

## 1. INTRODUCTION

WR-TGC Solar Generation XVI, LLC, (TGC, Applicant) is proposing to install an approximately 1.3-MW solar photovoltaic (PV) and electrical interconnection system on a Town-owned site located at 327 South River Road, in Tolland, Connecticut (Site). Although Town properties are exempt from Zoning Regulations, the Town felt it was important to provide nearby residents with the opportunity to understand and provide input regarding the project. Therefore, TGC is submitting this Report in support of the project's application for Site Plan Review. The Report and its attachments address existing and proposed site conditions, natural resources, stormwater management, and compliance with Town regulations. Additionally, a copy of the document providing answers to "Frequently Asked Questions" regarding solar, which was submitted to the Design Advisory Board on February 29, 2016, has been provided in Appendix F for your reference.

### 1.1 PROPERTY OWNERSHIP

The proposed solar array will be located on the site of Town-owned vacant land. The project parcel is designated as MBLU 30/C/009. The proposed solar array will be located on the western side of the property, adjacent to South River Road, and will encompass approximately 5 acres of the 28.5-acre parcel. The Applicant will enter into a lease agreement with the Town for the development and operation of the proposed solar facility.

In accordance with Section 22-3.B of the Zoning Regulations, the following items have been provided for your reference:

- A key map showing location of the property with respect to nearby streets, adjacent properties, municipal boundaries and other landmarks is included on the Drawings in Appendix B;
- A 200-scale plan showing all properties or portions thereof, which fall within 500 feet of any part of the subject property is provided in Appendix A; and
- The names and complete mailing address of all property owners within the 500-foot area is also provided in Appendix A.

### 1.2 EXISTING CONDITIONS

The plans included in Appendix B show the Site's existing conditions. The project Site is an undeveloped open field (former cornfield) with some tree line vegetation along South River Road. The parcel also contains approximately 20 acres of wooded land between the open field and the Willimantic River. There is no existing water or sewer infrastructure on site.

A topographic ground survey and a partial boundary survey of the Site was performed by James E. Nagle on January 15, 2016, and January 29, 2016, respectively. Based on discussions with the Town, it is our understanding that, since the Site takes up only a portion of the project parcel's area, a partial boundary survey is sufficient for the purposes of this Site Plan Application. These surveys depict property boundaries adjacent to the proposed solar array, topography, and applicable property features, and are included in Appendix B for your reference. These surveys were utilized to develop the base plan for the drawings provided in Appendix B.

### 1.3 PROPOSED DEVELOPMENT

The proposed project is comprised of the installation of security measures (fencing and locked gate; no barbed wire or razor wire fencing will be utilized), solar panels, inverters, transformers, and an electrical interconnect system. Minor modifications will be made to site grades, but existing drainage patterns will remain largely unchanged. The proposed development will result in new impervious area from the gravel

access, concrete equipment pads, and posts associated with the solar panels. Stormwater management on the Site is described further in Section 1 of this Report. No water or sewer service is needed for the Site.

The existing grass cover in the area of the proposed solar panels will be maintained; area disturbed by solar panel installation and grading activities will be re-vegetated. The wooded area between the project site and the adjacent Willimantic River will remain undisturbed. The project has designated areas of existing vegetation that will remain as natural buffers, and in addition, the Applicant is providing over 90 trees and 45 shrubs to help supplement these natural buffers. The planting plan has been developed with the input of the Town's Design Advisory Board. Where residences abut the solar development to the North and South of South River Road, a mixed stand of plantings will be provided, including Eastern White Pines, Red Spruces, Fraser Firs, and Red Maples. Along South River Road, the natural vegetation will be supplemented with these tree species as well as understory plantings of Shadblow Serviceberry and Mountain Laurel. Wildflower mix will be utilized in all disturbed areas outside of the panel area and stormwater management features, as recommended by the Town's Design Advisory Board.

In compliance with the National Electric Code, the solar development will be secured by a 7-ft high chain link fence, which prevents children and the public from coming into contact with the installation. Also, as recommended by the DAB, the fence will be constructed of black (or green) vinyl coated materials for sections facing residential abutters or the public right of way. The proposed site development is depicted on the drawings provided in Appendix B.

### **1.3.1 Environmental & Transportation Impact Analysis**

The overarching purpose of the proposed project is to provide a renewable source of energy, with minimal impact on the surrounding environment. The solar photovoltaic system is a passive use, which will have no noise, dust, odor, or other pollution or hazardous material concerns during the operation of the facility. Transformers used at PV installations are similar to the ones used throughout the electricity distribution system in cities and towns. Glare from the panels will be negligible since the panels are designed to absorb light as opposed to reflecting light. PV panels are made of tempered glass, which is quite strong. PV panels pass hail tests, and are regularly installed in Arctic and Antarctic conditions.

After construction has been completed, operations traffic will be minimal, consisting only of periodic visits to the Site to inspect the system. Due to electrical code restrictions, access to the Site will be limited strictly to authorized personnel. No traffic impacts are anticipated to result from the proposed development.

