Hickory Creek Consulting LLC

Karen Schneller-McDonald
25 Carriage Drive
Red Hook, New York 12571

845 800-0368
katykill2@gmail.com
hickorycreekllc.com

Atlas Renewables Kirkland 1 and Kirkland 2 Solar Farm Project
Summary of key project effects
November 7, 2022

## Introduction

Renewable energy projects including solar farms can produce negative environmental impacts if not sited and planned carefully. This review of the proposed Atlas Renewables Kirkland 1 and Kirkland 2 Solar Farm Project summarizes environmental impacts of this project, particularly those pertaining to flooding and water quality. It is based on a review of publicly available project and site information, reports, and maps.

Local projects are proposed and presented for town review one site at a time. However, natural resources — especially water—are connected across many sites, which is why we also need to evaluate each project's cumulative effects over a larger area. What we do on land affects water supply, flooding, and water quality. Each project that adds its impacts to Mud Creek for example, increases the effects on the overall water system (including the larger Sauquoit Creek watershed to which Mud Creek is a tributary). Upstream impacts affect downstream areas. Land use activities change water systems and the way they work. Whether or not these changes are harmful depends on location, the type and degree of change, and the cumulative effects from multiple projects throughout the watershed.

## Project Effects

The following project effects occur in the context of climate change and watershed-wide cumulative impacts. Downstream flooding on Mud Creek is already an issue (Milone and MacBroom, 2014). NRCS EWPP Floodplain Easement Program has allotted funds to buy out properties in the flood zone along Sauquoit Creek in Whitesboro. The removal of forest and increase in impervious land surfaces will likely increase flooding potential for properties downstream, contribute to degradation of Mud Creek's water quality, and adversely affect recreation and wildlife. The cumulative impacts of these effects on

Mud Creek and downstream areas will likely be exacerbated by the effects of climate change: Increased flooding from larger, more intense storms and “flash drought” caused by longer heat waves.

**Removing forest**

The project site lies within a 500+ acre forested area adjacent to Sherrill Brook Park. This project requires clearcutting 60 acres of forest, significantly fragmenting the surrounding forested habitat (Map 3). Tree removal de-stabilizes soil, decreases groundwater replenishment, increases stormwater runoff and erosion, decreases water quality, and removes habitat. It also decreases capacity for carbon sequestration—the capturing and storing of atmospheric carbon. Sequestration contributes to reducing the impacts of global warming.

Mud Creek’s watershed is about 40% forested cover (USGS Streamstats). Cumulative loss of forested acreage in the Mud Creek watershed contributes to increased stormwater runoff, flooding, and erosion. The Trust for Public Land and the American Water Works Association found that the more forest cover in a watershed, the lower the cost for producing clean drinking water.

The removal of forest to accommodate renewable energy development is not a “green” action; it promotes a view of energy use in isolation from other important environmental issues. Negative environmental effects from deforestation can undermine the greenhouse gas benefits of a solar project.

**Increasing impervious surfaces**

After tree removal, heavy equipment grades and compacts soil. Roads (including gravel), compacted soil, PV panels and infrastructure add to the site’s impervious surfaces. These activities convert forest that absorbs stormwater into impervious areas that decrease groundwater replenishment and increase stormwater flows, erosion, and pollutant loading in streams. Increased erosion along steep stream banks of Mud Creek and portions of its tributaries contributes to a larger sediment load in Mud Creek. This increases the scour potential of Mud Creek’s flow, further eroding banks and raising the potential for flood damage downstream.

Stream water quality generally declines as a watershed’s impervious surface area exceeds 10 percent of total land area. The Mud Creek watershed was 9.1% impervious surface according to the 2011 USGS National Land Cover Database. Impervious surfaces are not evenly distributed throughout the Mud Creek watershed. Developed areas in the north half of the watershed (north of Utica Street/Clinton Road) contain a higher proportion of impervious surfaces. The project site lies in the less developed southern half of the watershed (Map 1). Undeveloped, the project site contributes to balancing the higher proportion of impervious surfaces to the north.

Federal and state stormwater regulations and typical stormwater management practices were not developed to address the unique characteristics of solar farms (eg. a configuration of pervious and impervious surfaces). Site plans do not include best management practices specifically recommended for solar farms (eg. Great Plains Institute, 2021), including Low Impact Development (LID), extensive soil decompaction, and detailed planting plans that match specific site conditions.

