

Cortlandville 1 Solar and Energy Storage Project

DG New York, CS, LLC
Cortland County, New York

Glint & Glare Analysis

December 20, 2019



Capitol Airspace Group

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Summary

DG New York, CS, LLC is proposing to construct solar arrays near the town of Cortland in Cortland County, New York (**Figure 1**). On behalf of DG New York, CS, LLC, Capitol Airspace performed a Glint and Glare Analysis utilizing the Solar Glare Hazard Analysis Tool (SGHAT) in order to identify any potential impacts on residences and vehicles on Routes 1 through 7.

There is no predicted glare for residences with an estimated single story viewing height of 8 feet or a second story viewing height of 16 feet. There was also no predicted glare from the solar arrays along Routes 1 through 8 for cars with an estimated viewing height of 4 feet and for large trucks with an estimated viewing height of 8 feet. Additionally, various business locations were analyzed at the request of DG New York, CS, LLC with varying heights. The results show no predicted glare for the businesses. Capitol Airspace has applied FAA's glint and glare standards to vehicular operations and buildings due to the absence of non-aviation regulatory guidelines.

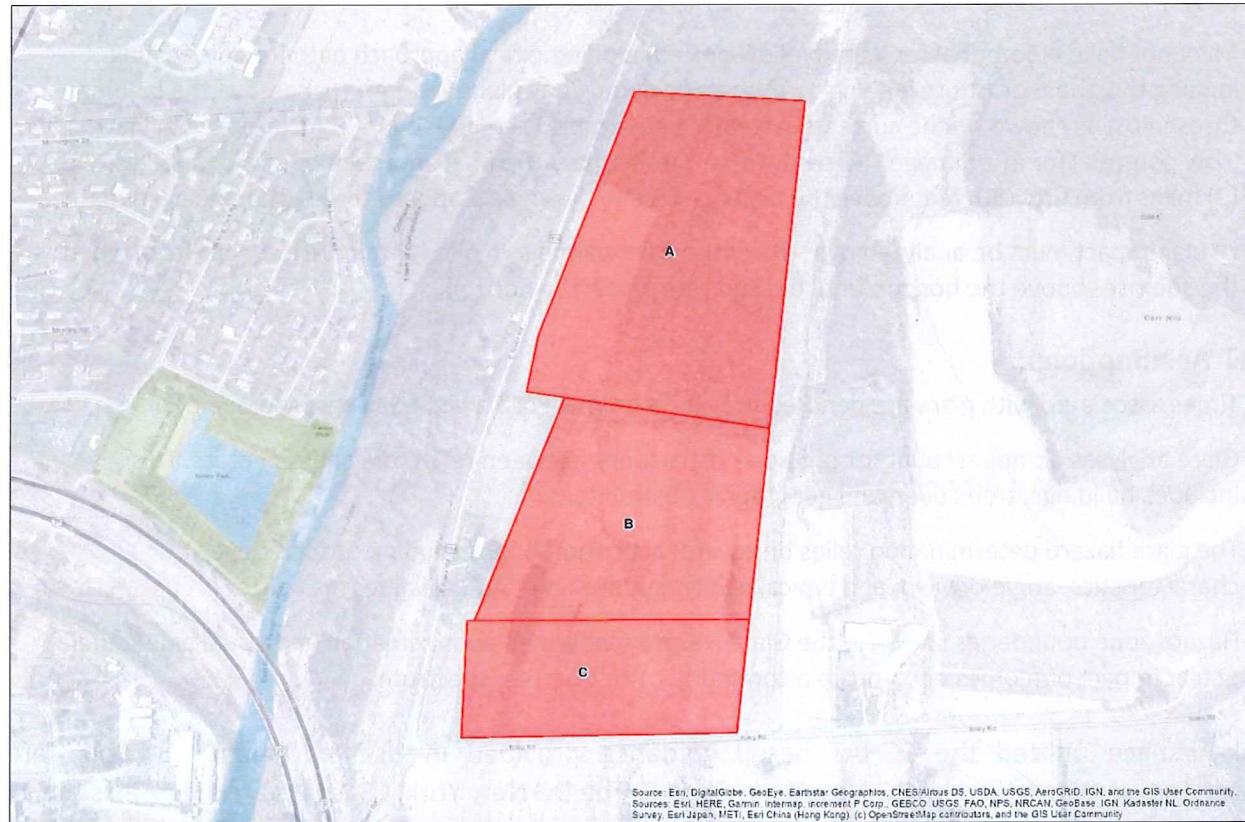


Figure 1: Location of Cortlandville 1 Solar and Energy Storage project arrays



Methodology

The results of this analysis conform to, and are in accordance with, the FAA's interim policy for *Solar Energy System Projects on Federally Obligated Airports*.¹ The FAA adopted this interim policy in order to enhance safety by providing standards for measuring ocular impact of proposed solar energy systems on pilots and air traffic controllers. In cooperation with the Department of Energy (DOE), the FAA developed and validated the Sandia National Laboratories' "*Solar Glare Hazard Analysis Tool*" (SGHAT), now licensed through ForgeSolar. The FAA requires the use of the SGHAT to demonstrate compliance with the standards for measuring ocular impact.

In order for the FAA to approve a revised airport layout plan depicting a solar installation and/or issue a determination of no hazard, the airport sponsor is required to show that the solar installation meets the standards set forth in the interim policy. The interim policy states that a project:

1. Must not have a potential for glint or glare in the existing or planned ATCT cab, (Green, Yellow, or Red).
2. Must not have a potential for glare (Yellow or Red) along the final approach path for any existing landing threshold or future landing thresholds (including any planned interim phases of the landing thresholds) as shown on the current FAA-approved Airport Layout Plan (ALP). An airport may have a "low potential for after image" (Green) within these areas. The final approach path is defined as two (2) miles from fifty (50) feet above the landing threshold using a standard three (3) degree glidepath.
