



PSC Case No. 9483  
PPRP Exhibit\_\_\_ (FSK-3)

**PPRP**

DRAFT

Project Assessment Report for  
Citizens UB Solar

July 12, 2019

**MARYLAND POWER PLANT  
RESEARCH PROGRAM**



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Citizens UB Solar, LLC (Citizens UB Solar or the applicant) submitted a Certificate of Public Convenience and Necessity (CPCN) application to the Maryland Public Service Commission (PSC) for approval to construct an 8.2-megawatt (MW) alternating current (AC) solar polycrystalline photovoltaic (PV) facility in Carroll County, Maryland. As part of the licensing process, the Maryland Department of Natural Resources (DNR) Power Plant Research Program (PPRP), in coordination with other State agencies, evaluated the facility's potential impacts to environmental and cultural resources in Maryland, pursuant to Section 3-304 of the Natural Resources Article of the Annotated Code of Maryland.

This report summarizes PPRP's evaluation of the project in the following sections:

- Section 2 provides a description of the proposed site and facility components;
- Section 3 describes the project's effect on biological resources;
- Section 4 presents socioeconomic resources and associated impacts;
- Section 5 presents the noise impacts from the project;
- Section 6 discusses electromagnetic field impacts;
- Section 7 summarizes the findings of PPRP's evaluations.

Throughout this document, PPRP based the descriptions of the proposed project and its impacts on the Citizens UB Solar CPCN application filed on June 8, 2018 and associated Environmental Review Document (ERD); amended ERD filed on April 12, 2019; direct testimony; and responses to PPRP data requests. PPRP has reviewed the applicant's plans and conducted independent analyses as appropriate.

The analysis of potential impacts serves as the basis for establishing initial recommended license conditions for constructing and operating the proposed facility, pursuant to Section 3-306 of the Natural Resources Article. PPRP develops these recommended conditions in coordination with other programs within DNR as well as the State's Departments of Agriculture, Commerce, Environment, Planning, and Transportation, and the Maryland Energy Administration (reviewing State Agencies). The recommended license conditions are included in PPRP Exhibit \_\_ (FSK-2) for this case. Appendix A includes selected data request responses from Citizens UB Solar that PPRP has referenced in this report.

## 2.0 *PROJECT DESCRIPTION*

### 2.1 *Site Description*

The Citizens UB Solar project is located on South Main Street/Green Valley Road (MD 75) in the Town of Union Bridge and Carroll County, Maryland (see Figure 1). The project will be constructed on a portion of a 195-acre property located on both sides of MD 75. Citizens UB Solar purchased the 195-acre property from the Kilfadda Corporation, which consists of 100 acres in Frederick County, 68.3 acres in Carroll County, and 26.5 acres within the Town of Union Bridge. The project was initially proposed by the applicant to be constructed on a 95-acre portion of the property, but Citizens UB Solar revised the project site to be located on only a 65-acre portion of the 195-acre property (Response to PPRP Data Request No. 6-2).

The 65-acre project site is predominately within an unincorporated area of Carroll County, with a small section located within the Town of Union Bridge. To the west of MD 75, the project will be located on an approximately 61-acre portion of the parcel, directly north of the Kilfadda Farm (Kilfadda parcel). To the east of MD 75, the project will be located on a 3.8-acre portion of the parcel, which is adjacent to the Lehigh Portland Cement Company (Lehigh parcel). The project's limit of disturbance (LOD) will be 34 acres of the 65-acre project site.

The project is bordered to the north by the Potomac Edison Carroll Substation, residences, and farmland. To the south and southwest, the project is bordered by residences and farmland. To the east it is bordered by residences and the Lehigh Portland Cement Plant. The project is bisected by Green Valley Road (MD 75), which becomes South Main Street as it enters the corporate limits of Union Bridge. The portion of the project to the east of Green Valley Road will be connected to the remainder of the project via an underground cable that will be directionally drilled under Green Valley Road (response to PPRP Data Request No. 3-7).

As shown in Figure 2, the project is zoned by Carroll County as Restricted Industrial (shown as light purple), General Industrial (dark purple), and Conservation (green). The small area of the project within the Town of Union Bridge is zoned Industrial Restricted (shown in blue). Solar arrays will only be located on land within Carroll County zoned General Industrial or Restricted Industrial. The limit of disturbance for the project will avoid all areas of the property zoned Conservation. In addition, only the perimeter road and fencing for portions of the project are proposed to

be located within the Town of Union Bridge. Utility-scale solar is a permitted use within the industrial zoned areas of Carroll County.

The project site primarily consists of agricultural fields with a large residence, the Kilfadda Farm, that includes multiple farm buildings located directly south of the project site within the property purchased by Citizens UB Solar. All existing farm structures will be avoided by the project. To the north of the project site are multiple transmission line right-of-ways (ROWs) to the Carroll Substation, which will also be avoided by the project.

The project site is bisected by an abandoned railroad ROW that is now a forested line that separates the agricultural fields. The applicant successfully negotiated a Termination of Easement Agreement between the Central Railroad of Maryland and the Kilfadda Corporation. In addition to the forested railroad ROW, the project site includes forested areas to the west and south of the LOD that include wetlands. Wetland avoidance will be achieved through the use of a 35-foot setback from the drip line of all forested areas surrounding and bisecting the project. The Maryland Department of the Environment (MDE) confirmed that no wetlands extend into the project's defined LOD during field visits on August 2, 2017 and September 20, 2017. The project is not in a Critical Area; however, portions of the perimeter fence and road are located within the 100-year floodplain. The applicant submitted a letter to the Maryland Department of the Environment (MDE) Waterway Construction Division on March 20, 2019 indicating that a hydrologic study was not necessary for the project, since the fence and road installations will not alter the grades of the floodplain. MDE found this to be acceptable and did not require a hydrologic study.

Although the applicant will avoid all forested areas, the project will entail removal of some stand-alone trees. Section 3.2 of this report discusses forest conservation considerations. The Maryland Historical Trust (MHT) has reviewed the project and determined that the project area contains three items of archeological importance and that the National Register-listed Union Bridge Historic District is adjacent to project site. MHT recommended a Phase I archeological investigation in all planned disturbance areas prior to any ground-disturbing activities associated with the installation of the solar facility. It also requested documentation for two on-site historic properties, the Kilfadda Farm and also the site of the former Union Bridge Toll House within the Lehigh parcel. Section 4.5 of this report further discusses cultural resource impacts.

Figure 1 Project Site Location Map



Source: Citizens UB Solar Amended ERD (April 12, 2019) – Figure 3



*Source: Citizens UB Solar Response to PPRP Data Request No. 5-1*

## 2.2

### *Project Components*

As proposed by Citizens UB Solar, the project entails the design, construction, and operation of an 8.2 MW AC solar generating facility. Project components include approximately 24,375 solar PV panels, a racking system, direct current (DC) to AC power inverters, two transformers, control and distribution cabinets, a medium-voltage collection system, and other equipment necessary to interconnect to the PJM Interconnection, LLC (PJM) distribution system.

The proposed PV panels will be secured on a fixed-tilt racking system, which is supported by steel piles inserted into the ground by a pile-driving machine. The PV panels, once installed, will be designed to comply with MDE Stormwater Design Guidance for Solar Panel Installations. The minimum leading-edge height (bottom edge of panels) will be approximately two feet from grade, and the maximum top edge of the panels will be no higher than ten feet from grade. Citizens UB Solar will construct the solar PV panels generally to follow the site topography and on existing grades; however, some site grading may be necessary.

The DC collection system will collect electrical power from the panels and transmit it to a power center. Inverters convert DC power from the panels into three-phase AC power for distribution. The site plan layout shows two power center locations within the facility, each including DC to AC inverters and a transformer (response to PPRP Data Request No. 5-2). The applicant will bury electrical cables 36 to 48 inches below grade in compliance with standard National and International Electrical Code.

Citizens UB Solar will enclose and protect the solar panel arrays with a 6-foot chain link fence. The project's main entrance will be from the south via the existing entrance to the Kilfadda parcel on the west side of South Main Street/Green Valley Road (MD 75) (response to PPRP Data Request No. 5-4). There will also be a second entrance from the west side of MD 75 to the Kilfadda parcel for emergency vehicle access only. A third entrance is planned from the east side of MD 75 to access the Lehigh parcel. All internal service drives will be unpaved grass roads. However, some paving may be required to improve the project entrances in order to stabilize the area for construction traffic to the project site.

The site layout that the applicant provided in response to PPRP Data Request No. 5-1 shows a 75-foot setback along both sides of South Main Street. The setback includes a 50-foot landscape screening buffer, fencing, and perimeter emergency drive. The landscape buffer is proposed by the applicant to only be located where the project is adjacent to South Main

Street. PPRP has concluded that the applicant's proposed landscaping plan is both inadequate for screening the project from adjacent residences and inconsistent with the community's vision emphasizing the preservation of historic characteristics and values. This is further discussed in Section 4.4.

Permanent water and sewer utilities will not be needed for the project as there will be no continuous operations and/or maintenance facilities as part of this project and no full-time personnel located at the site.

The project will not require surface or groundwater for construction or operation; however, groundwater dewatering may be required during construction and is further discussed in Section 2.3. During years of normal precipitation amounts, rain events will act as a cleaning system, keeping manual cleaning to a minimum. If necessary for dust control during construction or semiannual cleaning during operation, bulk water services will be utilized to supply water, as needed.

The electricity produced by the project will be delivered through Potomac Edison into the PJM distribution system via an overhead line tap between the Carroll and Mt. Airy Substations. The interconnection voltage and the collection voltage for the project will both be 34.5 kV AC; therefore, no project substation will be required (response to PPRP Data Request No. 5-7).

## **2.3      *Site Management, Construction and Operation Details***

The following sections describe key elements of the applicant's plans for site development, and identify relevant requirements imposed by State and local regulations.

### **Erosion & Sediment Controls and Stormwater Management**

The project will add impervious surfaces such as paving at the entrances to the project site, the two inverter pads, posts for the solar panels and fencing, and associated improvements. The applicant estimates that total impervious surface added will be less than one acre.

The State of Maryland has comprehensive programs for stormwater management, and erosion and sediment control, to reduce adverse impacts of development of stormwater runoff. These requirements address both the temporary and the permanent impacts associated with development activities. Citizens UB Solar must comply with COMAR 26.17.01 and COMAR 26.17.02, which applies to the preparation, submittal, review, approval, and enforcement of erosion, sediment and

stormwater control plans, including any dewatering plans and associated water recycling plans. COMAR 26.08.01 through 26.08.04 also regulate discharges to waters of the State and maintenance of surface water quality. The required permits and plans relevant to these actions are addressed in the reviewing State Agencies' Recommended License Conditions:

- Pollutant Discharge Elimination System (NPDES) General Permit: All projects that will ultimately disturb one acre or more must obtain a General or Individual Permit for Stormwater Associated with Construction Activity before beginning earth disturbance on the first part of the project. The permit is necessary to protect water quality and to meet federal and State requirements under Code of Federal Regulations 40 CFR 122.26 and 40 CFR 450, as well as Code of Maryland Regulations COMAR 26.08.04.09A. MDE has put in place a new electronic system for entities to submit Notices of Intent (NOIs) to MDE, track the status of NOIs and permits, and perform actions like transferring and terminating permits. The completed NOI form is considered a formal application for coverage and intent to comply with the terms of the General Permit.

Applicants for the General Permit include information on their NOIs listing the stormwater Best Management Practices (BMPs) they expect to use at the time of application. The General Permit requires that permittees obtain approval (from the appropriate approval authority, in this case both the Town of Union Bridge and Carroll County) for the Stormwater Management Plan prior to beginning earth disturbance, unless exempt or waived by the approval authority.

- Soil Erosion and Sediment Control (ESC): An approved ESC plan is required to manage stormwater during construction, if the project involves earth disturbances of 5,000 square feet or more and 100 cubic yards or more. The Planning & Zoning Commissions for both Carroll County and the Town of Union Bridge will conduct a joint review and approval of these plans. COMAR 26.17.02 requires that stormwater quality and quantity controls be implemented. Guidelines for water quality and quantity control through environmental site design (ESD) techniques and best management practices (BMPs) are specified in the 2000 Maryland Stormwater Design Manual, Volumes I and II (2000) with Supplement No. 1. Citizens UB Solar must also employ erosion and sediment control BMPs as specified in MDE's 2011 Maryland Standards and Specifications for Soil Erosion and Sediment

Control. All portions of the project site disturbed during construction shall be stabilized as soon as practicable after the cessation of construction activities within that portion of the site, followed by seed application. Citizens UB Solar must maintain the site controls during construction and keep a record of daily inspections to the controls.

- Grading Permit: Carroll County and the Town of Union Bridge may require the applicant to obtain a grading permit prior to construction, depending on the amount of grading specified in the applicant's ESC Plan. As required by Carroll County and the Town of Union Bridge, the grading permit application package will provide the detailed engineering and specifications required to implement the approved site plan. The applicant will apply for a grading permit, if required, after the construction drawing approval.
- Building Permits: The applicant is required to work in close coordination with Carroll County and the Town of Union Bridge to file the appropriate and necessary building permits as required by Carroll County and the Town of Union Bridge. The applicant will apply for a building permit after Carroll County and the Town of Union Bridge review and approve the site plan.

### **Water and Sewer**

Permanent water and sewer utilities will not be needed for the project as there will be no continuous operations and/or maintenance facilities as part of the project.

Per the applicant's response to PPRP Data Request No. 5-8, it is anticipated that some groundwater dewatering will be required during construction of panels and underground utilities at lower elevations near the farm house, wetlands, and 100-year floodplain. However, the applicant does not anticipate being able to quantify its construction dewatering requirements until the preliminary site plan has been approved by Carroll County and the Town of Union Bridge.

COMAR 26.17.06.03 requires all individuals or entities to obtain a permit from MDE before appropriating or using waters of the State except for temporary dewatering during construction that lasts for less than 30 calendar days and does not exceed an average of 10,000 gallons per day (COMAR 26.17.06.03B(3)). If these allowances are anticipated to be exceeded, the applicant will be required to complete the necessary documentation to obtain a Permit to Appropriate and Use Waters of the State. The withdrawal of groundwater for dewatering purposes that does

not meet the COMAR exemption requires a new appropriation be issued by the Maryland PSC through the CPCN process. Therefore, any such future appropriation request by the applicant or a successor shall trigger a modification to the CPCN pursuant to COMAR 20.79.03.02.B(3) and is addressed in the reviewing State Agencies' Construction Dewatering Recommended License Condition.

### **Air Emissions**

Because it is a non-combustion process relying on the direct conversion of solar energy into electrical energy, the operation of a solar PV facility does not produce air emissions. This differs significantly from conventional fossil-fired electric power plants. Electricity generated by solar PV facilities represents a way of meeting the region's demand for electric power without emitting combustion-related air pollutants.

