

March 4, 2021

City of Auburn Planning Board
60 Court Street
Auburn, ME 04210

Dear Members of the Planning Board and Staff,

Please find the following information in response to the City of Auburn's Planning Staff's review of Auburn Solar, LLC's application for a 4.0MW (alternating current) solar array to be located off of North River Road in the City of Auburn. Staff raised several questions, which I address and clarify below. Included in this letter are several attachments which I reference respectively in the responses.

I will be providing an updated plan set reflecting the minor changes mentioned below, as well as a few pictures of the site from North River Road, which I will bring with me to the hearing on Tuesday, March 9th. In the meantime, please do not hesitate to contact me with any additional questions or comments, and I look forward to seeing you on the evening of March 9.

Sincerely,



J. Scott Remer
Senior Development Manager



Responses to Staff Questions for Auburn Solar Development Review Application

Key:

- 1) Staff report comments are shown in black text, both normal, *italic*, and **bolded**;
- 2) *Staff comments and questions in the report are shown in green italics*;
- 3) Hexagon's responses are shown in blue.

From Chapter 60, Article XVIII. – Solar Energy Generating Systems. Section 60-1430 (Approval):

VI. *Glare.* This section requires solar arrays to minimize or negate solar glare that could impact nearby properties or roadways, it also has specific requirements for solar arrays in the Airport Overlay. **This parcel is not located within a 2 nautical mile radius of the Auburn Lewiston Municipal Airport so a glare study is not required.** *Email to Applicant: I didn't see any information provided about glare. Can you please include in a cover letter an explanation that there won't be any glare impacts associated with the project and how you made this determination?*

Central to the purpose of a solar panel module is absorbing sunlight rather than reflecting it, so any module selected will be finished with stippled glass and an anti-reflective coating so that they reflect less than 2% of incoming sunlight. Modern solar panels are non-reflective enough to be commonly installed at and around airports across the country. Please reference the attached U.S. Department of Energy report on solar glare for more information from a third-party source.

VII. *Visual Impact.* This section requires the applicant to make a reasonable effort (determined by the Planning Board) to minimize any visual impacts associated with the solar project. In making this determination, the board shall consider the size, location and topography of the site, characteristics of the surrounding property and the amount of type of development on the properties in determining how much screening and buffering is appropriate. **The site is screened from public view by natural topography and will be at least 400 Feet away from North River Road. A tree line is also proposed on the corner of the property abutting the existing access road.** *Email to Applicant: In terms of visual impact, I know you are proposing a tree-line on the corner of the abutting access road and the existing topography should mitigate any visual impacts but are you able to provide photos of the site from North River Road to show the topography and what the panels might look like as part of these mitigation efforts? The ordinance requirement states: This section requires the applicant to make a reasonable effort (determined by the Planning Board) to minimize any visual impacts*



associated with the solar project. In making this determination, the board shall consider the size, location and topography of the site, characteristics of the surrounding property and the amount of type of development on the properties in determining how much screening and buffering is appropriate.

Our current site plan in fact does not include planting a tree line or screening buffer based on the screening provided by natural topography, buildings, and other trees, but we are happy to incorporate a tree screen if needed. I will provide photos of the site from N River Road at the public hearing on March 9 to help the Planning Board determine if additional screening is required.

- VIII. Lighting. This section requires that lighting be limited to that required for safety and operation and that it be shielded from abutting properties and directed downward. **Email to Applicant:** *Are you proposing any type of lighting for safety purposes, etc.?*

Lights will be installed on the transformer pad for use during maintenance or as needed when crews are on site, but otherwise these lights will be kept off. The solar array will be surrounded by a 6' fence with locked gates, so no other lighting is proposed.