3. Ocular impact must be analyzed over the entire calendar year in one (1) minute intervals from when the sun rises above the horizon until the sun sets below the horizon.

SGHAT Assumptions:

- Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
- Glare analyses do not account for physical obstructions between reflectors and receptors. This includes buildings, tree cover, and geographic obstructions.
- The glare hazard determination relies on several approximations including observer eye characteristics, angle of view, and typical blink response time. Actual values may differ.
- Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.

Capitol Airspace utilized the SGHAT based guidance provided in User's Manual v.3. Solar array specifications were provided by DG New York, CS, LLC. The DG New York, CS arrays are single axis tracking solar arrays. Specifically, the module for discrete observation points was utilized for residences and businesses and the module for routes was used for roads that are adjacent or near the solar arrays.

¹ 78 FR 63276, 10/23/2013



Data

DG New York, CS, LLC provided the following data for the Cortlandville 1 Solar and Energy Storage project solar arrays, based on the input parameters defined in the SGHAT User’s Manual v.3.

The data for the Cortlandville 1 Solar and Energy Storage project arrays are as follows:

Parameter	Value
Axis tracking:	Single-axis rotation
Tracking axis orientation:	180.0°
Tracking axis tilt:	0.0°
Max tracking angle:	60.0°
Resting angle:	7.0°
Panel material:	Lighted Textured glass with AR coating
Reflectivity:	Vary with sun
Slope error:	Correlate with material

Table 1: Cortlandville 1 Solar and Energy Storage project Inputs for all Arrays

ID	Latitude	Longitude	Ground Elevation (feet)	Height Above Ground (feet)	Total Elevation
1	42.614679	-76.151555	1204.14	8	1212.14
2	42.614582	-76.148525	1367.84	8	1375.84
3	42.61029	-76.149069	1379.65	8	1387.66
4	42.610732	-76.153391	1221.55	8	1229.55
5	42.611462	-76.153206	1217.26	8	1225.26

Table 2: Cortlandville 1 Solar and Energy Storage project Array A Vertices

ID	Latitude	Longitude	Ground Elevation (feet)	Height Above Ground (feet)	Total Elevation
1	42.610663	-76.152717	1235.16	8	1243.16
2	42.61029	-76.149069	1379.65	8	1387.66
3	42.607782	-76.149386	1374.72	8	1382.72
4	42.607731	-76.154262	1233.55	8	1241.55

Table 3: Cortlandville 1 Solar and Energy Storage project Array B Vertices



ID	Latitude	Longitude	Ground Elevation (feet)	Height Above Ground (feet)	Total Elevation
1	42.607729	-76.154384	1230.12	8	1238.12
2	42.607782	-76.149386	1374.72	8	1382.72
3	42.606293	-76.149575	1367.2	8	1375.2
4	42.606187	-76.154463	1235.81	8	1243.81

