EXHIBIT U – Request for Amendment No. 1

PUBLIC SERVICES

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

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U.1 INTRODUCTION

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

Response: This exhibit provides the information required by Oregon Administrative Rules (OAR) 345-021-0010(1)(u), in support of the Request for Amendment No. 1 of the Site Certificate for the Carty Generating Station (RFA). This exhibit identifies the public and private providers in the analysis area and the Carty Solar Farm's potential impacts on their ability to provide the services listed in OAR 345-022-0110. The analysis area for potential impacts on public and private providers is the area in the amended Site Boundary and 10 miles from the amended Site Boundary.

U.2 IMPORTANT ASSUMPTIONS USED TO EVALUATE POTENTIAL IMPACTS

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

Response: Exhibit U of the Application for Site Certificate (ASC) provided key assumptions and information used to evaluate potential impacts of the original project on public and private providers. As stated in the ASC, regional or local standards for public services are not available for the analysis area; therefore, system capacities and operating service levels are described and used to estimate the level of service. Given the minimal public services the Carty Solar Farm would need, this analysis assumes that it would not adversely impact a particular service system if the system were currently operating below capacity.

The 10-mile analysis area includes Morrow County and a very small portion of Gilliam County in Oregon and Benton County in Washington. Construction and operations personnel would access the project from Interstate 84 and Tower Road in Morrow County, about 5 miles west of the city of Boardman. Due to the location of the project, Portland General Electric Company (PGE) expects that within the analysis area, most project personnel would use public and private providers in northern Morrow County (i.e., in Boardman or Irrigon). However, PGE expects some project personnel to also use providers beyond the analysis area, including in Umatilla County, Oregon (e.g., hospital and housing in Hermiston), and in Benton and Franklin Counties, Washington (e.g., housing in the Tri-Cities area).

PGE expects an average of 50 to 60 workers per day during the nine-month construction period for the Carty Solar Farm, with a peak number of workers ranging between 100 and 130 per day

during the second half of the construction period. PGE expects that the Carty Solar Farm would require one to two personnel for daily maintenance activities during operations.

U.2.1 Sewers and Sewage Treatment

During construction, portable toilets would be used; these would be provided and serviced by a sanitation service provider.

During operation of the Carty Solar Farm, PGE's staff would make use of sanitary facilities at the plant services building adjacent to Unit 1, which sends sewage to the Boardman Plant sewage lagoons. Occasionally, if there were numerous workers on the Carty Solar Farm site for multiple days in a row, a portable toilet may also be temporarily placed at the Carty Solar Farm unit.

U.2.2 Water

PGE expects to use 8,000,000 gallons of water during construction of the Carty Solar Farm. PGE expects to use 2 to 5 acre-feet per year of water for panel washing for the Carty Solar Farm during operations. Water used during construction and for panel washing during operations would be discharged to the ground and allowed to infiltrate or evaporate. Water used during construction would be withdrawn from Carty Reservoir; water during operations would be either withdrawn from Carty Reservoir or provided by an off-site source. Refer to Exhibit O of this RFA for more details.

U.2.3 Stormwater Drainage

The Carty Solar Farm site would be graded in a manner to encourage stormwater to infiltrate the ground without the need for collection in stormwater swales or retention basins. During construction, stormwater best management practices would be implemented and maintained in accordance with a 1200-C National Pollution Discharge Elimination System permit and Erosion and Sediment Control Plan (see Exhibit I, Appendix I-1). No community/public stormwater collection systems would be utilized.

U.2.4 Solid Waste Management

Construction Waste

The types of waste produced during construction of the Carty Solar Farm would be similar to those discussed in the ASC. Solid waste would consist of domestic refuse, office waste, packaging materials, steel cut-offs, and construction materials (e.g., concrete waste, wood, plastic, glass, erosion control materials). Waste may also include oil rags, spent batteries, and equipment and vehicle maintenance solvents and oils. PGE expects the construction of the Carty Solar Farm to generate up to approximately 5 tons of solid waste per week.

Operating Waste

PGE expects that the Carty Solar Farm would generate a negligible amount of solid waste during operation. Solid waste would consist primarily of office and maintenance waste; this waste would be generated and managed in the existing Carty Generating Station plant services building, as the Carty Solar Farm would not have its own office or maintenance buildings. Hazardous waste produced as a result of the Carty Solar Farm could include oil rags, spent batteries, and vehicle maintenance solvents and oils. PGE still anticipates that the Carty Generating Station would be classified as a Conditionally Exempt Generator, meaning that less than 220 pounds per month of hazardous waste would be produced during operation.

Solid Waste Produced By Retirement

The retirement of the Carty Solar Farm would involve the reuse, recycling, or disposal of the solar panels, rack systems, and other components. Exhibit W of this RFA provides a more detailed list of components and quantities of expected waste for retirement of the Carty Solar Farm.

U.2.5 Housing

The United States Census Bureau notes that there were a total of 4,442 housing units in Morrow County in 2010, and 4,482 in 2016 (United States Census Bureau 2018). Oregon Housing and Community Services (2018) reports vacancy rates in Morrow County from 2011 to 2015 to be 4.5 percent for rental units. There are at least 60 to 70 hotels/motels within 70 miles driving distance to the project (Hotels.com 2018). These include at least four and 10 hotels/motels in nearby Boardman and Hermiston, respectively. Pendleton, in Umatilla County, supports at least 10 hotels/motels, and the Tri-Cities area in Benton and Franklin Counties, Washington, supports 25 to 30 hotels/motels. In addition, approximately 20 recreational vehicle parks are available within 45 miles driving distance of the project in Morrow and Umatilla Counties in Oregon (rvparkfinder.com 2018). These include at least two in Boardman and three in or near Irrigon, in Morrow County, with the remainder in the Hermiston and Pendleton areas in Umatilla County.

U.2.6 Traffic

PGE expects an average of up to 48 worker vehicle trips generated during construction of the Carty Solar Farm during both the AM and PM hours, with a peak of 104 trips during AM and PM hours (assuming carpooling factor of 1.25). PGE expects a peak of 28 two-way trips per day by small and large trucks to deliver modules, trackers, and cabling. PGE expects that the Carty Solar Farm would require one two-way vehicle trip per day for maintenance personnel during operations.

U.2.7 Police and Fire Protection

Due to the project's location near Boardman in northern Morrow County, PGE expects to rely primarily on police and fire protection services based in Morrow County. The Carty Solar Farm would adhere to all federal, state, and local requirements for fire safety, including Oregon Fire Code sections 605.12.1 through 605.12.3 and National Fire Protection Association Standard 70 (the National Electric Code).

U.2.8 Health Care

For any necessary emergency health care, patients would be transported to Hermiston for Trauma Level III services, or to Portland for Trauma Level I services (Estes 2018). Emergency medical transport would be provided by the Morrow County Health District's Emergency Medical Services, which has ambulances in Boardman and Irrigon (Estes 2018).

U.2.9 Schools

Only schools in Morrow County are included in the analysis area.

U.3 PUBLIC AND PRIVATE PROVIDERS IN THE ANALYSIS AREA

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

Response: Table U-1 identifies the public and private service providers in and near the analysis area a that would likely be affected by construction of the Carty Solar Farm. The analysis area includes Morrow County in Oregon, as well as a small portion of eastern Gilliam County in Oregon and southern Benton County in Washington. As stated in Section U.2, PGE does not expect any providers in those portions of the analysis area to be affected. As described below, PGE does expect that some providers in Umatilla County in Oregon and in Benton and Franklin Counties in Washington to be affected.

PGE contacted providers in the analysis area to verify that they service the project area and that they can provide the expected levels of services for the project. In addition, PGE acquired letters of assurance from the Boardman Rural Fire Protection District and the Morrow County Sheriff's Office stating that the proposed project would not adversely impact their ability to provide services to the affected areas, as long as certain site certificate conditions were implemented (refer to Appendix U-1).

Table U-1 Public and Private Providers in the Analysis Area and Near the Analysis Area[1]

Service	Service Provider Detail	Location
Sewage Collection and Treatment	During construction of the Carty Solar Farm, PGE would contract a site sanitation service to provide and service portable toilets, with licensed off-site disposal (there are several private services in the Boardman and Hermiston areas). During operation, PGE's staff would continue to make use of sanitary facilities at Unit 1 or occasionally portable toilets if there is a high level of site activity for maintenance during operations.	On site and/or transported off site by licensed service provider.
Water	No service is required. Water would continue to be withdrawn from Carty Reservoir, which is owned and operated by PGE. Potable water would be obtained from the existing Boardman/Carty system potable water system.	Carty Reservoir and well on PGE property.
Storm Water Drainage	No service is required. All stormwater run-off for the Carty Solar Farm would be allowed to evaporate or infiltrate the surface.	On-site drainage and infiltration
Solid Waste Management	Sanitary Disposal Inc.	Hermiston, Oregon
	Finley Buttes Landfill: non-hazardous and some hazardous waste	Boardman, Oregon
	Waste Management – Columbia Ridge Recycling and Landfill: non-hazardous waste	Arlington, Oregon
	Waste management – Chemical Waste Management of the Northwest: hazardous waste	Arlington, Oregon
Police	Morrow County Sheriff's Office: primary law enforcement provider for the project location (see letter of services assurance in Appendix U-1)	Heppner, Oregon
	Oregon State Police: secondary law enforcement provider for the project location.	Hermiston, Oregon
	Boardman Police Department: backup law enforcement provider. The Carty Generating Station does not fall in the Boardman Police Department's Service area; however, some increase in police services associated with temporary work force during the construction phase could be required. In addition, the Boardman Police Department can respond to calls at the project location, if needed.	Boardman, Oregon
Fire	Boardman Rural Fire Protection District (see letter of services assurance in Appendix U-1)	Boardman, Oregon
Health Care	Irrigon Medical Clinic (not Trauma rated)[2]	Irrigon, Oregon (28 miles from project)

Table U-1 Public and Private Providers in the Analysis Area and Near the Analysis Area[1]

Service	Service Provider Detail	Location
	Good Shepherd Community Hospital (Level III Trauma center)[2]	Hermiston, Oregon (40 miles from project)
	Mid-Columbia Medical Center (Level III Trauma center)[2]	The Dalles, Oregon (80 miles from project)
	Oregon Health and Sciences University (Level I Trauma center)[2]	Portland, Oregon (165 miles from project)
	Morrow County Health District's Emergency Medical Services (Emergency Medical Transport)	Boardman and Irrigon, Oregon
Education	PGE does not expect construction of the Carty Solar Farm to affect education services in Morrow County. The Morrow County School District operates schools in Boardman and Ione, Oregon; however, PGE does not expect school bus routes or other educational services there to be affected.	

Key:

PGE = Portland General Electric Company

Notes:

[1] Small portions of Gilliam County and Washington State lie within the analysis area; however, services in these areas are not included in Table U-1 as they would not be affected by the project. Table also includes information about providers that may be affected in nearby areas outside of the analysis area, including, but not limited to, in Umatilla and Gilliam Counties, Oregon.

