FINAL SUPPLEMENTAL EA
PITTSBURGH INTERNATIONAL AIRPORT
PV SOLAR ARRAY MICROGRID
PHASE 2 EXPANSION

PITTSBURGH
INTERNATIONAL AIRPORT

Allegheny County Airport Authority
Pittsburgh International Airport
Landside Terminal, 4th Floor Mezz.
Pittsburgh, PA 15231-0370

January 2024

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This environmental assessment becomes a Federal document when evaluated, signed, and dated by the Responsible FAA Official.

ANDREW N BROOKS

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Responsible FAA Official **Date**

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ACRONYMS AND ABBREVIATIONS

AC	Alternating Current
ACAA	Allegheny County Airport Authority
ACEIT	Airport Construction Emissions Inventory Tool
ALP	Airport Layout Plan
AOA	Air Operations Area
CEQ	White House Council on Environmental Quality
CO	Carbon monoxide
CO_{2eq}	Carbon dioxide equivalent
DC	Direct Current
EA	Environmental Assessment
EJScreen	Environmental Justice Screening and Mapping Tool
FAA	Federal Aviation Administration
FONSI	Finding of No Significant Impact
GHG	Greenhouse Gas
HCHO	Formaldehyde
HDPE	High Density Polyethylene (geosynthetic)
IMG	IMG Energy Solutions
IMG Solar	IMG Solar LLC
kW	Kilowatt
kWh	Kilowatt hour
MM	Million
mT	Metric tons
MW	Megawatt
NEPA	National Environmental Policy Act
NOx	Nitrogen oxides
PADEP	Pennsylvania Department of Environmental Protection
PADER	Pennsylvania Department of Environmental Resources
PA SHPO	Pennsylvania State Historic Preservation Office
Peoples	Peoples Natural Gas Company LLC

PIT	Pittsburgh International Airport
PM	Particulate matter
PNDI	Pennsylvania Natural Diversity Index
PV	Photovoltaic
Rhea	Rhea Engineers & Consultants, Inc.
SCR	Selective catalytic reduction
SOx	Sulfur Oxides
TMP	Terminal Modernization Program
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound
WOTUS	Waters of the United States

1.0 INTRODUCTION

The Allegheny County Airport Authority (ACAA) owns and operates Pittsburgh International Airport (PIT or Airport) and prepared an Environmental Assessment (EA) for the PIT Microgrid project on April 23, 2020 (referred to herein as the 2020 EA)[1]. The PIT Microgrid project consisted of development of an on-site natural gas-fired electric power plant and Phase 1 of a solar photovoltaic (PV) array on Airport property to provide electricity for Airport facilities. The natural gas power plant is owned by Peoples Natural Gas Company LLC (Peoples) and operated by IMG Energy Solutions (IMG); the Phase 1 PV Solar Array is owned and operated by IMG Solar LLC (IMG Solar).

The main environmental impact of the PIT Microgrid addressed in the 2020 EA was emissions from the gas-fired power plant addressed through compliance with emissions standards defined by the Allegheny County Health Department. No significant environmental impacts were identified for the construction of the Phase 1 PV Solar Array, except that it was necessary to define construction procedures consistent with the requirements of the PA Department of Environmental Protection (PADEP) to avoid compromising the old landfill upon which the PV Solar Array was constructed.

At the time of the preparation of the 2020 EA a Phase 2 PV Solar Array was contemplated to provide additional power redundancy and resiliency, while also contributing to better sustainability efforts at PIT. However, plans were not sufficiently advanced due to regulatory constraints on net metering requirements. The Phase 1 PV Solar Array was limited in size due to PA regulatory constraints (52 PA Code § 75 Subchapter B) that limit non-residential solar projects to a maximum of 3 MW if they seek to interconnect under net metering regulations. The Phase 2 PV Solar Array (the Proposed Action) therefore is required to pursue an independent interconnection which resulted in several additional years of development and planning prior to achieving interconnection with the power grid and moving to construction. Accordingly, this document supplements the 2020 EA with additional information describing the characteristics of the Phase 2 PV Solar Array project. This Supplemental EA also provides information that was not available for the original 2020 EA, and also provides an updated National Environmental Policy Act (NEPA) evaluation for environmental resources as applicable to the entire Microgrid project including the Phase 2 PV Solar Array.

[1] Short Environmental Assessment Form, PIT Microgrid, Pittsburgh International Airport, prepared by Ricondo & Associates, Inc. and approved by Allegheny County Airport Authority April 23, 2020. Available at ACAA web page at: https://flypittsburgh.com/wp-content/uploads/2020/05/PIT-Microgrid-Short-Form-EA-20200501-.pdf and provided in Appendix A.

The Federal Aviation Administration (FAA) issued a Finding of No Significant Impact (FONSI) on May 8, 2020, which approved the PIT Microgrid development including the Phase 1 PV Solar Array, which was inaugurated into operation in July 2021. Appendix A provides the 2020 EA for the PIT Microgrid project and the associated FONSI.

The 2020 EA was presented in the format of a Short Environmental Assessment Form for Airport Development Projects. Most of the information covered in the 2020 EA is still valid and does not require any changes. Information either modified or not modified from the 2020 EA in this Supplemental EA are described as follows:

+ Project Description: this description has been modified to include the Phase 2 PV Solar Array
+ Project Purpose and Need: this Purpose and Need remains consistent with the addition of the Phase 2 PV Solar Array
+ Affected environment (existing conditions) and land use in the vicinity of project: the description of the affected environment has been enhanced from what was presented in the 2020 EA to reflect work undertaken by Rhea Engineers & Consultants, Inc. (Rhea) at the landfill where the PV Solar Arrays are located.
+ Alternatives to the Project: This topic has been revisited at FAA's request.
+ Environmental Consequences

  Air Quality: Construction emissions for the Phase 1 microgrid project were calculated with FAA's Airport Construction Emissions Inventory Tool (ACEIT) program on the basis of 2014 emissions factors from the United States Environmental Protection Agency (USEPA). This analysis tool is no longer valid because in 2020 USEPA issued new emissions factors with their MOVES3 program. Accordingly, construction emissions from the Phase 2 PV Solar Array have been estimated on the basis of the MOVES3 program and the Phase 1 microgrid construction emissions have been re-calculated to verify that construction emissions were below allowable *de minimis* values. Calculations in support of this verification are presented as Appendix B.

  Biological Resources: The 2020 EA provides a valid description of local biological resources, but to check if there have been any changes over the past three years a Pennsylvania Natural Diversity Index (PNDI) review was conducted as provided in Appendix C.

  Climate: Potential impacts to climate are reviewed in the context Greenhouse gas (GHG) emissions for construction and operations of the entire microgrid and included with the air quality assessment and reviewed

in the context of the January 6, 2023 White House Council on Environmental Quality (CEQ) updated *Guidance on Consideration of Greenhouse Gas Emissions and Climate Change*.

Coastal Resources: There have been no changes to coastal resources from what was presented in the 2020 EA.

Section 4(f) Resources: Per FAA request, the potential impact to the Airport Link Trail section of the Montour Trail has been reviewed in greater detail than presented in the 2020 EA.

Farmlands: There have been no changes to farmlands from what was presented in the 2020 EA.

Hazardous Materials, Solid Waste, and Pollution Prevention: Since the preparation of the 2020 EA, a permit for constructing the PV Solar array on a landfill was obtained by IMG Solar from the Pennsylvania Department of Environmental Protection (PADEP) as Landfill Minor Permit Modification (Solid Waste Permit No. 101479). This permit, as well as the Building Permit from Findlay Township, is presented as Appendix D, which also includes the Permit Application containing the design and construction details of the installation of the solar panels on a landfill. Consistent with the requirements of this permit, this Supplemental EA discusses decommissioning of the PV Solar Arrays.

Historic, Architectural, Archaeological, and Cultural Resources: A letter from the Pennsylvania State Historic Preservation Office (PA SHPO) has been provided (Appendix E) demonstrating that PIT Microgrid project has no potentially significant cultural resources under PA Section 106.

Land Use: The Land Use has been modified to include the Phase 2 PV Solar Array. There are no new changes in land use from what was presented in the 2020 EA.

Natural Resources and Energy Supply: this Environmental Consequence has been modified to include the Phase 2 PV Solar Array.

Noise and Noise Compatible Land Use: this Environmental Consequence has been modified to include the Phase 2 PV Solar Array.

Socioeconomics, Environmental Justice, and Children's Health and Safety Risks: The discussion presented in the 2020 EA has been supplemented with the reports derived from the application of the USEPA's

Environmental Justice Screening and Mapping Tool (EJScreen) tool provided in Appendix F.

Visual Effects including Light Emissions: There have been no changes to visual effects including light emissions from what was presented in the 2020 EA. The glare analysis presented in the 2020 EA anticipated construction of the Phase 2 PV Solar Array and the design of the Phase 2 PV Solar Array is consistent with the assumptions made in the original analysis. The glare analysis presented in the 2020 EA (Appendix A) and is not repeated here.

Water Resources: The subject of water resources has been revisited from that was presented in the 2020 EA in consideration of January 2023 revisions to the definition of "Waters of the United States" (WOTUS) and the Sackett Opinion of the U.S. Supreme Court decided May 25, 2023. Rhea revisited the PV solar array site on January 5, 2023, to review any changes in conditions from what was observed in 2020 and the final wetlands report is provided in Appendix G. One wetland not in the footprint of the Proposed Action is present on the landfill and is confirmed to be non-jurisdictional by the USACE as also provided in Appendix G.

Cumulative Impacts: Potential cumulative impacts have been modified to include the Phase 2 Solar Array.

The FAA's authority to approve a release of the sponsor's federal obligations for the subject parcel, and any other Federal approvals associated with the project (such as funding under the AIP or PFC programs), are federal actions subject to NEPA. The property where the project is located covers multiple Airport parcels acquired with federal funds and the proposed solar array was classified as non-aeronautical land use by the FAA as recorded in Appendix H – Phase 2 Section 163 Consultation. Therefore, the proposed project qualifies as an independent Federal action subject to NEPA and a letter of approval is required for non-aeronautical use of the parcels acquired with federal funds. A drafted land release request for non-aeronautical use is attached in Appendix I. As provided in the Section 163 consultation in Appendix H, FAA determined the proposed project would have no material impact on aircraft operations, at, to, or from the Airport; would not affect the safety of people and property on the ground adjacent to the Airport as a result of aircraft operations; and would not have an adverse effect on the value of prior Federal investments to a significant extent.

In conclusion, since the proposed Phase 2 PV Solar Array project is an addition to the existing Microgrid project (that was subject to previous federal action), this document supplements the 2020 EA with additional information describing the characteristics

of the Phase 2 PV Solar Array project. As previously described, this Supplemental EA provides information that was not available for the original 2020 EA, and also provides an updated NEPA evaluation for environmental resources as applicable to the entire Microgrid project including the Phase 2 PV Solar Array.

2.0 PROJECT DESCRIPTION

The Proposed Action covering 11.6 acres is an approximately 4.7 MW alternating current (AC) expansion to the existing 7.9-acre 3.0 MW PV Solar Array associated with the Phase 1 PIT Microgrid. Both PV arrays are outside of the Air Operations Area (AOA) on the southwest corner of Airport property on a capped and closed landfill, approximately 1,600 feet south of the extended centerline of Runway 10R-28L and north of Interstate 376 (see Exhibits 1 and 2). As discussed in greater detail in Section 3.0 (Purpose and Need), the Proposed Action was contemplated to be part of the PIT Microgrid from the early planning stages, but the Phase 1 PV Solar Array was limited in size due to PA regulatory constraints and the lack of sufficient plans required to proceed suspended the development of the Proposed Action.

Phase 1 of the PIT Microgrid project sponsored by ACAA, as documented in greater detail in the 2020 EA (Appendix A), consists of an on-site 20 megawatt (MW) natural gas-fired electric power plant owned by Peoples and a 3 MW PV Solar Array covering 7.9 acres on a capped, inactive landfill on Airport property. Exhibit 1 shows the locations of the two components of the Phase 1 PIT Microgrid project.

Peoples is the owner of the power plant operated by IMG. The plant consists of five Jenbacher J624 Natural Gas Engines that can produce approximately 4 MW per unit for a total of 20 MW at the facility. Each engine is equipped with an oxidation catalyst and a selective catalytic reduction (SCR) system to control emissions. The site contains a gas conditioning system that uses a desiccant system along with a small gas heater rated less than 0.5 million (MM) Btu/hr. Also, there are a number of tanks on site for glycol, spent glycol, waste water, clean oil, waste oil, and urea. A diagram of the layout of the gas-fired power plant is presented as Exhibit 2 in the 2020 EA provided in Appendix A. Additional details are provided in the Minor Source Operating Permit given for the plant by the Allegheny County Health Department (ACHD) provided in Appendix D.

An ACAA press release from July 14, 2021[2] announced the inauguration of the PIT Microgrid with a statement highlighting that PIT was the first airport in the world to be completely powered by natural gas and solar energy. Construction of the first two components to the PIT Microgrid started in July 2020 and was completed on schedule even as the pandemic stalled the aviation industry.

Because the construction of the Phase 1 PV Solar Array was over a landfill (Airport Midfield Terminal Solid Waste Disposal Site), PADEP required IMG to obtain a Landfill Minor Permit Modification (Solid Waste Permit No. 101479 provided in

[2] https://flypittsburgh.com/acaa-corporate/newsroom/news-releases/pittsburgh-international-airport-goes-live-with-first-of-its-kind-microgrid-powering-entire-facility-with-natural-gas-and-solar-energy/

Appendix D) to allow for construction through the landfill's cap system consisting of a 24-inch-thick cover soil. This permit also covered the development of both Phase 1 and Phase 2 installations of 7.4-foot by 3.7-foot direct current (DC) solar panels constructed on driven post foundations which will penetrate the soil cap to a depth of 7 feet. The bottom of the driven posts will be at least 6 feet above the existing liner system, which will allow for any settlement of the driven posts. Other ancillary features of the solar array, including electrical conduit and control equipment, will not penetrate the landfill cap. The panels would face south - away from approaches to the east-west parallel runways, similar to the existing Phase 1 PV Solar Array.

3.0 PURPOSE AND NEED

The purpose and need for the PIT Microgrid project are well documented in the 2020 EA provided in Appendix A. The peak power demand at PIT is 14 MW and energy at the Airport prior to construction of the PIT Microgrid was provided by the region's electrical grid.[3] In response to power outages that had affected major airports across the nation, including Los Angeles International Airport and Hartsfield-Jackson Atlanta International Airport, ACAA recognized the need to provide power redundancy and resiliency at PIT to ensure greater power reliability and uninterrupted operations for the Airport and its passengers. In addition, ACAA recognized the need to improve sustainability at the Airport and the operation of the Microgrid would decrease GHG emissions from Airport operations (see Section 6.3).

In order to prevent power outages, the natural gas-fired electric power plant and PV Solar Array comprising the Microgrid would completely power Airport facilities at PIT. This Microgrid is now the primary power source although a connection to the traditional electrical grid has been maintained as an option for emergency or backup power when needed due to extreme weather events or other grid interruptions. The Phase 2 PV Solar Array will be net metered and have the potential to power other facilities outside the airport fence.

At the time of the preparation of the 2020 EA, the Phase 2 PV Solar Array was contemplated to become part of the PIT Microgrid. However, plans were not sufficiently advanced enough to proceed and Phase 1 was limited in size due to PA regulatory constraints under 52 PA Code § 75 Subchapter B, "Net Metering" that limit solar projects to a maximum of 3 MW if they seek to interconnect under net metering regulations. Net metering is the policy that allows people with solar power generation capacity to get a credit on their electric bill for the energy they produce from their system and the regulatory limit is 3MW for non-residential capacity. Phase 2 therefore is required to pursue an independent interconnection which resulted in several additional years of development and planning prior to achieving interconnection with the power grid and moving to construction. As a result of regulatory-induced development restrictions, plans were not sufficiently advanced to include the Phase 2 PV Solar Array in the 2020 EA. The addition of the Phase 2 PV Solar Array will ensure greater power reliability and energy sustainability that will benefit PIT.

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[3] Allegheny County Airport Authority, *Powering the Future: Pittsburgh International Unveils First-of-Its-Kind Microgrid to Power Entire Facility*, October 18, 2019, https://flypittsburgh.com/acaa-corporate/newsroom/news-releases/powering-the-future-pittsburgh-international-airportunveils-first-of-its-kind-microgrid-to-power-entire-facility/ (accessed February 26, 2020).

4.0 AFFECTED ENVIRONMENT

The Proposed Action has a footprint of approximately 11.6 acres on ACAA property (Proposed Project Area) located at the southwest corner of PIT (outside the fenced boundary of the PIT airport on ACAA property) immediately adjacent to the Phase 1 PV Solar Array that covers 7.9 acres. The project site is approximately 1,100 feet southwest of the centerline of Runway 10R-28L and north of Interstate 376 (Exhibit 1). Exhibit 2 depicts the Proposed Project Area for the Phase 2 PV Solar Array next to the Phase 1 PV Solar Array that is already constructed. The ground consists of graded landfill cap, with soil and maintained lawn as the topmost layer.

The landfill occupied by the Phase 1 PV Solar Array and the Proposed Action (Airport Midfield Terminal Solid Waste Disposal Site) was constructed as an approved solution to the 1986 discovery of waste dumped historically (newspapers from the 1950s were found in the waste) where the Midfield Terminal construction would be impacted. Right-of-way clearance requirements for Interstate 376 (inaugurated on September 9, 1992) and additional waste disposal requirements, mainly refuse from the excavation of coal seams from airport construction, resulted in the final landfill configuration. Hazardous wastes including paint and solvents were removed prior to landfilling at this facility. Landfill construction began in 1988 under Pennsylvania Department of Environmental Resources (PADER) Permit No. 101479. Construction was completed in 1989.

The landfill is engineered with a geosynthetic, High Density Polyethylene (HDPE), liner and a leachate collection system. The leachate passes to an on-site treatment plant before discharging. Treated leachate does not contain significant organics and is actively monitored for iron, manganese, and pH – monitoring that is more in-line with mine drainage when compared with typical solid waste landfill leachate. It is understood that most of the organic waste was highly decomposed prior to being placed in the landfill. The landfill also contains material from the excavation of unmined coal.

The landfill is inactive. A study by Rhea in 2017[4] concluded that parameters monitored for the landfill since 1990 have never indicated that the landfill is a significant source of groundwater contamination. Based on the Rhea study, PADEP rescinded their requirements for monitoring the landfill's groundwater in December 2017.

[4] Rhea Engineers and Consultants, Inc., March 2017, Report, *Evaluation of Groundwater Monitoring, Greater Pittsburgh International Airport, On-Site Solid Waste Landfill*, prepared for ACAA.

