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March 28, 2016

Heidi Samokar, AICP
Director of Planning and Development
Town of Tolland
21 Tolland Green
Tolland, CT 06084

Re: 327 South River Road – Ground Mounted Solar Photovoltaic Project
Stormwater Peer Review Services

Dear Ms. Samokar:

The Horsley Witten Group (HW) is pleased to provide this peer review of the Site Plan Application (SPA) submitted by Woodard and Curran (W&C) on behalf of WR-TGC Solar Generation XVI, LLC (Applicant). The 5-acre project site is located at 327 South River Road in Tolland, CT and is part of a 28.5-acre parcel owned by the Town of Tolland (Town). The proposed project consists of the construction of a 5-acre solar field to be located on the western side of the property. The project area is primarily open field (former cornfield) with gently sloped (<15%) topography. The proposed project includes the installation of erosion control measures, construction of the 5-acre solar farm with a concrete pad for electrical equipment, associated site grading, installation of a security fence around the new solar farm, and construction of a drainage swale and stormwater basin.

This review of the submitted materials is based on requirements in the Town of Tolland Low Impact Development and Stormwater Management Design Manual and the Connecticut Stormwater Quality Manual (CSQM), as well as standard engineering practices.

The following documents and plans were prepared by W&C and reviewed by HW:

- Site Plan Application for TGC - South River Road Solar Project, dated March, 2016;
- Letter responding to the HW March 21, 2016 Memorandum, dated March 26, 2016;
- HydroCAD calculations, dated March 24, 2016;
- Operation and Maintenance Plan, dated March 2016; and
- Plan set entitled "TGC Solar 1, 327 South River Road, Tolland, CT 06084," March 2016, revisions dated March 23, 2016, which includes:
    - Cover Sheet
    - Existing Conditions Plan & Legend C-100
    - Site Plan, Grading and Erosion Control C-101
    - Details - 1 D-200
    - Details - 2 D-201

Stormwater Review

HW has reviewed the documents listed above. HW offers the following comments concerning the stormwater management design as per the requirements listed in Section 4.0 of the Town of Tolland Low Impact Development and Stormwater Management Design Manual (Design Manual) revised July 1, 2011 and the State of Connecticut 2004 Stormwater Quality Manual (CSQM).

1. *Environmental Site Design (ESD) - Requirement #1*:

    a. The Applicant has provided documentation of wetland resource areas and soil delineations and surveys, vegetation types, pre-construction site and drainage conditions (Section 2.2.1 and Appendix C: Wetland Report of the Application). The Applicant has utilized Low Impact Development (LID) strategies in the site design by minimizing impervious surfaces, minimizing land disturbance, maintaining the majority of the existing topography, and designing a drainage swale and a stormwater basin to manage the stormwater impacts. The Applicant appears to have complied with Requirement #1.

    b. It is not clear from the submission if the required land disturbance includes the removal of any large trees. HW recommends that the Applicant inform the Planning and Zoning Commission if any significant size trees will need to be removed as a result of this project.

2. *Groundwater Recharge Volume (GRv) – Requirement #2*

    a. The Applicant has provided Groundwater Recharge Volume in Section 2.2.2 and Appendix G: Stormwater Figures and Calculations, of the Application. The proposed stormwater basin appears to provide infiltration and recharge of stormwater exceeding the required level. The Applicant appears to have complied with Requirement #2.

    b. The proposed design appears to cut approximately 3 to 5 feet of existing material to form the stormwater basin. HW did not receive any soil test pit data in the vicinity of the basin and therefore recommends that the Applicant verify that there is the necessary separation between the bottom of the basin and the estimated seasonal high ground water table beneath the basin. The Applicant has requested that these test pits be conducted as a condition of approval. HW recommends that the Commission condition the project to require that the test pits within the stormwater basin be conducted prior to any significant land disturbance at the site and that a Professional Engineer confirm that the sizing and depth of the stormwater basin is acceptable.

3. *Water Quality Volume (WQv) – Requirement #3*

   a. Water Quality Volume calculations have been provided in Section 2.2.3 and Appendix G: Stormwater Figures and Calculations of the Application. The proposed stormwater basin will provide infiltration and treatment of stormwater.

   b. In accordance with Section 4.4 of the Design Manual, the Applicant should have provided the calculation for the minimum WQv for a developed site with little or no impervious areas (0.2 inches over the entire disturbed area).

      0.2 inches/12 * 3.2 acres = 0.05 acre-ft of WQv required.

      The Applicant appears to be providing greater than 0.05 acre-ft in the stormwater basin and therefore is in compliance with Requirement #3.

   c. The surface area values input for Pond 1P in the original submission were not accurate. The Applicant has verified the values and adjusted the HydroCAD model as necessary. The pond values in the HydroCAD calculations dated March 24, 2016 appear to have been input correctly. The Applicant's response is adequate

4. *Pollutant Removal Analysis - Requirement #4*

   a. The Applicant has provided Pollutant Removal calculations in Appendix G: Stormwater Figures and Calculations, of the Application. The proposed infiltration basin appears to decrease pollutant concentrations to below the pre-development levels. The Applicant appears to be in compliance with Requirement #4.

   b. A level spreader detail has been provided as originally recommended by HW. The detail includes notes on material, length, width, depth and installed top of spreader elevation. The Applicant's response is adequate.