**Removing buffers**

This project will remove protective buffers along the site's wetlands and streams. Precipitation would normally be intercepted, stored and filtered by the site's forest, wetlands, streams and their buffers (Map 2). The buffers' size, vegetation, and lack of impervious surfaces are critical to the effective functioning of these wetlands and streams. Trees and shrubs within buffers provide optimal bank stabilization and habitat. They also intercept stormwater runoff and cool the water during summer. A minimum buffer of 100 feet on both sides of streams (measured from the top of the stream bank) and along the edges of wetlands is commonly recommended to protect water quality, banks, and habitat. To provide the same level of protection, larger buffers are required along steep banks of Mud Creek and tributaries.

Streams in good condition generally have a higher portion (45 percent or more) of their length in forested buffer at least 100 feet wide. Site plans indicate removal of trees along most of the length of two Mud Creek tributaries, and close to the steep slope along the west side of Mud Creek. Removal of buffers will impair the ability of these tributaries to reduce flood flows, flashiness, and peak flows in Mud Creek, especially during storms.

The site's seven wetlands total about five acres within the project site boundary; three of them extend into adjacent properties. Wetlands and their buffers store water and release it slowly during dry periods, and catch, absorb and store floodwaters during storms. A one-acre wetland, one foot deep, can hold approximately 330,000 gallons of water. Wetlands also intercept and process sediment and contaminants carried by stormwater runoff. Buffer removal, and significant clearing and road construction through the two northernmost wetlands, will change wetlands' storage capacity and reduce their ability to filter sediment and other pollutants (keeping them out of Mud Creek). Watersheds with less than 10 percent area in natural water storage (wetlands, ponds, lakes) generally have higher peak stormwater flow in streams and rivers. Mud Creek's watershed has about 1.5% of its area in natural water storage (USGS Streamstats). Although wetlands of all sizes play an important role in cumulatively addressing impacts from climate change, many of this watershed's wetlands in developed areas have already been lost. This makes the remaining wetlands increasingly valuable.

**Revegetation**

Reseeding this solar farm site after construction will not restore the value of the existing forest. Clearing and grading makes the site more vulnerable to invasive species. PV panels alter onsite growing conditions. Their presence changes light, temperature, drip line impacts, and rainfall distribution/erosive potential. Site restoration after solar panel installation requires carefully planned planting of native plants beneath and between panels. This includes selecting plants that maximize habitat value (eg for pollinators), and minimize invasive species risk. Most herbicides and pesticides contain harmful contaminants that can seep into groundwater or be carried by runoff into Mud Creek. They should not be used for site preparation or maintenance, especially within 100 feet of wetlands and streams.

**Fencing and Wildlife**

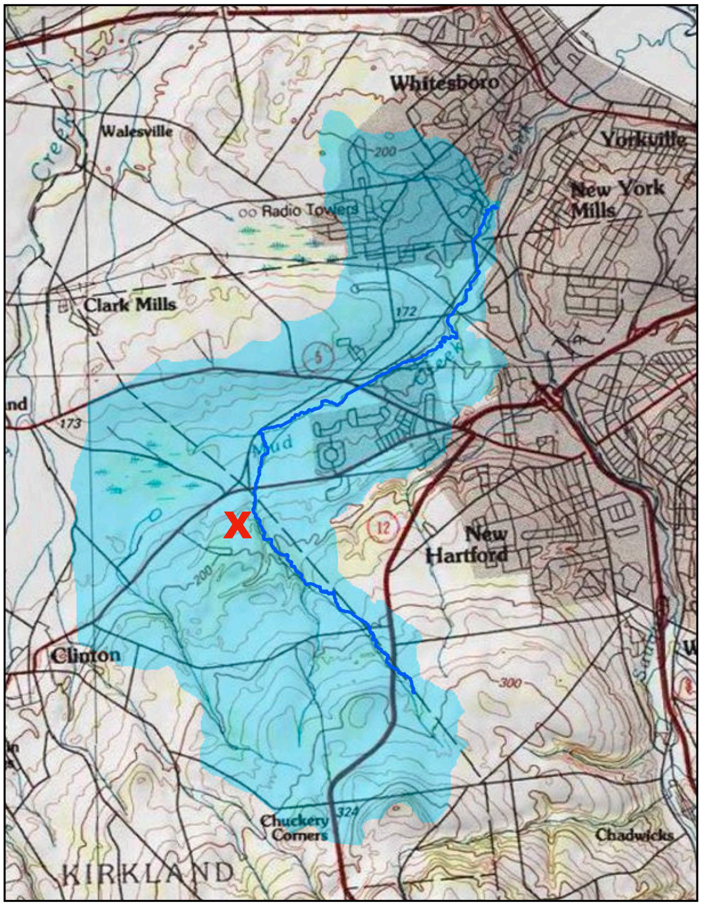
This project will negatively affect wildlife species and diversity onsite and in adjacent habitat. The project plans make no effort to accommodate wildlife or mitigate impacts. In addition to habitat loss due to removing forest and buffers, project fencing will disrupt or block wildlife travel corridors (commonly along streams and wetlands), cutting species off from food and water sources. Species such as deer are more likely to move into nearby residential areas and onto roads. Changes in wildlife distribution and movement will also affect nearby recreation and trail experiences. The proposed 6 inch gap at the bottom of the fence will benefit few species and is not adequate to address these issues. Alternative fencing placement and fence design based on site specific wildlife information can mitigate some of these impacts. This project does not include such measures.