The only sources of air emissions from the project will be those associated with construction activities, including site clearing, grading, and the use of construction equipment, which will be for a temporary period.

As specified in the Applicable Laws and Regulations Recommended License Condition, Citizens UB Solar must comply with the following State regulations intended to minimize air quality impacts during construction activities:

- COMAR 26.11.06.03D — Particulate Matter from Materials Handling and Construction – A person may not cause or permit any material to be handled, transported, or stored, or a building, its appurtenances, or a road to be used, constructed, altered, repaired, or demolished without taking reasonable precautions to prevent particulate matter from becoming airborne.
- COMAR 26.11.06.08 — Nuisance – An installation or premises may not be operated or maintained in such a manner that it creates a nuisance or air pollution. Nothing in this regulation relating to the control of emissions may in any manner be construed as authorizing or permitting the creation of, or maintenance of, a nuisance or air pollution.
- COMAR 26.11.06.09 — Odors – A person may not cause or permit the discharge into the atmosphere of gases, vapors, or odors beyond the property line in such a manner that a nuisance or air pollution is created.

## **Local Permits**

Citizens UB Solar must obtain approval of its site plan from Carroll County and the Town of Union Bridge, demonstrating substantial conformity with local regulatory codes that address site planning, forest conservation, floodplain management, sediment and erosion control, and stormwater management. The applicant is also required to work in close coordination with Carroll County and the Town of Union Bridge to secure the appropriate and necessary building permits.

## **2.4      *Decommissioning***

In general, the developers of solar PV facilities design their projects for a finite operating life span. Typical land leases for solar projects include lease terms extending between 20 and 30 years. At the end of the project's operating life, the facility's owner must be prepared to dismantle it and remove all components. Whenever solar projects are constructed on agricultural land, the reviewing State Agencies recommend that the PSC require the development of robust decommissioning plans to ensure that future landowners can use the parcels for agricultural or other useful purposes.

Reviewing State Agencies' Solar Decommissioning Recommended License Condition requires the applicant to provide PPRP and the PSC with a facility Decommissioning Plan for review that outlines the responsible party(ies), timeframes, and estimated costs for decommissioning, dismantling, and legal disposal of all components, including cables, wires, and foundations below and above ground. The plan must also address site conditions after decommissioning, including stabilization, grading and seeding all disturbed areas and evenly distributing topsoil if stockpiled onsite. The Condition also requires that the decommissioning plan maximize the extent of component recycling and reuse, where practicable, and ensure all materials are handled in accordance with applicable federal, State, county, and local requirements. The applicant may not begin construction of the Project until it has addressed all comments from the PSC, its Staff, and PPRP; the PSC has approved the plan; and all specified financial guaranties are in place.

To ensure that decommissioning costs are not borne by the State or County at the end of the useful life of the Project or in the event of abandonment of the Project, the applicant must also secure funding mechanisms to cover the cost of implementing the Decommissioning Plan. The State will consider the Project to be abandoned if there is no output from the Project to the grid for a period of twelve (12) consecutive months. The financial instrument may be in the form of a surety bond, a letter of

credit issued by a financial institution, or other alternative arrangement and must be in place prior to the commencement of construction of the Project.

The applicant must also provide an estimate of decommissioning costs by a third-party consultant to determine the amount of the decommissioning surety bond, letter of credit, or other alternative arrangement. The cost estimate must address provisions for the safe removal and proper disposal of all components of the Project, including any components containing hazardous or toxic materials. Every five years, over the life of the Project, the applicant is required to prepare an updated estimate of decommissioning costs to adjust for inflation, or any other necessary changes. Based on this estimate, the financial guarantee mechanism will be adjusted to cover the revised estimate of decommissioning. As part of this recommended condition, the applicant's decommissioning cost estimate, including the five-year updated estimates, would be subject to review and approval as part of the overall decommissioning plan.

Based on PPRP's research, the recycling and salvage industry for solar panels is not mature enough to handle large scale processing or for prices to be reliable. Thus, salvage value should not be included in the initial cost estimate. However, by requiring that updated cost estimates be prepared every five years, the reviewing State Agencies' recommended license condition would allow Citizens UB Solar or its successors to request that salvage value be considered in the future as market conditions change, as long as the applicant provides reliable documentation showing that the cost estimate is defensible.



The following sections provide a review of the potential environmental effects of the proposed Citizens UB Solar project on biological resources, including vegetation; wildlife; rare, threatened and endangered (RTE) species; and wetlands and streams. Also included is an assessment of the biological impacts that may be caused by the interconnection to the Potomac Edison transmission system. Information on these resources was derived from the project proponent's environmental review document and subsequent data request responses; from publicly available environmental information; from Maryland DNR documents, web pages, and agency communications; and from a site visit by PPRP staff and consultants on July 31, 2018.

**3.1*****Vegetation***

The project site consists of 64.7 acres of mostly rolling agricultural fields (Response to PPRP Data Request No. 6-2). The majority of the area is planted annually with conventional crops under a rigorous planting schedule that includes a cover crop, a full season crop, and/or a late season crop. Typical crops are wheat, rye, oats, alfalfa, corn, and soybeans. Most of the site was planted with 5-6' tall corn during the site visit on July 31, 2018.

The soils report provided as Appendix 4 to the ERD indicates that 89.1% of the site is classified as prime farmland<sup>1</sup>. If uncultivated, this portion of the site could support a wide variety of vegetation cover types and productive ecosystems.

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<sup>1</sup> Prime farmland is "land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is also available for these uses. It has the soil quality, growing season, and moisture supply needed to produce economically sustained high yields of crops when treated and managed according to acceptable farming methods, including water management. In general, prime farmlands have an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt and sodium content, and few or no rocks. They are permeable to water and air. Prime farmlands are not excessively erodible or saturated with water for a long period of time, and they either do not flood frequently or are protected from flooding. [SSM, USDA Handbook No. 18, October 1993]" Extracted from [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/nra/nri/?&cid=nrcs143\\_014052](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/nra/nri/?&cid=nrcs143_014052) on 11/1/16.

There are several small, segregated wooded areas on the property boundaries, and a narrow, wooded area surrounding the abandoned railroad right-of-way. The revised Forest Stand Delineation Report provided in response to PPRP Data Request 5-12 identifies an approximately 9.5 acre stand of uneven age and density, dominated by Maple and Oak species, with four specimen trees on site. The applicant proposes a 35' buffer around the drip line of the trees in the wooded areas of the project site. The applicant's ERD indicates the removal of "few stand-alone and isolated trees" but does not propose direct disturbance to the forests, wetlands, streams, or their buffers. The most recent site plans appear to show access roads encroaching into the forests and their buffers, but the applicant indicated that these locations are approximate, and that field surveys of driplines and appropriate setbacks will be done during the local site plan process (Response to PPRP Data Request No. 5-11).

Construction of the solar panels would restrict the types of vegetation that could be allowed to grow on the site. Citizens UB Solar expects that, as designed, the elevated solar panel system will permit permanent vegetation to grow under the panels so that the fields will become largely vegetated. The project includes planting and maintaining the entire site during the operational lifetime of the project in a low-height cover grass in accordance with plans as approved by local agencies. Per the applicant's ERD, it has agreed to coordinate pollinator planting design with local groups to promote Monarch Butterflies.

During construction, as part of its Sediment and Erosion Control and Stormwater Management Plans, the applicant will develop a stormwater pollution prevention plan, implement BMPs, and reseed disturbed areas. Citizens UB Solar proposes to use low maintenance native seed mix that provides low growth for the vegetation beneath and around the arrays when possible, with the objective of controlling erosion and promoting stormwater infiltration under and between the panels. PPRP notes that achieving effective stormwater infiltration will be dependent on avoiding soil compaction during construction, or re-loosening compacted areas before planting the cover grass (see further discussion in Section 3.5).

In PPRP's view, the most beneficial ecological result is achieved when vegetation is not mowed at any time to a height less than 10 inches and mowing is restricted during the nesting season of ground nesting birds (May through August). Grass heights lower than 8 inches discourage nesting by desirable birds (WHS 2017), and may also damage or kill warm season grasses (KYDFWR 2017). A self-sustaining, low-growing vegetation community that requires little if any mowing and provides wildlife and pollinator habitat can be achieved using a native seed mix and an integrated vegetation management (IVM) approach. This

approach is incorporated in the Vegetation Management Plan Recommended License Condition.

The project parcel contains several Potomac Edison transmission line rights-of-way. The applicant has indicated that they will be the responsible party for maintenance of these rights-of-way, and that these areas will remain in agricultural use (Response to PPRP Data Requests Nos. 1-10 and 4-1). The undeveloped areas both in the existing rights-of-way and outside the project fence line are candidate areas for pollinator habitat or reforestation if agricultural activities cease in the future.

The physical presence of the solar panels may change the heat and moisture balances in the fields and affect on-site and nearby vegetation. This effect is discussed further in Section 3.6.

### 3.2 *Forest Conservation*

In 2013, the General Assembly established that it is the policy of the State to achieve no net loss of forest, meaning that 40% of all public and private land in Maryland is covered by tree canopy<sup>2</sup>. One element of this policy is the Maryland Forest Conservation Act (FCA; Natural Resources Article 5-1601 through 5-1613), which establishes standards for land development that make the identification and protection of forests and other sensitive areas an integral part of the site planning process. FCA provides a set of *minimum* standards that developers must follow when designing a new project.

The FCA applies two tests to establish the amount of forest cover that a project must establish, replant, or retain to contribute to the statewide no net loss goal. In the first test, the FCA established a minimum forest cover percentage for each land use type, called the Afforestation Threshold. Post construction, the developer must meet the Afforestation Threshold even if no trees are cut or removed. In the second test, the FCA requires the developer to restore any existing trees/forest that it removes on the development site or another acceptable location. The FCA applies two restoration ratios: a ¼:1 replacement ratio for clearing above the Conservation Threshold, and a stronger 2:1 replacement for losses below the Forest Conservation Threshold.

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<sup>2</sup> p. 14, Forest Conservation Act and Other Forestry Programs in Maryland. Department Of Legislative Services, Office of Policy Analysis, Maryland General Assembly, November 2017. <http://dls.maryland.gov/pubs/prod/NatRes/Forest-Conservation-Act-and-Other-Forestry-Programs-in-Maryland.pdf>

Depending on the land use type, zoning, and initial forest cover of a project site, some projects will contribute more than the no net loss 40% cover percentage and some less. The state achieves the overall statewide goal of 40% forest cover using both afforestation and replacement rules across many projects; the "no-net-loss" policy cannot be applied on an individual project basis.<sup>3</sup>

In general, County and municipal governments are responsible for making sure that Forest Conservation standards are met through local ordinances, but may choose to implement more stringent criteria than required by the FCA. In CPCN cases, however, Section 5-1603(f) of the Natural Resources Article directs the PSC to make an appropriate determination about afforestation and reforestation under the provisions of the State FCA:

After December 31, 1992, the Public Service Commission shall give due consideration to the need to minimize the loss of forest and the provisions for afforestation and reforestation set forth in this subtitle together with all applicable electrical safety codes, when reviewing applications for a certificate of public convenience and necessity issued pursuant to § 7-204, § 7-205, § 7-207, or § 7-208 of the Public Utilities Article.

Through this process, appropriate weight can be given to state forest conservation policy and regulations, local jurisdictional preferences, and the specialized nature of electrical power facilities in determining the developer's FCA obligations.

The applicant has indicated they will request an exemption from Carroll County from the Forest Conservation Act. No additional information regarding the County implementation of the FCA has been provided as of June 2019. The reviewing State Agencies recommend that the applicant provide afforestation in compliance with Carroll County's Forest Conservation Ordinance (Forest Conservation Recommended License Condition).

The State FCA includes a preferred mitigation sequence that emphasizes on-site afforestation and reforestation. The highest priority areas for afforestation or reforestation are: establishing or enhancing buffers

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<sup>3</sup> The applicant's ERD, page 13, errs in stating that there is a "statutory exemption" in the Forest Conservation Act for facilities that satisfy a "no net loss" criterion. The term "no net loss" does not appear in the FCA (NRA 5-1601 through 5-1613) and, as explained above, this statewide policy goal does not apply to individual parcels or projects.

adjacent to intermittent and perennial streams, establishing or increasing forest corridors, and establishing or enhancing forest buffers adjacent to critical habitats or on 100-year floodplains (NRA 5-1607(d)). PPRP's evaluation has not identified any unusual burden that meeting these requirements would place on the applicant, nor any peculiarity of the facility compared to other solar facilities that would prohibit meeting the requirements.

### 3.3 *Wildlife*

The proposed project site currently offers little wildlife habitat. The farmed lands are intensively managed, limiting nesting by birds or occupancy by other wildlife. Common species of insects, amphibians, reptiles, birds, and mammals that are compatible with agricultural environments may be present, but overall biodiversity is limited. The surrounding forest and wetland areas are likely to support more wildlife than the agricultural fields inside the project fence line.

While there is agreement that covering the land with structures, breaking up open areas with fencing, changing vegetation types, and disturbing soils will have an impact on wildlife, there is limited research available on these impacts, particularly with respect to utility scale conversion of farmland (Turney and Fthenakis, 2011). Harrison, et al. (2016) found "No peer reviewed experimental scientific evidence exists relating solely to the ecological impacts of solar PV developments." Therefore, without a site-specific study of the wildlife and ecosystem before conversion, it is not possible to quantify the likely impacts or determine whether they will be beneficial or detrimental.

There will be changes in open space, forage availability, water retention, and runoff as a result of construction. At a minimum, wildlife usage that is displaced to nearby agricultural fields will increase competition for those resources. Terrestrial species that use the open space for travel will be hindered by the border fences. Aquatic and amphibious species that use the stream and wetland habitat adjacent to the site will not be directly affected, but construction noise, runoff, fugitive dust, and changes in hydrology could have detrimental impacts on these species. However, given the relatively small footprint of the project, it is unlikely that conversion of the farmland to a solar facility will affect the species present.

The applicant's ERD indicates that the project is not anticipated to have significant effects on any wildlife or wildlife habitat. The most suitable habitat for wildlife on the project site is in the forested areas that are not to be disturbed. The forest stands on the project site are described in Appendix 3 of the applicant's ERD as fair quality, providing some food

sources and canopy cover for wildlife. PPRP encourages the installation of bat boxes in the forested area surrounding the abandoned railroad right-of-way to provide additional wildlife habitat at little cost to the project.

