NATIONAL ENVIRONMENTAL POLICY ACT
DRAFT
ENVIRONMENTAL ASSESSMENT

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICES
PROPOSED SOLAR ARRAY PROJECT
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UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH CENTER
FACILITIES DIVISION
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Acronyms and Abbreviations

AC	Alternating current
AIHA	American Industrial Hygiene Association
ANSI	American National Standards Institute
AOC	Areas of concern
APE	Area of Potential Effect
ARS	Agricultural Research Service (USDA-ARS)
AST	Aboveground storage tank
BARC	Beltsville Agricultural Research Center
BLM	Bureau of Land Management
BMP	Best management practice
BNL	Brookhaven National Laboratory
CAA	Clean Air Act
CCC	Civilian Conservation Corps
CEC	Chesapeake Executive Council
CEQ	[U.S.] Council on Environmental Quality
CFR	Code of Federal Regulations
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CWA	Clean Water Act
dB	Decibel
dBA	A-weighted Decibel
DC	Direct current
DOE	[U.S.] Department of Energy
DOT	[U.S.] Department of Transportation
EA	Environmental Assessment
ECOS	Environmental Conservation Online System
EIS	Environmental Impact Statement
EISA	Energy Security and Independence Act
EO	Executive Order
EPA	[U.S.] Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
EPAct 2005	Energy Policy Act of 2005
FEMA	Federal Emergency Management Agency

FNSI	Finding of No Significant Impact
FIRM	Flood Insurance Rate Map
FR	Federal Register
ft^2	Square Feet/Square Foot
FWCA	Fish and Wildlife Coordination Act
GHG	Greenhouse gases
HUD	Housing and Urban Development
IPP	Independent Power Producer
kVA	kilovolt ampere
kPa	Kilopascals
kW	kilowatt
kWh	kilowatt-hours
MDE	Maryland Department of the Environment
MDNR	Maryland Department of Natural Resources
MGS	Maryland Geologic Survey
MHT	Maryland Historical Trust
MIHP	Maryland Inventory of Historic Places
M-NCPPC	Maryland-National Capital Park and Planning Commission
MSL	Mean sea level
M-X-T	Mixed Use-Transportation Oriented
NAAQS	National Ambient Air Quality Standards
NAL	National Agriculture Library
NEPA	National Environmental Policy Act
NFA	No Further Action
NFIA	National Flood Insurance Act
NO_X	Nitrogen Oxide
NPC	Noise Pollution Clearinghouse
NCPC	National Capital Planning Commission
NRCS	Natural Resources Conservation Service
NREL	[U.S. Department of Energy] National Renewable Energy Laboratory
NWI	National Wetland Inventory
O_3	Ozone
OPA	Oil Pollution Act
O-S	Open Space
OSHA	Occupational Safety and Health Administration
Pb	Lead
PCB	Polychlorinated biphenyl

PEPCO	Potomac Electric Power Company
PM	Particulate Matter
POL	Petroleum, Oil, Lubricant
PPA	Power Purchase Agreement
PPE	Personal protective equipment
PSI	Pounds per square inch
PV	Photovoltaic
RCRA	Resource Conservation and Recovery Act
REC	Renewable energy certificate
RFP	Request for Proposal
R-O-S	Reserved Open Space
R-R	Rural Residential
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
SPCC	Spill Prevention, Control, and Countermeasures
SPVS	Solar Photovoltaic System
U.S.	United States
USACE	United States Army Corps of Engineers
U.S.C.	United States Code
USCB	United States Census Bureau
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UST	Underground storage tank
VOC	Volatile organic compound
WMATA	Washington Metropolitan Area Transit Authority
WSSC	Washington Suburban Sanitary Commission
WWTP	Wastewater treatment plant

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1.0. PURPOSE AND NEED

1.1. THE ENVIRONMENTAL ASSESSMENT

This Environmental Assessment (EA) was prepared in accordance with the National Environmental Policy Act (NEPA) as amended (42 United States Code [U.S.C.] § 4321, et seq.); Executive Orders 11514, 12144, and 13807; 34 FR 4247, as amended by Executive Order 119911; 42 FR 26927; 44 FR 11957; 5 U.S.C 301; and 40 CFR 1500-1508 (51 FR 34191, 1986). The purpose of a NEPA EA is to assess whether the Proposed Action would pose a potential significant impact on the environment and to determine whether an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FNSI) is required for the Proposed Action. The specific needs and the proposed action or purpose to be evaluated in this EA are described Sections 1.2–1.5 below.

The Proposed Project and No Action are evaluated to determine the direct, indirect and cumulative impacts or changes that may occur on both people and the environment because of the potential effects of the proposed improvements. Effects can be ecological, aesthetic, historic, cultural, economic, social, or health-related. The following are the interest factors to be evaluated in this EA:

- Ground Resources
- Water Resources
- Air Quality
- Biological Resources
- Cultural Resources
- Noise
- Visual Resources
- Land Use
- Human Health and Safety
- Utilities and Infrastructure
- Waste Management
- Transportation and Parking
- Socioeconomics
- Environmental Justice and Protection of Children

The purpose of this EA is to inform decision makers and the public of the likely environmental consequences of the Proposed Project. To that end, the EA identifies, documents, and evaluates potential effects of construction and operation of a solar photovoltaic system (SPVS) on the natural and human environment using a period of analysis from 2018 (facility opening) through 2038 (expiration of the 20-year easement). The actual opening date is uncertain at this time.

An interdisciplinary team has described the existing environment and analyzed the Proposed Project with respect to the no-action alternative in the study area (defined as the area that may be directly and indirectly affected, as explained in Section 2), and has identified relevant beneficial and adverse effects associated with the project. The impacts can be direct effects (those caused by the action that occur at the same time and place), indirect effects (those caused by the action that take place later in time or farther removed in distance), or cumulative effects (the incremental impacts of the project when combined with past, present, and reasonably foreseeable future activities).

The Study Area for this EA includes 72 individual locations where an SPVS could be installed. There are four different SPVS array types, which vary by mount type and whether they are fixed or tracking SPVS. The four types are ground mount, roof mount, agriculture mount, and parking lot mount. The ground-mount SPVS are proposed to be fixed or tracking arrays, while the roof, agriculture, and parking lot mounts will be fixed arrays. The SPVS array type proposed for each site has been determined by USDA based upon the site location and existing facilities present (Figure 1). Detailed locations and type of proposed array types for each of the 72 sites are provided in Appendix A, Figures A-1 through A-8.

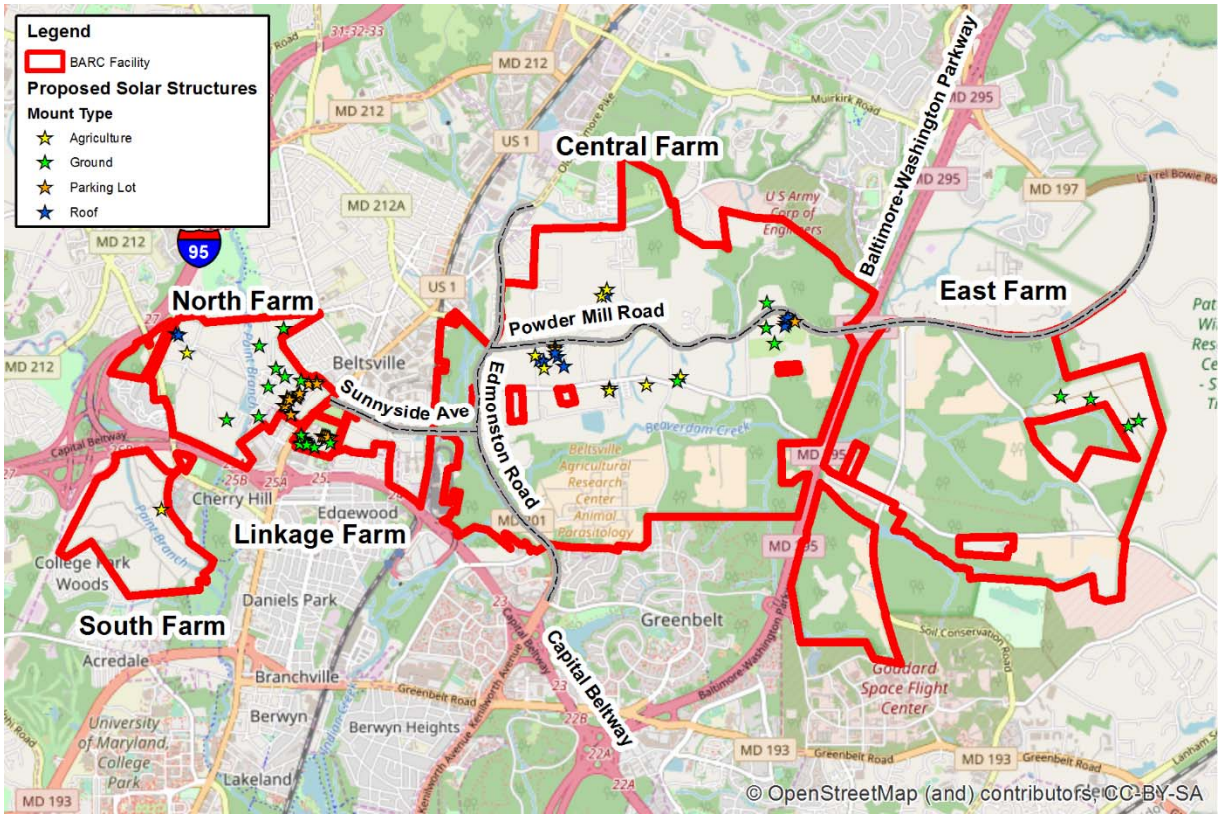

Figure 1: Potential Solar Array Locations at BARC Facility

The opportunity for public input is an important aspect of NEPA. This feedback is sought through making the EA available for public review and includes a Public Notice and request for feedback through mailings to interested parties. This process includes an opportunity for the public, agencies, and tribes to provide input prior to finalization of the EA and its associated findings.

1.2. BELTSVILLE AGRICULTURAL RESEARCH CENTER FACILITY DESCRIPTION AND VICINITY

In 1910, the U.S. Department of Agriculture (USDA) purchased a farm in Beltsville, Maryland, referred to as the Experiment Farm of the Diary and Animal Husbandry Divisions. Major growth occurred during the 1930s, with extensive improvement projects performed by the Civilian Conservation Corps (CCC). By 1942, all USDA research facilities in Bethesda, Maryland; Arlington,

Virginia; and Washington, D.C. were transferred to Beltsville, forming one consolidated research center known as the Beltsville Agricultural Research Center (BARC). In subsequent years, some land has been transferred to various other Federal agencies; slowly reducing the size of BARC. The current BARC facility is administered by the USDA-Agricultural Research Service (ARS). The BARC facility contains the greatest concentration of agriculture research programs within the ARS nationwide (USDA-ARS 1996).

Located in Beltsville, Maryland, BARC is in northern Prince George's County and is a campus of agriculture fields and supporting infrastructure, laboratories, and offices located 15 miles north-northeast of central Washington, D.C. BARC is accessible from Baltimore Avenue, which is in close proximity to both Interstate 95 (I-95) and the Capital Beltway Inner Loop (I-495). The BARC facility is also bisected by U.S. Route 1 and the Baltimore-Washington Parkway. BARC is comprised of approximately 6,615 acres supporting permanent buildings organized as laboratories and administrative buildings, as well as numerous temporary agricultural storage structures. BARC is bordered by the suburban community of Beltsville, the Cities of Greenbelt and College Park, and by several Federal properties managed by other agencies.

Figure 2 depicts the BARC facility and its vicinity, while Figure 3 provides a more-detailed view of the BARC facility campus. BARC is organized into distinct management areas, known as South Farm, West Farm, Linkage Farm, Central Farm, and East Farm (Figure 3). The distinct management units are most commonly accessed through Sunnyside Avenue, Powder Mill Road, and Edmonston Road.

1.3. THE PURPOSE

The Purpose of the Proposed Action is to provide the BARC facility with an on-site cost-efficient renewable energy source that would offset energy requirements in the future while meeting federal government renewable energy directives in EPAct 2005 and EISA. It would also allow USDA and USDA-ARS to support the development of local renewable energy infrastructure, reduce energy costs, and to continue to support broader green power initiatives through the purchase of non-solar renewable energy certificates (RECs) applied towards annual Agency renewable energy goals.

1.4. BARC ARS NEEDS

Research at BARC is conducted in one center and three institutes under control of ARS, Northeast Area. These include:

- Beltsville Human Nutrition Research Center
- Natural Resources Institute
- Plant Sciences Institute
- Livestock and Poultry Sciences Institute

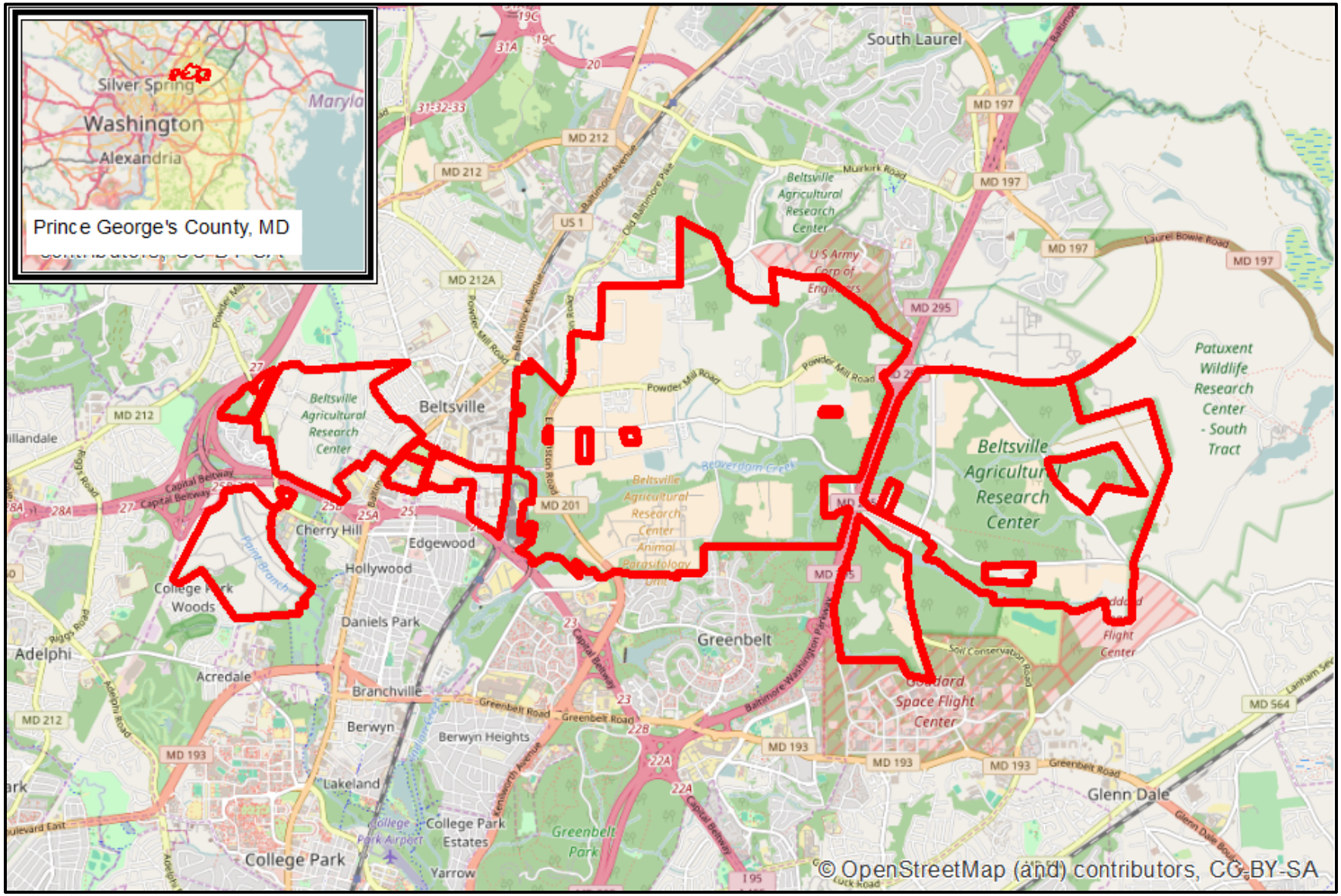

Figure 2: Henry A. Wallace BARC Facility Vicinity Map

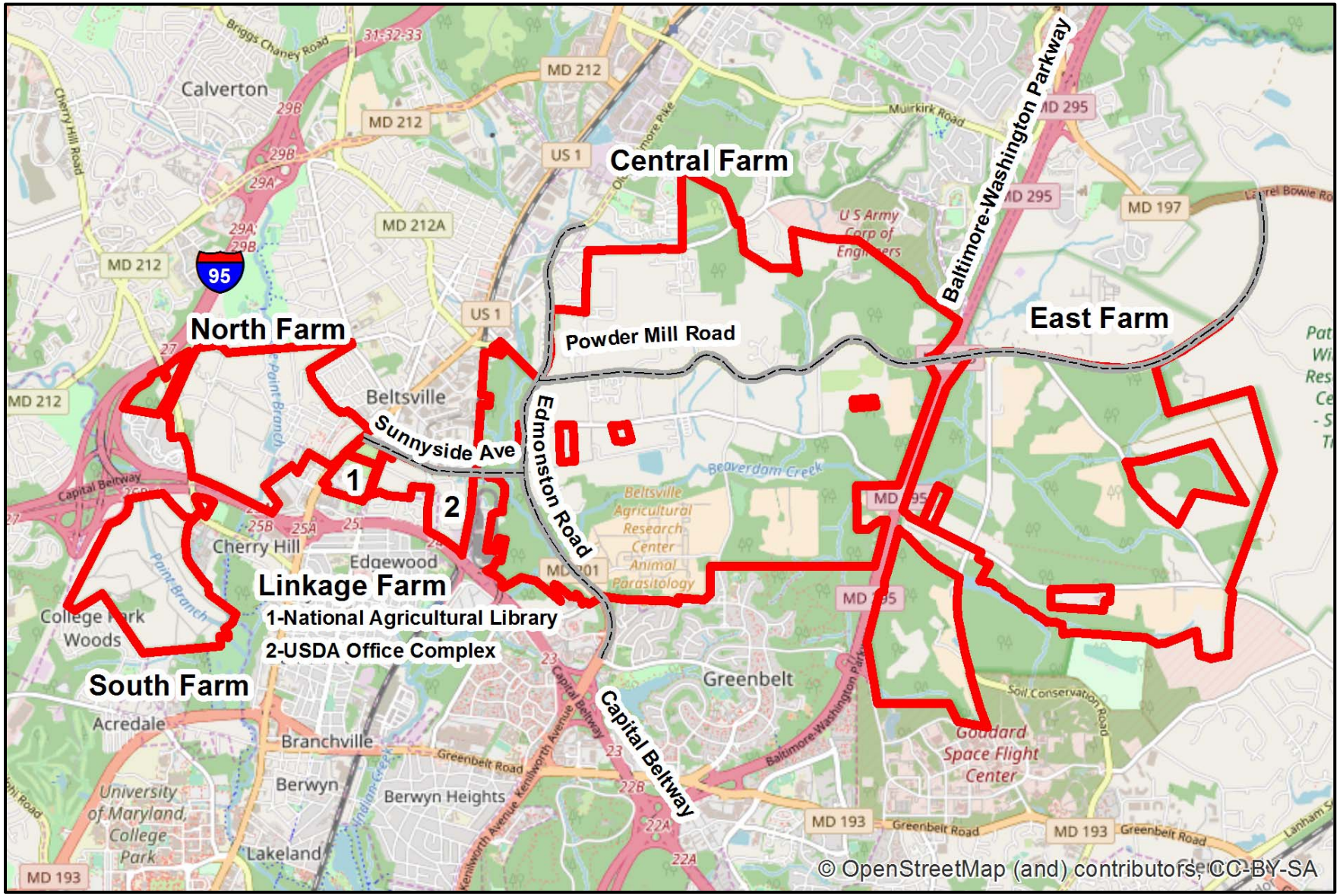

Figure 3: Henry A. Wallace BARC Facility Overview Map

The BARC facility supports research focused on most aspects of agriculture, including production, processing, and consumption. Therefore, the primary need for the BARC facility is to continue to support its diverse and important mission. Through the Proposed Action, the USDA and ARS will be able to further its mission through the reduced operation costs realized through integration of an SPVS system.

While the primary need to maintain operations at BARC is in-line with the mission of the facility research goals, the second need of the BARC facility is compliance with EO 13834 Efficient Federal Operations; Energy Policy Act (EPAct 2005: federal facility renewable power requirements), and the Energy Independence and Security Act (EISA) of 2007 (energy efficiency and carbon-neutral design). The cost, availability, demand, and environmental impact of energy remains an important part of economic and national security, which in turn drives national policy. Through EO 13834, President Trump directed Federal agencies to increase the efficiency and environmental performance of Federal facilities in order to make them more resilient and reduce cost. This executive order was consistent with existing legislation such as the EPAct (2005). Among the many energy conservation measures, EPAct 2005 directs the federal government to use more renewable energy. Solar power is among the renewable energy sources promoted in EPAct 2005, which further established a 7.5 percent renewable energy goal for federal facilities. In addition, EISA (2007) specifies targets for energy efficiency and fossil fuel use reduction by federal facilities. Specifically, new federal buildings should be designed so that they are carbon-neutral by 2030. To meet the 7.5 percent renewable energy goal for federal facilities established by the EPAct 2005, the BARC facility will need at least 3,150,000 kWh per year developed through renewable sources to offset 7.5 percent of the ~42,100,000 kWh annual electricity budget at BARC (average of FY14 and FY15 data) as directed by EPAct (2005).

The third need of the BARC facility is to offset the large utility costs of operating the USDA-ARS mission as well as the capital costs of developing more energy efficient and renewable power sources. An opportunity may exist in the electric market to procure green power through contracting with an independent power producer (IPP) via purchase of renewable energy certificates (RECs). The REC targets could be established in a Federal procurement solicitation, and developed by the IPP within the purchaser's sites.

1.5 DECISIONS TO BE MADE

This EA evaluates the site-specific issues the public has with the proposed action and analyzes effects of the Proposed Action on the environment. Based on the purpose and need identified, the scope of the project is limited to decisions concerning activities within the 72 identified sites described as the Proposed Action. The environmental analysis will provide the deciding official with the information to make the following decisions regarding the Solar Photovoltaic System Project at BARC and the National Agriculture Library:

- Which actions, if any, will be approved, and
- Any additional mitigation measures and monitoring requirements that may be needed to protect resources.

The deciding officials are Dr. Dariusz Sweitlik, Northeast Area Director of the Agricultural Research Service and Paul Wester, Director of the National Agriculture Library. Dr. Sweitlik will be the decision maker for any sites associated with BARC, and Mr. Wester is the decision maker for any sites located at the National Agriculture Library.

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2.0. DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

USDA-ARS proposes to enter into a Power Purchase Agreement (PPA) and provide easements at specific locations throughout the BARC facility to an Independent Power Producer (IPP). The IPP would be responsible for building and operating the SPVS. The solar energy would be generated within the easements and established under the specifications of the PPA. This section will describe the components of the Proposed Action including the easement action, electrical connectivity, construction, operation, maintenance, and dismantling of the SPVS. For the purposes of this analysis, the terms IPP and contractor are interchangeable.

2.1. SITE ALTERNATIVES

The USDA-ARS developed a screening process to identify or establish sites within the facility that could accommodate development of renewable power generation, substation, and distribution facilities (Meyers 2018). The BARC facility has undergone previous evaluations in feasibility studies to determine the potential for cost-effective photovoltaic installations at the BARC facility. Based upon a study performed in 2010, the National Renewable Energy Laboratory (NREL) determined that solar was the optimal renewable energy source to use at BARC (Morgan 2018). The potential sites which can be made available by the USDA-ARS to develop a renewable power system (e.g., not actively in use by ongoing programs, or restricted from development for other reasons) to support generation of the necessary RECs may not be suitably large enough to support all renewable power generation options. The available sites are potentially most suited to SPVS, which aligns with the recommendations by NREL and benefits USDA-ARS for deployment at BARC since solar systems are typically smaller modular systems which can be established in single or multi-unit groupings and can potentially be developed by a third-party IPP.

These SPVS will require a minimum surface area to generate the needed RECs, but the total area utilized by the IPP can vary depending the type and design efficiencies of the arrays installed by the IPP. The exact area is not determinable until design and procurement are underway.

The USDA-ARS undertook a screening process that evaluated BARC to identify areas that would be suitable for building rooftop, ground mount, agriculture type “pole barn” roof top mounted, and carport parking type SPVS. The criteria for the screening process identified buildings less than 50 years old, buildings with metal roof tops, and open land not well suited for cultivation. These available areas were then evaluated to ensure that their use for SPVS development would be consistent with research plans. The last step of the screening process was to submit the potential sites to the Maryland Historical Trust (MHT) for consultation to ensure that none of the sites would have historical or viewshed concerns. Upon completion of the screening process, the USDA-ARS has determined that there is more than enough area, evaluated at 72 sites in this document, to support the necessary commitment of area to be offered as potential easements by the USDA-ARS. The design and efficiency assumptions of proposed SPVS, as discussed in Section 2.2.2, determine the minimum area of the BARC facility required to support the proposed RECs development.

The IPP will be able to select the sites that they view best in terms of connectivity, preferred solar array types, and proximity to existing electrical infrastructure for the construction and operation of the proposed SPVS. The following discussion presents all of the 72 sites as the Proposed Action, since the IPP will select a sub-set of these sites in order to meet the minimum power need requested by USDA in the RFP. Other site alternatives eliminated from further consideration are discussed in Section 2.4.

2.2. PROPOSED ACTION

The Proposed Action has two distinct Federal actions, the award of PPA to an IPP and the recording of a non-exclusive utility easement at sites selected by the IPP from an available pool of sites described as the Proposed Action. USDA-ARS is proposing to select an IPP through an open competition, and then enter into a PPA with that IPP to establish a non-exclusive utility easement for distinct portions of the BARC facility property. The IPP will be responsible for identifying which of the sites from the available pool described as the Proposed Action will be developed, based upon considerations of efficient delivery to the existing electrical grid. Once the specific sites are identified, the IPP would be responsible for building and operating an SPVS or solar panel array. Once installed, the IPP would have a Professional Land Surveyor define the utility easements through a mete and bounds description of the final array and wiring locations. The utility easements would be recorded at Prince George's County, and will be granted by the USDA-ARS for a 20-year term. The IPP would be solely responsible for the cost of planning, development, construction, operation, maintenance, and ultimate dismantling (if applicable) of the SPVS when the lease expires. The PPA would set a price per kilowatt- hour (kWh) for the electricity generated by the SPVS, and the BARC facility would agree to purchase the energy generated from the SPVS to meet the facility's energy demands. The BARC facility would benefit by having a set price for the electricity supplied by the SPVS.

The power generated from the SPVS system would be directly tied to the BARC facility downstream of the existing electrical meters. In addition, the IPP would coordinate with the local utility, the Potomac Electric Power Company (PEPCO), to connect the solar array to the utility grid. The electricity generated by the SPVS would offset a portion of the total electrical needs of the BARC facility for 20 years. When the easement expires, the dismantling and removal of the SPVS will be required or the government could purchase the SPVS at the end of the 20-year term for fair market value. The IPP selection process and the SPVS technical specifications and details will be determined and fully defined through a competitive bidding process scheduled to begin this calendar year.

2.2.1. Easement Action

The USDA-ARS proposes to publish a Request for Proposal (RFP) that will be circulated publicly. The RFP would request IPPs to develop a proposal for the construction, maintenance and operation, and dismantling or sale of an SPVS on 72 sites included in a 20-year easement granted to the IPP. The USDA anticipates that the construction, operation and maintenance, and dismantling or sale of such an SPVS would be consistent with similar projects around the country. The IPP would be

required to obtain all necessary federal, state, and local permits and comply with USDA-specific policy directives, instructions, memoranda, and all applicable BARC facility environmental plans.

2.2.2. SPVS and Electrical Connections to the Utility Grid

The total rated capacity may vary depending on which of the available locations and specific solar array type (fixed or tracking arrays) the IPP develops throughout the BARC facility. However, the USDA-ARS estimates that the SPVS would have an annual capacity of 1,450 kilowatts hours per year (kWh/year) for ground, parking, and agriculture array types, and 1,325 kWh/year for building roof type arrays (Morgan 2018). Inverters would be used to transform DC (direct current) to alternating current (AC) and transformers would be installed to step up voltage to tie into the BARC owned electrical power grid. There are two separate electric grids on East BARC (serving Central and East Farm) and West BARC (serving North Farm) that are fed from two BARC-owned substations which are in turn connected to feeders from PEPCO, the local regulated utility.

The developed SPVS would be connected to the nearest existing distribution power lines as shown in Appendix A, Figures A-1 through A-8. To protect the integrity of the system during electrical failures and lightning strikes, the installation of a 15-kilovolt ampere (kVA) combination fused cutout/lightning arrestor is anticipated at all locations where the SPVS connects to the electrical infrastructure. The purpose of the arrestor would be to shut down the SPVS immediately if there is a main power system failure.

It is anticipated that a sub-set of the available 72 sites would be developed by the IPP based upon their final design plans. Power produced from the SPVS would provide electricity equivalent to at least 7.5 percent of the total annual electricity budget of the BARC facility. Depending on the proposal of the successful IPP selected to provide the SPVS, more than the 7.5 percent goal may be provided, so long as the solar arrays are developed at the sites considered by this EA. The SPVS would be connected to BARC facility buildings downstream of existing meters, and electric meters would be placed at each location where the SPVS connects to the power grid. The meters would record the total electrical demand on the solar panels and the BARC facility power consumption. There would be potential to produce excess power, in particular during weekends when electrical power demand of the BARC facility is less than the amount of energy produced by the solar panels. Electricity will not be fed back into the PEPCO grid but there will be battery storage.

2.2.3. SPVS Installation

It is anticipated that power lines connecting the SPVS to the main grid circuits would utilize existing overhead lines. If existing power lines are not present, the distribution lines would be placed underground in trenches, which could be as deep as three feet where these underground lines run under roadways. Following placement of the line in an underground trench, the line would be covered with earth and the disturbed areas would be graded to maintain current drainage patterns.

The project area would require a staging area for solar panel assembly. Clearing and grading of the land and potential trenching activities would require heavy equipment. It is anticipated that heavy

equipment use would not last more than 45 days. Most of the construction process would involve the installation of the solar panels, which could last up to 60 days.

2.2.4. Operation and Maintenance

Operation and maintenance of the SPVS would be the responsibility of the IPP. The efficiency of the panels is dependent upon their cleanliness. As a result, the contractor would be responsible for conducting regular inspections of the SPVS and would clean them as needed. Cleaning is anticipated to be provided by compressed air or through power washing with freshwater transported to the site by the IPP contractor. Cleaning activities are anticipated to be annually. Additionally, panels that break or malfunction would require repair or replacement. All maintenance activities would occur on an as-needed basis and would not require the use of heavy equipment.

2.2.5. Dismantling of the SPVS

At the end of the easement term of 20 years, the equipment associated with the SPVS will transfer to the ownership of the Federal Government at fair market value. An SPVS installed on an open area would require surface restoration if the equipment is removed.

The Government's decision to exercise the option to purchase for fair market value may have three alternative results, the choice of which shall be made by the Government based on what is in the Government's best interest at the time of the decision:

1) Purchase the equipment – Purchase the equipment using the funds reserved for the purchase for Fair Market Value. The equipment is turned over as-is, in place, and operational. Any residual funds are returned to the government.

2) Abandon in place - Direct the Contractor to leave the equipment in place as-is at no cost, because it has negligible value and removing it would not be in the Government's best interest. The equipment becomes the property of the government and the reserved funds are returned to the government.

3) Remove and restore – Direct the contractor to remove the equipment, restore the areas to their pre-contract state that were impacted by the presence of the equipment, and turn the removed equipment over to the government in a manner directed by the government for disposal through proper methods. The equipment becomes the property of the government. The reserved funds are used for the costs of removal and restoration and any residual funds are returned to the government. It is anticipated that the dismantling of the SPVS would take approximately 45 days, excluding the time necessary to restore the site to pre-project conditions.

2.2.6. SPVS Array Types within the Proposed Action

The Proposed Action consists of 72 sites spread out over the BARC facility. There are four different SPVS array types, which vary by mount type and whether they are fixed or tracking SPVS. The four

types are ground mount, roof mount, agriculture mount, and parking lot mount. The ground-mount SPVS are proposed to be fixed or tracking arrays, while the roof, agriculture, and parking lot mounts will be fixed arrays. The SPVS array type proposed for each site has been determined by USDA based upon the site location and existing facilities present. Detailed locations and type of proposed array types for each of the 72 sites are provided in Appendix A, Figures A-1 through A-8.

Figure 4 provides an example of the four different types of arrays proposed for use at BARC. The agriculture building type will be roof-mounted arrays on open-air storage buildings and sheds that have irregularly shaped roofs to support storage, equipment, as well as shade and weather protection. The agriculture type buildings are not considered "finished buildings" compared to the roof mounted arrays on occupied buildings.

The ground type arrays will be pole-mounted panels aligned in an east-west direction to facilitate southern exposure for maximum light collection. The poles will be mechanical-auger dug or driven into the ground to avoid significant excavation or need for concrete pads for footing. Grading of the natural ground condition is not proposed for this type of array. Any gaps between the array structures not needed for maintenance or operations will be planted with pollinator friendly herbaceous species.

The parking mount arrays will be pole mounted into concrete footers and provide overhead shading and cover to vehicles parked. The arrays will be oriented to follow the axis of the existing parking section, and the existing number of parking spaces are proposed to be preserved. The arrays will be tilted so that they face south at as close to the optimum angle as possible. For parking arrays that are oriented north/south, flat roofs may be considered, but will be installed at the discretion of the IPP based upon predicted energy production efficiencies.

The roof mount arrays will be attached to the existing roofs of buildings identified by USDA to have the supplemental energy needs, roofing material (metal preferred), and/or orientation (south facing) to best support a SPVS on top of the building. Metal roofs were identified as preferable to other types of roof materials because of the thermoregulatory benefit to the building of the solar energy absorption, as well as easier mounting and installation to the metal roof compared to other materials.

Figure 4: Examples of proposes types of solar facilities at BARC

Note: Examples from upper to left to lower right include agriculture building, ground mount, parking mount, and roof mount. (Photos courtesy USDA)

Table 1 presents the potential power generating capabilities of the proposed sites. Power densities that range from 0.44 kW/100 square feet (ft^2) to 1.3 kW/100 ft^2 were used to establish the USDA estimates of power. Array efficiencies varied depending on whether high-efficiency solar arrays were used. These densities result in estimates of 1,450 kW hours per year for ground, carport, and agricultural mounted arrays, while 1,325 kW hours per year for roof mounted arrays. The power generation for the site is DC and would be converted to AC using invertors that will be selected by the IPP that will be compatible with the SPVS and the local power grid (Jackson 2018).