### **1.3.2 Prior Approvals and Additional Permits**

In 2013, the Town Council approved participating in the Connecticut Conference of Municipalities' Energy Solar PV Program, in order to identify sites and a solar developer. The Council later approved a contract with TGC and, more recently, the leases for the sites. The Planning and Zoning Commission approved the concept of using this site for a solar project in May of 2015. More recently, the Design Advisory Board reviewed the project at its February and March meetings and provided recommendations to improve project screening with vegetation and vinyl coated fencing. TGC has incorporated the Design Advisory Board's recommendations on the drawings included in Appendix B.

The estimated area of disturbance during construction is approximately 3.2 acres, which includes areas disturbed by proposed grading, plantings, and new impervious area, including solar panel post installations. According to the Connecticut Department of Energy & Environmental Protection (CTDEEP) Construction General Permit (CGP) for construction activity disturbing greater than one acre, Locally Approvable construction projects with a total disturbed area of one to five acres are not required to register with the Department provided the development plan has been approved by a municipal land use agency and adheres to local erosion and sediment control land use regulations and the CT Guidelines for Soil Erosion and Sediment Control. The proposed project is considered "Locally Approvable" and soil erosion and sediment control measures will be provided in accordance with the Department of Energy and Environmental

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Protection 2002 Connecticut Guidelines for Soil Erosion and Sediment Control. A CTDEEP CGP is therefore not required for the development.

#### **1.4 NATURAL RESOURCES**

Mason & Associates, Inc. conducted a field survey on December 31, 2015, and found no wetland areas on the Site, as outlined by the letter prepared by Joseph P. McCue dated January 26, 2016, which has been provided in Appendix C for your reference. A copy of the wetland report was provided to the Inland Wetlands Commission (IWC) and it was determined that no wetlands permit would be required. The IWC recommended that discharge from the Site's culvert include an "energy dissipater" to reduce the velocity of runoff and prevent erosion of the existing drainage area. To address energy dissipation, stone check dams and a level spreader will be provided to reduce the velocity of runoff and prevent erosion, as detailed on the plans provided in Appendix B.

The parcel is adjacent to the Willimantic River, but the proposed solar development is located over 400 feet from the waterbody. The proposed solar development is not located within a FEMA Flood Zone, as shown by the Flood Insurance Rate Map provided in Appendix D. The Site is located within a Natural Resource Protection Zone and Aquifer Protection Area. It should be noted that ground surface will be available for infiltration, but that the proposed solar development does not pose a risk to the Aquifer. As further described in the Frequently Asked Questions document provided in Appendix F, solar developments pose less risk for contamination than agriculture uses. Appropriate Erosion and Sediment Control measures will be implemented, as specified in the Plan provided in Appendix E of this Report.

There are no other known protected resource areas within or adjacent to the Site.

## 2. STORMWATER MANAGEMENT

The following Section describes how the proposed project will comply with the Town of Tolland Low Impact Development and Stormwater Management Design Manual. The proposed development will result in only 2,770 sf new impervious area from the gravel access, concrete equipment pads, and posts associated with the solar panels. The new impervious area represents 0.2% of the parcel area, and is therefore an insignificant increase. According to *The Guide to Developing Solar Photovoltaics at Massachusetts Landfills*, the Massachusetts Department of Environmental Protection has indicated that modules should not be considered impervious surfaces.

It is common practice to consider the panel area of a solar photovoltaic facility as pervious cover, as demonstrated by the Pennsylvania Department of Environmental Protection's (PA DEPs) *Information to use in the Determination of Stormwater Management Impacts for Solar Projects*, revised October 4, 2011. Pennsylvania also has a Tri-County Regional Planning Commission that has developed a model ordinance for Pennsylvania communities concerning the development of regulations for solar energy systems. The Tri-County Regional Planning Commission notes that the area beneath solar energy systems is typically not considered impervious cover.

In an article written by Denny L. Howell, a Professional Engineer registered in the States of Pennsylvania, Maryland, Delaware, and North Carolina, on February 23, 2012, titled *Solar Panels: Impervious or Pervious?*, he relates solar panels to raised decks that are typically considered pervious surfaces; he states "solar panels raised above the ground in vegetated areas whether large or small will not generate anymore runoff than the ground did before their installation assuming the ground cover has not changed." Denny Howell also notes that many municipalities and states have adopted laws excluding solar panels from impervious cover calculations. For example, the States of Maryland and New Jersey have enacted statutory laws (Chapter 702 and Chapter 4, respectively) concerning solar panels and impervious surfaces as they relate to stormwater management, which state that solar panels shall not be included in any calculation of impervious surface.

### 2.1 STORMWATER MANAGEMENT PLAN

This Stormwater Management Plan has been prepared in accordance with the Town of Tolland Low Impact Development (LID) and Stormwater Management Design Manual (Manual). The Plan consists of the following topics, each of which is discussed in the following sections of this Report:

- Project Information;
- Existing hydrologic conditions at the Site;
- Proposed hydrologic conditions; and
- Stormwater calculations to demonstrate compliance with the requirements of the Town requirements.