Table 4: Cortlandville 1 Solar and Energy Storage project Array C Vertices



Cortlandville 1 Solar and Energy Storage Project Discrete Observation Points - Residents

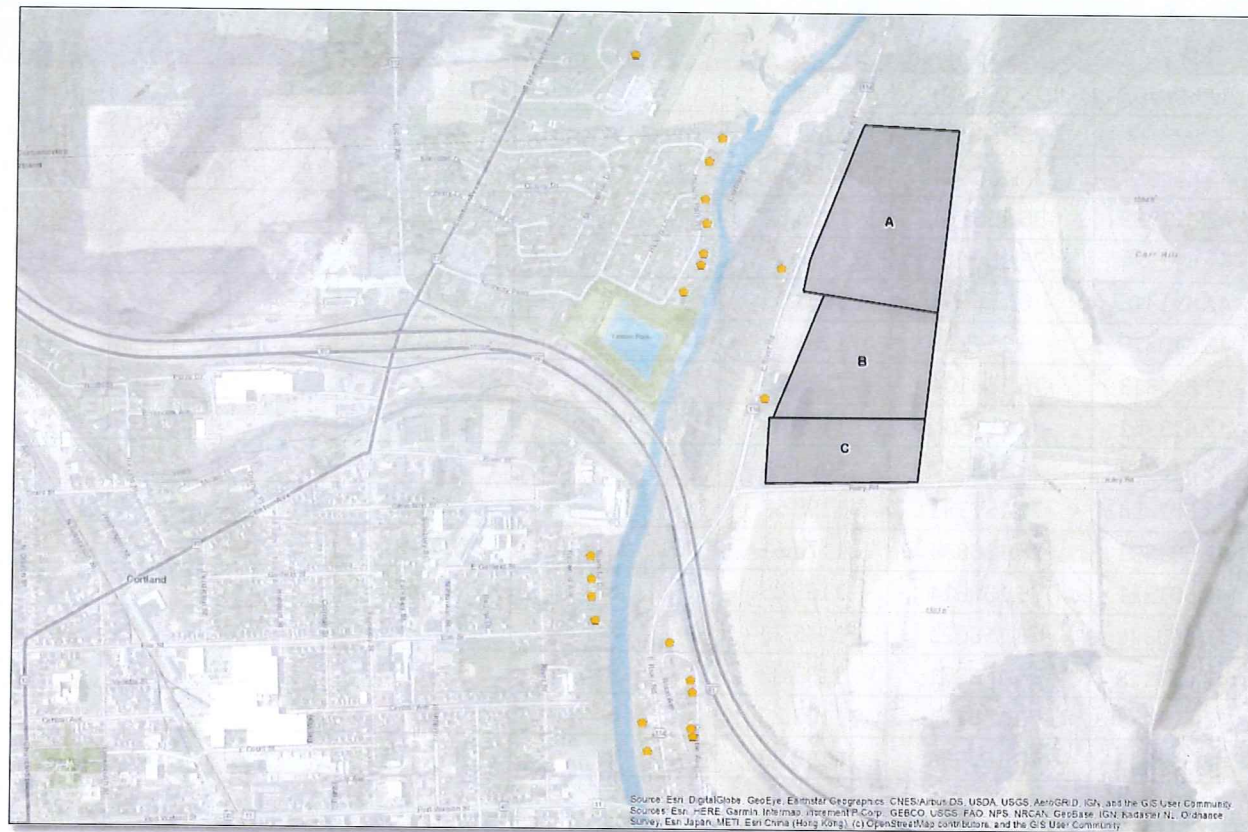


Figure 2: Location of Cortlandville 1 Solar and Energy Storage project Arrays Discrete Observation Points - Residents



