

July 14th, 2016

Kittitas County Community Development Services
Attn: Jeff Watson
411 North Ruby Street, Suite 2
Ellensburg, WA 98926

RE: Iron Horse CUP Application, Supplemental Materials

Dear Mr. Jeff Watson,

OneEnergy Renewables (“OER”), is pleased to be participating in the land use permitting process with Kittitas County through the filing of a Conditional Use Permit application for Iron Horse Solar. We appreciate your ongoing consideration of our project.

OER recognizes the volume of comments received during the public comment period and is furnishing additional information to support the project application and address areas of public concern. The purpose of the enclosed documentation is to ensure that the record reflects OER’s response to the comments received by Kittitas County Community Development Services (“KCCDS”).

We respectfully request that KCCDS review our application with the additional materials. Please feel free to reach out to me directly with any questions you may have during the review process.

Thank you,



Taylor Steele

Associate, OneEnergy Renewables

1. Zoning Compliance
 2. Aesthetics
 3. Glare
 4. Environmental Impacts
 5. Hazardous Materials
 6. Electromagnetic Fields (EMFs)
 7. Noise
 8. Taxes, Subsidies and Economics
 9. Jobs and Local Economy
 10. Property Values
 11. Financial Security
 12. Transportation
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1. Zoning Compliance

Kittitas County Zoning Code Compliance

Zoning Designation: Agriculture-20 (Ag-20)

Iron Horse Solar (Project) consists of four parcels, identified by Kittitas County Assessor as parcels 269033, 279033, 19292, and 19293, totaling 67.8 acres of which 47.5 acres will be used for the Project. All parcels associated with the Project are zoned Agricultural use as Ag-20. Per Chapter 17.29 of the Kittitas County Code, Ag-20 is defined as “an area wherein farming, ranching and rural life styles are dominant characteristics. The intent of this zoning classification is to preserve fertile farmland from encroachment by nonagricultural land uses; and protect the rights and traditions of those engaged in agriculture.”

Conditional Uses within Zoning Designation Ag-20

According to **Kittitas County Code (KCC) 17.61.010**, “a ‘Major alternative energy facility’ is defined as a hydroelectric plant, solar farm, or wind farm that is not a minor alternative energy facility.” This code also specifies that a “minor alternative energy facility” is not more than 100kW. The Project will generate 4.5 megawatts (MW) of solar power and is thus considered a major alternative energy facility in Kittitas County.

KCC 17.61.020 states that, “Major alternative energy facilities may be authorized in the Ag-20, forest and range, commercial agriculture, and commercial forest zones as follows:

- a. Wind farms may be authorized pursuant to the provisions of KCC Chapter 17.61A;
- b. All other major alternative energy facilities may be authorized as a conditional use.”

The Kittitas County Code clearly states that solar facilities, similar to that of this Project, are conditionally allowed uses within the Ag-20 zoning. As such, the Project is allowed, subject to conditions that would address impacts related to the specific site and setting.

Per KCC 17.15.030.1, conditional uses in Rural Non-LAMIRD Ag-20 Resource land (i.e. land zoned and classified the same as the property underlying the Project) include:

- Animal boarding
- Agricultural processing

- Agricultural sales
- Dairy
- Feedlot
- Riding academics
- Small scale event facility
- Libraries
- Religious institutions
- Hospital, animal or veterinary
- Shooting range
- Airport
- Forest product processing (portable)
- Forest product processing (permanent)
- Refuse disposal/recycle
- Warehousing and distribution
- Campground
- Golf course
- Guest ranch or guest farm
- Recreational vehicle park
- Group home
- Mining and excavation
- Rock crushing
- Utilities

When compared to some alternative uses allowed conditionally in Ag-20, such as a sampling of those listed above—forest product processing, shooting range, mining and excavation, refuse disposal and recycling, and others—solar power generation is less obstructive to the view sheds and rural character with low-lying panels (as further described in the CUP application, under eight feet) and minimal activity during operation.

Kittitas County has approved a wide variety of conditional uses within the Ag-20 zone. Approved developments in the county include but are not limited to:

- 45 Acre Basalt Excavation Operation (CU-09-00006)¹
- 50 Acre Small Scale Event Facility (CU-14-00004)²
- 182 Acre Shooting Range (CU-11-00003)³
- 8 Acre Campsite (CU-11-00002)⁴
- 10 Acre Marijuana Processing and Production (CU-14-00002)⁵
- 13.6 Acre Photovoltaic Solar Power Generation facility (CU-14-00003)⁶

Furthermore, Kittitas County has set a precedent for solar power generation in Ag-20 zoning with its approval of Osprey Solar in July of 2015. The community has also set a precedent for local solar power generation through the development, expansion and continued support of Ellensburg Community Renewable Park.

Farmland Impacts

According to the US Department of Agriculture (USDA) 2012 Census of Agriculture, there are approximately 183,124 acres of farmland in Kittitas County. According to Table 2-1 of the Kittitas

¹ [CU-09-00006](#). Clerf. 2009.

² [CU-14-00004](#). McIntosh. 2014.

³ [CU-11-00003](#). Cascade Field and Stream Club. 2001.

⁴ [CU-11-00003](#). Maughan. 2011.

⁵ [CU-14-00002](#). Graham. 2014.

⁶ [CU-14-00003](#). Osprey. 2014.

Comprehensive Plan, *Land Use Designations and Corresponding Zoning Classifications with Acreage*, there are approximately 113,274.4 acres of land designated in Ag-20, which is not the only zone dedicated to agricultural production. Subtracting 47.5 acres (at most) of land in this zone from crop production will be a roughly .04% reduction in potentially productive farmland over the next 25-35 years in Kittitas County. After that time, the land will likely be restored to an agriculture-ready state. Additionally, there are roughly 14,748,107 acres of farmland within Washington State and the Project will result in a temporary (during the life of the facility) reduction of farmland by 0.0003%.

Kittitas County Comprehensive Growth Plan Compliance

OneEnergy Renewables (OER) has reviewed the Kittitas County Comprehensive Plan (Kittitas County, 2016) to assess the Project's consistency with county policies. At this time, the plan does not contain policies specifically related to solar power projects. The Project is consistent with the intent, goals, policies, and objectives of the Kittitas County Comprehensive Plan (GPO).⁷ A few highlights can be found below:

GPO 2.15 "The development of resource based industries and processing should be encouraged in all areas of Kittitas County. When such uses are located in rural and resource lands, criteria shall be developed to ensure the protection of these lands to ensure compatibility with rural character. Consider adding a definition for "resource based industry" to the definitions in Title 17, Zoning."