In its ERD, the applicant states it will plant and maintain the site in low cover grasses, and also proposes, pursuant to recommendations from the reviewing State Agencies, to incorporate wildflower seed mixes to promote pollinator habitat. PPRP recognizes that this proposed development approach provides benefits to wildlife, with little cost to the project. In its ERD, the applicant also notes that it may coordinate with local groups on initiatives to promote Monarch Butterflies. Following the installation of the solar panel arrays, the applicant may plant areas below and between the solar panels with native, warm season grasses and low-growing pollinator-friendly plant species, to encourage ground-nesting birds and pollinators. Suitable pollinator habitats consist of native herbaceous plants that attract a variety of pollinator species (e.g., Bee Balm, Butterfly Milkweed, Black-eyed Susan, Joe-Pye Weed). Although warm season grasses may take longer to establish, they offer a number of ecological benefits including strong root systems that hold soil in place and act as a filter of stormwater runoff by removing sediment. They remain standing throughout the winter, thereby providing cover for wildlife. The reviewing State Agencies' Pollinator Habitat Recommended License Condition requires the development of a Pollinator Habitat Plan.

Maintaining a minimum vegetation height of 10 inches and eliminating mowing during the nesting season of ground-nesting birds (from the beginning of May through August of each year) will attract and support wildlife communities. Grass heights lower than 8 inches discourage nesting by desirable birds (WHS, 2017), and may also damage or kill warm season grasses (KYDFWR, 2017). These grass heights are generally achievable on all parts of a solar facility (including under the solar panels, which do not come closer to the ground than 24 inches at the lower edge) using commercially available mowing equipment. In addition, PPRP encourages Citizens UB Solar to adopt the pollinator friendly criteria established in Senate Bill 1158, passed in Maryland's 2017 legislative session, and pursue future designation by DNR as a "pollinator friendly" solar facility.

### **3.4 *Rare, Threatened, and Endangered (RTE) Species***

In response to a letter requesting environmental review of the proposed project, the Maryland Department of Natural Resources, Wildlife and Heritage Service (WHS) indicated in a June 27, 2017 letter (provided as Appendix 11 of the ERD) that there are no State or Federal records for

rare, threatened, or endangered species within the delineated project area. The U.S. Fish and Wildlife Service's Environmental Conservation Online System reports that there are three RTE species known or believed to occur in Carroll County (Indiana bat, northern long-eared bat, and bog turtle).

In general, agricultural fields do not provide habitat for RTE species, but adjacent forested areas and stream corridors may provide such habitat. PPRP concludes that it is unlikely that any RTE species are present on the site. However, in order to assure protection of RTE species on the site, the reviewing State Agencies are recommending a license condition that requires the applicant to notify and consult with WHS to institute appropriate avoidance and/or minimization measures (e.g., fencing or flagging, the presence of an environmental monitor, or appropriate time of year restrictions) if any RTE species are encountered during planning, construction, operation, or maintenance of the facility (RTE Species Recommended License Condition).

### 3.5 *Wetlands and Streams*

The project site drains to Little Pipe Creek and Sams Creek within the Monocacy River Watershed. Receiving waters in the vicinity of the site are designated as USE IV-P - Recreational Trout Waters and Public Water Supply. This class designation includes waters that are public water supply and are capable of holding or supporting adult trout for put-and-take fishing. In-stream construction is prohibited in Use IV-P waters from March 1 – May 31.

The Preliminary Waters of the U.S. Determination Report provided as Appendix 7 to the applicant's ERD, indicated that there were no jurisdictional wetlands within the project Limits of Disturbance. MDE confirmed these findings during field visits on August 2, 2017 and September 20, 2017. There are wetlands just outside the project Limits of Disturbance. Maryland DNR data shows a small Palustrine Forested Wetland, and the U.S. Fish and Wildlife Service National Wetlands Inventory data shows a freshwater pond (associated with the Town of Union Bridge wastewater treatment plant) to the northwest of the project.<sup>4</sup> The project is not expected to have impacts on these areas.

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<sup>4</sup> Maryland iMAP Hydrology service. MD Wetlands Map Server; Accessed Sept. 2018.  
[https://geodata.md.gov/imap/rest/services/Hydrology/MD\\_Wetlands/MapServer](https://geodata.md.gov/imap/rest/services/Hydrology/MD_Wetlands/MapServer)

The topography of the project site is rolling agricultural fields with slopes ranging from 0% to 15%. While the applicant's ERD states that slopes are generally in the 0-8% range, PPRP's analysis<sup>5</sup> revealed some proposed solar arrays on areas with slopes in the 10-15% range, and very few arrays on areas with slopes exceeding 15%. Development in these areas will require stormwater best management practices appropriate for steep slopes. The applicant indicates that permanent erosion matting, or level spreaders will be included in the stormwater management design of non-rooftop disconnection BMPs on areas with 5-10% slopes. The applicant's response to PPRP Data Request No. 1-8 indicated that stormwater management for slopes exceeding 10% would be addressed as part of the stormwater management report and concept design to be reviewed with Carroll County.

The applicant indicated that less than one acre of impervious area will be developed for entrance improvements, equipment pads, inverters and racking posts. However, deliveries and construction activities inside the fence are likely to compact the soil and reduce the ability of the site to infiltrate water. Although the site will not be mass graded, even light vehicle traffic has been shown to diminish the hydrologic function of soil (Gregory 2006, Millward 2011, Haynes 2013). Once construction is complete, the fields will no longer receive the frequent tilling and husbandry associated with active agriculture, and any compaction resulting from construction will persist. Guidance on identifying, avoiding, and managing soil compaction is widely available.<sup>6</sup> Recent work (Schwartz and Smith, 2016; SHA 2016; Haynes, et al. 2013) shows that soil decompaction and amendment can be highly effective at improving stormwater infiltration and providing deeper, longer water storage after compaction from construction activities. In compacted areas (e.g. graded areas, staging areas, or heavily trafficked areas), especially those used for non-rooftop disconnection crediting, the reviewing State Agencies recommend that ripping (to a depth of 12") and compost amendment be performed to ensure the proper post-construction runoff characteristics (Soil Compaction Management Recommended License Condition).

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<sup>5</sup> Maryland iMAP LIDAR data service. Carroll County Slope dataset; accessed Sept. 2018.  
[https://lidar.geodata.md.gov/imap/rest/services/Caroline/MD\\_caroline\\_slope\\_m/ImageServer](https://lidar.geodata.md.gov/imap/rest/services/Caroline/MD_caroline_slope_m/ImageServer)

<sup>6</sup> See:  
[https://www.nrcs.usda.gov/Internet/FSE\\_DOCUMENTS/nrcs142p2\\_053258.pdf](https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_053258.pdf),  
[https://www.ars.usda.gov/ARSUserFiles/60100500/csr/researchpubs/raper/raper\\_06\\_d.pdf](https://www.ars.usda.gov/ARSUserFiles/60100500/csr/researchpubs/raper/raper_06_d.pdf),  
<https://extension.psu.edu/avoiding-soil-compaction>



To avoid impacts to aquatic resources resulting from construction-related siltation and sedimentation, an approved Erosion and Sediment Control Plan that contains appropriate stormwater quality and quantity control measures will be required. The applicant is required to obtain an NPDES general permit for construction activities over one acre. The applicant's ERD does not explicitly address the sediment and erosion impacts to stormwater during construction. The reviewing State Agencies recommend the use of standard Best Management Practices (BMPs)<sup>7</sup> to accommodate a majority of the control requirements during construction. In accord with NPDES permit requirements, the applicant must maintain site controls during construction and keep a record of daily inspections to the controls for the MDE inspector to review upon site visits. In addition, the reviewing State Agencies are recommending that the stream be protected from unintended releases of contaminants from the transformers (Spill Control Recommended License Condition). This specifically includes a licensing condition requiring that a Spill Prevention, Control and Countermeasure (SPCC) Plan be developed and implemented to minimize the potential for unintended releases of hazardous chemicals during project construction and operation.

The overall Environmental Site Design will comply with the Maryland Stormwater Design Manual, Volumes I and II (2000) and with Supplement No. 1 (MSD, page 25). The applicant indicates that, post-development, vegetation will grow beneath the elevated solar panels and essentially the entire field will mimic a forested site. While PPRP agrees that the water quality leaving the site may be improved compared to that resulting from the current agricultural use of the site, it is likely that the area will perform more like a grassland or meadow than a forest. Thus, there will be slower runoff and less surface evaporation than with an agricultural field, but not the deeper, longer water storage associated with tree root systems.

The net effect on ground water resources from removing these parcels from cultivation, installing panels, and planting a permanent vegetation cover cannot be assessed definitively with the information available. Therefore, the reviewing State Agencies are recommending a license condition that grading and associated stormwater controls shall be designed to minimize hydrological changes to off-site streams and wetlands (Grading and Stormwater Management Recommended License Condition). In its ERD, the applicant states that stabilizing the project site with permanent vegetative cover will improve downstream water quality. With proper construction techniques, stormwater management, and

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<sup>7</sup> Maryland Department of the Environment (MDE), 2011 *Maryland Standards and Specifications for Soil Erosion and Sediment Control*

adherence to licensing conditions, PPRP agrees that this project can improve, or at least maintain, water quality in the surrounding wetlands and streams.

### 3.6 *Cumulative and Outside the Fence Effects*

In addition to local impacts on individual resources, there are potential effects outside of the limits of disturbance resulting from the reduction of open space and the displacement of wildlife (Section 3.3), and discharges to streams or changes in hydrology from development affecting offsite and downstream water quality (Section 3.5).

Solar facilities do not generally affect farmland unless construction requires grading, topsoil removal, soil compaction, or changes in hydrology. Most other impacts are reversible if the solar panels are removed at a future date. With suitable planning to avoid permanent disturbance to soils, the agricultural productivity can be maintained and productive use as farmland resumed later (NCTECH 2017). In some cases, where enhanced wildlife or pollinator habitat is not desired or practicable, grazing (e.g. by sheep) can reduce mowing requirements and maintain the land as a productive farm element (NCTECH 2017).

The physical characteristics of the solar panels themselves may have environmental effects. Solar panels change the absorption, reflection, conversion, and emission of solar energy by the land surface compared to either bare ground or crops. The "land surface energy balance" that results from these factors depends on the topography and soil moisture of the land surface, as well as the vegetation or materials that cover it. Solar facilities convert approximately 15% of the incoming solar radiation to usable form (electricity) while vegetation only uses about 2% for photosynthesis. On the other hand, solar facilities must re-radiate excess heat directly to the air while vegetation uses the excess energy to move and evaporate soil water into the atmosphere (evapotranspiration). These differences can be quantified by measuring the components of the energy flows.

Land surface energy balance, and the resulting fluxes of heat and water, are well studied for vegetated areas (Sellers, et al., 1995), but less effort has been devoted to measuring the fluxes at solar facilities. Fthenakis and Yu (2013) reported observations of wind, temperature, solar irradiance, relative humidity, and rainfall in and near a solar facility. They found that annual average temperatures above the solar panels were slightly higher than areas without solar panels (1.9 deg. C), with above-ambient temperatures occurring during the day and below-ambient temperatures at night. This heat effect dissipated rapidly in the vertical direction

(within 5 to 20 meters) and rolled off a little more gradually in the horizontal direction (within 300 m). The authors indicated that these differences were insufficient to cause adverse micro-climate changes.

Another study found that the surface below photovoltaic panels remained cooler during the day and warmer at night than exposed surfaces (Dominguez, et al. 2011). Such differences could reduce soil water evaporation and enhance growing conditions for grasses below the panels, depending on the panel configuration. A National Renewable Energy Laboratory study (NREL 2017) found that vegetation growth below sun-tracking panels was different on the east and west sides of the panels. This was attributed to consistent time-of-day differences in shading and precipitation runoff: clouds and rain events occurred primarily in the afternoon in their test area, while mornings were predominantly sunny and dry. In a fixed panel configuration, like the proposed Citizens UB Solar facility, precipitation runoff would always occur at the lower panel edge and shading would be constant below the panels. This would lead to permanent vegetation growth differences between the two areas.

PPRP concludes that the available studies indicate that solar panels have measurable physical effects on environmental conditions, but that these effects are generally small and local in nature.

### **3.7**      *Generator Interconnection*

The project is adjacent to the Carroll Substation. The physical interconnection will consist of an overhead tap line on the existing Carroll Mt. Airy 34.5 kV circuit. The applicant did not indicate any tree clearing or wetland impacts from the construction of the generator interconnection. Potential issues arising from construction of the interconnection related to spill control, impervious area runoff, and vegetation management were addressed in previous sections of this report.

*Economic and Fiscal Impacts*

The project will install approximately 24,375 PV modules. Construction will occur over a 5 to 7-month period, creating between 40-60 jobs during the peak construction period. Most construction activities will not require highly specialized skills. As a result, many construction jobs will be sourced from the local labor pool if area subcontractors competitively bid for the work. This will have a positive effect on the local economy from construction worker payrolls and subsequent consumption expenditures, local purchases of common construction materials, tax revenues, and associated multiplier effects. Not all benefits will accrue to Maryland since specialized components, particularly PV panels, are manufactured elsewhere and must be imported into the State.

With no permanent operations and maintenance (O&M) workforce and most of the construction workforce within daily commuting distance, the project will have a minimal effect on population and housing, or population-related public service provision. With public service levels largely unaffected, the net benefit of project construction will be positive.