5.0 ALTERNATIVES TO THE PROJECT

ACAA considered various alternatives for the solar and gas PIT Microgrid prior to 2020 in terms of site location (see Exhibit 3). Although these locations were considered prior to the recent revisions to NEPA resulting from Fiscal Responsibility Act also called the Debt Limit Bill (June 3, 2023), these alternatives represent a "reasonable range of alternatives" consistent with the new statutes. A potential location of the gas-fired power plant was originally considered near the Landside Terminal building (Exhibit 3). This location was rejected because it would be visible to passengers, would require special security, and would potentially interfere with upcoming terminal construction and demolition activities associated with the Terminal Modernization Program (TMP). The final preferred location for the power plant was identified within the Hangar Road industrial portion of the Airport as it would be located away from passengers and TMP construction and would also not require additional security measures for its construction and operation.

The development of the PV Solar Arrays was considered at several locations within the Airport where there was open space without public access. This included the roof of the existing parking garage and the roof of the Multi-Modal Facility (parking garage) to be constructed as part of the TMP. Other possibilities included future carports on parking lots and the rooftops of existing and future ACAA buildings, not identified on Exhibit 3. Problems with using existing or future buildings were the need to undertake structural evaluations of the existing buildings and the uncertain future of some of these buildings. Using the roofs of future buildings required design changes not anticipated within the TMP.

The location of the closed landfill was identified as the preferred option for the Phase 1 and Phase 2 PV Solar Arrays as there would be no disruption to airport operations or the upcoming terminal construction at that location and the landfill site was unlikely to be used for any other benefit to the airport. The landfill also offered lower cost construction than rooftop or parking carports and it also offered the ability to net meter at an existing Duquesne Light Company metering point.

In terms of screening criteria for the solar power development, the options discussed above are summarized in the following decision chart and satisfy the purpose and need to generate solar power.

SITING CRITERIA FOR THE LOCATION OF THE PV SOLAR ARRAYS

Alternative	Adequate Location for Sunlight	Avoids Obvious and Significant Environmental Impacts and Reduces Long Term GHG Emissions	Avoids Structural Evaluations	Localized Net Metering Available	Avoids Potential to Interfere with Airport Operations and Public During Construction, Maintenance, and Deconstruction	Constructible Site
PV Solar Array on Roof of Existing Parking Garage	Y	Y	N	N	N	Y
PV Solar Array on Roof of Future Parking Garage	Y	Y	N	N	N	Y
PV Solar Array on Landfill (Preferred Option)	Y	Y	Y	Y	Y	Y
No Action	N/A	N	Y	N/A	Y	N/A

Alternatives for the Phase 2 PV Solar Array were never considered as the alternatives analysis for the solar development contemplated both the Phase 1 and Phase 2 PV Arrays to be built side-by-side. However, plans were not sufficiently advanced enough to proceed as Phase 1 was limited in size due to PA regulatory constraints on the capacity of net metering projects. Phase 2 therefore needed to obtain an independent interconnection approval that resulted in several additional years of development and planning. The intent was to use the full landfill acreage for the development of solar power. ACAA had previously worked with Duquesne Light to design the electrical interconnection of Phase 1 and 2 in combination and the landfill permitting was obtained from the PADEP for both Phase 1 and Phase 2. The interconnection process is already in progress with PJM, a regional transmission organization that coordinates the movement of wholesale electricity, for Phase 2 at the landfill site.

6.0 ENVIRONMENTAL CONSEQUENCES

6.1 Ambient Air Quality

Construction emissions for the Phase 1 microgrid project were calculated with FAA's ACEIT program on the basis of 2014 emissions factors from the USEPA as presented in the 2020 EA. This analysis tool is no longer valid because in 2020 USEPA issued new emissions factors with their MOVES3 program. Accordingly, construction emissions from the Phase 2 PV Solar Array have been estimated on the basis of the MOVES3 program and the Phase 1 microgrid construction emissions have been re-calculated to verify that construction emissions were below allowable *de minimis* values. These calculations were undertaken by Epsilon Associates, Inc. from Maynard, MA, a company specializing in the application of the MOVES3 program. Their results are provided in Table 1 and their calculations in support of this verification are presented as Appendix B.

Table 1 Annual Pollutant Emissions Due To The Construction Of The Proposed Action And A Recalculation Of The Construction Emissions From The Phase 1 Microgrid

Annual Pollutant Emissions Due To The Construction Of The Proposed Action And A Recalculation Of The Construction Emissions From The Phase 1 Microgrid							
Year	Emissions (tons/year)						Metric tons/year
	CO	VOC	NOx	SOx	PM_{10}	$PM_{2.5}$	CO_{2e}
Phase 1 Gas-Fired Power Plant							
2020	3.46	0.77	2.61	4.5E-03	0.30	0.16	830
2021[1]	0.57	0.1	1.08	7.8E-04	0.08	0.06	280
	4.03	**0.87**	**3.69**	**5.3E-03**	**0.38**	**0.22**	**1110**
Phase 1 PV Solar Array							
2020	3.02	0.20	2.97	1.4E-03	0.20	0.30	647
2021[1]	0.82	0.18	0.92	1.0E-03	0.08	0.08	247
	3.84	**0.38**	**3.88**	**2.5E-03**	**0.30**	**0.40**	**894**
Phase 2 PV Solar Array							
2024[2]	**0.14**	**0.01**	**0.14**	**1.94E-04**	**0.01**	**0.01**	**48**

Notes:
[1] 2020 volatile organic compounds (VOCs), SO_2, and CH_4 (part of CO_2 equivalence) emission factors used for 2021 estimates due to missing data in MOVES for these pollutants.
[2] 2023 VOCs, SO_2, and CH_4 (part of CO_2 equivalence) emission factors used for 2024 estimates due to missing data in MOVES for these pollutants.

Net emissions from the project would not exceed the applicable *de minimis* thresholds for Allegheny County. Project-related emissions from Phases 1 and 2 are shown, by year, in Table 2. The pollutant that comes closest to meeting its threshold is CO at 6.49 tons per year in 2020, which is still well-below the 100 ton per year standard.

Table 2 Comparison Of Construction Emissions To *De Minimis* Thresholds

Comparison Of Construction Emissions To De Minimis Thresholds							
Year	Emissions (tons/year)						Metric tons/year
	CO	VOC	NOx	SOx	PM_{10}	$PM_{2.5}$	CO_{2e}
2020	6.49	0.97	5.58	5.90E-03	0.53	0.48	647
2021	1.39	0.28	2.00	1.83E-03	0.15	0.14	247
2024	0.49	0.12	0.66	1.94E-04	0.01	0.01	48
De minimis threshold	100	100	100	100	N/A	100	N/A
% Difference ("-" under)/over *de minimis* threshold							
2020	-93.513	-99.025	-94.421	-99.994	N/A	-99.525	N/A
2021	-98.613	-99.717	-98.002	-99.998		-99.859	
2023	-98.351	-99.860	-97.818	-99.999		-99.787	
2024	-99.858	-99.986	-99.861	-100.000		-99.991	

Operational emissions are associated only with the gas-fired power plant, where the emissions are below *de minimis* values, but as a stationary source must be permitted by the Allegheny County Health Department (ACHD). The plant operates under Minor Source Operating Permit 0976-OP22 dated August 24, 2022. Operational emissions were estimated in the 2020 EA but as the plant has been operational for a year, the emissions based on actual monitoring are available as presented in Table 3.

Table 3 Annual Pollutant Emissions Measured from the First Year of Operation of the Gas-Fired Power Plant

Annual Pollutant Emissions Measured from the First Year of Operation of the Gas-Fired Power Plant								
	Emissions (tons/year)							
	PM1,2	PM101,2	PM2.5	NOx	SOx	CO	VOCs	HCHO
De Minimis Threshold	n/a	n/a	100	100	100	100	100	n/a
Permit limit	8.77	8.77	8.77	16.87	0.43	22.97	6.11	2.62
Actual[3]	5.51	5.51	5.51	9.34	0.33	2.89	3.26	0.53

[1] All particulate is considered $PM_{2.5}$. $PM_{2.5}$ is total particulate.
[2] PM, PM_{10} and $PM_{2.5}$ emissions include both filterable and condensable particulate.
[3] Rolling 12 months updated May 2023.

Based on the results of stack testing, the gas-fired power plant is being operated within the allowable emissions defined by their permit (obtained from the Allegheny County Health Department and provided in Appendix D) and well beneath USEPA *de minimis* values.

6.2 Biological Resources

Biological Resources are well described in the 2020 EA with confirmation that construction and operation of the PIT microgrid would not have significant impact to local biodiversity. This conclusion was based on a February 2020 PNDI consultation. In January 2023, a new PNDI search of state and federal threatened, endangered, and special concern species was conducted specifically for the Phase 2 PV Solar Array. This tool allowed Rhea to coordinate with the PA Game Commission, the PA Department of Conservation and Natural Resources, the PA Fish and Boat Commission, and the U.S. Fish and Wildlife Service to ensure that no federal threatened, endangered, and special concern species were present within the project area. The PNDI, provided in Appendix C, confirms the original conclusions of the 2020 EA and that the proposed Phase 2 PV Solar Array project results in no known impact to threatened and endangered species and/or special concern species and resources.

6.3 Climate Change

On January 6, 2023, the CEQ updated *Guidance on Consideration of Greenhouse Gas Emissions and Climate Change*.[5] As discussed in this guidance, when conducting climate change analyses in NEPA reviews, agencies should consider: (1) the potential effects of a proposed action on climate change, including by assessing both GHG emissions and reductions from the proposed action; and (2) the effects of climate change on a proposed action and its environmental impacts. Potential impacts to climate were reviewed in the 2020 EA in the context GHG emissions (carbon dioxide equivalent – CO_{2eq}) for construction and operations of the PIT Microgrid with the conclusion that GHG emissions would be reduced from PIT's previous energy consumption.

> *The Proposed Action would result in the net decrease of GHG given that the microgrid which utilizes energy from solar PV Array in addition to a natural gas-fired electric power plant would emit fewer emissions than the No Action alternative which relies upon the electrical grid. No change to Airport operations would occur as a result of the Proposed Action. Energy consumption at the Airport is anticipated to be the same under the Proposed Action as with existing conditions.*

The 2020 EA did not quantify this interpretation but did provide an estimate of CO_{2eq} emissions of a total of about 2,300 tons associated with the construction of the power plant and the Phase 1 PV Solar Array. Based on the calculations presented in Appendix B, the Proposed Action represents an additional 48 tons of GHG emissions. Operational emissions from the power plant were not estimated for the power plant in terms of CO_{2eq} emissions in the 2020 EA.

Actual annual GHG emissions from the power plant are 60,758 metric tons (mT) CO_{2eq}, as provided by IMG with an annual production of 112,003,810 kilowatts (kW) per hour (kWh). This corresponds to 0.0005 mT CO_{2eq} emissions per kWh. Allegheny County reports typical GHG generation in Allegheny County to be 0.0007 mT CO_{2eq} emissions per kWh[6][7] so just with the gas-fired plant there is a significant GHG reduction from normal power supplied through the grid. Considering that the PIT

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[5] COUNCIL ON ENVIRONMENTAL QUALITY [CEQ–2022–0005] RIN 0331–AA06, *National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions and Climate Change*, Federal Register, Vol. 88, No. 5 / Monday, January 9, 2023 / Notices

[6] Citizen's Guide to Sustainability, Allegheny County, September 2021 https://www.alleghenycounty.us/uploadedFiles/Allegheny_Home/Dept-Content/Sustainability/docs/2021%20Citizens%20Guide%20to%20Sustainability.pdf

[7] A Message from the County Executive, Improving Air Quality, 2019, available at https://www.alleghenycounty.us/uploadedFiles/Allegheny_Home/Dept-Content/Sustainability/docs/Sustainability%20Primer%2008-22-19.pdf

Microgrid already has 3 MW of production from the Phase 1 PV Solar Array and an additional 4.7 MW is planned for the Phase 2 array, the addition of these two projects with zero operational emissions is further confirmation that the conclusion in the 2020 EA is correct and the PIT microgrid projects represent a reduction in GHG emissions.

6.4 DOT Section 4(f) Resources

The 2020 EA concluded that the Proposed Action would have no effect on DOT Section 4(f) resources. The 2020 EA identified the Montour Trail with the Airport Link Trail as a local 4(f) resource but did not identify these resources as the ones closest to the Proposed Action and did not review potential impacts to the users of the trails. In particular, the Airport Link Trail section of the Montour Trail is located about 700 feet from the Phase 1 PV Solar Array and about 1,300 feet from the Phase 2 PV Solar Array. As the two PV Solar Arrays are located on the northern side of the Airport Expressway (I-376) and the Airport Connector Trail is south of the Expressway at the base of a steep scarp, at no location is the existing or proposed PV Solar Array visible from the Trail.

Exhibit 4 depicts the viewshed from the Airport Connector Trail to the PV Solar Arrays. A signage prohibiting Trail users from approaching the PV solar farm area is well posted at the closest point to the Trail. This review confirms the conclusion from the 2020 EA that the Phase 1 and 2 PV Solar Array projects do not impact the users of the Airport Link Trail and there are no other DOT Section 4(f) resources in the vicinity of PIT that could potentially be impacted.

6.5 Hazardous Materials, Solid Waste, and Pollution Prevention

The 2020 EA identifies the existing areas of environmental concern on PIT property, including one permitted landfill, one Act 2 site, and several contaminated areas of concern that are the result of past industrial and airfield activities on PIT property. Phase 1 of the PV Solar Array is constructed at the closed landfill site and is closed to public access. The Proposed Action of the Phase 2 PV Solar Array will also be developed on the landfill next to the Phase 1 PV Solar Array (Exhibit 2).

Since the preparation of the 2020 EA, a permit for constructing both the Phase 1 and Phase 2 PV Solar arrays on a landfill was obtained by IMG Solar from the PADEP as Landfill Minor Permit Modification (Solid Waste Permit No. 101479). This permit is presented in Appendix D.

The landfill was constructed as an approved solution to the 1986 discovery of waste dumped historically (newspapers from the 1950s were found in the waste) where the Midfield Terminal construction would be impacted. Right-of-way clearance requirements for Interstate 376 (inaugurated on September 9, 1992) and additional waste disposal requirements, mainly refuse from the excavation of coal seams from airport construction, resulted in the final landfill configuration. All hazardous wastes, including paint and solvents, were removed prior to landfilling at this facility. Landfill construction began in 1988 under PADER Permit No. 101479. Construction was completed in 1989. The landfill is inactive and, since December 2017, ACAA is no longer required to test and report groundwater quality from its monitoring wells.

To prevent impact to the landfill as an effort towards pollution prevention, the Minor Permit Modification provides authorization to drill up to seven feet into the landfill cap, provided the metal beams driven into the ground to support the solar panels maintain at least 6 feet of separation above the 3.5-feet thick bottom liner system to allow for any settlement. Breaching the landfill bottom liner is prohibited. Electrical conduit and control equipment are prohibited from penetrating the landfill cap. Construction will minimally disturb the landfill cap at all times. To prevent any surface water infiltration at the base of the driven metal posts, a layer of bentonite clay chips or powder will be poured around the base of each completed post. A topsoil/vegetative layer will be replaced over the bentonite clay chips or powder layer. This seal will prevent any infiltration at the base of each metal post. Routine inspection of the solar array will be performed to identify any need for additional bentonite around the posts to prevent surface water infiltration.

Waste generated during the construction of the Phase 1 PV Solar Array and during the construction and operation of the gas-fired power plant has been managed commercially consistent with standards established by PADEP. The waste from the construction phase of the Phase 2 PV Solar Array will be managed similarly.

The operation of the PV Solar Array would not generate waste. Future decommissioning of the PV Solar Array will require management of potentially hazardous waste and the Minor Permit Modification has requirements for closure of the PV Solar Arrays that includes Closure and Post-Closure Plans including recycling of components and hazardous waste management.

There are hazardous chemicals used to make PV cells and panels that must be carefully handled to avoid release to the environment. Some types of PV cell technologies use heavy metals, and these types of cells and PV panels may require special handling when they reach the end of their useful life. U.S. environmental laws regulate the use and disposal of hazardous materials. The U.S. Department of Energy is supporting various efforts to address end-of-life issues related to solar energy technologies, including the recovery and recycling of the materials used to

manufacture PV cells and panels. In Pennsylvania, Senate Bill 284[8], introduced by Sen. Gene Yaw, which passed on April 14, 2022, provides guidelines for PV Solar Array decommissioning. Another state bill, House Bill 2104[9], introduced by Rep. Kathy Rapp, would require a decommissioning plan and also imposes limits on recycling solar parts – the total amount delivered to a landfill cannot exceed 20 percent of the total mass of the panels. It is reasonable to assume that Pennsylvania will have enacted decommissioning legislation for PV solar arrays by the time the Proposed Action requires decommissioning. IMG Solar plans to recycle the PV panels at the time of closure or when PV panels are replaced for maintenance of the array.

Based on existing and anticipated regulatory requirements, it is anticipated that the eventual closure of the PV Solar Arrays will be based on recycling of components and pollution prevention. These requirements are consistent with the FAA Desk Reference that identifies factors that the FAA has considered in evaluating the context and intensity of potential environmental impacts for hazardous materials, hazardous waste, and hazardous substances, as well as solid waste that would be generated by the project, and describes methods associated with pollution prevention. Based on existing and anticipated regulatory requirements, the closure of the facility will not have significant impacts.

6.6 Historic, Architectural, Archaeological, and Cultural Resources

The 2020 EA describes the historic, architectural, archaeological and cultural resources of the Phase 1 Microgrid project that are also applicable to the Phase 2 Proposed Action with the following conclusions:

> *No known historical, architectural, archaeological, or cultural resources are present within the Proposed Project Area. There are no historic or archaeological resources within the Proposed Project Area that are listed or eligible for listing on the National Register of Historic Places……. As the entire Proposed Project Area has experienced varying degrees of ground disturbance from historical mining, development of existing Airport facilities, and the*

[8] Senate Bill 284, An Act amending Title 27 (Environmental Resources) of the Pennsylvania Consolidated Statutes, in environmental protection, providing for decommissioning of solar energy facilities available at https://www.legis.state.pa.us/cfdocs/billinfo/billinfo.cfm?syear=2021&sind=0&body=S&type=B&bn=284

[9] House Bill 2104, An Act amending Title 27 (Environmental Resources) of the Pennsylvania Consolidated Statutes, in environmental protection, providing for decommissioning of alternative energy facilities available at https://www.legis.state.pa.us/cfdocs/billInfo/billInfo.cfm?sYear=2021&sInd=0&body=H&type=B&bn=2104

landfill, it is unlikely any archaeological resources exist within these sites……. There would be no impacts to archeological resources as a result of the Proposed Action. No archeological resources are anticipated to fall within the Proposed Project Area for the Proposed Action.

A Section 106 concurrence for the above conclusion was not solicited from the PA SHPO at the time the 2020 EA was prepared as neither the gas-fired power plant nor the PV Solar Array projects are located on natural ground. As this was an oversight in the 2020 EA, for the Phase 2 Proposed Action with construction on a landfill, a letter from the PA SHPO has been solicited, and is provided in Appendix E demonstrating that the Phase 2 PV Solar Array project has no potentially significant cultural resources under PA Section 106.