Response: According to KCC 17.08.468, "Resource based industry" means an industry based on natural resources including but not limited to recreation-related tourism, agriculture, fisheries, forestry and mining. Solar, relying on the sun, is a natural resource based industry and fits squarely with the development recommendations of GPO 2.15 above.

The Project will be fully compatible with the rural character of Kittitas Valley as proven by the compliance with RCW 36.70A.030 addressed below.

GPO 6.7 "Decisions made by Kittitas County regarding utility facilities will be made in a manner consistent with and complementary to regional demands and resources."

Response: The Project will draw upon the natural, locally abundant solar resource to generate renewable alternative energy as a means to meet regional power demands. The Project will be consistent with, and complementary to, regional utility demands and local resources. Additionally, the Project will reinforce and bolster Puget Sound Energy's (PSE) regional distribution grid and benefit the local electrical system given the infrastructure upgrades being paid for by the Project to facilitate interconnection.

GPO 8.14 "Allow for a variety of rural densities which maintain and recognize rural character, agricultural activities, rural community and development patterns, open spaces and recreational opportunities."

Response: The Project will maintain and conform with rural character, agricultural activities, rural community and development patterns, and open spaces through the following means:

- The low-lying nature of the panels and native grasses will perpetuate the visual landscapes of open space and vegetation that are traditionally found in this rural area.
- No trees or forested areas will be removed in the development of this Project.
- This Project has been sited on previously disturbed parcels, in order to further minimize potential impacts on local wildlife.

⁷ This response to comprehensive plan provisions is intended to address comments submitted to the County. However, while the Comprehensive Plan sheds light on County policies, and informed the County's decisions made in its land use regulations, OER does not agree that comprehensive plan policies control over adopted County Code provisions.

- This development will not impact any adjacent farming or ranching operations, nor will it affect the neighboring residences.
- Economically, this Project will foster traditional rural lifestyles and opportunities by offering the landowner a long-term, predictable annual revenue stream to supplement the financial impacts of vacillating market forces inherent in farming.
- This Project will not lead to any sprawling, low-density development.
- The Project will not impede the view of open spaces, mountains or other natural landscapes in the area.
- The impacts to both surface water and ground water will be minimal to non-existent.
- At the end of the Project life, the ground will be returned to its previous state, at which time the land can act as an agricultural resource.

GPO 8.44 "Growth and development in Rural lands will be planned to minimize impacts upon adjacent natural resource lands."

Response: All impacts associated with the Project will be limited to the Project site. There are no anticipated impacts to any adjacent resource lands.

The Project is sited on previously-disturbed agricultural land impacted by regular tilling, crop production and harvest, installation of fences, road construction and ditching. The Project is designed to be a low impact development. Reclamation measures will be implemented to restore the temporarily disturbed surface soils at the Project Site. Permanent impacts from Project construction will be minimized whenever possible, enabling the land to return to pasture or other agricultural uses at the end of its useful life.

Growth Management Act Rural Policies and Guidance

Under the Growth Management Act (GMA), Washington State has developed a guide to the development and adoption of comprehensive plans and development regulations that most Washington counties, including Kittitas County, have adopted. The GMA requires that counties include measures that apply to rural development and protect the rural character of the area as established by the County.

In addition to zoning designations, Kittitas County designates land use for each parcel. All parcels associated with the Project are designated as Rural Working Land Use. As per Section 2.4.1 of the Kittitas Comprehensive Plan, "Rural Working lands, generally encourage farming, ranching and storage of agriculture products, and some commercial and industrial uses compatible with rural environment and supporting agriculture and/or forest activities. Areas in this designation often have low population densities and larger parcel sizes compared to Rural Residential areas. Agriculture and forestry activities are generally less in scope than in the Resource lands."

In the GMA, in relation to Rural Development, RCW 36.70A.070 outlines that "Counties shall include a rural element including lands that are not designated for urban growth, agriculture, forest, or mineral resources". All parcels associated with the Project have been classified as Resource Land by Kittitas County and are generally described as, "the commercial agriculture lands, the commercial forested lands and mineral lands" in Section 8.1 of the Kittitas Comprehensive Plan. Due to the agricultural Resource designation of the subject parcels, this development is not subject to rural element provisions as outlined in RCW 36.70A.070.

Although this Project is not obligated to directly meet the GMA's requirements regarding development in rural areas, the Project is consistent with the GMA's definition of rural character. The County has complied with these provisions in its adoption of its zoning code. According to RCW 36.70A.030, "Rural character" refers to the patterns of land use and development established by a county in the rural element of its comprehensive plan and is defined in A-G below.

(a) In which open space, the natural landscape, and vegetation predominate over the built environment;

At a height not to exceed 8.0 feet, the solar panels will not impede the view of open spaces, mountains or other natural landscapes in the area. Currently, this site and many surrounding farms are growing Timothy and Alfalfa Hay. According to the USDA, Timothy (*Pheleum pratense*) ranges from 1.6 to 3.3 feet in height while Alfalfa (*Medicago sativa*) ranges from 2.0 to 3.0 feet.⁸⁹ Other Top Crop Items in the County, as listed in the 2012 Census of Agriculture commonly found in rural Kittitas landscape include Wheat (ranging 2.0 to 10 feet¹⁰) and Sweet Corn (10 feet or more¹¹).¹² Hay bales, another common component to the local rural landscape, can range in height from roughly 1.0 feet to 4.0 feet with round bales up to 7.0 feet in diameter.¹³

Again, no trees or forested areas will be removed in the development of this Project.

(b) That foster traditional rural lifestyles, rural-based economies, and opportunities to both live and work in rural areas;

Local farming, ranching and rural life styles will not be affected by this Project. The only farming practices that will be impacted are those that originally occurred on the leased 47.5 acres sited for the Project.

Additionally, the Project landowner, Bill Hanson, will continue to farm the remaining 450 acres of his farm and uphold the agricultural traditions in this area.

This development will not impact any adjacent farming or ranching operations nor will it negatively affect the neighboring residences.

Economically, this Project will foster traditional rural lifestyles and opportunities by offering the Landowner a long-term, predictable annual revenue stream. This diversified income will allow the landowner to invest in his ongoing farming operations. Additionally, this Project will act as an economic engine for local businesses, jobs and the tax base.

(c) That provide visual landscapes that are traditionally found in rural areas and communities;

Rural areas include many different visual elements and uses, including surface mines, large commercial greenhouse structures, silos, barns, wind generation facilities, etc. Such an array of rural uses is anticipated by the County's zoning code. On the Project site, native grasses

⁸ [Plant Guide: Timothy Hay Phleum pratense L.](#), US Department of Agriculture. Ogle, et al. 2011.

⁹ [Plant Guide: Tall Wheat Grass Thinopyrum ponticum](#), US Department of Agriculture. Scheinost, et al.