The Town of Union Bridge, Carroll County, the State and surrounding jurisdictions will experience fiscal benefits from taxes on construction worker wages, consumption expenditures, supplier sales receipts and property. The corporate income tax rate on Maryland taxable income is 8.25 percent rate. Maryland's sales and use tax rate is 6 percent. Personal income tax rates in Maryland range from two to 5.75 percent, and the County's piggyback rate is 3.0 percent.<sup>8</sup> Property tax revenues will accrue to the extent that the project increases the value of real property. Real property is taxed at a rate of \$1.018 per \$100 valuation in Carroll County.<sup>9</sup>

The facility, itself, will be classified as a non-utility generator (Kittel 2014). The project will therefore be subject to personal property/utility tax, calculated in accordance to §7-237 of the Maryland Tax-Property Article. In addition to the 50 percent assessment exemption, the State Department of Assessments and Taxation (SDAT) currently assumes a 30-year life for long lived electric generation machinery and equipment, which is

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<sup>8</sup>[http://taxes.marylandtaxes.com/Individual\\_Taxes/Individual\\_Tax\\_Types/Income\\_Tax/Tax\\_Information/Tax\\_Rates/Local\\_and\\_County\\_Tax\\_Rates.shtml](http://taxes.marylandtaxes.com/Individual_Taxes/Individual_Tax_Types/Income_Tax/Tax_Information/Tax_Rates/Local_and_County_Tax_Rates.shtml)

<sup>9</sup>[http://dat.maryland.gov/Documents/statistics/Taxrate\\_July2017.pdf](http://dat.maryland.gov/Documents/statistics/Taxrate_July2017.pdf)

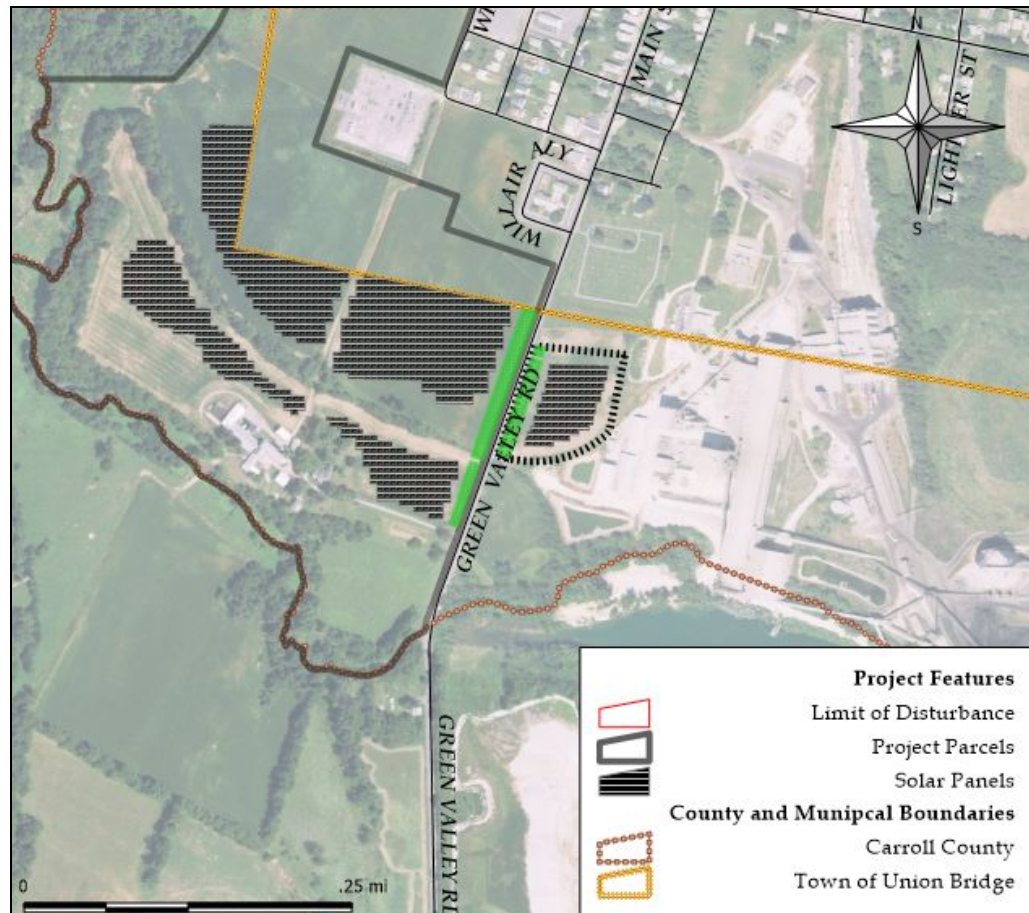
depreciated at 3.3 percent per year to a floor of 25 percent. For solar facilities, machinery and equipment used directly to generate electricity for resale includes PV panels, supports and mounting equipment, electrical materials and inverters.

Of the 65 acres comprising the project, nearly all are located in an unincorporated area of Carroll County. (The sole exception, is a portion of the project's perimeter road, which lies inside the Town of Union Bridge.) The County assesses a tax rate of \$2.515 per \$100 valuation to utility personal property. On that basis, PPRP has estimated business personal property taxes from the project to the county could approach \$95,000 in the first full year of operation, declining to about \$37,000 in Year 30, depending on the final design and equipment specification.

## 4.2 *Land Use*

As noted above, the project is located in an unincorporated part of Carroll County. Approximately 60.8 acres of the project site lie west of Green Valley Road (Kilfadda parcel). A 3.85-acre parcel lies east of Green Valley Road (Lehigh parcel) (Figure 3). The Kilfadda parcel is an active, conventional farm with a farmhouse and several outbuildings. The farmhouse will continue to be occupied. The project will use an overhead tap to connect to an existing Potomac Edison distribution line that bisects the parcel.

**Figure 3**      **Project Location**



In general, land to the northeast of the project has been developed, much of it in the 1800s. Land uses include residential, commercial, and municipal buildings. The Union Bridge Quarry and Cement Plant, owned by Lehigh Portland Cement Company, is located east of the Kilfadda parcel across Green Valley Road (MD 75). Green Valley Road becomes South Main Street as it enters the corporate limits of Union Bridge. In general, land to the west of the project is less developed. According to Maryland Department of Planning (MDP) 2010 Land Cover Land Use data, agriculture is the predominant use, with small patches of forested land and low or very low-density residential areas.

The project includes areas that are zoned Restricted Industrial (IR), General Industrial (IG), and Conservation (C). Utility-scale solar projects are permitted in zones IG and IR, without any size restrictions. Citizens UB Solar has stated that it will not erect any panels on C-zoned land.

Of the Kilfadda parcel's acreage in Carroll County, approximately 48.5 acres are classified by MDP as cropland, with the remainder deciduous

forest. The Lehigh parcel is classified as cropland. Most of the project acreage is prime farmland (36.4 acres), prime farmland if protected from flooding (19.8) or farmland of statewide importance (6.1).<sup>10</sup> Within the project's perimeter fencing, prime farmland comprises approximately 27.1 acres, with the remainder classed as farmland of statewide importance.

Carroll County has a goal to preserve 100,000 acres of farmland. To this end, the County has designated a Priority Preservation Area (PPA) that contains nearly 93,000 acres.<sup>11</sup> The PPA also contains two Rural Legacy Areas (RLAs).<sup>12</sup> Contiguity to existing preserved lands and proximity to RLAs are considered when prioritizing land parcels for preservation. The proposed project does not conflict with either the PPA or RLAs.<sup>13,14</sup> No agricultural or other land preservation easement protects the project property or any adjoining parcels.

Maryland's Chesapeake Bay Critical Area Act of 1984 requires counties to regulate land development within 1,000 feet of tidal waters and wetlands of Chesapeake Bay. No portion of Carroll County is in the Critical Area.

Maryland's Smart Growth initiative is a set of policies designed to protect rural areas by targeting development toward designated growth areas. One of the requirements of the 1997 Smart Growth Act imposed on Maryland's counties is to identify Priority Funding Areas (PFA). PFAs provide the focus for development by directing state and local resources to areas where there is public infrastructure that can support it. The project site is within the county's Union Bridge PFA. The project is not dependent on State infrastructure funding.

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<sup>10</sup> Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is also available for these uses (the land could be cropland, pastureland, rangeland, forest land, or other land, but not urban built-up land or water). The soils are of the highest quality and can economically produce sustained high yields of crops when treated and managed according to acceptable farming methods (USDA 1993). Farmland is prime where 50 percent or more of the soils in a map unit composition is prime. Farmland is of statewide importance where less than 50 percent of the components in the map unit is prime, but a combination of lands of prime or statewide importance is 50 percent or more of the map unit composition.

<sup>11</sup> Carroll County, Master Plan 2014, pp. 78082

<sup>12</sup> <http://dnr.maryland.gov/land/Pages/RuralLegacy/All-Rural-Legacy-Areas.aspx>

<sup>13</sup>

<http://ccgovernment.carr.org/ccg/compplanning/MasterPlan/2014/doc/Master%20Plan%202014%20-%20Adopted%202-26-15%20Final.pdf?x=1534772881828>, p. 82

<sup>14</sup> [http://dnr.maryland.gov/land/Documents/RuralLegacy/littlepipeck\\_rla.pdf](http://dnr.maryland.gov/land/Documents/RuralLegacy/littlepipeck_rla.pdf)

The applicant has not yet submitted construction plans nor identified the project's construction staging areas, but has stated that construction will be staged within the project's limit of disturbance (response to PPRP Data Request No. 2-5).

The reviewing State Agencies have concluded that review by both the Carroll County and Union Bridge Planning Commissions is necessary to ensure that the final Site Plan complies with all existing local laws, regulations and ordinances, and provides a basis for the issuance of building and grading permits.

Land Use Recommended License Condition:

- Citizens UB Solar shall certify to the PSC and to PPRP that it has designed the facility in substantial conformity to Carroll County Site Plan requirements as codified in § 158.153 of the Carroll County Code, titled Solar Energy Conversion Facilities. Citizens UB Solar shall also certify that it has received Site Plan approval and all required local permits and authorizations prior to the commencement of construction.

Post-construction, the land uses of other properties in the area will not change if the applicant adopts all of the reviewing State Agencies' recommended license conditions.

#### **4.3      *Transportation***

The primary entrance to the Kilfadda parcel will be an existing entrance to the farm from Green Valley Road (MD 75) less than one-tenth of a mile north of Sam's Creek, the boundary between Carroll and Frederick counties. The Lehigh parcel will be accessed from an entrance off MD 75 near its northern boundary. According to the applicant's response to PPRP Data Request No. 5-4, there will be an emergency entrance to the Kilfadda parcel from South Main Street.

MD 75 originates in Frederick County. It intersects I-70 and MD 26, both of which provide good access from outside the region. The Maryland State Highway Administration (MDOT SHA) classifies MD 75 as a rural major collector (SHA 2016). Lane widths are generally 11 feet with narrow paved shoulders. As MD 75 enters Carroll County, the maximum speed is 45 mph, declining to 30 mph entering the Town of Union Bridge. In 2016, the average annual daily traffic (AADT) was 2,332 vehicles, of which 8.05% were single-unit and 11.43% combination-unit trucks (SHA 2017). There are currently no weight or height restrictions on State



highways near the project site and no highway projects are planned by MDOT SHA near the project site (MDOT 2018).

Entrances for commercial or industrial site access (new or modified) from State highways will require access permits from MDOT SHA Access Management.

Construction Traffic Recommended License Condition:

- Citizens UB Solar shall require all construction traffic to enter and exit the Project site from the proposed access driveways off Green Valley Road (MD 75). If circumstances or conditions require construction traffic to temporarily access the Project site from an alternative access driveway, Citizens UB Solar shall file an amendment request with the PSC and PPRP describing the reason(s) for and duration of the amendment, and shall receive approval from the PSC and PPRP prior to using an alternate access driveway.

Transportation impacts associated with the project will occur during the construction period. Trucks will deliver all materials for project construction. The applicant outlined a preliminary construction phasing plan that limits deliveries to between the hours of 9:00am and 2:00pm in order to minimize disruption to commuter traffic (response to PPRP Data Request No. 2-8). Trucks will be onsite for about two hours, and no more than four trucks will be onsite at any given time. According to the applicant, if site preparation activities are typical, project construction will require from 72 to 85 truck trips for the delivery of components and other construction materials, and additional truck trips for the delivery of excavation, grading, and installation equipment. The applicant estimated racking trucks and miscellaneous material trucks will arrive on-site in the first 30-60 days. Module trucks will arrive around the 90-day mark with four trucks arriving every day for 2-3 weeks. Inverter and switchgear deliveries will follow. The construction site will be active between 6:30am and 5:00pm.

In addition to trucks delivering equipment and materials, construction worker traffic will be added to background traffic volumes at the beginning and end of each workday, primarily on weekdays. The peak construction crew traffic of 20-25 vehicles per day will be during a two-month timeframe. At other times, the construction workforce is expected to be half of peak estimated staffing. Given existing conditions on MD 75, the additional construction worker traffic will not affect the level of service near the project even if coincident with local morning and evening peak hour traffic.

During construction, some loads transporting equipment to or from the project site could be oversized or overweight. MDOT SHA requires hauling permits for transporting oversized or overweight loads on Maryland highways. An oversized or overweight vehicle is defined under Title 24, Subtitle 1 of the Transportation Article of the Annotated Code of Maryland. The applicant has stated solar panels within the Lehigh parcel will be electrically connected to the remainder of the project via an underground cable directionally drilled under MD 75 (response to PPRP Data Request No. 3-7). Occupancy of State highway ROWs is subject to SHA's utility policy (SHA 1998).

Road Permits Recommended License Condition:

- Citizens UB Solar shall comply with all permit requirements and restrictions for use, crossing and occupancy of State, Carroll County and Town of Union Bridge Roads and obtain appropriate approvals, as necessary.

Trucks exiting the site could also affect nearby roads by depositing dirt and debris from excavation or other construction activities. PPRP concluded responsibility for any damage from increased construction and/or truck traffic to public roads accessing the project site lies with the applicant during construction.

Road Damage Recommended License Condition:

- Prior to construction, Citizens UB Solar shall document road, shoulder, and right-of-way (ROW) conditions on roads with direct access to the Project site, and monitor road conditions weekly during the construction period, or when notified of damage or debris caused by construction vehicles. If Citizens UB Solar causes damage during its work to any roadway under the authority of the Maryland Department of Transportation State Highway Administration (MDOT SHA), they shall contact MDOT SHA District 7 Maintenance to report any damage to a MDOT SHA roadway. Citizens UB Solar shall correct all identified road conditions that deviate from its initial reconnaissance within 48 hours of being detected or reported. Repairs to roads, shoulders, and ROWs shall conform to MDOT SHA specifications or Carroll County Design Manual for Roads and Storm Drains, whichever is applicable.

Post construction, the facility will not be a significant traffic generator. Most traffic to the site during operations will be light vehicles.

Federal Regulation Title 14 Part 77 establishes standards and notification requirements for objects affecting navigable airspace, including determining the potential hazardous effect of the proposed construction on air navigation. Part 77 also provides the Federal Aviation Administration (FAA) with the authority to conduct aeronautical studies of proposed activities that could affect airspace. These studies review physical incursions of proposed structures into airspace, interference with radar communications and any other conditions that might negatively affect air traffic. Maryland Aviation Administration (MAA) rules regarding navigable airspace, as annotated in COMAR 11.03.05, are consistent with FAA regulations.

Regardless of height or location, all solar projects at airports must submit to the FAA a Notice of Proposed Construction Form (Form 7460-1) to ensure the project does not penetrate the imaginary surfaces<sup>15</sup> around the airport or cause radar interference or glare. For off-airport projects, local governments, solar developers, and other stakeholders near an airport have the responsibility to inform the FAA about proposed projects so that the agency can determine if the project presents any safety or navigational problems (FAA 2010).

In 2013, the FAA issued interim policy for the review of solar energy projects on federally obligated airports (FAA 2013). The policy adopted the Solar Glare Hazard Analysis Plot as the standard for measuring the ocular impact of any proposed solar energy system.<sup>16</sup> Furthermore, to obtain FAA approval for a solar installation and/or a “no objection” to a Notice of Proposed Construction Form, an airport sponsor is required to demonstrate that the proposed solar energy system meets the following standards.

- No potential for glint or glare in the existing or planned airport traffic control tower.

