

**199.9 kW Photovoltaic Solar Project at
Green Mountain Power Corporation's
Berlin Plant #5
Berlin, Vermont**

Aesthetic Analysis Report

Prepared for:



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September 2009

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I. Introduction

T. J. Boyle Associates, LLC (“TJB”), a landscape architecture and planning firm located in Burlington, Vermont, was retained by Green Mountain Power Corporation (“GMP”) to conduct a visual analysis that evaluates potential impacts of the proposed photovoltaic solar system (“PV system”) Project at its Berlin Plant #5 in Berlin, Vermont. The aesthetic analysis determines whether changes to the landscape’s visual character attributable to the proposed Project are adverse, and if so, whether they are also undue. This report presents the findings and conclusions of the aesthetic analysis

T. J. Boyle Associates has conducted numerous field visits, analyzed GIS data, USGS maps, aerial photography and detailed design plans, and used the latest computer technologies to best understand the Project and how planned improvements will alter the visual character of the landscapes for which they are proposed

II. Project Description

The Project entails new construction of a PV system to be built on GMP’s existing property located off Dog River Road in Berlin. The proposed PV system consists of a fixed, ground-mounted array of solar panels, made up of 952 modules. The power rating per module is 210 watts (DC) and the total Project output is anticipated to be 199,920 watts at Standard Test Conditions. The PV system will not be attached to a new or existing home or business. At maximum output, GMP anticipates that the energy generated by the planned Project will be enough to power approximately 100 average homes.

Each of the proposed PV modules is 39 by 58 inches. They will be mounted on poles at a 30 degree tilt facing south with the highest point nearly six feet above grade. The front side will be the dark blue color characteristic of PV modules. An anti-reflective coating that is applied to the front glass increases conversion efficiency, and should also significantly reduce the potential for glare. The back side of the PV nodules, the support structure will be a light gray.

The proposed PV system will occupy less than an acre of land. In addition to the PV structures, the Project includes two planned inverters, which convert the DC electricity from the solar panels to alternating current. The inverters will be inside a small utility shed adjacent to the PV array.

The Project will be built entirely on GMP owned-land, and use existing distribution poles and rights of way. Materials and equipment will be transported to the site by truck. Project parking and the equipment lay-down area will be on GMP’s land at the Berlin Plant #5 site. Present plans are to maintain a mown vegetative cover throughout the site.

The proposed site is located approximately 100 feet west of Dog River Road, and is accessed by Nelson Drive and a small bridge across the Dog River. The site is roughly triangular in shape, with the New England Central Railroad to the west, an agricultural field to the northeast, and the Dog River to the southeast. The site is visually buffered by hedgerows of mature trees along the



property boundaries to the northeast and southeast. Green Mountain Power's Berlin Plant #5 electric generation plant is just to the west of the railroad; the Dog River Road is just to the east of the Dog River. The Montpelier Department of Public Works and Water Pollution Control Plant are located on Dog River Road near the site. Interstate 89 is located just to the east of Dog River Road.



Figure 1. These overlapping photos were taken at eye-level on the proposed site. In the photo on the left, Interstate 89 is visible crossing the hillside about 1.5 miles away. The photo on the right sets the industrial context of the site.

Conformance with Local Regulations

Local plans and regulations were reviewed to establish whether the Project was in conformance with them. Berlin's *Town Plan* (2005a) has not inventoried scenic areas of the town or established any scenic protections. In the section on Land Use Patterns, the *Town Plan* identifies the site as part of the "transition between the rural portions of Berlin and the more urbanized Montpelier. ... The western edge of this transition area abuts commercial and industrial areas between the Winooski River and US Route 2. Some of this type of development activity has extended into Berlin along the Dog River, VT Route 12, and the railroad. This location has some access potential and commercial and industrial activities in the area should be encouraged, extending as far south along Route 12 as the first bridge over the Dog River" (2005a, page 18). This transition is further recognized and encouraged in the *Zoning Regulations* (Town of Berlin 2005b, page 145), where the site is included in the Industrial District.