6.7 Land Use

The Proposed Action would take place on ACAA property on a closed landfill (Airport Midfield Terminal Solid Waste Disposal Site) over land that consists primarily of graded soil and maintained grassy lawn. The site is designated as Heavy Industrial by Findlay Township. The Proposed Action is compatible with existing uses and no communities, residences, businesses, or natural resource areas would be affected.

The Proposed Action would not create a wildlife hazard as defined in FAA Advisory Circular 150/5200-33C dated February 21, 2020. The development of a solar PV array and/or an electric power plant do not constitute wildlife hazards as defined in FAA Advisory Circular 150/5200-33C, and the existing Proposed Project Area is disturbed, graded land that does not accommodate or attract wildlife.

The Proposed Action would not result in a significant change to land use and would not introduce any non-compatible land uses. The area near PIT is primarily suburban mixed-use development with nearby business parks, commercial and mixed density residential development. Moon Township, to the north and east of PIT, is more heavily developed than Findlay Township, located to the south and west of PIT (see Exhibit 5). Pursuant to 49 U.S.C. § 47107(a)(10) of the 1982 Airport and Airway Improvement Act, ACAA is committed to undertake actions to the extent reasonable, to restrict the use of land adjacent to, or in the immediate vicinity of, PIT to activities and purposes compatible with normal airport operations. Airport zoning to restrict the use of land adjacent to, or in the immediate vicinity of, PIT to activities and purposes compatible with normal airport operations has been enacted by all surrounding municipalities.

The area directly to the north of PIT is designated for Regional Commerce use in the Moon Township Comprehensive Plan. The area also includes the University

Boulevard Business Corridor and the Carnot District. These use areas are compatible with Airport use and development. The area adjacent to PIT in Findlay Township is designated for a variety of uses, including Town Center, Commercial and Industrial, Mixed Use and Medium Density Residential. These use areas are compatible with PIT use and development.

The PIT property contains airport uses, commercial uses, the Pittsburgh Air Reserve Station, a Pennsylvania Air National Guard base, natural gas wells, and open space. Additionally, the PIT property is surrounded by freeways on all sides.

6.8 Natural Resources and Energy Supply

The 2020 EA describes that development of the PIT Microgrid would not impact energy consumption required for Airport operations. Electricity at PIT prior to the construction of the Microgrid was provided commercially from Duquesne Light Company through the electrical grid. The Proposed Action would change the source of energy for the Airport to rely primarily on the Microgrid.

The Proposed Action would enhance the existing microgrid and allow PIT to have additional surplus energy generated by a renewable source. As noted in Section 6.3, the Proposed Action would provide a more reliable source of energy without adding to PIT's carbon footprint.

Solar energy technologies require the use of materials, such as metals and glass, which are energy-intensive to make. The environmental issues related to the production of these materials could be associated with solar energy systems when conducting life cycle or so-called cradle-to-grave environmental analysis. Studies conducted by a number of organizations and researchers have concluded that PV systems can produce the equivalent amount of energy that was used to manufacture the systems within 1 to 4 years. Most PV systems have operating lives of up to 30 years or more.[10]

Construction of the Proposed Action would consume energy in the form of electricity, natural gas, and transportation-related fuels, through use of construction equipment, transport of construction materials, and temporary lighting. In addition, construction of the Proposed Action would also require water for dust suppression, concrete production, and equipment cleaning. Construction energy consumption is both short-term and minor when compared to long-term regional energy use. As such, construction of the Proposed Action would not exceed area energy supplies.

[10] U. S. Energy Information Administration, February 25, 2022, *Solar explained, Solar energy and the environment*. https://www.eia.gov/energyexplained/solar/solar-energy-and-the-environment.php

Operations of the Proposed Action would not change energy consumption of Airport facilities. No increase in Airport operations would occur as a result of implementation of the Proposed Action.

6.9 Noise and Compatible Land Use

The Proposed Action would not result in any changes to Airport operations and noise from aircraft operations would not be affected by the Proposed Action. No changes would occur to existing or future aircraft noise exposure levels. The Proposed Action would not result in any permanent increases in ambient noise. The Proposed Action would occur in the middle of the PIT airfield in an area adjacent to highway and undeveloped land. Existing ambient noise in the vicinity of the Proposed Project Area is influenced by aircraft operations and ground transportation noise from adjacent freeway traffic. The nearest residential community is located more than a mile west of the Proposed Action and the nearest disadvantaged community is located more than 2.5 miles away in Coraopolis as discussed in Section 6.10. Due to the distance of the Proposed Project Area to sensitive noise receptors, no noise impacts are anticipated. Construction traffic would access the Proposed Project Area via freeways and not through residential areas and the increase in noise levels resulting from construction would be short term and minor in duration and would not exceed applicable standards.

6.10 Socioeconomics, Environmental Justice, and Children's Health and Safety Risks

The 2020 EA describes the local socioeconomic setting and of the Phase 1 PIT Microgrid and Phase 2 PV Solar Array with the conclusion that there will be no significant impacts that disproportionately impact minority or low-income residents and would not have the potential to lead to a disproportionate health or safety risk to children. The discussion presented in the 2020 EA has been supplemented with the reports derived from the application of the USEPA's EJScreen tool provided in Appendix F.

The EJScreen tool identifies the nearest disadvantaged community to be in Coraopolis more than 2.5 miles from the nearest point of ACAA property and approximately 5 miles from the PV Solar Arrays. As the PIT Microgrid project including the Phase 2 PV Solar Array is entirely within ACAA property isolated from local communities and because the nearest disadvantaged community is distant, the data provided with the EJScreen tool confirms the conclusions of the 2020 EA.

In addition to the application of the EJScreen tool that identifies disadvantaged communities, local schools and day care centers have also been considered to evaluate

potential impacts to children's health with the conclusion that the Proposed Action will not have the potential to lead to a disproportionate health and safety risk to children. The nearest school, the Goddard School of Moon Township, is located approximately 2.6 miles northeast from the Proposed Action. The two nearest existing daycares are a daycare within the DICK's Sporting Goods, Inc. building located approximately 1.7 miles northwest of the Proposed Action and Play Academy Inc, located approximately 2.1 miles to the northeast. A new daycare, La Petit Academy, will operate on airport property in the summer of 2023. It will be approximately 0.9 miles northwest of the Proposed Project Area. The local predominant wind direction at PIT is primarily from the west blowing towards the east[11]. Due to the placement of the nearest school and daycares compared to the direction of the prevailing winds, the Proposed Action would not have the potential to lead to a disproportionate health or safety risk to children.

6.11 Water Resources

The subject of water resources has been revisited from that presented in the 2020 EA in consideration of January 2023 revisions to the definition of WOTUS and the Sackett Opinion of the U.S. Supreme Court decided May 25, 2023.

On December 30, 2022, the USEPA and the U.S. Department of the Army announced the final "Revised Definition of WOTUS" rule. On January 18, 2023, the rule was published in the Federal Register[12] and the rule took effect on March 20, 2023. The implementation of the new rules has been litigated in several states (not including Pennsylvania) with the result that agencies are interpreting WOTUS consistent with the pre-2015 regulatory regime[13] in 27 States including Pennsylvania until further notice. PennDOT considers WOTUS to be equivalent to Waters of the Commonwealth.[14]

The agencies are in receipt of the U.S. Supreme Court's May 25, 2023, decision in the case of *Sackett v. Environmental Protection Agency*[15]. In light of this decision, the agencies will interpret the phrase WOTUS consistent with the Supreme Court's decision in *Sackett*. In essence, the Supreme Court ruling (9-0) curtails the application of the Clean Water Act (CWA) to a particular wetland (making it a jurisdictional wetland) only if it blends or flows into a neighboring water that is a

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11 Windfinder. Wind & weather statistics: Pittsburgh International Airport. https://www.windfinder.com/windstatistics/pittsburgh_intl_airport Accessed March 16, 2023.

12 https://www.federalregister.gov/documents/2023/01/18/2022-28595/revised-definition-of-waters-of-theunited-states.

13 https://epa.gov/wotus/pre-2015-regulatory-regime

14 https://www.penndot.pa.gov/ProjectAndPrograms/RoadDesignEnvironment/Environment/environmental-policy/Pages/Natural-Resources.aspx

15 https://www.supremecourt.gov/opinions/22pdf/21-454_4g15.pdf

channel for interstate commerce. Given the recency of the ruling it is expected that it will take time before it is fully promulgated into legislation, but in any case, the Proposed Action of the Phase 2 PV Solar Array does not have impacts to WOTUS, and the nearest navigable water is the Ohio River. The nearest river identified within WOTUS is Montour Run, a first-order tributary to the Ohio River. The depiction of surface water drainage and wetlands from the National Wetlands Inventory[16] is presented in Exhibit 9 in the 2020 EA. The wetlands identified in the National Wetlands Inventory and drainage in the immediate surroundings of the PV Solar Array projects is presented as Exhibit 6.

On April 1, 2020, a wetland investigation of the total proposed PV Solar Array site (including the area of both Phase 1 and Phase 2) was conducted by Rhea using guidelines outlined in the 1987 Corps of Engineers Wetland Delineation Manual.[17] Rhea revisited the PV solar array site on January 5, 2023, to review any changes in conditions from what was observed in 2020. As a result of this investigation, a previously identified wetland about 50 feet north of the proposed project's construction area was observed to still be present. The wetland is approximately 596 square feet and is located within the man-made drainage swale in the northeastern portion of the project site. As this wetland is isolated from drainage and does not blend or flow into a neighboring water that is a channel for interstate commerce it is not a jurisdictional wetland within WOTUS.

The opinion that the mapped wetland on the landfill outside of the footprint of the Phase 2 PV Solar Array construction is not a jurisdictional wetland is confirmed by an opinion provided to the FAA by Abbey Vipperman, Regulatory Division, US Army Corps of Engineers – Pittsburgh District in an email dated March 24, 2023. This correspondence between FAA and USACE is provided in Appendix G.

Because construction or vehicle movement is unlikely to occur within the drainage swale, and because the wetland sits outside of the proposed project's construction area, it is expected that no impacts to this wetland will occur due to development activities. Accordingly, PADEP does not require permitting under 25 Pa. Code § 105 as the wetland will not be impacted. The 2023 final wetland field survey report is provided in Appendix G.

The Airport operates under a National Pollutant Discharge Elimination Systems (NPDES) General Permit (Permit Number PA0203815) held by the ACAA. The Proposed Action does not require a construction-phase NPDES permit under

[16] National Wetlands Inventory, map available at https://www.fws.gov/program/national-wetlands-inventory/wetlands-mapper

[17] Rhea Engineers & Consultants, Inc, *Microgrid Solar PV Solar Array Site – Field Site Summary Report*, On-Call Planning and Environmental Services, Pittsburgh International Airport, Moon Township, Pennsylvania, prepared for Ricondo April 8, 2020.

PADEP's Chapter 102 regulations as ground disturbance is less than an acre and PADEP has ruled that groundwater at the site of the Proposed Action no longer requires monitoring.

6.12 Cumulative Impacts

The 2020 EA summarizes the past, ongoing, and anticipated future development activities at PIT with the conclusion that the construction and operation of the PIT Microgrid would not produce a cumulative effect on any of the environmental impact categories evaluated. The Cumulative Impacts Summary presented in Table 7 of the 2020 EA is still valid and is not repeated here. Since the completion of the 2020 EA some of the activities listed as ongoing have been completed and new activities added. A current (June 2023) list of activities at PIT is summarized in Table 4.

Table 4 Past, Present, and Future Actions at PIT (5-Year Timeframe)

Past, Present, and Future Actions at PIT	
PROJECT	**STATUS**
Past Actions	
Rehabilitate Deicing Pad C	Completed in 2018
Cargo 3 Ramp Expansion	Completed in 2018
Airfield Signage Upgrade and Replacement	Completed in 2020
Airport Maintenance Complex	Completed in 2020
Fire Training Facility Rehabilitation	Completed in 2020
Taxiway N Rehabilitation	Completed in 2020
U.S. Air Force C17 Conversion - construction of facilities to house, fuel, and maintain C-17 Globemaster III aircraft	Completed in 2020
Ewing Road Improvements	Completed in 2021
Phase 1 PIT Microgrid (Power Plant and Solar)	Completed in 2021
Airfield Drainage Improvements	Completed in 2022
8G1-22 Airfield Pavement Rehabilitation Project	Completed in 2022
Taxiways E, F, & W and Taxiways B, B3, B4, B5, B6 & B7 Pavement Rehabilitation	Completed in 2023
Ongoing and Future Activities	
Rehabilitate Airfield Pavements	Ongoing expected completion 2024
Rehabilitate Non-Airfield Pavement	Currently Ongoing
Buildings and Hangar Improvements	Currently Ongoing
Terminal Modernization Program	Currently Ongoing
Extend Northfield Taxiways	Currently Ongoing
Oil and Gas Drilling Activity	Currently Ongoing
Area-wide Sewage Treatment Plant	Currently Ongoing
Rehabilitate Runway 10L-28R	Currently Ongoing

Past, Present, and Future Actions at PIT	
PROJECT	**STATUS**
Utility Pipeline	Currently ongoing and further improvements and projects expected for the future
Cargo 4 construction	Currently Ongoing
Airside Renovations Program	Currently Ongoing
Neighborhood 91 Development	Currently Ongoing
Clinton Commerce Site 12 Phase II	Currently Ongoing
Northfield Development	Currently Ongoing
Skyview Business Park	Currently Ongoing
Construction of Bus Charging Station Equipment Pad	August 2023
Potassium Acetate Storage Facility	2023 or 2024
Deicing Pads Pavement Rehab	2024
RW-10L Rehab	2024 - 2025
Purchase of SRE Equipment	2023

Since the completion of the 2020 EA the CEQ has incorporated new requirements for the evaluation of cumulative impacts related to GHG emissions as contained in the *Guidance on Consideration of Greenhouse Gas Emissions and Climate Change* discussed in Section 6.3. The 2023 interim guidance is more stringent, instructing agencies to analyze and publicly disclose cumulative effects by quantifying GHG emissions and providing context, e.g., monetizing climate damages using the social cost of GHG emissions (SC-GHG), considering the damage estimates relative to climate goals and commitments, and summarizing and citing to available scientific literature. As discussed in Section 6.3, the operation of the Phase 1 Microgrid project has reduced GHG emissions from what the Airport previously produced so the cumulative impact of the Phase 1 development is a reduction of GHG impact. Similarly, the Proposed Action will further reduce GHG emissions.

The USEPA has also revised their interpretation of cumulative effects through their issuance on January 23, 2023, of their Cumulative Impacts Addendum[18]. Cumulative impacts in this document refer to the analysis, characterization, and possible quantification of the combined risks to human health and/or the environment from multiple agents or stressors. The Addendum builds on EPA's Legal Tools to Advance Environmental Justice which addresses an array of environmental statutory and regulatory regimes for the agency to ramp up its environmental justice efforts. This document provides examples of environmental and other legal authorities that the EPA can use to identify and address cumulative impacts through a range of actions including permitting, cleanup, emergency response, and grants in communities with

[18] U.S. Environmental Protection Agency, Office of General Counsel, January 2023, *EPA Legal Tools to Advance Environmental Justice: Cumulative Impacts Addendum*.

environmental justice concerns and other disadvantaged populations. As discussed in Section 6.9, the Proposed Action has no impacts that disproportionately impact minority or low-income residents and would not have the potential to lead to a disproportionate health or safety risk to children. The EJScreen tool identifies the nearest disadvantaged community to be in Coraopolis more than 2.5 miles from the nearest point of ACAA property and approximately 5 miles from the PV Solar Arrays.

Table 5 summarizes the cumulative impacts specifically associated with the Proposed Action. Past actions impacting the area of the Proposed Action are the Phase 1 Microgrid activities and future actions are activities that could potentially be taking place concurrently with the construction of the Proposed Action.

Table 5 Summary of Cumulative Impacts for the Proposed Action

Summary of Cumulative Impacts for the Proposed Action				
Resource	**Past Actions**	**Proposed Action**	**Future Actions**	**Cumulative Impact**
Ambient Air Quality	Phase 1 Microgrid construction added a stationary emissions source, which does not impact airport operations, or significantly[19] affect ambient air quality in the Proposed Project Area.	Temporary construction emissions would be generated.	No significant future change in automobile traffic. The airfield layout would not be impacted, and the solar PV array would not generate operational emissions.	Temporary construction emissions would occur but would not be cumulatively significant and below *de minimis* thresholds .
Biological Resources	The construction of the Phase I Microgrid did not impact fish, wildlife, or plant resources within the Proposed Project Area.	The Proposed Action would not significantly impact fish, wildlife, plant resources, or habitat within the Proposed Project Area.	Oil and gas drilling could require mitigation for the Indiana Bat. Other future actions would not significantly impact fish, wildlife, or plant resources within the Proposed Project Area .	No state or federal species are impacted in the Proposed Project Area. No significant biological resources impacts would be anticipated by the past, present or proposed developments.
Climate	No past significant actions within the Proposed Project Area that would impact climate.	Temporary construction emissions would be generated. By eliminating operational GHG emissions, the Proposed Action generates electricity without potential climate impact.	No future significant actions within the Proposed Project Area that would impact climate.	Temporary construction emissions would occur but would not be cumulatively significant. No significant climate impacts would be anticipated by the past, present or proposed developments.

[19] The reference to the term "significant" or "significantly" is used in the context of *EPA Legal Tools to Advance Environmental Justice: Cumulative Impacts Addendum.*

Summary of Cumulative Impacts for the Proposed Action				
Resource	**Past Actions**	**Proposed Action**	**Future Actions**	**Cumulative Impact**
Coastal Resources	No past significant actions within the Proposed Project Area that would impact coastal resources.	The Proposed Action would not impact Coastal Resources	No future actions will impact Coastal Resources	No Coastal Resources impacts would be anticipated by the past, present, or future developments at PIT.
Section 4(f) Resources	No significant past actions that would impact Section 4(f) resources within the Proposed Project Area. The Phase I Microgrid was constructed where it is not visible from the nearest 4(f) resource, the Airport Link to the Montour Trail.	The Proposed Action would not impact Section 4(f) resources within the Proposed Project Area and will not be visible from the nearest 4(f) resource, the Airport Link to the Montour Trail.	Temporary impacts could occur to the Airport Link Trail from projects not related to the Proposed Action, such as the construction associated with the TMP; however, given the nature of the path on PIT property, these would not be cumulatively significant.	Temporary impacts could occur to the Airport Link Trail from projects not related to the Proposed Action; however, given the nature of the path on PIT property, these would not be cumulatively significant. No significant impacts to Section 4(f) resources within the Proposed Project Area.
Farmlands	No past actions that would have significant impacts to Farmlands	The Proposed Action would not impact Farmlands	No future actions that would have significant impacts to Farmlands	No significant Farmlands impacts would be anticipated by the past, present, or proposed developments.
Hazardous Materials, Solid Waste, and Pollution Prevention	Past actions were the development of the site as a solid waste landfill, currently closed.	Construction of the Proposed Action would involve the use of hazardous materials, primarily through use of motor fuels, paints, etc. Construction will also result in removal of a minor amount of solid waste that would be disposed of in a permitted local landfill.	Future actions are not expected to encroach on the Proposed Project Area, because it is located on the top of a closed landfill, but PIT can be expected to have future projects where hazardous materials will need to be managed consistent with established procedures.	Construction of the Proposed Action and future airport projects and the decommissioning of the Proposed Action would involve use and handling of hazardous materials, primarily through use of motor fuels, and paints, minor amounts of solid waste, and recycling of solar unit components. However, through adherence to established guidelines, no cumulative impacts would occur.
Historic, Architectural, Archeological, and Cultural Resources	No past actions that would have significant impacts to Historic, Architectural, Archeological, and Cultural Resources	The Proposed Action would have no impacts to Historic, Architectural, Archeological, and Cultural Resources	No future actions that would have impacts to Architectural, Archeological, and Cultural Resources	No Archeological and Cultural Resources impacts would be anticipated by the past, present or proposed developments.

