Mohawk Solar

Case No. 17-F-0182

1001.24 Exhibit 24

Visual Impacts

Table of Contents

List of Tables

EXHIBIT 24 VISUAL IMPACTS

(a) Visual Impact Assessment

The Applicant has completed a Visual Impact Assessment (VIA; EDR, 2019a; see Appendix 24-A) that describes the extent and significance of Facility[1] visibility. The VIA includes identification of visually sensitive resources, viewshed mapping, results of photography fieldwork, visual simulations (photographic overlays), and proposed visual impact mitigation. The methodology and results of the VIA are further described in Appendix 24-A and summarized herein.

(1) Character and Visual Quality of the Existing Landscape

Per the requirements set forth in set forth in 16 NYCRR § 1000.24(ar), the Visual Study Area is defined as the area within five miles of the Facility. In addition, as requested in review correspondence from the DPS, the Visual Study Area was expanded to include "selected areas extending beyond that radius for one mile along the Route 20 Scenic Byway corridor travelling west towards East Springfield and for one mile along Route 67 North towards the Fulton County line" (DPS, 2019). The Visual Study Area, which includes these areas requested by DPS, is described in Section 3.1 and shown on Figure 3 in the VIA (see Appendix 24-A).

Defining distinct landscape types (or Landscape Similarity Zones [LSZs]) within a given study area provides a useful framework for describing the character and visual quality of the existing landscape and facilitates the analysis of a project's potential visual effects. In accordance with established visual assessment methods (notably, USDA Forest Service, 1995; Smardon et al., 1988; USDOT Federal Highway Administration, 1981; USDI BLM, 1980), five distinct LSZs were defined and mapped within the Visual Study Area (see Table 24-1). Descriptions and representative photographs of each LSZ are provided in Section 3.3 and their location shown on Figure 4 of the VIA (see Appendix 24-A).

Table 24-1. Landscape Similarity Zones within the Visual Study Area

Landscape Similarity Zone	Total Area of LSZ within the Visual Study Area (square miles)	Percent of Total Area* within Visual Study Area
Rural Uplands	90.5	64.6%
Forest	29.3	20.9%
Mohawk Valley	12.8	9.1%
Village	5.6	4.0%
Transportation Corridor	1.9	1.4%

*The 5-mile visual study area includes approximately 140.0 square miles, or approximately 89,590 acres.

[1] As defined throughout this Application, the Facility refers to all components of the proposed project, including PV panels and support structures, inverters, access roads, buried and above ground collection lines, a generation tie line (or "gen-tie"), a substation, a switching station, fences, and staging areas.

(2) Visibility of the Facility

The VIA (see Appendix 24-A) includes an analysis of the potential visibility of the Facility and identifies locations within the Visual Study Area where it may be possible to view the proposed PV arrays and/or substation. PV panels will be installed on a low-profile single axis tracker, racking system, consisting of steel I-beam posts driven into the ground and tubular steel horizontal beams to allow attachment and articulation of the PV panels. The height of the panels will vary as the structures tilt to follow the sun throughout the day and it is anticipated that the height of the panels (when at their tallest position) will typically be less than 10 feet (note the height will be variable given undulations in the existing terrain). However, for the purpose of ensuring a conservative analysis, the viewshed models in the VIA were based on a conservative assumption that the maximum PV panel height would be up to 11 feet above existing grade. The methodology used to prepare viewshed (i.e., visibility) analyses for the Facility is described in Section 4.1.1 of the VIA (Appendix 24-A) and summarized below in Section 24(b)(2) of this Exhibit. Viewshed maps (see Figures 9 and 10 in the VIA; Appendix 24-A) show areas where the Facility will potentially be visible, and areas where existing topography, vegetation, and structures will screen potential views of the Facility.

As described in Section 4.1.2 of the VIA report, to verify results of the viewshed analysis, EDR personnel conducted field review in the visual study. During these site visits, EDR staff members drove public roads and visited public vantage points within the visual study area to document locations from which the PV panels and other Facility components would likely be visible, partially screened, or fully screened. This determination was based on the visibility of the distinctive Facility Site ridges/landforms, as well as existing built structures (such as silos, barns, and communications towers) on or around the Facility Site, which served as locational and scale references. During field review, photographs were obtained from 193 separate viewpoints to document potential visibility of the Facility from the various LSZs, distance zones, directions, and VSR's throughout the visual study area. A photolog, including a representative photograph toward the Facility Site from each viewpoint, is included in Appendices B and G of the VIA (see Appendix 24-A).

Weather conditions during the field visits were generally sunny and clear with low humidity and little cloud cover. Such weather conditions represented the highest visibility conditions and, therefore, the potential "worst case" in terms of potential Facility visibility and visual impact. In obtaining photos, consideration was also given to viewer orientation and time of day by strategically capturing a variety of lighting conditions (front lit, side lit, and backlit) as well as the different angles at which the PV panels may be viewed. During each site visit, photos were taken using digital SLR cameras with a minimum resolution of 24.1 megapixels.[2] All cameras utilized a focal length between 28 and 35 mm (equivalent to between 45 and 55 mm on a standard 35 mm film camera). This focal length is the standard used in visual impact assessment because it most closely approximates normal human perception of spatial relationships and scale in the landscape (CEIWEP, 2007). At each viewpoint, a series of overlapping photos were taken to cover the full field of view toward the Facility Site. Viewpoint locations were determined using hand-held global positioning system (GPS) units and high-resolution aerial photographs (digital ortho quarter quadrangles). The time and location of each photo were documented on all electronic equipment (cameras, GPS units, etc.) and noted on field maps and data sheets. Viewpoints photographed during field review generally represented the most open, unobstructed available views toward the Facility.

Because of the Facility's geographic location on the south side of the ridge that defines the Mohawk Valley (i.e., facing away from the valley), the Facility will not be visible from the nearby Village of Canajoharie or other densely populated areas. In addition, because of the rolling topography in the immediate vicinity of the Facility and its low-profile, visibility of the Facility components is for the most part be limited to areas within 0.5-mile of the proposed Facility.