- XI. Fire & Electrical Codes. Requires all Solar Energy Generating Systems to be installed in compliance with the photovoltaic systems standards of the National Fire Protection Association and National Electrical Code. **EMAILED APPLICANT**

I am in communication with Mr. David O'Connell about making sure the site plan meets all requirements. The revisions we are making include 1) providing a Vegetation Management Plan (attached at the end of this letter); 2) demonstrating that a minimum 10' passageway is kept between panels, fences, and other features in our Site Plan; 3) increasing road width from 12' to an adequate width to accommodate emergency vehicle access; and 4) increasing the length of the driveway hammerhead features to 50' to allow for easier emergency vehicle maneuverability.

From Sec. 60-1431. Abandonment or Decommissioning standards, including the requirement of a financial surety to cover the cost of facility removal in the future.

The Applicant has provided a decommissioning estimate and plan that appropriately describes how the project will be removed and the site restored at the end of the project. It is important to note that the ordinance has requirements for decommissioning of solar arrays specific to projects in the Ag-Zone. **Email to Applicant:** *As part of the decommissioning plan, are you able to propose a*



figure for future plantings/the means necessary to reestablish prime farmland (however that may look in the future)?

Please see the attached Vegetation Management Plan and the Decommissioning Plan included on our original application. The original plan includes a line item of approximately \$5,000 in 2021 dollars for re-seeding vegetation after the solar array is removed. This amount is to be included in the surety bond posted with the City. It will increase annually at a rate of 2% to account for inflation and also includes a 25% contingency.

From Chapter 60, Article IV, Division 2, Agriculture and Resource Protection District, Sec. 60-145. – Use Regulations.

(B) Special Exception Uses. Ground-Mounted and Dual-Use Solar Energy Generating Systems greater than one acre in total land area as defined in Sec. 60-1425, subject to the following conditions:

f) Clearing

1. The presence of the Solar Energy Generating System will not result in unnecessary soil erosion or loss that could limit agricultural productivity on the subject property or abutting properties. **(SEE BELOW)**.
Please see the attached Vegetation Management Plan for more information

4. A Vegetative Cover Plan is provided that demonstrates, where feasible, the replanting of forested areas disturbed during construction and preservation of prime soils throughout the life of the project. **A Vegetative Cover Plan was not specifically provided; however, the Applicant has indicated the areas will be re-seeded with a pollinator friendly fescue grass mix of local native plants. *Email to Applicant: The ordinance requires a Vegetative Cover Plan. It does not describe what format this has to be presented in, for other projects, information has been included as part of a cover letter. The purpose of the plan is to demonstrate that prime farm soils will be preserved throughout the life of the project. Basically, what measures will be in place to ensure the prime farmland remains on the site for the next 20 years and isn't degraded?***
 - a. *As part of this discussion, can you also outline the process for how topsoil will be preserved/maintained? The*



ordinance requires a plan for topsoil maintenance. I think this is something that could be included as part of the O&M Plan or under a separate cover as a brief paragraph.

Please see the attached Vegetation Management Plan for a detailed plan on how we will maintain soil integrity and Prime Farmland soil characteristic and how we will manage the minimal clearing required for the project. Succinctly, any areas that require clearing will be shortly replanted with a local pollinator mix (an example mix is provided) and the few areas that require smoothing or grading to keep slopes <20% will be recovered with topsoil as soon as is practically feasible.

h) Additional requirements that ensure the following:

1. Siting of the overall facility and individual panels shall keep with the existing contours of the land, and
2. Only pile driven, or ballast block footing shall be used so as to minimize the disturbance of soils during installation, and
3. To the extent possible, infrastructure shall not be located on steep slopes, and

Email to Applicant: *I know in our conversations you mentioned that only a minimal amount of grading will be necessary, otherwise the panels will follow the existing topography of the land. Can you please include this information in a cover letter?*

Please see the updated site plans that indicate where this minimal grading will take place, to be provided before the Public Hearing on March 9th. Please also reference the Vegetation Management Plan for information on how topsoil from grading activity will be handled.