[2] Trauma level refers to a hospital's ability to provide emergency medical response, patient triage, patient transport, hospital transfers, and trauma team activation, as determined in Oregon by the Oregon Health Authority (Oregon Revised Statute 431A.050-100; Oregon Health Authority 2018).

U.4 ADVERSE IMPACT TO THE ABILITY OF PROVIDERS TO PROVIDE SERVICES

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

Response: The anticipated changes in the demand to services are described in Section U.2. Evaluations of the potential impacts on providers are described below.

U.4.1 Sewers and Sewage Treatment

PGE would contract a site sanitation service to provide and service portable toilets for the crews during construction. During operations, PGE's staff would continue to make use of the sanitary

facilities at the plant services building adjacent to Unit 1. Therefore, PGE expects no significant impacts on public and private providers.

U.4.2 Water

PGE would obtain potable water from a temporary tie in with the Boardman/Carty potable water system or hauled in from nearby potable water systems, or a private water provider. The Boardman/Carty potable water system is sourced from an existing well located 170 feet south of the Carty Unit 1 generation building. PGE does not expect adverse impacts on community water systems because these would not be used as water sources.

U.4.3 Stormwater Drainage

Stormwater would not reach community stormwater systems because it would evaporate or infiltrate the ground on site. Therefore, PGE does not expect adverse effects on any community stormwater systems as a result of the project.

U.4.4 Solid Waste Management

PGE would contract Sanitary Disposal Inc. to transport any solid waste that is not recycled to an approved landfill (Garcia 2018). Finley Buttes Landfill, located 20 miles northeast of the project site in Boardman, or Waste Management, Inc.'s Columbia Ridge Landfill and Chemical Waste Management of the Northwest, located 30 to 35 miles west of the project site, would be the most likely recipients for solid waste for the Carty Solar Project. All landfills have the capacity to accept the expected volumes of solid waste (Snider 2018; Anderson 2018).

PGE expects construction of the Carty Solar Farm to produce 5 tons of solid waste per week during construction, which is well within the handling capacities of Sanitary Disposal Inc. and the aforementioned landfills. During operation, PGE anticipates that the amended Carty Generating Station would be classified as a Conditionally Exempt Generator, meaning that less than 220 pounds per month of hazardous waste would be produced. Overall, PGE does not expect adverse impacts on service providers because of the small volumes of waste that would be generated by construction and operation of the Carty Solar Farm.

U.4.5 Housing

Since the ASC was submitted, it appears that the number of housing units in Boardman has increased slightly (United States Census Bureau 2018), and the number of short-term hotels/ motels in Boardman and Hermiston has remained the same or increased slightly. However, based on PGE's experience during construction of Unit 1 from 2014 to 2016, PGE anticipates that much of the construction personnel will be permanent residents or temporary residents who commute from the Tri-Cities area in Washington. In addition, there are approximately 70 hotels/ motels within 70 driving miles of the project, primarily in the Tri-Cities area (see Section U.2.5).

Therefore, PGE does not expect adverse impacts on housing in the analysis area as a result of the construction of the Carty Solar Farm. Due to the low number of additional permanent employees during operation of the Carty Solar Farm, PGE does not expect adverse impacts on housing as a result of operations.

U.4.6 Traffic

Construction personnel would have a limited impact on the congestion of Interstate 84; however, some adverse impacts on traffic safety may occur on Tower Road. The traffic volumes expected for the construction of the Carty Solar Farm would be substantially lower than those experienced during construction of Unit 1. However, the Morrow County Sheriff's Office has indicated that they have seen an increase in traffic on Tower Road associated with nearby crop and dairy operations over the past several years (MCSO 2018). In addition, during construction of Unit 1, Tower Road required additional patrols to enforce traffic laws on the county road. The estimated one to two maintenance personnel required daily during operation of the Carty Solar Farm would result in minimal traffic impact.

U.4.7 Police and Fire Protection

The construction and operation of the Carty Solar Farm and its associated transmission line would require an average of 50 to 60 personnel and a peak of 130 personnel. This increase in personnel traveling to the project site may cause small adverse impacts on local law enforcement and fire agencies if services along Tower Road or the project site area needed often. PGE consulted with the Morrow County Sheriff's Office (see section U.4.2) and the Boardman Rural Fire Protection District to address these potential impacts and committed to coordinating with them regarding appropriate traffic safety measures. As a result, PGE received letters of assurance from both the Morrow County Sheriff's Office and the Boardman Rural Fire Protection District that they can sufficiently provide services relative to the activities proposed in this RFA. PGE does not expect adverse impacts on police and fire protection services.

U.4.8 Health Care

PGE does not expect the construction of the Carty Solar Farm to have adverse impacts on local and regional emergency health service providers, hospitals, or health clinics, considering the relatively small number of personnel that would be added for the construction and operation of the Carty Solar Farm.

U.4.9 Schools

PGE does not expect the construction of the Carty Solar Farm to have adverse impacts on schools, considering the relatively small number of personnel that would be added for the construction and operation of the Carty Solar Farm.

U.5 EVIDENCE THAT ADVERSE IMPACTS ARE UNLIKELY TO BE SIGNIFICANT AND RELEVANT MITIGATION MEASURES

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

Response: This RFA includes no changes to the response provided in the ASC, as no adverse impacts on public service providers are anticipated with implementation of the measures described below to increase traffic safety. PGE would continue to communicate with the Morrow County Planning Department and local service providers, such as sheriff's office and fire department, to keep them informed of major developments at the Carty Generating Station that could potentially affect the public services in nearby communities.

U.5.2 Traffic

As described in Section U.4. 6, there is the potential for adverse impacts on traffic as a result of construction of the Carty Solar Farm. Prior to start of construction, PGE would provide evidence of consultation with the Morrow County Sheriff's Office and would implement agreed-upon mitigation measures on Tower Road at appropriate times. Mitigation measures could include, but are not limited to, controls such as a temporary traffic signal at the intersection used by dairy operations (just south of the railroad crossing on Tower Road), funding for overtime to provide additional traffic patrols along Tower Road, coordination of random patrols along Tower Road, and/or frequent coordination with the sheriff's office to inform them of periods of increased traffic coming to and from the site. Mitigation measures actually implemented would be decided during consultation with the sheriff's office prior to construction. Morrow County Zoning Ordinance 3.070.E requires a traffic impact analysis (TIA) be completed if the project would generate more than 400 passenger car equivalent trips per day. Based on the assumptions described in Section U.2.6, the project would not require a TIA; however, prior to start of construction, when staging and workforce assumptions are better known, PGE will confirm expected passenger car equivalents and prepare a TIA if found necessary. If a TIA is prepared, it would also be used to inform the consultation with the Morrow County Sheriff's Office.

PGE would encourage carpooling for construction workers and include traffic safety as part of its project safety training program.

Due to the low volumes of traffic expected for the Carty Solar Farm and implementation of these measures, PGE does not expect construction and operation of the Carty Solar Farm to have significant adverse impacts on traffic safety.

U.6 MONITORING PROGRAMS

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

Response: Because PGE does not anticipate the construction and operation of the proposed facility to have long-term significant adverse impacts on the ability of service providers in the analysis area to provide services, PGE does not plan any monitoring programs.

U.7 REFERENCES

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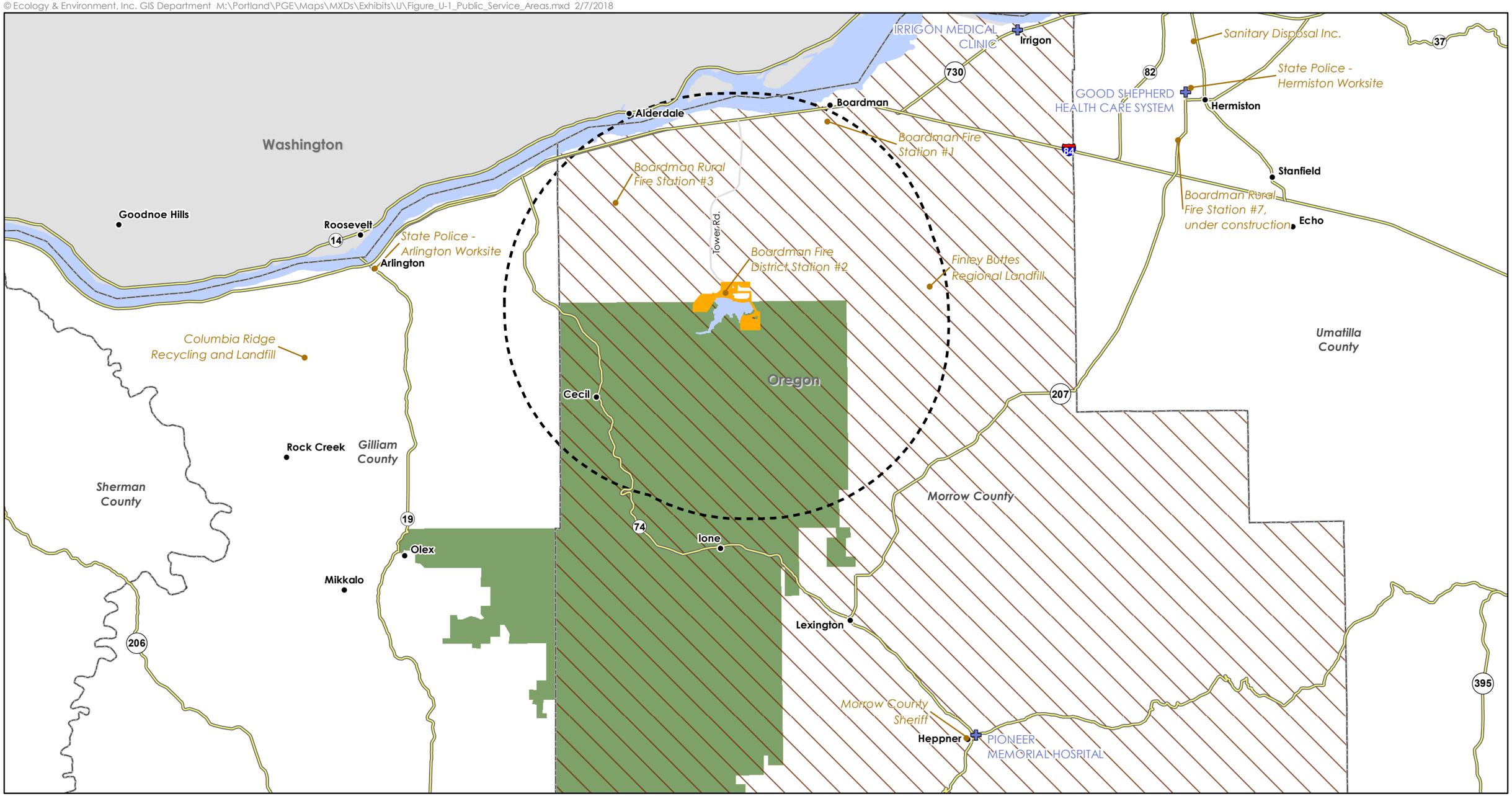

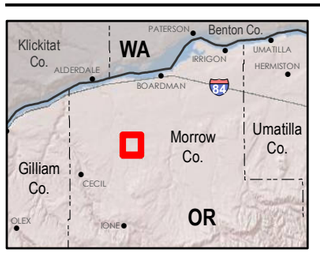

- Amended Site Boundary
- 10-mile Analysis Area
- County Boundary
- City
- Public Service Location
- Hospital
- Major Roads

School Districts
- Ione*
- Morrow County

*The Ione School District is a Charter School District and can receive students from other school districts, including the Morrow County School District.