Table 1: Solar Energy Production Estimation by Proposed Site

Map Name	BARC Bldg #	Near BARC Bldg #	Building Year Built	Fed By	Electric Feeder #	Array Type	Site Acreage	Site Area (sq ft)	Array kW	Array MW	Array kWh
E-10	301E,F,G		1967, 1991, 2012	East Sub-station	6	Ag	0.95	41,414	414	0.41	600,504
E-11	none	218Q		East Sub-station	10	Ag	1.55	67,593	676	0.68	980,095
E-13	none	203C		East Sub-station	10	Ag	0.29	12,722	127	0.13	184,473
E-18	none	171D		East Sub-station	4	Ag	0.54	23,716	237	0.24	343,882
E-58	none			East Sub-station	10	Ag	0.75	32,491	325	0.32	471,126
E-59	none			East Sub-station	4	Ag	0.32	13,841	138	0.14	200,691
E-67	none			East Sub-station	10	Ag	0.34	14,981	150	0.15	217,222
E-68	none			East Sub-station	10	Ag	0.32	14,064	141	0.14	203,932
E-01	none	606		East Sub-station	9	Ground	37.90	1,650,805	7,200	7.20	10,440,698
E-02	none	606		East Sub-station	9	Ground	6.39	278,364	1,214	1.21	1,760,546
E-03	none	606		East Sub-station	9	Ground	17.88	778,908	3,397	3.40	4,926,289
E-04	none	606		East Sub-station	9	Ground	18.82	819,921	3,576	3.58	5,185,680
E-66	none			East Sub-station	10	Ground	1.62	70,419	307	0.31	445,373
E-75	none			East Sub-station	10	Ground	22.00	958,320	4,180	4.18	6,061,000
E-76	none			East Sub-station	9	Ground	15.40	670,824	2,926	2.93	4,242,700
E-77	none			East Sub-station	9	Ground	25.70	1,119,492	4,883	4.88	7,080,350
E-09	none	426		East Sub-station	9	Parking Lot	0.53	23,117	231	0.23	335,197
E-19	none	177A		East Sub-station	4	Parking Lot	0.15	6,395	64	0.06	92,731
E-20	none	177A		East Sub-station	4	Parking Lot	0.15	6,705	67	0.07	97,222
E-05	427		1938	East Sub-station	9	Roof	0.12	5,198	52	0.05	68,871
E-06	430		1940	East Sub-station	9	Roof	0.06	2,552	26	0.03	33,810
E-07	426		1935	East Sub-station	9	Roof	0.43	18,536	185	0.19	245,604
E-08	426A		1993	East Sub-station	9	Roof	0.06	2,604	26	0.03	34,503
E-12	203C		1977	East Sub-station	10	Roof	0.59	25,504	255	0.26	337,927
E-14	163F		1978	East Sub-station	4	Roof	0.47	20,690	207	0.21	274,143
E-15	178-2		1994	East Sub-station	4	Roof	0.64	27,822	278	0.28	368,644
E-16	183		1992	East Sub-station	4	Roof	0.25	10,988	110	0.11	145,587
E-17	166H		1962	East Sub-station	4	Roof	0.11	4,811	48	0.05	63,740
E-61	none			East Sub-station	4	Roof	0.23	9,963	100	0.10	132,016
						East Campus Totals	**155**	**6,732,761**	**31,542**	**32**	**45,574,555**

Table 1, cont'd

Map Name	BARC Bldg #	Near BARC Bldg #	Building Year Built	Fed By	Electric Feeder #	Array Type	Site Acreage	Site Area (sq ft)	Array kW	Array MW	Array kWh
L-50*	none			Library Main Panel	N/A	Ground	2.64	115,095	634	0.63	919,488
L-78*	none			Library Main Panel	N/A	Ground	5.25	228,690	1,260	1.26	1,827,000
L-79*	none			Library Main Panel	N/A	Ground	1.12	48,787	269	0.27	389,760
L-80*	none			Library Main Panel	N/A	Ground	0.73	31,799	175	0.18	254,040
L-82*	none			Library Main Panel	N/A	Ground	2.81	122,404	674	0.67	977,880
L-45*	none			Library Main Panel	N/A	Parking Lot	0.38	16,553	215	0.22	312,020
L-46*	none			Library Main Panel	N/A	Parking Lot	0.48	20,909	272	0.27	394,131
L-47*	none			Library Main Panel	N/A	Parking Lot	0.22	9,523	124	0.12	179,499
L-48*	none			Library Main Panel	N/A	Parking Lot	0.21	8,983	117	0.12	169,332
L-49*	none			Library Main Panel	N/A	Parking Lot	0.07	3,150	41	0.04	59,384
L-51*	none			Library Main Panel	N/A	Parking Lot	0.09	3,767	49	0.05	71,016
L-52*	none			Library Main Panel	N/A	Parking Lot	0.14	5,999	78	0.08	113,088
L-53*	none			Library Main Panel	N/A	Parking Lot	0.07	2,981	39	0.04	56,184
L-54*	none			Library Main Panel	N/A	Parking Lot	0.10	4,246	55	0.06	80,041
L-55*	none			Library Main Panel	N/A	Parking Lot	0.10	4,323	56	0.06	81,483
L-56*	none			Library Main Panel	N/A	Parking Lot	0.10	4,211	55	0.05	79,381
						National Agricultural Library Totals	**14**	**631,419**	**4,113**	**4.1**	**5,963,728**
S-22	none				14774	Ag	0.27	11,574	116	0.12	167,829
						South Farm Totals	**0.27**	**11,574**	**116**	**0.12**	**167,829**

Table 1, cont'd

Map Name	BARC Bldg #	Near BARC Bldg #	Building Year Built	Fed By	Electric Feeder #	Array Type	Site Acreage	Site Area (sq ft)	Array kW	Array MW	Array kWh
W-23	033C,D,E		1991	West Sub-Station	1	Ag	0.42	18,158	182	0.18	263,292
W-28	none	050		West Sub-Station	1	Ground	2.32	101,042	441	0.44	639,051
W-41	none			West Sub-Station	0	Ground	0.33	14,201	62	0.06	89,816
W-69	Field			West Sub-Station	0	Ground	17.20	749,232	3,268	3.27	4,738,600
W-70	Field			West Sub-Station	0	Ground	18.40	801,504	3,496	3.50	5,069,200
W-71	Field			West Sub-Station	0	Ground	21.60	940,896	4,104	4.10	5,950,800
W-72	Field			West Sub-Station	0	Ground	1.80	78,408	342	0.34	495,900
W-73	Field			West Sub-Station	0	Ground	0.80	34,848	152	0.15	220,400
W-74	Field			West Sub-Station	0	Ground	3.90	169,884	741	0.74	1,074,450
W-29	none	007		West Sub-Station	0	Parking Lot	0.13	5,643	45	0.05	65,456
W-30	none	007		West Sub-Station	0	Parking Lot	0.14	6,232	50	0.05	72,297
W-31	none	007		West Sub-Station	0	Parking Lot	0.15	6,387	51	0.05	74,094
W-32	none	001		West Sub-Station	0	Parking Lot	0.08	3,297	26	0.03	38,248
W-33	none	001		West Sub-Station	0	Parking Lot	0.04	1,750	14	0.01	20,297
W-34	none	003		West Sub-Station	0	Parking Lot	0.12	5,093	41	0.04	59,078
W-35	none			West Sub-Station	0	Parking Lot	0.12	5,414	43	0.04	62,808
W-36	none			West Sub-Station	0	Parking Lot	0.13	5,492	44	0.04	63,702
W-37	none			West Sub-Station	0	Parking Lot	0.13	5,638	45	0.05	65,402
W-38	none			West Sub-Station	0	Parking Lot	0.35	15,110	121	0.12	175,273
W-39	none			West Sub-Station	0	Parking Lot	0.30	13,270	106	0.11	153,934
W-40	none			West Sub-Station	0	Parking Lot	0.16	6,959	56	0.06	80,730
W-42	none			West Sub-Station	0	Parking Lot	0.07	2,883	23	0.02	33,443
W-43	none			West Sub-Station	0	Parking Lot	0.07	3,030	24	0.02	35,143
W-44	none			West Sub-Station	0	Parking Lot	0.07	2,883	23	0.02	33,443
W-24	028A		1994	West Sub-Station	1	Roof	0.07	3,218	32	0.03	42,642
W-25	028C		2012	West Sub-Station	1	Roof	0.07	3,218	32	0.03	42,642
						West Campus Total	**69**	**3,003,691**	**13,564**	**14**	**19,660,141**
						All USDA ARS Beltsvile Sites	**238**	**10,379,445**	**49,335**	**49**	**71,366,252**

Notes: sq ft = square feet, kW = kilowatt, kWh = kilowatt-hour, MW = megawatt, MWh = megawatt-hour

In Federal fiscal year 2014, the BARC facility was billed for 45,587,928 kWh of electrical use, and in fiscal year 2015, it was billed for 38,543,015 kWh (Meyers 2016). Considering a 2-year average of 42,065,472 kWh, the BARC facility would need approximately 3,155,000 kWh of solar energy in order to meet the 7.5 percent goal prescribed by the EPAct and associated Executive Order directives.

As shown in Table 1, the potential energy production of the 72 proposed sites can more than meet the minimum recommended goal for power production. The BARC facility will partner with the IPP to identify the best sites to cost-effectively provide the needed solar energy, and will seek to go beyond the minimum goal to realize approximately $1,000,000 in energy savings, which is approximately 25 percent of the annual electricity budget at BARC.

2.3. NO ACTION ALTERNATIVE

Under the No Action Alternative, the USDA-ARS would not award a PPA to an IPP, and easements for SPVS would not be installed at BARC. This would result in no creation of renewable energy sources at the facility. The current grid supplied energy source would continue to supply power to the BARC facility. It is likely that power rates would continue to increase, and the BARC facility would continue to offset the consumption of nonrenewable resources through RECs until implementation of USDA energy conservation goals and alternative methods of meeting the requirements of EPAct 2005 and associated Executive Orders.

2.4. ALTERNATIVE SITES ELIMINATED FROM CONSIDERATION

Nine sites that were initially considered as possible SPVS siting locations were eventually eliminated due to limiting characteristics and other land use constraints were eliminated from further consideration. The locations of these sites are shown in Figures 5–7.

Sites S-21 and S-57 are adjacent array sites, with S-21 proposed for an agriculture-building array for additional storage and S-57 proposed to be a ground-mount system (see Figure 6). These areas were excluded for additional consideration because of ongoing research and some measure of uncertainty regarding management objectives for that area for the foreseeable future of the IPP lease. Through internal coordination amongst the USDA stakeholders, it was determined that utilizing these areas for an SPVS at this location would interfere with the experimental site. Upon consultation with the pilot project stakeholders, this site was eliminated from further consideration (Meyers 2016).

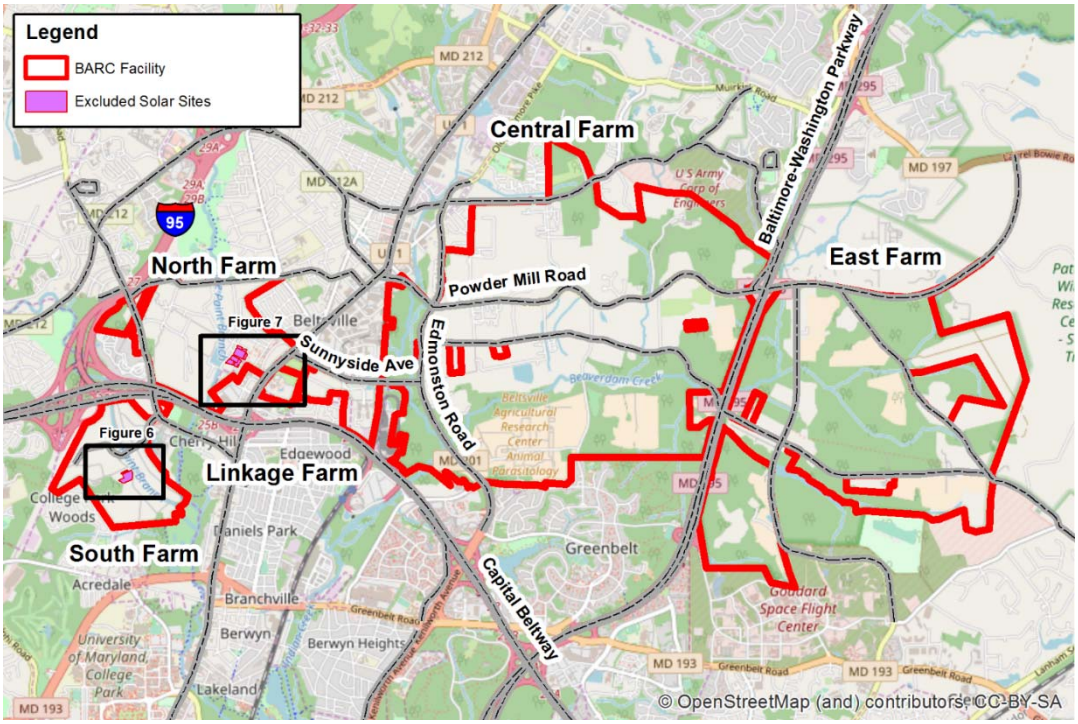

Figure 5: Map of alternative sites eliminated from consideration by this environmental assessment

Note: The eliminated sites have more-detailed figures of their site locations provided in Figures 6 and 7.

Figure 6: Site overview and site photographs of S-21 and S-57

Note: S-21 and S-57 have been excluded from consideration due to ongoing research activities.

Figure 7: Overviews of sites W-26, W-27, W-60, W-62, W-63, W-64, and W-65

Note: These sites have been excluded from consideration due to ongoing coordination with MHT regarding the demolition of damaged buildings within the footprints of the proposed ground-mount solar photovoltaic systems.

Sites W-26, W-27, W-60, W-62, W-63, W-64, and W-65 are all sites proposed for ground-based SPVS, which would have required demolition of existing structures within those sites that were damaged beyond repair by severe weather (NWS 2001). Prior to their destruction by a tornado in September 2001, these structures included research facilities and associated greenhouses. While functionally deficient and now abandoned for all research and USDA ARS purposes, the buildings are a part of the Beltsville Agricultural Research Center Historic District (MIHP# PG: 62-14). The Historic District is included in the Maryland Inventory of Historic Properties and has been determined eligible for listing in the National Register of Historic Places for its role as a national center of agricultural experimentation and testing. Through project scoping coordination with MHT for this assessment, MHT raised concerns about the demolition of the structures within these seven sites, thus these sites have been removed from further evaluation by this environmental assessment until coordination with MHT has been resolved (MHT 2016).

3.0. AFFECTED ENVIRONMENT

The affected environment studied and addressed in this EA focuses on the current environmental resources that could be affected by the Proposed Action at the BARC facility and its surrounding areas. It was determined that the following areas and resources have the potential to be affected by the Proposed Action and are discussed to determine the presence of significant impacts.

Data sources reviewed for the affected environment include government documents from federal entities, the State of Maryland, Prince George's County, and the City of Beltsville; communications and interviews with BARC facility staff and personnel; reports or data made available by the USDA that is maintained for the BARC facility operations; and field reconnaissance conducted on November 8 and 9, 2016 of the BARC facility.

3.1. GROUND RESOURCES

3.1.1. Geology

All 72 sites associated with the Proposed Action occur in the Atlantic Coastal Plain physiographic province about 5 miles east of the Fall Line, the geographical demarcation between the Coastal Plain and the Piedmont physiographic provinces. In greater detail, the 72 sites are also underlain by the Chesapeake Rolling Coastal Plain level IV ecoregion, which is characterized by distinctive sedimentary rocks that set it apart from the Piedmont ecoregion, which consists of metamorphic rock. The Chesapeake Rolling Coastal Plain is comprised of hilly uplands with well drained loamy soils and incised streams (Woods et al. 1999). Specifically, the 72 sites in the Proposed Action are underlain by Potomac Group sediments that make up the recently deposited Patapsco, Arundel, and Patuxent formations (MGS 2003).

The Patapsco, Arundel, and Patuxent Formations of the Potomac Group are the product of a large river system during the early Cretaceous period. It is believed that the Piedmont was the principal source of sediment for the Potomac Formation (Fleming 2008).

3.1.2. Topography

The BARC facility is topographically varied, including among the 72 individual sites that comprise the Proposed Action. According to the U.S. Geological Survey (USGS) topographic data, the minimum site elevation is 92 feet above sea level at site S-22, and the maximum site elevation is 213 feet above sea level at sites W-24 and W-25 (USGS 2016). The mean elevation across all sites is 148 feet above sea level. The sites are all characterized as flat or gently sloping with an average slope of approximately 3 degrees. The maximum and minimum slopes are at site W-29 (5 degrees) and site W-41 (0.4 degrees), respectively.

3.1.3. Soils

The U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) leads the National Cooperative Soil Survey and is responsible for collecting, storing, maintaining, and distributing soil survey information for privately owned lands in the United States. According to NRCS mapping, the proposed sites are located on 16 different soil mapping units of varying compositions. None of these soils are classified as hydric soils, but several of them are prone to erosion (USDA 2018a) (USDA NRCS 2016).

These sixteen soil mapping units are composed primarily of silty to sandy loams with clay loams in deeper layers. The rate at which runoff occurs is controlled by the interaction of the slope and permeability of the soil. Runoff from the soil mapping units range from very low to very high; five of the sixteen soil types are classified as having high or very high runoff factors, which could potentially result in high erosion or the transport of pollutants into the nearby Beaverdam Creek. Sites with low and very low runoff factors are prone to absorbing rainfall and could potentially become waterlogged or flooded if there is low water storage in the soil profile. Soils with medium runoff factors present both of these risks, especially in areas with low water storage in the soil profile.

Table 2 below describes the most common soil types found on the BARC PV sites and describes them in terms of runoff class, water storage in the soil profile, and farmland classification. Runoff class refers to the loss of water from an area by flow over the land surface. Surface runoff classes are based on slope, climate, and vegetative cover. The concept indicates relative runoff for very specific conditions. It is assumed that the surface of the soil is bare and that the retention of surface water resulting from irregularities in the ground surface is minimal. The classes are negligible, very low, low, medium, high, and very high (NRCS 2016).

Water storage is the total volume of water that should be available to plants when the soil, inclusive of rock fragments, is at field capacity. It is commonly estimated as the amount of water held between field capacity and the wilting point, with corrections for salinity, rock fragments, and rooting depth.

Farmland classification is provided as prime farmland, not prime farmland, or farmland of statewide importance. Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil quality, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. The water supply is dependable and of adequate quality. Prime farmland is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is

not frequently flooded during the growing season or is protected from flooding. Slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service. In some areas, land that does not meet the criteria for prime or unique farmland is considered to be farmland of statewide importance for the production of food, feed, fiber, forage, and oilseed crops. The criteria for defining and delineating farmland of statewide importance are determined by the appropriate State agencies. Generally, this land includes areas of soils that nearly meet the requirements for prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods (NCRS 2016).

Table 2: Soil Mapping Units, Runoff, Water Storage, Farmland Suitability, and Erodibility Underlying the Proposed SPVS Sites

Mapping Unit	Runoff Class	Water Storage	Farmland Classification	Erodibility	BARC Site
BaB	Medium	Low	Prime Farmland	Low	E76, E77
BuB	Medium	Low	Not Prime Farmland		L78, L79
CcC	High	Low	Farmland of Statewide Importance	Slight	E10, E67, E68, E58, E66, E75, E76, E77, W38, L51, L52, E9, L82, W71, W73, W74
CcD	High	Low	Not Prime Farmland	Moderate	E75
CcE	Very High	Low	Not Prime Farmland	Moderate	L50
CdD	High	Low	Not Prime Farmland	Moderate	E3, E15, E19, E20, W29, W30, W31, W33, W34, W35, W36, W37, W42, W43, W44, W73, W74
CF	High	High	Not Prime Farmland	Slight	S22, W28, W69, W70, W71, W72
Ch	Very High	High	Not Prime Farmland	Not rated	W41
CrC	Low	Low	Not Prime Farmland	Moderate	W71
CrD	Low	Low	Not Prime Farmland	Moderate	E77
CzD	Medium	Low	Not Prime Farmland	Moderate	W39,
DoB	Very Low	Low	Prime Farmland	Slight	L48, L50, E75, L80, L82, W71
DoD	Low	Low	Not Prime Farmland	Slight	E2
EkA	High	High		Slight	E77
EwB	Very Low	Low	Prime Farmland if irrigated	Slight	E4
FaaA	Very Low	High	Not Prime Farmland	Slight	E77
GbB	Very Low	Low	Not Prime Farmland	Slight	E2
RcA	Low	High	Prime Farmland	Slight	E13, E18, E58, E75, L82

Table 2, cont'd

Mapping Unit	Runoff Class	Water Storage	Farmland Classification	Erodibility	BARC Site
RcB	Low	High	Prime Farmland	Slight	E10, E11, E13, E66, E18, W23, W23, E58, E59, W69, E11, E10, E66, W71, W72, W73, W74
RuB	Low	High	Not Prime Farmland	Slight	E1-10, E12, E13, W32-40, L45-56, E58, W72-74, E67, E68, E76, E77, L78-80, L82
ScC	Low	Low	Farmland of Statewide Importance	Slight	W24, W25, W71, W74
SnE	Medium	High	Not Prime Farmland	Slight	W71
UdbB	Low	Low	Not Prime Farmland	Undetermined	E1-4
UrrB	Medium	Low	Not Prime Farmland	Medium	E14-20, E59, E61

3.2. WATER RESOURCES

3.2.1. Surface Water

According to USGS mapping, 95 individual stretches of surface water features are mapped on the BARC facility property measuring a total of approximately 54 km. These stretches ranged between small-unnamed headwater tributaries that form on the BARC facility to longer stretches of named creeks that both receive from and carry water offsite the BARC facility. Examples of named streams at BARC include Beaverdam Creek, Indian Creek, Little Paint Branch, and Paint Branch. However, no jurisdictional streams or other jurisdictional open waters were identified at any of the 72 solar sites during a field review in November 2016.

3.2.2. Groundwater

The BARC Facility is located within both the Patuxent watershed and the Lower Potomac watershed; no potable wells are located on the facility (EPA "Surf your Watershed" Map 2016). The BARC facility pumps and treats its own well water that is used for all operational purposes including laboratory, sanitary and potable drinking water (NHDPoint 2016). However, no wells are located within the limits of the 72 sites that comprise the Proposed Action.

3.2.3. Floodplains and Wetlands

The National Flood Insurance Act (NFIA) provides insurance to communities and projects based on the level of flooding hazard present in the area (FEMA 1997). BARC has four named streams with floodplains extending onto each farm as shown in Table 3.

Table 3: FEMA Regulated floodplains at BARC, listed by Farm

Streams with Floodplains at BARC	
Farm	Stream
South Farm	Paint Branch
North Farm	Little Paint Branch
Linkage Farm	Indian Creek
Central Farm	Beaver Dam Creek
East Farm	Beaver Dam Creek

Floodplains are listed as 100-year and 500- year frequency. Prince George's County zoning regulations restrict development in 100-year floodplains. FEMA flood insurance rate maps (FIRM) for Prince George's County (Map #245208) were published in July 1982 and rechecked and BARC is on Map Sheets 24033C0043E and 24033C0044E published in September 2016 (DHS 2018). Structural development and grading that restricts stormwater flows are regulated by FEMA and MDE in designated 100-year floodplain.

North and South Farms' floodplains are used for agricultural and research purposes, with some buildings on the North Farm constructed in the floodplain before the 1980s. These structures are not anticipated to be expanded under the Master Plan. Floodplains on Linkage, Central, and East Farms are forested (USDA 1996b). Seven sites (S-22, W-28, W-41, W-69, W-70, W-71, and W-72), occur within the 100-year floodplains on West BARC. Six of these sites are proposed as ground mount, while S-22 is proposed as an agriculture mount.

According to the U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI), some wetlands are mapped running through the BARC facility along the paths of the larger creeks such as Beaverdam Creek and Indian creek as well as several unnamed tributaries (NWI 2016). The USDA and NWI wetland data generally agree about wetland location and extent along the larger creeks, with some minor deviations along boundaries and smaller areas (USDA 2007). Neither of these mappings sources suggest any presence of vegetated wetlands at the 72 proposed solar sites. During a field review, no vegetated wetlands were identified at any of the SPVS sites that comprise the Proposed Action.

3.3. AIR QUALITY

Air quality in a given location is based on the concentration of various pollutants in the atmosphere. The federal Clean Air Act (CAA) stipulates that emissions sources must comply with the air quality standards and regulations that have been established by federal, state, and county regulatory agencies. EPA established the National Ambient Air Quality Standards (NAAQS) for six criteria pollutants: ozone (O_3), carbon monoxide (CO), nitrogen oxide (NO_x), sulfur dioxide (SO_2), particulate matter equal to or less than 10 and 2.5 microns in diameter (PM_{10}/$PM_{2.5}$), and lead (Pb). EPA designates all areas of the United States as having air quality better than ("attainment") or

worse than ("nonattainment") the NAAQS. EPA designates the area within Prince George's County as being in nonattainment of the NAAQS for ozone (marginal), $PM_{2.5}$ (moderate), and carbon monoxide (moderate) (EPA Green Book 2016). Areas that exceed the NAAQS require preparation of a State Implementation Plan (SIP) detailing how the state would attain the standard within mandated time frames. Section 176(c) of the CAA provides that a federal agency cannot support an activity in any way unless the federal agency determines that the activity would conform to the SIP for attaining and maintaining the NAAQS. If emissions from a federal action do not exceed de minimis (minimal risk) thresholds (based on the degree of nonattainment of the area) it is exempt from further conformity analysis. Beltsville, Maryland is in a nonattainment area for ozone (marginal), $PM_{2.5}$ (moderate), and carbon monoxide (moderate). The applicable *de minimis* thresholds for Prince George's County are shown in Table 4 below.

Table 4: Applicable General Conformity De Minimus Thresholds

Pollutant	*De Minimis* Threshold (tons)
Ozone (inside an ozone transport region)	
NO_X	100
VOC	50
$PM_{2.5}$	
Direct Emissions	100
SO_2	100
NO_X	100
VOC	100
CO	100

Table taken from 40 CFR 93.

3.3.1 Climate Change/Greenhouse Gas (GHG) Emissions

Climate change refers to major changes in temperature, rainfall, snow, or wind patterns lasting for decades or more. These changes may be the result of natural occurrences (e.g., changes in the Earth's orbit, sun's intensity, or volcanic activity) or manmade activity (e.g., combusting fossil fuels, deforestation and land development) (EPA 2010). Combustion of fossil fuels results in greenhouse gases (GHG), which trap and convert sunlight into infrared heat. Increased levels of GHGs in the atmosphere have been correlated to a rise in surface temperatures of the Earth, which is thought to contribute to climate change. The White House Council on Environmental Quality (CEQ) published guidance on August 2, 2016 to federal agencies requiring the consideration of GHG emissions and their effects on climate change. The CEQ guidance is applicable to all federal actions subject to NEPA, including site-specific actions, certain funding of site-specific projects, rulemaking actions, permitting decisions, and land and resource management decisions. In order to remain consistent with NEPA, federal agencies should consider the extent to which a proposed action and its reasonable alternatives would contribute to climate change, through GHG emissions, and take into

account the ways in which a changing climate may impact the proposed action and any alternative actions, change the action's environmental effects over the lifetime of those effects, and alter the overall environmental implications of such actions. The Purpose and Need of this project are to reduce operational reliance on fossil fuels while maintaining the mission at BARC. While the SPVS is only a temporary installation, it is expected to reduce the annual consumption of fossil fuels.

3.4. BIOLOGICAL RESOURCES

Biological resources consist of native or naturalized plants and animals, along with their habitats. The Endangered Species Act of 1973 and the Fish and Wildlife Coordination Act (FWCA) of 1934 provide a framework for conservation of vegetative and wildlife resources and can be supplemented with sound conservation principles to minimize impacts to vegetation and wildlife communities.

3.4.1. Vegetation and Wildlife

The BARC facility land use can be characterized as primarily active agriculture and rural land, along with a mosaic of paved and landscaped areas. Developed areas include facilities for agricultural operations, water treatment and utilities, and administrative buildings. Vegetation in these developed areas is limited, but includes turf/grass, urban trees, and shrubs. Forested areas occur in successional ruderal areas and in drainage areas. Areas surrounding the BARC Facility are mostly developed and interspersed with small wooded and vegetated areas, which most likely provide habitat for animal species. There is limited wildlife on and near some of the proposed 72 sites due to varied land use of agriculture, paved land, buildings, and open ground. Wildlife observed during the November 2016 field studies included mourning doves, red-shouldered hawks, American robins, American crows, blue jays, Canada geese, European starlings, red-tailed hawks, northern mockingbirds, tufted titmice, Carolina wrens, gray squirrels, white tailed deer, and eastern cottontail.

Dominant tree species located on or around the BARC facility include oaks, Virginia pine, and lesser stands of American holly, black gum, sweet gum, beech, and sassafras in the uplands. Bottomland species consist of willow oak, sweet gum, river birch, and red maple (BARC 1996). Site W60 contains ruderal forest and is dominated by *Rosa multiflora, Morus* sp.*, Lonicera japonica, Gleditsia triacanthos, Platanus occidentalis, Wisteria frutescens, Ligustrum sinense, Quercus phellos, Prunus serotina, Liquidambar styraciflua,* and *Acer saccharinum.* E58 contains a tributary and is dominated by *Eupatorium capillifolium, Ligustrum sinense, Acer saccharum, Liquidambar styraciflua,* and *Juniperus virginiana.* Site E3 contains *Juniperus virginiana, Quercus phellos, Acer saccharum, Prunus serotina,* and *Pinus virginiana.*

3.4.2. Endangered, Threatened and Rare Species

Federally or state-listed endangered, threatened, and rare species are unlikely to exist within the 72 proposed sites on the BARC facility. Various federal and state government databases and sources were reviewed to determine the presence of endangered, threatened and rare species or their

critical habitats. Sources include Maryland Department of Natural Resources (MDNR) and the USFWS. Based on a review of these sources, no federally listed Designated Wilderness Areas, Wilderness Wildlife Preserves, or threatened or endangered species' Critical Habitats reside within a one-mile radius of the BARC Facility, and no state- designated Wildlife Management Areas or state parks reside within Prince George's County (MDNR 2016, USFWS 2015).

There is only one federally listed species in Prince George's County, the sensitive jointvetch. Sensitive jointvetch is a robust, bushy-branched, annual legume often exceeding 3.3 feet in height. Sensitive jointvetch occurs in the intertidal zone near the upper limit of tidal fluctuation. It seems to prefer sparsely-vegetated areas where annuals predominate (USFWS 1995). Habitat for this species in consists of moist to wet coastal roadside ditches and moist fields that are nearly tidal, especially in full sun (Leonard 1985). Associated plants listed for this are all fresh water species. Sensitive jointvetch is not expected to be found in association with salt-tolerant species such as saltmarsh cordgrass or giant cordgrass (Rouse 1994). This species seems to favor microhabitats where there is a reduction in competition from other plant species, and usually some form of soil disturbance (FWS 1995). Since the proposed solar sites do not occur in areas that support any waters of the U.S., there is no habitat for the jointvetch at any of the proposed sites.

According to species lists and databases maintained by the USFWS Environmental Conservation Online System (USFWS 2018) and MDNR, multiple state listed threatened or endangered species have ranges that include Prince George's County, Maryland. These species are listed in Table 5 (MDNR 2016). However, none of these species of state importance are anticipated to have appropriate habitat within the 72 SPVS sites proposed as the Proposed Action.

According to a comparison of the habitat requirements of these species to land use at the 72 sites, no habitat for any of these species is present. Therefore, all federally or state-listed endangered, threatened, and rare species are unlikely to exist on or be in the vicinity of the proposed solar sites due to a lack of appropriate habitat for all of the species listed in Table 5.

Table 5: Federally and State-listed Endangered or Threatened Species for Prince George's County

			Classification		
Group	Common Name	Scientific name	State Listing	Federal Listing	Habitat presence
Vascular Plant	Sensitive Joint-vetch	*Aeschynomene virginica*	Endangered	Threatened	No
	Sandplain Gerardia	*Agalinis acuta*	Endangered	N/A	No
	Auricled Gerardia	*Agalinis auriculata*	Endangered	N/A	No
	Blunt-leaved Gerardia	*Agalinis obtusifolia*	Endangered	N/A	No
	Thread-leaved Gerardia	*Agalinis setacea*	Endangered	N/A	No
	Midwestern Gerardia	*Agalinis skinneriana*	Endangered	N/A	No
	Woodland Agrimony	*Agrimonia striata*	Endangered	N/A	No
	Single-headed Pussytoes	*Antennaria solitaria*	Threatened	N/A	No
	Leopard's-bane	*Arnica acaulis*	Endangered	N/A	No
	Red Milkweed	*Asclepias rubra*	Endangered	N/A	No
	Wild False Indigo	*Baptisia australis*	Threatened	N/A	No
	Small-fruited Beggar-ticks	*Bidens mitis*	Endangered	N/A	No
	Broad-glumed Brome	*Bromus latiglumis*	Endangered	N/A	No
	Grass-pink	*Calopogon tuberosus*	Endangered	N/A	No
	Buxbaum's Sedge	*Carex buxbaumii*	Threatened	N/A	No
	Hitchcock's Sedge	*Carex hitchcockiana*	Endangered	N/A	No
	Field Sedge	*Carex conoidea*	Endangered	N/A	No
	Long-stalked Sedge	*Carex pedunculata*	Endangered	N/A	No
	Short's Sedge	*Carex shortiana*	Endangered	N/A	No
	Dark Green Sedge	*Carex venusta*	Threatened	N/A	No
	Velvety Sedge	*Carex vestita*	Threatened	N/A	No
	Red Turtlehead	*Chelone obliqua*	Threatened	N/A	No
	Goldthread	*Coptis trifolia*	Endangered	N/A	No
	Wister's Coralroot	*Corallorhiza wisteriana*	Endangered	N/A	No
	Few-flowered Tick-trefoil	*Desmodium pauciflorum*	Endangered	N/A	No
	Rigid Tick-trefoil	*Desmodium rigidum*	Endangered	N/A	No
	Tall Swamp Panicgrass	*Dichanthelium scabriusculum*	Endangered	N/A	No
	Glade Fern	*Diplazium pycnocarpon*	Threatened	N/A	No
	White-bracted Boneset	*Eupatorium leucolepis*	Threatened	N/A	No
	Blunt-leaved Spurge	*Euphorbia obtusata*	Endangered	N/A	No
	Rough-leaved Aster	*Eurybia radula*	Endangered	N/A	No
	Fringe-tip Closed Gentian	*Gentiana andrewsii*	Threatened	N/A	No
	Striped Gentian	*Gentiana villosa*	Endangered	N/A	No
	Short's Hedge-hyssop	*Gratiola viscidula*	Endangered	N/A	No
	Hoary Frostweed	*Helianthemum bicknellii*	Endangered	N/A	No
	Coppery St. John's-wort	*Hypericum denticulatum*	Threatened	N/A	No

Table 5, cont'd

			Classification		
Group	Common Name	Scientific name	State Listing	Federal Listing	Habitat presence
	Slender Blue Flag	*Iris prismatica*	Endangered	N/A	No
	Dwarf Iris	*Iris verna*	Endangered	N/A	No
	Long's Rush	*Juncus longii*	Endangered	N/A	No
	Torrey's Rush	*Juncus torreyi*	Endangered	N/A	No
	Potato Dandelion	*Krigia dandelion*	Endangered	N/A	No
	Thin-leaved Flatsedge	*Kyllinga pumila*	Endangered	N/A	No
	Vetchling	*Lathyrus palustris*	Endangered	N/A	No
	Sandplain Flax	*Linum intercursum*	Threatened	N/A	No
	Hairy Ludwigia	*Ludwigia hirtella*	Endangered	N/A	No
	Wild Lupine	*Lupinus perennis*	Threatened	N/A	No
	Carolina Clubmoss	*Lycopodiella caroliniana*	Endangered	N/A	No
	Climbing Fern	*Lygodium palmatum*	Threatened	N/A	No
	Winged Loosestrife	*Lythrum alatum*	Endangered	N/A	No
	Anglepod	*Matelea carolinensis*	Endangered	N/A	No
	Erect Water-hyssop	*Mecardonia acuminata*	Endangered	N/A	No
	Narrow Melicgrass	*Melica mutica*	Threatened	N/A	No
	Creeping Cucumber	*Melothria pendula*	Endangered	N/A	No
	Sweet Pinesap	*Monotropsis odorata*	Endangered	N/A	No
	Virginia False-gromwell	*Onosmodium virginianum*	Endangered	N/A	No
	American Feverfew	*Parthenium integrifolium*	Endangered	N/A	No
	Swamp Lousewort	*Pedicularis lanceolata*	Endangered	N/A	No
	Coville's Phacelia	*Phacelia covillei*	Endangered	N/A	No
	White Fringed Orchid	*Platanthera blephariglottis*	Threatened	N/A	No
	Purple Fringeless Orchid	*Platanthera peramoena*	Threatened	N/A	No
	Marsh Fleabane	*Pluchea camphorata*	Endangered	N/A	No
	Cross-leaved Milkwort	*Polygala cruciata*	Threatened	N/A	No
	Racemed Milkwort	*Polygala polygama*	Threatened	N/A	No
	Flatstem Pondweed	*Potamogeton zosteriformis*	Endangered	N/A	No
	Torrey's Mountain-mint	*Pycnanthemum torrei*	Endangered	N/A	No
	Whorled Mountain-mint	*Pycnanthemum verticillatum*	Endangered	N/A	No
	Early Buttercup	*Ranunculus fascicularis*	Endangered	N/A	No
	Yellow Water-crowfoot	*Ranunculus flabellaris*	Endangered	N/A	No
	Long-stalked Crowfoot	*Ranunculus hederaceus*	Endangered	N/A	No
	Capitate Beakrush	*Rhynchospora cephalantha*	Endangered	N/A	No
	Grass-like Beakrush	*Rhynchospora globularis*	Endangered	N/A	No
	Engelmann's Arrowhead	*Sagittaria engelmanniana*	Threatened	N/A	No
	Sandbar Willow	*Salix exigua*	Endangered	N/A	No

Table 5, cont'd

			Classification		
Group	Common Name	Scientific name	State Listing	Federal Listing	Habitat presence
	Canada Burnet	*Sanguisorba canadensis*	Threatened	N/A	No
	Northern Pitcher-plant	*Sarracenia purpurea*	Threatened	N/A	No
	Veined Skullcap	*Scutellaria nervosa*	Endangered	N/A	No
	Snowy Campion	*Silene nivea*	Endangered	N/A	No
	Halberd-leaved Greenbrier	*Smilax pseudochina*	Threatened	N/A	No
	Showy Goldenrod	*Solidago speciosa*	Threatened	N/A	No
	Swamp-oats	*Sphenopholis pensylvanica*	Threatened	N/A	No
	Trailing Stitchwort	*Stellaria alsine*	Endangered	N/A	No
	Featherbells	*Stenanthium gramineum*	Threatened	N/A	No
	Silvery Aster	*Symphyotrichum concolor*	Endangered	N/A	No
	Fameflower	*Talinum teretifolium*	Threatened	N/A	No
	Bog Fern	*Thelypteris simulata*	Threatened	N/A	No
Birds	Sedge Wren	*Cistothorus platensis*	Endangered	N/A	No
Insects	Triangle Floater	*Alasmidonta undulata*	Endangered	N/A	No
	Green-patterned Tiger Beetle	*Cicindela patruela*	Endangered	N/A	No
	Spring Blue Darner	*Rhionaeschna mutata*	Endangered	N/A	No
	Selys' Sunfly	*Helocordulia selysii*	Threatened	N/A	No
	Planthopper	*Limotettix minuendus*	Endangered	N/A	No
	Elfin Skimmer	*Nannothemis bella*	Endangered	N/A	No
Fishes	Logperch	*Percina caprodes*	Threatened	N/A	No
	Stripeback Darter	*Percina notogramma*	Endangered	N/A	No
	Glassy Darter	*Etheostoma vitreum*	Threatened	N/A	No

3.5. CULTURAL RESOURCES

The entire BARC facility is tracked within MHT with 119 distinct records on specific buildings and historic districts that involve architectural records and reports on the status, purpose, and eligibility of these historic features (MHT 2018). As one of the largest and most active agricultural research facilities in the world, the established history at BARC is vitally important role in the preservation of knowledge, agricultural practices, and agriculture related records.