¹⁰ Ibid.

¹¹ [Sweet Corn Production, National Corn Handbook](#), The Corn Crop, Purdue University Cooperative Extension Service. Waters et al.

¹² [Kittitas County Profile, 2012 Census of Agriculture](#), US Department of Agriculture. 2012.

¹³ [Anderson Hay & Grain Co., Inc.](#) Anderson Hay. 2014.

will be planted beneath the panels. The low-lying nature of the panels and native grasses will perpetuate the visual landscapes of open space and vegetation that are traditionally found in this rural area.

(d) That are compatible with the use of the land by wildlife and for fish and wildlife habitat;

The Project has been, and will continue to be reviewed according to all relevant local, state and federal laws and regulations for potential environmental impacts. This Project is proposed on previously disturbed parcels in order to minimize potential impacts on local wildlife. By temporarily developing on a previously disturbed agricultural plot rather than undisturbed sage brush, a solar farm requires significantly less clearing, grading, and infrastructure to access a habitat type typically populated by fewer known endangered species. OER will implement Best Management Practices (BMPs) in the construction and maintenance of this Project.

OER will continue to work with the Washington Department of Fish and Wildlife (WDFW) to address any potential concerns related to existing wildlife habitat.

(e) That reduce the inappropriate conversion of undeveloped land into sprawling, low-density development;

This Project will temporarily change the use of no more than 47.5 acres of land currently used for agriculture to alternative energy generation. As outlined above, this is an allowed use in the Ag-20 zone, subject to conditions that address localized impacts. Given that this land has been identified as Resource Land by Kittitas County, this is an appropriate temporary conversion of agricultural land. This Project will not lead to any sprawling, low-density development. OER does not have any plans for future additions or expansion at the facility.

Further, projects of this nature that are allowed as a conditional uses disincentivize landowners from pursuing conversions to residential development because they offer opportunities for landowners to generate diversified income while retaining traditional agricultural land uses. The Project will provide the landowner with a steady, long-term supplemental revenue that will allow and encourage the family to continue their traditional farming practices while the site generates electricity.

At the end of the Project life, the ground will be returned to its previous state, at which time the land can be returned to use as a purely agricultural resource.

(f) That generally do not require the extension of urban governmental services; and

The Project requires only rural government services such as, but not limited to, police and fire protection services. Any additional services required will be provided by the Project. This Project will not require the extension of urban governmental services.

(g) That are consistent with the protection of natural surface water flows and groundwater and surface water recharge and discharge areas.

The impacts to both surface water and ground water will be minimal to non-existent. Per a letter provided by the Project's principal geotechnical consultant (Michael Place, PE, Professional Service Industries, Inc.) and found in OER's application, "the arrays will shield soil immediately below the panels from rain, but will only have a small foundation in contact with the ground leaving mostly vegetated ground below it. Any water running off the panels will still come in contact with the exposed soil below and infiltrate in virtually the same manner as before since the actual reduction of surface soils for water to infiltrate into will be minimal."

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Additionally, the Project will have no impacts to ground water since it will not draw water out of the ground for this Project. Further, cutting and grading will not exceed two feet in depth.

In summary, RCW 36.70A.030 requires local governments to adopt land use regulations that allow and protect ongoing agricultural land uses. The direction to local governments requires consideration of uses that would not disrupt the ongoing use of land for traditional agricultural practices. The Project will not disrupt the surrounding area's rural characteristics including, but not limited to farming, ranching and rural life styles. Furthermore, there will be no impact to the neighboring farming operations. Potential impacts such as weed control and transportation issues are appropriately addressed through the conditions in a conditional use permit.

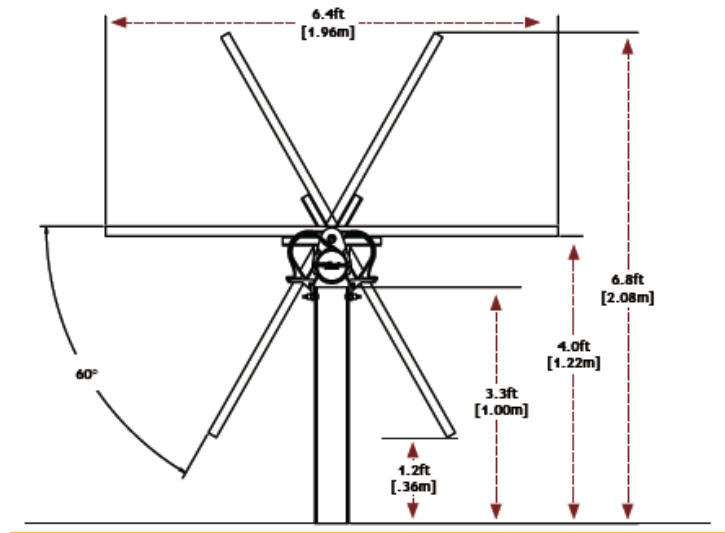
2. Aesthetics

Visual impacts created by the Project will be limited to the view shed in close proximity to the Site and are not anticipated to be significant due to the low profile of the proposed facilities. Specific to the tracking technology, as currently designed: when the panels are oriented horizontally to the ground with a 0° tilt, the entire panel will be approximately 4.0 feet above grade. When the module is fully tilted in either direction at approximately 60°, the leading edge height (bottom edge of panels) will be approximately 1.2 feet from grade, and the top edge of the modules will be approximately 6.8 feet from grade.¹⁵ See Figure 1 below.

Figure 1. NX Horizon Self-Powered Tracker – Diagram of Height Ranges

¹⁴ G2_Construction Effects on Groundwater, OneEnergy Renewables Caribou Site. Application materials. 2015.

¹⁵ [NX Horizon Self-Powered Tracker](#). NeXtTracker. 2016.



Agricultural equipment and infrastructure are often much higher than any part of the proposed Project. For example, pivot irrigation systems found on similar lands average approximately 11 feet in height to allow for crop clearance and can range from 660 to 1,350 feet in length.¹⁶ Additionally, hay barns—much like the ones adjacent the Project site—can range between 16 feet and 20 feet in height; grain silos, commonly found in the Kittitas Valley, can range from 15 feet to 54 feet in height.^{17,18} Infrastructure of these heights is common across the Kittitas County landscape. Therefore, any visual impacts by the Project will be minimal, and are consistent with, and often lower than current view sheds. Figure 2 below shows the current proposed site and nearby agricultural infrastructure.

Figure 2. Project Site with Adjacent 20+ Foot Hay Barn



¹⁶ [Irrigation Systems Product Guide](#). Lindsey. 2011.

¹⁷ [Planning and Building Barns that Work](#). Wilkerson. Department of Biosystems and Agricultural Engineering, University of Kentucky.