Only a minimal amount of grading will be required for this project. The solar array's racking system can accommodate slopes up to 20% and follow the contour of the land. In the few places where knolls in the field exceed this 20%, the knolls will be smoothed only to the point of allowing the racking to be built over them.

A topsoil maintenance plan was not included in the materials provided. (SEE ABOVE).

Please see that attached Vegetation Management Plan.

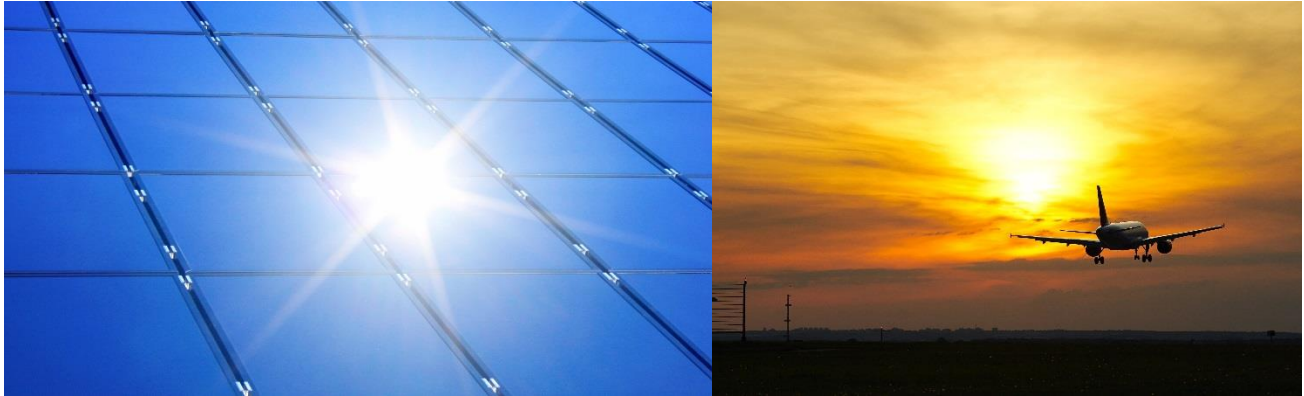
Addressing –Addressing Officer, Rosemary Mosher will need to create an E-911 plan with you for the solar project to differentiate that portion of the parcel from the residence and fruit barn. ***Email to Applicant:*** *Please coordinate with Rosemary Mosher (Addressing Officer) for the City to create an E-911 plan that will differentiate the solar project portion of the parcel from the existing buildings.*



We will coordinate with Ms. Mosher to create an E-911 address for the project before applying for a building permit.



Solar and Glare



I. Introduction

A common misconception about solar photovoltaic (PV) panels is that they inherently cause or create “too much” glare, posing a nuisance to neighbors and a safety risk for pilots. While in certain situations the glass surfaces of solar PV systems can produce glint (a momentary flash of bright light) and glare (a reflection of bright light for a longer duration), light absorption, rather than reflection, is central to the function of a solar PV panel - to absorb solar radiation and convert it to electricity. Solar PV panels are constructed of dark-colored (usually blue or black) materials and are covered with anti-reflective coatings. Modern PV panels reflect as little as two percent of incoming sunlight, about the same as water and less than soil or even wood shingles (SEIA/Sandia 2013). Some of the concern and misconception is likely due to the confusion between solar PV systems and concentrated solar power (CSP) systems. CSP systems typically use an array of mirrors to reflect sunlight to heat water or other fluids to create steam that turns an electric generator. These typically involve large ground-mounted reflectors, usually in remote desert locations, and are not installed in residential or commercial areas or near airports.

