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October 4, 2023

Mr. Laurance Rand, III, Chairman
Planning and Zoning Commission
Town of Sharon
63 Main Street
Sharon, Connecticut 06069

Re: Proposed Solar Array
Sharon Center School
64 Hilltop Road
Sharon, Connecticut

Dear Mr. Rand and Members of the Planning and Zoning Commission,

I was retained by several property owners to review the proposed plans and documents for the solar array proposed at Sharon Center School. I have the following comments on the reviewed documents.

Executive Summary:

I. No stormwater management analysis and report were provided to the Planning and Zoning Commission. This is a significant omission on the part of the applicant.
II. No Decommissioning plan for the solar array has been provided.
III. No Carbon Debt Analysis has been provided.

Site Plans by Verogy (5 Sheets) :
Sheet 3 :

1. It does not appear that the proposed construction entrance meets the requirements of the CT DEP 2002 Guidelines for Soil Erosion and Sediment Control which must be a minimum of fifty feet in length and the full width of the construction driveway.
2. No alignment of the construction driveway from the parking area to the array area has been provided. This is an omission on the plans.
3. The construction driveway must traverse a fairly steep slope near the basketball courts and will require grading of the area which has not been shown.
4. No erosion control measures have been provided along the alignment of the construction driveway.

Sheet 4:

5. There are no provisions for handling the increased runoff from the solar panels. Solar panels even when placed over existing ground are an impervious surface which will increase both the rate and volume of runoff discharged from the site. Based upon my review of other ground mounted solar proposals, both the rate and volume of runoff from the site will increase between 30% and 40% from the current conditions. This increased runoff will cause adverse impacts to the upland area on and below the proposed array. What will happen is that the concentrated flow running under the dripline of the panel rows on the ground surface heading downslope to the east will erode the upland soils, starting with sheet erosion, then rill erosion, and lastly gully erosion. The eroded material will then be deposited further downslope and over time may reach the downgradient wetland area.
6. To install the steel posts for the racking system, a Bobcat with a pile driving attachment or similar piece of equipment must be used. This will result in tracking back and forth over the lawn area resulting in the compaction of the upper soil layers. Additionally, pick up trucks or similar vehicles will be required to deliver the panels and other equipment to the array site which will also result in further compaction of the soils.
7. While the panels face south, the land slopes from the west to the east. This means that runoff from the front edge of the panels will fall onto the ground and then run directly under the dripline of the panel to the east. This concentrated flow will cause erosion of the upland soils and result in the deposition of sediment beyond the limit of the array.

Sheet 5:

8. Based upon the construction narrative, it is apparent that the site will be disturbed for the installation of the solar array, thus the concerns about stormwater management expressed above are factual.

Special Exception Narrative:

9. It is stated on page 6 that there will be no change in the stormwater report. This statement is false as discussed above.
10. No decommissioning plan for the solar array has been provided. What will happen to the panels at the end of their useful life? The following is an article about a solar array in Nebraska which was destroyed by a hailstorm a few months ago and discusses that solar panels cannot be recycled.
11. The following material is from an article from the "Cowboy State Daily" which is very applicable to this and all decommissioning plans for ground mounted solar arrays; "*The extent of the damage at a Scottsbluff solar farm that was heavily damaged in a hailstorm last week remains unknown. "They're still working through that process," Grant Otten, spokesperson for the Nebraska Public Power District, which owns the solar farm, told Cowboy State Daily. Cowboy State Daily reached out to Sol Systems, which financed and developed the project, but didn't receive a response. While some of the solar panels at the farm may be salvageable, as well as other equipment, it's likely many of the panels will need to be discarded. Even if solar panels aren't destroyed by weather events, they gradually stop producing much electricity and reach the end of their lives in 20 to 30 years. By 2050, the International Renewable Energy Agency estimates that 78 million tons of solar panels will come to that point.*

Recycling

While renewable energy proponents are pinning their hopes on recycling to deal with this coming deluge of e-waste from dead solar panels, only about 10% of them are recycled, and only a small portion of any single panel provides recoverable minerals.