Summary of Cumulative Impacts for the Proposed Action				
Resource	**Past Actions**	**Proposed Action**	**Future Actions**	**Cumulative Impact**
Land Use	No significant past actions that would impact land use within the Proposed Project Area.	Proposed Action would maintain existing land use and would be constructed entirely within the PIT property boundary. The Proposed Action complies with all local plans and land use designations.	No significant future actions that would impact land use within the Proposed Project Area.	No significant changes in land use would occur. Past, present, and future projects within the Proposed Project Area would maintain existing land uses and would not result in changes to the surrounding land use.
Natural Resources and Energy Supply	No past actions that would impact natural resources or energy supply within the Proposed Project Area.	The Proposed Action would not require significant natural resource use or energy supply for construction. Operations would result in a net reduction of energy compared to existing conditions	No future actions that would impact natural resources or energy supply within the Proposed Project Area.	Construction of Proposed Action and other cumulative projects would increase materials and energy consumption but are not anticipated to have a significant impact to natural resource supply. The production of energy during operations represents a cumulative benefit to other development projects at PIT.
Noise and Noise Compatible Land Use	No past actions that would have significant impacts to noise and compatible land use within the Proposed Project Area.	Proposed Action would not result in any increase to occupational noise, would maintain existing land use, and would be constructed entirely within the PIT property boundary. The Proposed Action complies with all local plans and land use designations.	No future actions that would have significant impacts to noise and land use within the Proposed Project Area.	The Proposed Action does not generate occupational noise and would not contribute cumulatively to other development projects at PIT. No significant changes in land use would occur. Past, present, and future projects within the Proposed Project Area would maintain existing land uses and would not result in changes to surrounding land use.
Socioeconomic Impacts, Environmental Justice, & Children's Health	No past actions would have had significant socioeconomic, environmental justice or children's health impacts.	The Proposed Action would not result in any significant socioeconomic, environmental justice or children's health impacts.	No future actions would have significant socioeconomic, environmental justice or children's health impacts.	No significant socioeconomic, environmental justice or children's health impacts.
Visual Effects including Light Emissions	No past actions within the Proposed Project Area that would impact light emissions or visual impacts.	Proposed Action would not result in impacts to light emissions or visual impacts.	No future actions within the Proposed Project Area that would impact light emissions or visual impacts.	Other cumulative projects are not expected to impact light emissions or visual impacts.

Summary of Cumulative Impacts for the Proposed Action				
Resource	**Past Actions**	**Proposed Action**	**Future Actions**	**Cumulative Impact**
Water Resources (including Wetlands, Floodplains, Surface Waters, Groundwater, and Wild and Scenic Rivers)	No past significant actions within the Proposed Project Area that would impact natural resources (including Wetlands, Floodplains, Surface Waters, Groundwater, and Wild and Scenic Rivers).	The Proposed Action does not impact natural resources (including Wetlands, Floodplains, Surface Waters, Groundwater, and Wild and Scenic Rivers). As the Proposed Action is the construction of a solar PV array, the natural drainage and infiltration characteristics of the Proposed Development Area will not change from currently existing conditions.	As the Proposed Development Area is over a landfill that cannot be disturbed and the Proposed Action occupies the remaining available space on the landfill, future actions will not encroach on the Proposed Project Area and future actions at PIT are in the AOA.	The construction and operation of the Proposed Action does not add to the cumulative impact of other developments at PIT located in the AOA and the cumulative impacts of other developments are managed within regulatory permits and PADEP Best Management Practices.

Current and anticipated projects at the Airport are not located on the south side of the Airport where the Proposed Action is planned for the closed landfill. The only nearby facilities are the ARFF Fire Training Facility, and the wells and pipelines associated with natural gas development where additional development in these areas would not impact solar development and vice versa. It is not credible that any future gas development at PIT would be planned in the area of the landfill. The construction and operation of the Phase 2 PV Solar Array will be the last activity that takes place on the closed landfill as there will be no more room for additional development at that location. The Proposed Action is not anticipated to be cumulatively significant when considered with other past, present and reasonably foreseeable actions.

7.0 PUBLIC INVOLVEMENT

The draft of this Supplemental EA was posted on the ACAA web page at https://flypittsburgh.com/wp-content/uploads/2023/10/draft_supplemental_ea_-_pit_phase_2_pv_solar_array_project.pdf and public comments and responses were solicited in a Legal Notice published in the Pittsburgh Post-Gazette on October 26, 2023 included in Appendix J. This Notice was also published on the ACAA web page on October 26 at https://flypittsburgh.com/wp-content/uploads/2023/10/Public-Notice-Phase-2-PV-Solar-Array-Project.pdf and also provided in Appendix J. Both notifications required that comments must be submitted by November 30, 2023.

No public comments were received from October 26 through November 30.

8.0 PREPARER CERTIFICATION

I certify that the information I have provided above is, to the best of my knowledge, correct.

Signature	**12/11/2023** Date
Marcella G. Johnson PE Name	
President Title	
Rhea Engineers & Consultants, Inc Affiliation	**724-443-4111** Phone #

9.0 AIRPORT SPONSOR

I certify that the information I have provided above is, to the best of my knowledge, correct. I also recognize and agree that no construction activity, including but not limited to site preparation, demolition, or land disturbance, shall proceed for the above proposed project(s) until FAA issues a final environmental decision for the proposed development.

Justin Stascak — **12/11/2023**

Signature — Date

Justin Stascak

Name

Project Manager, Environmental Planning

Title

Allegheny County Airport Authority — **412-272-5885**

Affiliation — Phone #

APPENDIX A

Environmental Assessment for PIT Microgrid Project and FAA Approval

Short Form EA for Phase 1 PIT Microgrid Project

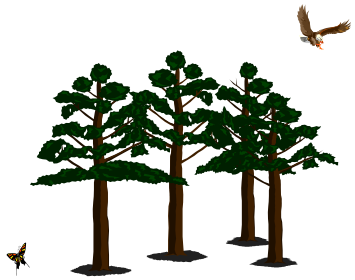
Phase 1 EA FONSI

Short Form EA for Phase 1 PIT Microgrid Project

FEDERAL AVIATION ADMINISTRATION

EASTERN REGION
AIRPORTS DIVISION

Short Environmental Assessment Form for AIRPORT DEVELOPMENT PROJECTS



Airport Name: Pittsburgh International Airport Identifier: PIT

Project Title: Microgrid

This Environmental Assessment becomes a Federal document when evaluated, signed, and dated by the Responsible FAA official.

Responsible FAA Official Date

INSTRUCTIONS

THIS FORM IS FOR LIMITED USE ON SPECIFIC TYPES OF PROJECTS. AIRPORT SPONSORS MUST CONTACT YOUR LOCAL AIRPORTS DISTRICT OFFICE (ADO) ENVIRONMENTAL PROTECTION SPECIALIST (EPS) BEFORE COMPLETING THIS FORM.

This form was prepared by FAA Eastern Region Airports Division and can only be used for proposed projects in this region.

Introduction: This Short Environmental Assessment (EA), is based upon the guidance in Federal Aviation Administration (FAA) Orders 1050.1F – *Environmental Impacts: Policies and Procedures*, and the *Environmental Desk Reference for Airport Actions* and 5050.4B – *NEPA Implementing Instructions for Airport Actions.* These orders incorporate the Council on Environmental Quality's (CEQ) regulations for implementing the National Environmental Policy Act (NEPA), as well as US Department of Transportation environmental regulations, and other applicable federal statutes and regulations designed to protect the Nation's natural, historic, cultural, and archeological resources. The information provided by sponsors, with potential assistance from consultants, through the use of this form enables the FAA ADO offices to evaluate compliance with NEPA and the applicable special purpose laws.

Use: For situations in which this form may be considered, refer to the APPLICABILITY Section below. The local ADO has the final determination in the applicability of this form to a proposed Federal Action. Proper completion of the Form will allow the FAA to determine whether the proposed airport development project can be processed with a short EA, or whether a more detailed EA or EIS must be prepared. **If you have any questions on whether use of this form is appropriate for your project, or what information to provide, we recommend that you contact the environmental specialist in your local ADO.**

This Form is to be used in conjunction with applicable Orders, laws, and guidance documents, and in consultation with the appropriate resource agencies. Sponsors and their consultants should review the requirements of special purpose laws (See 5050.4B, Table 1-1 for a summary of applicable laws). Sufficient documentation is necessary to enable the FAA to assure compliance with all applicable environmental requirements. Accordingly, any required consultations, findings or determinations by federal and state agencies, or tribal governments, are to be coordinated, and completed if necessary, prior to submitting this form to FAA for review. Coordination with Tribal governments must be conducted through the FAA. We encourage sponsors to begin coordination with these entities as early as possible to provide for sufficient review time. Complete information will help FAA expedite its review. This Form meets the intent of a short EA while satisfying the regulatory requirements of NEPA for an EA. Use of this form acknowledges that all procedural requirements of NEPA or relevant special purpose laws still apply and that this form does not provide a means for circumvention of these requirements.

Submittal: When using this form for an airport project requesting *discretionary funding*, the documentation must be submitted to the local ADO by April 30th of the fiscal year preceding the fiscal year in which funding will be requested. When using this form for an airport project requesting *entitlement funding*, the documentation must be submitted to the local ADO by November 30th of the fiscal year in which the funding will be requested.

Availability: *An electronic version of this Short Form EA is available on-line at http://www.faa.gov/airports/eastern/environmental/media/short-form-ea-final.docx. Other sources of environmental information including guidance and regulatory documents are available on-line at http://www.faa.gov/airports_airtraffic/airports/environmental.*

APPLICABILITY

Local ADO EPSs make the final determinations for the applicability of this form. If you have questions as to whether the use of this form is appropriate for your project, contact your local EPS BEFORE using this form. Airport sponsors can consider the use of this form if the proposed project meets either Criteria 1 or Criteria 2, 3, and 4 collectively as follows:

1) It is normally categorically excluded (see paragraphs 5-6.1 through 5-6.6 in FAA Order 1050.1F) but, in this instance, involves at least one, but no more than two, extraordinary circumstance(s) that may significantly impact the human environment (see paragraph 5-2 in 1050.1F and the applicable resource chapter in the 1050.1F Desk reference).

2) The action is one that is not specifically listed as categorically excluded or normally requires an EA at a minimum (see paragraph 506 in FAA Order 5050.4B).

3) The proposed project and all connected actions must be comprised of Federal Airports Program actions, including:

(a) Approval of a project on an Airport Layout Plan (ALP),
(b) Approval of Airport Improvement Program (AIP) funding for airport development,
(c) Requests for conveyance of government land,
(d) Approval of release of airport land, or
(e) Approval of the use of Passenger Facility Charges (PFC).

4) The proposed project is not expected to have impacts to more than two of the resource categories defined in the 1050.1F Desk Reference.

This form cannot be used when any of the following circumstances apply:

1) The proposed action, including all connected actions, requires coordination with or approval by an FAA Line of Business of Staff Office other than the Airports Division. Examples include, but are not limited to, changes to runway thresholds, changes to flight procedures, changes to NAVAIDs, review by Regional Counsel, etc.

2) The proposed action, including all connected actions, requires coordination with another Federal Agency outside of the FAA.

3) The proposed action will likely result in the need to issue a Record of Decision.

4) The proposed action requires a construction period exceeding 3 years.

5) The proposed action involves substantial public controversy on environmental grounds.

6) The proposed project would have impacts to, or require mitigation to offset the impacts to more than two resources[1] as defined in the 1050.1F Desk Reference.

7) The proposed project would involve any of the following analyses or documentation:
    a. The development of a Section 4(f) Report for coordination with the Department of the Interior,
    b. The use of any Native American lands or areas of religious or cultural significance,
    c. The project emissions exceed any applicable *de minimis* thresholds for criteria pollutants under the National Ambient Air Quality Standards, or
    d. The project would require noise modeling with AEDT 2b (or current version).

If a project is initiated using this form and any of the preceding circumstances are found to apply, the development of this form must be terminated and a standard Environmental Assessment or Environmental Impact Statement (if applicable) must be prepared.

****

[1] A resource is any one of the following: Air Quality; Biological Resources (including Threatened and Endangered Species); Climate; Coastal Resources; Section 4(f); Farmlands; Hazardous Materials, Solid Waste, and Pollution Prevention; Historical, Architectural, Archaeological, and Cultural Resources; Land Use; Natural Resources and Energy Supply; Noise and Noise-Compatible Land Use; Scoioeconomics; Environmental Justice; Children's Environmental Health and Safety Risks; Visual Effects; Wetlands; Floodplains; Surface Waters; Groundwater; Wild and Scenic Rivers; and Cumulative Impacts.

Complete the following information:

Project Location

Airport Name:	Pittsburgh International Airport		Identifier: PIT	
Airport Address:	Pittsburgh International Airport, Landside Terminal 4th Floor Mezzanine, P.O. Box 12370			
City:	Pittsburgh	County: Allegheny	State: PA	Zip: 15231-0370

Airport Sponsor Information

Point of Contact:	Eric Buncher, Manager of Planning Services		
Address:	Pittsburgh International Airport, Landside Terminal 4th Floor Mezzanine, P.O. Box 12370		
City:	Pittsburgh	State: PA	Zip: 15231-0370
Telephone:	412-472-5692	Fax: 412-472-3544	
Email:	EBuncher@flypittsburgh.com		

Evaluation Form Preparer Information

Point of Contact:	Stephen Culberson, Vice President		
Company (if not the sponsor):	Ricondo & Associates, Inc.		
Address:	20 N Clark Street, Suite 1500		
City:	Chicago	State: IL	Zip: 60602
Telephone:	312-212-8812	Fax: 312-606-0706	
Email:	sculberson@ricondo.com		

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1. Introduction/Background:

The Allegheny County Airport Authority (ACAA), as owner and operator of Pittsburgh International Airport (PIT or the Airport), is proposing a microgrid project in order to address issues related to energy security and energy resilience. The microgrid project (Proposed Action) entails the development of an on-site natural gas-fired electric power plant and a solar photovoltaic (PV) array on Airport property to provide electricity for Airport facilities. This Environmental Assessment (EA) is intended to identify and consider potential environmental impacts related to the Proposed Action. This Short EA for the proposed microgrid project has been prepared pursuant to the requirements of Section 102(2) of the *National Environmental Policy Act of 1969* (NEPA) and Section 509(b)(5) of the *Airport and Airway Improvement Act of 1982*, as amended.

NEPA requires federal agencies to prepare environmental documentation that discloses to decision-makers and the interested public a clear, accurate description of potential environmental effects resulting from proposed federal actions and reasonable alternatives to those actions. Through NEPA, the U.S. Congress directs federal agencies to integrate environmental factors in their planning and decision-making processes and to encourage and facilitate public involvement in decisions that affect the quality of the human environment. Federal agencies are required to consider the environmental impacts of the proposed action, alternatives to the proposed action, and a no action alternative (assessing the potential environmental effects of not undertaking the proposed action).

This Short EA has also been prepared in accordance with Federal Aviation Administration (FAA) Order 1050.1F, *Environmental Impacts: Policies and Procedures*[2], and FAA Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions*.[3] The FAA is the lead Federal Agency to ensure compliance with NEPA for airport development actions. The ACAA has prepared this EA on behalf of the FAA, in compliance with FAA Orders 1050.1F and 5050.4B, to evaluate the potential environmental impacts of construction and operation of the proposed microgrid project which constitutes the "Proposed Action" evaluated in this EA.

PIT is located approximately 16 miles west-northwest of the city of Pittsburgh in southwestern Pennsylvania. PIT is located within Allegheny County on the borders of Findlay and Moon Townships between the Ohio River to the north and east and Interstate 376 to the south and west. The regional location of PIT is depicted on **Exhibit 1**.

2. Project Description (List and clearly describe **ALL** components of project proposal including all connected actions). A**ttach a map or drawing of the area with the location(s) of the proposed action(s) identified:**

Peoples Natural Gas Company LLC (Peoples Gas) is proposing to develop a microgrid at PIT. The Proposed Action would include an on-site natural gas-fired electric power plant and a solar PV array on a capped, inactive landfill on Airport property. The ACAA is the official project sponsor for the Pittsburgh International Airport Microgrid (Proposed Action).

People's Gas would construct a 20 megawatt (MW) natural gas-fired electric power plant at PIT that would generate electricity through the combustion of natural gas to provide electricity to PIT. This part of the Proposed Action would consist of five generators, distribution equipment, an electrical building, and a mechanical building on a 0.9-acre site located outside of the Air Operations Area (AOA), approximately 2,000 feet east of the airside terminal and 800 feet east of Taxiway T. A location map is provided as **Exhibit 2**. The site footprint of the natural gas fired generators would be approximately 182 feet wide by 238 feet long. The generators would be 35 feet tall, but exhaust stacks associated with each generator would be 45 feet tall at their highest point. A conceptual plan of the natural gas-fired electric power plant is provided on **Exhibit 3**.

The natural gas-fired electric power plant would be located approximately 400 feet west of an existing substation that is located southeast of Hangar Road on Airport property. Electrical distribution lines would run from the natural gas-fired electric power plant to the existing substation. Approximately 1,300 linear feet of new underground conduit would be installed from the substation to existing duct banks that begin adjacent to the site on Tower Road (see Exhibit 3). These existing utility raceways continue via a network of existing manholes underground and underneath the airfield to the landside terminal main distribution power utility feeds. Additionally, as shown on **Exhibit 4**, approximately 450 feet of natural gas lines ranging in diameter from 8 inches to 12 inches would be installed to provide gas to the generators.

[2] U.S. Department of Transportation, Federal Aviation Administration, Order 1050.1F, *Environmental Impacts: Policies and Procedures*, effective July 16, 2015.

[3] U.S. Department of Transportation, Federal Aviation Administration, Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions*, effective April 28, 2006.