(3) Visibility of Above-ground Interconnections and Roadways

Access roads, fences, and any other above ground component of the Facility are depicted in the visual simulations included as Appendix D in the VIA (see Appendix 24-A). In addition, the Facility will include a Facility substation and POI switchyard. Most of the equipment in the substation and switchyard will remain below a height of 25 feet with the exception of the lightning masts, which will have a maximum height of 65 feet. The equipment for the collection substation will be installed on concrete foundations and enclosed by chain link fencing. A generation tie line (gen-tie) will connect the collection substation to the POI switchyard. The gen-tie will be constructed as an overhead line carried on 12 pole structures with an anticipated height of 65 feet over a distance over 200 feet between the collection and POI substations. Sections 5.1.2 and 5.1.3 of the VIA report include a viewshed analysis (see VIA Figure 10) and representative line-of-sight profiles (see VIA Figure 11) that depict the potential visibility of the above-ground interconnection facilities.

(4) Appearance of the Facility Upon Completion

To show anticipated visual changes associated with the proposed Facility, the Applicant used high-resolution computer-enhanced image processing to create realistic photographic simulations of the proposed Facility from nine selected viewpoints. The methodology to create the simulations is described in Section 4.3.2 of the VIA report

[2] Digital SLR cameras used in the photography fieldwork included Nikon D7100 and Cannon EOS 5D Mark IV.

(see Appendix 24-A) and summarized as follows. Photographic simulations were developed by using Autodesk 3ds Max Design® to create a simulated perspective (camera view) to match the location, bearing, and focal length of each existing conditions photograph. Existing elements in the view (e.g., topography, buildings, roads, and silos) were modeled based on aerial photographs and DEM data in AutoCAD Civil 3D®. This assures that any elements introduced to the model space (e.g., the proposed PV panels) will be shown in proportion, perspective, and proper relation to the existing landscape elements in the view. Consequently, the alignment, elevations, dimensions and locations of the proposed Facility structures are depicted accurately and true in their relationship to other landscape elements in the photograph.

Computer models of the proposed panel layout and fence line were prepared based on the preliminary design drawings for the Facility. Using the camera view as guidance, the visible portions of the modeled Facility components were imported to the landscape model space described above and set at the proper coordinates. Once the proposed Facility was accurately aligned within the camera view, a lighting system was created based on the actual time, date, and location of the photograph. Using the Mental Ray Rendering System® with Final Gather and Mental Ray Daylight System® within the Autodesk 3ds Max Design® software, light reflection, highlights, color casting, and shadows were accurately rendered on the modeled Facility based on actual environmental conditions represented in the photograph. The rendered Facility was then superimposed over the photograph in Adobe Photoshop® and portions of the Facility components that fall behind vegetation, structures or topography were masked out. Photoshop was also used to take out any existing structures or vegetation proposed to be removed as part of the Facility.

As described in Section 4.2 and Appendix G of the VIA, the Applicant has developed a conceptual visual mitigation planting plan, using native species and mimicking the character of successional fields in the study area, to minimize and mitigate the Facility's visual effect on the surrounding landscape. For each viewpoint that featured a foreground or near-midground view (i.e., where details of the Facility would be apparent to viewers) two versions of each visual simulation were prepared. The first shows the Facility's planting plan in a newly installed conditions, with the visual mitigation plantings shown at the size that would be expected within a year of being installed. In addition, a second visual simulation was prepared for these viewpoints that shows the planting plan in a mature condition, within approximate 5-7 years following installation of the Facility. These simulations are intended to demonstrate and allow for evaluation of the efficacy of the proposed conceptual planting plan. Simulations showing the newly installed and mature condition are included in Appendix D of the VIA (see Appendix 24-A).

(5) Lighting

No lighting will be installed as part of the PV arrays. The only light sources that are anticipated to be installed for the Facility are safety/security lighting to be installed at the collection substation and the O&M building. All such lighting will be directed downward at a 30-degree tilt angle to minimize the effects of light pollution. Lighting will also be kept to a minimum and will use the lowest intensity required to assure safety and security. Additionally, all lighting will be operated manually or placed on an auto-off switch to further minimize the impacts of off-site light trespass. Details of the proposed lighting to be installed at the collection substation and the O&M building are included in Appendices 5-F, 11-C, and 11-D of the Article 10 Application.

(6) Photographic Overlays

To show anticipated visual changes associated with the proposed Facility, high-resolution computer-enhanced image processing was used to create realistic photographic simulations of the completed arrays from each of the selected viewpoints. See Section 24(a)(4) above for discussion of the methodology used for creating the simulations. The visual simulations of the Facility are included in Appendix D of the VIA (see Appendix 24-A).

(7) Nature and Degree of Visual Change from Construction

Visual impacts during construction are described in Section 5.3.5 of the VIA (see Appendix 24-A) and are anticipated to be relatively minor and temporary in nature. Representative photographs of construction activities are included in the VIA. Anticipated visual effects during construction will include soil disturbance, loss of vegetation, and addition of construction equipment and materials to certain views. Large earth moving equipment, land clearing equipment, concrete trucks, excavators, pile driving equipment, and construction vehicles will be present over the course of several months.

(8) Nature and Degree of Visual Change from Operation

The methodology and results of a visual contrast rating that was conducted as part of the VIA is described in Sections 4.3.3 and 5.3.1 of the VIA (see Appendix 24-A). The visual simulations (described above in Sections 24(a)(2) and 24(a)(5) of this Exhibit) were evaluated by a rating panel consisting of three professionals with experience in the visual/aesthetics field to determine the type and extent of visual impact likely to result from installation of the proposed Facility. To evaluate anticipated visual change associated with installation of the PV panels, the photographic simulations of the completed Facility were compared to photos of existing conditions from each of the nine selected viewpoints. These "before" and "after" photographs, identical in every respect except for the Facility components shown in the simulated views, were provided to the rating panel, who were then asked to determine the effect of the proposed Facility in terms of its contrast with existing elements of the landscape.

The methodology utilized in this evaluation is based on the U.S. Bureau of Land Management (BLM) contrast rating methodology (USDI BLM, 1980), and was developed by EDR in 1999, (and subsequently updated), for use on utility scale renewable energy projects. It involves using a short evaluation form and a simple numerical rating process. This methodology 1) documents the basis for conclusions regarding visual impact, 2) allows for independent review and replication of the evaluation, and 3) allows many viewpoints to be evaluated in a reasonable amount of time. The results of this analysis are described in Sections 5.3.1, 5.3.2, and Appendix E of the VIA (see Appendix 24-A) and summarized below in Section 24(b)(7) of this Exhibit.

