APPENDIX G ENVIRONMENTAL IMPACT ANALYSIS

Environmental Impact Analysis

CTEC Solar, LLC

Bristol Landfill Solar Project

Environmental Impact Analysis

prepared for

CTEC Solar, LLC
Bristol Landfill Solar Project
City of Bristol, Connecticut

1/31/2024

prepared by

Burns & McDonnell Engineering Company, Inc.
Wallingford, Connecticut

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LIST OF ABBREVIATIONS

Abbreviation	Term/Phrase/Name
ACOE	Army Corps of Engineers
AMSL	Above mean sea level
APA	Aquifer Protection Area
BMP	Best Management Practice
Burns & McDonnell	Burns & McDonnell Engineering Company, Inc.
CLEAR	Center for Land Use Education and Research
CSC	Connecticut Siting Council
CT-DEEP	Connecticut Department of Energy and Environmental Protection
CT-DOT	Connecticut Department of Transportation
CT-ECO	Connecticut Environmental Conditions Online
CTEC	CTEC Solar, LLC
ConnCRIS	Connecticut Cultural Resources Information System
E&S	Erosion and sedimentation
EIA	Environmental Impact Analysis
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Act
FIRM	Flood Rate Insurance Map
IPaC	Information for Planning and Consulting Database
LOC	Limit of construction
NHD	National Hydrography Dataset
NLEB	Northern long-eared bat
NOAA	National Oceanic and Atmospheric Administration

Abbreviation	Term/Phrase/Name
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
Project	Bristol Landfill Solar Project
SHPO	State Historic Preservation Office
SSURGO	Soil Survey Geographic Database
UConn	University of Connecticut
USDA	United States Department of Agriculture
USFWS	United States Fish & Wildlife Service

1.0 PROJECT APPROACH

To support CTEC Solar, LLC (CTEC) with their petition to the Connecticut Siting Council (CSC) for Declaratory Ruling that no Certificate of Environmental Compatibility and Public Need is required for the construction, operation, and maintenance of the Bristol Landfill Solar Project (Project), a ballast mount fixed tilt solar facility located in Bristol, Connecticut, Burns & McDonnell Engineering Company, Inc. (Burns & McDonnell) conducted an Environmental Impact Analysis (EIA) to identify environmental characteristics on and around the Project site. Burns & McDonnell scientists and environmental specialists conducted desktop analyses and field investigations to identify the presence of protected or sensitive resources, such as waters of the U.S., state- and federal-listed Threatened & Endangered species and habitats, cultural resources including archaeological and historical sites, and floodplains and aquifers.

The desktop analysis utilized publicly-available online databases including Connecticut Environmental Conditions Online 2019 aerial photography, U.S. Geological Survey (USGS) National Wetlands Inventory (NWI) maps and topographic maps, U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Soil Survey Geographic database (SSURGO), U.S. Fish and Wildlife Service (USFWS) Information, Planning, and Conservation System (IPaC) database, National Hydrography Database (NHD), National Oceanic and Atmospheric Administration (NOAA), Federal Emergency Management Agency (FEMA), Connecticut Department of Energy and Environmental Protection (CT-DEEP), University of Connecticut (UConn), and other State of Connecticut databases, and National Register of Historic Places (NRHP) data. Ecomaps LLC conducted a field investigation on November 28, 2023 to delineate state and federal jurisdictional wetlands and watercourses according to the 1987 U.S. Army Corps of Engineers (USACE) *Wetland Delineation Manual*, other USACE jurisdictional guidance, Connecticut Inland Wetlands and Watercourses regulations, Connecticut Tidal Wetlands regulations, and any additional applicable state wetland regulations.

The results of the analyses and investigations, presented below for each environmental resource, demonstrate that the Project will comply with the CT-DEEP environmental quality standards such that the Project will not have an adverse effect on the environment.

2.0 PROJECT INFORMATION

2.1 Project Location

The Project will be located on an approximately 58.8-acre parcel on Lake Avenue in Bristol, Connecticut. The location of the parcel is shown in Appendix A, Exhibit 1. The Bristol Transfer Station currently operates at the site, with a transfer station in the western portion of the parcel and a capped landfill in the eastern portion of the parcel.

The topography at the site slopes down in all directions from the landfill. The elevation ranges from approximately 290 feet above mean sea level (AMSL) in the east to 230 feet AMSL in the southwest. A topographic map of the site is shown in Appendix A, Exhibit 2.

The parcel is surrounded to the north and to the east by commercial and industrial facilities, to the south by parking lots, and to the west by neighborhoods and forested land. The land use surrounding the site is shown in Appendix A, Exhibit 3. The parcel is zoned Industrial.

2.2 Project Construction, Operation, and Maintenance

The Project will be constructed on approximately 7.72 acres of the parcel. These 7.72 acres represent the approximate limit of construction (LOC). Within the LOC, there will be no ground disturbance on the capped landfill as the solar arrays will be ballast mounted, and the electrical conduits will be located on cable trays. There will be minimal ground disturbance in the southern portion of the transfer station, as the solar array system will be interconnected to an existing utility pole on site via four new utility poles and an overhead electric line. Because construction activities will result in minimal ground disturbance, construction impacts are considered de minimus.

When constructed and fully operational, the Project will contain 3,724 540W Heliene 144HC M10 SL photovoltaic modules (or panels). The site will be unstaffed once it is operational; the only visits Project personnel will make to the site will be for maintenance activities, which are anticipated to occur twice a year.

2.2.1 Access

The Project area will be accessible using an existing gravel access road. The access road begins in the western portion of the parcel and runs generally west to east along the northern edge of the capped landfill. No new access roads will need to be developed for this Project.

2.2.2 Compliance with Health and Safety Standards

The Project will maintain compliance with all applicable health and safety standards related to electric power generation. The Project will not consume raw materials, will not produce by-products, and will be unstaffed during normal operating conditions.

The Bristol Transfer Station is fenced and gated, so no new fencing is proposed for the solar facility.

2.2.3 Compliance with Local, State, and Federal Land Use Plans

The Project is consistent with local, state, and federal land use plans and policies. As stated previously, the Project will be located within an Industrial zone, and although local land use requirements will not apply, the Project has still been designed to meet the City of Bristol's land use regulations for Industrial zones to the extent feasible.

The Project will benefit the City of Bristol by increasing the local energy generation capacity that does not rely on the congested regional electrical transmission networks to improve electrical reliability.

Additionally, the Project will support the city's and the state's goals to develop renewable energy resources. In the City of Bristol's 2015 Plan of Conservation and Development, the City identified "[encouraging] energy-efficient patterns of development and land use, the use of solar and other renewable forms of energy, and energy conservation" as ways to protect the natural resources in the City of Bristol. The development of the Project progresses the City towards this goal.

3.0 NATURAL AND CULTURAL RESOURCES

3.1 Habitats

As previously discussed, the Bristol Transfer Station currently operates at the parcel on which the Project will be located. The transfer station is located on a gravel lot in the western portion of the parcel, and a capped landfill is located in the eastern portion of the parcel. The landfill is covered by grass. A wetland, discussed further in Section 3.3.2, flows from two culverts to the south of the transfer station. Land cover is illustrated in Appendix A, Exhibit 4.

Because the site is already developed, vegetative and habitat diversity has been reduced, and only species that are habitat-generalists or that are adapted to disturbed habitats are likely to be present at the site.

3.1.1 Protected Habitats

3.1.1.1 Core Forests

Because the Project will be constructed entirely on an existing transfer station and capped landfill, no tree clearing will be required. However, Burns & McDonnell still assessed the Project's potential impacts on forests, specifically core forests, as there is forested land surrounding the parcel where the Project will be located. Core forests are defined by the University of Connecticut's Center for Land Use Education and Research's (CLEAR) as forests greater than 300 feet from non-forested habitat. CLEAR identifies three categories of core forest: small (< 250 acres); medium (250-500 acres); and large (>500 acres). Based on the 2015 CLEAR data, the Project area does not contain any forested habitats identified as core forests; the nearest core forest is a large core forest, approximately 0.28 miles to the west of the Project area. This is consistent with Burn's and McDonell's independent analysis, based on field observations and professional experience, which indicated that no forested habitat is located on-site.

The forested habitat surrounding the site likely influenced by what are called edge effects. In the 300-foot zone between forested and non-forested habitats, there are often edge effects, such as decreased forest quality, increased levels of disturbance, and increased rates of nest predation and brood parasitism for forest birds. Since the Project will be constructed on an existing transfer station and capped landfill, no new impacts to forested habitats, specifically core forests, are anticipated.

3.2 Rare, Threatened, and Endangered Species

3.2.1 State-Listed Species

The CT-DEEP Natural Diversity Database (NDDB) program reviews proposed development projects to

assess their potential impacts on state-listed rare, threatened, and endangered species. CT-DEEP also maintains publicly available NDDB maps to be used as an initial assessment tool to show the approximate locations of the state-listed species and their habitats. Burns & McDonnell reviewed the NDDB maps, and based on the July 2023[1] data, the Project site overlaps with an NDDB area in the northwest corner of the site. This is shown in Appendix A, Exhibit 6.

CTEC submitted a request for NDDB state listed species review on December 12, 2023, in accordance with CT-DEEP and CSC requirements. On December 20, 2023, CTEC received a response stating that the project is not expected to negatively impact state listed species. The response is included in Appendix B, Exhibit 1.

3.2.2 Federal-Listed Species

The United States Fish & Wildlife Service (USFWS) maintains the Information for Planning and Consulting Database (IPaC) to assist in the assessment of proposed development projects' potential impacts on federal-listed species.

A USFWS IPaC review identified one Endangered species, the Northern Long-eared Bat (*Myotic septentrionalis*) (NLEB), and one Candidate species, the Monarch Butterfly, as potentially present in the vicinity of the Project site. The Species List generated from the IPaC review is included in Appendix B, Exhibit 2.

Federally-Listed RTE Species Potentially Occurring: Project site

Common Name (*Scientific Name*)	Status
Northern Long-eared Bat *(Myotis septentrionalis)*	Endangered
Monarch Butterfly *(Danaus plexippus)*	Candidate

No take[2] of a federal-listed species, in this case the NLEB, is anticipated during the construction, operation, and maintenance of the Project. The NLEB utilizes caves, called hibernacula, as their winter habitat and live and dead trees, called snags, as their summer habitat. The NLEB can be found throughout the northeastern United States, including the entire State of Connecticut, and within Connecticut, areas of concern for the NLEB are shown in the *Northern long-eared bat areas of concern in Connecticut to assist with Federal Endangered Species Act Compliance map* (March 6, 2019). There are no NLEB areas of concern around the Project site; the nearest NLEB area of concern is in Morris, Connecticut,

[1] NDDB maps are updated bi-annually.
[2] Under the Endangered Species Act, to "take" means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."

approximately 15 miles from the site. Furthermore, as previously discussed, the Project will not require the removal of any trees. Therefore, the Project will likely not result in a take of NLEB or any other federally listed threatened and/or endangered species.

CTEC received a determination of "No Effect" on the NLEB from the USFWS on January 3, 2024. The determination is included in Appendix B, Exhibit 3.

3.3 Wetlands and Watercourses

3.3.1 Desktop Review

Burns & McDonnell consulted the following databases related to wetlands and watercourses: the United States Fish and Wildlife Service's (USFWS) National Wetlands Inventory (NWI), the United States Department of Agriculture (USDA) Natural Resource Conservation Service's (NRCS) Soil Survey Geographic Database (SSURGO), the National Hydrography Dataset (NHD), and CT-DEEP hydric soils and hydrography data. The results are shown in Appendix A, Exhibit 7.

CT-DEEP data shows a possible marsh in the south of the site, approximately 106.3 feet south from the approximate LOC, and possible wetland soil in the southwest corner of the site, approximately 157.4 feet west from the approximate LOC. NWI data shows a possible palustrine wetland, which includes bogs, fens, marshes, and forested wetland swamps, in the southwest of the site, approximately 301.99 feet northwest from the approximate LOC.

CT-DEEP data also shows unnamed watercourses in the western portion of the site within the LOC and Grannis Brook in the northeastern portion of the site, approximately 226.9 feet from the LOC; it also shows Mix Brook approximately 597.8 feet to the southwest of the LOC.

3.3.2 Field Investigation

Burns & McDonnell contracted EcoMaps, LLC to conduct a field investigation and wetland delineation in accordance 1987 U.S. Army Corps of Engineers (USACE) *Wetland Delineation Manual*, other USACE jurisdictional guidance, Connecticut Inland Wetlands and Watercourses regulations, and Connecticut Tidal Wetlands regulations. Certified soil scientist Michelle Ford conducted the investigation and delineation on November 28, 2023. The results of the investigation are summarized below and included in Appendix C. Delineated wetland resources at the Site include two areas located predominantly in the Town-owned parcel south of the active landfill nearest to Lake Avenue and the Lake Compounce Campground access road. The locations of the resources identified during the investigation are shown in Appendix A, Exhibit 8.

The area identified as Wetland W1 is located south of the transfer station portion of the site. It is hydrologically supported by stormwater runoff, primarily from two culverts that discharge into the wetland. The underlying substrate and an otherwise restrictive layer retain water resulting in the development and establishment of hydric soils, vegetation, and hydrology. The wetland is dominated by non-native vegetation such as common reed (*Phragmites australis*) and invasive vegetation such as Asiatic bittersweet (*Celastrus orbiculatus*), autumn olive (*Elaeagnus umbellata*), and multiflora rose (*Rosa multiflora*)

The second delineated area, Mix Brook, flows from west to east southwest of the Project area. The substrate of the brook is primarily sand and gravel. At the time of the delineation, the water level ranged from 4 to 12 inches, but the Brook is likely influenced by stormwater runoff that result in highly variable flows throughout the year. The Brook is classified by CT-DEEP as a Class 2 watercourse, meaning it has the potential to support the drinking water supply, the agricultural and industrial water supply, fish and wildlife habitat, recreational use.

3.3.3 Impacts to Wetlands and Watercourses

No impacts to wetlands or watercourses are anticipated in the construction, operation, and maintenance of the Project. The Project will require construction activity, specifically the installation of four utility poles and an overhead electric line, near Wetland W1. The proposed work will be isolated to areas of existing impacts within the buffer of Wetland W1, and no new impervious areas are proposed.

Best Management Practices (BMPs) will also be installed to avoid any unintentional impacts to the wetland during construction. Project-specific BMPs will be outlined in full in the Stormwater Pollution Control Plan (SWPCP) and will likely include stormwater control measures such as compost filter sock and silt fence. These BMPs will ensure that any potential adverse impacts to the wetland are mitigated.

Any potential long-term impacts to the wetland associated with the operation and maintenance of the Project are minimized by several design and operational factors. The Project will be unstaffed once it is operational, meaning it will generate almost no additional traffic, and those who do visit the Project site once it is operational for maintenance will use an existing gravel road, which eliminates the creation of new impervious surfaces and decreases the potential for gravel erosion into the wetland. Additionally, the ground below the solar arrays will remain vegetated, which allows ample opportunity for water to infiltrate or slow prior to discharge to surrounding wetlands and watercourses.

Therefore, the Project will not have a likely adverse impact to wetlands and watercourses.

3.3.4 Impacts to Vernal Pools

Under the Connecticut Inland Wetland and Watercourses Act, vernal pools, or seasonal wetlands that are typically wet from winter to spring and dry from summer to fall, are considered watercourses. Therefore, vernal pools were also assessed during the wetlands and watercourses delineation. No vernal pools were identified on or around the Project site, and therefore, no impacts to vernal pools are expected.

3.4 Floodplains

The Federal Emergency Management Agency (FEMA) describes a base flood as the flood that has a 1-percent chance of being equal to or exceeded each year, also known as a 100-Year Floodplain. Based on a review of the FEMA Flood Insurance Rate Map (FIRM), the Project is located within FIRM Panel #09003C0468F, effective September 26, 2008, and most of the Project area is not located within a 100-Year Floodplain. The Project property does overlap with a 100-Year Floodplain at the north and east property boundary. However, the Project construction area does not overlap with the floodplain, so no considerations regarding developing in floodplains were required. This is shown in Appendix A, Exhibit 7.