The Proposed Action would also include a 3.0 MW alternative current (AC) solar PV array that would be located outside of the AOA on the southwest corner of airport property on a former (closed) landfill (see **Exhibit 5**), approximately 1,600 feet south of the extended centerline of Runway 10R-28L and north of Interstate 376. The solar PV array would consist of 9,360 3.3-foot by 6.5-foot, 390-Watt solar panels covering approximately 13 acres. The panels would face south away from approaches to the east-west parallel runways. A glare analysis has been conducted in conjunction with the preparation of this EA and has been included in **Appendix A**.

If approved, construction would start in the 2nd/3rd quarter of 2020 and be completed within nine months. Construction staging and laydown would occur on the existing sites, which has been previously disturbed and is currently used for staging/laydown of materials and aggregates.

3. Project Purpose and Need:

The peak power demand at PIT is 14 MW and energy at the Airport is currently provided by the region's electrical grid.[4] In response to power outages that have affected major airports across the nation, including Los Angeles International Airport and Hartsfield-Jackson Atlanta International Airport, ACAA recognizes the need to provide power redundancy and resiliency at PIT to ensure greater power reliability and uninterrupted operations for the Airport and its passengers. In addition, ACAA recognizes the need to improve sustainability at the Airport.

In order to prevent airport power outages, the natural gas-fired electric power plant and solar PV array would form a microgrid to completely power PIT, including terminals, the airfield, the Hyatt hotel, and the Sunoco gas station. A microgrid is an independent electricity source that can operate autonomously. The Airport's microgrid would be its primary power source but would remain connected to the traditional electrical grid as an option for emergency or backup power when needed due to extreme weather events or other grid interruptions.[5] The microgrid would be fueled by three forms of electric generation to ensure reliability: natural gas-powered electric power plant, solar PV array, and connection to the traditional electric grid. The microgrid would contribute to the Airport's sustainability initiatives by providing energy to the Airport using renewable energy sources while reducing energy costs for the Airport and tenants.[6]

The proposed microgrid would ensure greater power reliability and energy sustainability and enhance public safety at PIT.

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[4] Allegheny County Airport Authority, P*owering the Future: Pittsburgh International Unveils First-of-Its-Kind Microgrid to Power Entire Facility*, October 18, 2019, https://flypittsburgh.com/acaa-corporate/newsroom/news-releases/powering-the-future-pittsburgh-international-airport-unveils-first-of-its-kind-microgrid-to-power-entire-facility/ (accessed February 26, 2020).

[5] Allegheny County Airport Authority, P*owering the Future: Pittsburgh International Unveils First-of-Its-Kind Microgrid to Power Entire Facility*, October 18, 2019, https://flypittsburgh.com/acaa-corporate/newsroom/news-releases/powering-the-future-pittsburgh-international-airport-unveils-first-of-its-kind-microgrid-to-power-entire-facility/ (accessed February 26, 2020).

[6] Allegheny County Airport Authority, *Environmental*, https://flypittsburgh.com/acaa-corporate/about/environmental/ (accessed February 26, 2020).

4. Describe the affected environment (existing conditions) and land use in the vicinity of project:

The Proposed Action would comprise natural gas generators on a 0.9-acre site and the addition of solar panels on approximately 13 acres of graded land on ACAA property. The natural gas-fired electric power plant would be located outside of the AOA, approximately 2,000 feet east of the airside terminal and approximately 800 feet east of Taxiway T, and the solar PV array would be located at the southwest corner of PIT (outside the fenced boundary of the PIT airport on ACAA property) approximately 1,640 feet southwest of the centerline of Runway 10R-28L and north of Interstate 376 (Proposed Project Area). Exhibit 2 depicts the project sites for the natural gas generators and the solar PV array. The Proposed Project Area has been previously disturbed and consists of graded land including soil and maintained lawn.

The natural gas-fired electric power plant would be located between Tower Road and Hangar Road adjacent to a surface parking lot and hangars on land that was previously used for construction staging. The solar PV array would be located on an inactive (closed) landfill at PIT. It is a permitted municipal waste landfill by the Pennsylvania Department of Environmental Resources (DER), now known as the Pennsylvania Department of Environment Protection (PADEP), under permit number 101479.[7] Decomposed municipal waste and spoils from a surface mining operation were discovered during the PIT Midfield Terminal Project construction. A decision was made in concert with Allegheny County, the DER, and U.S. Army Corps of Engineers, to relocate the decomposed municipal waste and spoils from a surface mining operation to another area of the PIT property in a newly constructed landfill rather than truck the contents away to an existing municipal waste facility. The landfill has a leachate treatment and monitoring system that is monitored on-site from an environmental building adjacent to the landfill.

The landfill is considered inactive and is no longer required to test and report its monitoring wells or report leachate flow levels to the Allegheny County Health Department (ACHD) or PADEP due to significantly lower flow levels in recent years relative to the yearly average.

5. Alternatives to the Project: Describe any other reasonable actions that may feasibly substitute for the proposed project, and include a description of the "No Action" alternative. If there are no feasible or reasonable alternatives to the proposed project, explain why (attach alternatives drawings as applicable)**:**

Alternatives

There are no other reasonable alternatives that could feasibly meet the Purpose and Need. Sites considered for the natural gas generators would need to be in close proximity to the existing electrical substation to provide a connection to the existing Airport electrical utilities. No other feasible sites exist in proximity to the electrical substation that are outside the AOA and would not disturb other Airport or tenant facilities. Sites inside the AOA would have the potential to alter Airport operations and were not considered to be reasonable alternatives.

[7] IMG Energy Solutions, *Attachment to the Form 7460 Notice of Proposed Construction*, December 13, 2019.

The land where the solar PV array would be located is the only portion of ACAA-owned property that can accommodate the proposed solar PV array. The land where the proposed solar PV array would be located is an inactive, capped landfill, facing away from airside operations on the boundary of ACAA-owned property.

As such, the Proposed Action is the only reasonable alternative that would provide power redundancy and resiliency to ensure greater power reliability and uninterrupted operations for the Airport.

No Action Alternative

Under the No Action Alternative, an Airport microgrid would not be constructed, and energy operations would continue to be provided by the existing power grid. The Airport would remain vulnerable to power outages and operations disruptions.

Explanation

Of the preliminary alternatives considered during the development of this project, the Proposed Action best meets the purpose and need, while resulting in no significant impacts. Therefore, the only two alternatives carried forward in this analysis are the No Action Alternative and the Proposed Action.

A comparison of the environmental consequences of the Proposed Action and the No Action Alternative is shown in **Table 1**.

TABLE 1 COMPARISON OF ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVES

RESOURCE CATEGORY	PROPOSED ACTION	NO ACTION ALTERNATIVE
Air Quality	No significant impact	No impact
Biological Resources	No significant impact	No impact
Climate	No significant impact	No impact
Coastal Resources	No impact	No impact
Section 4(f) Resources	No impact	No impact
Farmlands	No impact	No impact
Hazardous Materials, Solid Waste, and Pollution Prevention	No significant impact	No impact
Historic, Architectural, Archeological, and Cultural Resources	No impact	No impact
Land Use	No impact	No impact
Natural Resources and Energy Supply	No impact	No impact
Noise and Noise Compatible Land Use	No impact	No impact
Socioeconomics, Environmental Justice, and Children's Health and Safety Risks	No impact	No impact
Visual Effects including Light Emissions	No impact	No impact
Natural Resources (including Wetlands, Floodplains, Surface Waters, Groundwater, and Wild and Scenic Rivers)	No significant impact	No impact
Cumulative Impacts	No significant impact	No impact

SOURCE: Ricondo & Associates, Inc., February 2020.

6. Environmental Consequences – Special Impact Categories (refer to the Instructions page and corresponding sections in 1050.1F, the 1050.1F Desk Reference, and the Desk Reference for Airports Actions for more information and direction. Note that when the 1050.1F Desk Reference and Desk Reference for Airports Actions provide conflicting guidance, the 1050.1F Desk Reference takes precedence. The analysis under each section must comply with the requirements and significance thresholds as described in the Desk Reference).

(A) AIR QUALITY

(1) Will the proposed project(s) cause or create a reasonably foreseeable emission increase? Prepare an air quality assessment and disclose the results. Discuss the applicable regulatory criterion and/or thresholds that will be applied to the results, the specific methodologies, data sources and assumptions used; including the supporting documentation and consultation with federal, state, tribal, or local air quality agencies.

The Proposed Action would not cause or create significant air quality impacts. **Table 2** summarizes the annual emissions of criteria air pollutants and CO_{2e} estimated by source for construction of the Proposed Action, which would occur from 2020-2021.

The USEPA has set National Ambient Air Quality Standards (NAAQS) for six principal pollutants, which are called "criteria" air pollutants in the Clean Air Act (CAA). These include carbon

monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), particle pollution (PM_{10} and $PM_{2.5}$), and sulfur dioxide (SO_2). **Appendix B** describes the methods used to calculate emissions of criteria pollutants in support of this EA for construction of the Proposed Action at PIT.

The emissions analysis was conducted to develop emissions inventories pursuant to NEPA and to determine whether emissions associated with the Proposed Action would exceed applicable *de minimis* thresholds as documented in the United States Environmental Protection (USEPA) general conformity regulations. Construction-related activities are anticipated to occur in 2020 and 2021.

TABLE 2 ANNUAL POLLUTANT EMISSIONS DUE TO CONSTRUCTION OF THE PROPOSED ACTION

	EMISSIONS (TONS/YEAR)						METRIC TONS/YEAR
	CO	VOC	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_{2E}
Natural Gas-Fired Electric Power Plant Construction							
2020	2.263	1.921	1.132	0.022	0.216	0.059	1,005.942
2021	0.396	0.096	0.376	0.003	0.044	0.024	282.885
	2.659	**2.017**	**1.508**	**0.025**	**0.260**	**0.084**	**1,288.827**
Solar PV Array Installation							
2020	1.974	0.507	1.285	0.007	0.161	0.120	784.009
2021	0.568	0.167	0.320	0.004	0.045	0.032	249.685
	2.543	**0.674**	**1.605**	**0.011**	**0.206**	**0.152**	**1,033.694**

SOURCE: Ricondo & Associates, Inc., February 2020, based on inputs to the Airport Construction Emissions Inventory Tool (ACEIT), using the U.S. Environmental Protection Agency NONROAD2008a and MOVES2014b emissions models.

An air quality permit for a minor source for the proposed natural gas-fired electric power plant has been filed with the Allegheny County Health Department. Emissions associated with operation of the natural gas-fired electric power plant were calculated as part of the permit application and are presented in **Table 3**.

TABLE 3 ANNUAL POLLUTANT EMISSIONS DUE TO OPERATION OF THE PROPOSED ACTION

	EMISSIONS (TONS/YEAR)					
	CO	VOC	NO_X	SO_X	PM_{10}	$PM_{2.5}$
Natural Gas-Fired Electric Power Plant Operation	1.05	0.28	0.77	0.019	0.32	0.32

SOURCE: Peoples Natural Gas Company LLC, "Pittsburgh International Airport Project, ACHD Air Quality Installation Permit Application, 22 MW Power Project, Moon Township, Allegheny County, PA," January 2020.

(2) Are there any project components containing unusual circumstances, such as emissions sources in close proximity to areas where the public has access or other considerations that may warrant further analysis? If no, proceed to (c); if yes, an analysis of ambient pollutant concentrations may be necessary. Contact your local ADO regarding how to proceed with the analysis.

There are no Proposed Action components containing unusual circumstances, such as emissions sources in close proximity to areas where the public has access or other considerations that may warrant further analysis. The Proposed Action is not accessible to the public and is located away from publicly accessible areas.

(3) Is the proposed project(s) located in a nonattainment or maintenance area for the National Ambient Air Quality Standards (NAAQS) established under the Clean Air Act?

Allegheny County, which includes PIT, is a designated nonattainment area for $PM_{2.5}$ and sulfur dioxide. Allegheny County, as part of a larger area designated as the Pittsburgh-Beaver Valley area, is also designated as nonattainment for ozone. The County is in attainment for the other criteria air pollutants, as shown in **Table 4**. The principal air quality concern in Allegheny County is $PM_{2.5}$. On April 15, 2015, the USEPA designated all of Allegheny County as a specific nonattainment area with the new 2012 EPA $PM_{2.5}$ annual standard of 12 $\mu g/m^3$.

Allegheny County and the surrounding six counties of the Pittsburgh-Beaver Valley Area are currently designated by the USEPA as marginal nonattainment for ozone. In Allegheny County, ozone concentrations have steadily decreased over the past 10 years, although the EPA standard (8-hour average) has also lowered; 0.08 parts per million (ppm) in 1997, 0.075 ppm in 2008, and 0.07 ppm as of December 28, 2015. The most recent monitoring data from Allegheny County (the annual fourth-highest daily maximum, averaged over 2014-2016, which is the USEPA indicator) indicates that the County is compliant with the current 2015 standard.

A portion of Allegheny County (the lower Monongahela Valley, approximately 20 miles southeast of PIT) was designated by the USEPA as a nonattainment area for sulfur dioxide (SO_2) in August 2013 and this status has not changed. However, PIT is located within the portion of the county designated as an attainment area for SO_2.

TABLE 4 ATTAINMENT/NONATTAINMENT DESIGNATIONS

POLLUTANT OR PRECURSOR	ALLEGHENY COUNTY STATUS
8-hour Ozone	Marginal Nonattainment
Sulfur Dioxide (SO_2)	Nonattainment (partial county)[1]
Nitrous Oxides (NO_x)	Attainment
Carbon Monoxide (CO)	Attainment
Volatile Organic Compounds (VOCs)	Attainment
Particulate matter (PM_{10})	Attainment
Particulate matter ($PM_{2.5}$)	Moderate Nonattainment

NOTE:

1 Allegheny County is in partial non-attainment for SO_2; however, the part of the county where PIT is located is in attainment for SO_2.

SOURCE: United States Environmental Protection Agency, *Green Book: Pennsylvania Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants*, https://www3.epa.gov/airquality/greenbook/anayo_pa.html (accessed February 26, 2020).

4) Are all components of the proposed project, including all connected actions, listed as exempt or presumed to conform (See FRN, vol.72 no. 145, pg. 41565)? If yes, cite exemption and go to (B) Biological Resources. If no, go to (e).

The Proposed Action is not listed as exempt or presumed to conform.

(5) Would the net emissions from the project result in exceedances of the applicable *de minimis* threshold (reference 1050.1F Desk Reference and the *Aviation Emissions and Air Quality Handbook* for guidance) of the criteria pollutant for which the county is in non-attainment or maintenance? If no, go to (B) Biological Resources. If yes, stop development of this form and prepare a standard Environmental Assessment.

The net emissions from the project would not result in exceedances of the applicable *de minimis* thresholds for Allegheny County. **Table 5** compares the maximum annual construction emissions with the applicable *de minimis* thresholds. Even with the short-term increase in emissions from the construction of the Proposed Action, emission levels would be well below *de minimis* thresholds. Changes in criteria air pollutant emissions due to construction of the Proposed Action would not result in an adverse effect on air quality.

TABLE 5 PROPOSED ACTION CONSTRUCTION EMISSIONS SUMMARY AND COMPARISON TO *DE MINIMIS* THRESHOLDS

	EMISSIONS (TONS/YEAR)					
	CO	VOC	NO_X	SO_X[1]	PM_{10}	$PM_{2.5}$
Total Emission by Year						
2020	4.238	2.428	2.417	0.029	0.377	0.179
2021	0.964	0.263	0.696	0.007	0.089	0.056
de minimis Threshold	100	100	100	100	n.a.	100
Difference (Under)/Over *de minimis* threshold						
2020	(95.762)	(97.572)	(97.583)	(99.971)		(99.821)
2021	(99.036)	(99.737)	(99.304)	(99.993)		(99.944)
Significant?	**No**	**No**	**No**	**No**		**No**

NOTES:
n.a. – Not applicable
1 For purposes of this analysis, it was assumed that estimates of SO_x emissions are equal to calculated emissions of SO_2.
SOURCE: Ricondo & Associates, Inc., February 2020, based on inputs to the Airport Construction Emissions Inventory Tool (ACEIT), using the U.S. Environmental Protection Agency NONROAD2008a and MOVES2014b emissions models.

Natural gas to fuel the natural gas-fired electric power plant would be derived from on-Airport sources. Emissions associated with the operation of the natural gas-fired electric power plant, compared to applicable *de minimis* thresholds is provided in **Table 6**. The increase in emissions associated with the operation of the Proposed Action would be well below *de minimis* thresholds. Changes in criteria air pollutant emissions due to operation of the Proposed Action would not result in an adverse effect on air quality.

TABLE 6 PROPOSED ACTION OPERATION EMISSIONS SUMMARY AND COMPARISON TO *DE MINIMIS* THRESHOLDS

	EMISSIONS (TONS/YEAR)					
	CO	VOC	NO_X	SO_X[1]	PM_{10}	$PM_{2.5}$
Annual Emissions	1.05	0.28	0.77	0.019	0.32	0.32
de minimis Threshold	100	100	100	100	n.a.	100
Difference (Under)/Over *de minimis* threshold	(98.95)	(99.72)	(99.23)	(99.981)		(99.68)
Significant?	**No**	**No**	**No**	**No**		**No**

NOTES:
n.a. – Not applicable
1 For purposes of this analysis, it was assumed that estimates of SO_x emissions are equal to calculated emissions of SO_2.
SOURCE: Peoples Natural Gas Company LLC, "Pittsburgh International Airport Project, ACHD Air Quality Installation Permit Application, 22 MW Power Project, Moon Township, Allegheny County, PA," January 2020.

(B) BIOLOGICAL RESOURCES

Describe the potential of the proposed project to directly or indirectly impact fish, wildlife, and plant communities and/or the displacement of wildlife. Be sure to identify any state or federal species of concern (Candidate, Threatened or Endangered).

1) Are there any candidate, threatened, or endangered species listed in or near the project area?

Non-developed areas of PIT property consist of disturbed habitats. Regenerating forests on previously strip-mined areas and shrubby or regenerating woodland borders of actively maintained utility rights of way are the two most common habitats. To a significantly lesser extent, open grasslands or meadows, wetlands, and small areas of more mature, less-disturbed woodlands are present. Developed areas of PIT are maintained for landside Airport use, providing facility access to passengers and Airport personnel; and airside Airport use, which provides secure areas for aircraft operations and associated vehicles and personnel.

ACAA maintains the Wildlife Hazard Management Plan (WHMP) that was developed and is monitored by the United States Department of Agriculture (USDA). The WHMP includes an inventory of species on PIT property and recommends control measures to ensure compatibility with Airport operations and safety requirements.

In February 2020, an online database search of state and federal threatened, endangered, and special concern species was conducted using the Pennsylvania Natural Diversity Index (PNDI) mapping tool. This database search indicates the federally listed bald eagle (*Haliaeetus leucocephalus*), Indiana bat (*Myotis sodalis*), and Northern long-eared bat (*Myotis septentrionalis*) as having potential habitat throughout Allegheny County, including the Proposed Project Area.[8] This database search is provided in **Appendix C**.

