APPENDIX 'H'

SITE DESCRIPTION/ SUITABILITY ASSESSMENT (SD/SA) REPORT

for

SOLAR PHOTO-VOLTAIC SYSTEM/ POWER PURCHASE AGREEMENT FOR FORT INDIANTOWN GAP ANNVILLE, PENNSYLVANIA

Prepared by

GANFLEC
ARCHITECTS
& ENGINEERS

March 2015

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ATTACHEMENT

Executive Summary

Ganflec Architects and Engineers has conducted additional assessment studies for the Pennsylvania Department of Military and Veterans Affairs (PADMVA) related to the parcel for the proposed Solar PV Power Purchase Agreement Project. This study expands upon the previous Environmental Baseline Survey prepared by PADMVA in July 2014 and is included at the end of this assessment report as reference.

Ganflec Architects and Engineers has completed the following studies related to the solar lease area and has identified the following concerns or potential concerns in relation to the proposed solar lease area:

Wetland Investigation

While the larger contiguous areas of wetlands, Aires Run and drainage along Service Road, in close proximity to the lease and access areas do not impact the project area, there are two smaller pockets of wetlands located near the center of the lease area.

These areas are likely due to poor drainage on the site, and their size may allow for removal without further mitigation for their removal. Any potential permitting required for the removal of these areas should be reviewed with the appropriate jurisdiction.

Pennsylvania National Diversity Index (PNDI)

The PNDI search for the property yielded two (2) potential impacts (Horse Gentian and Bog Turtle habitat) that will require further investigation. These items are seasonal sensitive (Horse Gentian – May/June and Bog Turtle habitat early Spring). At the appropriate time, necessary studies will be completed during the Bid Period by the Government. Following the conclusion of the studies and receipt of a final clearance from the required agencies, final letters will be provided to the PPAP.

Utilities

Identified utilities within the lease area do not appear to pose an impact to the overall project. It should be noted that the existing overhead electric lines along Service Drive do create a limiting height restriction for entering the site. The lines should be protected during construction operations to limit any potential damage from construction operations.

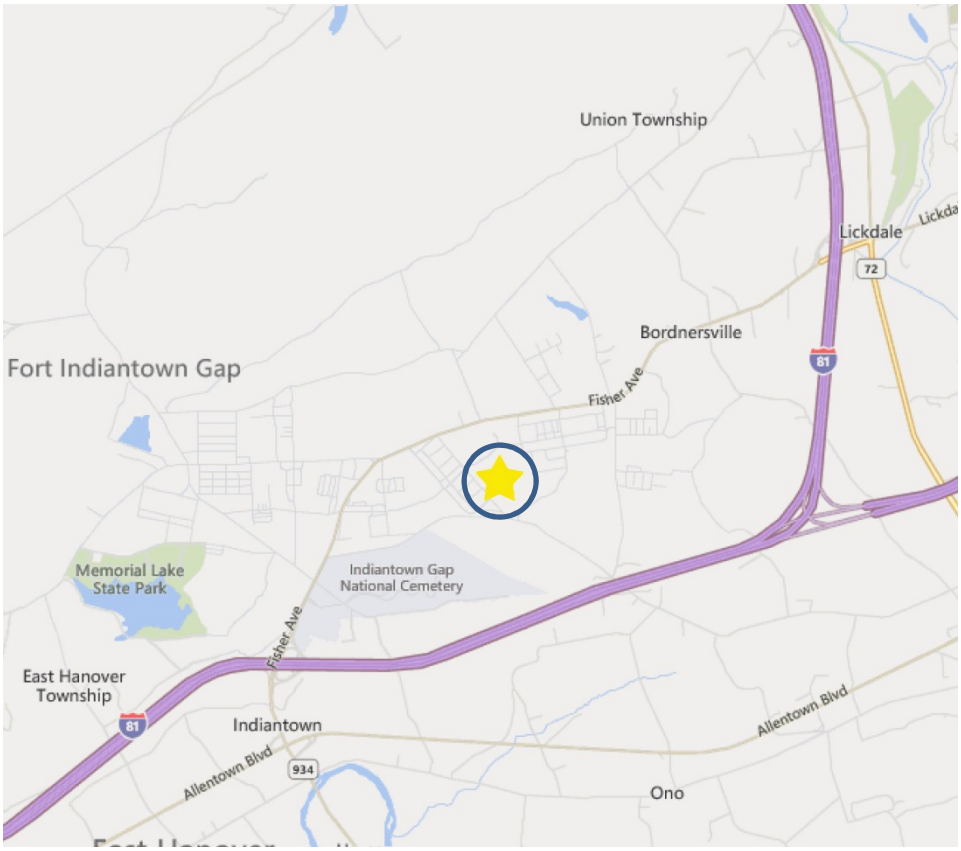
Project Description

The Department of Military and Veteran Affairs/ Army National Guard is seeking to develop a project to purchase electric power and produce Renewable Energy Credits through a Power Purchase Agreement between the Department of Military and Veteran Affairs and the Power Purchase Agreement Provider (PPAP). The PPAP will install, operate, and maintain a Photo-voltaic plant on a leased (nominal) tract of land on the Fort Indiantown Gap military installation base.

Project Location

The project area is located within the Fort Indiantown Gap military base reservation located in Union Township, Lebanon County, Pennsylvania. The site area encompasses approximately 18.95 acres located between Service Road and Coulter Road just south of the Arena Road/ Service Road intersection.

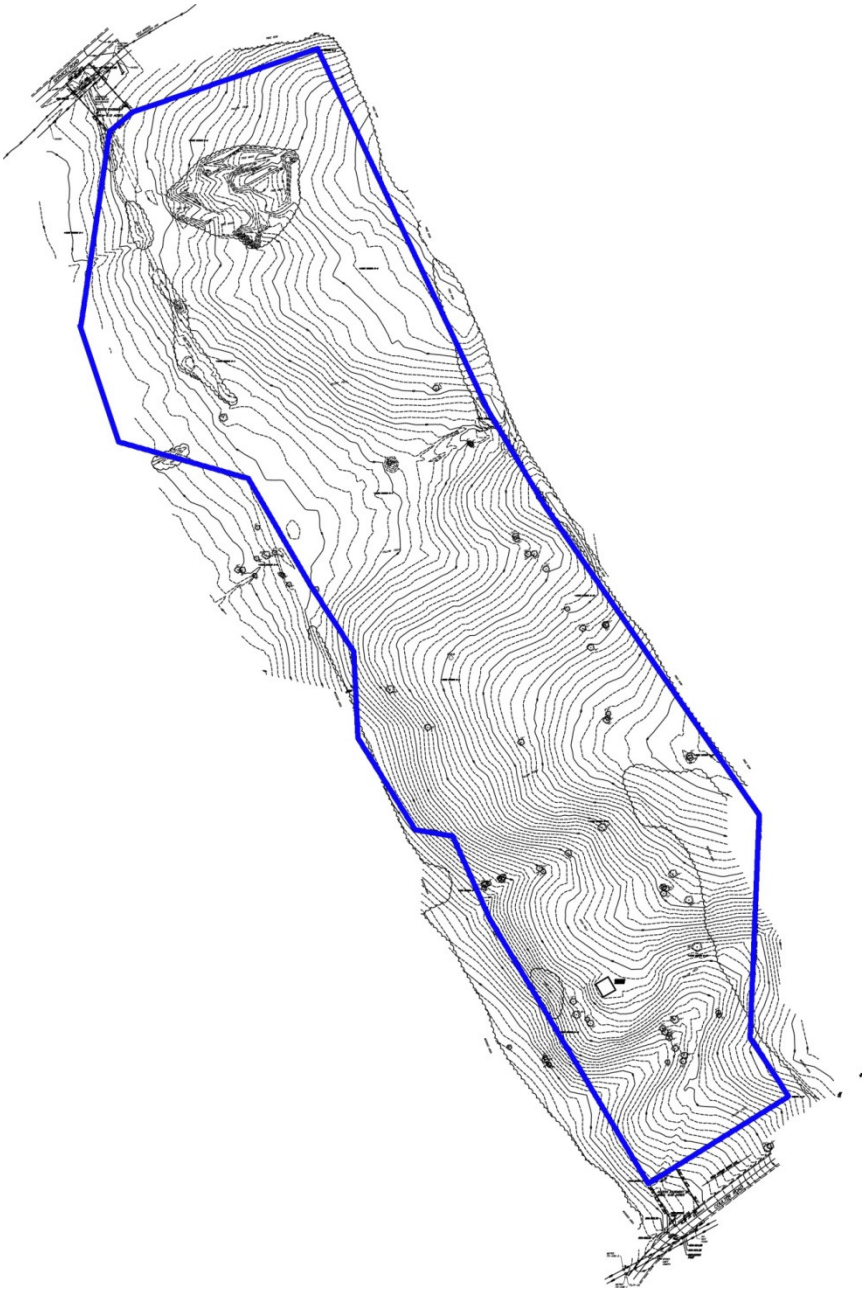
Project Location Map



Lease Area

The Department of military and Veteran Affairs/ Army National Guard has designated an approximately 18.95 acre lease area within the project site, for the PPAP to construct the proposed Photo-voltaic System. The proposed lease area is located and detailed as follows. Please see Attachment SDSA - 2 for additional plan information related to the lease area boundary.

Lease Area Plan



Lease Area Legal Description

LEGAL DESCRIPTON
FOR
SOLAR LEASE AREA

ALL THAT CERTAIN a portion of land, situate in the Township of Union, County of Lebanon, Commonwealth of Pennsylvania as being more fully bounded and described as follows, to wit:

BEGINNING at a point in the lands n/f of The Commonwealth of Pennsylvania; thence through said lands the following 19 courses and distances; 1) N 48°21'45" E, 50.00' to a point; thence 2) N 70°47'21" E, 319.55' to a point; thence 3) S 25°15'20" E, 672.47' to a point; thence 4) S 31°22'43" E, 120.59' to a point; thence 5) S 34°30'21" E, 660.40' to a point; thence 6) S 02°05'13" W, 199.31' to a point; thence 7) S 02°37'28' W, 164.22' to a point; thence 8) S 32°08'47" E, 116.05' to a point; thence 9) S 58°08'59' W, 267.50' to a point; thence 10) N 30°59'19" W, 492.38' to a point; thence 11) N 25°03'42" W, 162.06' to a point; thence 12) N 79°08'24" W. 62.75' to a point; thence 13) N 31°30'05" W, 173.99' to a point; thence 14) N 04°03'05" W, 144.33' to a point; thence 15) N 32°45'08" W, 119.26' to a point; thence 16) N 30°18'35" W, 208.88' to a point; thence 17) N 73°59'45" W, 221.81' to a point; thence 18) N 18°11'21" W, 196.35' to a point; thence 19) N 08°20'10" E, 321.69' to the point and place of **BEGINNING**.

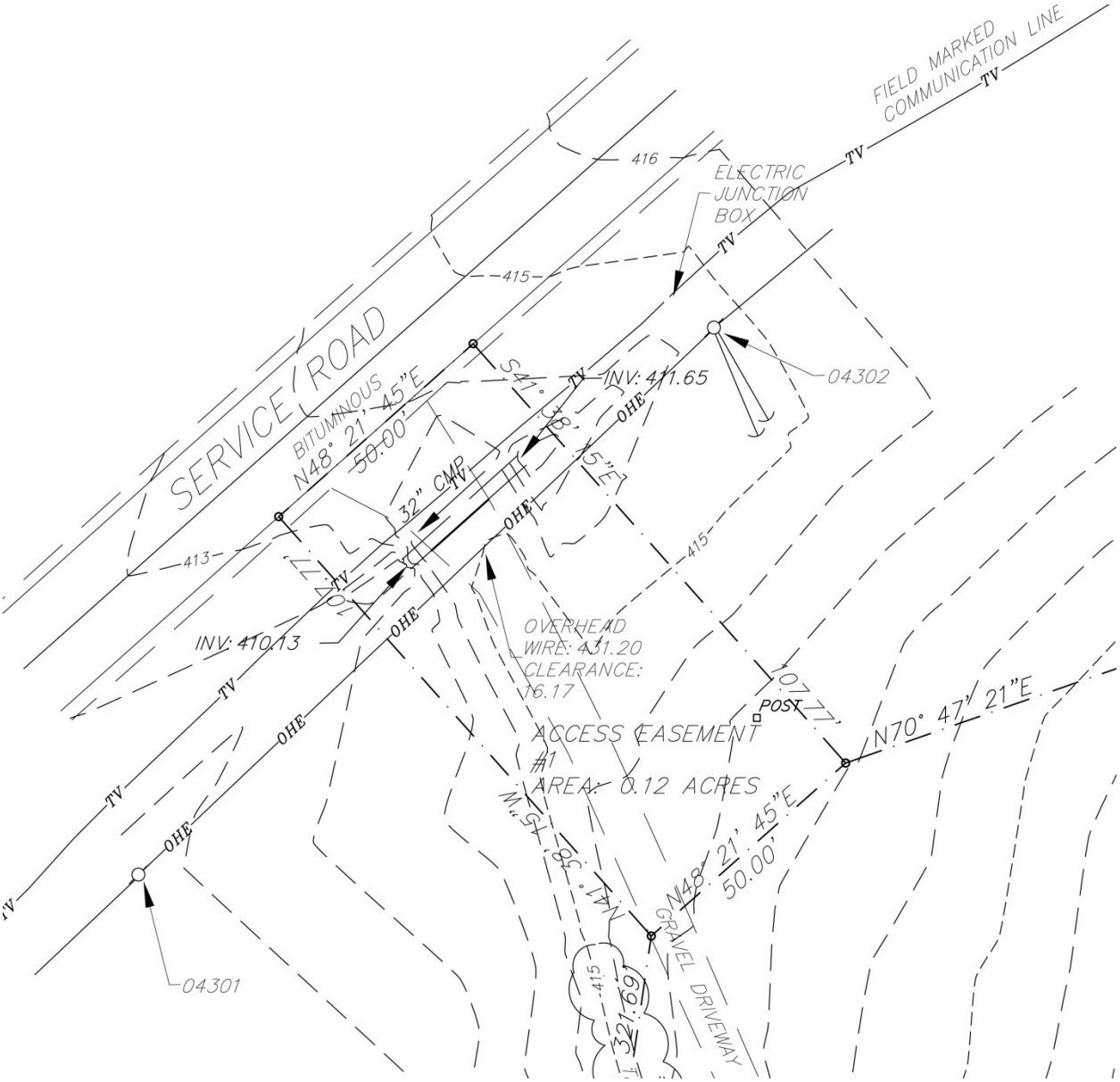
CONTAINING an area of 825,458 square feet, or 18.95 acres of land.

BEING a portion of lands of the premises which E.E. Shuey, granted and conveyed unto The Commonwealth of Pennsylvania by deed dated May 08, 1936 and recorded in the Lebanon County Recorder of Deeds Office in Deed Book CO-8, Page 36.

Site Access

Access to the lease area is available from both Service Road and Coulter Road via established access easements. The proposed access easements are located and detailed as follows:

Service Road Access Easement Plan



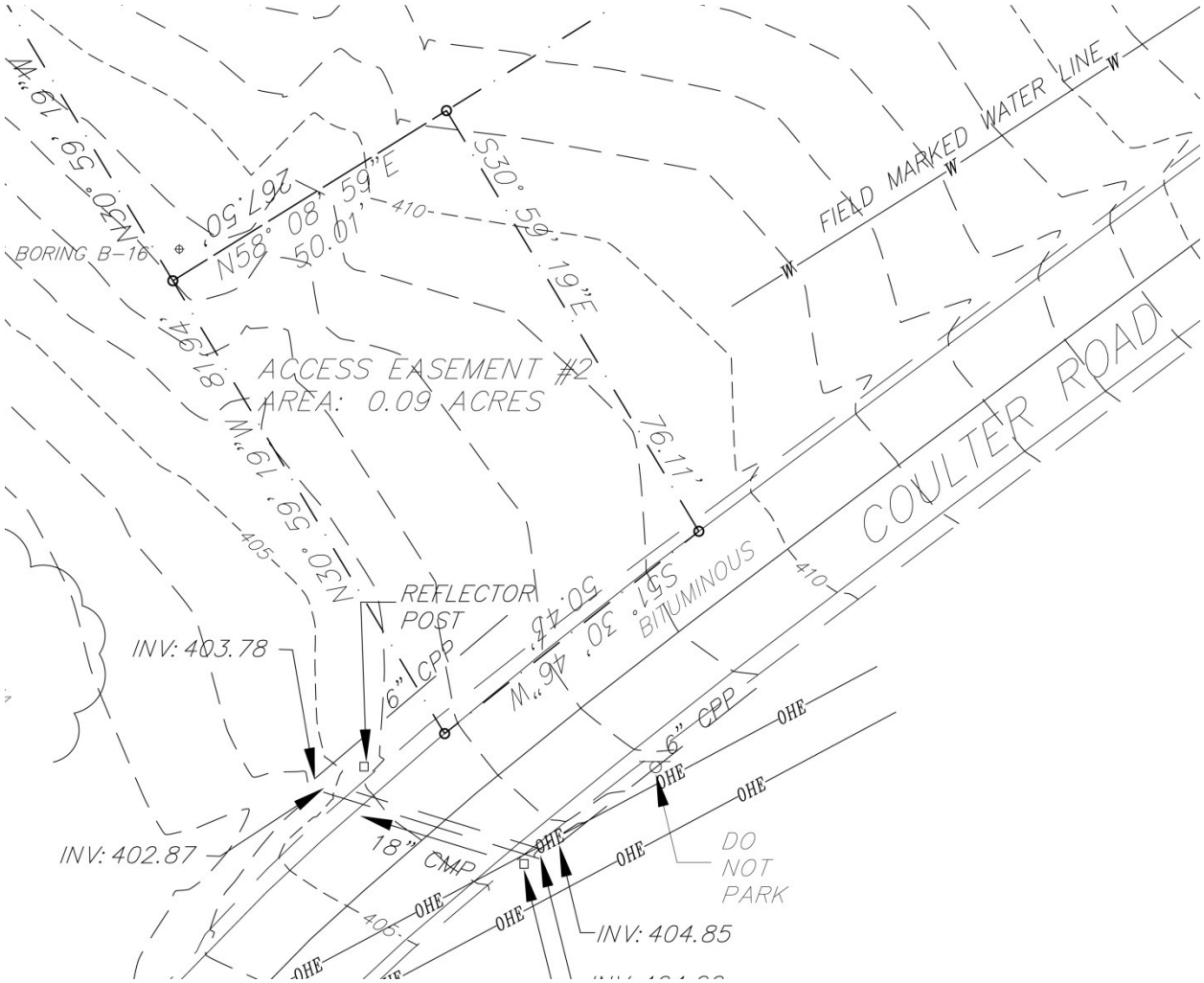
LEGAL DESCRIPTON
FOR
SOLAR LEASE AREA ACCESS EASEMENT #1
SERVICE ROAD ACCESS

ALL THAT CERTAIN a strip of land adjacent to the south right of way line of Service Road, situate in the Township of Union, County of Lebanon, Commonwealth of Pennsylvania as being more fully bounded and described as follows, to wit:

BEGINNING at a point on the south right of way line of Service Road; thence along said right of way N 48°21'45" E, 50.00' to a point; thence through lands n/f of The Commonwealth of Pennsylvania as described in Deed Book CO-8, Page 28 the following 3 courses and distances, 1) S 41°38'15" E, 107.77' to a point; thence 2) S 48°21'45" W, 50.00' to a point; thence 3) N 41°38'15" W, 107.77' to the point and place of **BEGINNING**.

CONTAINING an area of 5,389 square feet, or 0.12 acres of land.

Coulter Road Access Easement Plan



LEGAL DESCRIPTON
FOR
SOLAR LEASE AREA ACCESS EASEMENT #2
COULTER ROAD ACCESS

ALL THAT CERTAIN a strip of land adjacent to the north right of way line of Coulter Road, situate in the Township of Union, County of Lebanon, Commonwealth of Pennsylvania as being more fully bounded and described as follows, to wit:

BEGINNING at a point on the north right of way line of Coulter Road; thence along said right of way S 51°30'46" W, 50.43' to a point; thence through lands n/f of The Commonwealth of Pennsylvania as described in Deed Book CO-8, Page 28 the following 3 courses and distances, 1) N 30°59'19" W, 81.94' to a point; thence 2) N 58°08'59" E, 50.01' to a point; thence 3) S 30°59'19" E, 76.11' to the point and place of **BEGINNING**.

CONTAINING an area of 3,952 square feet, or 0.09 acres of land.

Wetlands Investigation

Gannett Fleming, Inc. conducted a field investigation of the project area to locate the limits of potential wetland areas nearby the project area. Below is a summary of those finding:

Findings

The major area of wetlands, within the site area, encompasses the floodplain area along Aires Run and extends along a drainage channel along the south side of Service Road. The wetlands along Aires Run primarily lie within existing wooded areas. There are also two small isolated wetland areas located within the central portion of the project site. For a detailed review of the performed testing and findings please see Attachment SDSA – 3 - "Wetland Report" attached to the end of this SD/SA report.

Wetland Map

Pennsylvania National Diversity Inventory (PNDI)

Gannett Fleming, Inc. conducted an initial Pennsylvania National Diversity Inventory (PNDI) request of the proposed project area. From that initial notification, three (3) potential impacts were identified within the project site. The impacts are as follows:

Pennsylvania Game Commission

Northern long-eared bat (Myotis septentrionalis – Northern Myotis)

Conservation Measure – Voluntary implementation of the following conservation measure will minimize impacts to roosting northern long-eared bats. All trees or dead snags greater than 5" in diameter at breast height that need to be harvested to facilitate the project, including any access roads or off- R.O.W. work spaces, should be cut between November 1 and March 31.

Pennsylvania Department of Conservation and Natural Resources

Horse-gentian (Triosteum angustifolium)

A physical site investigation of the project site will need to be conducted during the flowering time of the listed plant species in order to determine a presence or absence of the identified plant species. Flowering times for Horse-gentian are: Spring: May/ June and Fall: August/ September.

U.S. Fish and Wildlife Service

Bog Turtle

Conduct a Bog Turtle Habitat (Phase 1) Survey in accordance with USFWS Guidelines for Bog Turtle Surveys (April 2006). Evaluate all wetlands within 300 feet of the project area, which includes all areas that will be impacted by earth disturbance or project features (e.g., roads, structures, utility lines, lawns, detention basins, staging areas, etc.)

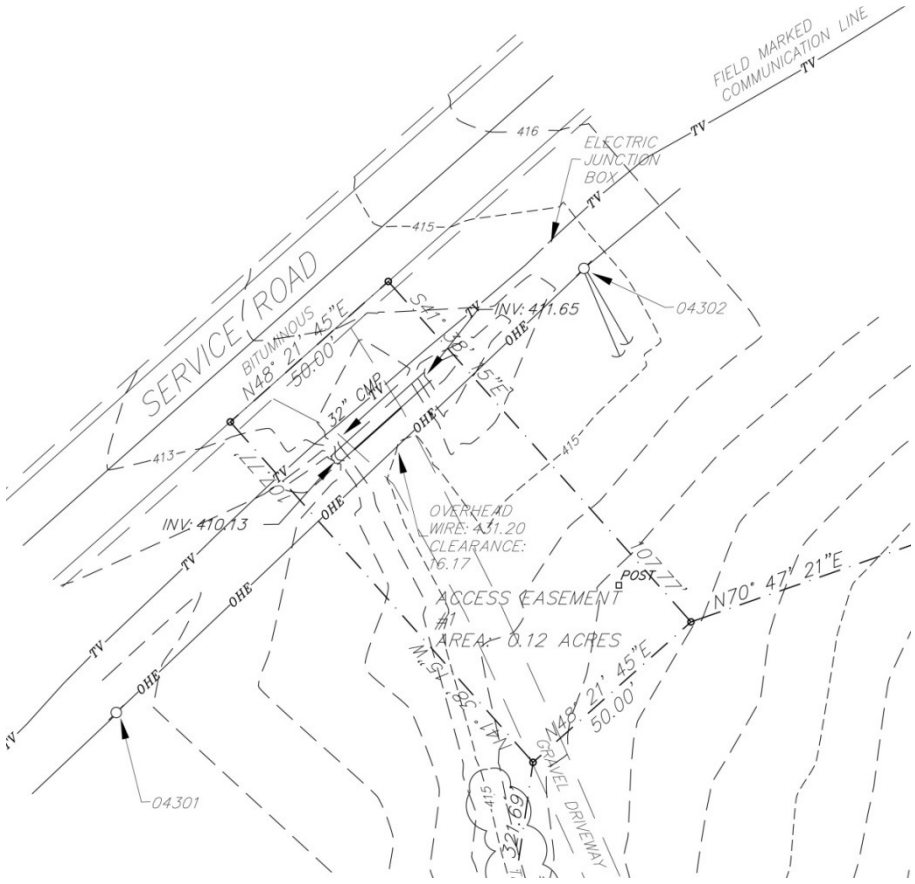
The original PNDI request is included for reference as Attachment SDSA - 4 at the end of this SD/SA report.

Utilities

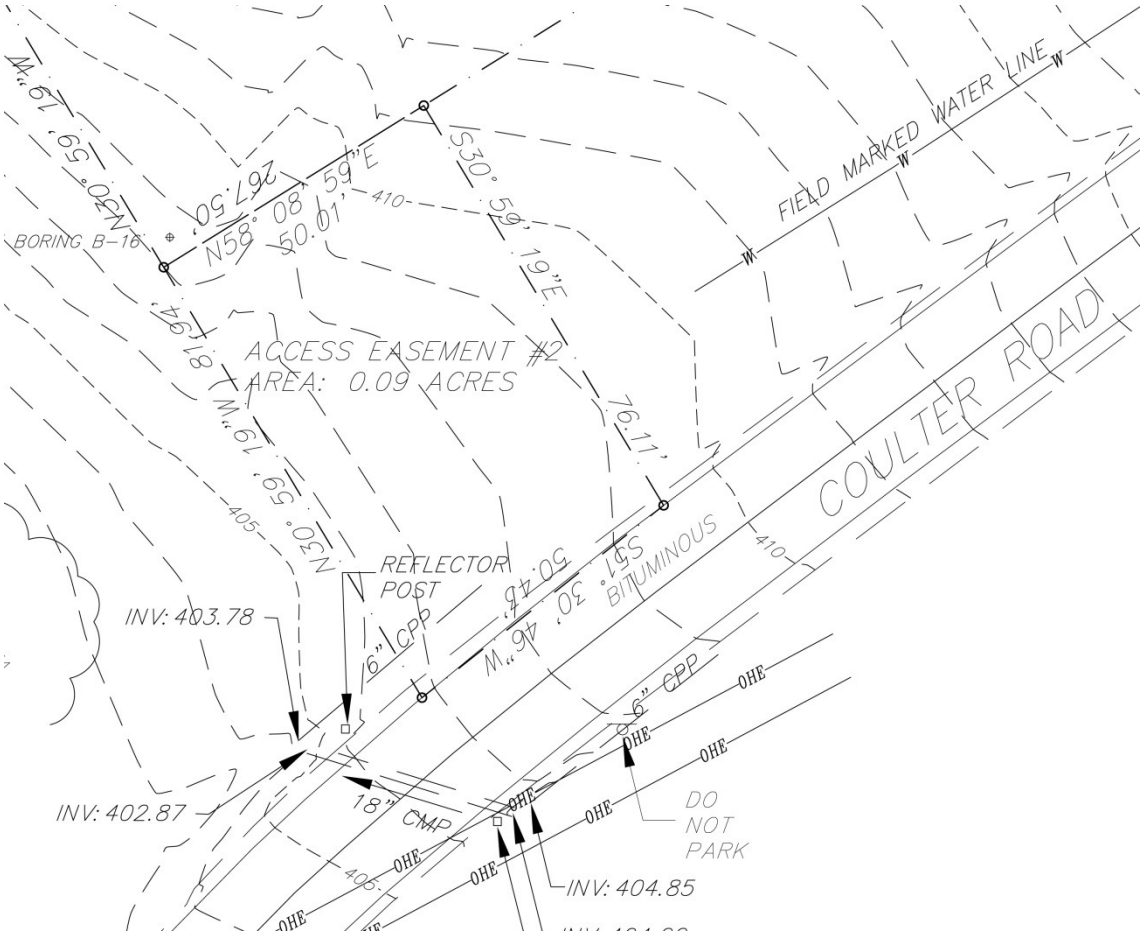
Based on mapping and field markings provided by Fort Indiantown Gap Reservation Maintenance and PA One-call, the following utilities have been identified within, and immediately adjacent to, the project lease and access easement area:

Electric……Existing overhead lines along south side of Service Road.
Vertical clearance limited to approximately sixteen (16) feet.
Water……..Existing 8" underground line along north side of Coulter Road.
Assumed depth: four (4) feet.
Sanitary Sewer……None identified
Telecommunications…An existing communications line along south side of Service Road.
Assumed depth: Three (3) feet.
Storm Sewer……Existing 32" CMP culvert located under the access drive off Service Road.
Natural Gas…….None identified.

Site Utility Map Service Road



Site Utility Map Coulter Road



Site/ Power System Hook-up Assessment

Ganflec Architects & Engineers facilitated a meeting that was attended by members of the Government & Met-Ed, a First Energy Company.

It was confirmed that the point of connection to the base 13.2kV primary distribution system would be to Feeder 103 on pole P4303, located just outside the proposed lease property limits on the south side of the service road. Feeder 103 shares a connection to a transformer located at the base substation that transforms the Met-Ed utility delivery voltage of 69kW down to the distribution voltage of 13.2kV.

There is a single Met-Ed utility meter for the entire base with connections on the 69kV Met-Ed electric utility feeder. Met-Ed will allow reverse power into their 69kV distribution system if there is sufficient generation as compared to consumption to permit this condition. Net-Metering is permitted within a billing cycle such that consumption exceeds generation within that cycle.

The PPAP is required to submit the Interconnection Agreement to Met-Ed and to PJM as required.

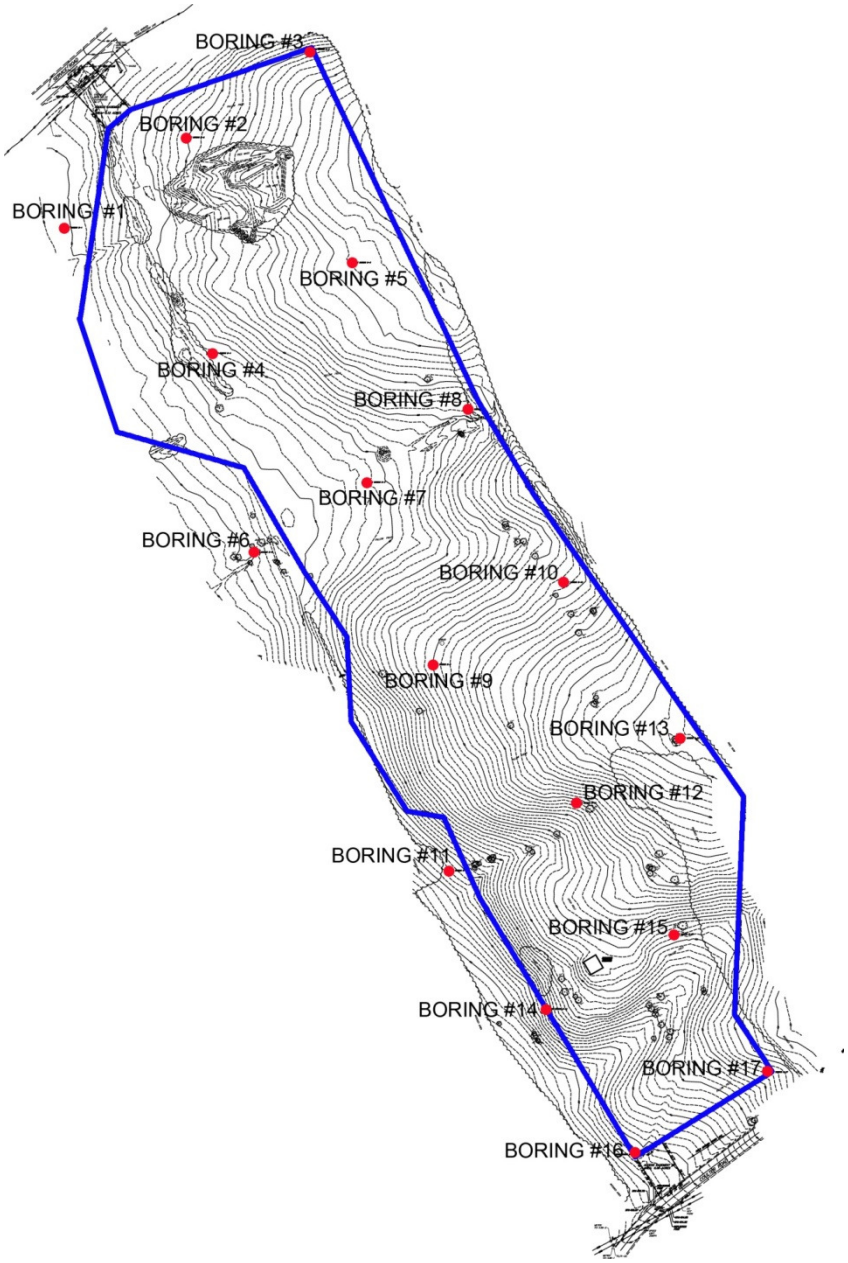
The Government utilizes capacitor load banks on base to switch on and off every day. The PPAP must deliver power at the point of connection that at all times meets the interconnection requirements for power factor and coordinate with FTIG's power factor control strategy to deliver a lagging power factor of >0.95. The measured voltage on Feeder 103 varies through the year from 12.9kV to 13.6kV.

The PPAP shall provide power meter/transmitter/receiver that matches the base standard (General Electric F650) to monitor and control the solar array. The PPAP shall provide cost effective and reliable data communications via fiber-optic or wireless/radio connection from the solar farm to the base utility substation.

Geotechnical Investigation

Gannett Fleming, Inc. conducted detailed investigation of site subsurface conditions within the proposed lease area. For a detailed review of the performed testing and findings please see Attachment SDSA - 5 "Geotechnical Investigation Report" attached to the end of this SD/SA report.

Geotechnical Investigation Map – (Boring Locations)



Solar Glare Hazard Analysis

Ganflec Architects & Engineers conducted three sets of Solar Glare Hazard Analyses using the tool made available by Sandia National Laboratories.

The first calculation set analyzed four flight paths (DIR E PAD, L BASE, DOWNWIND & WIDE DOWNWIND) using the criteria provided by the Government. This report is included in Attachment SDSA - 6. In each of these cases there is a low potential for temporary after-image and glare beyond 50 degrees from the pilot line-of-sight during select times of the solar day. There is no calculated potential for permanent eye damage.

The second calculation set analyzed two flight paths (DIR E PAD, L BASE) using the criteria provided by the Government except we selected a 3 degree Glide Slope consistent with the FAA guideline criteria. This report is included in Attachment SDSA - 7. In each of these cases there is a low potential for temporary after-image and glare beyond 50 degrees from the pilot line-of-sight during select times of the solar day. There is no calculated potential for permanent eye damage.

The third calculation analyzed the potential for glare at the Air Traffic Control Tower which is to the north of the proposed solar array. The height of the control tower above grade was assumed to be 120 feet above ground level. This report is included in Attachment SDSA - 8. In this case there is no calculated potential for solar glare.

Environmental Baseline Survey for Cantonment Area 4

The Environmental Baseline Survey (EBS was prepared by the Pennsylvania Department of Military and Veterans Affairs (PADMVA). The purpose of the EBS was to document the existing environmental conditions of the proposed solar lease area. The EBS serves to identify areas of concern or potential concern that may impact the suitability of the site. The full EBS can be found in Attachment SDSA - 9 at the end of this report.

ATTACHMENT SDSA -1

SITE SURVEY

80' 40' 0 80' 160'
1"=80'

GANFLEC
ARCHITECTS & ENGINEERS
209 SENATE AVENUE
CAMP HILL, PA 17011

PENNSYLVANIA ARMY NATIONAL GUARD

FORT INDIANTOWN GAP, ANNVILLE, PENNSYLVANIA

FORT INDIANTOWN GAP SOLAR PHOTO - VOLTAIC SYSTEM/POWER PURCHASE AGREEMENT

NO.	DATE	DESCRIPTION

REVISIONS

PROJECT NUMBER:

DESIGNED:	MODELED:	CHECKED:
BES	SMA	BES

DATE: DECEMBER 1, 2014

DRAWING TITLE:
CIVIL

SITE SURVEY

DRAWING NO.:
Attachment SDSA-1

ATTACHMENT SDSA -2

SITE LEASE AREA

80' 40' 0 80' 160'

1"=80'

GANFLEC
ARCHITECTS & ENGINEERS
209 SENATE AVENUE
CAMP HILL, PA 17011

PENNSYLVANIA ARMY NATIONAL GUARD
FORT INDIANTOWN GAP, ANNVILLE, PENNSYLVANIA

FORT INDIANTOWN GAP SOLAR PHOTO - VOLTAIC SYSTEM/POWER PURCHASE AGREEMENT

NO.	DATE	DESCRIPTION

REVISIONS

PROJECT NUMBER:

DESIGNED:	MODELED:	CHECKED:
BES	SMA	BES

DATE:
DECEMBER 1, 2014

DRAWING TITLE:
CIVIL

SITE LEASE AREA

DRAWING NO.:
Appendix B

ATTACHMENT SDSA -3

WETLANDS REPORT

WETLAND IDENTIFICATION AND DELINEATION REPORT

PENNSYLVANIA AIR NATIONAL GUARD
SOLAR FARM
SERVICE & COULTER ROADS, FORT INDIANTOWN GAP
UNION TOWNSHIP, LEBANON COUNTY, PENNSYLVANIA

Prepared for:
PENNSYLVANIA AIR NATIONAL GUARD

Prepared by:

Gannett Fleming

December 2014

WETLAND IDENTIFICATION AND DELINEATION REPORT

Pennsylvania Air National Guard
Solar Farm
Service & Coulter Roads, Fort Indiantown Gap
Union Township, Lebanon County, Pennsylvania

Prepared for:

Pennsylvania Air National Guard

Prepared by:

Gannett Fleming

December 2014

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FIGURES

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APPENDICES

1.0 Project Description

The Department of Military and Veteran Affairs/Army National Guard is seeking to develop a project to purchase electric power and produce Renewable Energy Credits through a Power Purchase Agreement between the Department of Military and Veteran Affairs and the Power Purchase Agreement Provider (PPAP). The PPAP will install, operate, and maintain a photo-voltaic plant ("Solar Farm") and associated infrastructure on a leased (nominal) tract of land on the Fort Indiantown Gap military base in Union Township, Lebanon County. The site is located between Service Road and Coulter Road on the Fort Indiantown Gap Military Reservation, Union Township, PA. The proposed solar farm site will be constructed in what currently exists as a vacant fallow field with tree line boundaries to the northeast and to the southwest along Aires Run. Currently on site, the only existing improvement is an unnamed gravel access drive off of Service Road. The Solar Farm is approximately 17.3 acres in size within the 30-acre project study area. The coordinates for the center of the project study area are 40° 25′ 50.52″ N; 76° 33′ 17.28″ W.

2.0 Purpose

The purpose of this report is to present the results of the wetlands and waterways investigation conducted within the proposed project study area. This report was prepared, in part, to satisfy the regulatory requirements of the U.S. Army Corps of Engineers (USACE) under the purview of Section 404 of the Clean Water Act, and the Pennsylvania Department of Environmental Protection (PADEP) under PA Code Title 25, Chapter 105 Dam Safety and Waterway Management.

3.0 Study Area Description

The study area encompasses 30 acres. The study area is bordered by Service Road to the north, Coulter Road to the south, Aires Run to the West, and a narrow tree line to the east. The 30-acre project study area extended beyond the proposed limit of disturbance for the project. The majority of the study area is occasionally mowed, fallow fields with some small clusters of trees. Wetlands flank the floodplain of Aires Run. An unnamed gravel access drive enters the project study area from Service Road, and several vehicular paths are evident within the fields. A Project Location and Study Area Map is provided as **Figure 1**.

3.1 Topography

According to the U.S. Geological Survey (USGS) 7.5 minute topographic quadrangle map (Indiantown Gap, PA), the elevation of the project site ranges from approximately 440 feet above mean sea level (amsl) along the tree line creating the eastern boundary of the project study area to 410 feet amsl along the east bank of Aires Run. An excerpt from the USGS Topographic Quadrangle Map is provided as **Figure 2**.

3.2 Soils

According to the U.S. Department of Agriculture (USDA) National Resources Conservation Service (NRCS) Web Soil Survey, soils across the site were predominantly Berks channery silt loam (BkgB), Comly silt loam, 3 to 8 percent slopes (CmB), and Holly silt loam (Ho). An excerpt from the soil survey is provided as **Figure 3**. According to the USDA National Hydric Soils List for Pennsylvania (2014),Comly silt loam (CmB) and Holly silt loam (Ho) are listed by the USDA as hydric or partially hydric soils for Lebanon County.

Legend

- Project Study Area
- Streams

Figure 1
Project Location and Study Area Map

Pennsylvania Air National Guard
Solar Farm
Service Road, Fort Indiantown Gap

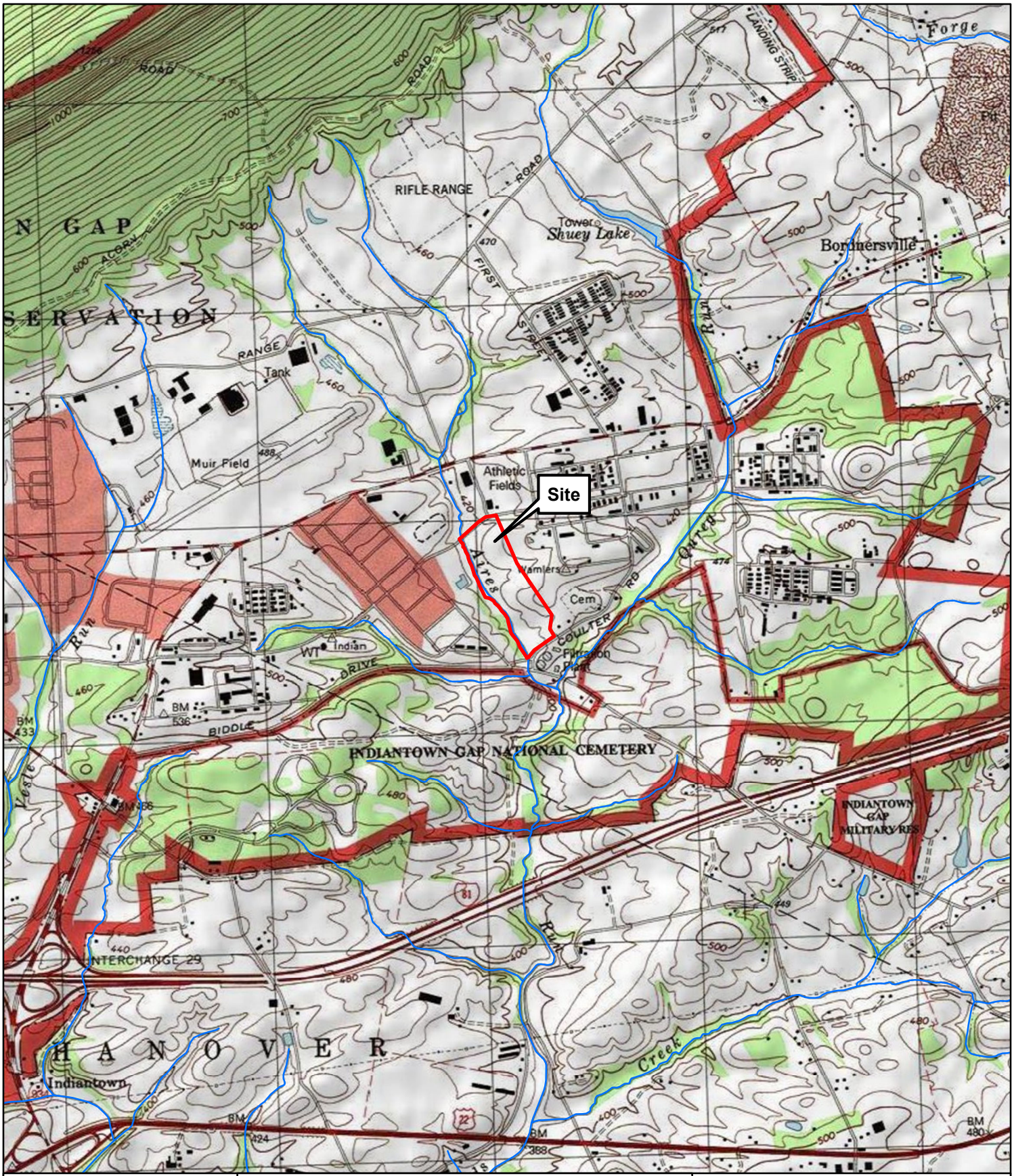
Union Township, Lebanon County, Pennsylvania

N
W E
S

Feet
300 150 0 300

Gannett Fleming

Aerial imagery basemapping provided ESRI ArcGIS Online webservices.



Legend

- Project Study Area
- Streams

Figure 2
USGS Topographic Map

Pennsylvania Air National Guard
Solar Farm
Service Road, Fort Indiantown Gap

Union Township, Lebanon County, Pennsylvania

N
W E
S

2,000 1,000 0 2,000 Feet

Gannett Fleming

USGS topographic basemapping provided ESRI ArcGIS Online webservices.

Legend

- Project Study Area
- Streams
- Lebanon County Soils

Figure 3
Lebanon County Soil Map

Pennsylvania Air National Guard
Solar Farm
Service Road, Fort Indiantown Gap

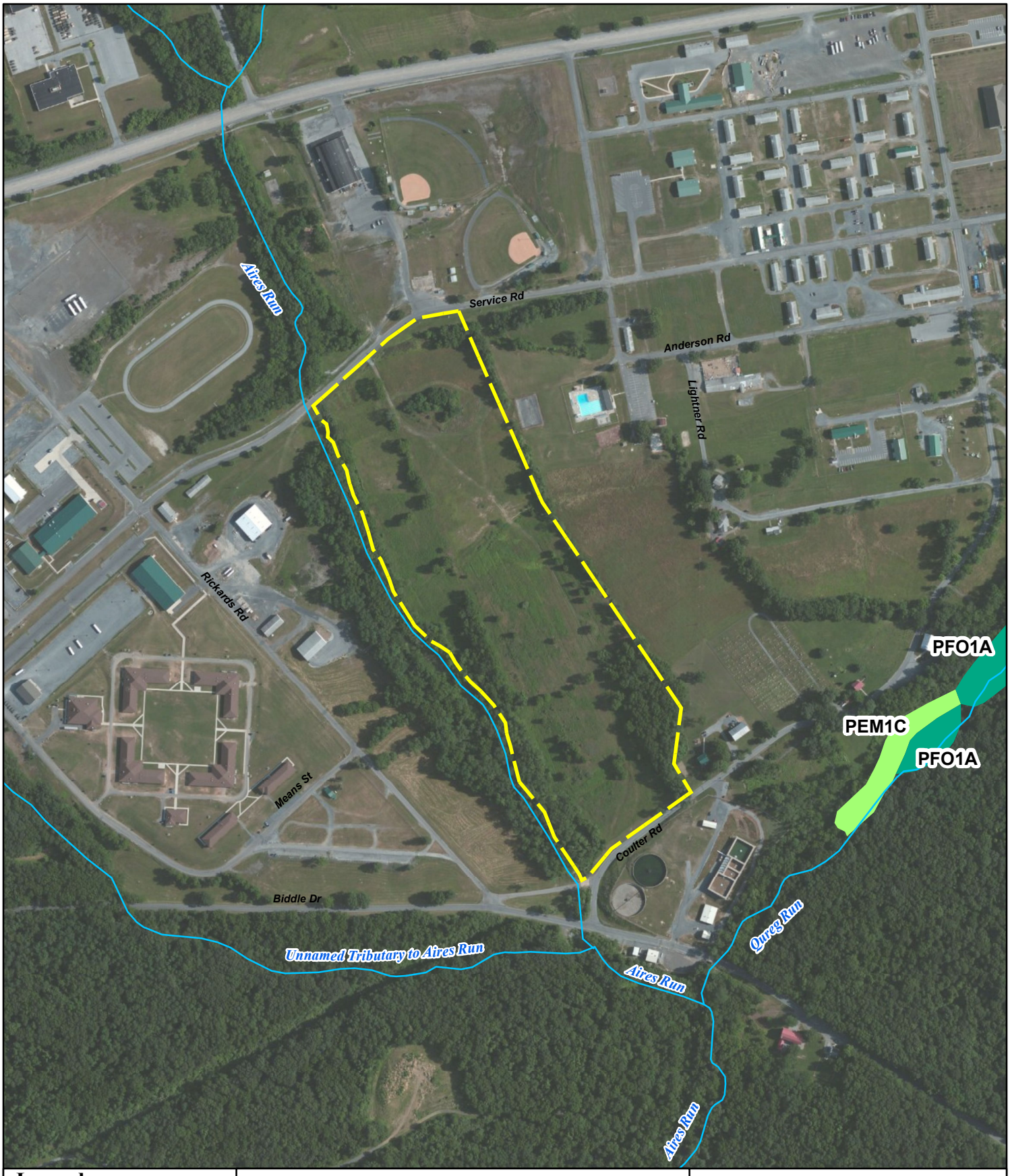
Union Township, Lebanon County, Pennsylvania

N
W E
S

300 150 0 300 Feet

Gannett Fleming

Aerial imagery basemapping provided ESRI ArcGIS Online webservices.



Legend

- Project Study Area
- Streams

NWI Wetland Type

- Freshwater Emergent Wetland
- Freshwater Forested /Shrub Wetland

Figure 4

National Wetlands Inventory Map

Pennsylvania Air National Guard
Solar Farm
Service Road, Fort Indiantown Gap

Union Township, Lebanon County, Pennsylvania

N
W E
S

500 250 0 500 Feet

Gannett Fleming

Aerial imagery basemapping provided ESRI ArcGIS Online webservices.

3.3 Geology

The proposed project is located in the Great Valley Section of the Ridge and Valley Physiographic Province of Pennsylvania (DCNR, 2000). According to the Pennsylvania Bureau of Topographic and Geologic Survey, the site is underlain with shale, limestone, dolomite, and sandstone of the Ordovician period (PADCNR, 2007).

3.4 Surface Waters

Aires Run was identified as a perennial stream by the USGS along the western boundary of the project study area (**Figure 2**). No additional previously-mapped surface water features were identified within the study area boundary.

Aires Run is a tributary of Reeds Creek. The Pennsylvania Code, Chapter 93, Drainage List "O" - Water Quality Standards, does not list Aires Run or Reeds Creek. The Pennsylvania Fish & Boat Commission (PFBC) does not list Aires Run as a wild trout waters. The PFBC does not stock Aires Run. Aires Run and Reeds Creek drain to Swatara Creek. Chapter 93 designations for unnamed tributaries (UNT) to Swatara Creek in Lebanon and Dauphin Counties are Warm Water Fisheries (WWF) and Migratory Fisheries (MF).

3.5 National Wetlands Inventory

The National Wetlands Inventory (NWI) online mapping tool did not identify any previously-mapped wetlands within or immediately adjacent to the project study area. The NWI map for the site is provided as **Figure 4**.

3.6 PNDI Project Environmental Review

The project study area was submitted for environmental review to the Pennsylvania Natural Diversity Inventory (PNDI) on November 7, 2014 (Project Search ID: 20140909466275) to identify potential environmental impacts within the project study area, and aid in initiating jurisdictional agency coordination to avoid potential environmental impacts.

A conservation measure for the northern long-earred bath (*Myotis septenrionalis*) was identified and no further coordination was required for the Pennsylvania Game Commission (PGC). The conservation measure requests that tree and standing dead tree (snag) removal occur between November 1 and March 13, and implementation of this conservation measure is currently voluntary. One potential impact was identified and will require further coordination with Pennsylvania Department of Conservation and Natural Resources (PA DCNR) for a species of special concern, horse-gentian (*Triosteum angustifolium*). No potential impacts were identified and will not require further coordination with Pennsylvania Fish and Boat Commission (PFBC).

One potential impact was identified and will require further coordination with the United States Fish and Wildlife Service (USFWS). The potential impact is regarding bog turtles (*Clemmys muhlenbergii*) which are listed as a state endangered species and federally threatened species. The PNDI Review Receipt requests that a Bog Turtle Habitat (Phase 1) Survey be conducted in accordance with USFWS Guidelines for Bog Turtle Surveys (April 2006). The PNDI Project Environmental Review Receipt (Project Search ID: 201409094662745) is provided as **Appendix D.**

4.0 Methods

The 30-acre study area was investigated for palustrine wetland indicators of vegetative composition, soil development, and hydrology. The investigation was conducted in accordance with the *Regional Supplement to the Corps of Engineers Wetlands Delineation Manual: Eastern Mountains & Piedmont Region (Version 2.0)* (Environmental Laboratory, 2012). Wetland field data forms were completed to document wetland or non-wetland data points. If present, wetlands within and directly adjacent to the study area were delineated so that their presence could be shown on project mapping to aid in impact avoidance and/or minimization during engineering design.

Soils were characterized by evaluating the upper horizons of the soil profile. Soil pits were dug using a "sharpshooter" spade with a 16-inch blade. Soil horizons were evaluated using normal field protocols for determining texture and nomenclature. The *Munsell Soil Color Charts* (Macbeth Division of Kollmorgen Instruments Corporation, 1994) were used to determine the colors of horizons and redoximorphic features. Soil observations of reducing conditions were determined in the field using presence/absence determinations of redoximorphic concretions and oxidized rhizospheres, and identifying low chroma matrices.

Vegetation was identified using *A Field Guide to Trees and Shrubs* (Petrides, 1986), *Newcomb's Wildflower Guide* (Newcomb, 1977) and *Grasses: An Identification Guide* (Brown, 1979). Plant species were assigned an indicator status [Not Listed (NL), Upland (UPL), Facultative Upland (FACU), Facultative (FAC), Facultative Wetland (FACW), or Obligate Wetland (OBL)] based on the *2014 USACE National Wetland Plant List* (Lichvar *et al*, 2014).

Data point locations were investigated for primary and secondary wetland hydrology indicators. If present, wetland boundaries were marked using pink wetland flagging. Wetland boundary data points were located using a Trimble GeoXH 6000 Global Positioning System (GPS). The Trimble GeoXH 6000 is capable of attaining sub-meter accuracy. The GPS data were then transferred onto relevant site mapping using the U.S. State Plane, PA South coordinate system. Wetlands and waterways were identified on site mapping to show their proximity to the proposed construction area.

Wetland function and value assessments were performed at each wetland location (if present) using the methods outlined in *The Highway Methodology Workbook Supplement, Wetland Functions and Values: A Descriptive Approach*, USACE New England Division (NEDEP-360-1-30a 1995). Wetland functions were evaluated and recorded using the standard wetland function-value evaluation form. Classifications were assigned to each wetland following the Cowardin *et al* methods (1979). Color photographs were taken of all relevant features to document site conditions during the time of the investigations.

Waterways were identified through a review of available mapping and field investigations. Topographic and engineering maps were reviewed for the presence of streams within the project study area. Field investigations for waterways were performed in conjunction with the wetland field investigation. The waterway investigations included the field verification of mapped watercourses and the identification and delineation of streams, springs, and seeps that were not shown on existing engineering plans. Waterways were identified by the presence of bed and banks and/or ordinary high water marks. The flow regime of each identified waterway was

characterized based upon field indicators of hydrologic, floral, and faunal character at the time of the investigation. All identified waterways were located using GPS and photographed.

5.0 Results

The study area was field-investigated for palustrine wetland indicators of vegetative composition, soil development, and hydrologic characteristics on November 10, 2014. Weather conditions were clear and sunny throughout the day and warm with temperatures ranging from 28 to 60°F. Preliminary data for the region indicated approximately 0.81 inch of rain fell within 72 hours of the investigation (Weather Underground, 2014). The closest weather station to the site was at Fort Indiantown Gap's Muir Army Air Field, approximately 3,300 feet from the project study area. The dominant land uses within the study area were occasionally-mowed field, forested borders, and wetland.

Table 1
Dominant Vegetation

Scientific Name	Common Name	Mowed Field	Floodplain Forest	Wetland	Indicator Status
Trees					
Acer rubrum	Red maple		X	X	FAC
Carya ovata	Shagbark hickory		X		FACU
Fraxinus americana	White ash	X	X		FACU
Fraxinius pennslyvanica	Green ash		X	X	FACW
Juglans nigra	Black walnut	X	X	X	FACU
Prunus serotina	Black cherry		X		FACU
Quercus palustris	Pin oak			X	FACW
Quercus rubra	Red oak	X	X		FACU
Ulmus rubra	Slippery elm		X	X	FAC
Shrubs					
Berberis thunbergii	Japanese barberry		X		FACU
Crataegus sp.	Hawthorn		X	X	--
Elaeganus angustifolia	Russian Olive	X	X	X	FACU
Elaeagnus umbellata	Autumn olive		X	X	NL
Lindera benzoin	Spicebush		X	X	FAC
Rosa multiflora	Rambler rose	X	X	X	FACU
Rubus sp.	Raspberry/blackberry	X	X	X	--
Vines					
Lonicera japonica	Japanese honeysuckle		X	X	FAC
Parthenocissus quinquefolia	Virginia creeper	X	X		FACU
Toxicodendron radicans	Poison ivy		X	X	FAC
Vitis sp.	Wild grape		X	X	--

Table 2 Dominant Vegetation (continued)					
Scientific Name	**Common Name**	**Mowed Field**	**Floodplain Forest**	**Wetland**	**Indicator Status**
Herbs					
Achillea millefolium	Common yarrow	X			FACU
Alliaria petiolata	Garlic mustard	X	X	X	FACU
Andropogon virginicus	Broomsedge bluestem	X			FACU
Asclepias incarnata	Marsh milkweed			X	OBL
Asclepias syriaca	Common milkweed	X			FACU
Ambrosia artimisiifolia	Common ragweed	X	X		FACU
Cirsium arvense	Canada thistle	X	X		FACU
Dactylis glomerata	Orchard grass	X	X		FACU
Daucus carota	Queen Anne's lace	X	X		FACU
Dichanthelium clandestinum	Deer tongue grass			X	FACW
Galium palustre	Marsh bedstraw			X	OBL
Hordeum jabatum	Foxtail barley	X			NL
Juncus effusus	Soft rush			X	FACW
Leersia oryzoides	Rice cutgrass			X	OBL
Lysimachia nummularia	Creeping jennie			X	FACW
Microstegium vimineum	Japanese stiltgrass	X	X	X	FAC
Onoclea sensibilis	Sensitive Fern			X	FACW
Plantago major	Common plantain	X	X		FACU
Plantago lanceolata	English plantain	X	X		UPL
Poa pratensis	Kentucky bluegrass	X	X		FACU
Potentilla simplex	Old field cinquefoil	X			FACU
Setaria glauca	Yellow foxtail	X			NL
Solidago gigantea	Tall goldenrod		X	X	FACW
Solidago altissima	Tall goldenrod	X			FACU
Trifolium dubium	Lesser hops clover	X	X		UPL
Trifolium repens	White clover	X	X		FACU

Three wetlands were identified within the project study area. Wetland W1 was located within a depression near the eastern section of the project study area. Wetland W2 was located adjacent to the floodplain forest of Aires Run along the western end of the project study area. Wetland W3 was located in a depression within the mowed field. Aires Run was confirmed within the project study area and was observed to flow from north to south within defined bed and banks along the western boundary of the project study area. See **Appendix B** for representative photographs of the project study area, including the wetlands and waterways.

5.1 Wetlands

Wetland W1
Cowardin Classification: PEM
Area (acres): 0.04

Wetland 1 was a palustrine emergent wetland (PEM) delineated in a depression located in the eastern portion of the project study area. Wetland W1 had an area of 0.04 acre and was delineated with pink wetland delineation flagging consisting of flags W1-1 through W1-8. This wetland receives its hydrology from stormwater and drainage retention from the surrounding upland slopes. Dominant wetland vegetation within this wetland consisted of the following species:

Vegetation		
Scientific Name	**Common name**	**Wetland Indicator Status**
Juncus effusus	Soft rush	FACW
Dichanthelium clandestinum	Deer tongue grass	FAC
Lysimachia nummularia	Creeping jennie	FACW
Carex sp.	Sedge sp.	

A soil test pit (Plot 1) was advanced to approximately 16 inches below the ground surface. The soil profile to a depth of 16 inches was a gray (Gley1 5/N) clay with strong brown (7.5YR 4/6) redox concentrations in the pore linings of living roots. Primary hydrologic indicators within this wetland area consisted of surface water, water-stained leaves, and oxidized rhizospheres on living roots. Secondary hydrologic indicators included geomorphic position and microtopographic relief.

Wetland W1 exhibits the required criteria to be identified as a wetland. Wetland boundaries were mapped and are presented in **Appendix A**. Photographs were taken of the wetland and are provided in **Appendix B**. The Wetland Determination Data Form is provided in **Appendix C**.