The Dog River is recognized as one of Berlin's most significant natural features (Town of Berlin 2005a, page 27). However there is no mention of significant scenic value and no provision is made to protect scenic quality. A conservation plan has been prepared for the Dog River (Bear Creek Environmental 2009). This study characterizes the segment that includes the proposed site (Winooski River to the Nelson Drive Bridge) in this way: "Erosion was extensive and riparian buffers were generally lacking on both banks. Near bank vegetation often included invasive species. Surrounding land use includes agriculture on the west bank of the channel and recreational fields on the east bank. This segment has been historically channelized and armored to accommodate the surrounding land use practices." (Bear Creek Environmental 2009, page 14).

This section was assessed as having only fair wildlife habitat “due to limited refuge habitat, extensive historic channelization, and poor bank and riparian vegetation coverage.” Scenic quality was not specifically evaluated.

The Dog River has a reputation as one of Vermont’s best trout streams: “This isn’t one of the prettiest rivers you’ll ever fish, but it does hold big fish for its size. ... The Dog River is one of Vermont’s finest brown trout streams” (Williams 1996). However, as the description from the this generalization is less applicable to the *River Corridor Plan* extracted above indicate, the final segment before the Dog River joins the Winooski River is not of such high quality.

The *Central Vermont Regional Plan* mentions the importance of aesthetic quality in several places, and states that its fifth land use goal is “to preserve the aesthetic quality of the Region” (Central Vermont Regional Planning Commission 2004, page 2-24). However, no scenic protection areas are established. The Project is in conformance with the general language of this goal: It is not out of scale with the surrounding industrial uses. Outdoor lighting is kept to a minimum, and will not generally be visible from public roads. There are no plans to use non-native species to landscape the site. Parking is minimal and will not be visible from public roads. Existing screening vegetation on the site will be retained.

Based on this review, the proposed Project is in conformance with local regulations.

III. Methodology

Section 248(b)(5) of Title 30, Vermont Statutes Annotated requires the Board to make a finding that a proposed transmission Project will not have an undue adverse effect on aesthetics, as outlined in the so-called “Quechee Lakes Decision” (Quechee Lakes Corporation, #3EW0411-EB and #3O439- EB [1986]). As explained in the Public Service Board’s recent order in Docket No. 6860, this Board applies the Quechee Test in Section 248 proceedings, as follows:

The Public Service Board has adopted the Environmental Board’s Quechee analysis for guidance in assessing the aesthetic impacts of proposed projects under Section 248. We have previously explained the components of the Quechee analysis as follows:

In order to reach a determination as to whether the project will have an undue adverse effect on the aesthetics of the area, the Board employs the two-part test first outlined by the Vermont Environmental Board in Quechee, and further defined in numerous other decisions.

Pursuant to this procedure, first a determination must be made as to whether a project will have an adverse impact on aesthetics and the scenic and natural beauty. In order to find that it will have an adverse impact, a project must be out of character with its surroundings. Specific factors used in making this evaluation include the nature of the project's surroundings, the compatibility of the project's design with those surroundings, the suitability of the project's colors and materials with the

immediate environment, the visibility of the project, and the impact of the project on open space.

The next step in the two-part test, once a conclusion as to the adverse effect of the project has been reached, is to determine whether the adverse effect of the project is "undue." The adverse effect is considered undue when a positive finding is reached regarding any one of the following factors:

1. Does the project violate a clear, written community standard intended to preserve the aesthetics or scenic beauty of the area?
2. Have the applicants failed to take generally available mitigating steps which a reasonable person would take to improve the harmony of the project with its surroundings?
3. Does the project offend the sensibilities of the average person? Is it offensive or shocking because it is out of character with its surroundings or significantly diminishes the scenic qualities of the area?

Our analysis, however, does not end with the results of the Quechee test. Instead, our assessment of whether a particular project will have an "undue" adverse effect on aesthetics and scenic or natural beauty is "significantly informed by overall societal benefits of the project."