ID	Latitude	Longitude	Ground Elevation (feet)	Height Above Ground - Single Story (feet)	Total Elevation - Single Story	Height Above Ground – Second Story (feet)	Total Elevation - Second Story
OP 1	42.608205	-76.154549	1230.13	8	1238.13	16	1246.13
OP 2	42.61127	-76.154095	1205.64	8	1213.64	16	1221.64
OP 3	42.612867	-76.156604	1103.45	8	1111.45	16	1119.45
OP 4	42.612299	-76.156534	1106.84	8	1114.84	16	1122.84
OP 5	42.611584	-76.156615	1106.6	8	1114.6	16	1122.6
OP 6	42.611316	-76.156695	1105.89	8	1113.9	16	1121.9
OP 7	42.610676	-76.157215	1105.05	8	1113.05	16	1121.05
OP 8	42.614313	-76.156104	1107.27	8	1115.27	16	1123.27
OP 9	42.613761	-76.156501	1109.45	8	1117.45	16	1125.45
OP 10	42.616232	-76.158937	1099.98	8	1107.98	16	1115.98
OP 11	42.602394	-76.157381	1158.58	8	1166.58	16	1174.58
OP 12	42.601501	-76.156684	1170.51	8	1178.51	16	1186.51
OP 13	42.601221	-76.156614	1163.05	8	1171.05	16	1179.05
OP 14	42.600376	-76.156625	1143.73	8	1151.73	16	1159.73
OP 15	42.600178	-76.156571	1138.83	8	1146.83	16	1154.83
OP 16	42.600479	-76.158191	1102.79	8	1110.8	16	1118.8
OP 17	42.599815	-76.157998	1102.35	8	1110.35	16	1118.35
OP 18	42.604392	-76.159977	1109.43	8	1117.43	16	1125.43
OP 19	42.603862	-76.159924	1107.01	8	1115.01	16	1123.01
OP 20	42.603444	-76.159908	1106.32	8	1114.32	16	1122.32
OP 21	42.602879	-76.159774	1107.49	8	1115.49	16	1123.5

Table 5: Cortlandville 1 Solar and Energy Storage project Arrays Discrete Observation Receptors-Residents



Cortlandville 1 Solar and Energy Storage Project Discrete Observation Points - Business