Wetland W2
Cowardin Classification: PEM/PFO
Area (acres): 5.92

Wetland W2 was a palustrine emergent/palustrine forested (PEM/PFO) wetland complex delineated along the western edge of the project study area and the eastern bank of Aires Run. Wetland W2 was 5.62 acres and was delineated with pink wetland delineation flagging consisting of flags W2-1 through W2-70 and stream bank flags S1-1 through S1-66. This wetland receives its hydrology from stormwater runoff and drainage from the surrounding mowed field, adjacent forested buffers, and flooding from Aires Run. Dominant wetland vegetation within Wetland 2 consisted of the following species:

Vegetation		
Scientific Name	**Common name**	**Wetland Indicator Status**
Fraxinus pennslyvanica	Green ash	FACW
Quercus palustris	Pin oak	FACW
Lindera benzoin	Spicebush	FAC
Microstegium vimineum	Japanese stiltgrass	FAC
Onoclea sensibilis	Sensitive Fern	FACW
Solidago gigantea	Tall goldenrod	FACW
Leersia oryzoides	Rice cutgrass	OBL
Dichanthelium clandestinum	Deer tongue grass	FACW

A soil test pit (Plot 3) was advanced to approximately 16 inches below the ground surface. The upper 4 inches of the soil profile was a grayish brown (10YR 5/2) clay loam with yellowish brown (10YR 5/8) redox features. From a depth of 4 to 10 inches, the soil was a grayish brown (10YR 5/2) clay loam with yellowish brown (10YR 5/8) redox features. From a depth of 10 to 16 inches, the soil was a gray (10YR 5/1) clay loam with yellowish brown (10YR 5/8) redox features.

Primary hydrologic indicators within this wetland area consisted of a water stained leaves, and oxidized rhizospheres on living roots. Geomorphic position was the secondary hydrologic indicators observed.

Wetland W1 exhibits the required criteria to be identified as a wetland. Wetland boundaries were mapped and are presented in **Appendix A**. Photographs were taken of the wetland and are provided in **Appendix B**. The Wetland Determination Data Form is provided in **Appendix C**.

Wetland W3
Cowardin Classification: PEM
Area (acres): 0.01

Wetland W3 was a palustrine emergent wetland (PEM) delineated in a depression located downslope of Wetland W1. Wetland W3 had an area of 0.01 acre and was delineated with pink wetland delineation flagging consisting of flags W3-1 through W3-5. This wetland receives its hydrology from stormwater and drainage retention from the surrounding upland slopes. Dominant wetland vegetation within this wetland consisted of the following species:

Vegetation		
Scientific Name	**Common name**	**Wetland Indicator Status**
Juncus effusus	Soft rush	FACW
Galium palustre	Marsh bedstraw	OBL

A soil test pit (Plot 2) was advanced to approximately 16 inches below the ground surface. The soil profile to a depth of 16 inches was a gray (Gley1 5/N) clay with strong brown (7.5YR 4/6) redox concentrations in the pore linings of living roots. Primary hydrologic indicators within this wetland area consisted of surface water, high water table, saturation, water-stained leaves,

Legend

- Project Study Area
- Streams

Delineated Features

- Wetlands
- Waterways

Appendix A - Map 1 of 3
Wetlands and Waterways Mapping
Feature Overivew Map
Pennsylvania Air National Guard
Solar Farm
Service Road, Fort Indiantown Gap
Union Township, Lebanon County, Pennsylvania

N
W E
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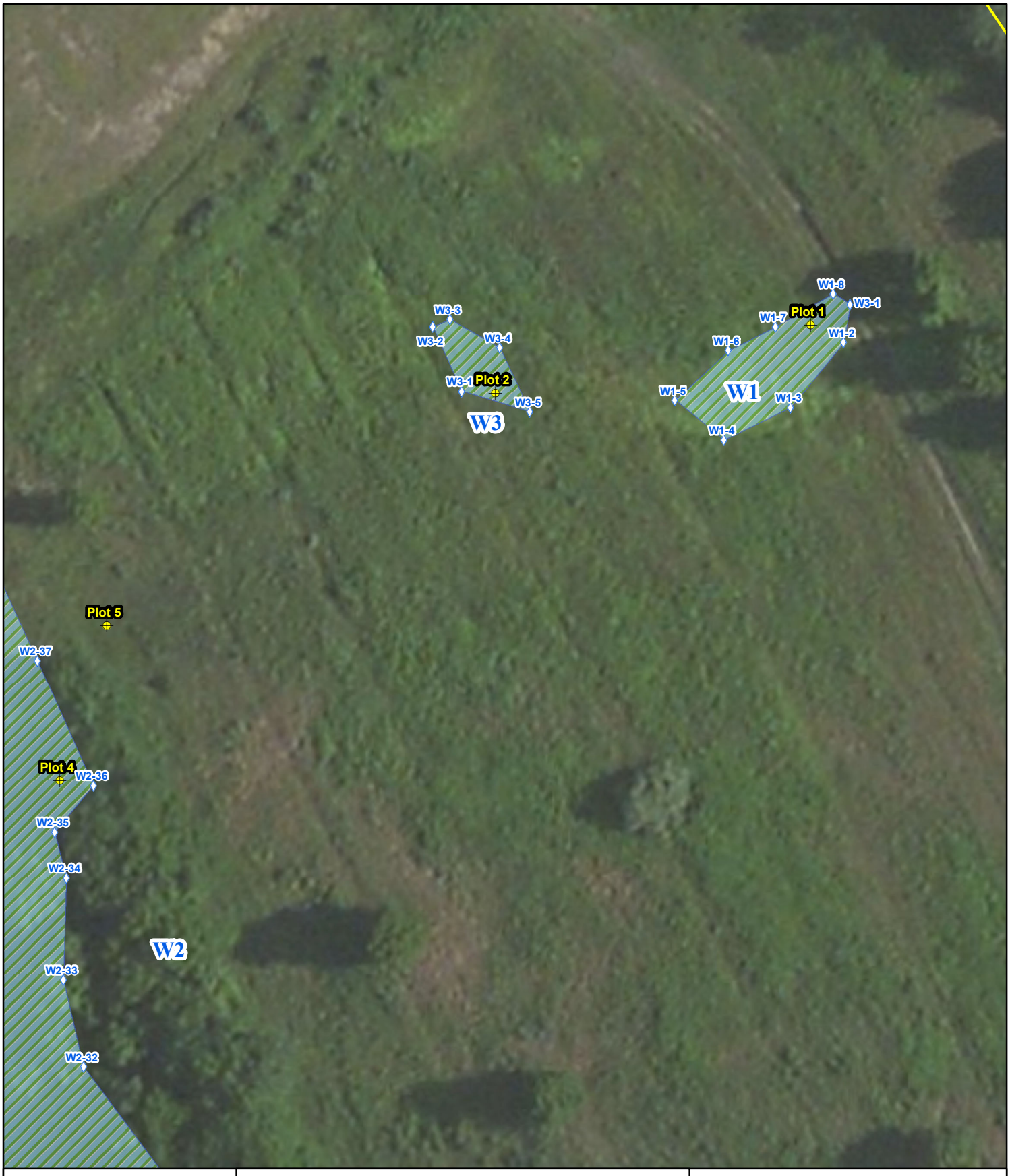
300 150 0 300 Feet

Gannett Fleming

Aerial imagery basemapping provided ESRI ArcGIS Online webservices.



Legend

- Project Study Area
- Streams

Delineated Features

- Wetlands
- Waterways

Flag Type

- Test Plot
- Delineation Flag

Appendix A - Map 2 of 3
Wetlands and Waterways Mapping
Feature Detail Map
Pennsylvania Air National Guard
Solar Farm
Service Road, Fort Indiantown Gap
Union Township, Lebanon County, Pennsylvania

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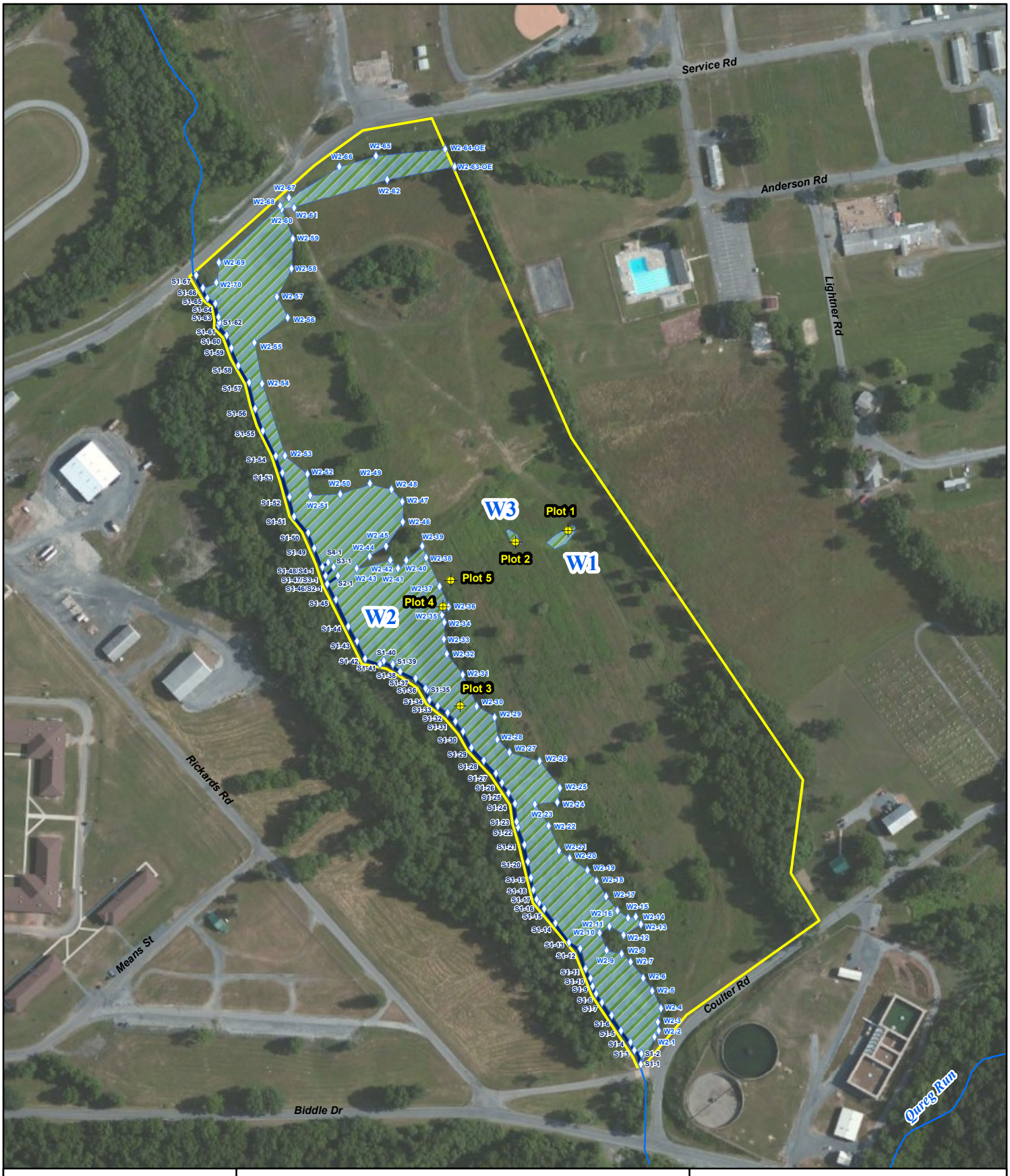
Gannett Fleming

Aerial imagery basemapping provided ESRI ArcGIS Online webservices.



Legend

- Project Study Area
- Streams

Delineated Features

- Wetlands
- Waterways

Flag Type

- Test Plot
- Delineation Flag

Appendix A - Map 3 of 3
Wetlands and Waterways Mapping
Feature Detail Map

Pennsylvania Air National Guard
Solar Farm
Service Road, Fort Indiantown Gap
Union Township, Lebanon County, Pennsylvania

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Gannett Fleming

Aerial imagery basemapping provided ESRI ArcGIS Online webservices.

and oxidized rhizospheres on living roots. Secondary hydrologic indicators included geomorphic position and microtopographic relief.

Wetland W3 exhibits the required criteria to be identified as a wetland. Wetland boundaries were mapped and are presented in **Appendix A**. Photographs were taken of the wetland and are provided in **Appendix B**. The Wetland Determination Data Form is provided in **Appendix C**.

5.2 Waterways

Stream S1 – Aires Run
Stream S1 (Aires Run) was a perennial watercourse and was delineated with pink wetland delineation flagging consisting of flags S1-1 through S1-67 to map the eastern stream bank. Stream S1 had an average width of 15 feet within the study area (see **Appendix A**). Water depths ranged from 1 to 10 inches. The portion of the creek within the project study area was predominantly run with riffles, woody debris snags, and pools. The stream substrate was predominantly gravel and sand; however, where tributaries and springs connected to the channel from the western stream banks, the substrate transitioned to silty muck with organic detritus. The streambanks were varied from 8 inches to 4 feet high, and were eroded in places. Small fish, less than two inches long, were observed within the stream channel.

Streams S2, S3, and S4
Streams S2, S3, and S4 were an ephemeral watercourses and had an average width of 1 to 2 feet (see **Appendix A**). None of the stream channels contained flow or standing water during the field investigation. All three channels had substrate of predominantly soil, gravel, and leaf litter with a few larger rocks. The stream banks were varied from 4 to 10 inches in height. All three streams may drain Wetland W2 during high precipitation events and convey stormwater run-off to Stream S1 – Aires Run.

6.0 Summary

Field investigations conducted by Gannett Fleming on November 10, 2014, identified and delineated wetlands and waterways in conjunction with the proposed construction of a solar farm and the associated infrastructure. Aires Run was confirmed in the field, and three previously unmapped, ephemeral tributaries to Aires Run were identified and delineated. Three palustrine wetlands were identified and delineated within the project study area.

- Wetland W1 – PEM – 0.04 acres
- Wetland W2 – PEM/PSS – 5.92 acres
- Wetland W3 – PEM – 0.01 acres
- Stream S1 (Aires Run) – Perennial Waterway – 2187+ linear feet
- Stream S2 – Ephemeral Waterway – 31 linear feet
- Stream S3 – Ephemeral Waterway – 29 linear feet
- Stream S4 – Ephemeral Waterway – 17 linear feet

7.0 References

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8.0 List of Contributors

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M.S., Biology

APPENDIX A
WETLAND AND WATERWAYS MAPPING

APPENDIX B
SITE PHOTOGRAPHS

Legend

- Project Study Area
- Streams

Delineated Features

- Wetlands
- Waterways

Appendix B
Site Photograph Location Map Map

Pennsylvania Air National Guard
Solar Farm
Service Road, Fort Indiantown Gap

Union Township, Lebanon County, Pennsylvania

N
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300 150 0 300 Feet

Gannett Fleming

Aerial imagery basemapping provided ESRI ArcGIS Online webservices.

Photo 1 (11-10-2014)
Wetland W1 is a palustrine emergent (PEM) wetland located in a depression surrounded by fallow field in the eastern portion of the project study area. Plot 1 is the hydric test plot for this wetland. View is west.

Photo 2 (11-10-2014)
Wetland W2 is a palustrine forested/palustrine emergent (PFO/PEM) wetland complex in the floodplain on the east bank of Aires Run. Plot 3 is the hydric test plot representing the PFO community in Wetland W2. View is west.

Photo 3 (11-10-2014)
Wetland W2 is palustrine forested/palustrine emergent (PFO/PEM) wetland complex located in the eastern floodplain of Aires Run. Plot 4 is the hydric test plot representing the PEM community in Wetland W2. View is east.

Photo 4 (11-10-2014)
Wetland W3 is a palustrine emergent (PEM) wetland located in a depression downslope of Wetland W1. Plot 2 is the hydric test plot for this wetland. View is north.

Photo 5 (11-10-2014)
The dominant land cover type within the project study area is fallow field. Plot 5 is upland test plot located near Plot 4 (Wetland W2). View is north.

Photo 6 (11-10-2014)
The fallow field was dominated by mowed grasses, broomsedge bluestem (*Andropogon virginicus*), common plantain (*Plantago major*), English plantain (*Plantago lanceolata),* white clover (*Trifolium repens*), lesser hop trefoil (*Trifolium dubium*), and yarrow (*Achillea millefolium*). View is east.

Photo 7 (11-10-2014)
Stream S1 is a perennial watercourse that provided the western boundary of the project study area. View is of the downstream end of Stream S1 at a culvert under Coulter Road. View is south.

Photo 8 (11-10-2014)
View of Stream S1 looking upstream from Flag S1-4. The stream bank on the right is within project study area boundary, and the stream bank on the left is off site. View is north.

Photo 9 (11-10-2014)
View of Stream S1 looking upstream from Flag S1-21. The stream bank on the right is within project study area boundary, and the stream bank on the left is off site. View is north.

Photo 10 (11-10-2014)
View of Stream S1 looking upstream from Flag S1-31. The stream bank on the right is within project study area boundary, and the stream bank on the left is off site. View is north.

Photo 11 (11-10-2014)
View of Stream S1 looking upstream from Flag S1-43. The stream bank on the right is within project study area boundary, and the stream bank on the left is off site. View is north.

Photo 12 (11-10-2014)
Upstream view of Stream S1 (Aires Run) as it flow into the project study area beneath Service Road.
The stream bank on the right is within project study area boundary, and the stream bank on the left is off site. The bridge is the northwestern corner of the project study area boundary. View is north from Flag S1-68.

Photo 13 (11-10-2014)
Stream S2 is an ephemeral watercourse that drains Wetland W2 to Stream S1 (Aires Run). View is downstream from Flag S2-2 and west.

Photo 14 (11-10-2014)
Stream S3 is an ephemeral watercourse that drains Wetland W2 to Stream S1 (Aires Run). View is downstream from Flag S3-1 and west.

Photo 15 (11-10-2014)
Stream S4 is an ephemeral watercourse that drains Wetland W2 to Stream S1 (Aires Run). View is downstream from Flag S2-1 and west.

Photo 16 (11-10-2014)
View of Coulter Road at the southern end of the project study area. View is west.

Photo 17 (11-10-2014)
View of Service Road at the northern end of the project study area. View is east.

Photo 18 (11-10-2014)
View of gravel and dirt access road that leads to the center of the project study area from Service Road. View is south.

APPENDIX C
WETLAND FIELD DATA FORMS

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Fort Indiantown Gap Solar Farm City/County: Lebanon County Sampling Date: 11/10/2014

Applicant/Owner: Pennsylvania Air National Guard State: PA Sampling Point: Plot 1

Investigator(s): D. Iuliucci, S. Hockenberry Section, Township, Range: Union Township

Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): none

Slope (%): <5 Lat: 40.430708° N Long: -76.553965°W Datum: NAD83

Soil Map Unit Name: Comly silt loam, 3 to 8 percent slopes (CmB) NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

Wetland W1 and Plot 1 are located within a depression sloping west.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ✓ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ✓ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): <1
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No ✓	Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Wetland W1 appears to be a perched wetland over a restrictive layer of dense clay. Water was present on the surface and the soil profile was moist (not saturated) to a depth of 5". The soil profile moisture declined as profile depth increased. Below 5", the soil was dry, very dense clay.

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: Plot 1

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
Total Cover: 0			
50% of total cover: 0	20% of total cover: 0		
Sapling Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
Total Cover: 0			
50% of total cover: 0	20% of total cover: 0		
Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
Total Cover: 0			
50% of total cover: 0	20% of total cover: 0		
Herb Stratum (Plot size: 5)			
1. Juncus effusus	60	X	FACW
2. Carex sp.	30	X	
3. Dichanthelium clandestinum	15		FAC
4. Lysimachia nummularia	3		FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
Total Cover: 108			
50% of total cover: 54	20% of total cover: 21.6		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
Total Cover: 0			
50% of total cover: 0	20% of total cover: 0		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

	Total % Cover of:	Multiply by:
OBL species	0	x 1 = 0
FACW species	63	x 2 = 126
FAC species	15	x 3 = 45
FACU species		x 4 = 0
UPL species		x 5 = 0
Column Totals:	78 (A)	171 (B)

Prevalence Index = B/A = 2.192

Hydrophytic Vegetation Indicators:

___ 1- Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Five Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size. Includes woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: Plot 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 16	GLEY1 5/N	98	7.5YR 4/6	2	C	PL	Clay	fibrous roots throughout

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ✓ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coastal Prairie Redox (A16) (MLRA 147, 148)
- ___ Piedmont Floodplain Soils (F19) (MLRA 136, 147)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** ___

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Fort Indiantown Gap Solar Farm City/County: Lebanon County Sampling Date: 11/10/2014

Applicant/Owner: Pennsylvania Air National Guard State: PA Sampling Point: Plot 2

Investigator(s): D. Iuliucci, S. Hockenberry Section, Township, Range: Union Township

Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): none

Slope (%): <5 Lat: 40.430641° N Long: -76.554404° W Datum: NAD83

Soil Map Unit Name: Comly silt loam, 3 to 8 percent slopes (CmB) NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

Wetland W3 and Plot 2 are located within a depression sloping west.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ✓ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ✓ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): <1
Water Table Present?	Yes ✓	No _____	Depth (inches): 6
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0 to 14

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Wetland W2 appears to be a perched wetland over a restrictive layer of dense clay. Water was present on the surface and the soil profile was saturated from the surface to a depth of 14 inches. The soil profile moisture declined as profile depth increased. Below 14 inches, the soil was dry, very dense clay.

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: Plot 2

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
Total Cover: 0			
50% of total cover: 0	20% of total cover: 0		
Sapling Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
Total Cover: 0			
50% of total cover: 0	20% of total cover: 0		
Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
Total Cover: 0			
50% of total cover: 0	20% of total cover: 0.0		
Herb Stratum (Plot size: 5)			
1. Juncus effusus	100	X	FACW
2. Galium palustre	1		OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
Total Cover: 101			
50% of total cover: 50.5	20% of total cover: 20.2		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
Total Cover: 0			
50% of total cover: 0	20% of total cover: 0		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species		x 5 =	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

✓ 1- Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Five Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size. Includes woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: Plot 2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 16	GLEY1 5/N	98	7.5YR 4/6	2	C	PL	Clay	fibrous roots throughout

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ✓ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coastal Prairie Redox (A16) (MLRA 147, 148)
- ___ Piedmont Floodplain Soils (F19) (MLRA 136, 147)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** ___

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Fort Indiantown Gap Solar Farm City/County: Lebanon County Sampling Date: 11/10/2014

Applicant/Owner: Pennsylvania Air National Guard State: PA Sampling Point: Plot 3

Investigator(s): D. Iuliucci, S. Hockenberry Section, Township, Range: Union Township

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): none

Slope (%): <3 Lat: 40.4296° N Long: -76.554883° W Datum: NAD83

Soil Map Unit Name: Holly silt loam (Ho) NWI classification: PEM/PFO

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

Wetland W2 is a PFO/PEM wetland complex located on the east bank of Aires Run. Plot 3 is located the PFO section of the wetland complex.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ✓ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ✓ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No ✓	Depth (inches): _____
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No ✓	Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: Plot 3

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Fraxinus pennsylvanica	50	X	FACW
2. Quercus palustris	10		FACW
3. Juglans nigra	5		FACU
4.			
5.			
6.			
Total Cover:	65		
50% of total cover: 32.5	20% of total cover: 13		
Sapling Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
Total Cover:	0		
50% of total cover: 0	20% of total cover: 0		
Shrub Stratum (Plot size: 15)			
1. Lindera benzoin	65	X	FAC
2. Ulmus rubra	20		FAC
3. Crataegus sp.	15		
4. Ilex verticillata	15		FACW
5. Rosa multiflora	15		FACU
6.			
Total Cover:	130		
50% of total cover: 65	20% of total cover: 26.0		
Herb Stratum (Plot size: 5)			
1. Microstegium vimineum	75	X	FAC
2. Onoclea sensibilis	40	X	FACW
3. Solidago gigantea	20		FACW
4. Euthamia graminifolia	15		FAC
5. Scirpus sp.	3		
6. Agrimonia parviflora	1		FACW
7.			
8.			
9.			
10.			
11.			
Total Cover:	154		
50% of total cover: 77	20% of total cover: 30.8		
Woody Vine Stratum (Plot size: 30)			
1. Lonicera japonica	5	X	FACU
2. Rubus sp.	3	X	FAC
3.			
4.			
Total Cover:	8		
50% of total cover: 4	20% of total cover: 1.60		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 83.33 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species		x 5 =	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1- Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Five Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size. Includes woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: Plot 3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 4	10YR 5/2	95	10YR 5/8	2	C	PL	Clay Loam	
			10YR 5/8	3	C	M		
4 - 10	10YR 5/2	95	10YR 5/8	5	C	PL	Clay Loam	
10 - 16	10YR 5/1	90	10YR 5/8	10	C	PL	Clay Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coastal Prairie Redox (A16) (MLRA 147, 148)
- ___ Piedmont Floodplain Soils (F19) (MLRA 136, 147)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** ___

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Fort Indiantown Gap Solar Farm City/County: Lebanon County Sampling Date: 11/10/2014

Applicant/Owner: Pennsylvania Air National Guard State: PA Sampling Point: Plot 4

Investigator(s): D. Iuliucci, S. Hockenberry Section, Township, Range: Union Township

Landform (hillslope, terrace, etc.): low grade hillslope Local relief (concave, convex, none): none

Slope (%): <3 Lat: 40.430236° N Long: -76.555015° W Datum: NAD83

Soil Map Unit Name: Holly silt loam (Ho) NWI classification: PEM/PFO

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

Wetland W2 is a PFO/PEM wetland complex located on the east bank of Aires Run and continues up a low grade slope into a fallow field. Plot 4 is located the PEM section of the wetland complex.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ✓ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ✓ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No ✓	Depth (inches): _____
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0 (surface)

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: Plot 4

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
Total Cover: 0			
50% of total cover: 0	20% of total cover: 0		
Sapling Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
Total Cover: 0			
50% of total cover: 0	20% of total cover: 0		
Shrub Stratum (Plot size: 15)			
1. Rosa multiflora	5	X	FACU
2. Elaeagnus angustifolia	5	X	FACU
3. Lindera benzoin	5	X	FAC
4.			
5.			
6.			
Total Cover: 15			
50% of total cover: 7.5	20% of total cover: 3.0		
Herb Stratum (Plot size: 5)			
1. Leersia oryzoides	90	X	OBL
2. Solidago gigantea	15		FACW
3. Dichanthelium clandestinum	10		FAC
4. Euthamia graminifolia	5		FAC
5. Asclepias incarnata	3		OBL
6. Rubus sp.	3		
7. Cirsium sp.	3		
8.			
9.			
10.			
11.			
Total Cover: 129			
50% of total cover: 64.5	20% of total cover: 25.8		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
Total Cover: 0			
50% of total cover: 0	20% of total cover: 0.00		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	93	x 1 =	93
FACW species	15	x 2 =	30
FAC species	20	x 3 =	60
FACU species	10	x 4 =	40
UPL species		x 5 =	0
Column Totals:	138 (A)		223 (B)

Prevalence Index = B/A = 1.596

Hydrophytic Vegetation Indicators:

___ 1- Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Five Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size. Includes woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: Plot 4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 3	10YR 4/1	98	10YR 4/4	2	C	PL	Silt Loam	
3 - 16	GLEY1 6/N	85	7.5YR 5/6	10	C	M	Silty Clay	
			7.5YR 5/6	5	C	PL		

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ✓ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coastal Prairie Redox (A16) (MLRA 147, 148)
- ___ Piedmont Floodplain Soils (F19) (MLRA 136, 147)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** ___

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Fort Indiantown Gap Solar Farm City/County: Lebanon County Sampling Date: 11/10/2014

Applicant/Owner: Pennsylvania Air National Guard State: PA Sampling Point: Plot 5

Investigator(s): D. Iuliucci, S. Hockenberry Section, Township, Range: Union Township

Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): none

Slope (%): <3 Lat: 40.430399° N Long: -76.554947° W Datum: NAD83

Soil Map Unit Name: Holly silt loam (Ho) NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Plot 5 is located on an upland hillslope near Plot 4

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No ✓	Depth (inches): _____
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No ✓	Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: Plot 5

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Juglans nigra	10	X	FACU
2.			
3.			
4.			
5.			
6.			
Total Cover: 10			
50% of total cover: 5	20% of total cover: 2		
Sapling Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
Total Cover: 0			
50% of total cover: 0	20% of total cover: 0		
Shrub Stratum (Plot size: 15)			
1. Elaeagnus angustifolia	10	X	FACU
2.			
3.			
4.			
5.			
6.			
Total Cover: 10			
50% of total cover: 5	20% of total cover: 2.0		
Herb Stratum (Plot size: 5)			
1. Poa sp. (mowed lawn/field)	90	X	
2. Andropogon virginicus	30		FACU
3. Plantago major	20		FACU
4. Plantago lanceolata	20		UPL
5. Trifolium repens	10		FACU
6. Trifolium dubium	3		UPL
7. Achillea millefolium	3		FACU
8. Hordeum jubatum	3		FAC
9. Daucus carota	1		UPL
10. Rosa multiflora	1		FACU
11. Parthenocissus quinquefolia	1		FACU
Total Cover: 182			
50% of total cover: 91	20% of total cover: 36.4		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
Total Cover: 0			
50% of total cover: 0	20% of total cover: 0.00		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	1	x 3 =	3
FACU species	85	x 4 =	340
UPL species	24	x 5 =	120
Column Totals:	110 (A)		463 (B)

Prevalence Index = B/A = 4.209

Hydrophytic Vegetation Indicators:

___ 1- Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Five Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size. Includes woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ____ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: Plot 5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 16	10YR 5/3	100					Silty Clay Loam	Dry, crumbly

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
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- ___ Loamy Gleyed Matrix (F2)
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- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coastal Prairie Redox (A16) (MLRA 147, 148)
- ___ Piedmont Floodplain Soils (F19) (MLRA 136, 147)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

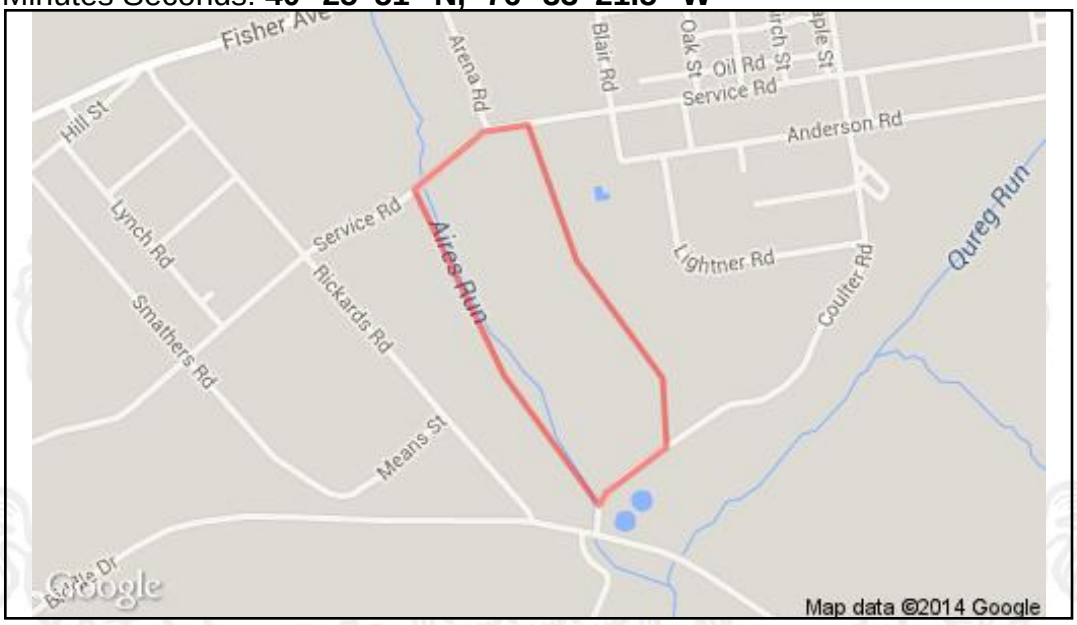
Hydric Soil Present? **Yes** _____ **No** ✓

Remarks:

APPENDIX D
PNDI RECEIPT #20141107473571

1. PROJECT INFORMATION

Project Name: **Fort Indiantown Gap Solar Array**
Date of review: **11/7/2014 7:09:44 AM**
Project Category: **Energy Storage, Production, and Transfer,Energy Production (generation),Solar Power Facility -- new or expansion**
Project Area: **34.8** acres
County: **Lebanon** Township/Municipality: **Union**
Quadrangle Name: **INDIANTOWN GAP** ~ ZIP Code: **17003**
Decimal Degrees: **40.430847 N, -76.555980 W**
Degrees Minutes Seconds: **40° 25' 51" N, -76° 33' 21.5" W**



2. SEARCH RESULTS

Agency	Results	Response
PA Game Commission	**Conservation Measure**	**No Further Review Required, See Agency Comments**
PA Department of Conservation and Natural Resources	**Potential Impact**	**FURTHER REVIEW IS REQUIRED, See Agency Response**
PA Fish and Boat Commission	No Known Impact	No Further Review Required
U.S. Fish and Wildlife Service	**Potential Impact**	**MORE INFORMATION REQURIED, See Agency Response**

As summarized above, Pennsylvania Natural Diversity Inventory (PNDI) records indicate there may be potential impacts to threatened and endangered and/or special concern species and resources within the project area. If the response above indicates "No Further Review Required" no additional communication with the respective agency is required. If the response is "Further Review Required" or "See Agency Response," refer to the appropriate agency comments below. Please see the DEP Information Section of this receipt if a PA Department of Environmental Protection Permit is required.

Note that regardless of PNDI search results, projects requiring a Chapter 105 DEP individual permit or GP 5, 6, 7, 8, 9 or 11 in certain counties (Adams, Berks, Bucks, Carbon, Chester, Cumberland, Delaware, Lancaster, Lebanon, Lehigh, Monroe, Montgomery, Northampton, Schuylkill and York) must comply with the bog turtle habitat screening requirements of the PASPGP.

RESPONSE TO QUESTION(S) ASKED

Q1: Is tree removal, tree cutting or forest clearing necessary to implement all aspects of this project?
Your answer is: **2. Yes**

Q2: "Will the entire project area (including any discharge), plus a 300 feet buffer around the project area, all occur in or on an existing building, parking lot, driveway, road, road shoulder, street, runway, paved area, railroad bed, maintained (periodically mown) lawn, crop agriculture field or maintained orchard?"
Your answer is: **2. No**

Q3: Are there any perennial or intermittent waterways (rivers, streams, creeks, tributaries) in or near the project area, or on the land parcel?
Your answer is: **1. Yes**

Q4: Accurately describe what is known about wetland presence in the project area or on the land parcel by selecting ONE of the following. "Project" includes all features of the project (including buildings, roads, utility lines, outfall and intake structures, wells, stormwater retention/detention basins, parking lots, driveways, lawns, etc.), as well as all associated impacts (e.g., temporary staging areas, work areas, temporary road crossings, areas subject to grading or clearing, etc.). Include all areas that will be permanently or temporarily affected -- either directly or indirectly -- by any type of disturbance (e.g., land clearing, grading, tree removal, flooding, etc.). Land parcel = the lot(s) on which some type of project(s) or activity(s) are proposed to occur.
Your answer is: **2. The project area (or land parcel) has not been investigated by someone qualified to identify and delineate wetlands, or it is currently unknown if the project or project activities will affect wetlands.**

3. AGENCY COMMENTS

Regardless of whether a DEP permit is necessary for this proposed project, any potential impacts to threatened and endangered species and/or special concern species and resources must be resolved with the appropriate jurisdictional agency. In some cases, a permit or authorization from the jurisdictional agency may be needed if adverse impacts to these species and habitats cannot be avoided.

These agency determinations and responses are **valid for two years** (from the date of the review), and are based on the project information that was provided, including the exact project location; the project type, description, and features; and any responses to questions that were generated during this search. If any of the following change: 1) project location, 2) project size or configuration, 3) project type, or 4) responses to the questions that were asked during the online review, the results of this review are not valid, and the review must be searched again via the PNDI Environmental Review Tool and resubmitted to the jurisdictional agencies. The PNDI tool is a primary screening tool, and a desktop review may reveal more or fewer impacts than what is listed on this PNDI receipt. The jursidictional agencies **strongly advise against** conducting surveys for the species listed on the receipt prior to consultation with the agencies.

PA Game Commission

RESPONSE: Conservation Measure: Voluntary implementation of the following conservation measure will minimize impacts to roosting northern long-eared bats. All trees or dead snags greater than 5 inches in diameter

at breast height that need to be harvested to facilitate the project, including any access roads or off - R.O.W. work spaces, should be cut between November 1 and March 31.

PGC Species: (Note: The PNDI tool is a primary screening tool, and a desktop review may reveal more or fewer species than what is listed below.)
Scientific Name: Myotis septentrionalis
Common Name: Northern Myotis
Current Status: Special Concern Species*

PA Department of Conservation and Natural Resources

RESPONSE: Further review of this project is necessary to resolve the potential impacts(s). Please send project information to this agency for review (see WHAT TO SEND).

DCNR Species: (Note: The PNDI tool is a primary screening tool, and a desktop review may reveal more or fewer species than what is listed below. After desktop review, if a botanical survey is required by DCNR, we recommend the DCNR Botanical Survey Protocols, available here: http://www.gis.dcnr.state.pa.us/hgis-er/PNDI_DCNR.aspx.)
Scientific Name: Triosteum angustifolium
Common Name: Horse-gentian
Current Status: Special Concern Species*
Proposed Status: Endangered

PA Fish and Boat Commission

RESPONSE: No Impact is anticipated to threatened and endangered species and/or special concern species and resources.

U.S. Fish and Wildlife Service

RESPONSE: Information Request: Conduct a Bog Turtle Habitat (Phase 1) Survey in accordance with USFWS Guidelines for Bog Turtle Surveys (April 2006). Evaluate all wetlands within 300 feet of the project area, which includes all areas that will be impacted by earth disturbance or project features (e.g., roads, structures, utility lines, lawns, detention basins, staging areas, etc.). IF THE PHASE 1 SURVEY IS DONE BY A QUALIFIED BOG TURTLE SURVEYOR (see http://www.fws.gov/northeast/pafo/surveys.html): 1) Send positive results to USFWS for concurrence, along with a project description documenting how impacts will be avoided. OR, conduct a Phase 2 survey and send Phase 1 and 2 results to USFWS for concurrence. 2) Send a courtesy copy of negative results to USFWS (label as "Negative Phase 1 Survey Results by Qualified Bog Turtle Surveyor: USFWS Courtesy Copy"). USFWS approval of negative results is not necessary when a qualified surveyor does the survey in full accordance with USFWS guidelines. IF THE PHASE 1 SURVEY IS NOT DONE BY A QUALIFIED SURVEYOR: Send ALL Phase 1 results to USFWS for concurrence, and if potential habitat is found, also send a project description documenting how impacts will be avoided. As a qualified bog turtle surveyor, I _____ (name) certify that I conducted a Phase 1 survey of all wetlands in and within 300 feet of the project area on _____(date) and determined that bog turtle habitat is absent.
_____ (Signature)

* Special Concern Species or Resource - Plant or animal species classified as rare, tentatively undetermined or candidate as well as other taxa of conservation concern, significant natural communities, special concern populations (plants or animals) and unique geologic features.
** Sensitive Species - Species identified by the jurisdictinal agency as collectible, having economic value, or being susceptible to decline as a result of visitation.

WHAT TO SEND TO JURISDICTIONAL AGENCIES

If project information was requested by one or more of the agencies above, send the following information to the agency(s) seeking this information (see AGENCY CONTACT INFORMATION).

Check-list of *Minimum* Materials to be submitted:

____**SIGNED** copy of this Project Environmental Review Receipt
____Project narrative with a description of the overall project, the work to be performed, current physical characteristics of the site and acreage to be impacted.
____Project location information (name of USGS Quadrangle, Township/Mu?icipality, and County)
____USGS 7.5-minute Quadrangle with project boundary clearly indicated, and quad name on the map

The inclusion of the following information may expedite the review process.
____A basic site plan(particularly showing the relationship of the project to the physical features such as wetlands, streams, ponds, rock outcrops, etc.)
____Color photos keyed to the basic site plan (i.e. showing on the site plan where and in what direction each photo was taken and the date of the photos)
____Information about the presence and location of wetlands in the project area, and how this was determined (e.g., by a qualified wetlands biologist), if wetlands are present in the project area, provide project plans showing the location of all project features, as well as wetlands and streams

4. DEP INFORMATION

The Pa Department of Environmental Protection (DEP) requires that a signed copy of this receipt, along with any required documentation from jurisdictional agencies concerning resolution of potential impacts, be submitted with applications for permits requiring PNDI review. For cases where a "Potential Impact" to threatened and endangered species has been identified before the application has been submitted to DEP, the application should not be submitted until the impact has been resolved. For cases where "Potential Impact" to special concern species and resources has been identified before the application has been submitted, the application should be submitted to DEP along with the PNDI receipt. The PNDI Receipt should also be submitted to the appropriate agency according to directions on the PNDI Receipt. DEP and the jurisdictional agency will work together to resolve the potential impact(s). See the DEP PNDI policy at http://www.naturalheritage.state.pa.us.

5. ADDITIONAL INFORMATION

The PNDI environmental review website is a **preliminary** screening tool. There are often delays in updating species status classifications. Because the proposed status represents the best available information regarding the conservation status of the species, state jurisdictional agency staff give the proposed statuses at least the same consideration as the current legal status. If surveys or further information reveal that a threatened and endangered and/or special concern species and resources exist in your project area, contact the appropriate jurisdictional agency/agencies immediately to identify and resolve any impacts.

For a list of species known to occur in the county where your project is located, please see the species lists by county found on the PA Natural Heritage Program (PNHP) home page (www.naturalheritage.state.pa.us). Also note that the PNDI Environmental Review Tool only contains information about species occurrences that have actually been reported to the PNHP.

6. AGENCY CONTACT INFORMATION

PA Department of Conservation and Natural Resources

Bureau of Forestry, Ecological Services Section
400 Market Street, PO Box 8552, Harrisburg, PA. 17105-8552
Fax:(717) 772-0271

U.S. Fish and Wildlife Service

Pennsylvania Field Office
110 Radnor Rd; Suite 101, State College, PA 16801
NO Faxes Please.

PA Fish and Boat Commission

Division of Environmental Services
450 Robinson Lane, Bellefonte, PA. 16823-7437
NO Faxes Please

PA Game Commission

Bureau of Wildlife Habitat Management
Division of Environmental Planning and Habitat Protection
2001 Elmerton Avenue, Harrisburg, PA. 17110-9797
Fax:(717) 787-6957

7. PROJECT CONTACT INFORMATION

Name: Samantha R. Hockenberry
Company/Business Name: Gannett-Fleming, Inc.
Address: 207 Senate Ave.
City, State, Zip: Camp Hill, PA 17011
Phone:(717) 763-7212 x2144 Fax:( )
Email: shockenberry@gfnet.com

8. CERTIFICATION

I certify that ALL of the project information contained in this receipt (including project location, project size/configuration, project type, answers to questions) is true, accurate and complete. In addition, if the project type, location, size or configuration changes, or if the answers to any questions that were asked during this online review change, I agree to re-do the online environmental review.

Samantha R Hockenberry — 11/24/2014

applicant/project proponent signature — date

ATTACHMENT SDSA -4

PENNSYLVANIA NATIONAL DIVERSITY INDEX (PNDI)

1. PROJECT INFORMATION

Project Name: **Fort Indiantown Gap Solar Array**
Date of review: **11/7/2014 7:09:44 AM**
Project Category: **Energy Storage, Production, and Transfer,Energy Production (generation),Solar Power Facility -- new or expansion**
Project Area: **34.8** acres
County: **Lebanon** Township/Municipality: **Union**
Quadrangle Name: **INDIANTOWN GAP** ~ ZIP Code: **17003**
Decimal Degrees: **40.430847 N, -76.555980 W**
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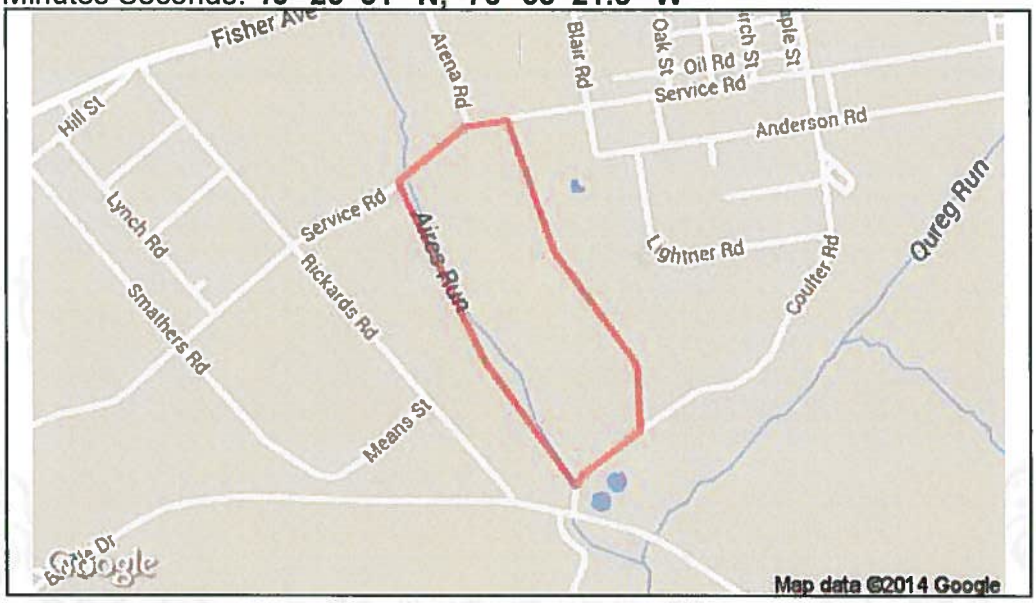

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Agency	Results	Response
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U.S. Fish and Wildlife Service	**Potential Impact**	**MORE INFORMATION REQURIED, See Agency Response**

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RESPONSE TO QUESTION(S) ASKED

Q1: Is tree removal, tree cutting or forest clearing necessary to implement all aspects of this project?
Your answer is: **2. Yes**

Q2: "Will the entire project area (including any discharge), plus a 300 feet buffer around the project area, all occur in or on an existing building, parking lot, driveway, road, road shoulder, street, runway, paved area, railroad bed, maintained (periodically mown) lawn, crop agriculture field or maintained orchard?"
Your answer is: **2. No**

Q3: Are there any perennial or intermittent waterways (rivers, streams, creeks, tributaries) in or near the project area, or on the land parcel?
Your answer is: **1. Yes**

Q4: Accurately describe what is known about wetland presence in the project area or on the land parcel by selecting ONE of the following. "Project" includes all features of the project (including buildings, roads, utility lines, outfall and intake structures, wells, stormwater retention/detention basins, parking lots, driveways, lawns, etc.), as well as all associated impacts (e.g., temporary staging areas, work areas, temporary road crossings, areas subject to grading or clearing, etc.). Include all areas that will be permanently or temporarily affected -- either directly or indirectly -- by any type of disturbance (e.g., land clearing, grading, tree removal, flooding, etc.). Land parcel = the lot(s) on which some type of project(s) or activity(s) are proposed to occur.
Your answer is: **2. The project area (or land parcel) has not been investigated by someone qualified to identify and delineate wetlands, or it is currently unknown if the project or project activities will affect wetlands.**

3. AGENCY COMMENTS

Regardless of whether a DEP permit is necessary for this proposed project, any potential impacts to threatened and endangered species and/or special concern species and resources must be resolved with the appropriate jurisdictional agency. In some cases, a permit or authorization from the jurisdictional agency may be needed if adverse impacts to these species and habitats cannot be avoided.

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PA Game Commission

RESPONSE: Conservation Measure: Voluntary implementation of the following conservation measure will minimize impacts to roosting northern long-eared bats. All trees or dead snags greater than 5 inches in diameter

at breast height that need to be harvested to facilitate the project, including any access roads or off - R.O.W. work spaces, should be cut between November 1 and March 31.

PGC Species: (Note: The PNDI tool is a primary screening tool, and a desktop review may reveal more or fewer species than what is listed below.)
Scientific Name: Myotis septentrionalis
Common Name: Northern Myotis
Current Status: Special Concern Species*

PA Department of Conservation and Natural Resources

RESPONSE: Further review of this project is necessary to resolve the potential impacts(s). Please send project information to this agency for review (see WHAT TO SEND).

DCNR Species: (Note: The PNDI tool is a primary screening tool, and a desktop review may reveal more or fewer species than what is listed below. After desktop review, if a botanical survey is required by DCNR, we recommend the DCNR Botanical Survey Protocols, available here: http://www.gis.dcnr.state.pa.us/hgis-er/PNDI_DCNR.aspx.)
Scientific Name: Triosteum angustifolium
Common Name: Horse-gentian
Current Status: Special Concern Species*
Proposed Status: Endangered

PA Fish and Boat Commission

RESPONSE: No Impact is anticipated to threatened and endangered species and/or special concern species and resources.

U.S. Fish and Wildlife Service

RESPONSE: Information Request: Conduct a Bog Turtle Habitat (Phase 1) Survey in accordance with USFWS Guidelines for Bog Turtle Surveys (April 2006). Evaluate all wetlands within 300 feet of the project area, which includes all areas that will be impacted by earth disturbance or project features (e.g., roads, structures, utility lines, lawns, detention basins, staging areas, etc.). IF THE PHASE 1 SURVEY IS DONE BY A QUALIFIED BOG TURTLE SURVEYOR (see http://www.fws.gov/northeast/pafo/surveys.html): 1) Send positive results to USFWS for concurrence, along with a project description documenting how impacts will be avoided. OR, conduct a Phase 2 survey and send Phase 1 and 2 results to USFWS for concurrence. 2) Send a courtesy copy of negative results to USFWS (label as "Negative Phase 1 Survey Results by Qualified Bog Turtle Surveyor: USFWS Courtesy Copy"). USFWS approval of negative results is not necessary when a qualified surveyor does the survey in full accordance with USFWS guidelines. IF THE PHASE 1 SURVEY IS NOT DONE BY A QUALIFIED SURVEYOR: Send ALL Phase 1 results to USFWS for concurrence, and if potential habitat is found, also send a project description documenting how impacts will be avoided. As a qualified bog turtle surveyor, I _____ (name) certify that I conducted a Phase 1 survey of all wetlands in and within 300 feet of the project area on _____(date) and determined that bog turtle habitat is absent.
_____ (Signature)

* Special Concern Species or Resource - Plant or animal species classified as rare, tentatively undetermined or candidate as well as other taxa of conservation concern, significant natural communities, special concern populations (plants or animals) and unique geologic features.
** Sensitive Species - Species identified by the jurisdictinal agency as collectible, having economic value, or being susceptible to decline as a result of visitation.

WHAT TO SEND TO JURISDICTIONAL AGENCIES

If project information was requested by one or more of the agencies above, send the following information to the agency(s) seeking this information (see AGENCY CONTACT INFORMATION).

Check-list of *Minimum* Materials to be submitted:

____**SIGNED** copy of this Project Environmental Review Receipt
____Project narrative with a description of the overall project, the work to be performed, current physical characteristics of the site and acreage to be impacted.
____Project location information (name of USGS Quadrangle, Township/Mu?icipality, and County)
____USGS 7.5-minute Quadrangle with project boundary clearly indicated, and quad name on the map

The inclusion of the following information may expedite the review process.
____A basic site plan(particularly showing the relationship of the project to the physical features such as wetlands, streams, ponds, rock outcrops, etc.)
____Color photos keyed to the basic site plan (i.e. showing on the site plan where and in what direction each photo was taken and the date of the photos)
____Information about the presence and location of wetlands in the project area, and how this was determined (e.g., by a qualified wetlands biologist), if wetlands are present in the project area, provide project plans showing the location of all project features, as well as wetlands and streams

4. DEP INFORMATION

The Pa Department of Environmental Protection (DEP) requires that a signed copy of this receipt, along with any required documentation from jurisdictional agencies concerning resolution of potential impacts, be submitted with applications for permits requiring PNDI review. For cases where a "Potential Impact" to threatened and endangered species has been identified before the application has been submitted to DEP, the application should not be submitted until the impact has been resolved. For cases where "Potential Impact" to special concern species and resources has been identified before the application has been submitted, the application should be submitted to DEP along with the PNDI receipt. The PNDI Receipt should also be submitted to the appropriate agency according to directions on the PNDI Receipt. DEP and the jurisdictional agency will work together to resolve the potential impact(s). See the DEP PNDI policy at http://www.naturalheritage.state.pa.us.

5. ADDITIONAL INFORMATION

The PNDI environmental review website is a **preliminary** screening tool. There are often delays in updating species status classifications. Because the proposed status represents the best available information regarding the conservation status of the species, state jurisdictional agency staff give the proposed statuses at least the same consideration as the current legal status. If surveys or further information reveal that a threatened and endangered and/or special concern species and resources exist in your project area, contact the appropriate jurisdictional agency/agencies immediately to identify and resolve any impacts.

For a list of species known to occur in the county where your project is located, please see the species lists by county found on the PA Natural Heritage Program (PNHP) home page (www.naturalheritage.state.pa.us). Also note that the PNDI Environmental Review Tool only contains information about species occurrences that have actually been reported to the PNHP.

6. AGENCY CONTACT INFORMATION

PA Department of Conservation and Natural Resources
Bureau of Forestry, Ecological Services Section
400 Market Street, PO Box 8552, Harrisburg, PA. 17105-8552
Fax:(717) 772-0271

U.S. Fish and Wildlife Service
Pennsylvania Field Office
110 Radnor Rd; Suite 101, State College, PA 16801
NO Faxes Please.

PA Fish and Boat Commission
Division of Environmental Services
450 Robinson Lane, Bellefonte, PA. 16823-7437
NO Faxes Please

PA Game Commission
Bureau of Wildlife Habitat Management
Division of Environmental Planning and Habitat Protection
2001 Elmerton Avenue, Harrisburg, PA. 17110-9797
Fax:(717) 787-6957

7. PROJECT CONTACT INFORMATION

Name: Samantha R. Hockenberry
Company/Business Name: Gannett-Fleming, Inc.
Address: 207 Senate Ave.
City, State, Zip: Camp Hill, PA 17011
Phone:(717) 763-7212 x2144 Fax:( )
Email: shockenberry@gfnet.com

8. CERTIFICATION

I certify that ALL of the project information contained in this receipt (including project location, project size/configuration, project type, answers to questions) is true, accurate and complete. In addition, if the project type, location, size or configuration changes, or if the answers to any questions that were asked during this online review change, I agree to re-do the online environmental review.

Samantha R Hockenberry — 11/24/2014

applicant/project proponent signature — date

ATTACHMENT SDSA -5

GEOTECHNICAL REPORT

GEOTECHNICAL DATA REPORT
FOR
SOLAR PHOTO-VOLTAIC SYSTEM/POWER PURCHASE AGREEMENT PROJECT
FORT INDIANTOWN GAP
LEBANON COUNTY, PENNSYLVANIA

Prepared for

USPFO FOR PENNSYLVANIA ARMY AND AIR NATIONAL GUARD

Prepared by

Gannett Fleming

Project No. 54419

JANUARY 2015

Gannett Fleming

GEOTECHNICAL DATA REPORT
FOR
SOLAR PHOTO-VOLTAIC SYSTEM/POWER PURCHASE AGREEMENT PROJECT
FORT INDIANTOWN GAP

LEBANON COUNTY, PENNSYLVANIA

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Gannett Fleming

GEOTECHNICAL DATA REPORT
FOR
SOLAR PHOTO-VOLTAIC SYSTEM/POWER PURCHASE AGREEMENT PROJECT
FORT INDIANTOWN GAP
LEBANON COUNTY, PENNSYLVANIA

INTRODUCTION

The Department of Military and Veteran Affairs/Army and Air National Guard intends to develop a project to purchase electric power and produce Renewable Energy Credits through a Power Purchase Agreement between the Department and the Power Purchase Agreement Provider (PPAP). The PPAP will install, operate, and maintain a Photo-voltaic plant on a leased (nominal) tract of land on the Fort Indiantown Gap military base reservation. The project site consists of approximately 17.3 acres located between Service Road and Coulter Road, just south of the Arena Road/Service road intersection. A Site Location Map is included as Figure 1.

The purpose of this Geotechnical Data Report is to provide subsurface information for the site to allow for the design of the solar rack foundations to be performed by the prospective bidders. This report presents site soils and geologic information obtained from a review of published literature, a description of the subsurface exploration and laboratory testing programs, the results of the subsurface exploration program, and the results of laboratory testing performed on soil samples obtained during the subsurface exploration at the site. In accordance with the scope of work, no geotechnical foundation recommendations are required or provided in this report.

PHYSIOGRAPHIC SETTING

The project is located in the Great Valley Section of the Ridge and Valley Physiographic Province. The dominant topography of the Great Valley section is characterized by very broad valleys; with the Northwest half comprised of dissected uplands while the Southeast half includes low karst terrain. The local relief is low to moderate. The underlying rock types in the Northeast include shale and sandstone; slate at the east end. The Southeast is comprised of limestone and dolomite. The geologic structure includes thrust sheets, nappes, overturned and steep faults; many third- and fourth-order folds. The origin of the sedimentation is fluvial erosion, solution of carbonate rocks; and some periglacial mass wasting.

SOIL SURVEY

According to the USDA, National Resource Conservation Services (NRCS) of Lebanon County, Pennsylvania, the soils present at the project site are identified as Berks (BkB), Comly (CmB), and Holly (Ho) soils. A Soils Map is included in Figure 2.

The Berks soil is a relatively flat lying soil from 3 to 8 percent slopes, moderately shallow, well drained, channery silt loam to extremely channery silt loam found on ridges or

mountain slopes. The soil's parent material is residuum weathered from shale and siltstone and/or fine-grained sandstone. The approximate depth to a restrictive bedrock feature can typically be found from 20 to 40 inches. Permeability ranges from moderately low to high and the available water holding capacity is very low. The depth to the water table typically exceeds 80 inches.

The Comly soil is a relatively flat lying soil from 3 to 8 percent slopes, reasonably deep, moderately well drained, silt loam to very channery silt loam found on hills. The soil's parent material is colluvium derived from shale and siltstone. The approximate depth to a restrictive bedrock feature can typically be found from 60 to 90 inches. Permeability is moderately high and the available water holding capacity is low. The water table is typically shallow.

The Holly soil is a relatively level lying soil from 0 to 3 percent slopes, deep, poorly drained, silt loam to gravelly loamy sand found within flood plains. The soil's parent material is alluvium derived from sandstone and shale. The approximate depth to a restrictive bedrock feature typically exceeds more than 80 inches. Permeability is moderately high to high and the available water holding capacity is high. The water table is typically very shallow.

SITE GEOLOGY

This project area is located within two formations, the Hamburg sequence rocks (Oh) and the Shale and Greywacke of Hamburg sequence (Ohsg), as shown on Figure 3, Geology Map.

The shale of Hamburg sequence is predominantly greenish-gray, gray, purple and maroon phyllitic shale that is silty and siliceous. The unit also contains interbedded red siltstone and shale, olive siltstone and shale, siliceous shale, greywacke, minor beds of chert, quartzitic sandstone, and limestone. The total thickness of all Hamburg sequence rocks is about 3,000 feet.

Shale and Graywacke of the Hamburg sequence consists of olive-weathering gray shale interbedded with brown calcareous graywacke. Its thickness is unknown.

SUBSURFACE CONDITIONS

Seventeen borings, designated B-1 through B-17 were drilled to provide subsurface information for the proposed solar farm. The borings were drilled by CGC Geoservices, LLC of Carlisle, Pennsylvania in December 2014 and personnel from Gannett Fleming, Inc. observed drilling operations, field classified the subsurface materials, and prepared the boring logs. Boring locations are shown on the Boring Location Plan presented in Figure 4, and typed boring logs are included in Appendix A.

Standard Penetration Test (SPT) sampling, using a 2-inch O.D. split spoon, was performed in all the borings. The number of blows per six inches of penetration of the sampler driven by a 140-pound hammer falling 30 inches was recorded on the boring logs. Rock was sampled in boring B-1 using a NQ2-size bit. SPT N-values, soil recoveries, USCS soil classification, rock core recoveries, Rock Quality Designation (RQD) values, rock descriptions, and groundwater readings were recorded on the logs.

The boring logs indicate that the overburden generally consists of a surficial layer of sand, silt, or clay overlying weathered shale, typically described as sand or gravel with varying amounts of silt and clay. The surficial layer typically extended to depths ranging from 1.5 to 3.0 feet. The weathered shale was encountered from the bottom of the surficial layer to the termination depths of the borings. SPT N-values recorded in the overburden, ignoring the refusal blow counts that occurred, ranged from 3 blows per foot (bpf) to 93 bpf and averaged 30 bpf.

