- 50-mile radius

Quaternary Faults (Age)

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

Earthquakes

Magnitude

- 2.5 - 2.7
- 2.7 - 3.2
- 3.2 - 3.6
- 3.6 - 3.9
- 3.9 - 4.2

Note:

1. Faults - USGS Geological Survey, Quaternary fault and fold database for the United States, 2014
2. Historical Earthquakes—USGS Database, Earthquake Hazards Program. Historical earthquakes resulting in a MM Intensity Level III at the site span the timeframe between the year 1700 and present; only those visible within approximately 50 miles of the facility site are displayed. Other (lesser) events are also present in the historical record.
3. Geologic evidence demonstrates the existtence of a fault or suggest Quaternary deformation, but either (1) the fault might not extend deeply enough to be a potential source of significant earthquakes, or (2) the currently availble geologic evidence is too strong to confidently assign the feature to Class C but not strong enough to asign it to Class A.

N

0 11 22

Miles

Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
Content may not reflect National Geographic's current map policy. Sources: National Geographic, Esri, DeLorme, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.

FIGURE H-2
Historical Earthquakes and Quaternary Faults
Boardman Solar Energy Facility
Application for Site Certificate
Morrow and Gilliam Counties, Oregon

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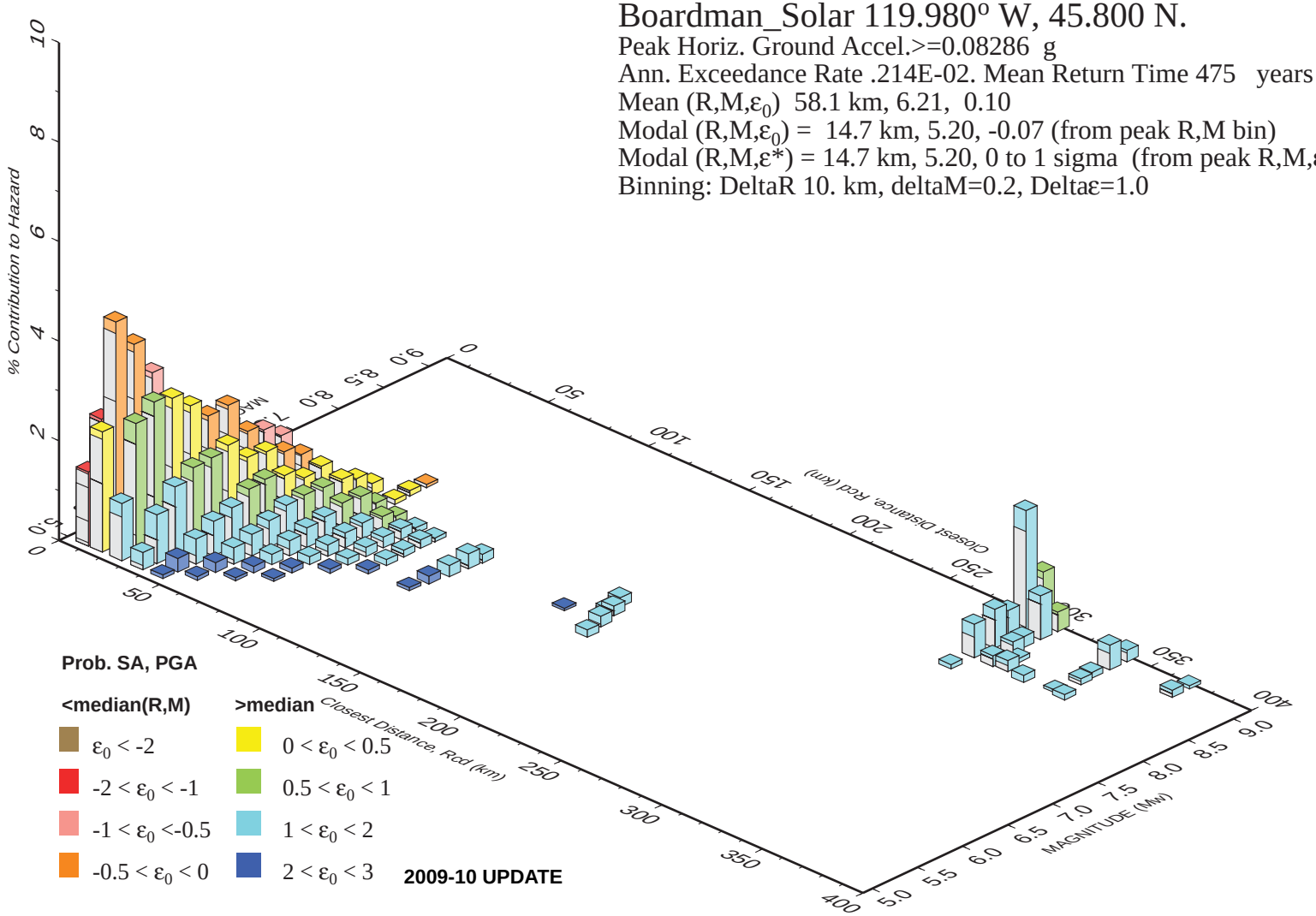
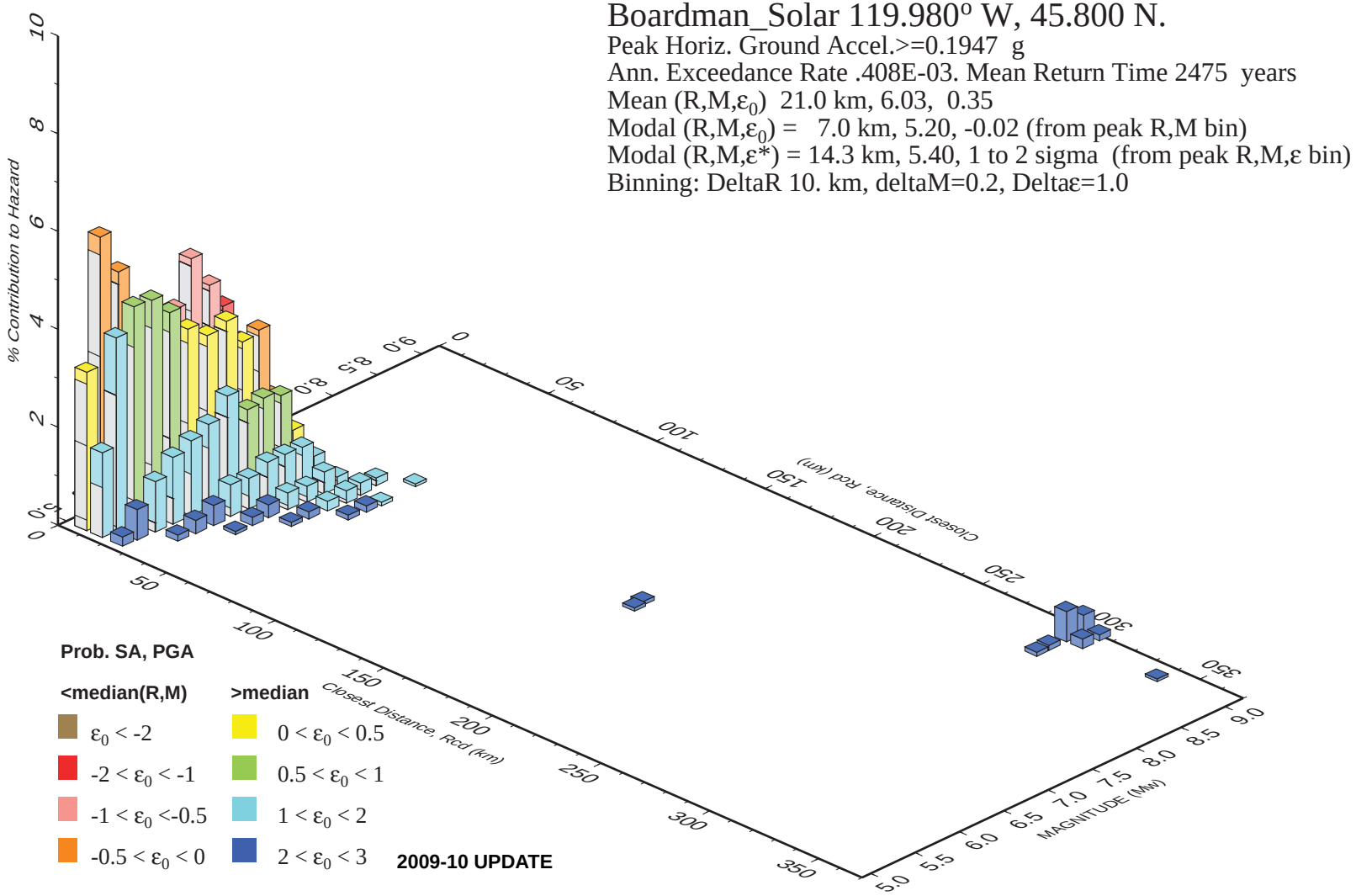
ch2m



GMT 2016 Nov 18 18:23:38 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on rock with average vs= 760. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

FIGURE H-3
Probabilistic Seismic Hazard Deaggregation for the Maximum Probable Earthquake Event
Boardman Solar Energy Facility Application for Site Certificate
Morrow and Gilliam Counties, Oregon



GMT 2016 Nov 18 18:14:21 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on rock with average vs= 760. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

FIGURE H-4
Probabilistic Seismic Hazard Deaggregation for the Maximum Considered Earthquake Event
Boardman Solar Energy Facility Application for Site Certificate
Morrow and Gilliam Counties, Oregon

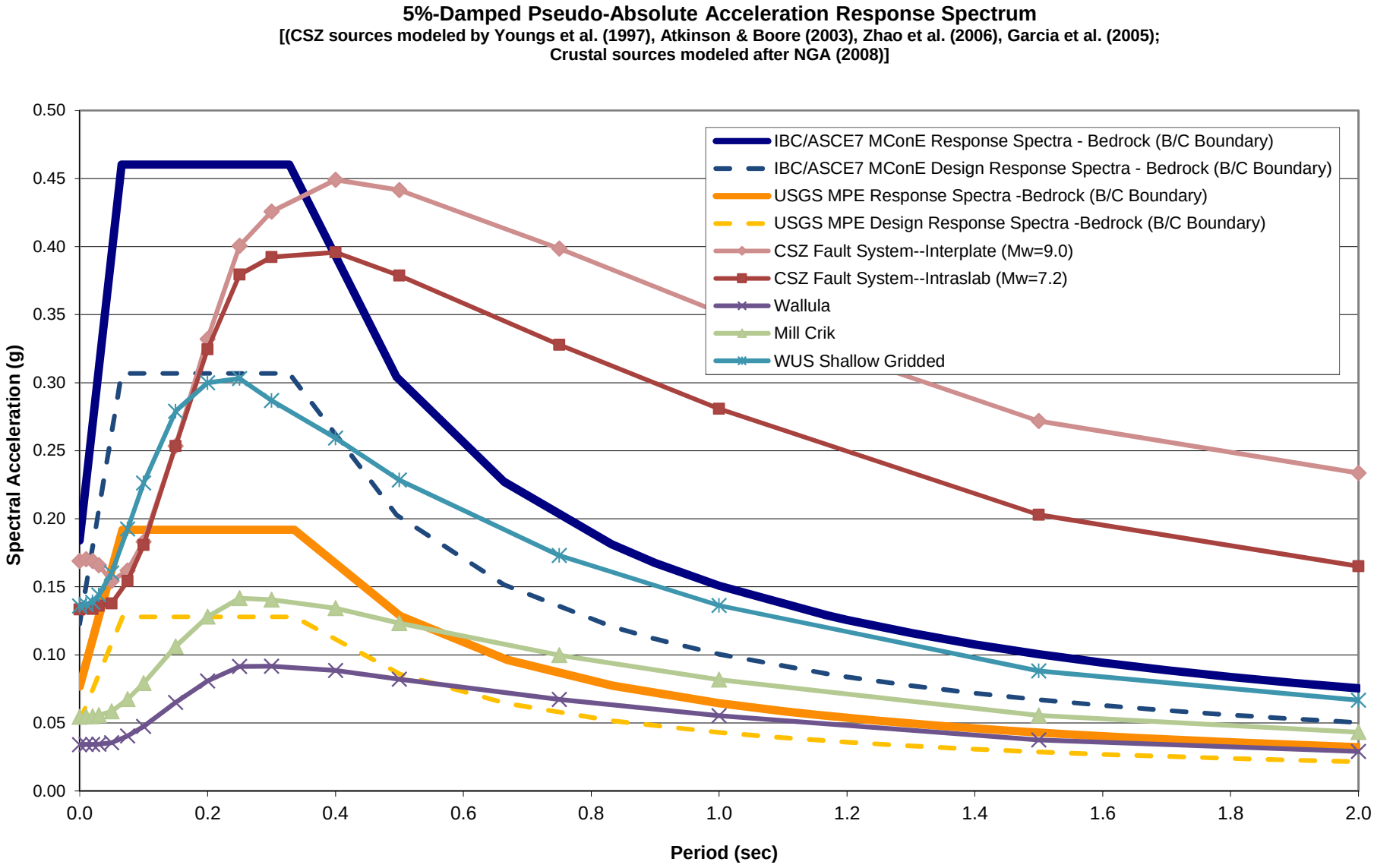


FIGURE H-5
Median Ground Response Spectra Plots
Boardman Solar Energy Facility Application for Site Certificate
Morrow and Gilliam Counties, Oregon