3.5 Water Quality

No impacts to water quality are expected during the construction, operation, and maintenance of the Project. The Project will be unstaffed once it is operational, so there will be no potable water uses or sanitary discharges. There will also be no liquid fuels required to operate the Project. Any stormwater generated by the development of the Project will be properly managed according to the 2023 *Connecticut Stormwater Quality Manual* and CT DEEP's General Permit Appendix I. Stormwater management is discussed further in Section 3.5.3.

3.5.1 Groundwater

CT-DEEP classifies the groundwater at the Project site as "GB," meaning the groundwater is assumed to have some degradation making it not suitable to drink without treatment. Based on CT-DEEP data, the Project site is not within a regulated Aquifer Protection Area (APA). The nearest APA, the "Well 9" APA, is approximately 3.1 miles to the east of the site. Therefore, the Project is not expected to have an adverse impact on groundwater quality.

3.5.2 Surface water

Based on CT-DEEP data, the Project is located in the South Central Coast Major Drainage Basin, the Quinnipiac Regional Drainage Basin, and the Eight Mile Subregional Drainage Basin, and Local Drainage Basin 5201-02 in the western portion of the parcel and 5201-00 in the eastern portion of the

parcel.

As discussed in Section 3.3.1 and 3.3.2, CT-DEEP data shows unnamed water resources in the western portion and Grannis Brook in the northeastern portion of the Project area; these resources were not observed in the field. There are no other surface water resources on-site. The nearest surface water resource is Mix Brook, which is approximately 597.8 feet to the southwest of the Project area.

The Project is not expected to have an adverse impact on surface water quality. There are sufficient setbacks established from surface water resources near the Project, and during construction, erosion and sedimentation (E&S) controls will be installed and maintained according to the 2002 *Connecticut Guidelines for Soil Erosion and Sediment Control*. Any stormwater generated from the site will be managed according to the 2023 *Connecticut Stormwater Quality Manual*.

3.5.3 Stormwater

In addition to the 2023 *Connecticut Stormwater Quality Manual* and 2002 *Connecticut Guidelines for Soil Erosion and Sediment Control*, the Project has been designed to meet CT-DEEP's General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities (GP) Appendix I. Combined, these address three (3) main concerns: stormwater runoff peak attenuation, water quality volume treatment, and E&S control during construction.

3.5.3.1 Stormwater Runoff Peak Attenuation

The Project will utilize ballast mounted solar modules and concrete equipment pads on gravel. No ground disturbance or penetrations are proposed on the landfill to maintain the integrity of the existing cap. The capped landfill is considered impervious. As such, no increase in stormwater runoff is anticipated for this Project. The landfill has existing stormwater management features that will be maintained and are anticipated to be sufficient.

3.5.3.2 Water Quality Volume Treatment

The Project is not anticipated to increase the effective impervious cover of the Site. As such, it would not require additional water quality volume treatment.

3.5.3.3 Erosion and Sediment Control During Construction

Since the Project is not anticipating any ground disturbance or penetration on the capped landfill, no protective measures are anticipated to be needed on the cap as no sediment should be generated during construction. A construction entrance is proposed along the existing gravel access road, and a stockpile area is shown in an existing paved area associated with the transfer yard. Additionally, the phased erosion

control plans show a compost filter sock sediment barrier on the downstream sides of the project along the cap if additional protections are needed. With the incorporation of these protective measures, stormwater runoff from the Project development is not anticipated to result in adverse impacts to water quality.

3.6 Air Quality

The Project will be located entirely on an existing transfer station and capped landfill. No air emissions will be generated during the operation of the Project, as it will be a solar energy generation facility, and therefore, no adverse impacts on air quality are expected.

During the construction of the Project, there may be temporary mobile source emissions associated with construction vehicles and equipment; such air quality impacts can be considered de minimis. Still, the impacts will be mitigated to the extent practicable through measures like limiting idling, maintaining vehicles and equipment, and spraying to minimize dust and particulate releases. Additionally, all on-site and off-road equipment will meet the standards for diesel emissions prescribed by the United States Environmental Protection Agency.

3.7 Soils

The soils below the Project area are classified by the NRCS Soil Survey Geographic Database (SSURGO) as smoothed Udorthents, a well-drained soil derived from human-transported material which has been disturbed by cutting, filling, or grading. The soils surrounding the Project area are classified as Udorthents-Pits complex, Udorthents-Urban land complex, Saco silt loam, Hinckley loamy sand, Windsor loamy sand, and Scarboro muck.

Because the Project will be located almost entirely on a capped landfill, there will be almost no soil disturbance associated with the Project. The solar panels will be ballast mounted on concrete blocks on the surface of the landfill. The electrical cable connecting the solar arrays will sit in a cable tray also on the surface of the landfill. Therefore, there will be no soil disturbance associated with the installation of the solar panels. There will be minimal soil disturbance associated with the installation of the utility poles; however, these poles will be installed in an already disturbed area associated with the transfer station. Therefore, any soil disturbance impacts can be considered de minimis.

During construction, precautionary E&S controls will be installed and maintained according to the 2002 *Connecticut Guidelines for Soil Erosion and Sediment Control* to ensure any exposed soils resulting from construction activities will be properly and promptly treated.

The bedrock beneath the Project Area is New Haven Arkose, which is described as a reddish poorly sorted arkose. Because there is no earth disturbance associated with the Project, no bedrock is likely to be encountered.

3.7.1 Prime and Important Farmland Soils

Connecticut Environmental Conditions Online (CT-ECO) defines farmland soils as land that is prime, unique, or of state or local importance based on the soil type. Based on a review of the CT-ECO data, there are no prime, unique, or important farmland soils on the site. The locations of the farmland soil relative to the site are shown in Appendix A, Exhibit 5.

3.8 Cultural Resources

Burns & McDonnell reviewed National Register of Historic Places (NRHP), Connecticut State Historic Preservation Office (SHPO) Connecticut Cultural Resources Information System (ConnCRIS), CT-DEEP, and Connecticut Department of Transportation (CT-DOT) data to identify cultural resources and historic properties within two miles of the site.

3.8.1 Historical and Archaeological Resources

Based on a review of NRHP data, there is one NRHP-listed building within two miles of the Project site, the Terry-Hayden House, which is approximately 1.62 miles to the north of the site. There are also two NRHP-listed historic districts within two miles of the site: the Sound End Historic District and the Federal Hill Historic District, which are approximately 2 miles and 2.58 miles northwest of the site, respectively. These is also one NRHP landmark, the Charles H. Norton House, which is approximately 2.16 miles to the northeast of the site.

Based on a review of ConnCRIS data, the closest state-inventoried resource is the Otis Elevator Co., which is approximately 0.38 miles to the north of the site. The closest state-registered resource is the Bugryn-Terry-Ball Farmhouse, which is approximately 0.95 miles to the north of the site.

The locations of these resources are shown in Appendix A, Exhibit 9.

CTEC requested confirmation from CT-SHPO regarding the absence of any cultural resources at the Project site, and CT-SHPO confirmed that there are no archaeological sites and properties within or near the Project site, and as such, the Project would not affect any historic properties. The confirmation included in Appendix B, Exhibit 4. Burns & McDonell does not anticipate that there will be any impacts to cultural resources associated with the Project.

3.8.2 Recreational Resources

Based on a review of CT-DEEP data, no designated recreational areas will be impacted, physically or visually, by the construction, operation, and maintenance of the Project. The nearest recreational area is the Compounce Cascade Trail, a CT Blue Blaze Hiking Trail located approximately 0.23 miles west of the Project area. The locations of the recreational resources surrounding the Project are included in Appendix A, Exhibit 3.

3.8.3 Scenic Resources

Based on a review of CT-DOT data, no designated scenic roads will be impacted, physically or visually, by the construction, operation, and maintenance of the Project. The nearest scenic road is approximately 5 miles northwest of the Project area.

3.9 Noise

All noise currently generated at the site is associated with the operation of the Bristol Transfer Station. No unusual noise sources are present. During the Project's construction, there will likely be a temporary increase in noise immediately at and around the Project site. The noise will be primarily generated by construction equipment, such as bulldozers, cranes, and trucks. The highest noise level from this equipment is approximately 88 dBA at the source. Noise generated by construction equipment is exempt from the regulations in City of Bristol Code of Ordinances Chapter Fifteen Article II – Noise if the equipment is operated during the daytime (7:00a.m. to 10:00p.m. Monday through Saturday, 9:00a.m. to 10:00p.m. Sunday).

Once the Project operational, only minimal noise associated with the Project will be generated at the site. Any noise generated will meet applicable City of Bristol noise standards for a Residential Daytime/Nighttime zone and an Industrial zone. The Project (the emitter) is located within an Industrial (IP-3) zone; the receptors could be located within the same Industrial (IP-3) zone or within the neighboring Industrial (IP-1) or Multi-family Residential (A) zones. As such, the strictest standards the project could be subject to would be 61 dBA during the daytime and 51 dBA during the nighttime.

The only noise associated with the Project will be generated by the Project's inverters and transformers. Based on the most conservative information provided by specified equipment manufacturers, the loudest piece of proposed equipment is a 2,000 kVA transformer that will generate a maximum sound level of approximately 65 dBA at one (1) meter away and 25 degrees Celsius. Equipment specifications can be found in Appendix D.

Sound reduces with distance, and the inverters and transformers are inactive at night. The closest property line relative to the nearest inverter/transformer is approximately 242 feet to the south, associated with the Hershey Lake Coumpounce Park Entrance Road. Based on the Inverse Square Law, the anticipated noise level of this transformer from that distance drops well below the local zoning regulations.

3.10 Lighting

Light sources associated with the Bristol Transfer Station are currently installed on-site. No exterior lights will be installed on-site associated with the Project. Small, non-intrusive lights will be installed on the Project equipment for visibility during maintenance activities. Therefore, no impacts from light sources are anticipated by the development of the Project.

3.11 Visibility and Reflectivity

The Project will require installing 3,724 solar panel modules, each measuring approximately 6 feet above final grade, in two arrays. The western array will contain 1,372 models, and the eastern array with contain 2,352 modules. The proposed electrical interconnection for the Project will also require the installation of four new utility poles in the western portion of the site.

Because of the topography at the site, the Project will likely be visible from the roads and residences immediately surrounding the site, specifically Enterprise Drive to the east, Lake Avenue to the west, the unnamed roads to the north and south, and the residential community to the west. There are, in almost all places along the road and near the residences, vegetative buffers between the Project site and the nearby residences and roads. Little to no visibility of the Project is anticipated from immediate abutters due to the existing vegetative buffers. A visual simulation of the Project is included in Appendix E.

The solar panel modules are designed to minimize reflectivity. It is anticipated that only a small amount of light will be reflected off the panels, less than the amount of light reflected off the surface of smooth water. The panels will also be tilted up toward the southern sky at a fixed angle of 20 degrees, thereby further reducing reflectivity.

3.12 FAA Determination

Burns & McDonnell consulted the Federal Aviation Administration (FAA) Notice Criteria Tool to assess the Project's potential impacts on air navigation. The results are included in Appendix B, Exhibit 5. Burns & McDonell does not anticipate any impacts to air navigation associated with the Project.

4.0 CONCLUSION

As discussed in this Environmental Impact Analysis, the Project will not have an adverse effect on the natural and cultural resources in and around the Project site. The Project will comply with the CT-DEEP environmental quality standards, and furthermore, the Project will benefit the City of Bristol and the State of Connecticut by increasing the local energy generation capacity, improving electrical reliability, and advancing the city's and the state's goals to develop renewable energy resources

The Bristol Transfer Station currently operates at the site where the Project will be located. The solar arrays will and electrical conduits be constructed on a capped landfill in the eastern portion of the parcel, and the utility poles and overhead electric line will be constructed on a gravel lot in the western portion of the parcel.

The Project is not expected to have an impact on the habitats at and around the Project site. Because the site is already developed, habitat diversity and quality there has already been reduced, and only species that are habitat-generalists or that are adapted to disturbed habitats are likely to be present. There is forested land around the site, but these forests are not core forests, and their quality as habitats is also likely reduced due to the nearby development.

The Project is also not expected to have an impact on state or federal-listed threatened and endangered species. The Project site overlaps with an area identified as an approximate location of the state-listed species or state-listed species' habitat, but this area is outside the limit of construction. As such, no impacts to state-listed species are expected. The NLEB, a federal-listed species, was identified as being potentially present at the Project site, but because the site is not within an NLEB area of concern, and because the Project will not require the removal of any tress, no impacts to NLEB or other federal-listed species are expected.

Field investigations identified one wetland and one watercourse within the vicinity of the Project site. There will be construction near the wetland, but the work will be minimal, limited to the installed of the four utility poles and the overhead electric line, and it will be isolated to areas of existing impacts. BMPs will also be installed to avoid any unintentional impacts to the wetland during construction.

The installation of the utility poles and the overhead electric line will be the only ground disturbance associated with the Project, and as such, no impacts to surface or ground water quality are expected. No impervious surfaces will be created, erosion and sedimentation controls will be installed and maintained, and stormwater will be managed. Furthermore, the site will be unstaffed once it is operational, meaning

there will be no potable water uses or sanitary discharges, and no liquid fuels are required to operate the Project.

Because there will be minimal ground distances, limited to an already developed area, no impacts to soil are expected.

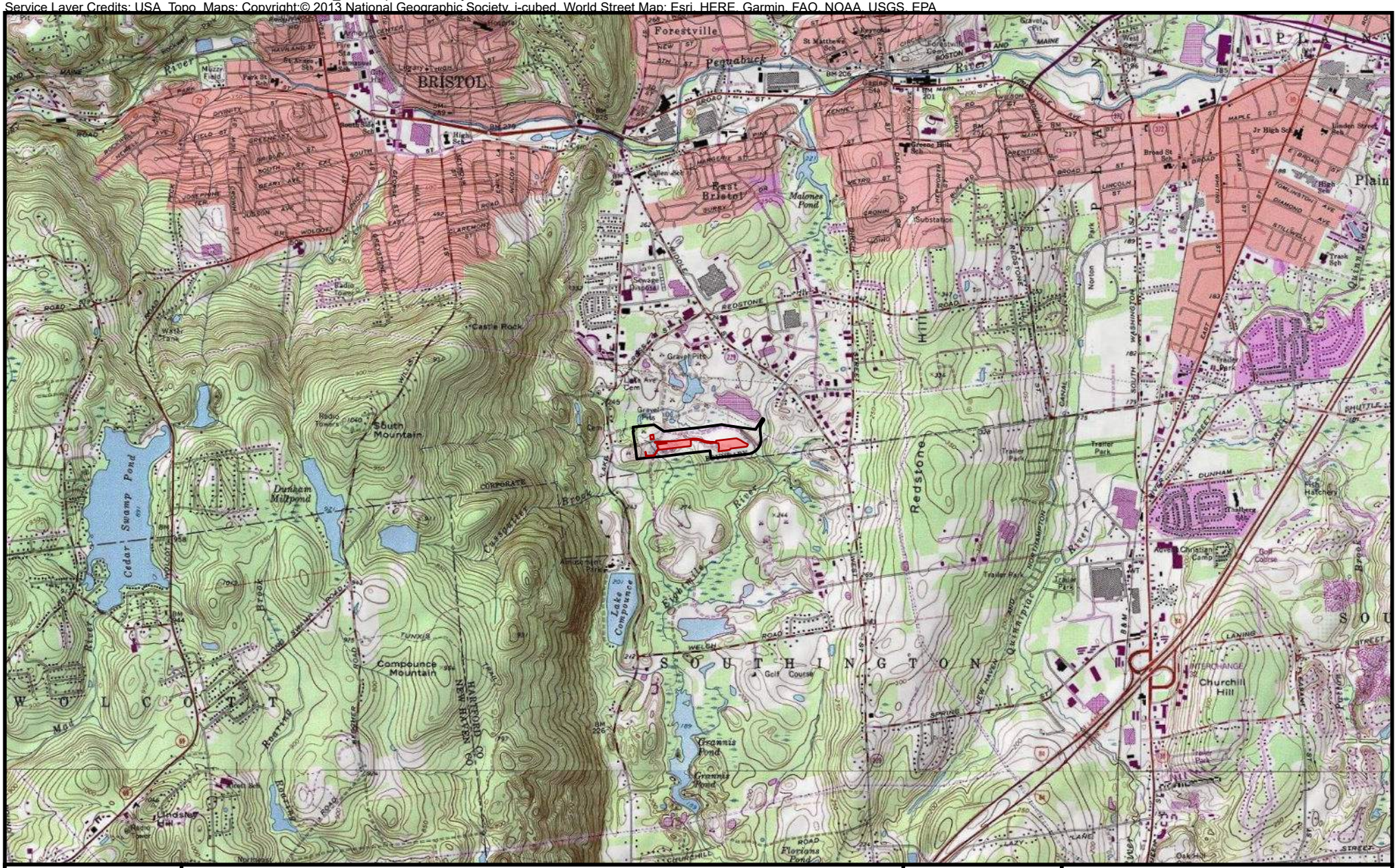
There may be increased emissions and noise during the construction of the Project, but any impacts will be mitigated to the extent practicable by following federal, state, and local guidelines. Once the Project is operational, there will be no emissions generated, and any noise generated will be below the limit permissible by the City of Bristol.