In addition, aesthetic resources and landscape character have been identified as important concerns in regional planning documents prepared by municipal authorities and non-profit groups. A summary of goals/objectives in regional planning documents regarding aesthetic assets and visual character of the project's setting is included in Section 3.2 of the VIA (see Appendix 24-A).

(9) Operational Effects of the Facility

Glare is frequently raised as a possible concern for solar PV installations. PV panels are designed to absorb as much of the solar spectrum as possible to maximize efficiency. There is an inverse correlation between light absorption and reflection. Consequently, virtually all PV panels installed in recent years have at least one anti-reflective coating to minimize reflection and maximize absorption. The reflectivity of a surface is often measured as albedo, which is the fraction of solar energy reflected by that surface. For comparison, the albedo of PV panels (0.1 -0.3) (Lasnier and Ang, 1990) is generally similar to, or lower than many natural surfaces such as coniferous forests (0.2), grasslands (0.25), dry sand (0.45), and snow cover (0.50) (Budikova, 2010). Furthermore, the glare and reflectivity of PV panels have been found to be lower than the glare and reflectivity generated by standard glass (NYSERDA, 2019; SunPower, 2009). In addition, Mohawk Solar intends to use single-axis trackers, which direct the panels at the sun for optimal energy production. An added benefit of the use of trackers is that any glare, however small, that might be generated is reflected directly back at the sun, therefore essentially eliminating any glare available to observers.

In addition, operation of the Facility will not generate plumes or any other visible effect. The only visual effect of the Facility is the visibility of PV panels and other Facility components. Therefore, construction and operation of the Facility is not anticipated to result in potential impacts from glare or other off-site effects (such as plumes).

As further described in Exhibit 31 of this Application, pursuant to a request by the Towns, the Applicant engaged a licensed engineer to evaluate the occurrence and duration of any potential glare from the Facility that would be visible to sensitive receptors, including adjacent residences and major transportation routes. Based on that analysis (Power Engineers, 2019; see Appendix 31-A; described in Exhibit 31 of the Article 10 Application), the potential occurrence of glare at the Facility was limited to one residence at intermittent times throughout the year around sunrise (when the viewers would otherwise have their gaze diverted to avoid looking directly into the setting or rising sun) with durations of less than ten minutes. Therefore, the potential for glare is minimal, to non-existent. However, despite the negligible impacts, as a means of further minimizing the potential for glare, the Applicant has eliminated several panels such that no further potential for glare exists.

(10) Measures to Mitigate for Visual Impacts

The minimization and mitigation of visual impacts is an important consideration when siting and designing solar facilities. The NYSDEC Program Policy *Assessing and Mitigating Visual Impacts* provides general guidance regarding appropriate considerations to address visual effects for development projects of all types, such as relocation, camouflage/disguise, low profile, downsizing, use of alternative technology, non-specular material, lighting, and screening (NYSDEC, 2000; 2018). Some of these considerations (e.g., low-profile, downsizing) are more applicable to large/tall structures than to solar facilities; however, the use of vegetation to help screen views of a solar facility, improve the aesthetics of projects, and provide ecological/wildlife benefits is becoming well-established as the preferred method of mitigating visual impacts for solar facilities (e.g., NYSERDA, 2019; Scenic Hudson, 2018; Sullivan and Abplanalp, 2013; Walston, *et al*. 2018).

As described in Sections 4.2, 6.2, and Appendix G of the VIA (see Appendix 24-A), the Applicant has developed a conceptual visual mitigation planting plan, using native species and mimicking the character of successional fields in the study area, to minimize and mitigate the Facility's visual effect on the surrounding landscape. This conceptual planting plan was developed as a site-specific solution appropriate to the scale of the Facility and visual character of its setting. However, a variety of visual mitigation options can be considered for solar projects, such as selection of equipment/technology, siting/setbacks, fencing, and screening. These mitigation options and their applicability to the proposed Mohawk Solar Facility are discussed below:

<u>Equipment/Technology</u>

PV panels have a low-profile (in this case, anticipated to be no greater than 10 feet in height depending on undulations in the existing topography), which limits their visibility and potential visual effect in terms of the distance from which the PV panels will be visible. However, the large areas of land required to achieve the necessary scale of electrical production for utility-scale solar projects can result in a substantial change in the visual character of the environment for viewers located in areas adjacent to the Facility. Other elements of Facility design, such as burying proposed electrical interconnects, are intentionally designed to avoid visual impacts (i.e., relative to the use overhead lines for electrical collection within the Facility).

Siting

Proper siting considerations for solar projects include avoidance of areas with significant VSRs and high density of residents. The Mohawk Solar Facility has been sited to avoid or minimize visual impacts to population centers. Due to the screening provided by vegetation and topography, visibility is generally concentrated within 0.5 mile of the Facility. Additionally, siting the proposed Facility in open agricultural lands minimizes the potential need for tree clearing and associated visual impacts, and the patchwork of existing woodlots and hedgerows around those agricultural fields help to minimize Facility visibility. In addition, the arrays generally will follow the existing topography of the Facility Site and will require little grading.

Setbacks

The general design criteria for the Facility included setbacks established in consideration of local zoning requirements to allow a sufficient buffer between Facility components and public rights of way ("ROW") and private residences/property lines. Within the Town of Canajoharie, a 200-foot setback between the PV arrays and the property line of any parcel whose owner is not hosting Facility components (i.e., a "non-participating parcel") and/or the edge of any public road ROW. Within the Town of Minden, a 100-foot setback between the PV arrays and the property line of any parcel whose owner is not hosting Facility components (i.e., a "non-participating parcel") and/or the edge of any public road ROW.

Screening

As describe above, the Applicant has developed a conceptual perimeter planting plan intended to block or soften views of the solar arrays from surrounding areas. Alternate approaches to visual screening considered for use in the Mohawk Solar Facility site are described below:

Berms, Opaque Enclosures, and Evergreen Hedges

Visual mitigation for solar facilities can include installing earthen berms, opaque enclosures (such as vinyl fencing or similar), and/or a screening hedge made up of evergreen trees. These approaches can be effective to fully screen views of a project and might be appropriate in urban and suburban settings. In addition, there are no design configurations or solutions for these types of screening measures that would allow the Facility to be fully screened from view without resulting in additional environmental impacts. The use of berms would require large areas of soil disturbance, which is contrary to the design objective of the Facility to minimize soil disturbance to the greatest extent practicable and could interfere with current or future agricultural uses of the Facility Site. In addition, the use of berms, opaque enclosures, or evergreen hedges would introduce new visual elements into the landscape that would be inconsistent with the character of the existing visual environment and therefore result in unnecessary visual impacts. In a rural/agricultural setting, such as the Facility Site, the introduction of berms, opaque enclosures, and/or uniform evergreen hedges would be inconsistent with the native vegetation and existing visual character. Consequently, no such treatment is proposed as visual mitigation for the Mohawk Solar Facility. As indicated in the description of proposed planting modules (see Section 4.2 of the VIA; Appendix 24-A), the proposed installation of evergreens will be intermittent, in keeping with the existing visual character of the visual study area.