Surveys and design drawings showing the Site's existing and proposed conditions, respectively, are provided in Appendix B; a key map of the project site is included on the drawings. Pre- and Post-Development Drainage Area Figures are also provided in Appendix G.

#### 2.1.1 Project Information

##### Project Location:

327 South River Road, Tolland, Connecticut

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MBLU 30/C/009

Site Owner:

Town of Tolland  
21 Tolland Green  
Tolland, CT 06084

Project Engineer:

Woodard & Curran  
Alan Benevides, P.E. Senior Principal  
1520 Highland Ave., Cheshire, CT 06410  
(978) 482-7835  
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Applicant

WR-TGC Solar Generation XVI, LLC, c/o Adam Rasken  
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(212) 376-6114  
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### **2.1.2 Existing Drainage Area**

The existing Site consists of one large subwatershed, illustrated on the Pre-Development Drainage Area Figure provided in Appendix G. The existing subwatershed is bordered by South River Road to the west, wooded area to the east, and residential properties to the north and south. The 7.4 acre subwatershed is composed primarily of grass cover, with some perimeter trees. The Site slopes generally in a southerly direction. Stormwater runoff from the Site is currently conveyed via overland flow to the southern abutting property. An existing ditch conveys water from a 12-inch culvert under South River Road to a point near the rear of an abutting property, south of the proposed development.

### **2.1.3 Proposed Drainage Area**

The proposed Site consists of the same large subwatershed as in existing conditions, as illustrated on the Post-Development Drainage Area Figure provided in Appendix G. The 7.4 acre subwatershed is composed primarily of grass cover, with some perimeter trees and a small amount of impervious area associated with the gravel access, concrete equipment pads, and solar panel posts. The area under the solar panels will be maintained in its existing condition. Some selective tree cutting will be performed at the tree line along South River Road in order to install the 12-foot wide gravel access drive and underground electric; all other trees will be protected during construction. Existing trees along South River Road will be maintained and supplemented to serve as a natural buffer, and additional vegetated buffers will be provided between the proposed solar development and the northern and southern abutters.

The installation of a solar photovoltaic (PV) and electrical interconnection system will result in minor modifications to site grades such that the panel area will have a maximum cross slope of 15%, but existing drainage patterns will remain largely unchanged. Runoff from the Site under proposed conditions will be conveyed via overland flow to the same general location as runoff under existing conditions. A new drainage swale will convey stormwater from the existing South River Road culvert along the western and southern edge of the project area, towards a new stormwater basin designed to promote infiltration into the existing subgrade soil, providing treatment and helping to attenuate peak stormwater flows prior to discharging towards the southern abutting property. Stone check dams and a level spreader will be provided to reduce the velocity of runoff and prevent erosion.

#### **2.1.4 Stormwater Calculations**

The stormwater calculations presented in Appendix G were prepared to demonstrate compliance with the Town of Tolland Low Impact Development and Stormwater Management Design Manual, as described in Section 2.2 of this Report. Hydrologic models of the pre-development and post-development conditions were created using the HydroCAD Stormwater Modeling System by Applied Microcomputer Systems.

The existing and proposed subwatersheds were delineated based on topography, and area measurements were utilized to compute weighted (composite) Runoff Curve Numbers (RCNs). The RCN values were calculated by HydroCAD based on cover type and Hydrologic Soil Group A, as mapped by the Natural Resources and Conservation Service Web Soil Survey for the Site. The time of concentration (TC) calculations assume sheet flow and shallow concentrated flow.

It is anticipated that the proposed stormwater basin will promote infiltration into the existing subgrade soils, as Hydrologic Soil Group A soils are considered “well-drained” to “excessively drained”. This soil classification indicates that the existing soils have a high infiltration rate (low runoff potential) when thoroughly wet. For the purposes of conservatively evaluating the peak rate of runoff from the site, the HydroCAD model does not account for the infiltration that will occur within the basin. Even without considering stormwater infiltration, the peak rate of stormwater runoff will be less than the existing condition because the proposed basin will provide some detention, and the RCN for the Site will not increase as a result of the proposed development.

### **2.2 COMPLIANCE WITH TOWN OF TOLLAND LOW IMPACT DEVELOPMENT AND STORMWATER MANAGEMENT DESIGN MANUAL**

The proposed project, initiated by the Town of Tolland, has been designed to comply with the standards set forth in the Manual where feasible. The Manual recommends that commercial/industrial designs utilize LID site strategies, such as respecting the natural land form, to the maximum extent practical. The proposed project has been designed to respect the natural land form such that there will be only minor changes to site topography and a small increase in impervious area.

The following requirements of Section 4.2 of the Manual apply to commercial/industrial sites which contain greater than two acres of land, and the proposed project has been designed to comply as described in the Sections below.

#### **2.2.1 Environmental Site Design**

The first step in the Environmental Site Design (ESD) process is to evaluate natural resources; this step has been documented in Section 1.4 of this Report. No wetlands, vernal pools, significant or unusual tree species, large ledge outcrops, or 100-year flood zone are located within the project boundary. This information is reflected on the base map that was created for the project site.