There may also be impacts associated with lighting, visibility, and reflectivity, but these impacts can be considered de minimis. Small light sources will be installed within the solar arrays, but these lights will be non-intrusive. The Project itself will be visible from the roads immediately surrounding the site, but it will likely not be visible from the residences near the site as there are vegetative buffers already in place. The project has also been designed to minimize reflectivity, such that the amount of light reflected from the solar panels will, at most, be comparable to the amount of light reflected off the surface of still water.

There are no cultural resources, including historical, archaeological, recreational, and scenic resources, immediately surrounding the Project site; the nearest is the Compounce Cascade Trail, which is about a quarter mile away. The Project will likely not be visible from the trail, and therefore no impacts to this resource or other resources are expected.

APPENDIX A MAPS

Path: C:\Geodata\ENV CIA BESS\Bristol Solar CIA\Bristol_BESS.aprx kcassady 12/19/2023
Service Layer Credits: USA_Topo_Maps: Copyright:© 2013 National Geographic Society, i-cubed, World Street Map: Esri, HERE, Garmin, FAO, NOAA, USGS, EPA



Source: Esri, USGS, CT DEEP, CT ECO, Burns & McDonnell

Issued: 12/19/2023

Path: C:\Geodata\ENV CIA BESS\Bristol Solar CIA\Bristol_BESS.aprx kcassady 12/19/2023
Service Layer Credits: images\Ortho_2019_tiled; , World Street Map: Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, NPS

Site Location

Legend

- Approximate Project Construction Limit
- Project Property Boundary
- Parcel Boundary
- 10 FT Contour

NORTH

0 250 500

Scale in Feet

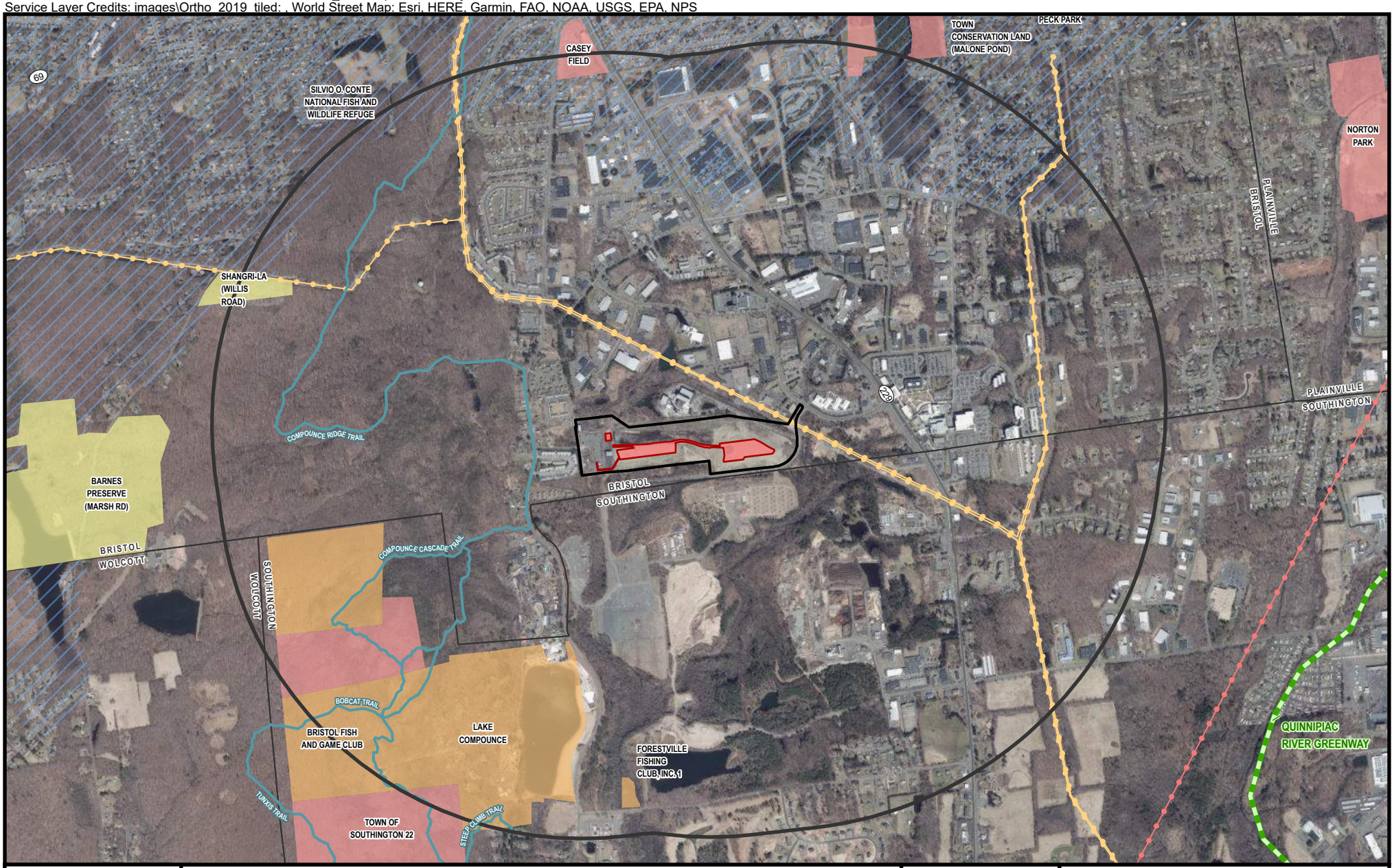
BURNS McDONNELL

Exhibit 2
Site Topography
Bristol Solar Site
Bristol, Connecticut

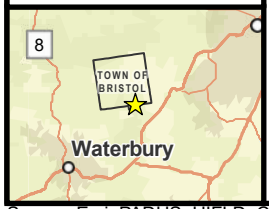
Source: Esri, UCONN, CT ECO, CT DEEP, Burns & McDonnell

Issued: 12/19/2023

Path: C:\Geodata\ENV CIA BESS\Bristol Solar CIA\Bristol_BESS.aprx kcassady 12/19/2023
Service Layer Credits: images\Ortho_2019_tiled: , World Street Map: Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, NPS



Site Location



Legend

- Approx. Project Construction Limit
- Project Property Boundary
- 1-Mile Property Buffer
- Town Boundary
- State Route
- US Route
- Interstate
- Transmission Line
- Natural Gas Pipeline
- Designated Connecticut Greenway
- CT Blue Blazed Hiking Trail

Protected Areas

- Designation
- Local Government
- Private
- Unknown

NORTH

0 0.25 0.5
Scale in Miles

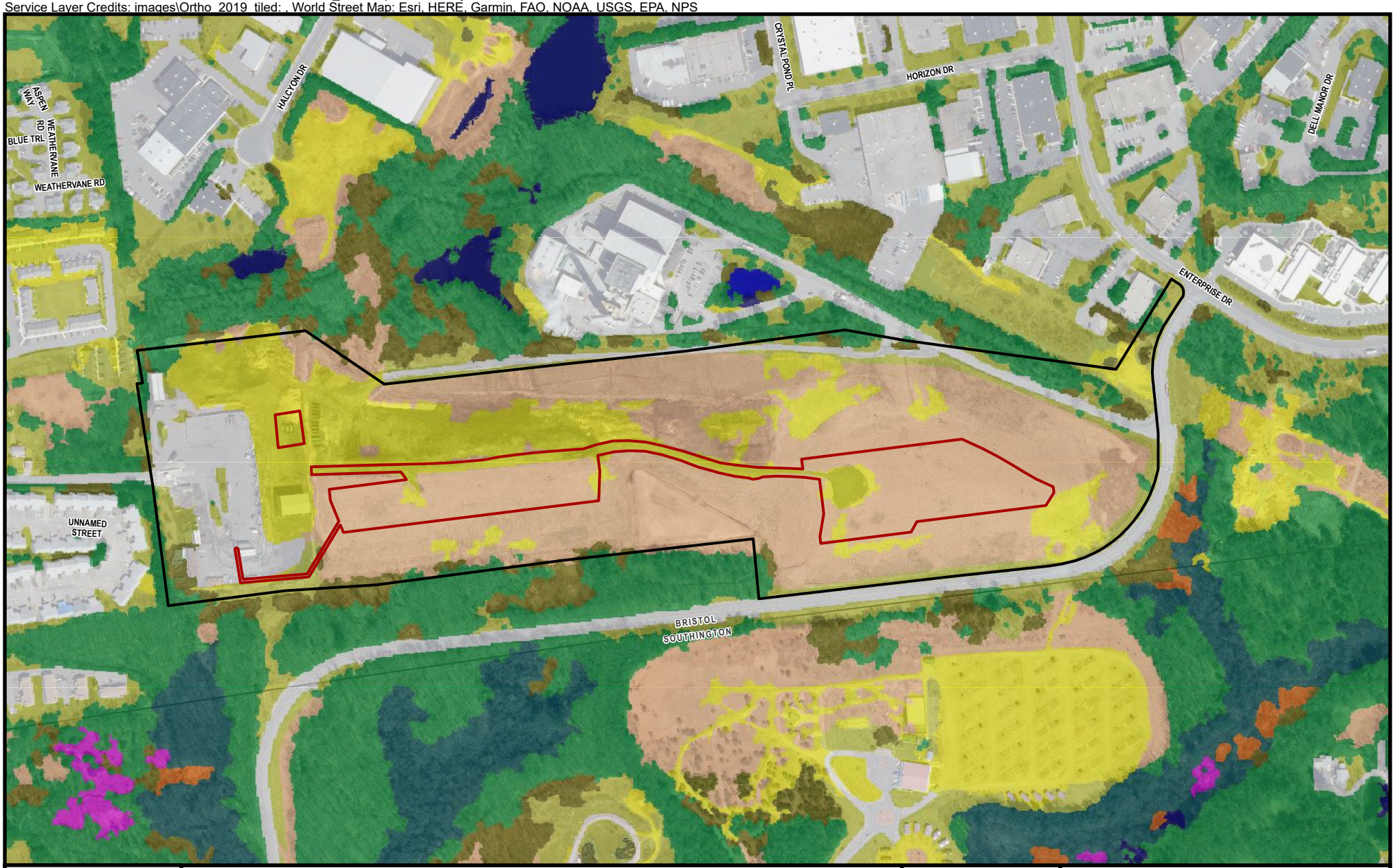
BURNS McDONNELL

Exhibit 3
Land Use
Bristol Solar Site
Bristol, Connecticut

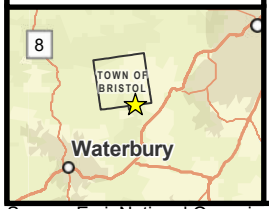
Source: Esri, PADUS, HIFLD, CT DEEP, CT ECO, Burns & McDonnell

Issued: 12/19/2023

Path: C:\Geodata\ENV CIA BESS\Bristol Solar CIA\Bristol_BESS.aprx kcassady 12/19/2023
Service Layer Credits: images\Ortho_2019_tiled: , World Street Map: Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, NPS



Site Location



Legend

- Approx. Project Construction Limit
- Project Property Boundary
- Town Boundary

CT C-CAP 1m Land Cover (2016)

- Impervious
- Developed Open Space
- Grassland
- Mixed Forest
- Scrub/Shrub
- Palustrine Forested Wetland
- Palustrine Scrub/Shrub Wetland
- Palustrine Emergent Wetland
- Bare Land
- Open Water
- Palustrine Aquatic Bed

NORTH

0 250 500

Scale in Feet

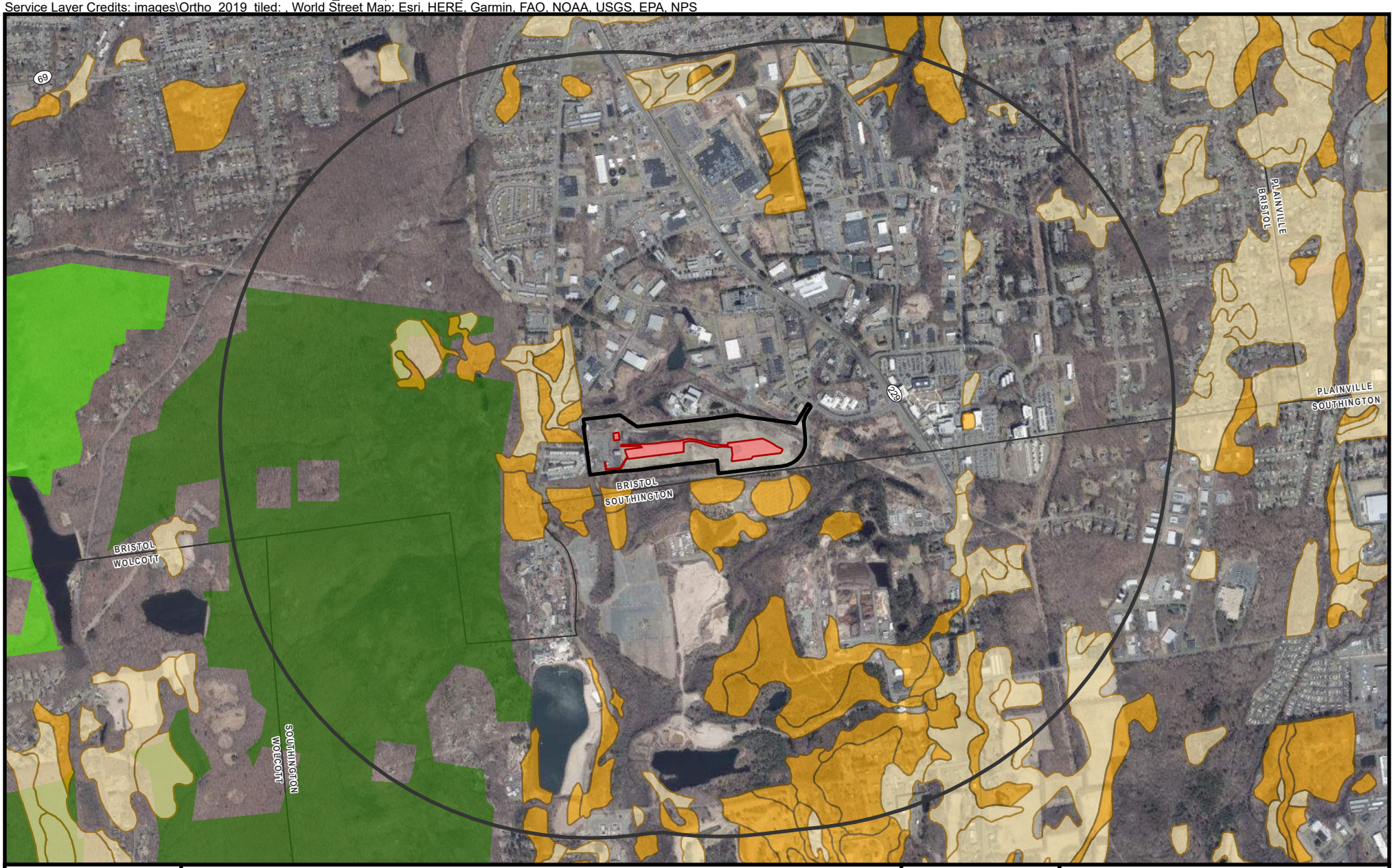
BURNS McDONNELL

Exhibit 4
Land Cover
Bristol Solar Site
Bristol, Connecticut

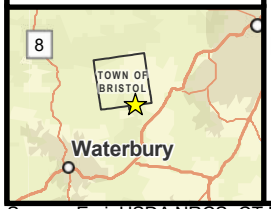
Source: Esri, National Oceanic and Atmospheric Administration (NOAA), Coastal Change Analysis Program (C-CAP), UConn CLEAR, CT DEEP, CT ECO, Burns & McDonnell