Native Shrubs and Trees

An alternative to berms and evergreen hedges, which may not appear natural or appropriate in many settings, is the use of native shrub and tree plantings between adjacent roads and the fencing that encloses the solar arrays. A well-designed solar facility should include a planting plan with thoughtful selection of appropriate, native plants installed in locations that will screen or soften views of the facility from adjacent properties or roadways. The selection of plant materials is an important consideration not only for aesthetics but also to provide habitat for pollinators and other wildlife (Eskew, 2018; Walston, *et al*., 2018). Scenic Hudson, Inc., a New York-based land use advocacy and land preservation organization in the Hudson River Valley, has established five criteria for plant selection when screening a solar project. These criteria include: (1) plants large enough to screen the facility from the time of their installation; (2) be selected to provide year-round screening; (3) enhance the area's existing beauty; (4) provide long-lived, resilient and dense bank of vegetation; (5) use of native species mix (Scenic Hudson, 2018). In addition to these criteria, a diverse selection of native tree and shrub species, varying in height, should be used (North Carolina Pollinator Conservation Alliance, 2018).

In addition, removing vegetation from a given facility site can result in a strong visual contrast between a project and the surrounding environment (Sullivan and Abplanalp, 2013). The Mohawk Solar Facility has been designed to retain existing on-site vegetation wherever feasible, particularly along roadways and property lines to retain the screening benefits of existing vegetation. Maintaining existing vegetation enables the Facility Site to preserve the visual and ecological character of the surrounding landscape.

For the Mohawk Solar Facility, the Applicant selected combinations of trees and shrubs that mimic early successional and/or hedgerow communities observed within and adjacent to the Facility Site (see Appendix G in the VIA; Appendix 24-A). While the use of native shrubs and trees will not necessarily result in plantings that completely screen views of the Facility, it will serve to soften the overall visual effect and help to better integrate the Facility into the surrounding landscape. Plantings were selected to match or complement the existing composition and pattern of vegetation within the Facility Site. In addition to helping blend the Facility into the surrounding landscape, use of native plant species also provides ecological benefits, such as food and cover for local wildlife communities.

Pollinator-Friendly Grasses and Wildflowers

Planting pollinator-friendly species can aid in the aesthetics of a solar facility, while also providing habitat for wildlife such as hummingbirds, butterflies, and bees (Eskew, 2018; NYSERDA, 2019; Scenic Hudson, 2018; Walston, *et al*., 2018). Agricultural settings include areas characterized by open fields and unimpeded long-distance views. To match the character of these areas, the Applicant intends to install tall native grasses and wildflowers along selected roadsides to soften the appearance of a project and better integrate it into the landscape. In the case of Mohawk Solar, regionally appropriate herbaceous plantings were included in the conceptual planting modules to provide habitat for pollinator species when planted around the periphery of the site and/or in locations on site where mowing can be restricted during the summer months. Pollinator seed mixes can provide a colorful backdrop, particularly in the spring, summer, and fall months. Leaving the taller plants un-mowed during the summer provides benefits to pollinators, habitat for ground nesting/feeding birds, and cover for small mammals, in addition to softening the appearance of the Facility.

<u>Lighting</u>

No lighting will be installed within the PV arrays. The substations and O&M building will need to be equipped with lights for safety and security. Light fixtures will be directed downward at a 30-degree angle to minimize the effects of light pollution. Additionally, lighting at the Facility will be kept to a minimum and turned on only as needed, by manual switch or timer. These measures will effectively minimize and mitigate the potential visual effect of any proposed lighting at the Facility.

<u>Relocation</u>

Due to the geographic extent of the Facility and the variety of viewpoints from which the Facility can be seen within the visual study area, the relocation of PV panels would generally not significantly alter the visual effect of the Facility. Moving individual solar arrays to different sites would not necessarily reduce impacts, but rather relocate them. Additionally, because the Facility layout is restricted to participating parcels and has been designed to accommodate various setbacks from roads and residences, options for relocation of individual Facility components are limited.

<u>Downsizing</u>

Reducing the number of PV panels could reduce visual impact from certain viewpoints, but from most locations within the visual study area where more than one solar array is visible, the visual impact of the Facility would change only marginally unless a substantial number of PV panels were removed. Along with affecting the financial viability of the Facility, downsizing the Facility would significantly reduce the local socioeconomic benefits of the Facility and reduce the Facility's ability to assist the State in meeting its energy policy objectives and goals.

Decommissioning

As described in Exhibit 29 of the Article 10 Application, the Applicant will establish a decommissioning fund to assure that all above-ground components of the Facility are removed at the end of their operational life.

In summary, while the conceptual planting plan for the Mohawk Solar Facility was not designed to completely screen views of the proposed Facility, the introduction of native tree and shrub mixes interspersed with pollinator plants along the roadsides adjacent to the Facility will provide a visual buffer of natural vegetation between the Facility and the viewer. These natural forms and colors are intended to divert attention from the modern materials and inorganic forms of the PV panel arrays. As demonstrated in the visual simulations included in this VIA, the installation of the proposed planting plan, upon reaching maturity, would better integrate the PV arrays into the character of the existing landscape. With the inclusion of these measures, the Applicant has developed a plan that effectively minimizes the potential visual effect of the Facility.

