

Project: Matrix LLC / Hudson National Solar Project

Scope: Response to Certain Comments of Hudson Land Design (HLD)

Date: January 14, 2022

By: Ralph G. Mastromonaco, PE

Part 1 – Woods and Forest Quality Assessment

The firm of Hudson Land Design (HLD), operating as an engineering firm, provided to the Village of Croton-on-Hudson their analysis of a particular factor used by our firm in various stormwater reports. HLD insists that the woods should be considered in the “Good” category, not the “Fair” values that we used.

Accordingly, to the contrary, we respond here with facts.

TR-55 is a publication used by Engineers to estimate runoff. For the “Woods” land use category there are three (3) choices for quality, as follows:

Poor - Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.

Fair - Woods are grazed but not burned, and some forest litter covers the soil.

Good - Woods are protected from grazing, and litter and brush adequately cover the soil.

The woods at the proposed solar site are not protected from the first criteria, “grazing”, thus the “Good” category is easily excluded. As to litter and brush, the second criteria, the following facts are relevant:

The determination of the quality of a particular stand of woods is made in the field. However, HLD has chosen to make their determination of the wooded quality from “pictures” which is improper and, unfortunately, HLD did not inspect the site before making their claims.

Our analysis of conditions was based on numerous travels through the wooded site and we made determinations on the quality of the woods based on actual field inspections.

Our site investigation revealed numerous rock outcroppings, or significant areas of rock at or near the surface, which for this reason alone, excluded these woods from the “Good” category due to reduced opportunities for forest litter.

The density of trees on the site at 5 inches diameter and over, is computed at 85 trees per acre based on the tree survey by Bartlett Tree Service. Conversely, the US Forest Service indicates that a hearty timberland forest in the Lower Hudson Area (≥ 5 ”) would have a density of about 167 trees per acre. Thus the density of trees at the site of the solar arrays is only about half compared to a forest one would generally consider being in “Good” condition.

The proposed solar site is sloped with many areas of steep slopes. Litter formation is minimal on steep slopes and is non-existent in rocky areas. Hence, based on these conditions, our determination of the quality of the woods as being “Fair” is also supported.

The minimal tree density, as noted, results in reduced forest litter. Forest litter, especially along southern-facing steep slopes, is also reduced as compared to lowlands (some references indicate a reduction of about 25%) which further supports that the sloped, wooded areas are more likely to be considered in the “Fair” condition due to reduced litter.

Further, aerial photographs from 1947 indicate that the site was an open meadow in many areas. Hence the forest litter could not compare to old-growth forests where litter accumulates for centuries, further weighing towards the determination of “Fair” rather than “Good” condition.

Importantly, the Village's special consultant from the Labella (Chazen) Company that has been involved in reviewing the site in detail, including their several site inspections, agreed with our firm that the classification of the wooded area as “Fair” is appropriate.

It should be noted that HLD is also incorrect in claiming that there are no stormwater controls built into the site. There is a permanent stormwater detention system on the Site Plans where it is needed. This device was provided for additional control over stormwater from the site. It is unclear how HLD overlooked this feature.

It should be noted also, that the temporary devices to control sediment are to become permanent in the system as HLD suggests.

As to the above, we affirm that the estimates made in our reports were appropriate, and have been certified by us and approved by the Village's consultants. The wooded area is not in a "Good" condition but should be considered "Fair" for purposes of stormwater estimates for the reasons stated herein.

Part 2 – The Effect on Runoff by Water Uptake by Trees

HLD asserts that the removal of trees will increase runoff since a tree can “soak up to 100 gallons per day.” They assert that the removal by trees is more than what would be expected from the proposed meadow grasses.

It is clear that HLD provides no reference to the water uptake from meadow grasses – they merely speculate the meadow grasses proposed for the site would not offset the uptake by trees.

The figure quoted by HLD is probably based on a 100-foot tall tree with 200,000 leaves, from the US Forest Service brochure, as follows:

“A healthy 100-foot-tall tree has about 200,000 leaves. A tree this size can take 11,000 gallons of water from the soil and release it into the air again, as oxygen and water vapor, in a single growing season.”
<https://www.fs.usda.gov/stelprdb5269813>

Given the local standard of about 140-160 days of a growing season, such a large tree may use 68-78 gallons per day.

However, the solar site does not have many 100 foot trees and we compute the average tree is 12 inches based on the site tree data. The Weibull relationship then indicates that the average tree height is 50 feet at the general elevation of the site above sea level.

Thus, the annual water uptake of the average tree should be reduced by 50% to about 34 to 39 gallons per day in a linear relationship – not 100 gallons per day as noted by HLD.

Further, the average uptake is an irrelevant factor in considering a storm event that may last only a few hours. The uptake in two hours would be about 5 gallons per tree which can be compared, for example, to the 136,000 gallons of runoff during a 3.42-inch storm (2-year event), and the loss of tree-uptake would not affect peak runoff. The many acres of meadow grasses to be planted will effectively replace the uptake of water due to the reduction in trees.

Accordingly, as HLD does not site any information on the uptake of water by meadow grasses and misrepresenting the uptake by trees, we believe that the HLD comment is without merit.

Part 3 – Design of the Site Discharges

Comment Number 2 by HLD in their letter of January 10, 2022, asserts that the access "roads" on the site are likely to become eroded from "concentrated" stormwater runoff.

On the contrary, the Site Plan has intended to avoid any concentration of flow by designing the stormwater system to allow all runoff to discharge to the channels and locations currently in use, as sheet flow.

The Site Plan indicates that all flow is directed naturally to the original points of discharge.

Further, the site does not contain any "roads" as such. The paths are to be used temporarily to install the solar panels, after which the paths will be vegetated.

HLD suggests that numerous drains are needed on the site to prevent the concentration of flows. However, if the site topography is reviewed, it is clear that no drains are needed. Drains will necessarily gather and then concentrate flow and this is to be avoided in the Site design.

Accordingly, the recommendations by HLD in this matter, if implemented, would be harmful to the intended strategy used in the design of the Site since they would require the collection and concentration of runoff, which is exactly the opposite of what the Site design intends.

Summary:

As noted above, all of the comments by HLD related to this project are provided without a basis in fact and are often mere speculation. The responses provided here are factual and are better suited to guide an evaluation of the solar array project.

Submitted by:



Ralph G. Mastromonaco
Ralph G. Mastromonaco, PE

Cc: Matrix. LLC