EXHIBIT I
SOILS

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

TABLE OF CONTENTS

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, including:*

Response: The evidence provided in this Exhibit demonstrates that the requirements specified in OAR 345-022-0022 have been met, because the Boardman Solar Energy Facility (Facility) is not expected to result in significant adverse impacts to soils. The potential impacts from erosion are anticipated to be minimal and will occur primarily during construction. The impacts are addressed through erosion-control measures required by the 1200-C Construction Stormwater National Pollution Discharge Elimination System (NPDES) Permit. A 1200-C permit application is included as Attachment I-1 to this Exhibit. The application has been independently submitted to the Oregon Department of Environmental Quality (DEQ) under separate cover. Boardman Solar Energy LLC (Applicant) anticipates a permit decision from DEQ before the start of Facility construction. Attachment I-2 in Exhibit I contains a response from DEQ deeming the application complete. DEQ states in the attached response letter that a permit will be issued within 30 days of receiving the site certificate from ODOE following review of the final ESCP.

I.1 IDENTIFICATION AND DESCRIPTION OF SOIL TYPES

OAR 345-021-0010(1)(i)(A) *Identification and description of the major soil types in the analysis area.*

Response: The near-surface soils at the Facility site and vicinity were identified according to the Natural Resources Conservation Survey (NRCS) web-based soil survey (NRCS, 2010; NRCS, 2008), the Soil Survey of Morrow County (Hosler, 1983), and the Soil Survey of Gilliam County (Hosler, 1984). The NRCS database includes the physical and chemical properties of the soils in the vicinity.

Each of the general soil units contains a number of specific soil series, which are mapped and described at a greater level of detail in this Exhibit, but share relatively similar spatial coverage and exhibit the same engineering properties as the more general soil unit. Typically, the Facility features such as roads, arrays of photovoltaic cells, and 115-kilovolt transmission line will be constructed on the flatter, upland portion of the site, rather than the steep side slopes. Thus, the soils that underlie the flatter upland areas are more likely to be impacted.

A soils map showing the major soil units for the Facility site boundary and a distance of 500 feet from the site boundary is provided in Figure I-1 with the proposed Facility structures overlain. Because the soil surveys that cover the site are conducted by individual counties, the nomenclature and soil series names vary within the Facility site boundary. The western part of the Facility site is in the Gilliam County soil survey and the eastern part of the site is in the Morrow County soil survey. Thus, on Figure I-1, some of the soils have different designations but are effectively the same soil units. The following sections contain detailed descriptions of the major soil units that underlie proposed Facility features and are most likely to be impacted.

I.1.1 Gilliam County Soil Survey Area—Soil Units along the Proposed Transmission Line Alignment

The proposed north-south transmission line is underlain by Prosser-Rock outcrop complex and the Taunton loamy fine sand, described below in Sections I.1.1.1 and I.1.1.2, respectively. The Olex Gravelly silt loam (20 to 40 percent slopes) and Sagehill Fine sandy loam (20 to 40 percent slopes) are minor areas mapped along the corridor, as is the Quinton-rock outcrop complex (2 to 20 percent slopes) These areas are not anticipated to be disturbed and are not described further.

I.1.1.1 27B—Prosser-Rock Outcrop Complex, 1 to 5 percent

This soil complex lies on plateaus and is formed in loess over fractured basalt. The unit contains 60 percent Prosser and similar soils, and 20 percent rock outcrop. The typical soil profile for this

unit is dark brown silt loam to a depth of 25 inches, and unweathered basalt bedrock below that. Saturated hydraulic conductivity of this soil is high (17 by 10^{-4} centimeters per second [cm/sec]). The soil is well drained, with a depth to water table greater than 80 inches. The frequency of ponding and flooding is none.

I.1.1.2 45B—Taunton Loamy Fine Sand, 2 to 5 Percent Slopes

This soil complex contains 85 percent Taunton and similar soils. These soils are formed in old alluvium reworked by wind. The typical soil profile for this unit consists of brown, fine sandy loam to a depth of 21 inches, and a cemented calcareous hardpan from 21 to 25 inches. Permeability of this this soil is high (11 by 10^{-4} cm/sec) above the hardpan, but very low within the hardpan. This soil is well drained, with a depth to water table greater than 80 inches. The frequency of ponding and flooding is none.

I.1.2 Morrow County Soil Survey Area—Dominant Soil Units within the Site Boundary (Excluding the Transmission Line Alignment)

In Morrow County, the Prosser-Rock outcrop complex and the Prosser silt loam underlie the majority of the site, at 306 and 286 acres, respectively. These soils are described in Sections I.1.2.1 and I.1.2.2. Very limited areas of "Rock outcrop-Rubble land complex" (49F) and the Gravden very gravelly loam (13E) are mapped along the slopes of Threemile Canyon on the eastern site boundary. However, they are on steep slopes and will not be disturbed, and thus are not discussed further.

I.1.2.1 37A—Prosser Silt Loam, 0 to 2 Percent Slopes

The Prosser silt loam is the most common soil unit in the Facility vicinity. These soils lie on plateaus with slopes less than 2 percent, and are formed in loess over fractured basalt. The typical soil profile for this unit is silt loam to a depth of 29 inches, and unweathered basalt bedrock below that. Saturated hydraulic conductivity of this soil is moderately high to high (9 by 10^{-4} cm/sec). The soil is well drained, with a depth to water table greater than 80 inches. The frequency of ponding and flooding is none.

I.1.2.2 38D—Prosser-Rock Outcrop Complex, 1 to 20 Percent Slopes

This soil complex contains 60 percent Prosser and similar soils: 60 percent and 20 percent Rock outcrop. This soil is generally equivalent to the Prosser-Rock outcrop complex (2 to 5 percent slopes) mapped adjacently in Gilliam County (see Figure I-1). The typical soil profile for this unit is silt loam to a depth of 29 inches, and unweathered basalt bedrock below that. Permeability of this soil is moderately high (9 by 10^{-4} cm/sec). The soil is well drained, with a depth to water table greater than 80 inches. The frequency of ponding and flooding is none.

Table I-1 summarizes the physical properties and some of the potential limitations of the predominant onsite soils. An assessment of Facility impacts on soils during construction is included in Section I.3.

Table I-1. Physical Properties of Predominant Onsite Soils within the Facility Site Boundary

Soil Series/Map Unit	USDA Soil Texture/Description	Slopes (percent)	Soil Erodibility Factor (K)[a]	Wind Erodibility Group[b]	Shrink-Swell Potential	Frost Action Potential
27B - Prosser-Rock outcrop complex	Dark brown silt loam	1 – 5	0.55	5	Low	High
38D - Prosser-Rock outcrop complex	Dark brown silt loam	1 – 20	0.55	5	Low	High

Table I-1. Physical Properties of Predominant Onsite Soils within the Facility Site Boundary

Soil Series/Map Unit	USDA Soil Texture/Description	Slopes (percent)	Soil Erodibility Factor (K)[a]	Wind Erodibility Group[b]	Shrink-Swell Potential	Frost Action Potential
45B - Taunton loamy fine sand	Dark brown, fine sandy loam	2 – 5	0.49	2	Low	Moderate
37A – Prosser silt loam	Dark brown silt loam	0 – 2	0.55	5	Low	Moderate

[a] Erodibility Factor (K) = susceptibility of a soil to sheet and rill erosion by water. Ranges from 0.02 to 0.69; the higher the number the more erosion potential.

[b] Wind Erodibility Group (WEG) = susceptibility of soil to blowing and the amount of soil lost as a result of blowing. WEGs range from 1 to 8; where 1 is the most susceptible and 8 is the least susceptible to wind erosion.

I.2 IDENTIFICATION AND DESCRIPTION OF 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 Facility site boundary will encompass approximately 798 acres in Gilliam and Morrow counties in Oregon. The primary land use within the analysis area consists of private agricultural use and rangeland; however, land within the Facility site boundary is not irrigated and therefore has historically been used only for winter and spring cattle grazing.

The Prosser soils, when irrigated, yield 4 tons per acre of alfalfa hay and 12 Animal-Unit-Months (AUMs) of pasture per acre. The Taunton soils, when irrigated, yield 90 bushels of winter wheat, 400 hundred-weight of Irish potatoes, 5 tons of alfalfa hay, 20 tons of corn silage, and 15 AUMs of pasture.

I.3 IDENTIFICATION AND ASSESSMENT OF IMPACTS ON SOILS

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: As listed in Table C-1 of Exhibit C, construction of the Facility will result in a total disturbance of approximately 545 acres. The Facility will permanently disturb approximately 486 acres and unavoidable impacts to soils will result during operations from the footprint of structures and components. Temporarily disturbed acres will be restored following construction, and the permanently disturbed acres will be restored following retirement.

The following section discuss potential water and wind erosion impacts to site soil, and the limitations posed by the soils related to Facility construction, operation, and retirement activities, hazardous materials, and other soil limitations such as frost action and shrink-swell.

I.3.1 Water Erosion Impacts

The rate and magnitude of soil erosion by water are controlled by rainfall intensity and runoff, soil erodibility, and vegetation cover. The erosion factor (K) indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Revised Universal Soil Loss Equation to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter, soil structure, and saturated hydraulic conductivity. Overall, values of K range from 0.02 to 0.69, with the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Data from the NRCS indicate that the predominant silt loam soils on the site, the Prosser silt loam and Prosser-Rock outcrop, have an erodibility rating of 0.55, which indicates relatively high water erosion potential (Table I-1). However, the Morrow County and Gilliam County soil surveys describe the Prosser silt loam as having a "slight" hazard of erosion. The Taunton soil units have a K factor is 0.49, which indicates moderate erosion potential. A large part of the erosion potential relates to disturbance and vegetation removal.

I.3.2 Wind Erosion Impacts

Wind can be a serious environmental and economic concern. It can cause soil erosion and crop damage. The soils within the Facility site boundary could be subject to wind erosion, particularly when the vegetation is removed. Wind Erodibility Groups (WEGs) consist of soils that have similar properties (primarily textural classes) that affect their resistance to soil blowing if cultivated or disturbed). The groups are used to predict the susceptibility of soil to blowing and the amount of soil lost as a result of blowing. WEGs range from 1 to 8; where 1 is the most susceptible and 8 is the least susceptible to wind erosion.

The Prosser silt loam soils are assigned to a WEG of 5, which means these soils are expected to have moderate wind erosion potential. However, the Gilliam County soil survey describes these soils as having a "high hazard of soil blowing." The fine-sandy Taunton soils are assigned to a WEG of 2, which indicates high potential for wind erosion. Although Gilliam County soil survey states "the hazard of soil blowing is high" for these soils.