N

1:315,000

0 2.5 5 Miles

Figure U-1
Public and Private Service Providers

Request for Amendment No. 1
Carty Generating Station Site Certificate
Portland General Electric Company
February 2018

Appendix U-1

Public Providers Letters of Assurance

Boardman Rural Fire Protection District

(541) 481-FIRE (3473) *Fax (541) 481-0909* *e-mail: mrogelstad@boardmanfd.com*

Marc Rogelstad, Fire Chief **Bill Ellis, Assistant Chief**
Suzanne Matthews, Volunteer Coordinator **Marty Broadbent, Fire Marshal**
300 Wilson Lane, Boardman, Oregon 97818

February 7, 2018

To: Lenna Cope
Portland General Electric

Re: Fire Protection for Carty Proposed Solar Site

The Boardman Rural Fire Protection District is responsible for Fire Protection of the proposed Location.
While the facility is not anticipated to cause any substantial increase to the impacts upon the fire district, it is located in an area that is subject to high indices of large and rapid spreading wildfires. After review of the facility's management plan documentation sent to us.

> "The equipment and operation expected for the Carty Solar Farm does not pose a significant fire concern. For the Carty Solar Farm, the equipment specified will meet all applicable national Electric Code (NEC) and Institute of Electrical and Electronics Engineers (IEEE) standards. In addition, the Carty Solar Farm generating facility will be constructed to meet State of Oregon requirements (Oregon Fire Code 605.12) to reduce the risk of fire. The Carty Solar Farm inter-array and perimeter roads will act as fire breaks and be sized for emergency vehicle access per applicable fire codes. Any potential incipient fires will be controlled by trained Carty Operations staff. If needed, additional fire prevention measures would be coordinated with the local fire district."

The Fire District will require that there will be no vegetation on the site as required in Oregon Fire Code 605.12.2 The area under and around the installation will have a gravel or other noncombustible base that is approved by the local fire code official and does not create a dust hazard.

This will address any concerns of the Fire District.

Marc Rogelstad, Chief
Boardman Rural Fire Protection District

MORROW COUNTY SHERIFF

325 Willow View Drive -:- P.O. Box 159
Heppner, Oregon 97836
Phone: (541) 676-5317
Fax: (541) 676-5577

Kenneth W. Matlack, Sheriff
John A. Bowles, Undersheriff

February 12, 2018

Ms. Lena Cope, Environmental Engineer
Portland General Electric
121 SW Salmon Street
Portland, OR 97204

Dear Ms. Cope,

Thank you for your recent call and discussing the upcoming construction for the Carty Solar Farm. The Morrow County Sheriff's Office provides law enforcement and emergency services in the area where the solar project will be built.

As I indicated in my first call to your office, I had significant concerns about another major construction project off of Tower Road in Morrow County.

During our recent conversation, we discussed several areas of concern that I had expressed on the new project. Your comments lead me to believe that the workforce issues, traffic concerns and related farm and dairy activity appeared that they were going to be less significant than they were on construction of Unit 1. This was good news as the Sheriff's Office begins to prepare for the next building project.

In your recent e-mail, you have identified the various points we discussed to mitigate these concerns. You have listed several specific examples of ways that you may be willing to partner with us to lessen the impact of specific issues that may occur during construction of the new project. I very much appreciate the idea that we hold off on specific plans or needs until such time that we are closer to construction and you know more specifics about the construction plans. When these facts are better know, then I agree to meet with you or your representatives to then look at the specific issues that may occur during construction that could reasonably impact the Sheriff's Office.

I do not expect the construction and operation to impact our ability to provide services as long as the mitigation measures are included the final plans and will be implemented during construction if needed.

Respectfully yours,

Kenneth W. Matlack

Sheriff Kenneth W. Matlack

EXHIBIT V – Request for Amendment No. 1

SOLID WASTE AND WASTEWATER

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

V.1 INTRODUCTION

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

Response: This exhibit provides the information required by 345-021-0010(1)(v) in support of the Request for Amendment No. 1 of the Site Certificate for the Carty Generating Station (RFA). This exhibit addresses the estimated volumes and types of waste that would be produced during construction, operation, and retirement of the Carty Solar Farm (as defined in Exhibit B); the structures and systems that Portland General Electric Company (PGE) would operate to handle the wastes; how PGE would reduce, recycle, and reuse waste; and how PGE would mitigate adverse impacts.

V.2 TYPES OF WASTE

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

Response:

V.2.1 Solid Waste

Solid Waste Produced During Construction

The types of waste produced during construction of the Carty Solar Farm would be similar to those discussed in the Application for Site Certificate (ASC). Solid waste would consist of domestic refuse, office waste, packaging materials, steel cut-offs, and construction materials (e.g., concrete waste, wood, plastic, glass, erosion control materials). Waste may also include oil rags, spent batteries, and equipment and vehicle maintenance solvents and oils. PGE expects the construction of the Carty Solar Farm to generate approximately 5 tons of solid waste per week.

Solid Waste Produced During Operation

PGE expects that the Carty Solar Farm would generate a negligible amount of solid waste during operation. Solid waste would consist primarily of office and maintenance waste; this waste would be generated and managed in the existing Carty Generating Station plant services building; as the Carty Solar Farm would not have its own office or maintenance buildings. Hazardous waste produced as a result of the Carty Solar Farm may include oil rags, spent batteries, and vehicle maintenance solvents and oils. PGE still anticipates that the Carty

Generating Station would be classified as a Conditionally Exempt Generator, meaning that less than 220 pounds per month of hazardous waste would be produced during operation.

Solid Waste Produced By Retirement

The retirement of the Carty Solar Farm would involve the reuse, recycling, or disposal of the solar panels, rack systems, and other components. Exhibit W of this RFA provides a more detailed list of components and quantities of expected waste for retirement of the Carty Solar Farm.

V.2.2 Wastewater

Wastewater Produced During Construction and Retirement

PGE expects the volume of water used during construction of the Carty Solar Farm to be approximately 8,000,000 gallons, the majority used for dust control. Other construction activities that would produce small amounts of wastewater include washing equipment and vehicles, washing concrete trucks after delivery of concrete loads, and fire suppression during construction. During retirement, wastewater would result primarily from dust control while restoring the site, if grading is required. If required, PGE expects the volume of water for dust suppression during retirement to be less than the volume used during construction.

Wastewater Produced During Operation

The Carty Solar Farm may use water for panel washing during regular facility maintenance—if washing is determined to be necessary—which would produce wastewater. PGE expects the Carty Solar Farm to use approximately 650,000 to 1.6 million gallons (2 to 5 acre-feet) of water per year for washing solar panels. Panel wash water would evaporate and/or be absorbed into underlying soil. Disposal of the panel wash water would be permitted through a modification to the existing Water Pollution Control Facility (WPCF) permit for the facility prior to beginning construction. PGE has proposed a site certificate condition requiring the WPCF to be modified and approved by the Oregon Department of Environmental Quality prior to beginning construction through the addition of a condition stating that panel wash water is allowed to evaporate or infiltrate the ground as long as no chemicals, soaps, detergents, or heat are added to the water.

The addition of the Carty Solar Farm would not increase the amount of sanitary waste produced at the Carty Generating Station, as the facility was initially analyzed for a staff of 20 to 30 people. Currently, the Carty Generating Station has a permanent staff of approximately 22 people and PGE expects the addition of the Carty Solar Farm unit to add one or two new positions.

V.3 DESCRIPTION OF STRUCTURES AND SYSTEMS

OAR 345-021-0010(1)(v)(B) A description of any structures, systems and equipment for management and disposal of solid waste, wastewater and storm water.

Response: The ASC describes the structures and systems planned for solid waste; the description in the ASC is also applicable during construction, operation, and retirement of the Carty Solar Farm.

As discussed in the ASC, PGE had considered the following options for primary wastewater disposal during operations: returning water to Carty Reservoir, sending it to lined evaporation ponds, or a combination of the two. With detailed design of Unit 1, PGE's evaluation of disposal options resulted in all operational wastewater being discharged to Carty Reservoir. PGE no longer plans to construct evaporation ponds for wastewater disposal. The Carty Solar Farm would not require structures, systems, or equipment to manage and dispose of wastewater, other than erosion control devices during the construction phase. The Carty Solar Farm would not send wastewater to Carty Reservoir.

Portable toilets would be used during construction of the Carty Solar Farm and sanitary sewage would be managed and transported to a licensed sewage treatment plant by a contractor. Portable toilets may also be used occasionally during operations if maintenance activities warrant portable toilets based on the number of workers and hours per day workers are on site at the Carty Solar Farm. During normal operations, sanitary facilities will only be available at the Carty Generating Station Plant Services building near Unit 1.

Stormwater from the Carty Solar Farm would be allowed to infiltrate, and grading of the site would be completed in a manner that avoids stormwater impacts to adjacent property.

V.4 CONSUMPTIVE WATER USE REDUCTION

OAR 345-021-0010(1)(v)(C) *A description of any actions or restrictions proposed by the applicant to reduce consumptive water use during construction and operation of the facility.*

Response: PGE would potentially use water to wash solar panels during operation of the Carty Solar Farm. Approximately 2 to 5 acre-feet per year of water would be required. PGE would monitor the output of the solar farm to evaluate the need for washing prior to any cleaning. Depending on local rainfall, PGE may reduce the frequency of washing if it is not necessary for maintaining system performance, which would reduce the overall consumptive water use.

V.5 PLANS FOR RECYCLING AND REUSE

OAR 345-021-0010(1)(v)(D) *The applicant's plans to minimize, recycle or reuse the solid waste and wastewater described in OAR 345-021-0010(1)(v)(A).*

Response: PGE's plans to minimize, recycle, or reuse solid waste and wastewater, as described in the ASC, are unchanged.

V.6 ADVERSE IMPACTS OF WASTE DISPOSAL AND EVIDENCE THAT ADVERSE IMPACTS WOULD BE MINIMAL

OAR 345-021-0010(1)(v)(E) *A description of any adverse impact on surrounding and adjacent areas from the accumulation, storage, disposal and transportation of solid waste, wastewater and stormwater during construction and operation of the facility.*

OAR 345-021-0010(1)(v)(F) *Evidence that adverse impacts described in OAR 345-021-0010(i)(v)(E) are likely to be minimal, taking into account any measures the applicant proposes to avoid, reduce or otherwise mitigate the impacts.*

Response: PGE does not expect adverse impacts on surrounding or adjacent areas from wastes generated during the construction or operation of the Carty Solar Farm because the amount of solid waste and wastewater that would be generated is minimal. Any solid waste that is generated would be managed on site until it can be properly recycled or disposed of by licensed waste haulers. Although the construction of the Carty Solar Farm would result in additional trucks utilizing roads to transport waste, the impacts would be minor and temporary. During operations, the additional solid waste produced by the Carty Solar Farm would be minimal and not cause a noticeable increase in the amount of solid waste from the Carty Generating Station. Nearby solid waste disposal facilities have sufficient capacity to handle the volume of solid waste expected to be generated during construction and operation.