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<sup>15</sup> Airport imaginary surfaces delimit volumes of airspace around airports that exist to prevent existing or proposed manmade objects, objects of natural growth or terrain from extending upward into navigable airspace. They either slope out and up from all sides and ends of runways or are a horizontal plane or a sloping plane above public use airports. Federal Air Regulation Part 77 defines imaginary surfaces for civil airports (§77.19), Department of Defense airports (§77.21) and heliports (§77.23).

<sup>16</sup> The Solar Glare Hazard Analysis Plot is generated by the Solar Glare Hazard Analysis Tool (SGHAT) Version 2.0, a web-based simulation model developed and maintained by Sandia National Laboratories, U.S. Department of Energy. The model is currently licensed to Forge Solar under the trade name GlareGauge.

- No potential for glare or “low potential for after-image” along the final approach<sup>17</sup> path for any existing landing threshold or future landing thresholds as shown on the current FAA-approved Airport Layout Plan.

Ocular impact must be analyzed over the entire calendar year in one-minute intervals from sunrise to sunset. FAA interim policy requires the use of the Solar Glare Hazard Analysis Tool (SGHAT), a web-based application, to determine whether a proposed solar energy project would result in a potential ocular impact.

Solar energy systems located on an airport that is not federally obligated or located outside the property of a federally obligated airport are not subject to FAA interim policy. However, the FAA strongly urges proponents of solar energy systems located on off-airport property or on non-federally-obligated airports to consider the policy’s requirements when siting such systems (FAA 2013).

The closest airport to the project is Three J Airport, about 3.2 miles east. Three J Airport is a private use airport with a turf runway. Carroll County Regional/Jack B. Poage Field Airport, the closest public use airport, is nearly 10 miles from the project. PPRP has concluded the project will not have an adverse effect upon air navigation.

#### **4.4 Visual Impacts**

The terrain within the project site is moderately rolling. Entering Union Bridge from the south, views currently encompass fields of conventional crops to the left, where the bulk of the project would stand, and an electrical substation in the background. A woodland edge borders two sides of the Kilfadda parcel where there is no public access. A thin woodland edge separates the Kilfadda farmhouse and outbuildings from cultivated fields. The Lehigh parcel abuts the manufacturing operations of the Lehigh Portland Cement Company. Just north of the Lehigh parcel, the entrance to the town is framed by a cemetery and church, followed by residential and commercial uses.

The top edge of the solar array will be approximately 10 feet above ground, creating a low visual profile against the horizon. The Project Layout Map, received in response to PPRP Data Request No. 5, shows a 6-foot security fence around the project. The proposed array layout will

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<sup>17</sup> The final approach path is defined as two miles from fifty feet above the landing threshold using a standard three degree glide path.

maintain a 75-foot setback from Green Valley Road. Carroll County addresses setbacks from solar energy conversion facilities located in industrial zones in §158.153 of the Carroll County Code, which states:

§158.153(D)(3) Setbacks:

(a) Setbacks shall be 200 feet from the boundaries of all adjoining residentially zoned properties, and 100 feet from the boundary lines of adjoining non-residentially zoned properties.

(b) The Planning Commission may reduce required setback for any yard setback by up to 50% provided that supplemental landscaping, as may be determined by the Planning Commission, is provided.

Setbacks Recommended License Condition:

- Citizens UB Solar shall certify to the PSC and PPRP that setbacks shall conform to setback requirements as annotated in §158.153(D)(3) of the Carroll County Code where applicable. Citizens UB Solar shall certify to the PSC and PPRP that all proposed setbacks in the Site Plan have been reviewed and approved by Carroll County.

The applicant states where necessary 50' screening buffers of native evergreen trees or shrubs will be installed to minimize adverse visual impacts. Although a formal landscaping plan has not yet been provided to PPRP, the applicant's Project Layout Map shows landscape buffers on both sides of South Main Street where the project abuts the road. No other perimeter landscaping is indicated.

Carroll County's landscape standards require screening to consist of trees, shrubs, fences, berms in conjunction with planting materials, or solid brick or architectural block walls. The degree of intensity of adjacent land uses and width of the landscape strip available as a buffer dictate the height, density, opacity, and landscape elements required.<sup>18</sup> Generally, shrubs must be at least 18" high at installation and 3' at maturity, while evergreen trees must be 5' at installation and 15' at maturity. Deciduous trees in a buffer must mature to at least 30'. The Landscape Enhancement of Development chapter of the Carroll County Code is incorporated by

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<sup>18</sup> Carroll County Code, §157.

reference as the law of the Town of Union Bridge.<sup>19</sup> Citizens UB Solar indicates landscaping plans will be reviewed and approved by Carroll County.

In theory, under ideal viewing conditions at sea level, a 6-foot human can see the top of an 8-foot structure from a distance of 4.6 miles (JPL 1996). However, visual acuity, atmospheric conditions, terrain variations, objects within one's line-of-sight and a host of other factors significantly limit such "far" views (Krischiunas & Carona 2015). Even when a distant object is visible, it may not impart a reaction from the viewer until it is closer (Shang and Bishop 2000).

Using Citizen UB Solar's Project Layout Map, PPRP estimated the visual extent of the project taking into account bare earth terrain elevations, areas of mature forest, nearby buildings, proposed landscape buffers, and physical characteristics of the array. Since initial plantings do not have the height or fullness to block views of the top edges of arrays, PPRP estimated the project's visual "footprint" (excluding glare) within one-half mile of the project both when the buffer is initially planted and after it matures. In both cases, landscape buffers were assumed to be completely opaque.

PPRP recognizes the inherent limitations of the viewshed analysis methodology. For example, it doesn't take into account many encumbrances to views, which can include small copses of (or even individual) trees, utility distribution lines, fences and low-growing vegetation, all of which diminish or obscure views. Various atmospheric conditions usually related to humidity and distance also attenuate views. Conversely, views obscured by forest may be less so when deciduous trees lose their leaves, although woody masses remain in sight lines. Finally, viewshed analysis does not consider "visual sensitivity," the relative degree of public interest in visual resources and concern over adverse changes in the quality of that resource. Within these limitations, visible footprints presented here are conservative, representing a "worst case" estimate of the project's visual impact.

In general, views of the topmost parts of the project (such as array edges, inverters, perimeter fencing) are expected to extend to homes and businesses near the southern limits of Union Bridge, traffic on MD 75, and to properties surrounding the site. Mature woods mitigate most views from the west, eliminating the need for buffering the western perimeter of the project. A woodland edge blocks views of some arrays from the south,

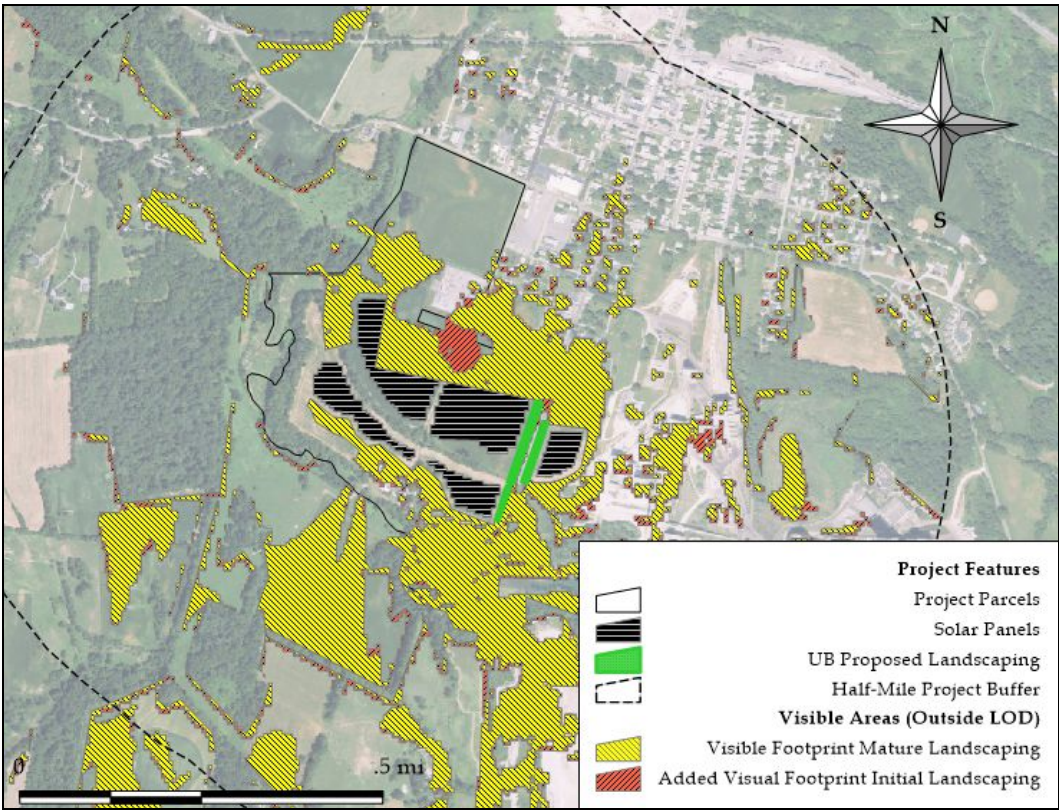
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<sup>19</sup> Union Bridge Code, §100.

but may not be sufficient to mitigate views from Kilfadda Farm, which sits within the project parcel near its southern boundary. Views further to the south are unbuffered, but are at distances from which the project will be difficult to detect.

As landscape plantings mature, the project’s visual footprint will contract slightly (Figure 4). However, where no landscape buffers are proposed, views of the project will be unchanged. Properties not protected by landscaping include some homes north of Whyte Street and West Locust Street (some of which are contributing resources to the Union Bridge Historic District), Union Bridge Church of the Brethren, Mountain View Cemetery and some of South Main Street, part of the Old Main Streets scenic byway. Views from some of these locations are already compromised by the Lehigh Cement Company facilities and the Potomac Edison substation, but will now contain another industrial element, extensive in area if not in height.

*Figure 4      Union Bridge Solar Visual Impact*



Even where the landscape screen mitigates the project’s visual impact, it does not mean that existing views toward the project will be unchanged. An agricultural field seen from the MD 75, a Maryland Scenic Byway, will no longer be visible, for example. Landscaping may even create a visual contrast to viewers due to their linearity and uniformity of design.

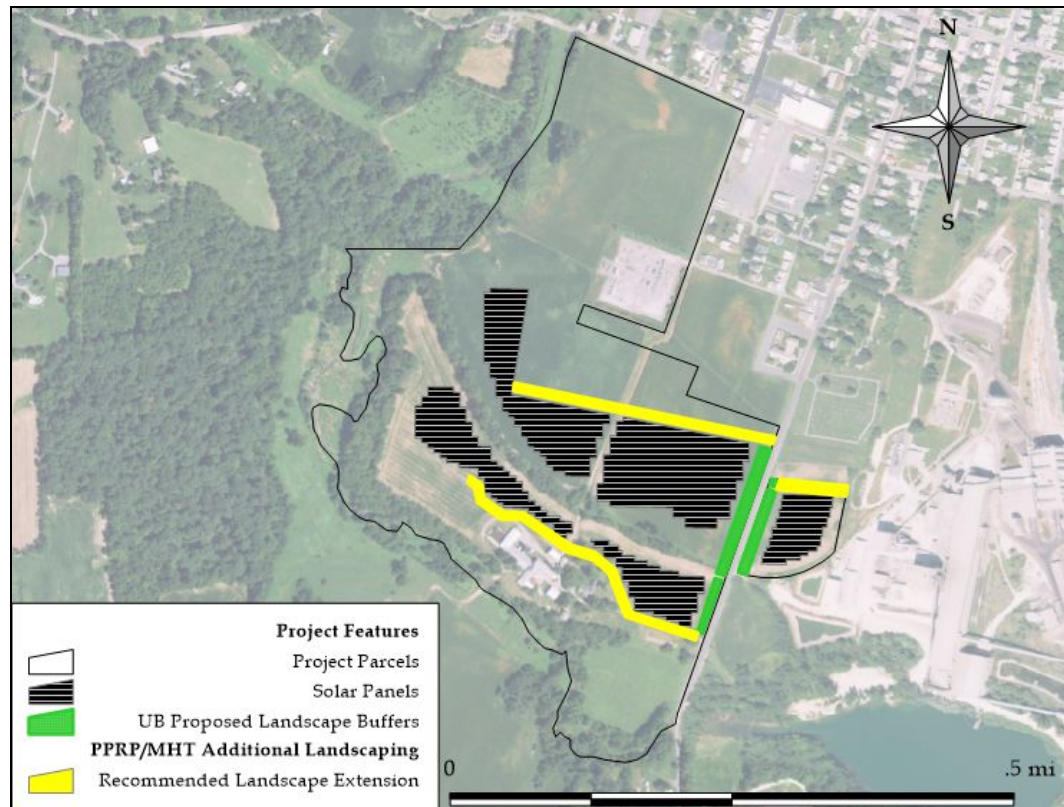
PPRP has concluded that landscape placement in the applicant's Project Layout Map is both inadequate for screening the project from nearby properties and inconsistent with the community's vision emphasizing the preservation of historic characteristics and values (Union Bridge 2010b). A landscape buffer needs to be extended along the northern perimeter of the Kilfadda parcel and along the northern edge of the eastern array field to mitigate views from residential properties in Union Bridge, the Union Bridge Church of the Brethren, Mountain View Cemetery and the unbuffered segment of South Main Street within Town limits.<sup>20</sup> PPRP notes that in its review of the project dated September 17, 2018, the Maryland Historical Trust (MHT) requested the applicant consider a similar buffer to avoid an adverse effect on historic properties within the Union Bridge Historic District (MHT 2018). In its review of the project dated April 17, 2019, MHT concluded that constructing the project within the boundary of the National Register eligible Kilfadda Farm, significant as a rural farmstead, would diminish the integrity of the property's setting, association and feeling. Additional buffering around the Kilfadda Farm will be necessary to resolve and mitigate the adverse effect. Recommended landscape additions are shown in Figure 5.

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<sup>20</sup> Landscaping north of the Kilfadda parcel would be located in the Town of Union Bridge.



**Figure 5**      *Recommended Landscape Additions*



Annotated as general standards for development, Carroll County's and, by reference, the Town's landscape standards do not address the unique visual characteristics of solar energy facilities.

Landscape Buffer Recommended License Condition:

- Citizens UB Solar shall design a landscape buffer within the setback and outside the perimeter fence that will effectively screen, to a minimum 6 feet above ground level at planting and 30 feet at maturity, views of the solar facility. The buffer must mitigate views, to the extent practicable, from all adjacent public roads, residential properties, and cultural landmarks, and be consistent with buffer recommendations of the Maryland Historical Trust (MHT). Landscape screening requirements may be waived by the Town of Union Bridge and/or Carroll County where Citizens UB Solar can demonstrate that conditions on adjacent land are present, such as forest, woodland, wetlands, open fields, or cropland, such that the landscaped buffer serves no purpose. The landscape buffer plan must be submitted to the PSC, PPRP, MHT, the Town of Union Bridge, and Carroll County for review and approval prior to the start of construction.