Soil data indicate that the potential for wind and water erosion within the Facility site boundary is generally moderate or high. However, because of steady, relatively high wind speeds, and brief but intense rainfall events, areas of vegetation removal could potentially expose soils to accelerated water and wind erosion during construction until they are stabilized. Excavations for foundations, roads, and trenches could also temporarily expose the excavated spoils to wind and water erosion during construction. Mitigation measures to account for the high wind erosion (Fugitive Dust Control) are described in Section I.5.

I.3.3 Construction Impacts

Facility construction will require aggregate and construction of new or improved access roads and surfacing. Rock required for construction of Facility components will be obtained from one or more existing, permitted, commercially-producing quarries. Associated rock-crushing activities will occur at the quarries before transporting to the site. Accordingly, no soil or rock will be disturbed to create new quarry sites.

Because the construction of roads, foundations, and other Facility components will be engineered, these components are subject to the requirements of a NPDES stormwater construction permit and other pertinent construction and operation permits and pollution control. In accordance with these regulations, the Applicant will implement an erosion and sediment control plan and erosion-control best management practices (BMPs) during Facility construction and operation. Attachment I-1 contains the NPDES permit application.

Construction will require the use of heavy equipment and haul trucks to deliver aggregates, concrete, water, and similar construction supplies. The repeated traffic of heavy machinery could cause localized soil compaction, which could result in temporary loss of agricultural productivity where the trucks are forced to leave existing access roads. Potential loss in agricultural productivity caused by compaction will be temporary and will be mitigated as described below.

I.3.4 Operations Impacts

Facility operations will have no impact on soil erosion. General Facility operation will be constrained to the access and service roads. Therefore, no ground disturbance is anticipated to occur during Facility operations. Depending on the effects of solar module dust and dirt on energy production (referred to as soiling), the solar modules will be washed. For the purpose of this analysis, it is conservatively assumed that they will be washed twice a year and require 250,000 gallons per wash, for a total of 0.5 million gallons per year. Washwater will be discharged by evaporation and seepage into the ground using BMPs and will be covered under an Oregon General Water Pollution Control Facilities Permit, WPCF-1700-B, Washwater Discharge from Equipment Cleaning.

I.3.5 Retirement Impacts

During retirement, potential erosion hazards will be similar to those occurring during construction. Soil will be exposed to accelerated soil erosion because of the lack of vegetation during the removal of solar arrays, underground cables, and roadways.

I.3.6 Hazardous Material Impacts

No significant impacts are expected to occur from chemical factors during construction, operation, or retirement. Only minimal amounts of chemicals, such as lubricating oils and cleaners for the turbines and pesticides for weed control, will be used at the Facility site. Chemicals will be stored according to applicable requirements and regulations to limit the risk of adverse effects related to chemical factors. The risk of a chemical spill is negligible and the impacts of any such spill would be limited, because of the small amounts of chemicals that will be transported to the Facility site. Exhibit G provides a discussion of precautions to be taken in handling hazardous materials, such as lubricating oils, and the measures to be taken in the event of a spill.

I.3.7 Other Soil Limitations

Frost action: Frost action refers to freezing and thawing of soil moisture. Frost action can damage roads, building, and other structures. The most common soils on the site, the Prosser series, are rated “high” for frost action potential. Therefore, to avoid damage from frost action these soils could potentially require mitigation measures (discussed below).

Shrink-Swell: Changes in soil moisture cause certain clay minerals in soils to either expand or contract. The amount and type of clay minerals in the soil influence the change in volume. Structures or roads built on shrinking or swelling soils could be damaged by the change in volume of the soil. Linear extensibility (shrink-swell potential) refers to the change in length of an unconfined clod as its moisture content is decreased from a moist state to a dry state. The volume change is reported as percent change for the soil. The most common soils on the site have a low shrink-swell. Therefore, shrinking and swelling of these soils are not expected to impact the Facility.

Shallow Rock: The most common soils on the site (the Prosser series) are thin with a typical depth to rock is between 20 and 40 inches. The Taunton soils have a cemented calcareous duripan approximately 21 to 25 inches deep. Therefore, shallow rock or cemented soils are expected to be present where Facility components overlie these soils, which is much of the site. The preliminary geotechnical investigation conducted for the site (Terracon, 2016) indicated depth to rock ranges from 1.5 to 7.5 feet across the site.

Corrosion: Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical

conductivity of the soil. Steel that intersects multiple soil boundaries or soil layers is more susceptible to corrosion than the steel entirely within one kind of soil or within one soil layer. The site soils are rated as "low" for corrosion potential of steel. Therefore, the proposed steel pile foundations should not be considered as risk of corrosion.

I.4 DESCRIPTION OF PROPOSED 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: Direct permanent impacts to soils will occur as a result of Facility construction. Although permanent impacts are unavoidable, they will be minimized whenever possible. Reclamation measures will be implemented to restore the temporarily disturbed near-surface soils at the Facility. Construction of access roads, foundations, and other facilities will be regulated by an erosion and sediment control plan and a 1200-C Construction Stormwater NPDES Permit (see Attachment I-1) that will require BMPs to minimize possible impacts from erosion or other impacts to soils.

A summary of the BMPs provided in Attachment I-1 along with additional proposed mitigation measures is provided below. The mitigation measures will be implemented to minimize or avoid adverse impacts to soils during construction of the Facility and access roads. The measures may be upgraded or modified as needed to comply with applicable local, state, and federal erosion and sediment control regulations. The mitigation measures are as follows:

- **Clearing and Grading:** To the maximum extent practicable, clearing and grading will be phased to prevent exposed inactive areas from becoming a source of erosion. As grading progresses, temporary or permanent soil stabilization measures will be applied immediately on disturbed areas and for all roadways, including gravel roadways. Construction activities will avoid or minimize excavation and creation of bare ground during wet weather.
- **Protect Critical Riparian Areas:** Using fencing or other means, critical riparian areas and vegetation including important trees and associated rooting zones and vegetation areas will be identified, marked, and protected for preservation. Vegetative buffer zones between the site and sensitive areas (i.e., wetlands) and other areas will be identified for preservation, especially in perimeter areas.
- **Existing Vegetation:** To the extent practicable, existing vegetation will be preserved and open areas will be revegetated or placed with stable ground cover. When practicable, open areas will be revegetated or stabilized before and after grading or construction. Erosion and sediment control and perimeter sediment control measures will be in place before vegetation is disturbed and will remain in place and be maintained, repaired, and promptly implemented for the duration of construction.
- **Soil Stockpiles:** At the end of each workday, soil stockpiles will be stabilized or covered, or other BMPs will be implemented to prevent discharges to surface waters or conveyance systems leading to surface waters.
- **Silt Fencing:** Silt fencing will be installed at various locations throughout the Facility and will be used as perimeter control. The fencing will be installed around the perimeter of material stockpiles and the perimeter of construction laydown areas. The silt fencing and other erosion-control measures will remain in place until the disturbed areas are permanently stabilized and the risk of erosion has been eliminated. Additional details regarding silt fencing construction and placement are provided in the 1200-C Construction Stormwater NPDES Permit (see Attachment I-1).

- **Fiber Rolls:** Fiber rolls may be installed to decrease the velocity of stormwater sheet flow. The rolls will be used along the downgradient edge of access roads adjacent to slopes or sensitive areas. Additional details regarding fiber roll construction and placement are provided in the 1200-C Construction Stormwater NPDES Permit (see Attachment I-1).
- **Temporary Stabilization (Mulching, Matting, Soil Binders, and Tackifiers):** These measures will be used for stabilization and during reseeding and revegetation of disturbed areas.
- **Stabilized Construction Entrance/Exit:** A stabilized construction entrance and exit will be installed at locations where soil (exposed, disturbed land) or newly constructed roads intersect existing paved roads.
- **Revegetation:** At the completion of land-disturbing activities, the site will be revegetated with an approved seed mix as necessary consistent with the Facility's *Revegetation and Noxious Weed Control Plan* (see Attachment P-6 to Exhibit P). The seed will be applied with mulch to protect the seeds as the grass establishes. Scarifying and reseeding of affected areas will occur after construction has been completed.
- **Pollutant Management:** Material, waste storage areas, and other nonstormwater controls will be established. During construction, source-control measures will be implemented to reduce the potential of chemical pollution to surface water or groundwater during construction. Chemical pollution could occur from a release of diesel fuel or lubricating oils, or from improper debris and waste handling. Fuels and oils will be stored in a dedicated area, and construction vehicles will be fueled and maintained only in dedicated areas. The handling, storage, and disposal of materials will be consistent with federal, state, and local ordinances, and in a manner that will not cause stormwater contamination.
- **Haul Truck Traffic:** Before land-disturbing activities begin, BMPs will be in place to prevent the tracking of sediment onto public or private roads such as using graveled (or paved) exits and parking areas, placing gravel on all unpaved roads onsite, or using an exit tire wash. Haul truck traffic will be limited to improved access roads and gravel-covered haul roads, limiting deep soil compaction and disturbance. The loads of the haul trucks and heavy equipment, and the resulting induced stress, will be distributed through the gravelly surfacing material, minimizing compaction of the native soils to an anticipated 6 inches or less. Mitigation efforts to reduce impacts from soil compaction will include scarifying and reseeding affected areas after construction is completed.
- **Geotechnical Investigation and Design:** Soil hazards that could impact facilities include shrinking and swelling of fine-grained soils, and frost action. Therefore, during the design phase of the Facility, a detailed geotechnical investigation and testing program will be conducted to evaluate the engineering properties of the soils and measure groundwater levels. The foundation types and pavement thickness for roads will be designed based on engineering properties of the soils. A limited geotechnical investigation was conducted by Terracon (2016) and describes special construction techniques to address shallow rock.
- **Frost Action:** Mitigation for frost action in surficial soils will be addressed by soil improvements, over-excavation and replacement by nonfrost-susceptible soils, and drainage. Other geologic and seismic hazards are discussed and addressed in Exhibit H.
- **Fugitive Dust Abatement:** BMPs will be used to control fugitive dust in accordance with DEQ regulations. Water, soil-binding agents, or other dust control techniques will be implemented as needed to avoid wind-blown soil. For example, the Facility will minimize temporary and permanent impacts from fugitive dust by using measures including applying water to disturbed ground and roads during construction, implementing wheel wash and

vehicle scrape for construction vehicles, imposing appropriate construction and operation speed limits on site roads, graveling or paving permanent roadways, and revegetation after construction, covering temporary stockpiles with fabric or other materials, using chemical dust suppressants and flocculating agents, minimizing the disrupted surface area, and rescheduling work around especially windy days.

- **Facility Retirement:** Retirement requirements will include strict implementation of erosion-control measures when soil is exposed to prevent erosion. In addition to revegetation requirements, erosion-control measures will include the use of silt fences, mulching, check dams, and other similar methods.

I.5 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: Erosion- and sediment-control measures will be inspected and maintained regularly as detailed in the erosion and sediment control plan and 1200-C Construction Stormwater NPDES Permit (see Attachment I-1 for NPDES permit application). The inspections will verify that the structural BMPs described in the plan are in good condition and are minimizing erosion. The inspections will also verify that the procedures used to prevent stormwater contamination from construction materials and petroleum products are effective.

As outlined in the erosion and sediment control plan, the following inspection and maintenance practices will be used to maintain erosion and sediment controls:

- The stabilized construction entrance will be inspected for sediment tracked on the road. Traffic will be directed to use the stabilized entrance when leaving the site.
- Sediment barrier fences (silt fences) will be inspected, and accumulated sediments will be removed when they reach one-third the height of the silt fence. Any areas that develop rills or washouts along the silt fence will be repaired and reanchored to avoid concentrated flows.
- A maintenance inspection report that details corrective actions will be made after each inspection.
- An employee-training program will be developed and implemented to educate employees about the requirements of the erosion and sediment control plan.