Bedrock was cored in boring B-1, which was the first boring drilled, after two consecutive refusal blow counts were achieved. Top of rock was encountered at elevation 402.0 feet. One distinct bedrock strata was identified in the boring. A stratum of weathered shale with some calcite veins was encountered within five feet of the top of the rock. Rock core recovery in the shale ranged from 43 to 55 percent while the RQD was 0 percent for all core runs in the boring. The relatively poor recovery and RQD indicate that soft and/or weathered zones are present between the more competent layers of rock.

Prior to coring rock in subsequent borings, it was noted by the drill operator that the augers required minimal down-pressure to penetrate and continue into the rock mass. Due to the low percentage of recovery during the core runs performed in the initial boring (B-1) and the ability to easily penetrate the augers into the weathered rock, SPT testing was performed in lieu of rock coring in the remainder of the borings.

Water levels were recorded immediately after drilling and 24 hours or more after completion of drilling. Water elevations immediately after drilling varied in elevation from 406.2 feet in boring B-1 to 432.0 feet in boring B-10. The groundwater levels 24-hours or more after completion ranged from elevation 404.6 feet in boring B-16 to elevation 434.5 feet in boring B-10. Note that groundwater elevations will fluctuate with topography, seasonal influences, and precipitation, and may vary from the readings observed during the subsurface investigation.

LABORATORY TESTING RESULTS

Laboratory testing was conducted on various soil samples gathered throughout the duration of the drilling. Eight classification tests were completed in the Gannett Fleming, Inc. soil testing laboratory. The classification tests included the following parameters: moisture content, sieve gradation, hydrometer analysis, and Atterberg limits. The sieve gradation, hydrometer analysis, and Atterberg limits are used in the process for determining the laboratory soil classification using the Unified Soil Classification System (USCS). The classification is represented as the USCS group symbol. Table 1 includes summarized results from the laboratory tested samples and individual test reports are provided in Appendix B.

Table 1: Summary of Laboratory Testing – Soil

Boring	Sample Interval (ft)	USCS Class.	Moisture Content (%)	% Gravel	% Sand	% Silt	% Clay	LL	PL	PI
B-3	1.5–6.0	GC-GM	7.3	44.1	42.4	9.3	4.2	25	20	5
B-4	1.5–6.0	GC	15.2	36.1	19.9	21.7	22.3	38	24	14
B-8	3.0–6.9	SC	10.3	16.9	53.2	17.2	12.7	27	19	8
B-9	3.0–7.5	SC-SM	8.1	29.9	45.5	15.8	8.8	26	20	6
B-10	4.5–9.0	GC	11.5	51.5	33.9	7.3	7.3	31	22	9
B-12	1.5–6.0	SC-SM	9.2	21	48	21.5	9.5	27	20	7
B-15	1.5–6.0	SM	13.8	27.9	42.9	16.9	12.3	34	25	9
B-16	3.0–6.6	SC-SM	7.7	33.0	48.6	10.9	7.5	26	19	7

CORROSION TESTING RESULTS

Russell Corrosion Consultants, Inc. tested representative soil samples, one from each of the three soil series, identified by the USDA mapping to determine the corrosion potential of the in-situ soils. The individual test reports are provided in Appendix C and are summarized in Table 2.

Table 2: Summary of Corrosion Testing Results

Boring	Sample Interval (ft)	Resistivity (ohm-cm)		Chloride (ppm)	Sulfate (ppm)	pH
		As-Is	Saturated			
B-1	3.0 – 5.4	46,000	4,100	45	30	7.9
B-7	0.0 – 3.0	9,300	4,200	45	15	8.1
B-13	0.0 – 3.0	26,000	1,600	45	15	7.7

The foundation design should consider these test results in determining if measures are necessary to mitigate the detrimental effects of corrosion on steel and/or concrete foundations.

REFERENCES

Pennsylvania Department of Conservation and Natural Resources, 2014, *Pa DCNR Interactive Map,* December 2014, retrieved from http://www.gis.dcnr.state.pa.us/maps/index.html

Pennsylvania Department of Conservation and Natural Resources Bureau of Topographic and Geologic Survey, 2014, *Physiographic Provinces of Pennsylvania*, December 2014, retrieved from http://www.dcnr.state.pa.ud/topogeo

United States Department of Agriculture, Natural Resources Conservation Service, 2014, Web *Soil Survey,* December 2014, retrieved from http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx

FIGURES

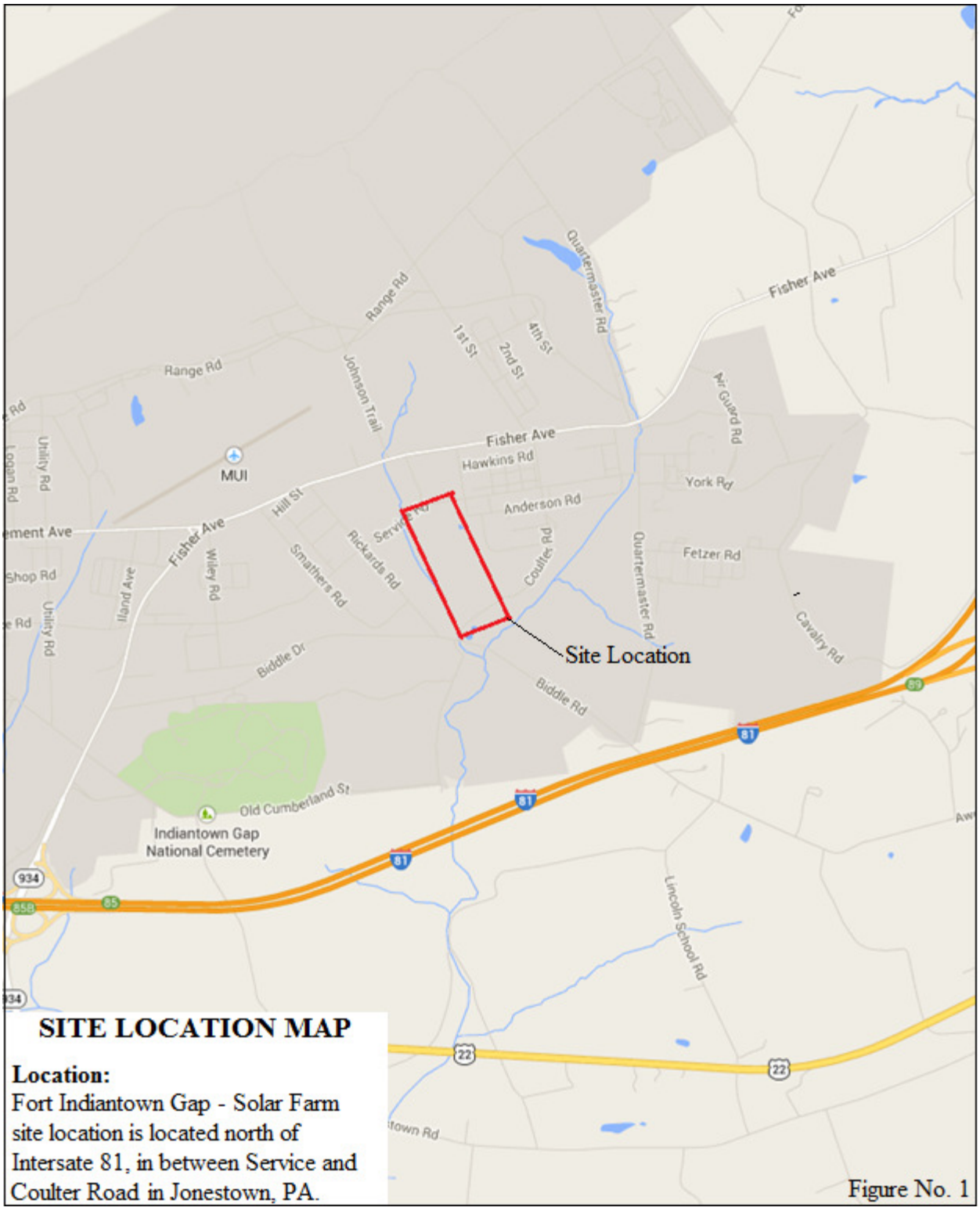


Figure 1: *Site Location Map*

Figure 2: *Soils Map*

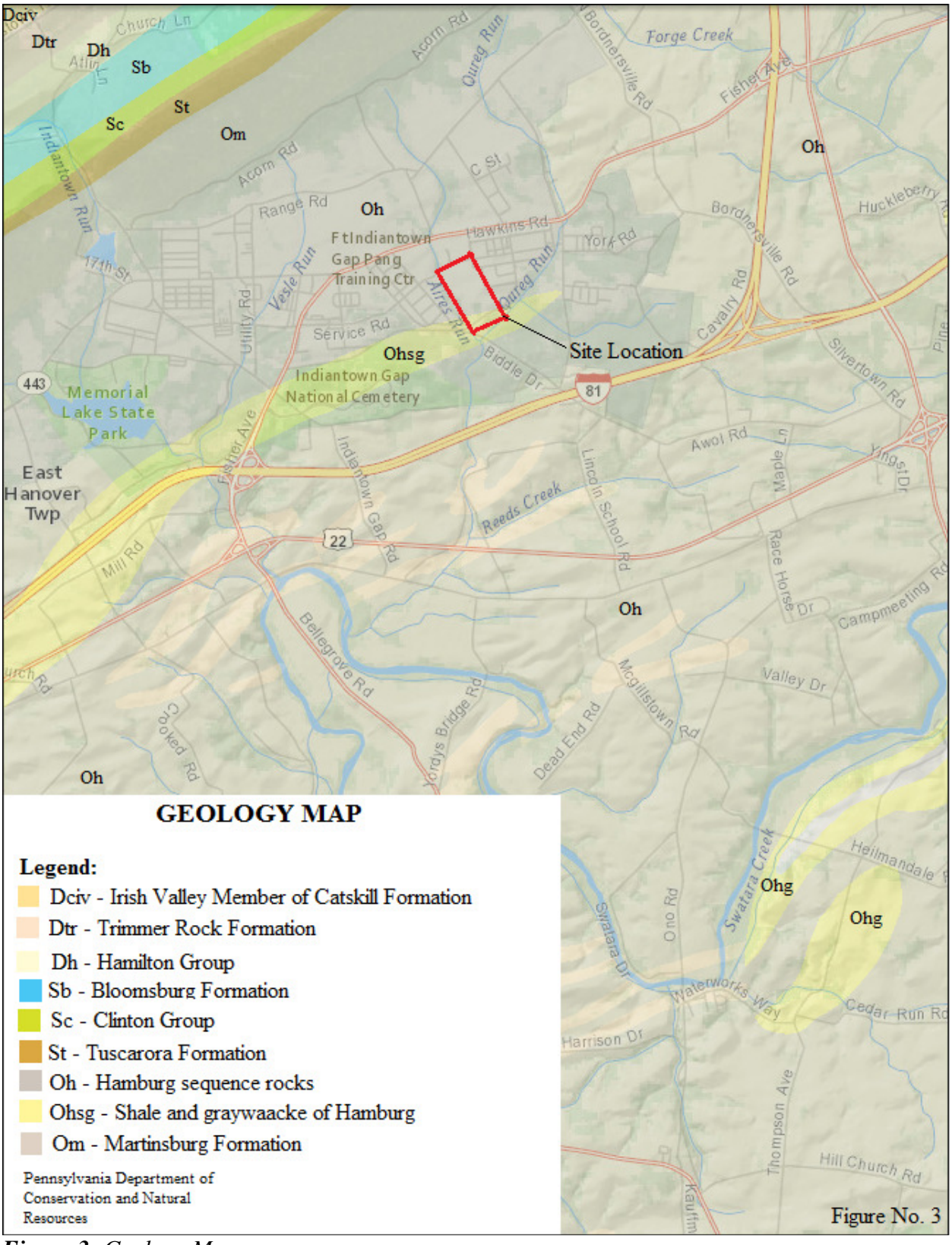
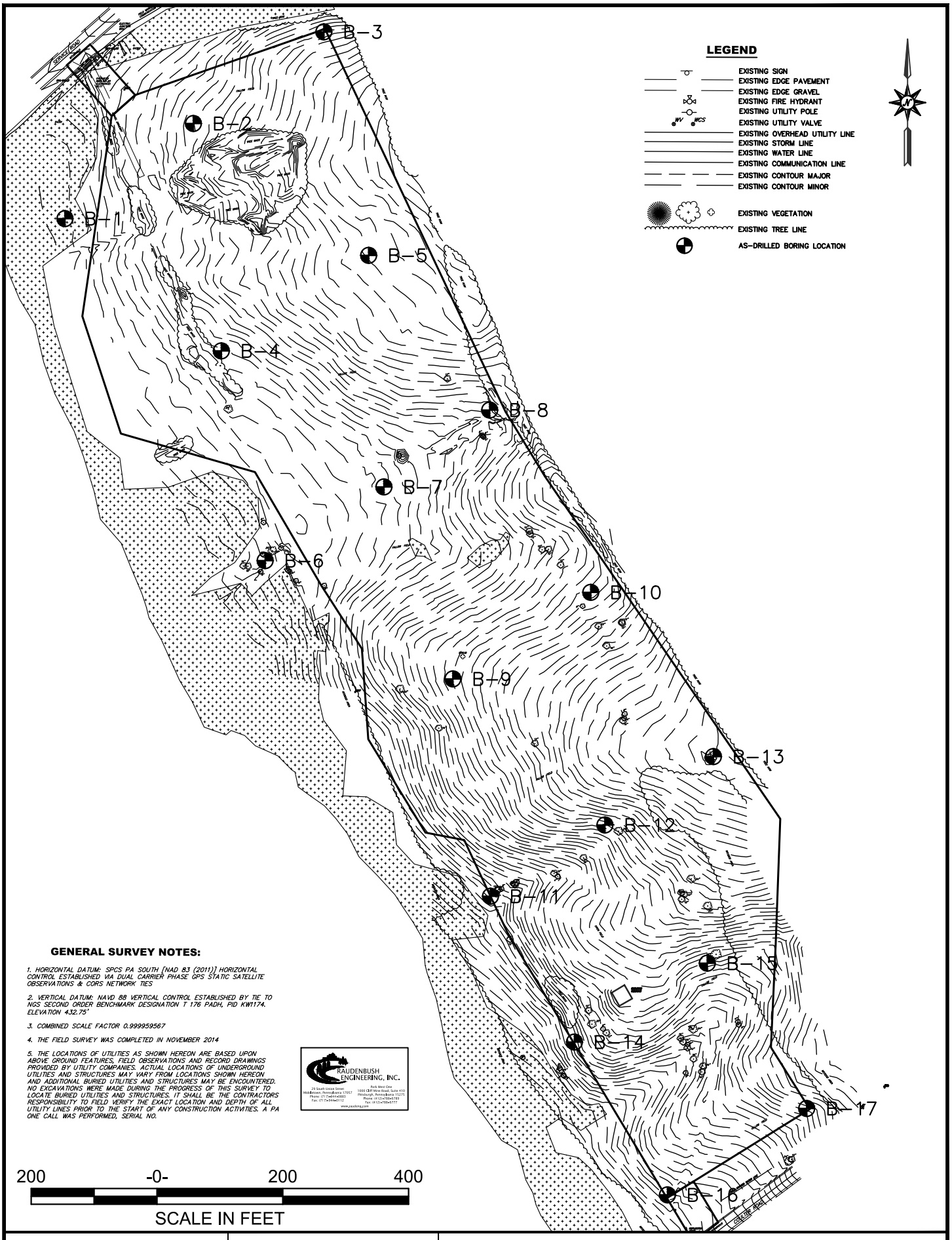


Figure 3: *Geology Map*



GENERAL SURVEY NOTES:

1. HORIZONTAL DATUM: SPCS PA SOUTH [NAD 83 (2011)] HORIZONTAL CONTROL ESTABLISHED VIA DUAL CARRIER PHASE GPS STATIC SATELLITE OBSERVATIONS & CORS NETWORK TIES

2. VERTICAL DATUM: NAVD 88 VERTICAL CONTROL ESTABLISHED BY TIE TO NGS SECOND ORDER BENCHMARK DESIGNATION T 176 PADH, PID KW1174. ELEVATION 432.75'

3. COMBINED SCALE FACTOR 0.999959567

4. THE FIELD SURVEY WAS COMPLETED IN NOVEMBER 2014

5. THE LOCATIONS OF UTILITIES AS SHOWN HEREON ARE BASED UPON ABOVE GROUND FEATURES, FIELD OBSERVATIONS AND RECORD DRAWINGS PROVIDED BY UTILITY COMPANIES. ACTUAL LOCATIONS OF UNDERGROUND UTILITIES AND STRUCTURES MAY VARY FROM LOCATIONS SHOWN HEREON AND ADDITIONAL BURIED UTILITIES AND STRUCTURES MAY BE ENCOUNTERED. NO EXCAVATIONS WERE MADE DURING THE PROGRESS OF THIS SURVEY TO LOCATE BURIED UTILITIES AND STRUCTURES. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO FIELD VERIFY THE EXACT LOCATION AND DEPTH OF ALL UTILITY LINES PRIOR TO THE START OF ANY CONSTRUCTION ACTIVITIES. A PA ONE CALL WAS PERFORMED, SERIAL NO.

RAUDENBUSH ENGINEERING, INC.

GANNETT FLEMING, INC.
HARRISBURG, PA

FIGURE 4

FT. INDIANTOWN GAP SOLAR FARM BORING LOCATION PLAN

K:\352\54419 - PAANG - Solar Array\project\1 - submission\Solar - topo - Plan.dwg

APPENDICES

Gannett Fleming

APPENDIX A

Typed Boring Logs

FORM NO: D-481
(12/89)
REPRODUCE LOCALLY

ENGINEERS FIELD BORING LOG

BORING NO. **B-1**
SHEET **1** OF **1**
DATE: START **12/2/14**
END **12/2/14**
O.G. ELEV. **409.7**

PROJECT NAME **Fort Indiantown Gap- Solar Farm** COUNTY **Lebanon**
PROJECT LOCATION
STATION OFFSET FROM CENTERLINE
NORTHING **402,524.80'** EASTING **2,300,754.50'**
STATE RT. NO. SECT. SEGMENT OFFSET
INSPECTOR **M. Kulbacki** DRILLERS NAME/COMPANY **Dan Bolze/CGC Geo Services**
EQUIPMENT USED **Acker XLS Track Rig with Autohammer**
DRILLING METHODS **HSA/ 2" SPT/ NQ2 Rock Core**
CASING: SIZE: **3.25"** ; DEPTH: **7.7'** ; WATER: DEPTH: **3.5'** TIME: **10:41** DATE: **12/2/14**
CHECKED BY: **GDB** ; DATE: **1/2015** DEPTH: **0.5'** TIME: **8:30** DATE: **12/4/14**

Checked = No Recorded Water Reading Measurements ☐

DEPTH (FT)	SAMPLE NO./ TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (Ft.)	RECOVERY(%) / RQD (%)	POCKET PENT/ TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
	S-1	1 2 5	1.1'	73	-	ml	Moist	SILT (ml), dark brown, moist, loose, homogeneous	
1.5								1.5 408.2	
	S-2	5 7 10	1.1'	73	PP 2.75	cl	Moist	Gravelly Lean CLAY with sand (cl), gray to reddish brown, moist, very stiff	
3.0								3.0 406.7	
	S-3	9 19 23	1.5'	100	-	gm	Moist	Silty GRAVEL (gm), grayish brown to tan, moist to dry, dense to very dense, homogeneous	Weathered shale encountered starting at 3.0'.
4.5									
5.3	S-4	29 50/0.3	0.8'	100	-	gm	Dry	5.3 404.4	
6.0	Augered				-			Well Graded GRAVEL (gw), gray, dry, very dense, homogeneous	
6.3	S-5	50/0.3	0.2'	67	-	gw	Dry	6.3 403.4	
	Augered				-			Poorly Graded GRAVEL (gp), gray, dry, very dense, homogeneous	
7.5									
7.7	S-6	50/0.2	0.1'	50	-	gp	Dry	7.7 402.0	
	R-1		1.1'	55 - 0				SHALE, dark gray, soft, moderately weathered, very thinly bedded 0°-5°, extremely close, spaced fractures, 0°-5°, (RQD=0).	
9.7									
	R-2		1.3'	43 - 0					
12.7								12.7 397.0	
								Bottom of borehole at 12.70 feet.	

NOTE: DRAW STRATIFICATION LINES AT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES FOR THIS BORING LOCATION AND SHOW DEPTHS

FORM NO: D-481
(12/89)
REPRODUCE LOCALLY

ENGINEERS FIELD BORING LOG

BORING NO. **B-2**
SHEET **1** OF **1**
DATE: START **12/4/14**
END **12/4/14**
O.G. ELEV. **424.9**

PROJECT NAME **Fort Indiantown Gap- Solar Farm** COUNTY **Lebanon**
PROJECT LOCATION
STATION OFFSET FROM CENTERLINE
NORTHING **402,675.90'** EASTING **2,300,958.60'**
STATE RT. NO. SECT. SEGMENT OFFSET
INSPECTOR **M. Kulbacki** DRILLERS NAME/COMPANY **Dan Bolze/CGC Geo Services**
EQUIPMENT USED **Acker XLS Track Rig with Autohammer**
DRILLING METHODS **HSA/ 2" SPT**
CASING: SIZE: **3.25"** ; DEPTH: **9.0'** ; WATER: DEPTH: **Dry** TIME: **11:00** DATE: **12/4/14**
CHECKED BY: **GDB** ; DATE: **1/2015** DEPTH: **4.7'** TIME: **8:48** DATE: **12/5/14**

Checked = No Recorded Water Reading Measurements ☐

DEPTH (FT)	SAMPLE NO./ TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (Ft.)	RECOVERY(%) / RQD (%)	POCKET PENT/ TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
1.5	S-1	1 2 3	1.3'	87	-	ml	Moist	Sandy SILT with gravel (ml), orange to brown, moist, loose, homogeneous 1.5 423.4	
3.0	S-2	7 11 19	1.5'	100	-	gm	Dry	Silty GRAVEL (gm), gray to brown, dry, dense, homogeneous 3.0 421.9	S-2: Some rock fragments.
4.5	S-3	22 17 19	1.5'	100	-	sm	Moist	Silty SAND (sm), reddish brown, moist, dense, homogeneous 4.5 420.4	
6.0	S-4	26 29 36	1.5'	100	-	gm	Moist	Silty GRAVEL (gm), grayish brown, moist, very dense, homogeneous	4.5'-9.0': Highly weathered rock fragments.
6.8	S-5	48 50/0.3	0.8'	100	-	gm	Moist		
7.5	Augered				-				
8.3	S-6	38 50/0.3	0.7'	87	-	gm	Moist		
9.0	Augered				-			9.0 415.9	
								Bottom of borehole at 9.00 feet.	

NOTE: DRAW STRATIFICATION LINES AT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES FOR THIS BORING LOCATION AND SHOW DEPTHS

FORM NO: D-481
(12/89)
REPRODUCE LOCALLY

ENGINEERS FIELD BORING LOG

BORING NO. **B-3**
SHEET **1** OF **1**
DATE: START **12/4/14**
END **12/4/14**
O.G. ELEV. **430.1**

PROJECT NAME **Fort Indiantown Gap- Solar Farm** COUNTY **Lebanon**
PROJECT LOCATION
STATION OFFSET FROM CENTERLINE
NORTHING **402,821.50'** EASTING **2,301,166.10'**
STATE RT. NO. SECT. SEGMENT OFFSET
INSPECTOR **M. Kulbacki** DRILLERS NAME/COMPANY **Dan Bolze/CGC Geo Services**
EQUIPMENT USED **Acker XLS Track Rig with Autohammer**
DRILLING METHODS **HSA/ 2" SPT**
CASING: SIZE: **3.25"** ; DEPTH: **9.0'** ; WATER: DEPTH: **Dry** TIME: **11:00** DATE: **12/4/14**
CHECKED BY: **GDB** ; DATE: **1/2015** DEPTH: **6.0'** TIME: **8:46** DATE: **12/5/14**

Checked = No Recorded Water Reading Measurements ☐

DEPTH (FT)	SAMPLE NO./ TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (Ft.)	RECOVERY(%) / RQD (%)	POCKET PENT/ TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
	S-1	1 2 3	1.3'	87	-	gc	Moist	Clayey GRAVEL (gc), light brown, moist, loose, homogeneous	
1.5								1.5 428.6	
	S-2	2 5 23	1.3'	87	-	GC-GM	Moist	Silty Clayey GRAVEL with sand (gc-gm), light brown to dark brown, moist to dry, medium dense to very dense, homogeneous	Weathered rock encountered starting at 1.5'.
3.0									
	S-3	30 49 44	1.5'	100	-	GC-GM	Dry		
4.5									
	S-4	25 45 50/0.3	1.3'	100	-	GC-GM	Dry		
5.8									
6.0	Augered				-			6.0 424.1	
6.3	S-5	50/0.3	0.3'	100	-	gm	Dry	Silty GRAVEL (gm), gray to brown, dry, very dense, homogeneous	
	Augered				-				
7.5								7.5 422.6	
7.8	S-6	50/0.3	0.1'	33	-	gp	Dry	Poorly Graded GRAVEL (gp), gray to brown, dry, very dense, homogeneous	
	Augered				-				
9.0								9.0 421.1	
								Bottom of borehole at 9.00 feet.	

NOTE: DRAW STRATIFICATION LINES AT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES FOR THIS BORING LOCATION AND SHOW DEPTHS

FORM NO: D-481
(12/89)
REPRODUCE LOCALLY

ENGINEERS FIELD BORING LOG

BORING NO. **B-4**
SHEET **1** OF **1**
DATE: START **12/2/14**
END **12/2/14**
O.G. ELEV. **418.8**

PROJECT NAME **Fort Indiantown Gap- Solar Farm** COUNTY **Lebanon**
PROJECT LOCATION
STATION OFFSET FROM CENTERLINE
NORTHING **402,314.50'** EASTING **2,301,003.10'**
STATE RT. NO. SECT. SEGMENT OFFSET
INSPECTOR **M. Kulbacki** DRILLERS NAME/COMPANY **Dan Bolze/CGC Geo Services**
EQUIPMENT USED **Acker XLS Track Rig with Autohammer**
DRILLING METHODS **HSA/ 2" SPT**
CASING: SIZE: **3.25"** ; DEPTH: **10.5'** ; WATER: DEPTH: **7.0'** TIME: **11:57** DATE: **12/2/14**
CHECKED BY: **GDB** ; DATE: **1/2015** DEPTH: **5.7'** TIME: **8:33** DATE: **12/4/14**

Checked = No Recorded Water Reading Measurements ☐

DEPTH (FT)	SAMPLE NO./ TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (Ft.)	RECOVERY(%) / RQD (%)	POCKET PENT/ TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
1.5	S-1	2 3 4	1.3'	87	-	ml	Moist	SILT (ml), brown, moist, loose, homogeneous 1.5 417.3	
3.0	S-2	2 7 9	1.5'	100	-	GC	Moist	Clayey GRAVEL with sand (gc), yellowish brown, dry to moist, medium dense to very dense, homogeneous	
4.5	S-3	9 15 13	1.5'	100	-	GC	Moist		
6.0	S-4	10 15 16	1.5'	100	-	GC	Moist		
7.5	S-5	20 36 48	1.5'	100	-	gc	Dry	7.5 411.3	Weathered rock encountered starting at 6.0'.
7.9	S-6	50/0.4	0.4'	100	-	gp-gm	Wet	Poorly Graded GRAVEL with silt (gp-gm), dark brown, wet, dense to very dense, homogeneous	
9.0	Augered				-				
10.5	S-7	29 22 14	1.1'	73	-	gp-gm	Wet	10.5 408.3	
								Bottom of borehole at 10.50 feet.	

NOTE: DRAW STRATIFICATION LINES AT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES FOR THIS BORING LOCATION AND SHOW DEPTHS

FORM NO: D-481
(12/89)
REPRODUCE LOCALLY

ENGINEERS FIELD BORING LOG

BORING NO. **B-5**
SHEET **1** OF **1**
DATE: START **12/4/14**
END **12/4/14**
O.G. ELEV. **436.1**

PROJECT NAME **Fort Indiantown Gap- Solar Farm** COUNTY **Lebanon**
PROJECT LOCATION
STATION OFFSET FROM CENTERLINE
NORTHING **402,466.30'** EASTING **2,301,237.30'**
STATE RT. NO. SECT. SEGMENT OFFSET
INSPECTOR **M. Kulbacki** DRILLERS NAME/COMPANY **Dan Bolze/CGC Geo Services**
EQUIPMENT USED **Acker XLS Track Rig with Autohammer**
DRILLING METHODS **HSA/ 2" SPT**
CASING: SIZE: **3.25"** ; DEPTH: **9.0'** ; WATER: DEPTH: **9.0'** TIME: **9:21** DATE: **12/4/14**
CHECKED BY: **GDB** ; DATE: **1/2015** DEPTH: **7.1'** TIME: **8:45** DATE: **12/5/14**

Checked = No Recorded Water Reading Measurements ☐

DEPTH (FT)	SAMPLE NO./ TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (Ft.)	RECOVERY(%) / RQD (%)	POCKET PENT/ TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
1.5	S-1	1 5 6	1.5'	100	-	gm	Moist	Silty GRAVEL with sand (gm), tan to light brown, moist, loose, homogeneous 1.5 434.6	
3.0	S-2	1 5 5	1.5'	100	PP 2.50	cl	Moist	Gravelly Lean CLAY (cl), reddish orange to brown, moist, stiff, homogeneous 3.0 433.1	Weathered rock encountered starting at 1.5'.
4.5	S-3	4 6 10	1.5'	100	-	ml	Moist	SILT (ml), orange to brown, moist, medium dense, homogeneous 4.5 431.6	S-3: Friable weathered rock.
6.0	S-4	4 3 3	1.5'	100	-	sc	Moist	Clayey SAND with gravel (sc), dark brown, moist, loose, homogeneous 6.0 430.1	
7.5	S-5	4 8 8	1.5'	100	-	gm	Moist	Silty GRAVEL (gm), orangish brown, moist, medium dense, homogeneous 7.5 428.6	
9.0	S-6	8 3 4	1.5'	100	-	ml	Moist	SILT (ml), dark brown, moist, loose 9.0 427.1	S-6: Friable weathered rock.
								Bottom of borehole at 9.00 feet.	

NOTE: DRAW STRATIFICATION LINES AT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES FOR THIS BORING LOCATION AND SHOW DEPTHS

FORM NO: D-481
(12/89)
REPRODUCE LOCALLY

ENGINEERS FIELD BORING LOG

BORING NO. **B-6**
SHEET **1** OF **1**
DATE: START **12/2/14**
END **12/2/14**
O.G. ELEV. **410.6**

PROJECT NAME **Fort Indiantown Gap- Solar Farm** COUNTY **Lebanon**
PROJECT LOCATION
STATION OFFSET FROM CENTERLINE
NORTHING **401,981.20'** EASTING **2,301,072.70'**
STATE RT. NO. SECT. SEGMENT OFFSET
INSPECTOR **M. Kulbacki** DRILLERS NAME/COMPANY **Dan Bolze/CGC Geo Services**
EQUIPMENT USED **Acker XLS Track Rig with Autohammer**
DRILLING METHODS **HSA/ 2" SPT**
CASING: SIZE: **3.25"** ; DEPTH: **9.0'** ; WATER: DEPTH: **Dry** TIME: **2:33** DATE: **12/2/14**
CHECKED BY: **GDB** ; DATE: **1/2015** DEPTH: **3.3'** TIME: **11:38** DATE: **12/4/14**

Checked = No Recorded Water Reading Measurements ☐

DEPTH (FT)	SAMPLE NO./ TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (Ft.)	RECOVERY(%) / RQD (%)	POCKET PENT/ TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
1.5	S-1	1 2 5	1.1'	73	-	ml	Moist	SILT (ml), gray to brown, moist, loose, homogeneous	
3.0	S-2	1 2 3	1.2'	80	-	ml	Moist	3.0 407.6	
4.5	S-3	3 4 3	1.3'	87	-	gc	Moist	Clayey GRAVEL (gc), orange to brown, moist, loose to medium dense, homogeneous	
6.0	S-4	7 5 7	1.5'	100	-	gc	Moist	6.0 404.6	
7.5	S-5	10 11 24	1.3'	87	-	gm	Moist	Silty GRAVEL (gm), dark brown, moist to moist, dense to very dense, homogeneous	Weathered shale encountered starting at 6.0'.
7.7	S-6	50/0.2	0.2'	100	-	gm	Wet		
9.0	Augered				-			9.0 401.6	
								Bottom of borehole at 9.00 feet.	

NOTE: DRAW STRATIFICATION LINES AT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES FOR THIS BORING LOCATION AND SHOW DEPTHS

FORM NO: D-481
(12/89)
REPRODUCE LOCALLY

ENGINEERS FIELD BORING LOG

BORING NO. **B-7**
SHEET **1** OF **1**
DATE: START **12/2/14**
END **12/2/14**
O.G. ELEV. **419.3**

PROJECT NAME **Fort Indiantown Gap- Solar Farm** COUNTY **Lebanon**
PROJECT LOCATION
STATION OFFSET FROM CENTERLINE
NORTHING **402,098.30'** EASTING **2,301,261.60'**
STATE RT. NO. SECT. SEGMENT OFFSET
INSPECTOR **M. Kulbacki** DRILLERS NAME/COMPANY **Dan Bolze/CGC Geo Services**
EQUIPMENT USED **Acker XLS Track Rig with Autohammer**
DRILLING METHODS **HSA/ 2" SPT**
CASING: SIZE: **3.25"** ; DEPTH: **9.0'** ; WATER: DEPTH: **Dry** TIME: **12:50** DATE: **12/2/14**
CHECKED BY: **GDB** ; DATE: **1/2015** DEPTH: **8.0'** TIME: **8:47** DATE: **12/4/14**

Checked = No Recorded Water Reading Measurements ☐

DEPTH (FT)	SAMPLE NO./ TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (Ft.)	RECOVERY(%) / RQD (%)	POCKET PENT/ TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
1.5	S-1	1 1 3	1.3'	87	-	ml	Moist	SILT (ml), dark brown, moist, loose, homogeneous	
3.0	S-2	3 5 8	1.5'	100	PP 3.00	cl	Moist	2.5 416.8 Lean CLAY (cl), yellowish brown, moist, medium stiff, homogeneous	
4.5	S-3	7 11 13	1.5'	100	-	gm	Moist	4.0 415.3 Silty GRAVEL (gm), dark brown, moist, medium dense to very dense, homogeneous	
6.0	S-4	17 41 39	1.5'	100	-	gm	Moist	6.0 413.3	S-4: Soil wet at 5.2', isolated.
6.9	S-5	43 50/0.4	0.9'	100	-	gp	Moist	Poorly Graded GRAVEL (gp), grayish brown, moist, very dense, homogeneous	
7.5	Augered				-			7.5 411.8	
9.0	S-6	34 35 37	1.5'	100	-	gm	moist	Silty GRAVEL (gm), grayish brown, moist, very dense, homogeneous 9.0 410.3	Weathered rock encountered starting at 7.5'.
								Bottom of borehole at 9.00 feet.	

NOTE: DRAW STRATIFICATION LINES AT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES FOR THIS BORING LOCATION AND SHOW DEPTHS

FORM NO: D-481
(12/89)
REPRODUCE LOCALLY

ENGINEERS FIELD BORING LOG

BORING NO. **B-8**
SHEET **1** OF **1**
DATE: START **12/3/14**
END **12/3/14**
O.G. ELEV. **426.5**

PROJECT NAME **Fort Indiantown Gap- Solar Farm** COUNTY **Lebanon**
PROJECT LOCATION
STATION OFFSET FROM CENTERLINE
NORTHING **402,220.50'** EASTING **2,301,429.70'**
STATE RT. NO. SECT. SEGMENT OFFSET
INSPECTOR **M. Kulbacki** DRILLERS NAME/COMPANY **Dan Bolze/CGC Geo Services**
EQUIPMENT USED **Acker XLS Track Rig with Autohammer**
DRILLING METHODS **HSA/ 2" SPT**
CASING: SIZE: **3.25"** ; DEPTH: **7.5'** ; WATER: DEPTH: **-** TIME: DATE:
CHECKED BY: **GDB** ; DATE: **1/2015** DEPTH: **3.9'** TIME: **8:40** DATE: **12/4/14**

Checked = No Recorded Water Reading Measurements ☐

DEPTH (FT)	SAMPLE NO./ TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (Ft.)	RECOVERY(%) / RQD (%)	POCKET PENT/ TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
1.5	S-1	1 3 3	0.4'	27	-	sm	Moist	Silty SAND (sm), brown, moist, loose, homogeneous 1.5 425.0	
3.0	S-2	4 8 9	1.2'	80	-	cl	Moist	Lean CLAY with sand (cl), orange to gray to brown, moist, very stiff, homogeneous 3.0 423.5	
4.5	S-3	14 13 16	1.5'	100	-	SC	Moist	Clayey SAND with gravel (sc), orange brown to dark brown, moist to dry, medium dense to very dense, homogeneous	Weathered rock encountered starting at 3.0'.
6.0	S-4	24 40 41	1.5'	100	-	SC	Moist		
6.9	S-5	30 50/0.4	0.5'	56	-	SC	Moist		
7.5	Augered				-				
9.0	S-6	30 42 47	1.2'	80	-	sc	Dry	9.0 417.5	
								Bottom of borehole at 9.00 feet.	

NOTE: DRAW STRATIFICATION LINES AT THE APPROXIMATE BOUNDARY
BETWEEN SOIL TYPES FOR THIS BORING LOCATION AND SHOW DEPTHS

FORM NO: D-481
(12/89)
REPRODUCE LOCALLY

ENGINEERS FIELD BORING LOG

BORING NO. **B-9**
SHEET **1** OF **1**
DATE: START **12/2/14**
END **12/2/14**
O.G. ELEV. **435.0**

PROJECT NAME **Fort Indiantown Gap- Solar Farm** COUNTY **Lebanon**
PROJECT LOCATION
STATION OFFSET FROM CENTERLINE
NORTHING **401,793.10'** EASTING **2,301,371.20'**
STATE RT. NO. SECT. SEGMENT OFFSET
INSPECTOR **M. Kulbacki** DRILLERS NAME/COMPANY **Dan Bolze/CGC Geo Services**
EQUIPMENT USED **Acker XLS Track Rig with Autohammer**
DRILLING METHODS **HSA/ 2" SPT**
CASING: SIZE: **3.25"** ; DEPTH: **9.0'** ; WATER: DEPTH: **Dry** TIME: **3:30** DATE: **12/2/14**
CHECKED BY: **GDB** ; DATE: **1/2015** DEPTH: **Dry** TIME: **11:30** DATE: **12/4/14**

Checked = No Recorded Water Reading Measurements ☐

DEPTH (FT)	SAMPLE NO./ TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (Ft.)	RECOVERY(%) / RQD (%)	POCKET PENT/ TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
	S-1	2 1 3	1.1'	73	-	gm	Moist	Silty GRAVEL (gm), dark brown, moist, very loose, homogeneous	
1.5								1.5 433.5	
	S-2	5 9 10	1.5'	100	-	gc	Moist	Clayey GRAVEL (gc), tan to dark brown, moist, medium dense, homogeneous	
3.0								3.0 432.0	
	S-3	10 50/0.4	0.9'	100	-	SC-SM	Dry	Silty Clayey SAND with gravel (sc-sm), light brown to dark brown, dry, very dense, homogeneous	Weathered rock encountered starting at 3.0'.
3.9									
4.5	Augered				-				
	S-4	20 42 44	1.5'	100	-	SC-SM	Dry		
6.0									
	S-5	43 22 43	1.3'	87	-	SC-SM	Dry		
7.5									
	S-6	28 48 50/0.2	1.2'	100	-	sc-sm	Dry		
8.7									
9.0	Augered				-			9.0 426.0	
								Bottom of borehole at 9.00 feet.	

NOTE: DRAW STRATIFICATION LINES AT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES FOR THIS BORING LOCATION AND SHOW DEPTHS

FORM NO: D-481
(12/89)
REPRODUCE LOCALLY

ENGINEERS FIELD BORING LOG

BORING NO. **B-10**
SHEET **1** OF **1**
DATE: START **12/3/14**
END **12/3/14**
O.G. ELEV. **438.5**

PROJECT NAME **Fort Indiantown Gap- Solar Farm** COUNTY **Lebanon**
PROJECT LOCATION
STATION OFFSET FROM CENTERLINE
NORTHING **401,930.80'** EASTING **2,301,590.40'**
STATE RT. NO. SECT. SEGMENT OFFSET
INSPECTOR **M. Kulbacki** DRILLERS NAME/COMPANY **Dan Bolze/CGC Geo Services**
EQUIPMENT USED **Acker XLS Track Rig with Autohammer**
DRILLING METHODS **HSA/ 2" SPT**
CASING: SIZE: **3.25"** ; DEPTH: **7.5'** ; WATER: DEPTH: **6.5'** TIME: **--** DATE: **12/3/14**
CHECKED BY: **GDB** ; DATE: **1/2015** DEPTH: **4.0'** TIME: **11:27** DATE: **12/4/14**

Checked = No Recorded Water Reading Measurements ☐

DEPTH (FT)	SAMPLE NO./ TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (Ft.)	RECOVERY(%) / RQD (%)	POCKET PENT/ TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
1.5	S-1	1 2 3	1.4'	93	-	gc	Moist	Clayey GRAVEL (gc), orangish brown, moist, loose, homogeneous 1.5 437.0	
3.0	S-2	2 7 10	1.2'	80	-	gm	Moist	Silty GRAVEL (gm), dark brown, moist, medium dense, homogeneous	
4.5	S-3	12 14 14	1.4'	93	-	gm	Moist	4.5 434.0	
6.0	S-4	14 15 19	1.1'	73	-	GC	Moist	Clayey GRAVEL with sand (gc), orangish brown, moist, medium dense to dense, homogeneous	
7.5	S-5	12 12 13	1.5'	100	-	GC	Moist		
9.0	S-6	12 17 15	1.3'	87	-	GC	Moist	9.0 429.5	
								Bottom of borehole at 9.00 feet.	

NOTE: DRAW STRATIFICATION LINES AT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES FOR THIS BORING LOCATION AND SHOW DEPTHS

FORM NO: D-481
(12/89)
REPRODUCE LOCALLY

ENGINEERS FIELD BORING LOG

BORING NO. **B-11**
SHEET **1** OF **1**
DATE: START **12/3/14**
END **12/3/14**
O.G. ELEV. **415.2**

PROJECT NAME **Fort Indiantown Gap- Solar Farm** COUNTY **Lebanon**
PROJECT LOCATION
STATION OFFSET FROM CENTERLINE
NORTHING **401,447.80'** EASTING **2,301,431.00'**
STATE RT. NO. SECT. SEGMENT OFFSET
INSPECTOR **M. Kulbacki** DRILLERS NAME/COMPANY **Dan Bolze/CGC Geo Services**
EQUIPMENT USED **Acker XLS Track Rig with Autohammer**
DRILLING METHODS **HSA/ 2" SPT**
CASING: SIZE: **3.25"** ; DEPTH: **9.0'** ; WATER: DEPTH: **Dry** TIME: **--** DATE: **12/3/14**
CHECKED BY: **GDB** ; DATE: **1/2015** DEPTH: **7.9'** TIME: **11:42** DATE: **12/4/14**

Checked = No Recorded Water Reading Measurements ☐

DEPTH (FT)	SAMPLE NO./ TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (Ft.)	RECOVERY(%) / RQD (%)	POCKET PENT/ TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
1.5	S-1	1 2 1	1.1'	73	-	sm	Moist	Silty SAND (sm), brown, moist, very loose, homogeneous 1.5 413.7	
3.0	S-2	1 2 3	1.4'	93	-	cl	Moist	Sandy Lean CLAY (cl), gray to brown, moist, medium stiff, homogeneous 3.0 412.2	
4.5	S-3	6 9 9	1.5'	100	-	sc	Moist	Clayey SAND (sc), orange to gray, moist, medium dense, homogeneous 4.5 410.7	
5.4	S-4	16 50/0.4	0.7'	78	-	gm	Moist	Silty GRAVEL with sand (gm), dark brown, moist to dry, very dense, homogeneous	
6.0	Augered				-				
6.4	S-5	50/0.4	0.3'	75	-	gm	Dry		
7.5	Augered				-				
8.2	S-6	48 50/0.2	0.6'	86	-	gm	Dry		
9.0	Augered				-			9.0 406.2	
								Bottom of borehole at 9.00 feet.	

NOTE: DRAW STRATIFICATION LINES AT THE APPROXIMATE BOUNDARY
BETWEEN SOIL TYPES FOR THIS BORING LOCATION AND SHOW DEPTHS

FORM NO: D-481
(12/89)
REPRODUCE LOCALLY

ENGINEERS FIELD BORING LOG

BORING NO. **B-12**
SHEET **1** OF **1**
DATE: START **12/3/14**
END **12/3/14**
O.G. ELEV. **438.6**

PROJECT NAME **Fort Indiantown Gap- Solar Farm** COUNTY **Lebanon**
PROJECT LOCATION
STATION OFFSET FROM CENTERLINE
NORTHING **401,561.00'** EASTING **2,301,612.90'**
STATE RT. NO. SECT. SEGMENT OFFSET
INSPECTOR **M. Kulbacki** DRILLERS NAME/COMPANY **Dan Bolze/CGC Geo Services**
EQUIPMENT USED **Acker XLS Track Rig with Autohammer**
DRILLING METHODS **HSA/ 2" SPT**
CASING: SIZE: **3.25"** ; DEPTH: **9.0'** ; WATER: DEPTH: **Dry** TIME: **--** DATE: **12/3/14**
CHECKED BY: **GDB** ; DATE: **1/2015** DEPTH: **Dry** TIME: **11:45** DATE: **12/4/14**

Checked = No Recorded Water Reading Measurements ☐

DEPTH (FT)	SAMPLE NO./ TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (Ft.)	RECOVERY(%) / RQD (%)	POCKET PENT/ TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
1.5	S-1	1 2 4	1.5'	100	-	sc	Moist	Clayey SAND with gravel (sc), orangish brown, moist, loose, homogeneous 1.5 437.1	
3.0	S-2	7 10 13	1.4'	93	-	SC-SM	Moist	Silty Clayey SAND with gravel (sc-sm), orangish brown to light brown, moist to dry, medium dense to very dense, homogeneous	
4.5	S-3	16 27 20	1.5'	100	-	SC-SM	Moist		
6.0	S-4	15 26 28	1.5'	100	-	SC-SM	Dry		
7.5	S-5	27 47 45	1.4'	93	-	sc-sm	Dry	7.5 431.1	
8.6	S-6	30 32	0.9'	82	-	gm	Dry	Silty GRAVEL (gm), dark brown, dry, very dense, homogeneous	S-6: Some friable gravel.
9.0	Augered	50/0.1			-			9.0 429.6	
								Bottom of borehole at 9.00 feet.	

NOTE: DRAW STRATIFICATION LINES AT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES FOR THIS BORING LOCATION AND SHOW DEPTHS

FORM NO: D-481
(12/89)
REPRODUCE LOCALLY

ENGINEERS FIELD BORING LOG

BORING NO. **B-13**
SHEET **1** OF **1**
DATE: START **12/3/14**
END **12/3/14**
O.G. ELEV. **456.9**

PROJECT NAME **Fort Indiantown Gap- Solar Farm** COUNTY **Lebanon**
PROJECT LOCATION
STATION OFFSET FROM CENTERLINE
NORTHING **401,669.70'** EASTING **2,301,785.40'**
STATE RT. NO. SECT. SEGMENT OFFSET
INSPECTOR **M. Kulbacki** DRILLERS NAME/COMPANY **Dan Bolze/CGC Geo Services**
EQUIPMENT USED **Acker XLS Track Rig with Autohammer**
DRILLING METHODS **HSA/ 2" SPT**
CASING: SIZE: **3.25"** ; DEPTH: **9.0'** ; WATER: DEPTH: **-** TIME: DATE:
CHECKED BY: **GDB** ; DATE: **1/2015** DEPTH: **Dry** TIME: **11:48** DATE: **12/4/14**

Checked = No Recorded Water Reading Measurements ☐

DEPTH (FT)	SAMPLE NO./ TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (Ft.)	RECOVERY(%) / RQD (%)	POCKET PENT/ TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
1.5	S-1	1 3 5	1.1'	73	-	sm	Moist	Silty SAND (sm), brown, moist, loose, homogeneous 1.5 455.4	
3.0	S-2	5 6 12	1.4'	93	-	gc	Moist	Clayey GRAVEL (gc), orange to brown, moist, medium dense, homogeneous	
4.5	S-3	12 11 19	1.2'	80	-	gc	Moist	4.5 452.4	
6.0	S-4	17 30 46	1.0'	67	-	gm	Moist	Silty GRAVEL (gm), grayish brown, very dense, homogeneous	
6.4	S-5	50/0.4	0.3'	75	-	gm	Dry		
7.5	Augered				-				
8.2	S-6	46 50/0.2	0.6'	86	-	gm	Dry		
9.0	Augered				-			9.0 447.9	
								Bottom of borehole at 9.00 feet.	

NOTE: DRAW STRATIFICATION LINES AT THE APPROXIMATE BOUNDARY
BETWEEN SOIL TYPES FOR THIS BORING LOCATION AND SHOW DEPTHS

FORM NO: D-481
(12/89)
REPRODUCE LOCALLY

ENGINEERS FIELD BORING LOG

BORING NO. **B-14**
SHEET **1** OF **1**
DATE: START **12/3/14**
END **12/3/14**
O.G. ELEV. **413.7**

PROJECT NAME **Fort Indiantown Gap- Solar Farm** COUNTY **Lebanon**
PROJECT LOCATION
STATION OFFSET FROM CENTERLINE
NORTHING **401,216.00'** EASTING **2,301,564.40'**
STATE RT. NO. SECT. SEGMENT OFFSET
INSPECTOR **M. Kulbacki** DRILLERS NAME/COMPANY **Dan Bolze/CGC Geo Services**
EQUIPMENT USED **Acker XLS Track Rig with Autohammer**
DRILLING METHODS **HSA/ 2" SPT**
CASING: SIZE: **3.25"** ; DEPTH: **7.5'** ; WATER: DEPTH: **Dry** TIME: **--** DATE: **12/3/14**
CHECKED BY: **GDB** ; DATE: **1/2015** DEPTH: **Dry** TIME: **11:52** DATE: **12/4/14**

Checked = No Recorded Water Reading Measurements ☐

DEPTH (FT)	SAMPLE NO./ TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (Ft.)	RECOVERY(%) / RQD (%)	POCKET PENT/ TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
1.5	S-1	1 2 3	1.3'	87	-	cl	Moist	Gravelly Lean CLAY with sand (cl), brown, moist, medium stiff, homogeneous 1.5 412.2	
3.0	S-2	2 5 6	1.1'	73	-	gc	Moist	Clayey GRAVEL (gc), brown, moist, medium dense, homogeneous 3.0 410.7	
4.5	S-3	8 10 10	1.4'	93	-	gw-gm	Moist	Well Graded GRAVEL with silt and sand (gw-gm), brown, moist, medium dense, homogeneous 4.5 409.2	
6.0	S-4	9 11 11	1.4'	93	-	sm	Moist	Silty SAND with gravel (sm), orange to brown, moist, medium dense, homogeneous 6.0 407.7	
7.5	S-5	12 25 25	1.1'	73	-	gc	Moist	Clayey GRAVEL (gc), orange to brown, moist, dense 7.5 406.2	S-5: Friable rock fragments.
9.0	S-6	19 23 32	1.2'	80	-	gm	Moist	Silty GRAVEL (gm), dark brown, moist, very dense, homogeneous 9.0 404.7	
								Bottom of borehole at 9.00 feet.	

NOTE: DRAW STRATIFICATION LINES AT THE APPROXIMATE BOUNDARY
BETWEEN SOIL TYPES FOR THIS BORING LOCATION AND SHOW DEPTHS

FORM NO: D-481
(12/89)
REPRODUCE LOCALLY

ENGINEERS FIELD BORING LOG

BORING NO. **B-15**
SHEET **1** OF **1**
DATE: START **12/3/14**
END **12/3/14**
O.G. ELEV. **426.3**

PROJECT NAME **Fort Indiantown Gap- Solar Farm** COUNTY **Lebanon**
PROJECT LOCATION
STATION OFFSET FROM CENTERLINE
NORTHING **401,341.30'** EASTING **2,301,775.60'**
STATE RT. NO. SECT. SEGMENT OFFSET
INSPECTOR **M. Kulbacki** DRILLERS NAME/COMPANY **Dan Bolze/CGC Geo Services**
EQUIPMENT USED **Acker XLS Track Rig with Autohammer**
DRILLING METHODS **HSA/ 2" SPT**
CASING: SIZE: **3.25"** ; DEPTH: **7.5'** ; WATER: DEPTH: **Dry** TIME: **--** DATE: **12/3/14**
CHECKED BY: **GDB** ; DATE: **1/2015** DEPTH: **Dry** TIME: **11:52** DATE: **12/4/14**

Checked = No Recorded Water Reading Measurements ☐

DEPTH (FT)	SAMPLE NO./ TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (Ft.)	RECOVERY(%) / RQD (%)	POCKET PENT/ TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
1.5	S-1	1 2 4	1.3'	87	-	sc	Moist	Clayey SAND (sc), orange to brown, moist, loose, homogeneous 1.5 424.8	
3.0	S-2	3 7 8	1.4'	93	-	SM	Moist	Silty SAND with gravel (sm), orange to brown, moist, medium dense, homogeneous	
4.5	S-3	7 8 9	1.4'	93	-	SM	Moist		
6.0	S-4	6 8 11	1.2'	80	-	SM	Moist	6.0 420.3	
7.5	S-5	10 12 13	1.4'	93	-	sp	Moist	Poorly Graded SAND with gravel (sp), dark brown, moist, medium dense, homogeneous 7.5 418.8	
9.0	S-6	11 12 12	1.4'	93	-	sc	Moist	Clayey SAND with gravel (sc), dark brown, moist, medium dense, homogeneous 9.0 417.3	
								Bottom of borehole at 9.00 feet.	

NOTE: DRAW STRATIFICATION LINES AT THE APPROXIMATE BOUNDARY
BETWEEN SOIL TYPES FOR THIS BORING LOCATION AND SHOW DEPTHS

FORM NO: D-481
(12/89)
REPRODUCE LOCALLY

ENGINEERS FIELD BORING LOG

BORING NO. **B-16**
SHEET **1** OF **1**
DATE: START **12/4/14**
END **12/4/14**
O.G. ELEV. **408.4**

PROJECT NAME **Fort Indiantown Gap- Solar Farm** COUNTY **Lebanon**
PROJECT LOCATION
STATION OFFSET FROM CENTERLINE
NORTHING **400,973.10'** EASTING **2,301,712.40'**
STATE RT. NO. SECT. SEGMENT OFFSET
INSPECTOR **M. Kulbacki** DRILLERS NAME/COMPANY **Dan Bolze/CGC Geo Services**
EQUIPMENT USED **Acker XLS Track Rig with Autohammer**
DRILLING METHODS **HSA/ 2" SPT**
CASING: SIZE: **3.25"** ; DEPTH: **9.0'** ; WATER: DEPTH: **Dry** TIME: **2:00** DATE: **12/4/14**
CHECKED BY: **GDB** ; DATE: **1/2015** DEPTH: **3.8'** TIME: **8:35** DATE: **12/5/14**

Checked = No Recorded Water Reading Measurements ☐

DEPTH (FT)	SAMPLE NO./ TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (Ft.)	RECOVERY(%) / RQD (%)	POCKET PENT/ TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
	S-1	3 6 14	1.3'	87	-	gm	Dry	Silty GRAVEL (gm), yellowish brown, dry, medium dense, homogeneous	
1.5								1.5 406.9	
	S-2	13 17 12	1.3'	87	-	gc	Moist	Clayey GRAVEL (gc), brown, moist, medium dense, homogeneous	S-2: 1/8" Clay seam at 2.9'.
3.0								3.0 405.4	
	S-3	13 17 43	1.4'	93	-	SC-SM	Moist	Silty Clayey SAND with gravel (sc-sm), light orangish brown, moist to dry, very dense, homogeneous, weathered friable rocks.	S-3: Gravel weathered and friable.
4.5									
5.1	S-4	31 50/0.1	0.6'	100	-	SC-SM	Dry		S-4: Gravel weathered and friable.
6.0	Augered				-				
6.6	S-5	43 50/0.1	0.6'	100	-	SC-SM	Moist		S-5: Gravel weathered and friable.
7.5	Augered				-				
7.7	S-6	50/0.2	0.0'	0	-				S-6: No recovery reason unknown.
	Augered				-				
9.0								9.0 399.4	
								Bottom of borehole at 9.00 feet.	

NOTE: DRAW STRATIFICATION LINES AT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES FOR THIS BORING LOCATION AND SHOW DEPTHS

FORM NO: D-481
(12/89)
REPRODUCE LOCALLY

ENGINEERS FIELD BORING LOG

BORING NO. **B-17**
SHEET **1** OF **1**
DATE: START **12/4/14**
END **12/4/14**
O.G. ELEV. **427.4**

PROJECT NAME **Fort Indiantown Gap- Solar Farm** COUNTY **Lebanon**
PROJECT LOCATION
STATION OFFSET FROM CENTERLINE
NORTHING **401,110.50'** EASTING **2,301,933.70'**
STATE RT. NO. SECT. SEGMENT OFFSET
INSPECTOR **M. Kulbacki** DRILLERS NAME/COMPANY **Dan Bolze/CGC Geo Services**
EQUIPMENT USED **Acker XLS Track Rig with Autohammer**
DRILLING METHODS **HSA/ 2" SPT**
CASING: SIZE: **3.25"** ; DEPTH: **9.0'** ; WATER: DEPTH: **Dry** TIME: **3:00** DATE: **12/4/14**
CHECKED BY: **GDB** ; DATE: **1/2015** DEPTH: **Dry** TIME: **8:37** DATE: **12/5/14**

Checked = No Recorded Water Reading Measurements ☐

DEPTH (FT)	SAMPLE NO./ TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (Ft.)	RECOVERY(%) / RQD (%)	POCKET PENT/ TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
1.5	S-1	1 1 2	1.4'	93	-	cl	Moist	Lean CLAY (cl), orange to brown, moist, very soft, homogeneous 1.5 425.9	
3.0	S-2	2 5 12	1.3'	87	-	sm	Moist	Silty SAND (sm), orangish brown to dark brown, moist to dry, medium dense to very dense, homogeneous	
4.5	S-3	12 18 24	1.5'	100	-	sm	Dry		
6.0	S-4	13 15 18	1.5'	100	-	sm	Dry		
7.5	S-5	17 41 17	1.4'	93	-	sm	Moist		
9.0	S-6	35 29 48	1.4'	93	-	sm	Moist	9.0 418.4	
								Bottom of borehole at 9.00 feet.	