Issued: 12/19/2023

Path: C:\Geodata\ENV CIA BESS\Bristol Solar CIA\Bristol_BESS.aprx kcassady 12/19/2023
Service Layer Credits: images\Ortho_2019_tiled: , World Street Map: Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, NPS



Site Location



Legend

- Project Property Boundary
- Approx. Project Construction Limit
- 1-Mile Property Buffer
- Town Boundary

Farmland Soils

- Prime Farmland Soils
- Statewide Important Farmland Soils
- Locally Important Farmland Soils

2015 Core Forest

- Large Core Forest
- Medium Core Forest
- Small Core Forest

NORTH

0 0.25 0.5

Scale in Miles

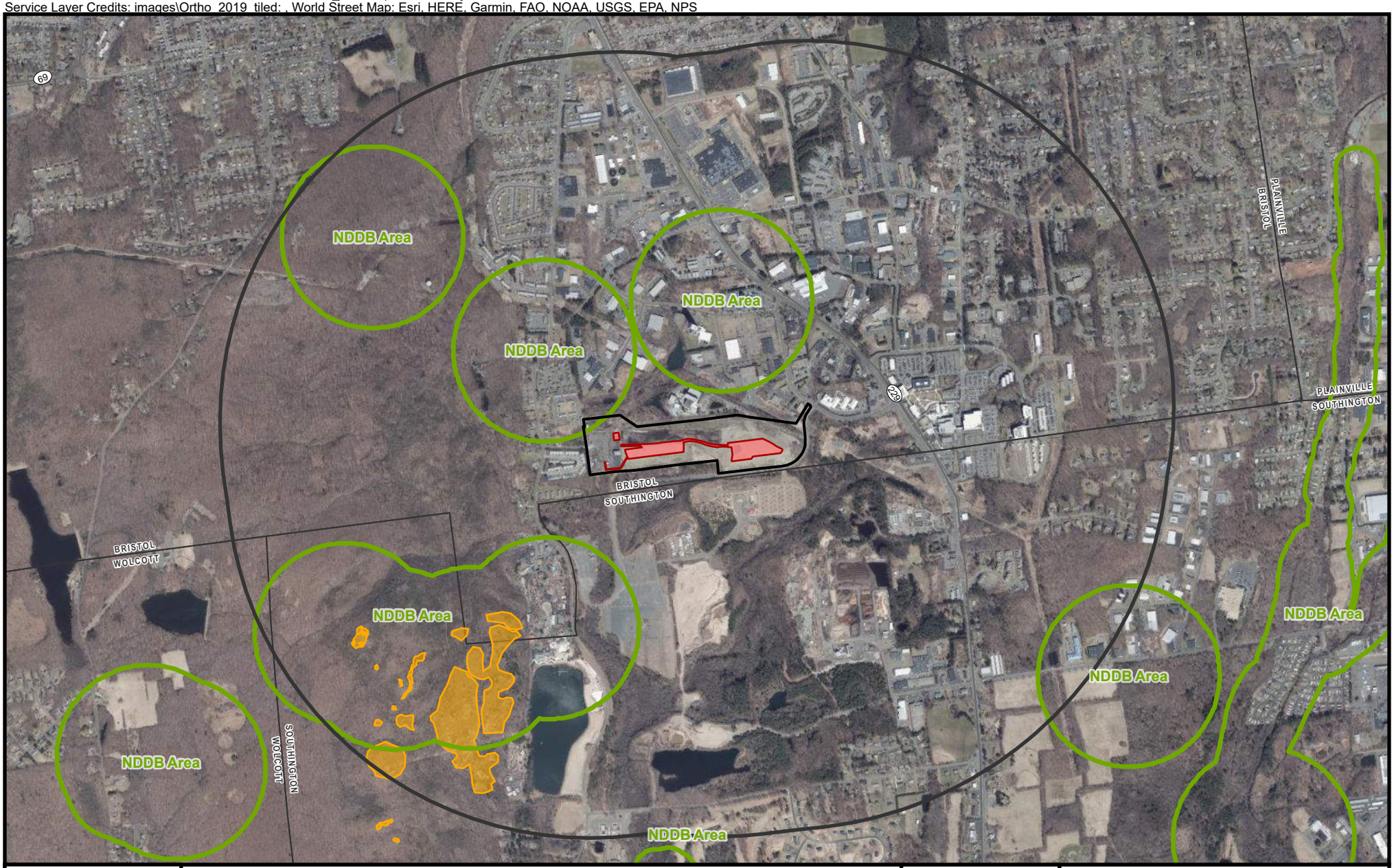
BURNS McDONNELL

Exhibit 5
Farmland Soils and Core Forest
Bristol Solar Site
Bristol, Connecticut

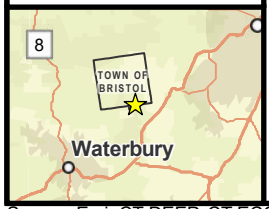
Source: Esri, USDA NRCS, CT DEEP, CT ECO, Burns & McDonnell

Issued: 12/19/2023

Path: C:\Geodata\ENV CIA BESS\Bristol Solar CIA\Bristol_BESS.aprx kcassady 12/19/2023
Service Layer Credits: images\Ortho_2019_tiled: , World Street Map: Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, NPS



Site Location



Legend

- Project Property Boundary
- Approximate Project Construction Limit
- 1-Mile Site Buffer
- Town Boundary
- State Route
- US Route
- Interstate
- Natural Diversity Database Area
- DEEP Critical Habitat

NORTH

0 0.25 0.5
Scale in Miles

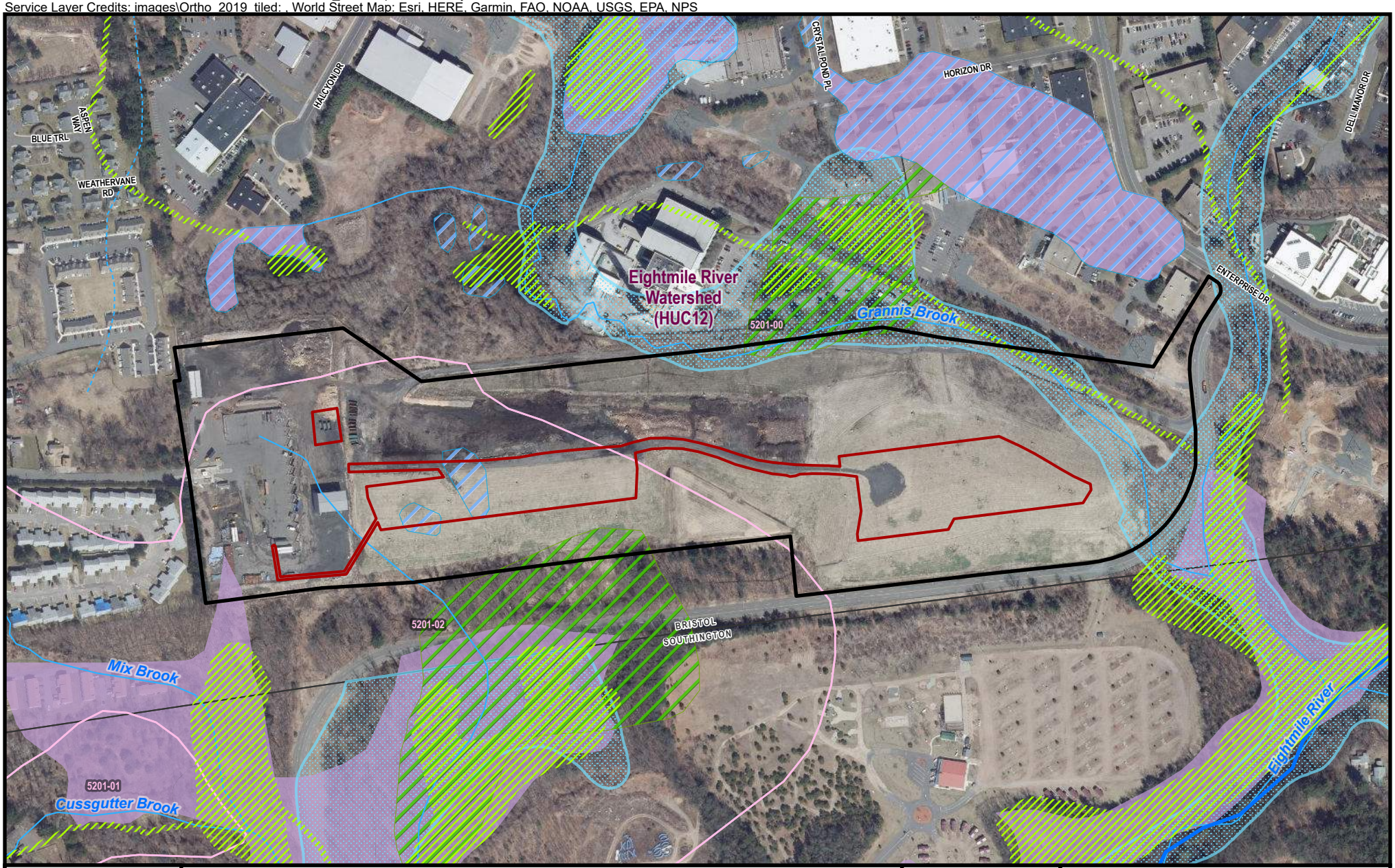
BURNS McDONNELL

Exhibit 6
Species of Concern
Bristol Solar Site
Bristol, Connecticut

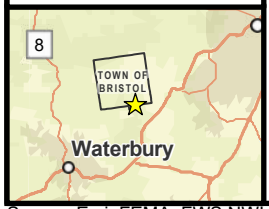
Source: Esri, CT DEEP, CT ECO, Burns & McDonnell

Issued: 12/19/2023

Path: C:\Geodata\ENV CIA BESS\Bristol Solar CIA\Bristol_BESS.aprx kcassady 12/19/2023
Service Layer Credits: images\Ortho_2019_tiled: , World Street Map: Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, NPS



Site Location



Legend

- Project Property Boundary
- Approximate Project Construction Limit
- CT DEEP Local Basin
- NHD Hydrography
- FEMA 100-Year Floodplain

NWI Wetland

- Palustrine
- Lacustrine
- CT Inland Wetland Soil

CT Hydro

- Water
- Intermittent Water
- Marsh
- Water

NORTH

0 250 500
Scale in Feet

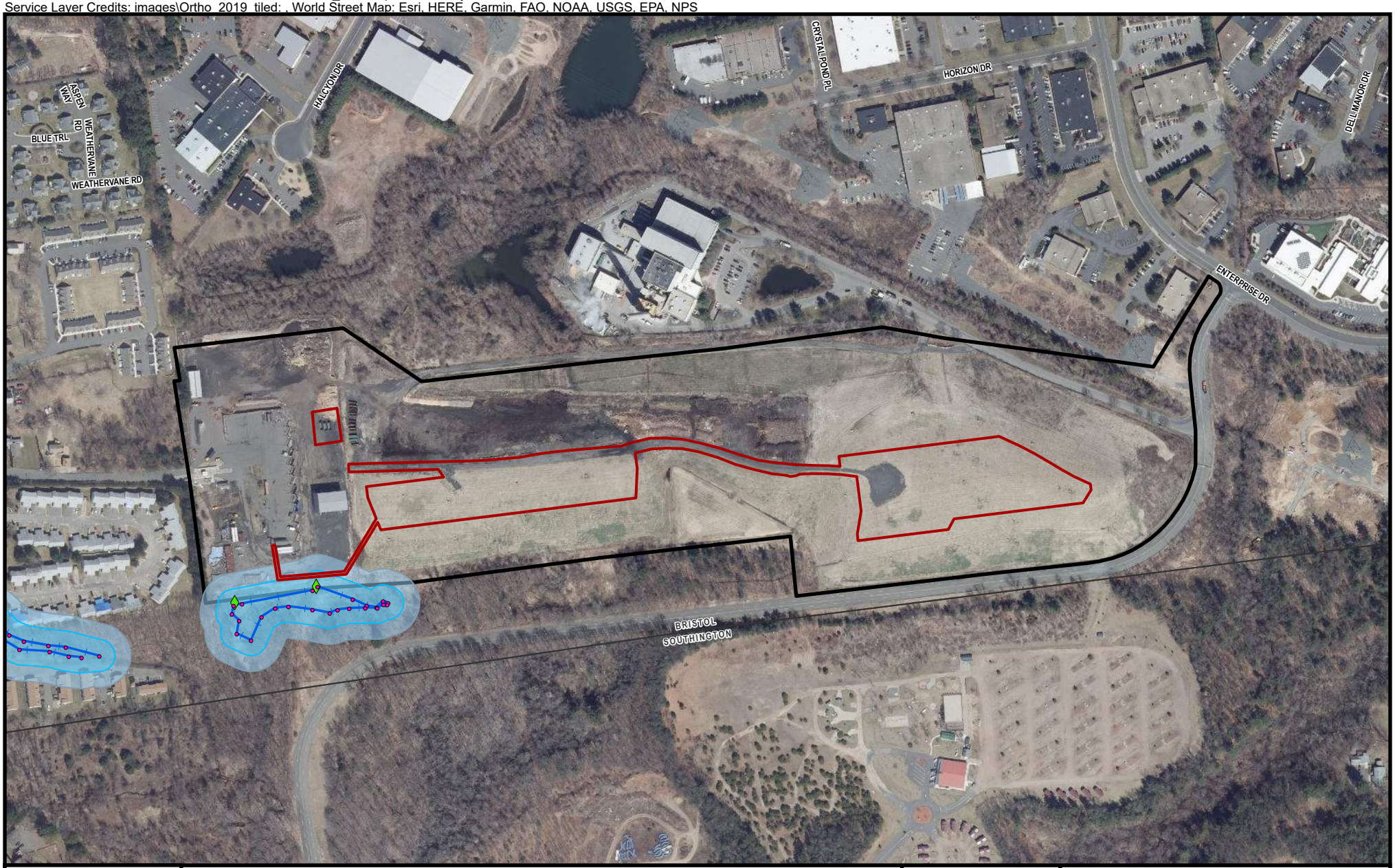
BURNS McDONNELL

Exhibit 7
Wetlands/Jurisdictional Waters
Bristol Solar Site
Bristol, Connecticut

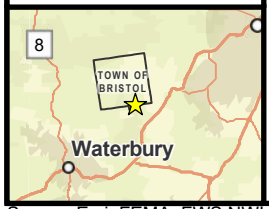
Source: Esri, FEMA, FWS NWI, USGS NHD, USDA NRCS, CT DEEP, CT ECO, Burns & McDonnell