I.6 SUMMARY

The evidence presented in this Exhibit demonstrates that Facility construction, operation, and retirement will not cause significant adverse impacts to soils. Construction of roads, photovoltaic arrays, and other Facility components will be regulated by an erosion and sediment control plan and a 1200-C Construction Stormwater NPDES Permit that will require BMPs to minimize possible impacts to soils from wind and water erosion. Implementation of the mitigation measures described in this Exhibit will further minimize that potential. In addition, the rigorous reclamation measures described in this Exhibit will be instituted to restore the temporarily disturbed near-surface soils at the Facility. On the basis of this evidence, the Council may find that the design, construction, operation, and retirement of the Facility will not likely result in significant adverse impacts to soils.

I.7 REFERENCES

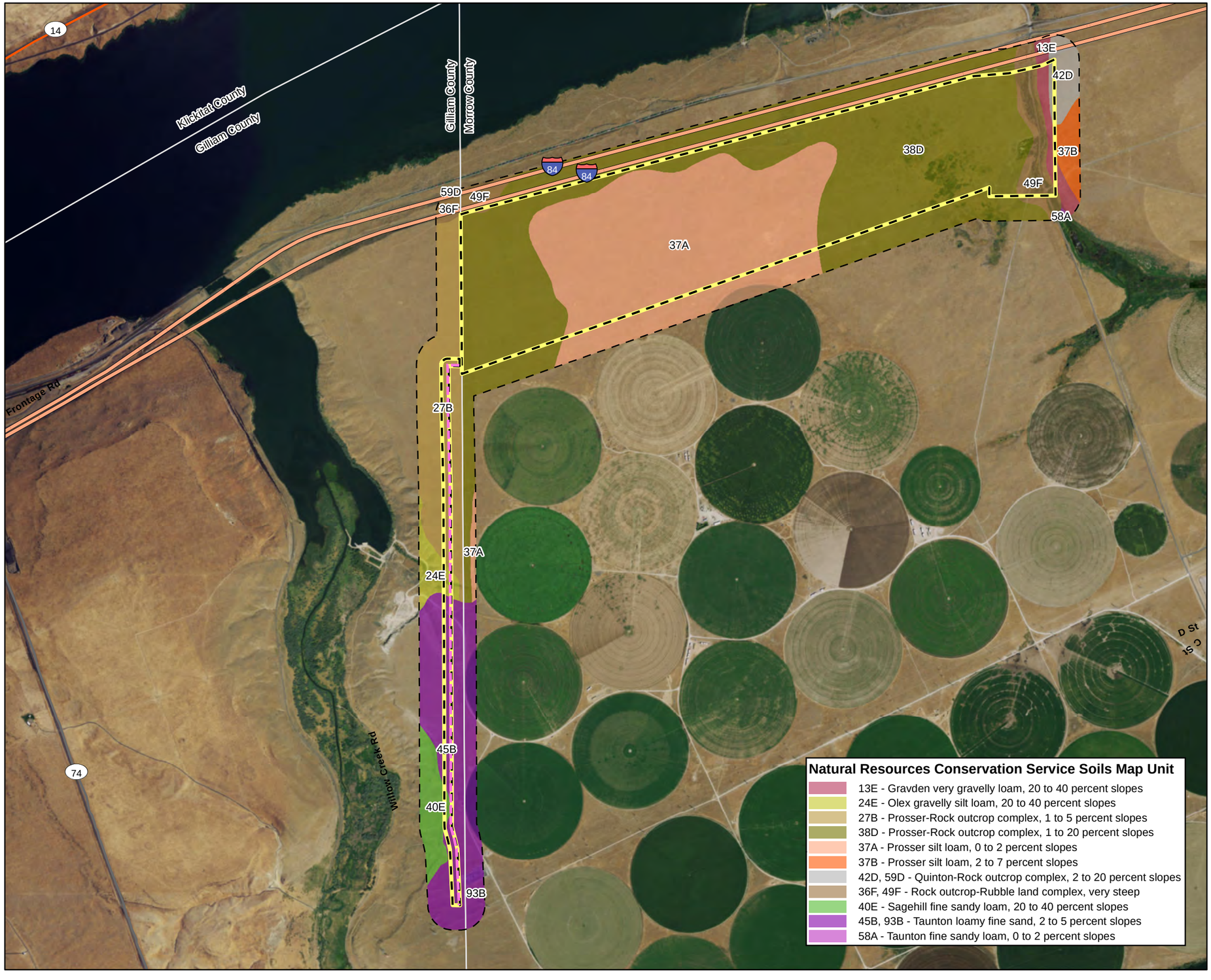
Hosler, R.E. 1983. *Soil Survey of Morrow County Area, Oregon*. USDA Natural Resources, Soil Conservation Service, in cooperation with Oregon Agricultural Experiment Station.

Hosler, R.E. 1984. *Soil Survey of Gilliam County, Oregon*. USDA Natural Resources, Soil Conservation Service, in cooperation with Oregon Agricultural Experiment Station.

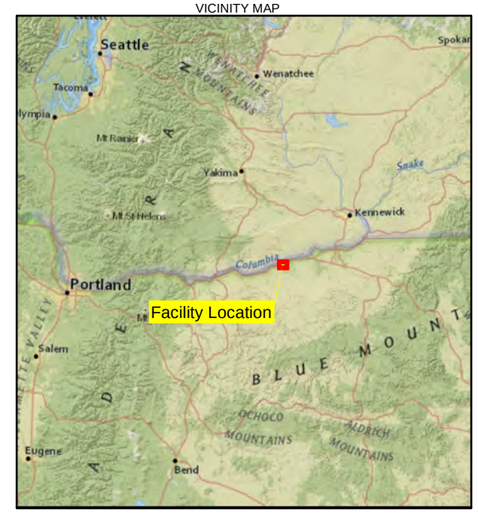
Natural Resources Conservation Service (NRCS). 2008. *Official Soil Series Descriptions*. Soil Survey Staff. United States Department of Agriculture NRCS, Lincoln, Nebraska. Accessed November 2016. http://soils.usda.gov/technical/classification/osd/index.html.

Terracon Consultants, Inc. (Terracon). 2016. *Geotechnical Summary Report, Boardman, Oregon Solar Project, Morrow County, Oregon*. Prepared for Invenergy Solar Development, LLC, Chicago, Illinois. May 20.

Figure



VICINITY MAP



LEGEND

- Facility Site Boundary
- 500 feet from Facility Site Boundary
- Transmission Line
- County
- Major Highway
- Highway
- Major Road

Soils data from Natural Resources Conservation Service USDA
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Content may not reflect National Geographic's current map policy.
Sources: National Geographic, Esri, DeLorme, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.

N

0 2,000 4,000
Feet

FIGURE I-1
Soils Map
Boardman Solar Energy Facility
Application for Site Certificate
Morrow and Gilliam Counties, Oregon

Invenergy
ch2m

Attachment I-1
1200-C Construction Stormwater NPDES Permit Application with Erosion and Sediment Control Plan

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 #:
Check Name:
Deposit #:
Receipt #:
Notes:

*A project *may* be eligible for "automatic coverage" under NPDES general permit 1200-CN if stormwater *does not* discharge to a waterbody 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/stormwater/docs/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.

A. PROJECT INFORMATION

1. Boardman Solar Energy LLC
Applicant (entity legally responsible for permit)

Laura Miner
Contact Name (if different from applicant)

1 S Wacker Drive, Suite 1800
Address

Chicago | IL | 60606
City | State | Zip

503-964-8900 | lminer@invenergyllc.com
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)

Same as Applicant
Invoice Contact Name (if different from applicant)

Address

City | State | Zip

Telephone | E-Mail Address

3. Blue Oak Energy
Architect/Engineering Firm (Erosion & Sediment Control Plan)

Samuel P. Laughlin, PE
Project Manager

530-747-2026 | sam@blueoakenergy.com
Telephone | E-Mail Address

4. TBA
Applicant's Designated Erosion and Sediment Control Inspector

Company Name

Telephone | E-Mail Address

Qualification program and number (if applicable)
**required after January 1, 2017*

5. Boardman Solar Energy Facility
Name of Project

Three Mile Canyon Road and Interstate 84
Address or Cross Street

City	State	Zip
	OR	

Morrow and Gilliam
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): Transmission line construction
- ■ Other (SIC Code required): 1629 - Heavy Construction (power plant)

Army Corps No. (if any): _____

7. Approximate location of center of site

Latitude: 45.800 Longitude: -119.980

For assistance: DEQ Location Improvement Tool at: http://deqapp1/website/lit/data.asp

8. Approximate start date: Fall 2018

a. Project Size
Total Site Acreage (acres): _____

Total Disturbed Area (acres): _____

Total Number of Lots: _____

9. Are you aware of groundwater contamination located within the site boundary? ☐ YES ■ NO

Indicate if a dewatering plan or active treatment system O & M Plan is included (plan review fee may apply). ☐ YES ■ NO

10. Receiving waterbody - Must identify final discharge location of construction stormwater flows.
- ☐ Infiltration device(s)
- ■ Waters of the State (name or description): Columbia R, Willow C
- ☐ Ditch (downstream receiving waterbody):
- ☐ Municipal storm sewer or drainage system (downstream receiving waterbody):
- ☐ Other:

11. Stormwater runoff during construction discharges directly to or through a storm sewer or drainage system that discharges to a waterbody with a Total Maximum Daily Load (TMDL) **or** 303(d) listing for turbidity or sedimentation? ■ YES ☐ NO

For assistance: DEQ assessment database page at http://www.deq.state.or.us/wq/assessment/assessment.htm or DEQ Map/Table at http://deq12.deq.state.or.us/tmdl/default.aspx

B. LAND USE COMPATIBILITY STATEMENT

Provide the original completed Land Use Compatibility Statement (LUCS) signed by the local land use authority and findings if applicable. The application will be incomplete unless the local land use authority approves activities ensuring construction is consistent with local and statewide planning goals.

A copy of this form may be found at http://www.deq.state.or.us/pubs/permithandbook/lucs.htm

C. SIGNATURE OF LEGALLY AUTHORIZED REPRESENTATIVE

The legally authorized representative *must* sign the application (see instructions – Section C).

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.

Michael Baird	Vice President
Name of Legally Authorized Representative (Type or Print)	**Title**
Michael Baird	November 30, 2016
Signature of Legally Authorized Representative	**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. Include the Findings if so stated on the LUCS.
- ☐ Stormwater Erosion and Sediment Control Plan Narrative, if applicable.
- ☐ Dewatering and/or Treatment Plan, if applicable.
- ■ Stormwater Erosion and Sediment Control Plan Drawings; full-sized hard copy and electronic file.
- ■ Applicable permit fee. Appropriate fees are available at http://www.deq.state.or.us/wq/wqpermit/stminfo.htm. All stormwater permits charge an application fee and an annual fee upon registration. DEQ will invoice the annual fee amount if your project coverage extends more than a year. **Please note:** if submitting a dewatering or active treatment O&M Plan to address contaminants beyond sediment a disposal system plan fee may be charged as indicated in Table 70H.

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) and Dewatering Plan, if applicable.
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 state TBA and when selected, submit to DEQ or to the DEQ Agent, the name, contact information, training and experience. After January 1, 2017, for project 5 acres or more include inspectors' qualification certificate program and number.
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). For projects that have submitted a joint permit application, please provide the US Army Corps of Engineers assigned number.
7. Enter latitude and longitude for the approximate center of the site (DEQ Location Tool at http://deqapp1/website/lit/data.asp).
8. If known, specify approximate start date. Provide information on the project size as indicated (based on the total project and not just a single phase).
9. For projects that anticipate dewatering or the need for active treatment system, additional details of BMPs and/or operation and maintenance plans is required. This may include a disposal system plan review fee (Table 70H) for treatment of contaminants beyond sediment. http://www.deq.state.or.us/wq/wqpermit/docs/340-045-0075Tabl70AH.pdf
10. Indicate where stormwater runoff during construction will flow. Request information from local authority or use best judgment to determine the name of the receiving waterbody.
11. 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 waterbody for turbidity or sedimentation. To make this determination, the following tools are available on DEQ's website:
    - WQ Assessment page: http://www.deq.state.or.us/wq/assessment/rpt2010/search.asp to use scroll down to search criteria: waterbody and listing status Category 5 (303d) and Category 4a (TMDL approved).
    - Lookup tool: http://deq12.deq.state.or.us/tmdl/default.aspx

SECTION B. LUCS COMPLETE AS INSTRUCTED ON THE FORM AND INTIALLY INDICATED ON THIS APPLICATION.