¹⁸ [Brock On-Farm Grain Storage Bins](#). Brock. 2016.

Furthermore, when compared to other uses allowed and active in the Ag-20 zone, such as forest product processing, shooting range, mining and excavation and others highlighted previously, solar power facilities are less obstructive to the view sheds with their low-lying panels and minimal activity.

For example, a typical view of a gravel excavation operation, much like the one under conditional use approval on Ag-20 land and located approximately two miles southwest of the Project site, may include heavy equipment and machinery, including but not limited to: mass excavators, trenchers and dump trucks.¹⁹ There is a second active gravel excavation site under a conditional use permit located roughly 2.5 miles southeast of the Project, that is also sited in Ag-20 (see Figures 3, 4 and 5 below).²⁰ In addition to visual impacts caused by equipment and activity “Excavation and associated working resulting in loss of landscape feature e.g. topographical changes, loss of vegetation (woodland, hedges), interruption of field pattern (hedge/wall removal) which causes changes in landscape character”.²¹

Figures 3 and 4. Gravel mine of Parke Creek Road, Ellensburg WA



Figure 5. Rock and Gravel Pit²²



¹⁹ [Excavation and Trenching](#). Heavy Equipment. 2016.

²⁰ [Gibson Land Use Petition](#). Superior Court of Washington for Kittitas County. 2010.

²¹ [Landscape and Visual Impact \(Operational\)](#). Sustainable Aggregates.

²² [Rock and Gravel](#). Gibson and Son. 2004.

Previous real estate appraisals of utility-scale solar farms have identified larger greenhouses as a “very reasonable comparison” in terms of appearance given that a greenhouse is essentially another method for collecting passive solar energy.²³ Greenhouses are well received in both residential and rural areas and have more visual impact on a landscape when compared to a solar farm in terms of height and glare (shown in Figure 6 below). The visual impact of the solar panels will be less high than a typical greenhouse or even a single-story residential dwelling. Kittitas County Code allows for greenhouses and nurseries in all agriculturally-zoned land, including Ag-20. Currently, according to the USDA, at least five agricultural scale greenhouses are in operation within Kittitas County that could be used to gauge visual impacts of the Project.²⁴

Figure 6. Greenhouse in Kittitas Valley.²⁵



If the Project site were to be developed with single-family housing, it would have a far greater visual and noise impact on the surrounding area given that a two-story home could be four times as high as these proposed panels. Additionally, the land on which any housing structure is constructed is then permanently taken out of agricultural production.

3. Glare

PV panels are designed to absorb, not reflect, sunlight. Surface color and physical composition are the two factors in determining the reflectivity of an object or surface. White surfaces are the most reflective while darker colors absorb more light. Current solar panel technologies utilize a layer of anti-reflective material that allows sunlight to pass through while minimizing reflection and also includes an anti-

²³ [Real Property Appraisal Report, including Matched Pair Analysis](#), Kirkland Appraisals, LLC. 2014.

²⁴ [Agricultural Census: Nursery, Greenhouse, and Floriculture](#), U.S. Department of Agriculture. 2012.

²⁵ [Kittitas Valley Greenhouse](#). Kittitas Valley Greenhouse. 2012.

reflective material on the outer surface to further limit reflection. In a Federal Aviation Administration sponsored report investigating the safety of energy technologies at airports and in aviation, the authors noted that these design improvements have enabled today's PV panels to reflect as little as 2% of incoming sunlight.^{26 27}

The percentage of sunlight that is reflected from solar panels is significantly lower than many common materials, including roughly 60% less than flat water and roughly 50% less than grass and vegetation (what is currently located on the Project site). Other comparisons of readily found materials that reflect sunlight at appreciably higher levels than solar panels include: bare soil (roughly 30% more), rural environments (roughly 50% more), snow (roughly 80% more), and even wood shingles (18% more). (See Figures 1 and 2 below.)^{28 29}

Given the very limited glare reflected from solar farms, numerous solar projects have been successfully sited on or near major US and international airports, including Indianapolis, Boston, New York, San Jose and Denver, just to name a few. The biggest glare hazard in aviation is the sun itself—particularly when it is low on the horizon and it is worth noting that glare assessments are only required by the FAA for solar projects developed within two miles of airport runways.^{30 31} The Project was submitted for review to the FAA by the Obstruction Evaluation Group and received a Determination of No Hazard to Air Navigation result in the aeronautical study review.

When designing solar farms, OER uses the publically-available Solar Glare Hazard Analysis Tool (SGHAT) developed by the Sandia National Laboratory (available at www.sandia.gov/glare) to determine the potential for glare from any given project. SGHAT is widely used tool within the solar industry. OER has undertaken multiple glare analysis studies of the Project. These studies estimate the intensity, time-of-day and duration of reflective glare upon stationary observation points and views (including multi-story homes and other stationary objects). OER's glare studies included view points from I-90, Clerf Road, Caribou Road, Hemingston Road, Hazel Lane, and Vantage Hwy.

Using Project data, including the height of the arrays, simulation results from SGHAT suggest that in no case is glare produced from the Project considered significant, meaning that glare, to the extent it is even experienced, is not expected to be bright enough to remain in one's vision after the exposure to the original image has ceased. Given these observations, while the potential exists for glint or glare, the likelihood of reflective glare from the Project being perceived on nearby public roads and residential properties is minimal at best.

²⁶ [Solar and PV Glare Fact Sheet](#), Meister Consultants Group, Inc. and supported by U.S. Department of Energy's SunShot program. 2014.

²⁷ [Investigating Safety Impacts of Energy Technologies on Airports and Aviation](#), Airport Cooperative Research Program, Sponsored by the FAA. 2011.

²⁸ Ibid

²⁹ [Solar farm projects near airports: Is glare an issue?](#), Solar Choice, 2013

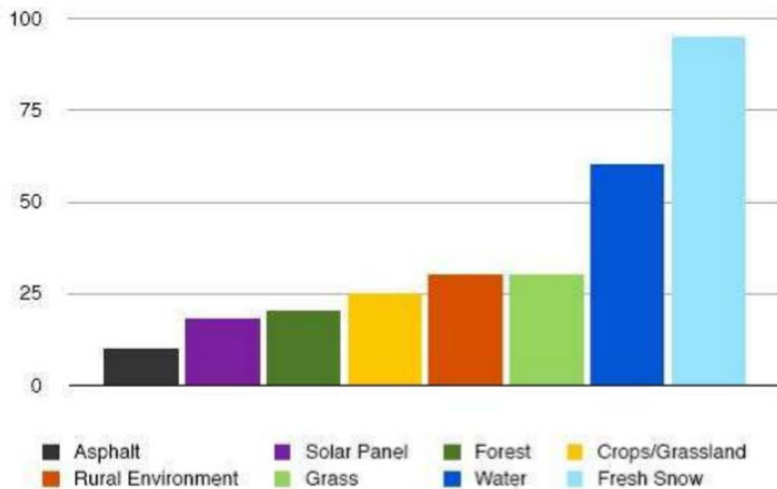
³⁰ [Solar Community Engagement Strategies for Planners-2012](#), American Planning Association. 2012

³¹ [Solar Glare Hazard Analysis Tool](#), Sandia National Laboratories. 2016.

