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PLANNING BOARD
GRAFTON, MA

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September 10, 2015

Joseph Laydon
Town Planner
Grafton Municipal Center
30 Providence Road
Grafton, MA 01519

Subject: **Proposed Site Development, CEC Solar #1056 LLC**
207 Providence Road
Special Permit and Site Plan Review

Dear Joe:

We received the following documents on August 14, 2015:

- Plans entitled Proposed Site Development, CEC Solar #1056 LLC, 207 Providence Road, Grafton, Massachusetts dated August 12, 2015, prepared by Field Engineering Co, Inc. for CEC Solar #1056 LLC. (12 sheets)
- Bound document entitled Stormwater Management System Report, CEC Solar #1056 LLC Proposed Solar Panel Array Installation dated August 12, 2015 prepared by Field Engineering Co, Inc. for Clean Energy Collective, LLC.
- Bound document entitled Special Permit & Site Plan Approval Application Package, CEC Solar #1056 LLC, Proposed Solar Panel Array Installation dated August 12, 2015 prepared by Field Engineering Co, Inc. for Clean Energy Collective, LLC.

Graves Engineering, Inc. (GEI) has been requested to review and comment on the plans' conformance with applicable "Grafton Zoning By-Law" amended through October 14, 2013; Massachusetts Department of Environmental Protection (MADEP) Stormwater Management Policy and standard engineering practices on behalf of the Planning Board. GEI has also been requested to review and comment on the documents' conformance with applicable Conservation Commission "Regulations Governing Stormwater Management" dated May 2013 on behalf of the Conservation Commission.

Our comments follow:

Zoning By-Law

1. GEI agrees with the concept of the cul-de-sac turnaround proposed for the site's access road. However, the slope within the cul-de-sac is proposed to be 8%, which means that turning vehicles will have an 8% cross slope. Cross slopes should not exceed 4%. Consideration should be given to reduce the slope within the cul-de-sac portion of the access road to accommodate large vehicles (especially fire trucks). (§1.3.3.1)
2. The Board may wish to inquire about the applicant's intentions for employee parking during the construction phase of the project. No parking is shown at the site and on-street parking along Providence Road should be avoided. (§1.3.3.1)

3. The Application for Site Plan Approval lists the date the plans were prepared as 7/30/15, however the plans show that they were prepared on August 12, 2015. This is likely a minor typo. We defer to the Planning Board if the application should be corrected. (§1.3.3.3.a)

4. Some of the plan sheets (Sheets 3, 4 and 8) were prepared at a scale of 1" = 60' instead of 1" = 40'. The plans were legible and we were able to read them. We defer to the Planning Board if the scale of 1" = 60' is acceptable to the Board. (§1.3.3.3.d)

5. Two Locus Maps were provided, one at a scale of 1"=600' and one at a scale of 1"=500' instead of 1"=1,000' as is required by the regulations. The Locus Maps were legible and we were able to read them. We defer to the Planning Board if the alternative scales are acceptable. (§1.3.3.3.d.8)

6. North arrows were not shown on the Locus Maps. (§1.3.3.3.d.8)

7. Calculations of the volume of earth material to be removed or filled were not provided. (§1.3.3.3.d.17)

8. Proposed lighting at the site was not shown on the plans. The Board may wish to inquire of the applicant if any lighting is anticipated (e.g. at the security gate). (§1.3.3.3.d.22)

9. A written statement is required from the engineer, the applicant and the property owner in regards to compliance with Section 4.1 of the Zoning By-Law. The engineer must indicate that the project was designed to comply with Section 4.1, while the applicant and the property owner must indicate that the site will be maintained in compliance with Section 4.1. Such statements were not submitted to our office. We understand that such statements would be submitted to and reviewed by the Planning Board. (§1.3.3.3.g)

Grafton's Regulations Governing Stormwater Management

10. Considering the steepness of the slopes, it would be prudent to include interior lines of erosion and sediment control barriers rather than rely only on the perimeter line of hay bales/silt fence. In our opinion, interior barriers should be set at key locations (e.g. to protect the crushed stone edge drains from sedimentation) and in such a way to generally be parallel with topographic contour lines and to limit up-gradient disturbed areas to approximately 200 feet in length as measured perpendicular to the topographic contour lines.

11. Water velocities in pipes must not exceed 10 feet per second. (§6.B.3.d)

12. The plans do not show the proposed locations for the storage of materials, wastes, vehicles, equipment, soil and snow. (§7.B.2.f)

Hydrology Review & MADEP Stormwater Management

13. GEI reviewed the hydrology computations and found them to be in order except as noted below.

14. In the pre-development conditions the western hydrology analysis point consists of a property line approximately 300 feet long with distributed stormwater runoff. In the post-development conditions the same analysis point will have some distributed runoff from Subcatchment 1A, but there will predominantly be a concentrated flow that will be discharged from Detention Basin 1 to the remaining northwest section of the subject property where a dwelling and accessory buildings are located. The plans show an existing swale on the northwest section of the property that directs stormwater around the accessory buildings. Furthermore, GEI is aware of drainage concerns at the northwest section of the site via a complaint made in the mid-2000's. In short, we're concerned about whether the concentrated flow will negatively impact the northwest section of the property and whether the property owner finds the proposed discharge point acceptable. The Board may wish to inquire of the applicant if the property owner has authorized the proposed discharge point. Absent confirmation by the owner of the proposed discharge point, the hydrology computations should evaluate the pre- versus post-development peak runoff rates at the area up-gradient of the remaining 207 Providence Road site independently from the abutting land of Shields.