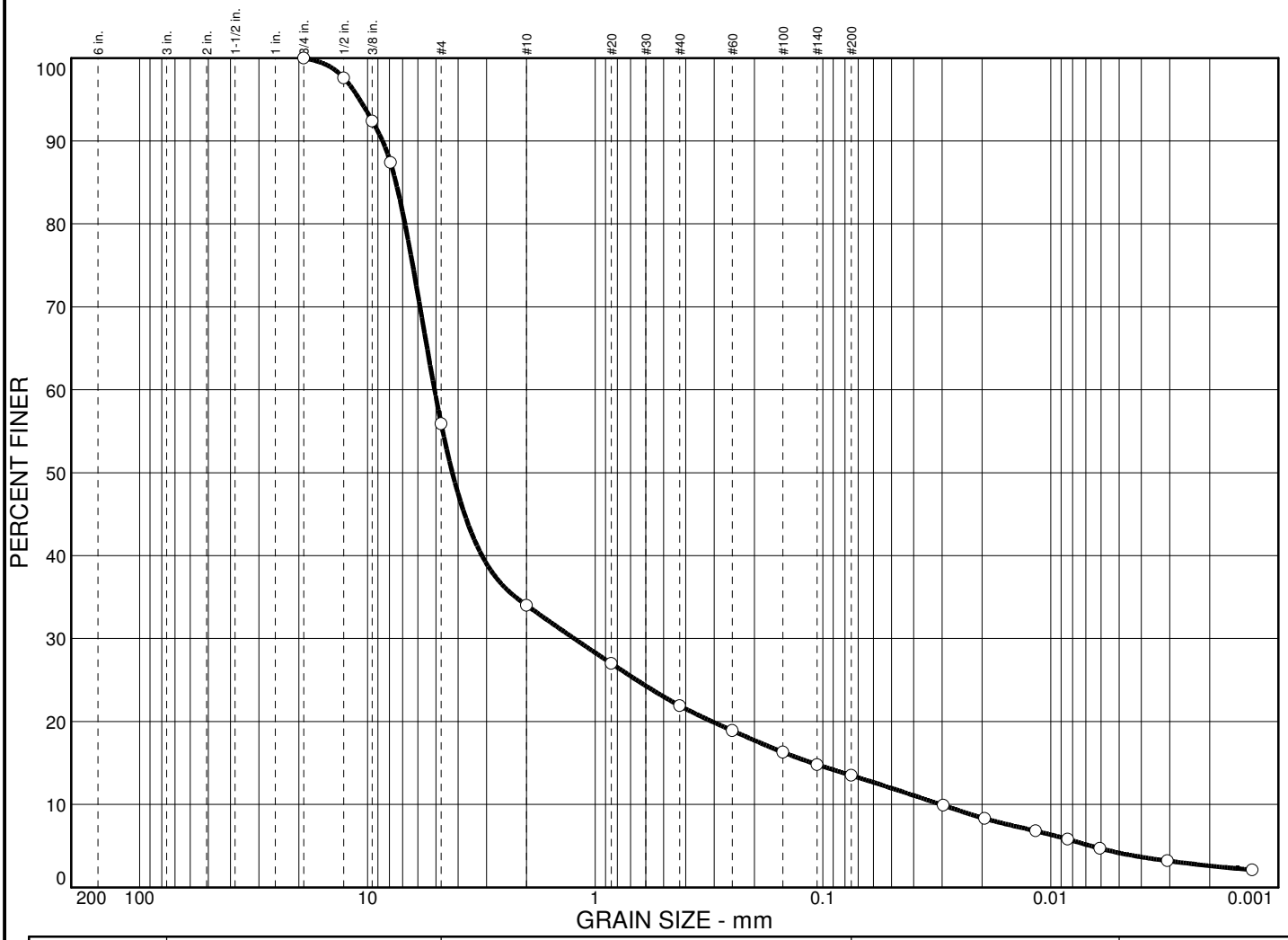
NOTE: DRAW STRATIFICATION LINES AT THE APPROXIMATE BOUNDARY
BETWEEN SOIL TYPES FOR THIS BORING LOCATION AND SHOW DEPTHS

Gannett Fleming

APPENDIX B

Laboratory Test Results

Particle Size Distribution Report



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	44.1	42.4	9.3	4.2

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	25	20	7.50	5.08	4.24	1.24	0.111	0.0304	9.92	167.07

MATERIAL DESCRIPTION	USCS	AASHTO
○ Brown silty clayey GRAVEL with sand	GC-GM	

Project No. 054419 **Client:** USPFO for Pennsylvania, Army and Air National Guards

Project: Fort Indiantown Gap-Solar Farm

○ **Source:** Boring No.: B-3 **Sample No.:** S-2,3,4 **Elev./Depth:** 1.5'-6.0'

Remarks:

○ Date:December 24, 2014

Nat.Water Content: 7.3 %

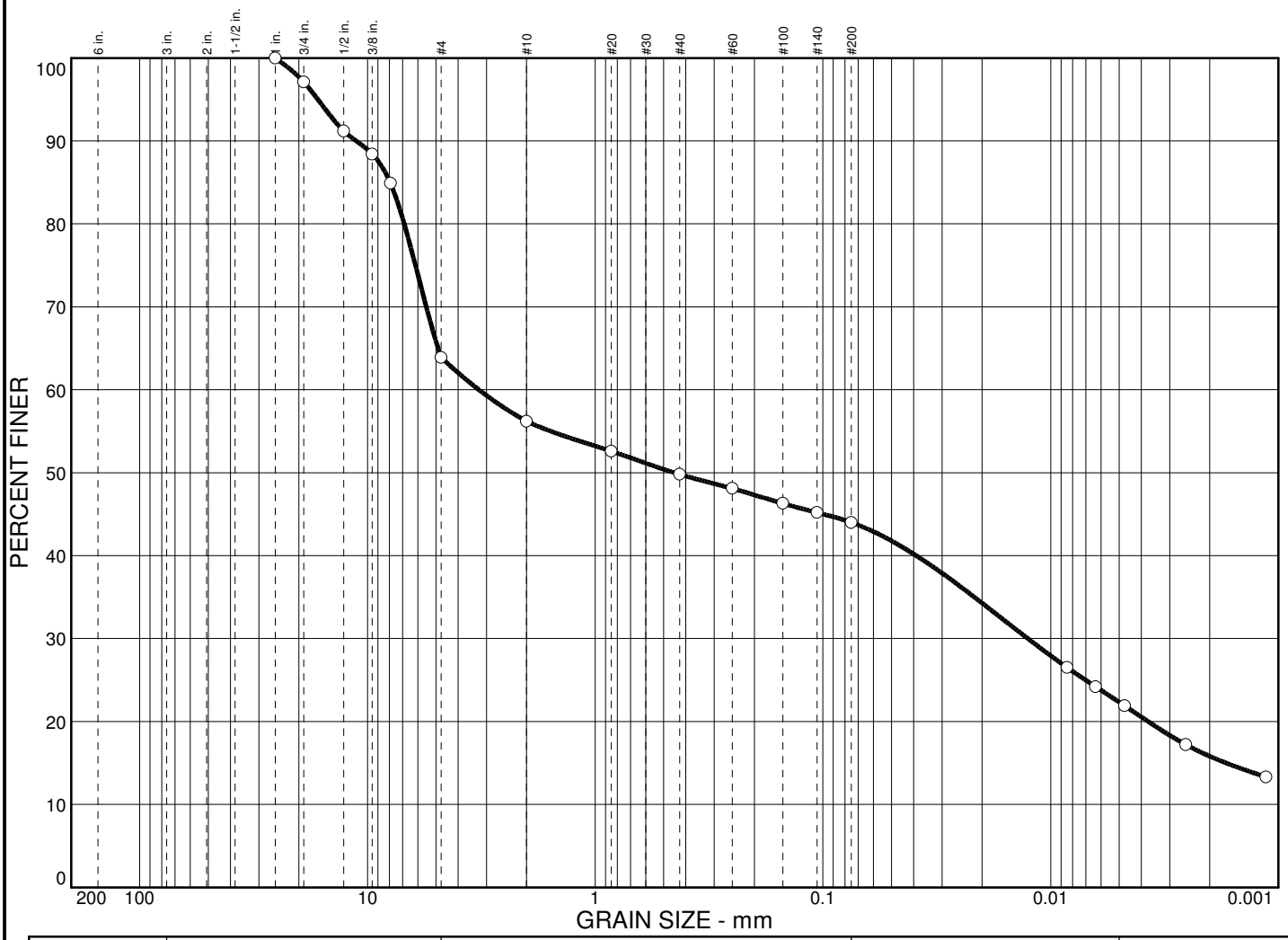
W.O.# 1

Tested By: KAA

Gannett Fleming
ENGINEERS AND PLANNERS

Figure

Particle Size Distribution Report



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	36.1	19.9	21.7	22.3

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	38	24	7.95	3.24	0.449	0.0126	0.0017			

MATERIAL DESCRIPTION	USCS	AASHTO
○ Brown clayey GRAVEL with sand	GC	

Project No. 054419 **Client:** USPFO for Pennsylvania, Army and Air National Guards

Project: Fort Indiantown Gap-Solar Farm

○ **Source:** Boring No.: B-4 **Sample No.:** S-2,3,4 **Elev./Depth:** 1.5'-6.0'

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Remarks:

○ Date:December 24, 2014

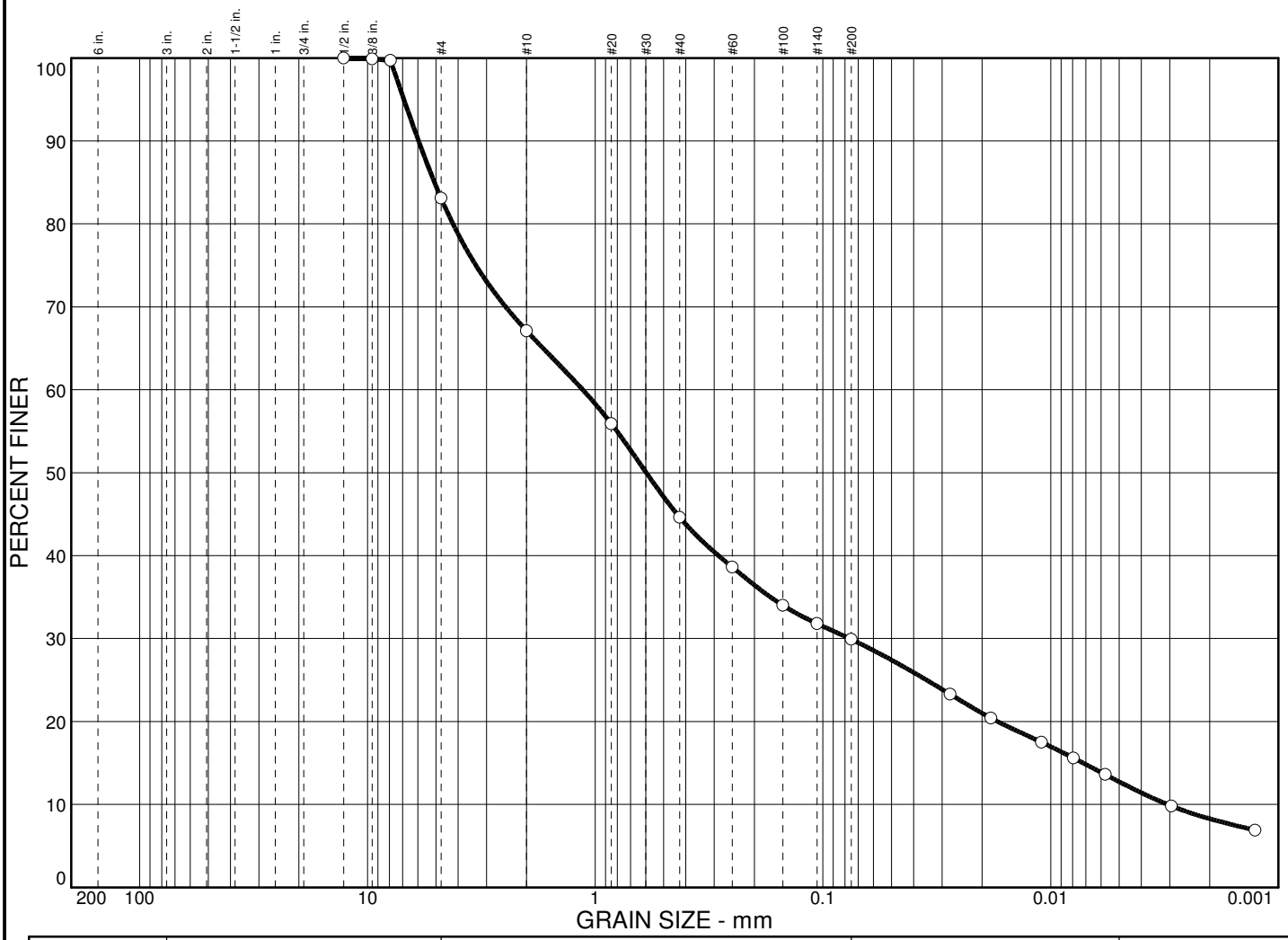
Nat.Water Content:15.2 %

W.O.# 1

Tested By: KAA

Figure

Particle Size Distribution Report



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	16.9	53.2	17.2	12.7

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	27	19	5.08	1.13	0.597	0.0763	0.0072	0.0031	1.67	369.60

MATERIAL DESCRIPTION	USCS	AASHTO
○ Brown clayey SAND with gravel	SC	

Project No. 054419 **Client:** USPFO for Pennsylvania, Army and Air National Guards

Project: Fort Indiantown Gap-Solar Farm

○ **Source:** Boring No.: B-8 **Sample No.:** S-3,4,5 **Elev./Depth:** 3.0'-6.9'

Gannett Fleming
ENGINEERS AND PLANNERS

Remarks:

○ Date:December 24, 2014

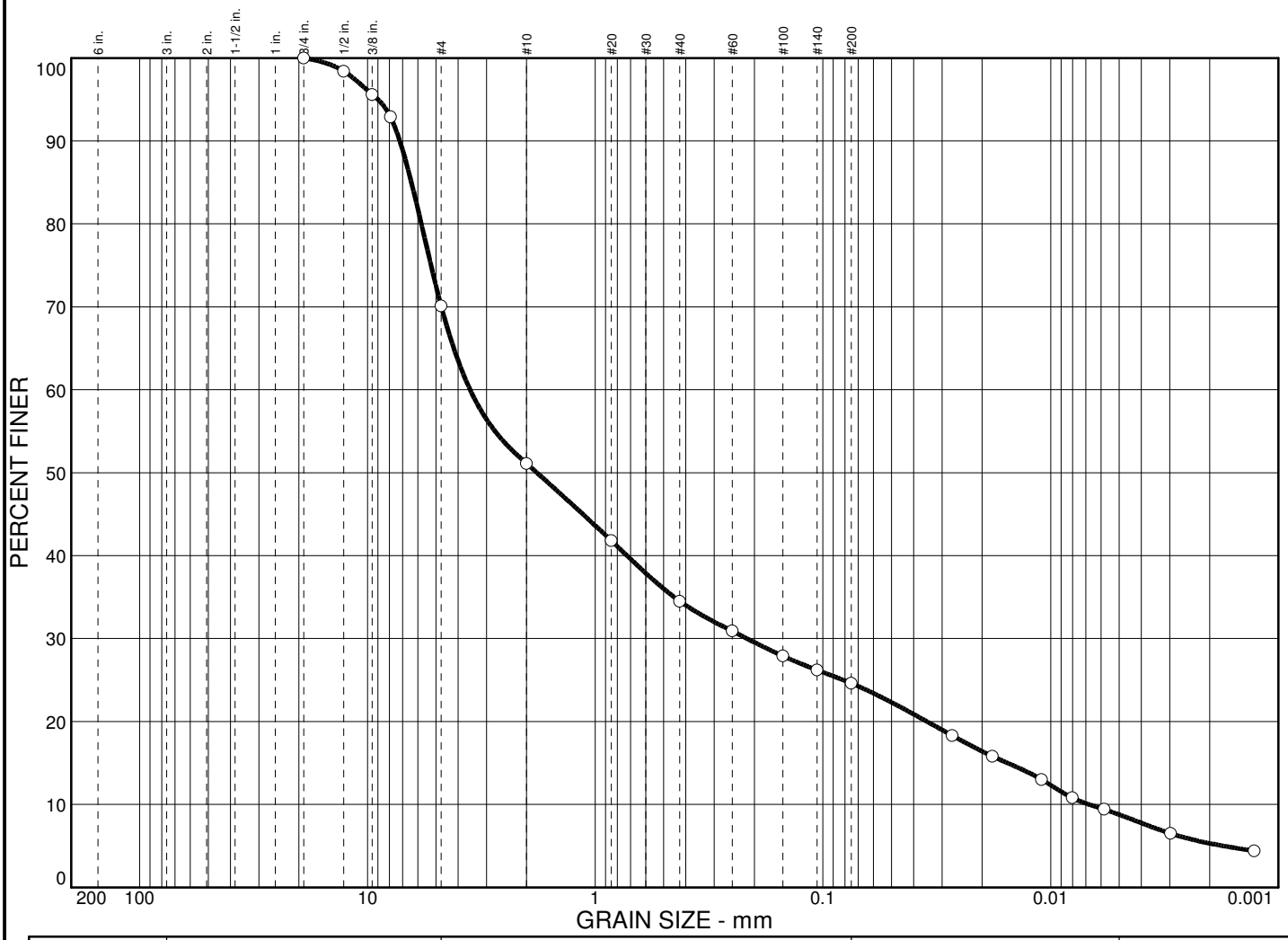
Nat.Water Content:10.3 %

W.O.# 1

Tested By: KAA

Figure

Particle Size Distribution Report



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	29.9	45.5	15.8	8.8

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	26	20	6.42	3.54	1.80	0.216	0.0155	0.0068	1.93	520.40

MATERIAL DESCRIPTION	USCS	AASHTO
○ Brown silty, clayey SAND with gravel	SC-SM	

Project No. 054419 **Client:** USPFO for Pennsylvania, Army and Air National Guards

Project: Fort Indiantown Gap-Solar Farm

○ **Source:** Boring No.: B-9 **Sample No.:** S-3,4,5 **Elev./Depth:** 3.0' - 7.5'

Gannett Fleming
ENGINEERS AND PLANNERS

Remarks:

○ Date:December 24, 2014

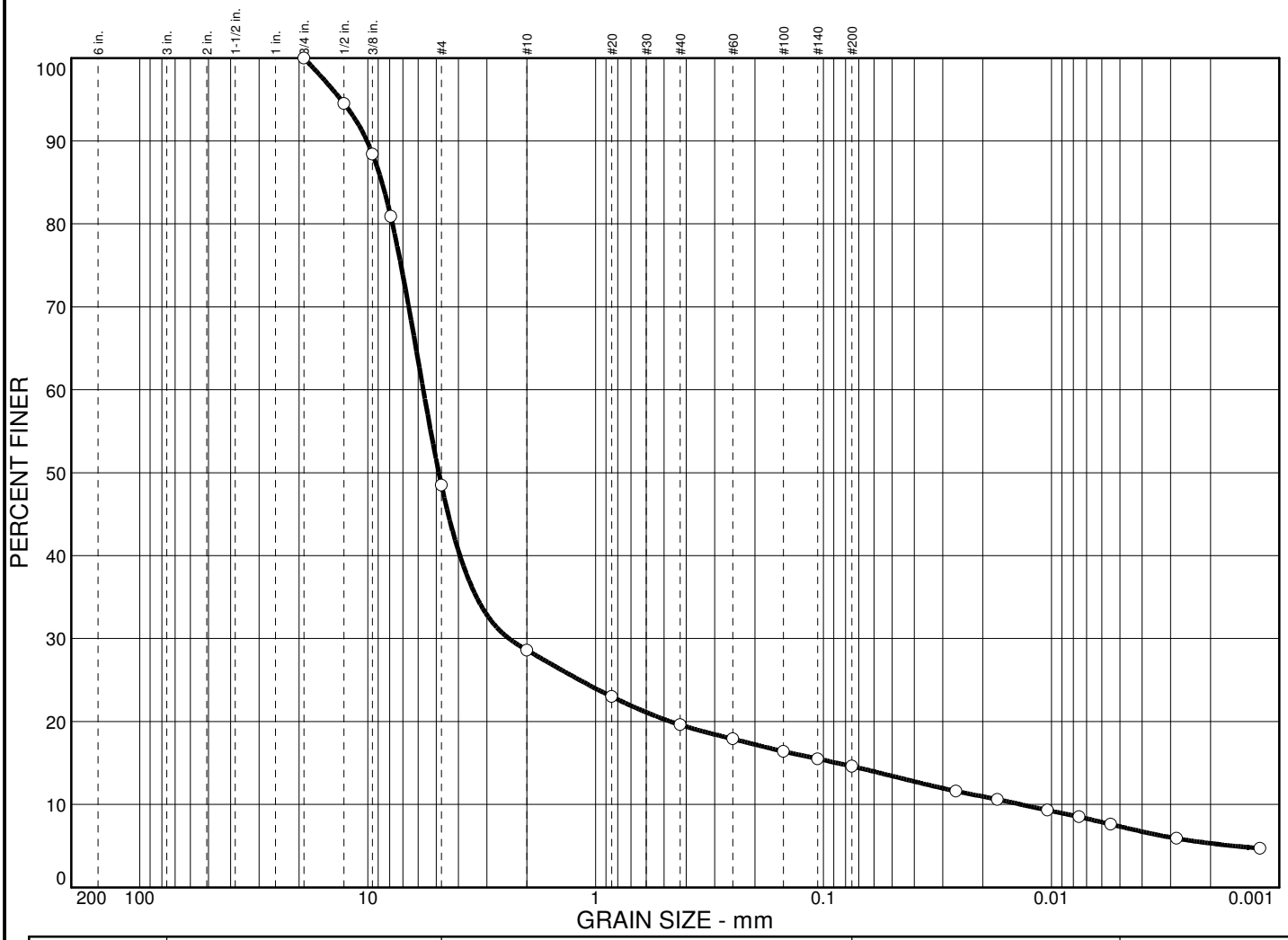
Nat.Water Content: 8.1 %

W.O.# 1

Tested By: KAA

Figure

Particle Size Distribution Report



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	51.5	33.9	7.3	7.3

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	31	22	8.66	5.71	4.88	2.40	0.0872	0.0136	74.14	419.08

MATERIAL DESCRIPTION	USCS	AASHTO
○ Brown clayey GRAVEL with sand	GC	

Project No. 054419 **Client:** USPFO for Pennsylvania, Army and Air National Guards

Project: Fort Indiantown Gap-Solar Farm

○ **Source:** Boring No.: B-10 **Sample No.:** S-4,5,6 **Elev./Depth:** 4.5'-9.0'

Gannett Fleming
ENGINEERS AND PLANNERS

Remarks:

○ Date:December 24, 2014

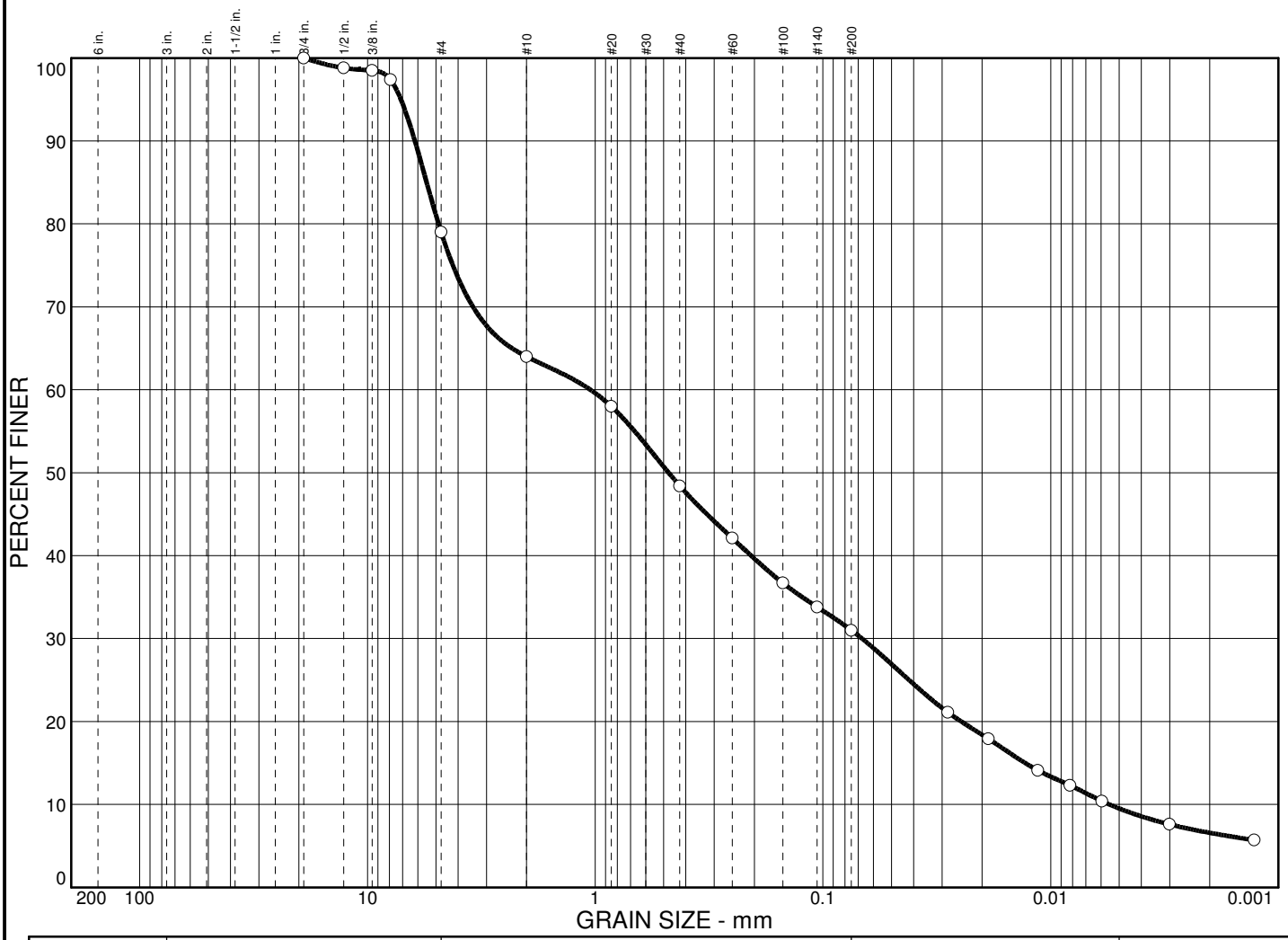
Nat.Water Content: 11.5 %

W.O.# 1

Tested By: KAA

Figure

Particle Size Distribution Report



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	21.0	48.0	21.5	9.5

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	27	20	5.50	1.05	0.476	0.0674	0.0130	0.0055	0.78	190.14

MATERIAL DESCRIPTION	USCS	AASHTO
○ Brown silty, clayey SAND with gravel	SC-SM	

Project No. 054419 **Client:** USPFO for Pennsylvania, Army and Air National Guards

Project: Fort Indiantown Gap-Solar Farm

○ **Source:** Boring No.: B-12 **Sample No.:** S-2,3,4 **Elev./Depth:** 1.5'-6.0'

Gannett Fleming
ENGINEERS AND PLANNERS

Remarks:

○ Date:December 24, 2014

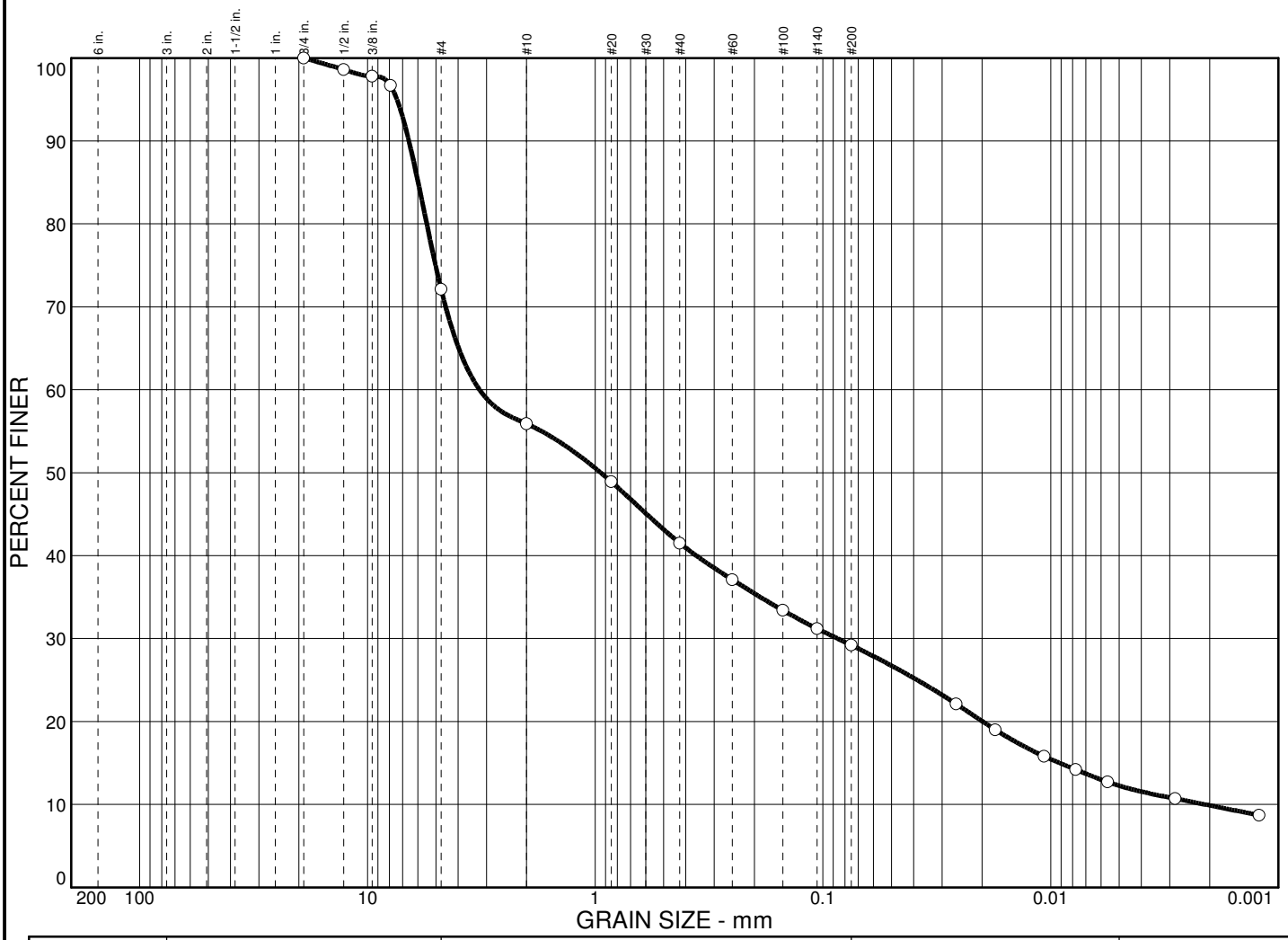
Nat.Water Content:9.2 %

W.O.# 1

Tested By: KAA

Figure

Particle Size Distribution Report



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	27.9	42.9	16.9	12.3

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	34	25	5.99	3.22	0.946	0.0862	0.0091	0.0021	1.10	1532.27

MATERIAL DESCRIPTION	USCS	AASHTO
○ Brown silty SAND with gravel	SM	

Project No. 054419 **Client:** USPFO for Pennsylvania, Army and Air National Guards

Project: Fort Indiantown Gap-Solar Farm

○ **Source:** Boring No.: B-15 **Sample No.:** S-2,3,4 **Elev./Depth:** 1.5' - 6.0'

Gannett Fleming
ENGINEERS AND PLANNERS

Remarks:

○ Date:December 24, 2014

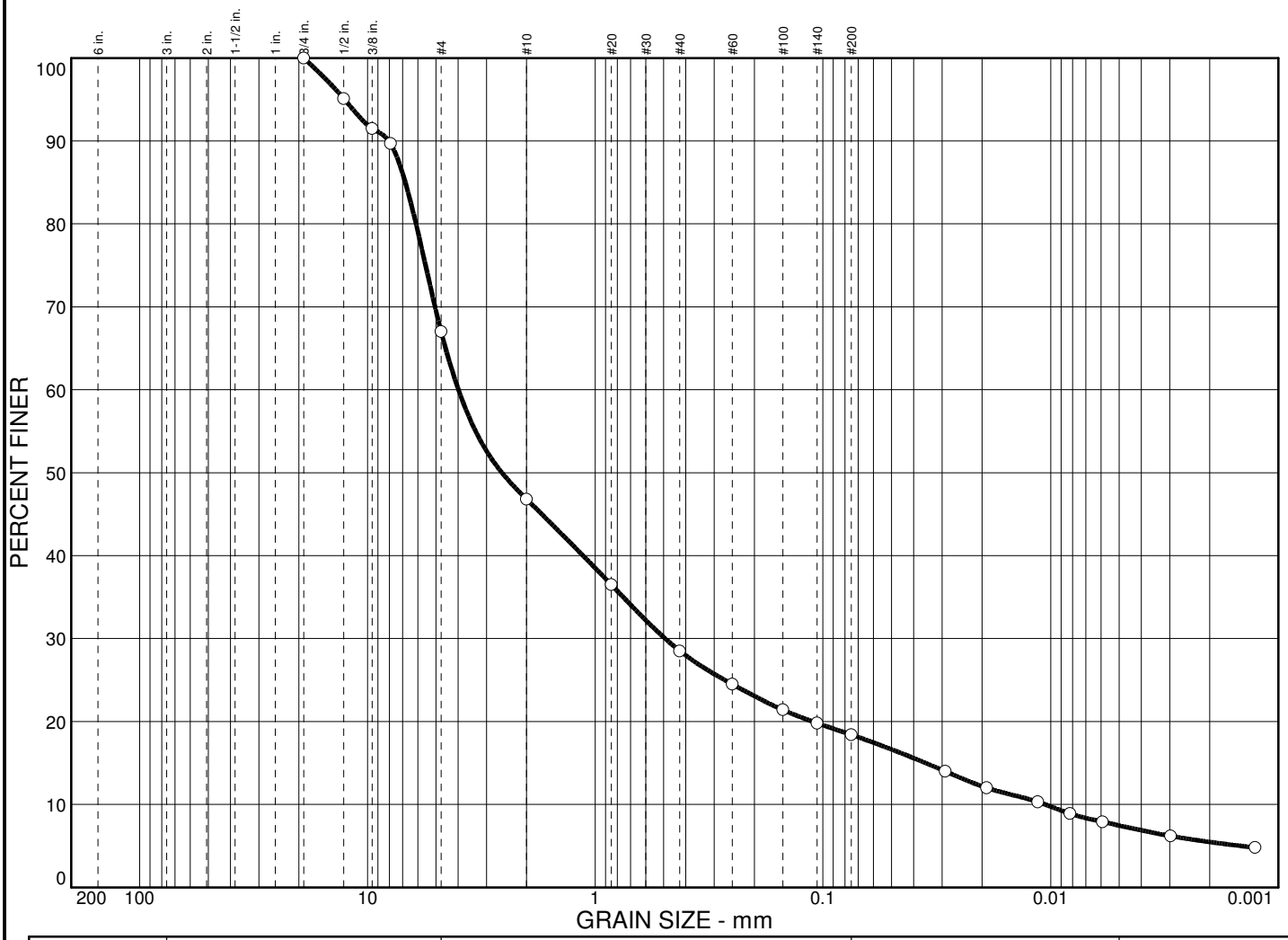
Nat.Water Content:13.8 %

W.O.# 1

Tested By: KAA

Figure

Particle Size Distribution Report



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	33.0	48.6	10.9	7.5

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	26	19	6.82	3.99	2.57	0.493	0.0354	0.0106	5.77	376.77

MATERIAL DESCRIPTION	USCS	AASHTO
○ Brown silty, clayey SAND with gravel	SC-SM	

Project No. 054419 **Client:** USPFO for Pennsylvania, Army and Air National Guards

Project: Fort Indiantown Gap-Solar Farm

○ **Source:** Boring No.: B-16 **Sample No.:** S-3,4,5 **Elev./Depth:** 3.0' - 6.6'

Gannett Fleming
ENGINEERS AND PLANNERS

Remarks:

○ Date:December 24, 2014

Nat.Water Content:7.7 %

W.O.# 1

Tested By: KAA

Figure

APPENDIX C

Corrosion Test Results

RUSSELL CORROSION CONSULTANTS, INC.

P.O. Box 197 · Simpsonville, MD 21150
(410) 997 - 4481 · Fax (410) 740 - 2541

January 5, 2015

Karim Abdolos
Gannett Fleming, Inc.
P.O. Box 67100
Harrisburg, PA 17106-7100

Subject: Laboratory Report on Soil Sample Testing
GF Job No. 022472.400, Project Name: Fort Indiantown Gap – Solar Farm
(054419.49.9000 W.O. # 1)

Reference: GF Letter of Authorization dated December 9, 2014
RCC Project Number: 1309

Dear Mr. Abdolos:

Russell Corrosion Consultants, Inc. has completed the laboratory testing of the three combined soil samples provided to us. The samples were identified as follows:

Sample #1: B-1/S-3, S-4 (3.0' to 5.4')
Sample #2: B-7/S-1, S-2 (0.0' to 3.0')
Sample #3: B-13/S-1, S-2 (0.0' to 3.0')

The samples were tested for the following characteristics in accordance with the referenced ASTM Standards:

1. pH - ASTM G-51.
2. Chloride Content - ASTM D-512.
3. Sulfate Content - ASTM D-516.
4. Resistivity - ASTM G-57.

The laboratory test results are included in the attached Table.

Please call us if you have any questions or require additional information.

Sincerely,
RUSSELL CORROSION CONSULTANTS, INC.

Thomas R. Fowler
Project Engineer
NACE Certified Senior Corrosion Technologist # 5668

cc: Rick Grant, Principal
Yaofu Zhang, P.E.

LABORATORY TEST DATA
Fort Indiantown Gap – Solar Farm (054419.49.9000 W.O. # 1)

SAMPLE	Depth (ft)	pH	Chloride (ppm)	Sulfate (ppm)	Resistivity (ohm-cm)	
					As-Is	Saturated
B-1/S-3,S-4	3.0' to 5.4'	7.9	45	30	46,000	4,100
B-7/S-1, S-2	0.0' to 3.0'	8.1	45	15	9,300	4,200
B-13/S-1, S-2	0.0' to 3.0'	7.7	45	15	26,000	1,600

ATTACHMENT SDSA -6

SOLAR GLARE HAZARD ANALYSIS REPORT – USING GOVERNMENT ANALYSIS CRITERIA

FLIGHT PATH

DIR E PAD

(5 deg Glide Slope – 10’ Threshold)

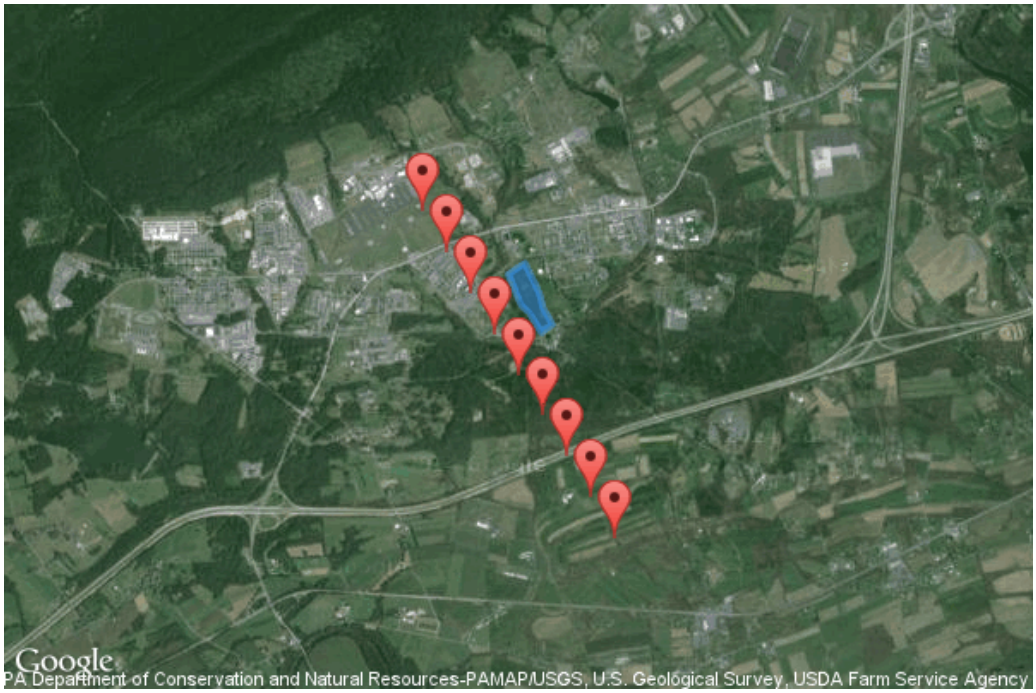
Solar Glare Hazard Analysis Flight Path Report

Generated Dec. 2, 2014, 8:15 a.m.

Flight path: DIR E PAD

Glare found

Print



Analysis & PV array parameters

Analysis name	MUI Array 12-01
PV array axis tracking	none
Orientation of array (deg)	168.5
Tilt of solar panels (deg)	40.0
Rated power (kW)	0.0
Vary reflectivity	True
PV surface material	Smooth glass without ARC

Timezone offset	-5.0
Subtended angle of sun (mrad)	9.3
Peak DNI (W/m^2)	1000.0
Ocular transmission coefficient	0.5
Pupil diameter (m)	0.002
Eye focal length (m)	0.017
Time interval (min)	1
Slope error (mrad)	10.0

Flight path parameters

Direction (deg)	329.5
Glide slope (deg)	5.0
Consider pilot visibility from cockpit	True
Max downward viewing angle (deg)	60.0
Azimuthal viewing angle (deg)	120.0

PV array vertices

id	Latitude (deg)	Longitude (deg)	Ground Elevation (ft)	Height of panels above ground (ft)	Total elevation (ft)
1	40.432134627	-76.5565752983	409.3	6.0	415.3
2	40.4298152957	-76.5553092957	403.17	6.0	409.17
3	40.4291782823	-76.5544724464	407.44	6.0	413.44
4	40.4277082283	-76.5532708168	401.39	6.0	407.39
5	40.4283125877	-76.5521764755	435.15	6.0	441.15
6	40.4296029586	-76.5531206131	452.19	6.0	458.19
7	40.4306483042	-76.5534424782	437.94	6.0	443.94
8	40.4329839395	-76.5549230576	426.01	6.0	432.01

Flight Path Observation Points

	Latitude (deg)	Longitude (deg)	Ground Elevation (ft)	Eye-level height above ground (ft)	Glare?
Threshold	40.4368485845	-76.5651328862	486.05	10.0	No
1/4 mi	40.4337348777	-76.5627203155	473.77	137.75	No
1/2 mi	40.4306211709	-76.5603077448	443.7	283.32	Yes

	Latitude (deg)	Longitude (deg)	Ground Elevation (ft)	Eye-level height above ground (ft)	Glare?
3/4 mi	40.427507464	-76.5578951742	449.18	393.31	Yes
1 mi	40.4243937572	-76.5554826035	444.62	513.35	Yes
1 1/4 mi	40.4212800504	-76.5530700328	385.59	687.88	No
1 1/2 mi	40.4181663436	-76.5506574621	439.4	749.55	No
1 3/4 mi	40.4150526368	-76.5482448915	436.23	868.22	No
2 mi	40.41193893	-76.5458323208	410.55	1009.38	No

Glare occurrence plots

All times are in standard time. For Daylight Savings Time add one hour.

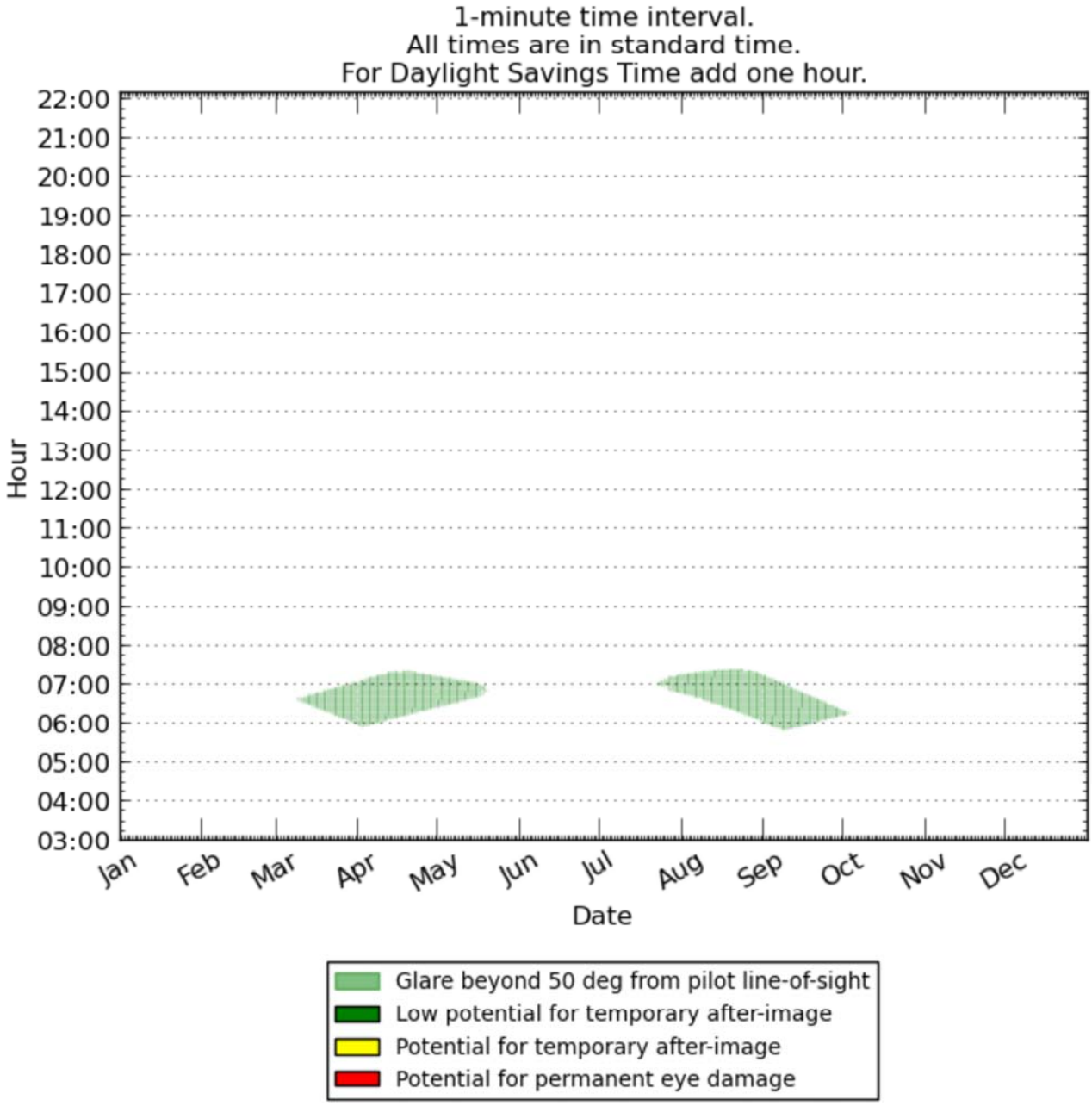
Threshold

No glare

1/4 mi

No glare

1/2 mi


1-minute time interval.
All times are in standard time.
For Daylight Savings Time add one hour.
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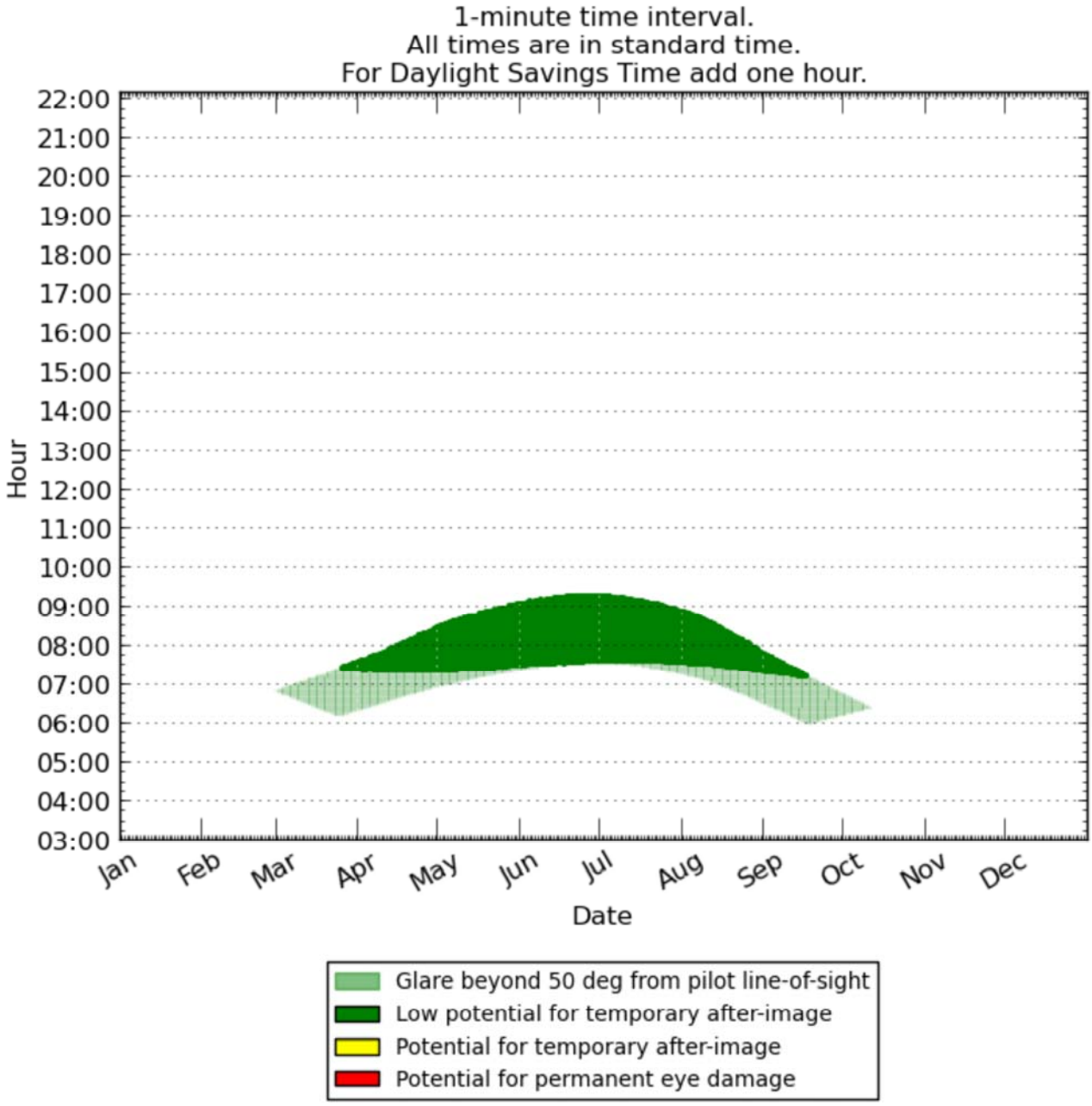
Glare beyond 50 deg from pilot line-of-sight
Low potential for temporary after-image
Potential for temporary after-image
Potential for permanent eye damage

3/4 mi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All times are in standard time.
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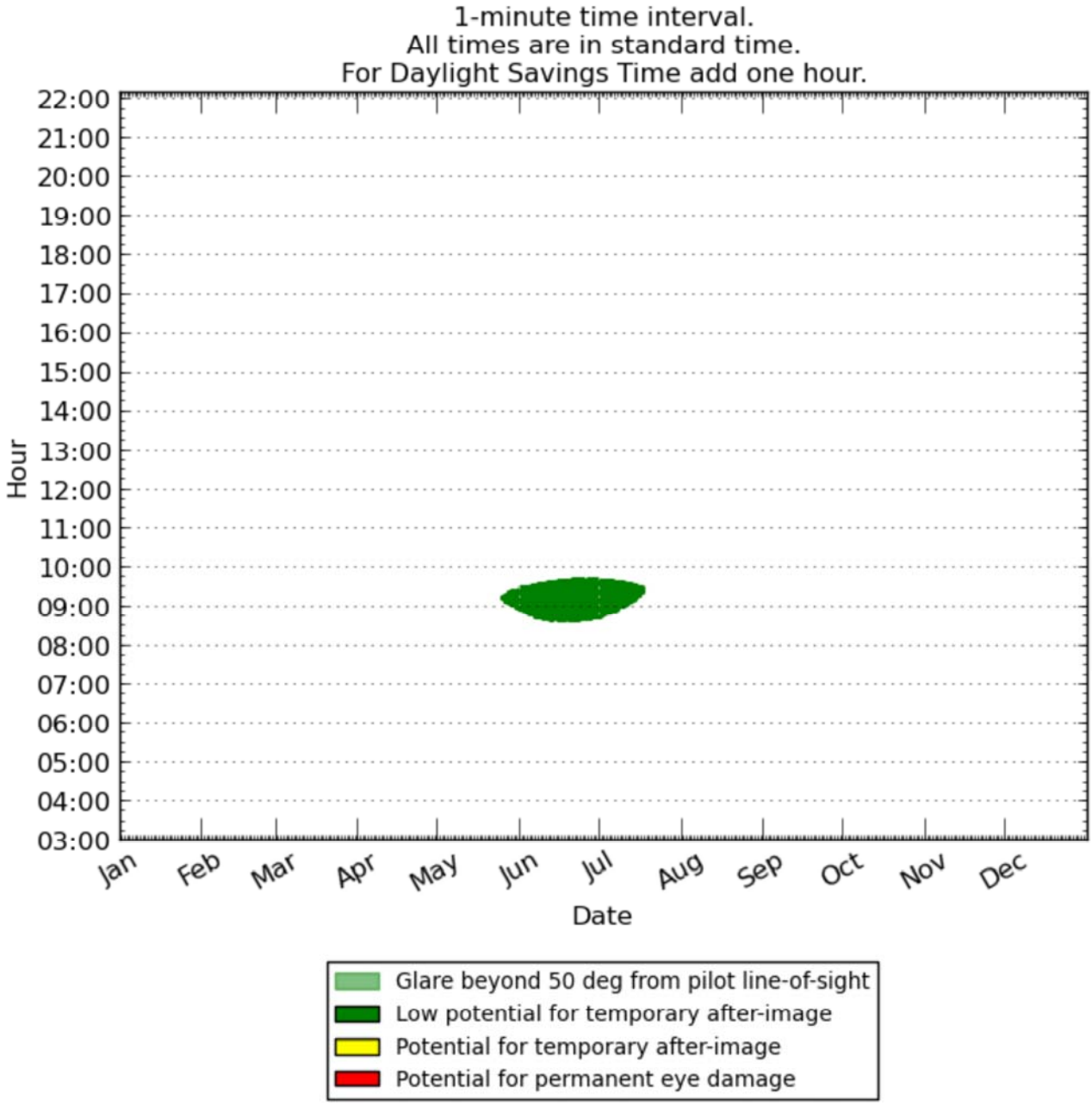
Glare beyond 50 deg from pilot line-of-sight
Low potential for temporary after-image
Potential for temporary after-image
Potential for permanent eye damage

1 mi


1-minute time interval.
All times are in standard time.
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Date
Glare beyond 50 deg from pilot line-of-sight
Low potential for temporary after-image
Potential for temporary after-image
Potential for permanent eye damage

1 1/4 mi

No glare

1 1/2 mi

No glare

1 3/4 mi

No glare

2 mi

No glare

FLIGHT PATH

L BASE

(1.5 deg Glide Slope – 500’ Threshold)

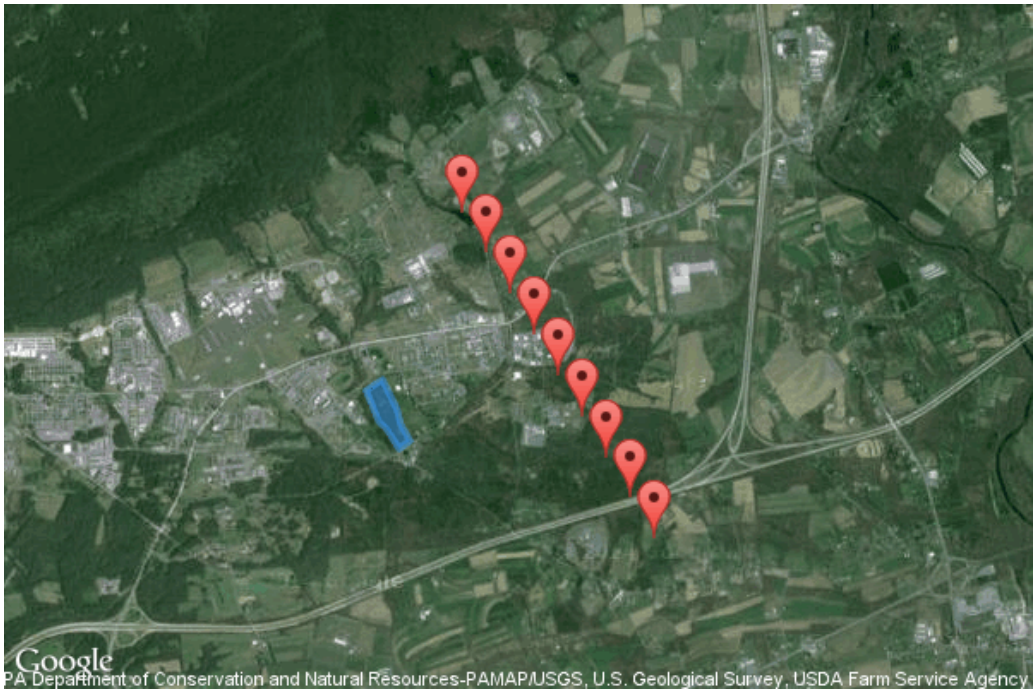
Solar Glare Hazard Analysis Flight Path Report

Generated Dec. 2, 2014, 8:18 a.m.

Flight path: L BASE

Glare found

Print



Analysis & PV array parameters

Analysis name	MUI Array 12-01
PV array axis tracking	none
Orientation of array (deg)	168.5
Tilt of solar panels (deg)	40.0
Rated power (kW)	0.0
Vary reflectivity	True
PV surface material	Smooth glass without ARC

Timezone offset	-5.0
Subtended angle of sun (mrad)	9.3
Peak DNI (W/m^2)	1000.0
Ocular transmission coefficient	0.5
Pupil diameter (m)	0.002
Eye focal length (m)	0.017
Time interval (min)	1
Slope error (mrad)	10.0

Flight path parameters

Direction (deg)	329.5
Glide slope (deg)	1.5
Consider pilot visibility from cockpit	True
Max downward viewing angle (deg)	60.0
Azimuthal viewing angle (deg)	120.0

PV array vertices

id	Latitude (deg)	Longitude (deg)	Ground Elevation (ft)	Height of panels above ground (ft)	Total elevation (ft)
1	40.432134627	-76.5565752983	409.3	6.0	415.3
2	40.4298152957	-76.5553092957	403.17	6.0	409.17
3	40.4291782823	-76.5544724464	407.44	6.0	413.44
4	40.4277082283	-76.5532708168	401.39	6.0	407.39
5	40.4283125877	-76.5521764755	435.15	6.0	441.15
6	40.4296029586	-76.5531206131	452.19	6.0	458.19
7	40.4306483042	-76.5534424782	437.94	6.0	443.94
8	40.4329839395	-76.5549230576	426.01	6.0	432.01

Flight Path Observation Points

	Latitude (deg)	Longitude (deg)	Ground Elevation (ft)	Eye-level height above ground (ft)	Glare?
Threshold	40.4456896811	-76.54697299	435.98	500.0	No
1/4 mi	40.4425759743	-76.544560102	441.05	529.49	No
1/2 mi	40.4394622674	-76.5421472141	426.94	578.17	No
3/4 mi	40.4363485606	-76.5397343261	438.32	601.36	Yes

	Latitude (deg)	Longitude (deg)	Ground Elevation (ft)	Eye-level height above ground (ft)	Glare?
1 mi	40.4332348538	-76.5373214381	463.53	610.71	Yes
1 1/4 mi	40.430121147	-76.5349085501	508.1	600.71	Yes
1 1/2 mi	40.4270074402	-76.5324956621	464.14	679.23	Yes
1 3/4 mi	40.4238937334	-76.5300827741	527.28	650.66	Yes
2 mi	40.4207800265	-76.5276698861	478.12	734.38	Yes

Glare occurrence plots

All times are in standard time. For Daylight Savings Time add one hour.