A project review request was submitted by the USDA to MHT in 2016 to identify whether there would be any concerns about installing SPVS at 64 locations throughout BARC, many of which are included the Proposed Action. However, MHT expressed concerns with seven sites (see Section 2.4) because of their proximity to buildings that were under evaluation as contributing elements to the North Farm Historic District (see PG: 61-20) (MHT 2016, MHT 2017, USDA 2018). The USDA and MHT continued to coordinate through successive file reviews that added additional sites that could be used as alternates to the sites that garnered MHT's concern. The current list of 72 sites described in the Proposed Action (see Section 2.2.1 and Appendix A) have all been submitted to MHT in advance of this assessment, and do not include the seven sites that were eliminated due to MHT concerns of their impact on eligible structures.

The Proposed Action has been reviewed in accordance with the requirements of Executive Order 13175, "Consultation and Coordination with Indian Tribal Governments." Executive Order 13175 requires Federal agencies to consult and coordinate with tribes on a government-to-government basis on policies that have tribal implications, including regulations, legislative comments or proposed legislation, and other policy statements or actions that have substantial direct effects on one or more Indian tribes, on the relationship between the Federal Government and Indian tribes or on the distribution of power and responsibilities between the Federal Government and Indian tribes.

3.6. NOISE

The U.S. has a noise law known as the Noise Control Act of 1972; however, state and local authorities generally address noise enforcements regulations (Shapiro 1991). See Table 6 for an outline of Prince George's County noise standards as prescribed in the County Code at Sub-Title 19, Division 2, Section 19-120 through 19-126. Consistent with its mixed urban, industrial, and agricultural setting, the dominant noise features vary depending on where within the BARC facility the individual SPVS sites occur. As presented in Table 7, the BARC facility supports numerous land use types, with the agriculture and roof type SPVS occurring within the agriculture building complexes throughout BARC where ambient noise varies relative to the amount of activity during the work day. Many of these areas are away from the portions of the roadway network that carry large amounts of traffic, but can include several hour duration noises from farm equipment, building HVAC systems, trucks associated with deliveries and waste management, and traffic. These noises can be intermittent in nature over time, but can last for a several hours duration for 1 day

Table 6: Prince George County Noise Standards

Sound Source Property Category	Receiving Property Category				
	All Times	Day	Night	Day	Night
Residential	A person may not create noise or allow noise to be created that disturbs the peace, quiet, and comfort of a residential area and includes residences in all areas.	N/A	N/A	N/A	N/A
Commercial	N/A	67	62	N/A	N/A
Industrial	N/A	N/A	N/A	75	75

Definitions and Exemptions:

Noise is defined as audible from 50 feet from the source of the sound in a public right-of-way or an adjacent building:

- any sound resulting from the emergency operation of a public service company as defined in Section 1-101(x), Public Utilities Article of the Annotated Code of Maryland;
- any sound resulting from the operations of an instrumentality of the Federal, State, or County government, the Board of Education, a bicounty agency, or of a municipality;
- a sound resulting from the operation of an aircraft.
- on private property for which a valid use and occupancy permit has been issued for purposes of sporting, recreational, entertainment establishment, or for any other event to which the public is invited; or
- an event or activity with a validly issued permit, license or other written authority which takes place on property owned by the United States, the State, the County, the Board of Education, a bicounty agency, or a municipality.
- farm equipment being used on more than 5 acres or outside of 100 feet of the property line.
- lawn care, snow removal equipment and other household tools or equipment when used and maintained in accordance with the manufacturer's specifications between the hours of 7:00 am to 9:00 pm.
- Prince George's County Code of Ordinances Division 2, Sec 19-120 to 19-125

or a couple of days if there is a major project or harvest underway. The parking type SPVS occur at parking lots adjacent to USDA buildings where the public has access, and traffic and other urban noise is more prevalent. The ground-mount type SPVS can vary from being relatively remote areas within central portions of the BARC campus, to adjacent to residential and urban areas. The noise profiles at these types can vary, but will align with the noise profiles found at the other array types. Overall, the most consistent noise in the immediate vicinity of the various proposed solar sites is road traffic noise emanating from adjacent roads (see 3.12) running through the BARC Facility, as well as heavy farm equipment used throughout the BARC Facility in the research farm areas. Within BARC there are farm roads, narrow roads, campus streets, paved and shouldered 2-lane highways, and multi-lane, high-speed thoroughfares (such Route 1 and Interstate 95). Other transportation infrastructure includes a CSX railroad line which bisects the Linkage farm.

Natural features that contribute to noise mitigation consist of vegetation and landforms. In portions provided in Table 7, the dominant natural features within BARC are urban and residential areas, cropland, forest, and pasture. Additional infrastructure includes any man-made structures such as roads, fencing, and railroad tracks. There are also many buildings on BARC such as service

complexes, small farm compounds, large farm compounds, office complexes, and campuses. Each of these different land uses have different baseline noise conditions; therefore, they may each be uniquely affected by noise pollution.

Table 7: Land Cover

Land Cover	Acres
Building Area	596.18
Cropland	922.82
Forest	2,166.71
Pasture	318.03
Ponded Area	48.62
Research Field	922.07
Wastewater Treatment Plant	58.77
Wetlands	782.35

Source: Personal Communication, Tom Callsen, November 16, 2016

3.7. VISUAL RESOURCES

Visual resources are those visible natural or manmade elements that are particularly valued by a community and are afforded protection from alteration or obstruction through an adopted policy or regulation. Examples are water or land formations, trees, parks, buildings or clusters of buildings, or other distinctive manmade elements. The visual character of a resource is defined by its form, line, color, and texture. For example, building height and bulk, the density of vegetation, and distinct architectural styles would contribute to the visual character of a structure. Visual setting includes scenic views, natural features, built features, and existing light and glare. A landscape has two primary components: natural features, such as topography and vegetation, and built features, such as roads, buildings, and fences. In combination, natural and built features create the form, line, height, colors, and textures of an area—the visual setting of the landscape. Scenic views can be either panoramic (over a broad expanse) or focal (viewable only close to the visual resource). Because of the flat to gently sloping topography (Section 3.1.2) and interspersed forested areas (Section 3.4.1), scenic views are limited, with the exception of views afforded by open agricultural areas. BARC is comprised of approximately 6,615 acres supporting permanent buildings organized as laboratories and administrative buildings, as well as numerous temporary agricultural storage structures. BARC is bordered by the suburban community of Beltsville, the Cities of Greenbelt and College Park, and by several Federal properties managed by other agencies. Land cover, according to USDA on the BARC facility, is included in Table 7 and Figure 8, with forest as the dominant cover, followed by cropland and research field. BARC's green space is a visual asset to adjoining properties (USDA 1996).

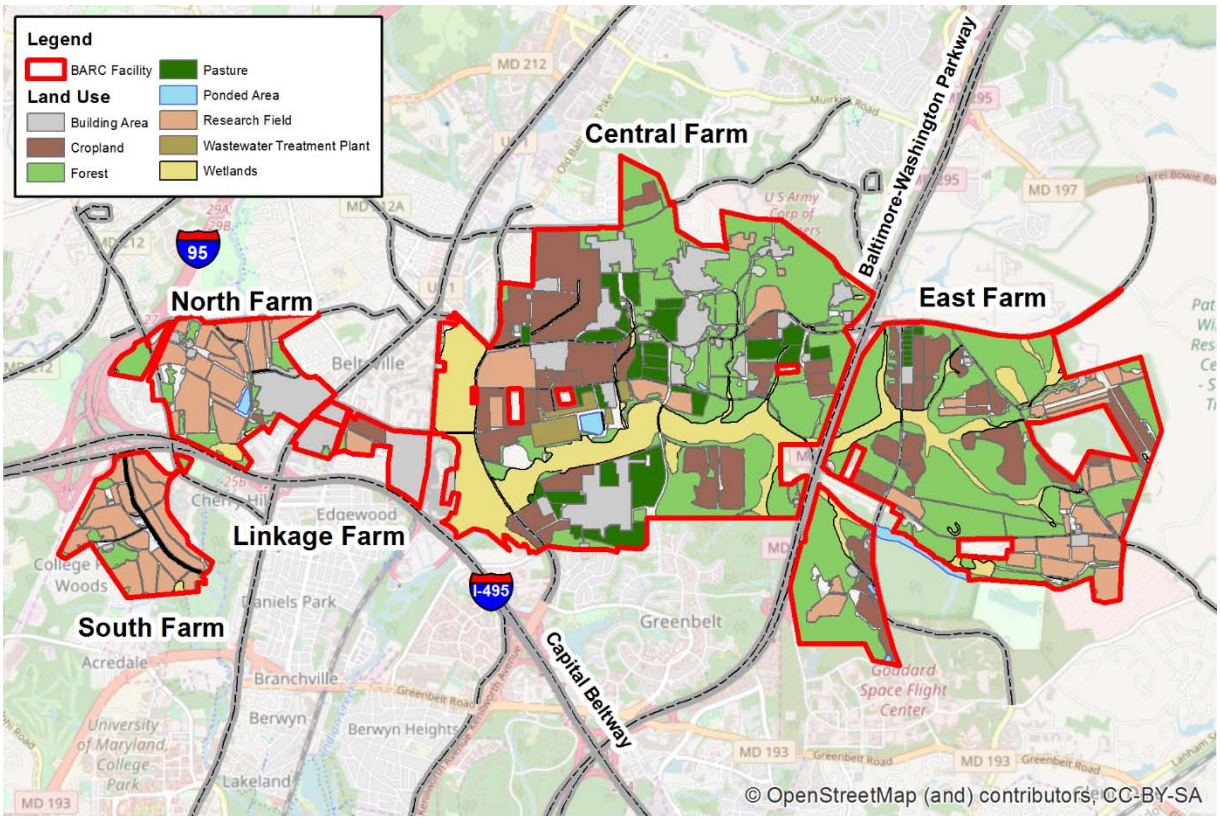

Figure 8: Land Use at BARC

Natural features consist of vegetation, landforms, and watercourses. The dominant natural features within BARC are forests, uncultivated fields, wetlands, and several streams; Beaverdam Creek, Paint Branch, Little Paint Branch, and Indian Creek. Agricultural areas are comprised of large, mostly flat open fields, gently rolling farmland, and research plots. Built features are any man-made structures such as roads, fencing, and railroad tracks. Within BARC there are farm roads, narrow roads, campus streets, paved and shouldered 2-lane highways, and multi-lane, high-speed thoroughfares (such Route 1 and Interstate 95). Other transportation infrastructure includes a CSX railroad line which bisects the Linkage farm. There are also many buildings on BARC such as service complexes, small farm compounds, large farm compounds, office complexes, and campuses. BARC is also located within the North Farm Historic District described in Section 3.5 which add to the visual character of the facility. BARC is organized into distinct management areas, known as South Farm, North Farm, Linkage Farm, Central Farm, and East Farm (Figure 2). The overall visual character of BARC is best described by detailing conditions in each of the five farms.

South Farm

South Farm is located at the western end of BARC and is south of the Capital Beltway. Significant views of South Farm from the Capital Beltway are available between U.S. Route 1 and Interstate 95. It is bordered by multi-family apartments to the east, a golf course to the southeast, Acredale (University of Maryland) and apartments to the south, single-family housing to the southwest, and

Interstate 95 to the north and development associated with US Route 1 to the west. South farm is mostly cultivated with a few buildings.

North Farm

Beltsville Agricultural Research Center

The North Farm is bordered by high-volume highways on the east (I-95), south (I-495), and west (US 1). To the north and northeast are residential areas. Specifically, homes face BARC across Sellman Road and south of Montgomery Road. Two apartment complexes have a view into the Beltsville Agricultural Research Center and the U.S. National Agricultural Library along U.S. Route 1. Forests and hills screen views from the Beltway and Interstate 95. The highest point at BARC is located along Cherry Hill Road, from which views are available across BARC to the east. Little Paint Branch divides North Farm with clusters of small buildings, sloping croplands, and orchards to the west and BARC's largest building cluster to the east in a campus setting. The laboratories/offices and the main administration building along U.S. Route 1 is the public's most identifiable location on BARC.

Linkage Farm

U.S. National Agricultural Library

Linkage Farm is the smallest segment of BARC with Rhode Island Avenue and the CSX railroad dividing the farm that is bounded by U.S. Route 1/Baltimore Avenue on the west. The western portion is visually typified by the U.S. National Agricultural Library. The other significant structures on Linkage Farm is the USDA George Washington Carver Center. To the east of the railroad, the farm is forested. Linkage Farm is bordered on the north by an Industrial Park, which consists of several one-story light industrial facilities. To the south, single-family residences are buffered from BARC by trees. Linkage Farm is visible by the public along U.S. Route 1/Baltimore Avenue, Rhode Island Avenue, Sunnyside Avenue and from the Beltway near the Greenbelt Metro.

Central Farm

Central Farm is the largest of the five farms. It has large farm fields on the east side and is mostly forested on the west side. There are also clusters of research buildings. The public can travel through Central Farm along Powder Mill Road with mostly unobstructed views of the BARC property. It is bordered to the north by single family homes along Odell Road, which have views into BARC. To the northeast are single-family residential areas and other Federal facilities, but they are visually separated from BARC by forest. Views of BARC from the Baltimore-Washington Parkway are obstructed by forests. To the south is the City of Greenbelt.

Example of cultivated area on the Central Farm.

East Farm

The East Farm is bordered on the west by the Baltimore-Washington Parkway, to the north by Powder Mill Road, while the east and south sides are comprised of other Federal properties or county parks. The East Farm is primarily forested, with the primary vistas occurring at cultivated areas dispersed throughout. The Goddard Geophysical and Astronomical Observatory and the Goddard softball complex are inholdings to the East Farm. Views into East Farm can be seen by the public from accessing Soil Conservation Road, Powder Mill Road or Springfield Road, however due to the extent of forests, views are generally limited in distance. Views are restricted from the Baltimore-Washington Parkway by forests as well. Structures on the East Farm are limited. A former airfield has been decommissioned at East BARC, and is proposed for ground SPVS installation as part of the Proposed Action. However, the area is mostly maintained as agriculture and the vistas align with other agricultural areas in the vicinity.

Vista on East Farm near the abandoned Beltsville Airport.

The existing lighting levels in BARC are low in the majority of the site, as lighting is concentrated to building areas. Lighting in these areas is limited to building security lighting, which does not produce a substantial level of sky glow; however, views of the night sky are somewhat obscured because of adjacent, existing urban development.

3.8. LAND USE

The BARC facility is zoned approximately 99 percent Reserved Open Space (R-O-S), with <1 percent open space (O-S), and <1 percent rural residential (R-R) (M-NCPPC 2018a) (Figure 9), however the BARC property is under Federal jurisdiction and County laws governing land use and planning do not apply (M-NCPPC 2018b). According to the Prince George's County Maryland Code of Ordinances, the R-O-S district encourages preservation of large areas of open space and trees and is designed to protect environmentally sensitive areas. It allows for development of a limited range of public, agricultural, recreational uses. The O-S district provides for areas of low-intensity residential development and promotes the economic use of conservation land for agriculture, natural resource, and non- intensive recreational use. The R-R permits large (½ acre) residential lots and allows a number of nonresidential Special Exemption uses. A guide to all zoning categories for Prince George's County, Maryland are available at http://www.mncppc.org.

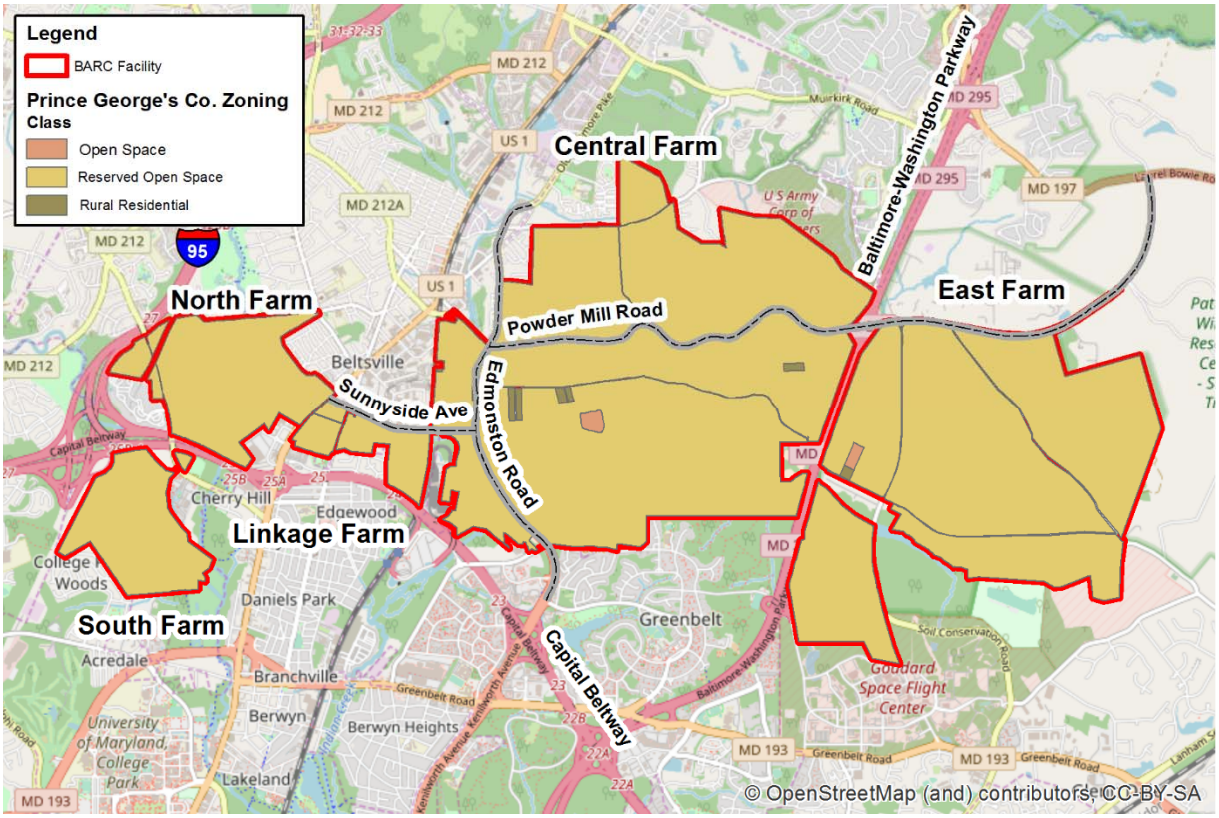

Figure 9: Prince George's County Zoning Class

The zoning for parcels adjacent to the BARC facility's boundary are as follows (M-NCPPC 2018a). The North farm is bounded to the north by R-O-S and R-R, to the west by R-R, to the south by the Capital Beltway, and to the east by mixed use - transportation oriented (M-X-T) and multifamily medium density residential (R-18). The South farm is bordered to the south by one-family detached residential (R-55) and R-R, to the east by multifamily, high density residential-efficiency (R-10) and

R-O-S, to the north by R-R, and to the west by R-R. The Linkage farm is surrounded to the north by heavy industrial (I-2), to the south by R-55, to the east by O-S, and to the west by R-O-S. The Central farm is bounded to the north by R-O-S and R-R; to the west by I-2, one-family semidetached and two-family detached residential (R-35), and R-R; to the south by O-S, R-R, and R-55, and to the east by the Baltimore-Washington parkway. Finally, the East farm is bordered to the west by the Baltimore-Washington parkway, to the south by R-O-S, to the east by R-O-S, and to the north by R-O-S.

The Greenbelt Metro Area Sector Plan recognizes the BARC facilities are under Federal jurisdiction, but makes recommendations for the subarea such as providing vehicular access directly from the Beltway to the 365,000 ft^2 office complex in the Linkage farm. Other objectives for future management of the facility include encouraging the preservation of existing open spaces, exploring access improvements and pedestrian/bicycle linkages to other key areas of the sector area and beyond, and encouraging buffering of incompatible land uses (M-NCPPC 2018b).

3.9. HUMAN HEALTH AND SAFETY

The BARC Facility currently has safety, health, and environmental programs and systems in place to comply with Occupational Safety and Health Administration (OSHA) requirements. This includes policies and procedures to document programmatic safety and health-related goals and performance. Existing policies and protocol at the BARC Facility include USDA Manual 160 for Safety, Health, and Environment, BARC Construction Manual, and more general OSHA-focused policies to ensure compliance. In addition, the BARC Facility provides regular training for their personnel. Other existing safety and security measures in place include fencing surrounding parts of the BARC campus, and stationary guards at the entrances to specific buildings.

3.10. UTILITIES AND INFRASTRUCTURE

The affected environment associated with existing utilities and infrastructure at the BARC Facility include electrical utility management, potable water and wastewater management, stormwater management, and storage tank management.

3.10.1. Electrical Utility Management

The USDA has a goal to have 7.5 percent of the agency's electricity budget be purchased or produced through renewable sources or Renewable Energy Credits (REC) by 2020. This goal is intended to meet the requirements of EPAct 2005 and EISA. As an agency-wide goal, the renewable energy targets allow some facilities to exceed those goals while others may fall short in areas where renewable energy sources are not available or compatible with the mission of the facility. At BARC, the well-developed electrical infrastructure combined with large amounts of open lands should allow BARC to exceed its own facility-based renewable energy targets and contribute to the goals for the entire USDA agency. In 2014 and 2015, the BARC Facility was billed for an average of 42.07 million kWh of electrical use (Robinson 2016). Currently, electricity is provided by PEPCO. The

BARC Facility operates on a standard federal weekday schedule with the building typically occupied Monday through Friday (6:30 AM to 6:00 PM).

3.10.2. Potable Water and Wastewater Management

Water Supply Systems

The BARC water supply system is divided into two distribution areas, the South, North and Linkage Farms are supplied by the Washington Suburban Sanitary Commission (WSSC). The Central and East Farms are supplied by BARC's Water system. However, none of the 72 proposed SPVS sites has water or sewer hookups, and none are proposed at these sites.

Waste Water Treatment Systems

BARC operates and maintains two wastewater treatment plants (WWTP). The BARC-East WWTP serves the Central Farm; the BARC-West WWTP serves the North Farm. WSSC serves the National Agricultural Library and the USDA Office Complex on the Linkage Farm. While sewer lines pass through or adjacent to many of the proposed SPVS sites, the Proposed Action does not include adding sewer connections to any of the sites. No additional connections to WSSC sewers are anticipated at BARC. No capacity modifications or increases are anticipated because of the Proposed Action.

3.10.3. Stormwater Management

BARC has numerous streams and large areas of wetlands present on all five farms. All of BARC's stormwater run-off drains into the Northeast Branch of the Anacostia River through the Paint Branch, Little Paint Branch Indian Creek, Beaver Dam Creek, and Beck Branch. The following agencies and regulations apply to use of storm drainage areas and wetlands: (USDA 1996b).

- The Environmental Protection Agency (EPA) requires National Pollution Discharge Elimination System (NPDES) permits for control of stormwater quality (large municipalities and some Standard Industry Codes do not require NPDES permits).
- The U.S. Army Corps of Engineers oversees wetlands in the United States.
- Prince George's County Zoning and Maryland State Regulations restrict disturbance of floodplain areas established by the Federal Emergency Management Agency (FEMA).

The following describes how BARC affects stormwater conveyance and environmentally sensitive wetlands.

Stormwater Management

Stormwater management procedures have been developed by the State of Maryland that mandate minimum requirements and procedures to control the adverse impacts associated with increased stormwater runoff. BARC has not made major changes in its land use activities since the Maryland

Stormwater Management Regulations were enacted in the mid-1980s. The few building projects that fall within the regulations have been reviewed by the State and approved as complying (USDA 1996b).

Although farm operations are exempt from the State regulations, BARC is sensitive to the latest stormwater management, soil conservation, and water pollution control procedures. Farm operations at BARC are continually working with the USDA Natural Resources Conservation Service to preserve the agricultural potential of BARC's soils and the natural environment (USDA 1996b).

Stormwater Quality

The quality of stormwater runoff has been sampled in the past and one such sampling event is described in the 1996 Master Plan Update Report (USDA 1996b). BARC is required under the EO13508, the Clean Water Act, its MS4 permit, NPDES permits, and General Permit to reduce the nutrient load of the federal facility to support the restoration of the Chesapeake Bay. In addition to all of the BMP management, reforestation, and wetland restoration going on at BARC, the Facility is also an active farm that is required to provide MDE with an annual nutrient management plan. BARC also is a participant on the Federal Facility Work Group that coordinates efforts between federal facility in the CBW, regulators, and the EPA to work towards these goals, and is required to report annual progress to the MDE that is provided to EPA (Jackson 2018).

3.10.4. Storage Tank Management

The BARC Facility does store sufficient quantities (greater than 10,000 pounds) of petroleum products and laboratory samples to warrant community right-to-know reporting pursuant to Executive Order (EO) 13148, *Greening the Government through Leadership in Environmental Management*, and the Emergency Planning and Community Right-to-Know Act (EPCRA). While there are registered USTs at the BARC Facility, none are known to be leaking. Further, none of the 72 sites associated with the Proposed Action are underlain by USTs.

3.11. WASTE MANAGEMENT

This section describes the affected environment associated with solid, hazardous, and sanitary waste management.

3.11.1. Solid Waste Management

The nonhazardous solid waste stream produced by the BARC Facility includes standard office waste and nonhazardous laboratory wastes. BARC has developed waste disposal protocols for solid waste management at all the sites within the facility. The BARC Facility has implemented a recycling program for several nonhazardous solid wastes. Project specific is developed for long term projects, such as the Building 307 renovation. Based on site personnel interviews, the BARC Facility's solid waste and recycling is removed by RJ Disposal Service and then transported to the appropriate off-

site recycling and disposal facilities. Animal solid wastes and wastewater treatment sludge is disposed of by land application at the former Airport site (USDA 1996a)

The solid waste management practices at all the 72 sites associated with the Proposed Action currently fall under the same environmental management program at the BARC Facility. None of these sites has their own designated waste management containers, and refuse originating in these areas is typically transported to other designated pick-up locations.

3.11.2. Hazardous Waste Management

The BARC Facility operates as a large quantity generator under Maryland Resource Conservation and Recovery Act (RCRA) regulations, since it routinely generates quantities of hazardous waste in excess of the 1,000 kg/month threshold for non-acute hazardous waste and occasionally generates more than 1 kg of acutely hazardous waste. The majority of these waste streams generated by the BARC Facility consist of non-halogen solvents, analytical wastes, electrical devices and compressed gases.

Based on inquiries of the Resource Conservation and Recovery Act (RCRA) database, the BARC Facility has implemented hazardous waste management programs as a part of their environmental management system. Two RCRA permits are in place for disposal of hazardous waste. The BARC Facility is subject to hazardous waste management regulations for the handling, storage, and disposal of laboratory and related hazardous wastes.

Wastes generated by the BARC facility's analytical activities are initially placed in labeled accumulation containers (as appropriate for the type of waste) in each laboratory where hazardous wastes are generated. Wastes from Buildings 33 F and 312 C are picked up and transported to the appropriate disposal or treatment facilities.

3.11.3. Superfund Site

BARC is a Superfund Site, listed on the NPL in 1994 and a Federal Facility Agreement in 1998. Sixty-three AOCs were determined to require investigation after the PA/SI and site screening process. A review of the RCRA database identified 12 of the listed hazardous waste Areas of Concern (AOCs) were located within or adjacent to some of the proposed solar sites (see Table 8 and Figures 10 and 11). Of these AOCs, 10 had been given a final evaluation of No Further Action (NFA), indicating that they would have a low potential for impact on the proposed development, these NFA Sites have been formally closed. The other two sites (at W-23 and W-70) had a finding of Further Investigations Planned, which led to the initiation of a remedial investigation/feasibility study (RI/FS). The conclusion of the remediation report for removal of contaminated soils from this site stated, "*The soil pathway at the Site has been adequately addressed in terms of reduction in human health and ecological risk. Cleanup action levels were achieved relative to soil exposure and the Site should be considered for unrestricted use based on immunoassay and fixed laboratory confirmation sampling. Future work may be performed onsite depending on the results of ongoing bioremediation studies by BARC researchers*" (Tidewater 2014).

Table 8: Hazardous Material AOCs and Potentially Impacted Solar Sites

Location	AOC	Status	Solar Site	Contamination	Source
Central Farm	BARC 10	NFA	E-10, E-66	Pesticides, Metals	*BMT Entech, Inc. 2009a*
Central Farm	ENTECH M23	NFA	E-10, E-66	Metals	*BMT Entech, Inc. 2009b*
Central Farm	BARC 30	NFA	E-75, E-76	Unknown	*Need Report*
Central Farm	ENTECH R1	NFA	E-75, E-76	Unknown	*Entech, Inc., 1998*
Linkage Farm	ENTECH R5	NFA	L-50	Building Remains & Rubble	*BMT Entech, Inc. 2009d*
North Farm	EPIC 7-8	RI/FS	W-70	Metals, VOCS	*BMT Inc. 2011*
North Farm	EPIC 9	NFA	W-70	Metals, VOCS	*EPA 2009*
North Farm	BARC 4	RI/FS	W-23	Pesticides	*Tidewater 2014*
North Farm	ENTECH M6	NFA	W-24, W-25	Metals, VOCs	*BMT Entech, Inc., 2009b*
East Farm	ENTECH 20	NFA	E-4	Metals	*BMT Entech, Inc., 2010b*
East Farm	BARC 44	NFA	E-2	Metals	*BMT Entech, Inc., 2010a*
East Farm	BARC 36	NFA	E-1	Pesticides	*Syracuse Research Corporation, 2009*

NFA = No Further Action

RI/FS=Remedial investigation/feasibility study

3.11.4. Sanitary Waste

Currently, sanitary waste generated at the BARC Facility in the restrooms, sinks and wastewater drains in the buildings is treated by one of the local onsite wastewater treatment plants located on either the Central Farm or the North Farm, and septic tanks and fields (USDA 1996b). None of the SPVS sites are anticipated to require connections to existing sanitary waste systems.

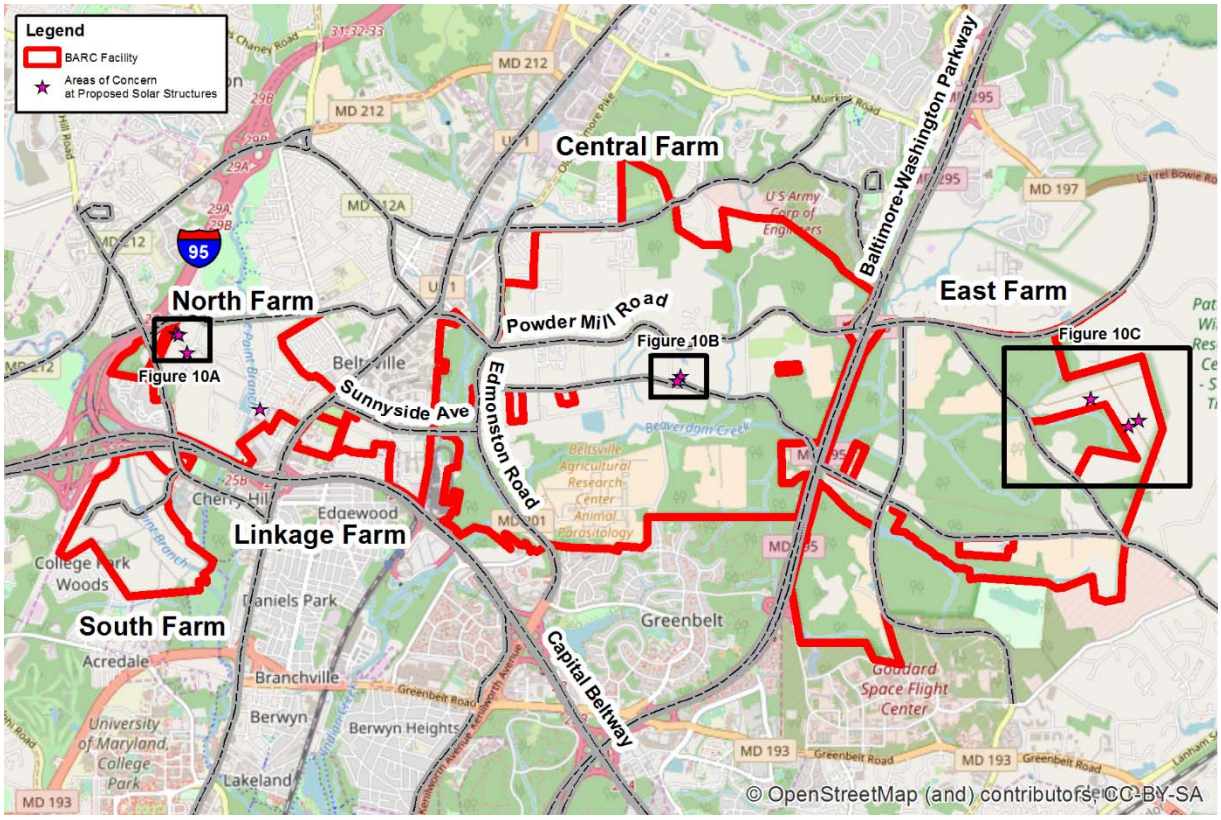

Figure 10: Known Areas of Concern that underlie proposed SPVS sites

3.12. TRANSPORTATION AND PARKING

The BARC Facility is located approximately 15 miles north of Washington, D.C., and is accessible from Baltimore Avenue (US 1), proximally located to I-495, I-95, and Baltimore-Washington Parkway (MD 295).

As shown on Figure 12, there are eight primary roads on the BARC Facility:

- Baltimore Avenue runs north to northeast from I-495, bisecting North Farm to the west and Linkage Farm to the east. Baltimore Avenue provides access to various administration buildings and serves as the primary entry way into the BARC Facility.