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 (full-sized hard copies and electronic copy), Dewatering and/or Treatment Plan 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.

AGENTS AND REGIONAL OFFICES CONTACTS

City of Eugene 99 W. 10th Avenue Eugene, OR 97401 541-682-2706	**City of Hermiston** 215 Gladys Avenue Hermiston, OR 97838 541-667-5025	**City of Troutdale** 342 SW 4th Street Troutdale, OR 97060 503-674-3300
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 541-664-6300	**Clackamas 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*
DEQ Northwest Region	**DEQ Western Region**	**DEQ Eastern Region**
DEQ Northwest Region 700 Lloyd Building at 700 NE Multnomah St., Suite #600, Portland, OR 97232 503-229-5263 or 1-800-452-4011	**DEQ Western Region** 165 East 7th Avenue, Suite 100 Eugene, OR 97401 541-687-7326 or 1-800-844-8467	**DEQ Eastern Region** 800 SE Emigrant Avenue, Suite 330 Pendleton, OR 97801 541-278-4605 or 1-800-304-3513

Clackamas	Benton	Lane	Baker	Hood River	Sherman
Clatsop	Coos	Lincoln	Crook	Jefferson	Umatilla
Columbia	Curry	Linn	Deschutes	Klamath	Union
Multnomah	Douglas	Marion	Gilliam	Lake	Wallowa
Tillamook	Jackson	Polk	Grant	Malheur	Wasco
Washington	Josephine	Yamhill	Harney	Marrow	Wheeler

Oregon Department of Environmental Quality
LAND USE COMPATIBILITY STATEMENT (LUCS)

SECTION 1 - TO BE COMPLETED BY APPLICANT

1A. Applicant Name: Boardman Solar Energy LLC	**1B. Project Name:** Boardman Solar Energy Facility
Contact Name: Laura Miner	**Physical Address:** Three Mile Canyon Road and Interstate 84
Mailing Address: 1 S Wacker Drive, Suite 1800	**City, State, Zip:** Morrow and Gilliam counties, Oregon
City, State, Zip: Chicago, IL 6060	**Tax Lot #:** 04N23E00110, 0422E00200, 03N22E00100
Telephone: 503-964-8900	**Township:** **Range:** **Section:**
Tax Account #: 1234940-98 (Business registry number)	**Latitude:** 45.800
	Longitude: -119.980

1C. Describe the project, include the type of development, business, or facility and services or products provided (attach additional information if necessary):

The Applicant proposes to construct a solar energy facility (Facility) in unincorporated areas of Morrow and Gilliam counties in Oregon. The facility will consist of approximately 75 megawatts (MW) of nominal and average electric generating capacity.

The proposed Facility site boundary will be located in Morrow County, Oregon in the following sections:
- Township 4 North, Range 23E, Sections 20, 21, 28, 29, 30

The proposed transmission line will be located in Gilliam County, Oregon in the following sections:
- Township 4 North, Range 22E, Sections 25, 36
- Township 3 North, Range 22E, Sections 1, 12

The DEQ permits being applied for are to construct the Facility, specifically for general construction stormwater management and an on-site temporary concrete batch plant.

1D. Check the type of DEQ permit(s) or approval(s) being applied for at this time.

- ☐ Air Quality Notice of Construction
- ■ Air Contaminant Discharge Permit *(excludes portable facility permits)*
- ☐ Air Quality Title V Permit
- ☐ Air Quality Indirect Source Permit
- ☐ Parking/Traffic Circulation Plan
- ☐ Solid Waste Land Disposal Site Permit
- ☐ Solid Waste Treatment Facility Permit
- ☐ Solid Waste Composting Facility Permit (includes Anaerobic Digester)
- ☐ Conversion Technology Facility Permit
- ☐ Solid Waste Letter Authorization Permit
- ☐ Solid Waste Material Recovery Facility Permit
- ☐ Solid Waste Energy Recovery Facility Permit
- ☐ Solid Waste Transfer Station Permit
- ☐ Waste Tire Storage Site Permit
- ☐ Pollution Control Bond Request
- ☐ Hazardous Waste Treatment, Storage, or Disposal Permit
- ☐ Clean Water State Revolving Fund Loan Request
- ☐ Wastewater/Sewer Construction Plan/Specifications *(includes review of plan changes that require use of new land)*
- ☐ Water Quality NPDES Individual Permit
- ☐ Water Quality WPCF Individual Permit *(for onsite construction-installation permits use the DEQ Onsite LUCS form)*
- ■ Water Quality NPDES Stormwater General Permit *(1200-A, 1200-C, 1200-CA, 1200-COLS, and 1200-Z)*
- ■ Water Quality General Permit *(all general permits, except 600, 700-PM, 1700-A, and 1700-B when they are mobile.)*
- ☐ Water Quality 401 Certification for federal permit or license

1E. This application is for: ☐ Permit Renewal ■ New Permit ☐ Permit Modification ☐ Other:

SECTION 2 - TO BE COMPLETED BY CITY OR COUNTY PLANNING OFFICIAL

Instructions: Written findings of fact for all local decisions are required; written findings from previous actions are acceptable. For uses allowed outright by the acknowledged comprehensive plan, DEQ will accept written findings in the form of a reference to the specific plan policies, criteria, or standards that were relied upon in rendering the decision with an indication of why the decision is justified based on the plan policies, criteria, or standards.

2A. The project proposal is located: ☐ Inside city limits ☐ Inside UGB ■ Outside UGB

2B. Name of the city or county that has land use jurisdiction *(the legal entity responsible for land use decisions for the subject property or land use)*:
Morrow County and Gilliam County

SECTION 2 - TO BE COMPLETED BY CITY OR COUNTY PLANNING OFFICIAL

Applicant Name: Boardman Solar Energy LLC | **Project Name:** Boardman Solar Energy Facility

2C. Is the activity allowed under Measure 49 (2007)? ■ No, Measure 49 is not applicable ☐ Yes; if yes, then check one:

☐ Express; approved by DLCD order #:

☐ Conditional; approved by DLCD order #:

☐ Vested; approved by local government decision or court judgment docket or order #:

2D. Is the activity a composting facility?
■ No ☐ Yes; Senate Bill 462 (2013) notification requirements have been met.

2E. Is the activity or use compatible with your acknowledged comprehensive plan as required by OAR 660-031?
Please complete this form to address the activity or use for which the applicant is seeking approval (see 1.C on the previous page). If the activity or use is to occur in multiple phases, please ensure that your approval addresses the phases described in 1.C. For example, if the applicant's project is described in 1.C as a subdivision and the LUCS indicates that only clearing and grading are allowed outright but does not indicate whether the subdivision is approved, DEQ will delay permit issuance until approval for the subdivision is obtained from the local planning official.

☐ The activity or use is specifically exempt by the acknowledged comprehensive plan; explain:

☐ **YES**, the activity or use is pre-existing nonconforming use allowed outright by *(provide reference for local ordinance)*:

☐ **YES**, the activity or use is allowed outright by *(provide reference for local ordinance)*:

■ **YES**, the activity or use received preliminary approval that includes requirements to fully comply with local requirements; ~~findings are attached.~~ Application to the ODOE is anticipated for approval by the EFSC.

☐ **YES**, the activity or use is allowed; findings are attached.

☐ **NO**, see 2.C above, activity or use allowed under Measure 49; findings are attached.

☐ **NO**, *(complete below or attach findings for noncompliance and identify requirements the applicant must comply with before compatibility can be determined)*:

Relevant specific plan policies, criteria, or standards:

Provide the reasons for the decision:

Additional comments (attach additional information as needed):
Allowed subject to a site certificate from the Oregon Energy Facility Siting Council under ORS 469.320, 469.378, and 469.401.

Planning Official Signature: Carla B McLane **Title:** Planning Director

Print Name: Carla McLane **Telephone #:** 5419224624 **Date:** 11/17/2016

If necessary, depending upon city/county agreement on jurisdiction outside city limits but within UGB:

Planning Official Signature: **Title:**

Print Name: **Telephone #:** **Date:**

OPERATING AGREEMENT

OF

BOARDMAN SOLAR ENERGY LLC

a Delaware limited liability company

OPERATING AGREEMENT OF
BOARDMAN SOLAR ENERGY LLC

A DELAWARE LIMITED LIABILITY COMPANY

THIS OPERATING AGREEMENT is made as of the 18th day of July, 2016 (the **"Effective Date"**) by Invenergy Solar Development LLC, a Delaware limited liability company (**"Member"** and **"Manager"**), and Boardman Solar Energy LLC, a Delaware limited liability company (the **"Company"**).

ARTICLE 1
DEFINITIONS

The following terms used in this Operating Agreement shall have the meanings set forth below (unless otherwise expressly provided herein):

(a) **"Act"** shall mean the version of the Limited Liability Company Act adopted by the State of the Delaware.

(b) **"Entity"** shall mean any general partnership, limited partnership, limited liability company, corporation, joint venture, trust, estate, business trust, cooperative or association.

(c) **"Operating Agreement"** shall mean this Operating Agreement as originally executed and as amended from time to time.

(d) **"Person"** shall mean any individual or Entity, and the heirs, executors, administrators, legal representatives, successors, and assigns of such Person where the context so admits.

ARTICLE 2
FORMATION OF COMPANY

2.1 **Formation.** On July 18, 2016, the Company was organized as a Delaware limited liability company under and pursuant to the Act.

2.2 **Name.** The name of the Company is Boardman Solar Energy LLC, a Delaware limited liability company.

2.3 **Principal Place of Business.** The principal place of business of the Company within the State of Illinois shall be at One South Wacker Drive, Suite 1800, Chicago, Illinois 60606. The Company may locate its places of business and registered office at any other place or places as the Manager may from time to time deem advisable.

2.4 **Registered Office and Registered Agent.** The Company's registered office shall be at the office of its registered agent at 1209 Orange Street, Wilmington, Delaware 19801 and the name of its initial registered agent at such address shall be The Corporation Trust Company.

2.5 **Certificate of Formation.** The Certificate of Formation is hereby adopted and incorporated by reference in this Operating Agreement. In the event of any inconsistency between the Certificate of Formation and this Operating Agreement, the terms of the Certificate of Formation shall govern.

2.6 **Term.** The term of the Company shall be perpetual, unless the Company is earlier dissolved in accordance with either the provisions of this Operating Agreement or the Act.

ARTICLE 3
BUSINESS OF THE COMPANY

3.1 **Permitted Businesses.** The Company is hereby authorized to undertake any and all lawful acts or activities for which limited liability companies may be formed under the Act.

ARTICLE 4
BOOKS, RECORDS, AND ACCOUNTING

4.1 **Books and Records.** The Manager shall maintain books of account that accurately record all items of income and expenditure relating to the business of the Company and that accurately and completely disclose the results of the operations of the Company. Such books of account shall be maintained on the method of accounting selected by the Manager.

4.2 **Bank Accounts.** The Manager shall establish and maintain one or more separate accounts in the name of the Company in one or more federally insured banking institutions of its choosing into which shall be deposited all funds of the Company and from which all Company expenditures and other disbursements shall be made. Funds may be withdrawn from such accounts on the signature of such Person or Persons that the Manager shall from time to time determine.

ARTICLE 5
MANAGEMENT

The business and affairs of the Company shall be managed by the Manager, except that the Manager does not have the authority to direct the day-to-day operations of the Company, including operations involving the sale of power, such activities being hereby vested by in the Officers of the Company.

ARTICLE 6
OFFICERS

6.1 **Number.** The Officers of the Company shall be a President, a Secretary and any number of Vice Presidents or Assistant Secretaries or other officers (each an "**Officer**" and collectively "**Officers**") as may be elected by the Manager. Any two or more offices may be held by the same person.