8 Pennsylvania Department of Conservation and Natural Resources, *Pennsylvania Conservation Explorer, Conservation Planning and PNDI Environmental Review*, accessed: October 26, 2017, https://conservationexplorer.dcnr.pa.gov/.

The plant communities are predominantly native and alien invasive species and early successional species. A full inventory of invasive plants has not been undertaken at PIT, but common invasive species in southwestern Pennsylvania are known to exist in the vicinity of the Airport.[9]

The Proposed Action is within a portion of PIT that is developed and disturbed landscape comprising a parking lot, concrete rubble piles, public roadway, an electrical substation, and open field at the proposed natural gas-fired electric power plant site and maintained lawn at the proposed solar PV array site. Vegetation in the Proposed Project Area consists of grasses (*Poaceae* or *Gramineae* sp.), goldenrod (*Solidago* sp.), dandelion (*Taraxacum officinale*), ground ivy (*Glechoma hederacea*), narrow-leaved plantain (*Plantago lanceolata*), white clover (*Trifolium repens*), pokeweed (*Phytolacca americana*), black raspberry (*Rubus allegheniensis*), burdock (*Arctium minus*), black locust (*Robinia pseudoacacia*), staghorn sumac (*Rhus typhina*), and black cherry (*Prunus serotina*).[10]

None of the state or federal listed species identified above are present, nor have been identified in the Proposed Project Area.

(2) Will the action have any long-term or permanent loss of unlisted plants or wildlife species?

The Proposed Action would occur in portions of the Airport that are currently disturbed and graded land and consist of maintained lawn and soil that was formerly used for construction staging and a closed, capped landfill. There would be no long-term or permanent loss of unlisted plants or wildlife species.

(3) Will the action adversely impact any species of concern or their habitat?

The Proposed Action would occur in portions of the Airport that are currently disturbed and graded landscape. The PNDI mapping tool shows the bald eagle (*Haliaeetus leucocephalus*), Indiana bat (*Myotis sodalis*), and Northern long-eared bat (*Myotis septentrionalis*) as having potential habitat throughout Allegheny County, including the Proposed Project Area; however, the Proposed Project Area does not provide habitat for these species and no adverse effects to these species would be anticipated with the implementation of the Proposed Action. The Proposed Action would not adversely impact any species of concern or their habitat.

(4) Will the action result in substantial loss, reduction, degradation, disturbance, or fragmentation of native species habitats or populations?

The Proposed Action would occur in portions of the Airport that are currently disturbed and graded landscape. The Proposed Action would not result in substantial loss, reduction, degradation, disturbance, or fragmentation of native species habitats or populations.

[9] Pennsylvania Conservation Reserve Enhancement Program, *A Guide for Identifying and Controlling Common Noxious and Invasive Weeds in Southwestern Pennsylvania*, 2016, http://wcdpa.com/wp-content/uploads/SW-PA-Weed-Guide-Oct-2016.pdf

[10] Palustris Environmental, Correspondence with Sheffler & Company, Inc, *Regulated Waters Presence / Absence Investigation, Pittsburgh International Airport Micro Grid Project, Findlay Township, Allegheny County, Pennsylvania*, March 16, 2020.

(5) Will the action have adverse impacts on a species' reproduction rates or mortality rate or ability to sustain population levels?

The Proposed Action would occur in portions of the Airport that are currently disturbed and graded land and consist of maintained lawn and dirt that was formerly used for construction staging and a closed, capped landfill. The Proposed Action would not have adverse impacts on a species' reproduction rates or mortality rate or ability to sustain population levels.

(6) Are there any habitats, classified as critical by the federal or state agency with jurisdiction, impacted by the proposed project?

The Proposed Action would occur in portions of the Airport that are currently disturbed and graded landscape. The USFWS Critical Habitat for Threatened & Endangered Species Online Mapper was consulted to determine the presence of critical habitats within two miles of the Proposed Project Area. No critical habitat was identified. No habitats classified as critical by the federal or state agency with jurisdiction would be impacted by the Proposed Action.

(7) Would the proposed project affect species protected under the Migratory Bird Act? (If **Yes**, contact the local ADO).

The Proposed Action would not affect species protected under the Migratory Bird Act. The PNDI database indicates the bald eagle (*Haliaeetus leucocephalus*) as having potential habitat throughout Allegheny County, including the Proposed Project Area. The Proposed Action would not involve communications towers or wind energy. Forested areas surrounding the Proposed Project Area would not be affected by the construction of or implementation of the Proposed Action. The Proposed Action would be constructed on previously cleared land that does not provide habitat for migratory birds. As discussed above, ACAA maintains a WHMP for PIT which includes control measures to limit habitat in order to ensure compatibility with Airport operations and safety requirements. As such, limited habitat for migratory birds is present at the Proposed Project Area. No intentional or unintentional take of migratory birds or their nests is anticipated by the Proposed Action.

If the answer to any of the above is "Yes", consult with the USWFS and appropriate state agencies and provide all correspondence and documentation.

(C) CLIMATE

(1) Would the proposed project or alternative(s) result in the increase or decrease of emissions of Greenhouse gases (GHG)? If neither, this should be briefly explained and no further analysis is required and proceed to (D) Coastal Resources.

The Proposed Action would not result in a significant increase of emissions of GHG. Energy sources used to power the Airport would change from the traditional electrical grid to energy provided by the Microgrid which includes energy generated from natural gas and renewable solar power. Under the Proposed Action it is anticipated that energy consumption for Airport facility operations would emit fewer emissions than the No Action alternative due to the use of the proposed solar PV array. The Proposed Project would not result in a long-term increase in vehicle

traffic or aircraft operations. Construction activities would result in minor short-term emissions from construction vehicle exhaust.

(2) Will the proposed project or alternative(s) result in a net decrease in GHG emissions (as indicated by quantitative data or proxy measures such as reduction in fuel burn, delay, or flight operations)? A brief statement describing the factual basis for this conclusion is sufficient.

The Proposed Action would result in the net decrease of GHG given that the microgrid which utilizes energy from solar PV array in addition to a natural gas-fired electric power plant would emit fewer emissions than the No Action alternative which relies upon the electrical grid. No change to Airport operations would occur as a result of the Proposed Action. Energy consumption at the Airport is anticipated to be the same under the Proposed Action as with existing conditions.

(3) Will the proposed project or alternative(s) result in an increase in GHG emissions? Emissions should be assessed either qualitatively or quantitatively as described in 1050.1F Desk Reference or Aviation Emissions and Air Quality Handbook.

The Proposed Action would not result in a net increase in GHG emissions given that the microgrid would utilize energy from solar PV array in addition to a natural gas-fired electric power plant would emit fewer emissions than the No Action alternative which relies upon the electrical grid. No change to Airport operations would occur as a result of the Proposed Action.

(D) COASTAL RESOURCES

(1) Would the proposed project occur in a coastal zone, or affect the use of a coastal resource, as defined by your state's Coastal Zone Management Plan (CZMP)? Explain.

PIT is not located within a Coastal Zone Management Zone or near any coastal resource. The only two areas in Pennsylvania that are designated as coastal zones and managed through policies and procedures specified in Pennsylvania's Coastal Zone Management Plan (September 1980) are the 63-mile coastline of Lake Erie, which is located in Erie County in northwestern Pennsylvania (approximately 100 miles northwest of PIT), and a 57-mile stretch of coastline along the Delaware Estuary located in Bucks, Philadelphia, and Delaware counties in southeastern Pennsylvania (approximately 260 miles southeast of PIT).[11]

(2) If **Yes**, is the project consistent with the State's CZMP? (If applicable, attach the sponsor's consistency certification and the state's concurrence of that certification).

Not applicable

(3) Is the location of the proposed project within the Coastal Barrier Resources System? (If **Yes**, and the project would receive federal funding, coordinate with the FWS and attach record of consultation).

No coastal barriers are located at or within the vicinity of the Airport.

[11] Pennsylvania Department of Environmental Protection, Pennsylvania Coastal Zone Management Program Fact Sheet, http://www/dep.state.pa.us/, (accessed February 2020).

(E) SECTION 4(f) RESOURCES

(1) Does the proposed project have an impact on any publicly owned land from a public park, recreation area, or wildlife or waterfowl refuge of national, state, or local significance, or an historic site of national, state, or local significance? Specify if the use will be physical (an actual taking of the property) or constructive (i.e. activities, features, or attributes of the Section 4 (f) property are substantially impaired.) If the answer is "No," proceed to (F) Farmlands.

The Proposed Action would not have an impact on any publicly owned land from a public park, recreation area, or wildlife or waterfowl refuge of national, state, or local significance, or an historic site of national, state, or local significance. The U.S. Department of Transportation (DOT) Section 4(f) Resources on PIT property and around PIT include:

- The Great Allegheny Passage Montour Trail, including the Airport Link Trail;
- Clinton Community Park;
- Leopold Lake Park;
- Robin Hill Park;
- Moon Township Park;
- Moon Township Golf Club; and
- Aten Road and Westbury Ballfields.

The nearest park to the Proposed Project Area is Leopold Lake Park which is located approximately one mile south-southwest of the proposed solar PV array. The Airport Link Trail section of the Montour Trail is located over one mile from the Proposed Project Area. The Proposed Action would have no physical or constructive use of these resources nor any other DOT Section 4(f) resources in the vicinity of PIT.

Additionally, there are no wildlife or waterfowl refuges of national, state, or local significance, nor land of a historic site of national, state, or local significance; nor any sites of archaeological significance within the vicinity of PIT.

(2) Is a *De Minimis* impact determination recommended? If "yes", please provide; supporting documentation that this impact will not substantially impair or adversely affect the activities, features, or attributes of the Section 4 (f) property; a Section 106 finding of "no adverse effect" if historic properties are involved; any mitigation measures; a letter from the official with jurisdiction concurring with the recommended *de minimis* finding; and proof of public involvement. (See Section 5.3.3 of 1050.1F Desk Reference). If "No," stop development of this form and prepare a standard Environmental Assessment.

The Proposed Action would have no effect on Section 4(f) resources.

(F) FARMLANDS

Does the project involve acquisition of farmland, or use of farmland, that would be converted to non-agricultural use and is protected by the Federal Farmland Protection Policy Act (FPPA)? (If **Yes**, attach record of coordination with the Natural Resources Conservation Service (NRCS), including form AD-1006.)

The Proposed Action does not involve acquisition of farmland, or use of farmland, that would be converted to non-agricultural use and is protected by the Federal Farmland Protection Policy Act (FPPA). Prior to its development as an airport, PIT was a dairy farm, so it is expected that farmlands are still present within the PIT boundary. However, there are no farm uses on Airport property and the Proposed Action would not require the acquisition of any land. The Proposed Action would not be located on or near any existing farmland.

(G) HAZARDOUS MATERIALS, SOLID WASTE, AND POLLUTION PREVENTION

(1) Would the proposed project involve the use of land that may contain hazardous materials or cause potential contamination from hazardous materials? (If Yes, attach record of consultation with appropriate agencies). Explain.

The Proposed Action would involve the use of land that may contain hazardous materials or cause potential contamination from hazardous materials. **Exhibit 6** identifies the existing areas of environmental concern on PIT property, including one permitted landfill, one Act 2 site,[12] and several contaminated areas of concern that are the result of past industrial and airfield activities on PIT property. The proposed solar PV array component of the Proposed Action would be developed at the closed landfill site; however, this component would minimally disturb the soil cap of the landfill. The site would be closed to public access. The following permits would be obtained prior to any construction:

- Building Permit for the solar PV array from Findlay Township
- Landfill Minor Modification Permit from PADEP

The landfill at PIT was designed and constructed in 1987 during the construction of the Midfield terminal project. It is located outside the fenced portion of the PIT property while still located within the PIT property boundary. It is a permitted municipal waste landfill by the DER, now known as PADEP, under permit number 101479. The landfill is considered inactive and is no longer required to test and report its monitoring wells or leachate flow levels to the Allegheny County Health Department (ACHD) or PADEP due to significantly lower flow levels in recent years relative to the yearly average.

On Exhibit 6, areas designated as "contaminated land" are remnants of solid waste that possibly remain after construction of the existing airport in the late 1980s and early 1990s. Most of this waste was placed in the engineered landfill where a leachate system is in place and is being monitored through groundwater wells; to date, no significant groundwater contamination has been reported. None of these areas are located in the vicinity of the Proposed Project Area.

Exhibit 7 identifies areas where potential hazards exist with respect to past coal mining activities and oil/gas extraction. The Pittsburgh Coal seam was extensively mined across PIT property from elevations of approximately 1,180 and 1,200 feet Mean Sea Level (msl), whereas current land elevations across the Proposed Project Area are between about 1,150 and 1,160 feet msl.

[12] In Pennsylvania, significance thresholds for affecting a contaminated site and/or adversely affecting human health and the environment are defined under standards defined by Pennsylvania's Land Recycling Program (Voluntary Cleanup Program), which was established by a series of legislation enacted in 1995. This package (Acts 2, 3 and 4 of 1995) serves as the basis for what is more commonly known as Act 2. Act 2 provides standards for soil and groundwater contamination that represent significance thresholds.

Accordingly, all of the coal has been removed from the Proposed Project Area and the presence of mines is not an environmental/safety concern. Coal refuse is present at the surface within areas of the Airport property; a fire that had been smoldering for decades in coal refuse apparently from the Clinton Mine was extinguished in 2014 – 2015 under supervision of the PADEP. Exhibit 7 also identifies the approximate location of old oil and gas wells that were drilled in the late 19th and early 20th century as identified on WPA (Work Projects Administration) Mine Maps prepared between 1933 and 1934. The coal mining areas, oil and gas wells, and extinguished coal refuse fire are not located within the vicinity of the Proposed Project Area. Although it is unlikely that the old wells represent a hazard for leaking natural gas, it is recommended that any geotechnical borings undertaken during the design of the proposed improvements be monitored for gas. In the unlikely event that gas is detected, ventilation of the gas will be incorporated into the foundation designs.

Subsurface contamination in the Proposed Project Area for the Proposed Action is not expected to be encountered, but should contaminated material be encountered during construction, it will be excavated and stored on site for testing. Such material will be disposed of by a certified hauler at a permitted disposal facility. Sampling, testing, handling, storage, transportation, and disposal will be conducted in accordance with all relevant PADEP regulations and guidance. As such, the Proposed Action would not be anticipated to cause contamination from hazardous materials.

(2) Would the operation and/or construction of the project generate significant amounts of solid waste? If **Yes**, are local disposal facilities capable of handling the additional volumes of waste resulting from the project? Explain.

The operation and/or construction of the Proposed Action would not generate significant amounts of solid waste. No demolition of existing structures is proposed. The Proposed Action would produce nominal amounts of solid waste. Construction debris and other solid waste resulting from the project would be removed and routed for recycling or landfill disposal. The amount of waste produced would not exceed local landfill or recycling facility capacity. All construction would comply with federal, state, and local laws. The operation of the solar PV array would not generate waste. A Hazardous/Residual Waste Permit from the PADEP for the natural gas-fired electric power plant component of the Proposed Action would be obtained prior to any construction, and all requirements and regulations would be followed to properly route any waste generated.

There are five active landfills within a 40-mile driving distance of the Proposed Project Area that are listed as “Active” by the PADEP and are accepting solid waste. **Table 7** provides details for these facilities.

TABLE 7 ACTIVE LANDFILLS IN THE VICINITY OF THE PROPOSED PROJECT AREA

FACILITY NAME	STATE FACILITY ID	ADDRESS	MUNICIPALITY	DRIVING DISTANCE (MILES)	COUNTY
Imperial Landfill	241838	11 Boggs Road	Imperial	7	Allegheny
Alex Paris Landfill	560697	Clinton Frankfort Road	Hookstown	11	Beaver
Brunner Landfill	245259	Township Road 694	Zelienople	23	Beaver
Arden Landfill	243892	200 Rangos Lane	Washington	29	Washington
Monroeville Landfill	254373	600 Thomas Street	Monroeville	34	Allegheny

SOURCE: Pennsylvania Department of Environmental Protection, Municipal Waste Landfills and Resource Recovery Facilities, http://www.dep.pa.gov/Business/Land/Waste/SolidWaste/MunicipalWaste/MunicipalWastePermitting/Pages/MW-Landfills-and-Resource-Recovery-Facilities.aspx, (accessed: December 29,2017).

(3) Will the project produce an appreciable different quantity or type of hazardous waste? Will there be any potential impacts that could adversely affect human health or the environment?

The operation of the solar PV array would not generate waste. The natural gas-fired electric power plant component of the Proposed Action may generate small quantities of hazardous waste typical of the operation of gas-powered generators. A Hazardous/Residual Waste Permit from the PADEP for the natural gas-fired electric power plant component of the Proposed Action would be obtained prior to any construction. All requirements and regulations associated with this permit would be followed to properly route any waste generated.

(H) HISTORIC, ARCHITECTURAL, ARCHEOLOGICAL, AND CULTURAL RESOURCES

(1) Describe any impact the proposed project might have on any properties listed in, or eligible for inclusion in the National Register of Historic Places. (Include a record of your consultation and response with the State or Tribal Historic Preservation Officer (S/THPO)).

No known historical, architectural, archaeological, or cultural resources are present within the Proposed Project Area. There are no historic or archaeological resources within the Proposed Project Area that are listed or eligible for listing on the National Register of Historic Places.

The Pennsylvania Historic and Museum Commission's (PHMC) Cultural Resources Geographical Information System (CRGIS) data indicates that information concerning the prehistory for this region is somewhat limited. Based on this data and the archaeological record from the Upper Ohio Valley, if prehistoric sites are situated in the Proposed Project Area, they would be small in size and indicative of a transitory occupation.

The U.S. Department of the Interior, National Park Service, National Register of Historic Places (NRHP) is the United States' official list of districts, sites, buildings, structures and objects deemed worthy of preservation for their historical significance. A review of NRHP maps does not show any properties or resources located at PIT. The nearest NRHP resource is the Mooncrest Historic District located approximately 2.5 miles northeast of the Proposed Project Area. Additionally, four historic sites have been inventoried as part of previous studies in the PIT area with two of them consisting of historic farmsteads and one of them a domestic site. The site type is not stated on the

fourth historic site. A review of the historic cartographic sources indicates that several buildings/structures were once located on PIT property. However, the area where these buildings/structures were identified has been heavily surface mined and many of the standing farmsteads/homesteads were removed during the construction of PIT. Within the Proposed Project Area for the Proposed Action, all of the historic farm structures that existed prior to the construction and operation of the existing airport no longer exist. Records and previous site work indicate there are no archaeological resources known to exist within the Proposed Project Area. As the entire Proposed Project Area has experienced varying degrees of ground disturbance from historical mining, development of existing Airport facilities, and the landfill, it is unlikely any archaeological resources exist within these sites.