(11) Description of Visual Resources to be Affected

As described in Sections 3.6, 5.2, and Appendix C of the VIA (see Appendix 24-A), Visually Sensitive Resources (VSRs) within the visual study area were identified in accordance with guidance provided by New York State Department of Environmental Conservation (NYSDEC) Program Policy DEP-00-2 *Assessing and Mitigating Visual Impacts* (NYSDEC, 2000) and the requirements of Article 10, as described in 16 NYCRR § 1000.24(b)(4). In addition, EDR identified other resources that could be considered visually sensitive based on the type or intensity of use they receive. The categories of VSRs that would be typically required for consideration in VIAs include the following:

- **Properties of Historic Significance** (National Historic Landmarks, Sites Listed on the National or State Registers of Historic Places [NRHP, SRHP]; Properties Eligible for Listing on the NRHP or SRHP; National or State Historic Sites).
- **Designated Scenic Resources** (Rivers Designated as National or State Wild, Scenic, or Recreational; Adirondack Park Scenic Vistas; Sites, Areas, Lakes, Reservoirs or Highways Designated or Eligible for Designation as Scenic; Scenic Areas of Statewide Significance; Other Designated Scenic Resources)
- **Public Lands and Recreational Resources** (National Parks, Recreation Areas, Seashores, and/or Forests; National Natural Landmarks; National Wildlife Refuges; Heritage Areas; State Parks; State Nature and Historic Preserve Areas; State Forest Preserves; Other State Lands; Wildlife Management Areas &

Game Refuges; State Forests; State Boat Launches/Waterway Access Sites; -Designated Trails; Palisades Park; Local Parks and Recreation Areas; Publicly Accessible Conservation Lands/Easements; Rivers and Streams with Public Fishing Rights Easements; Named Lakes, Ponds, and Reservoirs)

- **High Use Public Areas** (State, US, and Interstate Highways, Cities, Villages and Hamlets; Schools)
- **Locally Identified Resources**

To identify VSRs within the visual study area, EDR consulted a variety of data sources including digital geospatial data (summarized in the VIA report). In addition, in accordance with the requirements set forth in 16 NYCRR § 1000.24(b)(4), as well as Section 24 of the Facility's PSS (EDR, 2017), Mohawk Solar LLC also conducted a systematic program of public outreach to assist in the identification of VSRs. Copies of the correspondence sent by the Applicant as part of this process, as well as responses received from stakeholders, are included as Appendix F in the VIA (see Appendix 24-A). This outreach effort included the following:

- The Applicant distributed a request on October 18, 2017 to appropriate municipal planning representatives, town and village historians, local and regional chambers of commerce, along with multiple local environmental groups.
- The Applicant sent a visual outreach letter to an additional contact, Otsego 2000, in November of 2017 asking for their help as well in identifying VSRs that should be included in the VIA.
- The Applicant received one response to this outreach that highlighted the importance of two VSRs already included in the VIA inventory and analysis.
- The Applicant has engaged in consultation with the New York State Office of Parks, Recreation, and Historic Preservation (NYSOPRHP) in order to evaluate the Facility's potential effect on historic resources listed or eligible for listing in the S/NRHP (EDR, 2018, 2019b). Through this correspondence with NYSOPRHP, 19 additional properties were identified as S/NRHP eligible, including a rural historic district.

As a result of the database review and outreach effort described above, VSRs of national, regional and statewide significance, as well as locally significant aesthetic resources, were identified within the visual study area. The locations of inventoried VSRs are included on maps and listed in tables in the VIA (see Appendix 24-A). The identification of VSRs also included consideration of residences located adjacent to or nearby to the proposed Facility. Consideration of views from adjacent residences factored into the selection of viewpoints for the preparation of visual simulations, as further described below in Section 24(b)(4) of this Exhibit.

(b) Viewshed Analysis

The VIA includes a viewshed analysis to identify locations within the visual study area where it may be possible to view the proposed PV arrays and other proposed above-ground facilities from ground-level vantage points. Viewshed analyses were generated based solely on topography (i.e., the most conservative analysis) as well as models that include the potential screening effect of vegetation and structures/objects in the environment. The methodology to be employed in this analysis is described below.

(1) Viewshed Maps

The VIA r (see Appendix 24-A) includes viewshed maps (Figures 9, 10, and Appendix A in Appendix 24-A), which define the maximum area from which the completed Facility could potentially be seen within the study area. With respect to line-of-sight profiles, please note that the computer model program defines the viewshed (when evaluating topography only for instance) by reading every cell of the digital elevation model (DEM) data and assigning a value based upon the existence of a direct, unobstructed line of sight to the location/elevation coordinates of each cluster of PV panels from observation points throughout the entire visual study area. Therefore, for the purposes of the Article 10 Application, the viewshed analyses also serves to document the line-of-sight profiles for resources of statewide concern.

(2) Viewshed Methodology

The methodology used to prepare viewshed analyses for the Facility are described in Section 4.1.1 and illustrated in Figure 6 of the VIA (see Appendix 24-A) and summarized below.

PV Panel Viewshed Analysis

A topographic viewshed map for the proposed PV panels (see Figure 9: Sheet 1 in the VIA; Appendix 24-A) was prepared using the following data and assumptions:

- A 2-meter resolution bare earth digital elevation model (DEM) derived from the 2014 USGS and 2007 Federal Emergency Management Agency's (FEMA) Light Detection and Ranging (lidar) data for Schoharie, Montgomery, and Fulton Counties, New York;
- sample points representing PV panel locations;[3]

[3] Sample points representing the PV panels were placed 200 feet apart in a grid pattern throughout the PV array areas.

- an assumed maximum PV panel height of 11 feet.[4]
- an assumed viewer height of 6 feet;
- potential vegetation clearing along roadside areas to accommodate installation of proposed underground collection lines, and
- ESRI ArcGIS® software with the Spatial Analyst extension.

The ArcGIS program defines the viewshed (using topography only) by reading every cell of the bare earth (or ground surface) DEM data and assigning a value based upon the existence of a direct, unobstructed line of sight to PV panel sample point location/elevation coordinates from observation points throughout the visual study area. The resulting topographic viewshed map defines the maximum area from which any PV panel sample point could potentially be seen within the visual study area (i.e., ignoring the screening effects of existing vegetation and built structures). Because the screening provided by vegetation and buildings is not considered in this stage of the analysis, the topographic viewshed is very accurate in predicting where visibility will not occur due to topographic interference.