B.F. Randall, who has a background in project development and finance, told Cowboy State Daily that a lot of people are under the impression that recycling a solar panel means you make a new solar panel. "A solar panel has very little mineral content relative to the volume of the panel," Randall said. "So, it's just not something that can be recycled in that sense."

Polysilicon

The polysilicon in solar panels cannot be recycled at all, he said.

It takes 3 to 5 tons of polysilicon to produce 1 megawatt worth of solar panels. To make it, they take silicon dioxide and mix it with carbon, which is most often derived from coal. However, it's possible to use wood or graphite. The mixture is dropped in a furnace at about 3,600 degrees Fahrenheit, which means it takes large amounts of constant energy to produce the heat needed for the process. For every ton of polysilicon produced, 3-4 tons of silicon tetrachloride, a highly toxic compound, also are produced. As solar panels reach the end of their useful lives, most of that polysilicon will need to be disposed of in landfills. "Polysilicon ... can't ever be recycled back into polysilicon. If it's fake cycled into sand it would be absolutely toxic," Randall said.

Other minerals

It is possible to recover aluminum and copper from a panel's frame and junction box.

The Grist, a publication of a pro-renewable nonprofit, reported that a recycled panel will produce about $3 in recovered aluminum, copper and glass, which after transportation costs will cost between $12 and $25 to get. The same panel tossed into a landfill will cost less than a buck.

There is also a small amount of silver to recover from the panel that's worth less than the cost to recover it. As Randall explains in a Substack article, solar panels contain about 60 grams of silver paste. Each panel only has a tiny amount, but the industry altogether consumes 9% of all silver produced in the world. If that solar paste were refined silver, it would be worth $6 — but it's not refined. Randall said in an interview that the paste contains contaminants that have diluted that refined silver. "You can't recover the silver. It doesn't work that way," he said.

Regulations

So long as the cost to recover minerals from the solar panels exceeds the value produced, the best way to deal with destroyed or exhausted solar panels is to throw them away, like is done with most wind turbine blades. Some nonprofits are shipping dead panels to developing countries where the weak amount of electricity they produce still has some benefit to people who have no access to other sources of power. The European Union is trying to address the problem by requiring manufacturers to finance end-of-life collection and recycling, which will increase the cost of the panels. So far, only Washington state has passed similar legislation, which will go into effect in 2025." Here is link to actual article: https://cowboystatedaily.com/2023/07/08/spent-solar-panels-likely-to-end-up-in-landfills-because-recycling-them-isnt-economical/?utm_source=Klaviyo&utm_medium=campaign&_kx=s0jgVuk3akhgRMRJ5SHk-JeBs-6gLo6APrj4tRRqpOY%3D.UXPtrV . The reality is that solar panels are not going to be recycled but will wind up in landfills where there is a high probability of environmental harm from leaching of toxic compounds in the solar panels.

Other Comments:

12. A common argument in favor of ground mounted solar is a reduction of fossil fuels to generate electricity. Thus, it needs to be shown that the proposed ground mounted array will be a significant improvement over conventional power generation. This is demonstrated by performing a Carbon Debt Analysis. No Carbon Debt Analysis has been prepared per the EPA requirements.
13. Solar panels have an efficiency of less than 24% for the conversion of sunlight to electricity. It is not known what the efficiency of the panels are for this site. It is important to note and understand that this efficiency degrades by 0.5% per year (occurs with all silicon panels). If the efficiency is 21% (assumed after a literature review), at 25 years, the efficiency will only be 8.5%. Is this worth the adverse environmental impacts which will occur because of this project?
14. It is important to point out that solar panels cannot be made, transported, installed and removed without using a significant amount of fossil fuels, thus the carbon footprint of ground mounted solar arrays is significantly larger than represented by the applicant.

Please contact my office if you have any questions concerning this information.

Respectfully submitted,
Trinkaus Engineering, LLC

Steven D. Trinkaus, PE