6.2 **Election and Term of Office.** The Officers of the Company shall be elected or appointed by the Manager. Vacancies may be filled or new offices created and filled by the Manager. Each Officer shall hold office until his successor shall have been duly elected or appointed and shall have qualified or until his death or until he shall resign or shall have been removed in the manner hereinafter provided. Election of an Officer shall not of itself create contract rights.

6.3 **Vacancies.** A vacancy in any office because of death, resignation, removal, disqualification or otherwise, may be filled by the Manager for the unexpired portion of the term.

6.4 **Removal.** Any Officer elected or appointed by the Manager may be removed by the Manager whenever in its judgment the best interests of the Company would be served thereby, but such removal shall be without prejudice to the contract rights, if any, of the person so removed.

6.5 **President.** The President shall be the principal officer of the Company. Subject to the direction and control of the Manager, he shall be in charge of the business of the Company; he shall see that the resolutions and directions of the Manager are carried into effect except in those instances in which that responsibility is specifically assigned to some other person by the Manager; and, in general, he shall discharge all duties as may be prescribed by the Manager from time to time. Except in those instances in which the authority to execute is expressly delegated to another officer or agent of the Company or a different mode of execution is expressly prescribed by the Manager or this Operating Agreement, he may execute for the Company any contracts, deeds, mortgages, bonds, or other instruments which the Manager has authorized to be executed, and he may accomplish such execution either individually or with any other officer thereunto authorized by the Manager according to the requirements of the form of the instrument. He may vote all securities which the Company is entitled to vote except as to the extent such authority shall be vested in a different officer or agent of the Company by the Manager.

6.6 **The Vice Presidents.** The Vice President (or in the event there be more than one Vice President, each of the Vice Presidents) shall assist the President in the discharge of his duties as he may direct, and shall perform such other duties as from time to time may be assigned to him by the President or by the Manager. In the absence of the President or in the event of his inability or refusal to act, the Vice President (or in the event there be more than one Vice President, the Vice Presidents in the order designated by the Manager, or if the Manager has not made such a determination, or in the absence of any designation, then in the order of seniority of tenure as Vice President) shall perform the duties of the President, and when so acting, shall have all the powers of and be subject to all the restrictions upon the President. Except in those instances in which the authority to execute is expressly delegated to another officer or agent of the Company or a different mode of execution is expressly prescribed by the Manager or this Operating Agreement, the Vice

President (or each of them if there are more than one) may execute for the Company any contracts, deeds, mortgages, bonds or other instruments, which the Manager has authorized to be executed, and he may accomplish such execution either individually or with any other officer thereunto authorized by the Manager according to the requirements of the form of the instrument.

6.7 **Secretary.** The Secretary shall keep a register of the post office address of each Member which shall be furnished to the Secretary by such Member. The Secretary shall have the authority to certify this Agreement, resolutions of the Manager, and other documents of the Company as true and correct copies thereof, and in general to perform all duties incident of the office of the Secretary and such other duties as from time to time may be assigned to him or her by the President and any of the Vice Presidents or by the Manager. If the Manager chooses to appoint an Assistant Secretary or Assistant Secretaries, the Assistant Secretaries, in the order of their seniority, in the absence, disability or inability to act of the Secretary, shall perform the duties and exercise the powers of the Secretary, and shall perform such other duties as the Manager may from time to time prescribe.

6.8 **Salaries.** The salaries and other compensation of the Officers shall be fixed from time to time by the Manager.

6.9 **Indemnification of Officers.**

(a) To the greatest extent allowed by the Act, the Officers shall not be liable to the Member because any taxing authorities disallow or adjust income, deduction or credits in the Company tax returns. Furthermore, the Officers shall not have any liability for the repayment of the capital contributions of the Member. In addition, the doing of any act or the omission to do any act by the Officers the effect of which may cause or result in loss or damage to the Company, if done in good faith and otherwise in accordance with the terms of this Operating Agreement, shall not subject the Officers or their successors and assigns to any liability to the greatest extent allowed by the Act. To the greatest extent allowed by the Act, the Company will indemnify and hold harmless the Officers and their successors, delegees and assigns from any claim, loss, expense, liability, action or damage resulting from any such act or omission, including, without limitation, reasonable costs and expenses of litigation and appeal of such litigation (including reasonable fees and expenses of attorneys engaged by any of the Officers in defense of such act or omission), but the Officers shall not be entitled to be indemnified or held harmless due to, or arising from, their fraud, gross negligence, bad faith or willful malfeasance. The foregoing indemnification is limited to the assets of the Company, and nothing contained herein is intended to create personal liability for the Member.

(b) The Company may purchase and maintain insurance on behalf of any Person who is or was an Officer, employee, or agent of the Company, or who is or was serving at the request of the Company as a director, manager, officer, trustee, employee, or agent of another limited liability company, corporation, partnership, joint venture, trust, or other enterprise, against any liability asserted against the Person and incurred by the person in any capacity, or arising out of the Person's status as such, whether or not the Company would have the power to indemnify the Person against the liability under the provisions of this Section 6.9.

ARTICLE 7
RIGHTS AND OBLIGATIONS OF MEMBER

7.1 **Limitation of Liability.** The Member's liability shall be limited as set forth herein and in the Act and other applicable law.

7.2 **Company Debt Liability.** The Member will not personally be liable for any debts or losses of the Company, except as provided in the Act.

ARTICLE 8
DISSOLUTION AND TERMINATION

8.1 **Dissolution.** The Company shall be dissolved upon the occurrence of any of the following events ("**Dissolution Event**"):

(a) the expiration of the term of the Company as provided in Section 2.6;

(b) by the written resolution of the Member;

(c) upon the death, retirement, resignation, bankruptcy, court declaration of incompetence with respect to, or dissolution of the Member (a "**Withdrawal Event**");

(d) entry of a decree of judicial dissolution under Section 18-802 of the Act; or

(e) administrative dissolution under Section 18-801 of the Act.

8.2 **Distribution of Assets Upon Dissolution.** In settling accounts after dissolution, the liabilities of the Company shall be entitled to payment in the following order:

(a) to creditors, including the Member if it is a creditor, in the order of priority as provided by law; and

(b) to the Member.

8.3 **Certificate of Dissolution.** When all debts, liabilities and obligations have been paid and discharged or adequate provisions have been made therefor and all of the remaining property and assets have been distributed to the Member, a certificate of dissolution shall be executed and verified by the Person signing the certificate, which certificate shall set forth the information required by the Act.

8.4 **Filing of Certificate of Dissolution.**

(a) A certificate of dissolution shall be delivered to the Delaware Secretary of State.

(b) Upon the filing of the certificate of dissolution, the existence of the Company shall cease, except for the purpose of suits, other proceedings and appropriate action as provided in the Act.

ARTICLE 9
MISCELLANEOUS PROVISIONS

9.1 **Notices.** Any notice or communication required or permitted to be given by any provision of this Agreement, including but not limited to any consents, shall be in writing and shall be deemed to have been given and received by the Person to whom directed (a) when delivered personally to such Person or to an officer or partner of the Person to which directed, (b) twenty-four (24) hours after transmitted by facsimile, evidence of transmission attached, to the facsimile number of such Person who has notified the Company and the Manager of its facsimile number, or (c) three (3) business days after being posted in the United States mails if sent by registered or certified mail, return receipt requested, postage and charges prepaid, or one (1) business day after deposited with overnight courier, return receipt requested, delivery charges prepaid, in either case addressed to the Person to which directed at the address of such Person as it appears in the records of the Company or such other address of which such Person has notified the Company and the Manager.

9.2 **Application of Delaware Law.** This Operating Agreement, and the application of interpretation hereof, shall be governed exclusively by its terms and by the laws of the State of Delaware, and specifically, the Act.

9.3 **Construction.** Whenever the singular number is used in this Operating Agreement and when required by the context, the same shall include the plural, and the masculine gender shall include the feminine and neuter genders and vice versa.

9.4 **Headings.** The headings in this Operating Agreement are inserted for convenience only and are in no way intended to describe, interpret, define, or limit the scope, extent or intent of this Operating Agreement or any provision hereof.

9.5 **Severability.** If any provision of this Operating Agreement or the application thereof to any Person or circumstance shall be invalid, illegal or unenforceable to any extent, the remainder of this Operating Agreement and the application thereof shall not be affected and shall be enforceable to the fullest extent permitted by law.

[signature page attached.]

IN WITNESS WHEREOF, the undersigned has executed this Operating Agreement as of the date first set forth above.

BOARDMAN SOLAR ENERGY LLC

By: _____
Steven Ryder, Vice President

INVENERGY SOLAR DEVELOPMENT LLC
its Member and Manager

By: _____
Steven Ryder, Vice President

EXHIBIT A

MEMBERS

THIS SCHEDULE MAY BE AMENDED FROM TIME TO TIME TO REFLECT THE ADDITION OF NEW MEMBERS, THE ISSUANCE OF NEW MEMBERSHIP INTERESTS, THE SALE OR EXCHANGE OF MEMBERSHIP INTERESTS, OR OTHER SHIFTS OF MEMBERSHIP INTERESTS PURSUANT TO THE OPERATING AGREEMENT OR A CHANGE OF ADDRESS OR FACSIMILE NUMBER OF A PERSON FOR WHICH NOTICE WAS GIVEN TO THE COMPANY PURSUANT TO THIS OPERATING AGREEMENT.

Name and Address	Facsimile Number	Percentage Interest
Invenergy Solar Development LLC One S. Wacker Drive Suite 1800 Chicago, Illinois 60606	(312) 224-1444	100%
TOTALS		100%

CONSENT OF THE SOLE MANAGER
OF
BOARDMAN SOLAR ENERGY LLC

The undersigned, being the sole Manager of Boardman Solar Energy LLC, a Delaware limited liability company, (the "**Company**"), hereby gives its express written consent to the following resolutions:

RESOLVED: That the following persons are hereby appointed to the offices set forth opposite their respective names to serve until their respective successors are appointed or until the earlier of their resignation or removal:

Michael Polsky	-	President
James Murphy	-	Vice President
James Shield	-	Vice President
Steven Ryder	-	Vice President
Bryan Schueler	-	Vice President
Michael Baird	-	Vice President

FURTHER RESOLVED: That all acts and deeds heretofore done or actions taken by any member or any officer or agent of the Company for and on behalf of the Company, including any act or deed in entering into, executing, acknowledging or attesting any arrangements, agreements, instruments or documents which carry out the terms and intentions of any of the foregoing resolutions are hereby in all respects ratified, approved and confirmed.

Dated as of July 18, 2016.

INVENERGY SOLAR DEVELOPMENT LLC, Being the sole Manager of the Company

Steven Ryder, Vice President

LEGEND

- SITE BOUNDARY
- COUNTY SITE SETBACK
- (N) PERIMETER FENCE
- (E) FENCE
- SETBACK / ROW
- (E) MAJOR CONTOUR
- (E) MINOR CONTOUR
- (N) DAYLIGHT LINE
- (N) MAJOR CONTOUR
- (N) EQUIPMENT PAD
- (E) WETLAND DELINEATION AS PROVIDED BY WEST ECOSYSTEMS TECHNOLOGY INC.
- (N) ACCESS ROAD
- (N) SERVICE ROAD
- (E) PAVED ROAD
- (E) DIRT ROAD
- (N) TRANSMISSION LINE
- (N) SILT FENCE
- (N) FIBER ROLL
- FLOW DIRECTION

KEYED NOTES:

1. OUTLINE OF TYPICAL 2.5 MW INVERTER AND TRANSFORMER BLOCK.
2. 20 FOOT WIDE ACCESS ROAD, MINIMUM INTERIOR TURNING RADIUS OF 28 FEET.
3. WETLANDS WERE DELINEATED BY WEST ECOSYSTEMS TECHNOLOGIES INC. A 100' OFFSET WAS INCORPORATED PER INVENERGY DIRECTION FOR ALL OF THE AREA EXCEPT FENCING ALONG THE SOUTHERN BORDER PER HABITAT MITIGATION PLAN.