The Natural Resources and Conservation Service Web Soil Survey for the Site indicates that soils consist of Hydrologic Soil Group A, which have a high potential infiltrative capacity. Soil compaction will be minimized on the Site during construction by prohibiting vehicular access over designated infiltration areas. Existing subwatershed boundaries on the Site have been delineated, as shown on the Pre-Development Drainage Area Figure provided in Appendix G. The generalized vegetative types on the Site are described in the Wetland Reconnaissance Letter provided in Appendix C. Some selective tree cutting will be done to the tree line along South River Road in order to install a 12-foot wide gravel access road; all other trees will be protected during construction.

There is only a small area (less than 10,000 Square-Feet) that consists of 20% slopes, located on the eastern side of the project area, as shown on the drawings provided in Appendix B. All other areas on the project site are considered “Developable Area”. This area of steep slopes will be re-graded such that slopes within the project area will not exceed 15%.

LID site design strategies have been implemented to avoid, reduce, and manage impacts from development to the maximum extent practicable, such as:

- Protecting as much undisturbed land as possible to maintain pre-development hydrology and allow rainfall to infiltrate into the ground;
- Minimizing the disturbance of the land necessary for clearing and grading;
- Utilizing low maintenance landscapes that will encourage the retention and planting of native types of vegetation, and minimize the extent of lawn areas, which will reduce the potential application of fertilizers and pesticides;
- Minimizing the extent of impervious areas on the site, particularly the directly connected impervious areas;
- Increasing the “Time of Concentration” for post-development conditions to closely approximate the “Time of Concentration” for pre-development conditions; and
- Using vegetated conveyance and treatment source controls to infiltrate runoff as close as possible to the point rainfall reaches the ground surface.

As described throughout this Report, the proposed solar development will not involve the application of pollutant causing substances; solar developments pose less risk for contamination than agriculture uses. The proposed site has been designed such that flow velocities from the stormwater basin are reduced to non-erosive levels (less than one foot per second during the 25-year storm).

## 2.2.2 Groundwater Recharge Volume

To maintain pre-development hydrology, post-development stormwater will be infiltrated utilizing the Site’s natural infiltrative capacity to maintain the appropriate pre-development infiltration rate. The required Groundwater Recharge Volume is defined as a function of the annual pre-development recharge rate for site-specific soil conditions, the 90% rainfall event (1” of rain/24 hrs), and the extent of impervious cover on a site. The proposed development will result in a small amount of new impervious area from the gravel access, concrete equipment pads, and posts associated with the solar panels. As the Site consists of only one post-development subwatershed area and one soil type, the required Groundwater Recharge Volume is calculated as follows:

$$GR_v = (P)(D)(I)/12$$

Where:

$$P = 1'' \text{ (90\% rainfall event)}$$

$$D = \text{Recharge Factor (Table 4.3.a of Manual)} = 0.60$$

$$I = \text{Impervious area (acres)} = 0.06 \text{ acres}$$

$$GR_v = \text{Groundwater Recharge Volume required (acre-feet)} = 0.003 \text{ acre-feet} < 0.08 \text{ acre-feet provided}$$

The proposed stormwater basin will provide storage for stormwater to promote infiltration in excess of the required recharge volume. The proposed stone check dams within the vegetated drainage swale discharging to the stormwater basin will serve as a series of sediment forebays to provide pre-treatment in compliance with the Manual.

## 2.2.3 Water Quality Volume

As described above, stormwater basin has been proposed to promote infiltration utilizing the Site’s natural infiltrative capacity, which will provide water quality treatment. As the Site consists of only one post-

development subwatershed area and one soil type, the required Water Quality Volume is calculated as follows:

$$WQ_v = (1'')(I)/12$$

Where:

$$I = \text{Impervious area (acres)} = 0.06 \text{ acres}$$

$$WQ_v = \text{Water Quality Volume required (acre-feet)} = 0.005 \text{ acre-feet} < 0.08 \text{ acre-feet provided}$$

The proposed stormwater basin will provide storage for stormwater to promote infiltration and provide treatment in excess of the required water quality volume. The proposed stone check dams within the vegetated drainage swale discharging to the stormwater basin will serve as a series of sediment forebays to provide pre-treatment in compliance with the Manual.

## 2.2.4 Pollutant Renovation Analysis

A Pollutant Renovation Analysis has been conducted to demonstrate that the proposed stormwater treatment system will achieve the required water quality goals. The calculations are provided in Appendix G.

## 2.2.5 Conveyance Flow

The proposed open drainage conveyance system has been designed to provide adequate capacity for the flows leading to, from, and through stormwater management systems for the 10-year, 24-hour storm event.