In addition, a second-level analysis was conducted to incorporate the screening effect of structures and vegetation by using the USGS and FEMA lidar datasets. A 2-meter resolution digital surface model (DSM) of the visual study area was created from these lidar data, which includes the elevations of buildings, trees, and other objects large enough to be resolved by lidar technology. Because this data can include narrow hedgerows or overhead electrical lines as potential screening features, an additional 35 feet of clearing was added on each side of every road to avoid introducing artificial screening from roadside distribution lines and thin hedgerows. Additionally, relatively small woodlots and hedgerows that may potentially be cleared during construction of the Facility were removed from the resulting DSM to reflect the bare-earth elevation in these locations. The modified DSM was then used as a base layer for the viewshed analysis, as described above. Once the viewshed analysis was completed, a conditional statement was used to set PV panel visibility to zero in locations where the DSM elevation exceeded the bare earth elevation by 6 feet or more. This was done for two reasons: 1) in locations where trees or structures are present in the DSM, the viewshed would reflect visibility from the vantage point of standing on the tree top or building roof, which is not the intent of this analysis and 2) to reflect the fact that ground-level vantage points within buildings or areas of vegetation exceeding 6 feet in height will generally be screened from views of the Facility (see Figure 6 in the VIA report for further information on the viewshed analysis process).

[4] The height of the panels will vary as the structures tilt to follow the sun throughout the day and it is anticipated that the height of the panels (when at their tallest position) will typically be less than 10 feet (note the height will be variable given undulations in the existing terrain). However, for the purpose of ensuring a conservative analysis, the viewshed models in the VIA were based on a conservative assumption that the maximum PV panel height would be up to 11 feet above existing grade.

Because it accounts for the screening provided by structures and trees, this second-level analysis is a more accurate representation of probable Facility visibility (see Figure 9: Sheet 2 in the VIA; Appendix 24-A). However, it is worth noting that because certain characteristics of the Facility and the visual study area that may influence visibility (e.g., color, atmospheric/weather conditions, distance from viewer) are not into taken consideration in the viewshed analyses, being located within the DSM viewshed does not necessarily equate to actual Facility visibility.

Above-Ground Interconnection Facilities Viewshed Analysis

Topographic and DSM viewshed maps also were prepared for the above-ground interconnection facilities (including the collection substation, POI Switchyard, and associated above-ground gen-tie line poles; see Figure 10 in the VIA; Appendix 24-A). The tallest proposed component of the substation are narrow lightning masts, with a maximum height of 65 feet. The precise location of these structures is not known at this time, so the analysis was run based on representative points at each corner of the substation and switchyard footprints, each with an assigned height of 65 feet. Additionally, sample points at a height of 65 feet were also included at the proposed locations of all above-ground transmission, of gen-tie, poles. All other data sources and assumptions used in the substation viewshed analysis are as described above for the PV panel viewshed analysis.

Per the requirements set forth in 16 NYCRR § 1000.24(a), the potential cumulative visual effect of the Facility as well as other energy projects built or proposed in the surrounding region must be considered. However, the Applicant is not aware of any other currently proposed solar projects (or other energy projects) in the visual study area. Consequently, it is not anticipated that any cumulative visual impacts will occur due to construction of the proposed Facility.

(3) Sensitive Viewing Areas

As described above in Section 24(a)(11) of this Exhibit and in Sections 3.6 and 5.2 of the VIA (see Appendix 24-A), Visually Sensitive Resources (VSRs) within the visual study area were identified in accordance with guidance provided by New York State Department of Environmental Conservation (NYSDEC) Program Policy DEP-00-2 *Assessing and Mitigating Visual Impacts* (NYSDEC, 2000) and the requirements of Article 10, as described in 16 NYCRR § 1000.24(b)(4). To identify VSRs within the visual study area, the Applicant consulted a variety of data sources including digital geospatial data (summarized in the VIA report). In addition, in accordance with the requirements set forth in 16 NYCRR § 1000.24(b)(4), as well as Section 24 of the Facility's PSS (EDR, 2017), the Applicant also conducted a systematic program of public outreach to assist in the identification of VSRs. Copies of the correspondence sent by the Applicant as part of this process, as well as responses received from stakeholders, are included as an appendix to the VIA.

A total of 116 VSRs were identified within the visual study area, with 66 of those showing potential Facility visibility according to the viewshed analysis. Results of this analysis are presented in Table 24-2. Additional discussion regarding potential visibility of the Facility from VSRs within the study area is included in Section 5.2 and Appendices A and C of the VIA (see Appendix 24-A).

Table 24-2. Visually Sensitive Resources with Potential Visibility of the Facility

Visually Sensitive Resources	Total Number of Resources within the Visual Study Area	Total Number of Resources with Visibility
Properties of Historic Significance [6 NYCRR 617.4 (b)(9)]	**Total 61**	**Total 36**
National Historic Landmarks (NHL)	2	0
Properties Listed on National or State Registers of Historic Places (NRHP/SRHP)	31	11
Properties Eligible for Listing on NRHP or SRHP	28	25
National/State Historic Sites	0	0
Designated Scenic Resources	**Total 2**	**Total 2**
Rivers Designated as National or State Wild, Scenic or Recreational	0	0
Adirondack Park Scenic Vistas [Adirondack Park Land Use and Development Map]	0	0
Sites, Areas, Lakes, Reservoirs or Highways Designated or Eligible for Designation as Scenic ([ECL Article 49Title 1] or equivalent)	2	2
Scenic Areas of Statewide Significance [Article 42 of Executive Law]	0	0
Other Designated Scenic Resources (Easements, Roads, Districts, and Overlooks)	0	0
Public Lands and Recreational Resources	**Total 27**	**Total 12**
National Parks, Recreation Areas, Seashores, and/or Forests [16 U.S.C. 1c]	0	0
National Natural Landmarks [36 CFR Part 62]	0	0
National Wildlife Refuges [16 U.S.C. 668dd]	0	2
Heritage Areas [Parks, Recreation and Historic Preservation Law Section 35.15]	2	0
State Parks [Parks, Recreation and Historic Preservation Law Section 3.09]	0	0
State Nature and Historic Preserve Areas [Section 4 of Article XIV of the State Constitution]	0	0
State Forest Preserves [NYS Constitution Article XIV]	0	0
Other State Lands	0	0
Wildlife Management Areas & Game Refuges	0	0
State Forests	0	0
State Boat Launches/Waterway Access Sites	1	0
Designated Trails	7	4
Palisades Park [Palisades Interstate Park Commission]	0	0
Local Parks and Recreation Areas	7	2
Publicly Accessible Conservation Lands/Easements	0	0
Rivers and Streams with Public Fishing Rights Easements	0	0
Named Lakes, Ponds, and Reservoirs	10	4
High-Use Public Areas	**Total 25**	**Total 16**