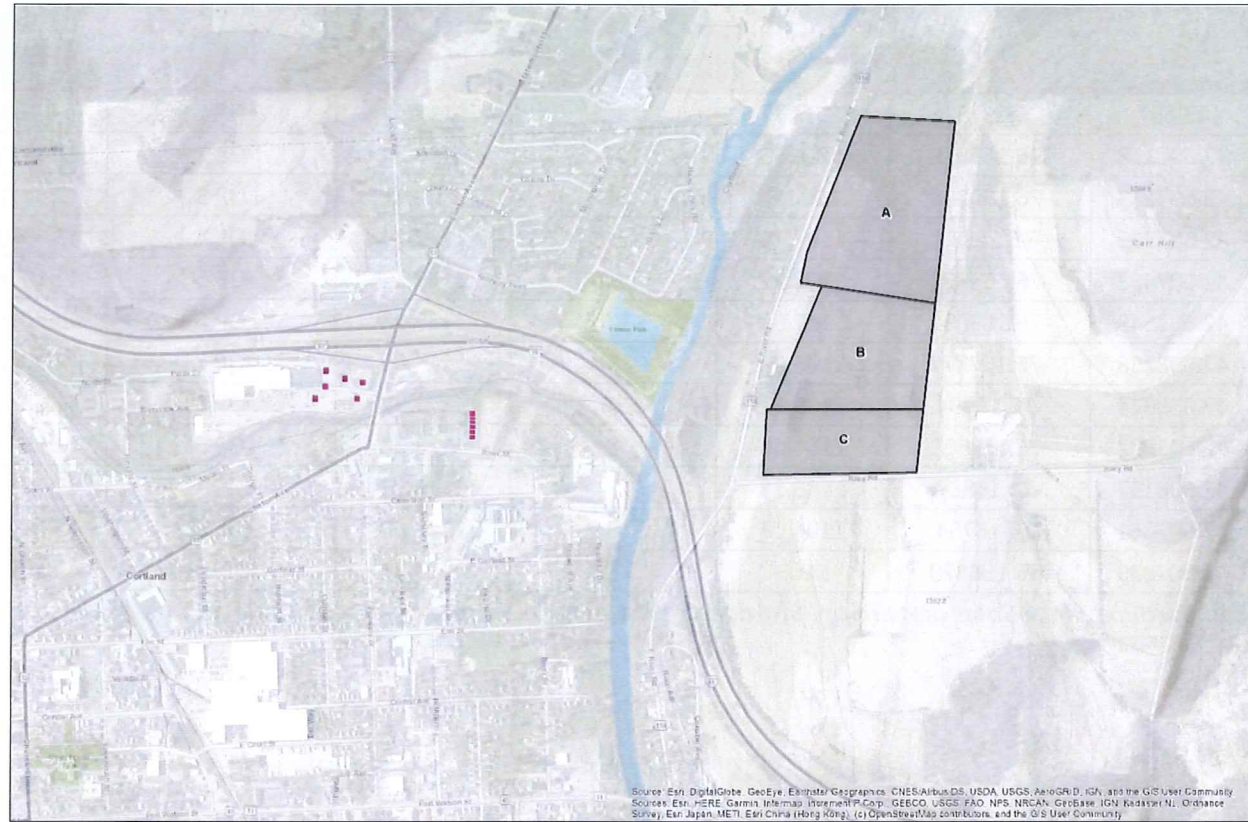


Figure 3: Location of Cortlandville 1 Solar and Energy Storage project Arrays Discrete Observation Points – Business

ID	Latitude	Longitude	Ground Elevation (feet)	Height Above Ground - Single Story (feet)	Total Elevation - Single Story	Height Above Ground – Second Story (feet)	Total Elevation - Second Story
OP 1	42.607	-76.163818	1107.77	10	1117.77	OP 1	42.607
OP 2	42.607118	-76.163818	1108.53	20	1128.54	OP 2	42.607118
OP 3	42.607253	-76.163818	1108.6	30	1138.6	OP 3	42.607253
OP 4	42.607365	-76.16382	1107.76	10	1117.76	OP 4	42.607365
OP 5	42.607462	-76.163823	1107.52	20	1127.52	OP 5	42.607462
OP 6	42.607543	-76.163831	1107.58	30	1137.58	OP 6	42.607543
OP 7	42.608238	-76.167377	1106.09	8	1114.09	OP 7	42.608238
OP 8	42.608324	-76.16794	1105.32	16	1121.32	OP 8	42.608324
OP 9	42.608502	-76.168559	1104.68	8	1112.68	OP 9	42.608502
OP 10	42.608137	-76.16857	1105.23	8	1113.23	OP 10	42.608137
OP 11	42.607861	-76.16754	1104.08	8	1112.08	OP 11	42.607861
OP 12	42.607839	-76.168879	1103	8	1111	OP 12	42.607839

Table 6: Cortlandville 1 Solar and Energy Storage project Arrays Discrete Observation Receptors-Businesses

Cortlandville 1 Solar and Energy Storage Project Discrete Observation points - Routes