## 2.2.6 Flood Protection

The Flood Protection requirements applies to projects where the post-development Runoff Curve Number (RCN) exceeds the pre-development RCN. The pre-development RCN for the project site is equal to 39 (as calculated by the HydroCAD Report provided in Appendix G). The post-development RCN for the project site, including the proposed impervious area, is equal to 39 (as calculated by the HydroCAD Report provided in Appendix G). Even though the proposed development will result in a slight increase in impervious area, the post-development RCN will not exceed the pre-development RCN because additional trees will be added to the Site. Additionally, the table below summarizes the results of the HydroCAD analysis and demonstrates that the proposed development will not result in an increase in the peak rate of runoff from the site during the 2-, 10-, and 100-year, 24-hour storms:

| Study Point                 | Peak Rate of Runoff (CFS) |                        |                         |
|-----------------------------|---------------------------|------------------------|-------------------------|
|                             | 2-year, 24-hour Storm     | 10-year, 24-hour Storm | 100-year, 24-hour Storm |
| Pre-Development Conditions  | 0.00                      | 0.17                   | 2.47                    |
| Post-Development Conditions | 0.00                      | 0.07                   | 1.77                    |
| <i>Net Change</i>           | <i>0.00</i>               | <i>-0.10</i>           | <i>-0.70</i>            |

The appended HydroCAD Reports also provide time of concentration calculations and routing analyses. As described above, the proposed development will comply with the objectives of the Flood Protection requirements.

### **2.2.7 Water Quality Flow**

The Water Quality Flow Requirements apply only to projects utilizing off-line treatment systems; the proposed open conveyance system is considered to be inline. The Water Quality Flow Requirements therefore do not apply to the proposed project.

### **2.2.8 Channel Protection Flow**

The proposed project will not discharge directly to a natural stream channel and is therefore not subject to this requirement. However, HydroCAD Reports for the pre- and post-development conditions have been provided in Appendix G for your reference, which demonstrate that the proposed development will not result in an increase in the peak rate of runoff from the Site for the 2-year storm; these reports also provide time of concentration calculations, runoff curve numbers, and routing analyses.

### **2.2.9 Pollution Prevention**

The proposed project will implement the following pollution prevention measures to minimize the impacts that the runoff from the project will have on stormwater quality to the maximum extent practicable:

- No or minimal application of fertilizers and pesticides on green spaces which are in close proximity to connected impervious areas.

The small amount of impervious area on the proposed site is associated with the gravel access, concrete equipment pads, and posts associated with the solar panels, and will not require the application of sand and/or salt. Additionally, the Site does not contain any existing or proposed catch basins. Pollution prevention measures will be implemented during construction, as described in the Soil Erosion and Sediment Control Plan provided in Appendix E. The Contractor will be responsible for implementing pollution prevention measures during construction, and the Applicant will be responsible for maintaining the Site thereafter.

### **2.2.10 High Density Residential/Commercial/Industrial Redevelopment Projects**

The existing Site does not contain high density residential, commercial, or industrial uses. Additionally, the proposed solar use poses less risk for contamination than agriculture uses. Neither the existing or proposed land uses are considered uses with a high pollutant load. These requirements do not apply to the proposed development.

### 3. COMPLIANCE WITH TOWN OF TOLLAND ZONING REGULATIONS

This section discusses the project's compliance with the Town of Tolland's Zoning Regulations. According to the Town's Zoning Map, the proposed solar development is located within the Residential Design District, the Natural Resource Protection Overlay Area, and the Aquifer Protection Area. The project parcel is also located within the Floodplain/Stream Belt Zone; however, it should be noted that the proposed development will be located entirely outside of this zone and is therefore not subject to those requirements.

A summary of each requirement is provided below (in italics) for reference purposes, and a description regarding the project's compliance with the requirement is provided.

#### 3.1 SOIL EROSION AND SEDIMENT CONTROL (ARTICLE IV)

##### 3.1.1 Activities Requiring a Soil Erosion and Sediment Control Plan (Section 4-2)

*A soil erosion and sediment control plan (hereinafter called a "control plan") shall be submitted with any application for development when the disturbed area of such development is cumulatively more than one-half (1/2) acre.*

A Soil Erosion and Sediment Control Plan has been developed per the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control and is provided in Appendix E of this Report.

#### 3.2 AQUIFER PROTECTION OVERLAY ZONE (ARTICLE XIV)

##### 3.2.1 Permitted and Prohibited Uses (Section 14-3)

*All uses permitted under these regulations for a given zone shall be permitted within the Aquifer Protection Zone, with the exception of the following prohibited uses:*

- A. Filling stations, motor vehicle repair shops, auto body shops and public garages. Any use involving the storage and/or loading of road salt.*
- B. Any use involving the overland transmission of oil, gasoline or hazardous material through pipelines.*
- C. Dry cleaning, dyeing and/or laundry operations that utilize organic cleaning solvents.*
- D. Junkyard and salvage operations.*
- E. Photographic chemical processing.*
- F. Printing shops involving the uses of hazardous materials.*
- G. Beauty shops.*
- H. Furniture stripping.*
- I. Car wash operations.*
- J. Laboratories utilizing hazardous materials.*
- K. Garden centers and nurseries.*
- L. Any other commercial or industrial use involving the use, disposal, treatment and bulk storage of hazardous materials or contaminants including herbicides, pesticides and fertilizers or hazardous waste in its operation.*

The proposed development is not considered a prohibited use within the Aquifer Protection Overlay Zone.