Figures 1 and 2. Materials Comparison - Percentage of Sunlight Reflected³²



³² Figure 1 source: [HMMH](#); Figure 2 source: [Solar farm projects near airports: Is glare an issue?](#), Solar Choice. 2013



4. Environmental Impacts

OER's experienced development team employs rigorous site analysis and abides by low impact development practices. OER generally sites its solar projects on previously disturbed parcels, such as agriculture, in order to further minimize potential impacts on local wildlife. Temporarily developing on a previously disturbed and regularly tilled agricultural plot, such as the site selected for the Project rather than undisturbed sage brush, requires significantly less clearing and grading, given that such activities are already occurring to support farming practices on-site. According to the Washington Department of Fish and Wildlife (WDFW) in their July 31, 2015 comment letter, the Project "will have only minor impacts on terrestrial wildlife" and "no additional native vegetation (shrub steppe habitat) will need to be converted for this project."³³

While placing ground-mounted photovoltaic panels in accordance with the required safety and electric codes will have some environmental impacts, once a site is rigorously reviewed according to all relevant state and local laws for possible impacts, the County can assume the following:

- a) The impacts of the Project has been reviewed by state and federal agencies to ensure wildlife will not be negatively affected.
- b) This Project will be managed to mitigate invasive plant species.
- c) OER has both selected and designed the Project to minimize all foreseeable negative impacts to both the local wildlife and Caribou Creek.

These assurances can be secured in both the SEPA MDNS as well as conditions imposed in the CUP.

As it relates to potential avian impacts, there is no scientific evidence to suggest PV panels cause significant bird fatalities when compared to other anthropogenic land uses.³⁴ In fact, there are a number of documented accounts of birds nesting on the structures that support ground-mounted PV solar panels. It is reasonable to hypothesize that some ground-nesting birds, such as quails, would be attracted to solar farms due to the availability of safe nesting area and the deterred predation within security fencing.^{35 36}

³³ D_IHSolar WDFW Comments to OneEnergy Renewables. Application materials. 2015.

³⁴ [Potential ecological impacts of ground-mounted PV solar panel in UK](#), BSG Ecology.2014.

³⁵ [Environmental Impacts of Utility-Scale Solar Energy](#). Renewable and Sustainable Energy Reviews. Hernandez, et al. 2013.

³⁶ [Effectiveness of Predator Removal for Enhancing Bird Populations](#). Smith, et al. 2010.

OER has already provided WDFW an opportunity to preliminary review the Project site and both parties are enthusiastic about further discussions concerning how to monitor and prevent avian impacts. Due diligence review of the wildlife impacts through the use of the U.S. Fish and Wildlife Service Information for Planning and Conservation (IPaC) Trust Resource Report tool identified no threatened or endangered species known to be on or near the site.

OER has designed a weed management plan to abide with both the Washington State weed control requirements and Integrated Pest Management Guide as defined by Northwest Weed Management Partnership, as detailed further in the CUP submittal appendices. To illustrate its commitment to designing solar farms that support native vegetation, OER has recently partnered with Fresh Energy, a Minnesota non-profit committed to designing solar farms that also provide critical native pollinator habitat. At the Project, OER will continue to work with WDFW for local expertise on appropriate native seed mixes for the site and to improve the riparian area along Caribou Creek. According to WDFW, revegetation of the site to some native plant species will “not only offset habitat impacts but actually improve habitat.”

OER continues to engage WDFW in discussions related to impacts at the Project site and the parties are actively working together to resolve issues that we raised in WDFW’s June 6, 2016 letter to the County. See Appendix A.

5. Hazardous Materials

Photovoltaic solar panels do not produce any emissions, radiation, or leaching during normal operation conditions.³⁷ Unless exposed to excessive heat (greater than 1000 degrees Celsius) for an extended amount of time, there is no risk of chemicals leaching from the PV modules. For comparison, the typical roof-level temperatures observed during residential fires have been documented between 800-900 degrees Celsius. A fire sufficiently hot enough to produce these types of conditions is highly unlikely to occur in the vicinity of the Project.³⁸

The basic component of a PV solar cell is made of silicon (referred to as the crystalline solar cell) and is not considered to be hazardous to the environment.³⁹ To provide electrical insulation and protection against environmental corrosion, the solar cells are encased in a transparent material referred to as an encapsulate (typically ethylene vinyl acetate, which is nontoxic) and are mounted on top of a rigid flat surface or substrate (typically polyvinyl fluoride, which is also nontoxic). All of these nontoxic components ensure that PV panel and its semiconductor material are enclosed, do not mix with rain or other water sources, and/or vaporize into the air. PV panels pass hail tests and are regularly installed in Arctic and Antarctic conditions. Therefore, there is little, if any, risk of chemical releases to the environment during operation under normal conditions.⁴⁰

Although PV panels themselves are not flammable, OER makes the provision of adequate fire protection a fundamental aspect for each project. This includes design measures such as minimum driveway widths, ground clearance, and accessibility to all areas of the Project as defined by county-specific codes, the National Fire Protection Association (NFPA) 1 Fire Code Handbook §11.12.3, and the NFPA 70 National Electrical Code, which provide fire prevention guidance specific to ground-mounted photovoltaic installations.⁴¹

6. Electromagnetic Fields (EMFs)

³⁷ [Overview of Potential Hazards in Practical Handbook of Photovoltaics: Fundamentals and Applications](#), U.S. Department of Energy’s Brookhaven National Laboratory. Fthenakis. 2003.

³⁸ [Questions & Answers Ground-Mounted Solar Photovoltaic Systems](#), Massachusetts Department of Energy. 2015.

³⁹ [Report No. NREL/FS-520-24618](#), National Renewable Energy Laboratory. 1999.

⁴⁰ Ibid.

⁴¹ [Codes and Standards for the Built Environment](#), National Fire Protection Association. 2012

Solar PV projects like this Project generate low level electromagnetic fields (EMFs) through two specific components of the Project: the inverters, which convert the energy generated by the sun through the solar panels from DC current to a form that can connect to the electrical grid (alternating current); and the interconnection points on the electrical poles outside the property—this is the point where the power from the Project is connected to the electrical grid. EMFs are only generated during daylight hours when the sun is shining and they are not produced at night when the Project is not generating electricity via the sun's rays.