Minor quantities of wastewater may be generated during construction and operation that might require collection; if necessary, those wastes would be collected and disposed of through the wastewater facilities already constructed for Unit 1 (e.g., oil/water separator) or disposed of off site if not permitted to be disposed of by the WPCF permit. Panel wash water would evaporate or infiltrate the ground and is not expected to impact surrounding and adjacent areas.

PGE would not discharge stormwater run-off to waterways during construction or operation. Construction of the Carty Solar Farm would employ a variety of erosion and sediment control measures and good housekeeping practices to avoid, reduce, or mitigate impacts on surrounding or adjacent lands that might result from stormwater. PGE does not expect significant stormwater impacts during construction or operation of the facility.

The management of sanitary waste with portable toilets serviced frequently during construction would prevent impacts to surrounding and adjacent areas. A minimal amount of sanitary waste is expected due to the small increase in workforce at the Carty Generating Station associated with the Carty Solar Farm.

V.7 PROPOSED MONITORING PROGRAM

OAR 345-021-0010(1)(v)(G) *The applicant's proposed monitoring program, if any, for minimization of solid waste and wastewater impacts.*

Response: The ASC describes the monitoring that will take place for wastewater discharges to comply with WPCF permit conditions. No further monitoring is necessary as a result of the Carty Solar Farm.

EXHIBIT W – Request for Amendment No. 1

FACILITY RETIREMENT
OAR 345-021-0010(1)(w)

TABLE OF CONTENTS

TABLES

APPENDICES

W.1 INTRODUCTION

OAR 345-021-0010(1)(w) *Information about site restoration, providing evidence to support a finding by the Council as required by OAR 345-022-0050(1).*

Response: This exhibit provides the information required by Oregon Administrative Rules (OAR) 345-021-0010(1)(w), in support of the Request for Amendment No. 1 of the Site Certificate for the Carty Generating Station (RFA). This exhibit evaluates the expected operating life and methods of retirement and site restoration, and provides an estimate of retirement and site restoration costs for the Carty Solar Farm. Retirement and site restoration costs for Carty Unit 1 and associated support facilities, including the Grassland Switchyard and the Unit 1 to Grassland Switchyard transmission line, were evaluated in the Application for Site Certificate (ASC). Prior to starting construction of Unit 1, Portland General Electric Company (PGE) provided a letter of credit to the State of Oregon through the Oregon Energy Facility Siting Council (Council) as required by Condition 15.1 of the site certificate. That letter of credit has been adjusted on an annual basis as required by Condition 15.1(b). No changes to the retirement and restoration costs for Unit 1 are proposed as part of this RFA. Retirement and restoration costs for Carty Solar Farm will be added to the costs for Unit 1.

W.2 USEFUL LIFE

OAR 345-021-0010(1)(w)(A) *The estimated useful life of the proposed facility.*

Response: The estimated useful life for the Carty Solar Farm is 30 years. When it is determined that the Carty Solar Farm unit is no longer used and useful, PGE will develop a retirement plan and submit it to the Council for its approval. The retirement plan would outline how the Carty Solar Farm would be retired and the site restored to a useful, non-hazardous condition. If both Unit 1 and the Carty Solar Farm unit are retired at the same time, the retirement plan may address retirement of both units (e.g. a separate retirement plan may not be prepared for each unit).

W.3 RETIREMENT AND SITE RESTORATION

OAR 345-021-0010(1)(w)(B) *The specific actions and tasks to restore the site to a useful, non-hazardous condition.*

Response: The ASC provides information on the actions and tasks required to restore the Carty Generation Station site to a useful, non-hazardous condition. Those same actions and tasks also apply with the addition of the Carty Solar Farm. The Carty Solar Farm would be sited in areas

currently zoned as Industrial and Exclusive Farm Use. Retirement and site restoration would be conducted in compliance with conditions in the approved retirement plan and in compliance with all contemporary laws and regulations in effect at the time of retirement. Site restoration would consist primarily of the dismantling and removal of most equipment and structures and restoring the site to conditions suitable for agricultural use. PGE would remove wooden transmission line poles, if not being used by another energy source. Prior to the date on which PGE plans to permanently shut down Unit 1 or the proposed Carty Solar Farm, PGE would develop a site restoration plan and submit it to the Council for approval.

W.4 ESTIMATED COST OF RETIREMENT

OAR 345-021-0010(1)(w)(C) *An estimate, in current dollars, of the total and unit costs of restoring the site to a useful, non-hazardous condition.*

Response: The cost of site restoration for the Carty Solar Farm would depend on the nature of the zoning regulations and the approved retirement plan. Even if site restoration involves removal of all equipment and structures from the site, PGE does not expect the cost to exceed $2.4 million, expressed in Q3 2016 dollars. See Table W-1 for additional details regarding the total cost and Appendix W-1 for unit costs of restoring the site.

W.5 COST ESTIMATE METHODS AND ASSUMPTIONS

OAR 345-021-0010(1)(w)(D) *A discussion and justification of the methods and assumptions used to estimate site restoration costs.*

Response: PGE commissioned Blue Oak Energy to develop the retirement cost estimate for the Carty Solar Farm, as shown in Table W-1. Blue Oak Energy is a leading solar energy company that has completed over 700 megawatts of utility scale solar projects. Company information is available at http://www.blueoakenergy.com/solar-company/press#js-anchor-company-information, including a statement of qualifications for the company with a description of relevant experience (Blue Oak Energy n.d.). In addition, please see Blue Oak's relevant project experience in Appendix W-2, Blue Oak Energy Project List.

Appendix W-1 provides detailed assumptions used to develop this cost estimate. Because of the differences in equipment decommissioning for a solar-powered generating unit compared with a natural-gas-powered unit, PGE developed a cost estimate for the Carty Solar Farm using a slightly different methodology than for Unit 1 in the ASC, informed by the experience of the owner's engineer on numerous other solar projects. The costs include removal, segregation, transport, and disposal for system components, as well as site restoration and reclamation. Additional costs for profit, contingency, administration, permitting, and insurance are also included. Appendix W-1 also provides details regarding how wages were estimated.

Table W-1 Retirement Cost Estimate for Carty Solar Farm

Task Description	Allocated Dollars	Comments
Task 1 - Mobilization and Management	$597,200	Includes mobilization and demobilization of equipment and personnel, planning, and oversight
Task 2 - Module and Rack Disassembly	$380,450	Includes removal of solar array and demolition of racking structure
Task 3 - Pile Removal	$66,250	Includes removal and transport of piles
Task 4 - Electrical Demolition	$289,172	Includes removal of conductors, transformers, inverters, switchgear, lines, poles and other electrical equipment (Note: costs differ from Appendix W-1 – increased to account for expected wiring and pole removal of the transmission line)
Task 5 - Civil Site Reclamation	$183,700	Includes removal of fence and pad and site restoration and reclamation
Task 6 - Materials Transportation and Disposal	$379,300	Includes transport and disposal of removed materials
Task 7 - Profit & Contingency	$514,600	Includes profit @ 10%, contingency @ 10%, administration @ 5%, permitting @ 0.1%, and insurance @ 2%
Total (Q3 2016)	**$2,410,672**	

Note: Carty Solar Farm costs include supporting facilities, including the interconnection transmission line and interconnection equipment.

W.6 MONITORING PLAN

OAR 345-021-0010(1)(w)(E) *For facilities that might produce site contamination by hazardous materials, a proposed monitoring plan, such as periodic environmental site assessment and reporting, or an explanation why a monitoring plan is unnecessary.*

Response: No change to the existing ASC. The Carty Solar Farm is not expected to use hazardous materials during operation. Any hazardous materials used during construction would be minimal and used and stored in a manner that minimizes the chance of accidental release to the environment.

W.7 REFERENCES

Blue Oak Energy. Not dated. Statement of Qualifications. http://s3.amazonaws.com/hoth.bizango/assets/11906/boe_soq_2015.pdf. Accessed December 14, 2017.

Appendix W-1
Retirement Cost Estimates – Carty Solar Farm

Craig Armstrong
Portland General Electric
121 SW Salmon St, 3WTCBR02
Portland, OR 97204

June 14, 2016

Subject: PGE Carty Project Decommissioning Budget, Version B

Dear Mr. Armstong:

Blue Oak Energy has prepared a decommissioning budget for the 67 MW-DC/ 50 MW-AC Carty Solar project located near Boardman, OR. The estimated budget represents a probable cost, in present value, for the decommissioning based on the assumption that the solar modules, module support structure/racking, electrical system, interconnection facilities and other project components will be disassembled and recycled or disposed of following completion of use of the solar electric power system.

Information Sources for this Review

This review is based on preliminary design information produced by Blue Oak Energy, and through discussions with contractors familiar with this type of construction and maintenance experience. Wage rates used in these estimates are based on a collaboration of the federal Department of Labor, Defense, Management & Budget, General Administration, and Commerce.

Each task, listed under each section, lists both the total worker hours needed to complete the project as well as the breakdown for each discipline. The total cost of that task is a function of the worker's class and time, and scales with the quantity or magnitude of the task.

Basis for Rate Selection

Hourly wages are determined for each discipline by the County, State, and General Decision Number at the time of Asset Retirement Obligation (ARO) report implementation. Typical disciplines utilized for decommissioning are a principal electrician, equipment operator and general laborer.

- Web Address: http://www.wdol.gov/wdol/scafiles/davisbacon/OR75.dvb?v=0
- County, State: Morrow, OR
- General Decision Number: OR160075
- Modification Number: 0
- Publication Date: 01/08/2016

Worker Title	Class/Group (If applicable)	General Rate ($/hr.)	Fringes ($/hr.)	Total Rate ($/hr.)
Electrician	Principal	38.80	18.59	57.39
General Laborer	General	18.76	6.27	25.03
Equipment Operator	Group 5	34.13	14.10	48.23

Decommissioning Scope

The decommissioning and restoration process in the plan consists of the following steps:

- Disassembly and removal of above ground structures
- Removal of below-ground structures to a depth of three feet.
- Restoration of project site

Above-ground structures include the solar modules, module support structures & trackers, combiner boxes, inverters, switchgear, switchboards, transformers, meteorological station and all structures or concrete pads to support them. Below-ground structures are limited to concrete pad foundations, conduit, pull boxes and electrical conductors. For the purposes of this estimate, all below-ground conduit, concrete, and asphalt was removed to a depth of three feet below grade.