Petitions of Vermont Electric Power Company, Inc. (VELCO), Vermont Transco, Docket No. 6860, Vt. Pub. Serv. Bd. (Jan. 28, 2005) at 79 (footnotes omitted).

To apply the Quechee test, TJB first determined locations from which public views of the Project might be possible by creating a topographic viewshed map for the proposed Project. Five two-meter high targets were located at the center and cardinal points of the proposed PV array. The map in Appendix 2 shows the location of these targets on the Project site. The map also presents the project topographic viewshed, shaded to show the number of these target points that would be visible from eye-level within a five mile radius of the proposed Project. It is important to emphasize that this viewshed map does not incorporate screening from vegetation, which is considerable in this area. Potential viewpoints were identified by reviewing maps and aerial photographs project area, and design plans of the Project. These areas were then visited in the field and the existing conditions were documented through notes and photography. Locations from which photos were taken were recorded with a Global Positioning System ("GPS") unit. The field documentation was used to assess the existing visual character at each location and to evaluate the proposed Project's visibility and visual character. The GPS waypoints recorded at the photo locations, or "viewpoints", were imported to a Geographical Information System ("GIS") program, and portrayed on aerial photos along with the Project location and other relevant data. A map locating the project and viewpoints on an aerial photograph is included in Appendix 3. A catalog of photographs showing the existing conditions in the Project area are included as Appendix 4. These photos portray the visual character of the area, usually at areas with the highest potential visibility of the Project. Unless noted, all photos utilize a focal length

approximately equivalent to 50mm on a 35mm single lens reflex camera. The field notes for each viewpoint are included as Appendix 5.

TJB next evaluated field data and compared existing conditions with plans of the proposed Project. In most areas it was determined that surrounding vegetation, diverse topography, and other existing conditions will continue to screen views of the Project. Since it will not be visible from most public viewpoints, the Project will not have an adverse affect. As such, the second part of the Quechee test, determining whether the adverse impact is considered undue, was not required.

IV. Project Viewshed Analysis

To best evaluate visual impacts of the Project, it is necessary to understand the existing landscape conditions from which the Project is being viewed and assessed. To help illustrate the existing character of the view locations, we will use a standard set of descriptions.

The first method of description used is to characterize what activities are happening in a given area, or the land-use. These descriptions include:

- Remote, Rural, or Rural Residential: Consists of land that is not developed, nor being used for active farming or other uses. It can be isolated or secluded. Some individual residences may be present but are typically more than a road mile from another residence.
- Low Density Residential: Residential development that consists of single-family houses on large, spacious lots. These are typically not subdivisions, and form patterns of residences fronting a single road. Densities are no more than one residential unit per 2 acres.
- Medium Density Residential: Residential development that consists primarily of single family detached houses at densities of 1 unit per acre. Development patterns include clusters of units along roads, or small subdivisions.
- High Density Residential: Residential development that includes single family and multi-family units. Densities are greater than 1 unit per acre
- Park or Recreational: Areas specifically designated for recreational uses, or as town, state, or national forest lands.
- Agricultural: Areas in active agricultural use including crops and livestock
- Commercial: Customer-based businesses that typically do not involve exterior storage and warehouse facilities.
- Industrial: Uses that portray a “manufacturing” type of appearance; includes utility-based infrastructure.

Due to the fact that most views were identified from public roads, the second method used to portray the character of the land is through road classification. Most of the publically accessible areas where visibility of the Project will be possible are from public roadways. Roads within



Vermont are defined by a class system. The location and class for each roadway within the Project study area was derived from GIS data used by 911 Emergency Services (E911) available through the Vermont Center for Geographic Information. The classes give an impression of the area and the extent of usage the area receives. Areas we describe include the following road classifications:

- Class 9 – Private road: These roads are not public and are used for display on local maps.
- Class 4 - Undivided Town Highway: Class 4 roads are not funded by VTrans, but are legally considered Class 3. These are local roads that mainly provide property access. They are not always maintained by the town and are typically not cleared of snow in the winter.
- Class 3 - Undivided Town Highway: Typically these are local roads that provide access to rural and low-density properties. Within the study area, Class 3 roads are typically unimproved dirt roads (although some are paved), and are typically maintained year round.
- Class 2 – Undivided Town Highway: These roads are regional collector roads and provide the only access to many Vermont communities. They are typically (although not always) paved roadways.
- Class 30 – Vermont State Highway, Undivided centerline: These roads are major transportation routes and provide access between major regions within the state.
- Class 40 – US Highway, Undivided centerline: US highways are major transportation routes that provide access between regions within and out of the state.
- Classes 51 and 52 – US Interstate Highway, Divided centerline: Class 51 is northbound and Class 52 is southbound. Interstate highways have limited access points, multiple lanes and other design features that support high speed long distance travel.

We have utilized both land-use and road classifications to help portray the intensity of use and land-use development of the areas assessed in the study. Our report also describe the scenic quality and diversity of the landscape; whether Project elements are in the foreground, middleground, or background of views; the extent or duration of views; and how prominent the Project will appear within the view.

The Viewshed Map indicates that the proposed Project has very little potential visibility within a five mile radius. There appear to be four areas with possible visibility: (1) Berlin local roads within a mile of the Project, (2) Montpelier local roads north of the Project site, (3) southbound traffic on Interstate 89 between the Middlesex-Montpelier Town line and Exit 8, and (4) northbound traffic on Interstate 89 between Exits 7 and 8. The following is a section-by-section analysis of areas from which the Project s will be visible.

1. Berlin Local Roads

NOT ADVERSE

Most local roads with a potential view of the proposed Project are located in Berlin within a mile of the Project, as indicated by the Topographic Viewshed Map in Appendix 2. This area is characterized by a mixture of agricultural fields, medium to high density residences, and industrial facilities. The

Nelson Drive. The Project site is accessed on Nelson Drive, a Class 3 road that bridges the Dog River. The road is also used to access GMP's Berlin Plant #5. It is gated, though not posed, and vehicular traffic is restricted. The Project will only be visible beyond this gate.

Dog River Road. This is a Class 2 road. The Montpelier Water Pollution Control Plant and Department of Public Works are located on Dog River Road, north of Nelson Drive. The two baseball fields in Figure 1 are located across the street, one of which has night lighting on tall poles. While there are open fields between these facilities and the site, views are blocked mature hedgerows along the Dog River and the proposed Project site's northeastern boundary.

On Dog River Road south of Nelson Drive there are several residences, and commercial development at the junction with Vermont Route 12. There is no potential visibility along this stretch due to topographic and vegetative screening.

Junction Road. This is another Class 2 road that is characterized by a mixture of commercial, residential and agricultural land uses. Industrial uses include Capital Steel & Supply Company, and Ireland's cement plant. Junction Road bridges the Dog River, but a railroad bridge and utility pipe crossing obstruct views up river. The Topographic Viewshed Map indicates potential visibility of the site along an 800 foot stretch west of the intersection with Dog River Road. However, the mature trees screen all views of the site from these locations.

Vermont Route 12. This is a State Highway (Class 30). There is a 1,000 foot stretch of Vermont Route 12 with potential visibility of the project. Three streets form a 74-unit trailer park to the east of Vermont Route 12 in this area also have potential visibility of the site. However, mature trees screen the Project site from view. The top of the gas storage tanks at GMP's Berlin Plant #5 are visible from Vermont Route 12 by looking down a 115 kV power line just south of this area. However the much lower PV structures will not be visible.

The **Dog River** is also in this area. However, the height of the river banks and riverside trees screen views of the site.

Since the Project is not visible from these locations, the impact is Not Adverse.



Figure 2. The site will be screened from this view on Dog River Road over baseball fields, the Dog River, and an agricultural field. This the most open view from this area.