**Recreation**

This site has significantly high recreational potential, with scenic forest and streams easily accessed by nearby communities. Its value as a recreation asset will be severely compromised by the industrial-level land use associated with solar farm development. Trails improve our health and well being and are proven assets to local communities. Enjoying a recreational trail is more than traveling along a pathway — what you see on both sides of that trail influences your overall experience. Future additional trails are needed to meet the needs of a growing population. The proposed solar farm project effectively ruins the site for recreation and ignores these values.

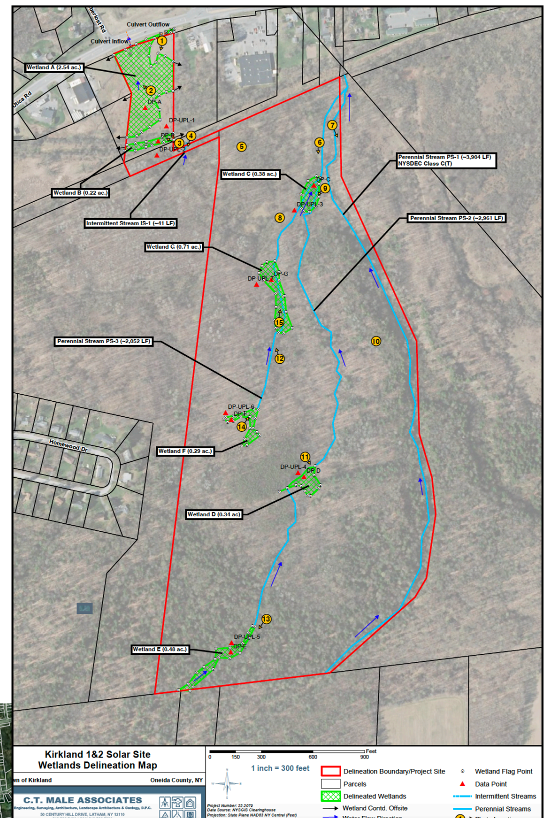
## Conclusion

There is no question that we need to scale up renewable energy production quickly. But benefits are diminished if renewable energy projects contribute to the effects of climate change on significant local natural resources. With appropriate siting that protects forests, wetlands, streams and buffers, solar farms can be sited and constructed so that the benefits of renewable energy are realized without harming land, water, and wildlife. I would invite the Town to encourage solar farm siting only in developed or otherwise disturbed areas (eg brown fields, roof tops, abandoned agricultural fields) and other sites that do not require extensive tree cutting. This would maximize the benefits of solar energy without incurring the costs of forest removal and the other negative environmental impacts associated with this project.