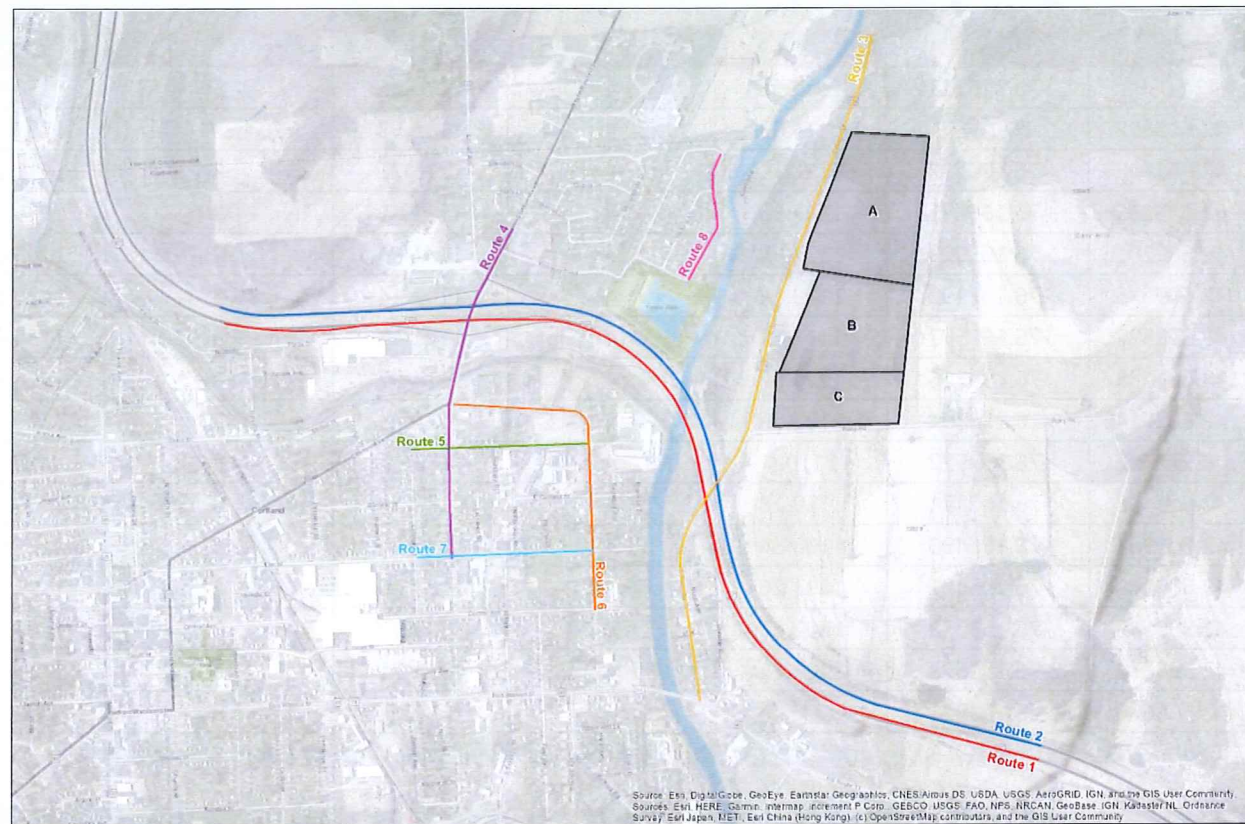


Figure 4: Location of Cortlandville 1 Solar and Energy Storage project Arrays Observation Points - Routes

ID	Latitude	Longitude	Ground Elevation (feet)	Height Above Ground - Cars (feet)	Total Elevation (Cars)	Height Above Ground - Trucks (feet)	Total Elevation (Trucks)
1	42.60898	-76.176011	1122.55	4	1126.55	8	1130.55
2	42.608822	-76.17438	1114.53	4	1118.53	8	1122.53
3	42.608948	-76.170732	1111.71	4	1115.71	8	1119.71
4	42.609161	-76.166473	1107.55	4	1111.55	8	1115.55
5	42.609201	-76.163329	1127.64	4	1131.64	8	1135.64
6	42.609035	-76.162192	1128.14	4	1132.14	8	1136.14
7	42.608522	-76.160572	1127.48	4	1131.48	8	1135.48
8	42.607788	-76.159306	1120.97	4	1124.97	8	1128.97
9	42.607014	-76.158394	1121.05	4	1125.05	8	1129.05
10	42.60635	-76.157922	1110.4	4	1114.4	8	1118.4
11	42.605458	-76.157471	1129.18	4	1133.18	8	1137.18
12	42.601991	-76.156431	1168.64	4	1172.64	8	1176.64
13	42.600341	-76.155401	1183.26	4	1187.26	8	1191.26
14	42.599045	-76.153738	1201.87	4	1205.87	8	1209.87
15	42.598074	-76.151528	1207.21	4	1211.21	8	1215.21
16	42.596668	-76.143921	1215.5	4	1219.5	8	1223.5

Table 7: Cortlandville 1 Solar and Energy Storage project Arrays Observation Receptors Route 1

ID	Latitude	Longitude	Ground Elevation (feet)	Height Above Ground - Cars (feet)	Total Elevation (Cars)	Height Above Ground - Trucks (feet)	Total Elevation (Trucks)
1	42.597071	-76.143835	1238.52	4	1242.52	8	1246.52
2	42.598414	-76.151152	1234.02	4	1238.02	8	1242.02
3	42.599306	-76.153191	1230.56	4	1234.56	8	1238.56
4	42.600459	-76.154757	1213.99	4	1217.99	8	1221.99
5	42.601968	-76.155819	1190.48	4	1194.48	8	1198.48
6	42.605513	-76.156967	1141.34	4	1145.34	8	1149.34
7	42.606532	-76.157418	1128.57	4	1132.57	8	1136.57
8	42.607227	-76.157944	1107.72	4	1111.72	8	1115.72
9	42.608095	-76.158898	1119.61	4	1123.61	8	1127.62
10	42.608901	-76.160325	1126.33	4	1130.33	8	1134.34
11	42.609462	-76.162106	1128.42	4	1132.42	8	1136.42
12	42.609627	-76.163244	1127.9	4	1131.9	8	1135.9
13	42.60954	-76.166312	1106.59	4	1110.59	8	1114.59
14	42.609351	-76.170775	1112.76	4	1116.76	8	1120.76
15	42.609225	-76.174326	1127.66	4	1131.66	8	1135.66
16	42.609446	-76.176183	1142.17	4	1146.17	8	1150.17