Visually Sensitive Resources	Total Number of Resources within the Visual Study Area	Total Number of Resources with Visibility
Properties of Historic Significance [6 NYCRR 617.4 (b)(9)]	**Total 61**	**Total 36**
State, US, and Interstate Highways	9	9
Cities, Villages, Hamlets	8	3
Schools	8	4
Resources Identified by Stakeholders	Total 0	Total 0
Total Number of Visually Sensitive Resources in the Visual Study Area	115	66

(4) Viewpoint Selection

As described in Section 4.3.1 and Appendix F of the VIA (see Appendix 24-A), the Applicant conducted additional outreach to agency staff and stakeholder groups to determine an appropriate set of viewpoints for the development of visual simulations. This outreach effort included the following:

- On April 2, 2018, in accordance with Article 10, Exhibit 24, Part 1001.24(b)(4), EDR distributed a letter entitled "Mohawk Solar (DPS Case 17-F-0182 - Recommendations Viewpoints – Official Request for Information", to appropriate municipal planning representatives and State of New York interested parties. This memo included 1) a summary of research and consultation undertaken as part of the VIA to date, 2) a description of the field review/photography conducted for the Facility, 3) the rationale for viewpoint selection, 4) recommendations regarding the viewpoints to be selected for the preparation of visual simulations, and 5) an invitation to a webinar to discuss viewpoint selection.
- On April 11, 2018, EDR hosted an on-line webinar that included, 1) a review of the visual studies conducted to date, 2) discussion of proposed and alternate viewpoints for the development of simulations, and 3) a request that stakeholders provide any additional suggestions or comments regarding viewpoint selection via email.

Based on the outcome of stakeholder and agency consultation, a total of nine viewpoints were selected for the development of visual simulations. These viewpoints were selected based upon the following criteria:

- They provide open views of proposed PV Panels (as indicated by field verification),
- They illustrate Facility visibility from VSRs identified by local stakeholders and state agencies.
- They illustrate typical views from LSZs where views of the Facility will be available.
- They illustrate typical views of the proposed Facility that will be available to representative viewer/user groups within the visual study area, including adjacent residences.

- They illustrate typical views of different numbers of PV Panels, from a variety of viewer distances, and under different lighting/sky conditions, to illustrate the range of visual change that will occur with the Facility in place.
- The photos obtained from the viewpoints generally displayed good composition, lighting, and exposure.

The visual simulations included as Appendix D in the VIA (see Appendix 24-A) provide representative depictions of the appearance of the built project, including views that represent typical views from adjacent residences.

(5) Photographic Simulations

As described above in Section 24(a)(4) of this Exhibit, the Applicant used high-resolution computer-enhanced image processing to create realistic photographic simulations of the proposed Facility from nine selected viewpoints. The methodology to create the simulations is described in Section 4.3.2 of the VIA. The photographic simulations are included as Appendix D of the VIA, as well as described and included as inset figures in Section 5.3.1 of the VIA report (see Appendix 24-A).

(6) Additional Simulations Illustrating Mitigation

As described in above in Section 24(a)(4) of this Exhibit and Section 4.2 and Appendix G of the VIA (see Appendix 24-A), the Applicant has developed a conceptual visual mitigation planting plan, using native species and mimicking the character of successional fields in the study area, to minimize and mitigate the Facility's visual effect on the surrounding landscape. For each viewpoint that featured a foreground or near-midground view (i.e., where details of the Facility would be apparent to viewers) two versions of each visual simulation were prepared. The first shows the Facility's planting plan in a newly installed conditions, with the visual mitigation plantings shown at the size that would be expected within a year of being installed. In addition, a second visual simulation was prepared for these viewpoints that shows the planting plan in a mature condition, within approximate 5-7 years following installation of the Facility. These simulations are intended to demonstrate and allow for evaluation of the efficacy of the proposed conceptual planting plan. Simulations showing the newly installed and mature condition are included in Appendix D of the VIA (see Appendix 24-A).

(7) Simulation Rating and Assessment of Visual Impact

As described above in Section 24(a)(8) of this Exhibit and Sections 4.2.3, 5.3.2, and Appendix E of the VIA (see Appendix 24-A), three professionals with experience in the visual/aesthetics field (one in-house, two independent) evaluated the visual impact of the proposed Facility as depicted in nine visual simulations. The rating panel members reviewed the existing and proposed views, evaluated the contrast/compatibility of the Facility with various components of the landscape (landform, vegetation, land use, water, sky, and viewer activity), and assigned quantitative visual contrast ratings on a scale of 0 (insignificant) to 4 (strong). The average contrast score assigned by each rating panel member was calculated for each viewpoint, and an average score for each viewpoint was determined. Copies of the completed rating forms from this analysis are included as Appendix E of the VIA, and the results of this evaluation process are summarized in Table 24-3, below.

Table 24-3. Summary of Results of Contrast Rating Panel Review of Simulations

Viewpoint Number	Distance to Nearest Visible Facility Component[1]	Distance Zone	Landscape Similarity Zone	Viewer Groups			Contrast Rating Scores[2]				
				Local Residents	Through Travelers/ Commuters	Tourists/ Recreation	#1	#2	#3	Average	Contrast Rating Result
Visual Simulations That Depict Newly Installed Condition (Year 1)											
16	0.1	Foreground	Rural Uplands	●			3.1	2.6	1.9	2.5	Moderate / Appreciable
24	0.1	Foreground	Rural Uplands	●			3.4	2.5	2.1	2.7	Moderate / Appreciable
26	0.4	Foreground	Rural Uplands	●	●		2.1	2.0	1.7	1.9	Moderate
28	0.3	Foreground	Rural Uplands	●			3.0	2.9	3.1	3.0	Appreciable
130	0.1	Foreground	Rural Uplands	●			2.5	2.6	1.8	2.3	Moderate
153	0.4	Foreground	Rural Uplands	●			3.7	2.9	2.4	3.0	Appreciable
154	0.1	Foreground	Rural Uplands	●	●		3.9	2.2	2.8	3.0	Appreciable
Total average rating for the simulations that depict the newly installed condition (Year 1)										2.6	Moderate / Appreciable
Visual Simulations That Depict Mature Plantings (5-7 years post install)											
16	0.1	Foreground	Rural Uplands	●			2.1	1.8	1.3	1.7	Minimal / Moderate
24	0.1	Foreground	Rural Uplands	●			2.5	2.2	2.1	2.3	Moderate
Visual Simulations That Depict Mature Plantings (5-7 years post install, continued)											
26	0.4	Foreground	Rural Uplands	●	●		2.1	1.9	1.7	1.9	Moderate
28	0.3	Foreground	Rural Uplands	●			3.0	2.9	3.1	3.0	Appreciable
130	0.1	Foreground	Rural Uplands	●			1.8	2.4	1.4	1.9	Moderate
153	0.4	Foreground	Rural Uplands	●			1.4	1.6	2.7	1.9	Moderate
154	0.1	Foreground	Rural Uplands	●	●		3.7	2.2	2.7	2.9	Moderate / Appreciable
Total average rating for the simulations that depict mature plantings (5-7 years post-install)										2.2	Moderate
Visual Simulations That Do Not Depict Planting Modules (due to distance)											
32	3.1	Middle ground	Rural Uplands	●	●		0.0	0.2	0.3	0.2	Insignificant
82 snow	4.3	Background	Transportation Corridor		●	●	0.7	1.1	0.4	0.7	Insignificant/ Minimal
82 fall	4.3	Background	Transportation Corridor		●	●	0.2	1.4	0.3	0.6	Insignificant/ Minimal
Total average rating for the simulations that do not depict planting modules										0.5	Insignificant/ Minimal