5. *Channel Protection Flow - Requirement #5*

   Requirement #5 is not applicable to this project. The infiltration basin recharges the entire 2-year storm event and the site has less than 1 acre of impervious area.

6. *Conveyance Flow - Requirement #6*

   The Applicant has stated that the proposed open drainage system has been designed to meet the conveyance flow requirement; however calculations for the open swale do not appear to have been provided to HW for review. The Applicant has provided the pipe full

calculations as a conservative analysis of the flow estimated from the 12 inch culvert. It appears that the swale has been sized adequately. However, for documentation purposes, HW recommends that the Applicant provided calculations illustrating that the proposed swale is sized adequately to convey the estimated flow from the 12 inch culvert.

7. *Flood Protection - Requirement #7*

   In our March 21, 2016 memorandum HW recommended that the Applicant revise the Curve Number (CN) values for pre-development conditions utilizing a CN value of 30 which corresponds to *Meadow or Brush*, while a CN value of 39 (>75% Grass cover, Good, HSG A) is appropriate for post-development conditions. The Applicant has provided revised HydroCAD modeling calculations and adjusted the CN values appropriately. The Applicant's response is adequate and the Applicant appears to be in compliance with Requirement #7.

8. *Water Quality Flow - Requirement #8*

   There does not appear to be any off-line treatment practices proposed as part of this project therefore Requirement #8 does not appear to be applicable.

9. *Pollution Prevention - Requirement #9*

   a. The Applicant appears to be in compliance with Requirement 9. Fertilizer and pesticide use will be minimal and pollution prevention measures will be implemented during the construction phase as detailed in the Erosion and Sediment Control Plan.

   b. As recommended in our March 21, 2016 Memorandum the Applicant has provided an Operation & Maintenance Plan that details how the drainage swale and stormwater basin will be maintained, including the frequency of inspections and the need to remove debris, repair gullies, and monitor the functionality of the level spreader.

   c. The submitted Operation & Maintenance Plan also includes requirements for maintaining grass cover (e.g., revegetating areas that become barren) to reduce the potential for erosion and list the frequency the grass is to be cut annually.

   d. As the functioning of the stormwater system depends on the area beneath the solar panels being maintained as grass, it is critical that the vegetation establishes quickly and any gullies that form before then are repaired as necessary. The Applicant has provided a note on the plans and in the Operation and Maintenance Plan requiring the contractor to water the newly seeded areas for one year and reseed barren areas and repair gullies as necessary.

e. The Applicant has added a note on Sheet C-101 stating that the existing 12-inch culvert pipe which is silted in shall be cleaned during the construction process and that rip rap will be placed at the outlet to protect the proposed swale against scour from high flows exiting the culvert.

f. The proposed stormwater basin is designed to overflow via a 20 foot level spreader directed towards the property at 343 South River Road and ultimately discharges into Green Brook which flows towards the Willimantic River. The proposed design reduces the flows from the project site onto 343 South River Road as illustrated in the Table provided in W&C's March 25, 2016 letter. The Applicant has responded to HW comment regarding this discharge point. With regular inspections of the level spreader as discussed previously and as outlined in the Operation & Maintenance Plan it appears that the design is appropriate and if any erosion occurs near the abutting property it will be remedied immediately.

g. In HW's March 21, 2016 Memorandum it was recommended that the Applicant provide permanent erosion control measures along the drip line of the solar panels to decrease the likelihood of scour from sheeting stormwater runoff from the panels. The Applicant has provided photographs of similar sites and believes that the additional erosion controls are not necessary. HW recommends to the Commission that a condition be added stating that prior to removal of the sedimentation barrier the vegetation growth be analyzed and the need for additional erosion controls be determined.

h. HW also recommended the installation of temporary erosion control measures to effectively minimize exposed soils along the steep slopes. The Applicant has adequately responded to our comment by providing an additional note on Sheet C-101.

Conclusion

HW is satisfied that the Applicant has adequately responded to our previous comments. HW suggests that the following items be considered by the Commission during the permitting process:

- Document if any significant size (>12" diameter) trees will need to be removed as a result of this project.
- Require that test pits within the stormwater basin be conducted prior to any significant land disturbance at the site.
- Require that a Professional Engineer confirm that the sizing and depth of the stormwater basin is acceptable once test pits are conducted.
- Require that the Applicant provide calculations illustrating that the proposed swale is sized adequately to convey the estimated flow from the existing 12 inch culvert.
- Reference the long term Operation & Maintenance of the erosion controls and stormwater management system.

- Require that prior to removal of the sedimentation barrier the vegetation growth be analyzed and that the need for additional erosion controls is determined.

The Applicant is advised that addressing these comments does not relieve him/her of the responsibility to comply with all Town of Tolland Bylaws and Regulations, State of Connecticut laws, and federal regulations as applicable to this project. We appreciate the opportunity to provide review comments on the subject site and are available to answer any questions. Please contact Janet Bernardo at 857-263-8193 or at jbernardo@horsleywitten.com if you have any questions regarding these comments.

Sincerely,

HORSLEY WITTEN GROUP, INC.

Janet Carder Bernardo, P.E.
Senior Project Manager