Following removal of all equipment and structures, the disturbed areas will be re-graded to be consistent with surrounding areas and reseeded to promote vegetation. The cost for disposal for any materials that are not scrapped is considered incidental, unless otherwise noted.

Decommissioning Budget

The decommissioning process has been divided into 7 general sections. Quantities and unit prices for these individual sections are presented and discussed in detail in the following paragraphs.

1. Mobilization & Management
2. Module and Rack Disassembly
3. Pile Removal
4. Electrical Demolition
5. Civil Site Reclamation
6. Materials Transportation and Disposal
7. Profit & Contingency

1. Mobilization & Management

1.1 Mobilization. The decommissioning and removal process will require an estimated 12 weeks.

A. Mobilization and demobilization of trash dumpsters, storage containers, pallets, portable toilets, heavy equipment, and small tools. A complete list of items included in this section can be viewed in Appendix A, Table A1.

	$	342,770		
Subtotal:			$	342,770

1.2 Project Management:

A. Planning and oversight is a function of system type and was estimated based on job functions and costs presented in Carty1 Gas-Fired Combined Cycle Energy Facilities Decommissioning Estimate.

Supervision	$	47,040		
Foreman	$	39,840		
Guard Service	$	60,000		
Clerical	$	14,400		
Jobsite Office	$	2,400		
Temp. Utilities	$	1,200		
Special Insurance	$	25,000		
Subsistence	$	64,512		
Subtotal:			$	254,392

Total estimate for **Mobilization & Management:** **$ 597,200**

2. Module and Rack Disassembly

2.1 Removal of Solar Array:

A. Removal of the individual solar modules will require laborers, telescopic forklift operators and an electrician. Modules will be palletized for shipping.

Estimated number of PV modules:		198,450	modules
Worker Title	Workers Per Team	(hr. /person/mod.)	
Electrician: De-energizes circuits, disconnects module	1	0.01	
General Laborer: Disassembles modules, palletizes	2	0.02	
Equipment Operator: Mass transportation	1	0.00139	

Subtotal:	$	325,900

B. Demolition of the racking structure will require laborers with pneumatic impact tools or saws for the disassembly of racking members, bearing pedestal caps, bonding jumpers. All structural members will be collected by a backhoe or similar tractor.

Trackers		2,450	trackers
Worker Title	Workers Per Team	(hr. /person/equip.)	
General Laborer: Demolition team	2	0.3	
Equipment Operator: Mass transportation	1	0.15	

Subtotal:	$	54,550

Total estimate for **Module and Rack Disassembly:**	**$**	**380,450**

3. Pile Removal

3.1 Removal of Piles

Removal of the pile will be done using a pile driver. Each pile will be scooped and transported using a skidsteer with grappler

Estimated number of Piles		26,950	Piles
Worker Title	Workers Per Team	(hr. /person/pile)	
General Laborer: Demolition team	2	0.025	
Equipment Operator: Mass transportation, excavation	1	0.025	

Subtotal:	$	66,250

Total estimate for Pile Removal:	**$**	**66,250**

4. Electrical Demolition

The majority of the electrical system is composed of power aggregation string wiring, panels, and inverter pads. All conductors are assumed to be removed and aggregated for recycling. All subterranean conduit, conductors and inverter pad equipment, will be removed for off-site recycling.

4.1 Excavation and removal of underground conductors

The estimated cost for excavation and removal of underground direct-buried conductors for scrap and/or disposal is based on labor costs for excavation & earthwork, conduit removal, and transportation of materials for two teams.

Estimated length of trench:		121,792	ft.
Worker Title	Workers Per Team	(hr. /person/100 ft.)	
General Laborer: Wire pull operator	1	0.15	
Equipment Operator: Forklift, wire pulling, excavation	1	2.5	

Subtotal:	$	151,450

4.2 Removal of above ground conductors

The estimated cost for removal of above ground conductors for scrap and/or disposal is based on labor costs for conductor spooling and transportation of materials. Pull rate is assumed to be an average of 120 ft./minute.

Estimated length:			1,086,050	ft.
Worker Title	Workers Per Team	(hr. /person/100 ft.)		
General Laborer: Decoupling, equipment and backhoe	1	0.15		
Equipment Operator: Forklift driver, Backhoe	1	0.10		
Subtotal:			$	93,200

4.3 Removal of Overhead Transmission Lines

The estimated cost for removal of overhead transmission lines is based on PGE Carty Gas-Fired Combined Cycle Energy Facilities decomissioning estimate. Total length of overhead transmission lines is estmated at 3 miles with a removal cost of $324/mile.

Estimated length:	3	mi.	
Removal cost per unit length:	$ 324.00		
Subtotal:		$	842

4.4 Removal of step-up transformers

Removal work includes cutting and removal of cable and conduit as well as containment of transformer for recycling or disposal.

Number of step-up transformers:	25	transformers	
Number of teams necessary to complete work by given project duration tir	1		
Electrician: De-energizes circuits, removes termination:	1	1	
General Laborer: Cutting conduit/wire, harnessing	1	1	
Equipment Operator: transportation, forklift	1	2	
Subtotal:		$	4,500

4.5 Removal of Inverters

Removal of inverters. Removal work includes cutting and removal of non-concrete foundations, cable, and conduit to a three-foot depth.

Number of inverters:	25	inverters	
Number of teams necessary to complete work by given project duration tir	1		
Worker Title	Workers Per Team	(hr. /person/inv.)	
General Laborer: Cutting conduit/wire, harnessing	1	2	
Equipment Operator: transportation, forklift	1	2	
Subtotal:		$	5,100

4.6 Removal of Switchgear

Removal of switchgears from site with any support structures, cable, and conduit to a depth of three feet below grade.

Number of switchgear:	1	switchgear	
Number of teams necessary to complete work by given project duration tir	1		
Electrician: De-energizes circuits, removes termination:	2	4	
General Laborer: Cutting conduit/pulling wire, harnessi	2	8	
Equipment Operator: transportation, forklift	1	4	
Subtotal:		$	1,100

4.7 Removal of Additional Electrical Equipment.

Removal of combiner/recombiner boxes, DC/AC recombiners, and any panel boards. Cost estimate accounts for equipment and labor costs for removal to a depth of three feet below grade.

Number of Electrical Poles		3		
Number of combiner boxes:		350	combiner boxes	
Worker Title	Workers Per Team	(hr. /person/equip.)		
Electrician: De-energizes circuits, removes termination	1	0.25		
General Laborer: Conduit/wire, harnessing	1	0.5		
Equipment Operator: transportation, forklift	1	0.05		
Subtotal:			$	10,350
Total estimate for **Electrical System Removal:**				**$ 266,542**

5. Civil Site Reclamation

All developed areas will be restored to pre-construction conditions or as stated in decommissioning contract.

5.1 Equipment Pad Demolition

The equipment pads contain an inverter, a transformer, and ancillary electrical equipment. This equipment has been accounted for in Removal of Inverter and Transformer Sections and will not be counted here.

Approximate Volume of concrete to be removed		466.67	cubic yards	
Worker Title	Workers Per Team	(hr. / person / cu yd.)	cubic yards	
General laborer	1	0.70		
Equipment Operator: Transporation, Backhoe	1	0.70		
Subtotal:			$	23,950

5.2 Fence Removal

The decommissioning plan includes removing chain link fence around the project perimeter including gates.

Approximate length of fence:		16,034	ft.	
Number of teams necessary to complete work by given project duration tir		2		
Worker Title	Workers Per Team	(hr./person/ft.)		
General Laborer: Fence detachment, aggregating	1	0.05		
Subtotal:			$	20,100

5.3 Trench Filling

The decommissioning plan includes filling trenches where underground conductor and fence removal occurs.

Approximate length of all trenches:		137,826	ft.	
Worker Title	Workers Per Team	(hr./person/ft.)		
General Laborer: Excavation	1	0.01		
Subtotal:			$	66,500

5.4 Gravel Removal

The decommissioning plan includes removing gravel from roads in order to restore the site to pre-project conditions. The cost for removal is estimated based on a gravel depth of 6".

Approximate volume of gravel on site		10,884	cubic yards
Worker Title	Workers Per Team	(hr./person/cu yd.)	
Equipment Operator: Mass transportation, backhoe	1	0.00670	

Subtotal:	$	3,550

5.5 Re-grading of Site

The decommissioning plan includes excavation and removal of underground materials and foundations. After removal, all excavated areas will need to be filled, compacted, and re-graded to restore the site to pre-project conditions. Restoration of the site to pre-project conditions does not include matching the original land topography or existing vegetation.

Estimated acres of grading required:		314	acres
Worker Title	Workers Per Team	(hr. /person/acre)	
Equipment Operator: Mass transportation, backhoe	1	0.6	

Subtotal:	$	9,100

5.6 Site Rehabilitation

The estimated cost of this restoration work accounts for all costs of mowing, disking, and hydraulic seeding of the project site. The labor costs associated with this task are lumped to include equipment as well as labor rates from an external party. Rates were taken from a 2012 report for average tillage rates. These estimates are considered to be conservative given that the cost of fuel has dropped dramatically since 2012.

Area of site to be rehabilitated:		314	acres
Number of teams necessary to complete work by given project duration tir		4	
Worker Title	Workers Per Team	(hr. /person/acre)	
Equipment Operator: Agricultural restoration	1	3	
Estimated equipment rate for subsoil ripping:	$	17	
Estimated equipment rate for cutting disk:	$	16	
Estimated equipment & material rate for seeding (grass or mulch)	$	15	

Subtotal:	$	60,500

Total estimate for **Civil Site Reclamation:**	**$**	**183,700**

6. Materials Transportation and Waste Disposal

6.1 Transportation and Disposal of Waste and Non-Salvageable Materials

The decommissioning plan includes excavation removal of all cement, gravel, waste materials, and other miscellaneous non-salvageable items from the project site. Mobilization accounts for a portion of disposal via dumpster rental, which includes up to 3 tons of disposal per dumpster with weekly delivery and pickup, for a weekly fee of $600. Cost of disposal for the remaining waste was estimated at $33.58/ton, based on $0.5/ton/mile for a 34-mile round-trip, and $16.58/ton in tipping fees.

Estimated weight of unsalvageable equipment:	239	tons
Estimated weight of miscellaneous waste:	1	tons
Tons accounted for in mobilization:	36	tons
Total Net:	204	tons
Tipping Fee:	16.58	$/ton
Transportation Unit Cost:	0.50	$/ton/mile
Round-Trip Transportation Distance:	34.00	miles

Subtotal:	$	6,900

6.2 Transportation and Disposal of Salvageable Materials

The decommissioning plan includes removal of all equipment and structures from the project site that may have a salvage value at the time of decommissioning, including: switchgear, inverters, transformers, racking, fencing, and other miscellaneous items. Transportation costs for salvageable materials to the salvage yard were estimated at $0.5/ton/mile for a 17-mile one way trip.