EMFs created by the Project, even if standing directly next to an inverter, will measure drastically below the minimum thresholds established by the most rigorous exposure guidelines to date (see below International Commission on Non-Ionizing Radiation Protection guidelines). Exposure to EMFs when standing just outside the fence of the Project, would be the same as standing a full mile away from an individual's personal cell phone, according a study completed by the U.S. Naval Facilities Engineering Command.⁴²

Based upon county setbacks and solar array designs at the Project, inverter placement will be a significant distance from any public access point and EMF measurements at the fenced boundary of the solar Project will measure at less than one-tenth of one percent of the safe exposure limit to the general public.⁴³

While there are no federal, state or local regulatory exposure limits in the U.S. for EMFs applicable to solar farms, EMFs from utility-scale solar projects have undergone extensive formal scientific study, including by the U.S. Department of Energy, the Federal Aviation Administration and others. These studies have shown that EMFs are measured between 0.2 to 0.4 milli-Gauss (mG) at the perimeter of a Project. When measured at 50 to 150 feet from the fence line of a project, EMFs were not elevated above background levels (background levels are the base standard levels of EMF in any regular environment). This Project will be no different.^{44 45 46}

To put these measurements in perspective, the International Commission on Non-Ionizing Radiation Protection (ICNIRP) has a recommended exposure limit to EMFs of 833 mG for the general public.⁴⁷ The ICNIRP is an organization of 15,000 scientists in 40 nations and their recommendations are routinely used in EMF exposure studies.

Examples of average EMF values found in everyday life can be found below.⁴⁸

⁴² [Renewable Energy, Photovoltaic Systems Near Airfields: Electromagnetic Interference Report](#). Dann, et al. 2012.

⁴³ [Study of Acoustic and EMF Levels from Solar Photovoltaic Projects](#). Guldberg. 2012.

⁴⁴ [Department of Energy letter to Allison Hamilton of the Oregon Department of Transportation](#). Department of Energy. 2009.

⁴⁵ Ibid.

⁴⁶ Ibid.

⁴⁷ [Guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields](#). ICNIRP. 1998.

⁴⁸ [Magnetic Field Levels Around Homes](#), Long Island Power Authority via University of San Diego, California. 2005.

	(in mG) Mid-point 1 ft.	(in mG) Mid-point 3 ft.		(in mG) Mid-point 1 ft.	(in mG) Mid-point 3 ft.
Clothes Dryer	15	<1	Blender	11.1	1
Clothes Washer	1.9	<1	TV	10.2	<1
Coffee Maker	1.05	<1	Fluorescent		
Toaster	3.8	<1	Desk Lamp	13	1.15
Can Opener	115.5	3.75	Microwave	60	5.5
Mixer	52.5	1.08	Electric Range	22	3.55
Refrigerator	1.5	<1			

The Federal Aviation Administration (FAA) has also studied whether a solar project can interfere with community communication systems. According to the FAA, solar PV systems have been found to be compatible near airports and communication system interferences are most commonly a result of a physical structure being placed between the transmitter and receiver. Due to their low profiles, solar PV systems represent little risk of interfering with radar transmissions.⁴⁹

7. Noise

The low level operational noise created by the Project is primarily limited to daytime hours and would occur within the Project site, with little noise spillover into adjacent properties. The Project noise level is not expected to result in adverse permanent increases to ambient noise levels. Studies conducted on other solar PV projects have concluded that daytime project noise level increases from solar PV project would not exceed 3 dB (decibels) above the ambient noise level. In general, a difference of 3 dBA or (a-weighted decibels) less is not a perceptible change in environmental noise.⁵⁰

Outdoor ambient noise in rural and urban areas comes from transportation, construction, industrial, and human and animal sources, with road traffic being the major source of most noise. Noise can be highly variable and it is common that Day-Night sound (defined by the U.S. Environmental Protection Agency as an equivalent sound level for a 24-hour period⁵¹) may vary by 50 dB. For example, outdoor ambient noise is generally 85-90 dB in urban areas and may be as low as 30-40 dB in the certain wilderness areas.⁵²

Ambient noise in the vicinity of the Project, among other rural and suburban daily noise, includes agricultural noise and traffic noise from both Vantage Highway which is .5 miles from the Project, and from Interstate 90, which is less than 1.0 mile from the Project.

Solar panels, themselves, do not make noise. However, the inverters, which convert solar energy into a form the electrical grid can use, can produce a low noise comparable in volume to a normal conversation taking place three to five feet away from you, and is inaudible at 50 to 150 feet from the boundary of project (Table 1).⁵³ The Kittitas substation, located approximately 1.25 miles west of the Project, will experience little to no increased noise.

Tracking equipment allows solar modules to face the sun over the course of the day and can also generate a low level of noise as they gently move with the sun's trajectory. The noise associated with the

⁴⁹ [Technical Guidance for Evaluating Selected Solar Technologies on Airports](#), Federal Aviation Administration. 2010.

⁵⁰ [Noise Study, SCE West of Devers Upgrade Project](#), U.S. Bureau of Land Management. 2015.

⁵¹ [Day and Night Sound Level](#), Engineering Toolbox.

⁵² [Outdoor Ambient Sound Levels](#), Engineering Toolbox.

⁵³ [NEMA Standards Publication No. TR 1-2013](#), Transformers, Regulators and Reactors. 2014

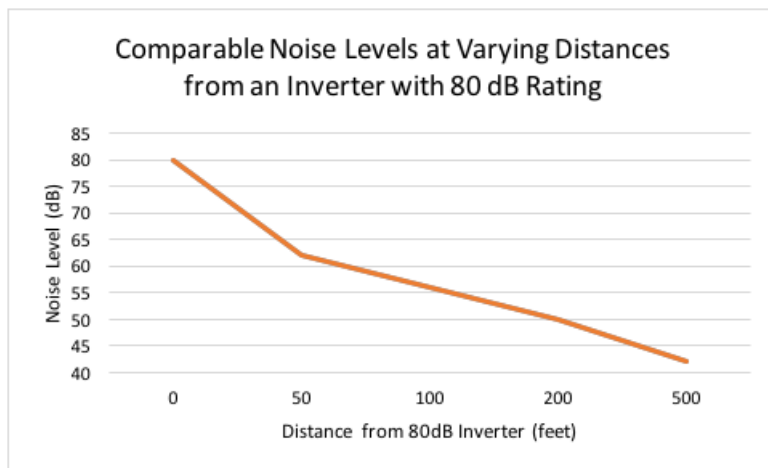
inverters and tracking equipment occurs during the daytime when solar arrays are generating electricity and are silent at night when the sun is below the horizon.⁵⁴

The below graphic illustrates how a decibel rating of 80dB is influenced over distance (Table 1 and Figure 1). Noise reduction occurs at 6dB per doubling of distance. Specific to the Project, the noise produced by the inverter at the source of generation (0 feet from the inverter) will be equal that of a household appliance such as a vacuum cleaner or coffee grinder. The decibel level decreases across distance. Therefore, at the Project boundary fence line (150-200 feet from the inverter), the decibel level will decrease to a decibel level equivalent to that of the sound of rainfall or a small window air conditioning unit. Any noise created by the Project will be completely imperceptible from neighboring parcels (500+ feet).⁵⁵ During the construction phase, intermittent noise levels will not exceed the daytime allowable use of 90dB as mandated by Washington State law.