15. If the proposed discharge location discussed in the preceding comment is to be utilized, then the design engineer needs to evaluate the flow path between the discharge point of Detention Basin 1 and Providence Road to determine if there is adequate hydraulic capacity and that the concentrated flow will not cause erosion along the flow path – part of the flow path consists of sparsely-vegetated soil. Likewise, the analysis should evaluate impacts to the Providence Road drainage system due to the rerouting of stormwater runoff.

16. GEI has no issues relative to compliance with the MADEP Stormwater Management Standards except as noted below.

17. There needs to be at least one-foot of freeboard in the detention basins, as measured from the peak 100-year water surface to the crest of the embankment. The hydrology computations show that there will only be 0.20 feet and 0.68 feet of freeboard in Basins 1 and 2, respectively.

18. The hydrology computations show that the emergency spillway will be used to discharge stormwater at Detention Basin 1 during the 100-year storm event and at Detention Basin 2 during the 10, 25 and 100-year storm events. During these storm events, water must only be discharged via the basins' primary outlets (with appropriate energy dissipation) so that the overflow spillways are available for unusual or emergency situations.

19. The emergency overflow spillway at Detention Basin #1 is not wide enough and should be deeper. The spillway is proposed to be only five feet wide and 0.75 feet deep. The five-foot width does not allow for a 5H:1V side slope as shown on the "Emergency Overflow Spillway" construction detail on Sheet 12 and will result in a V-shaped channel. A V-shaped channel should be avoided so that flow may be distributed across the channel bottom. Also, the V-shaped channel is not consistent with the five-foot long broad-crested weir modeled in the hydrology computations. Finally, the spillway's depth should be at least one foot.

20. Riprap sizing calculations (e.g. stone size and apron dimensions) must be provided to demonstrate that the riprap aprons at the pipe outlets were adequately sized.

21. Access to Detention Basin 2 and its outlet structures requires vehicles to pass over a slope of approximately 28%. Per MassDEP's Stormwater Handbook, the slope must not exceed 20%.

22. A gate must be provided in the fence to allow access to Detention Basin 1.

23. No information was submitted concerning soil testing at the two stormwater basins and based upon visual observations during our site visit soil testing has not yet been performed. The basins are proposed with earth cuts of three to ten feet and one to seven feet at Detention Basins 1 and 2, respectively. We are concerned about the depths of bedrock and groundwater at the basins. Prolonged interception of groundwater within the detention basins could result in prolonged discharges at the basins' discharge points. Although the stormwater basins are proposed as detention basins and not as infiltration basins, soil testing should be performed to confirm design assumptions relative to the depth to bedrock and groundwater.

24. We recognize that the amount of proposed impervious area is insignificant, but nonetheless it would be prudent to provide stone check dams or another means to create forebays at the inlet areas of the detention basins for improved water quality. The forebay would be most beneficial during the construction phase of the project.

General Engineering

25. The location of the flow control structure at Detention Basin 1 needs to be revised. The structure's lowest inlet is elevation 161.0 feet but the proposed ground elevation around the structure is 164 feet.

26. The 7.5% slope of the 12" outlet pipe at Detention 1 is too steep. Using the pipe's Manning's "n" value in the hydrology computations, we estimated that the velocity of water discharged during the 10-year, 25-year and 100-year storm events will be approximately 15 feet per second. Standard practice is to not exceed 10 to 12 feet per second.

27. The slope of the 12" pipe that will discharge into Detention 1 and the two pipes that will discharge into Detention Basin 2 are too steep – 24% to 28%. The velocity of water in the pipes will be excessive. Standard practice is to not exceed 10 to 12 feet per second.

28. At Detention Basin 1, the rim of the drain manhole and the lowest portions of the stone edge drains will be elevation 164 to 164.5 or 0.3 to 0.8 feet lower than the calculated peak water surface of 164.80 feet during a 100-year storm event. The potential exists for stormwater to surcharge from the lowest sections of the edge drain.

29. The plans need to include a construction detail for the level spreader proposed at Detention Basin 1.

30. At the northern inlet to Detention Basin 1, the riprap apron needs to be extended to the base of the 3H:1V slope and for a distance on the basin bottom to provide a splash pad.

31. The pipe invert elevation needs to be provided at the southern discharge point into Detention Basin 1.

32. The drain manholes are fairly shallow but nevertheless ladder rungs should be included on the "Typical Drain Manhole" construction detail on Sheet 12.

General Comments

33. On Sheet 5, there is a leader note for a drain manhole southeast of Detention Basin 1 that appears to apply to an earlier draft of the plans – the inlet pipe diameter of 12" is incorrect and the leader does not point to a manhole.

34. On Sheet 1, the owner of Lot No. 99/9 is listed as Hillview Estates, Inc. Trustee. This lot is actually the Providence Road Commons residential development that is currently under construction and is understood to be owned by Providence Road Commons, LLC.

35. It would be helpful if pertinent dimensions (e.g. turnout at the electrical equipment pads, cul-de-sac diameter) of the driveway/access road were provided on Sheet 4 of the plans.

36. Plan Sheets 6 and 7 do not have a north arrow on the plan views. North arrows should be provided.

We trust this letter addresses your review requirements. Feel free to contact this office if you have any questions or comments.

Very truly yours,
Graves Engineering, Inc.

Jeffrey M. Walsh, P.E.
Vice President

cc: Grafton Conservation Commission
Richard R. Riccio III, P.E.; Field Engineering Co., Inc.