Threshold

No glare

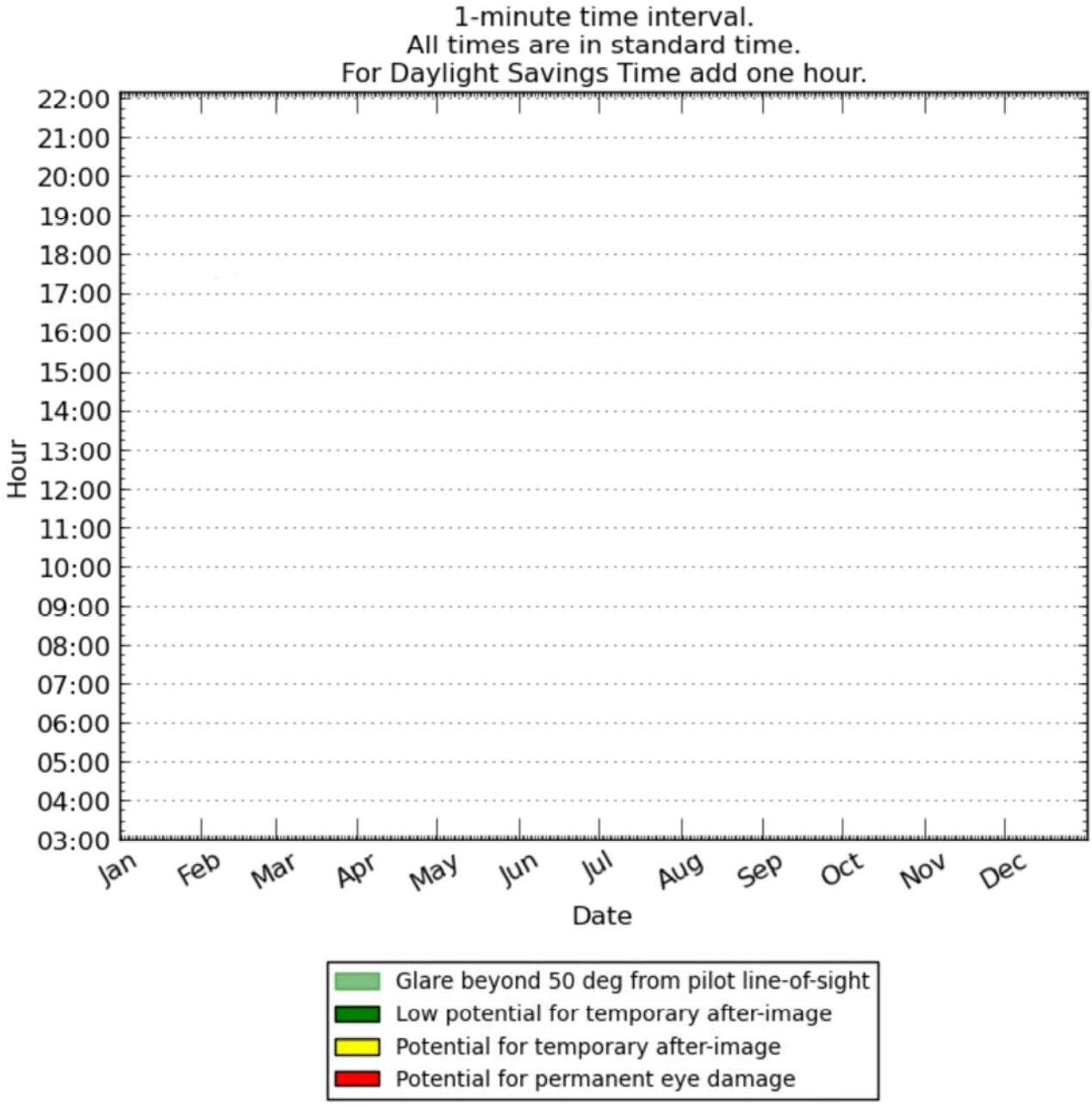
1/4 mi

No glare

1/2 mi

No glare

3/4 mi


1-minute time interval.
All times are in standard time.
For Daylight Savings Time add one hour.
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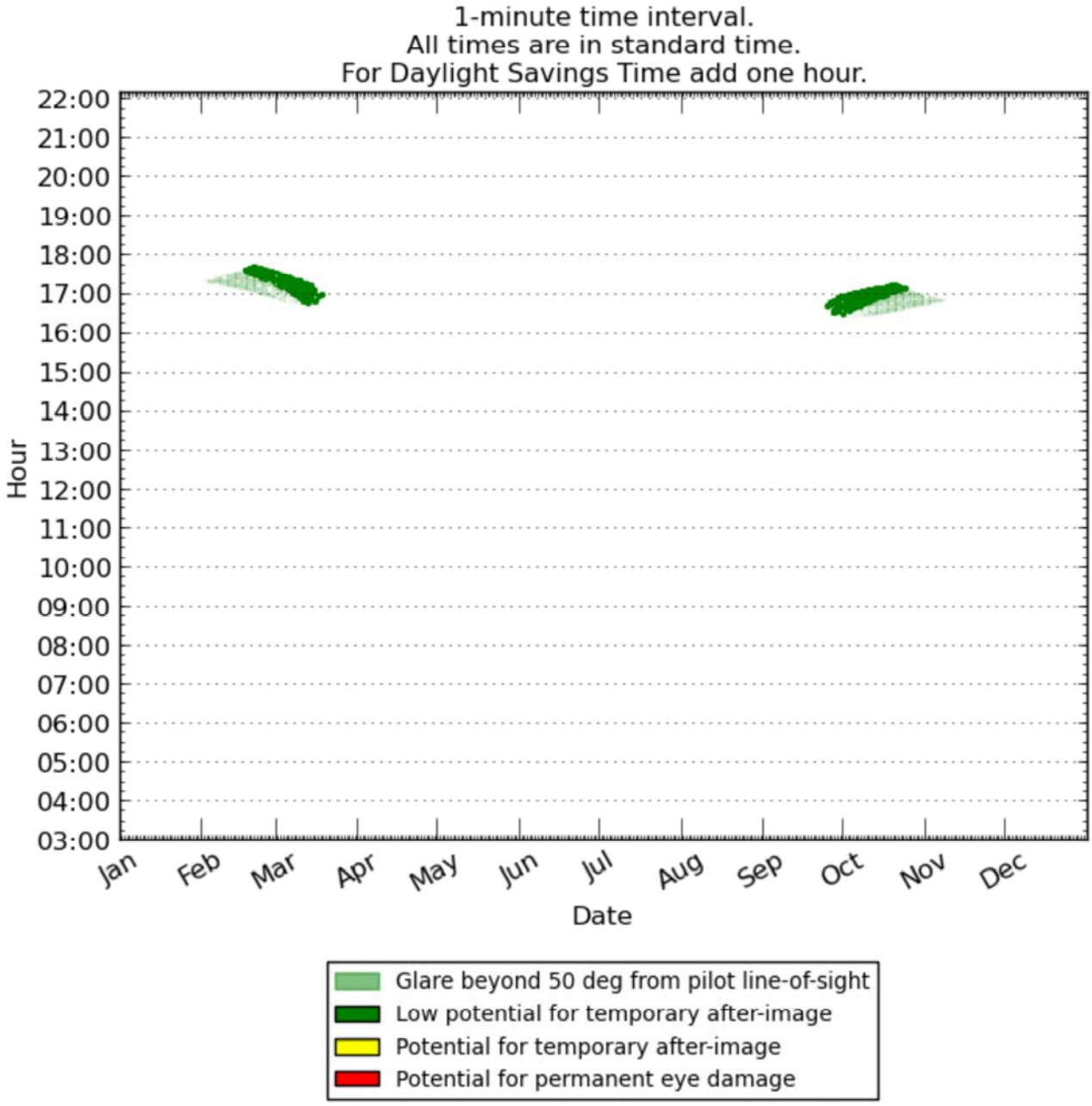
Date
Glare beyond 50 deg from pilot line-of-sight
Low potential for temporary after-image
Potential for temporary after-image
Potential for permanent eye damage

1 mi


1-minute time interval.
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For Daylight Savings Time add one hour.
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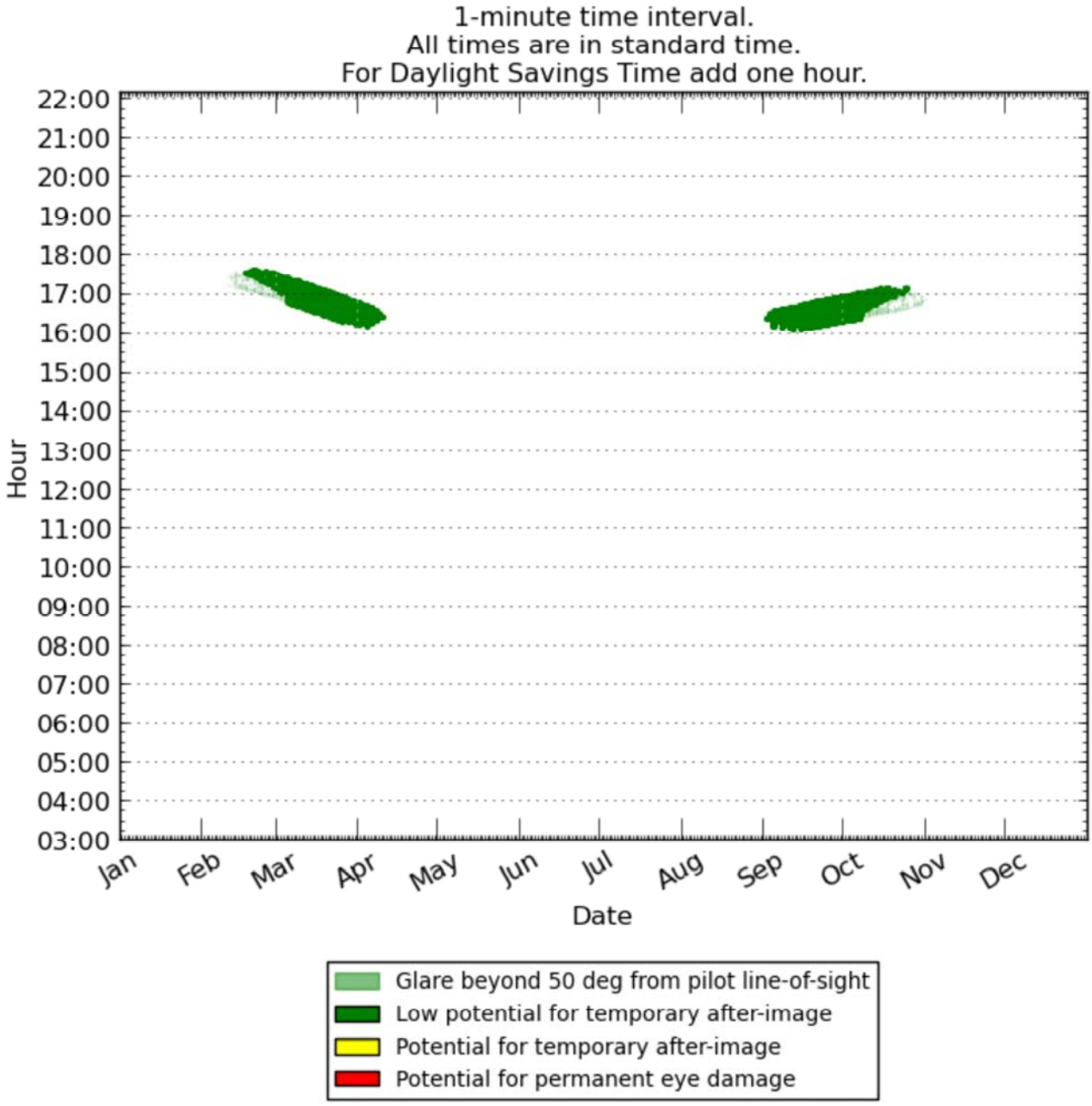
Date
Glare beyond 50 deg from pilot line-of-sight
Low potential for temporary after-image
Potential for temporary after-image
Potential for permanent eye damage

1 1/4 mi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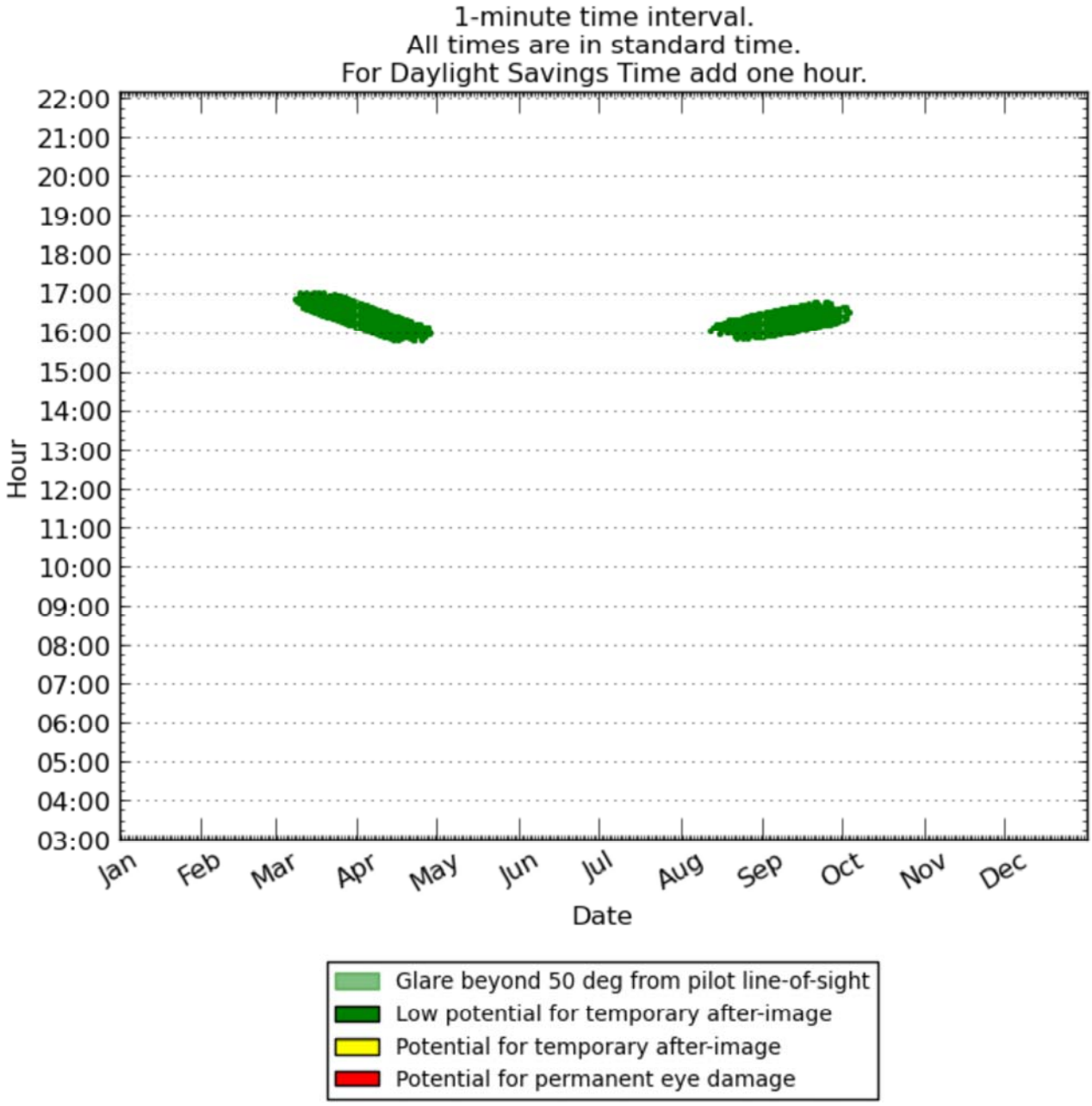
Glare beyond 50 deg from pilot line-of-sight
Low potential for temporary after-image
Potential for temporary after-image
Potential for permanent eye damage

1 1/2 mi


1-minute time interval.
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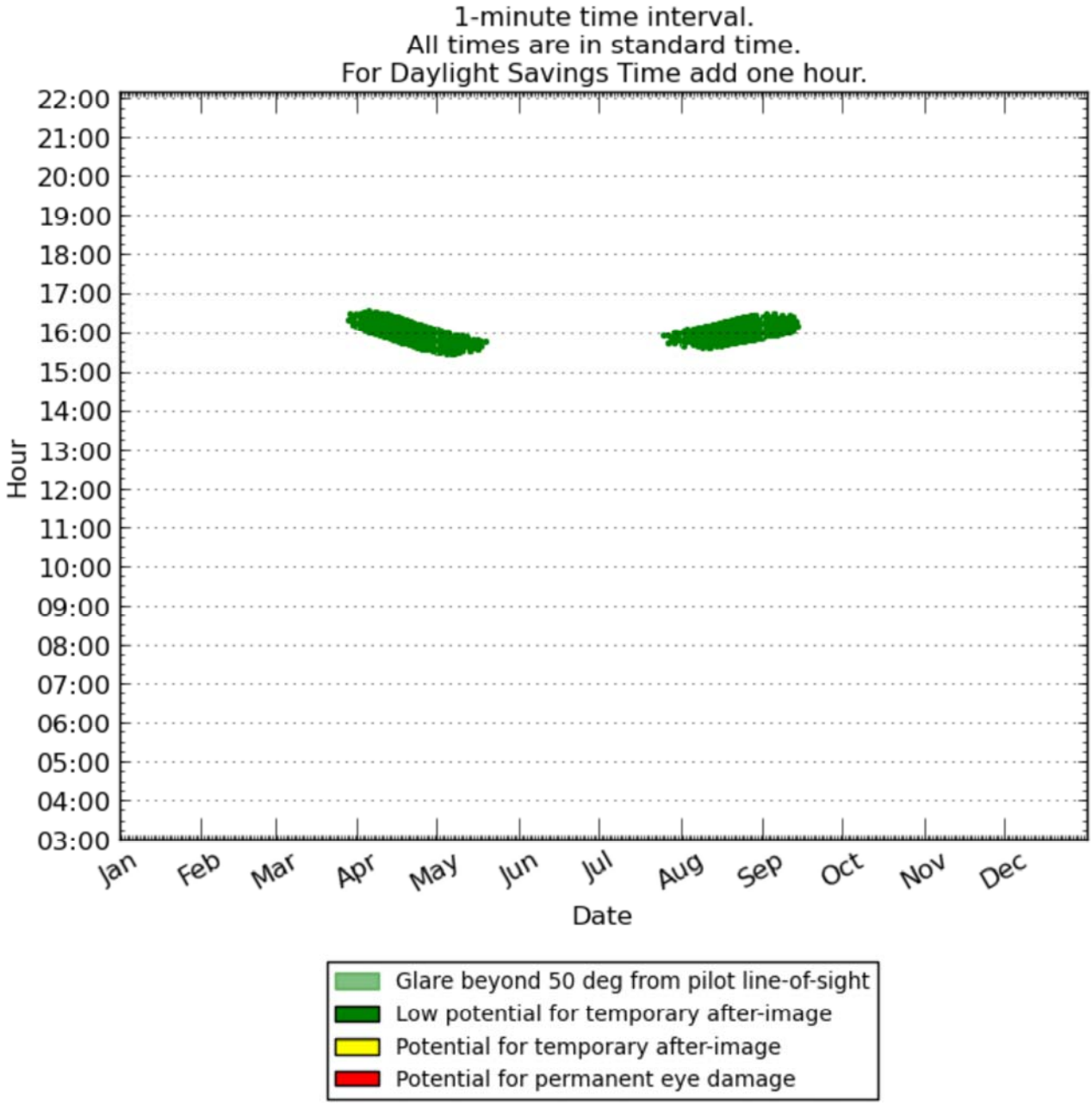
Date
Glare beyond 50 deg from pilot line-of-sight
Low potential for temporary after-image
Potential for temporary after-image
Potential for permanent eye damage

1 3/4 mi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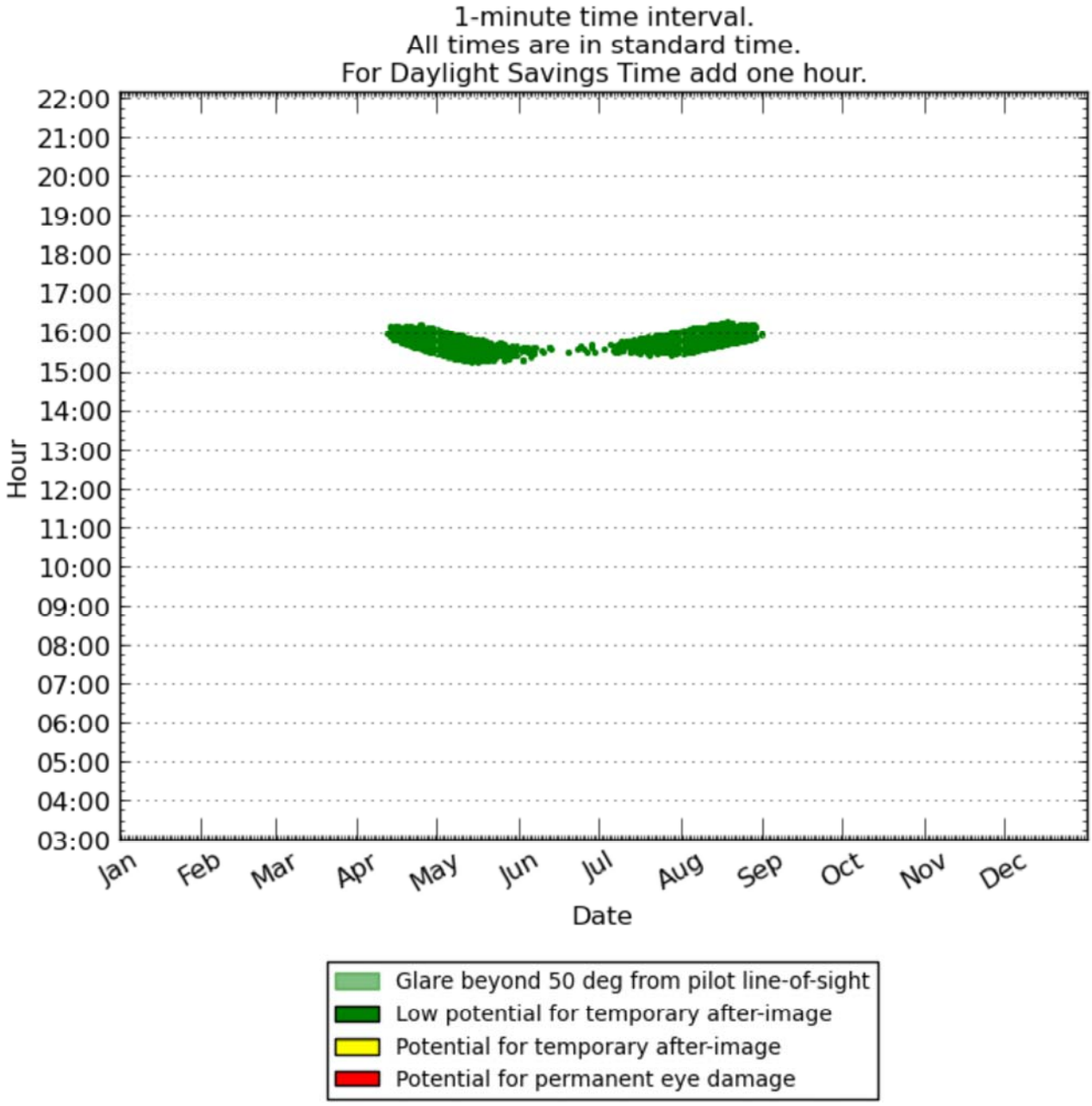
Glare beyond 50 deg from pilot line-of-sight
Low potential for temporary after-image
Potential for temporary after-image
Potential for permanent eye damage

2 mi



FLIGHT PATH

DOWNWIND

(0.0 deg Glide Slope – 700’ Threshold)

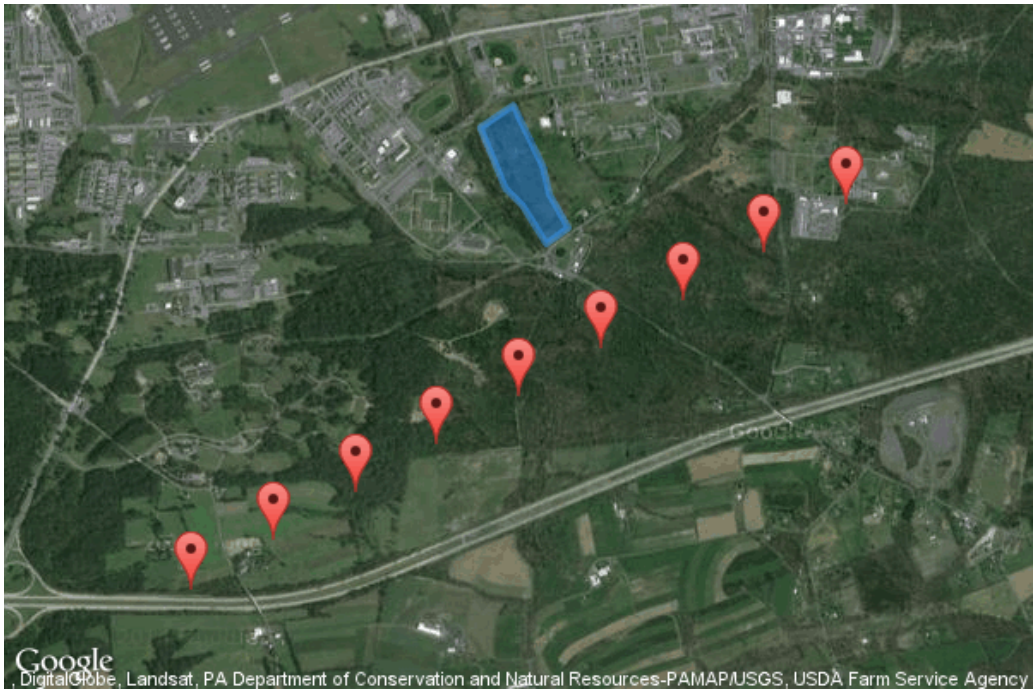
Solar Glare Hazard Analysis Flight Path Report

Generated Dec. 2, 2014, 7:50 a.m.

Flight path: Downwind

Glare found

Print



Analysis & PV array parameters

Analysis name	MUI ARRAY 12-02
PV array axis tracking	none
Orientation of array (deg)	168.5
Tilt of solar panels (deg)	40.0
Rated power (kW)	0.0
Vary reflectivity	True
PV surface material	Smooth glass without ARC

Timezone offset	-5.0
Subtended angle of sun (mrad)	9.3
Peak DNI (W/m^2)	1000.0
Ocular transmission coefficient	0.5
Pupil diameter (m)	0.002
Eye focal length (m)	0.017
Time interval (min)	1
Slope error (mrad)	10.0

Flight path parameters

Direction (deg)	59.5
Glide slope (deg)	0.0
Consider pilot visibility from cockpit	True
Max downward viewing angle (deg)	60.0
Azimuthal viewing angle (deg)	120.0

PV array vertices

id	Latitude (deg)	Longitude (deg)	Ground Elevation (ft)	Height of panels above ground (ft)	Total elevation (ft)
1	40.432134627	-76.5565752983	409.3	6.0	415.3
2	40.4298152957	-76.5553092957	403.17	6.0	409.17
3	40.4291782823	-76.5544724464	407.44	6.0	413.44
4	40.4277082283	-76.5532708168	401.39	6.0	407.39
5	40.4283125877	-76.5521764755	435.15	6.0	441.15
6	40.4296029586	-76.5531206131	452.19	6.0	458.19
7	40.4306483042	-76.5534424782	437.94	6.0	443.94
8	40.4329839395	-76.5549230576	426.01	6.0	432.01

Flight Path Observation Points

	Latitude (deg)	Longitude (deg)	Ground Elevation (ft)	Eye-level height above ground (ft)	Glare?
Threshold	40.4291793032	-76.5382303298	481.53	700.0	No
1/4 mi	40.4273451897	-76.5423255949	418.24	763.3	Yes
1/2 mi	40.4255110762	-76.5464208601	450.93	730.61	Yes

	Latitude (deg)	Longitude (deg)	Ground Elevation (ft)	Eye-level height above ground (ft)	Glare?
3/4 mi	40.4236769627	-76.5505161252	450.8	730.73	Yes
1 mi	40.4218428493	-76.5546113904	414.83	766.7	No
1 1/4 mi	40.4200087358	-76.5587066555	449.89	731.65	No
1 1/2 mi	40.4181746223	-76.5628019207	422.48	759.06	No
1 3/4 mi	40.4163405088	-76.5668971858	452.37	729.17	No
2 mi	40.4145063953	-76.570992451	465.93	715.6	No

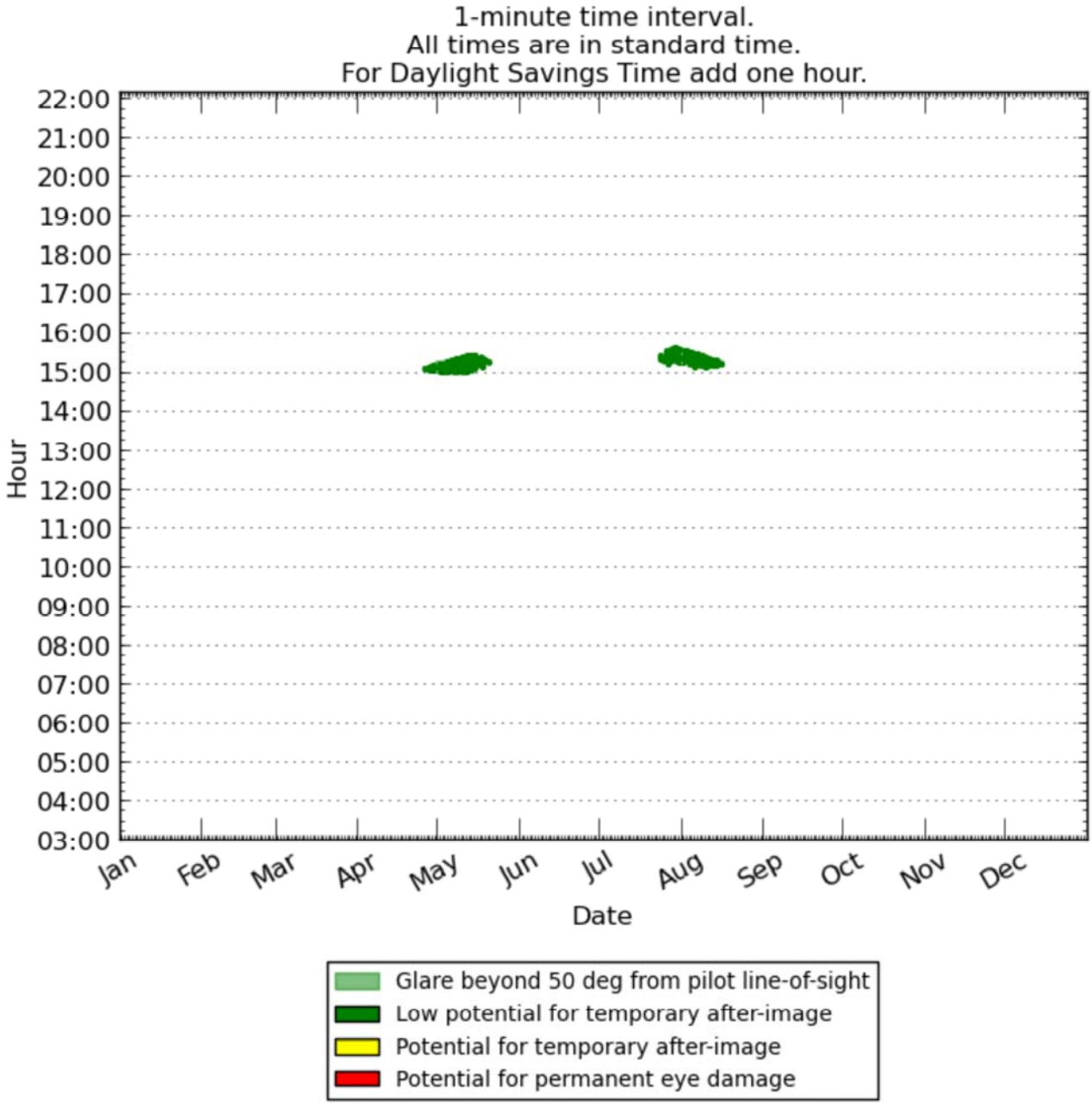
Glare occurrence plots

All times are in standard time. For Daylight Savings Time add one hour.

Threshold

No glare

1/4 mi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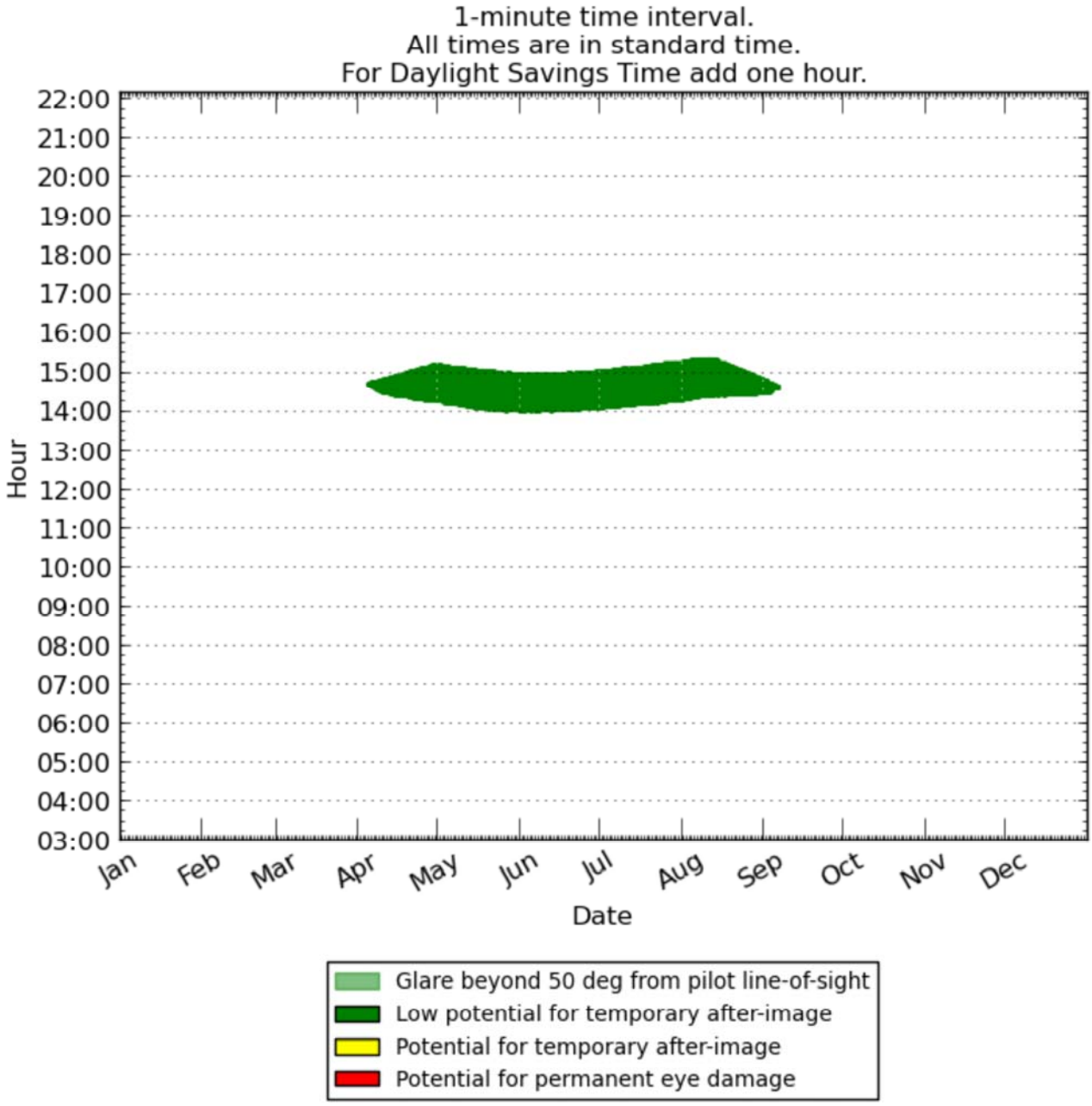
Date
Glare beyond 50 deg from pilot line-of-sight
Low potential for temporary after-image
Potential for temporary after-image
Potential for permanent eye damage

1/2 mi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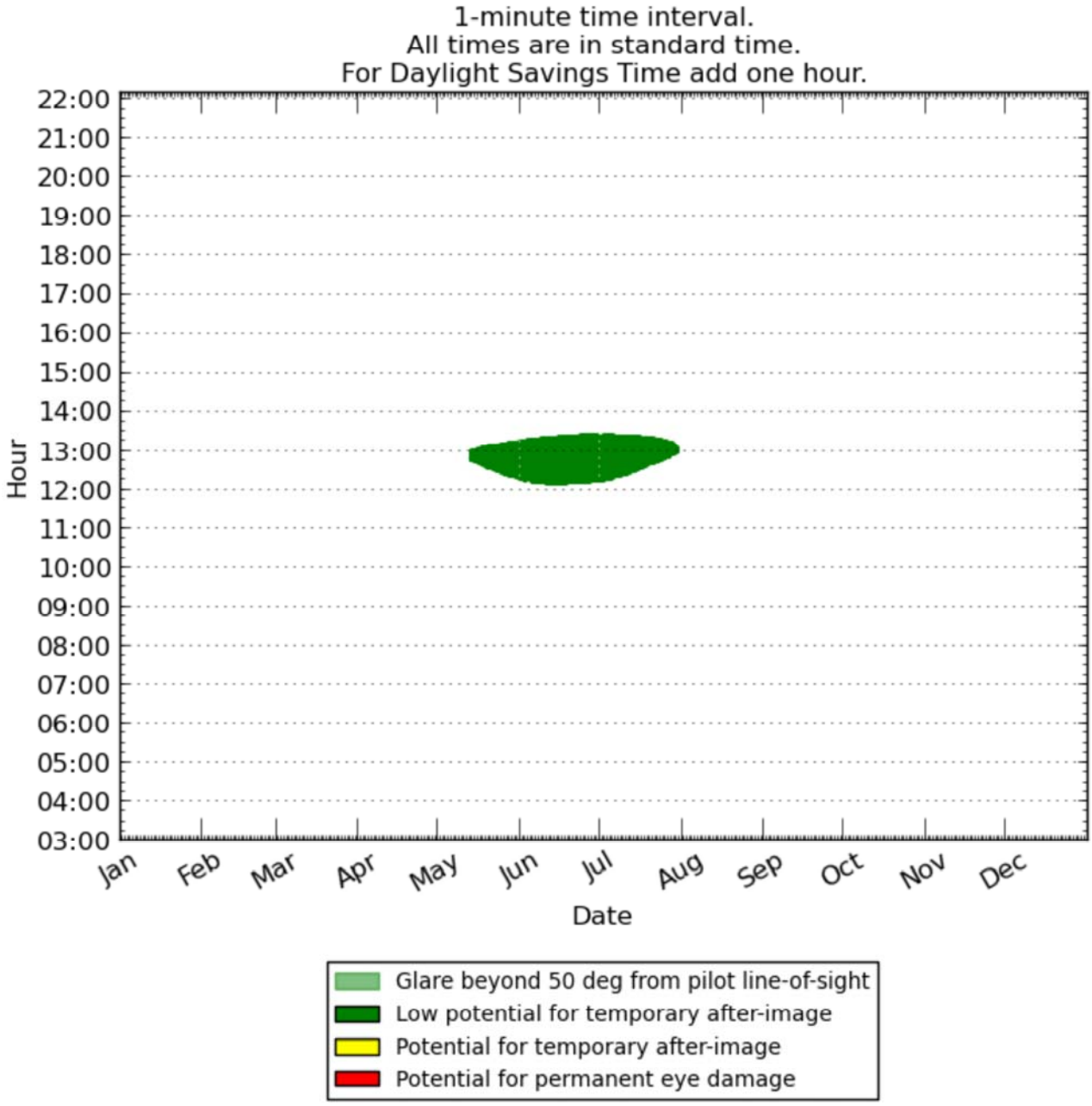
Glare beyond 50 deg from pilot line-of-sight
Low potential for temporary after-image
Potential for temporary after-image
Potential for permanent eye damage

3/4 mi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Date
Glare beyond 50 deg from pilot line-of-sight
Low potential for temporary after-image
Potential for temporary after-image
Potential for permanent eye damage

1 mi

No glare

1 1/4 mi

No glare

1 1/2 mi

No glare

1 3/4 mi

No glare

2 mi

No glare

FLIGHT PATH

WIDE DOWNWIND

(0.0 deg Glide Slope – 700’ Threshold)

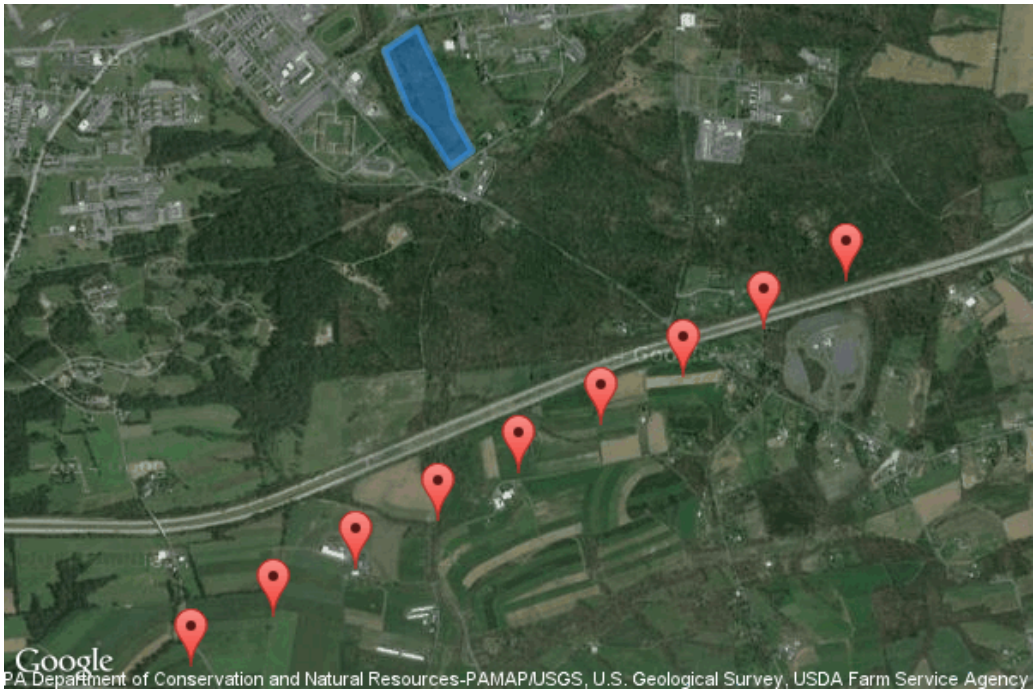
Solar Glare Hazard Analysis Flight Path Report

Generated Dec. 2, 2014, 7:58 a.m.

Flight path: Wide Downwind

Glare found

Print



Analysis & PV array parameters

Analysis name	MUI ARRAY 12-02
PV array axis tracking	none
Orientation of array (deg)	168.5
Tilt of solar panels (deg)	40.0
Rated power (kW)	0.0
Vary reflectivity	True
PV surface material	Smooth glass without ARC

Timezone offset	-5.0
Subtended angle of sun (mrad)	9.3
Peak DNI (W/m^2)	1000.0
Ocular transmission coefficient	0.5
Pupil diameter (m)	0.002
Eye focal length (m)	0.017
Time interval (min)	1
Slope error (mrad)	10.0

Flight path parameters

Direction (deg)	59.5
Glide slope (deg)	0.0
Consider pilot visibility from cockpit	True
Max downward viewing angle (deg)	60.0
Azimuthal viewing angle (deg)	120.0

PV array vertices

id	Latitude (deg)	Longitude (deg)	Ground Elevation (ft)	Height of panels above ground (ft)	Total elevation (ft)
1	40.432134627	-76.5565752983	409.3	6.0	415.3
2	40.4298152957	-76.5553092957	403.17	6.0	409.17
3	40.4291782823	-76.5544724464	407.44	6.0	413.44
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5	40.4283125877	-76.5521764755	435.15	6.0	441.15
6	40.4296029586	-76.5531206131	452.19	6.0	458.19
7	40.4306483042	-76.5534424782	437.94	6.0	443.94
8	40.4329839395	-76.5549230576	426.01	6.0	432.01

Flight Path Observation Points

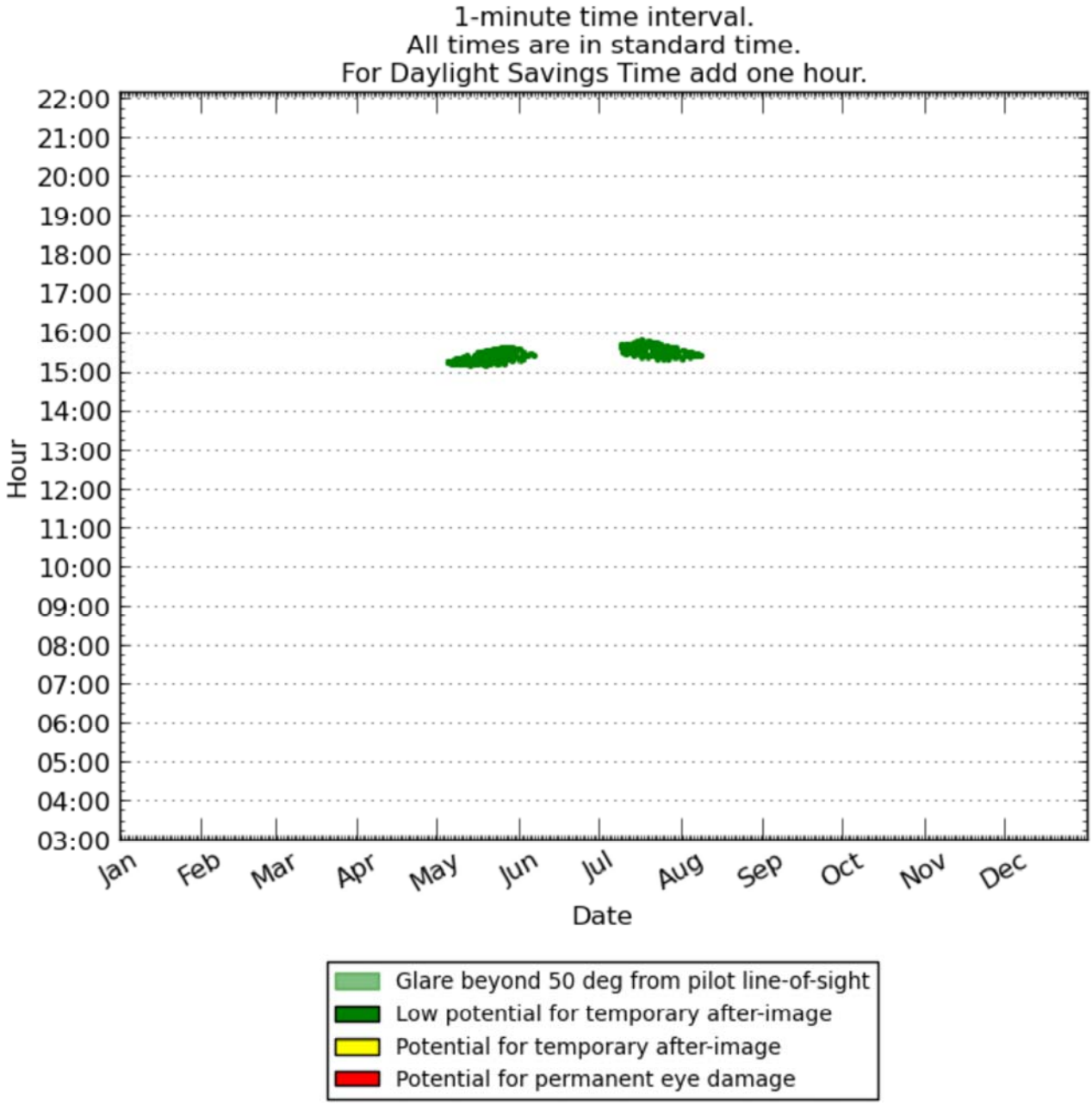
	Latitude (deg)	Longitude (deg)	Ground Elevation (ft)	Eye-level height above ground (ft)	Glare?
Threshold	40.4232978735	-76.5334171057	532.09	700.0	Yes
1/4 mi	40.42146376	-76.5375120127	506.67	725.41	Yes
1/2 mi	40.4196296465	-76.5416069198	508.82	723.26	Yes

	Latitude (deg)	Longitude (deg)	Ground Elevation (ft)	Eye-level height above ground (ft)	Glare?
3/4 mi	40.4177955331	-76.5457018269	451.9	780.19	No
1 mi	40.4159614196	-76.5497967339	427.46	804.63	No
1 1/4 mi	40.4141273061	-76.553891641	382.62	849.46	No
1 1/2 mi	40.4122931926	-76.5579865481	426.31	805.77	No
1 3/4 mi	40.4104590791	-76.5620814551	442.45	789.64	No
2 mi	40.4086249656	-76.5661763622	460.38	771.7	No

Glare occurrence plots

All times are in standard time. For Daylight Savings Time add one hour.

Threshold


1-minute time interval.
All times are in standard time.
For Daylight Savings Time add one hour.
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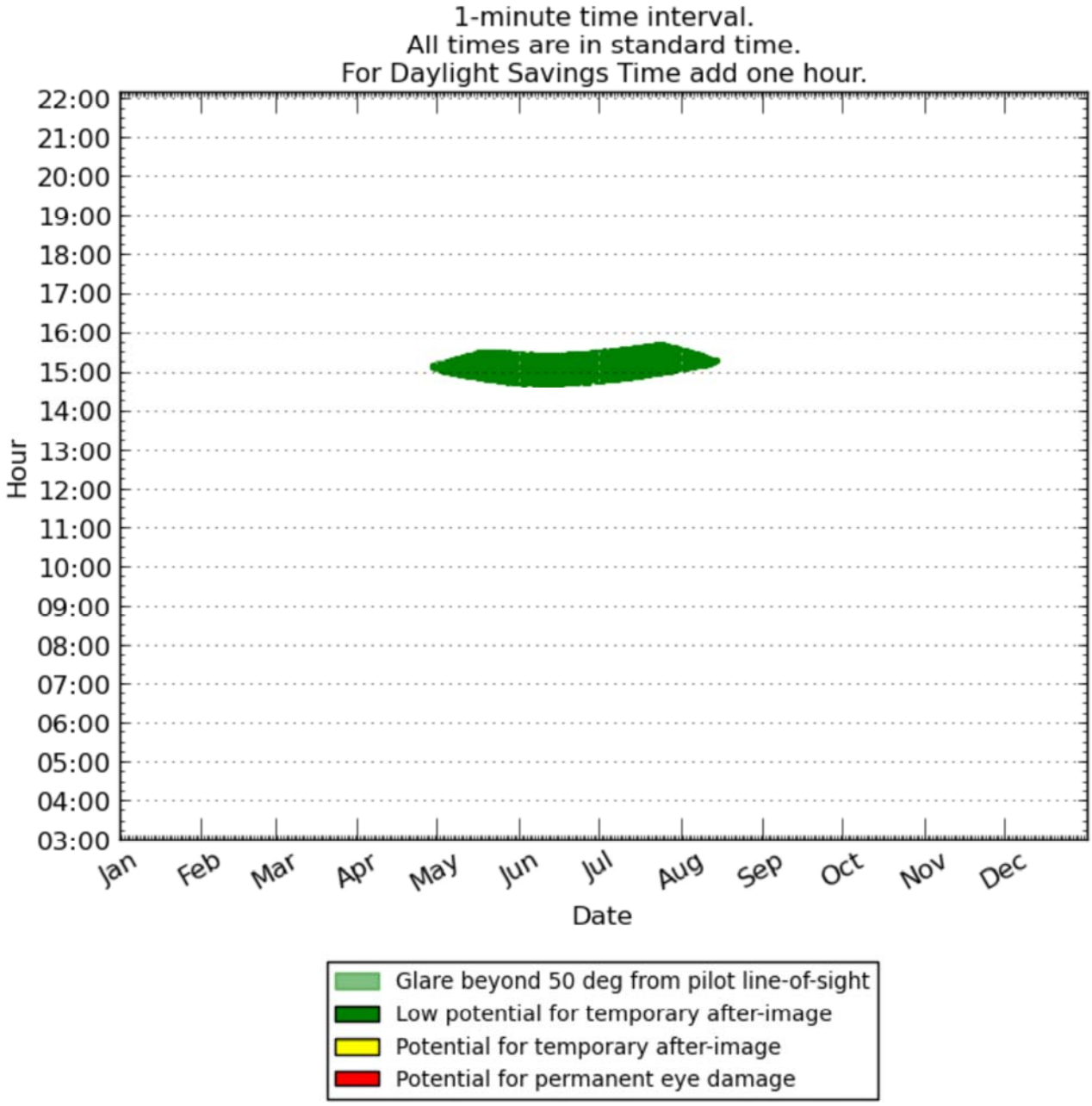
Glare beyond 50 deg from pilot line-of-sight
Low potential for temporary after-image
Potential for temporary after-image
Potential for permanent eye damage

1/4 mi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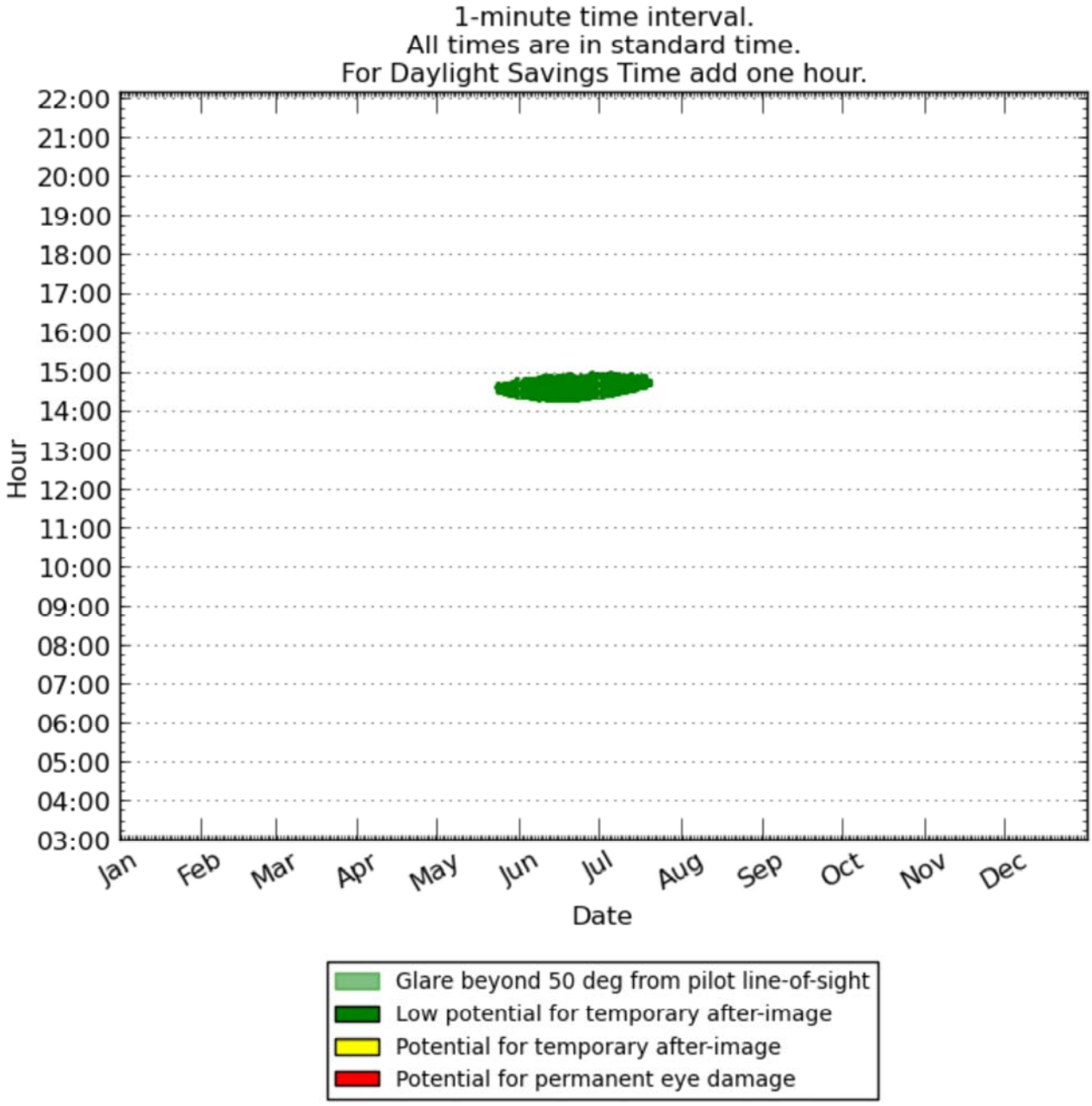
Glare beyond 50 deg from pilot line-of-sight
Low potential for temporary after-image
Potential for temporary after-image
Potential for permanent eye damage

1/2 mi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Date
Glare beyond 50 deg from pilot line-of-sight
Low potential for temporary after-image
Potential for temporary after-image
Potential for permanent eye damage

3/4 mi

No glare

1 mi

No glare

1 1/4 mi

No glare

1 1/2 mi

No glare

1 3/4 mi

No glare

2 mi

No glare

ATTACHMENT SDSA - 7

SOLAR GLARE HAZARD ANALYSIS REPORT – USING GOVERNMENT ANALYSIS CRITERIA

FLIGHT PATH

DIR E PAD w/3 deg Glide Slope

(10’ Threshold)

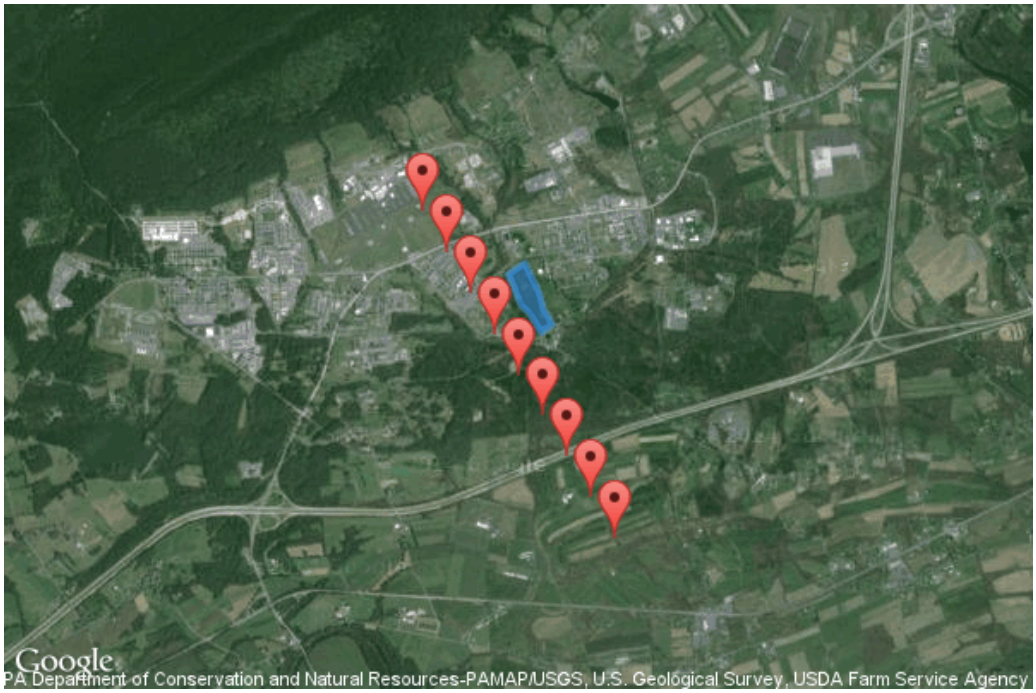
Solar Glare Hazard Analysis Flight Path Report

Generated Dec. 2, 2014, 12:42 p.m.

Flight path: DIR E PAD w/3 deg Glide Slope

Glare found

Print



Analysis & PV array parameters

Analysis name	MUI Array 12-01
PV array axis tracking	none
Orientation of array (deg)	168.5
Tilt of solar panels (deg)	40.0
Rated power (kW)	0.0
Vary reflectivity	True
PV surface material	Smooth glass without ARC

Timezone offset	-5.0
Subtended angle of sun (mrad)	9.3
Peak DNI (W/m^2)	1000.0
Ocular transmission coefficient	0.5
Pupil diameter (m)	0.002
Eye focal length (m)	0.017
Time interval (min)	1
Slope error (mrad)	10.0

Flight path parameters

Direction (deg)	329.5
Glide slope (deg)	3.0
Consider pilot visibility from cockpit	True
Max downward viewing angle (deg)	60.0
Azimuthal viewing angle (deg)	120.0

PV array vertices

id	Latitude (deg)	Longitude (deg)	Ground Elevation (ft)	Height of panels above ground (ft)	Total elevation (ft)
1	40.432134627	-76.5565752983	409.3	6.0	415.3
2	40.4298152957	-76.5553092957	403.17	6.0	409.17
3	40.4291782823	-76.5544724464	407.44	6.0	413.44
4	40.4277082283	-76.5532708168	401.39	6.0	407.39
5	40.4283125877	-76.5521764755	435.15	6.0	441.15
6	40.4296029586	-76.5531206131	452.19	6.0	458.19
7	40.4306483042	-76.5534424782	437.94	6.0	443.94
8	40.4329839395	-76.5549230576	426.01	6.0	432.01

Flight Path Observation Points

	Latitude (deg)	Longitude (deg)	Ground Elevation (ft)	Eye-level height above ground (ft)	Glare?
Threshold	40.4368485845	-76.5651328862	486.05	10.0	No
1/4 mi	40.4337348777	-76.5627203155	473.77	91.44	No
1/2 mi	40.4306211709	-76.5603077448	443.7	190.71	Yes

	Latitude (deg)	Longitude (deg)	Ground Elevation (ft)	Eye-level height above ground (ft)	Glare?
3/4 mi	40.427507464	-76.5578951742	449.18	254.4	Yes
1 mi	40.4243937572	-76.5554826035	444.62	328.13	No
1 1/4 mi	40.4212800504	-76.5530700328	385.59	456.35	No
1 1/2 mi	40.4181663436	-76.5506574621	439.4	471.72	No
1 3/4 mi	40.4150526368	-76.5482448915	436.23	544.07	No
2 mi	40.41193893	-76.5458323208	410.55	638.93	No

Glare occurrence plots

All times are in standard time. For Daylight Savings Time add one hour.