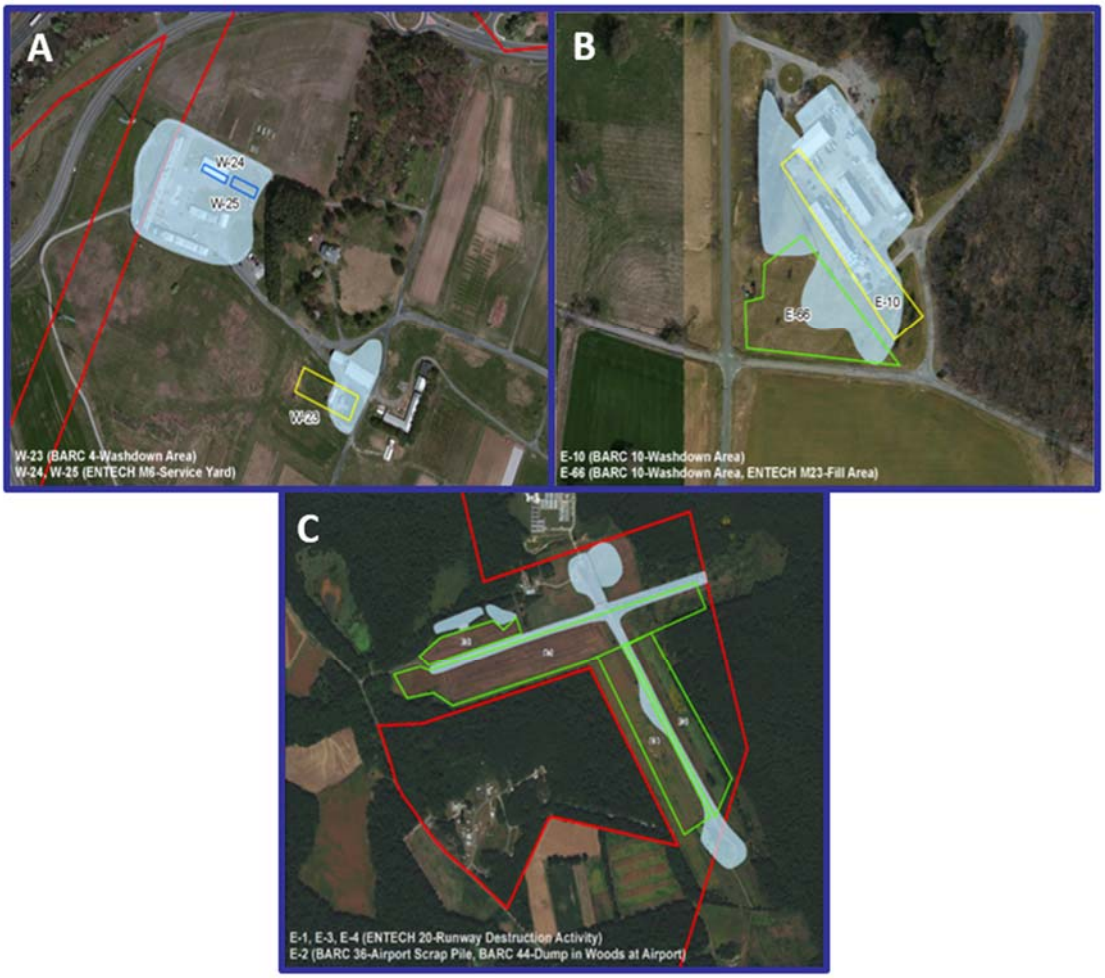

Figure 11: Aerial View of Identified Areas of Concern within proposed solar sites

- Cherry Hill Road runs north from I-495 primarily along the western boundary of North Farm, intersecting Sellman Road, which provides access across nearly the entire boundary of North Farm. Heading south and east from I-495, Cherry Hill Road provides access to South Farm via Buck Lodge Road (a secondary road only accessibly by authorized BARC staff).
- Sunnyside Avenue generally heads east from Baltimore Avenue across the northern boundary of the Linkage Farm, and serves as a major connector between North Farm and Central Farm. Sunnyside Avenue crosses railroad tracks immediately to the north of the Washington Metropolitan Area Transit Authority (WMATA) Greenbelt Rail Yard before Intersecting with Edmonston Road (MD 201) within the Central Farm.
- Edmonston Road (MD 201) runs north to south from I-495 parallel to Indian Creek across the western portion of Central Farm. Traveling north, Edmonston Road intersects with Powder Mill Road followed by Odell road—each of which provide east/west access to Central Farm.

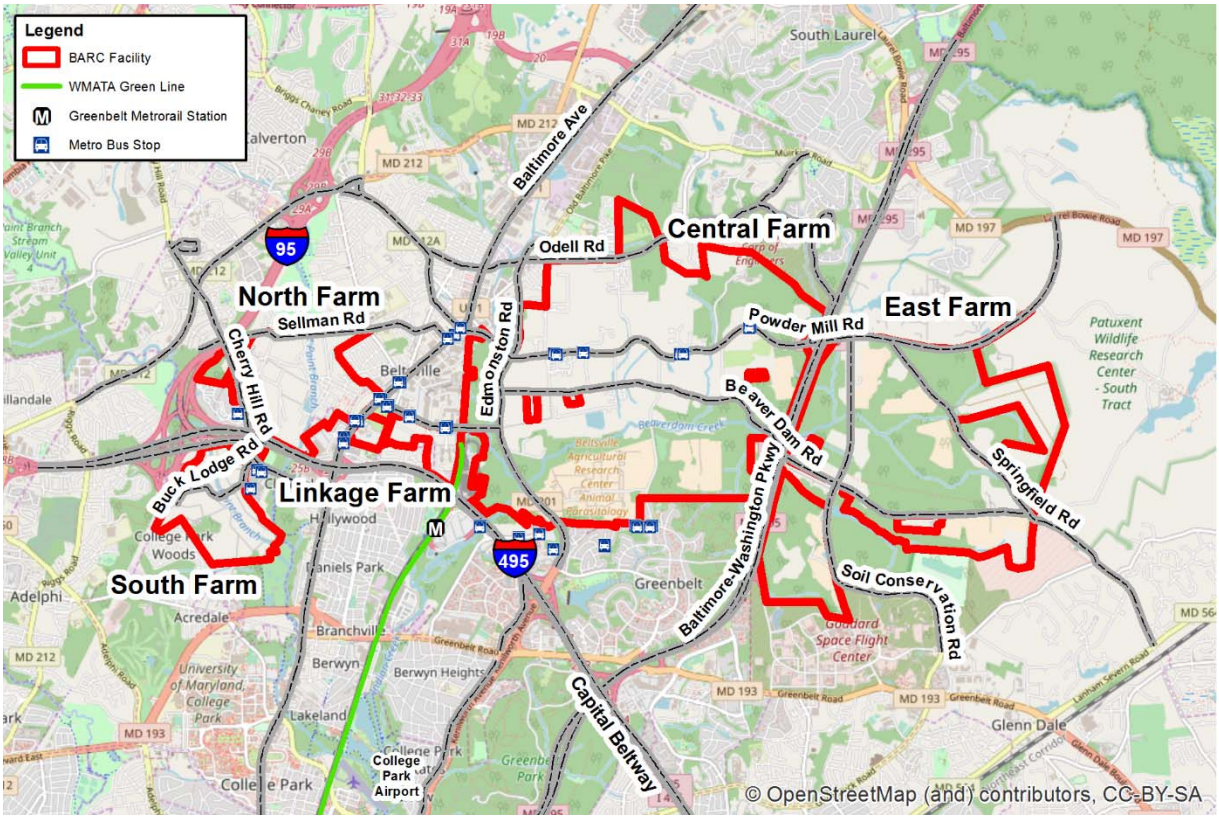

Figure 12: Transportation within the vicinity of the BARC Facility

- Powder Mill Road travels west from Edmonston Road, traversing Central Farm before crossing under Baltimore-Washington Parkway and entering East Farm along its northern border.
- Odell Road is located north of Powder Mill Road and bisects the northern most portion of Central Farm for approximately 0.3 miles.
- Soil Conservation Road initiates at Powder Mill Road and travels south through East Farm. Soil Conservation Road crosses Beck Branch, outside of the BARC Facility, before reentering the Facility boundary to the south and travels along the eastern boundary of East Farm.
- From Powder Mill Road, Springfield Road runs to the south east across East Farm before intersecting with Beaver Dam Road, an unimproved east-west connector, and exiting East Farm along the southeastern border.

The BARC Facility and campus is accessible by multiple nearby bus stops along Baltimore Avenue, Cherry Hill Road, and Buck Lodge Road. These stops provide ample access to North and South Farms. As well, there are stops along Edmonston Road, Sunnyside Avenue, and Powder Mill Road providing access to Central Farm. The WMATA Greenbelt Metrorail Station is located approximately one mile south of Sunnyside Avenue, outside of the BARC Facility boundary, providing access south

into the Washington D.C. Metro area via the WMATA Green Line. The nearest commercial airport, located approximately 5 miles south, is College Park Airport. Parking capacity is primarily for employees and researchers, but the publicly available buildings have parking lots available to the public free of charge.

3.13. SOCIOECONOMICS

The BARC Facility employs approximately 536 personnel, including scientists, professional staff, administrative and facilities support, and visiting scientists and students (USDA 2018). This workforce represents a relatively minor portion of the 2010 Prince George's County Maryland estimated population of 863,420 (U.S. Census Bureau [USCB], 2010a) and 2010 average estimated labor force of 237,908. (USCB 2010b). According to the 2010 census, the Prince George's County Maryland workforce comprises 15 percent of persons employed in retail; 12 percent in construction; 12 percent in health care and social assistance; 10 percent in professional, scientific, and technical services; 10 percent in Administrative and support and waste management and remediation services; and the remaining 41 percent in other employment. Less than 0.1 percent of the workforce is represented in farming, fishing, and forestry occupations. With the lease of the land used for the installation and operation of SPVS, there would likely be no change to the breakdown in these employment categories because of the Proposed Project.

3.14. ENVIRONMENTAL JUSTICE AND PROTECTION OF THE CHILDREN

Due to the low potential for impact, specific resource areas have been dismissed from further consideration in the analysis of this EA. Specifically, impacts to socioeconomics and environmental justice are not anticipated due to the nature of the Proposed Action. Short-term negligible beneficial economic impacts would occur as a result of a temporary increase in construction workers hired and the local purchasing of construction materials. Long-term negligible economic benefits could occur due to potential contractual support needs for operation and maintenance of new infrastructure. The Proposed Action would not significantly impact sales volume, income, employment, or the local tax base. Additionally, because the Proposed Action would occur entirely on the interior of BMARC and would not result in any increase in population, no impacts to public services (e.g., fire protection, police enforcement, medical services, education, etc.), or low income, minority, or children populations would occur. Overall impacts to socioeconomics and environmental justice would be negligible and further analysis has been dismissed from this EA.

3.14.1. Environmental Justice

EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, is designed to focus the attention of federal agencies on the human health and environmental conditions in minority communities and low-income communities.

3.14.2. Protection of Children

EO 13045, Protection of Children from Environmental Health Risks and Safety Risks, requires federal agencies to identify and assess if its activities, including the Proposed Action, would have a disproportionate effect on infants and children. As children's bodily systems, including neurological, immunological and digestive systems, are still developing, it is important to address any potential impacts that a proposed project may have on the health and well-being of children who are in the vicinity of, or could come in contact with, a proposed project. There are no facilities within the BARC Facility grounds to which children would have unsupervised access.

4.0. ENVIRONMENTAL CONSEQUENCES

This section addresses the impacts to the environment anticipated during the construction, operation and maintenance, and dismantling of the proposed SPVS on the BARC Facility. The following subsections outline potential impacts to environmental resources as a result of construction, operation and maintenance, and dismantling of the SPVS. This section analyzes construction and dismantling impacts collectively, because dismantling impacts are generally similar in scope to construction impacts. Where differences in construction and dismantling impacts exist, the text will provide appropriate discussion of the different impacts. The No Action Alternative is not individually analyzed throughout this section since the analysis is generally the same for each resource area.

No Action Alternative

Under the No Action Alternative, the SPVS would not be constructed at any of the proposed 81 sites. Therefore, all the resources discussed below would experience no impacts.

4.1. GROUND RESOURCES

4.1.1. Construction and Dismantling

Geology

The BARC Facility is located within the Coastal Plain physiographic province and is underlain by thick terrace sediment deposits. Excavation during construction activities is expected to be minimal, since the SPVS mounts are anticipated to be installed through boring or driving piles. No excavations or removal of rock is anticipated; therefore, geologic features are not expected to be encountered during construction or dismantling of the SPVS. Potential impacts caused by encountering geologic formations and/or impacts to geologic formations themselves are unlikely.

Topography

The ground disturbance for the Proposed Action would include boring or augering into the ground surface to allow for installation of the mounts for the SPVS, as well as potential trenching for installation of power line conduit, installation of security fencing, and installation of a water-permeable aggregate layer (such as gravel) to control vegetation and prevent runoff. No mass grading or excavation is proposed for any of the ground-mount installations, and the remainder of the SPVS system will be installed on top of structures. Therefore, there is no potential for impact to topography on the site or surrounding properties during construction. Similarly, dismantling of the SPVS would not include significant excavation or other topography altering activities; therefore, dismantling of the SPVS would not impact topography.

Soils – Erosion Concerns

The sites involved in the Proposed Action Plan are currently undeveloped and consist of mostly open ruderal, agricultural, and developed land uses. Construction of the SPVS at the sites would entail limited disturbance and will maintain existing grasses underneath the panels in pervious land use types. Since the SPVS will be mounted to posts with no grading, actual ground disturbance is not anticipated to exceed the 1-acre disturbance threshold. If the IPP determines that more than 1 acre is required for disturbance, construction activities would require permitting for compliance with local land disturbance regulations. Upon dismantling of the SPVS at the sites, the footings would be removed and the surface regraded and restored.

Vehicular access to the site is available via existing paved roads, negating the need for temporary construction roads; therefore, sediment control measures would not be required or necessary along the existing roadways.

Soils – Contamination Concerns

Solar panels may contain trace levels of heavy metals within their components, depending on the manufacturer. It is unlikely that these components would leach heavy metals during installation or dismantling; however, potential soil contamination could result during construction and dismantling of the SPVS from leakage of petroleum from construction equipment. Leakage from transformers fluids is not expected to be a concern, since existing transformers use bio-based oils, such as mineral oil, and these specifications are expected to extend to the IPP for any new transformers installed to support the SPVS. Any fluid stored in transformers would be minimal and modern dielectric fluid does not contain polychlorinated biphenyls (PCBs). Best management practices (BMPs) and equipment maintenance significantly reduce the potential of a release from equipment. Therefore, the risk of soil contamination during construction, operation, or dismantling of the Proposed Action is not significant.

As discussed in Section 3.11.3, USDA investigations identified nine Areas of Concern (AOCs) for possible contamination, eight have received findings of No Further Action (NFA), the remaining AOCs have been managed under the remediation investigation process to resolve.

As a result of the USDA non-time critical removal action to remove known contamination, it is unlikely that additional significantly contaminated soils would be encountered during the Proposed Action. Finally, the Proposed Action itself does not have a potential to cause any further negative impact to the condition of the soil at the SPVS sites.

4.1.2. Operation and Maintenance

Geology

No geologic features would be encountered during operation and maintenance of the proposed SPVS and impacts from or to geologic features would not occur.

Topography

Operation and maintenance to the SPVS would not include significant excavation or other topography altering activities. Operation and maintenance of the SPVS would not impact topography.

Soils

The long-term operation of the SPVS is not anticipated to result in significant environmental impacts to the quality of soils at the BARC Facility or in the surrounding area. Localized soil heating may occur in the vicinity of the array due to the absorption of heat by the solar panels from the sun, but the impact would be minimal and is unlikely to affect soil conditions.

Ongoing environmental investigation/remediation in the area of the area of the SPVS is not anticipated as the majority of the AOCs identified on BARC have been assessed and remediated and have a finding of No Further Action (NFA). The limited excavation anticipated for installation minimizes the amount of soil disturbance.

4.1.3. Conclusion

Impacts from the Proposed Action to ground resources, including geology, topography, and soils, are expected to be minimal at the proposed site due to the limited ground disturbance since installation will occur on mounted poles with little to no excavation of the underlying soils.

Additionally, any previous soil contamination located at these potential solar sites is unlikely to be encountered or otherwise be disturbed due the limited ground disturbance for installation of the solar panel mounts.

4.2. WATER RESOURCES

4.2.1. Construction and Dismantling

Surface Water

Since there are no surface water resources or wetlands located at any of the proposed sites, no direct impacts are anticipated.

There remains the potential for indirect impacts to nearby surface waters include siltation caused by soil erosion from installation of the ground-mount solar PV sites, which includes minor ground disturbing activities for construction and dismantling of the SPVS. Use of BMPs to comply with state and local sediment control laws would control any siltation or erosion from this site during the construction and dismantling phases.

Other potential indirect impacts to nearby surface waters could result from the release and subsequent runoff of dielectric fluids used in the transformers or any fuel or oil from construction

and/or dismantling equipment. The potential for leaks or releases of dielectric fluids, fuels, and oils is minimal due to use of BMPs and implementation of spill prevention plans; therefore, surface water contamination caused as a result of the construction and dismantling of the SPVS is not significant.

Groundwater

Excavation for the sites would include the installation of concrete footer bases for the solar panels, security fencing, and potential trenching for electrical utility conduit. These excavation activities are not expected to exceed a depth of 6 feet below grade. Similarly, dismantling activities are not expected to exceed a depth of 6 feet below grade. An ongoing groundwater monitoring program on the BARC Facility is not currently occurring, however, due to the presence of wetlands and floodplains, the water table is expected to be above the maximum depth of excavation for portions of the year.

Potential groundwater contamination sources that may exist during construction and dismantling of the SPVS are limited to leakage of petroleum from construction equipment and dielectric fluid from transformers. In the unlikely event of leakage, impacts to groundwater would be localized and limited. Therefore, the potential for contamination impacts to groundwater during construction of the proposed SPVS is not significant.

Floodplains and Wetlands

Four streams on the BARC facility have mapped flood plains. Seven sites (S-22, W-28, W-41, W-69, W-70, W-71, and W-72), occur within the 100-year floodplains on West BARC. Six of these sites are proposed as ground mount, while S-22 is proposed as an agriculture mount. Whether these sites are constrained will be evaluated by the IPP, since the pole mounts are not anticipated to contribute to a rise requiring evaluation by FEMA or Prince George's County, the primary concern is whether any flooding in those areas will present a hazard to the SPVS equipment. MDE has jurisdiction over floodplain impacts as a result of any grading or construction activity. The seven proposed locations and would require MDE review and authorization for the installation of the ground mounts and agriculture mounts within floodplains.

During construction, the very limited soil disturbance from wire trenching activities will minimally increase the risk for erosion from the sites. Use of erosion control BMPs would prevent soil erosion at the proposed sites. State and local regulations require that sediment control measures, if applicable, be in place prior to the start of construction. Therefore, the likelihood that floodplains at the BARC facility will be impacted are not significant.

Wetlands are mapped on the BARC Facility; however, wetlands are mapped primarily along riparian corridors. The greatest potential for impact to the wetland is siltation from runoff during construction and dismantling activities. Use of erosion control BMPs would prevent soil erosion at the proposed site. State and local regulations require that sediment control measures be in place

prior to the start of construction. Therefore, the likelihood that wetlands on the BARC Facility would be impacted by soil erosion is not significant.

As established earlier, the risk of a fuel spill due to construction and dismantling equipment failure or spill from a transformer is considered minimal. If a spill from equipment or a transformer were to occur, it would likely be localized to a small area near the equipment and could easily be abated. Therefore, the risk of contamination from spills to wetlands from construction of the proposed SPVS is not significant.

4.2.2. Operation and Maintenance

Surface Water

Since there are no surface waters at any of the 72 sites, direct impacts to surface waters are not associated with the Proposed Action. During operation and maintenance, there would be no ground disturbing activities that could contribute soil erosion. The SPVS will be designed to facilitate localized infiltration, and will be integrated into existing stormwater infrastructure for building rooftop, agricultural, and parking type arrays. The ground-mounted arrays will continue to have pervious soils and ground cover below the panels, so substantial runoff is not anticipated.

The potential for leaks or releases of dielectric fluids, fuels, and oils during operation and maintenance is minimal due to use of BMPs and implementation of spill prevention plans. Additionally, transformers are sealed for operation, and no removal or refilling of fluids occurs as part of operation and maintenance. Therefore, the lack of fluid handling negates the risk of spillage from routine maintenance.

Groundwater

Potential groundwater contamination sources that may exist during operation and maintenance of the SPVS are not anticipated, since fluid from transformers is anticipated to be bio-based oils, such as mineral oil. In the unlikely event of leakage, impacts to groundwater would be localized and minimal. These types of events will be managed by the SPCC plans at BARC and the IPP contractor that is awarded the SPVS contract.

Floodplains and Wetlands

Based upon the pole mounting of the ground based arrays, significant impact floodplains is unlikely. However, it will be the responsibility of the IPP to determine whether the seven sites that occur within floodplains present a hazard to their SPVS equipment from an operation and maintenance standpoint due to increased flooding probability at these sites.

4.2.3. Conclusion

Impacts from soil erosion and accidental spills to water resources, including surface water, groundwater, floodplains, and wetlands, are expected to be minimal at the Proposed Action sites and do not present a potential for significant impact to the environment.

4.3. AIR QUALITY

Beltsville, Maryland, is in a nonattainment area for ozone (marginal), $PM_{2.5}$ (moderate), and carbon monoxide (moderate). Since ozone is not a pollutant that is emitted directly into the atmosphere, ozone precursor pollutants, such as NO_x and VOCs, must be analyzed to determine the potential for ozone impacts. To determine whether the Proposed Action would contribute to air pollution above the thresholds listed in Table 4, a General Conformity applicability determination was conducted. Air quality impacts associated with the construction and operation of the SPVS are primarily related to increases in vehicle emissions associated with the heavy equipment in the construction and operation phases of the Proposed Action as listed below in Table 9.

A sample set of equipment was set up for construction and operation of the proposed SPVS. Table 9 depicts the equipment anticipated to be used in the construction and operation of the Proposed Action. In the absence of construction equipment specifications for this project, construction equipment utilized and their emissions were estimated to equal those specified for the Lucerne Valley Solar Project (BLM 2007). This project is similar in scope to the Proposed Action; therefore, air emissions associated with this project are expected to be similar in size.

Table 9: Equipment Listing for Construction and Operation of the Proposed Action

Phase	Equipment
Construction	Vibratory Post Driver/Drill Rig, Crawler Tractors/Dozer, Excavators, Forklifts/Aerial Lifts/Booms, Generator/Compressor, Graders, Rollers/Compactors, Scrapers, Tractors/Loaders/Backhoes, Vibratory Plate
Operation	Heavy Duty Truck, ATV

4.3.1. Construction

Construction activities that have the potential to result in air emissions impacts include fugitive dust impacts from surface disturbance, use of construction equipment, and a temporary increase in vehicle access to the site during the construction phase. Any impact to ambient air quality associated with construction of the SPVS would be temporary in nature and easily mitigated by applying BMPs such as wetting the ground on a regular basis during construction to reduce fugitive dust and prohibiting the idling of trucks.

Construction activities from the equipment listed in Table 9 would cause a temporary increase in all NAAQS criteria pollutants. The emissions associated with construction are shown in Table 10. As

shown in the table, emissions would be well below *de minimis* standards. As a result, there would be a minor adverse, but less than significant, air quality impact associated with construction emissions.

Table 10: Construction Air Quality Emissions (tons)

	VOC	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$
Construction Emissions	0.66	2.65	6.06	0.01	6.64	0.48
***De minimis* Standard**	50	100	100	100	100	100
% De minimis	1.32%	2.65%	6.06%	0.01%	6.64%	0.48%

Notes:

Construction Impacts anticipated for 1 year in duration, beginning in 2018.

Source: BLM 2007.

4.3.2. Operation

The primary contributors to air emission in the operation phase of the project are from the routine use of a heavy-duty truck and an ATV equipped with air compressors and pressure washers to maintain the solar arrays. For the purposes of this analysis, washing and blowing with compressed air, utilizing a heavy-duty truck and an ATV for transportation was assumed as a worse case. The emissions associated with operations and maintenance are shown in Table 11. As a result, there would be a minor adverse, but less than significant, air quality impact associated with operation emissions.

Table 11: Operation Emissions (tons)

	VOC	CO	NO_X	SO_2	PM_{10}	$PM_{2.5}$
Operation Emissions	0.18	3.47	0.44	0.00	3.83	0.41
***De minimis* Standard**	50	100	100	100	100	100
% De minimis	0.00%	3.47%	0.44%	0.00%	3.83%	0.41%

Notes:

Source: BLM 2007.

Multiplier applied to source data to adjust from a 125 to 365 days of operation.

4.3.3. Greenhouse Gas Emissions

In the absence of construction equipment specifications for this project, greenhouse gas emissions were estimated to equal those specified for the Lucerne Valley Solar Project (BLM 2007). This project is similar in scope; therefore, air emissions associated with the Proposed Action are expected to be similar in size. The GHG emissions anticipated during the construction phase of the Proposed Action are shown in Table 12.

Table 12: Construction Greenhouse Gas Emissions (metric tons)

Site 1	CO_2
Construction	653

Source: BLM 2007.

Final calculations for electrical output are unavailable at this time; therefore, it is difficult to accurately project GHG outputs associated with operation of the Proposed Action. In the absence of this data, analysis of GHG output associated with operation of the Proposed Action is presented by comparing CO_2 output against generation of electricity by common fossil fuel combustion methods. Table 13 depicts the average output of CO_2 per kWH of solar power vs. power generation from the combustion of fossil fuels.

Table 13: CO_2 Emissions for Solar Generation vs. Fossil Fuels

	CO_2 (pounds/kWH)
Coal	909
Natural Gas	465
Solar	105

Source: BlueSkyModel 2017

4.3.4. Conclusion

The emissions associated with the project are projected to be well below de minimis standards. The Proposed Action would result in a temporary increase in emissions during construction; however, not in an amount significant enough to hinder maintenance of the NAAQS within the region of influence. Temporary fugitive dust impacts would be easily mitigated with regular wetting of the affected ground; vehicle emissions impacts would be mitigated as much as possible by prohibiting equipment idling. Based on these findings, there would be an adverse, but insignificant, impact associated with air quality emissions resulting from construction of the Proposed Action. Although final calculations of GHG once the facility is placed into operation are not available at this time, generation of renewable solar energy will create a net positive impact by reducing the GHG footprint of the facility, and replacing energy sources in the region that would otherwise be generated through the combustion of fossil fuels.

4.4. BIOLOGICAL RESOURCES

4.4.1. Construction and Dismantling

Vegetation and Wildlife

Under the Proposed Action, only a few of the ground-mounted array sites would require any vegetation clearing for SPVS construction and dismantling activities. The removal or displacement of some of the recently planted trees may be necessary, and to comply with Chesapeake Bay Urban Tree Canopy goals, tree replacements or permits may be required, based on the size and type of tree being removed. (CEC 2003).

Construction and dismantling impacts are expected to be minimal and insignificant because the site is already currently developed, construction BMPs would be utilized, trees requiring displacement

would be moved or replaced (rather than being removed completely), and no long- term changes in biological habitat are likely or anticipated.

Endangered, Threatened and Rare Species

Based on the previous ecological surveys, referenced in Section 3.4, it is unlikely that there are any federally or state listed endangered, threatened, or rare species in the immediate area of the Proposed Action. Therefore, it is unlikely any endangered, threatened or rare species would be significantly impacted by construction or dismantling activities associated with the Proposed Action.

The USFWS Chesapeake Bay Ecological Services Office currently maintains a website that allows project review and the ability to obtain a formal species list (accessed March 2018) and avoid consultation with the USFWS if existing information and field surveys demonstrate that no potentially suitable habitat is located within the project's action area (i.e., the affected environment). (USFWS 2018). After uploading the proposed locations of the SPVS into the USFWS Information for Planning and Consultation (IPac) system, no species with Federal protection are anticipated and further consultation is not required since no habitat was observed during field evaluation of the sites.

4.4.2. Operation and Maintenance

Vegetation and Wildlife

Possible impacts from the operation and maintenance of the proposed SPVS may result from typical anticipated maintenance activities. Maintenance activities include removing and trimming of any trees or vegetative that would potentially shade the SPVS panels. In addition, the SPVS array may create perching opportunities for birds. This would not be anticipated to harm the wildlife, but may require more frequent cleaning and washing of the solar panels to remove possible bird droppings. (DOE 2009). The USDA has included language in the SPVS scope of work that requires the contractor to use environmentally preferable products for any cleaning that will take place during the operation and maintenance phase. Thus, this would not be expected to significantly impact the surrounding wildlife and vegetation.

None of the above-mentioned potential impacts on vegetation and wildlife are expected to be significant or adverse.

Endangered, Threatened and Rare Species

Based on previous ecological surveys, referenced in Section 3.4, it is unlikely any federally or state listed endangered, threatened and rare species would have habitats in the immediate vicinity of the SPVS.

4.4.3. Conclusion

The Proposed Action is not expected to impose significant impacts on local vegetation and wildlife or any endangered, threatened, and rare species. There would be no anticipated significant impacts on biological resources resulting from the construction, operation and maintenance, or dismantling of the proposed SPVS.

4.5. CULTURAL RESOURCES

The Proposed Action would not have an impact on either the buildings associated with the North Farm Historic District or any other eligible properties located at the BARC Facility. Consultation with MHT has resulted in concurrence that these sites will not have an adverse impact to historic or archeological resources (see Appendix B).

The Proposed Action would not introduce viewshed concerns that could produce adverse effects to cultural resources. Additionally, the Proposed Action is temporary as the SPVS would be provided to a contractor for 20 years under an easement. Therefore, the introduction of the SPVS to the viewshed of these buildings would not be permanent. Portions of the BARC Facility property are currently fenced and additional fences that may be constructed for the Proposed Action are not anticipated to create viewshed concerns.

Since all of the 72 sites that comprise the Proposed Action are either buildings, parking lots, or existing agricultural fields with no excavation proposed, impacts to native American resources are not anticipated.

The Agricultural Research Service has assessed the impact of the Proposed Project on Indian tribes and determined that the Proposed Project does not, to our knowledge, have tribal implications that require tribal consultation under EO 13175. If a Tribe requests consultation, the Agricultural Research Service will work with the Office of Tribal Relations to ensure meaningful consultation is provided where changes, additions and modifications identified herein are not expressly mandated by Congress.

None of the actions associated with the Proposed Action, including construction, operation and maintenance or dismantling, would affect cultural and/or historic resources within and near the SPVS sites.

4.6. NOISE

4.6.1. Construction and Dismantling

Vehicles and equipment involved in the SPVS construction and dismantling would generate the primary noise from the Proposed Action. The typical noise levels generated by these activities range from 74 to 84 A-weighted decibels (dBA) at approximately 50 feet from the source. Table 14 illustrates the anticipated sound pressure levels at a distance of 50 feet for the miscellaneous heavy equipment.

Table 14: Heavy Equipment Noise Levels

Equipment Type	Number Used	Noise Levels (dBA)
Bulldozer	1	83
Backhoe (rubber tire)	1	74
Front Loader (rubber tire)	1	80
Dump Truck	1	78
Concrete Truck	1	82
Concrete Finisher	1	79
Crane	1	82
Flat-bed Truck (18 Wheel)	1	78
Scraper	1	84
Grader	1	83
Trenching Machine	1	77

Source: DOT 1981.

Estimate based on typical construction scenario.

There would be a temporary increase in noise during construction and dismantling activities associated with the Proposed Action. Construction noise would be comparable to noise generated from trucks and heavy equipment used in the surrounding areas.

In the unlikely event that all of the equipment would be active at a SPVS site at once, the noise level generated would still be expected to fall within the noise criteria for an industrial site (see Table 6). In the event that construction noise briefly exceeds industrial standards, the construction would be exempt from Prince George's County noise standards since it is occurring on a Federal facility, but would occur during traditional work hours so the effect is not anticipated to be significant due to its temporary nature.

4.6.2. Operation and Maintenance

The operation of the solar panels would be virtually silent for a fixed array. An array that is tracked to align itself with the relative position of the sun would have very minimal noise emanating from the small electrical motors powering the tracks as they align the surface to face the sun. Maintenance of the solar panels would include wash-down of the solar panels with water or using air blowers to remove any dust or debris, but this activity would be infrequent. Pressure washers, air blowers and compressors would result in temporary and minimal noise impacts.

4.6.3. Conclusion

The noise associated with the Proposed Action would be greatest during construction and dismantling of the SPVS. Although impacts are anticipated to be adverse at times during the construction and dismantling phases, they would be for short periods of time and only occur during work hours to minimize the impact to any nearby receptors. They are not anticipated to be

significant due to similar types of equipment that is used for agriculture and the operations of the BARC facility. The presence of large open spaces and forested margins along riparian areas allow for thick foliage and other natural noise barriers. The noise associated with the operation and maintenance of the solar panels would be virtually nonexistent and, therefore, not be significant.

4.7. VISUAL RESOURCES

4.7.1. Construction and Dismantling

The area around the BARC facility is fully developed with a combination of industrial, housing and commercial uses. The Proposed Action consists of 72 sites spread out over the BARC facility. There are four different SPVS array types, which vary by mount type and whether they are fixed or tracking SPVS. The four types are ground mount, roof mount, agriculture mount, and parking lot mount. The ground-mount SPVS are proposed to be tracking arrays, while the roof, agriculture, and parking lot mounts will be fixed arrays. The roof mounts are being installed on existing structures and would therefore represent a negligible change to the visual character of the area. The parking lot and agriculture mounts would be built on constructed covered parking and constructed covering for agricultural equipment, respectively and therefore introducing new visual elements to the landscape. Finally, the ground mounts are anticipated to have a relatively low profile, but panel height or other design details are not available at this time. Regardless, the ground-mount structures would alter the visual landscape because they would also be new visual elements. For each site, the IPP would be responsible for constructing a transmission feeder line that would add separate new visual elements to the landscape. The construction of the proposed transmission feeder lines is not expected to impact the visual character of the sites as distribution lines are a common aspect of the existing visual landscape. When possible, the IPP would locate the transmission feeder lines in existing right-of-way.

Photovoltaic (PV) panels are thought to create glint, glare, or dazzle which can cause a brief loss of vision (also known as flash blindness) due to the reflectivity (i.e., the light that is reflected off surfaces) of the solar panels. In certain situations, PV panels can produce brief glint and glare, but the photovoltaic technologies proposed are primarily absorptive and less likely to produce glint, glare, or dazzle than other solar technologies, such as concentrated solar power technologies that are highly reflective. Concentrated solar power is not typically installed near residential or commercial areas including airports (Meister 2014). Therefore, the potential for visual impacts due to the reflectivity of the solar panels for any of the proposed sites would be negligible.

Some of the 72 sites are sited in areas with no public view and therefore no impact to visual resources. However, sites with public views and associated visual landscape alteration impacts are generally discussed below. Details on individual sites' visibility are included in Table 15 and Appendix A. Efforts to minimize visual impacts are noted in the descriptions below.

Table 15: Visual Resources Analysis

Map Name	BARC Bldg #	Near BARC Bldg #	Array Type	Visual Land-scape Altera-tion	Supporting Details
E-10	301E, F, G		Ag	Yes	Visible to motorists accessing Research Road and Beaver Dam Road. Partially screened by single row of trees while traveling from north to south along Research Road.
E-11	none	218Q	Ag	Yes	Visible to motorists traveling along Research Road and Beaverdam Road. Site is partially obscured by building 218Q.
E-13	none	203C	Ag	No	Site obscured to motorists traveling along Powder Mill Road relief as well as screening by buildings along Animal Husbandry Road. Site is greater than 2,000 feet from Odell Road and greater than 1,600 feet from Powder Mill Road.
E-18	none	171D	Ag	Yes	Site is not accessible via public road. Site is obscured to motorists traveling along Powder Mill Road as well as Edmonston Road by topographic relief and is screened by multiple buildings. However, site is visible by residents traveling along Beaver Dam Road and Rosedale Lane. These residential areas are located approximately 800-1,000 feet south of Site.
E-58	none		Ag	No	Site obscured to motorists traveling along Powder Mill Road relief as well as screening by buildings along Animal Husbandry Road. Site is greater than 2,000 feet from Odell Road and greater than 1,600 feet from Powder Mill Road.
E-59	none		Ag	Yes	Site visible by motorists traveling along Powder Mill Road as well as pedestrians accessing the Metro Bus Stop along Powder Mill Road. Site is approximately 300 feet from Powder Mill Road and approximately 400 feet from the Metro Bus Stop with few mature, individual trees partially obscuring the view.
E-67	none		Ag	Yes	Site visible by motorists traveling along Beaver Dam Road, unscreed and located approximately 200 feet south of Beaver Dam Road. Residences are located approximately 1,200 feet from the sites and would have a partially obstructed view due to scattered trees and other vegetation.

Table 15, cont'd

Map Name	BARC Bldg #	Near BARC Bldg #	Array Type	Visual Land-scape Altera-tion	Supporting Details
E-68	none		Ag	Yes	Site visible by motorists traveling along Beaver Dam Road, unscreed and located approximately 250 feet south of Beaver Dam Road. Residences are located approximately 1,200 feet from the sites and would have a partially obstructed view due to scattered trees and other vegetation.
E-01	none	606	Ground	No	No public views. 430-foot forested buffer to public road located to the west. No additional roads for public access.
E-02	none	606	Ground	No	No public views. 880-foot forested buffer to public road located to the west.
E-03	none	606	Ground	No	No public views and no public access. Screened by forested buffer.
E-04	none	606	Ground	No	No public views and no public access. Screened by forested buffer.
E-66	none		Ground	Yes	Visible to motorists accessing Research Road and Beaver Dam Road. Partially screened by single row of trees while traveling from north to south along Research Road.
E-75	none		Ground	Yes	Visible, and unobscured to motorists traveling along Powder Mill Road. Site located immediately adjacent to Powder Mill Road.
E-76	none		Ground	Yes	Visible, and unobscured to motorists traveling along Powder Mill Road. Site located immediately adjacent to Powder Mill Road.
E-77	none		Ground	Yes	Visible, and unobscured to motorists traveling along Powder Mill Road. Site located immediately adjacent to Powder Mill Road.
E-09	none	426	Parking Lot	Yes	Visible, and unobscured to motorists traveling along Powder Mill Road. Site located immediately adjacent to Powder Mill Road.
E-19	none	177A	Parking Lot	Yes	Site visible by motorists traveling along Powder Mill Road as well as pedestrians accessing the Metro Bus Stop along Powder Mill Road. Site is approximately 160 feet from Powder Mill Road and approximately 300 feet from the Metro Bus Stop with an unobstructed view.