GENERAL NOTES:

1. THE OVERALL HISTORICAL DRAINAGE PATTERNS ARE TO REMAIN.
2. THE INTENT OF THE GRADES SHOWN IS TO MATCH THE EXISTING GRADES UNLESS OTHERWISE NOTED. IF A DISCREPANCY BETWEEN THE PROPOSED GRADES AND THE EXISTING GRADES IS FOUND THE ENGINEER SHALL BE NOTIFIED IMMEDIATELY.
3. DIMENSIONS PROVIDED ARE FOR GENERAL GUIDANCE ONLY AND DO NOT REPRESENT SLOPES OR DIFFERENCES IN ELEVATIONS.
4. THE ENTIRE SITE SHALL BE CLEARED AND GRUBBED FOR CONSTRUCTION SITE PREPARATION.
5. SEE PRELIMINARY GRADING PLAN FOR FURTHER INFORMATION.
6. A COMPREHENSIVE LIST OF AVAILABLE BMP OPTIONS BASED ON ODEQ's 1200-C PERMIT APPLICATION AND ESCP GUIDANCE DOCUMENT HAVE BEEN REVIEWED TO COMPLETE THIS EROSION AND SEDIMENT CONTROL PLAN. SOME OF THE BMPS THAT WILL BE UTILIZE ARE NOT DETAILED ON THIS PRELIMINARY EROSION AND SEDIMENT CONTROL PLAN. AS THE PROJECT PROGRESSES AND THERE IS A NEED TO REVISE THE EROSION AND SEDIMENTATION CONTROL PLAN THESE DETAILS WILL BE PROVIDED.

COLUMBIA RIVER

EDGE OF COLUMBIA RIVER (LOCATED FROM THE USGS NATIONAL HYDROGRAPHY DATASET)

APPROXIMATE INTERSTATE LOCATION (LOCATED FROM THE US DEPARTMENT OF COMMERCE, U.S. CENSUS BUREAU, GEOGRAPHY DIVISION)

INTERSTATE 84 R/W

INTERSTATE 84

SILT FENCE (TYP) C -

THREE MILE CANYON ROAD

(E) WETLAND (TYP)

10 ACRE TEMPORARY STAGING AREA

SITE ACCESS SEE EROSION AND SEDIMENTATION CONTROL NOTE #9

(E) 125' TRANSMISSION LINE EASEMENT
BOARDMAN POWER COMPANY
PORTLAND GENERAL ELECTRIC COMPANY
INSTRUMENT NO. 12263

FIBER ROLL (TYP) B -

A C-403

(N) 10,000 SQ. FT. SUBSTATION TEMPORARY LAYDOWN AREA

(N) 25,000 SQ. FT. SUBSTATION YARD

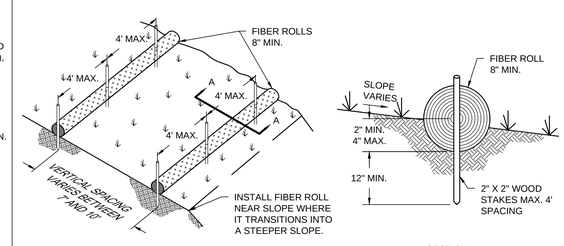
N

0 200' 400' 800'

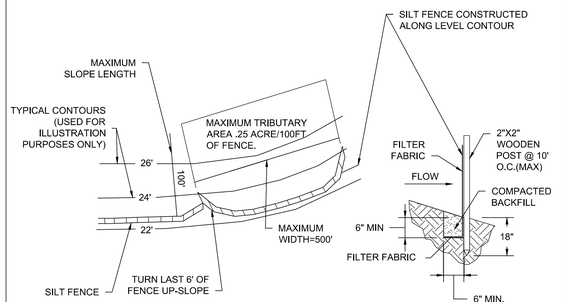
SCALE: 1"=400'

EROSION AND SEDIMENT CONTROL NOTES:

1. THE ESCP MEASURES SHOWN ON THIS PLAN ARE THE 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.
2. PHASE CLEARING AND GRADING TO THE MAXIMUM EXTENT PRACTICAL TO PREVENT EXPOSED INACTIVE AREAS FROM BECOMING A SOURCE OF EROSION.
3. 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.
4. PRESERVE EXISTING VEGETATION WHEN PRACTICAL AND RE-VEGETAE OR PLACE STABLE GROUND COVER ON OPEN AREAS. RE-VEGETATE OR STABILIZE OPEN AREAS WHEN PRACTICAL BEFORE AND AFTER GRADING OR CONSTRUCTION.
5. 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.
6. ESTABLISH CONCRETE TRUCK AND OTHER CONCRETE EQUIPMENT WASHOUT AREAS BEFORE BEGINNING CONCRETE WORK.
7. APPLY TEMPORARY AND/OR PERMANENT SOIL STABILIZATION MEASURES IMMEDIATELY ON ALL DISTURBED AREAS AS GRADING PROGRESSES AND FOR ALL ROADWAYS INCLUDING GRAVEL ROADWAYS.
8. ESTABLISH MATERIAL AND WASTE STORAGE AREAS, AND OTHER NON-STORMWATER CONTROLS.
9. PREVENT TRACKING OF SEDIMENT ONTO PUBLIC OR PRIVATE ROADS USING BMPS SUCH AS: GRAVELED (OR PAVED) EXITS AND PARKING AREAS, GRAVEL ALL UNPAVED ROADS LOCATED ONSITE, OR USE AN EXIT TIRE WASH. THESE BMPS MUST BE IN PLACE PRIOR TO LAND-DISTURBING ACTIVITIES.
10. USE WATER, SOIL-BINDING AGENT OR OTHER DUST CONTROL TECHNIQUE AS NEEDED TO AVOID WIND-BLOWN SOIL.
11. AT THE END OF EACH WORKDAY SOIL STOCKPILES MUST BE STABILIZED OR COVERED, OR OTHER BMPS MUST BE IMPLEMENTED TO PREVENT DISCHARGES TO SURFACE WATERS OR CONVEYANCE SYSTEMS LEADING TO SURFACE WATERS.
12. CONSTRUCTION ACTIVITIES MUST AVOID OR MINIMIZE EXCAVATION AND CREATION OF BARE GROUND DURING WET WEATHER.



A FIBER ROLL INSTALLATION
SCALE: NTS



NOTE(S):

1. CONSTRUCT THE SILT FENCE ALONG A LEVEL CONTOUR.
2. SILT FENCES SHALL REMAIN IN PLACE UNTIL THE DISTURBED AREA IS PERMANENTLY STABILIZED.
3. PROVIDE SUFFICIENT ROOM FOR RUNOFF TO POND BEHIND THE FENCE AND ALLOW SEDIMENT REMOVAL EQUIPMENT TO PASS BETWEEN THE SILT FENCE AND TOE OF SLOPE OR OTHER OBSTRUCTIONS. ABOUT 1200 SQ. FT. OF PONDING AREA SHALL BE PROVIDED FOR EVERY ACRE DRAINING TO THE FENCE.
4. TURN THE ENDS OF THE FILTER FENCE UPHILL TO PREVENT STORMWATER FROM FLOWING AROUND THE FENCE.
5. LEAVE AN UNDISTURBED OR STABILIZED AREA IMMEDIATELY DOWNSLOPE FROM THE FENCE.
6. DO NOT PLACE IN LIVE STREAM OR INTERMITTENTLY FLOWING CHANNELS.
7. WHEN STANDARD FILTER FABRIC IS USED, A WIRE MESH SUPPORT FENCE SHALL BE FASTENED SECURELY TO THE UPSLOPE SIDE OF THE POSTS USING HEAVY-DUTY (0.6 INCH) WIRE STAPLES AT LEAST 1.75 INCHES LONG, TIE WIRES OR HOG RINGS.
8. FILTER FABRIC SHALL BE WOVEN POLYPROPYLENE GEOTEXTILE WITH A MINIMUM WIDTH OF 36 INCHES AND A MINIMUM TENSILE STRENGTH OF 100 LB FORCE.
9. WOOD STAKES SHALL BE COMMERCIAL QUALITY LUMBER NO LESS THAN 2 INCH BY 2 INCH. WOOD STAKES SHALL BE DRIVEN TO A DEPTH OF NO LESS THAN 18 INCHES FROM SURFACE.

B SILT FENCE
SCALE: NTS

BLUE OAK ENERGY
1560 Drew Avenue
Davis, CA 95618
www.blueoakenergy.com
530.747.2026

CLIENT:
Invenergy
ONE SOUTH WACKER DRIVE SUITE 1900
CHICAGO, IL 60606

PRELIMINARY
NOT FOR CONSTRUCTION

	DESCRIPTION	DATE	BY	PRINTED: 12/05/2016
- INTERNAL USE ONLY -				
DRAWN: LJK				
CHK'D: SPL				
P.M.: SPL				
PROJECT #: INV0L18.001				
FILE NAME: C701.dwg				

PROJECT:
BOARDMAN SOLAR ENERGY FACILITY
SECTION 20,21, 28,29, 30 OF T4N, R25E, W.M. & SECTION 4 OF T3S, R25E, W.M.
MORROW COUNTY, OREGON

DRAWING TITLE:
EROSION & SEDIMENTATION CONTROL PLAN & DETAILS

DRAWING NO.
C-701

BOE - ARCH D SIZE - 24"X36" © Blue Oak Energy, LLC

PRELIMINARY HYDROLOGY CALCULATIONS:

1. PRELIMINARY WATERSHED DELINEATION UTILIZING USGS TOPOGRAPHIC DATA AND GOOGLE EARTH IMAGES. ANALYSIS ESTIMATES TWO TRIBUTARY OFFSITE WATERSHEDS TOTALING APPROXIMATELY 2420 ACRES AND SITE BOUNDARY TOTALING APPROXIMATELY 615 ACRES.

2. PRELIMINARY INDIVIDUAL WATERSHED DELINEATION ESTIMATES ARE PROVIDED BELOW:
   - 2.1. WEST WATERSHED: 1673 ACRES
   - 2.2. EAST WATERSHED: 1337 ACRES
   - 2.3. TRANSMISSION LINE WATERSHED 468 ACRES

3. DUE TO BOTH SUBWATERSHEDS BEING DETERMINED LESS THAN 2000 ACRES THE OREGON ENGINEERING HANDBOOK - HYDROLOGY GUIDE INDICATES THE TECHNICAL RELEASE NO. 55 (TR-55) METHOD CAN BE USED FOR CALCULATING STORMWATER RUNOFF VOLUME AND PEAK RATE OF DISCHARGE. THIS METHOD IS REFERENCED IN THE OREGON DEPARTMENT OF TRANSPORTATION, APPENDIX G.