Issued: 12/19/2023

Path: C:\Geodata\ENV CIA BESS\Bristol Solar CIA\Bristol_BESS.aprx kcassady 12/19/2023
Service Layer Credits: images\Ortho_2019_tiled: , World Street Map: Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, NPS



Site Location



Legend

- Project Property Boundary
- Approximate Project Construction Limit
- Culvert
- Wetland Flag
- Wetland Boundary
- 50-foot Wetland Buffer
- 100-foot Wetland Buffer

NORTH

0 250 500
Scale in Feet

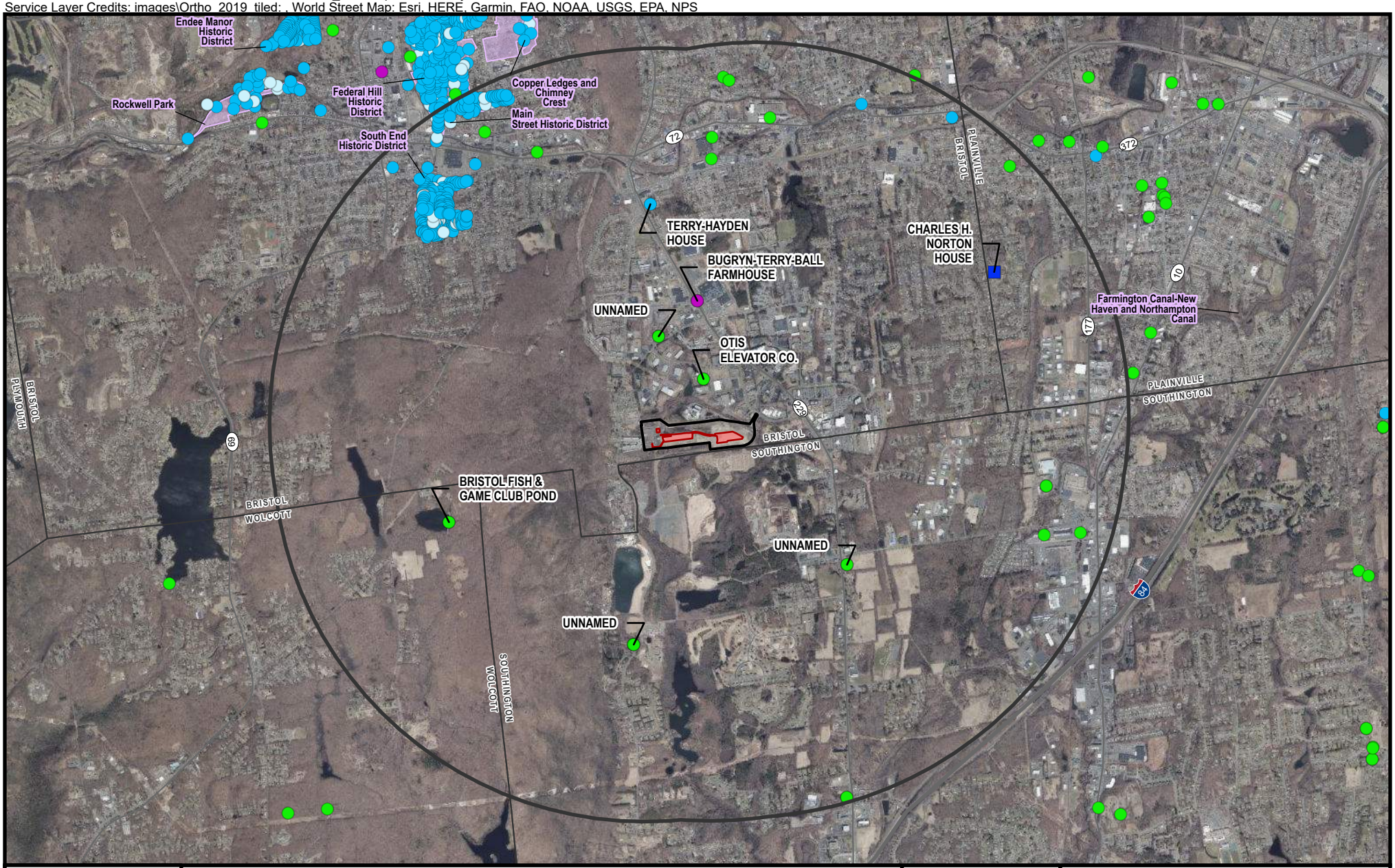
BURNS McDONNELL

Exhibit 8
Delineated Features
Bristol Solar Site
Bristol, Connecticut

Source: Esri, FEMA, FWS NWI, USGS NHD, USDA NRCS, CT DEEP, CT ECO, Burns & McDonnell

Issued: 12/19/2023

Path: C:\Geodata\ENV CIA BESS\Bristol Solar CIA\Bristol_BESS.aprx kcassady 12/19/2023
Service Layer Credits: images\Ortho_2019_tiled: , World Street Map: Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, NPS



Source: Esri, NPS NRHP, CT ECO, CT DECD SHPO, Burns & McDonnell

Issued: 12/19/2023

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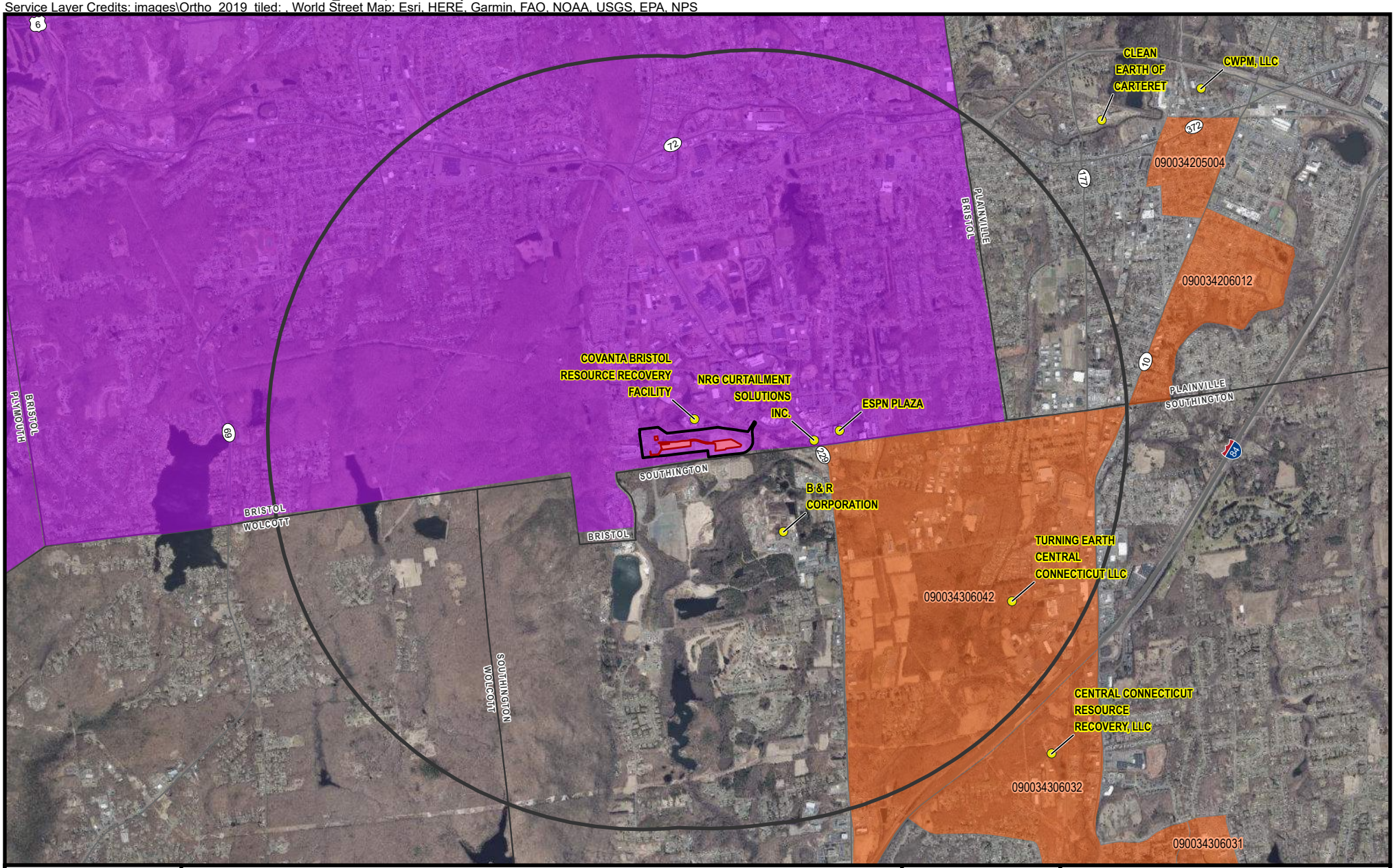
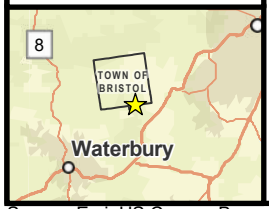
Service Layer Credits: images\Ortho_2019_tiled: , World Street Map: Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, NPS



Site Location



Legend

- Project Property Boundary
- Approximate Project Construction Limit
- 2-Mile Site Buffer
- Town Boundary
- State Route
- US Route
- Interstate
- Affecting Facility 2022
- Environmental Justice Block Groups 2022
- Environmental Justice Distressed Municipalities 2022

NORTH

0 0.5 1
Scale in Miles

BURNS McDONNELL

Exhibit 10
Environmental Justice
Bristol Solar Site
Bristol, Connecticut

Source: Esri, US Census Bureau 2019 TIGER/Line Shapefiles, CT DEEP, CT ECO, Burns & McDonnell

Issued: 12/19/2023

APPENDIX B AGENCY CONSULTATIONS

Exhibit 1

Connecticut
Department of Energy &
Environmental Protection

portal.ct.gov/DEEP

12/20/2023

Michael Toro
C-TEC SOLAR, LLC
1 Griffin Rd S
Bloomfield, CT 06002
mickey.toro@ctecsolar.com

Subject: Bristol Landfill Solar Project
Filing #: 104610
NDDB - New Determination Number: 202309319

Expiration Date: 12/20/2025

Location Description: Bristol Landfill, 685 Lake Ave, Bristol, CT

I have reviewed Natural Diversity Database (NDDB) maps and files regarding this project. I do not anticipate increased negative impacts to State-listed species (RCSA Sec. 26-306) resulting from your proposed activity at the site.

General Site Design Recommendations:

If planned properly, you can increase the value of the habitat for wildlife and state listed species with your development.

- **Create a site management plan to promote native vegetation growth in the area under the solar panels.** Restoring native vegetation will attract pollinators and avoid the need for constant mowing. Reduced need for mowing will reduce the risk for reptiles and amphibians.
  - More specific management suggestions can be found here: https://ag.umass.edu/clean-energy/services/pollinator-friendly-solar-pv-for-massachusetts

Your submission information indicates that your project requires a state permit, license, registration, or authorization, or utilizes state funding or involves state agency action. This NDDB - New determination may be utilized to fulfill the Endangered and Threatened Species requirements for state-issued permit applications, licenses, registration submissions, and authorizations.

Please be aware of the following limitations and conditions:

Natural Diversity Database information includes all information regarding listed species available to us at the time of the request. This information is a compilation of data collected over the years by the Department of Energy and Environmental Protection's Natural History Survey and cooperating units of DEEP, land owners, private conservation groups and the scientific community. This information is not necessarily the result of comprehensive or site-specific field investigations. Current research projects and new contributors continue to identify additional populations of species and locations of habitats of concern, as well as enhance existing

data. Such new information is incorporated into the Database and accessed through the ezFile portal as it becomes available. New information may result in additional review, and new or modified restrictions or conditions may be necessary to remain in compliance with certain state permits.

- During your work listed species may be encountered on site. A report must be submitted by the observer to the Natural Diversity Database promptly and additional review and restrictions or conditions may be necessary to remain in compliance with certain state permits. Please fill out the appropriate survey form and follow the instructions for submittal.
- Your project involves the state permit application process or other state involvement, including state funding or state agency actions; please note that consultations with your permit analyst or the agency may result in additional requirements. In this situation, additional evaluation of the proposal by the DEEP Wildlife Division may be necessary and additional information, including but not limited to species-specific site surveys, may be required. Any additional review may result in specific restrictions or conditions relating to listed species that may be found at or in the vicinity of the site.
- If your project involves preparing an Environmental Impact Assessment, this NDDB consultation and determination should not be substituted for biological field surveys assessing on-site habitat and species presence.
- The NDDB - New determination for the Bristol Landfill Solar Project as described in the submitted information and summarized at the end of this document is valid until 12/20/2025. This determination applies only to the project as described in the submission and summarized at the end of this letter. Please re-submit an updated Request for Review if the project's scope of work and/or timeframe changes, including if work has not begun by 12/20/2025.

If you have further questions, please contact me at the following:

Shannon Kearney
CT DEEP Bureau of Natural Resources
Wildlife Division
Natural Diversity Database
79 Elm Street
Hartford, CT 06106-5127
(860) 424-3170
Shannon.Kearney@ct.gov

Please reference the Determination Number 202309319 when you e-mail or write. Thank you for consulting the Natural Diversity Data Base.

Shannon Kearney
Wildlife Division- Natural Diversity Data Base
79 Elm Street
Hartford, CT 06106-5127
(860) 424-3170
Shannon.Kearney@ct.gov

Application Details:

Project involves federal funds or federal permit:	No
Project involves state funds, state agency action, or relates to CEPA request:	No
Project requires state permit, license, registration, or authorization:	Yes
DEEP enforcement action related to project:	
Project Type:	Energy and Utility Production Facilities and Distribution Infrastructure
Project Sub-type:	Solar Energy
Project Name:	Bristol Landfill Solar Project
Project Description:	

Exhibit 2

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104

In Reply Refer To:
Project Code: 2024-0023590
Project Name: Bristol Landfill Solar

December 07, 2023

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

Updated 4/12/2023 - Please review this letter each time you request an Official Species List, we will continue to update it with additional information and links to websites may change.

About Official Species Lists

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Federal and non-Federal project proponents have responsibilities under the Act to consider effects on listed species.

The enclosed species list identifies threatened, endangered, proposed, and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested by returning to an existing project's page in IPaC.

Endangered Species Act Project Review

Please visit the "**New England Field Office Endangered Species Project Review and Consultation**" website for step-by-step instructions on how to consider effects on listed

species and prepare and submit a project review package if necessary:

https://www.fws.gov/office/new-england-ecological-services/endangered-species-project-review

NOTE Please do not use the **Consultation Package Builder** tool in IPaC except in specific situations following coordination with our office. Please follow the project review guidance on our website instead and reference your **Project Code** in all correspondence.

Northern Long-eared Bat - (**Updated 4/12/2023**) The Service published a final rule to reclassify the northern long-eared bat (NLEB) as endangered on November 30, 2022. The final rule went into effect on March 31, 2023. You may utilize the **Northern Long-eared Bat Rangewide Determination Key** available in IPaC. More information about this Determination Key and the Interim Consultation Framework are available on the northern long-eared bat species page:

https://www.fws.gov/species/northern-long-eared-bat-myotis-septentrionalis

For projects that previously utilized the 4(d) Determination Key, the change in the species' status may trigger the need to re-initiate consultation for any actions that are not completed and for which the Federal action agency retains discretion once the new listing determination becomes effective. If your project was not completed by March 31, 2023, and may result in incidental take of NLEB, please reach out to our office at newengland@fws.gov to see if reinitiation is necessary.

Additional Info About Section 7 of the Act
Under section 7(a)(2) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to determine whether projects may affect threatened and endangered species and/or designated critical habitat. If a Federal agency, or its non-Federal representative, determines that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Federal agency also may need to consider proposed species and proposed critical habitat in the consultation. 50 CFR 402.14(c)(1) specifies the information required for consultation under the Act regardless of the format of the evaluation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

https://www.fws.gov/service/section-7-consultations

In addition to consultation requirements under Section 7(a)(2) of the ESA, please note that under sections 7(a)(1) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species. Please contact NEFO if you would like more information.