Citizens UB Solar must also address issues of non-compliance with recommended licensing conditions, such as complaints related to visual impacts associated with the project structures (Visual Impact Complaint Resolution Recommended License Condition).

§157.20(K) of the Carroll County Code requires the owner of any property on which landscaping has been installed to maintain the landscaping in good condition in perpetuity through a landscape maintenance agreement. In addition, by §157.21, prior to issuance of any grading permit, any person required to install landscaping must enter into a surety agreement with the county. PPRP has concluded the applicant or its successors has an obligation to maintain the landscape screening in good health throughout the life of the project, and directs the applicant to negotiate a landscape maintenance and surety agreement with the Carroll County and the Town of Union Bridge.

Landscaping Maintenance Agreement Recommended License Condition:

- Prior to the issuance of a grading permit, Citizens UB Solar shall negotiate and execute a landscape maintenance and surety agreement that ensures the landscape buffer is protected, monitored and maintained over the life of the Project.

Landscaping Surety Agreement Recommended License Condition:

- Citizens UB Solar shall submit to the PSC and to PPRP a copy of an executed maintenance agreement for the landscape plan with a surety or other financial assurance to cover replacement of plantings or associated irrigation systems planting in conformance with §157.20(K) and §157.21 of the Carroll County Code.

Citizens UB Solar has stated that there are few lighting requirements for the project. Lighting could be required during construction or during operations to provide illumination to achieve safety and security objectives. For utility-scale photovoltaic facilities, these objectives are achievable using downward-facing, shielded luminaires and sensor-triggered lights. Carroll County will address outdoor lighting during site plan review.

Outdoor Lighting Recommended License Condition:

- Citizens UB Solar shall develop a plan that will mitigate intrusive night lighting and avoid undue glare onto adjoining properties. Citizens UB Solar shall certify to PPRP and the PSC that it has

received approval of the outdoor lighting distribution plan from Carroll County during Site Plan review.

Glare is a very harsh, bright, or dazzling light that causes an uncomfortable or disabling visual sensation in the eye. It can occur from direct or reflected sunlight or from artificial light. Reflected glare occurs when incident rays from a natural or artificial light source reflect off a smooth or polished surface, such as a solar panel. It is sometimes called glint when a surface reflects a momentary flash of bright light.

To increase electricity production efficiency, a PV panel is designed to maximize absorption and minimize reflection. However, some sunlight is invariably reflected off its surface. With an anti-reflective (A/R) coating, PV panels reflect as little as 2% of incoming sunlight, depending on the angle of the sun. Reflected light from a solar panel is predominantly specular (as opposed to diffuse), a more concentrated type of light that occurs when a surface is smooth or polished. In the case of specular reflection, light reflects off surfaces in a very predictable manner with a reflected ray having the same angle to the surface normal as the incident ray. The reflectivity of solar panels is similar to water, but less than bare soil, vegetation, white concrete or snow (Spaven Consulting 2011).

The potential for glare from a PV energy facility is related to a number of factors:

- Position of the sun in the sky relative to the array, as a function of time of day and time of year.
- Intensity of the sunlight reaching the array, as a function of time of day and time of year.
- Tracking technology.
- Reflectivity of the panels.
- Degree to which light reflected from the panels is specular.
- Position of observers relative to the panels.

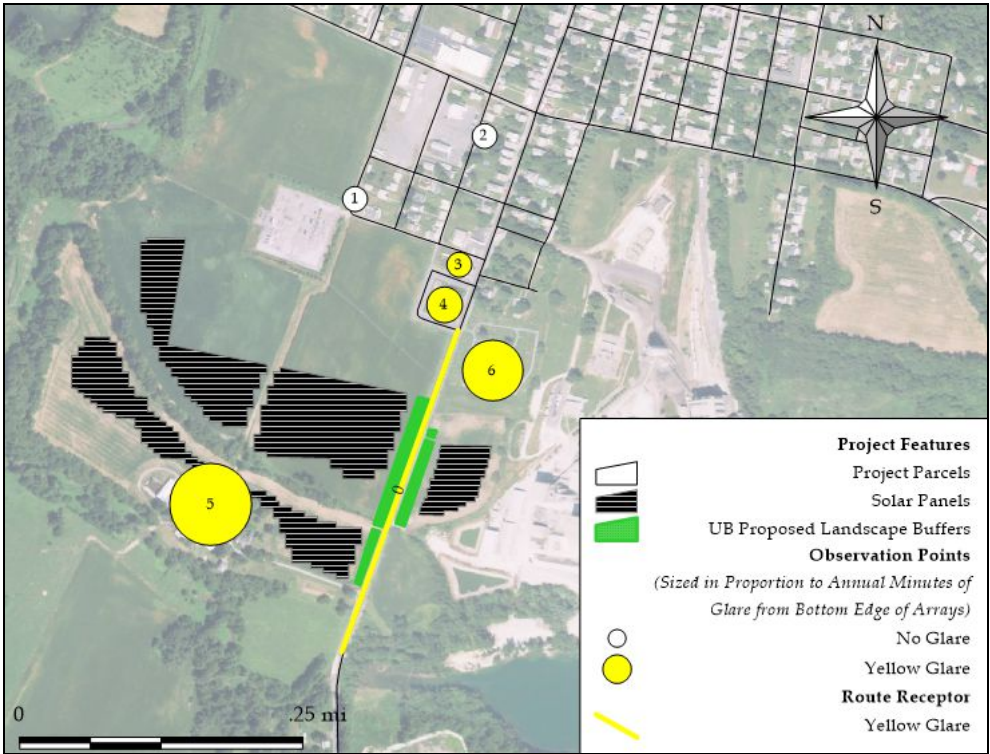
Broadly speaking, the impact of glare declines with increased distance from the source, but increases with the size and orientation of the reflective surface. Finally, one's light sensitivity can affect the perception of glare.

Citizens UB Solar plans to install fixed-tilt tracking arrays within the project's limit of disturbance. Without appropriate landscaping, off-site

glare can be an issue with fixed-tilt arrays shortly after sunrise and shortly before sunset when reflections asymptotically approach the height of the panel.

PPRP undertook a glare analysis of the project estimating the intensity, time-of-day, and duration of glare upon 6 stationary observation points and a segment of South Main Street/Green Valley Road from the Union Bridge Church of the Brethren to the Frederick County line assuming no tracking, a fixed tilt of 20° and no landscaping along exposed edges of the property (Figure 6). The observations represent views from nearby residences, public spaces and public roads from the height of a standing adult (6 feet). Simulation results from the Forge Solar GlareGauge model suggest, in the absence of effective landscaping, some areas within the Town of Union Bridge (in the early evening) and south (after sunrise) of the project and traffic along Green Valley Road could experience a moderately strong intensity of glare<sup>21</sup> for extended periods in non-winter months (Appendix B). Locations particularly affected include the Kilfadda Farm complex, Union Bridge Church of the Brethren, and Mountain View Cemetery.

**Figure 6**      *Incidence of Glare from Solar Panels*



<sup>21</sup> Glare with a potential to induce a temporary after-image within the receptor's vision.

PPRP's concern about glare trespassing onto Green Valley Road relates to motor vehicle safety. The National Highway Traffic Safety Administration, in a study on the risks of glare to oncoming vehicles (NHTSA 2007), associated glare with decreasing visibility distance, increasing reaction times and increasing recovery times.<sup>22</sup> While acknowledging the difficulty of relating crash risk to glare, the NHTSA has shown there is a definitive relationship between driving performance and glare, and that risk increases on two-lane highways.<sup>23</sup> Landscape buffers are intended to provide an opaque visual barrier that obscures the facility from sight once the vegetation reaches maturity. As such, off-site glare may not be fully mitigated until the proposed landscape buffer matures enough to completely block the sun's reflections.

Glare Mitigation Recommended License Condition:

- Prior to construction, Citizens UB Solar shall construct a temporary, opaque buffer within the setback to mitigate glare impacts upon surrounding public roads and properties. The buffer shall be any combination of additional fencing, landscaping and berms that completely screens Green Valley Road from the sun's reflections off solar arrays from the time the panels are mounted on supports. The temporary buffer shall be installed within the setback where permanent landscaping has been proposed or required, as described in Recommended Condition 22, and will be maintained until the permanent landscape buffer provides an opaque visual barrier. The temporary buffer will be in conformance with all applicable State and local laws and regulations.

Citizens UB Solar must also address complaints related to unanticipated solar reflections (Visual Impact Complaint Resolution Recommended License Condition).

## **4.5 Cultural and Aesthetic Resources**

Numerous organizations programmatically manage cultural resources within Carroll County. These resources include historic properties, archeological deposits and cultural designations that embody defined

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<sup>22</sup> In simulated tests of an automobile driver's view through his windshield, Saur & Dobrash (1969) found the increase of identification time over that required after no glare exposure varied from 0.8 sec to 2.7 sec.

<sup>23</sup> The NHTSA's primary focus in this study was nighttime glare from oncoming headlights.

land use components. There are four properties on the National Register of Historic Places (NRHP) within one mile of the project site, the closest being the Union Bridge Historic District, slightly north and east of the project. The district is significant for its development of a market center in the 19<sup>th</sup> century and for the architectural character of its buildings. Three structures on the National Register – Mt. Pleasant, Pipe Creek Friends Meeting House, and Hard Lodging (Solomon’s Folly) – are also within one mile. Several additional properties listed in the Maryland Inventory of Historic Properties (MIHP) are within one mile, including the 18<sup>th</sup> century Kilfadda Farm (MIHP CARR-948), which sits on the project parcel and is still in use. No preservation easements held by the MHT are within one mile.

In its review of the project, the MHT noted that the project area contains three items of archeological importance: Kilfadda Farm and two prehistoric sites along Sam’s Creek (18CR14, and 18CR13). The MHT also noted that the National Register-listed Union Bridge Historic District (MIHP CARR-3017) was adjacent to project site along its northern and eastern boundaries. Finally, MHT noted that the National Register-eligible Stem-Haines-Saylor Farm (MIHP F-8-157) is located just south of the project area in Frederick County.

MHT recommended an Area of Potential Effects (APE) survey to identify the potential visual, auditory, and physical effects of the project on its setting. MHT also recommended a Phase I archeological investigation in all planned disturbance areas prior to any ground-disturbing activities associated with the installation of the solar facility. The Phase I survey was conducted by Circa~ Cultural Resource Management, LLC (Circa~) during the 2018-19 winter season. Circa~ performed both archival research and archeological field testing. During the course of field testing, Circa~ investigated two previously identified archaeological sites (one being the site of the 19<sup>th</sup>-century Union Bridge Toll House, no longer extant, that MHT had specifically requested be included), and two new archaeological sites. Circa~ concluded that none of these archeological sites is eligible for listing on the National Register of Historic Places (Register). Therefore, Circa~ recommended that the portion of each site within the project area be given clearance for development. In a letter dated April 17, 2019, MHT concurred with this conclusion, provided that the project remains as it is currently defined.

With respect to the historic built environment, MHT requested National Register Determination of Eligibility (DOE) submissions for the Kilfadda Farm complex and an MIHP Addendum form for the Union Bridge Toll House (to indicate that it is no longer extant). In the submission, Circa~ recommended that the Kilfadda farm is eligible for listing on the National

Register of Historic Places. In the same April 17<sup>th</sup> letter, MHT concurred with this recommendation.

As noted earlier, the MHT has requested the applicant consider additional landscaping between the project and Kilfadda farmhouse (see Figure 5). According to the final section of Circa~'s DOE submission, *Viewshed Analysis and Landscape Plan for Kilfadda Farm*, a 25-foot setback with mature buffer and a fence will surround the solar farm. Also, according to the DOE, the applicant agrees with MHT's recommendation for "additional vegetative screening along the edge of the fencing to aid in masking the development from the farm complex." However, no additional vegetative screening between Kilfadda Farm and the PV panels is shown in the updated project layouts provided by the applicant in response to PPRP Data Request No. 5. In its April 17<sup>th</sup> letter, MHT concluded that the project, as currently proposed, will have an adverse effect on the Kilfadda Farm, diminishing the integrity of the property's setting, association, and feeling.

Documentation of Historic Resources Recommended License Condition:

- Citizens UB Solar shall supplement the Determination of Eligibility (DOE) form submitted by Circa~ for the Kilfadda Farm (CARR-948) with documentation of interior spaces within the farm house and associated agricultural buildings. This documentation shall be completed by a qualified architectural historian, preservationist, or historian and accompanied by supporting materials as described in *General Guidelines for Compliance-Generated Determinations of Eligibility and Standards and Guidelines for Architectural and Historical Investigations in Maryland*.
- The photographs contained in this supplemental documentation shall conform to the standards described on pages 36-7 of the *Standards and Guidelines for Architectural and Historical Investigations in Maryland* (Standards and Guidelines) and the standards described in the Maryland Historical Trust's "Guidelines for Digital Images."
- Citizens UB Solar or its qualified consultant shall submit the completed supplemental documentation package to MHT at least six (6) months prior to beginning construction of the Project.

Archeological Discoveries Recommended License Condition:

- In the event that relics from unforeseen archeological sites are revealed and identified during construction, Citizens UB Solar, in consultation with and as approved by the MHT, shall develop and implement a plan for avoidance and protection, data recovery, or destruction without recovery of such relics or sites.



The Maryland Heritage Areas Program preserves the State's historical, cultural, archeological, and natural resources for sustainable economic development through heritage tourism. The Program designates Heritage Areas, defined by a distinct focus or theme that makes a place or region different from other areas of Maryland. The Maryland Heritage Areas Authority (MHAA) certifies and governs Heritage Areas. A management plan sets forth the strategies, projects, programs, actions, and partnerships that will be involved in achieving each Heritage Area's goals. Once certified, a Heritage Area management entity becomes eligible for State-matching grants for operating assistance and marketing activities. Local jurisdictions and non-profit organizations in a Heritage Area may also qualify for State matching grants for planning, design, interpretation, and programming. Key components of a Certified Heritage Area (CHA) are the Target Investment Zone (TIZ), a designated area with exceptional potential to attract investment and enhance tourism, and Certified Heritage Structures, which are National Register properties, contributing resources within a National Register district or locally designated historic properties.