Estimated weight of salvageable steel:	3,057	tons	
Estimated weight of salvageable aluminum:	15	tons	
Estimated weight of salvageable copper:	79	tons	
Total weight:	3,151	tons	
Transportation Unit Cost:	0.50	$/ton/mile	
Round-Trip Transportation Distance:	34.00	miles	
Subtotal:		$	53,600

6.3 Transportation and Disposal of Concrete and Aggregate Waste

The decommissioning includes the removal of concrete waste, which can be repurposed into new construction materials off site for an assumed net zero value. Transportation costs for salvageable materials to the salvage yard were estimated at $0.5/ton/mile for a 17-mile one way trip.

Estimated weight of disposed concrete:	1,227	tons	
Estimated weight of disposed gravel:	16,326	tons	
Total:	17,553	tons	
Tipping Fee	16.58	$/tons	
Transportation Unit Cost:	0.50	$/ton/mile	
Round-Trip Transportation Distance:	34.00	miles	
Subtotal:		$	318,800

Total estimate for **Materials Transportation and Waste Disposal:** **$ 379,300**

7. Profit & Contingencies

7.1	Raw Disassembly, Transportation and Disposal Cost	$	1,873,442
7.2	Firm Profit. We assume a 10% profit margin for the company	$	187,350
7.3	Contingency. Approximately 10% of the decommissioning scope is recommended:	$	187,350
7.4	Administration. Approximately 5% of the decommissioning scope is recommended:	$	93,700
7.5	Permitting. Approximately 0.1% of the decommissioning scope.	$	2,500
7.6	Liability & Insurance. Approximately 2% of the decommissioning scope is recommended:	$	37,500

Total estimate for **Project Management & General Conditions**: **$ 2,381,842**

Scrap Value

The estimated scrap value is based on the following material estimates:

1. Estimated value of scrap metal salvaged from equipment

Scrap metal weights account for steel piles, salvageable equipment metal, and aluminum module support racking for the photovoltaic

Estimated weight of aluminum scrap metal:		33,085	lbs.
Estimated weight of steel scrap metal:		6,737,141	lbs.
Current average price for aluminum scrap:	$	0.56	/lb.
Current average price for steel scrap:	$	0.06	/lb.

Subtotal:	$	422,800

2. Estimated scrap value of conductors.

The conductor system is direct burial or encased in cement duct on site. Quantities of underground wire and wire sizes and lengths were

Circuit Location	Total Linear Feet	lbs. / Linear Foot	Total Weight (lb.'s)	$/lb.	Total ($)
Source : #10 (CU)	1,086,050	0.050	54,303	$1.60	$ 86,884
Combiner Box Output : 400 KCMIL (AL)	98,119	0.080	7,850	$0.20	$ 1,570
Transformer Output 750 Kcmil (AL)	23,673	1.066	25,235	$0.20	$ 5,047

Subtotal:	$	93,550

Scrap Value Summary

The total estimate of scrap value from summing the items above:	**$**	**516,350**

Decommissioning Summary

The total estimate of disassembly and removal costs is:	**$**	**2,381,842**
The total estimate of scrap value for the project is:	**$**	**516,350**

Please do not hesitate to contact us with any questions regarding the information contained in this review. We appreciate the opportunity to work with you on this project.

Sincerely,

Blue Oak Energy

Timothy D. Mills, P.E.

APPENDIX

Appendix A: Additional cost breakdown of compounded price structures.

Mobilization Costs

Table A1: General Mobilization Cost Summary

Equipment	Weekly Rate*	Delivery/ Setup and Dismantle	QTY	Weeks	Extended
Communications	$ 250	$ -	$ 1	$ 12	$ 3,000
Furniture, copier/scanner	$ 500	$ -	$ 1	$ 12	$ 6,000
Conex Trailer/Storage	$ 35	$ 400	$ 2	$ 12	$ 1,640
Small Generator	$ 75	$ -	$ 1	$ 12	$ 900
Portable toilet	$ 30	$ 40	$ 4	$ 12	$ 1,520
Dumpsters	$ 600	$ 100	$ 10	$ 12	$ 72,200
Telescoping Forklift	$ 1,050	$ 225	$ 2	$ 12	$ 25,650
Skidsteer w/ Grappler	$ 1,200	$ 225	$ 2	$ 12	$ 29,250
Small Tool Allowance	$ 2,500	$ -	$ 2	$ 12	$ 5,000
EHSS Allowance	$ 100	$ -	$ 1	$ 12	$ 1,200
Signage	$ 500	$ -	$ 1	$ 12	$ 6,000
Backhoe Loader	$ 960	$ 225	$ 3	$ 12	$ 35,010
Wheel Loader	$ 1,650	$ 225	$ 2	$ 12	$ 40,050
Excavator (50HP)	$ 1,100	$ 225	$ 2	$ 12	$ 26,850
SWPPP & Dust Control	$ 1,000	$ -	$ 1	$ 12	$ 12,000
Trucking On/Off	$ 1,500	$ -	$ 20	$ 12	$ 30,000
Subcontractor	$ 15,000	$ -	$ 3	$ 12	$ 45,000
On-Site Moves	$ 250	$ -	$ 6	$ 12	$ 1,500
				Mobilization Grand-Total	**$ 342,770**

*Weekly rates for Small Tools, Trucking On/Off, Subcontractor, and On-Site Moves were applied as unit costs, multiplied by their quantity to determine the extended cost.

Appendix W-2
Blue Oak Energy Project List

BLUE OAK ENERGY®

Engineering Project List

Project Name	City	State	Utility	System Size [STC kW DC]	Array Mounting Type	Job Class
Garland 120MW	Kern Co	CA	SCE	120000.00	Groundmount	Engineering
Grand View 100%	Elmore Co	ID		80000.00	Groundmount	Engineering
Garland CO Phase A Increase to 200MW	Kern Co	CA	SCE	80000.00	Groundmount	Engineering
GenSan Bawing 63MWac	General Santos	Philipines		63000.00	Groundmount	Engineering
Kawailoa	Oahu	HI	HECO	50000.00	Groundmount	Engineering
Long Island Solar Farm	Upton	NY	LIPA	36900.00	Groundmount	Engineering
Adelanto I&II	Adelanto	CA	SCE	27000.00	Groundmount	Engineering
SEPV 8 & 9	Twentynine Palms	CA	SCE	26610.00	Groundmount	Engineering
Mountain View	North Las Vegas	CA	NV Energy	25010.00	Groundmount	Engineering
Columbia IE and OSR (Pittsburg)	Pittsburg	CA	PG&E	25000.00	Groundmount	Engineering
Cascade 18.5MWac	Joshua Tree	CA		24050.00	Groundmount	Engineering
Grand Ridge Solar Farm	Grand Ridge	IL	ComED	22760.00	Groundmount	Engineering
Gillespie 20MWac	Maricopa County	AZ	APS	20200.00	Groundmount	Engineering
Ho'Ohana 20MW	Oahu	HI	HECO	20000.00	Groundmount	Engineering
Moca PR 20MW	Puerto Rico	PR	PREPA	20000.00	Groundmount	Engineering
North Coast Solar 20MW		PR	PREPA	20000.00	Groundmount	Engineering
Montgomery - NC	Biscoe	NC		20000.00	Groundmount	Engineering
Searchlight	Clark Co	NV		20000.00	Groundmount	Engineering
West Antelope	Lancaster	CA	SCE	20000.00	Groundmount	Engineering
Searchlight	Clark Co	NV	NVE	18500.00	Groundmount	Engineering
Solon Five Points	Five Points	CA	PG&E	18500.00	Groundmount	Engineering
Capital Dynamics	Palmdale	CA	SCE	13865.00	Groundmount	Engineering
UC Davis 13MW	Davis	CA	PG&E	13000.00	Groundmount	Engineering
Kaiser NorCal1 Carports	Sacramento	CA	SMUD, PG&E	10292.00	Carport	Engineering
Valley Center	San Diego County	CA	SDG&E	10230.00	Groundmount	Engineering
Dexus-Lee	Perris	CA	SCE	10150.00	Roofmount	Engineering
Marsh Hill Solar Farm	Uxbridge	ONT		10000.00	Groundmount	Engineering

Engineering Project List

SEPV Palmdale East CAISO Support	Palmdale	CA	SCE	10000.00	Groundmount	Engineering
Ramona	San Diego County	CA	SDG&E	9300.00	Groundmount	Engineering
Rialto I-210 Distribution Center #2	Rialto	CA	SCE	8601.60	Roofmount	Engineering
Redlands Distribution Center #10	Redlands	CA	SCE	7408.80	Roofmount	Engineering
Beltline GA 4 project portfolio	Multiple	GA	Georgia Power	7000.00	Groundmount	Engineering
Redlands Dist. Center #10	Redlands	CA	SCE	6500.00	Groundmount	Engineering
Dipolog City 6MW		Other	Other	6000.00	Groundmount	Engineering
Dipolog City 6MW Civil Grading Add		Other	Other	6000.00	Groundmount	Engineering
NC 3x2MW projects	Smithfield	NC	Duke	6000.00	Groundmount	Engineering
LandPro 6.0MW	San Bernardino	CA		6000.00	Groundmount	Engineering
LandPro 6.0MW	San Bernardino	CA		6000.00	Groundmount	Engineering
OUC Stanton Solar Farm	Lakeland	FL		5910.00	Groundmount	Engineering
ELISP Engineering Ronkonkoma	Ronkonkoma	NY		5440.00	Carport	Engineering
West Tennessee Solar Farm	Chattanooga	TN		5100.00	Groundmount	Engineering
Rutan 2061	Palmdale	CA	SCE	5040.00	Groundmount	Engineering
Redlands Distribution Center #4	San Bernadino	CA	SCE	5017.60	Roofmount	Engineering
Old Mill 5MWac	Bly	OR		5000.00	Groundmount	Engineering
Redlands Distribution Center #5	Redlands	CA	SCE	4928.00	Roofmount	Engineering
San Bernardino Distribution Center #1	Carson	CA	SCE	4856.32	Roofmount	Engineering
Rialto I-210 Distribution Center #1	Rialto	CA	SCE	4569.60	Roofmount	Engineering
Indigo Ranch	Desert Center	CA		4500.00	Groundmount	Engineering
Indigo 4.5MWac		CA		4500.00	Groundmount	Engineering
Kaiser Distribution Center #5	Fontana	CA	SCE	4497.92	Roofmount	Engineering
Kaiser Distribution Center #1	Fontana	CA	SCE	4254.72	Roofmount	Engineering
ELISP Engineering Cohalan	Islip	NY		4200.00	Carport	Engineering
National Grid	Boston	MA		4000.00	Groundmount	Engineering
Green Acres	Sacramento	CA		4000.00	Groundmount	Engineering
Transpark Inland Empire #1	Fontana	CA	SCE	3864.00	Roofmount	Engineering