[1]Distance in miles.
[2]Contrast Rating Scale: 0.0 - 0.4 (Insignificant), 0.5 – 0.9 (Insignificant/Minimal), 1 – 1.4 (Minimal), 1.5 – 1.9 (Minimal/Moderate), 2 - 2.4 (Moderate), 2.5 – 2.9 (Moderate/Appreciable), 3 – 3.4 (Appreciable) 3.5 – 3.9 Appreciable/Strong), 4 (Strong).

As indicated by the contrast ratings/summary in Table 24-3, the average overall composite contrast ratings for the visual simulations ranged from 0.2 (Insignificant) to 3.0 (Appreciable). The rating scores provided by the rating panel were generally consistent, with few outliers or conflicting scores. Rating panel results indicate that the proposed Facility will add a highly visible utilitarian feature to the landscape, which presents strong contrast with the current land use and viewer activity. Although appreciable contrast was noted for some viewpoints, the overall contrast presented by the Facility is considered moderate when the mature planting plan is included in the evaluation. Rating panel results indicate that the number of PV panels visible and their scale and form contrast with the existing landform and vegetation were the primary sources of visual contrast with the existing landscape. The greatest perceived visual impact typically occurs when a broad extent of PV panels is visible, when the solar arrays are unscreened and in close proximity to the viewer, or when the PV panels appear out of place in their setting (e.g., change the character of agricultural/agrarian landscapes). These conditions tend to heighten the Facility's contrast with existing elements of the landscape in terms of line, form, and land use. However, at many viewpoints this contrast was effectively reduced with the installation of plantings along the perimeter fencing. The results of this evaluation are described in more detail in Section 5.3.2 of the VIA (see Appendix 24-A).

The effectiveness of the conceptual planting plan in minimizing or mitigating the visual effect of the proposed Facility varied between viewpoints. As summarized in Tables 24-3 and 24-4, the simulations that depicted the mature plantings received a decreased average contrast rating score from 2.6 (moderate to appreciable impact) at their initial installation, to 2.2 (moderate impact) at 5-7 years post-installation. While the planting modules were not intended to fully screen views of the proposed Facility, at some viewpoints the plantings did provide a significant degree of screening and/or partially screen long lengths of the arrays. Additionally, the planting modules generally proved effective in breaking up the continuous horizontal and vertical lines of solar arrays and fencing as well as disrupting the modern materials and inorganic forms of the PV panels. In some situations, the plantings also obscured the shadow beneath the solar arrays, which again helped break up the visual mass of the solar array. Members of the rating panel also noted that the addition of the PV panels created a hard edge in the landscape, but the planting scheme minimizes this impact and softens the contrast of the arrays with surrounding features.

Table 24-4. Change in Contrast of Simulation Rating Between Initial Plantings and Mature Installations

Viewpoint Number	Difference in Contrast Rating Scores between Initial and Mature Planting				
	#1	#2	#3	Average	Visual Impact Summary
16	-1	-0.8	-0.6	-0.8	Impact decreased
24	-0.9	-0.3	0	-0.4	Impact decreased
26	0	-0.1	0	-0.03	Negligible change
28	0	0	0	0.0	No change
130	-0.7	-0.2	-0.4	-0.4	Impact decreased
153	-2.3	-1.3	0.3	-1.1	Impact decreased
154	-0.2	-0.7	-0.1	-0.3	Impact decreased

The results of the contrast ratings summarized in Tables 24-3 and 24-4, as well as further consideration of the effectiveness of the planting plan, are discussed in Section 5.3.2 of the VIA (see Appendix 24-A). In addition to the mitigating plantings, factors mitigating visual impact within the visual study area include, 1) the low profile of the proposed PV panels that limits visibility of the Facility over long distances, 2) the relatively few viewers present on the rural uplands (i.e., relative to other portions of the visual study area) where views of numerous solar arrays will be available, 3) the substantial screening provided by existing foreground landscape features in forested areas and areas of concentrated human settlement, and 4) the pattern of fields and woodlots that help integrate the "fields" of panels into the landscape in which the Facility would be viewed.

(8) Visible Effects Created by the Facility

As described Section 24(a)(9) of this Exhibit, operation of the Facility will not generate plumes or any other visible effect. The only visual effect of the Facility is the visibility of PV panels and other Facility components. Therefore, construction and operation of the Facility is not anticipated to result in potential impacts from glare or other off-site effects. As further described in Exhibit 31 of this Application, pursuant to a request by the Towns, the Applicant engaged a licensed engineer to evaluate the occurrence and duration of any potential glare from the Facility that would be visible to sensitive receptors, including adjacent residences and major transportation routes. Based on that analysis (Power Engineers, 2019; see Appendix 31-A; described in Exhibit 31 of the Article 10 Application), the potential occurrence of glare at the Facility was limited to one residence at intermittent times throughout the year around sunrise (when the viewers would otherwise have their gaze diverted to avoid looking directly into the setting or rising sun) with durations of less than ten minutes. Therefore, the potential for glare is minimal, to non-existent. However, despite the negligible impacts, as a means of further minimizing the potential for glare, the Applicant has eliminated several panels such that no further potential for glare exists.

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