There are 13 CHAs in Maryland, including the Heart of the Civil War Heritage Area (HCWHA), which spans portions of Carroll, Frederick, and Washington Counties. The HCWHA is anchored by three major battlefield sites, Antietam, Monocacy, and South Mountain. The boundary of the HCWHA nearest the project is a corridor that runs along Green Valley Road (MD 75), and continues through Union Bridge along Main Street to Bark Hill Road.<sup>24</sup> As such, the heritage area bisects the project as it enters Union Bridge from the south. In its April 17<sup>th</sup> letter, MHT concluded the project, as currently proposed, will have an adverse effect on the HCWHA by adding a new visual element with the potential to alter the character and general aesthetics of the area. After further consultations, HCWHA's management unit subsequently concluded the reviewing State Agencies' recommended license condition extending landscape buffers around the Kilfadda parcel along South Main Street and along the northern edge of the Lehigh parcel will mitigate views from Green Valley Road and the project's impact on the HCWHA. However, HCWHA also requested enhancements to the entry to the Union Bridge Historic District and additional mitigation regarding Kilfadda Farm, the

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<sup>24</sup> Linear areas follow troop movement along Carroll County roads, especially around the events at Gettysburg.



Union Bridge Toll House site, and Civil War-related material that will require negotiation between the parties.<sup>25</sup>

Heart of the Civil War Heritage Area Recommended License Condition:

- In order to address HCWHA concerns of adverse impacts to identified areas, Citizens UB Solar shall consider the mitigation strategies suggested by the HCWHA:
  - Enhanced and additional landscape buffering - shall be in accordance with Condition 22 Landscape Buffer.
  - Entry into the Historic District - Citizens UB Solar shall coordinate with HCWHA and MHT regarding signage content and location if deemed warranted.
  - Kilfadda (CARR 948) - the cost of nominating the Kilfadda house to the National Register may be undertaken in place of Condition 28 Documentation of Historic Resources. However, Citizens UB Solar shall consult with MHT prior to submitting the nomination.
  - Toll House (CARR 1546) - Citizens UB Solar shall consider implementing "mitigation by avoidance" by avoiding any disturbance to the Union Bridge Toll House site located east of South Main Street if the applicant determines use of other areas of the property is appropriate.
  - Troop movements - Citizens UB Solar shall coordinate with HCWHA to allow for future archaeological investigation of the Kilfadda property.

The Maryland Scenic Byways program is administered by the State Highway Administration. The program includes 18 byways, totaling 2,487 miles of roads that illustrate the state's beauty, history and culture. The Old Main Streets Scenic Byway is a 111-mile loop along country roads connecting Union Bridge and other small towns in Central Maryland. The byway follows Green Valley Road through Union Bridge, bypassing the project site. The focus of the byway is on the exploration of history,

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<sup>25</sup> Re: Citizens UB Solar, LLC - Union Bridge Solar Project (PSC Case 9483). Letter to Mr. Fred Kelley, Power Plant Research Program from Elizabeth Scott Shatto, Executive Director, Heart of the Civil War Heritage Area. June 28, 2019. (Appendix C)

heritage and architecture while savoring the flavor of local shops in small rural towns of mid-Maryland.

Scenic Byways Coordination Recommended License Condition:

- Citizens UB Solar shall certify to the PSC and to PPRP that it has consulted with the MDOT SHA Scenic Byways Coordinator to ensure the project's site layout, landscaping, and lighting maintains and enhances the byway's visual quality.

The project site is not adjacent to any county-designated bicycle routes.<sup>26</sup> However, MDOT SHA has designated MD 75 through Union Bridge as a State bikeway corridor (SHA 2015). As it bypasses the project, MD 75 has two marked 11-foot lanes with narrow paved shoulders, particularly in the northbound direction (SHA 2016a). As noted earlier, the highway carries a relatively high proportion of trucks for a rural area, partly due to the Lehigh Portland Cement factory south of Union Bridge. During construction, increased truck traffic could potentially affect cycling safety on these designated routes, particularly where traffic enters and leaves the road.

By Maryland law, bicycles are vehicles; COMAR §11-176 defines a "vehicle" as any device in, on, or by which any individual or property is or might be transported or towed on a highway. As such, cyclists have rights and responsibilities as do drivers of motor vehicles. Among other provisions, Maryland traffic laws require a vehicle overtaking another vehicle, including a bicycle, to proceed with due regard for the other vehicle on the approach, overtaking and clearance of the overtaken vehicle, and to yield to an overtaken bicycle before making any turns<sup>27</sup>.

The low volume of truck traffic servicing the facility is expected to mitigate impacts to cyclists during construction. Still, PPRP is concerned that the additional truck traffic delivering supplies and services, particularly during the peak construction period, could compromise the safety of cyclists on nearby designated bike routes.

Cycling Safety Recommended License Condition:

- Citizens UB Solar shall instruct its suppliers and contractors to be aware of on-road bicycle route designations near the project and

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<sup>26</sup> <https://carrollcountytourism.org/wp-content/uploads/2017/07/CCT-Bike-Map.pdf>

<sup>27</sup> <http://www.mva.maryland.gov/safety/mhso/program-bicycle-safety.htm>

Maryland traffic laws regarding bicycles on the road, and include the condition in all contracts with suppliers or contractors.

MDOT SHA Bicycle and Pedestrian Coordination Recommended License Condition:

- Citizens UB Solar shall certify to the PSC and to PPRP that it has consulted with the MDOT SHA Bicycle and Pedestrian Coordinator to ensure activity during construction minimizes conflict with bicyclists.

#### 4.6 *Public Services and Safety*

During construction and operation, no additional public services will be required to support the project under normal conditions. In the event of a fire or accident at the facility, emergency responders will be dispatched through the county's 9-1-1 center. The center is administered by the Carroll County Department of Public Safety. For EMS, the county funds driver and paramedic positions, providing services 24-hours a day within all 14 districts. For fire services, the county relies primarily on volunteers. There are 14 fire companies in the county, the closest of which is the Union Bridge Fire Company (Co. 8), located on South Whyte Street. Company 8 also houses Ambulance 89, which can operate as either an Advanced Life Support or Basic Life Support ambulance. Law enforcement service is provided by the Sheriff's Office, which is located in Westminster.

Solar panels and associated electrical equipment are largely free of flammable materials. Although potential health hazards have been associated with toxic materials released during fires from cadmium telluride, copper indium diselenide, and gallium arsenide photovoltaic modules (Moskowitz and Fthenakis 1990), crystalline solar cells, which are primarily made of silicon, are not considered to be hazardous to the environment (Alchemie 2013). Modules for the project will be comprised of crystalline solar cells. Still, respiratory exposure to combustion products associated with PV components should be avoided (FPRF 2013, UCS 2015). With respect to other components, some modern transformers use mineral oil as a coolant while others use dry-type cooling. The flashpoint of mineral oil is 335°F, significantly higher than the U.S. Occupational Safety and Health Administration (OSHA) standard, which defines a flammable liquid as any liquid having a flashpoint at or below 199.4 °F (29 C.F.R. §1910.106(a)(19)).

Post-construction, the risk of fire from ground-mounted photovoltaic systems will be low if site preparation and maintenance has removed potential fuels from under and around solar arrays (Planning Solutions 2014). Fire prevention guidance for ground-mounted PV installations is contained within the National Fire Protection Association's NFPA 1 Fire Code Handbook and NFPA 70 National Electrical Code.

Fire Safety Recommended License Condition:

- Citizens UB Solar shall design, install and maintain the Project to meet all applicable minimum standards set forth in the National Fire Protection Association (NFPA) 70: National Electrical Code and all applicable minimum standards appropriate for ground-mounted solar facilities set forth in NFPA 1: Fire Code.

Although the likelihood of fire is low, a challenge facing firefighters during fireground operations at PV facilities is the risk of electrical shock (FPRF 2013). This is because PV panels generate electricity when exposed to sunlight. Even at night, apparatus-mounted scene lighting may produce enough light to generate an electrical hazard. Under a continuous electrical load, any conduit or components between PV modules and disconnect switches will remain energized. Inverters may also provide voltage during daylight hours for several minutes on both sides of a disconnect, even when opened (FPRF 2013). The Fire Protection Research Foundation also recommends the use of respiratory protection during fireground operations involving PV systems.

While guidelines for fire operations at PV facilities have been published (NREL 2013, CalFire 2010, Orange County 2010), the Union Bridge Fire Company and other companies in Carroll County are all-volunteer organizations that may not address fireground operations at PV facilities in their Standard Operating Procedures (SOPs) or Standard Operating Guidelines (SOGs).

Emergency Preparedness Recommended License Condition:

- Citizens UB Solar shall contact the Union Bridge Fire Company and the Carroll County Department of Public Safety to develop appropriate protocols for addressing on-site emergencies.

#### **4.7 *Property Values***

To date, the impact of utility scale solar photovoltaic systems on nearby property values has been the subject of little research. This may be partly because utility scale photovoltaic land requirements favor rural locations where adjacency issues are not as prevalent, or because repeat sales data,

which might capture such effects, are simply not available. Still public perceptions that solar farms adversely affect property values remain.

Limited evidence from real estate appraisal methods has mostly supported the contention that solar farm development does not influence property values. Expert opinion from a past siting case in Massachusetts, for example, concluded that utility scale photovoltaic energy systems that are not visible from surrounding properties would have no impact on their market values (Franklin County 2014). A paired comparison of market values of residential and agricultural properties near solar farms in North Carolina came to a similar conclusion (Kirkland Appraisals 2014).

In another solar case filed with the Maryland PSC<sup>28</sup>, a real estate appraisal study was commissioned by the project developer to investigate the potential impact of the project on neighboring property values using paired sales analysis of properties within and outside a half-mile radius of selected operational solar farms in Maryland (Treffer Appraisal Group 2016). Although the methodology and limited sample size do not allow one to draw a statistical inference from the data, the study nevertheless adds support to other appraisal findings.

With a minimal vertical profile and proposed buffering around the perimeter of the site, the project will be largely out of sight from nearby properties. The project's operation will not emit significant traffic, noise, air or water pollutants, or generate any hazardous waste that could potentially affect public health. In other words, the project will minimally affect the local environment. That the proposed facility will have a moderately benign local presence once the facility is operational suggests that property values will be unchanged by the project.

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<sup>28</sup> PSC Case #9429. In the matter of the application of LeGore Bridge Solar Center LLC for a CPCN to construct a 20.0MW solar photovoltaic generating facility in Frederick County, Maryland.

## 5.0

## NOISE IMPACTS

This licensing review incorporates an evaluation of noise impacts to ensure compliance with State noise regulations. The analysis of potential noise impacts focuses on the potential for sound pressure from generating equipment to exceed numerical limitations at the nearby noise sensitive areas.

### 5.1

#### *Definition of Noise*

Noise generally consists of many frequency constituents of varying loudness. Three decibels (dB) is approximately the smallest change in sound intensity that can be detected by the human ear. A tenfold increase in the intensity of sound is expressed by an additional 10 units on the dB scale, a 100-fold increase by an additional 20 dB. Because the sensitivity of the human ear varies according to the frequency of sound, a weighted noise scale is used to determine impacts of noise on humans. This A-weighted decibel (dBA) scale weights the various components of noise based on the response of the human ear. For example, the ear perceives middle frequencies better than low or very high frequencies; therefore, noise composed predominantly of the middle frequencies is assigned a higher loudness value on the dBA scale. Subjectively, a tenfold increase in sound intensity (10 dB increase) is perceived as an approximate doubling of sound. Typical A-weighted sound levels for various noise sources are shown in Table 1.

**Table 1** *Typical Sound Levels for Common Sources (dBA)*

Noise Source	Typical Sound Pressure Level
Lowest sound audible to human ear	10
Soft whisper in a quiet library	30-40
Light traffic, refrigerator motor, gentle breeze	50
Air conditioner at 6 meters, conversation	60
Busy traffic, noisy restaurant, freight train moving 30 mph at 30 meters	70
Subway, heavy city traffic, factory noise	80
Truck traffic, boiler room, lawnmower	90
Chain saw, pneumatic drill	100
Rock concert in front of speakers, sand blasting, thunder clap	120
Gunshot, jet plane	140

Sound energy dissipates with increasing distance from the noise source. For every doubling of the distance, the sound pressure level produced by a given noise source decreases by approximately 6 dBA.

5.2

Summary of Regulatory Requirements

Maryland noise regulations specify maximum allowable noise levels, shown in Table 2 (COMAR 26.02.03). The maximum allowable noise levels specified in the regulations vary with zoning designation and time of day. The noise limit for residential areas is 55 dBA during nighttime hours and 65 dBA during daytime hours. A noise source may not create noise that exceeds the allowable levels, as measured at the receiving property.

Table 2

State of Maryland Maximum Allowable Noise Levels (dBA) for Receiving Land Use Categories

	Zoning Designation		
	Industrial	Commercial	Residential
Day	75	67	65
Night	75	62	55

Source: COMAR 26.02.03

Note: Day refers to the hours between 7 AM and 10 PM; night refers to the hours between 10 PM and 7 AM.

The State regulations exempt certain noise sources and noise generating activities. For example, motor vehicles on public roads are exempt from Maryland noise regulations; however, while on industrial property, trucks are considered part of the industrial source and are regulated as such. The regulations also allow for construction activity to generate noise levels up to 90 dBA during daytime hours, but the nighttime standard may not be exceeded during construction.

While the State has established target levels for noise, enforcement authority for noise regulations rests with local government (in this case, Carroll County).

5.3

Noise Impact Evaluation

Operational noise from photovoltaic (PV) facilities is typically low. The PV panels and support equipment generate some noise, primarily associated with the power inverters and electrical transformers.

Regarding noise generated by the power inverters and electrical transformers, a study conducted for the Massachusetts Clean Energy Center (2012) found that operational noise is inaudible at moderate distances. The measured noise levels from the PV arrays included in the study declined to ambient background noise levels at distances between 50 and 150 feet. Based on the Preliminary Site Plan provided by Citizens UB Solar in response to PPRP Data Request No. 5, which shows the proposed conceptual layout of the solar array, the distance from the project panels to the nearest residential dwelling is approximately 760 feet (see Figure 7). At these distances, noise generated by the solar facility will be well below ambient background noise levels and therefore will have no significant impact at residential receptors.

Carroll County has additional regulations around sensitive receptors. The proposed solar array is located adjacent to Union Bridge Church of the Brethren, which qualifies as a sensitive receptor. The county specifies maximum allowable noise limits, as shown in Table 3, when measured at the property line of sensitive receptors.

**Table 3** *Carroll County Maximum Allowable Sound Levels (dBA) for Sensitive Receptors*

Sensitive Receptor	Noise Limit After 7:00 a.m. to Before 7:00 p.m.	Noise Limit After 7:00 p.m. to Before 10:00 p.m.	Noise Limit After 10:00 p.m. to Before 7:00 a.m.
Day care facilities, special population schools	60	55	N/A
Hospitals, elder care facilities, nursing homes	60	55	50
Libraries, churches, funeral homes	60	55	N/A

*Source: Carroll County, MD Code of Ordinances, Title IX, Chapter 93*

The closest panel at the proposed solar facility is located approximately 175 feet from the property line of Union Bridge Church of the Brethren. At this distance, noise generated by the solar facility is not expected to have a significant impact at sensitive receptors.