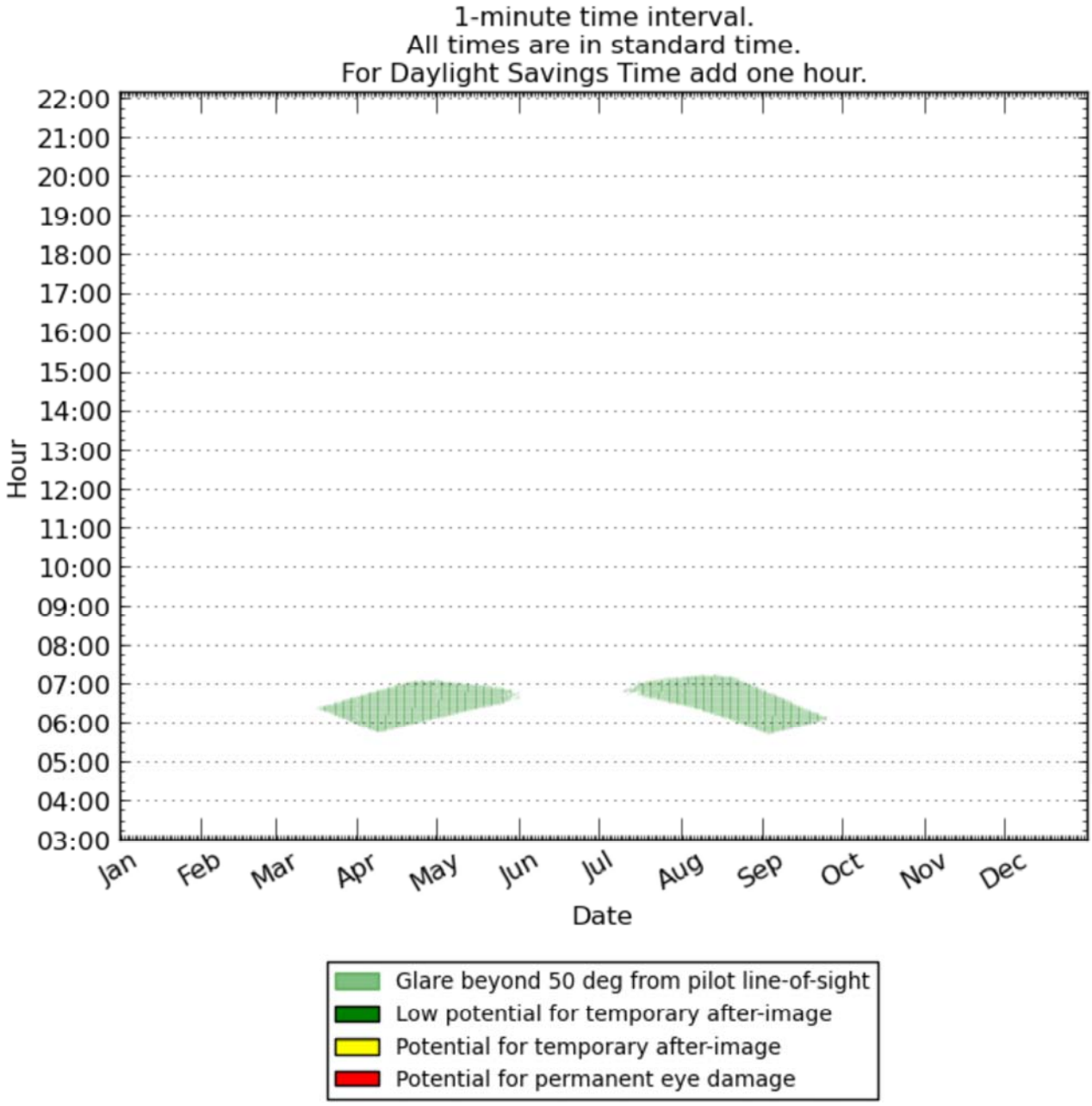
Threshold

No glare

1/4 mi

No glare

1/2 mi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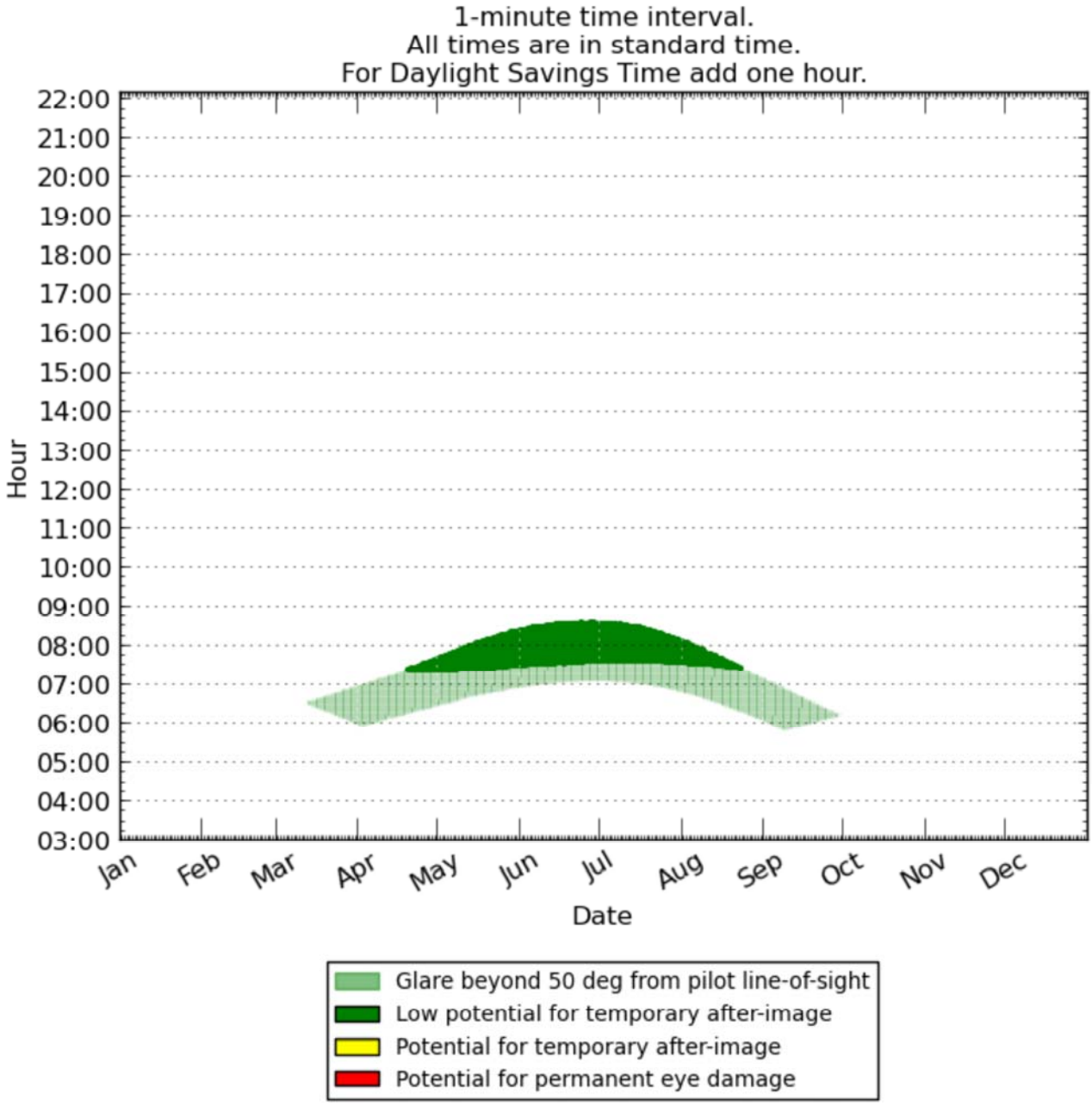
Date
Glare beyond 50 deg from pilot line-of-sight
Low potential for temporary after-image
Potential for temporary after-image
Potential for permanent eye damage

3/4 mi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Date
Glare beyond 50 deg from pilot line-of-sight
Low potential for temporary after-image
Potential for temporary after-image
Potential for permanent eye damage

1 mi

No glare

1 1/4 mi

No glare

1 1/2 mi

No glare

1 3/4 mi

No glare

2 mi

No glare

FLIGHT PATH

L BASE w/3 deg Glide Slope

(500’ Threshold)

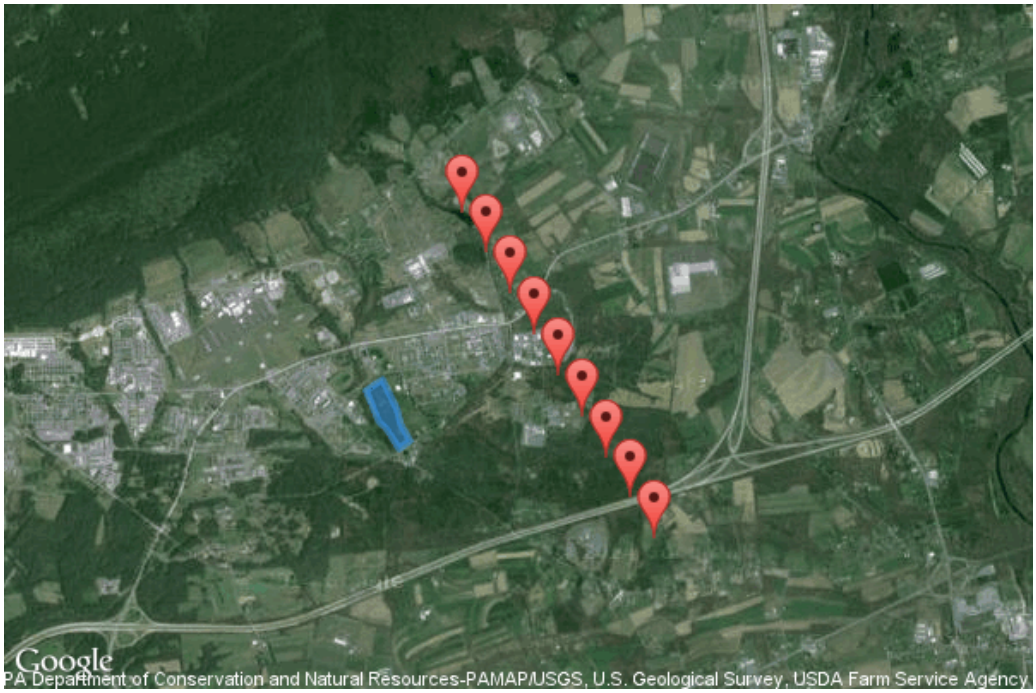
Solar Glare Hazard Analysis Flight Path Report

Generated Dec. 2, 2014, 12:45 p.m.

Flight path: L BASE w/ 3 deg Glide Slope

Glare found

Print



Analysis & PV array parameters

Analysis name	MUI Array 12-01
PV array axis tracking	none
Orientation of array (deg)	168.5
Tilt of solar panels (deg)	40.0
Rated power (kW)	0.0
Vary reflectivity	True
PV surface material	Smooth glass without ARC

Timezone offset	-5.0
Subtended angle of sun (mrad)	9.3
Peak DNI (W/m^2)	1000.0
Ocular transmission coefficient	0.5
Pupil diameter (m)	0.002
Eye focal length (m)	0.017
Time interval (min)	1
Slope error (mrad)	10.0

Flight path parameters

Direction (deg)	329.5
Glide slope (deg)	3.0
Consider pilot visibility from cockpit	True
Max downward viewing angle (deg)	60.0
Azimuthal viewing angle (deg)	120.0

PV array vertices

id	Latitude (deg)	Longitude (deg)	Ground Elevation (ft)	Height of panels above ground (ft)	Total elevation (ft)
1	40.432134627	-76.5565752983	409.3	6.0	415.3
2	40.4298152957	-76.5553092957	403.17	6.0	409.17
3	40.4291782823	-76.5544724464	407.44	6.0	413.44
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6	40.4296029586	-76.5531206131	452.19	6.0	458.19
7	40.4306483042	-76.5534424782	437.94	6.0	443.94
8	40.4329839395	-76.5549230576	426.01	6.0	432.01

Flight Path Observation Points

	Latitude (deg)	Longitude (deg)	Ground Elevation (ft)	Eye-level height above ground (ft)	Glare?
Threshold	40.4456896811	-76.54697299	435.98	500.0	No
1/4 mi	40.4425759743	-76.544560102	441.05	564.1	No
1/2 mi	40.4394622674	-76.5421472141	426.94	647.4	No
3/4 mi	40.4363485606	-76.5397343261	438.32	705.19	Yes

	Latitude (deg)	Longitude (deg)	Ground Elevation (ft)	Eye-level height above ground (ft)	Glare?
1 mi	40.4332348538	-76.5373214381	463.53	749.16	Yes
1 1/4 mi	40.430121147	-76.5349085501	508.1	773.77	Yes
1 1/2 mi	40.4270074402	-76.5324956621	464.14	886.9	Yes
1 3/4 mi	40.4238937334	-76.5300827741	527.28	892.95	Yes
2 mi	40.4207800265	-76.5276698861	478.12	1011.28	Yes

Glare occurrence plots

All times are in standard time. For Daylight Savings Time add one hour.

Threshold

No glare

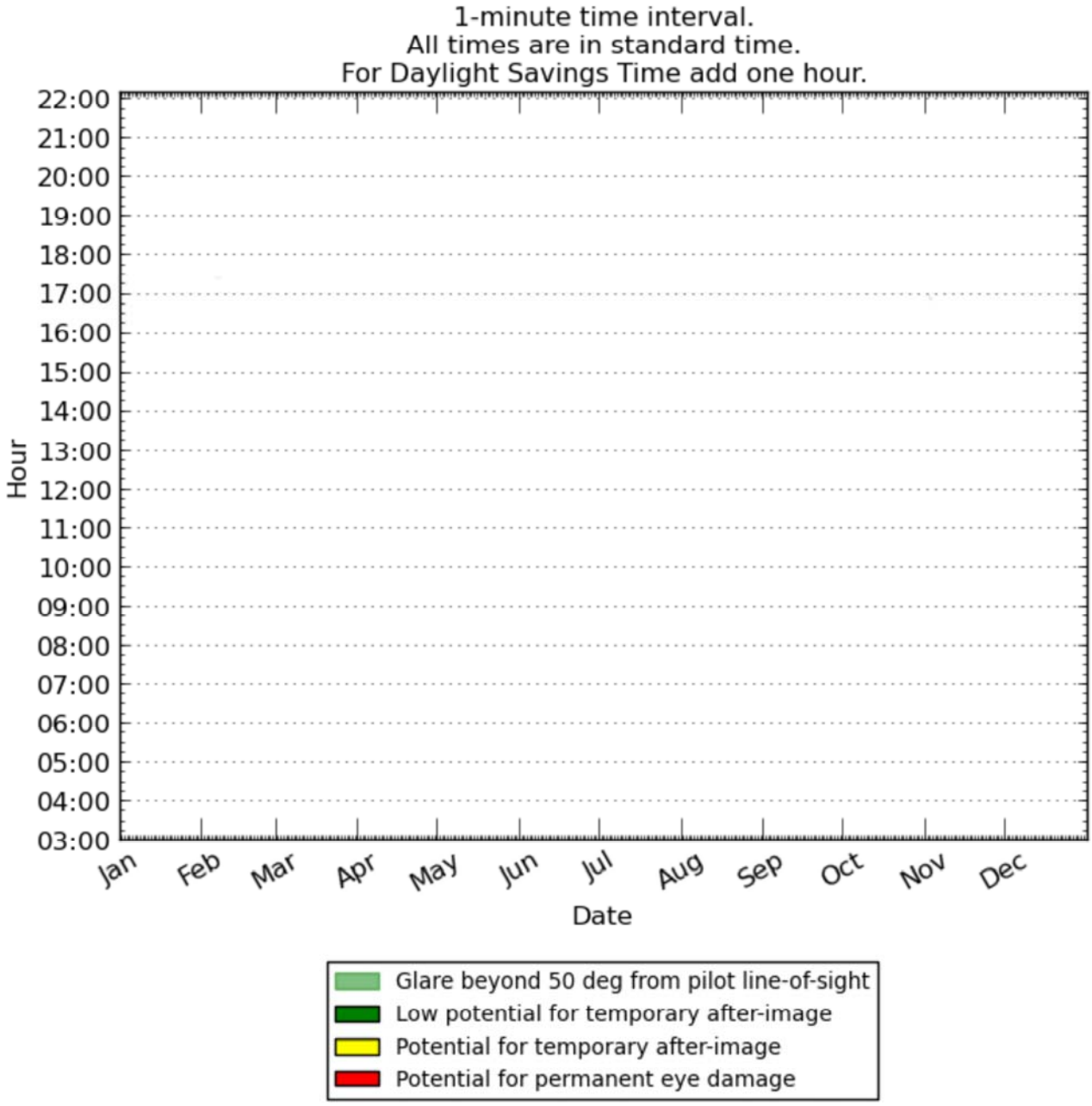
1/4 mi

No glare

1/2 mi

No glare

3/4 mi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All times are in standard time.
For Daylight Savings Time add one hour.
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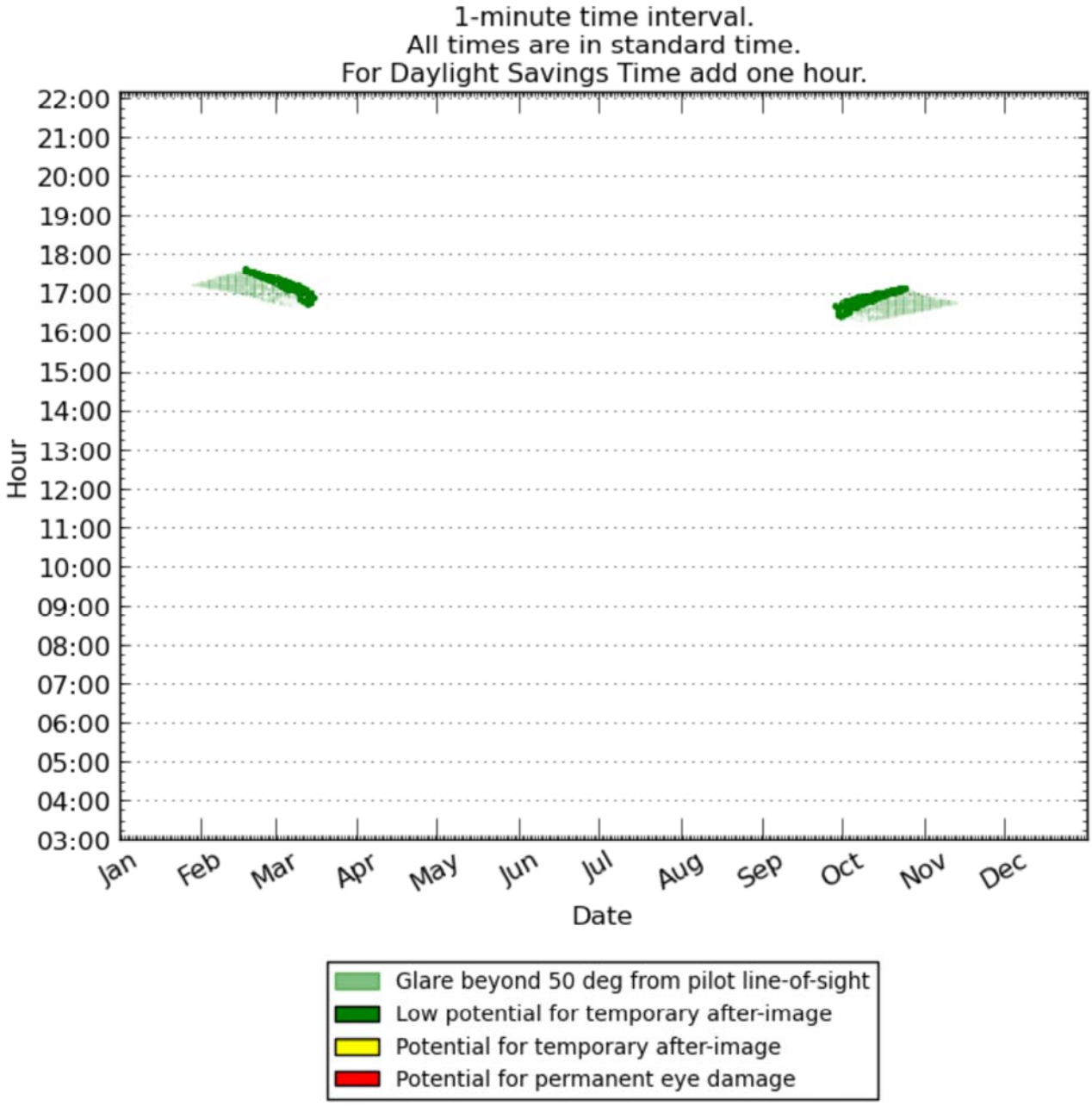
Date
Glare beyond 50 deg from pilot line-of-sight
Low potential for temporary after-image
Potential for temporary after-image
Potential for permanent eye damage

1 mi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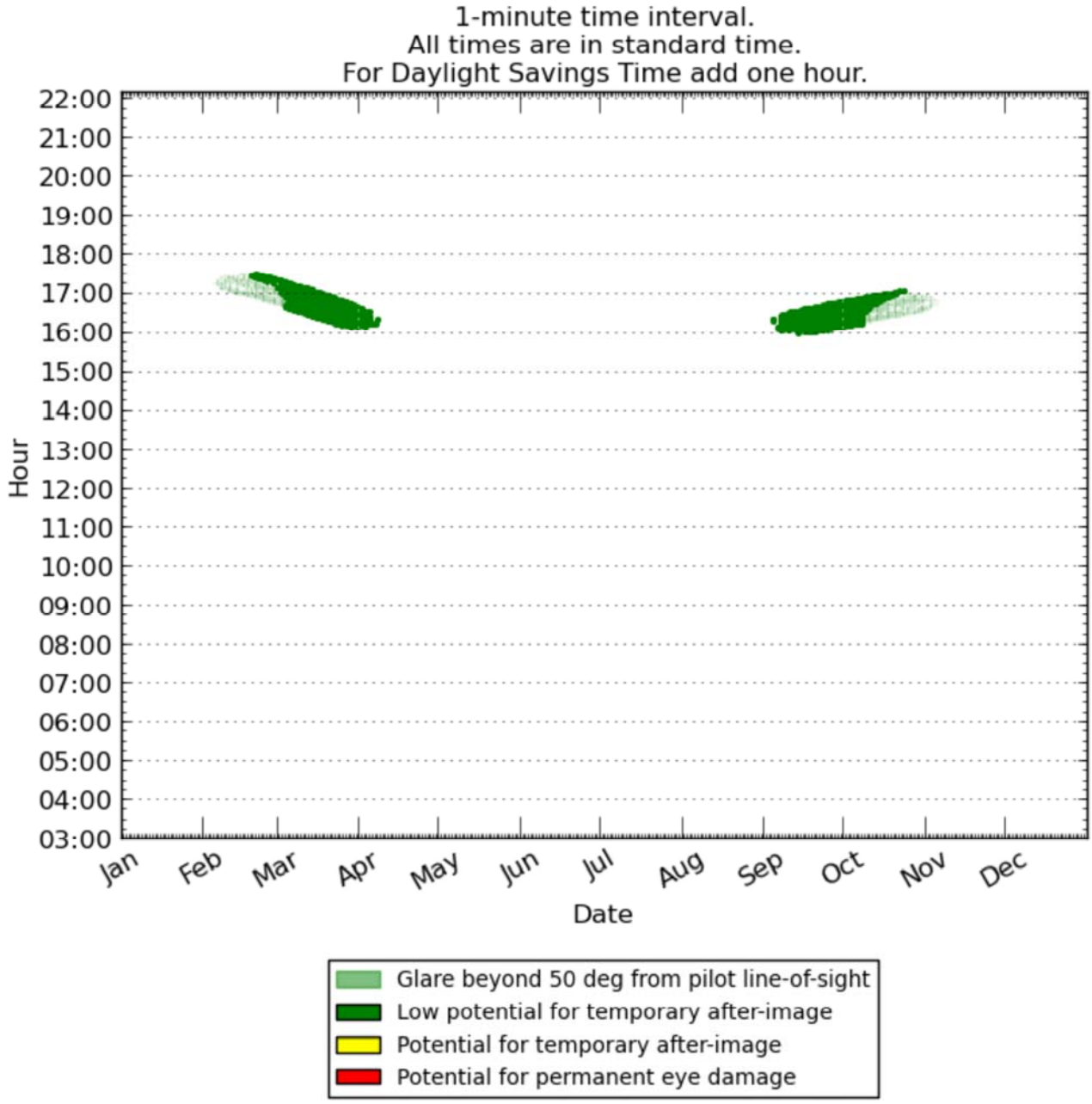
Glare beyond 50 deg from pilot line-of-sight
Low potential for temporary after-image
Potential for temporary after-image
Potential for permanent eye damage

1 1/4 mi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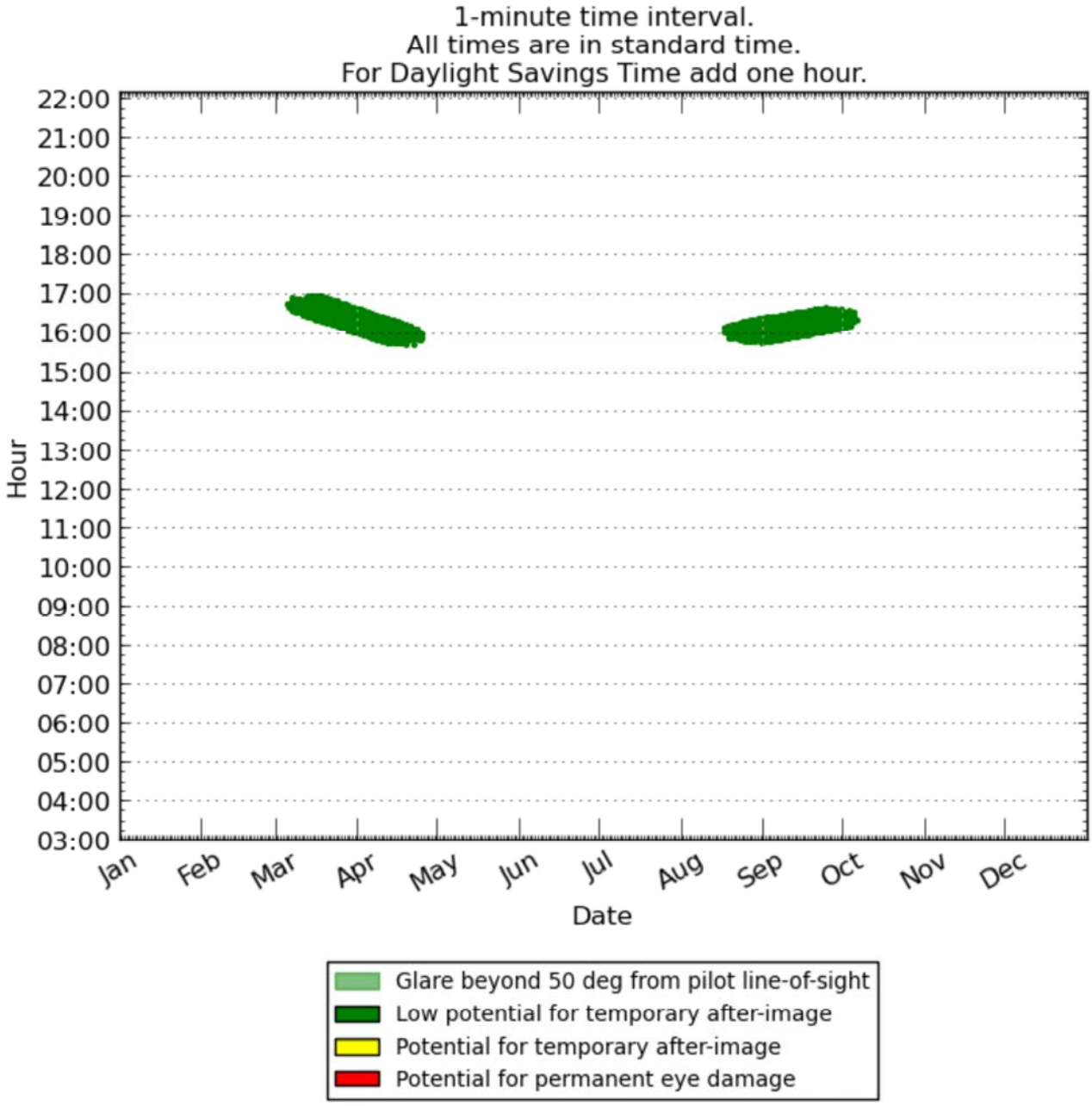
Glare beyond 50 deg from pilot line-of-sight
Low potential for temporary after-image
Potential for temporary after-image
Potential for permanent eye damage

1 1/2 mi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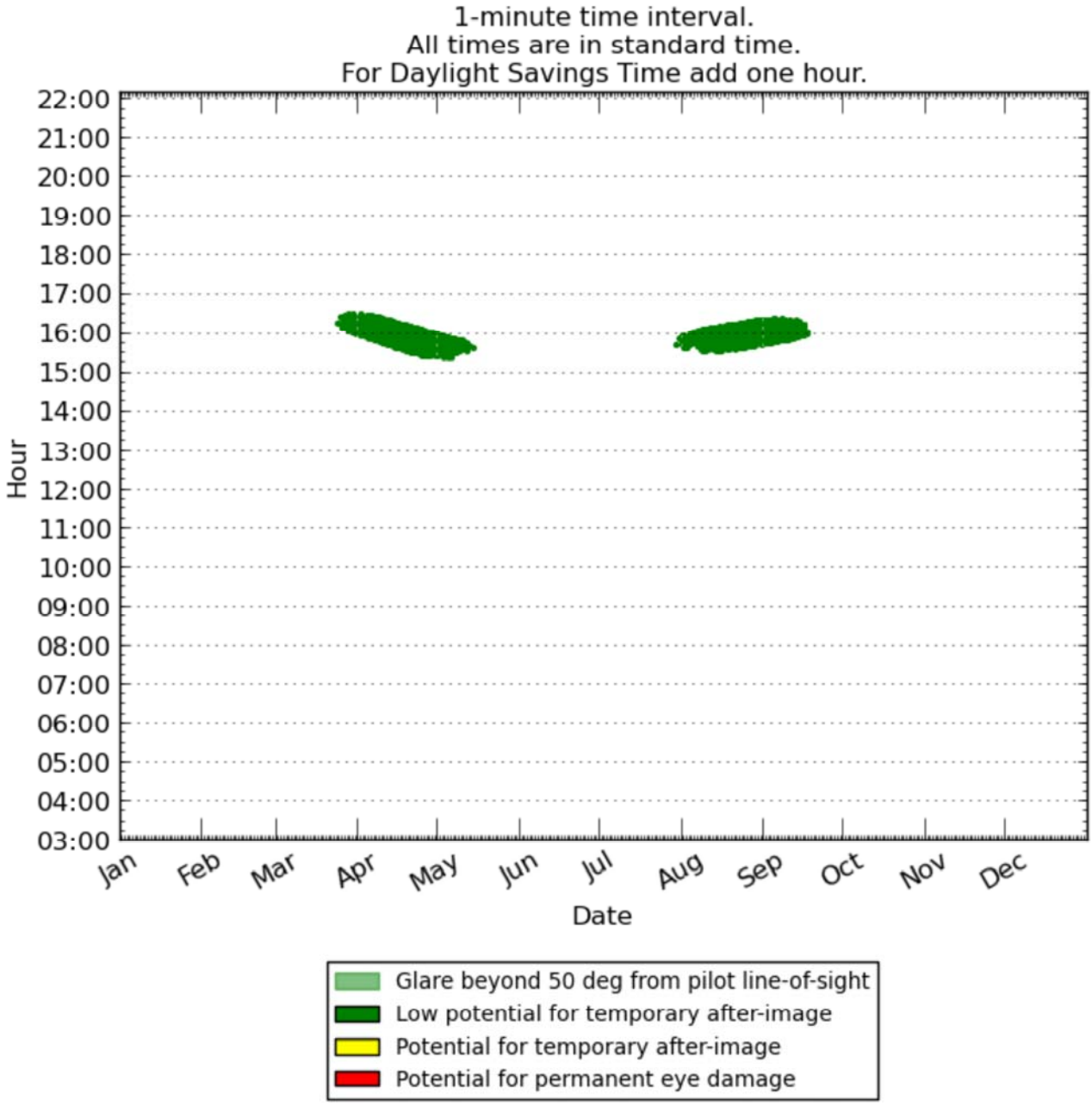
Glare beyond 50 deg from pilot line-of-sight
Low potential for temporary after-image
Potential for temporary after-image
Potential for permanent eye damage

1 3/4 mi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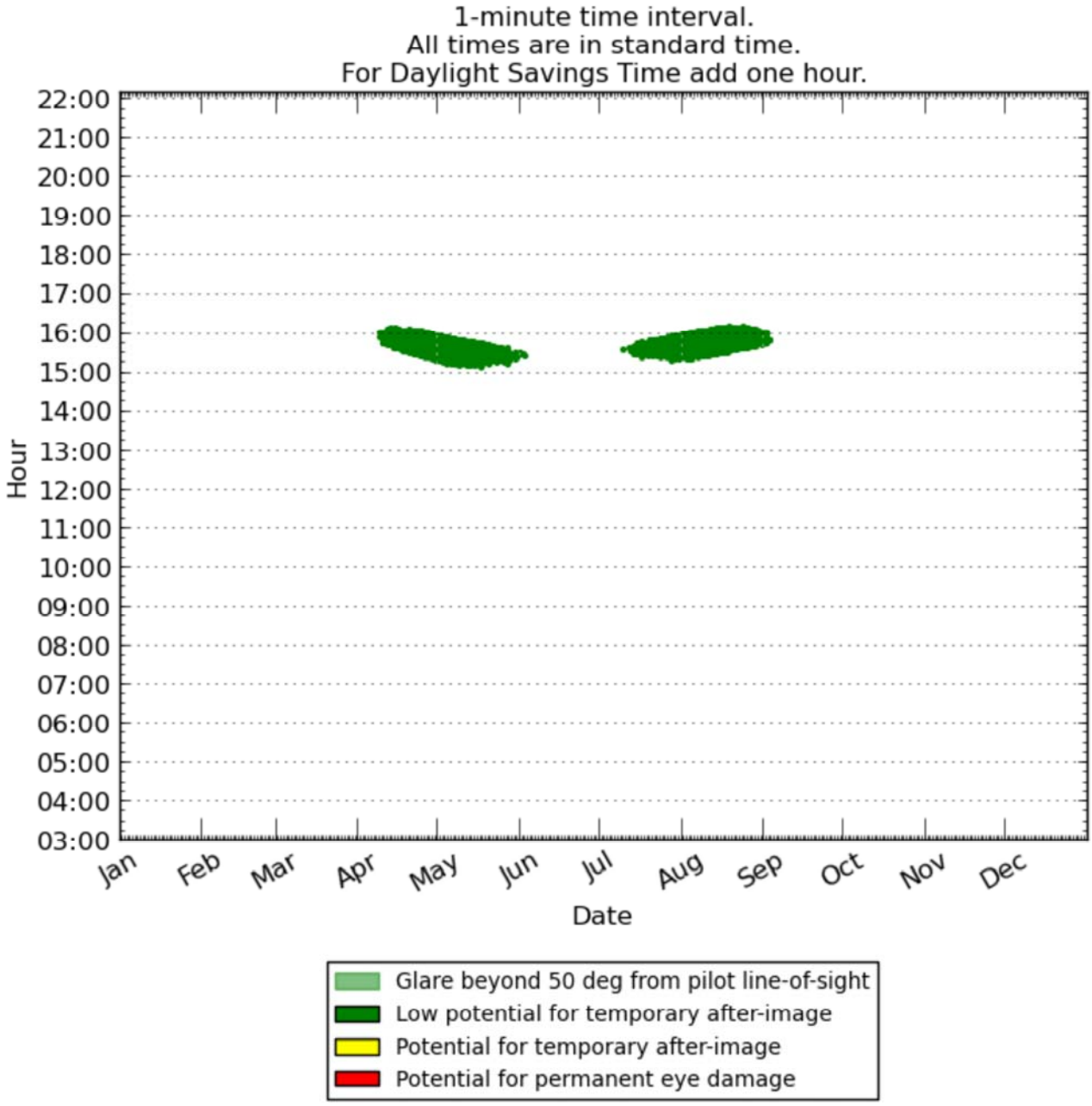
Glare beyond 50 deg from pilot line-of-sight
Low potential for temporary after-image
Potential for temporary after-image
Potential for permanent eye damage

2 mi



ATTACHMENT SDSA - 8

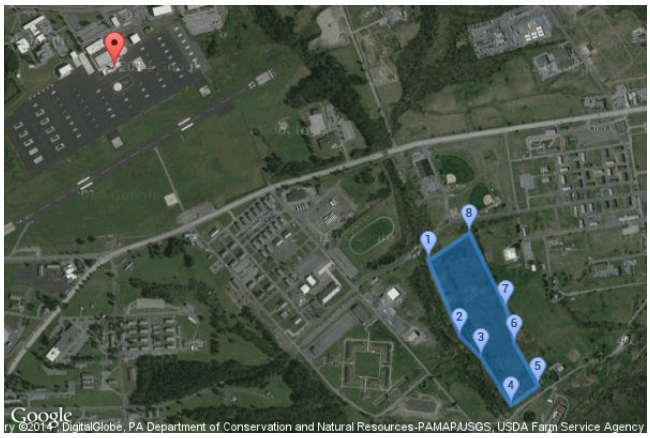
SOLAR GLARE HAZARD ANALYSIS REPORT – AIR TRAFFIC CONTROL TOWER

Solar Glare Hazard Analysis Report

Generated Dec. 2, 2014, 12:12 p.m.

No glare found

Print



Inputs

Analysis name	MUI Array 12-01
PV array axis tracking	none
Orientation of array (deg)	168.5
Tilt of solar panels (deg)	40.0
Rated power (kW)	0.0
Vary reflectivity	True
PV surface material	Smooth glass without ARC

Timezone offset	-5.0

Subtended angle of sun (mrad)	9.3
Peak DNI (W/m^2)	1000.0
Ocular transmission coefficient	0.5
Pupil diameter (m)	0.002
Eye focal length (m)	0.017
Time interval (min)	1
Slope error (mrad)	10.0

PV array vertices

id	Latitude (deg)	Longitude (deg)	Ground Elevation (ft)	Height of panels above ground (ft)	Total elevation (ft)
1	40.432134627	-76.5565752983	409.3	6.0	415.3
2	40.4298152957	-76.5553092957	403.17	6.0	409.17
3	40.4291782823	-76.5544724464	407.44	6.0	413.44
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6	40.4296029586	-76.5531206131	452.19	6.0	458.19
7	40.4306483042	-76.5534424782	437.94	6.0	443.94
8	40.4329839395	-76.5549230576	426.01	6.0	432.01

Observation Points

	Latitude (deg)	Longitude (deg)	Ground Elevation (ft)	Eye-level height above ground (ft)
ATCT	40.437993861	-76.5691146255	500.1	120.0

No glare found.

ATTACHMENT SDSA - 9

ENVIRONMENTAL BASELINE SURVEY FOR CANTONMENT AREA 4

Environmental Baseline Survey
For

Cantonment Area 4 Proposed Solar PV
Power Purchase Agreement Project
at
National Guard Training Center - Fort Indiantown Gap
Union Township, Lebanon County, Pennsylvania

Prepared by:

Daryl R. Valley, Environmental Specialist
Pennsylvania Department of Military and Veterans Affairs
Bureau of Environmental Management
Environmental Planning Division
Fort Indiantown Gap, Building 0-11, Annville, PA 17003-5002
(717) 861-2634 phone
(717) 861-8249 fax

July 2014

EXECUTIVE SUMMARY
ENVIRONMENTAL BASELINE SURVEY
Area 4 Proposed Solar PV
Power Purchase Agreement Project
National Guard Training Center - Fort Indiantown Gap
Annville, PA

ES-1. PURPOSE

This Environmental Baseline Survey (EBS) was prepared by the Pennsylvania Department of Military and Veterans Affairs (PADMVA). The purpose of this EBS is to document the existing environmental condition of an approximately 18-acre parcel in Area 4 of the Cantonment ("Site") at National Guard Training Center-Fort Indiantown Gap (NGTC-FTIG, or FTIG), in Union Township, Lebanon County, Pennsylvania. This EBS also serves to identify areas of concern or potential concern that may impact the suitability of the Site for lease. For the purposes of this EBS, the Study Area encompasses "the area within a one-mile radius of the approximate center of the Site, which encompasses the proposed project" (see the figures in Appendix B). This EBS serves to protect the Pennsylvania Department of Military and Veterans Affairs (PADMVA) against liability from exposure to potential contamination discovered during the construction of the proposed warehouses. This PCA also serves to enable determination of a Site Categorization designation, as per AR (Army Regulation) 200-1, §15-6(b) *Military Construction, and Morale, Welfare, and Recreation Construction Projects on Army Installations*; and AR 420-1.

ES-2. METHODOLOGY

This EBS was performed in general accordance with ASTM International D6008-96 (2005), *Standard Practice for Conducting Environmental Baseline Surveys*. The Site reconnaissance was conducted on 18 and 24 April, 2014. Although many of the EBS development activities may be considered "due diligence" functions, this EBS report is not prepared to satisfy a real property purchaser's duty to conduct an "all appropriate inquiry" to establish an "innocent purchaser defense" under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

ES-3. SITE DESCRIPTION AND HISTORICAL USE SUMMARY

The Site and surrounding property are currently occupied by the Pennsylvania Army National Guard (PAARNG) and its leasees, including the United States Army Reserve (USAR). The Site contains a total of approximately 18-acres of previously disturbed land in an area bounded approximately by Service Road (north), Coulter Road (south), Aires Run (west), and a tree line adjacent to FTIG's outdoor swimming pool facilities, basketball court, and Quarters 35 (east) in the southern portion of Cantonment Area 4 of Fort Indiantown Gap, in Union Township, Lebanon County, Pennsylvania. The Site is located within the eastern portion of the Cantonment area of FTIG (see the figures in Appendix B), and is currently utilized for unmounted small unit maneuvers training. Other facilities present in Area 4 include several health and wellness-related facilities (large gymnasium, baseball fields, swimming pool, etc.),

billeting (Quarters 35), multiple administrative buildings, and the FTIG wastewater treatment plant. There are currently multiple buildings, roads, and vehicle parking areas located throughout Area 4.

Prior to the early 1930s, the Cantonment area of FTIG was forested and/or used for agricultural purposes. Since the early 1930s, and the establishment of FTIG, the Cantonment area has been associated with training activities and related support facilities for the United States Army and the Pennsylvania National Guard and its leasees. Prior to its current condition (likely sometime in the early 1940s), the Site contained a field latrine building and reportedly may have contained a gas chamber building. Historically, the Site has been disturbed but mostly not developed with permanent structures other than those noted.

Other than where indicated below, evidence of obvious historical environmental incidents, including significant hazardous material spills or other common environmental releases/incidents on or immediately adjacent to the Site was not found during this investigation. Several locations of historical environmental interest are located throughout the Study Area; these locations are described in Section 3.0 of this report.

Based on a review of applicable information reviewed during this investigation, the data described in Sections 2.0 and 3.0 of this report reveal the following:

1. The Site was historically used for small military unit maneuvers training likely since at least the early 1940s (some time after the creation of Fort Indiantown Gap in the 1930s). Sometime prior to 1956, a field latrine building was constructed on the southern portion of the Site. A tear gas training facility was reportedly located somewhere in this area also; a period of use for this building was not identified during this investigation. Prior to these uses, the Site was likely part of a larger parcel utilized for agricultural and residential purposes. The Target Site has not historically been used for vehicle/equipment maintenance or other use that would typically include the presence of one or more hazardous substances.
2. The former field latrine building was demolished sometime in 1998. The reported tear gas chamber building, if it truly existed onsite, was removed from the Site at an unspecified date, likely sometime prior to 1990.
3. Records of significant, obvious spills of petroleum products or other hazardous substances on the Site were not found within available Agency-held files. A review of relevant local, state, and federal environmental databases did not identify the Site as a parcel of concern with respect to current or historical environmental releases. A Site Investigation was completed in July 2000 for the reported former gas chamber location. That investigation did not identify significant remaining environment or human health risks likely to be present in that area. All soil samples collected for laboratory analysis during that investigation did not display concentrations of the parameters of concern (tear gas byproducts and metals) above their respective laboratory method detection limits and/or their respective statewide health standards (SHSs) under Pennsylvania's Act 2 land recycling program.

4. Observations made during the Site reconnaissance did not suggest the presence of other obvious environmental concerns associated with the Site.

None of the noted environmental sites/incidents of concern described in the main text of this report are expected to have impacted the Target Site, due to distance/location, elevation, and/or remedial status.

ES-4. ASSIGNMENT OF ENVIRONMENTAL CATEGORY

The Environmental Condition of Property (ECOP) Area Type designations for the Site are categorized as shown in Figure 3 (Appendix B) of this report. The Site is categorized as ECOP Area Type 1, or an area "where no release or disposal of hazardous substances or petroleum products has occurred (including no migration of these substances from adjacent areas)". This determination was made based on the information gathered during this investigation, including information on the historical use of the Site, a review of files held by the Bureau of Environmental Management, a review of aerial photographs and historical maps, and environmental information collected from multiple regulatory databases, as described in the main text of this report.

TABLE OF CONTENTS

TABLE OF CONTENTS

LIST OF APPENDICES

LIST OF ACRONYMS

AASF	Army Aviation Support Facility
ACM	Asbestos Containing Material
ACOE	Army Corps of Engineers
AMSL	Above Mean Sea Level
AOI	Area of Interest
AST	Aboveground Storage Tank
ASTM	American Society of Testing and Materials
bgs	below the ground surface
BRAC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	CERCLA Information System
CORRACT	Corrective Action Report
CESQG	Conditionally Exempt Small Quantity Generator
CSMS	Combined Services Maintenance Shop
EAATS	Eastern Army Aviation Training Site
EBS	Environmental Baseline Survey
eFACTS	Environment, Facility, Application, Compliance Tracking System
EPA	United States Environmental Protection Agency
FTIG	Fort Indiantown Gap
FUDS	Formerly Used Defense Sites
HSCA	Hazardous Sites Cleanup Act
IRP	Installation Restoration Program
LBP	Lead-Based Paint
LUST	Leaking Underground Storage Tank
MEC	Munitions and Explosives of Concern
MILCON	Military Construction
MW	Megawatt
NFA	No Further Action
NFRAP	No Further Remedial Action Planned
NGB	National Guard Bureau
NGTC-FTIG	National Guard Training Center – Fort Indiantown Gap
NPL	National Priorities List
PAANG	Pennsylvania Air National Guard
PAARNG	Pennsylvania Army National Guard
PADEP	Pennsylvania Department of Environmental Protection
PADMVA	Pennsylvania Department of Military and Veterans Affairs
PANG	Pennsylvania National Guard
PCB	Poly-Chlorinated Biphenyl

POL	Petroleum, Oil, and Lubricants
PPA	Power Purchase Agreement
PPC	Preparedness, Prevention, and Contingency
PV	Photo-Voltaic
RCRA	Resource Conservation and Recovery Act
SCP	Spill Contingency Plan
SHS	Statewide Health Standard
SPCC	Spill Prevention, Control, and Countermeasure
SQG	Small Quantity Generator
SVOC	Semi-Volatile Organic Compound
SWF/LF	Solid Waste Facilities/Landfill
TA	Training Area
TSD	Treatment, Storage, and Disposal
USAR	United States Army Reserve
USGS	United States Geological Service
UST	Underground Storage Tank
UXO	Unexploded Ordinance
VOC	Volatile Organic Compound

1.0 INTRODUCTION

PADMVA has conducted an Environmental Baseline Survey (EBS) of the Study Area using the American Society of Testing and Materials (ASTM; ASTM International) standard *D 6008-96 (2005): Standard Practice for Conducting Environmental Baseline Surveys* as a guide. The collected information was analyzed in order to determine an Environmental Condition of Property (ECOP) Area Type for the subject parcel. The purpose of this EBS is to document, consistent with Department of Defense (DoD) policy and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 120(h) (and other applicable sections), the environmental suitability of an approximately 18-acre parcel ("Site") in Cantonment Area 4 (Training Area A-22) at Fort Indiantown Gap (FTIG) for future lease to a solar power provider for construction and management of a proposed solar energy array.

1.1 Methodology and References

This investigation was completed in general accordance with the ASTM International Standard D6008-96 (2005) *Standard Practice for Conducting Environmental Baseline Surveys*, and the *Army National Guard Environmental Condition of Property Handbook* of 1 June 2011. During this process, Pennsylvania Department of Military and Veterans Affairs (PADMVA, "Agency") environmental personnel reviewed regulatory and historical records, conducted interviews, and performed a site reconnaissance, as applicable. References consulted during the preparation of this report are listed in the attached Appendix A.

1.2 Limitations and Exceptions

This EBS cannot eliminate all uncertainty regarding the potential for recognized environmental conditions in connection with a property. The intent is to reduce uncertainty in connection with the property to the minimum practicable level, as well as to recognize reasonable limits of time and cost for property information. No detailed evaluation of wetlands, radon, asbestos containing materials (ACM), lead-based paint (LBP), or mold was conducted during this investigation/assessment.

Use of this report by parties other than the Commonwealth of Pennsylvania, the Pennsylvania Army National Guard (PAARNG), PADMVA, and National Guard Bureau (NGB) requires written permission by the Environmental Program Manager of PADMVA. This report is not to be considered comprehensive and may not have identified all environmental concerns.

1.3 Project Description, Site Location, and History

Project Description: The proposed real estate transaction includes the lease of approximately 18-acres of land controlled by the Pennsylvania National Guard at Fort Indiantown Gap for the construction and operation of an estimated 3 Megawatt (MW) solar photo-voltaic (PV) electricity generation system, via a Purchase Power

Agreement (PPA) by September 2016. The proposed PPA will include the lease of the parcel at FTIG for at least 10, but less than 20 years. The PPA may also include a supplemental agreement for the PV firm/contractor team to also provide FTIG‟s entire electricity requirement for up to five years.

Location: The Site contains a total of approximately 18-acres of previously disturbed land located within the southern portion of FTIG‟s Cantonment Area 4 (FTIG Training Area A-22), a parcel bounded approximately by Service Road (north), Coulter Road (south), Aires Run (west), and a treeline adjacent to FTIG‟s outdoor swimming pool facilities, basketball court, and Quarters 35 (east) (see the Figures in Appendix B).

Historical Use: In 1931, the Commonwealth of Pennsylvania established a State Military Reservation at Indiantown Gap as a site for training the Pennsylvania National Guard (PANG). Actual development of Fort Indiantown Gap (FTIG) as a military training facility began in 1932, and the first permanent buildings were constructed in 1934, in what is now Area 13 of FTIG‟s Cantonment (Smoker, Jr., 2009). In September 1940, the Commonwealth leased the land to the Federal government as a training site for U.S. Army troops and as a staging area for the New York Port of Embarkation. In September 1995, the Base Realignment and Closure (BRAC) Commission‟s recommendation to close FTIG, except for minimal essential functions as a Reserve Component training enclave to permit the conduct of individual and annual training, was accepted by the President and approved by Congress, becoming law. The National Guard Bureau (NGB) accepted the responsibility to operate FTIG as a National Guard Training Center (NGTC). This arrangement transferred management of FTIG to the PANG in October 1998. Under this arrangement, the prior lease between the Federal government and the Commonwealth essentially remained in effect with only minor alterations, such as a reduction in acreage. NGTC-FTIG currently supports training for units of the Air and Army National Guards, Marine Corps Reserve, Naval Reserve, and Army Reserve (USAR), as well as active military units and federal, state, and local law enforcement agencies. FTIG‟s Cantonment has been utilized for training, maintenance, and related support and administrative activities since 1933.

The areas adjacent to the Site and Area 4 have historically and are currently being used for military training and associated support activities. Area 4 has been associated with military training since the early 1930s; prior to the initial development of Fort Indiantown Gap, its land was utilized for agricultural and residential purposes. The Civilian Conservation Corps started work to convert the area into a training camp in 1934. Based on an unscaled 1937 map of FTIG (or what was then known as Indiantown Gap Military Reservation), the Target Site was not occupied with permanent structures at that time, however, from this map and available historical accounts and photographs of the installation, it appears that much of Area 4 was utilized for sporting and exercise facilities (gymnasium, swimming pool, volleyball courts, baseball fields and a running track) starting in at least the early 1940s (Smoker, Jr., 2009). According to historical aerial photographs, interviews, and a June 1989 site plan map, a small field latrine building (the former Building 04-165) was present on the Site, prior to its demolition sometime in the late 1990s.

2.0 ENVIRONMENTAL SETTING

2.1 Surrounding Land Use

The Study Area shall be defined as "the area within the one mile radius which encompasses the proposed project"; see the figures in Appendix B for this location. The Site is entirely contained within FTIG‟s Cantonment Area 4/Training Area A-22. The Study Area (one-mile radius around the Target Site) is located almost entirely within the boundaries of Fort Indiantown Gap, with the exception of small portions of land outside of FTIG‟s northern and southern boundaries. FTIG is located in a portion of south-central Pennsylvania (Dauphin and Lebanon Counties), approximately 22-miles northeast of the state capital, Harrisburg. FTIG is approximately 5-miles wide (north to south) and 11-miles long (east to west), occupying approximately 17,100-acres of land.

The Study Area includes training facilities, aviation facilities (Area 19, including the Army Aviation Support Facility (AASF 1), the Eastern Army Aviation Training Site (EAATS) complex, and Muir Army Airfield), billeting, small arms ranges, maintenance facilities, administrative and other support functions facilities, and a small portion of Indiantown Gap National Cemetery. A review of historical records, aerial photographs, and interviews confirm that past uses of the land within the Study Area are similar to the current land use.

The adjacent areas have historically and are currently being used for military training and associated support activities, including billeting, aviation, administrative functions, and reservation and vehicle maintenance. The facilities north of the Site (north side of Service Road) include a large gymnasium, running track, and several baseball/softball fields. The All Army Sports offices, swimming pool, multi-purpose court, Quarters 35 and its associated barn, and other administrative facilities are located on the Site‟s east side. FTIG‟s wastewater treatment plant is located south of the Site, and Aires Run, FTIG‟s Recycling building, Pennsylvania State Police health and wellness offices, and the Area 6 fueling point are located west of the Site.

2.2 Geologic and Topographic Setting

2.2.1 Topography

FTIG is located at the junction of two sections of the greater Valley and Ridge physiographic province: the Appalachian Mountain Section and the Great Valley Section. In general, the Valley and Ridge province is underlain by complexly faulted and folded sedimentary rocks of Paleozoic Age. A wide range of lithologic types is represented, including limestone, sandstone, and shale. Sandstone, conglomerate, and limestone resistant to weathering comprise the ridges, while dolomites and limestone underlie the valleys. This portion of the Commonwealth of Pennsylvania is unglaciated. Blue, Second, Sharp, and Stony Mountains make up the topographic highs in the area around FTIG. A review of USGS Topographic Quadrangles (*Indiantown Gap, Pennsylvania* 7.5-minute quadrangle map) shows the mountain ridges reach elevations of approximately 1,200- to 1,440-feet Above Mean Sea Level (AMSL).

A topographic map review and field observations made during the Site reconnaissance indicate that the Site is situated at an average elevation of approximately 430-feet above mean sea level (AMSL), with a topographic high of approximately 460-feet AMSL on its east side and topographic low of approximately 420-feet AMSL on its west side. The Site generally slopes from west to east, towards Aires Run and contains several rolling rises oriented north to south.

2.2.2 Geology

The Appalachian Mountain Section is considered to have a high susceptibility to landslides, with shallow, slab-type bedrock slides fairly common on dip slopes of steeply tilted strata. Steep slopes and exposed bedrock areas occur throughout FTIG, primarily on the crests of Second and Blue Mountains. NGTC-FTIG is drained in the west by Manada Creek and in its central portion by Indiantown Run.

Ordovician-age phyllitic shales and lesser amounts of shale and graywacke of the Hamburg sequence underlie Area 4 and the Site. At FTIG, the Hamburg sequence is generally of complex origin and structure, and includes multiple tectonic units and thrust plates. Locally, the Hamburg sequence is largely composed of shales and poorly sorted siltstone, and minor amounts of interbedded sandstone, greywacke, limestone, chert, and quartzite. This formation is low to moderately resistant to weathering (Geyer and Wilshusen, 1982). Solution channels, sinkholes, other features typical of karst terrain have not been identified in this geologic unit at FTIG. Bedrock at NGTC-FTIG usually occurs within approximately 15-feet of the ground surface (Woodward-Clyde, 1997).

2.2.3 Soils

According to the *Soil Survey of Lebanon County, Pennsylvania*, the Site is underlain by soils from the Berks channery silt loam series, Comly silt loam series, and Holly silt loam series. Portions of these soil series are currently listed on the Natural Resource Conservation Service"s (NRCS) hydric soils list for Lebanon County, Pennsylvania, although on the Site, only the Holly silt loam soils are likely to be hydric or predominately hydric.

The Berks channery silt loam soils consist of nearly level to moderately steep soils weathered from shale and siltstone, and are commonly found on hill slopes and rounded and dissected uplands. The Berks soils vary from dark brown shaly silt loam to yellowish brown very shaly silt loam. A typical profile consists of a surface layer which is a dark brown shaly silt loam, then a strong brown shaly silt loam, turning into a yellowish brown very shaly silt loam in the substratum. These soils are well-drained and exhibit moderate to moderately rapid permeability. Bedrock is typically found at depths between 20 and 40-inches below the ground surface (bgs), and ground water is typically encountered at depths greater than 80-inches bgs (Holzer, 1991).

The Comly silt loam soils generally consist of deep to very deep soils found on concave upland slopes, lower footslopes, and broad flats. The Comly soils vary from dark brown silt loam to yellowish brown shaly silt loam. These soils are moderately well-drained, permeability is moderate to moderately slow, and surface runoff is slow to rapid. Depth to bedrock is 4- to 8-feet bgs, and groundwater is typically encountered at depths between 6- and 36-inches bgs.

The Holly silt loam soils consist of nearly level to slightly steep soils weathered from shale and sandstone, and are commonly found on broad, flat areas and within flood plains. The Holly soils typically vary from dark grayish brown silt loam to gray to dark greenish gray sandy loam. These soils are poorly to very poorly drained. Bedrock is typically found at depths between four and twenty-feet below the ground surface (bgs), and ground water is typically encountered at depth above the ground surface to one-foot bgs (Holzer, 1991).

2.2.4 Surface Water and Hydrogeology

The Target Site generally drains to the west and south towards Aires Run. This stream eventually drains into Swatara Creek, via Reeds Creek, outside of FTIG‟s southern boundary. Based on the local geology (Hamburg sequence), porosity in this formation is generally moderate, and most wells will yield 10- to 50-gallons of water per minute (Geyer and Wilshusen, 1982). Groundwater flow direction is believed to mimic surface water flow direction in the area of the Site, and surface water is expected to flow in a generally southern to south-southwestern direction. It should be noted that site-specific groundwater flow may fluctuate based on local soils, geology, local well use, and seasonal variations.

2.2.5 Sensitive Environments, Natural Resources, and Cultural Resources

During this investigation, Ms. Rita Meneses, PADMVA Cultural Resources Manager was interviewed in regards to her knowledge of the Site. Ms. Meneses stated that she did not know of any existing cultural resources or archaeological sites associated with the subject Site. A brief review of applicable Agency-held cultural resource documents did not identify any such features on the Site. The Site does not contain any obvious sensitive environmental features, although an area of wetlands was previously delineated downslope from the Site, adjacent to Aires Run. Based on the Site reconnaissance completed during this investigation, an area of one or more spring discharges or seeps appears to be located near the Site‟s east side. This feature appeared to be influenced by wet weather in that it was an intermittent flowing surface water feature. The poor-draining Holly silt loam soils found onsite likely influence the flow of this groundwater discharge area. No other natural resources of note were observed during the Site reconnaissance.

3.0 PAST AND CURRENT OPERATIONS

3.1 Agency-Held Historical Records Review

During this assessment, PADMVA personnel reviewed available and applicable Agency-held environmental files in regards to Area 4 of FTIG‟s Cantonment.

3.1.1 Spill and Environmental Release Reports and Related Records

As part of this investigation, DMVA personnel reviewed available files on spills and other releases in Cantonment Area 4, an area within approximately 0.25-miles of the Site. The following table presents a brief summary of these releases.

TABLE 1 – Spill/Environmental Release Incidents in Area 4

Location	Spill/Release Incident	Status
Building 4-65	February 1991 release of approximately 210-gallons of No. 2 fuel oil (heating oil), due to a leaking aboveground storage tank (AST).	Absorbent materials applied, standing oil was vacuumed off ground and off groundwater from nearby excavation
Former Building 4-118 bowling alley	June 1992 release of heating oil from bowling alley underground storage tank (UST) impacted Aires Run.	Utilized absorbent materials and containerized impacted soils and groundwater for disposal. UST lines were replaced.
WWTP	August 1992 release of 150- to 200-gallons heating oil to interior of WWTP.	Impacted water and sewage, and spilled oil recovered with vacuum truck for proper disposal.
Building 4-31	June 1995 release of approx. 20-gallons of heating oil from hole in AST.	Absorbent materials applied and remaining heating oil removed from AST. Impacted materials removed for disposal.
Building 4-100	July 1995 release of approx. 3-gallons of heating oil due to hot weather and overfill of AST.	Absorbent applied to impacted area, shaded AST. Impacted materials removed.
Road and grass slope west of Building 4-81	17 June 1998 release of approx. 15- to 20-gallons of gasoline	Utilized pads and booms to absorb and control release; impacted soils removed by maintenance for later disposal.