Solar PV system on the left compared to a parabolic trough CSP system on the right. Photo Copyright DOE/NREL/ORNL



II. PV on or near airports

Solar and Glare

As of June 2013, there were over 30 solar projects in operation at airports in 15 different states (Barrett 2013). Solar installations have been successfully located at or near US international airports in Boston, New York, San Francisco, and Denver, among others. Yet concerns over glint (a quick reflection) and glare (a longer reflection) often arise when a PV system is proposed on or near an airport. Pilots are familiar with both glint and glare as reflection is a common phenomenon, especially off of bodies of water or in the form of glare from the sun itself. However, issues can arise if the solar PV system were to cast glare into an air traffic control tower.¹

The Federal Aviation Administration (FAA) has been actively reviewing the impact of glare from solar panels to streamline an evaluation process that ensures safety while creating more opportunity for solar installations on or near airports. The FAA filed notice of its Interim Policy for review of solar energy systems on federally obligated airports (i.e. airports which receive federal funding) in October of 2013.² This policy requires that a sponsor of a federally obligated airport must request FAA review and approval to install solar on its "airport layout plan." Federally-obligated airports must also notify the FAA of its intent to construct any solar installation by filing FAA form 7460-1. The interim FAA policy also requires the use of the Solar Glare Hazard Analysis Tool for on-airport solar development.

III. FAA and the Solar Glare Hazard Analysis Tool

In order to understand and model glare in accordance with FAA standards, Sandia National Laboratories developed the Solar Glare Hazard Analysis Tool (SGHAT). Standardized safety metrics define what glare intensity will cause unwanted visual impacts to Air Traffic Control towers and airplane pilots. SGHAT can be used to evaluate the potential of a particular PV array to produce glare intensity, predicting when and where glare will occur from a prescribed PV array at user-defined observation points (i.e. from the Air Traffic Control Tower or from a series of points along an aircraft landing route) and be combined with Google maps for an easy user interface. In instances where glare may be a concern, the tool can prescribe minor adjustments to the tilt, direction, and location of the panels to alleviate any issues. SGHAT will predict annual energy production for the various adjusted positions (SEIA/Sandia PPT).

IV. Role for Local Governments

Local governments may wish to include airport guidance within their local zoning ordinances that address solar PV. The North Carolina Solar Center *Template Solar Energy Development Ordinance for North Carolina*³ includes a section on airports and recommends aviation notification steps for both on-airport solar projects and installations within 5 nautical miles of an airport. In addition to amendments to local zoning codes, local governments have the opportunity to conduct outreach to airports,

¹ <http://www.unionleader.com/article/20120830/NEWS02/708309966/0/newhampshire>

² <http://www.gpo.gov/fdsys/pkg/FR-2013-10-23/pdf/2013-24729.pdf>

³ http://ncsc.ncsu.edu/wp-content/uploads/Template-Solar-Ordinance_V1.0_12-18-13.pdf

Solar and Glare

organizations and local stakeholders about methods for predicting and managing glare impacts from solar panels near airports or other locations. Such outreach furthers the safety goals of the FAA and the solar energy development goals of municipalities and communities. Spreading awareness of the safety of PV systems along with FAA guidance and glare measurement tools will help foster informed communities and enable the deployment of safe and productive solar PV projects in locations where glint and glare may be of concern.

V. Useful Links

Sandia Solar Glare Mapping Tools: <https://share.sandia.gov/phlux>

V. Citations

Barrett, S., June 2013, Glare Factor: Solar Installations And Airports, *Solar Industry, Volume 6, Number 5*.
http://www.solarindustrymag.com/issues/SI1306/FEAT_02_Glare_Factor.html.

Federal Register 2013, etc.: <http://www.gpo.gov/fdsys/pkg/FR-2013-10-23/pdf/2013-24729.pdf>

SEIA/Sandia Webinar on Solar PV and Glare:

<http://www.seia.org/sites/default/files/resources/Final%20ofAA%20Webinar%20Slides%20August%202013.pdf>

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Auburn Solar: Vegetation Management Plan March 2021

Hexagon Energy, on behalf of Auburn Solar, LLC, has prepared this Vegetative Management Plan (Plan) for the Auburn Solar Photovoltaic Facility (Facility or Project) to be located off North River Road in the City of Auburn, Maine. This Plan has been prepared to fulfill the requirements of the state and local permitting bylaws and zoning ordinances in accordance with solar development best practices. This plan is based on previous vegetation management plans for other solar arrays submitted to the City.