(2) Describe any impacts to archeological resources as a result of the proposed project. (Include a record of consultation with persons or organizations with relevant expertise, including the S/THPO, if applicable).

There would be no impacts to archeological resources as a result of the Proposed Action. No archeological resources are anticipated to fall within the Proposed Project Area for the Proposed Action.

(I) LAND USE

(1) Would the proposed project result in other (besides noise) impacts that have land use ramifications, such as disruption of communities, relocation of residences or businesses, or impact natural resource areas? Explain.

The Proposed Action would not result in other impacts that have land use ramifications. The Proposed Project Area is previously cleared and graded land on ACAA-owned property. The area consists primarily of graded soil and maintained grassy lawn. The site is designated as Heavy Industrial by Findlay Township. The Proposed Action is compatible with existing uses and no communities, residences, businesses, or natural resource areas would be affected.

(2) Would the proposed project be located near or create a wildlife hazard as defined in FAA Advisory Circular 150/5200-33, "Wildlife Hazards On and Near Airports"? Explain.

The Proposed Action would not create a wildlife hazard as defined in FAA Advisory Circular 150/5200-33. The development of a solar PV array and/or an electric power plant do not constitute wildlife hazards as defined in FAA Advisory Circular 150/5200-33, and the existing Proposed Project Area is disturbed, graded land that does not accommodate or attract wildlife.

(3) Include documentation to support sponsor's assurance under 49 U.S.C. § 47107 (a) (10), of the 1982 Airport Act, that appropriate actions will be taken, to the extent reasonable, to restrict land use to purposes compatible with normal airport operations.

The Proposed Action would not result in a significant change to land use and would not introduce any non-compatible land uses. The area near PIT is primarily suburban mixed-use development with nearby business parks, commercial and mixed density residential development. Moon Township, to the north and east of PIT, is more heavily developed than Findlay Township, located to the south and west of PIT (see **Exhibit 8**). Pursuant to 49 U.S.C. § 47107(a)(10) of the 1982 Airport and Airway Improvement Act, ACAA is committed to undertake actions to the extent

reasonable, to restrict the use of land adjacent to, or in the immediate vicinity of, PIT to activities and purposes compatible with normal airport operations. Airport zoning to restrict the use of land adjacent to, or in the immediate vicinity of, PIT to activities and purposes compatible with normal airport operations has been enacted by all surrounding municipalities.

The area directly to the north of PIT is designated for Regional Commerce use in the Moon Township Comprehensive Plan. The area also includes the University Boulevard Business Corridor and the Carnot District. These use areas are compatible with Airport use and development. The area adjacent to PIT in Findlay Township is designated for a variety of uses, including Town Center, Commercial and Industrial, Mixed Use and Medium Density Residential. These use areas are compatible with PIT use and development.

The PIT property contains airport uses, commercial uses, the Pittsburgh Air Reserve Station, a Pennsylvania Air National Guard base, natural gas wells, and open space. Additionally, the PIT property is surrounded by freeways on all sides.

(J) NATURAL RESOURCES AND ENERGY SUPPLY

What effect would the project have on natural resource and energy consumption? (Attach record of consultations with local public utilities or suppliers if appropriate)

The Proposed Action would not impact energy consumption required for Airport operations. Electricity at PIT is currently provided commercially from Duquesne Light Company through an electrical grid. The Proposed Action would change the source of energy for the Airport to rely primarily on the proposed microgrid. The Proposed Action would provide a more reliable source of energy using an on-site natural gas-fired electric power plant and more sustainable sources of energy by including renewable solar energy provided by the on-site solar PV array.

The PIT property has a long history of coal mining and oil/gas extraction. Coal mining ceased at the beginning of the 20th century. PIT property is still being used for natural gas extraction. Consol Energy is permitted to drill 47 wells from six well pads on PIT property. Production began June 28, 2016 from the six wells on Pad No. 2, and in April 2017 from seven wells on Pad No. 1. All wells produce Marcellus Shale gas, which would be used to supply the natural gas-fired electric power plant.

Energy efficiency is also achieved by running the four hot water generators operated by ACAA at PIT fueled by natural gas. ACAA has programs at PIT to minimize their energy footprint and uses Energy Service Companies (ESCOs) to improve energy efficiency by implementing individual Energy Conservation Measures (ECMs) at PIT.

Consumption of natural resources and use of energy supplies would result from construction, operation, and/or maintenance of the Proposed Action. Construction associated with the Proposed Action would require natural resources, which may include petrochemical construction materials; lumber; sand and gravel; concrete; and steel, copper, and other metals. Construction of the Proposed Action would consume energy in the form of electricity, natural gas, and transportation-related fuels, through use of construction equipment, transport of construction materials, temporary lighting, etc. In addition, construction of the Proposed Action would also require water for dust suppression, concrete production, and equipment cleaning. Construction energy consumption is

short-term and minor compared to long-term regional energy use. As such, construction of the Proposed Action would not exceed area energy supplies.

Operations of the Proposed Action would not change energy consumption of Airport facilities. No increase in Airport operations would occur as a result of implementation of the Proposed Action. Under the Proposed Action, PIT would shift some current energy consumption from existing energy resources to the proposed natural gas-fired electric power plant and solar PV array. This would result in a decrease in energy demand on local public utility suppliers. Therefore, operation of the Proposed Action would not exceed energy supply.

(K) NOISE AND NOISE-COMPATIBLE LAND USE

Will the project increase noise by DNL 1.5 dB or more for a noise sensitive area that is exposed to noise at or above the DNL 65 dB noise exposure level, or that will be exposed at or above the DNL 65 dB level due to a DNL 1.5 dB or greater increase, when compared to the no action alternative for the same timeframe? (Use AEM as a screening tool and AEDT 2b as appropriate. See FAA Order 1050.1F Desk Reference, Chapter 11, or FAA Order 1050.1F, Appendix B, for further guidance). Please provide all information used to reach your conclusion. If yes, contact your local ADO.

The Proposed Action would not result in any changes to Airport operations and noise from aircraft operations would not be affected by the Proposed Action. No changes would occur to existing or future aircraft noise exposure levels. The Proposed Action would not result in any permanent increases in ambient noise. The Proposed Action would occur in the middle of the PIT airfield and at an area adjacent to highway and undeveloped land. Existing ambient noise in the vicinity of the Proposed Project Area is influenced by aircraft operations and ground transportation noise from adjacent freeway traffic. The nearest residential area is located approximately 4,000 feet north of the Proposed Project Area, and the nearest school is located approximately 1.3 miles northeast of the Proposed Project Area. Due to the distance of the Proposed Project Area to sensitive noise receptors, no noise impacts are anticipated. The increase in noise levels resulting from construction would be short term and minor in duration, and would not exceed applicable standards.

(L) SOCIOECONOMICS, ENVIRONMENTAL JUSTICE, and CHILDREN'S HEALTH and SAFETY RISKS

(1) Would the project cause an alteration in surface traffic patterns, or cause a noticeable increase in surface traffic congestion or decrease in Level of Service?

The Proposed Action would not substantially increase traffic or alter existing traffic patterns or cause a noticeable increase in surface traffic congestion or decrease in Level of Service during construction or operation. Construction activities associated with the Proposed Action is anticipated to occur from June 2020 to February 2021 during which the Proposed Action would result in increased traffic associated with construction employees and deliveries to the existing site. It is not anticipated that construction related trip increases would be substantial; existing roadways at and in the vicinity of the Airport could sustain a temporary increase in construction traffic. Construction traffic would use Interstate 376 and Interstate 376 Business to connect to on-Airport roadways. These Interstates and on-Airport roadways have the capacity to accommodate a minor increase in traffic without impacting existing Level of Service. Construction traffic would not disrupt any local communities.

Once operational the Proposed Action would not result in a substantial increase in surface traffic, as access to the site would be limited to a small number of personnel. Overall, the flow of exiting traffic volumes and the Level of Service on the local roadway network would not be substantially affected.

(2) Would the project cause induced, or secondary, socioeconomic impacts to surrounding communities, such as changes to business and economic activity in a community; impact public service demands; induce shifts in population movement and growth, etc.?

Construction activities would result in temporary positive impacts to the regional economy through the employment of construction workers, spending on materials, and spending in the local economy by construction workers. Construction of the Proposed Action would occur entirely on existing PIT property; as such, the Proposed Action would not change the availability of permanent housing, permanent employment, or retail opportunities. There would be no permanent shifts in the patterns of population movement and growth, public service demands, or changes in business or economic activity.

(3) Would the project have a disproportionate impact on minority and/or low-income communities? Consider human health, social, economic, and environmental issues in your evaluation. Refer to DOT Order 5610.2(a) which provides the definition for the types of adverse impacts that should be considered when assessing impacts to environmental justice populations.

The Proposed Action would be located entirely on existing PIT property. The nearest residences from the Proposed Action Area are approximately 4,000 feet to the northeast. Based on this distance, the Proposed Action occurring within and in the vicinity of an active airfield and terminal area, and the lack of impacts associated with noise, air quality, water, hazardous materials, vegetation, wildlife, or cultural resources, no significant impacts that disproportionately impact minority or low-income residents would occur.

(4) Would the project have the potential to lead to a disproportionate health or safety risk to children?

The Proposed Action would not have the potential to lead to a disproportionate health or safety risk to children. The nearest school, the Goddard School of Moon Township, is located approximately 1.3 miles from the Proposed Project Area. No schools, day care providers, or children's health clinics are located within 1 mile of the Proposed Project Area. Due to the distance from the project area, no impacts to the school or its students are anticipated.

The Proposed Action would not result in other impacts that would affect the health and safety of any populations near the project area. During construction, construction traffic would not travel through residential neighborhoods or near schools.

If the answer is "YES" to any of the above, please explain the nature and degree of the impact. Also provide a description of mitigation measures which would be considered to reduce any adverse impacts.

(M) VISUAL EFFECTS INCLUDING LIGHT EMISSIONS

(1)Would the project have the potential to create annoyance or interfere with normal activities from light emissions for nearby residents?

The Proposed Action would not have the potential to create annoyance or interfere with normal activities from light emissions for nearby residents. The Proposed Project Area would be located adjacent to the PIT airfield and an undeveloped area. The closest communities to the Proposed Project Area are located in Moon Township about 4,000 feet north of the Proposed Project Area. The natural gas-fired electric power plant component of the Proposed Action would not be visible from any surrounding communities. The solar PV array component of the Proposed Action would only be publicly visible from Interstate 376 and would not create an annoyance or interfere with normal community activities.

Additionally, the Greater Pittsburgh area, including PIT, is affected by light pollution, typical of urban/suburban areas surrounding a large city. The area of PIT is considered from the standpoint of light pollution as an urban/suburban transition environment where light pollution makes the entire sky light gray, strong light sources are evident in all directions, and clouds are brightly lit. Within this environment, the visual environment surrounding PIT is relatively isolated and characterized by airport land uses, including the Terminal Complex, airport roadways, runways, taxiways, and ancillary airport structures and facilities. The Proposed Action would result in minimal changes to the existing light emissions of the Airport vicinity.

(2) Would the project have the potential to affect the visual character of nearby areas due to light emissions?

The Proposed Action would not have the potential to affect the visual character of nearby areas due to light emissions. The Proposed Project Area would be located adjacent to the PIT airfield and an undeveloped area. As described above the Airport is within an urban/suburban area with existing light pollution. The Proposed Action would result in minimal change in ambient lighting and there would be no effect to the visual character of nearby areas due to light emissions.

To determine the potential effect of glare of the solar PV array, ForgeSolar conducted a glare analysis using Sandia National Labs' FAA-accepted Solar Glare Hazard Analysis Tool (SGHAT). The SGHAT result showed a "No Glare" determination. The ForgeSolar glare report is attached as **Appendix C**.

(3) Would the project have the potential to block or obstruct views of visual resources?

No visual resources are within the viewshed of the Proposed Project area.

If the answer is "YES" to any of the above, please explain the nature and degree of the impact using graphic materials. Also provide a description of mitigation measures which would be considered to reduce any adverse impacts.

(N) WATER RESOURCES (INCLUDING WETLANDS, FLOODPLAINS, SURFACE WATERS, GROUNDWATER, AND WILD AND SCENIC RIVERS)

(1) WETLANDS

(a) Does the proposed project involve federal or state regulated wetlands or non-jurisdictional wetlands? (Contact USFWS or appropriate state natural resource agencies if protected resources are affected) (Wetlands must be delineated using methods in the US Army Corps of Engineers 1987 Wetland Delineation Manual. Delineations must be performed by a person certified in wetlands delineation Document coordination with the resource agencies).

The U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) was consulted to determine the presence of wetlands onsite. No wetlands were identified within the Proposed Project Area. The site is previously disturbed and consists entirely of graded land and maintained lawn. The NWI shows five wetlands near the Proposed Project Area including a 1.61-acre Freshwater Forested/Shrub Wetland habitat located approximately 500 feet west of the proposed solar PV array across Harper Road; a 2.18-acre Freshwater Emergent Wetland located approximately 700 feet west of the proposed solar PV array across Harper Road; a 0.46-acre Freshwater Emergent Wetland located approximately 1,000 feet south of the proposed solar PV array across Interstate 376 and south of the Montour Trail – Airport Trail Link; a 1.13-acre Freshwater Forested/Shrub Wetland located approximately 1,200 feet south of the proposed solar PV array across Interstate 376 and south of the Montour Trail – Airport Link Trail; and a linear, 114-acre Riverine wetland approximately 1,100 feet east of the natural gas-fired electric power plant associated with McClarens Run stream.

On March 12, 2020, the natural gas-fired electric power plant portion of the Proposed Project Area was investigated for wetlands and other regulated waters as defined by the 1987 Corps of Engineers Wetland Delineation Manual, the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region Version 2.0, and subsequent guidance.[13] Additionally, on April 1, 2020, a wetland investigation of the solar PV array portion of the Proposed Project Area project site was conducted using guidelines outlined in the 1987 Corps of Engineers Wetland Delineation Manual.[14] The wetland field survey reports are provided in **Appendix D**. No watercourses or areas of hydric soils or indicators of hydrology were observed in the natural gas-fired electric power plant portion or the solar PV array portion of the Proposed Project Area. As such, no wetlands or Waters of the U.S. were identified within the Proposed Project Area. The Proposed Action does not involve federal or state regulated wetlands or non-jurisdictional wetlands; therefore, no impacts to wetlands are anticipated. The NWI wetlands map is included as **Exhibit 9**.

[13] Palustris Environmental, Correspondence with Sheffler & Company, Inc, *Regulated Waters Presence / Absence Investigation, Pittsburgh International Airport Micro Grid Project, Findlay Township, Allegheny County, Pennsylvania*, March 16, 2020.

[14] Rhea Engineers & Consultants, Inc, Correspondence with Ricondo, *Microgrid Solar PV Array Site – Field Site Summary Report, On-Call Planning and Environmental Services, Pittsburgh International Airport, Moon Township, Pennsylvania*, April 8, 2020.

(b) If yes, does the project qualify for an Army Corps of Engineers General permit? (Document coordination with the Corps).

Not applicable

(c) If there are wetlands impacts, are there feasible mitigation alternatives? Explain.

Not applicable

(d) If there are wetlands impacts, describe the measures to be taken to comply with Executive Order 11990, Protection of Wetlands.

Not applicable

(2) FLOODPLAINS
(a) Would the proposed project be located in, or would it encroach upon, any 100-year floodplains, as designated by the Federal Emergency Management Agency (FEMA)?

The Proposed Action would not be located in or encroach upon any 100-year floodplains, as designated by the Federal Emergency Management Agency (FEMA). The Proposed Project Area would not be located within the 100-year or the 500-year floodplain based upon a review of FEMA Flood Insurance Rate Maps (FIRM) panels 42003C0285H and 42003C0301H. There is a Special Flood Hazard Area (Zone A) south of Interstate 376 and the Montour Trail – Airport Trail Link; however, this area is over approximately 800 feet from the solar PV array portion of the Proposed Project Area. The FEMA FIRMs for the Proposed Project Area are included as **Exhibit 10** and **Exhibit 11**.

(b) If Yes, would the project cause notable adverse impacts on natural and beneficial floodplain values as defined in Paragraph 4.k of DOT Order 5620.2, *Floodplain Management and Protection*?

Not applicable

(c) If Yes, attach the corresponding FEMA Flood Insurance Rate Map (FIRM) and describe the measures to be taken to comply with Executive Order 11988, including the public notice requirements.

Not applicable

(3) SURFACE WATERS
(a) Would the project impact surface waters such that water quality standards set by Federal, state, local, or tribal regulatory agencies would be exceeded or would the project have the potential to contaminate a public drinking water supply such that public health may be adversely affected?

The Proposed Action would not impact surface waters such that water quality standards set by Federal, state, local, or tribal regulatory agencies would be exceeded, nor would the Proposed Action have the potential to contaminate a public drinking water supply such that public health may be adversely affected. The USFWS NWI was consulted and field views were performed to

determine the presence of surface waters onsite. No surface waters are located within the Proposed Project Area. The site is previously disturbed and consists entirely of graded land and maintained lawn.

Streams dominate surface water at PIT and in the surrounding area. Two watersheds comprise the on-airport area: Raredon Run and Montour Run. Montour Run is comprised of three sub-basins in the area of PIT including McClarens Run, Enlow Run, and North Fork Montour Run. Drainage in the area is typically towards the northwest or southeast eventually draining to the Ohio River. The nearest surface water resources to the Proposed Project Area would be McClarens Run approximately 1,100 feet east of the proposed natural gas-fired electric power plant and a tributary associated with Enlow Run approximately 500 feet west of the proposed solar PV array.

Surface water sampling and testing, which is consistent with the Deicing Action Plan Update under a PADEP Consent Order, is currently undertaken at PIT as related to aircraft and airfield deicing/anti-icing activities. More general sampling is undertaken as part of PIT's existing National Pollutant Discharge Elimination System (NPDES) Permit (No. PA0203815), which covers all industrial discharges from PIT. The Airport has storm water retention basins to limit runoff from impervious (paved) areas.

ACAA has a NPDES Permit for stormwater originating from construction activities with the Allegheny County Conservation District (ACCD) under Permit No. PAC020001. Where earth disturbances cover more than an acre, the work would need to be defined and approved under a modification to the permit.

(b) Would the water quality impacts associated with the project cause concerns for applicable permitting agencies or require mitigation in order to obtain a permit?

The water quality impacts associated with the Proposed Action would not cause concerns for applicable permitting agencies or require mitigation in order to obtain a permit.

If the answer to any of the above questions is "Yes", consult with the USEPA or other appropriate Federal and/or state regulatory and permitting agencies and provide all agency correspondence.

(4) GROUNDWATER

(a) Would the project impact groundwater such that water quality standards set by Federal, state, local, or tribal regulatory agencies would be exceeded or would the project have the potential to contaminate an aquifer used for public water supply such that public health may be adversely affected?