TABLE 1 – Spill/Environmental Release Incidents in Area 4 (Continued)		
Location	**Spill/Release Incident**	**Status**
Building 19-101/WWTP	April 1999 release of approx. 50-gallons heating oil from boiler to boiler room floor. Some of oil entered floor drain and presumably impacted WWTP.	Removed standing oil and cleaned impacted areas; oil skimmed form vault at WWTP. All waste materials transported for proper disposal.
FTIG Wastewater Treatment Plant	Circa February 2001 release of small amount of mercury to WWTP soils noted during excavation work	Approx. 50 cubic yards area of impacted soil and other material was removed for proper disposal. Post-excavation soils samples were below applicable Statewide Health Standards (SHS) for mercury.
Building 04-137	Leak at weld on AST led to release of approx. 50-gallons of heating oil.	Absorbent materials applied; impacted materials removed for later disposal.

Based on a review of available information on these spill incidents, they are not expected to have impacted the Site, due to distance, elevation, or remedial status.

3.1.2 BRAC 1995 Environmental Baseline Survey

During the United States Department of Defense 1995 BRAC proceedings, the entire FTIG installation was assessed, and fifteen Installation Restoration Program (IRP) sites were identified in the final BRAC Environmental Baseline Survey (EBS) Report dated 18 March 1997 (Woodward-Clyde, 1997). Three current or former IRP sites, described in Table 1 below, are within the one-mile radius of the Study Area. None of the noted IRP sites are expected to have impacted the Target Site.

TABLE 2 – Status of BRAC 1995 Findings and Impacts		
IRP #	**Description**	**Historical Status**
FTIG-003	Abandoned Sewer Plant Discharge	Abandoned sewer discharge found at Building 04-162. Sediment samples results indicated non-hazardous status. No further sampling or other remedial action is necessary or planned.
FTIG-004	Former Building 19-77 Fire Training Area	A former brick-lined pit was utilized to burn POL and fuels during fire training exercises. A PA/SI and contaminated soil excavation were completed. Resolved May 2003 after PADEP review.
FTIG-005	Hazardous Waste Storage At Building 04-25	Building demolished in April 2004; downgradient from target site – no impact on Site.

TABLE 2 – Status of BRAC 1995 Findings and Impacts (Continued)		
IRP #	**Description**	**Historical Status**
FTIG-008	South Water Tower soils were impacted by the historical use of lead-based paint on tower.	Soils below the south water tower were sampled and were confirmed to be impacted with lead. Impacted soils were excavated and removed for proper disposal, and the area around the tower was fenced off to prevent access.

Based on current information, the above IRP sites are not expected to have impacted the Site, due to distance, elevation, and/or remedial status.

3.1.3 Additional Historical Environmental Concerns in the Study Area

Historically, several environmental incidents or suspected incidents have occurred in the Study Area (approximate 1-mile radius) surrounding the Site. A brief summary of these impacts includes the following:

TABLE 3 – Summary of Historical Environmental Concerns in Study Area		
Impacted Location	**Description**	**Status**
Former Area 4 Incinerator	Historical use of incinerator for document and possibly hospital materials destruction. Lead impacted soils were the chief concern.	Multiple soil and groundwater investigations completed for this area. Approx. 2,100-tons of impacted soils and ash were removed for disposal. Received relief of liability under Pennsylvania‟s Act 2 program in June 11, 2007. NFRAP.
Reported Former Area 4 Tear Gas Chamber Building	Historical use of a small gas chamber building on or adjacent to the east side of the Site. Chief concerns were historical minor spills of hazardous materials and contact of hazardous materials with the environment during building demolition.	July 2000 Site Investigation (SI) collected soil samples in the vicinity. No tear gas parameters detected above laboratory detection limit; metal parameters not detected above applicable SHSs. NFRAP.
Former Area 6 waste staging area.	Former staging area for contaminated soil and other potentially hazardous materials, uncovered without containment features.	Soil samples collected in July 2000. No exceedances of applicable SHSs found. NFRAP.

TABLE 3 – Summary of Historical Environmental Concerns in Study Area (Continued)		
Impacted Location	**Description**	**Status**
Area 6 Fueling Point	Release of approx. 30-gallons of diesel fuel in March 2006 to soils.	Site characterization and remedial actions completed, including the removal of approx. 15-tons of soil. Relief of liability under Pennsylvania‟s Act 2 program granted on November 2, 2006. NFRAP.
Building 07-31 (Car Care Center)	In-ground hydraulic lift and unknown past disposal practices.	July 2000 Site Investigation (SI) collected soil and groundwater samples in vicinity. No parameters detected above applicable Statewide Health Standard (SHS). No further remedial action planned (NFRAP).
Former Building 09-66 (Shoppette) fueling facilities	February 2001, reportable release of fuels to soil and groundwater identified.	Characterization, remediation, and monitoring activities were completed for soil and groundwater in this location (October 2001 through September 2009). PADMVA received written notice of relief from liability under Pennsylvania‟s Act 2 on May 25, 2012.
AASF #1 – former UST near Building 19-102	Impacted soil and groundwater noted during Dec. 1998 closure of former 1,000-gal. JP-8/jet fuel UST.	Soils removed for disposal, groundwater assessed and monitored for multiple quarters under PA Act 2. NFRAP.

The majority of the noted environmental sites/incidents of concern described above are not expected to have impacted the Target Site due to location, distance, elevation, and/or completed or ongoing characterization and remedial activities. A search of BEM‟s environmental compliance and spill report records for Area 4 did not suggest the presence of historical large or otherwise significant releases of hazardous substances/wastes on the Site.

3.1.4 Post-BRAC 1995 FTIG Due Diligence Assessment

Beginning in April 1999, Ogden Environmental and Energy Services Company, Inc. of Blue Bell, Pennsylvania (“Ogden”), conducted a Post-wide due diligence effort during transfer of the FTIG property from the Department

of the Army control to PADMVA, resulting from the 1995 BRAC effort by the Department of Defense. Ogden"s Preliminary Analysis (PA) effort during April through July 2001 identified 24 locations at FTIG that required additional assessment, including a "former gas chamber building" located "1,000 – 1,500 feet from the north side of Coulter Road and 500-750 feet west of Walmer"s Church and Cemetery" (Ogden, 2000). The June 2000 Final Preliminary Assessment report states that this location (Area Of Interest (AOI) ID # O-5-19-5) was reportedly identified from a March 1978 "General Road and Railroad Map" produced by the Baltimore District of the US Army Corps of Engineers (ACOE). No photographs of the reported tear gas chamber site were included in the report files, both paper and electronic versions. Figure 8 in the PA report ("AOIs to be Investigated Further") depicts the tear gas chamber site as approximately in the same location as the former field latrine building (see Figure 3 of Appendix B). As such, it is possible that the ACOE map was simply incorrect in referencing what was likely the former field latrine Building 04-165.

The July 2001 Draft Final Site Inspection report (Ogden 2001) describes the scope of work for the investigation into the reported tear gas chamber. Four Geoprobe™ borings were advanced in the area of what was described as a "weathered foundation". A total of eight soil samples were collected from these borings and submitted to a laboratory service for analysis of semi-volatile organic compounds (SVOCs – the tear gas byproducts of 2-cholorbenzaldehyde and 2-chloroacetophenone) and multiple metal parameters. No tear gas byproducts were detected above their respective method detection limits. Multiple metal constituents were detected in each soil sample at concentrations below their respective Pennsylvania statewide health standards (SHSs). A review of the soil sample analytical results and additional background soil samples collected at FTIG did not find a significant difference between the two sets of soil samples.

A summary compilation of applicable PA/SI report materials findings is included as Appendix C of this report.

3.1.5 Other Documents

A bound collection of historic resource survey forms (KFS, June 1995) was reviewed during this investigation. An entry for a portion of the existing wastewater treatment facilities located south of the Site shows the presence of Building 04-165, labeled as "latrine" on the Site.

3.2 Aerial Photograph and Historical Map/Document Review

Readily available historical aerial photographs (Appendix D) and historical topographic maps (Appendix E) were obtained from public internet data sources, including the United States Geological Service (USGS) and the PennPilot website. It should be noted that the resolution of the aerial photographs limits the accuracy of conclusions derived from the review of these photographs.

3.2.1 Analysis of Aerial Photographs

Historical aerial photographs review during this investigation indicated the following:

1937 Aerial Photograph [AHN-25-64] – The 1937 Aerial Photograph shows the land in the Study Area as largely cleared land, with parcels that appear to be current and/or former agricultural fields on what is now FTIG. The Target Site largely consists of open field with some trees. An unimproved trail appears to run from north to south, approximately along the western boundary of the Site. A thin treeline runs along the Site‟s east side. Additional improved and unimproved roads and multiple buildings are located to the north, south, and east of the Site. Land adjacent to the north and south sides of the Site is largely cleared fields and partially wooded areas. Review of this photograph did not indicate obvious areas of environmental concerns or improper waste disposal at the Target Site and surrounding area.

1956 Aerial Photograph [AHN-3R-96] – The 1956 aerial photograph shows additional development of FTIG‟s facilities, including the addition of multiple buildings and improved roads throughout the Cantonment, the development of small arms training ranges along Range Road, and the partial development of an airfield in Area 19 (the location of the current Muir Army Airfield facilities). The existing FTIG wastewater treatment plant has been constructed south of the Site. A small building has been constructed near the southwest corner of the Site; a small trail road or trail allows for access to this building from Coulter Road. An unimproved trail allows for access to the Site from Service Road. The remainder of the Site has not changed obviously, still consisting mostly of open fields with some trees. Review of this photograph did not indicate obvious areas of environmental concerns or improper waste disposal at the Target Site and surrounding area.

1970 Aerial Photograph [AHN-2LL-214] – The 1970 aerial photograph shows the addition of an extension of Anderson Road (which appears to be an unimproved road or trail) across the northern portion of the Site, near Service Road. No additional obvious changes have occurred to the Site. The photograph also shows some additional development in the eastern and western portions of the Cantonment and, some additional development of the aviation facilities in Area 19. Interstate Route 81 has been constructed to the south of FTIG. Review of this photograph did not indicate obvious areas of environmental concerns or improper waste disposal at the Target Site and surrounding area.

1987 Aerial Photograph [NAPP 103-116] – The 1987 aerial photograph shows the removal of the Anderson Street extension noted in the 1970 photograph. This photograph does not show any additional obvious changes from the 1970 aerial photograph to the Target Site, although the resolution of this photograph may limit the accuracy of conclusions derived from its review. Additional minor development of the Cantonment area has occurred, including to the north and west of the Site. The flight facilities in Area 19 have been expanded. Land has been disturbed in the current location of Indiantown Gap National Cemetery, approximately southwest of the Site. Review of this photograph did not indicate obvious areas of environmental concerns or improper waste disposal at the Target Site and surrounding area.

1999 Aerial Photograph [NAPP 11357-180] – The 1999 aerial photograph shows the removal of the former latrine (Building 04-165) and its related access road from the Site. A portion of the Site in the area of the existing soil/debris mound (northern side of Site) appears to have been disturbed, however, the photograph‟s resolution limits more concrete conclusions about the status of this area. Additional development of the surrounding Cantonment has occurred, including the construction of additional aviation facilities in Area 19, demolition of some buildings in Areas 3, 4, and 6 in the Cantonment. Review of this photograph did not indicate obvious areas of environmental concerns or improper waste disposal at the Target Site and surrounding area.

3.2.2 Analysis of Historical Topographic Maps

Historical topographic maps prepared by the United States Geological Survey (USGS) indicated the following:

1892 – The 1892 *Hummelstown, Pennsylvania* USGS Topographic Map indicates that the Site was undeveloped; the area around the Site was largely undeveloped, as well, with the exception of a road network and the Walmers Church parcel east of the Site. Several buildings, likely residential and/or agricultural in nature, were located in the area around the Site. Several streams are located in the area around the Target Site; there were no indications on the map of military use of the Site and surrounding area.

1943 – The 1943 *Hummelstown, Pennsylvania* USGS 15-minute Topographic Quadrangle Map indicates that much of the land around the Site, has been partially developed, and the area is designated as „US Military Reservation Indiantown Gap‟. Several buildings and multiple roads have been constructed throughout the Cantonment area. No buildings are shown in the location of the Site. Additional residential and commercial development has occurred in the areas outside FTIG‟s Cantonment.

1956 – The 1956 *Hummelstown, Pennsylvania* USGS 15-minute Topographic Quadrangle Map indicates that much of the land around the Site has been developed. The map appears to show a building, presumably the former latrine, on the eastern boundary of the Site. Multiple additional buildings and roads have been constructed throughout the Cantonment area, and the addition of an airfield (what is now Muir Airfield) has occurred to the west of the Site. Additional residential and commercial development has occurred in the areas outside FTIG‟s Cantonment, including the development of multi-lane state roads south of FTIG.

1999 – The 1999 *Indiantown Gap, Pennsylvania* USGS 7.5-minute Topographic Quadrangle Map does not show the presence of any structures on the Site. Additional development of the parcels within the Cantonment area has occurred, to the north, east, and west of the Site, including additional development of the flight facilities at Muir Air Field. Additional residential and commercial development has occurred in the areas outside FTIG‟s Cantonment. Interstate Route 81 has been constructed south of FTIG.

3.2.3 Other Historical Maps and Records

The Bureau of Environmental Management maintains several historical maps of FTIG in its files. Maps and other records consulted during this investigation include the following:

FTIG Facility Reduction Plan Demolition List – 23 March 1998 – This list of buildings intended for demolition in Fiscal Year 1998 (although actual demolition may have occurred later, due to funding limits) stated that the former Building 04-165 was a latrine and was demolished sometime prior to 1 May 1998.

3.3 Hazardous Substances, Petroleum Products, and Special Contamination Concerns

The primary industrial wastes generated at NGTC-FTIG are used petroleum, oil and lubricants (POL), antifreeze, and waste paints. In the Study Area, these types of waste are typically generated at aircraft, general, and vehicle maintenance facilities in Areas 10 and 19. Construction-related waste generated as a part of on-Post construction projects is recycled, if possible, or the waste is disposed of in accordance with the PAARNG Hazardous and Residual Waste Management Plan. Existing waste management plans describe procedures for containerizing, storing, and disposing of hazardous wastes at NGTC-FTIG. Re-use, recycling, sale, or transfers of hazardous waste to the Defense Logistics Agency (DLA) are utilized where feasible. If off-site disposal of hazardous waste is required, DLA or another applicable agency is contacted.

According to Ms. Dreama O'Neal, the facility Hazardous Waste Manager, the typical activities that historically occurred on the Site (i.e., small unit maneuvers training on foot) do not typically generate hazardous materials or hazardous wastes, with the exception of a spill incident, which could generate potentially hazardous substances. Hazardous materials including common maintenance-related chemicals, including petroleum-based substances, paints, lubricants, and other chemicals may be utilized at other facilities located in the area around the Site. A review of PADMVA's files and records on FTIG's Cantonment did not identify obvious or significant historical hazardous materials/substance/waste mismanagement, releases, or spill events on the Site; however, multiple confirmed or suspected historical releases have occurred in the Study Area, as described in Sections 3.1.1 through 3.1.3 of this report. Obvious signs of impact to the Target Site from surrounding facilities were not identified during this investigation. Several RCRA small quantity generators of hazardous waste are located on FTIG, as described in Section 3.3.2 of this EBS. All hazardous and residual waste operations occurring at FTIG must adhere to the PAARNG Hazardous and Residual Waste Management Plan dated April 2014. All petroleum-handling facilities at FTIG also comply with federal Spill Prevention, Control, and Countermeasure (SPCC) regulations and related spill control plans that are required on the state, local, United States Army, and PAARNG levels. Facilities that deal with POL at FTIG must maintain a site-specific Spill Contingency Plan (SCP) and Waste Oil Generator Preparedness, Prevention, and Contingency (PPC) Plan.

3.3.1 Storage, Release, or Disposal of Hazardous Substances

There is no evidence that hazardous substances were stored, released, or disposed on the Site in excess of the reportable quantities listed in 40 CFR Part 373. Accordingly, there is no need for any notification of hazardous substance storage, release, or disposal.

3.3.2 Storage, Release, or Disposal of Petroleum Products

There is no evidence that any petroleum or petroleum products in excess of 55-gallons at one time were stored, released, or disposed on the Site. Accordingly, there is no need for any notification of petroleum product storage, release, or disposal.

3.3.3 Special Contamination Concerns

No obvious special contamination concerns were identified on the Site during this investigation, including the presence of lead-based paint (LBP), asbestos containing materials (ACM), radiological materials, pesticides, radon, and munitions and explosives of concern (MECs).

3.4 Ongoing Response Actions, Closed Response Actions, and Regulatory Orders

No ongoing or closed response actions, including remediation activities were identified for the Site during this investigation. The Site is not the subject of a current or former regulatory order in regards to a historical environmental release.

4.0 SITE RECONNAISSANCE AND INTERVIEWS

PADMVA personnel (Daryl Valley, Environmental Specialist) visited the Target Site on April 18 and 24, 2014. On a subsequent Site visit on 6 June 2014, PADMVA staff attempted to more conclusively locate the reported former gas chamber location. The Target Site is situated within an area of sports facilities, administration and training facilities, storage buildings, and billeting buildings. Figure 3 in Appendix B shows the Site‟s major features. Photographs collected during the Site visits are included in Appendix F of this report.

4.1 Observations

During the Site reconnaissance of 18 April, small pools of standing water (presumably from recent rain events) were observed at several locations onsite and onsite soils were obviously moist at the ground surface. The Site currently consists mostly of somewhat rolling fields containing multiple trees. The Site‟s topography generally slopes to the west towards Aires Run. A small partially graveled access road allows for vehicular access form Service Road to the parcel. A large “debris pile” consisting mostly of soil, rock, and other natural materials is located on the northern side of the Site. Chunks of rock, concrete, and miscellaneous pieces of plastic and metal were also noted in this feature. This debris pile was generally overgrown with vegetation and small trees; obvious signs of chemical containers, staining, or dumping of hazardous materials was not observed in this area. A shallow, vegetated stormwater drainage swale is also located in this area.

What appears to be a small spring/seep discharge area is located along the east side of the northern third of the parcel and originates near a small pile of logs near the Site‟s eastern boundary. Some water was observed flowing west from the presumed groundwater discharge point in an associated channel. This water appeared to discharge into another small hole in the ground during the 21 April Site reconnaissance, although during wetter conditions, the channel would likely allow water to flow down the slope towards Aires Run. A small stone and/or concrete block foundation was observed within a group of trees along the eastern side of the Site and near the Quarters residence and barn adjacent to its southeast corner. This foundation appeared to be part of an old farm outbuilding, or an old septic tank, likely associated with the residence and barn at Quarters 35. This structure did not appear to meet the description of a former tear gas chamber building that was reportedly present onsite at one time (see Sections 3.1.3 and 3.1.4 of this report). This area was previously assessed for cultural and archaeological resources, but this foundation was reportedly not identified as a relevant cultural or archaeological feature. A depression characteristic of a former access lane was observed at the southern end of the Site; this feature likely allowed for vehicular access to the Site from Coulter Road. Obvious visual or olfactory signs of impact to the environment (dead/discolored vegetation, soil staining, etc.) were not observed during the Site reconnaissance.

4.2 Analysis of Observations

No obvious evidence of spills, releases, or illegal dumping was observed on the Target Site during the Site reconnaissance. There was no obvious visual evidence of, or reports of, improper disposal of solid waste or military munitions, as defined in 40 CFR 261.2 and 40 CFR 266.202, respectively.

4.3 Interviews

General information in regards to the Target Site was derived from interviews with Mr. David Edwards (LTC, Ret.), former Director of Public Works for the Fort Indiantown Gap Training Site (FTIG-TS); Mr. Brian Shutter, Field Construction Maintenance Manager; and Mr. John Fronko, Environmental Program Manager. Additional interviewees are noted in subsequent sections of this report, where applicable.

Prior to the Commonwealth of Pennsylvania‟s purchase of lands for what would become FTIG, much of the area around the Target Site was either forested or utilized for agricultural purposes. The range areas were first constructed in the late 1930s, and the Target Site and surrounding area were likely largely utilized for billeting purposes during the World War II-era, with several barracks being constructed on the Target Site and adjacent areas in the 1940s. The Target Site and adjacent areas have reportedly been utilized for general military training purposes since their first development. The off-Post areas located within the Study Area (south of the Target Site) were historically utilized as agricultural and residential properties, and, later, as part of Indiantown Gap National Cemetery. Multiple World War II-era buildings (including billeting, administrative, and storage facilities) formerly located in multiple places within FTIG‟s Cantonment were demolished starting in the late 1990s and into the mid-2000s, from approximately 2001 to 2006. The Site and its surrounding area have historically been used for administrative, billeting, physical training, and related functions.

According to Mr. Edwards, the Site has historically been utilized for dismounted small military unit maneuvers training (a 1977 Installation Map describes Training Area A-22 as a "small unit training area"), including field maneuver exercises. Mr. Edwards indicated that the Site previously contained a small latrine building, which was demolished sometime previously. Mr. Edwards stated that to his knowledge, there was not a tear gas chamber building formerly present on the Site, although it was possible, but very unlikely for such a facility to be located in the Cantonment area.

Mr. Shutter and Mr. Sam Eisenhour (of PADMVA"s Bureau of Reservation Maintenance) were interviewed about the dirt pile located on the north side of the Site, near Service Road. Mr. Eisenhour stated that the pile has been present on the Site since the federal government turned control of FTIG over to the PANG. He indicated that this pile is likely soil, rock, and other natural "fill material". No indications of environmental concerns, such as chemical containers, stained soil, old drums, etc. were observed in the vicinity of this soil pile during the Site reconnaissance.

5.0 LOCAL, STATE, AND FEDERAL REGULATORY DATABASE SEARCH

DMVA personnel conducted a state and federal agency database review on May 30 and June 3, 2014, to identify and evaluate environmental conditions and potential environmental risks to the Target Site within the Study Area. Results of this data review are described below. The following text describes the results of a search of local, state, and federal databases, where available, for environmental concerns associated with the Target Site and adjacent properties that may have the potential to impact the Site.

5.1 Superfund Sites List, National Priorities List, and CERCLIS Database

A review of the United States Environmental Protection Agency"s (EPA"s) active and archived Superfund Sites Lists and CERCLA Information System (CERCLIS) database did not indicate that the Site is a current or former Superfund site, nor is it listed on EPA"s National Priorities List (NPL). No active or archived Superfund or NPL sites were otherwise identified within the Study Area. However, the former unpermitted landfill (EPA ID PA8210020444) located approximately 1.2-miles northeast of the Target Site at FTIG is listed as an archived site in the Superfund Information System. This facility is not expected to have obviously impacted the Target Site, based on currently available information, due to distance, topography, and/or ongoing remedial/monitoring activities. Based on the available information, no additional active/archived Superfund or other listed or delisted NPL sites were identified within a one-mile radius of the Site.

5.2 Resource Conservation and Recovery Act Related Information

According to a search of EPA"s Resource Conservation and Recovery Act database (RCRAInfo) and associated Enviromapper application, several small quantity generators (SQG) and conditionally exempt small quantity generators (CESQG) of hazardous waste are located within the installation boundary at FTIG (Table 4). Multiple PAARNG facilities, the Pennsylvania Air National Guard (PAANG), and the United States Army Reserve

(USAR) enclaves at FTIG have EPA RCRA ID numbers. The following Table 4 lists the active RCRA Generators at Fort Indiantown Gap. All hazardous and residual waste operations occurring at FTIG must adhere to the PAARNG Hazardous and Residual Waste Management Plan dated January 2011.

TABLE 4 – Fort Indiantown Gap RCRA Generator ID List
[* = Locations/facilities outside one-mile radius from Target Site]

FACILITY ADDRESS	EPA I.D. NUMBER	GENERATOR STATUS
Fort Indiantown Gap, Army Aviation Support Facility (AASF) #1, BLDG 19-101, Range Road, Fort Indiantown Gap	PA2211890049	SQG
*PA Army National Guard Combined Service Maintenance Shop (CSMS) East, Bldg. 10-102, Fort Indiantown Gap	PA6211890052	SQG
*PA Army National Guard Maintenance Shop (RETROEUR Repair Facility), Bldg. 13-165, Fort Indiantown Gap	PA0000960799	CESQG
Fort Indiantown Gap Training Site, Bldg. 11-19 Utility Road, multiple facilities at FTIG	PA4214020444	SQG
*PA Army National Guard Maintenance Shop, Bldg. 19-107, Range Road, Fort Indiantown Gap	PA7211890051	CESQG
*USAR 99th RSC ECS-24 Bldg 10-83, Fort Indiantown Gap	PA2211890056	SQG
PA Air National Guard Area 2, Fort Indiantown Gap	PA5570028824	SQG

A review of related compliance inspection and violations data in EPA‟s Enforcement & Compliance History Online (ECHO) database did not indicate the presence of any previous/historical violations at these facilities. No incidents associated with corrective actions, if any, for the noted generators are expected to have impacted the Site. No additional RCRA-related facilities of concern were identified within the one-mile search radius.

5.3 Institutional and Engineering Controls List

The Site was not identified on lists of properties with engineering or institutional controls in Lebanon County, as provided by PADEP in its engineering controls and institutional controls list, as well as, the Pennsylvania Activity and Use Limitations Registry. EPA‟s list of published institutional control site reports did not identify the Site or other facilities within the Study Area as being subject to federal institutional or engineering controls.

5.4 Formerly Used Defense Sites List

A review of the Army Corps of Engineers‟ (ACOE) Formerly Used Defense Sites (FUDS) Geographic Information System for Pennsylvania did not reveal the presence of any FUDS sites of concern on the Site or within a one-mile search radius.

5.5 National Response Center Database

A review of available records on oil and chemical releases compiled by the National Response Center (NRC) for the Fort Indiantown Gap/Jonestown area did not identify spill records associated with the Site and surrounding properties within a one-mile radius of the Target Site. Information on spill incidents within the vicinity of the Site is described in section 3.3.1 of this report.

5.6 PADEP eFACTS Database

A search of the Pennsylvania Department of Environmental Protection‟s (PADEP‟s) Environmental Facility Application Compliance Tracking System (eFACTS) did not identify records associated with the Site. However, several facilities on Fort Indiantown Gap are listed in this database, typically due to their use of a permit (in such areas as construction, stormwater management, and storage tanks), or inspection by a regulator such as PADEP or EPA. Violations noted during inspections were either of a technical or administrative nature, were listed as being corrected, and/or otherwise would not generally have the ability to impact the Target Site due to one or more factors.

5.7 Non-CORRACTS Treatment, Storage, and Disposal Facilities List

Based on a review of PADEP‟s current Commercial Hazardous Waste Treatment, Storage, and Disposal (TSD) facilities list, no hazardous waste (HW) TSD facilities were identified on the Site or within the one-mile search radius. In addition, no active solid waste landfill (SWL) operations, including resource recovery facilities, construction/demolition waste landfills, and municipal waste landfills are located within 0.5-miles of the Site. A former unpermitted landfill is located in the easternmost portion of FTIG‟s Cantonment, outside of the one-mile radius around the Site. This landfill is unlined, and is associated with a periodic groundwater monitoring program, in accordance with PADEP requirements prior to formal regulatory closure. Impacts to Area 4 from this landfill have not been identified to date.

5.8 Leaking Underground Storage Tank (LUST) Incident List

A review of PADEP‟s current Storage Tank Cleanup Locations list on June 3, 2014, indicated that six locations within the Study Area (all within FTIG‟s installation boundary) contain USTs that were previously involved in a material release to the environment. The relevant incidents include releases, as described previously in this report where applicable, from storage tanks at the AASF #1 in Area 19, a release at the fueling point in Cantonment Area 6, and releases at the Pennsylvania Air National Guard facilities in Cantonment Areas 1 and 2. PADEP utilizes a system of status codes when describing incident priority, location condition, and/or remedial progress for known storage tank release sites.

The codes and their descriptions are as follows:

1. **Interim Remedial Actions Not Initiated** – No physical activity to remove contaminants has been initiated.
2. **Interim or Remedial Actions Initiated** – At a confirmed release, site characterization and/or physical activity to remove contaminants are underway.
3. **Attainment Monitoring in Progress** – Demonstration of an Act 2 groundwater standard is being conducted.
4. **Cleanup Completed** – Removal of contaminants to applicable cleanup standards has been demonstrated to PADEP.
5. **Inactive** – Incidents in this status have not achieved „cleanup completed" status. However, these incidents have been determined by PADEP to be low priority for corrective action as a result of meeting the following criteria:
    - No product in the leaking storage tank system;
    - No known free product in the environment ;
    - Risks to human health and the environment have been mitigated including vapor/fire/explosion hazards, contaminated drinking water supplies, and releases to surface waters;
    - Strong potential for receptors to be impacted is not known to exist;
    - Responsible party is not performing or planning to perform corrective action;
    - The case is at least two (2) years old.
6. **Suspected Release** – Investigation Pending or Initiated
7. **Suspected Release** – Investigation Complete, No Release Confirmed
8. **Administrative Close Out (ACO)** – A facility where multiple releases have occurred and corrective action is ongoing. The prior release incidents will be assigned the ACO status. The most recent release incident will remain open.

The tank incidents noted in for the AASF #1 have statuses of "2 – **Interim or Remedial Actions Initiated**" and "4 – **Cleanup Completed**"; and the tank incidents noted for the Area 6 fueling point and Air Guard facilities have a status of "4 – **Cleanup Completed**". These tank incidents do not represent obvious risks to the Site, although residual impact to the subsurface may still exist in these areas.

Multiple aboveground and underground storage tanks are currently located within the Study Area. No specific information or observations collected during this investigation identified any obvious releases related to these storage tanks that are expected to affect the Site. No unregulated leaking tanks are known to exist within the Study Area.

5.9 State Hazardous Sites Cleanup List

A review of PADEP‟s Hazardous Sites Cleanup Act (HSCA) Response Actions List did not identify any properties within the one-mile search radius that are expected to have impacted the Site.

5.10 Local Records Review

Additional local record sources concerning the environmental condition of the Target Site were not identified during this investigation.

5.11 Analysis of Regulatory Database Search

Multiple facilities within the search radius are regulated under one or more state and/or federal environmental programs. Violations of related state and federal regulations, or other incidents that have the potential to affect the environment, were noted at one or more of these facilities. Based on readily available information about these incidents they are not anticipated to have affected the Target Site. The Target Site in Cantonment Area 10 was not identified within any of the noted databases during this review.

6.0 DATA REVIEW AND EVALUATION

6.1 Summary of Relevant Data

Based on a review of applicable information reviewed during this investigation, the data described in sections 2.0 and 3.0 of this report reveal the following:

1. The Site has not historically been highly developed with manmade structures, although a field latrine building, access lanes, and a portion of Anderson Road were present onsite at one time. The Site was reportedly used for small military unit maneuvers training likely since the 1940s. Prior to this use (as part of a military training facility), the Site was likely utilized for agricultural and residential purposes. The Site has not historically been used for vehicle/equipment maintenance or other uses that would typically include the presence of one or more hazardous substances.
2. A latrine building was formerly located onsite and was demolished sometime in 1989. A former gas chamber building may have been located onsite at one time. A July 2000 Site Investigation of the reported former gas chamber area did not identify concentrations of applicable hazardous substances above their respective Pennsylvania Department of Environmental Protection Statewide Health Standards, nor obvious visual or olfactory signs of impact to the ground or subsurface in this area.
3. Records of significant, obvious spills of petroleum products or other hazardous substances on the Site were not found within available Agency-held files. A review of relevant local, state, and federal environmental databases did not conclusively identify the Site as a parcel of concern with respect to current or historical environmental releases.

4. Observations made during the Site reconnaissance did not suggest the presence of obvious environmental concerns associated with the Site.

6.2 Potential Environmental Concerns Posing Risks to Workers and Occupants

Obvious environmental concerns that may pose risks to workers on and occupants of the Site were not identified during this investigation. It is likely potential hazards, if identified, can be managed safely during land disturbance activities on the Site. Proper personal protective equipment and health and safety precautions should be utilized by all onsite workers prior to and during all earth disturbance and construction activities. If hazardous substances, unexploded ordinance (UXO), or other unidentified objects, or subsurface media seemingly impacted by hazardous substances, are encountered during construction, all onsite personnel (including contractors, civilian, and military personnel) working on the Target Site, will stop work and immediately notify the FITG Fire Department, Range Control, the Bureau of Environmental Management, and other applicable offices, as necessary. Proposed environmental protection provisions for the parcel and real estate transaction are attached as Appendix G.

7.0 FINDINGS AND CONCLUSIONS

Evidence of significant historical, current, or continuing environmental incidents or UXO that have not been remediated or are otherwise not being currently addressed, including significant hazardous material releases on the Site was not identified during this investigation. However, due to the historical use of much of the Study Area as part of military operations, minor releases of POLs or other hazardous substances may have occurred throughout the Study Area over time. Obvious significant recognized environmental conditions (RECs) were not identified on the Site during this investigation; however, a former gas chamber building may have been located on the Site at one time. A July 2000 Site Investigation of this location did not indicate the presence of an obvious REC related to this reported former feature.

Based on the information obtained during this investigation, the environmental condition of property (ECOP) area type for the majority of the Site (the proposed Cantonment Area 4 Solar PV Power Purchase Agreement project parcel) at Fort Indiantown Gap is designated as an ECOP Area Type 1 parcel. This classification indicates that the ECOP Area Type 1 parcel is an area “where no release or disposal of hazardous substances or petroleum products has occurred (including no migration of these substances from adjacent areas)”. This determination was made based on the information gathered during this investigation, including information on the historical use of the Target Site, a review of files held by the Bureau of Environmental Management, a review of aerial photographs and historical maps, and environmental information collected from multiple regulatory databases, as described above.

Appendix A

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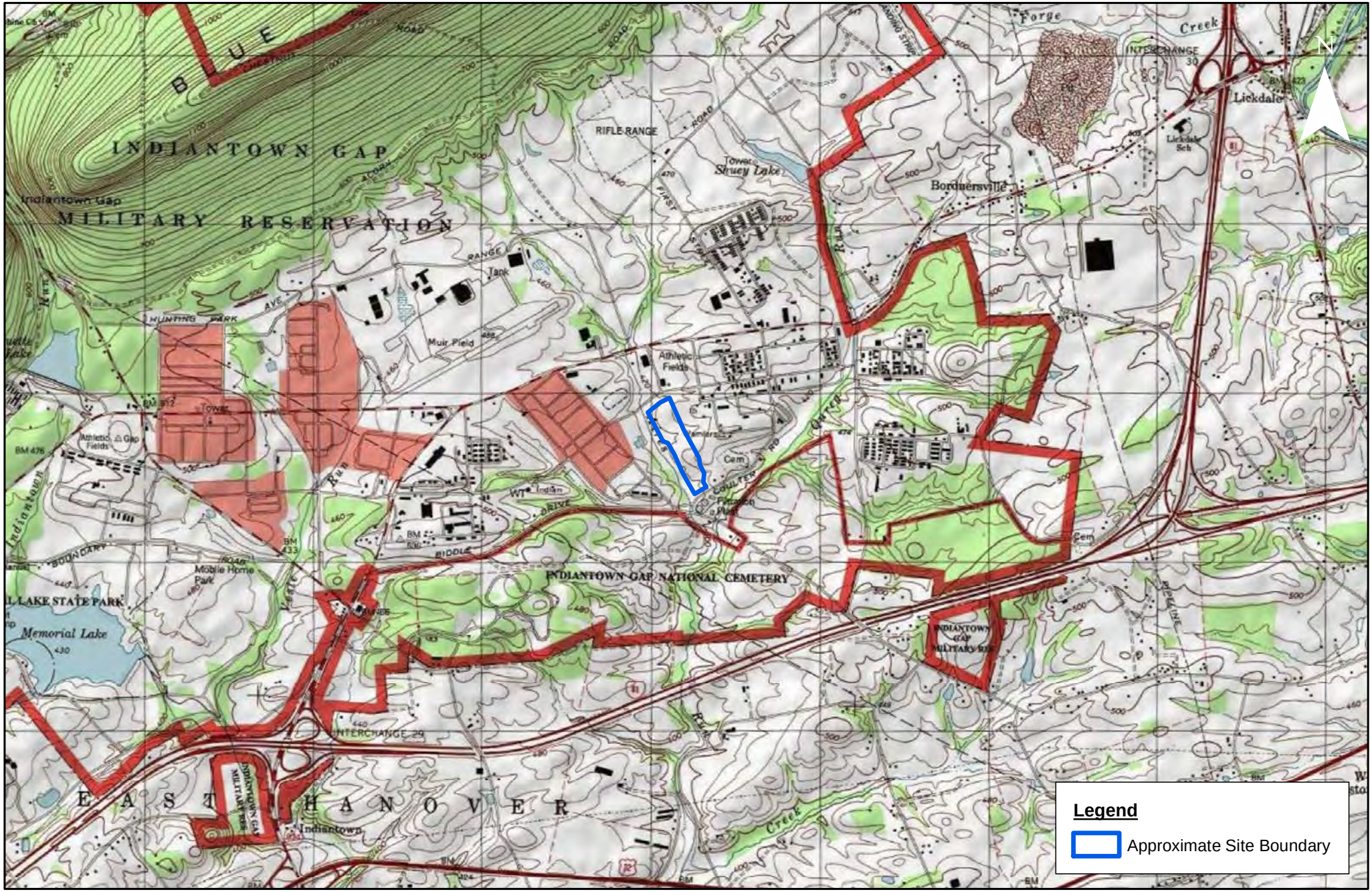
Appendix B

Figures



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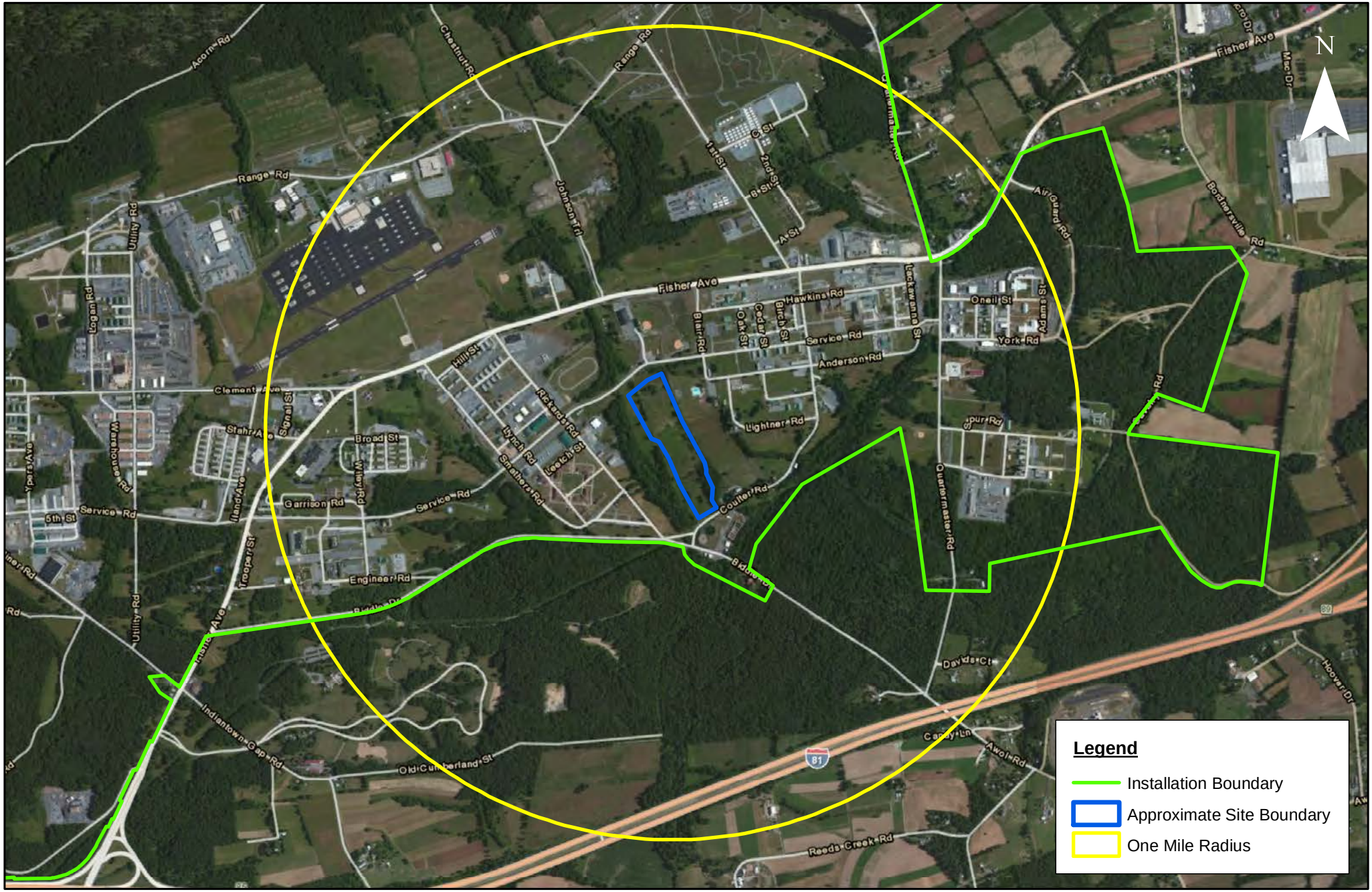
Prepared by PADMVA-OFE-BEM
COMM: (717) 861-2634 DSN: 491-2634
Created: 6 June 2014 drv

0 1,100 2,200 4,400 6,600 8,800 Feet

Figure 1: Site Location Map
National Guard Training Center - Fort Indiantown Gap
Proposed Area 4 Solar Array PPA
Union Township, Lebanon County, Pennsylvania

The information on this map is for planning purposes only. This information is not intended for use for legal boundary definitions, regulatory interpretation, or parcel-level analysis. This map is a living document, in that it is intended to change as new data become available and are incorporated into the Enterprise GIS database.



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NAD 1983 UTM Zone 18N
Prepared by PADMVA-OFE-BEM
COMM: (717) 861-2634 DSN: 491-2634
Created: 6 June 2014 drv

0 700 1,400 2,800 4,200 5,600 Feet

Figure 2: Study Area Map
National Guard Training Center - Fort Indiantown Gap
Proposed Area 4 Solar Array PPA
Union Township, Lebanon County, Pennsylvania

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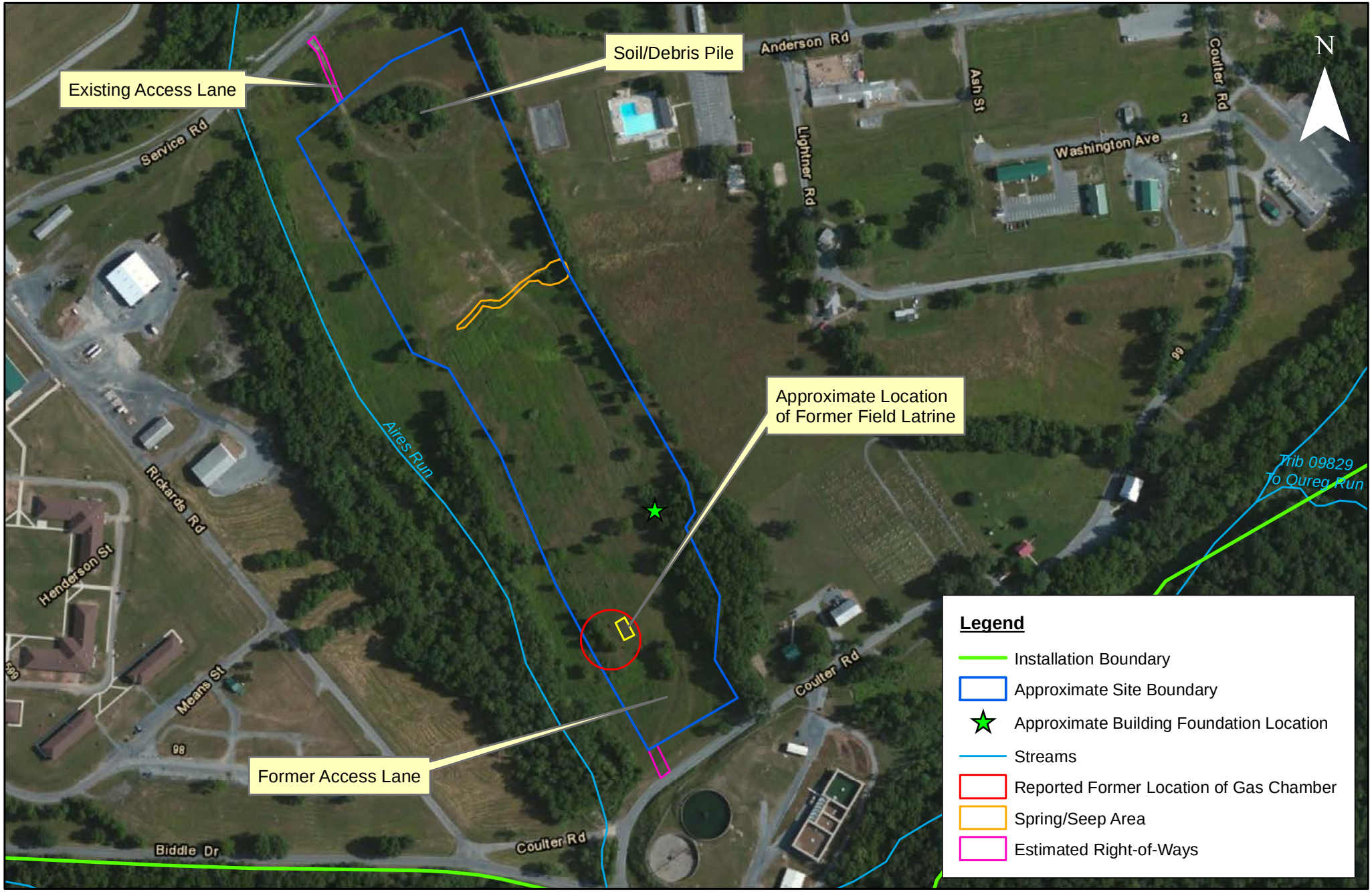

PENNSYLVANIA
NAD 1983 UTM Zone 18N
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COMM: (717) 861-2634 DSN: 491-2634
Created: 6 June 2014 drv

0 150 300 600 900 1,200
Feet

Figure 3: Site Features Map
National Guard Training Center - Fort Indiantown Gap
Proposed Area 4 Solar Array PPA
Union Township, Lebanon County, Pennsylvania

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Created: 6 June 2014 drv

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Feet

Figure 4: ECOP Category Map
National Guard Training Center - Fort Indiantown Gap
Proposed Area 4 Solar Array PPA
Union Township, Lebanon County, Pennsylvania

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Appendix C

Reported Former Tear Gas Chamber Site Documents Summary

(From Ogden reports, June 2000 and July 2001.)

FINAL
PRELIMINARY ASSESSMENT

NATIONAL GUARD TRAINING CENTER – FORT INDIANTOWN GAP

LEBANON AND DAUPHIN COUNTIES, PENNSYLVANIA

Prepared for:
NATIONAL GUARD BUREAU (NGB)
PENNSYLVANIA ARMY NATIONAL GUARD (PAARNG)
COMMONWEALTH OF PENNSYLVANIA

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- PA Issues

Environmental concerns were noted and were not associated with an active range, did not involve petroleum contamination, and were historical in origin (i.e. originated prior to 1984). 35 pAOIs met this criteria. However, after closer review, eleven pAOIs were eliminated from the PA list. These eleven sites and the explanations for their removal from the PA list are summarized in **Table 1-1**. The remaining 24 sites are considered AOIs and are discussed in this PA report.

Table 1-1. Summary of AOIs with No Further Action Planned

No.	AOI ID #	Name of Site	Explanation
1	A-11-7-5	Trash Pile	These 10 sites were determined to be operational issues and are discussed in detail in the Operational Issues report.
2	A-13-6-5	Pesticide/Herbicide Shop	
3	A-20-9-4	Oil/Water Separator at Building 17-40	
4	C-4-4-3	Soil and Debris Piles, Small Group	
5	C-4-7-3	Soil and Debris Piles, Large Group	
6	O-2-55-4	Oil/Water Separator at Building 10-102	
7	O-3-35-4	EDSI Oil/Water Separator	
8	O-3-36-4	Acid Neutralization Pit	
9	O-3-39-4	AASF Maintenance Building	
10	O-3-41-4	Oil/Water Separator at Building 19-101	
11	O-2-49-4	PCB Spill at Building 11-88	Following submittal of the Draft Final PA, additional documentation was found clearing this AOI of environmental concern. Results from an SI of this site (IRP Site #13) indicate that no further investigation is necessary (Woodward Clyde 1998).

1.2.2 Preliminary Assessment

The 24 AOIs determined to be PA issues are summarized in **Table 1-2**. A detailed PA was performed on these 24 sites. The PA process consisted of the following activities:

- Performed additional record searches;
- Interpreted aerial photographs;
- Interviewed NGTC-FTIG personnel;
- Visually inspected the site;
- Compiled and evaluated historical data for each site in order to assess the types and volumes of materials disposed; and,
- Identified potential contaminant sources and obtained a preliminary estimate of the nature and extent of contamination, if any, at each site.

The information gathered as part of this assessment are discussed in Sections 3.1 through 3.24 in this PA report. The specific site location, description, operational history, waste characteristics, and contamination pathways (i.e. groundwater, surface water, soil and air) are discussed for each individual AOI. The background information about NGTC-FTIG as a whole is discussed in Section 2. Data concerning NGTC-FTIG location, activities, population, geology, groundwater,

surface water, and sensitive environments are depicted in **Figures 2** through **7** (**Appendix 1**). The 24 individual AOI site locations are depicted in **Figure 8**. GIS technology was used to compile the background data and generate the resulting figures. Section 4.0 presents a summary of these results as well as the recommended level of effort for the site inspection at each of the 24 sites.

Table 1-2. Summary of AOIs determined to be PA issues at FTIG

No.	AOI ID #	Name of Site
1	A-11-8-5	Trash Pile and Illegal Dumping Site
2	A-13-2-5/A-13-3-5	Staging Area for Contaminated Soil, Adams & Cumberland Streets
3	O-4-22-5	Staging Area for Contaminated Soil, Smathers and Lynch Roads
4	A-19-6-4	Staging Area for Contaminated Soil, Artillery Road
5	A-15-5-5	Stream Located South of the Former FTIG Landfill
6	A-17-2-5	Former Wash Rack
7	A-17-8-5	Former Transportation Motor Pool
8	O-1-5-4	Former Coal/Diesel Central Boiler Plant
9	O-2-48-4	Possible Former Dry Cleaning Plant
10	O-2-52-4	Concrete Pad Near Building 11-1
11	O-2-50-4	Old Federal Photography Lab
12	O-2-51-4	Combined Support Maintenance Shop (CSMS)
13	O-2-53-4	PCB Spill at Hollywood Trailer Park
14	O-2-56-4	Former Pesticide/Herbicide Shop
15	O-3-42-4	ECS-24 Oil/Water Separator
16	O-4-1-4	Staging Area for Discarded Drums, Equipment, Substances
17	O-4-23-4	Maintenance Building 11-70
18	O-4-24-4	Oil/Water Separator at Building 11-76
19	O-4-25-4	Motor Pool, Building 9-59
20	O-4-26-4	Sign Shop, Building 11-18
21	O-4-27-5	Car Care Center
22	O-5-17-5	Former Incinerator
23	O-5-18-5	Waste Water Treatment Plant Sludge Drying Beds
24	O-5-19-5	Former Gas Chamber Building

handled by an overflow trough which is located on the southwest side of the treatment plant building. This overflow and all other flow is discharged two miles away from the WWTP to the Swatara Creek. During the site visit, paper and other debris were observed at the discharge point.

3.23.4 Groundwater, Surface Water, Soil, and Air Pathway Conclusions

3.23.4.1 Groundwater Pathway Conclusions

The release of hazardous substances from the site to the local groundwater is suspected due to possible discharge of contaminants directly to the ground surface from the suspect integrity of the infrastructure of the WWTP. Previous leaching of the sludge drying beds is suspect due to the age of the WWTP. In addition, historical disposal practices of contaminated materials, such as flushing of chemicals in sinks and drains, may have affected the groundwater through the leaching of sludge remains within the sludge drying beds.

3.23.4.2 Surface Water Pathway Conclusions

The release of hazardous substances from the site to surface water is suspected due to possible discharge of contaminants directly to the ground or to Aires Run which is located approximately 100 feet down gradient from the suspected leaching sludge drying beds. The site is located outside the 15-mile surface water primary target reach.

3.23.4.3 Soil Pathway Conclusions

The release of hazardous substances from the site to soil is suspected due to possible discharge of contaminants directly to the ground surface though the integrity of the sludge drying beds and associated piping.

3.23.4.4 Air Pathway Conclusions

No release to the air is suspected. There were no odors noted during the site reconnaissance.

3.23.5 Sensitive Environments

Sensitive areas for the site include a state listed plant, the yellow tinker's-weed (Triosteum angustifolium) within the near vicinity of the site. Although the species is state listed, it is not considered to be of concern (as listed or candidate species) on a national basis by the federal government. In addition, sensitive environments include a designated warm water fishery (Swatara Creek) within 100 feet of the site.

3.24 Former Gas Chamber Building (AOI ID# O-5-19-5)

3.24.1 Location

The site is located adjacent to Coulter Road just west of Walmer's Church/Cemetery (Historic Site/Private Property). The geographic coordinates were not taken during the Environmental

Evaluation but will be obtained during further site investigation. The location of the site is shown on **Figure 8**.

3.24.2 Site Description

The site is located in an open field area. Located to the north is a field area, to the east and west are wooded areas and to the south is Coulter Road. An old gravel road, currently overgrown with vegetation, leads from Coulter Road into the fielded area where the former gas chamber location has been identified. The area contains a hilly terrain and slopes slightly to the west to Aires Run.

The general topography of the area slopes to the west. Runoff from the site appears to flow west following moderate ground swales approximately 400 feet to Aries Run.

There are no additional buildings or other structures within the immediate area of the property. There are no access restrictions or barriers for access to the property. The site is located within an area that is accessible to the public.

3.24.3 Operational History and Waste Characteristics

This site was identified from the Post "General Road and Railroad Map" (USACE 1978). The gas chamber building has been razed. Environmental concerns include the possible mishandling of hazardous materials that may have led to spills. In addition, during demolition, some materials deposited on the building structure may have been loosened and deposited within on site soils.

3.24.4 Groundwater, Surface Water, Soil, and Air Pathway Conclusions

3.24.4.1 Groundwater Pathway Conclusions

The release of hazardous substances from the site to the local groundwater is suspected due to the potential mishandling of hazardous materials within the gas chamber area and the deposition of materials to ground surface during the demolition of the building.

3.24.4.2 Surface Water Pathway Conclusions

The release of hazardous substances from the site to surface water is suspected due to the slight slope of the terrain, and moderate ground swales that lead surface water approximately 400 feet west to Aires Run. The site is located outside the 15-mile surface water primary target reach.

3.24.4.3 Soil Pathway Conclusions

The release of hazardous substances from the site to the soil is suspected due to the potential mishandling of hazardous materials in the gas chamber area and the deposition of materials to ground surface during the demolition of the building.

Preliminary Assessment/Site Investigation
Fort Indiantown Gap Military Reservation
FIELD DATA REPORT FOR SITE ID O-5-19-5 (Pre-1984 CERCLA)

I. BACKGROUND INFORMATION USED TO LOCATE SITE

DESCRIPTION OF SITE LOCATION

SOURCE OF SITE INFORMATION: Identified from file review

II. SITE DESCRIPTION

NAME OF SITE: Former Gas Chamber Building

☑ CHECK IF A CERCLA-ELIGIBLE SITE

☐ CHECK IF IN THE WOODWARD-CLYDE REPORT

LOCATION DESCRIPTION OF THE SITE: 1,000-1,500 feet from north side of Coulter Road and 500-750 feet west of Walmer's Church and Cemetery.

DATE OF INVESTIGATION: 07/22/1999 INVESTIGATOR #1 TAT INVESTIGATOR #2: KWC

LATITUDE No reading taken LONGITUDE No reading taken

IDENTIFY TYPE OF SITE: Former gas chamber building

☐ CHECK HERE IF SITE IS ACTIVE

BEGINNING YEAR OF OPERATION: Unknown ENDING YEAR OF OPERATION: Unknown

PHYSICAL DESCRIPTION OF SITE (Dimensions, Size, Buildings, etc.): Former gas chamber building. Building gone; contaminants exposed to the elements.

DESCRIPTION OF SETTING (Topography, Land Use): Grassy hillside area

ADJACENT OR NEARBY PROPERTIES: Grassy field and wooded areas

SITE ACCESSIBILITY (access restrictions, natural barriers): No restrictions

III. OPERATIONAL HISTORY

CURRENT OPERATIONAL ACTIVITY: Open field, remains of former gravel road can be intermittently seen, but is heavily overgrown with vegetation

FORMER OPERATIONAL ACTIVITY: Former gas chamber

IV. WASTE CHARACTERISTICS

REGULATORY ACTIVITIES (IF APPLICABLE)

A. PAST PERMITS: None

B. CURRENT PERMITS: None

C. VIOLATIONS (IF ANY): None

D. INSPECTIONS BY LOCAL, STATE, OR FEDERAL AUTHORITIES:	n/a
CURRENT WASTE QUANTITIES AND PHYSICAL STATE	None
CURRENT CONTAINMENT OF WASTES:	n/a
PAST WASTE QUANTITIES AND PHYSICAL STATE:	Unknown
PAST CONTAINMENT OF WASTES:	Unknown
IS CURRENT WASTE ACCESSIBLE TO PUBLIC?	n/a
DESCRIPTION OF PRIOR SPILLS:	Unknown
SIZE/QUANTITY OF SPILLS:	Unknown
EMERGENCY REMOVAL ACTIVITIES RELATED TO SPILLS:	Unknown

V. GROUNDWATER INFORMATION:

ANY WELLS IN IMMEDIATE VICINITY?	None observed
DISTANCE TO NEAREST WELL:	Unknown
IS RELEASE OF HAZARDOUS SUBSTANCE TO GROUNDWATER POSSIBLE?	Unknown

VI. SURFACE WATER INFORMATION

DISTANCE TO NEAREST SURFACE WATER:	2,500 feet southwest
NOTES ABOUT OVERLAND DRAINAGE ROUTE:	steep slope towards the southwest
WATER AND/OR SEDIMENT DISCOLORATION?	No
IS WILDLIFE UNNATURALLY ABSENT? RELEVANT NOTES:	No
ANY DEPOSITION OF WASTE INTO SURFACE WATER?	No
ARE THERE GROUNDWATER INFLUENCES ON SURFACE WATER?	Unknown
DISTANCE FROM SITE TO POINT OF ENTRY TO SURFACE WATER:	2,500 feet southwest
IS RELEASE OF HAZARDOUS SUBSTANCE TO SURFACE WATER POSSIBLE?	Unknown

VII. SOIL EXPOSURE

ANY SIGNS OF STAINED SOIL OR STRESSED VEGETATION?	No
RISK OF HAZARDOUS MATERIAL MIGRATION TO RESIDENCES, SCHOOLS, OR DAYCARE?	No
HISTORY OF FLOODING OR HAZARDOUS OVERFLOW ONTO ADJACENT PROPERTIES?	No
PREVIOUS SURFACE SOIL SAMPLING? RESULTS?	No
SCHOOLS, DAY CARES OR PLAYGROUNDS IN AREA?	Day care at FTIG, 1.6 miles northwest; Residences, 2,000 feet east
IS RELEASE OF HAZARDOUS SUBSTANCE TO SOIL POSSIBLE?	Yes

VIII. AIR EXPOSURE

CURRENT NOTICABLE OR REPORTED ODORS?	No
ANY OBSERVATIONS OF HAZARDOUS RELEASE TO AIR?	No
CIRCUMSTANTIAL EVIDENCE OF RELEASE TO AIR?	No
IS RELEASE OF HAZARDOUS SUBSTANCE TO AIR POSSIBLE?	No

IX. EMERGENCY RESPONSE INFORMATION

ANY IMMINENT DANGERS OR REQUIRED EMERGENCY RESPONSES?	No

DRAFT FINAL
SITE INSPECTION

NATIONAL GUARD TRAINING CENTER AT FORT INDIANTOWN GAP
LEBANON AND DAUPHIN COUNTIES, PENNSYLVANIA

Prepared for:
NATIONAL GUARD BUREAU (NGB)
PENNSYLVANIA ARMY NATIONAL GUARD (PAARNG)
COMMONWEALTH OF PENNSYLVANIA

Prepared by:
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July 2001

EXECUTIVE SUMMARY

Ogden Environmental and Energy Service Company, Inc. (Ogden) conducted a Preliminary Assessment (PA) from April 1999 through July 1999. The PA was conducted as part of a due diligence assessment of the property being transferred from the Department of the Army to Pennsylvania Department of Military and Veteran Affairs. This transfer occurred because the 1995 Base Realignment and Closure (BRAC) Commission recommended partial closure of the National Guard Training Center (NGTC) at Fort Indiantown Gap (FTIG) in Lebanon County, Pennsylvania. The PA was performed on specific areas that may have been potentially contaminated within the approximate 17,100 acres of the transferred property.