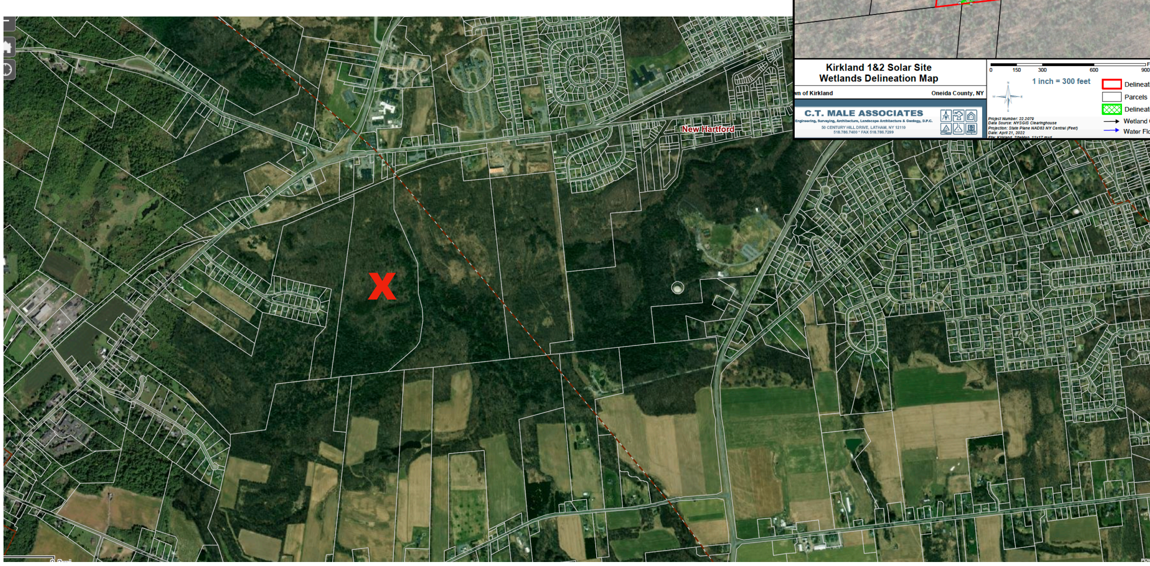



Map 1: Mud Creek Watershed
X indicates project site location

Map 2: Wetlands and Streams




Map 3: Location of project site within
larger forested area



### Qualifications summary, Karen Schneller-McDonald

Owner, Hickory Creek Consulting, Red Hook, New York (full resume at HickorycreekLLC.com). Author of "Connecting the Drops: A citizens' guide to protecting water resources" (Cornell University Press, 2015). Chair, Saw Kill Watershed Community, Red Hook, NY.

Over 30 years' experience including: environmental impact analysis of multiple wind farm and solar farm projects focusing on wetlands, watersheds, wildlife and habitats; watershed protection and management; biodiversity, watershed assessment and site prioritization for conservation; site plan review; habitat assessment; natural resources inventories; stormwater Best Management Practices reviews; mitigation guidelines; watershed planning and management; wetland delineation; riparian corridor evaluation; assessment of bridge replacement/stream enhancement projects; development of local watershed, wetland and stream protection laws and ordinances.

North Carolina State University: B.S. Conservation of Natural Resources 1974; Colorado State University Graduate School: Plant Ecology and Plant Geography. Selected training: Stormwater Management Program Course Series (SUNY College of Environmental Science and Forestry); Jurisdictional Delineation of Wetlands (National Wetland Training Cooperative); Functional Assessment of Wetland and Riparian Ecosystems and Wetland Identification (U.S. Fish and Wildlife Service).

### Selected Resources

Cappella, K. and L. Fraley-McNeal. 2007. The Importance of Protecting Vulnerable Streams and Wetlands at the Local Level. Ellicott City, Md. Center for Watershed Protection.

Erickson, G. Siting Solar Without Cutting Down Trees. https://www.bu.edu/rccp/files/2021/07/Siting-Solar-Final.pdf

Environmental Law Institute. 2003. Conservation Thresholds for Land Use Planners. https://www.eli.org/sites/default/files/eli-pubs/d13-04.pdf

Freeman, J. et al. Statistical Analysis of Drinking Water Treatment Plant Costs, Source Water Quality, and Land Cover Characteristics. The Trust for Public Land. 30 pp.

Great Plains Institute. 2021. Photovoltaic Stormwater Management Research and Testing (PV-SMaRT) Barriers and Best Practices. 16 pp.

Kalies, L. and T. Hartung. Principles of Low Impact Solar Siting and Design. The Nature Conservancy, North Carolina

Milone and MacBroom. 2014. Emergency Transportation Infrastructure Recovery Water Basin Assessment and Flood Hazard Mitigation Alternatives, Mud Creek. 46 pp.

Sauquoit Creek Basin Intermunicipal Commission. 2021. Stream Sediment and Debris Management Plan, Sauquoit Creek.

U.S. Department of the Interior: USGS Streamstats https://www.usgs.gov/mission-areas/water-resources/science/streamstats-streamflow-statistics-and-spatial-analysis-tools