Table 8: Cortlandville 1 Solar and Energy Storage project Arrays Observation Receptors Route 2



ID	Latitude	Longitude	Ground Elevation (feet)	Height Above Ground - Cars (feet)	Total Elevation (Cars)	Height Above Ground - Trucks (feet)	Total Elevation (Trucks)
1	42.617519	-76.150836	1144.77	4	1148.77	8	1152.77
2	42.616706	-76.151029	1147.27	4	1151.27	8	1155.27
3	42.616035	-76.15127	1151.34	4	1155.34	8	1159.34
4	42.610776	-76.153877	1216.44	4	1220.44	8	1224.44
5	42.609892	-76.15429	1218.06	4	1222.06	8	1226.06
6	42.608107	-76.154854	1217.69	4	1221.69	8	1225.69
7	42.606117	-76.155433	1203.08	4	1207.08	8	1211.08
8	42.605415	-76.155846	1196.37	4	1200.37	8	1204.37
9	42.603669	-76.157434	1160.26	4	1164.26	8	1168.26
10	42.602956	-76.157874	1145.65	4	1149.65	8	1153.65
11	42.602217	-76.158024	1132.07	4	1136.07	8	1140.07
12	42.598241	-76.157144	1100.48	4	1104.48	8	1108.48

Table 9: Cortlandville 1 Solar and Energy Storage project Arrays Observation Receptors Route 3

ID	Latitude	Longitude	Ground Elevation (feet)	Height Above Ground - Cars (feet)	Total Elevation (Cars)	Height Above Ground - Trucks (feet)	Total Elevation (Trucks)
1	42.611783	-76.164799	1104.11	4	1108.11	8	1112.11
2	42.609872	-76.166108	1105.08	4	1109.08	8	1113.08
3	42.609209	-76.166473	1107.47	4	1111.47	8	1115.47
4	42.607432	-76.166999	1107.94	4	1111.94	8	1115.94
5	42.606714	-76.167203	1110.39	4	1114.39	8	1118.39
6	42.603973	-76.167117	1106.54	4	1110.54	8	1114.54
7	42.602291	-76.166988	1111.81	4	1115.81	8	1119.81

Table 10: Cortlandville 1 Solar and Energy Storage project Arrays Observation Receptors Route 4

ID	Latitude	Longitude	Ground Elevation (feet)	Height Above Ground - Cars (feet)	Total Elevation (Cars)	Height Above Ground - Trucks (feet)	Total Elevation (Trucks)
1	42.605403	-76.168619	1118.72	4	1122.72	8	1126.72
2	42.60564	-76.161677	1102.39	4	1106.39	8	1110.39

Table 11: Cortlandville 1 Solar and Energy Storage project Arrays Observation Receptors Route 5



ID	Latitude	Longitude	Ground Elevation (feet)	Height Above Ground - Cars (feet)	Total Elevation (Cars)	Height Above Ground - Trucks (feet)	Total Elevation (Trucks)
1	42.606721	-76.166999	1109.63	4	1113.63	8	1117.63
2	42.606571	-76.162171	1102.69	4	1106.69	8	1110.69
3	42.6065	-76.161924	1102.53	4	1106.53	8	1110.53
4	42.606311	-76.161784	1103.77	4	1107.77	8	1111.77
5	42.605971	-76.161688	1101.17	4	1105.18	8	1109.18
6	42.600854	-76.161323	1102.19	4	1106.19	8	1110.19

Table 12: Cortlandville 1 Solar and Energy Storage project Arrays Observation Receptors Route 6

ID	Latitude	Longitude	Ground Elevation (feet)	Height Above Ground - Cars (feet)	Total Elevation (Cars)	Height Above Ground - Trucks (feet)	Total Elevation (Trucks)
1	42.602299	-76.168308	1108.4	4	1112.41	8	1116.41
2	42.60256	-76.161452	1102.66	4	1106.66	8	1110.66