Candidate species that appear on the enclosed species list have no current protections under the ESA. The species' occurrence on an official species list does not convey a requirement to

consider impacts to this species as you would a proposed, threatened, or endangered species. The ESA does not provide for interagency consultations on candidate species under section 7, however, the Service recommends that all project proponents incorporate measures into projects to benefit candidate species and their habitats wherever possible.

Migratory Birds

In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts see:

https://www.fws.gov/program/migratory-bird-permit

https://www.fws.gov/library/collections/bald-and-golden-eagle-management

Please feel free to contact us at **newengland@fws.gov** with your **Project Code** in the subject line if you need more information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat.

Attachment(s): Official Species List

Attachment(s):

- Official Species List

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
(603) 223-2541

PROJECT SUMMARY

Project Code: 2024-0023590
Project Name: Bristol Landfill Solar
Project Type: Power Gen - Solar
Project Description: Proposed ballast mounted fixed tilt solar facility.
Project Location:

Counties: Hartford County, Connecticut

ENDANGERED SPECIES ACT SPECIES

There is a total of 2 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Endangered

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

IPAC USER CONTACT INFORMATION

Agency: Private Entity
Name: Jin Tao
Address: 7-57 Wells Avenue, Suite 27
City: Boston
State: MA
Zip: 02459
Email jtao@burnsmcd.com
Phone: 3146806817

Exhibit 3

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104

In Reply Refer To:
Project code: 2024-0023590
Project Name: Bristol Landfill Solar

January 03, 2024

Federal Action Agency (if applicable):

Subject: Record of project representative's no effect determination for 'Bristol Landfill Solar'

Dear Jin Tao:

This letter records your determination using the Information for Planning and Consultation (IPaC) system provided to the U.S. Fish and Wildlife Service (Service) on January 03, 2024, for 'Bristol Landfill Solar' (here forward, Project). This project has been assigned Project Code 2024-0023590 and all future correspondence should clearly reference this number. **Please carefully review this letter.**

Ensuring Accurate Determinations When Using IPaC

The Service developed the IPaC system and associated species' determination keys in accordance with the Endangered Species Act of 1973 (ESA; 87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) and based on a standing analysis. All information submitted by the Project proponent into IPaC must accurately represent the full scope and details of the Project.

Failure to accurately represent or implement the Project as detailed in IPaC or the Northern Long-eared Bat Rangewide Determination Key (Dkey), invalidates this letter. ***Answers to certain questions in the DKey commit the project proponent to implementation of conservation measures that must be followed for the ESA determination to remain valid.***

Determination for the Northern Long-Eared Bat

Based upon your IPaC submission and a standing analysis, your project has reached the determination of "No Effect" on the northern long-eared bat. To make a no effect determination, the full scope of the proposed project implementation (action) should not have any effects (either positive or negative), to a federally listed species or designated critical habitat. Effects of the action are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A

consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action. (See § 402.17).

Under Section 7 of the ESA, if a federal action agency makes a no effect determination, no consultation with the Service is required (ESA §7). If a proposed Federal action may affect a listed species or designated critical habitat, formal consultation is required except when the Service concurs, in writing, that a proposed action "is not likely to adversely affect" listed species or designated critical habitat [50 CFR §402.02, 50 CFR§402.13].

Other Species and Critical Habitat that May be Present in the Action Area

The IPaC-assisted determination for the northern long-eared bat does not apply to the following ESA-protected species and/or critical habitat that also may occur in your Action area:

- Monarch Butterfly *Danaus plexippus* Candidate

You may coordinate with our Office to determine whether the Action may affect the animal species listed above and, if so, how they may be affected.

Next Steps

Based upon your IPaC submission, your project has reached the determination of “No Effect” on the northern long-eared bat. If there are no updates on listed species, no further consultation/ coordination for this project is required with respect to the northern long-eared bat. However, the Service recommends that project proponents re-evaluate the Project in IPaC if: 1) the scope, timing, duration, or location of the Project changes (includes any project changes or amendments); 2) new information reveals the Project may impact (positively or negatively) federally listed species or designated critical habitat; or 3) a new species is listed, or critical habitat designated. If any of the above conditions occurs, additional coordination with the Service should take place to ensure compliance with the Act.

If you have any questions regarding this letter or need further assistance, please contact the New England Ecological Services Field Office and reference Project Code 2024-0023590 associated with this Project.

Action Description
You provided to IPaC the following name and description for the subject Action.

1. Name

Bristol Landfill Solar

2. Description

The following description was provided for the project 'Bristol Landfill Solar':

> Proposed ballast mounted fixed tilt solar facility.

DETERMINATION KEY RESULT

Based on the information you provided, you have determined that the Proposed Action will have no effect on the Endangered northern long-eared bat (Myotis septentrionalis). Therefore, no consultation with the U.S. Fish and Wildlife Service pursuant to Section 7(a)(2) of the Endangered Species Act of 1973 (87 Stat. 884, as amended 16 U.S.C. 1531 *et seq.*) is required for those species.

QUALIFICATION INTERVIEW

1. Does the proposed project include, or is it reasonably certain to cause, intentional take of the northern long-eared bat or any other listed species?

   Note: Intentional take is defined as take that is the intended result of a project. Intentional take could refer to research, direct species management, surveys, and/or studies that include intentional handling/encountering, harassment, collection, or capturing of any individual of a federally listed threatened, endangered or proposed species?

   No

2. The proposed action does not intersect an area where the northern long-eared bat is likely to occur, based on the information available to U.S. Fish and Wildlife Service as of the most recent update of this key. If you have data that indicates that northern long-eared bats are likely to be present in the action area, answer "NO" and continue through the key.

   Do you want to make a no effect determination?

   Yes

PROJECT QUESTIONNAIRE

IPAC USER CONTACT INFORMATION

Agency: Private Entity
Name: Jin Tao
Address: 7-57 Wells Avenue, Suite 27
City: Boston
State: MA
Zip: 02459
Email jtao@burnsmcd.com
Phone: 3146806817

Exhibit 4

State Historic Preservation Office
Department of Economic and Community Development

CONNECTICUT

January 16, 2024

Mr. Michael Morrison
CTEC Solar, LLC
1 Griffin Road South, Suite 200
Bloomfield, CT 06002
(sent only via email to Michael.morrison@ctecsolar.com)

Subject: Proposed Solar Facility
Lake Avenue
Bristol, Connecticut

Dear Mr. Eydman:

The State Historic Preservation Office (SHPO) has reviewed the information submitted for the above-named project in accordance with the Connecticut Environmental Policy Act. SHPO understands that your client plans on constructing, operating, and maintaining a photovoltaic facility encompassing approximately 7.7 acres within the southern portion of a much larger landfill. Project plans call for all solar arrays, cables, and equipment to be installed above grade so as not to damage the capping system.

There are no archaeological sites or properties listed on the National Register of Historic Places recorded within or immediately adjacent to the project area for the proposed activities. Although all facilities will be installed above grade, the project area occupies soils comprised of only fill deposits. Based on the information submitted to this office, it is the opinion of SHPO that no historic properties will be affected by the proposed project.

This office appreciates the opportunity to review and comment upon this project. Do not hesitate to contact Catherine Labadia, Staff Archaeologist and Deputy State Historic Preservation Officer, for additional information at (860) 500-2329 or catherine.labadia@ct.gov.

Sincerely,

Jonathan Kinney
State Historic Preservation Officer

450 Columbus Boulevard, Suite 5
Hartford, CT 06103
Phone: 860-500-2300

Federal Aviation Administration

« OE/AAA

Notice Criteria Tool

Notice Criteria Tool - Desk Reference Guide V_2018.2.0

The requirements for filing with the Federal Aviation Administration for proposed structures vary based on a number of factors: height, proximity to an airport, location, and frequencies emitted from the structure, etc. For more details, please reference CFR Title 14 Part 77.9.

You must file with the FAA at least 45 days prior to construction if:

- your structure will exceed 200ft above ground level
- your structure will be in proximity to an airport and will exceed the slope ratio
- your structure involves construction of a traverseway (i.e. highway, railroad, waterway etc...) and once adjusted upward with the appropriate vertical distance would exceed a standard of 77.9(a) or (b)
- your structure will emit frequencies, and does not meet the conditions of the FAA Co-location Policy
- your structure will be in an instrument approach area and might exceed part 77 Subpart C
- your proposed structure will be in proximity to a navigation facility and may impact the assurance of navigation signal reception
- your structure will be on an airport or heliport
- filing has been requested by the FAA

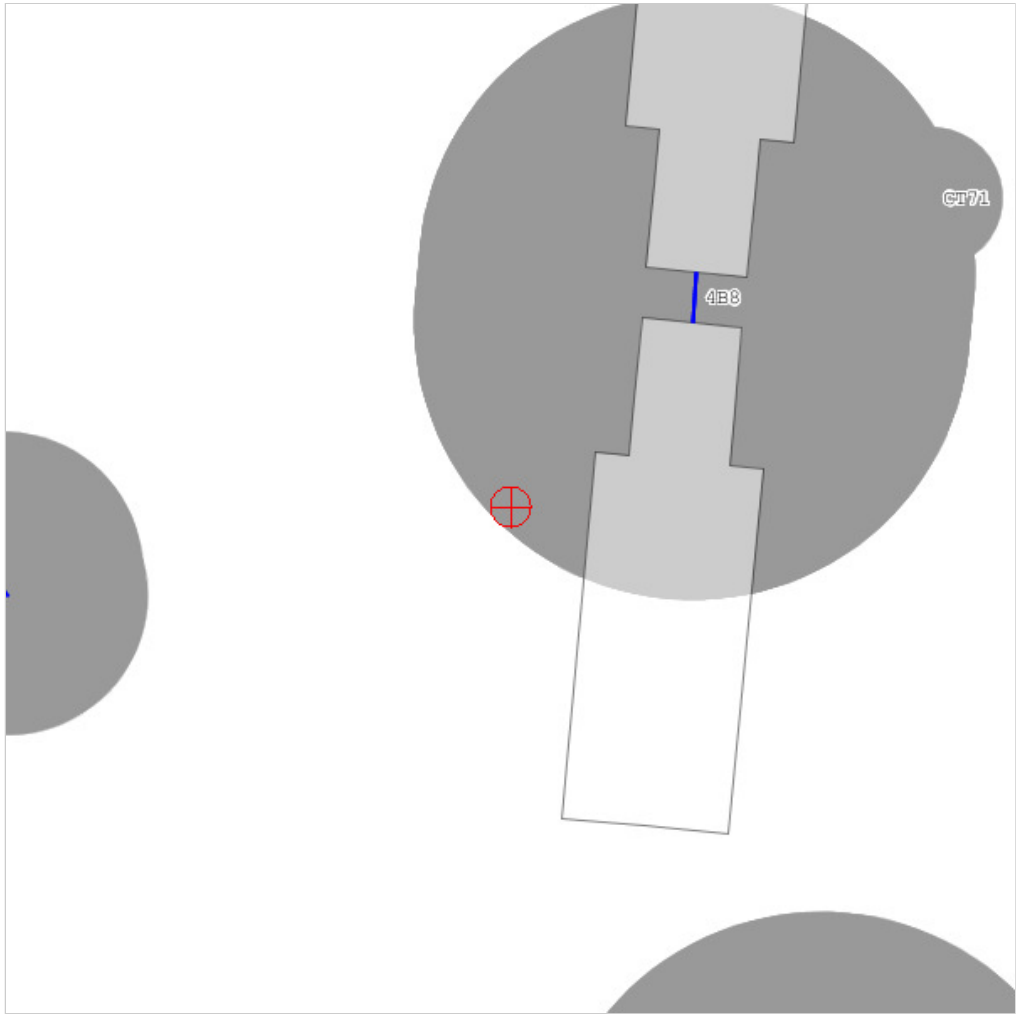
If you require additional information regarding the filing requirements for your structure, please identify and contact the appropriate FAA representative using the Air Traffic Areas of Responsibility map for Off Airport construction, or contact the FAA Airports Region / District Office for On Airport construction.

The tool below will assist in applying Part 77 Notice Criteria.

* **Structure Type:**	SOLAR | Solar Panel Please select structure type and complete location point information.
Latitude:	41 Deg 38 M 51.32 S N
Longitude:	72 Deg 54 M 47.66 S W
Horizontal Datum:	NAD83
Site Elevation (SE):	288 (nearest foot)
Structure Height :	18 (nearest foot)
Is structure on airport:	(•) No ( ) Yes

Results

You do not exceed Notice Criteria.


CT71
4B8

APPENDIX C WETLAND DELINATION REPORT

www.ecomapsllc.com | 42 Bar Gate Trail, Killingworth CT 06419 | (248) 885-5477 | michelle@ecomapsllc.com

November 30, 2023

Burns & McDonnell
Attn: Jin Tao (JTao@burnsmcd.com)
Adam Erney (AErney@bmcd.com)

RE: **Bristol Landfill Wetland Delineation Report**
Lake Avenue
Bristol, CT

Mr. Tao and Mr. Erney,

At the request of Burns & McDonnell (herein BMcD), I conducted an inspection of the area demarcated on the mapping provided in the request for a proposal for the above-referenced project. Two sketch maps of flagged locations are provided in Attachment A: Wetland Sketch Maps. The purpose of the inspection was to delineate federal and State of Connecticut jurisdictional wetlands and watercourses and was conducted by myself, a soil scientist as defined in the Connecticut General Statutes, Title 22a, Chapter 440, Inland Wetlands and Watercourses Act, Section 22a-38.

Regulated Wetlands and Watercourses

In Connecticut wetlands are defined as "land, including submerged land, not regulated pursuant to sections 22a-28 to 22a-35, inclusive, which consists of any of the soil types designated as poorly drained, very poorly drained, alluvial, and floodplain by the National Cooperative Soils Survey, as may be amended from time to time, of the Natural Resources Conservation Service of the United States Department of Agriculture."

Watercourses are defined as being "rivers, streams, brooks, waterways, lakes, ponds, marshes, swamps, bogs, and all other bodies of water, natural or artificial, vernal or intermittent, public or private, which are contained within, flow through or border upon this state or any portion thereof, not regulated pursuant to sections 22a-28 to 22a-35, inclusive. Intermittent watercourses shall be delineated by a defined permanent channel and bank and the occurrence of two or more of the following characteristics: (A) Evidence of scour or deposits of recent alluvium or detritus, (B) the presence of standing or flowing water for a duration longer than a particular storm incident, and (C) the presence of hydrophytic vegetation."

Federal Wetlands are defined as "Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." Federal wetlands are delineated based on three-parameters looking at soils, vegetation, and hydrology.

State and federal wetland resource areas were delineated by examining the upper 18 - 24" of the soil profile and those areas that met the criteria noted above were demarcated in the field with sequentially numbered pink and black flagging.

Site Description and Wetlands

The delineation was focused on the Bristol landfill property (herein the Site) located between Enterprise Drive to the east and Lake Avenue to the west in the Town of Bristol, Connecticut. The landfill property functions as an active transfer station and landfill and included a mix of paved and developed infrastructure and outbuilding as well as capped, vegetated landfill and undeveloped forest. Within the delineation area, State and federal wetlands were consistent.

Delineated wetland resources at the Site include two areas located predominantly in the Town-owned parcel south of the active landfill nearest to Lake Avenue and the Lake Compounce Campground access road as shown in Attachment A: Wetland Sketch Maps. A description of each resource area is provided below.

Wetland W1 (Flags W1-1 to W1-24)

This wetland is located at the toe-of-slope south of the active transfer station portion of the landfill and is hydrologically supported by stormwater runoff. Although soils within the upper 12-18" would be classified as well-drained, sandy material, the underlying substrate and an otherwise restrictive layer retains water within the topographical depression thus resulting in the development and establishment of hydric soils, vegetation and hydrology. Although the wetland is dominated by non-native common reed (*Phragmites australis*), other invasive vegetation such as Asiatic bittersweet (*Celastrus orbiculatus*), autumn olive (*Elaeagnus umbellata*) and multiflora rose (*Rosa multiflora*) were also observed. Although the wetland limit was flagged within the delineation area, the wetland system continues off-Site to the south between flags W1-18 and W1-17. Very dense, nearly impenetrable vegetation and steep slopes were observed along the northern wetland boundary near the toe-of-slope.