The reviewing State Agencies’ recommended license condition requires that the construction and operation of the proposed solar facility comply with the State’s regulatory standards of 65 dBA (day) and 55 dBA (night), and the 90 dBA level during daytime construction. Operation must also adhere to county regulations to prevent any noise disturbance in exceedance of allowable limits at sensitive receptors. It is anticipated that



noise from the project, as proposed, will meet these construction and operational noise limits.

Figure 7      Location of Nearby Receptors



Electric and magnetic fields, referred to collectively as electromagnetic fields (EMF), are naturally occurring and result from the generation, transmission, and use of electric power. These fields are present around such things as appliances, electronics, electric wiring, and power lines.

For electric fields, the strength of a field is dependent on the voltage level and the amount of current flow. For example, the amount of current flowing through a power line varies as the demand for electric power changes. Electric fields, measured in units of volts per meter (V/m), are produced by voltage and increase in strength as the voltage increases. Magnetic fields, measured in units of gauss (G) or tesla (T) result from the flow of current through wires or electrical devices and increase in strength as the current increases. Electric fields and magnetic fields are characterized by wavelength, frequency, and amplitude. The frequency of the field, measured in hertz (Hz), describes the number of cycles that occur in one second. Electricity in North American alternates through 60 cycles per second, or 60 Hz.

Electric fields are shielded or weakened by materials that conduct electricity (i.e., trees, buildings, and human skin), while magnetic fields pass through most materials and are more difficult to shield. Both electric and magnetic fields decrease rapidly as the distance from the source increases. However, since magnetic fields are not easily shielded, most research in recent years has focused on the potential health effects from magnetic field exposure. Estimated average background levels of 60 Hz magnetic fields in most homes, away from appliances and electrical panels, range from 0.5 to 5.0 milligauss (NIEHS 2002). Table 4 shows typical magnetic field levels for common household appliances.

The potential health effects of exposure to EMF in the extremely low frequency (ELF) range from power transmission facilities have been the subject of scientific and public scrutiny for almost 30 years. The International Commission on Non-Ionizing Radiation Protection (ICNIRP) in its 2010 Guidelines concluded that neither a causal relationship between ELF-EMF and increased risk of cancer nor other long-term effects can be established (ICNIRP 2010). Research and assessments done by international expert panels from 2009 to 2018 have reached similar conclusions (Scientific Council on Electromagnetic Fields 2018; SCENIHR 2015).

**Table 4**      *Typical Magnetic Field Levels of Common Appliances*

Source	Field Strength at 12 inches (milligauss)	Field Strength at 3 feet (milligauss)
Coffee maker	0.09 to 7.3	0 to 0.61
Copy machine	0.05 to 18.38	0 to 2.39
Television	1.8 to 12.99	0.07 to 1.11
Vacuum cleaner	7.06 to 22.62	0.51 to 1.28
Microwave oven	0.59 to 54.33	0.11 to 4.66
Computer monitor	0.2 to 134.7	0.01 to 9.37

*Source: California Department of Health Services*

## 6.1 *EMF and Solar Facilities*

PV solar panel arrays convert solar energy into DC electricity. A solar inverter, a component of a PV system, converts the DC output of a solar panel into AC that can be fed to the electrical grid. AC electricity produces “power frequency magnetic fields” and DC electricity produces “static magnetic fields.”

Humans are constantly exposed to EMF throughout daily life, but EMF may cause negative health effects if exposure exceeds certain health-based thresholds. The most rigorous exposure guidelines for EMF are those developed by the ICNIRP. For the general public, the ICNIRP has established a threshold for acute exposure of 830 milligauss for power frequency magnetic fields and 4 million milligauss for static magnetic fields.

Solar energy systems produce magnetic fields significantly below the minimum thresholds established by the ICNIRP. Solar energy systems will produce power frequency magnetic fields from their AC inverters and grid interconnection, while the DC electricity generated by the PV modules will produce static magnetic fields. A typical solar PV inverter may produce a power frequency magnetic field of about 3 milligauss at a distance of 10 feet; this level is comparable to the levels produced by common household appliances at a distance of only 3 feet. At the Citizens

UB Solar site, panels and inverters will be located at least 150 feet from any residences, and EMF levels will be insignificant at these distances.

The United States Department of Energy directed the National Renewable Energy Laboratory (NREL) to conduct a study on the emission of EMFs by solar panels (DOE 2009). NREL found that the magnitude of EMF measured at the perimeter of PV (photovoltaic, i.e., solar panels) installations has been shown to be indistinguishable from background EMF, and is lower than that from many household appliances such as televisions and refrigerators.

Table 5 provides an example of calculated EMF levels for a typical solar PV energy system, specifically the West Linn Highway Solar Project in Oregon. This project evaluation, published by the Oregon Department of Transportation, found that the calculated field strength of 509 milligauss measured at 10 feet from the PV modules is well below the ICNIRP static threshold of 4 million milligauss and the field strength of the DC to AC power inverters of 3 milligauss is well below the 830 milligauss power frequency threshold.

**Table 5** *EMF Levels at the Proposed 3 MW West Linn Highway Solar Project, Oregon*

Source	Field Type	Field Strength at 3 feet (milligauss)	Field Strength at 10 feet (milligauss)	Corresponding ICNIRP exposure limit for the general public (milligauss)
Parallel string of PV modules	Static	1,697	509	4,000,000
DC to AC power inverters	Power frequency	344	3	830
Grid interconnection	Power frequency	14	N/A	830

Source: ODOT 2010, *Scaling Public Concerns of Electromagnetic Fields Produced by Solar Photovoltaic Arrays*

Per the Project Layout Map provided by the applicant in response to PPRP Data Request No. 5-1, the shortest distance between any project inverter/transformer pad and any non-participating residence is over 750 feet. EMF levels at this distance will be well below the risk thresholds established by international guidelines; therefore, PPRP does not expect them to pose potential health risks to nearby residents.

## 6.2 *Mitigation Strategies*

As previously discussed, electric fields are shielded or weakened by materials that conduct electricity, while magnetic fields pass through most materials and are more difficult to shield. However, both electric and magnetic fields decrease rapidly as the distance from the source increases. Therefore, the most effective strategy for limiting exposure at solar energy systems is to provide adequate buffer space between the inverters and PV modules and nearby residential properties. As described above, magnetic field levels will fall below threshold human health standards at a distance of 3 feet, so for the Citizens UB Solar project, the distance from the solar panel layout to adjacent properties is sufficient so that EMF levels from the solar energy systems are not anticipated to pose a potential health risk to nearby residents.

PPRP concludes that there will not be significant impacts to environmental resources if the Citizens UB Solar project is constructed as proposed. Regardless, the reviewing State Agencies have put forth a number of recommended license conditions in PPRP\_Exhibit (FSK-2) in order to ensure that the project is built following appropriate environmental guidelines.

Because it is a non-combustion process relying on the direct conversion of solar energy into electrical energy, the operation of a solar PV facility does not produce air emissions. This differs significantly from conventional fossil-fired electric power plants. Electricity generated by solar PV facilities represents a way of meeting the region's growing demand for electric power without emitting combustion-related air pollutants. Therefore, there will be no significant impact to air quality.

PPRP assessed the potential environmental effects of the proposed project on biological resources, including vegetation; wildlife; rare, threatened and endangered (RTE) species; and wetlands and streams. The project is located on existing agricultural fields. Post-construction vegetation will be managed under the panels to allow grass to grow, maintaining the entire field in pervious surface. The grass under the panels, as well as the plantings that will occur in the landscape buffers surrounding the facility will provide habitat for wildlife, as well as mitigation for stormwater impacts. No forests will be cleared or disturbed. The streams and wetlands adjacent to the project will be avoided during construction and operation of the project. While there might be some local impacts to the wildlife of the area, there is also potential for the encouragement of wildlife habitat, specifically pollinators, under the panels and within the landscape buffers. There are no state or federal RTE species located on the project site. PPRP does not anticipate any biological impacts due to the construction of the transmission interconnection to the Carroll Substation.

The project will create temporary construction jobs and generate fiscal benefits to the State, Carroll County and the Town of Union Bridge. PPRP does not anticipate permanent population and housing impacts given the short duration of the construction schedule. Most fiscal benefits will be in the form of corporate income tax revenues to the State, taxes on lease payments to landowners, and personal property tax revenues.

In terms of land use, the project will be constructed on two parcels totaling approximately 65 acres. About 34 acres will be within the

project's limit of disturbance. In Carroll County, project lands are zoned Restricted Industrial (IR), General Industrial (IG), and Conservation (C). Utility-scale solar projects are permitted in zones IG and IR without any size restrictions. No panels will be installed on C-zoned land. The part of the perimeter road that lies within Union Bridge is on land zoned Industrial Restricted. Solar projects are not addressed explicitly in the Town's zoning bylaws.

The project site is not within any programmatically preserved lands, nor is it within a Priority Funding Area or Critical Area. Although located on prime farmland and farmland of statewide importance, the project is not located within the county's Priority Preservation Area. Post-construction, use of other properties in the area will not be affected if the applicant adopts all of the reviewing State Agencies' recommended license conditions.

Transportation impacts associated with the project will occur during the construction period. Entrances to the project will be from Green Valley Road (MD 75). Trucks will deliver all materials for project construction. The applicant outlined a preliminary construction phasing plan that minimizes disruption to commuter traffic. In addition to trucks delivering equipment and materials, construction worker traffic will be added to background traffic volumes at the beginning and end of each workday, primarily on weekdays. Given existing conditions on MD 75, the additional construction worker traffic will not affect the level of service near the project. Post construction, the facility will not be a significant traffic generator.

During construction, some loads transporting equipment to or from the project site could be oversize or overweight. An underground cable will be directionally drilled under MD 75 to electrically connect the project. MDOT SHA requires hauling permits for transporting oversize or overweight loads on Maryland highways and permits for occupancy of highway ROWs.

Trucks exiting the site could also affect nearby roads by depositing dirt and debris from excavation or other construction activities. The reviewing State Agencies have concluded responsibility for any damage from increased construction and/or truck traffic to public roads accessing the project site lies with the applicant during construction and has recommended a license condition to ensure damages to roads are remedied.

PPRP has concluded the project will not have an adverse effect upon air navigation.

The proposed array layout will maintain a 75-foot setback from Green Valley Road. The applicant states where necessary 50' screening buffers of native evergreen trees or shrubs will be installed to minimize adverse visual impacts. The applicant's Project Layout Map shows landscape buffers on both sides of Green Valley Road where the project abuts the road. No other perimeter landscaping is indicated. A formal landscaping plan has not been provided to PPRP. Citizens UB Solar indicates landscaping plans will be reviewed and approved by Carroll County, and provided to the PSC and PPRP.

PPRP concluded that landscape placement in the applicant's Project Layout Map is both inadequate for screening the project from adjacent residences and inconsistent with the community's vision emphasizing the preservation of historic characteristics and values. In its review of the project, the MHT requested the applicant consider additional buffering to avoid an adverse effect on historic properties. The reviewing State Agencies have recommended a license condition requiring the applicant to design a landscape buffer that will effectively screen views of the project, and to negotiate a landscape maintenance and surety agreement with the Carroll County and the Town of Union Bridge. The reviewing State Agencies have also added a condition requiring Citizens UB Solar to address issues of non-compliance with recommended license conditions, such as complaints related to visual impacts associated with the Project structures.

Citizens UB Solar has stated that there are few lighting requirements for the project. The reviewing State Agencies have recommended a license condition requiring Citizens UB Solar shall develop a plan that will mitigate intrusive night lighting and avoid undue glare onto adjoining properties. Carroll County and Union Bridge will address outdoor lighting during site plan review.

PPRP undertook a glare analysis of the project estimating the intensity, time-of-day, and duration of glare for stationary observation points representing views from nearby residences, public spaces and public roads. PPRP has concluded that in the absence of effective landscaping the project could cast a moderately strong intensity of glare outside of the project's limit of disturbance for extended periods in non-winter months, affecting both public roads and locations of cultural significance. Citing concerns from traffic safety, the reviewing State Agencies have recommended a license condition requiring the applicant to establish robust landscape buffers prior to the commencement of operation. The reviewing State Agencies have also recommended a condition requiring the applicant to address complaints related to potential solar reflections.



In its review of the project, the MHT noted the project area contains three items of archeological importance and that the National Register-listed Union Bridge Historic District is adjacent to project. MHT recommended a Phase I archeological investigation in all planned disturbance areas prior to any ground-disturbing activities associated the installation of the solar facility. It also requested documentation for two on-site historic properties and additional landscaping. After reviewing the applicant's archeological report, MHT concluded that no documented archeological site within the project's limit of disturbance is eligible for listing on the NRHP. MHT concurred, however, that the Kilfadda Farm complex is an NR-eligible property, and that the project, as currently proposed, will have an adverse effect on the property, diminishing its historical significance. A reviewing State Agencies' license condition requires the resolution of all cultural resource issues prior to the commencement of construction.

A corridor of the Heart of the Civil War CHA bisects the project as it enters Union Bridge from the south. PPRP has concluded that key heritage resources will not be adversely affected if the reviewing State Agencies' recommended license conditions are adopted. PPRP has consulted with the heritage area's management unit in fulfillment of its consultation requirement. The Old Main Streets Scenic Byway bypasses the project site. The reviewing State Agencies' landscaping condition is expected to mitigate views of the project from the byway. MDOT SHA has designated MD 75 through Union Bridge as a State bikeway corridor. The reviewing State Agencies have recommended a license condition to enhance the safety of cyclists sharing the road with construction vehicles servicing the project.

The reviewing State Agencies have included licensing conditions to ensure that the project conforms to national fire and electrical codes and that emergency response protocols are in place in the unlikely event of a fire or other emergency at the site. Overall, the project's operation will not emit significant traffic, noise, air or water pollutants, or generate any hazardous waste that could potentially affect public health. At the end of the facility's useful life, a decommissioning plan will return the project site to its original state. In other words, the project will minimally affect the local environment. Because of this, PPRP has concluded that property values will be unchanged by the project.

The reviewing State Agencies have included a license condition requiring all of the noise sources associated with the Project to comply with both the State noise regulations, as listed in COMAR 26.02.03, and with relevant Carroll County noise ordinances. The available information provided by

the applicant indicates that the project will comply with both the construction and operational noise limits.

EMF levels, in particular magnetic field levels, from the proposed project are projected to fall below threshold human health standards at a distance of 3 feet. The setback between the project property line and the edge of the solar panel layout will significantly exceed 3 feet, and thus EMF levels from the project are not anticipated to pose a health risk to the public.

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