Table 15, cont'd

Map Name	BARC Bldg #	Near BARC Bldg #	Array Type	Visual Land-scape Altera-tion	Supporting Details
E-20	none	177A	Parking Lot	Yes	Site visible by motorists traveling along Powder Mill Road as well as pedestrians accessing the Metro Bus Stop along Powder Mill Road. Site is approximately 160 feet from Powder Mill Road and approximately 300 feet from the Metro Bus Stop with an unobstructed view.
E-05	427		Roof	N/A	N/A
E-06	430		Roof	N/A	N/A
E-07	426		Roof	N/A	N/A
E-08	426A		Roof	N/A	N/A
E-12	203C		Roof	N/A	N/A
E-14	163F		Roof	N/A	N/A
E-15	178-2		Roof	N/A	N/A
E-16	183		Roof	N/A	N/A
E-17	166H		Roof	N/A	N/A
E-61	none		Roof	N/A	N/A
L-50	none		Ground	Yes	Partially visible to Residents of Wynfield Park Apartments, located south of NAL-screened by 45-foot buffer of trees between apts. and NAL. Visible to public traveling on South Drive accessing NAL or Rhode Island Ave.
L-78	none		Ground	Yes	Visible from highway US 1/Baltimore. Visible from South Dr. (entrance roundabout into NAL). Partially visible to Residents of Wynfield Park Apartments, located south of NAL-screened by 45-foot buffer of trees between apts. and NAL.
L-79	none		Ground	Yes	Visible from highway US 1/Baltimore. Visible from South Dr. (entrance roundabout into NAL). Partially visible to Residents of Wynfield Park Apartments, located south of NAL-screened by 45-foot buffer of trees between apts. and NAL.
L-80	none		Ground	Yes	Partially visible to Residents of Wynfield Park Apartments, located south of NAL-screened by 45-foot buffer of trees between apts. and NAL.

Table 15, cont'd

Map Name	BARC Bldg #	Near BARC Bldg #	Array Type	Visual Land-scape Altera-tion	Supporting Details
L-82	none		Ground	Yes	Visible to motorists traveling on South Drive accessing NAL. Or to motorists traveling on Rhode Island Ave. Obscured to Residents on Paducah Road and Rhode Island Ave by single row of trees.
L-45	none		Parking Lot	Yes	Visible from highway US 1/Baltimore. Visible from South Dr. (entrance roundabout into NAL). Partially visible to Residents of Wynfield Park Apartments, located south of NAL-screened by 45-foot buffer of trees between apts. and NAL.
L-46	none		Parking Lot	Yes	Visible from highway US 1/Baltimore. Visible from South Dr. (entrance roundabout into NAL). Partially visible to Residents of Wynfield Park Apartments, located south of NAL-screened by 45-foot buffer of trees between apts. and NAL.
L-47	none		Parking Lot	Yes	Visible from highway US 1/Baltimore. Visible from South Dr. (entrance roundabout into NAL). Partially visible to Residents of Wynfield Park Apartments, located south of NAL-screened by 45-foot buffer of trees between apts. and NAL.
L-48	none		Parking Lot	Yes	Visible from highway US 1/Baltimore. Visible from South Dr. (entrance roundabout into NAL). Partially visible to Residents of Wynfield Park Apartments, located south of NAL-screened by 45-foot buffer of trees between apts. and NAL.
L-49	none		Parking Lot	Yes	Visible from highway US 1/Baltimore. Visible from South Dr. (entrance roundabout into NAL). Partially visible to Residents of Wynfield Park Apartments, located south of NAL-screened by 45-foot buffer of trees between apts. and NAL.
L-51	none		Parking Lot	Yes	Visible to public traveling on South Drive accessing NAL. Or Rhode Island Ave. Partially visible by motorists traveling on Rhode Island Ave via east entrance to NAL. Primarily screened due to vegetation and trees growing alongside entryway.
L-52	none		Parking Lot	Yes	Visible to public traveling on South Drive accessing NAL or Rhode Island Ave.

Table 15, cont'd

Map Name	BARC Bldg #	Near BARC Bldg #	Array Type	Visual Land-scape Altera-tion	Supporting Details
L-53	none		Parking Lot	Yes	Visible to public traveling on South Drive accessing NAL. Or Rhode Island Ave. Partially visible by motorists traveling on Rhode Island Ave via east entrance to NAL. Primarily screened due to vegetation and trees growing alongside entryway.
L-54	none		Parking Lot	Yes	Visible to public traveling on South Drive accessing NAL. Or Rhode Island Ave. Partially visible by motorists traveling on Rhode Island Ave via east entrance to NAL. Primarily screened due to vegetation and trees growing alongside entryway.
L-55	none		Parking Lot	Yes	Visible to public traveling on South Drive accessing NAL. Or Rhode Island Ave. Partially visible by motorists traveling on Rhode Island Ave via east entrance to NAL. Primarily screened due to vegetation and trees growing alongside entryway.
L-56	none		Parking Lot	Yes	Visible to public traveling on South Drive accessing NAL. Or Rhode Island Ave. Partially visible by motorists traveling on Rhode Island Ave via east entrance to NAL. Primarily screened due to vegetation and trees growing alongside entryway.
S-22	none		Ag	Yes	Not accessible via public road; however, residents of Seven Springs Apartments would have a relatively unrestricted view of site as it is only screened by one row of sparse tree coverage. Site S-22 is approximately 150–350 feet from apartment complex.

Table 15, cont'd

Map Name	BARC Bldg #	Near BARC Bldg #	Array Type	Visual Landscape Alteration	Supporting Details
W-23	033C,D,E		Ag	No	Not accessible via public road. View of site obstructed by topography and landscaping along Cherry Hill Road and Sellman Road.
W-28	none	050	Ground	No	Ground mount location not accessible via public road. Wooded buffer of greater than 400 feet separates residents of Camden College Park Apartments to Site W28.
W-41	none		Ground	No	Not accessible via public road. Site is obscured from Circle Drive by multiple buildings.
W-69	Field		Ground	No	Ground mount location not accessible via public road. Wooded buffer of greater than 600 feet separates I-495 from site to the north. IKEA Home Furnishings and parking lot obscures site location by dense woodline approximately 250 feet wide. View from Cherry Hill Road obscured by 3 distinct woodlots and greater than 1,700 feet.
W-70	Field		Ground	Yes	Ground mount location is not accessible via public road; however, mount would be visible to motorists through scant tree coverage while traveling along Sellman Road.

Table 15, cont'd

Map Name	BARC Bldg #	Near BARC Bldg #	Array Type	Visual Landscape Alteration	Supporting Details
W-71	Field		Ground	Yes	Ground mount location is not accessible via public road; however, mount would be visible to motorists traveling along Sellman Road as there is no visual buffer screening the site. Site would be visible to residents located on Sellman Road and Woodleigh Court. As well, Site W-71 would be visible to residents located along 43rd Avenue as there is only one row of trees potentially screening the site.
W-72	Field		Ground	No	Site is not accessible via public road or to the residents located on Romlon Street as Site is screened by greater than 500 feet of forests.
W-73	Field		Ground	No	Site is not accessible via public road or to the residents located on Romlon Street as Site is screened by Building 011A.
W-74	Field		Ground	Yes	Partially visible to residents of apartment complexes located along Romlon Street. Some obscurity by scattered row of trees in between apartments and site.
W-29	none	007	Parking Lot	Yes	Site is potentially visible from Camden College Park Apartments, visible from South Drive, and visible from Circle Drive.
W-30	none	007	Parking Lot	Yes	Site is potentially visible from Camden College Park Apartments, visible from South Drive, and visible from Circle Drive.

Table 15, cont'd

Map Name	BARC Bldg #	Near BARC Bldg #	Array Type	Visual Landscape Alteration	Supporting Details
W-31	none	007	Parking Lot	Yes	Site is potentially visible from Camden College Park Apartments, visible from South Drive, and visible from Circle Drive.
W-32	none	001	Parking Lot	Yes	Visible to motorist traveling west along South Drive. Partially visible to residents of Camden College Park Apartments- although partially obstructed by row of trees in between South Drive and apartments.
W-33	none	001	Parking Lot	Yes	Visible to motorist traveling west along South Drive. Partially visible to residents of Camden College Park Apartments- although partially obstructed by row of trees in between South Drive and apartments.
W-34	none	003	Parking Lot	Yes	Potentially visible to residents of Camden College Park Apartments. Site is screened from Circle Drive by buildings 002, 003, and 004.
W-35	none		Parking Lot	Yes	Potentially visible to residents of Camden College Park Apartments. Site is screened from Circle Drive by buildings 002, 003, and 004.
W-36	none		Parking Lot	Yes	Potentially visible to residents of Camden College Park Apartments. Site is screened from Circle Drive by buildings 002, 003, and 004.
W-37	none		Parking Lot	Yes	Potentially visible to residents of Camden College Park Apartments. Site is screened from Circle Drive by buildings 002, 003, and 004.

Table 15, cont'd

Map Name	BARC Bldg #	Near BARC Bldg #	Array Type	Visual Landscape Alteration	Supporting Details
W-38	none		Parking Lot	Yes	Visible to motorists along Circle Dr. Partially visible to residents of apartment complexes located along Romlon Street and apartments along 45th Place and 46th Ave. Some obscurity by scattered row of trees in between apartments and site.
W-39	none		Parking Lot	Yes	Visible to motorists along Circle Dr. Partially visible to residents of apartment complexes located along Romlon Street and apartments along 45th Place and 46th Ave. Some obscurity by scattered row of trees in between apartments and site.
W-40	none		Parking Lot	Yes	Visible to motorists along Circle Dr. Partially visible to residents of apartment complexes located along Romlon Street and apartments along 45th Place and 46th Ave. Some obscurity by scattered row of trees in between apartments and site.
W-42	none		Parking Lot	Yes	Potentially visible to residents of Camden College Park Apartments.
W-43	none		Parking Lot	Yes	Potentially visible to residents of Camden College Park Apartments.
W-44	none		Parking Lot	Yes	Potentially visible to residents of Camden College Park Apartments.
W-24	028A		Roof	N/A	N/A
W-25	028C		Roof	N/A	N/A

Source: USDA and Atkins 2018.

A grouping of ground (L-50,78-82) and parking lot mount (L-45-49 and L-51-56) sites are clustered to the south of the U.S. National Agricultural Library in the Linkage Farm. The southern edge of this grouping borders the Wynfield Park apartments and a forested area. Some of the buildings of the Wynfield Park apartments adjacent to the BARC boundary would have a view of these sites that is partially obstructed by vegetation widths that average approximately 45 feet. Views would be less obstructed in the fall and winter when deciduous trees have lost their leaves. These sites are visible or partially visible to the public travelling on South Drive, Rhode Island Avenue, and/or US 1/ Baltimore Avenue. These sites would alter the visual landscape in vicinity of the National Agricultural Library. A fence and pollinator hedge is proposed to be added along US 1/Baltimore Avenue to minimize the visual alteration.

A concentration of ground and parking lot sites are proposed for the northeast corner of the North Farm. Site W-71 is bordered to the north and south by single family residential areas and the site would be visible to motorists traveling along Sellman Road as there is no visual buffer (e.g., vegetation or intervening buildings) screening the site. Site W-71 would be visible to residents located on Sellman Road, Woodleigh Court, and 43rd Avenue. The residential area to the north is similar in elevation to Site W-71, therefore views are reduced. The residential area to the south of W-71 is higher in elevation. As a result, residents located between 43rd Avenue and Site W-71 would have larger views of the site and there is limited vegetation to potentially screen the site. These sites would alter the visual landscape in vicinity of Sellman Road, Woodleigh Court, and 43rd Avenue.

On the east side of North Farm, site W-70 would be visible to motorists through scant tree coverage while traveling along Sellman Road. Site W-74 would be partially visible to residents of apartment complexes located along Romlon Street, due to a scattered row of trees in between the apartments and the site. The parking mount sites W-38, 39, and 40 would be visible to motorists along Circle Drive and partially visible to residents of apartment complexes located along Romlon Street and apartments along 45th Place and 46th Avenue due to a scattered row of trees in between the apartments and the site. These sites would alter the visual landscape in vicinity of Sellman Road, Romlon Street, 45th Place and 46th Avenue.

On the eastern edge of the North Farm, a group of parking lot mounts (W-29 through W-44) is proposed around buildings 001, 002, 003, and 004. Sites W-32 and 33 would be visible to motorists traveling west along South Drive and partially visible to residents of Camden College Park Apartments due to a row of trees. Sites W-29-31 would be potentially visible from Camden College Park Apartments and visible from South Drive and Circle Drive. Finally, sites W-34-37 and W-43-44 would be potentially visible to residents of Camden College Park Apartments. These sites would alter the visual landscape in vicinity of South Drive and Circle Drive.

There is only one proposed site on the South Farm. S-22 is an agriculture mount that would be visible by residents of Seven Springs Apartments. Residents with units adjacent to the site would have a relatively unrestricted view as it is only screened by one row of sparse tree coverage. Site S-22 is approximately 150-350 feet from the apartments and would alter the visual landscape in the vicinity.

In the Central Farm, there is a group of parking, agriculture, and roof mount sites proposed to be located south of Powder Mill Road. Site E-18 would be visible by residents traveling along Beaver Dam Road and Rosedale Lane. The closest residential areas are located approximately 800-1000 feet south of Site E-18. Site E-59 would be visible by motorists traveling along Powder Mill Road as well as pedestrians accessing the Metro Bus Stop along Powder Mill Road. Site E-59 would be approximately 300 feet from Powder Mill Road and approximately 400 feet from the Metro Bus Stop with few mature, individual trees partially obscuring the view. Parking lot mount sites E-19 and 20 would be visible by motorists traveling along Powder Mill Road as well as pedestrians accessing the Metro Bus Stop along Powder Mill Road. The sites are approximately 160 feet from Powder Mill Road and approximately 300 feet from the Metro Bus Stop with an unobstructed view. Sites E-67 and 68 would be located approximately 200 and 250 feet, respectively, south of Beaver Dam Road and would be visible by motorists traveling along Beaver Dam Road. Residences are located approximately 1,200 feet from the sites and would have a partially obstructed view due to scattered trees and other vegetation. Sites E-10, E-11, and E-66 would be visible to motorists accessing Research Road and Beaver Dam Road with site E-11 being partially obscured by building 218Q. Sites E-75-77 and site E-9 would be located immediately adjacent to Powder Mill Road and would be visible and unobscured to motorists traveling along Powder Mill Road. The sites proposed for the Central Farm would alter the visual landscape in the vicinity.

4.7.2. Operation and Maintenance

Operation and maintenance of the SPVS would be the responsibility of the IPP. Operation and maintenance tasks are anticipated to be regular inspections, cleaning, and panel repair/ replacement. No visual impacts are anticipated from operation and maintenance activities.

4.7.3. Conclusion

For the purposes of this analysis, visual mitigation such as that proposed for the NAL (i.e., fence and pollinator hedge) would be employed at sites with visual impacts. Therefore, adverse but not significant with mitigation, impacts to visual resources are expected as a result of the Proposed Action.

4.8. LAND USE

4.8.1. Construction and Dismantling

The SPVS would be installed under an agreement ultimately leading to easements with an IPP. The term of the easement is expected to be 20 years. Based on the terms of the easement, the SPVS would be dismantled at that time and the site would be returned to its previous use. Based on the easement terms, the Proposed Action would only have a short-term impact on the land use at each of the proposed SPVS sites, but no significant impact to the long-term land use is expected. The BARC property is under Federal jurisdiction and County laws governing land use and planning do not apply (M-NCPPC 2018b). However, the National Capital Planning Commission's (NCPC) mission is to "work with federal agencies as it seeks to preserve and enhance the extraordinary historical,

cultural, and natural resources and federal assets of the National Capital Region to support the needs of the federal government and enrich the lives of the region's visitors, workers, and residents" (NCPC 2018). The National Capital Region includes Prince George's County Maryland. The NCPC provides overall planning guidance for federal land and buildings in the region by reviewing the design of federal and certain local projects, overseeing long-range planning for future development, and monitoring capital investment by federal agencies (NCPC 2018). Therefore, the Proposed Action will have to be reviewed by the NCPC.

NCPC has review and approval authority over projects and proposals of the District and federal governments, including civilian and military installations and facilities in the region. The Commission's review includes assessment of conformance with applicable provisions of the NCPC Comprehensive Plan. Federal Elements of the Comprehensive Plan contain goals, policies, and implementation proposals addressing a variety of subjects, such as locations of federal facilities, employee services, affordable housing for federal employees, and energy conservation in the design and construction of federal facilities.

4.8.2. Operation and Maintenance

Operation and maintenance of the SPVS would be the responsibility of the IPP. Operation and maintenance tasks are anticipated to be regular inspections, cleaning, and panel repair/ replacement. Solar panels have a 25-year warranty. No impacts to land use are anticipated from operation and maintenance activities.

4.8.3. Conclusion

Based the Proposed Action's alignment with current zoning, the term of the lease agreement, and the passive nature of the Proposed Action, the potential for adverse effects to land use of neighboring properties is not significant.

4.9. HUMAN HEALTH AND SAFETY

4.9.1. Construction and Dismantling

Implementation of the Proposed Action would involve activities typical of construction projects. The contractor would be expected to ensure that construction and dismantling activities comply with OSHA standards and other applicable engineering and construction standards and codes, such as the National Electrical Safety Code. The contractor is expected to plan for potential site-specific risks and potential risks specific to solar array panel installation (e.g., danger of electric shock). Construction workers are expected to receive appropriate safety training, hold the proper certifications, and be knowledgeable in solar panel installation and its applicable hazards and precautions. For example, prior to installation, solar panels would be expected to remain in a shaded staging area and not in direct sunlight, to prevent possible burns from handling the panels. In addition, the contractor is expected to develop a worker health and safety plan, which would need to be in accordance with any existing health and safety plans at the BARC Facility.

At any of the sites discussed in 3.11.2 where there is a former history of remediation and testing for hazardous materials, construction and dismantling activities may require additional personal protective equipment (PPE) for workers, such as protective clothing and gear or additional equipment cleaning procedures. However, this is unlikely, given that there will be minimal ground disturbance limited to mount piling installation and that groundwater is not expected to be disturbed. The contractor is expected to coordinate with EPA and the USACE to ensure that proper precautions are taken and BMPs are implemented.

4.9.2. Operation and Maintenance

The Proposed Action would involve operation and maintenance activities that may expose on-site personnel to health and safety risks. The SPVS site design is expected to be protected on all sides; safety and security measures would likely include enhanced fencing, locked entrances, and signage to prevent unauthorized entrance onto the site, and to protect against danger of electric shock. Because the contractor would be responsible for all aspects of operating and maintaining the SPVS, they would also be responsible for training their personnel on related health and safety precautions related to the SPVS. The contractor would be expected to ensure that operation and maintenance activities comply with all applicable health and safety standards (e.g., OSHA). While USDA and other BARC Facility personnel are not expected to participate in the operation and maintenance of the SPVS, the BARC Facility would likely train their personnel on basic safety protocol, such as whom to notify if they observe an issue at the SPVS site.

4.9.3. Conclusion

Health and safety risks are expected to be minimal and temporary, and the contractor is expected to effectively manage these risks with measures such as developing a worker health and safety plan, providing PPE for workers, implementing protocols during SPVS operations, and installing secure fencing. Therefore, the potential health and safety impacts resulting from construction, operation and maintenance, and dismantling of the SPVS are expected to be minimal and insignificant.

4.10. UTILITIES AND INFRASTRUCTURE

4.10.1. Construction and Dismantling

Electrical Utility Management

Construction and dismantling of the proposed SPVS would be expected to temporarily require additional electrical demand to serve construction equipment and other typical activities. Construction and dismantling of the SPVS may also require temporary electrical utility service interruptions for portions of the BARC Facility. Table 1 lists the feeder line that will be used for connection to the existing utility transmissions, so land disturbances due to utility connections would be minimal.

After the SPVS is dismantled, the BARC Facility would no longer provide solar-derived electrical power to the electrical utility company. The utility would be expected to anticipate for this change

in electrical demand, reverting back to providing the previous electrical power demand prior to the construction and operation of the SPVS. Although the BARC Facility would no longer purchase electrical power through a contract involving the SPVS, the BARC Facility would continue with normal operations and would continue to obtain service from a local electrical utility company.

None of the abovementioned impacts are expected to be significant.

Potable Water and Wastewater

No temporary or permanent impacts to water or wastewater usage is anticipated as a result of the Proposed Action, since connections to those facilities are not anticipated as part of this project. There will be an increase in site personnel during construction and dismantling activities; however, the contractor will have to manage wastewater with portable toilets and provide water in portable tanks that may be needed for construction and OSHA rules. While not expected, some of the existing potable water and wastewater lines that occur locally at specific sites (mostly the parking lot sites) may need relocation depending on the utility survey that will occur during construction. Temporary water service interruptions to portions of the BARC Facility are unlikely, but may be necessary during construction activities if a relocation is required.

Stormwater Management

The proposed SPVS sites will have locally managed stormwater, including gutters and stormwater volume management that will be incorporated into the contract specifications of the IPP contractor. Additionally, the SPVS ground-mount sites will retain the pervious ground layer underneath the panels that will facilitate appropriate stormwater controls.

Stormwater runoff originating from the site is not expected to have increased sediment since pilings are being installed rather than grading or excavation to mount the SPVS associated with the Proposed Action. The SPVS are expected to be designed so that stormwater flow is directed away from parking areas or building foundations but still maintained through the existing stormwater collection network and or new BMPs. USDA-ARS has inserted sustainable development requirements into the project scope of work to require the contractor to ensure the stormwater profile of the site meets all federal requirements (e.g., EISA stormwater management requirements). The contractor would be expected to implement BMPs for erosion/sediment control and stormwater management during these activities to minimize impacts on the existing stormwater collection system, wetlands, and other environmental resources.

It is possible that there may be a temporary increase in stormwater runoff during construction and initial panel operations. However, site designs are expected to incorporate BMPs and the contractor will be required to ensure the design meets all federal stormwater requirements.

After dismantling the SPVS at BARC, the contractor is expected to remove the pilings and return the grounds to their previous condition. This would likely reduce the stormwater runoff back to its predevelopment conditions. For buildings, no substantial changes to roof top stormwater systems are anticipated.

Storage Tank Management

The Proposed Action would not include changes or improvements to any existing fuel storage tanks, nor is the Proposed Action expected to include construction of any new fuel storage tanks. Because the existing storage tanks (and any associated pipes or connections) are not located near the proposed SPVS, the storage tanks are not expected to be disturbed by construction or dismantling activities. In addition, the tanks are not located in the anticipated pathways of heavy equipment or delivery trucks. Thus, no expected impacts on storage tank management would result from the construction and dismantling activities associated with the Proposed Action.

4.10.2. Operation and Maintenance

Electrical Utility Management

The BARC Facility would continue to operate on a standard federal weekday. No significant increase in worker population is expected in the near future and thus, there would be no significant electrical power demand increase or reduction resulting from this.

The BARC Facility would obtain energy directly from the SPVS as well as continue to obtain electric service from an electrical utility company, which is currently PEPCO. If excess power is generated by the SPVS, the utility would obtain the solar-derived photovoltaic electricity from the SPVS. The SPVS electrical production would be metered and measured, as the BARC Facility's consumption is metered and measured. The SPVS would not produce electrical power when the sun is not present. It is expected that the BARC Facility will use all electricity generated by the SPVS, but that the SPVS would not meet 100 percent of the BARC Facility electrical power demands. Thus, it is expected that the BARC Facility's electrical usage would be charged an additional flat rate if the usage exceeds the SPVS production. However, the electrical power delivery to the BARC Facility would not be based upon the SPVS collection and production (i.e., the utility would continue to provide electricity to the BARC Facility, even when the BARC Facility's demand exceeds the SPVS production). This includes emergency and other situations as well; if the SPVS temporarily undergoes maintenance, operates at a lower efficiency, or is shut down due to damage or system failure, the BARC Facility would continue to obtain electrical service from the local utility. During power outages where the local utility and/or power grid are unable to provide electrical service to the BARC Facility, existing onsite emergency generators would be used temporarily as needed for priority functions for the areas affected by power outage.

While normal operations would continue, the SPVS would provide a potential additional electrical power source for the local BARC electric grid. It is expected that the SPVS would reduce the electricity demand on the local electrical utility providers. In addition, USDA may still procure green power RECs for the BARC Facility as a swap for the solar RECs developed under this project.

Potable Water and Wastewater

There is not expected to be any increase in the potable water use at the BARC Facility since the contractor will need to transport water in portable tanks to clean and wash the proposed SPVS. This maintenance is likely to be infrequent, as the contractor is expected to rely on precipitation as much as possible to wash the solar panels. Washdown from these cleaning activities would be expected to drain into stormwater collection system and is not anticipated to result in any increase in the use of the BARC Facility's infrastructure. None of the above-mentioned impacts are expected to be significant.

Stormwater Management

It is possible there would be a minor increase in the stormwater runoff water use due to cleaning/ washing of the proposed SPVS, although this would likely be infrequent and only when local temperatures were above freezing. Washdown from these activities would be expected to drain into the stormwater collection system, but it is possible that the washdown would infiltrate into the ground or surrounding vegetated areas. However, the water would not be expected to contain toxic or hazardous substances or a significant increase in sediment.

Therefore, there would be no anticipated adverse impacts on the stormwater runoff. In addition, site development designs are expected to implement BMPs for managing stormwater runoff.

Storage Tank Management

No significant impacts to storage tank management are expected to occur due to the operation and maintenance of the proposed SPVS. It is unlikely the SPVS would contribute to the occurrence of power outages and therefore impact emergency generator operations. Operation and maintenance activities associated with the Proposed Action would likely result in no impacts on the storage tank management.

4.10.3. Conclusion

Construction activities associated with the Proposed Action would have negligible impacts on the existing utilities and infrastructure management.

After construction is completed, the operation and maintenance of the SPVS would reduce demand on the local electric utility and would create additional electrical power for the local BARC electric grid. The anticipated impact on the electrical utility management would be potentially beneficial but not significant. Other operation and maintenance activities associated with the Proposed Action would likely result in minimal impacts on the existing potable water, wastewater, and stormwater infrastructure.

Dismantling activities would likely result in similar impacts from construction of the SPVS. In addition, the SPVS would no longer provide solar-derived electrical power to the local electrical

utility, but the BARC Facility would continue its normal operations and receive electrical power from the local utility company.

No significant impacts are expected to result from construction, operation and maintenance, or dismantling of the SPVS.

4.11. WASTE MANAGEMENT

4.11.1. Construction and Dismantling

Solid Waste

Construction of the proposed SPVS would be expected to temporarily generate solid wastes. Solid wastes that would be generated may include concrete, scrap wire, masonry, packing materials, and debris. The USDA-ARS may insert recycling and reuse requirements that meet all federal requirements into the project scope of work, so that the contractor would be required to ensure the design meets all federal pollution prevention requirements. The contractor would also be directed to recycle materials, where feasible, thereby reducing the amount of debris disposed in landfills. Solid waste not recycled by the contractor would likely be directed to an approved landfill, and it is possible that some solid waste (e.g., concrete rubble) would be left onsite per USDA's direction.

Solid wastes would be generated when dismantling the SPVS components; these wastes would be disposed of or recycled. PV panels are generally accepted at and safe for landfills, because the panel and solar cell materials are usually encased in glass or plastic, and most of the materials are insoluble. (DOE 2009; DOE National Renewable Energy Laboratory [NREL] EA 2007). However, as stated previously, some constituents could be classified as toxic or hazardous substances, a situation that is prompting the PV industry to develop recycling processes for modules. Because solar panel disposal is in its infancy, it is not possible to specify if the dismantled SPVS panels would ultimately be able to be recycled. (DOE NREL EA 2007). Thus, the dismantling of the SPVS would likely create solid waste and would create an adverse, but insignificant, impact on the local receiving landfill with respect to solid waste management. It is expected that the solid wastes generated from the dismantling activities would be the responsibility of the utility/operating contractor.

Hazardous Waste

As discussed in Section 3.11.2 there are a few sites where there has been known soil contamination. However, no hazardous waste management impacts are expected to result from activities associated with this construction, given that these activities are not expected to disrupt the soil profile or groundwater table. The contractor is expected to coordinate with EPA and the USACE to ensure that proper precautions are taken and BMPs are implemented.

In addition, the following potential impacts may occur:

- It is likely the construction and dismantling activities would require the use of potentially hazardous materials, such as petroleum, oils and lubricants (POLs). All hazardous materials and construction debris used during construction and dismantling activities would be handled, stored, and disposed of in accordance with federal, state, and local regulations and laws.
- The SPVS would require components which may contain hazardous substances, such as electrical connections to the power grid (e.g., lead soldering). Some models of solar photovoltaic panels may also contain trace amounts of hazardous materials and heavy metals, such as arsenic or cadmium. While solar panels are sealed under normal operating conditions, there is the potential for minimal risks if they are damaged during construction and dismantling activities. (DOE 2009). However, the potentially hazardous constituents in the solar panels are solid (i.e., they are not liquid or gaseous and thus would not be prone to leaking or dispersing), and these materials would not be expected to cause any contamination in soils or groundwater if the panels were de-commissioned properly upon being damaged (Fthenakis 2009).

While potential impacts listed above may occur during construction and dismantling, the likelihood of such events is very small, and BMPs are expected to be implemented to ensure proper management and control of these events. Therefore, potential impacts associated with hazardous waste from construction activities are expected to be minimal and insignificant.

Sanitary Waste

The volume of sanitary waste generated is likely to increase during construction and dismantling activities due to the increase of site personnel at the construction site. It is expected that portable toilets would be provided by an external contractor. This contractor would be expected to properly manage and dispose of the sanitary wastes through the proper wastewater treatment authority.

4.11.2. Operation and Maintenance

Solid Waste

Solar photovoltaic panels are encased and sealed in glass or plastic and typically have useful lives of up to 30 years. (DOE NREL EA 2007; Brookhaven National Laboratory [BNL], 2003). While there is a potential over the life of the SPVS for a panel to break or require replacement, under normal operating conditions, the solar panels would not require frequent replacement or disposal. Infrequent, isolated replacement of solar panels or other equipment over the course of the operation and maintenance of the SPVS may occur; this would not cause a significant increase in solid waste.

Hazardous Waste

As mentioned previously, some models of solar photovoltaic panels may also contain trace amounts of hazardous materials, such as lead, arsenic or cadmium. It is highly unlikely that these substances

would lead to environmental contamination during operation and maintenance (Fthenakis 2009). In addition, while other components of the SPVS, such as the transformers, are not expected to contain hazardous wastes (e.g., PCBs), but they may contain POLs and other fluids. Potential leaks from these transformers would be very unlikely and insignificant. The utility company would be expected to implement proper maintenance and inspection practices to prevent such leaks.

Sanitary Waste

No increase in sanitary wastes is anticipated to result from the operation and maintenance of the SPVS.

4.11.3. Conclusion

Potential impacts resulting from construction, operation and maintenance, or dismantling activities associated with the Proposed Action are not expected to have any significant impacts on solid, hazardous and sanitary waste management.

4.12. TRANSPORTATION AND PARKING

4.12.1. Construction and Dismantling

There would be a temporary increase in traffic accessing the BARC facility while a staging area is set up for the construction and dismantling activities. Heavy equipment, as shown in Sections 4.3 and 4.6, would access the BARC facility grounds during these project phases and could potentially hamper the traffic flow in and out of the facility during peak times. However, once the staging area is established, this traffic surge created by large delivery trucks and heavy equipment would then be limited to only construction workers accessing the BARC facility. The BARC facility has adequate roads and parking to accommodate utility vehicles, negating the need for road alterations or offsite parking. This would be true for all phases.

4.12.2. Maintenance and Operation

The contractor would be completely responsible for the operation, maintenance and upkeep of the SPVS. It is anticipated there would be equipment housed at the BARC facility for the purpose of maintaining the solar panels. Minimal traffic and parking would be required on a periodic basis for personnel to access the site for maintenance and upkeep duties.

4.12.3. Conclusion

There would be a minor and temporary increase in traffic accessing the BARC facility during the construction and dismantling phases. There would be little traffic activity associated with the operations and maintenance of the SPVS. With all vehicles operating from a staging area, there would be only a temporary impact on parking. As a result, the Proposed Action would not result in a significant impact to transportation or parking.

4.13. SOCIOECONOMICS

This section addresses the socioeconomic impacts anticipated from the Proposed Action. The impacts associated with the Proposed Action are not differentiated between the three phases of the project. Socioeconomic impacts from the Proposed Action are expected to be minimal because of the temporary nature of the proposed activities and substantial changes in the labor force at the BARC Facility or surrounding community is not expected. The construction and operation of the Proposed Action is not anticipated to impact employment at the BARC Facility or in the surrounding community. The Proposed Action would neither create nor eliminate any jobs at the BARC Facility. The construction activities at the BARC Facility would not be expected to require additional USDA or construction contract employees to be brought in from outside the local area. Therefore, the Proposed Action is not expected to cause significant change or stress on local employment, community social services (i.e., fire, police or health services) or community demographics.

4.14. ENVIRONMENTAL JUSTICE AND PROTECTION OF THE CHILDREN

4.14.1. Environmental Justice

The Proposed Action would not be expected to cause adverse or disproportionately high impacts to minority or low-income communities. Although the BARC Facility resides within the proximity of residential areas, the Proposed Action's potential impacts would be contained to the BARC Facility grounds. Therefore, there would be no significant impact on environmental justice from the Proposed Action.

4.14.2. Protection of Children

The Proposed Action would not produce any environmental impacts that could disproportionately affect infants or children. There would be no potential for releases of gasses, particulate matter, or noise that is outside the scope of a similar construction project. The Proposed Action would not produce excessive noise, and noise is expected to occur during working business hours. Additionally, any increases in truck or large vehicle traffic would take place during working business hours and travel to the site should take into account any vehicular restrictions imposed by the nearby school (e.g., crosswalks and loading/unloading zones). The Proposed Action would not be expected to cause adverse or disproportionately high impacts to infants or children. Therefore, there would be no significant impact on children from the Proposed Action.

5.0. CUMULATIVE IMPACTS

The CEQ Regulations (40 CFR Parts 1500-1508) implementing the procedural provisions of NEPA defines cumulative effects as:

> *The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other action. (40 CFR § 1508.7).*

Determination of cumulative impacts involves the consideration of both the affected environment and environmental consequences of the connected actions. The environmental consequences in all resource areas of this Proposed Action were of insignificant to minimal levels of impact and are not expected to contribute to cumulative impacts over time.

Direct and indirect impact analysis focuses only on those resources that may be impacted by the Proposed Action. Cumulative impacts analysis addresses these same resources from activities reasonably foreseeable in the future, with the potential to interact with the Proposed Action, together with past and present activities.

At this time, there are no reasonably foreseeable major projects outside BARC Facility grounds that would significantly impact the facility. The BARC Facility has numerous small projects completed in the past few years and several more being contemplated. One example of this is the planned demolition of buildings within the North Farm Historic District. The demolition of these buildings is undergoing independent NEPA review and coordination with MHT.

The addition of the SPVS would not add any significant impacts nor is it anticipated that the cumulative impacts of all of these actions would add up to significance in any resource area.

6.0. FINDINGS AND CONCLUSION

6.1. FINDINGS: IMPACT ANALYSIS

Using the No Action Alternative as the baseline for assessing potential impacts from the Proposed Action, the following potential issues and concerns have been identified:

- Temporary and localized, but not significant, adverse impacts to ground resources are expected in the land disturbance areas, such as soil erosion and sedimentation during construction. These impacts will be further minimized by contractual specifications for the IPP solicitation for appropriate erosion control that will prevent further impact from the drilling activities used to install the solar mounts.
- Temporary adverse, but not significant, impacts to air quality are expected from heavy equipment emissions and increases in fugitive dust and airborne particulates from construction and dismantling related activities.
- Adverse, but not significant, impacts to biological resources (vegetation) are expected as a result of the Proposed Action where shrub or tree clearing is required to facilitate the installation of the solar facilities.
- Temporary impacts, but not significant, to ambient noise are expected from construction and dismantling related activities.
- Adverse but not significant with mitigation, impacts to visual resources are expected as a result of the Proposed Action.
- Utilities services would not be expected to increase significantly as a result of the Proposed Action. After the solar array facilities are fully on-line, they are expected to augment available electricity for the BARC facility and offset the cost of baseload electricity from non-renewable sources.
- Adverse, but not significant, impacts to waste management are expected from construction and dismantling activities.
- Local roadways and parking are adequate to support movement of construction equipment and materials to the project area and there would be a minor and temporary impact to traffic accessing the BARC Facility grounds during the construction and dismantling phases.

Using the No Action Alternative as the baseline for assessing potential impacts, the following findings have been identified and are not expected to be affected by the Proposed Action:

- Water resources, including wetlands and floodplains are not expected to be affected by the Proposed Action because proper utilization of BMPs would protect against erosion impacts and leaks and spills.