Ogden performed an Environmental Evaluation to evaluate potential environmental issues across NGTC-FTIG property. Ogden compiled a list of 287 potential areas of interest (pAOIs) and visited each pAOI and assessed the potential environmental concerns associated with each area. Through a specified process, Ogden evaluated each pAOI and found 24 sites to be PA issues that require further assessment. These PA sites encompass the following issues:

- Maintenance buildings and related maintenance activities, including oil/water separators, paint storage areas, and vehicle wash pads.
- Storage and disposal areas used in the past, including the former FTIG landfill, several soil staging areas, and soil and debris piles.
- Areas where spills have occurred in the past, including fuel oil and PCB spills.
- FTIG operations both ongoing and historic: current waste water treatment plant sludge drying beds, pesticide/herbicide mixing shop, former gas chamber and chemical warfare storage locations, old incinerator and boiler locations, and previous dry cleaning and photography lab facilities.

A detailed PA was performed on these 24 sites, and information was gathered in the following manner:

- Performed additional record searches;
- Interpreted aerial photographs;
- Interviewed NGTC-FTIG personnel;
- Visually inspected the site;
- Compiled and evaluated historical data for each site in order to assess the types and volumes of materials disposed; and,
- Identified potential contaminant sources and obtained a preliminary estimate of the nature and extent of contamination, if any, at each site.

The site specific information such as location, description, operational history, waste characteristics, and contaminate pathways (i.e., groundwater, surface water, soil and air) are discussed in the Final PA dated June 2000. This site specific information was used to evaluate the level of effort needed for conducting a Site Inspection (SI).

The purpose of the SI was to determine if historical activities at each of the 24 sites have impacted the environment. To assure the proper assessment of these 24 sites, Ogden prepared a

Site Inspection Work Plan (SIWP) which detailed the assessment methodology to be followed in carrying out a SI. The SIWP was reviewed by NGB and PADEP and finalized in June 2000.

In accordance with the approved SIWP, Ogden carried out the Work Plan specifics to best of their abilities. There were instances were the field crews deviated from the approved SIWP. These specific deviations are described in detail in each site specific section. Ogden performed the field sampling activities from July 11, 2000 to July 21, 2000. Soil boring advancement was performed by Eichelbergers Inc. of Mechanicsburg, Pennsylvania (Eichelbergers), the Geoprobe drilling subcontractor. Soil, sediment, groundwater, and surface water samples collected during this investigation were submitted to CEIMIC Laboratory in Narragansett, Rhode Island.

Ogden and Eichelbergers personnel returned to the Post on November 7, 2000 to recollect select soil samples for volatile organic analysis. Select sample recollection was performed due to a laboratory error with regard to holding time exceedances. The resampling effort was completed by November 9, 2000.

The soil results were compared to PADEP's Land Recycling Program and Environmental Remediation Standards Act (Act 2). Applicable Act 2 standards are contained in Pennsylvania Bulletin, Vol. 27, No. 33, August 16, 1997, Appendix A, Table 3B, Non-Residential Medium Specific Concentrations (MSCs) for Organic Regulated Substances in Soil (Soil to Groundwater Values), and Table 4B, MSCs for inorganic regulated substances in soil (Soil to Groundwater Values).

The groundwater results were compared to the Act 2 standards contained in Pennsylvania Bulletin, Vol. 27, No. 33, August 16, 1997, Appendix A, Table 1, Organic Regulated Substances in Groundwater, and Table 2, MSCs for Inorganic Regulated Substances in Groundwater.

The PADEP Act 2 does not include standards for sediment sample analytical result comparison. Therefore, by default, the USEPA guidelines, The National Sediment Contaminant Point Source Inventory (EPA 832-R-97-008), September 1997, were used for result comparison.

The PADEP Act 2 also does not include standards for surface water sample analytical result comparison. Therefore, the Water Quality for Toxic Substances, Fish and Aquatic Life Criteria, Criteria Continuous Concentrations and Criteria Maximum Concentrations, Pennsylvania Code, Title 25, Chapter 16, Appendix A, Table 1, dated June 20, 1998 were used for result comparison.

Based on analytical results from the 24 sites and background sampling locations, 11 of the 24 sites had constituent concentrations that were either below the laboratory Method Detection Limit (MDL), or if above the MDL, were below their respective media action levels. The other 13 sites exhibited metals, SVOCs, and/or pesticides in soil and sediment at concentrations above the respective media action levels. However, only 5 sites exhibited constituents not associated with the project's background data set. The five sites are as follows:

- O-5-17-5: Former Incinerator
- A-13-2-5/A-13-3-5: Staging Area for Contaminated Soil
- O-2-56-4: Former Pesticide Shop
- O-4-1-4: Staging Area for Contaminated Soil
- O-4-24-4: Oil/Water Separator at Building 11-76

Table 3-2. Sampling Information Summary (continued)

AOI ID #	Site Description	Sample Location	Laboratory Sample ID	Sample Matrix				Sample Parameters						
				Ground water	Soil (depth, ft)	Sediment (depth, ft)	Surface Water	VOC	SVOC	Metals	PCB	Pest.	Dioxins/ Furans	Hard-ness
O-5-18-5 (cont)	Waste Water Treatment Plant, Sludge Drying Beds (cont)	MW-21	S-5-18-21-AS		0-2'			X	X	X	X	X		
			S-5-18-21-BS		WT			X	X	X	X	X		
			GW-5-18-21-S	X				X	X	X	X	X		
		SS-1 (PPE)	SD-5-18-1-S			0-0.5'		X	X	X	X	X		
		SS-2 (downstream)	SD-5-18-2-S			0-0.5'		X	X	X	X	X		
O-5-19-5	Former Gas Chamber Bldg.	GB-1	S-5-19-1-AS		0-2'				X	X[6]				
			S-5-19-1-BS		Refusal				X	X[6]				
		GB-2	S-5-19-2-AS		0-2'				X	X[6]				
			S-5-19-2-BS		Refusal				X	X[6]				
		GB-3	S-5-19-3-AS		0-2'				X	X[6]				
			S-5-19-3-BS		Refusal				X	X[6]				
		GB-4	S-5-19-4-AS		0-2'				X	X[6]				
			S-5-19-4-BS		Refusal				X	X[6]				

Footnotes:
AOI ID # = Area of Interest Identification Number as Defined in Ogden's Preliminary Assessment Report, December 1999.
WT = the sample was collected at the deepest unsaturated depth interval (just above the top of the water table)
VOC = Volatile Organic Compounds by US EPA Method 8260
SVOC = Semi-volatile Organic Compounds by US EPA Method 8270
Metals = Priority Pollutant Metals by US EPA Method 6010
PCB = Polychlorinated Biphenyls by US EPA Method 8082
Pest. = Pesticides by US EPA Method 8082
Dioxins/ Furans = by US EPA Method SW 846-8280A
Tear Gas = 2-chlorobenzaldehyde and 2-chloroacetophenone, by-products of Tear Gas, analyzed by EPA Method 8270
HA = Hand auger soil boring
GB = Geoprobe soil boring
SS = Surface Water/Sediment Sample
PPE = Probable Point of Entry
Refusal = Sample was collected at the depth interval directly above bedrock
Laboratory Sample ID = each individual sample was labeled with a code consisting of five characters, separated by hyphens, which represent part of the sample description.

Metals
A review of the analytical results revealed metal constituents detected in each soil and groundwater sample at concentrations above the laboratory MDL, but below the respective PA MSC. Each sediment sample also contained metal constituents above the MDL, but below the respective AQ-ERM value, with the exception of silver. The silver concentrations in the samples from locations SS-1 and SS-2 are 9.5 mg/kg and 7.2 mg/kg, respectively, which is above the AQ-ERM value of 3.7 mg/kg. The remaining quantified constituents are below their respective AQ-ERM value.

In addition, the constituents detected in the soil are similar to those detected in the background soil samples collected at the Post.

Semivolatiles
SVOCs were detected above the MDL in nineteen of the soil samples. The number of constituents detected in these samples ranged from one to sixteen. The quantified constituents are below their respective PA MSC. SVOCs were detected above the MDL in both sediment samples. Fifteen SVOCs were detected above the MDL in the sample collected from SS-1, the PPE location, while ten were detected above the MDL in the sample collected from SS-2, the downstream location. The quantified constituents are below their respective AQ-ERM value. No SVOCs were detected above the MDL in the groundwater samples collected.

PCBs
No PCBs were detected above the MDL in the soil samples. Aroclor-1254 was detected above the MDL in the sediment sample collected from SS-1, however, is below the respective AQ-ERM value. No other PCBs were detected above the MDL in the sediment samples. No PCBs were detected above the MDL in the groundwater samples collected.

Volatiles
VOCs were detected above the MDL in seventeen of the soil samples. The number of constituents detected in these samples ranged from one to three. The quantified constituents are below their respective PA MSC. VOCs were also detected above the MDL in the sediment samples. The sample collected from SS-1 had two VOCs above the MDL and the sample from SS-2 had one VOC above the MDL. The quantified constituents are below their respective AQ-ERM value. No VOCs were detected above the MDL in the groundwater or field blank samples.

The sampling program analytical results for this specific AOI are summarized in **Appendix 3.**

3.7.27 Former Gas Chamber Building (AOI ID# O-5-19-5)

The site is located adjacent to Coulter Road just west of Walmer's Church/Cemetery (Historic Site/Private Property). The previous operational history of the site was as a former gas chamber building. The gas chamber building has been razed. Environmental concerns include the mishandling of hazardous materials that may have led to spills. In addition, during demolition, some materials deposited on the building structure may have been loosened and deposited within onsite soils. Groundwater and soil at the site may have been adversely affected due to mishandling of chemicals and the likelihood of spills. No release to the air is suspected.

Proposed Scope of Work

The scope of work proposed for this site in the SIWP consisted of the following:

> Four Geoprobe™ borings, GB-1 through GB-4, will be advanced through the foundation of the former building. The locations of these borings are presented on Figure 26. Soil samples will be collected from the 0- to 2-foot depth interval and from the deepest unsaturated depth interval at each boring. A grab groundwater sample, HW-1, will be collected from the soil boring located closest to or directly downgradient of the potential source. If refusal is encountered at a depth more shallow than groundwater at this location, attempts to reach the depth of groundwater will be made in the remaining borings.
>
> The soil and groundwater samples will be placed in laboratory-supplied bottleware and submitted for SVOC and Metals analysis. The presence of tear gas will be tested in the SVOC analysis by analyzing for the tear gas, 2-chlorobenzaldehyde and for the environmental degradation product of CS, 2-chlorobenzaldehyde, and 2-chlorobenzoic and using the EPA Method 8270.

This scope of work served as the basis for the field sampling plan at the site, with the possibility of modification based upon site conditions encountered during the site field activities.

Site Field Activities

On July 18, 2000, Ogden personnel arrived at site O-5-19-5 with a drilling technician from Eichelbergers. A total of eight soil samples and one field blank were taken while on site. The weather was sunny and warm with slight humidity. There was a slight breeze from the north. Borings for the Former Gas Chamber Building site were advanced by the use of Geoprobe™ direct-push technology with 4-foot acetate liners. This continuous 4-foot soil sample was taken in all of the borings to the depth of refusal. Each 4-foot core sample interval from the prospective borings was screened with a PID.

During the sampling activities at the site, a total of eight soil samples were collected from four Geoprobe™ borings, GB-1 through GB-4. The boring locations are shown on Figure 26. Boring GB-1 was located on the northern end of the weathered foundation and Boring GB-2 was located within the southern portion of the weathered foundation. Boring GB-3 was located outside the weathered foundation east of Boring GB-1 and Boring GB-4 was located outside the weathered foundation east of Boring GB-2. Geoprobe™ samples were collected from the 0- to 2-foot depth interval, and from the deepest unsaturated depth interval. The depth of each boring varied upon the depth of refusal encountered. Soil types encountered at each boring location were continuously logged onto a "Surface and Shallow Soil Report Form," provided in **Appendix 2**. PID readings recorded are included on these forms.

A field blank sample was collected for VOC analysis. The soil samples were placed in laboratory-supplied bottleware and submitted for SVOC and Metals analysis. The presence of tear gas was tested in the SVOC analysis by analyzing for the tear gas byproducts 2-chlorobenzaldehyde and 2-chloroacetophenone using the EPA Method 8270.

Deviations from the Proposed Scope of Work

Based upon site conditions, the field sampling plan was modified as follows:

Borings GB-1 and GB-2 were advanced through the gravel foundation of the former gas chamber building, while GB-3 and GB-4 were advanced outside the foundation. According to the SIWP, all borings were to be advanced through the foundations, however, this was modified due to site conditions.

A grab groundwater sample, HW-1, was not collected from the soil borings because groundwater was not encountered at any of the boring locations.

The remainder of the soil samples were collected as proposed in the SIWP.

Results

The soils for the Former Gas Chamber Building site generally consisted of brown clay. Some of the clay contained gravel and some weathered bedrock. The weathered bedrock and intact bedrock at boring refusal consisted of shale. No PID readings were detected in the soil during the site activities.

Depths of refusal in the borings ranged from 4'-5" in Boring GB-3 to 7'-5" in Boring GB-2. Groundwater was not encountered at any soil boring location.

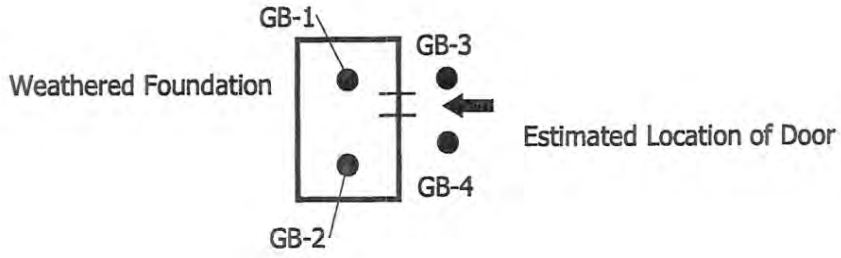
Metals

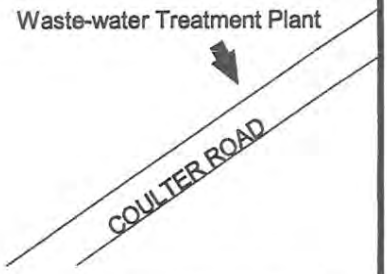
A review of the analytical results revealed metal constituents detected in each soil sample at concentrations above the laboratory MDL, but below the respective PA MSC. In addition, the constituents detected are similar to those detected in the background samples collected at the Post.

Tear Gas

No tear gas was detected above the MDL in any of the soil samples collected.

The sampling program analytical results for this specific AOI are summarized in **Appendix 3.**





Site Description	Sample Location	Laboratory Sample ID	Sample Matrix				Sample Parameters						
			Ground	Soil	Sediment	Surface	VOC	SVOC	Metals	PCB	Pest.	Dioxins/	Hardness
Former Gas Chamber Bldg	GB-1	S-5-19-1-AS		0-2'				X*	X				
		S-5-19-1-BS		Refusal				X*	X				
	GB-2	S-5-19-2-AS		0-2'				X*	X				
		S-5-19-2-BS		Refusal				X*	X				
	GB-3	S-5-19-3-AS		0-2'				X*	X				
		S-5-19-3-BS		Refusal				X*	X				
	GB-4	S-5-19-4-AS		0-2'				X*	X				
		S-5-19-4-BS		Refusal				X*	X				

* All samples - SVOC analysis for tear gas.

LEGEND

SITE O-5-19-5 ● Geoprobe Soil Boring

N

0 50 100 150 200 Feet

Fort Indiantown Gap

OGDEN ENVIRONMENTAL AND ENERGY SERVICES
Office: Louisville, Kentucky
502-257-0700

Figure 26

December 18, 2000

I:/gis/ftig/ftig_sl/viewer

ANALYTICAL RESULTS

FORMER GAS CHAMBER BUILDING

AOI ID# O-5-19-5

ANALYSIS:

SOIL SAMPLES: Metals, Tear Gas

Fort Indiantown Gap Site Investigation
Analytical Results for Detected Parameters
Former Gas Chamber Building: AOI O-5-19-5

Sample #	Matrix	Site ID	Date Sampled	Laboratory Method	Analyte	Conc.	Q	PA MSC*
FIG140	Soil	S-5-19-1-AS	07/18/2000	Metals: ILM040	ALUMINUM	20830	mg/kg	
					ARSENIC	6.2	mg/kg	150
					BARIUM	106	mg/kg	8,200
					BERYLLIUM	1.1	mg/kg	320
					CALCIUM	1800	mg/kg	
					CHROMIUM	26	mg/kg	190,000
					COBALT	16	mg/kg	220
					COPPER	35	mg/kg	36,000
					IRON	36187	mg/kg	
					LEAD	24	mg/kg	450
					MAGNESIUM	5043	mg/kg	
					MANGANESE	656	mg/kg	
					NICKEL	31	mg/kg	650
					POTASSIUM	1795	mg/kg	
					SILVER	8.4	mg/kg	84
					SODIUM	79	mg/kg	
					THALLIUM	2.2	mg/kg	14
					VANADIUM	35	mg/kg	210
					ZINC	105	mg/kg	12,000
				Tear Gas: 8270C	No target analytes reported			
FIG141	Soil	S-5-19-1-BS	07/18/2000	Metals: ILM040	ALUMINUM	18938	mg/kg	
					ARSENIC	7.2	mg/kg	150
					BARIUM	84	mg/kg	8,200
					BERYLLIUM	1.0	mg/kg	320
					CALCIUM	1610	mg/kg	
					CHROMIUM	28	mg/kg	190,000
					COBALT	22	mg/kg	220
					COPPER	53	mg/kg	36,000
					IRON	40830	mg/kg	
					LEAD	22	mg/kg	450
					MAGNESIUM	7059	mg/kg	
					MANGANESE	1024	mg/kg	
					NICKEL	35	mg/kg	650
					POTASSIUM	1892	mg/kg	
					SILVER	10	mg/kg	84
					SODIUM	47	mg/kg	
					THALLIUM	2.2	mg/kg	14
					VANADIUM	38	mg/kg	210
					ZINC	91	mg/kg	12,000
				Tear Gas: 8270C	No target analytes reported			
FIG142	Soil	S-5-19-2-AS	07/18/2000	Metals: ILM040	ALUMINUM	18124	mg/kg	
					ARSENIC	4.4	mg/kg	150
					BARIUM	130	mg/kg	8,200
					BERYLLIUM	1.1	mg/kg	320
					CALCIUM	4258	mg/kg	
					CHROMIUM	25	mg/kg	190,000
					COBALT	20	mg/kg	220
					COPPER	39	mg/kg	36,000
					IRON	41355	mg/kg	
					LEAD	21	mg/kg	450
					MAGNESIUM	5499	mg/kg	
					MANGANESE	634	mg/kg	
					NICKEL	38	mg/kg	650
					POTASSIUM	1656	mg/kg	
					SILVER	10	mg/kg	84
					SODIUM	46	mg/kg	
					THALLIUM	2.0	mg/kg	14
					VANADIUM	26	mg/kg	210
					ZINC	109	mg/kg	12,000
				Tear Gas: 8270C	No target analytes reported			

Fort Indiantown Gap Site Investigation
Analytical Results for Detected Parameters
Former Gas Chamber Building: AOI O-5-19-5

Sample #	Matrix	Site ID	Date Sampled	Laboratory Method	Analyte	Conc.	Q	PA MSC*
FIG143	Soil	S-5-19-2-BS	07/18/2000	Metals: ILM040	ALUMINUM	19970	mg/kg	
					ARSENIC	5.0	mg/kg	150
					BARIUM	110	mg/kg	8,200
					BERYLLIUM	1.4	mg/kg	320
					CALCIUM	8637	mg/kg	
					CHROMIUM	26	mg/kg	190,000
					COBALT	19	mg/kg	220
					COPPER	37	mg/kg	36,000
					IRON	42647	mg/kg	
					LEAD	20	mg/kg	450
					MAGNESIUM	5053	mg/kg	
					MANGANESE	704	mg/kg	
					NICKEL	37	mg/kg	650
					POTASSIUM	1628	mg/kg	
					SILVER	10	mg/kg	84
					SODIUM	47	mg/kg	
					THALLIUM	2.2	mg/kg	14
					VANADIUM	28	mg/kg	210
					ZINC	94	mg/kg	12,000
				Tear Gas: 8270C	No target analytes reported			
FIG144	Soil	S-5-19-3-AS	07/18/2000	Metals: ILM040	ALUMINUM	19984	mg/kg	
					ARSENIC	5.7	mg/kg	150
					BARIUM	97	mg/kg	8,200
					BERYLLIUM	1.2	mg/kg	320
					CALCIUM	1919	mg/kg	
					CHROMIUM	25	mg/kg	190,000
					COBALT	20	mg/kg	220
					COPPER	37	mg/kg	36,000
					IRON	37702	mg/kg	
					LEAD	33	mg/kg	450
					MAGNESIUM	4983	mg/kg	
					MANGANESE	753	mg/kg	
					NICKEL	32	mg/kg	650
					POTASSIUM	1409	mg/kg	
					SILVER	10	mg/kg	84
					SODIUM	47	mg/kg	
					THALLIUM	2.1	mg/kg	14
					VANADIUM	34	mg/kg	210
					ZINC	136	mg/kg	12,000
				Tear Gas: 8270C	No target analytes reported			
FIG145	Soil	S-5-19-3-BS	07/18/2000	Metals: ILM040	ALUMINUM	17766	mg/kg	
					ARSENIC	3.8	mg/kg	150
					BARIUM	104	mg/kg	
					BERYLLIUM	1.1	mg/kg	320
					CALCIUM	52560	mg/kg	
					CHROMIUM	24	mg/kg	190,000
					COBALT	19	mg/kg	220
					COPPER	39	mg/kg	36,000
					IRON	35665	mg/kg	
					LEAD	18	mg/kg	450
					MAGNESIUM	5885	mg/kg	
					MANGANESE	470	mg/kg	
					NICKEL	34	mg/kg	650
					POTASSIUM	1812	mg/kg	
					SILVER	8.2	mg/kg	84
					SODIUM	51	mg/kg	
					THALLIUM	1.5	mg/kg	14
					VANADIUM	25	mg/kg	210
					ZINC	100	mg/kg	12,000
				Tear Gas: 8270C	No target analytes reported			

Fort Indiantown Gap Site Investigation
Analytical Results for Detected Parameters
Former Gas Chamber Building: AOI O-5-19-5

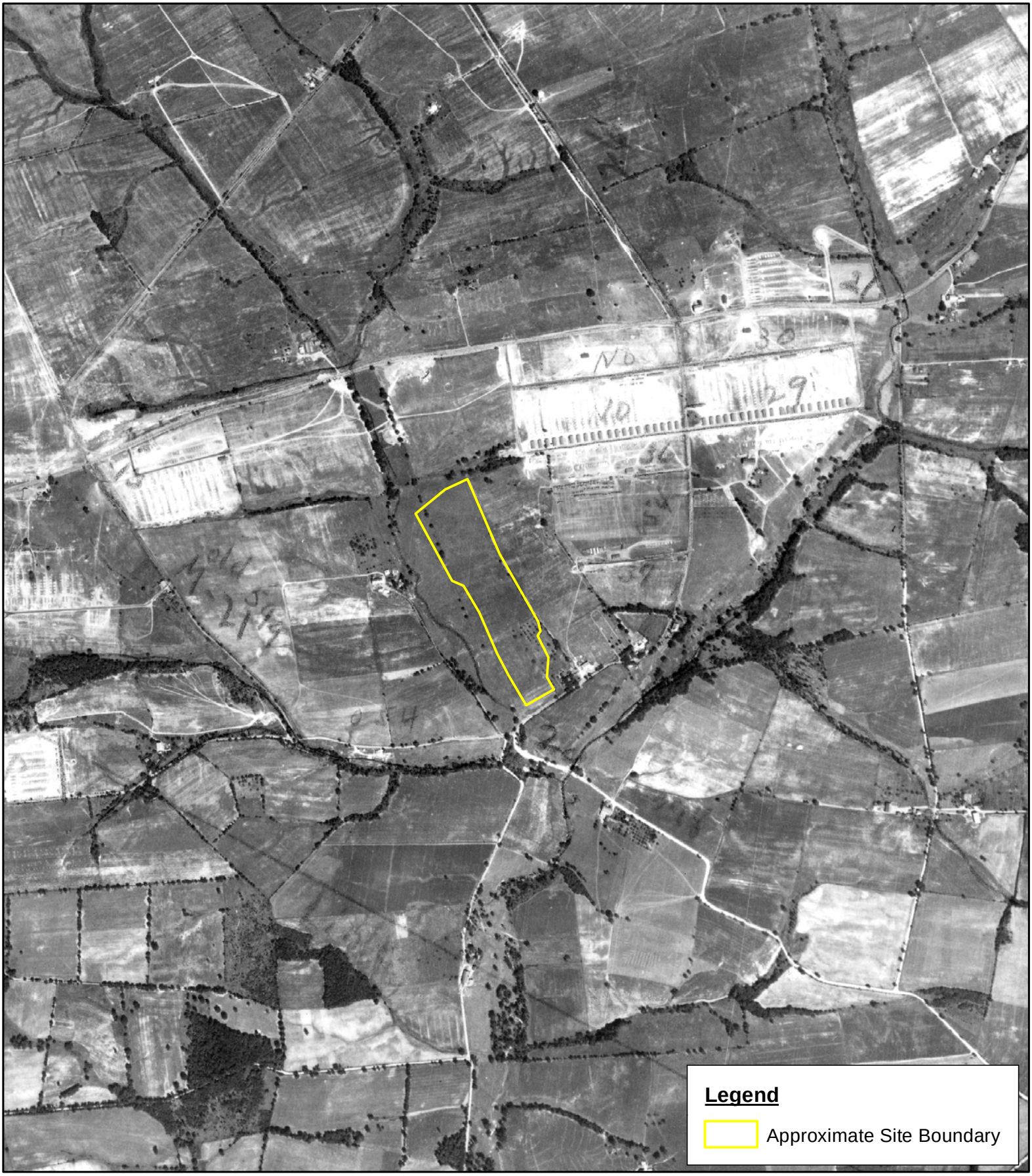
Sample #	Matrix	Site ID	Date Sampled	Laboratory Method	Analyte	Conc.	Q	PA MSC*
FIG146	Soil	S-5-19-4-AS	07/18/2000	Metals: ILM040	ALUMINUM	18767	mg/kg	
					ARSENIC	4.6	mg/kg	150
					BARIUM	104	mg/kg	8,200
					BERYLLIUM	1.1	mg/kg	320
					CALCIUM	5206	mg/kg	
					CHROMIUM	24	mg/kg	190,000
					COBALT	17	mg/kg	220
					COPPER	32	mg/kg	36,000
					IRON	34138	mg/kg	
					LEAD	24	mg/kg	450
					MAGNESIUM	6598	mg/kg	
					MANGANESE	763	mg/kg	
					NICKEL	30	mg/kg	650
					POTASSIUM	1411	mg/kg	
					SILVER	8.2	mg/kg	84
					SODIUM	47	mg/kg	
					THALLIUM	2.0	mg/kg	14
					VANADIUM	30	mg/kg	210
					ZINC	96	mg/kg	12,000
				Tear Gas: 8270C	No target analytes reported			
FIG147	Soil	S-5-19-4-BS	07/18/2000	Metals: ILM040	ALUMINUM	19910	mg/kg	
					ARSENIC	4	mg/kg	150
					BARIUM	113	mg/kg	8,200
					BERYLLIUM	1	mg/kg	320
					CALCIUM	7270	mg/kg	
					CHROMIUM	28	mg/kg	190,000
					COBALT	19	mg/kg	220
					COPPER	40	mg/kg	36,000
					IRON	44609	mg/kg	
					LEAD	19	mg/kg	450
					MAGNESIUM	5975	mg/kg	
					MANGANESE	663	mg/kg	
					NICKEL	39	mg/kg	650
					POTASSIUM	1971	mg/kg	
					SILVER	11	mg/kg	84
					SODIUM	65	mg/kg	
					THALLIUM	2.1	mg/kg	14
					VANADIUM	29	mg/kg	210
					ZINC	99	mg/kg	12,000
				Tear Gas: 8270C	No target analytes reported			

J = estimated value

* Pennsylvania Medium Specific Concentrations (MSC) values reported in same concentration units as the sample result for the analyte. values shown are for soil to groundwater for used aquifers with TDS<2500.

Appendix D

Historical Aerial Photographs



PENNSYLVANIA
NAD 1983 UTM Zone 18N
Prepared by PADMVA-OFE-BEM
COMM: (717) 861-2634 DSN: 491-2634
Created: 9 June 2014 drv

Aerial Photograph - AHN-25-64
Date: 08-03-1937
Fort Indiantown Gap
Mult Municipalities, Dauphin and Lebanon Cos., Pennsylvania

0 462.5 925 1,850 2,775 3,700
Feet

The information on this map is for planning purposes only. This information is not intended for use for legal boundary definitions, regulatory interpretation, or parcel-level analysis. This map is a living document, in that it is intended to change as new data become available and are incorporated into the Enterprise GIS database.

PENNSYLVANIA
NAD 1983 UTM Zone 18N
Prepared by PADMVA-OFE-BEM
COMM: (717) 861-2634 DSN: 491-2634
Created: 9 June 2014 drv

Aerial Photograph - AHN-3R-96
Date: 10-25-1956
Fort Indiantown Gap
Mult Municipalities, Dauphin and Lebanon Cos., Pennsylvania

0 462.5 925 1,850 2,775 3,700
Feet

The information on this map is for planning purposes only. This information is not intended for use for legal boundary definitions, regulatory interpretation, or parcel-level analysis. This map is a living document, in that it is intended to change as new data become available and are incorporated into the Enterprise GIS database.

PENNSYLVANIA
NAD 1983 UTM Zone 18N
Prepared by PADMVA-OFE-BEM
COMM: (717) 861-2634 DSN: 491-2634
Created: 9 June 2014 drv

Aerial Photograph - AHN-2LL-214
Date: 07-07-1970
Fort Indiantown Gap
Mult Municipalities, Dauphin and Lebanon Cos., Pennsylvania

0 462.5 925 1,850 2,775 3,700
Feet

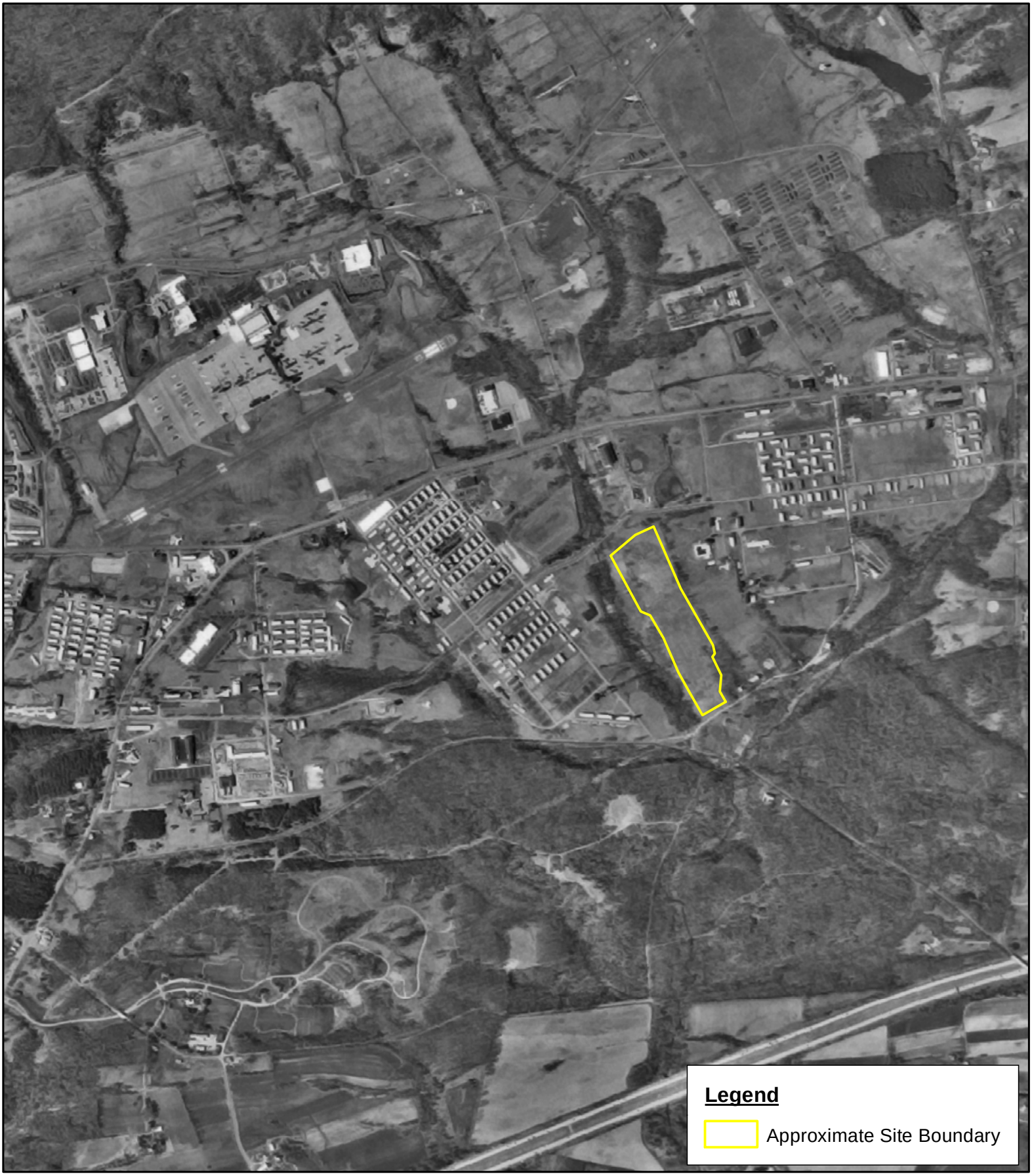
The information on this map is for planning purposes only. This information is not intended for use for legal boundary definitions, regulatory interpretation, or parcel-level analysis. This map is a living document, in that it is intended to change as new data become available and are incorporated into the Enterprise GIS database.

PENNSYLVANIA
NAD 1983 UTM Zone 18N
Prepared by PADMVA-OFE-BEM
COMM: (717) 861-2634 DSN: 491-2634
Created: 9 June 2014 drv

Aerial Photograph - NAPP 103-116
Date: 08-30-1987
Fort Indiantown Gap
Mult Municipalities, Dauphin and Lebanon Cos., Pennsylvania

0 650 1,300 2,600 3,900 5,200
Feet

The information on this map is for planning purposes only. This information is not intended for use for legal boundary definitions, regulatory interpretation, or parcel-level analysis. This map is a living document, in that it is intended to change as new data become available and are incorporated into the Enterprise GIS database.



PENNSYLVANIA
NAD 1983 UTM Zone 18N
Prepared by PADMVA-OFE-BEM
COMM: (717) 861-2634 DSN: 491-2634
Created: 9 June 2014 drv

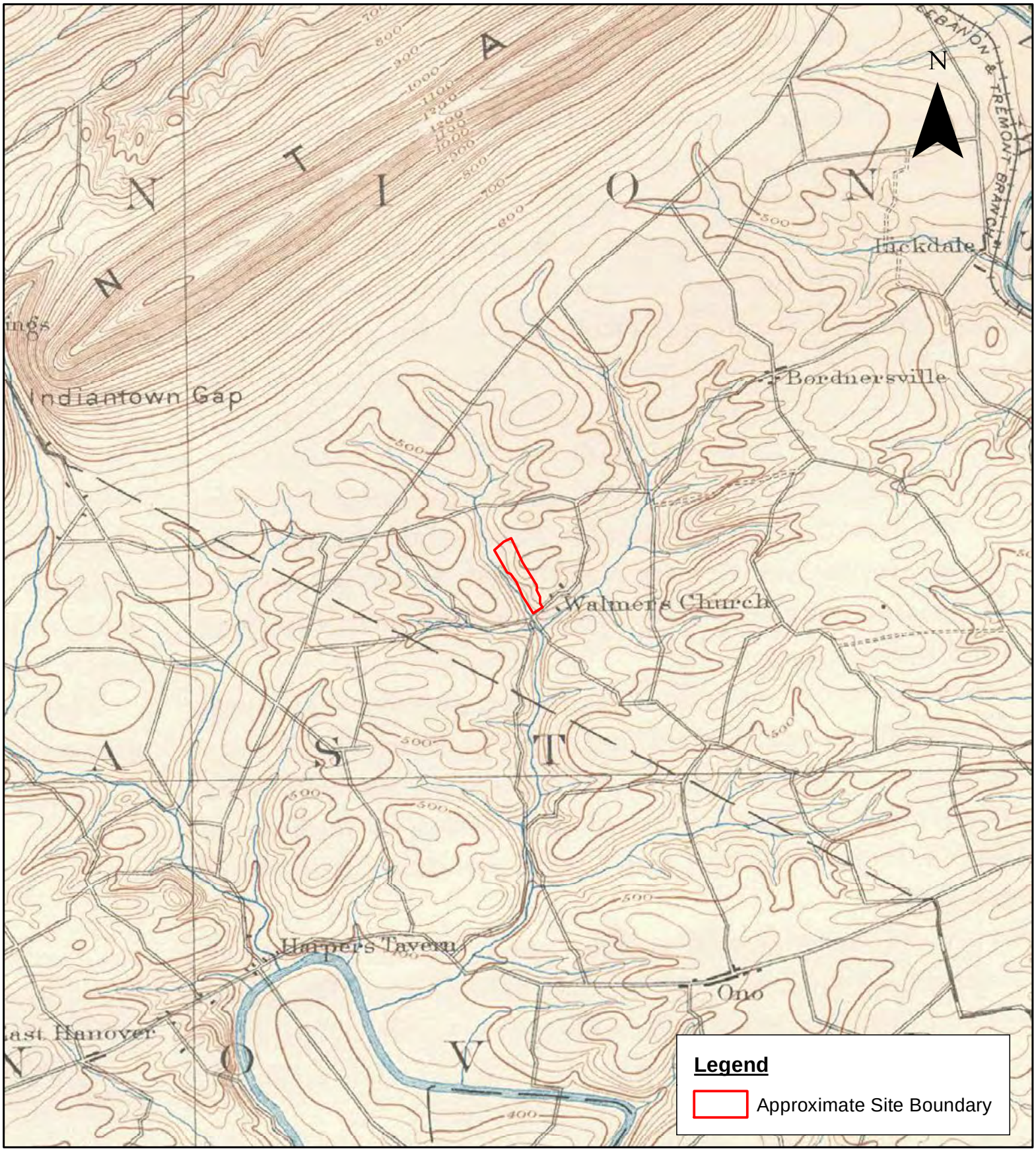
Aerial Photograph - NAPP 11357-180
Date: 04-10-1999
Fort Indiantown Gap
Mult Municipalities, Dauphin and Lebanon Cos., Pennsylvania

0 550 1,100 2,200 3,300 4,400
Feet

The information on this map is for planning purposes only. This information is not intended for use for legal boundary definitions, regulatory interpretation, or parcel-level analysis. This map is a living document, in that it is intended to change as new data become available and are incorporated into the Enterprise GIS database.

Appendix E

Historical Topographic Maps



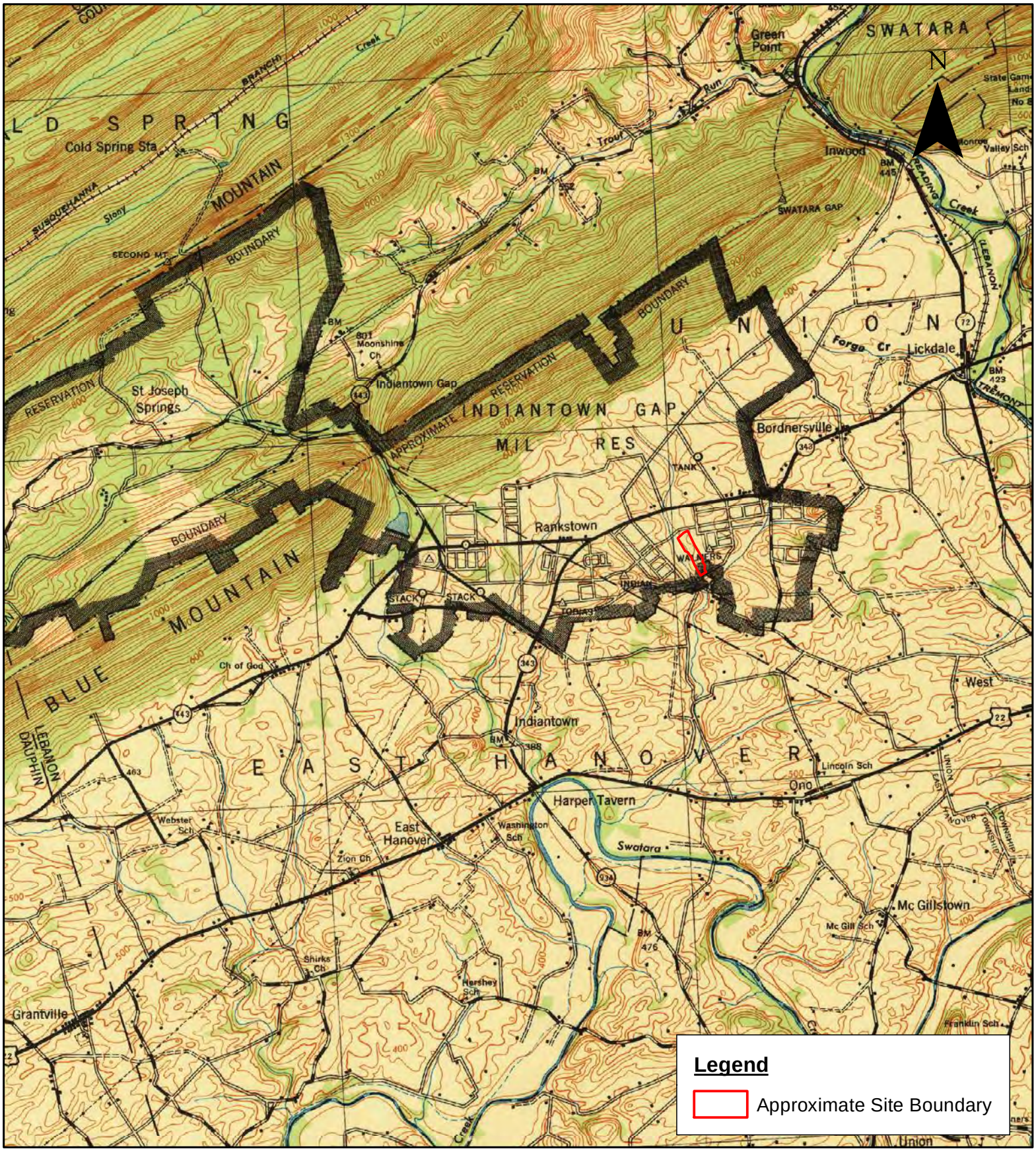
PENNSYLVANIA
NAD 1983
Prepared by PADMVA-OFE-BEM
COMM: (717) 861-2634 DSN: 491-2634
Created: 9 June 2014 drv

0 0.125 0.25 0.5 0.75 1
Miles

Historic Topographic Map
Hummelstown, Pennsylvania Topographic Map
Date: 1892
Fort Indiantown Gap
Multiple Municipalities, Dauphin and Lebanon Counties, Pennsylvania

The information on this map is for planning purposes only. This information is not intended for use for legal boundary definitions, regulatory interpretation, or parcel-level analysis. This map is a living document, in that it is intended to change as new data become available, as applicable.

Source: Topographic Map provided by USGS, via http://nationalmap.gov/historical/.



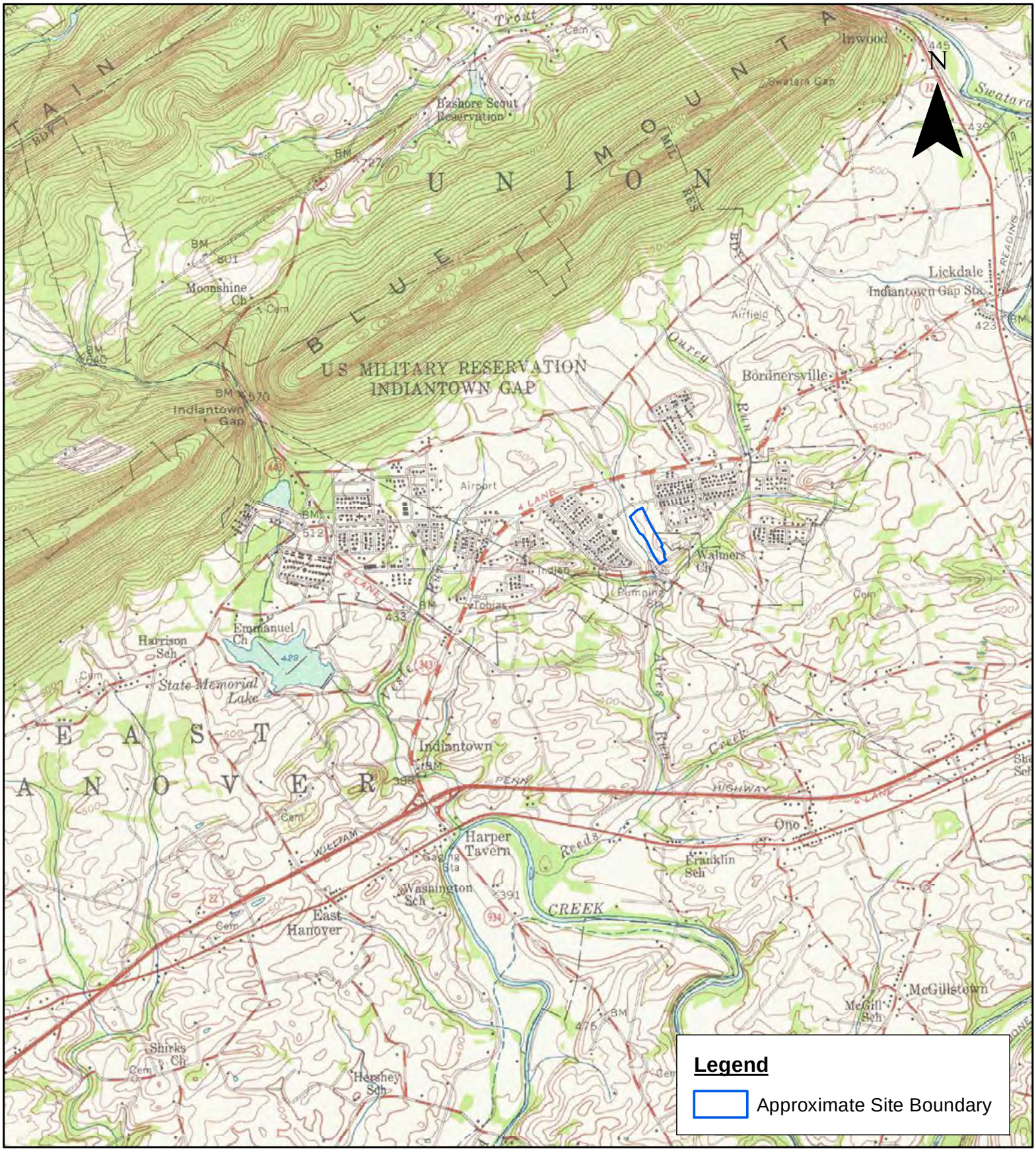
PENNSYLVANIA
NAD 1983
Prepared by PADMVA-OFE-BEM
COMM: (717) 861-2634 DSN: 491-2634
Created: 9 June 2014 drv

0 0.225 0.45 0.9 1.35 1.8
Miles

Historic Topographic Map
Hummelstown, Pennsylvania Topographic Map
Date: 1943
Fort Indiantown Gap
Multiple Municipalities, Dauphin and Lebanon Counties, Pennsylvania

The information on this map is for planning purposes only. This information is not intended for use for legal boundary definitions, regulatory interpretation, or parcel-level analysis. This map is a living document, in that it is intended to change as new data become available, as applicable.

Source: Topographic Map provided by USGS, via http://nationalmap.gov/historical/.



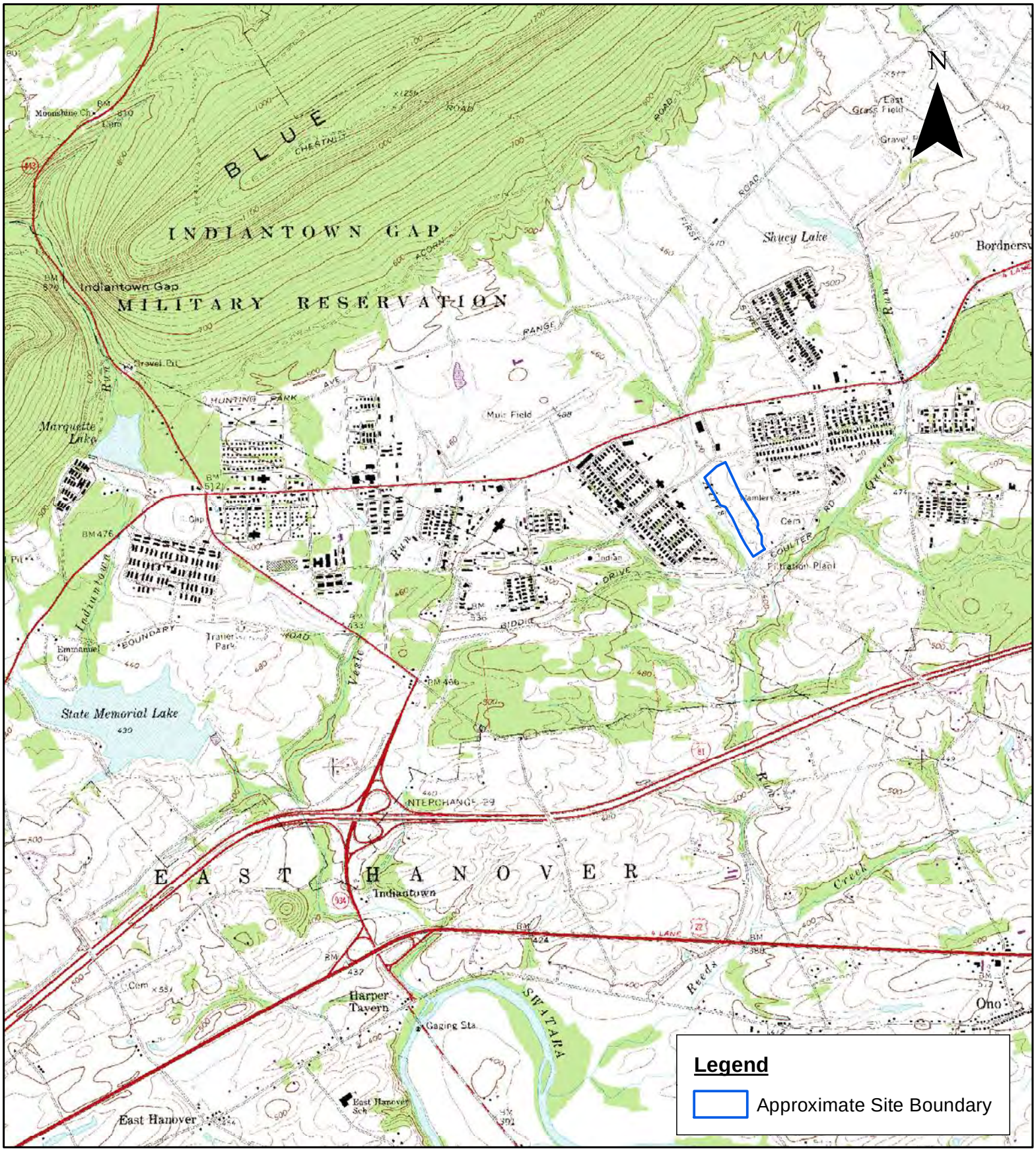
PENNSYLVANIA
NAD 1983
Prepared by PADMVA-OFE-BEM
COMM: (717) 861-2634 DSN: 491-2634
Created: 9 June 2014 drv

0 0.175 0.35 0.7 1.05 1.4
Miles

Historic Topographic Map
Hummelstown, Pennsylvania Topographic Map
Date: 1956
Fort Indiantown Gap
Multiple Municipalities, Dauphin and Lebanon Counties, Pennsylvania

The information on this map is for planning purposes only. This information is not intended for use for legal boundary definitions, regulatory interpretation, or parcel-level analysis. This map is a living document, in that it is intended to change as new data become available, as applicable.

Source: Topographic Map provided by USGS, via http://nationalmap.gov/historical/.



PENNSYLVANIA
NAD 1983
Prepared by PADMVA-OFE-BEM
COMM: (717) 861-2634 DSN: 491-2634
Created: 9 June 2014 drv

0 0.1 0.2 0.4 0.6 0.8
Miles

Historic Topographic Map
Indiantown Gap, Pennsylvania Topographic Map
Date: 1999
Fort Indiantown Gap
Multiple Municipalities, Dauphin and Lebanon Counties, Pennsylvania

The information on this map is for planning purposes only. This information is not intended for use for legal boundary definitions, regulatory interpretation, or parcel-level analysis. This map is a living document, in that it is intended to change as new data become available, as applicable.

Source: Topographic Map provided by USGS, via http://nationalmap.gov/historical/.

Appendix F

Site Reconnaissance Photographs

Photograph 1: View to the north of the debris pile near the Site's northern boundary.

Photograph 2: View to the south of the Site's general condition and topography.

Photograph 3: View to the north of a small offsite wetland and gymnasium adjacent to Service Road.

Photograph 4: View (facing north) of the onsite access road. A portion of the vegetated debris pile can be seen at the left of the photograph.

Photograph 5: View to the north of a shallow draining swale near the site's north side. Service Road can be seen in the background.

Photograph 6: View to the south from near the central portion of the Site. Part of Coulter Road and FTIG's wastewater treatment plant facilities can be seen in the background.

Photograph 7: View to the north from near the Site's central portion.

Photograph 8: View to the south of the portion of the Site adjacent to Coulter Road.

Photograph 9: View to the east of the adjacent Quarters residence and associated buildings, near the Site's southeast corner.

Photograph 10: View of the small building foundation observed near the Site's east side.

Photograph 11: View to the north from near the Site's southeast corner.

Photograph 12: View to the east of the apparent discharge point of the suspected spring/seep area along the Site's eastern boundary.

Photograph 13: View to the west of flowing water and the shallow drainage swale associated with the apparent spring/seep discharge.

Photograph 14: View to the north of the old building foundation on the Site's east side.

Photograph 15: View to the north of the approximate location of the former field latrine onsite.

Photograph 16: View to the northeast approximately of part of the former access lane off Coulter Road.

Appendix G

Proposed Environmental Protection Provisions

Environmental Protection Provisions

The following conditions will be proposed and placed in the lease to ensure there will be no unacceptable risk to human health or the environment and no interference with current or future environmental cleanup or human health protection activities at Fort Indiantown Gap, Pennsylvania, and to ensure the regulatory requirements for existing environmental cleanup and other compliance programs administered by the state and federal governments are met.

1. The Lessee shall not disrupt, inflict damage, obstruct, or impede on-going environmental restoration work on the leased premises or anywhere else on Fort Indiantown. The Lessee shall not physically disturb any identified environmental restoration, archaeological, historic, or cultural resources sites without prior coordination with the Pennsylvania Department of Military and Veterans Affairs, Bureau of Environmental Management, and other personnel, as applicable. The Lessee shall reimburse the Government for any costs incurred as a result of Lessee's breach of these provisions.

2. The Commonwealth of Pennsylvania's ("the Government") rights under this lease specifically include the right for Government officials to inspect upon reasonable notice the leased premises for compliance with environmental, safety, and occupational health laws and regulations, whether or not the Government is responsible for enforcing them. Such inspections are without prejudice to the right of duly constituted enforcement officials to make such inspections. The Government normally will give the Lessee twenty-four (24) hours prior notice of its intention to enter the leased premises unless it determines the entry is required for safety, environmental, operations, or security purposes or for the purposes enumerated in the following subparagraphs:

    a. To conduct investigations, and surveys, including, where necessary, drilling, soil and water sampling, test pitting, testing soil borings and other activities related to environmental assessment, remediation, and related activities at Fort Indiantown Gap.

    b. To inspect field activities of the Government and its contractors and subcontractors in implementing required best management practices (BMPs) and required human health and environmental safety practices, where applicable.

    c. To conduct any test or survey required by the United States Army/Department of Defense, the United States Environmental Protection Agency (EPA), or the Commonwealth of Pennsylvania related to the implementation of environmental compliance programs at the leased premises to collect or verify any data required by these agencies relating to the environmental condition of the property.

    d. To construct, operate, maintain or undertake any other investigation, corrective measure, response, or remedial action as required or necessary under any Fort Indiantown Gap environmental program, including, but not limited to monitoring wells, pumping wells, and treatment facilities.

3. The Lessee shall comply with the provisions of any Fort Indiantown Gap health or safety plans in effect during the course of any of the above described actions. Any inspection, survey, investigation, or other corrective measure, response or remedial action will, to the extent practicable, be coordinated with representatives designated by the Lessee. The Lessee shall have no claim on account of such entries against the United States or any officer, agent, employee, contractor, or subcontractor thereof.

4. If Hazardous Waste is generated and/or stored on site, the Lessee shall submit to the Government, and maintain thereafter, an environmental compliance plan which describes, in detail, the program for environmental management and method of compliance, by the user of any portion of the leased premises, whether Lessee or sublessee, with all Government, Federal, State, and local laws and regulations for the use, management, generation, storage, treatment, and disposal of all hazardous waste, hazardous materials, and hazardous substances. Each environmental compliance plan for a portion of the leased premises, or request for waiver of the requirement for a plan due to the non-hazardous nature of the proposed use, must be submitted and approved in writing by the Government prior to occupancy of the intended portion of the leased premises. Thereafter, each such environmental compliance plan shall be incorporated in the lease, and shall be included as an exhibit in the relevant sublease(s). The Lessee will be responsible for the overall compliance of its operations. The Lessee will be responsible for ensuring the preparation of all documents, records, and reports associated with the environmental compliance of its operation. No liability or responsibility shall attach to the Government as a result of the Government's review and approval of the Environmental Compliance Plan under this paragraph.

5. The Lessee shall strictly comply with the hazardous waste management requirements under the Resource Conservation and Recovery Act (RCRA), and the Commonwealth of Pennsylvania's hazardous waste laws and regulations. Except as specifically authorized by the Government in writing, the Lessee must provide, at its own expense, such hazardous waste management facilities, complying with all laws and regulations. Government hazardous waste management facilities will not be available to the Lessee.

6. Fort Indiantown Gap hazardous waste and hazardous materials accumulation points will not be used by the Lessee. Also, the Lessee will not permit its hazardous wastes and materials to be commingled with Fort Indiantown Gap's hazardous wastes and materials.

7. If it is determined by the Environmental Condition of Property (ECOP) and/or the National Environmental Policy Act (NEPA) process that there is the potential for hazardous waste, fuel, and other chemical spills, the Lessee shall submit to the Government, and maintain thereafter, a Government-approved plan for responding to prior to commencement of operations on the leased premises. Such plan shall be independent of Fort Indiantown Gap's existing Spill Contingency Plans; Spill Prevention, Control and Countermeasure (SPCC) plans, and similar spill response plans, and, except for fire response and/or initial spill response/containment, shall not rely on the use of Fort Indiantown Gap's installation personnel or equipment. Should the Government provide any personnel or equipment for additional spill response/containment, or otherwise on request of any Government officer, conducting timely cleanup actions, the Lessee agrees to reimburse the Government for its additional spill response/containment costs.

8. The Lessee shall not construct, make or permit its sublessees or assigns to construct or make any alterations, additions, or improvement to the leased premises in any way which may adversely affect Fort Indiantown Gap's environmental program, environmental cleanup, human health or the environment without prior written consent of the Government. Such consent may include a requirement to provide the Government with a performance and payment bond satisfactory to it in all respects and other requirements deemed necessary to protect the interests of the Government. Except as such written approval shall expressly provide otherwise, all such approved alterations, additions, modifications, improvement, and installations shall become Government property when annexed to the Leased Premises.

9. The Lessee shall not use the leased Premises for the storage or disposal of non-Department of Defense-owned hazardous or toxic materials, as defined in 10 U.S.C. 2692, unless authorized under 10 U.S.C. 2692 and properly approved by the Government.