Table 13: Cortlandville 1 Solar and Energy Storage project Arrays Observation Receptors Route 7

ID	Latitude	Longitude	Ground Elevation (feet)	Height Above Ground - Cars (feet)	Total Elevation (Cars)	Height Above Ground - Trucks (feet)	Total Elevation (Trucks)
1	42.614018	-76.156667	1104.78	4	1108.78	8	1112.78
2	42.613489	-76.156967	1104.33	4	1108.33	8	1112.33
3	42.612786	-76.156924	1102.82	4	1106.82	8	1110.82
4	42.612225	-76.156785	1103.61	4	1107.61	8	1111.61
5	42.611901	-76.156763	1103.46	4	1107.46	8	1111.46
6	42.610401	-76.157847	1106.32	4	1110.32	8	1114.32

Table 14: Cortlandville 1 Solar and Energy Storage project Arrays Observation Receptors Route 8



Results

Capitol Airspace utilized the previous inputs to analyze potential glint and glare at various points along the roadways and at houses utilizing the SGHAT route tool for roadways and discrete observation points for residents.

If glare is detected, “Glare Occurrence Plots” are generated by SGHAT. The plots show when glare can occur (as viewed from the prescribed observation point) throughout the year. The color indicates the potential ocular hazard. The colors are defined as:

- **Green:** Low potential for temporary after-image
- **Yellow:** Potential for temporary after-image
- **Red:** Potential for permanent eye damage

The results of this analysis indicate no predicted glare on the roadways or houses ([Table 15](#)).

Receptor	Green Glare (minutes / year)	Yellow Glare (minutes / year)	Red Glare (minutes / year)
Residences Single Story	0	0	0
Residences Two Story	0	0	0
Businesses	0	0	0
Route 1 Cars	0	0	0
Route 2 Cars	0	0	0
Route 3 Cars	0	0	0
Route 4 Cars	0	0	0
Route 5 Cars	0	0	0
Route 6 Cars	0	0	0
Route 7 Cars	0	0	0
Route 8 Cars	0	0	0
Route 1 Trucks	0	0	0
Route 2 Trucks	0	0	0
Route 3 Trucks	0	0	0
Route 4 Trucks	0	0	0
Route 5 Trucks	0	0	0
Route 6 Trucks	0	0	0
Route 7 Trucks	0	0	0
Route 8 Trucks	0	0	0

Table 15: Cortlandville 1 Solar and Energy Storage project Arrays Observation Receptors Glint and Glare summary

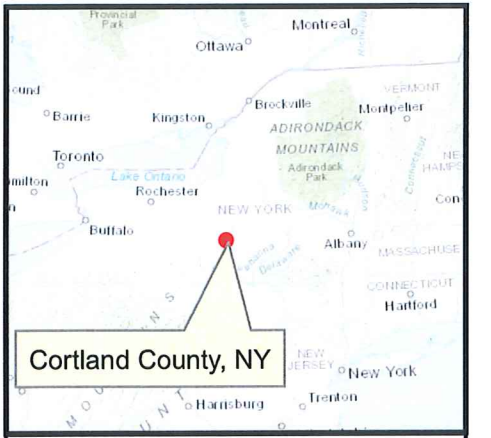


Conclusion





There was no predicted glare for residences with an estimated single story viewing height of 8 feet or a second story viewing height of 16 feet as a result of the project. Additionally, there was also no predicted glare from the solar arrays along Routes 1 through 8 for cars or large trucks. Various business locations were evaluated at the request of DG New York, CS, LLC and no glare was predicted. Capitol Airspace has applied FAA's glint and glare standards to vehicular operations and buildings due to the absence of non-aviation regulatory guidelines.

Additionally, as noted in assumptions, the glint and glare analysis does not take into account vegetation, fencing, or other natural obstructions. This glint and glare report takes the most conservative approach in calculating the possibility for glint and glare.

If you have any questions regarding the findings in this analysis, please contact [Rick Coles](#) at (703) 256-2485.



Legend

-  Property boundary
-  Proposed fenceline
-  Proposed solar array
-  Proposed access road



Approximate scale:



Proposed
Cortlandville I & Cortlandville III
Solar Projects

4250 E River Road &
Carr Hill Road
Cortland, NY 13045