- Threatened and endangered species are not expected to be affected by the Proposed Action due to the lack of species and species habitat within or near the vicinity of the Proposed Action.
- Land use impacts would be expected to be consistent with existing and future land use planning.
- No impacts to cultural resources are expected because any impacts to the buildings associated with the North Farm Historic District have been avoided through site selection of the Proposed Action.
- Socioeconomics within the vicinity of the BARC facility are not expected to be affected by the Proposed Action; however, the proposed offset cost through renewable electricity will benefit the BARC facility budget.
- The goals of EO 12898 related to environmental justice for minorities and the goals of EO 13045 related to the protection of children are expected to be maintained. Potential benefits of the Proposed Action include:
- Reduction in greenhouse gas emissions from the utilization of renewable energy source.
- Provide BARC Facility with a cost-efficient renewable energy source that would offset energy requirements for years into the future while meeting government renewable energy directives.
- The Proposed Action is not expected to result in significant cumulative impacts when considered along with other, known projects anticipated at the BARC Facility.

6.2. CONCLUSIONS: MITIGATION ACTION SUMMARY

Although no significant impacts to the environment are anticipated, the USDA-ARS would ensure the following mitigation measures are implemented to minimize potential impacts. These measures would be implemented through provisions stipulated in design and construction contracts and lease agreements. The potentially adverse environmental impacts related to the construction, operation, and dismantling of the Proposed Action could be minimized, mitigated and controlled to acceptable levels by implementation of the following measures:

- USDA-ARS would require the contractor to use dust abatement measures, such as wetting, mulching, or seeding exposed areas, where appropriate, to address any air quality concerns.
- USDA-ARS would require the contractor to mitigate vehicle emissions impacts as much as possible by prohibiting truck idling.
- USDA-ARS would require the contractor to provide lay down (i.e., temporary material storage) areas for construction equipment and materials within existing cleared and paved areas to minimize disturbance to existing land and vegetation.
- USDA-ARS would require contractor compliance with erosion and sediment control measures related to stabilization of disturbed areas.

- USDA-ARS would require the contractor to provide silt fencing, or other suitable control device, to be placed around the construction area to mitigate erosion and sediment runoff.
- USDA-ARS would require the contractor to implement BMPs for erosion/sediment control and stormwater management to minimize impacts to the existing stormwater collection system, wetlands, and other environmental resources.
- USDA-ARS would require all necessary measures be taken by the contractor to prevent, control, and mitigate the release of oils, trash, debris, and other pollutants to air, water and land.
- USDA-ARS would require contractors to safely handle and dispose of solid and hazardous waste in accordance with applicable local, state and federal regulations.
- USDA-ARS would require contractors to provide appropriate health and safety training, precautions and other protection for their workers.
- USDA-ARS would require contractors to recycle or reuse materials to the greatest extent possible, and to dispose of construction debris in accordance with federal, state and local waste disposal regulations.
- USDA-ARS would require that the Proposed Action not commence without the concurrence of the MHT regarding any National Register-eligible historic structures.
- USDA-ARS would require, in the event that unexpected cultural resources were found during construction activities, the contractor to stop work and consult with the MHT.
- USDA-ARS would require that the transportation of construction equipment and materials over local roads be scheduled to occur after peak traffic periods, whenever possible.
- USDA-ARS would require contractors to minimize construction-related noise impacts by limiting construction-related activities to the hours between 7:00 a.m. and 5:00 p.m. on weekdays.
- USDA-ARS would require that, upon commencement, the construction phase be executed expeditiously to minimize the period of disturbance to the affected environment.
- USDA-ARS would require that visual mitigation be employed at sites with visual impacts, similar to the mitigation proposed for the NAL.

Consideration of the activities involved in the construction, operations and maintenance, and dismantling of an SPVS at the BARC Facility would have no significant impacts on the quality of the human environment or on local natural resources. As a result of this EA, it is determined that an EIS is not required for the Proposed Action. In conclusion, a FNSI is recommended to be published for the Proposed Action.

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8.0. AGENCIES AND PERSONS CONSULTED

Prior to public notice of the draft Environmental Assessment, the USDA-ARS submitted for consultation with the MHT, USFWS, and reviewed the project with the USDA Office of Tribal Relations to determine if consultation with Native American tribal interests was recommended. The outcomes of this coordination is described in the appropriate sections for those resources. In addition, the public notice was sent to the parties in the following table (Table 16).

Table 16: Agency Contact List

Agency	Office	Position	Title	First	Last
Federal					
Federal Aviation Administration	Eastern Region	Environmental Program Manager	Mr.	Andrew	Brooks
Federal Aviation Administration	Washington Airports District Office	Environmental Specialist	Mr.	Marcus	Brundage
NASA	Goddard Space Flight Center	Chief of the Facilities Management Division	Mr.	Bradley	Jewitt
NASA	Goddard Space Flight Center	Assistant Chief of Operations	Mr.	Mark	Daly
Federal Emergency Management Agency	Region III	Regional Administrator	Ms.	MaryAnn	Tierney
Federal Railroad Administration	Region II	Regional Administrator	Mr.	Dave	Myers
Federal Transit Administration, Region III		Planning and Program Development Director	Ms.	Kathleen	Zubrzycki
National Park Service	Northeast Region	Regional Director	Ms.	Gay	Vietzke
U.S. Secret Service		Environmental, Sustainability, and Energy Manager	Mr.	Thomas	Franklin, REM
U.S. Senate		Senator	Mr.	Chris	Van Hollen
U.S. Senate		Senator	Mr.	Ben	Cardin
U.S. House of Representatives		Representative, Maryland's 5th Congressional District	Mr.	Steny	Hoyer
U.S. Fish and Wildlife Service	Northeast Region	Regional Chief, National Wildlife Refuge System	Mr.	Scott	Kahan
U.S. Fish and Wildlife Service	Patuxent Research Refuge	Deputy Refuge Manager	Mr.	Tarik	Adams
U.S. Fish and Wildlife Service	Patuxent National Wildlife Visitors Center	Refuge Manager	Mr.	Brad	Knudsen
U.S. Fish and Wildlife Service	Chesapeake Bay Field Office	Field Supervisor	Ms.	Genevieve	LaRouche
U.S. Fish and Wildlife Service	Northeast Region	Regional Director	Ms.	Wendi	Weber
U.S. Army Corps of Engineers	North Atlantic Division, Baltimore District	Deputy Distrct Engineer, Programs & Project Management	Mr.	Dave	Morrow
U.S. Army Corps of Engineers	North Atlantic Division, Baltimore District	Permit Process Program Manager	Ms.	Beth	Bachur
U.S. Department of Agriculture	State Office - Maryland & Delaware	State Director	Ms.	Denise	Lovelady
U.S. Department of Agriculture		State Conservationist	Dr.	Terron	Hillsman
U.S. Department of Agriculture	Prince George's Field Service Center	District Conservationist	Ms.	Heydsha	Cordero

Table 16, cont'd

Agency	Office	Position	Title	First	Last
U.S. Department of Agriculture	Farm Service Agency	County Executive Director	Mr.	Patrick	Goode
U.S. Department of Housing and Urban Development		Field Office Director - Maryland	Ms.	Carol	Payne
U.S. Department of Housing and Urban Development	Region III	Regional Environmental Officer	Mr.	Paul	Lehmann
U.S. Department of Interior	Office of Environmental Policy and Compliance	Regional Environmental Officer	Ms.	Lindy	Nelson
U.S. Environmental Protection Agency	Region 3, Environmental Assessment and Innovation Division	National Environmental Policy Act Team	Mr.	Randy	Pomponio
State					
Maryland State Senate		Senator, 21st District	Hon.	James	Rosapepe
Maryland House of Delegates		Delegate, 21st District	Hon.	Benjamin	Barnes
Maryland House of Delegates		Delegate, 21st District	Hon.	Joseline	Pena-Melnyk
Maryland House of Delegates		Delegate, 21st District	Hon.	Barbara	Frush
Maryland Department of Natural Resources		Secretary	Mr.	Mark	Belton
Maryland Department of Natural Resources	Wildlife and Heritage Service	Director	Mr.	Paul	Peditto
Maryland Department of Natural Resources	Forest Service	Director/State Forester	Mr.	Donald	VanHassent
Maryland Department of Natural Resources	Maryland Park Service	Superintendent	Ms.	Nita	Settina
Maryland Department of Natural Resources	Annapolis Service Center	Manager	Ms.	Amanda	Wilson
Maryland Department of the Environment		Secretary of the Environment	Mr.	Ben	Grumbles
Maryland Department of the Environment	Land Restoration Program	Program Manager	Mr.	James	Carroll
Maryland Emergency Management Agency		Executive Director	Mr.	Russ	Strickland
Maryland Department of Public Health		Secretary of Health	Mr.	Dennis	Schrader

Table 16, cont'd

Agency	Office	Position	Title	First	Last
Maryland Department of Transportation	Office of the Environment	Director	Ms.	Dorothy	Morrison
Maryland Department of Transportation	State Highway Administration, District 3 Office	District Engineer			
Maryland Historical Trust		Director/State Historic Preservation Officer	Ms.	Elizabeth	Hughes
Prince George's County					
Prince George's County		County Executive	Mr.	Rushern	Baker, III
Prince George's County	County Council	Council Member	Ms.	Mary	Lehmann
Prince George's County	Public Works and Transportation	Director	Mr.	Darrell	Mobley
Prince George's County	Department of Parks and Recreation	Director	Mr.	Ronnie	Gathers
Prince George's County	Department of the Environment	Director	Mr.	Adam	Ortiz
Prince George's County	Permitting, Inspections, and Enforcement	Director	Dr.	Haitham	Hijazi
Prince George's County	Prince George's Fire/EMS Department	Hazardous Materials Coordinator	Mr.	Craig	Black
Prince George's County Health Department		Health Officer	Ms.	Pamela	Creekmur
Prince George's County Historical Society		President	Ms.	Donna	Schneider
Prince George's Soil Conservation District		District Manager	Mr.	Steve	Darcey
Tribal Nations					
Oneida Indian Nation		Historian	Mr.	Jesse	Bergevin
Onondaga Nation		Faithkeeper	Mr.	Tony	Gonyea
Tuscarora Nation			Mr.	Bryan	Printup
St. Regis Mohawk Tribe		THPO	Mr.	Arnold	Printup
Maryland Commission on Indian Affairs		Tuscarora-Lumbee Administrative Director	Mr.	E. Keith	Colston
Local					
City of Laurel		Mayor	Hon.	Craig	Moe
City of Greenbelt		Mayor	Hon.	Emmet	Jordan
City of Greenbelt		City Manager	Ms.	Nicole	Ard

Table 16, cont'd

Agency	Office	Position	Title	First	Last
City of College Park		City Manager	Mr.	Scott	Somers
City of College Park		Mayor	Mr.	Patrick	Wojahn
City of College Park	District 1	Councilmember	Mr.	S.M. Fazlul	Kabir
City of College Park	District 1	Councilmember	Ms.	Christine	Nagle
City of College Park	District 2	Councilmember	Mr.	P.J.	Brennan
City of College Park	District 2	Councilmember	Mr.	Monroe	Dennis
City of College Park	District 3	Councilmember	Mr.	Robert	Day, Sr.
City of College Park	District 3	Councilmember	Ms.	Stephanie	Stullich
City of College Park	District 4	Councilmember	Ms.	Mary	Cook
City of College Park	District 4	Councilmember	Ms.	Dustyn	Kujawa
City of College Park		City Clerk	Ms.	Janeen	Miller

9.0. LIST OF PREPARERS

- Matthew T. Cusack, PWS, Atkins
- Rebecca Berzinis, PWS, Atkins
- Benjamin Cogdell, Atkins
- Brian Hayes, Atkins
- Rainor Gresham, Atkins
- Shelly Fisher, Atkins

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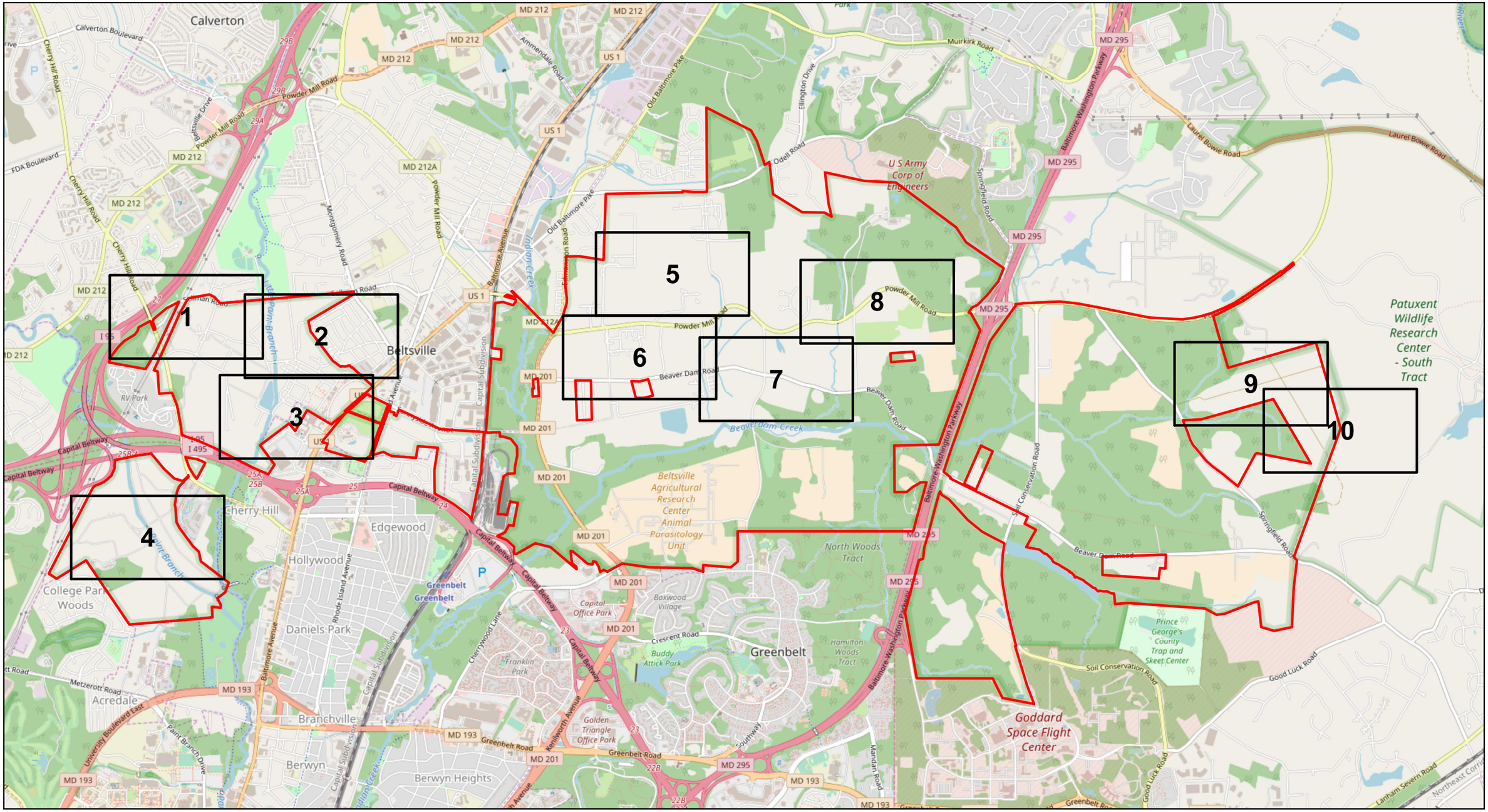
Appendix A

Detailed Sites Maps of the Proposed Action
SPVS Sites



Prepared By: ATKINS / LSY architects & planners

Prepared For: USDA ARS

Index Sheet

BARC Facility Boundary

INDEX

Proposed Solar Voltaic Sites

Environmental Assessment of Solar Photovoltaic Systems at Beltsville Agricultural Research Center

Prince George's County, MD

0 0.5 1 Miles

N

Dwn By:	BEC
Ckd By:	MTC
Date:	11/3/2017
Project No.:	100052289

FIGURE A

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Prepared By: ATKINS / LSY architects & planners

Prepared For: USDA ars

BARC Facility Boundary

Mount Type

Agricultural

Ground

Parking Lot

Roof

Sheet 1 of 10

Proposed Solar Voltaic Sites

Environmental Assessment of Solar Photovoltaic Systems at Beltsville Agricultural Research Center

Prince George's County, MD

0 300 600 Feet

N

Dwn By:	BEC
Ckd By:	MTC
Date:	3/22/2018
Project No.:	100052289

FIGURE A-1

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Prepared By: ATKINS | LSY architects & planners

Prepared For: USDA RDS

BARC Facility Boundary

Mount Type

Agricultural

Ground

Parking Lot

Roof

Sheet 2 of 10

Proposed Solar Voltaic Sites

Environmental Assessment of Solar Photovoltaic Systems at Beltsville Agricultural Research Center

Prince George's County, MD

0 300 600 Feet

N

Dwn By:	BEC
Ckd By:	MTC
Date:	3/22/2018
Project No.:	100052289

FIGURE A-2

O:\Sciences\Projects\Projects\LSY Architects\c_Projects\100052289_BARC_Solar_EA\GIS\MXD\EA_Figures\Appendix_A_rev02.mxd

Prepared By: ATKINS / LSY architects & planners

Prepared For: USDA RDS

BARC Facility Boundary

Mount Type

Agricultural

Ground

Parking Lot

Roof

Sheet 3 of 10

Proposed Solar Voltaic Sites

Environmental Assessment of Solar Photovoltaic Systems at Beltsville Agricultural Research Center

Prince George's County, MD

0 300 600 Feet

N

Dwn By:	BEC
Ckd By:	MTC
Date:	3/22/2018
Project No.:	100052289

FIGURE A-3

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Prepared By: ATKINS / LSY architects & planners

Prepared For: USDA

BARC Facility Boundary

Mount Type

Agricultural

Ground

Parking Lot

Roof

Sheet 4 of 10

Proposed Solar Voltaic Sites

Environmental Assessment of Solar Photovoltaic Systems at Beltsville Agricultural Research Center

Prince George's County, MD

0 300 600 Feet

N

Dwn By:	BEC
Ckd By:	MTC
Date:	3/22/2018
Project No.:	100052289

FIGURE A-4

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Prepared By: ATKINS / LSY architects & planners

Prepared For: USDA

BARC Facility Boundary

Mount Type

Agricultural

Ground

Parking Lot

Roof

Sheet 5 of 10

Proposed Solar Voltaic Sites

Environmental Assessment of Solar Photovoltaic Systems at Beltsville Agricultural Research Center

Prince George's County, MD

0 300 600 Feet

N

Dwn By:	BEC
Ckd By:	MTC
Date:	3/22/2018
Project No.:	100052289

FIGURE A-5

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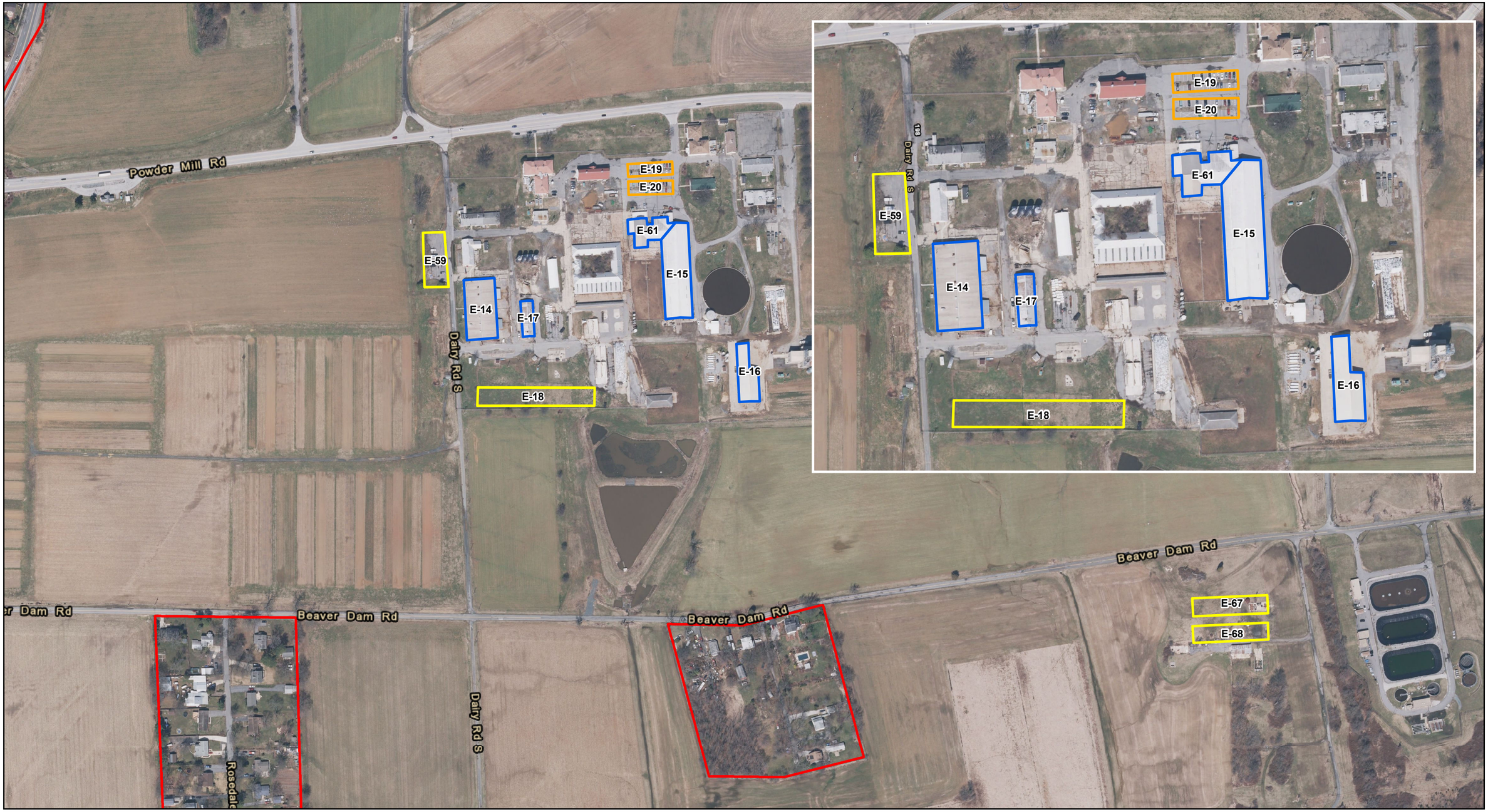

Prepared By: ATKINS / LSY architects & planners

Prepared For: USDA RDS

BARC Facility Boundary

Mount Type

Agricultural

Ground

Parking Lot

Roof

Sheet 6 of 10

Proposed Solar Voltaic Sites

Environmental Assessment of Solar Photovoltaic Systems at Beltsville Agricultural Research Center

Prince George's County, MD

0 300 600 Feet

N

Dwn By:	BEC
Ckd By:	MTC
Date:	3/22/2018
Project No.:	100052289

FIGURE A-6

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Prepared By: ATKINS | LSY architects & planners

Prepared For: USDA ars

BARC Facility Boundary

Mount Type

Agricultural

Ground

Parking Lot

Roof

Sheet 7 of 10

Proposed Solar Voltaic Sites

Environmental Assessment of Solar Photovoltaic Systems at Beltsville Agricultural Research Center

Prince George's County, MD

0 300 600 Feet

N

Dwn By:	BEC
Ckd By:	MTC
Date:	3/22/2018
Project No.:	100052289

FIGURE A-7

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Prepared By: ATKINS | LSY architects & planners

Prepared For: USDA ars

BARC Facility Boundary

Mount Type

Agricultural

Ground

Parking Lot

Roof

Sheet 8 of 10

Proposed Solar Voltaic Sites

Environmental Assessment of Solar Photovoltaic Systems at Beltsville Agricultural Research Center

Prince George's County, MD

0 300 600 Feet

N

Dwn By:	BEC
Ckd By:	MTC
Date:	3/22/2018
Project No.:	100052289

FIGURE A-8

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Prepared By: ATKINS | LSY architects & planners

Prepared For: USDA

BARC Facility Boundary

Mount Type

Agricultural

Ground

Parking Lot

Roof

Sheet 9 of 10

Proposed Solar Voltaic Sites

Environmental Assessment of Solar Photovoltaic Systems at Beltsville Agricultural Research Center

Prince George's County, MD

0 300 600 Feet

N

Dwn By:	BEC
Ckd By:	MTC
Date:	3/22/2018
Project No.:	100052289

FIGURE A-9

O:\Sciences\Projects\Projects\LSY Architects\c_Projects\100052289_BARC_Solar_EA\GIS\MXD\EA_Figures\Appendix_A_rev02.mxd

Prepared By: ATKINS | LSY architects & planners

Prepared For: USDA ars

BARC Facility Boundary

Mount Type

Agricultural

Ground

Parking Lot

Roof

Sheet 10 of 10

Proposed Solar Voltaic Sites

Environmental Assessment of Solar Photovoltaic Systems at Beltsville Agricultural Research Center

Prince George's County, MD

0 300 600 Feet

N

Dwn By:	BEC
Ckd By:	MTC
Date:	3/22/2018
Project No.:	100052289

FIGURE A-10

O:\Sciences\Projects\Projects\LSY Architects\c_Projects\100052289_BARC_Solar_EA\GIS\MXD\EA_Figures\Appendix_A_rev02.mxd

Appendix B

Public Agency Coordination and Consultation

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Chesapeake Bay Ecological Services Field Office
177 Admiral Cochrane Drive
Annapolis, MD 21401-7307
Phone: (410) 573-4599 Fax: (410) 266-9127
http://www.fws.gov/chesapeakebay/
http://www.fws.gov/chesapeakebay/endsppweb/ProjectReview/Index.html

In Reply Refer To: March 24, 2018
Consultation Code: 05E2CB00-2018-SLI-0956
Event Code: 05E2CB00-2018-E-02121
Project Name: BARC Solar Photovoltaic System EA

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

To Whom It May Concern:

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. This 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 feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. 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. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

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. Under sections 7(a)(1) and 7(a)(2) 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 and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, 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 Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. 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:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Wetlands

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:

Chesapeake Bay Ecological Services Field Office
177 Admiral Cochrane Drive
Annapolis, MD 21401-7307
(410) 573-4599

Project Summary

Consultation Code: 05E2CB00-2018-SLI-0956

Event Code: 05E2CB00-2018-E-02121

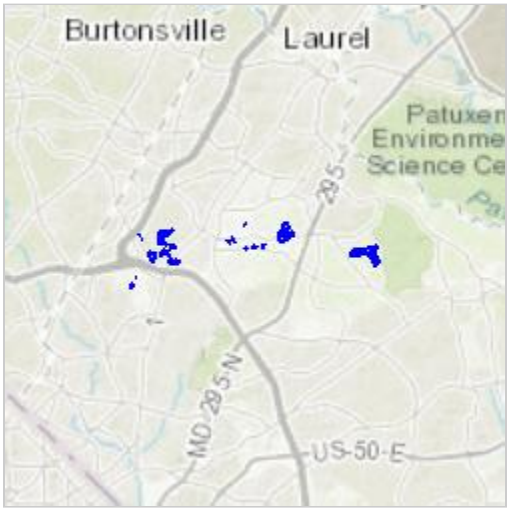
Project Name: BARC Solar Photovoltaic System EA

Project Type: POWER GENERATION

Project Description: Proposed Action is installation of ground, parking, and building mount solar arrays on areas selected by the USDA to generate renewable energy credits to meet Federal guidance and regulations, including Executive Orders.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/39.03199916065594N76.86445154633W



Counties: Prince George's, MD

Endangered Species Act Species

There is a total of 0 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.

Critical habitats

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

USFWS National Wildlife Refuge Lands And Fish Hatcheries

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

Wetlands

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

FRESHWATER POND

- PUBHx

FILE COPY

MDP

PROJECT REVIEW FORM

Request for Comments from the Maryland Historical Trust/ MDSHPO on State and Federal Undertakings

MHT USE ONLY
Date Received: 2/23/18 F USDA Log Number: 20180090 CR/NSL

Submit hard copy of form and all attachments to:
Beth Cole, MHT, 100 Community Place, Crownsville, MD 21032

Print Form

Section A: General Project Information

Project Name: Solar PV - National Agricultural Library BARC
County: Prince George's

☒ This is a new submittal **OR** This is additional information related Project Log Number:

Section B: Primary Contact Information

Contact Name: Claudette Joyner
Company/Agency: US. Department of Agricultural
Mailing Address: 10300 Baltimore Avenue, Building 003, Room 308
City: Beltsville
State: Maryland
Zip: 20705
Email: claudette.joyner@ars.usda.gov
Phone Number: +1 (301) 504-5221
Ext.:

Section C: Description of Undertaking

Location - Attach a map, preferably a section of a USGS quad, showing the location and boundaries of the project

Address: 10300 Baltimore Avenue
City/Vicinity: Beltsville, Maryland

List all federal and state agencies / programs (funding, permits, licenses) involved in this project (e.g. Bond Bill Loan of 2009, Chapter #; Transportation Enhancement Grant; HUD/CDBG; MDE/COE permit; etc.).

Agency Type	Agency/Program/Permit Name	Project/Permit/Tracking Number (if applicable)
Federal	USDA	

Proposed Work - Attach project description, scope of work, site plans / drawings

This project includes (check all applicable): ☒ **New Construction** ☐ **Demolition** ☐ **Remodeling/Rehabilitation**

This project involves: ☒ **State or Federal Rehabilitation Tax Credits**

☐ **Properties subject to an easement held by MHT, MET, or another entity**

Section D: Identification of Historic Properties

This project involves: ☐ **Properties designated as historic by a local government, listed in the National Register, or included in Maryland Inventory of Historic Properties**

Property/District Name: PG: 62-14 Beltsville Agricultural Research Center (BARC)

The subject property ☐ **has** ☐ **has not** been the subject of previous archeological, architectural, or historical investigations.

Please describe: Solar PV - NAL see Project Description.

Attachments

☐ **Map** ☒ **Project Description/Scope of Work** ☐ **Site Plans/Drawings**

☒ **Photographs** - Attach prints or digital photographs showing the project site including images of **all** buildings and structures, preferably keyed to a site plan

☒ **Conditions** - Attach a brief description of past and present conditions of the project area (wooded, mined, developed, agricultural uses, etc) including construction dates of buildings, if known.

MHT Determination MHT Reviewer: Date: 3/20/2018

☐ There are **NO HISTORIC PROPERTIES** in the area of potential effect
☐ The project will have **NO EFFECT** on historic properties
☒ The project will have **NO ADVERSE EFFECT** on historic properties
☐ The project will have **NO ADVERSE EFFECT WITH CONDITIONS**
☐ **MHT REQUESTS ADDITIONAL INFORMATION**
☐ The project will have **ADVERSE EFFECTS** on historic properties

Project Description: National Agricultural Library

In accordance with Section 106 of the National Historic Preservation Act (NHPA), the Beltsville Agricultural Research Center (BARC) is requesting consultation with your office with regards to The Henry A. Wallace, Beltsville Agricultural Research Center (BARC) - SolarARS Photovoltaic ESPC Project. The USDA Agricultural Research Service (ARS) has added additional areas where we plan to install a number of photovoltaic arrays at the BARC. The initial submission was reviewed by Ms. Amanda Apple, Preservation Officer at the Maryland Historical Trust with the determination that most of the undertaking had no adverse effects with the exception of Building 009 and Building 050. BARC is forwarding these new areas in order to meet its renewable energy requirements in the President's Executive Order (EO) 13693 - Planning for Federal Sustainability in the Next Decade on March 19, 2015 (EO 13693) to meet Federal agencies' goals of 30 percent of their electricity from renewable energy by Fiscal Year (FY) 2025.

USDA National Agricultural Library (NAL) is located contiguous with and maintained under BARC. NAL is part of the BARC SolarARS project. The proposed sites of ground mounted and carport mounted solar panels previously considered at NAL would provide only about half of the electricity needed for the NAL. New additional arrays of ground mounted solar panels around NAL will provide the additional electricity to meet the needs of the entire building so that USDA ARS can meet the requirements of EO 13693.

Project Scope – National Agricultural Library

Proposed sites for ground mounted solar panels at NAL. Solar panels at NAL previously considered were on covered parking structures in two parking lots , L-45 through L-49 and L51 through L-56, and rough mowed area L-50. These arrays of solar panels would have provided only half of the electricity consumed by NAL. Additional areas will provide almost all of the annual electricity consumption for NAL.

Added ground mount site areas being considered are outlined in green with identifying label in orange. The photographs on separate pages were taken of the added areas in four directions each for areas L-78, L-79, L-80 and L-82.

No demolition is being done in this project. Some clearing of scrub trees, brush and weeds is expected within the footprints outlined. Roads will be provided for access around Photovoltaic Arrays. All areas are currently rough mowed grass except area L-82 which was mowed until about 10 years ago and then let grow up in briars and brush. Several small trees will be removed. Areas around solar panels will be planted in pollinator plants.

NAL Revised Solar Panels

Map

L-45 (L-45,L-46,L-47,L-48)




Parking Lot Mount.


Sample image/s of what structure would look like
No change – previously considered

L-50




Ground Mount.


Sample image/s of what structure would look like
No change – previously considered

L-51 (L-51,L-52,L-53,L-54,L-55,L-56)




Parking Lot Mount.


Sample image/s of what structure would look like
No change – previously considered

L-78

Ground Mount.

Sample image/s of what structure would look like
Currently Mowed Grass. A fence and pollinator hedge to be added along Rte 1

L-79

Ground Mount.

Sample images of what structure would look like
Currently mowed grass. Trees to be removed

L-80

Ground Mount.

Sample image/s of what structure would look like
Currently mowed grass. Trees to be removed.

L-82

Ground Mount.

Sample image/s of what structure would look like
Currently mowed grass and brush/briars that were being mowed ~10 years ago. Fence and pollinator hedge to be added along RI Ave

MARYLAND DEPARTMENT OF
PLANNING
MARYLAND HISTORICAL TRUST

Larry Hogan, Governor
Boyd Rutherford, Lt. Governor

Wendi W. Peters, Secretary
Ewing McDowell, Deputy Secretary

October 13, 2016

Claudette Joyner
U.S. Department of Agriculture
10300 Baltimore Avenue, Building 003, Room 308
Beltsville, MD 20705-5123

Re: Solar PV
Beltsville Agricultural Research Center
Section 106 \ Review for Effects on Historic Properties

Dear Ms. Joyner:

Thank you for contacting the Maryland Historical Trust (MHT) regarding the above-referenced undertakings. As the State Historic Preservation Office, MHT reviews all projects in Maryland that are undertaken, assisted, or permitted by a federal or state agency, and MHT comments on the proposed action pursuant to Section 106 of the National Historic Preservation Act and Sections 5A-325 and 5A-326 of the State Finance and Procurement Article.

The proposed undertaking entails the construction/installation, at approximately 64 different project sites, of photovoltaic panels on roofs of existing structures, ground mounted panels, new solar carport structures, and new solar agricultural structures. These project sites are within the "Beltsville Agricultural Research Center District" (MIHP# PG: 62-14) which is included in the Maryland Inventory of Historic Properties and has been determined eligible for listing in the National Register of Historic Places for its role as a national center of agricultural experimentation and testing, and its period of significance extends at least into the 1940s. Plans for any undertaking within the vicinity should consider possible effects on these historic resources and ways to conform to the *Secretary of the Interior's Standards for the Treatment of Historic Properties* and *The Secretary of the Interior's Guidelines for the Treatment of Cultural Landscapes*.

After a thorough review of the list of undertakings MHT has determined that most of the undertakings (see attached list) will have **no adverse effect** on historic properties and the qualities that make the site eligible for listing on the National Register. Additional coordination with MHT is required for the proposed undertakings highlighted in yellow (W-26, W-27, 62, W-63, W-64, and W-65) within the Westside area as they appear to be associated with buildings that may contribute to the historic district and are built within the period of significance and where their demolition is eminent.

Thank you for providing us this opportunity to comment. If you have any questions or comments regarding this matter, please contact Amanda Apple at amanda.apple@maryland.gov.

Sincerely,

Amanda R. Apple
Preservation Officer
Maryland Historical Trust

ARA/201603110
Enclosure: List of Solar sites at BARC & NAL

List of Solar sites at BARC & NAL (those highlighted in yellow require additional coordination with the MD SHPO)

South Farm

S-22 Construct Ag barn (polebarn) equipment storage

Bldg. 030 Area

W-24, 25 Roof Mounted panels on Bldgs. 028A (1994) and 028C (2012)

W-23 Construct Ag barn (polebarn) over Bldgs. 033C, D, E (age of buildings? 1991?)