Two culverts that emerge from the base of the slope as shown in Attachment A discharge directly into the wetland and contribute to the wetland's hydrology. Although their primary function is likely stormwater conveyance, active flow from both culverts, though diminutive, was observed at the time of the delineation over 24 hours post-rain event.

Mix Brook (Flags WC1-1 through WC1-6 and WC1-1A through WC1-6A)

Mix Brook flows from west to east beneath Lake Avenue in the southwestern corner of the delineation area. The substrate throughout the brook is predominantly sand and gravel. At the time of the delineation, the water level was low to average, ranging from 4 to 12 inches, consisting primarily of runs and riffles with few pools. The Brook is likely influenced by stormwater runoff that result in highly variable and high-energy flows throughout the year. The Brook is classified by the Connecticut Department of Energy and Environmental Protection (CT DEEP) as a Class 2 watercourse meaning that it is a minimally altered, free-flowing stream.

Wetland Soil Types

To aid in the evaluation of wetland soils which may occur in the project area, digitally available soil survey information was obtained from the Natural Resources Conservation Service (Attachment B: Soils Map). Although the NRCS soil data is not representative of exact, on-site conditions, it provides a

general representation of soil characteristics and the soil catena present in the region. The following is a description of wetland and upland soil types observed on the site.

The NRCS Soil Survey Geographic Database (SSURGO) maps the soils within most of the landfill property as Udorthents Urban Land Complex. Soils within the mapped wetland areas include Scarboro muck, Windsor loamy sand, Rippowam fine, sandy loam and Saco silt loam, all of which are described below:

Udorthents urban land complex:

> Udorthent mapping units contain miscellaneous soil types that are present on the landscape in a complex pattern that is not practical or necessary to sperate. These soils are used to denote moderately well to well drained earthen material which has been so disturbed by cutting, filling, or grading, that the original soil profile can no longer be decerned and are co-associated with buildings, roads, parking lots and landscaping of developed areas.

Scarboro muck:

> Consists of very deep, very poorly drained soils in sandy glaciofluvial deposits on outwash plains, deltas, and terraces. They are nearly level soils in depressions with slopes ranging from 0 through 3 percent.

Windsor loamy sand:

> Consists of very deep, excessively drained soils formed in sandy outwash or eolian deposits. They are nearly level through very steep soils on glaciofluvial landforms with slopes ranging from 0 to 60 percent.

Saco silt loam:

> Consists of very deep, very poorly drained soils formed in silty alluvial deposits. They are nearly level soils on flood plains, subject to frequent flooding with slopes ranging from 0 to 2 percent. Permeability is moderate in the silty layers and rapid or very rapid in the underlying sandy materials.

Rippowam fine, sandy loam:

> Consists of very deep, poorly drained loamy soils formed in alluvial sediments. They are nearly level soils on flood plains subject to frequent flooding with slopes ranging from 0 to 3 percent.

According to the Soil Survey Geographic Database made available through CT DEEP, only soils within the far western portion of wetland W1 are mapped as inland wetland soils.

If you have any questions regarding the concerns, please do not hesitate to contact me by email at michelle@ecomapsllc.com or by phone at 248-885-5477.

Regards,

Michelle Ford

Michelle Ford, PWS, CWB®, CESSWI
Registered Professional Soil Scientist
EcoMaps, LLC.

(cont.)

Attachments:

Attachment A: Wetland Sketch Maps
Attachment B: Soils Map
Attachment C: Site Photographs

ECO maps LLC

Attachment A
Wetland Sketch Maps

Field Sketch Map - Overview
Bristol Landfill Solar
Lake Avenue
Bristol, CT

Legend

- Culvert
- Wetland Flag
- Wetland Boundary
- 100ft Wetland Buffer
- Parcel Boundaries (approx.)

Map Notes:

1. Wetland flags GPS located with sub-meter accurate Trimble Catalyst GPS. Accuracy may vary slightly based on satellite reception at time of survey.
2. Wetlands delineated by M. Ford on Nov. 28, 2023.

N
W E
S

1 inch = 400 feet

Delineation & Mapping by:
ECOmaps LLC
www.ecomapsllc.com

Field Sketch Map - Wetland Flags
Bristol Landfill Solar
Lake Avenue
Bristol, CT

Legend

- Culvert
- Wetland Flag
- Wetland Boundary
- 100ft Wetland Buffer
- Parcel Boundaries (approx.)

Map Notes:

1. Wetland flags GPS located with sub-meter accurate Trimble Catalyst GPS. Accuracy may vary slightly based on satellite reception at time of survey.
2. Wetlands delineated by M. Ford on Nov. 28, 2023.

N
W E
S

1 inch = 150 feet

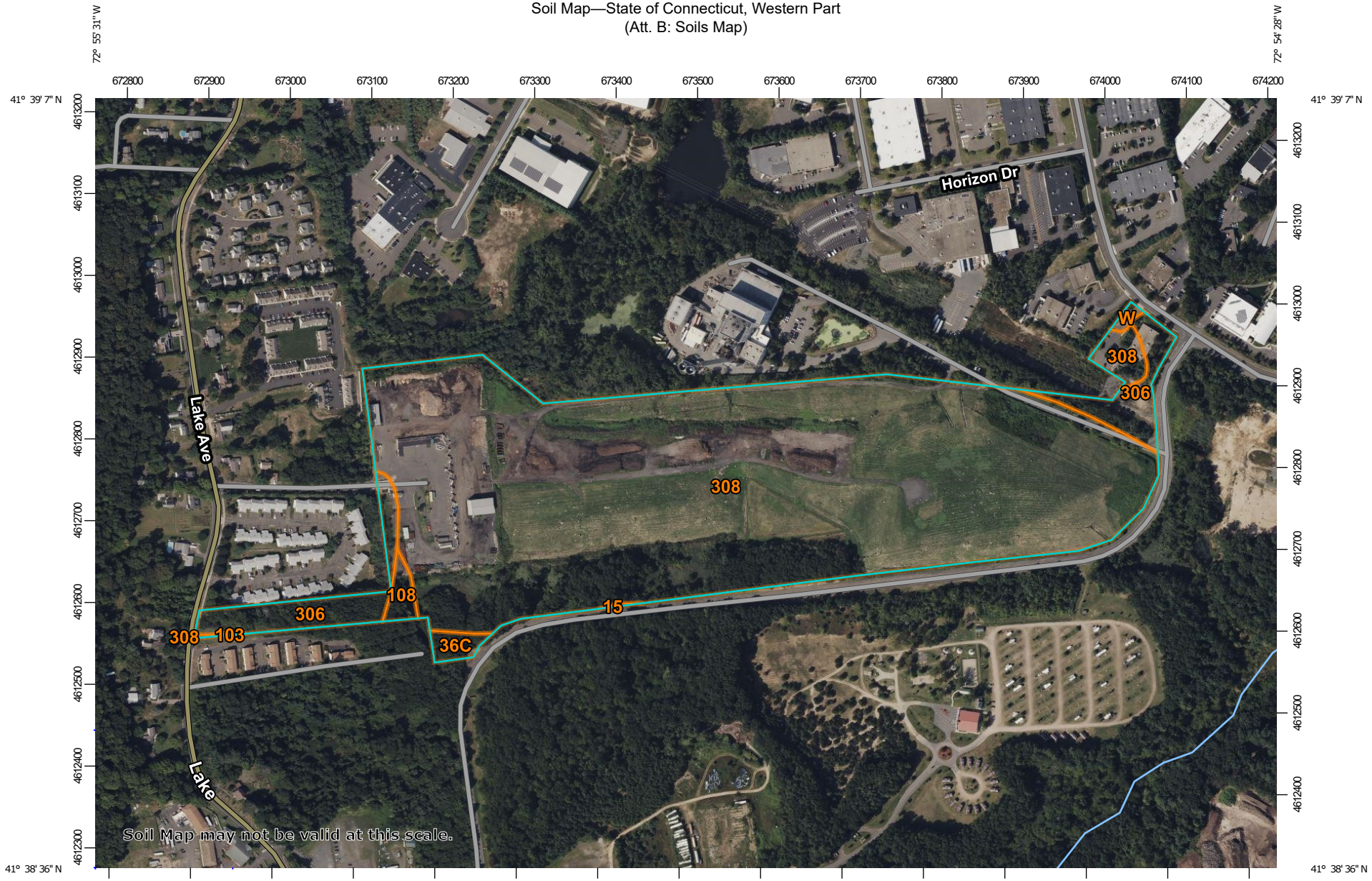
Delineation & Mapping by:

ECOmaps LLC

www.ecomapsllc.com

Attachment B
Soils Map

Soil Map—State of Connecticut, Western Part
(Att. B: Soils Map)



Map Scale: 1:6,630 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 300 600 1200 1800

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: State of Connecticut, Western Part
Survey Area Data: Version 1, Sep 15, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 14, 2022—Oct 6, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
15	Scarboro muck, 0 to 3 percent slopes	0.0	0.0%
36C	Windsor loamy sand, 8 to 15 percent slopes	0.5	0.8%
103	Rippowam fine sandy loam	0.0	0.0%
108	Saco silt loam, frequently ponded, 0 to 2 percent slopes, frequently flooded	0.5	0.8%
306	Udorthents-Urban land complex	4.3	6.9%
308	Udorthents, smoothed	57.2	91.2%
W	Water	0.2	0.2%
Totals for Area of Interest		**62.7**	**100.0%**

Attachment C:
Site Photographs

Photo 1. View facing the eastern end of wetland W1. Photo facing southeast toward the toe-of-slope adjacent to the landfill.

Photo 2. View facing the southern edge of the landfill east of wetland W1. Photo facing east.

Photo 3. Overview of a portion of wetland W1 from the top of the slope near the active transfer station. Photo facing southwest.

Photo 4. Small, embedded intermittent watercourse located at the eastern end of wetland W1 near flag W1-8. Photo facing northeast.

Photo 5. Eastern-most culvert at the base of the active transfer station that discharges into wetland W1. Photo facing northeast.

Photo 6. Discharge and debris from within the eastern-most culvert flowing into wetland W1. Photo facing south.

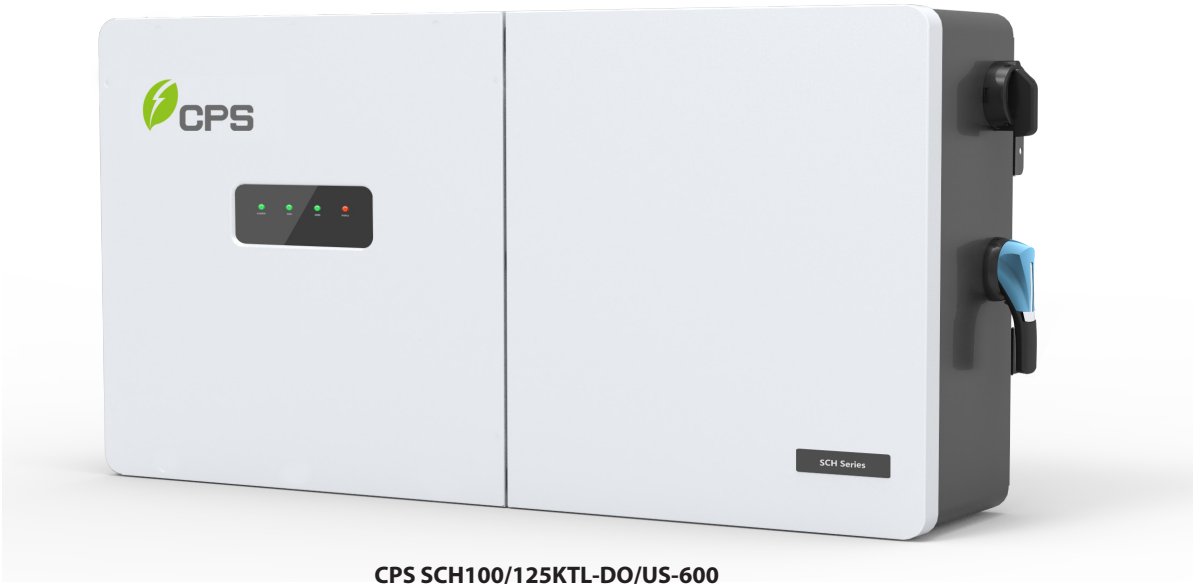
Photo 7: Rip-rap immediately downgradient of the western-most culvert flowing from beneath the active transfer station into the western end of wetland W1. Photo facing south.

Photo 8. View of Mix Brook which flows southwest of the Bristol landfill. Photo facing southeast.

Photo 9. View of a portion of Mix Brook southwest of the landfill. Photo facing northwest.

APPENDIX D PRODUCT INFORMATION SHEETS

100/125 kW, 1500 Vdc String Inverters for North America



CPS SCH100/125KTL-DO/US-600

The 100 and 125 kW high power CPS three-phase string inverters are designed for ground mount applications. The units are high performance, advanced and reliable inverters designed specifically for the North American environment and grid. High efficiency at 99.1% peak and 98.5% CEC, wide operating voltages, broad temperature ranges and a NEMA Type 4X enclosure enable this inverter platform to operate at high performance across many applications. The CPS 100/125 kW products ship with the Standard or Centralized Wire-box, each fully integrated and separable with AC and DC disconnect switches. The Standard Wire-box includes touch-safe fusing for up to 20 strings. The CPS FlexOM Gateway enables communication, controls and remote product upgrades.