Engineering Project List

Redlands Distribution Center #1	Redlands	CA	SCE	3396.24	Roofmount	Engineering
Redlands Distribution Center #3	Redlands	CA	SCE	3197.80	Roofmount	Engineering
Redlands Distribution Center #6	Redlands	CA	SCE	3091.20	Roofmount	Engineering
Lancaster 1&2	Lancaster	CA		3000.00	Groundmount	Engineering
Shasta County CUP	Fall River Mills	CA		3000.00	Groundmount	Engineering
ProLogis Park Ontario Airport #4	Ontario	CA	SCE	2846.48	Roofmount	Engineering
Rialto I-210 Distribution Center #3	Redlands	CA	SCE	2620.80	Roofmount	Engineering
ProLogis Park Ontario Airport #2	Ontario	CA	SCE	2550.24	Roofmount	Engineering
Kaiser Distribution Center #2	Fontana	CA	SCE	2250.78	Roofmount	Engineering
Kaiser Distribution Center #7	Redlands	CA	SCE	2247.68	Roofmount	Engineering
ELISP Engineering Dennison	Islip	NY		2180.00	Carport	Engineering
Charlee 6011	Palmdale	CA		2078.00	Groundmount	Engineering
Horn 4097	Lancaster	CA	SCE	2078.00	Groundmount	Engineering
Ma 4035	Lancaster	CA	SCE	2078.00	Groundmount	Engineering
Jamestown IE	Jamestown	CA	PG&E	2000.00	Groundmount	Engineering
Greenvolts	Byron	CA		2000.00	Roofmount	Engineering
Northfield Mountain	Northfield	MA		2000.00	Groundmount	Engineering
Kaiser Distribution Center #6	Fontana	CA	SCE	1941.66	Roofmount	Engineering
Ft Campbell KY 1.88MW	Ft Campbell	KY		1880.00	Groundmount	Engineering
Bear Creek Elec/Civil/Struct/Geotech	Lodi	CA		1830.00	Groundmount	Engineering
Redlands Distribution Center #2	Redlands	CA	SCE	1748.76	Roofmount	Engineering
ELISP Engineering Riverhead	Riverhead	NY		1580.00	Carport	Engineering
Baker Electric 29 Palms	29 Palms	CA		1500.00	Roofmount	Engineering
Charlee 1.5MWac	Palmdale	CA	SCE	1500.00	Groundmount	Engineering
Charlee 1.5MWac Subcontractor Cost deduction	Palmdale	CA	SCE	1500.00	Groundmount	Engineering
Vintner SLO 1.5MWac	Templeton	CA		1500.00	Groundmount	Engineering
ProLogis Park Ontario Airport #3	Ontario	CA	SCE	1410.36	Roofmount	Engineering
West County Wastewater District	Richmond	CA		1202.88	Groundmount	Engineering

Engineering Project List

Hanford	Hanford	CA		1122.00	Groundmount	Engineering
Derby	Derby	CT		1050.00	Groundmount	Engineering
ELISP Engineering North County	Smithtown	NY		1050.00	Carport	Engineering
Scotty's	Bowling Green	KY		1001.00	Groundmount	Engineering
Nashville NC	Nashville	NC	Duke	1000.00	Groundmount	Engineering
Bear Creek Solar CO#2 - fixed tilt 1MWac	Lodi	CA		1000.00	Groundmount	Engineering
Kettleman 1MWac	Lodi	CA		1000.00	Groundmount	Engineering
Coalinga	Fresno	CA		1000.00	Groundmount	Engineering
Fort Hunter Liggett	Ft. Hunter Ligget	CA	SCE	1000.00	Groundmount	Engineering
South Bay Distribution Center #5	Rialto	CA	SCE	974.40	Roofmount	Engineering
ProLogis Park Ontario Airport #5	Ontario	CA	SCE	772.80	Roofmount	Engineering
Brightfield	Kern County	CA		748.00	Groundmount	Engineering
Hopkins Phase II	New Freeland	MD	BG&E	700.00	Groundmount	Engineering
Vintner Surveys and Studies	San Luis Obispo	CA		531.40	Groundmount	Engineering
Ofu	American Samoa	Samoa	ASPA	500.00	Groundmount	Engineering
Taos Charter NM	Taos	NM		100.00	Carport	Engineering
Turlock Irrigation District	Turlock	CA		79.38	Carport	Engineering

EXHIBIT X – Request for Amendment No. 1

NOISE

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

TABLE OF CONTENTS

TABLES

FIGURES

X.1 INTRODUCTION

OAR 345-021-0010(1)(x) *Information about noise generated by construction and operation of the proposed facility, providing evidence to support a finding by the Council that the proposed facility complies with Oregon Department of Environmental Quality's noise control standards in OAR 340-035-0035.*

Response: This exhibit provides the information required by Oregon Administrative Rules (OAR) 345-021-0010(1)(x), in support of the Request for Amendment No. 1 of the Site Certificate for the Carty Generating Station (RFA). This exhibit addresses noise conditions associated with the Carty Solar Farm (as defined in Exhibit B); the Application for Site Certificate (ASC) provides information regarding noise associated with the Carty Generating Station as originally proposed.

Noise levels from construction and operation of the proposed Carty Solar Farm would include measures to ensure that the facility complies with the Oregon Department of Environmental Quality's (DEQ's) noise control standards (OAR 340-035-0035) and the amended Site Certificate conditions.

X.1.1 Acoustical Background

When determining noise-related impacts, it is useful to understand how noise is defined and measured. Noise is defined as unwanted sound. Airborne sound is a rapid fluctuation of air pressure above and below atmospheric pressure. There are several different ways to measure noise, depending on the source of the noise, the receiver, and the reason for the noise measurement. Table X-1 summarizes the technical noise terms used in this exhibit.

Table X-1 Definitions of Acoustical Terms

Term	Definition
Ambient noise level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Decibel (dB)	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the measured pressure to the reference pressure, which is 20 micropascals.
A-weighted sound pressure level (dBA)	The sound pressure level in decibels as measured on a sound level meter using the A-weighted filter network. The A-weighted filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound levels in this report are A-weighted.
Statistical noise level (L_n)	The noise level exceeded during n percent of the measurement period, where n is a number between 0 and 100 (for example, L_{50} is the level exceeded 50 percent of the time).

Table X-2 shows the relative A-weighted noise levels of common sounds measured in the environment and in industry for various sound levels.

Table X-2 Typical Sound Levels Measured in the Environment and Industry

Noise Source At a Given Distance	A-Weighted Sound Level in Decibels	Noise Environments	Subjective Impression
Civil defense siren (100 feet)	130		
Jet takeoff (200 feet)	120		Pain threshold
	110	Rock music concert	
Pile driver (50 feet)	100		Very loud
Ambulance siren (100 feet)			
	90	Boiler room	
Freight cars (50 feet)		Printing press plant	
Pneumatic drill (50 feet)	80	Kitchen with garbage disposal running	
Freeway (100 feet)			
	70		Moderately loud
Vacuum cleaner (10 feet)	60	Data processing center	
Department Store; light traffic (100 feet)	50	Private business office	
Large transformer (200 feet)	40		Quiet
Soft whisper (5 feet)	30	Quiet bedroom	
	20	Recording studio	
	10		Hearing threshold

Source: Beranek 1988

It can be useful to understand the difference between a sound *pressure* level (or noise level) and a sound *power* level. A sound power level (commonly abbreviated as PWL or Lw) is analogous to the wattage of a light bulb; it is a measure of the acoustical energy emitted by the source and is, therefore, independent of distance. A sound pressure level (commonly abbreviated as SPL or Lp) is analogous to the brightness or intensity of light experienced at a specific distance from a source and is measured directly with a sound-level meter. Sound pressure levels always should be specified with a location or distance from the noise source.

Sound power level data are used in acoustic models to predict sound pressure levels. This is because sound power levels take into account the size of the acoustical source and account for the total acoustical energy emitted by the source.

It is also important to note that decibels are logarithmic and cannot be directly added arithmetically; that is, 50 dBA + 50 dBA does not equal 100 dBA. When two sources of equal level are added together, the result will always be 3 dB greater; that is, 50 dBA + 50 dBA = 53 dBA, and 70 dBA + 70 dBA = 73 dBA. If the difference between the two sources is 10 dBA, the level (when rounded to the nearest whole decibel) will not increase; that is, 40 dBA + 50 dBA=50 dBA and 60 dBA + 70 dBA=70 dBA.

The decrease in sound level due to distance from any single sound source normally follows the inverse square law; that is, the SPL changes in inverse proportion to the square of the distance from the sound source. In a large open area with no obstructive or reflective surfaces, it is a general rule that at distances greater than approximately the largest dimension of the noise-emitting surface, the SPL from a single source of sound drops off at a rate of 6 dB with each doubling of the distance from the source. Sound energy is absorbed in the air as a function of temperature, humidity, and the frequency of the sound. This attenuation can be up to 2 dB over 1,000 feet. The drop-off rate will also vary based on terrain conditions and the presence of obstructions in the sound's propagation path. These factors are considered in the development of the acoustical model.

X.1.2 Regulatory Overview

Noise standards promulgated by DEQ are contained in OAR Chapter 340, Division 35, Noise Control Regulations.

Exhibit B provides additional description of the proposed Carty Solar Farm.

The Carty Solar Farm generation facility would be located on the same parcel as the existing Boardman ash disposal area. The ash disposal area is currently in use and has been in continuous use since 1980. The limits of OAR 340-035-0035(1)(b)(A) specify that no new noise source shall exceed the levels specified in Table 8 of OAR 340-035-0035 (duplicated below as Table X-3).

Table X-3 New Industrial and Commercial Noise Source Standards for Sources Located on Previously Used Sites (dBA)

Statistical Descriptor	Daytime (7 a.m.–10 p.m.)	Nighttime (10 p.m.–7 a.m.)
L_{50}	55	50
L_{10}	60	55
L_1	75	60

Source: OAR 340-35-0035, Table 8.
http://arcweb.sos.state.or.us/pages/rules/oars_300/oar_340/340_035.html

In addition, OAR 340-035-0035(1)(f) establishes standards that regulate octave band sound pressure levels and audible discrete tones. Such standards can be applied by DEQ when it appears that the limits discussed above do not adequately protect the health, safety, or welfare of the public.[1]

OAR 340-035-0035(5) provides exemptions for emergency equipment, warning devices not operating continuously for more than 5 minutes, sounds that originate on construction sites, and sounds created in construction or maintenance of capital equipment.

The noise limits apply at "appropriate measurement points" on "noise-sensitive property." The "appropriate measurement point" is defined as whichever of the following is farther from the noise source:

- 25 feet (7.6 meters) toward the noise source from that point on the noise-sensitive building nearest the noise source; or
- That point on the noise-sensitive property line nearest the noise source

"Noise-sensitive property" is defined as "real property normally used for sleeping, or normally used as schools, churches, hospitals, or public libraries. Property used in industrial or agricultural activities is not noise-sensitive property unless it meets the foregoing criteria in more than an incidental manner." The closest noise-sensitive properties are the same as those described in the ASC, the closest of which is approximately 12,500 feet from the Carty Solar Farm. See Figure X-1 for distance and direction to the closest noise-sensitive properties.