Table 1. Electric Inverter Noise across Distance

Distance from Inverter (ft)	Noise Level (dB)	Comparable Noise Levels ⁵⁶
0	80	Vacuum cleaner, coffee grinder, dial tone
50	62	Normal conversation, dishwasher
100	56	Office environment, quiet suburb
200	50	Window air conditioning unit, rainfall
500	42	Library, bird calls, computer, whispering

Figure 1. Decibel Level of Inverter at Varying Distances



⁵⁴ [Study of Acoustic and EMF Levels from Solar Photovoltaic Projects](#). Massachusetts Clean Energy Center. December 2012

⁵⁵ Ibid.

⁵⁶ [Noise Sources and Their Effects](#), Purdue University, Department of Chemistry, February 2000

8. Taxes, Subsidies and Economics

No taxpayer money is being used to develop this Project.

The Project will not benefit from the Washington State Sales Tax Exemption for Solar PV (WAC 458-20-263). As it is currently designed, this Project will also not qualify for the Washington State Production Incentive (RCW 82.16.110).

This Project will benefit from the Federal Investment Tax Credit (ITC). The ITC is a federal policy that incentivizes the deployment of both rooftop and utility-scale solar energy in the United States. The ITC offers a 30% **tax credit** applicable to the income taxes that the system owner would typically have to pay the federal government. A tax credit is a reduction in the amount of federal taxes owed by the project owner and does not reflect any taxpayer contributions.

This Project is estimated to increase average property tax revenues collected in Kittitas County by \$24,000 annually, which amounts to more than \$950,000 supporting the county tax base over the anticipated lifespan of the Project, or 36 years. The table below details anticipated property tax benefits resultant from the solar project improvements in comparison to use of the property for agricultural purposes only.

	Scenario 1: Solar Project⁵⁷	Scenario 2: No Project
	Solar Use	Ag Only
Tax Due per Year	\$3,848.24	\$2,348.24
Life of Project (years)	36	36
Removal Tax	\$19,048.00	\$-
Personal Property Tax from Equipment	\$800,000.00	\$-
Estimated Property Tax Revenues	\$957,584.64	\$84,536.64

Not only do solar projects generate property tax **revenues**, but they also provide consistent additional and diversified income opportunities for landowners.

The National Renewable Energy Laboratory (NREL) proposes that co-location of solar installations and agriculture has the potential to benefit agricultural areas, especially those where continuing agricultural production is a high priority. Specifically, temporarily incorporating solar technologies on existing grazing or agricultural land could provide an additional income stream to land owners and provide diversification of revenue for years when agricultural productivity is low or for crops that are relatively low value, such as hay.⁵⁸ These benefits have already been demonstrated with wind developments on agricultural land and similar benefits have been speculated upon for solar supporting the next generation of farmers.⁵⁹

The economics of utility-scale solar have become increasingly cost-competitive with conventional generation technologies. Its cost of generation, or levelized cost of energy (LCOE), has decreased by 82 percent in the last six years due to the declining cost of system components (e.g., panels, inverters,

⁵⁷ [Personal and Industrial Property Valuation Guidelines 2016. Washington State Department of Revenue. 2016.](#)

⁵⁸ [Overview of Opportunities for Co-Location of Solar Energy Technologies.](#) Macknick, et al. 2013.

⁵⁹ [Why are Californian Farmers Adopting More \(and Larger\) renewable Energy Operations?"](#) Beckman, et al. 2012.

racking systems, etc.), and dramatic improvements in efficiency, among other factors.⁶⁰ For example, the unsubsidized LCOE of utility-scale crystalline solar panels, which will be used for this Project, range from \$58 to \$70 whereas that of coal ranges from \$65 to \$150.⁶¹

9. Jobs and Iron Horse Solar

The renewable energy sector has been responsible for significant job growth across the globe and here in the United States. According to research conducted by the International Renewable Energy Agency in the Renewable Energy and Jobs – Annual Review 2016.⁶² 8.1 million people, worldwide were directly or indirectly employed in renewables in 2015. In the United States alone, renewable energy employment increased by 6% in 2015 with a total number of 769,000 jobs. Growth specifically in the solar sector was nearly 22% in 2015 for a total of 209,000 jobs.

The development of this Project is directly contributing to regional jobs in the Pacific Northwest. The development company, OER is headquartered in Seattle, WA with a development office in Portland, OR where project developers are employed. OER has further utilized several local contractors, consultants and engineers to assist with the development of the Project.

The vast majority of jobs will occur during the installation. It is estimated that approximately 40-60 jobs will be created during the construction phase of this Project and are anticipated to last for 4-6 months. Where feasible, local labor will be hired for the Project installation contingent upon the availability of a qualified labor pool. As further detailed on page 21 in the "Farming Impacts" section of the conditional use permit narrative, the Project will not inhibit traditional rural lifestyles, rural-based economies, and opportunities to both live and work in rural areas as local farming practices will continue and no job opportunities will be lost. Once installed, job opportunities will include vegetative maintenance and solar panel operations, including panel washing.

10. Property Values

The landowner, Mr. Bill Hanson, owns several parcels totaling approximately 500 acres that are being used for agriculture. The Project area will not exceed 47.5 acres, or less than 10% of his property and will not substantially impact the personnel required to operate his farm.

Although limited in number, current studies and real estate valuations concerning solar projects and their potential impacts on adjacent property values have consistently found that:

- a.) Utility-scale solar farms have no negative impact on the market values of surrounding or adjacent properties.
- b.) Comparably sized, utility-scale wind farms have no negative impact on the market values of surrounding or adjacent properties, including those already in Kittitas County.
- c.) Comparable solar technology implemented at the residential scale dramatically improves property values.