Key Features

- NFPA 70 and NEC compliant
- Touch-safe DC Fuse holders add convenience and safety
- CPS FlexOM Gateway enables remote firmware upgrades
- Integrated AC and DC disconnect switches
- 1 MPPT with 20 fused inputs for maximum flexibility
- Copper- and Aluminum-compatible AC connections
- NEMA Type 4X outdoor rated enclosure
- Advanced Smart-Grid features (CA Rule 21 certified)
- kVA headroom yields 100 kW @ 0.9 PF and 125 kW @ 0.95 PF
- Generous 1.87 (100 kW) and 1.5 (125 kW) DC/AC inverter load ratios
- Separable wire-box design for fast service
- Standard 5-year warranty with extensions to 20 years

100/125KTL Standard Wire-box

100/125KTL Centralized Wire-box

C SP US

FC This device complies with part 15 of the FCC Rules

Chint Power Systems America
1380 Presidential Drive, Suite 100, Richardson, TX 75081
Tel: 855-584-7168 Mail: AmericaSales@chintpower.com Web: www.chintpowersystems.com

Model Name	CPS SCH100KTL-DO/US-600	CPS SCH125KTL-DO/US-600
DC Input		
Max. PV power	187.5 kW	
Max. DC input voltage	1500 V	
Operating DC input voltage range	860-1450 Vdc	
Start-up DC input voltage / power	900 V / 250 W	
Number of MPP trackers	1	
MPPT voltage range[1]	870-1300 Vdc	
Max. PV input current (Isc x 1.25)	275 A	
Number of DC inputs	Standard Wire-box: 20 PV source circuits, pos. and neg. fused Centralized Wire-box: 1 input circuit, 1-2 terminations per pole, non-fused	
DC disconnection type	Load-rated DC switch	
DC surge protection	Type II MOV (with indicator/remote signaling)	
AC Output		
Rated AC output power	100 kW	125 kW
Max. AC output power[2]	100 kVA (111 kVA @ PF>0.9)	125 kVA (132 kVA @ PF>0.95)
Rated output voltage	600 Vac	
Output voltage range[3]	528-660 Vac	
Grid connection type[4]	3Φ / PE / N (neutral optional)	
Max. AC output current @ 600 Vac	96.2 / 106.8 A	120.3 / 127.0 A
Rated output frequency	60 Hz	
Output frequency range[3]	57-63 Hz	
Power factor	>0.99 (±0.8 adjustable)	>0.99 (±0.8 adjustable)
Current THD	<3%	
Max. fault current contribution (1-cycle RMS)	41.47 A	
Max. OCPD rating	200 A	
AC disconnection type	Load-rated AC switch	
AC surge protection	Type II MOV (with indicator/remote signaling)	
System		
Topology	Transformerless	
Max. efficiency	99.1%	
CEC efficiency	98.5%	
Stand-by / night consumption	<4 W	
Environment		
Enclosure protection degree	NEMA Type 4X	
Cooling method	Variable speed cooling fans	
Operating temperature range	-22°F to +140°F / -30°C to +60°C (derating from +108°F / +42°C)	
Non-operating temperature range[5]	-40°F to +158°F / -40°C to +70°C maximum	
Operating humidity	0-100%	
Operating altitude	8202 ft / 2500 m (no derating)	
Audible noise	<65 dBA @ 1 m and 25°C	
Display and Communication		
User interface and display	LED indicators, WiFi + APP	
Inverter monitoring	Modbus RS485	
Site-level monitoring	CPS FlexOM Gateway (1 per 32 inverters)	
Modbus data mapping	SunSpec / CPS	
Remote diagnostics / firmware upgrade functions	Standard / (with FlexOM Gateway)	
Mechanical		
Dimensions (W x H x D)	Standard Wire-box: 45.28 x 24.25 x 9.84 in (1150 x 616 x 250 mm) Centralized Wire-box: 39.37 x 24.25 x 9.84 in (1000 x 616 x 250 mm)	
Weight	Inverter: 121 lbs (55 kg) Standard Wire-box: 55 lbs (25 kg) Centralized Wire-box: 33 lbs (15 kg)	
Mounting / installation angle	15 - 90 degrees from horizontal (vertical or angled)	
AC termination	M10 stud type terminal [3Φ] (wire range: 1/0 AWG - 500 kcmil CU/AL; lugs not supplied) Screw clamp terminal block [N] (#12 - 1/0 AWG CU/AL)	
DC termination	Standard Wire-box: Screw clamp fuse holder (wire range: #12 - #6 AWG CU) Centralized Wire-box: Busbar, M10 bolts (wire range: #1AWG - 500kcmil CU/AL [1 termination per pole], #1 AWG - 300 kcmil CU/AL [2 terminations per pole]; lugs not supplied)	
Fused string inputs	25 A fuses provided (fuse values up to 30 A acceptable)	
Safety		
Certifications and standards	UL 1741-SA/SB Ed. 3, CSA-C22.2 NO.107.1-01, IEEE 1547-2018, FCC PART15	
Selectable grid standard	IEEE 1547a-2014, IEEE 1547-2018[6], CA Rule 21, ISO-NE	
Smart-grid features	Volt-RideThru, Freq-RideThru, Ramp-Rate, Specified-PF, Volt-VAR, Freq-Watt, Volt-Watt	
Warranty		
Standard[7]	5 years	
Extended terms	10, 15 and 20 years	

1) See user manual for further information regarding MPPT voltage range when operating at non-unity PF.
2) "Max AC apparent power" rating valid within MPPT voltage range and temperature range of -30°C to +40°C (-22°F to +104°F) for 100 kW PF≥0.9, and 125 kW PF≥0.95.
3) The "output voltage range" and "output frequency range" may differ according to the specific grid standard.
4) Wye neutral-grounded; delta may not be corner-grounded.
5) See user manual for further requirements regarding non-operating conditions.
6) Firmware version 12.0 or later required.
7) 5-year warranty effective for units purchased after October 1, 2019.

HELIENE

144HC M10 SL Bifacial Module

144 Half-Cut Monocrystalline 520W – 540W

21%

Utilizes the latest M10 size super high efficiency Monocrystalline PERC cells. Half cut design further reduces cell to module (CTM) losses.

Stability & Looks

Rugged, double webbed frame design withstands wind, snow, and other mechanical stresses. Framed Glass–Backsheet aesthetic is ideal for high visibility installation.

Anti-Reflective

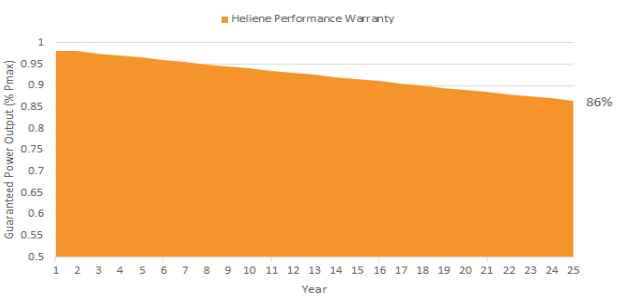
Premium solar glass with anti reflective coating delivers more energy throughout the day

High Reliability

Proven resistance to PID and reliable in high temperature and humidity environments.

No Compromise Guarantee

15 Year Workmanship Warranty
25 Year Linear Performance Guarantee



Manufactured Using International Quality System Standards: ISO9001

Half-Cut Design with Split Junction Box Technology

Bifacial Technology Enabling Additional Energy Harvest from Rear Side

1500V System Voltage Rating

World-class Quality

- Heliene's fully automated manufacturing facilities with state-of-the-art robotics and computer aided inspection systems ensure the highest level of product quality and consistency
- All manufacturing locations are compliant with international quality standards and are ISO 9001 certified
- Heliene modules have received Top Performer rankings in several categories from PV Evolution Labs (PV EL) independent quality evaluations

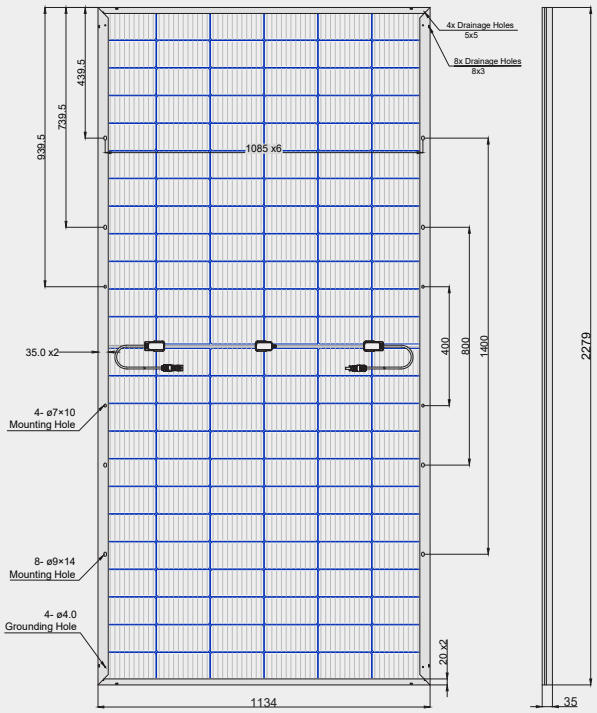
Bankable Reputation

- Established in 2010, Heliene is recognized as highly bankable Tier 1 manufacturer of solar modules and has been approved for use by the U.S. Department of Defense, U.S. Army Corps of Engineers and from numerous top tier utility scale project debt providers
- By investing heavily in research and development, Heliene has been able to stay on the cutting edge of advances in module technology and manufacturing efficiency

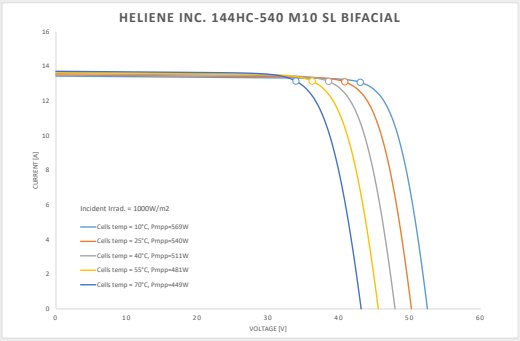
Local Sales, Service, and Support

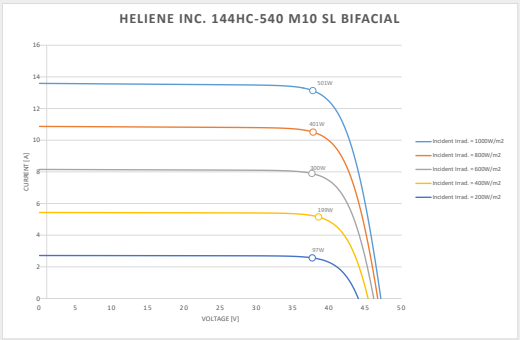
- With sales offices across the U.S. and Canada, Heliene prides itself on unsurpassed customer support for our clients. Heliene has become the brand of choice for many of the leading residential installers, developers and Independent Power Producers due to our innovative technology, product customization capability and just in time last-mile logistics support
- Local sales and customer support means answered phone calls and immediate answers to your technical and logistics questions. We understand your project schedules often change with little warning and endeavor to work with you to solve your project management challenges

Dimensions for 144HC M10 SL Bifacial Series Modules



I-V Curves for 144HC M10 SL Bifacial Series Modules





Certifications & Listing

Electrical Data (STC)

Peak Rated Power	P_{mpp} (W)	540	535	530	525	520
Maximum Power Voltage	V_{mpp} (V)	42.32	42.13	41.94	41.75	41.56
Maximum Power Current	I_{mpp} (A)	12.77	12.70	12.64	12.58	12.52
Open Circuit Voltage	V_{oc} (V)	50.22	49.97	49.72	49.23	48.73
Short Circuit Current	Isc (A)	13.50	13.44	13.37	13.32	13.28
Module Efficiency	Eff (%)	20.9	20.7	20.5	20.3	20.1
Maximum Series Fuse Rating	MF (A)	30	30	30	30	30
Power Output Tolerance			[- 0/+3%]			
Bifaciality Factor			70%			

STC - Standard Test Conditions: Irradiation 1000 W/m2 - Air mass AM 1.5 - Cell temperature 25 °C

Electrical Data (NMOT)

Maximum Power	P_{mpp} (W)	400	395	390	385	380
Maximum Power Voltage	V_{mpp} (V)	39.19	38.58	38.58	37.97	37.96
Maximum Power Current	I_{mpp} (A)	10.21	10.24	10.11	10.14	10.01
Open Circuit Voltage	V_{oc} (V)	47.13	46.89	46.66	46.20	45.73
Short Circuit Current	Isc (A)	10.87	10.82	10.77	10.72	10.70

NMOT - Nominal Module Operating Temperature:
Irradiance at 800W/m2, Ambient Temperature 20ºC, Wind speed 1m/s

Mechanical Data

Solar Cells	144 Half Cut, M10, 182mm, PERC Cells
Module Construction	Framed Glass–Backsheet
Dimensions (L x W x D)	2279 x 1134 x 35 mm (89.72 x 44.65 x 1.38 inch)
Weight	29.2 kg (64.3 lbs)
Frame	Double Webbed 15-Micron Anodized Aluminum Alloy
Glass	3.2mm Low-Iron Content, High-Transmission, PV Solar Glass with Anti Reflective Coating
Junction Box	IP-68 rated with 3 bypass diodes
Output Cables	0.3-meter Symmetrical Cables
Connectors	Multi-Contact/ Stäubli MC4

Certifications

UL Certification — UL61215, UL61730

Temperature Ratings

Nominal Operating Cell Temperature (NOCT)	+45°C (±2°C)
Temperature Coefficient of P_{max}	-0.36%/°C
Temperature Coefficient of V_{oc}	-0.28%/°C
Temperature Coefficient of I_{sc}	0.034%/°C

Maximum Ratings

Operational Temperature	-40°C to +85°C
Max System Voltage	1500V
Mech. Load Test (Front)	113 psf / 5400Pa
Mech. Load Test (Back)	50 psf / 2400 Pa
Fire Type	Type 1

Warranty

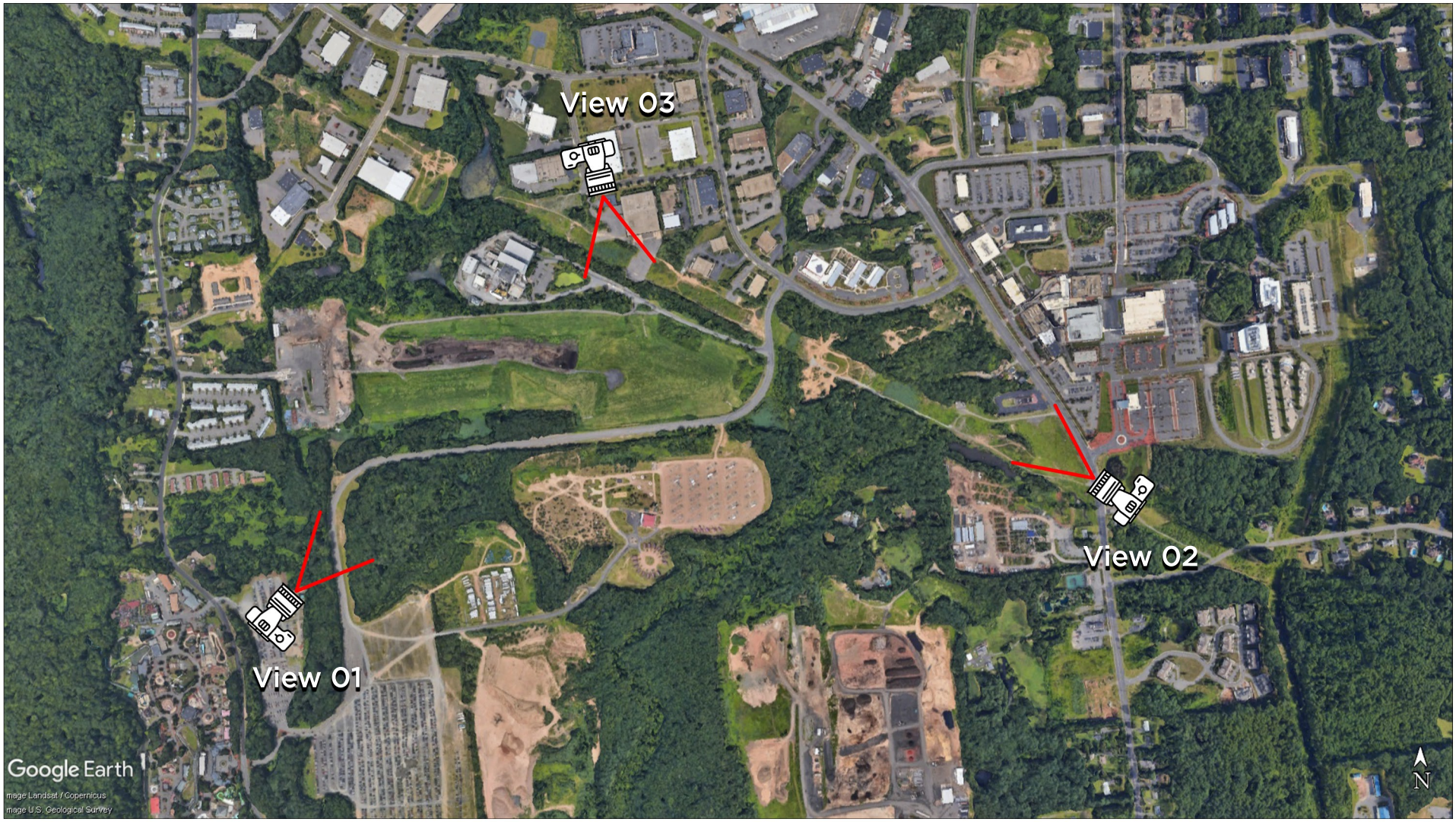
15 Year Workmanship Warranty

25 Year Linear Power Guarantee

Packaging Configuration

Modules per box:	31 pieces
Modules per 40' Container:	620 pieces
Modules per 53' Trailer:	806 pieces

APPENDIX E VISUAL SIMULATION



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Viewpoint Map

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