### 3.2.2 Special Requirements (Section 14-4)

*The following special requirements apply to permitted uses within an AP zone where applicable:*

*A. All elements of site development in an AP Zone shall achieve a goal of infiltrating a minimum of 100% of the post-development runoff volume back into the soil using Low Impact Development systems. Rain gardens, bioretention in parking islands, vegetated swales or level spreaders, underground infiltration systems, permeable pavement or grass pavers shall be employed as appropriate to the individual site and its anticipated use.*

The Stormwater management design of the Site allows for the infiltration of the post-development runoff volume using Low Impact Development strategies. Refer to Section 1 of this Report for more detailed information on the proposed stormwater management design.

*B. The depth of sand and gravel excavation pits shall be determined by the Commission as set forth in these regulations; proposed or anticipated use shall be of major consideration in the establishment of a protective separation from the site's high-water table.*

The proposed development will not include the use of any sand and gravel excavation pits.

*C. Discharge to on-site sewage disposal systems in any zone shall not exceed an amount equivalent to the discharge from one (1) three-bedroom, single-family dwelling per acre. This subsection shall not apply to structures served by public sewer.*

The proposed development will not result in any discharges to on-site sewage disposal systems.

*D. Agricultural operations which do not employ best management practices as recommended by the National Resources Conservation Service and/or Farm Services Agency and/or the Cooperative Extension Service for the application of manure, fertilizer or pesticides shall be prohibited.*

No agricultural operations will take place on Site.

*E. Any new or enlarged manure storage sites shall be subject to the review and approval of the Connecticut Department of Environmental Protection.*

No manure will be stored on Site.

*F. Commercial or industrial petroleum products shall be stored in double-hulled steel or fiberglass tanks encased in a concrete vault, in accordance with Section 22a-449(d) of the Connecticut General Statutes. All residential and/or domestic fuel tanks shall be above ground.*

No petroleum products will be stored on Site.

*G. Unused wells shall be abandoned in accordance with Sections 25-128-56 & 57 of the Public Health Code and performed by a registered well drilling contractor with notification of the Health District.*

There are no unused wells on Site.

*H. Disposal of septage in lagoons shall be prohibited.*

The proposed development will not result in the disposal of septage.

### 3.3 ACCESSORY USES AND STRUCTURES (ARTICLE XVII)

#### 3.3.1 Alternative Energy – Solar: Ground-Mounted Solar Arrays (Section 17-8.A.4)

*Ground-Mounted Solar Arrays may be accessory uses in all zones. All solar arrays shall comply with the following requirements:*

*a. Solar Arrays in residential zones*

- 1) *Ground-mounted solar arrays shall not exceed twenty-five (25) feet in height. Trackers are measured when the array is 60 degrees to horizontal.*

The solar arrays will not exceed 25 feet in height.

- 2) *Ground-mounted solar arrays must be setback a minimum of seventy-five (75) feet from the property line at the street and twenty-five (25) feet from side and rear property lines.*

The solar arrays are placed at a setback of 75 feet from the boundary line along South River Road and over 25 feet from all other boundaries.

- 3) *Ground-mounted solar arrays shall not be located in the front yard between the principal structure(s) and the public right-of-way except by Special Permit approval by the Commission base on the following criteria:*
  - a. *Height and visibility relative to the surrounding topography and structures*
  - b. *Impact to the character of the residential neighborhood*
  - c. *Existing or proposed buffers*

There are no principle structures on the Site.

### **3.3.2 Fences and Walls (Section 17-9)**

*Accessory fences and walls used as fences, with a maximum height of eight feet, shall be exempt from the provisions of this Article, except as may be otherwise required by the Commission.*

In compliance with the National Electric Code, the solar development will be secured by a 7-ft high chain link fence, which prevents children and the public from coming into contact with the installation.

## **3.4 ZONE CHANGES, SPECIAL PERMITS AND SITE PLANS (ARTICLE XXII)**

### **3.4.1 Site Plan Standards (Section 22-7)**

*To ensure that structures and the uses of land are arranged in a manner that enhances the public health, safety and general welfare, as a condition of approval the Commission may require such modifications of the proposed plans as it deems necessary to comply with the spirit as well as the letter of these regulations. The Commission shall take into account the following:*

#### *A. Conformity with Section 1-1*

The proposed project is compatible with Section 1-1 of the Zoning Regulations of the Town of Tolland in that its overarching purpose is to provide a renewable source of energy, to promote the health, safety, and general welfare of the community. Furthermore, the proposed development will be coordinated with the Town and will comply with all applicable standards contained in the Town's Zoning Regulations, as demonstrated herein.

#### *B. Traffic Considerations*

After construction has been completed, operations traffic will be minimal, consisting only of periodic visits to the site to inspect the system (monthly or less frequent). Due to electrical code restrictions, access to the Site will be limited strictly to authorized personnel. Due to the low volume of traffic and number of vehicles required on-site, the need for off-street parking is not anticipated. Loading areas will not be required for operations. No traffic impacts are anticipated to result from the proposed development.