Westside

W-28 Ground mounted solar (2 acres) (open field currently)

W-60 Ground mounted solar (scrub brush)

W-64 Bldg. 53 (1996?) ground mount in and round with future demolition

W-65 Bldg. 44 (1958?) ground mount in and round with future demolition

W-63 Bldg. 50 (1949) ground mount in and round with future demolition

W-62 Bldg. 9 (1948) ground mount in and round with future demolition

W-26 & W-27 Bldgs. 9 (1948) and 50 (1949) ground mount in and round w/ future demolition of Bldg. 9

W-41 Bldgs. 48 (1996?), 48A (1939?), 49 (1961?) Demolished recently ground mount

W-29, 30, 31 panels for new covered parking adjacent to Bldgs. 6 and 7

W-42, 43, 44 panels for new covered parking adjacent to Bldgs. 10A and 7

W-32, 33 panels for new covered parking adjacent to Bldgs. 6 and 1

W-34, 35, 36, 37 panels for new covered parking adjacent to Bldgs. 10A and 3

W-38 panels for new covered parking adjacent to Bldg. 5

W-39, 40 panels for new covered parking adjacent to Bldg. 5

National Agricultural Library

L-50 ground mounted solar on open grass field

L 45, 46, 47, 48, 51, 52, 53 ,54, 55, 56 panels for new covered parking adjacent to NAL

Dairy

E-19, 20 panels for new covered parking adjacent to Bldgs. 177a, 167, 178-2

E-18 Construct Ag barn (pole barn) cow shade or equipment storage

E-59 Construct Ag barn (pole barn) equipment storage over parking lot adjacent to Bldg. 163

List of Solar sites at BARC & NAL (those highlighted in yellow require additional coordination with the MD SHPO)

E-14 roof mounted solar on Bldg. 163F (1978)

E-17 roof mounted solar on Bldg. 166H (1962)

E-15, E-61 roof mounted solar on Bldgs. 178-1 (1970) and 178-2 (1994)

E-16 roof mounted solar on Bldg. 183 (1992)

Compost & Bldg. 215 Area

E-11 Construct Ag barn (polebarn) over compost area

E-67, 68 Construct Ag barn (polebarn) equipment storage

Bldg. 203C Area

E-12 roof mounted solar on Bldg. 203C (1977)

E-13, 58 Construct Ag barn (polebarn) for equipment storage adjacent to Bldg. 203C

Bldg. 301 Area

E-10 Construct Ag barn (polebarn) equipment storage over Bldgs. 301E (1967), 301G (2012) 301F (1991)

E-66 ground mount solar south of bldg. 301

Bldg. 426 Area

E-8 roof mounted solar on Bldg. 426A (1993)

E-7 roof mounted solar on Bldg. 426 (1935)

E-5 roof mounted solar on Bldg. 427 (1938)

E-6 roof mounted solar on Bldg. 430 (1940)

E-9 panels for new covered parking adjacent to Bldg. 426, 426A

Airport

E-1, 2, 3, 4 ground mount solar

PROJECT REVIEW FORM

Request for Comments from the Maryland Historical Trust/ MDSHPO on State and Federal Undertakings

MHT USE ONLY	
Date Received:	Log Number:

Submit hard copy of form and all attachments to:
Beth Cole, MHT, 100 Community Place, Crownsville, MD 21032

Print Form

Section A: General Project Information

Project Name: Solar PV - BARC

County: Prince George's

[X] This is a new submittal **OR** This is additional information related Project Log Number:

Section B: Primary Contact Information

Contact Name: Claudette Joyner

Company/Agency: US. Department of Agricultural

Mailing Address: 10300 Baltimore Avenue, Building 003, Room 308

City: Beltsville

State: Maryland

Zip: 20705

Email: claudette.joyner@ars.usda.gov

Phone Number: +1 (301) 504-5221

Ext.:

Section C: Description of Undertaking

Location - Attach a map, preferably a section of a USGS quad, showing the location and boundaries of the project

Address: 10300 Baltimore Avenue

City/Vicinity: Beltsville, Maryland

List all federal and state agencies / programs (funding, permits, licenses) involved in this project (e.g. Bond Bill Loan of 2009, Chapter #; Transportation Enhancement Grant; HUD/CDBG; MDE/COE permit; etc.).

Agency Type	Agency/Program/Permit Name	Project/Permit/Tracking Number (if applicable)
Federal	USDA	

Proposed Work - Attach project description, scope of work, site plans / drawings

This project includes (check all applicable): [X] **New Construction** [ ] **Demolition** [ ] **Remodeling/Rehabilitation**

This project involves: [X] **State or Federal Rehabilitation Tax Credits**

[ ] **Properties subject to an easement held by MHT, MET, or another entity**

Section D: Identification of Historic Properties

This project involves: [ ] **Properties designated as historic by a local government, listed in the National Register, or included in Maryland Inventory of Historic Properties**

Property/District Name: PG: 62-14 Beltsville Agricultural Research Center (BARC)

The subject property [ ] **has** [ ] **has not** been the subject of previous archeological, architectural, or historical investigations.

Please describe: Solar PV - BARC see Project Description.

Attachments [X] **Map** [X] **Project Description/Scope of Work** [ ] **Site Plans/Drawings**

[X] **Photographs** - Attach prints or digital photographs showing the project site including images of **all** buildings and structures, preferably keyed to a site plan

[X] **Conditions** - Attach a brief description of past and present conditions of the project area (wooded, mined, developed, agricultural uses, etc) including construction dates of buildings, if known.

MHT Determination MHT Reviewer: _____ Date: _____

[ ] There are **NO HISTORIC PROPERTIES** in the area of potential effect

[ ] The project will have **NO EFFECT** on historic properties

[ ] The project will have **NO ADVERSE EFFECT** on historic properties

[ ] The project will have **NO ADVERSE EFFECT WITH CONDITIONS**

[ ] **MHT REQUESTS ADDITIONAL INFORMATION**

[ ] The project will have **ADVERSE EFFECTS** on historic properties

Project Description:

In accordance with Section 106 of the National Historic Preservation Act (NHPA), the Beltsville Agricultural Research Center (BARC) is requesting consultation with your office with regard to The Henry A. Wallace, Beltsville Agricultural Research Center (BARC) - Solar ARS Photovoltaic ESPC Project. The USDA Agricultural Research Service (ARS) is planning to install a number of photovoltaic arrays at the BARC. The President issued Executive Order (EO) 13693 - Planning for Federal Sustainability in the Next Decade on March 19, 2015. EO 13693 requires Federal agencies to get 30 percent of their electricity from renewable energy by Fiscal Year (FY) 2025. It also requires that priority be given to contracting for the purchase of energy that includes the installation of renewable energy on site at a Federal facility and obtaining equal value replacement renewable energy Certificates (RECs) for the term of the contract.

The project will take advantage of a contracting method called an Energy Savings Performance Contract in which a private developer constructs, owns, and operates the photovoltaic array on Federal land and sells electricity to the government at a rate lower than the local utility over a 25 year term. ARS will purchase replacement RECs. Because the photovoltaic array is privately owned the developer can take advantage of tax incentives not available to the Federal government.

The project includes ground mounted, roof mounted, and carport mounted photovoltaic arrays. It also includes specially constructed agricultural shelters for farm equipment with solar panels on the roof. Locations for the arrays must be distributed over the 6,541 acre BARC campus because the government-owned electrical grid on BARC is not contiguous.

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH CENTER
FACILITIES DIVISION
BELTSVILLE, MARYLAND 20705-2350

STATEMENT OF WORK

TO

SOLAR POWER ARRAY PROJECT
HENRY A. WALLACE
BELTSVILLE AGRICULTURAL RESEARCH CENTER
BELTSVILLE, MARYLAND

January 2016

STATEMENT OF WORK

I. SCOPE OF WORK

A. PROJECT IDENTIFICATION

1. TITLE: Environmental Assessment (EA) for the Henry A. Wallace Beltsville Agricultural Research Center (BARC) Solar Power Array Project

2. LOCATION: Beltsville, MD.

3. PROJECT CONTROL NO.:

B. BACKGROUND

USDA Agricultural Research Service (ARS) is planning to install photovoltaic panels at various locations at BARC in Beltsville MD to generate electricity for BARC and the National Agricultural Library (NAL). A single energy conservation measure Energy Savings Performance Contract (ESPC) is the planned procurement method. The locations of the array are shown in the attached site drawing.

C. OBJECTIVES

1. Provide an EA that considers the impact of the proposed photovoltaic arrays.

D. SCOPE OF WORK

The scope of the study is, but not limited to, the following:

i. Survey all existing structures and grounds that are part of the photovoltaic solar array sites.

ii. Provide an EA that addresses the impacts of the photovoltaic array and provides a recommendation for the type of decision to be made by the Northeast Area Director, who shall have signatory authority on all final NEPA documentation.

iii. Provide an EA suitable for a National Environmental Policy Act (NEPA) review by the Council of Environmental Quality (CEQ) and submittal to the National Capital Planning Commission. Provide site plans, photos, and data sheets as required.

E. CRITERIA GOVERNING EA

Services to be performed by the Architect-Engineer (A/E) under this contract shall conform to all applicable requirements and criteria including but not limited to those indicated in the following handbooks and publications, and their latest issues and changes to date:

1. National Environmental Policy Act
2. The ARS NEPA regulations at 7 CFR 520
3. All applicable national and local codes and regulations

F. NEPA CONSIDERATIONS

At a minimum, the EA shall consider the following NEPA factors. Will the proposed project…

- Cause or contribute to soil erosion?
- Affect soil surface stability?
- Degrade water quality?
- Decrease aquifer yield or affect water rights?
- Affect aquatic life?
- Cause or contribute to flow variation in a stream or spring?
- Degrade the aesthetic properties and/or potential uses of either ground or surface waters?
- Affect chemical quality of ground or surface waters (pH, dissolved oxygen, nutrients, dissolved solids, pesticides, etc.)?
- Affect physical quality of ground or surface waters (suspended solids, turbidity, color, oil, temperature, etc.)?
- Cause odors or release odoriferous substances?
- Release toxic substances to the air in quantities that could affect human health or environmental quality?
- Release particulate matter to the air?
- Change local meteorological conditions or air movement patterns?
- Release substances for which there is a National Ambient Air Quality Standard (i.e., sulfur oxides, nitrogen oxides, carbon monoxide, lead, particulate matter, etc.)?
- Affect undisturbed natural areas or a wild and scenic river?
- Affect a known or potential cultural, historical or archeological site, district, or area? (A consultation with the State Historic Preservation Officer is required.)
- Affect game animals or fish or their taking?
- Affect rare, threatened, or endangered species, or a critical habitat?
- Affect species balance, especially among predators?
- Involve special hazards, such as radioactivity or electromagnetic radiation?

- Affect a wetland, flood plain, or the coastal zone?
- Affect local or regional systems related to:
  - Transportation?
  - Water supply?
  - Power and heating?
  - Solid waste management?
  - Sewer or storm drainage?
- Affect local land use through effects on:
  - Flood plains or wetlands?
  - Location land use?
  - Aesthetics?
  - Access to minerals?
- Affect socioeconomic aspects of an area including:
  - Population?
  - Housing supply or demand?
  - Employment?
  - Commercial activities?
  - Industrial activities?
  - Cultural patterns?
  - Environmental justice?
- Cause or contribute to unacceptable noise level?
- Affect public health or safety?
- Involve incomplete or unavailable information related to reasonably foreseeable significant environmental effects.
- Affect the human environment in a manner that is likely to be controversial?
- Cause climate change?
- Cause impacts from energy usage or alternative energy?

G. SPECIAL CONSIDERATIONS

1. The contractor shall comply with all BARC security requirements.
2. All work shall be scheduled, coordinated, and approved by Dana Jackson, Senior Remedial Project Manager, Dana.Jackson@ars.usda.gov, Phone: (301) 504-6025.
3. The Contracting Officer is Trent Stevens, Trent.Stevens@ars.usda.gov, Phone (301) 504-4584.

H. PUBLIC COMMENT PERIOD

Once the NEPA documentation has been accepted by USDA, but prior to final approval, the public shall be afforded a 30 day comment period. The contractor shall edit the EA report for any comments as directed by the contracting Officer.

II. SCHEDULE OF SUBMISSIONS AND REVIEWS

A. The A/E shall complete the services required under Clause I above and submit the documents required to the Contracting Officer within the following schedule:

Deliver no later than:

Draft Report	21 days after award
Final Report Submission	7 days
	(Total of 4 weeks)

III. Fee Schedule - Survey and Evaluation Services

Include labor categories, labor rates and totals.

United States Department of Agriculture
Agricultural Research Service
the in-house research arm of the USDA

Solar PV @ BARC

Sandy Morgan – Energy Manager

Objectives of Meeting

① Background

② Solar At USDA & BARC

① Third Party Ownership

② Feasibility Level Investigations – BARC

① Next Steps: Teaming Process

Background

- Confluence of Factors – Solar PV
  - Federal Mandates
  - Contract Authority Clarity With OMB
  - Maturity of Technology
  - Price drops
  - Expiration of 30% Investment Tax Credit 12/16
  - Other Tax Benefits
- USDA-ARS “RE Powering Program” Approaching RE Systematically

RE Energy @ USDA High Value & Good Fit

- Large electricity loads: labs, cold storage, water pumping, data centers
- Large facilities in states with high energy costs
- Critical operations – need for resiliency
- Space – USDA Sites
- Site staff very supportive

Why Solar At BARC?

- ✓ Reducing The Large Utility Costs (All Fuels)
- ✓ Compatibility With Existing Site Uses
- ✓ Parking, Ground, Roof Area
- ✓ Shaded Car and Ag Equipment Structures
  - ✓ Protect USDA Assets
  - ✓ Vehicle Charging
- ✓ Cultural Fit
- ✓ Maryland State Policies
- ✓ Energy Resiliency Needs

Federal Mandates

- Energy Policy Act of 2005 (EPAct)
  - Requires agency to meet 7.5% of electricity use from renewables by 2013.
  - Double bonus for on-site systems.
  - Potential on Coast Guard Island is 21% + but would increase to 42%+
- Executive Order 13514
  - Scope 1&2 Emissions Reductions

Executive Order -- Planning for Federal Sustainability in the Next Decade

(d) include in the renewable electric energy portion of the clean energy target established in subsection (b) of this section renewable electric energy as defined in section 19(v) of this order and associated with the following actions, which are listed in order of priority:

(i) installing agency-funded renewable energy on site at Federal facilities and retaining corresponding renewable energy certificates (RECs) or obtaining equal value replacement RECs;

(ii) contracting for the purchase of energy that includes the installation of renewable energy on site at a Federal facility or off site from a Federal facility and the retention of corresponding RECs or obtaining equal value replacement RECs for the term of the contract;

(iii) purchasing electricity and corresponding RECs or obtaining equal value replacement RECs; and

(iv) purchasing RECs;

Executive Order -- Planning for Federal Sustainability in the Next Decade

(c) ensure that the percentage of the total amount of building electric energy consumed by the agency that is renewable electric energy is:

(i) not less than 10 percent in fiscal years 2016 and 2017;

(ii) not less than 15 percent in fiscal years 2018 and 2019;

(iii) not less than 20 percent in fiscal years 2020 and 2021;

(iv) not less than 25 percent in fiscal years 2022 and 2023; and

(v) not less than 30 percent by fiscal year 2025 and each year thereafter;

USDA Standing – A REC Buyer

	Renewable Energy and Electricity Use (Megawatthours)											
	REC Purchases (Off-Site)	Green Energy Purchases and Remote Agency Owned (Off-Site)	Agency-Owned (On-Site)	Direct Bonus	REC Replacement	Total Facility Electric	Total Renewable kWh (All Sources)	% RE Use	% From REC Buys	% From Onsite	Additional MWh to 20% by 2020	OMB Scorecard Color
Colum	Column2	Column3	Column4	Column5	Column6	Column8	Column82	Column9	Column10	Column11	Column12	
USPS	0	0	486	486	0	4,639,937	972	0.02%	0.00%	100.00%	927,015.26	Red
USACE	0	3,321	17,616	17,616	0	319,509	38,554	12.07%	0.00%	91.39%	25,348.39	Red
TVA	0	4,750	23,832	19,732	0	515,253	48,314	9.38%	0.00%	90.17%	54,736.94	Green
DOJ	2,301	13,814	21,478	21,478	1,759	1,518,918	60,829	4.00%	3.78%	70.62%	242,954.46	Green
DOI	17,500	11,591	16,390	13,826	0	587,565	59,307	10.09%	29.51%	50.95%	58,205.89	Red
DHS	33,165	0	13,167	13,167	0	783,777	59,499	7.59%	55.74%	44.26%	97,256.73	Green
DoD	389,414	170,335	279,954	279,320	389,414	30,164,544	1,508,436	5.00%	25.82%	37.08%	4,524,472.27	Green
DOE	620,621	2,395	95,813	95,515	61,065	4,947,229	875,408	17.69%	70.90%	21.86%	114,038.03	Green
All Agencies	3,232,347	328,897	525,641	517,978	474,567	55,389,111	5,079,431	9.17%	63.64%	20.55%	5,998,391.38	Green
VA	400,000	7	26,791	26,791	0	3,302,637	453,590	13.73%	88.19%	11.81%	206,937.55	Red
NARA	0	6,585	315	315	0	88,430	7,214	8.16%	0.00%	8.72%	10,471.58	Green
DOC	28,936	0	1,135	1,079	0	505,621	31,150	6.16%	92.89%	7.11%	69,974.60	Green
OPM	1,644	1,452	117	117	0	19,051	3,331	17.49%	49.35%	7.05%	478.88	Green
NASA	72,275	11,638	2,361	2,361	18,919	1,413,132	107,553	7.61%	67.20%	4.39%	175,073.28	Green
SSA	30,000	4,697	765	765	0	200,254	36,227	18.09%	82.81%	4.22%	3,823.35	Green
GSA	1,129,300	0	24,183	24,183	2,901	2,550,728	1,180,568	46.28%	95.66%	4.10%	(670,422.23)	Red
USDA	61,250	382	584	576	12	511,560	62,804	12.28%	97.53%	1.85%	39,508.07	Green
Treasury	45,764	22,081	231	231	0	336,510	68,308	20.30%	67.00%	0.68%	(1,006.21)	Green
EPA	119,514	0	248	246	152	113,603	120,159	105.77%	99.46%	0.41%	(97,438.59)	Green
DOL	28,200	2,268	43	43	346	279,510	30,900	11.06%	91.26%	0.28%	25,002.05	Red
HHS	75,850	31,065	131	131	0	980,409	107,176	10.93%	70.77%	0.24%	88,905.59	Green
DOT	100,986	0	1	1	0	1,102,513	100,989	9.16%	100.00%	0.00%	119,513.84	Green
FDIC	44,390	0	0	0	0	39,149	44,390	113.39%	100.00%	0.00%	(36,560.11)	Green
DOS	0	40,475	0	0	0	110,460	40,475	36.64%	0.00%	0.00%	(18,382.82)	Green
SI	29,821	0	0	0	0	180,653	29,821	16.51%	100.00%	0.00%	6,309.40	Green
NRC	0	1,470	0	0	0	19,605	1,470	7.50%	0.00%	0.00%	2,450.59	Green
HUD	1,416	0	0	0	0	18,878	1,416	7.50%	100.00%	0.00%	2,359.81	Green
RRB	0	571	0	0	0	3,805	571	15.00%	0.00%	0.00%	190.23	

Source: FEMP 2013

Data as of February 14th, 2015

Looking At The BARC Site

- Annual kWh usage 40,000,000 kWh/Year +/-
- Equivalent to 30 MW System Size
- Surface Area = 100 – 130 Acres:
  - Module Efficiency
  - Array Row Space - Tilt
  - Tracking Vs. Fixed Axis

Looking At The BARC Site

Land Type	Size (Acres)
Total Area	6,461
Buildings + Pavement	229
Forest	2,298
Wetlands	921
Lawn + Ornamental	517
Cultivated – Tilled	180
Cultivated – Not Tilled	1,675
Non Arid Pasture	322

FINANCIAL ANALYSIS

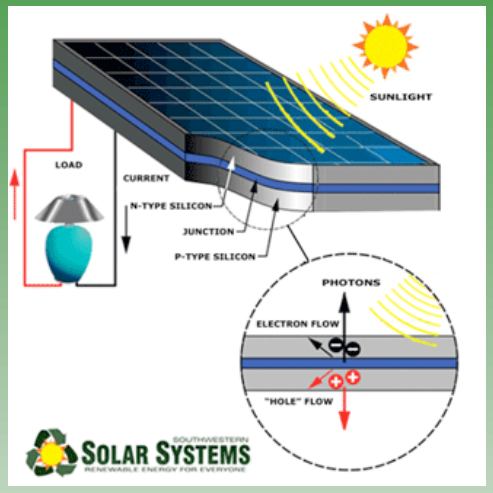
Appropriated vs. Industry Owned

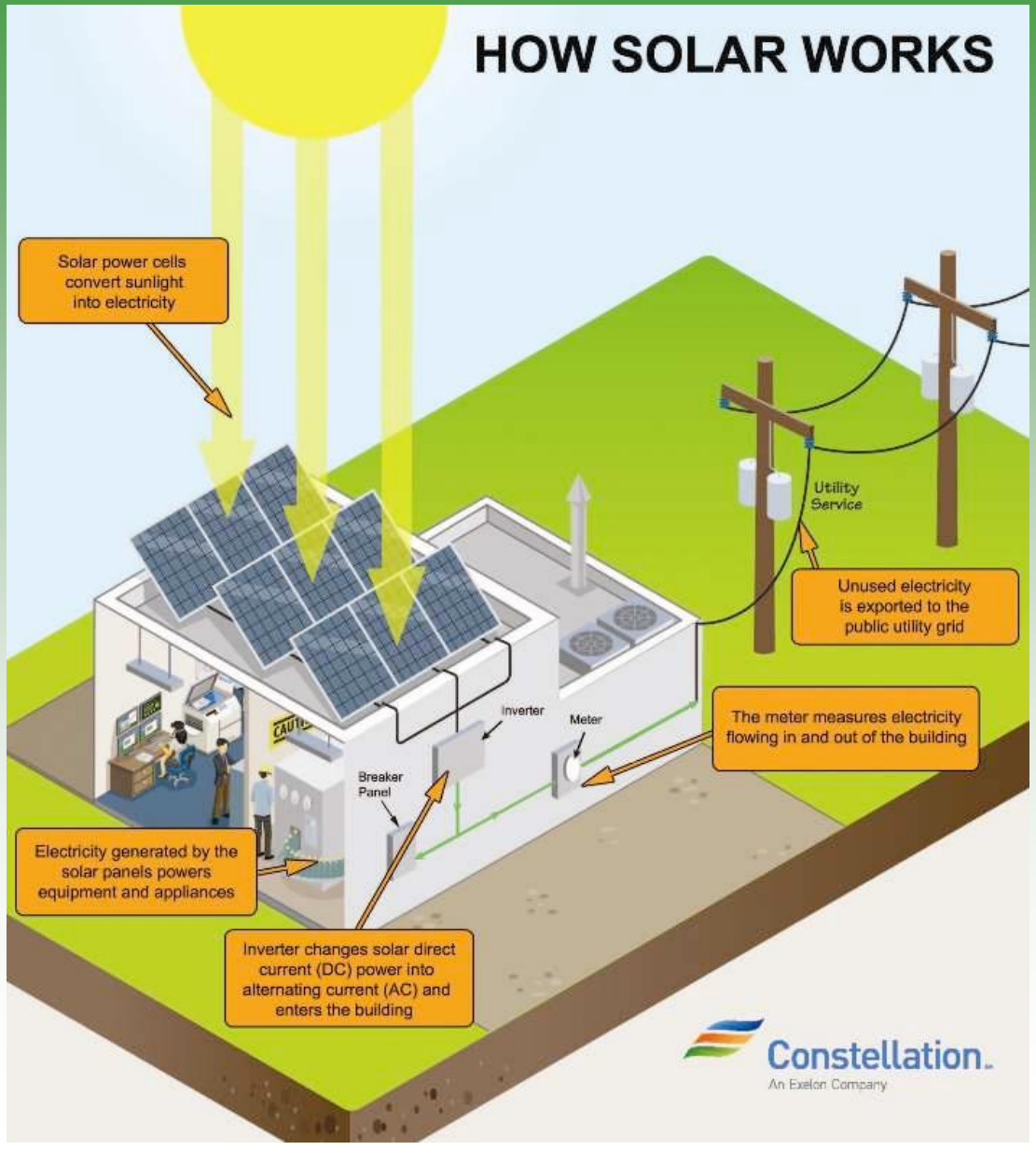
Feature	Government Owned	Industry Owned
30% Investment Tax Credit	None	Yes
Accelerated Depreciation	None	Yes
Operating Deductions	None	Yes
Resulting Cost $/kWh	Often Higher Cost Than Utility	Lower in Many Areas Than Utility
Meet Mandates	Impossible Unless REC Buying	Yes
Performance Risks	Yes	No
Operations Costs	Yes	No
Removal Liability	Yes	No
Fair Market Buy	No	Yes

United States Department of Agriculture

Agricultural Research Service

the in-house research arm of the USDA





Generic Third Party Structure

Agency Facility

ESPC-ESA

Electricity Billing

Special Purpose Entity

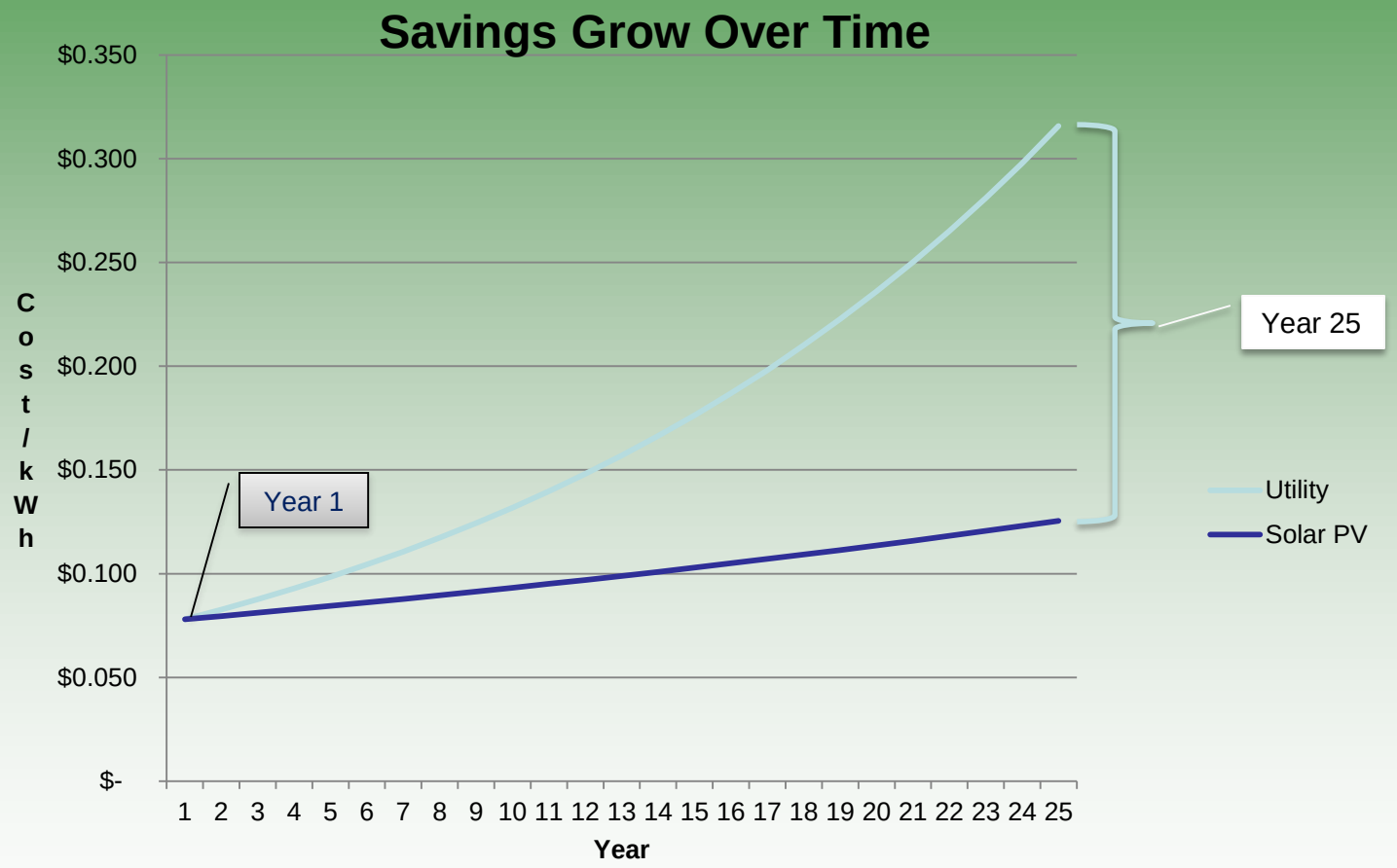
Electricity Flows to Agency Loads

Site Access Agreement

Developer Builds Onsite

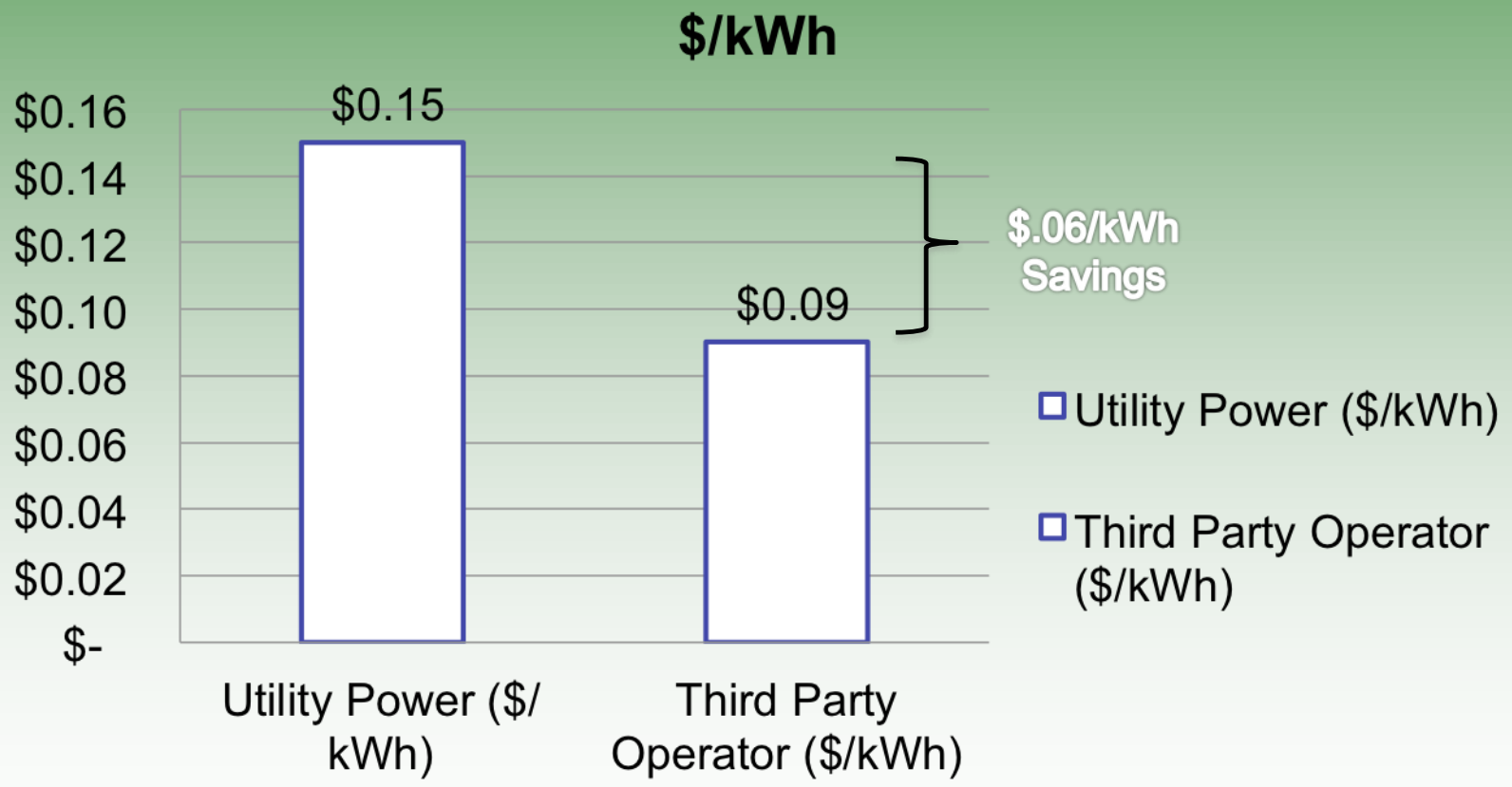
Developer/ Operator

The Business Case - ESA



Maryland 10-Year 3% Average Rate Increases. PPA Rate Escalation 2%.

On-Site Solar Reduces Utility Costs



USDA United States Department of Agriculture
Agricultural Research Service
the in-house research arm of the USDA

Financial Analysis Assumptions - USDA Solar PV 2015

UPDATED March 2015

Section 1 - PV System Costs (Direct and Indirect)

	Roof			Carport			Ground Mounted Fixed			Ground Mounted - 1-Axis		
	Small <100kW	Medium <1 MW	Large >1MW	Small <100kW	Medium <1 MW	Large >1MW	Small <100kW	Medium <1 MW	Large >1MW	Small <100kW	Medium <1 MW	Large >1MW
Module $/W-dc	$ 1.00	$ 0.90	$ 0.70	$ 1.00	$ 0.90	$ 0.70	$ 1.00	$ 0.90	$ 0.70	$ 1.00	$ 0.90	$ 0.70
Inverter $/W-dc	$ 0.75	$ 0.50	$ 0.45	$ 0.75	$ 0.50	$ 0.45	$ 0.75	$ 0.50	$ 0.45	$ 0.75	$ 0.50	$ 0.45
Balance of System $/W-dc	$ 1.00	$ 0.75	$ 0.60	$ 1.50	$ 1.30	$ 1.00	$ 1.00	$ 0.75	$ 0.65	$ 1.40	$ 1.15	$ 0.95
Labor $/W-dc	$ 1.00	$ 0.70	$ 0.70	$ 1.25	$ 1.05	$ 1.05	$ 1.15	$ 0.85	$ 0.50	$ 1.15	$ 0.95	$ 0.90
Installer Margin $/W-dc (20%)	$ 0.95	$ 0.71	$ 0.49	$ 0.90	$ 0.75	$ 0.64	$ 0.78	$ 0.60	$ 0.46	$ 0.86	$ 0.70	$ 0.60
Sales Tax	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total $/W-dc	**$ 5.64**	**$ 4.27**	**$ 2.94**	**$ 5.40**	**$ 4.50**	**$ 3.84**	**$ 4.68**	**$ 3.60**	**$ 2.76**	**$ 5.16**	**$ 4.20**	**$ 3.60**
Operations & Maintenance $/kW - Year	$ 40.00	$ 40.00	$ 40.00	$ 40.00	$ 40.00	$ 40.00						

Section 1 - Assumptions Used in Cash Flow Analysis

Utility Rate Escalator Factors (%)

		Source
California	3.60%	NIST - IOU in CA
Arizona	2.99%	NIST - IOU in AZ
New Mexico	2.77%	NIST - IOU in NM
Hawaii	2.74%	NIST - IOU in HI
Maryland	2.12%	NIST - IOU in MD
Puerto Rico		
St Croix		

PPA Details

		Source
All Sites	3.0%	Estimated
Term	25	
kWh Degradation	0.20%	New Linear Warranty

Section 2 - Common Assumptions to All Sites

Analysis Period (Years)	20	Set
Inflation Rate	0.9%	Website
Real Discount Rate	3.0%	FEMP - Website
Nominal Discount Rate	3.9%	FEMP - Website

Taxes & Insurance

Federal Rate	35%	Average
State Tax	14%	Average
Sales Tax - CA	8.75%	Level
Sales Tax - NV	8.10%	state 4.6%
Insurance (% of installed cost)	0.5%	Finance

Loan Details

		Source
Number of Loans	2	Poll of Financing Firms
Loan Term (Years)	20	Poll of Financing Firms
Construction Loan Rate	6%	Poll of Financing Firms
Loan Rate	4.5%	Poll of Financing Firms
Construction Financing (% installed cost)	1%	Poll of Financing Firms
Debt Fraction	50%	Poll of Financing Firms

Depreciation

Federal Depreciation	5 Yr-MACRS	IRS
State Depreciation	Straight Line	State Franchise Tax Boards

System Degradation

Annual Average Degradation	0.70%	Industry Standard Warranty

Incentives - PBI

PG&E	$ -	CA-CSI Tracker
SMUD	$ -	SMUD Website
Alameda	$ -	Solar Program
Island Energy	$ -	IE Manager
MD - SREC		SREC Trade (70% of)

Investor Returns

After Tax IRR	12%	Poll of Financing Firms
Salvage Value - End of Contract	20%	Poll of Financing Firms

Scenario 1. – All Ground Mounted – Fixed Axis

Assumptions

Utility Rate[2]	MD-Open Access		
Utility Rate$/kWh	$ 0.095	**Term (Years)**	20
First Year PPA Rate[1]	$ 0.075	**Annual Production (kWh)**	40,000,000
PPA Escalation Rate[1]	2.0%	**Annual Depreciation**	0.20%
Utility Escalation Rate[3]	2.1%	**Discount Rate**[4]	3.9%
		REC Swop ($/MWh)	$ 100

USDA - BARC 30 MW Ground - Fixed Axis

Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	20
Annual Production		40,000,000	39,920,000	39,840,160	39,760,480	39,680,959	39,601,597	39,522,394	39,443,349	39,364,462	39,285,733	39,207,162	39,128,747	39,050,490	38,972,389	38,507,052
Utility Rate $/kWh		$ 0.095	0.098	0.102	0.106	0.109	0.113	0.117	0.122	0.126	0.131	0.135	0.140	0.145	0.150	0.186
PPA Rate ($/kWh)		$ 0.075	$ 0.077	$ 0.079	$ 0.081	$ 0.083	$ 0.085	$ 0.087	$ 0.089	$ 0.091	$ 0.094	$ 0.096	$ 0.098	$ 0.101	$ 0.103	$ 0.120
$ Solar PV Electricity		$ 3,000,000	$ 3,068,850	$ 3,139,280	$ 3,211,327	$ 3,285,027	$ 3,360,418	$ 3,437,539	$ 3,516,431	$ 3,597,133	$ 3,679,687	$ 3,764,136	$ 3,850,523	$ 3,938,893	$ 4,029,290	$ 4,616,948
$/REC - Cost		$ (4,000)	$ (3,992)	$ (3,984)	$ (3,976)	$ (3,968)	$ (3,960)	$ (3,952)	$ (3,944)	$ (3,936)	$ (3,929)	$ (3,921)	$ (3,913)	$ (3,905)	$ (3,897)	$ (3,851)
Utility Supplied Electricity		$ 3,800,000	$ 3,928,926	$ 4,062,227	$ 4,200,050	$ 4,342,550	$ 4,489,884	$ 4,642,216	$ 4,799,717	$ 4,962,562	$ 5,130,932	$ 5,305,014	$ 5,485,003	$ 5,671,098	$ 5,863,507	$ 7,163,071
Savings		$ 796,000	$ 856,084	$ 918,963	$ 984,748	$ 1,053,555	$ 1,125,506	$ 1,200,725	$ 1,279,342	$ 1,361,493	$ 1,447,316	$ 1,536,958	$ 1,630,567	$ 1,728,300	$ 1,830,320	$ 2,542,272
Cumulative Savings	**$31,136,126**															
Net Present Value	**$19,788,804**															

[1] System Advisor Modeling using 20 year term, 50% debt fraction, investor return of 10% and system cost of $5.70/Watt installed

[3] FEMP utility rate escalator for Calfornia IOUs.