The proposed Facility consists of a 4.0 megawatt (alternating current, AC) capacity solar power-generating operation secured within a six (6)-foot security fence surrounding the PV solar panels and equipment and accessed via a locked gate from an as-now unimproved section of Elmwood Rd connecting to N River Rd, to be improved by the developer for project access.

Vegetation Management Plan

Hexagon Energy or any of its assigns will implement the measures described in the following sections to manage vegetation during Project construction, operation, and decommissioning as well as to control for and prevent fire hazards. This long-term vegetation management will provide site-stabilization, topsoil preservation, and stormwater runoff control while minimizing potential fire hazard fuel sources and optimizing solar capture.

Vegetation Removal

The overwhelming majority of the proposed site area is already cleared. Only a small amount of tree clearing and stumping will be required in the northwest corner of the site, and tree clearing for shade management—but not stumping or grubbing—will occur along the eastern edge of the southern array.

Clearing will include cutting, removal, and disposal of trees, bushes, shrubs, stumps, fallen timber, brush, refuse, trash, fencing, and other incidental materials not required for reuse on the site. Stumps and root systems will be grubbed within the clearing limits, within the fence and areas ten (10)-feet outside the fence. The clearing contractor will take precautions to minimize disturbance on existing low-growing vegetation and will restore and stabilize topsoil when removing stumps. For areas outside the solar arrays or collector line trenching, trees may be cut or mowed flush to the ground (using, for examples, a fecon mower/mulcher or a tracked brontosaurus). To the extent practicable, understory vegetation will be left in place to take advantage of existing groundcover and to expedite permanent stabilization following clearing.

Topsoil Maintenance during Construction

Minimal grading will be required for this project, only smoothing the few points on site where ground undulations exceed 20%; otherwise the solar racking and panels will follow the existing contours



of the land. The site area has been selected to avoid any areas of steep and continual slope, allowing the soils to naturally stay in place even during construction and operation

In any areas where topsoil is proposed to be temporarily stripped from the site for grading (see site plan), topsoil will be stockpiled in accordance with the topsoil stockpile best practices. Protecting stockpiled topsoil with silt fence and vegetative cover will prevent loss of Prime Farmland soils during construction. Additionally, low pressure tracked equipment may be used during construction to minimize soil compaction. Once grading is complete, stockpiled topsoil will be spread onto the disturbed area and seeded and mulched within six (6) days of final grading.

Post-Construction Restoration

Seeding and mulching for final stabilization shall be completed as soon as practicable and phased throughout construction. All areas achieving final grades or topsoil placement shall be seeded and mulched within seven (7) calendar days. Areas of final stabilization shall be clearly marked in the field and protected so as to prevent damage from construction vehicle traffic. Areas shall be inspected throughout construction and at a minimum of monthly after Project completion until 90 percent vegetative growth is achieved. The following tables provide a summary of permanent mulch and seeding requirements.

Operational Maintenance

Auburn Solar will be operated and maintained in accordance with the following plan:

1. Periodic inspections, approximately once per month, of the perimeter fence, solar array, and connecting infrastructure will be made by the maintenance contractor.
2. Repairs to the security fence shall be made as needed.
3. Erosion in access roads shall be repaired and stabilized.
4. Repairs to solar energy collecting and distribution equipment shall be made as needed.
5. Fence panels or chain link shall be raised approximately 6-inches off the ground to facilitate movement of ground dwelling animals.
6. Repairs to or replacement of utility poles shall be made as needed.
7. Access roads shall be maintained.
8. Culverts shall be maintained as necessary, including cleaning or replacement.
9. Mowing will occur approximately twice per year under and around the solar array in accordance with requirements for projects no requiring Maine Site Law.