#### *C. Environmental Considerations*

The existing vegetation along South River Road will be maintained as a buffer to the solar development. Along the northern and southern boundary, the Site will be screened with vegetation

to ensure harmony with adjacent development. Dust and erosion will be managed in accordance with the Connecticut Soil Erosion and Sediment Control Handbook. Measures to be used on site are described in the Soil Erosion and Sediment Control Plan provided in Appendix E. There are no known wetlands, historic structures, unique topographic formations or notable rock outcrops on site. Noise will also not be a concerning factor as solar panels have no moving parts and do not generate noise. The inverter and transformer equipment make a slight humming noise, but this equipment will be pad mounted in a location greater than 150 feet from residential buildings, such that the development is not anticipated to have any noise impact on the community. Additionally, there will be no artificial lighting at the property boundaries and Low Impact Development strategies will be utilized to maintain the existing site's hydrology and water quality as described in Section 1 of this Report.

*D. Preparer.*

The site plan has been prepared, signed, and sealed by Woodard & Curran (engineer).

*E. Architectural Plans.*

The proposed development does not include any buildings.

*F. Off-Site Information*

No offsite improvements will be required for the proposed development. Additional off-site information not shown on the drawings provided in Appendix B can be provided upon request.

*G. Impact Analysis*

As demonstrated throughout this Report, the proposed development will not adversely affect public facilities or the environment.

*H. Additional Information*

Additional information can be provided upon request.

*I. Referrals*

Acknowledged.

*J. Sites of Archaeological Significance*

Per the Town's official archaeological map, the Site is not located within a high sensitivity area. Additionally, the Town Planner contacted the State Archaeologist on March 8, 2016, and determined that there is no evidence of sites of archaeological significance on the subject property.

### **3.4.2 Landscaping Requirements – General Requirements (Section 22-8.C)**

- 1. The development of the site shall conserve as much of the natural terrain and existing vegetation as possible, shall preserve sensitive environmental land features such as steep slopes, wetlands and large rock outcroppings and shall preserve public scenic views and historically significant features such as stone walls.*

There are no wetlands, large rock outcroppings, or historically significant features on the project site. There is only a small area (less than 10,000 Square-Feet) that consists of steep slopes (20%), located on the eastern side of the project area, as shown on the drawings provided in Appendix B. This area will be re-graded such that slopes within the project area will not exceed 15%. Steep slopes outside of the project work area will be preserved.

The existing vegetation is to be preserved to the maximum extent practicable. The wooded area between the project area and the river will not be disturbed. Vegetation will be planted along the

northern and southern boundaries of the project area to improve the scenic attributes of the development.

2. *No plants listed on the Connecticut Invasive Plants List (as amended from time to time) shall be used. The Planning Staff may also strongly recommend against using other species to account for recent findings that may not be reflected in the Invasive Plant List.*

No plants listed on the Connecticut Invasive Plants List shall be used. Plant selections shown on the drawings are based upon the recommendations from the Town's Design Advisory Board.

3. *Landscaped areas that are designed to intercept and manage stormwater runoff and provide natural infiltration of rainwater in accordance with the Low Impact Development Regulations are encouraged and these landscape areas will be included as part of the overall landscape requirements.*

Low Impact Development techniques will be utilized to provide natural infiltration of rainwater, as described in Section 1 of this Report.

4. *Existing trees over 12 inches in caliper shall be preserved during the construction period unless approved for removal by the Zoning Enforcement Officer or designated agent and shall be protected by the following recommended measures:*
  - a. *There should be no operation of heavy equipment or storage of materials under the tree within the drip line.*
  - b. *A fence or other barrier shall be erected to protect the tree within the drip line*
  - c. *No more than 6 inches of fill may be added within the drip line unless a tree well or other arrangement designed to maintain the long-term health of the tree has been approved by the Zoning Enforcement Officer or designated agent.*

Some selective tree cutting will be done to the tree line along South River Road in order to install a 12-foot wide gravel access road. All other trees will be protected during construction.

5. *Approximately 50% of all plantings should be native plants. All others should be proven zone hardy (good to zone 5) and "deer resistant" if possible, especially for residential plantings. All approved plantings should be of #1 quality grade. Consider maturity size at the time of installation of all trees and shrubs, especially street, sidewalk or boulevard trees.*
6. *The proposed planting is shown on the drawings in Appendix B. These plant selections are based upon input from the Town's Design Advisory Board and meet the requirements of this standard. All plant material shall be nursery grown and conform to the standards of the American Association of Nurserymen.*

All plant material installed will meet the specifications of the American Standard for Nursery Stock (latest edition) as set forth by the American Association of Nurserymen.