X.2 PREDICTED NOISE LEVELS

OAR 345-021-0010(1)(x)(A) *Predicted noise levels resulting from construction and operation of the proposed facility.*

[1] Impulse noise is also regulated in OAR 340-35-0035(1)(d), but photovoltaic facilities do not generate impulsive sounds such as those associated with blasting, gunfire, pile-driving, riveting, hammering, or stamping.

OAR 345-021-0010(1)(x)(B) *An analysis of the proposed facility's compliance with the applicable noise regulations in OAR 340-035-0035, including a discussion and justification of the methods and assumptions used in the analysis.*

Response:

X.2.1 Construction

Construction activities associated with the RFA are expected to be similar to those described in the ASC. OAR 340-035-0035(5)(g) specifically exempts construction activity. Therefore, by regulatory definition, there will be no construction noise impacts related to the project.

X.2.2 Operations

A noise model of the proposed Carty Solar Farm was developed using source input levels derived from data supplied by manufacturers, or information found in the technical literature. The noise levels presented represent the anticipated steady-state level from the Carty Solar Farm with essentially all equipment operating.

Standard acoustical engineering methods were used in the noise analysis. The noise model used, CADNA/A by DataKustik GmbH of Munich, Germany, is a very sophisticated model and enables full modeling of very complex industrial plants. The sound propagation factors used in the model have been adopted from International Organization for Standardization (ISO) 9613-2 *Acoustics—Sound Attenuation During Propagation Outdoors*. Atmospheric absorption was estimated for conditions of 10 degrees Celsius and 70% relative humidity (conditions that favor propagation) and computed in accordance with ISO 9613-1. The model divides the proposed Carty Solar Farm into a list of individual point, line, and area noise sources representing each piece of equipment that produces a significant amount of noise. Using these sound power levels as a basis, the model calculates the sound pressure level that would occur at each receptor from each source after losses from distance, air absorption, blockages, and other factors are considered. The sum of all these individual levels is the total level from the Carty Solar Farm at the modeling point.

The sound power levels used in the model are summarized in Table X-4. As noted above, sound power level data are used in acoustic models to predict sound pressure levels. This is because sound power levels take into account the size of the acoustical source and account for the total acoustical energy emitted by the source. The approximate sound pressure level at 400 feet, the sound level one would measure or hear, is 44 dBA less than those identified in Table X-4.

As is typical at this stage of a project, these data are preliminary. Given the distance to the closest noise sensitive property (over 2 miles) and the low sound levels associated with solar equipment, compliance with the regulatory requirement is anticipated to be readily achieved.

Nonetheless, detailed vendor specifications will ultimately be developed to ensure that the project complies with the conditions of certification.

Table X-4 Sound Power Levels Used to Model Carty Solar Farm (dBA)

Plant Component	Sound Power Level (dBA)
Inverter	87
Transformer	94

Key:
dBA = A-weighted decibels

As indicated in Table X-4, the noise-generating equipment associated with the Carty Solar Farm would be minimal. The overall sound level of the Carty Solar Farm is predicted to be less than 20 dBA at the closest noise-sensitive receiver, which is located over 2 miles away. Such a low sound level is not anticipated to influence the overall sound level at the closest noise-sensitive receiver. See Figure X-1, which provides noise level contours.

X.2.3 Transmission Line

One of the electrical effects of high-voltage transmission lines is corona. Corona is the ionization of the air that occurs at the surface of the energized conductor and suspension hardware due to very high electric field strength at the surface of the metal during certain conditions. Corona may result in radio and television reception interference, audible noise, light, and production of ozone. Corona also depends on the transmission line voltage rather than the current or amperage, and is generally a principle design concern with transmission lines of 345 kilovolts and higher. Transmission lines associated with the Carty Solar Farm would be 34.5 kV; therefore, there are no anticipated noise impacts from the transmission lines.

X.3 MEASURES DESIGNED TO REDUCE NOISE

OAR 345-021-0010(1)(x)(C) *Any measures the applicant proposes to reduce noise levels or noise impacts or to address public complaints about noise from the facility.*

Response: Portland General Electric Company (PGE) proposes to employ the equipment selection and specification criteria necessary to ensure compliance with the Oregon noise standards (OAR 340-035-0035). While the Carty Solar Farm is anticipated to comply with the Oregon noise standards without unusual noise mitigation measures, PGE has many measures available to ensure that compliance is achieved during detailed design. Such measures include

specifying quieter equipment (when available), as well as improved acoustical enclosures, barriers, and silencers. PGE has also established a complaint process consistent with the existing conditions of certification. Therefore, no significant noise impacts from the Carty Solar Farm operation are anticipated and no additional mitigation is planned.

X.4 MEASURES TO MONITOR NOISE

OAR 345-021-0010(1)(x)(D) *Any measures the applicant proposes to monitor noise generated by operation of the facility.*

Response: Consistent with the existing conditions of certification, PGE will conduct monitoring upon the request of the Oregon Department of Energy.

X.5 NOISE-SENSITIVE PROPERTIES

OAR 345-021-0010(1)(x)(E) *A list of names and addresses of all owners of noise sensitive property, as defined in OAR 340-035-0015, within one mile of the proposed site boundary.*

Response: No noise-sensitive property has been identified within 1 mile of the proposed site boundary.

X.6 REFERENCES

Beranek, L.L. 1988. *Acoustical Measurements*. American Institute of Physics. Woodbury, New York.

CADNA/A DataKustik, GmbH, Munich, Germany. http://www.datakustik.com/en/products/cadnaa/. Accessed August 2, 2016

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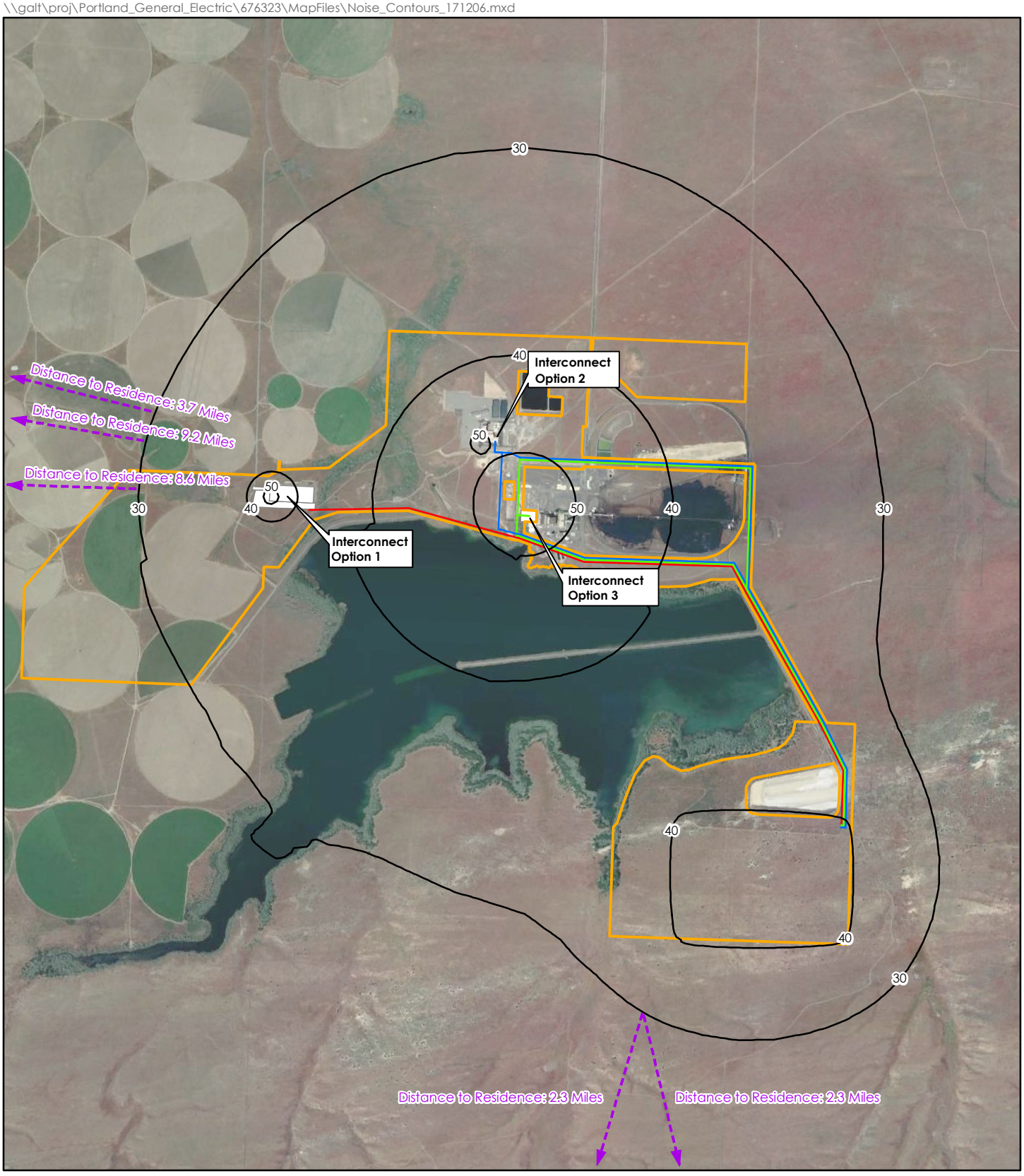

Noise Contour (10-decibel Interval)

Amended Site Boundary

Transmission Line Options

Option 1: Grassland 500kV

Option 2: Unit 1 Isophase

Option 3: Boardman Plant Interconnect

N

1:36,000

Miles

0 0.25 0.5

Credits: Google Earth Aerial Imagery

Figure X-1
Noise Contours

Request for Amendment No. 1
Carty Generating Station Site Certificate

Portland General Electric Company

January 2018

EXHIBIT Y – Request for Amendment No. 1

CARBON DIOXIDE EMISSIONS

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

Y.1 INTRODUCTION

OAR 345-021-0010(1)(y) *If the facility is a base load gas plant, a non-base load power plant, or a nongenerating energy facility that emits carbon dioxide, a statement of the means by which applicant elects to comply with the applicable carbon dioxide emissions standard under OAR 345-024- 0560, OAR 345-024-0600, or OAR 345-024-0630 and information, showing detailed calculations, about the carbon dioxide emissions of the energy facility.*

Response: The Carty Solar Farm is not a fossil-fueled unit; therefore, the carbon dioxide (CO_2) standards do not apply to that component of the Carty Generating Station. Unit 1 has already been constructed and has complied with site certificate pre-construction and 100-hour testing conditions related to the State of Oregon CO_2 Standard; therefore, no additional information related to CO_2 is necessary in this Request for Amendment for Unit 1.

EXHIBIT Z – Request for Amendment No. 1

COOLING TOWER IMPACTS
OAR 345-021-0010(1)(z)

Z.1 INTRODUCTION

OAR 345-021-0010(1)(z) *The application for site certificate for the proposed project must contain information about the cooling tower plume, if the proposed facility has an evaporative cooling tower.*

Response: This Request for Amendment does not add any additional evaporative cooling towers to the Carty Generating Station; therefore, the information required in this exhibit is not applicable to this request.