[4] FEMP/NIST Estimates of Nomical Discount Rates

Scenario 2. – 75% Ground 25% Ag Shade Structure

USDA - BARC 22.5 MW Ground - Fixed Axis and 7.5 MW Ag Shade Structures

Blended Average

Assumptions

Utility Rate[2]	MD-Open Access		
Utility Rate$/kWh	$ 0.095	**Term (Years)**	20
First Year PPA Rate[1]	$ 0.088	**Annual Production (kWh)**	40,000,000
PPA Escalation Rate[1]	2.0%	**Annual Depreciation**	0.20%
Utility Escalation Rate[3]	2.1%	**Discount Rate[4]**	3.9%
		REC Swop ($/MWh)	$ 100

Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	20
Annual Production		40,000,000	39,920,000	39,840,160	39,760,480	39,680,959	39,601,597	39,522,394	39,443,349	39,364,462	39,285,733	39,207,162	39,128,747	39,050,490	38,972,389	38,507,052
Utility Rate $/kWh		$ 0.095	0.098	0.102	0.106	0.109	0.113	0.117	0.122	0.126	0.131	0.135	0.140	0.145	0.150	0.186
PPA Rate ($/kWh)		$ 0.088	$ 0.090	$ 0.092	$ 0.094	$ 0.097	$ 0.099	$ 0.101	$ 0.104	$ 0.107	$ 0.109	$ 0.112	$ 0.115	$ 0.118	$ 0.121	$ 0.140
$ Solar PV Electricity		$ 3,500,000	$ 3,580,325	$ 3,662,493	$ 3,746,548	$ 3,832,531	$ 3,920,488	$ 4,010,463	$ 4,102,503	$ 4,196,655	$ 4,292,969	$ 4,391,492	$ 4,492,277	$ 4,595,375	$ 4,700,839	$ 5,386,439
$/REC - Cost		$ (4,000)	$ (3,992)	$ (3,984)	$ (3,976)	$ (3,968)	$ (3,960)	$ (3,952)	$ (3,944)	$ (3,936)	$ (3,929)	$ (3,921)	$ (3,913)	$ (3,905)	$ (3,897)	$ (3,851)
Utility Supplied Electricity		$ 3,800,000	$ 3,928,926	$ 4,062,227	$ 4,200,050	$ 4,342,550	$ 4,489,884	$ 4,642,216	$ 4,799,717	$ 4,962,562	$ 5,130,932	$ 5,305,014	$ 5,485,003	$ 5,671,098	$ 5,863,507	$ 7,163,071
Savings		$ 296,000	$ 344,609	$ 395,750	$ 449,527	$ 506,051	$ 565,436	$ 627,801	$ 693,270	$ 761,971	$ 834,035	$ 909,601	$ 988,813	$ 1,071,818	$ 1,158,771	$ 1,772,781
Cumulative Savings	**$18,624,093**															
Net Present Value	**$11,453,871**															

[1] System Advisor Modeling using 20 year term, 50% debt fraction, investor return of 10% and system cost of $5.70/Watt installed

[3] FEMP utility rate escalator for Calfornia IOUs.

[4] FEMP/NIST Estimates of Nomical Discount Rates

CLOSER LOOK AT BARC

Preface - Discussion

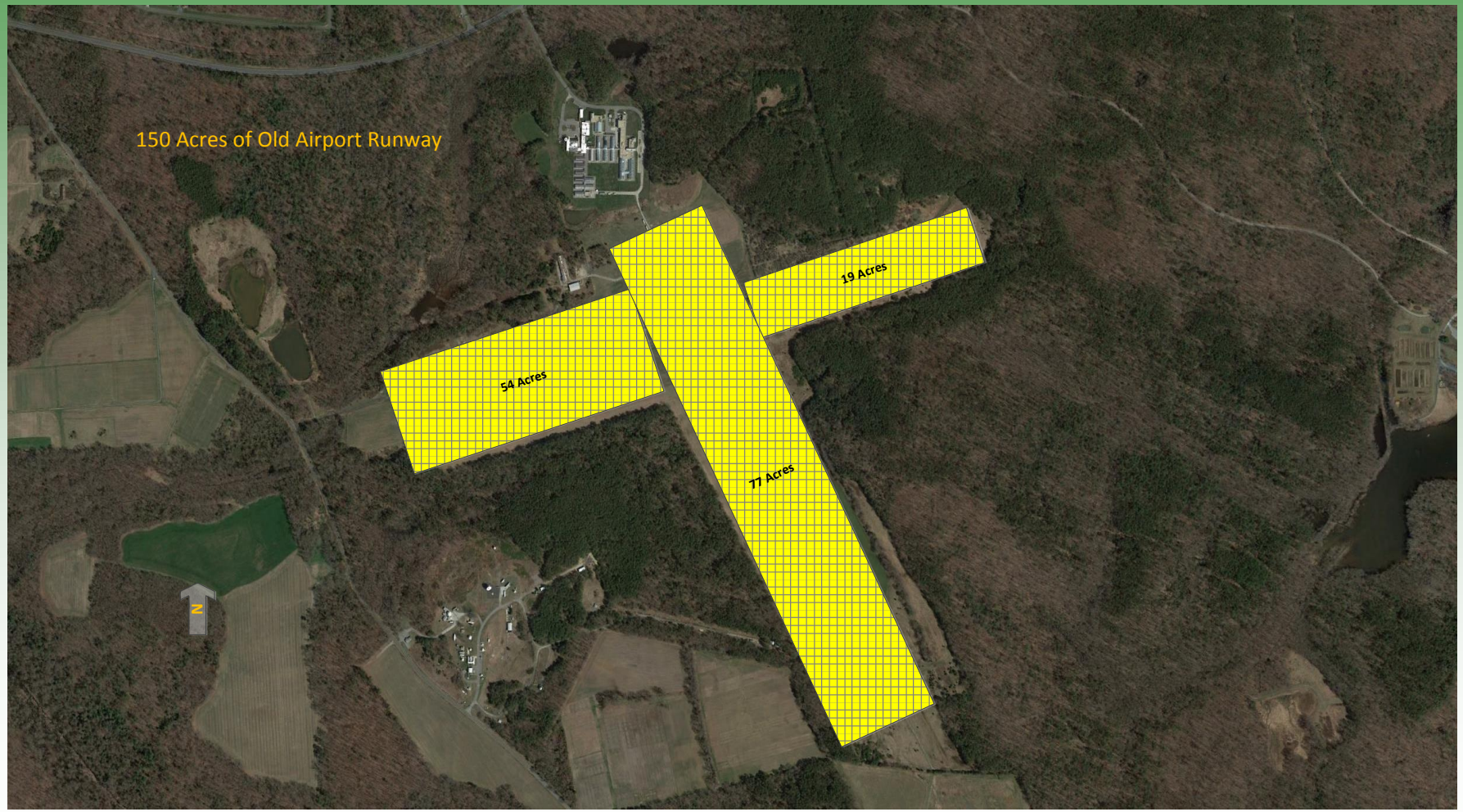
- Development Of Solar Addresses
  - Site Goals & Needs
  - Structural Studies
  - Electrical Capacities & Compatibilities
  - Community Stakeholder
  - NEPA
  - Historic Preservation Considerations
  - Sightline, Glare and Glint Studies
  - State and Federal Interconnection Regulations
  - Many others

Former Airport Location - Example

- ✓Already graded
- ✓No sightline issues with neighbors
- ✓Easy power line runs for interconnection
- ✓Not competing with agricultural land
- ✓Impacted site – NEPA issues can be managed

Beltsville Former Airport Site

June 28, 2015



Former Airport Site

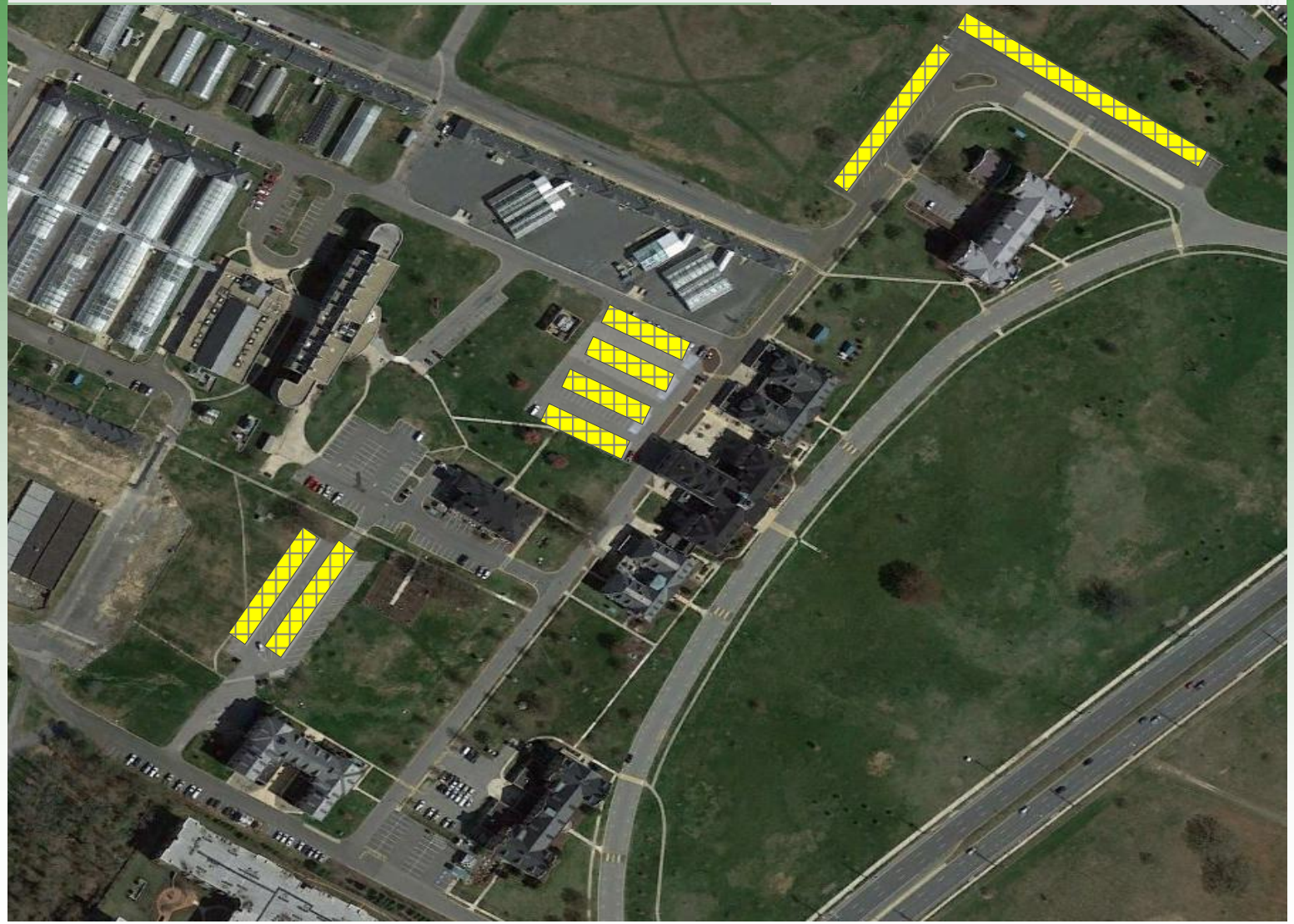
Location Quality	Summary
Acreage	Room for full system size
Sightline	No public view, glint or glare
Interconnect	Easy pathways in multiple directions for distribution
NEPA	TBD
Historic	Compatible

NAL Beltsville, MD

June 28, 2015

BARC 003 Parking Areas

June 28, 2015



CHOOSING ARRAYS LOCATIONS

Compatibility With Other Land Uses

Parking

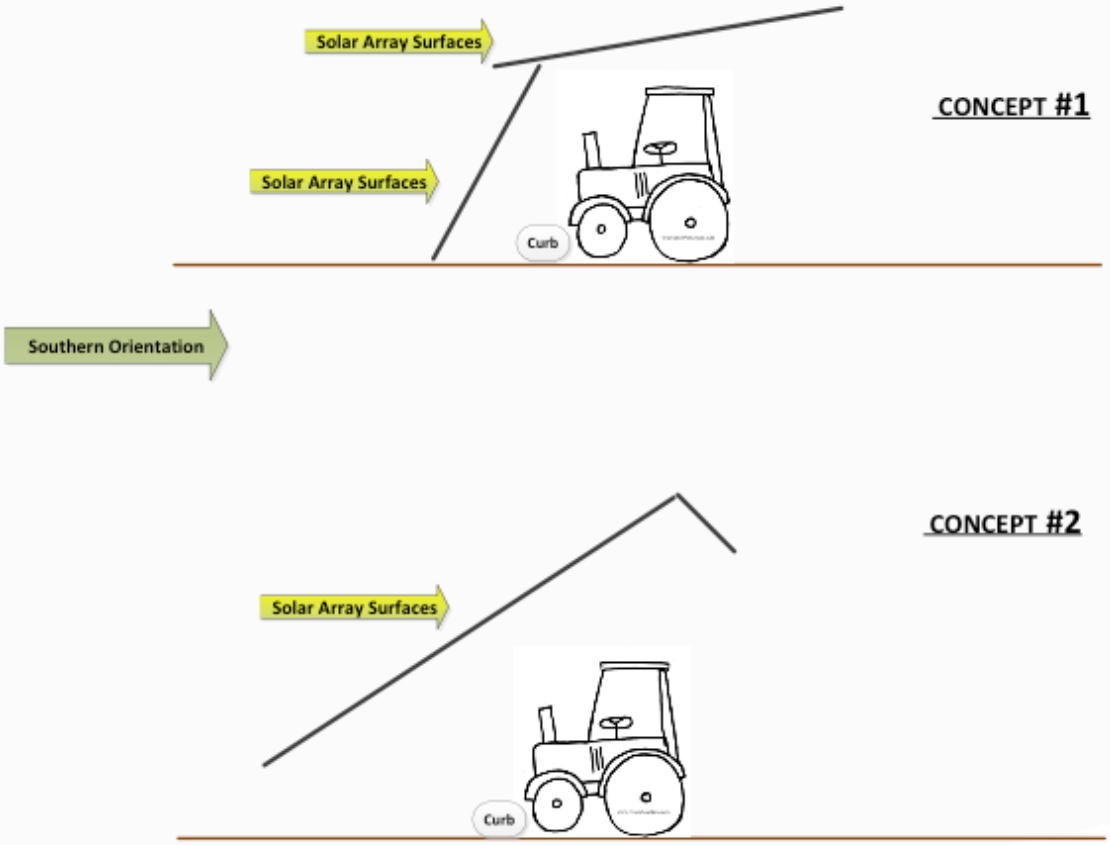
Grazing

Protecting Assets

SHADE!

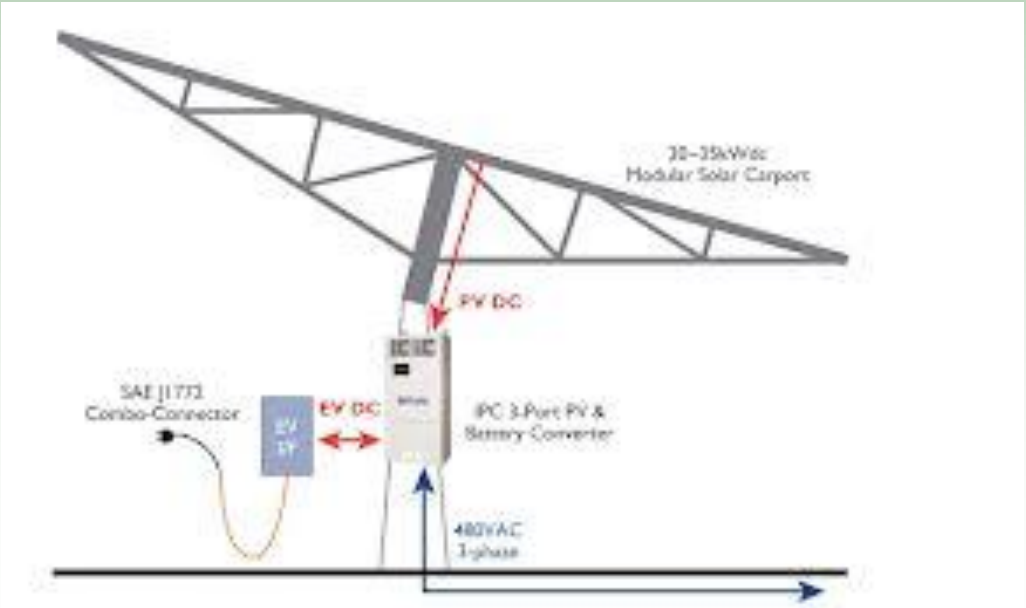
Solar Shaded Ag Shelter Concepts

June 26, 2015

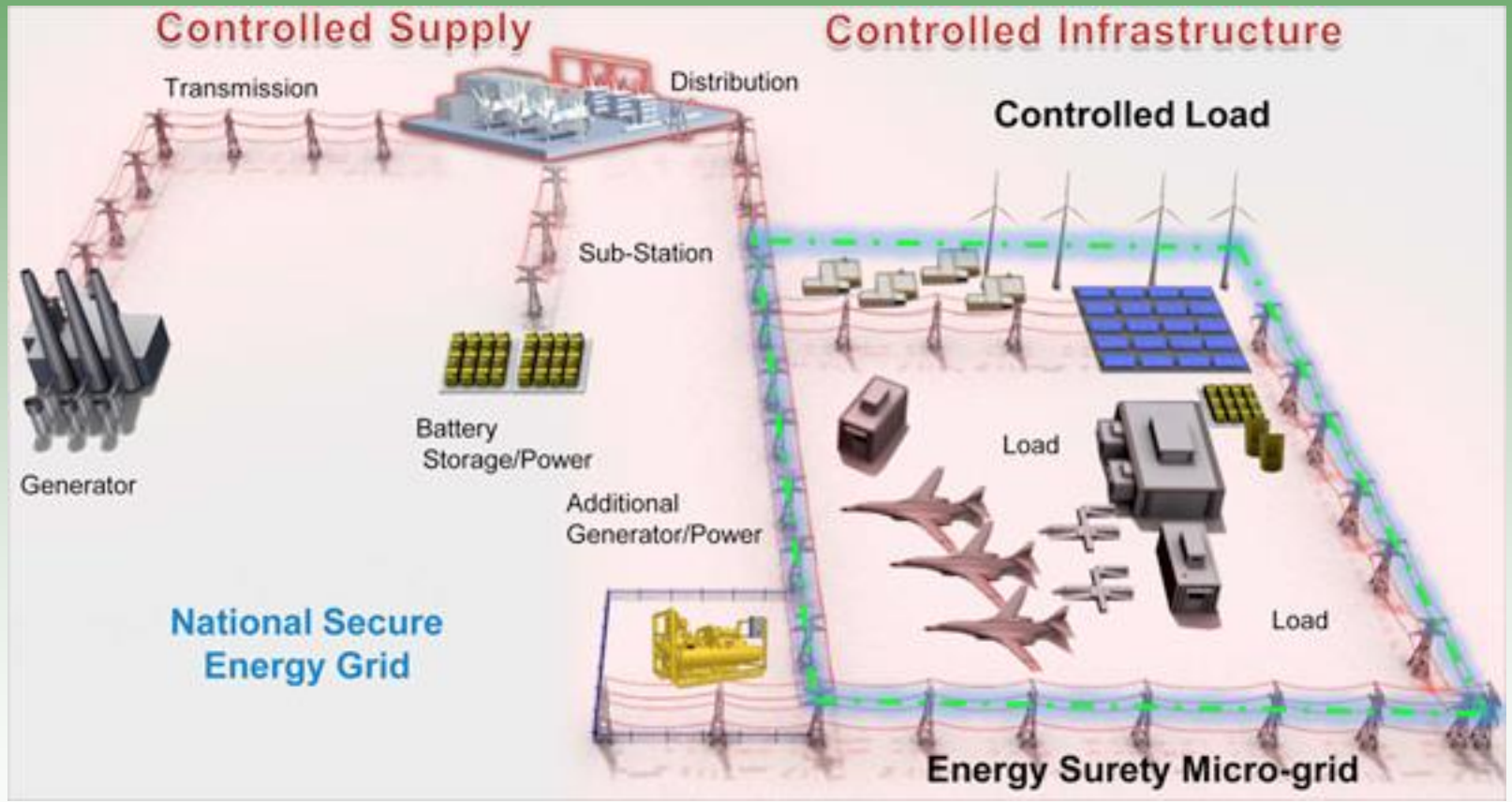


The Win-Wins of Carports

Shaded Carports – “EV Charger Ready”



Resiliency

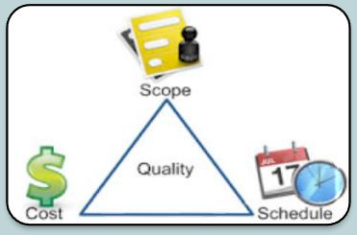

Controlled Supply
Controlled Infrastructure
Transmission
Distribution
Controlled Load
Sub-Station
Battery
Storage/Power
Generator
Load
Additional
Generator/Power
National Secure
Energy Grid
Load
Energy Surety Micro-grid

Moving Forward

- Assemble A Team
  - USDA – BARC
    - BARC Management
    - BARC NEPA
    - Energy Management
    - Engineering
  - FEMP
    - Technical Support – Subject Matter Experts
    - Project Development
    - Financial Analysis

Assessing Site

- Area
- Electrical Interconnect, Distribution
- Structural, NEPA



Composing Scope of Work

- Develop Site Objectives
- Reflect Site Conditions

RFP Phase

- Contractor Selection
- Contract Signing
- Construction Phase Management

Construction

- Commissioning
- Life of Contract Support

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Agricultural Research Service
the in-house research arm of the USDA

THANK YOU

Sandy Morgan – Energy Manager

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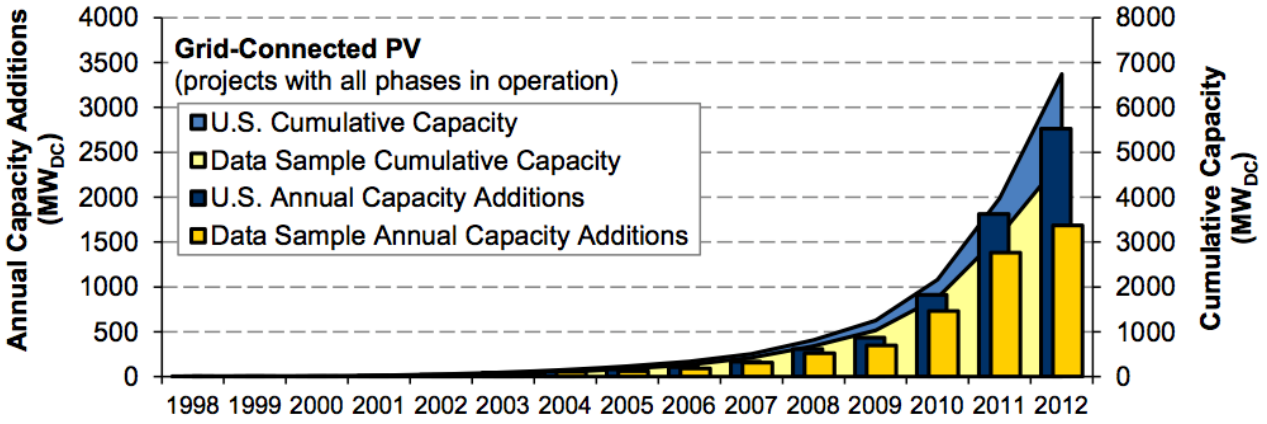
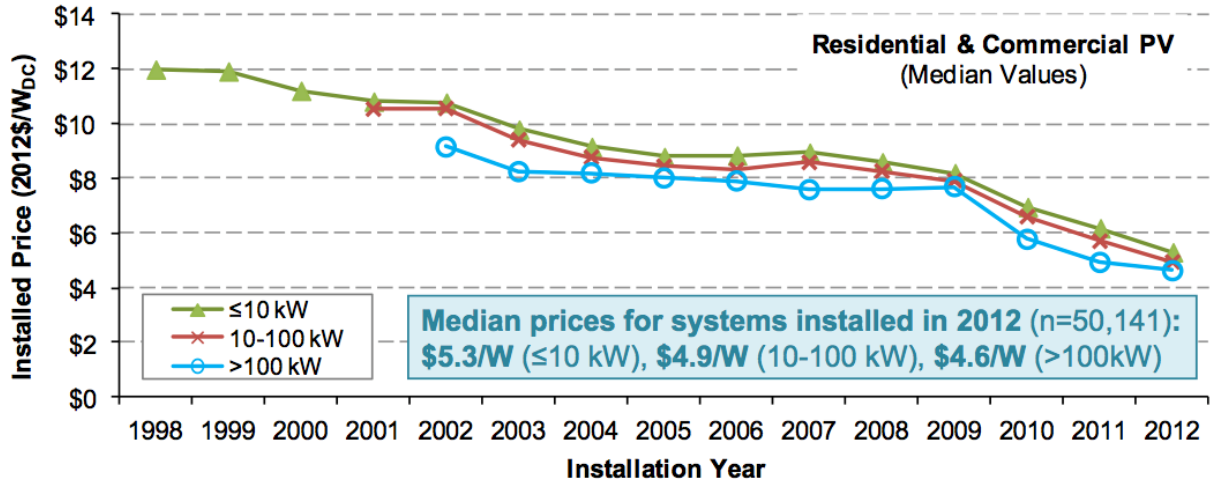


LBNL modified those values by deducting the capacity t were still under construction as of year-end 2012.

Median installed prices fell by $0.3-0.9/W (6-14%) from 2011-2012, across the three size ranges shown, and have fallen by an average of $0.5/W (6-7%) annually over the full historical period



Note: Median installed prices are shown only if 15 or more observations are available for the individual size range

What would it take?

Scenario 1: Reaching 20% by 2020 With 75% RECS & 25% Onsite

Assumptions		
Average kWh/kW Production	*1,500*	
Average Project Size (MW)	*1*	
Averge $/Watt Installed (1MW Size)	*$3.50*	
Details	**1X Credit**	**2X Credit**
Total MWhs Needed	**25,578**	**12,789**
Total MWs Needed	**17.05**	**8.53**
Total $ Bil of Economic Activity ($3.50/Watt)	**$59.7**	**$29.8**
Precentage of 2013 USDA Discretionary Funding ($23 bil)	**259%**	**130%**

Scenario 2: Reaching 20% by 2020 With 50% RECS & 50% Onsite

Assumptions		
Average kWh/kW Production	*1,500*	
Average Project Size (MW)	*1*	
Averge $/Watt Installed (1MW Size)	*$3.50*	
Details	**1X Credit**	**2X Credit**
Total MWhs Needed	**51,156**	**25,578**
Total MWs Needed	**34.10**	**17.05**
Total $ Bil of Economic Activity ($3.50/Watt)	**$119.4**	**$59.7**
Precentage of 2013 USDA Discretionary Funding ($23 bil)	**519%**	**259%**

New E.O. 30% by 2025

Scenario 3: Reaching 30% by 2025 With 75% RECS & 25% Onsite

Assumptions	
Average kWh/kW Production	*1,500*
Average Project Size (MW)	*1*
Averge $/Watt Installed (1MW Size)	*$ 3.50*

Details	1X Credit	2X Credit
Total MWhs Needed	38,367	19,184
Total MWs Needed	25.58	12.79
Total $ Cost Bil ($3.50/Watt)	$ 89.5	$ 44.8
Precentage of 2013 USDA Discretionary Funding ($23 bil)	389%	195%

Scenario 4: Reaching 30% by 2025 With 50% RECS & 50% Onsite

Assumptions	
Average kWh/kW Production	*1,500*
Average Project Size (MW)	*1*
Averge $/Watt Installed (1MW Size)	*$ 3.50*

Details	1X Credit	2X Credit
Total MWhs Needed	76,734	38,367
Total MWs Needed	51.16	25.58
Total $ Cost Bil ($3.50/Watt)	$ 179.0	$ 89.5
Precentage of 2013 USDA Discretionary Funding ($23 bil)	778%	389%

Financial Analysis

USDA - Agency Wide 20% by 2020

Based on 2013 Scorecard Numbers

SCENARIO

% REC	50%
% REN	50%

Assumptions

MWh Needed to 20% by 2020	102,312
Percentage of REC Buys (%)	50%
Percentage On-Site Renewable Buys (%)	50%
Cost ($/REC)	$ 1.25
Annual REC Price Inflator (%)	0.03

Utility Rate[2]	National Average
Utility Rate$/MWh	$ 120
First Year PPA Rate National Average (MWh)[1]	$ 90
PPA Escalation Rate[1]	2.0%
Utility Escalation Rate[3]	2.5%

National Average Incentive ($/MWh)/Year	$ 1.00
Term (Years)	20
Annual MWh 2020	511,560
Annual Depreciation	0.20%
Discount Rate[4]	3.9%

Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Annual Production (MWhj) Renewables		255,780	255,268	254,758	254,248	253,740	253,232	252,726	252,220	251,716	251,213	250,710	250,209	249,708	249,209	248,711	248,213	247,717
Utility Rate $/MWh		$ 120.00	123.000	126.075	129.227	132.458	135.769	139.163	142.642	146.208	149.864	153.610	157.450	161.387	165.421	169.557	173.796	178.141
PPA Rate ($/MWh)		$ 90	$ 91.800	$ 93.636	$ 95.509	$ 97.419	$ 99.367	$ 101.355	$ 103.382	$ 105.449	$ 107.558	$ 109.709	$ 111.904	$ 114.142	$ 116.425	$ 118.753	$ 121.128	$ 123.551
$/REC - Cost		$ (1.25)	$ (1.29)	$ (1.33)	$ (1.37)	$ (1.41)	$ (1.45)	$ (1.49)	$ (1.54)	$ (1.58)	$ (1.63)	$ (1.68)	$ (1.73)	$ (1.78)	$ (1.84)	$ (1.89)	$ (1.95)	$ (2.01)
Total REC Cost/Five Years		$ (63,945)				$ (71,971)					$ (83,434)					$ (96,723)		
Incentives ($/Year)		$ 255,780	$ 255,268	$ 254,758	$ 254,248	$ 253,740	$ 253,232	$ 252,726	$ 252,220	$ 251,716	$ 251,213	$ 250,710	$ 250,209	$ 249,708	$ 249,209	$ 248,711	$ 248,213	$ 247,717
$ Solar PV Electricity		$ 23,020,200	$ 23,433,643	$23,854,511	$24,282,938	$ 24,719,060	$ 25,163,014	$ 25,614,942	$26,074,986	$ 26,543,293	$ 27,020,010	$ 27,505,290	$ 27,999,285	$ 28,502,152	$ 29,014,050	$ 29,535,143	$ 30,065,594	$ 30,605,572
$ Utility Supplied Electricity		$ 30,693,600	$ 31,398,018	$32,182,969	$32,987,543	$ 33,812,231	$ 34,657,537	$ 35,523,976	$36,412,075	$ 37,322,377	$ 38,255,436	$ 39,211,822	$ 40,192,118	$ 41,196,921	$ 42,226,844	$ 43,282,515	$ 44,364,578	$ 45,473,692
Savings		$ 7,609,455	$ 7,964,375	$ 8,328,458	$ 8,704,605	$ 9,021,201	$ 9,494,523	$ 9,909,034	$10,337,089	$ 10,779,084	$ 11,151,992	$ 11,706,532	$ 12,192,833	$ 12,694,769	$ 13,212,793	$ 13,650,649	$ 14,298,984	$ 14,868,120
Cumulative Savings	$234,014,455																	
Net Present Value	$152,313,725																	

[1] System Advisor Modeling using 20 year term, 50% debt fraction, investor return of 10% and system cost of $4.00/Watt installed

2 FEMP utility rate escalator for Calfornia IOUs.

[3] FEMP/NIST Estimates of Nomical Discount Rates

High Potential Savings – USDA

Looking At The Potential – Big Picture View			
Scenarios – 30% by 2025	Cumulative Savings ($Mil)	Net Present Value ($Mil)	REC Costs ($)
75% Rec - 25% Onsite	$116	$76	$963,450
50% Rec - 50% Onsite	$234	$152	$642,000

Assumptions:
Discount Rate: 2.6% (FEMP)
Period: 20 Years
REC Cost: $1.25/REC

Pilot Sites Screened

USDA Western Pilot Sites - April 2015 - Solar PV

		Usage Profile (FY13-14)				System Info			Savings	
Site	**City State**	**Existing Annual kWh Consumption**	**Scope 2 GHG (tons/year)**	**Peak $/kWh**	**Existing Annual Electricity Cost**	**Type of System**	**System Size (MW)**	**Annual kWh**	**Life of Contract Savings**	**Solar PV % Reduction in kWh Consumed**
Western Region Research Center	Albany, CA	11,391,857	5,847,554	$ 0.150	$1,317,606	Roof & Carport	1.00	1,600,000	$ 1,053,000	14%
Research Center Salinas - Main Center	Salinas, CA	1,943,274	997,502	$ 0.150	$ 260,829	Ground, Roof, Carport	1.00	1,700,000	$ 1,300,000	87%
Research Center Salinas - Crop Area	Salinas, CA	173,596	89,109	$ 0.206	$ 33,540	Ground	0.100	170,000	$ 235,000	98%
Research Center Parlier	Parlier, CA	8,380,000	4,301,538	$ 0.149	$1,257,000	Ground	0.850	1,445,000	$ 1,900,000	17%
Tuscon	Tuscon, AZ	597,120	803,233	$ 0.146	$ 106,698	Ground & Carport	0.300	510,000	$ 578,000	85%
Maricopa	Maricopa, AZ	3,592,980	3,943,727	$ 0.146	$ 418,472	Roof	1.00	1,800,000	$ 1,590,000	50%
Tombstone	Tombstone, AZ	230,597	253,108	$ 0.146	$ 27,672	Ground, Roof, Carport	0.120	216,000	$ 190,000	94%
Las Cruces Mesilla Park Cotton Gin	Las Cruces, NM	276,800	332,160	$ 0.120	$ 33,000	Roof	0.282	282,336	$ 170,000	85%
Las Cruces Jornada Range	Las Cruces, NM	709,000	851,671	$ 0.120	$ 71,000	Ground, Roof	0.355	602,650	$ 363,000	85%
Las Cruces Wooten Building	Las Cruces, NM			$ 0.120		Roof				
							Totals		**$ 7,379,000**	