7. *At the time of planting, trees shall be balled and burlapped and guyed as needed. Plantings should be of a mixture of Ornamentals, Flowering, Broadleaved Evergreen, Deciduous & Conifers and shall be of the following minimum size [caliper measurements to be taken four and one-half (4.5) feet above ground level]:*
  - a. *Trees: Shade trees shall be two and one half to three inch caliper and 8' to 10' in height;*
  - b. *Evergreen trees: six-foot height.*
  - c. *Flowering trees: single stem; two and one half to three inch caliper and 8' to 10' in height; clump forms should be at least eight-feet in height.*

- d. All shrubs shall be a minimum of 3 to 5 gallon size, Juniper and other Ground cover shrubs shall be a minimum of 2 gallon size.*

Proposed plantings are specified on the drawings provided in Appendix B.

8. *Trees and shrubs within five (5) feet of any paved areas shall be of such varieties capable of withstanding damage from salt and snow.*

No trees or shrubs will be placed within five feet of any paved area.

9. *Mulched planting beds of an appropriate size shall be placed around all trees and shrubs to retain moisture. Mulching should consist of a premium type #1 grade mulch, such as Pine Bark, Cedar or Hemlock, at least four (4) inches in depth; dyed or industrial type mulch are not natural in appearance and are unacceptable. Acceptable mulching material shall be shredded bark, wood chips or other organic substitute. All new plantings should include a minimum of 6" to 8" of composted soil mix and starter fertilizer. All new beds should include an application of pre-emergent herbicide.*

Appropriate mulched planting beds shall be placed around all trees and shrubs, as shown on the drawings provided in Appendix B.

10. *Suitable ground cover shall be placed on all disturbed site areas not covered by paving, buildings or mulching for trees, shrubs and perennials. Suitable ground cover shall be grass, turf, or other approved vegetation.*

Suitable ground cover shall be placed on all disturbed site areas, as specified on the drawings provided in Appendix B. New England Wildflower mix will be utilized in all disturbed areas outside of the panel area and stormwater management features, as recommended by the Town's Design Advisory Board.

11. *No black top paving shall be located under existing evergreen trees and no more than 20% of the area under any deciduous trees natural drip line may be paved.*

No black top paving is proposed as part of the project.

12. *Street trees at a minimum of one tree for each 50' or part thereof street frontage shall be provided in all yard areas abutting public streets. The Commission may require street trees on private drives.*

There is an existing tree line along South River Road that will remain largely undisturbed. Additional trees and plantings along will also be provided to supplement the natural buffer.

13. *All residential and commercial foundation plantings should require a slightly bermed planting bed and slope away from the existing foundation, leaving not less than 4" to 5" of exposed foundation.*

The proposed project does not include foundation plantings.

### **3.4.3 Environmental and Performance Standards (Section 22-11)**

*The use of land, buildings and other structures shall be conducted in accordance with the following performance standards. All applicants for site plan approval shall demonstrate that the use they propose shall conform to the following standards:*

- A. *Particulate matter and smoke. No offensive dust, dirt, fly ash or smoke shall be emitted into the atmosphere. In no case shall dust be emitted in excess of one (1) cubic centimeter of settled matter per cubic meter of air. Smoke or other air contaminants shall not be discharged into the atmosphere from any single source of emission for a period or periods aggregating more than three (3) minutes in any one (1) hour which are as dark or darker in shade than that designated as No. 2 on the Ringelmann Chart as published*

*by the United States Bureau of Mines or of such opacity as to obscure an observer's view to a degree equal to or greater than does smoke designated as No. 2 on the Ringelmann Chart.*

The proposed solar development will not result in the emission of particulate matter or smoke.

*B. Odors, gases and fumes. No noxious, toxic or corrosive fumes or gases shall be emitted. Offensive odors noticeable off the premises where the use is located shall not exceed the standards established as a guide by Table III (Odor Thresholds) in Chapter 5, Air Pollution Abatement Manual, Copyright 1951, as amended, by the Manufacturing Chemists Association, Inc., Washington, D.C.*

The proposed solar development will not result in the emission of odors, gases, or fumes.

*C. Water pollution. No discharge into any watercourse, groundwater, wetlands or storm sewers shall be permitted except in accordance with applicable local, state and federal requirements.*

Stormwater management measures will be implemented to provide water quality treatment, as described in Section 1 of this Report.

*D. Vibrations. No vibration noticeable outside the property from which it originates shall exceed the standards of the United States Bureau of Mines, Bulletin No. 442.*

No vibrations will be produced as a result of the solar development.

*E. Hazardous or toxic materials. No hazardous, toxic or other dangerous material, including but not limited to explosives, flammable materials or radioactive materials, shall be permitted except in accordance with applicable local, state and federal requirements.*

No hazardous or toxic materials will be utilized or produced as a result of the proposed solar development.

### **3.5 LOW IMPACT DEVELOPMENT (ARTICLE XXVII)**

*The Town of Tolland requires that Low Impact Development techniques be implemented on all development projects within the boundaries of the Town to protect high quality wetlands, watercourses, open water bodies and other sensitive areas from the impacts of point and nonpoint sources of storm water due to land development projects.*

The proposed project will utilize Low Impact Development techniques per the Town of Tolland Low Impact Development and Stormwater Management Design Manual, as described in Section 2 of this Report.