4. ESTIMATING RUNOFF

NRCS SOIL TYPE	AREA (AC)	COVER	HYDROLOGIC SOIL GROUP	CN
KOEHLER LOAMY FINE SAND	420	OPEN SPACE (POOR COVER)	A	68
PROSSER SILT LOAM	890	OPEN SPACE (POOR COVER)	C	86
PROSSER ROCK OUTCROP COMPLEX	610	OPEN SPACE (POOR COVER)	C	86
TAUNTON FINE SANDY LOAM	730	OPEN SPACE (POOR COVER)	C	86
MISC. SOIL	878	OPEN SPACE (POOR COVER)	C	86

5. CURVE NUMBER WEIGHTED FOR BOTH SUBWATERSHEDS = 84

6. RAINFALL DISTRIBUTION TYPE = IA (HG APPENDIX B)

SHEET FLOW	WEST	EAST	TRANSMISSION
SURFACE DESCRIPTION	GRASS	GRASS	GRASS
MANNINGS ROUGHNESS, n	0.3	0.3	0.3
FLOW LENGTH, L	300 FT	300 FT	300 FT
2-YR, 24-HR RAINFALL, P2	1.6	1.6	1.6
LAND SLOPE, S	0.017	0.015	0.005
TRAVEL TIME, Tt	1.03 HR	1.09 HR	1.68 HR
SHALLOW CONCENTRATED FLOW			
SURFACE DESCRIPTION	GRASS	GRASS	GRASS
FLOW LENGTH, L	18000 FT	15000 FT	8200 FT
WATERCOURSE SLOPE, S	0.010	0.012	0.010
AVERAGE VELOCITY, V	1.6 FT/S	1.8 FT/S	1.6 FT/S
TRAVEL TIME, Tt	3.13 HR	2.32 HR	1.42 HR
TIME OF CONCENTRATION	4.16 HR	3.41 HR	3.10 HR

NO CHANNEL FLOW EXPECTED

7. GRAPHICAL PEAK DISCHARGE METHOD:

	WEST WATERSHED			EAST WATERSHED			TRANSMISSION	
	STORM 1	STORM 2	STORM 3	STORM 1	STORM 2	STORM 3	STORM 1	STORM 2
FREQUENCY (YR)	10	25	100	10	25	100	10	25
RAINFALL, P (24-HOUR), (IN)	1.6	2.0	2.8	1.6	2.0	2.8	1.6	2.0
RUNOFF, Q (IN)	0.6	1.0	1.8	0.6	1.0	1.8	0.6	1.0
INITIAL ABSTRACTION Ia	0.381	0.381	0.381	0.381	0.381	0.381	0.381	0.381
Ia/P	0.238	0.191	0.136	0.238	0.191	0.136	0.238	0.191
UNIT PEAK DISCHARGE, qu	50	55	60	52	57	63	55	60
POND & SWAMP ADJUSTMET FACTOR	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
PEAK DISCHARGE (CFS)	87	159.5	313.2	58.7	107.2	213.2	24.1	43.8

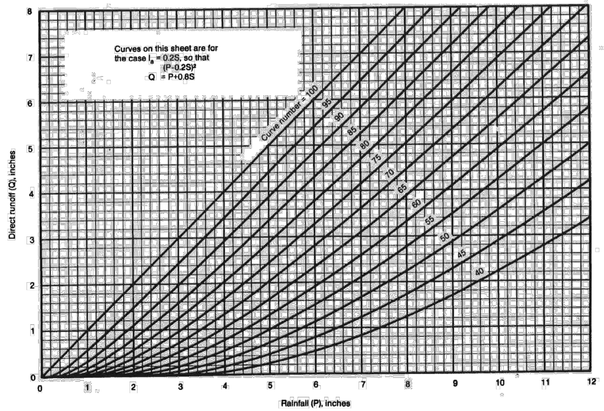
8. PRE-CONSTRUCTION PEAK DISCHARGE ANALYSIS IS PRELIMINARY. POST-CONSTRUCTION FLOWS, IN RELATION TO PRE-CONSTRUCITON RUNOFF RATES, TO BE IDENTIFIED DURING DETAILED TECHNICAL DRAINAGE STUDY DURING FINAL ENGINEERING.

LIMITATIONS

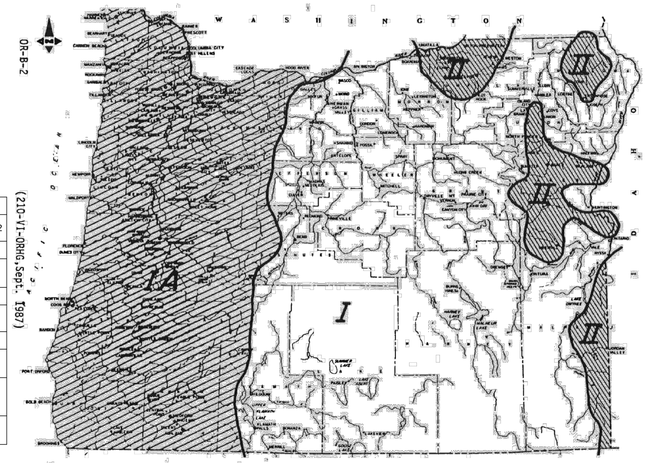
THE INFORMATION PROVIDED ON THIS PAGE IS BASED UPON PRELIMINARY SITE INFORMATION PROVIDED BY THE CLIENT AND PUBLICLY AVAILABLE SOILS AND PUBLICLY AS WELL AS SURVEYED TOPOGRAPHIC DATA. THIS HYDROLOGY ANALYSIS IS MEANT TO ASSIST IN PLANNING PURPOSES ONLY. IN ORDER TO PROVIDE FINAL ANALYSIS OF THE PROPOSED PROJECT FINAL SITE LAYOUT, DETAILED TOPOGRAPHIC INFORMATION, AGENCY COORDINATION, AND SITE VISIT WILL BE REQUIRED.

KEYED NOTES

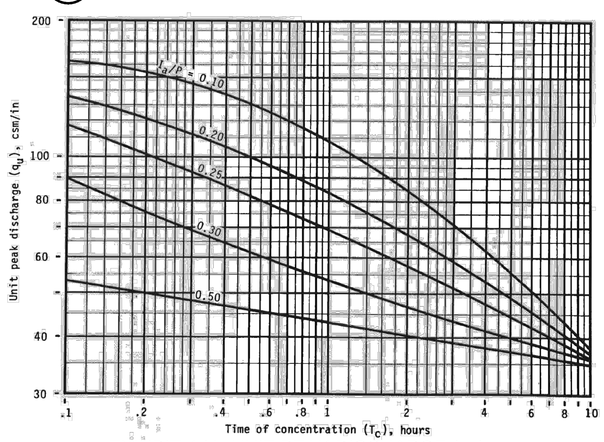
1. DETAIL TAKEN FROM THE OREGON ENGINEERING HANDBOOK - HYDROLOGY GUIDE.
2. WETLANDS DELINEATED BY WEST ECOSYSTEMS TECHNOLOGIES INC.



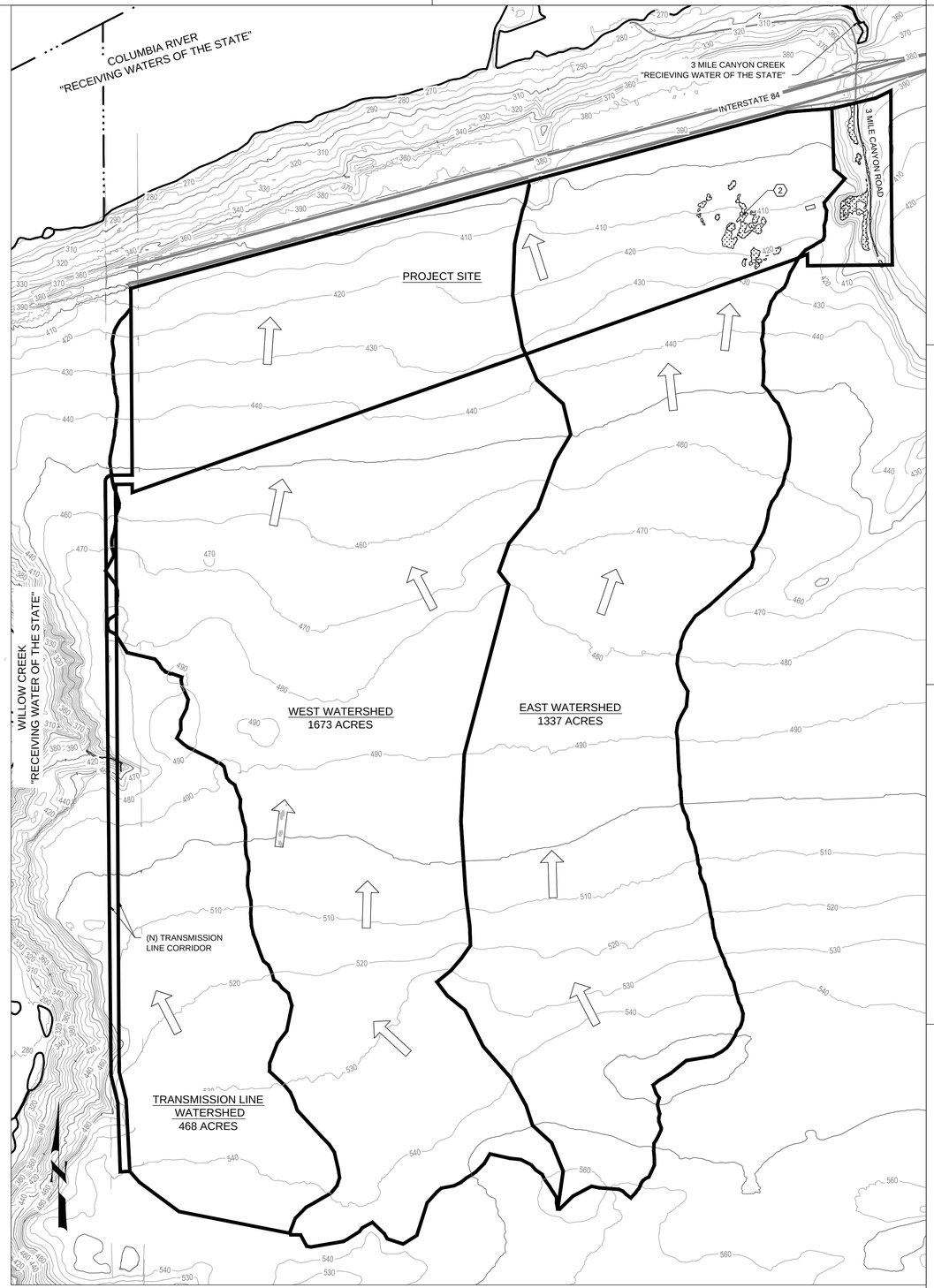
A FIGURE 2-1: SOLUTION OF RUNOFF EQUATION (1)
SCALE: NTS



B GEOGRAPHIC BOUNDARIES FOR SCS RAINFALL DISTRIBUTION (1)
SCALE: NTS



C EXHIBIT 4-IA: UNIT PEAK DISCHARGE (qu) FOR SCS TYPE 1A RAINFALL DISTRBUTION (1)
SCALE: NTS



D PRELIMINARY WATERSHED DELINEATION
SCALE: 1" = 2000'

BLUE OAK ENERGY
1560 Drew Avenue
Davis, CA 95618
www.blueoakenergy.com
530.747.2026

CLIENT:
Invenergy
ONE SOUTH WACKER DRIVE SUITE 1900
CHICAGO, IL 60606

PRELIMINARY
NOT FOR CONSTRUCTION

- INTERNAL USE ONLY -
DRAWN: LJK
CHK'D: SPL
P.M.: SPL
PROJECT #: IN10.16.001
FILE NAME: C702.dwg
DATE: 12/05/2016
BY: PRINTED

DATE	BY	DESCRIPTION
		△

PROJECT:
BOARDMAN SOLAR ENERGY FACILITY
SECTION 20, 21, 28, 29, 30 OF TOWNSHIP 4 N., RANGE 25 E.W.M., 23 EAST, MORROW COUNTY, OREGON

DRAWING TITLE:
PRELIMINARY DRAINAGE EXHIBIT

DRAWING NO.
C-702

BOE - ARCH D SIZE - 24"x36" © Blue Oak Energy, LLC

Attachment I-2
Letter from Oregon Department of Environmental Quality Confirming Receipt of NPDES Permit Application

Oregon
Kate Brown, Governor

Department of Environmental Quality
Eastern Region Bend Office
475 NE Bellevue Drive, Suite 110
Bend, OR 97701-7415
(541) 388-6146
Fax (541) 388-8283
TTY 711

January 3, 2017

Katie Clifford
Energy Facility Siting Analyst
Oregon Department of Energy
550 Capital St. NE
Salem, OR 97301-3737

Re: Confirmation of Permit Application by Boardman Solar Energy, LLC
1200-C Construction Stormwater Permit
Gilliam and Morrow County

Dear Ms. Clifford:

On Dec. 8, 2016, 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 of Boardman Solar Energy Facility. The application was submitted to Jackie Ray, Permit Coordinator, in DEQ's Pendleton office. Payment for the permit application was processed for $1932.00.

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) after a few minor revision requests. The permit will be assigned once a final ESCP meets the permit requirements and pending the determination by the Energy Facility Siting Council Final Order.

I expect that DEQ will be able to issue the NPDES 1200-C construction stormwater permit for Boardman Solar Energy Facility 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
Natural Resource Specialist, Stormwater
DEQ - Eastern Region

ecc: Laura Miner, Business Development Manager– Portland, OR