The City of Auburn’s bylaw prioritizes the co-mingling of agricultural and energy-generating land uses, and Auburn Solar is designed to advance this priority. The ground areas under and around the solar panels will be planted with a pollinator-friendly fescue grass mix of local native plants, designed to foster bees, butterflies, and other microfauna. An example of a potential seed mix to be used is included; this mix may be modified, but it is indicative of the type of expected plantings at the array. The improved pollinator habitat will foster bees and improve nearby agricultural activities dependent on such pollinators. Auburn Solar, with the landowner’s consent, would entertain allowing beekeepers to maintain apiaries near the array.



The fence surrounding the array will also be raised six inches above the ground surface to allow small mammals, birds, reptiles and other animals to easily pass between the array habitat and the surrounding woods and agricultural areas.

POLLINATOR / WILDFLOWER SEED MIX (CUSTOM)		
20 LBS./ ACRE		
Botanical Name	Common Name	Bulk Pound (lb.)
<i>Festuca ovina</i>	Sheep Fescue	0.25
<i>Schizachyrium scoparium</i>	Little Bluestem 'Camper'	0.2
<i>Andropogon virginicus</i>	Broomsedge	0.12
<i>Lolium multiflorum</i>	Annual Ryegrass	0.15
<i>Coreopsis lanceolata</i>	Lanceleaf Coreopsis	0.08
<i>Coreopsis tinctoria</i>	Plains Coreopsis	0.08
<i>Rudbeckia hirta</i>	Blackeyed Susan	0.05
<i>Achillea millefolium</i>	Common Yarrow	0.05
<i>Aesclepias tuberosa</i>	Butterfly Milkweed	0.05

Example Seed Mix of Solar Pollinator Planter

Site Restoration and Closeout

The following steps, drawn from the Decommissioning Plan submitted with our permit application, will be followed at the conclusion and closeout of the project:



1. Decommissioning Contractor shall remove any temporary fencing and equipment and haul it off site. Access roads, fences, gates or buildings may remain in place if they are in keeping with the resumed use of the site.
2. Decommissioning Contractor shall seed the site with native grasses.
3. Decommissioning Contractor shall remove any and all other materials related to the decommissioning process, including but not limited to decommissioning machinery, construction equipment, excess material and decommissioned material from the site.
4. Owner shall give written notice to MaineDEP and the City of Auburn that the site decommissioning is complete and the site is restored to near original conditions. Decommissioning will be considered complete and all responsibility will be released from Owner.

Upon removal of the solar facilities, portions of the Project mapped as Prime Farmland according to the USDA NRCS SSURGO soils database will be allowed to revert back to Prime Farmland. Prime Farmland soils, where present, will be preserved during operation of the facility as the groundcover will be maintained during operation in a meadow condition. Post- decommissioning, topsoil preserved by meadow cover could be mowed or tilled for agricultural use by the landowner at their discretion.

Restoration Bond and Financial Assurance

The surety bond proposal in our Decommissioning Plan submitted with the original application includes the line item "Grade and Seed Disturbed Area with Native Grasses (72 Hrs)" under the "Final Site Restoration" heading. In 2021 dollars, the estimated cost of grading and seeding is \$4,560, and this amount is to be included in the surety bond posted with the City of Auburn before construction of the array begins. The surety amount will increase annually by 2% to account for inflation and also includes a 25% contingency, so in 2041 the bond amount for replanting the site will be valued at approximately \$8,500. This will be part of the overall decommissioning bond amount of \$128,794 in 2041 dollars.

Fire Hazard Management

As previously mentioned, the area under and around the array will be mowed twice per year to control growth of the pollinator plantings. This mowing will control vegetative growth to keep the site accessible, control for shading from plant growth, and keep too much biomaterial from accumulating as a fire hazard. We will also conduct regular, approximately monthly, visual inspections of the array and address any rampant growth or any necessary preventive maintenance then. The array will also be monitored in real-time via remote sensor to keep track of its production, and any hiccup in its operation will be monitored closely.