Given the fact that solar PV facilities are a relatively new land use, limited peer-reviewed studies exist regarding potential impacts on the values of adjacent and surrounding properties. However, substantial peer-reviewed data does exist on other land uses, including wind generation facilities operating in rural areas. Concerning solar facilities, a recent external obsolescence study conducted in Chatham County, North Carolina of multiple solar farms and the potential impact of solar farms on adjacent property values concluded that "there is no impact in sale price for residential, agricultural or vacant residential land that adjoins existing or proposed solar farms." Further, the study noted that the "matched pair analysis shows no impact in home values due to the adjacency to the solar farm as well as no impact to adjacent vacant,

⁶⁰ [Lazard's Levelized Cost of Energy Analysis – Version 9.0](#). Lazard. 2015.

⁶¹ Ibid.

⁶² [Renewable Energy and Jobs-Annual Review 2016](#). International Renewable Energy Agency. 2016.

residential, or agricultural land.” And, finally, that “adjoining agricultural uses are consistent with a solar farm.” The study concluded that the solar farms would have “no negative impact on the adjoining properties” and were “a compatible and harmonious use with the area.”⁶³

Within the past year, a report was issued by The Massachusetts Department of Energy Resources, Massachusetts Department of Environmental Protection, and the Massachusetts Clean Energy Center stating that “A review of literature nationwide shows little evidence that solar arrays influence nearby property values.”⁶⁴

The United States Department of Energy (DOE) has historically noted that “the concern that property values will be adversely affected by wind energy facilities is commonly put forth by stakeholders.”⁶⁵ To address this concern, previous investigations of utility-scale wind farms have organized stakeholder concerns into three specific categories of potential impacts: scenic vista stigma (property devalued due to view of wind farm), area stigma (property devalued due to general area appears more developed), and nuisance stigma (property devalued due to adverse impacts such as sound or shadows). However, across 50,000 sales of single family homes situated within 10 miles of 67 existing wind facilities in nine different U.S. states, the DOE found that there is no statistical evidence that home values near wind turbines were affected in the post-construction or post-announcement/pre-construction periods.⁶⁶ Further, no significant evidence was found to support the presence of any of three stigmas across 24 wind facilities and 7,500 real estate transactions, which included Benton and Walla Walla Counties.⁶⁷ Specific to Kittitas County, the views of wind turbines were previously projected to not impact property values based on surveyed tax assessors and have not been proven to have had a significant impact since installation.⁶⁸

Further, a series of analyses focused on the impact of wind power projects on residential home values by the United States DOE Berkeley National Laboratory concludes that there is no statistical evidence that home values near wind turbines were affected in the post-construction or post-announcement/pre-construction periods.⁶⁹

Considering the significantly smaller impact of solar farms, in terms of height, noise, and moving parts, it is logical to assume the absence of significant impacts for wind farms on property values will be shared by solar farms.

11. Transportation

During normal operations there will be limited traffic to and from the Project. Seasonal vegetation maintenance and quarterly to yearly maintenance on the solar array components are the most likely reasons for occasional visits.

As discussed in the CUP Application, the Project will generate the greatest volume of traffic during the construction phases when workers are onsite for four to six months during the process of completing site preparation, panel and electrical equipment installation.

All construction traffic will use the designated transporter route, which was selected based on its proximity to the site, existing interstate exit, and the minimization of traffic on state and local roads. Daily

⁶³ [Real Property Appraisal Report, including Matched Pair Analysis](#), Kirkland Appraisals, LLC. 2014.

⁶⁴ [Questions & Answers: Ground Mounted Solar Photovoltaic Systems](#), Massachusetts Department of Energy Resources, Massachusetts Department of Environmental Protection, and the Massachusetts Clean Energy Center. 2015.

⁶⁵ [Wind Energy Facilities and Residential Properties: The effect of proximity and view on sale prices](#). Hoen, et al. 2011.

⁶⁶ [A Spatial Hedonic Analysis of the Effects of Wind Energy Facilities on Surrounding Property Values in the United States](#). LBNL. 2013.

⁶⁷ Ibid.

⁶⁸ [The Economic Impacts of a Proposed Wind Power Plant in Kittitas County, WA](#). Grover. 2013.

⁶⁹ [A Spatial Hedonic Analysis of the Effects of Wind Energy Facilities on Surrounding Property Values in the United States](#). Hoen, et al. 2013.

construction traffic will include grading and excavation equipment, general construction equipment, and other individual vehicles, which is not expected to cause any traffic delays on either highways or local roadways. The SEPA checklist provided in OER's CUP submittal further details any potential traffic impacts.

12. Financial Security and Iron Horse Solar

OER's proposal on financial security is detailed further in the Decommissioning and Site Restoration Plan of the CUP submittal.

"Financial assurance to cover the cost of implementing the Decommissioning and Site Restoration Plan shall be secured to ensure that the decommissioning costs are not borne by the County and/or State at the end of the useful life of the Project. The performance and financial assurance guarantees may be comprised of, but not limited to, one or more of the following: a corporate guarantee; a surety bond; a suitable insurance policy; or an irrevocable letter of credit. With respect to system removal, the Project company will commit that at the expiry of the term of December 31, 2030 of the initial Power Purchase Agreement signed by Puget Sound Energy on December 21, 2015, Project shall have obtained and maintained decommissioning insurance, or otherwise provided adequate financial assurance (which may include a bond that builds in equal increments over a ten year period to reflect the full value of the expected cost of decommissioning by November 2046) for one hundred and twenty-five percent (125%) of the estimated costs of the decommissioning efforts."

Appendix A

WDFW Correspondence

Please see the following page



State of Washington
DEPARTMENT OF FISH AND WILDLIFE
South Central Region • Region 3 • 1701 South 24th Avenue, Yakima, WA 98902-5720
Telephone: (509) 575-2740 • Fax: (509) 575-2474

July 15, 2016

Jeff Watson
Kittitas County Community Development Services, Planner II
411 North Ruby St., Suite 2
Ellensburg, WA 98926

RE: CU-15-00006 Iron Horse Solar Application update to WDFW concerns on the project

Dear Mr. Watson,

This is correspondence as requested by One Energy to be sent to Kittitas County that One Energy and WDFW is proceeding with working together to resolve issues that we raised in our June 6, 2016 letter to the county. We will be coordinating further on the riparian planting plan, vegetation restoration plan and incidental avian monitoring plan. WDFW will review the updated exhibits C and G that One Energy provided to WDFW on July 13 and will plan on submitting comments back to One Energy by the end of next week, July 22, 2016.

Please contact me at (509) 457-9307 or Scott.downes@dfw.wa.gov, if you have any questions or concerns regarding these comments.

Sincerely,

Scott Downes
Area Habitat Biologist

Cc: Brent Renfrow, WDFW
Taylor Steele, One Energy