The Proposed Action would not impact groundwater such that water quality standards set by Federal, state, local, or tribal regulatory agencies would be exceeded or have the potential to contaminate an aquifer used for public water supply such that public health may be adversely affected. Neither surface water nor the groundwater underlying PIT is used for drinking, irrigation, or industrial supply purposes. Depths of groundwater vary from the surface regionally. Groundwater flow rates vary due to the topography and hydraulic conductivity. Recharge of groundwater is similar to the regional patterns. Groundwater flow correlates closely with regional surface water flow towards major drainages.

No public groundwater sources are located within PIT property. The water supply for Moon Township is from groundwater obtained from an alluvial deposit of sand and gravel in the floodplain of and beneath the Ohio River and from the Ohio River itself. Findlay Township obtains groundwater from the Ohio River through Robinson Township, as well as obtaining water from Moon Township. None of these sources are subject to contamination from activities at PIT. Within PIT property, groundwater is monitored for evaluation of contamination at the closed landfill and other locations where soil contamination is present. The Proposed Action would not include construction or operational activities that would have the potential to impact groundwater.

(b) Would the groundwater impacts associated with the project cause concerns for applicable permitting agencies or require mitigation in order to obtain a permit?

The groundwater impacts associated with the Proposed Action would not cause concerns for applicable permitting agencies or require mitigation in order to obtain a permit.

(c) Is the project to be located over an EPA-designated Sole Source Aquifer?

The USEPA maintains a map of sole source aquifers in the United States;[15] the Proposed Action would not be located over or near an EPA-designated Sole Source Aquifer.

If the answer to any of the above questions is "Yes", consult with the USEPA or other appropriate Federal and/or state regulatory and permitting agencies and provide all agency correspondence as an attachment to this form.

(5) WILD AND SCENIC RIVERS

Would the proposed project affect a river segment that is listed in the Wild and Scenic River System or Nationwide River Inventory (NRI)? (If Yes, coordinate with the jurisdictional agency and attach record of consultation).

The Proposed Action would not affect a river segment that is listed in the Wild and Scenic River System or NRI. The Pennsylvania Department of Conservation of Natural Resources maintains a map of federally or state designated wild or scenic rivers located in Pennsylvania;[16] there are no federally- or state-designated wild or scenic rivers in Allegheny County.

(O) CUMULATIVE IMPACTS

Discuss impacts from past, present, and reasonably foreseeable future projects both on and off the airport. Would the proposed project produce a cumulative effect on any of the environmental impact categories above? Consider projects that are connected and may have common timing and/or location. For purposes of this Form, generally use 3 years for past projects and 5 years for future foreseeable projects.

[15] United States Environmental Protection Agency, Sole Source Aquifers, https://epa.maps.arcgis.com/apps/webappviewer/index.html?id=9ebb047ba3ec41ada1877155fe31356b (accessed February 21, 2020).

[16] Pennsylvania Department of Conservation of Natural Resources, Pennsylvania Scenic Rivers Program, http://www.docs.dcnr.pa.gov/cs/groups/public/documents/document/DCNR_20033444.pdf (accessed February 17, 2020).

The Proposed Action would not produce a cumulative effect on any of the environmental impact categories listed. The past, present, and reasonably foreseeable actions (Cumulative Impact Projects) considered in this EA are identified in **Table 6**. For a project to have potential cumulative effects with the Proposed Action, the project must result in impacts on the same resources impacted by the Proposed Action. As documented, no significant construction or operational impacts are anticipated to occur as a result of the Proposed Action. The potential for the Proposed Action to cumulatively contribute to effects on resource categories discussed in this chapter with other past, present, and reasonably foreseeable future projects are described in **Table 7**.

No other past, present, or future projects within the Proposed Project Area have been assessed to have significant impacts or would have cumulative impacts. As shown, the implementation of the Proposed Action is not anticipated to be cumulatively significant when considered with other past, present and reasonably foreseeable actions.

TABLE 6 PAST, PRESENT, AND FUTURE ACTIONS AT PIT

PROJECT	STATUS
Past Actions	
Runway 14-32 and Taxiways Q, R, and N4 Rehabilitation	Completed in 2015
Rehabilitate Taxiways D & N	Completed in 2015
Relocate Taxiway E	Completed in 2015
Rehabilitate Taxiways A, AA, and C	Completed in 2016
Replace SRE	Completed in 2016
Terminal Building Rehabilitation	Completed in 2016
Airport Rescue Fire Fighting Station E Rehabilitation	Completed in 2016
Rehabilitate Jetways	Completed in 2016
Rehabilitate Non-Airfield Pavement	Completed in 2016
Present Actions	
Rehabilitate Deicing Pad C	Currently Ongoing
Rehabilitate Airfield Pavements	Currently Ongoing
Airfield Signage Upgrade and Replacement	Currently Ongoing
Airport Maintenance Complex	Currently Ongoing
Rehabilitate Non-Airfield Pavement	Currently Ongoing
Fire Training Facility Rehabilitation	Currently Ongoing
Buildings and Hangar Improvements	Currently Ongoing
Cargo 3 Ramp Expansion	Currently Ongoing
U.S. Air Force C17 Conversion - construction of facilities to house, fuel, and maintain C-17 Globemaster III aircraft	Currently Ongoing
Terminal Modernization Program	Currently Ongoing
Rehabilitate Airfield Pavements	Currently Ongoing
Extend Northfield Taxiways	Currently Ongoing
Rehabilitate Non-Airfield Pavement	Currently Ongoing
Buildings and Hangar Improvements	Currently Ongoing
Airport Maintenance Complex	Currently Ongoing
Ewing Road Improvements	Currently Ongoing
Oil and Gas Drilling Activity	Currently Ongoing
Airport-wide Sewage Treatment Plant	Currently Ongoing
Rehabilitate Runway 10L-28R	Currently Ongoing
Airport Rescue Fire Fighting Station E Rehabilitation	Currently Ongoing
Future Actions	
Utility Pipeline	Currently ongoing and further improvements and projects project to be completed in the future

SOURCE: Allegheny County Airport Authority, February 2020.

TABLE 7 CUMULATIVE IMPACTS SUMMARY

RESOURCE	PAST ACTIONS	PRESENT ACTIONS	PROPOSED ACTION	FUTURE ACTIONS	CUMULATIVE IMPACT
Air Quality	No significant past changes in automobile traffic, stationary sources, airport operations, or other action that would increase emissions within the Proposed Project Area.	No significant present actions in automobile traffic, stationary sources, airport operations, or other action that would increase emissions within the Proposed Project Area.	Temporary construction emissions would be generated.	No significant future change in automobile traffic. The airfield layout would experience minor modifications, however no increase in operations or emissions is anticipated.	Temporary construction emissions would occur but would not be cumulatively significant. General Conformity *de minimis* thresholds are evaluated on a project by project basis and would not need to be evaluated cumulatively with other projects at PIT.
Biological Resources	No significant past actions that would impact fish, wildlife, or plant resources within the Proposed Project Area.	No significant present actions that would impact fish, wildlife, or plant resources within the Proposed Project Area.	The Proposed Action would not significantly impact fish, wildlife, plant resources, or habitat within the Proposed Project Area.	Oil and gas drilling would require mitigation for the Indiana Bat. Other future actions would not significantly impact fish, wildlife, or plant resources within the Proposed Project Area.	No state or federal species are known to exist in the Proposed Project Area. No significant biological resources impacts would be anticipated by the past, present or proposed developments.
Climate	No past significant actions within the Proposed Project Area that would impact climate.	No present significant actions within the Proposed Project Area that would impact climate.	The Proposed Action is not anticipated to result in significant climate impacts.	No future significant actions within the Proposed Project Area that would impact climate.	No significant climate impacts would be anticipated by the past, present or proposed developments.
Coastal Resources	No past actions that would have significant impacts to Coastal Resources	No present actions that would have significant impacts to Coastal Resources	The Proposed Action would not impact Coastal Resources	No future actions that would have significant impacts to Coastal Resources	No significant Coastal Resources impacts would be anticipated by the past, present or proposed developments.
Section 4(f) Resources	No significant past actions that would impact Section 4(f) resources within the Proposed Project Area.	Oil and gas drilling would temporarily impact the Great Allegheny Passage Montour Trail, including the Airport Link; however, impacts would be temporary and are not considered a use under Section 4(f).	The Proposed Action would not impact Section 4(f) resources within the Proposed Project Area.	Temporary impacts would occur to the Airport Link Trail; however, given the nature of the path on PIT property, these would not be cumulatively significant.	Temporary impacts would occur to the Airport Link Trail; however, given the nature of the path on PIT property, these would not be cumulatively significant. No significant impacts to Section 4(f) resources within the Proposed Project Area.
Farmlands	No past actions that would have significant impacts to Farmlands	No present actions that would have significant impacts to Farmlands	The Proposed Action would not impact Farmlands	No future actions that would have significant impacts to Farmlands	No significant Farmlands impacts would be anticipated by the past, present or proposed developments.

RESOURCE	PAST ACTIONS	PRESENT ACTIONS	PROPOSED ACTION	FUTURE ACTIONS	CUMULATIVE IMPACT
Hazardous Materials, Solid Waste, and Pollution Prevention	No significant past actions that would result in hazardous materials, pollution prevention, or solid waste impacts within the Proposed Project Area.	Construction of new facilities involves the use of hazardous materials, primarily through use of motor fuels, adhesives, etc.	Construction of the Proposed Action would involve the use of hazardous materials, primarily through use of motor fuels, paints, etc. Operation of the Proposed Action would not contribute to any additional hazardous materials or solid waste.	Future airport construction would include the use of hazardous materials, primarily through use of motor fuels, adhesives, etc. Oil and gas drilling and USAF C17 Conversion at PIT would need to adhere to established guidelines.	Construction of the Proposed Action and future airport projects would involve use of hazardous materials, primarily through use of motor fuels, paints, etc. However, through adherence to established guidelines, no cumulative impacts would occur.
Historic, Architectural, Archeological, and Cultural Resources	No past actions that would have significant impacts to Historic, Architectural, Archeological, and Cultural Resources	No present actions that would have significant impacts to Historic, Architectural, Archeological, and Cultural Resources	The Proposed Action would have no impacts to Historic, Architectural, Archeological, and Cultural Resources	No future actions that would have significant impacts to Historic, Architectural, Archeological, and Cultural Resources	No significant Historic, Architectural, Archeological, and Cultural Resources impacts would be anticipated by the past, present or proposed developments.
Land Use	No significant past actions that would impact land use within the Proposed Project Area.	No significant present actions that would impact land use within the Proposed Project Area.	Proposed Action would maintain existing land use and would be constructed entirely within the PIT property boundary. The Proposed Action complies with all local plans and land use designations.	No significant future actions that would impact land use within the Proposed Project Area.	No significant changes in land use would occur. Past, present, and future projects within the Proposed Project Area would maintain existing land uses and would not result in changes to surrounding land use.
Natural Resources and Energy Supply	No significant past actions that would impact natural resources or energy supply within the Proposed Project Area.	No significant present actions that would impact natural resources or energy supply within the Proposed Project Area.	The Proposed Action would not require significant natural resource use or energy supply for construction. Operations would consume natural gas but would also generate electricity from the solar panels, resulting in a net reduction of energy compared to existing conditions.	No significant future actions that would impact natural resources or energy supply within the Proposed Project Area.	Construction of Proposed Action and other cumulative projects would increase materials and energy consumption. Development projects are not anticipated to have a significant impact to natural resource supply.
Noise and Noise Compatible Land Use	No past actions that would have significant impacts to noise and compatible land use within the Proposed Project Area.	No present actions that would have significant impacts to noise and compatible land use within the Proposed Project Area.	The Proposed Action would not result in any increase in operational noise or changes to compatible land use.	No future actions that would have significant impacts to noise and compatible land use within the Proposed Project Area.	No significant changes in noise or compatible land use would occur. Other future actions during the Proposed Action would be over 3,000 feet away and have no significant noise impacts.

RESOURCE	PAST ACTIONS	PRESENT ACTIONS	PROPOSED ACTION	FUTURE ACTIONS	CUMULATIVE IMPACT
Socioeconomic Impacts, Environmental Justice, & Children's Health	No past actions would have significant socioeconomic, environmental justice or children's health impacts.	No present actions would have significant socioeconomic, environmental justice or children's health impacts.	The Proposed Action would not result in significant socioeconomic, environmental justice or children's health impacts.	No future actions would have significant socioeconomic, environmental justice or children's health impacts.	No significant impacts to socioeconomic, environmental justice or children's health impacts.
Visual Effects including Light Emissions	No past significant actions within the Proposed Project Area that would impact light emissions or visual impacts.	No present significant actions within the Proposed Project Area that would impact light emissions or visual impacts.	Proposed Action would not result in long-term significant impacts to light emissions or visual impacts.	No future significant actions within the Proposed Project Area that would impact light emissions or visual impacts.	Other cumulative projects are not expected to impact light emissions or visual impacts.
Natural Resources (including Wetlands, Floodplains, Surface Waters, Groundwater, and Wild and Scenic Rivers)	No past significant actions within the Proposed Project Area that would impact natural resources (including Wetlands, Floodplains, Surface Waters, Groundwater, and Wild and Scenic Rivers). Rehabilitation of existing facilities would not result in the conversion of undeveloped land. Therefore, there was no increase in the amount of impervious surface of past actions. No areas of groundwater recharge in the vicinity of the Proposed Project Area. No significant impacts from past actions. No wetlands have been directly impacted from past actions within the Proposed Project Area. Storm water runoff from developed areas may affect wetlands.	No present significant actions within the Proposed Project Area that would significantly impact natural resources (including Wetlands, Floodplains, Surface Waters, Groundwater, and Wild and Scenic Rivers). The Terminal Modernization Program converts approximately 6.2 acres to impervious surfaces; expansion of the Cargo 3 Ramp converts approximately 0.6 acres to impervious surfaces; and the USAF C17 Conversion converts approximately 1.1 acres to impervious surfaces. This could change the runoff patterns of the Proposed Project Area. Oil and gas drilling stormwater runoff volumes would be controlled, and no direct stream discharge would occur. No areas of groundwater recharge in the vicinity of the Proposed Project Area.	The Proposed Action would not result in significant Natural Resources impacts. No areas of groundwater recharge in the vicinity of the Proposed Project Area. No significant impacts from the Proposed Action. The Proposed Action would avoid impacting wetlands.	Proposed development may result in increased impervious surfaces which may increase runoff. No areas of groundwater recharge in the vicinity of the Proposed Project Area. No significant impacts from future actions. No wetlands are anticipated to be directly impacted from future actions within the Proposed Project Area.	A total increase of 7.9 acres of impervious surfaces will increase storm water runoff. These impacts would be mitigated through implementation of best management practices and applicable NPDES permits. Additional guidance will include PIT's Integrated Contingency Plan and the PADEP Best Management Practices. Improvements to the existing Terminal Area drainage system would be included in the Proposed Action to accommodate any additional runoff from the project. No areas of groundwater recharge in the vicinity of the Proposed Project Area. No direct impacts to wetlands would be anticipated by the past, present or proposed developments.

SOURCE: Allegheny County Airport Authority, Consol Energy, *Environmental Assessment for Oil & Gas Drilling at Pittsburgh International Airport*, February 2014; U.S. Air Force Reserve Command, Environmental Division, Environ*mental Assessment of Proposed Wing Headquarters Facility at Pittsburgh International Airport Air Reserve Station*, Pennsylvania, March 2005; Allegheny County Airport Authority, Envi*ronmental Assessment for the Westfield Site Improvements at Pittsburgh International Airport*, February 1, 2010; Ricondo & Associates, Inc., February 2020.

7. PERMITS

List all required permits for the proposed project. Has coordination with the appropriate agency commenced? What feedback has the appropriate agency offered in reference to the proposed project? What is the expected time frame for permit review and decision?

Table 8 provides an overview of the permit applications that would be required for the Proposed Action.

TABLE 8 REQUIRED PERMITS

PERMIT	PROPOSED ACTION COMPONENT	AGENCY
Building Permit – Solar PV Array	Solar PV array	Findlay Township
Building Permit – Electric Power Plant	Natural Gas-Fired Electric Power Plant	Findlay Township
Air Permit – Installation Permit	Natural Gas-Fired Electric Power Plant	Allegheny County Health Department
Air Permit – Operation Permit	Natural Gas-Fired Electric Power Plant	Allegheny County Health Department
National Pollutant Discharge Elimination System (NPDES) Permit	Natural Gas-Fired Electric Power Plant	Allegheny County Conservation District
Glint/Glare Analysis	Solar PV Array	FAA
Hazardous/Residual Waste	Natural Gas-Fired Electric Power Plant	Pennsylvania Department of Environmental Protection
Landfill Minor Modification Permit	Solar PV Array	Pennsylvania Department of Environmental Protection

NOTE: FAA – Federal Aviation Administration
SOURCE: Allegheny County Airport Authority, February 2020.

8. MITIGATION

Describe those mitigation measures to be taken to avoid creation of significant impacts to a particular resource as a result of the proposed project, and include a discussion of any impacts that cannot be mitigated.

No significant impacts would occur as a result of the Proposed Action; therefore, no mitigation would be required to avoid significant impacts. However, for all construction activities, the construction contractor would ensure that all applicable Federal, state, and local regulations are followed.

9. PUBLIC INVOLVEMENT

Describe the public review process and any comments received. Include copies of Public Notices and proof of publication.

This Final EA along with FAA's findings will be made available to the public once FAA has completed their review and FAA issues a final environmental decision for the proposed project.

10. LIST OF ATTACHMENTS

Exhibit 1	Regional Map
Exhibit 2	Proposed Action Location Map
Exhibit 3	Proposed Action Conceptual Plan – Natural Gas-Fired Electric Power Plant and Utilities
Exhibit 4	Natural Gas-Fired Electric Power Plant – Proposed Gas Line
Exhibit 5	Proposed Action Conceptual Plan – Diagram of Solar PV Array
Exhibit 6	Areas of Environmental Concern
Exhibit 7	PIT Potential Mining and Oil and Gas Extraction Potential Hazards
Exhibit 8	PIT Area Land Uses
Exhibit 9	National Wetlands Inventory Wetlands and Surface Waters Map
Exhibit 10	Federal Emergency Management Agency Flood Insurance Rate Map – Natural Gas-Fired Electric Power Plant
Exhibit 11	Federal Emergency Management Agency Flood Insurance Rate Map – Solar PV Array
Appendix A	ForgeSolar Glare Analysis Report
Appendix B	Air Quality Analysis
Appendix C	Pennsylvania Natural Diversity Index Search
Appendix D	Wetland Field Survey Reports

Project Title: Microgrid **Identifier:** PIT

11. PREPARER CERTIFICATION

I certify that the information I have provided above is, to the best of my knowledge, correct.

Signature — April 23, 2020 (Date)

Stephen Culberson
Name

Vice President
Title

Ricondo & Associates, Inc. — 312-212-8812
Affiliation — Phone #

12. AIRPORT SPONSOR CERTIFICATION

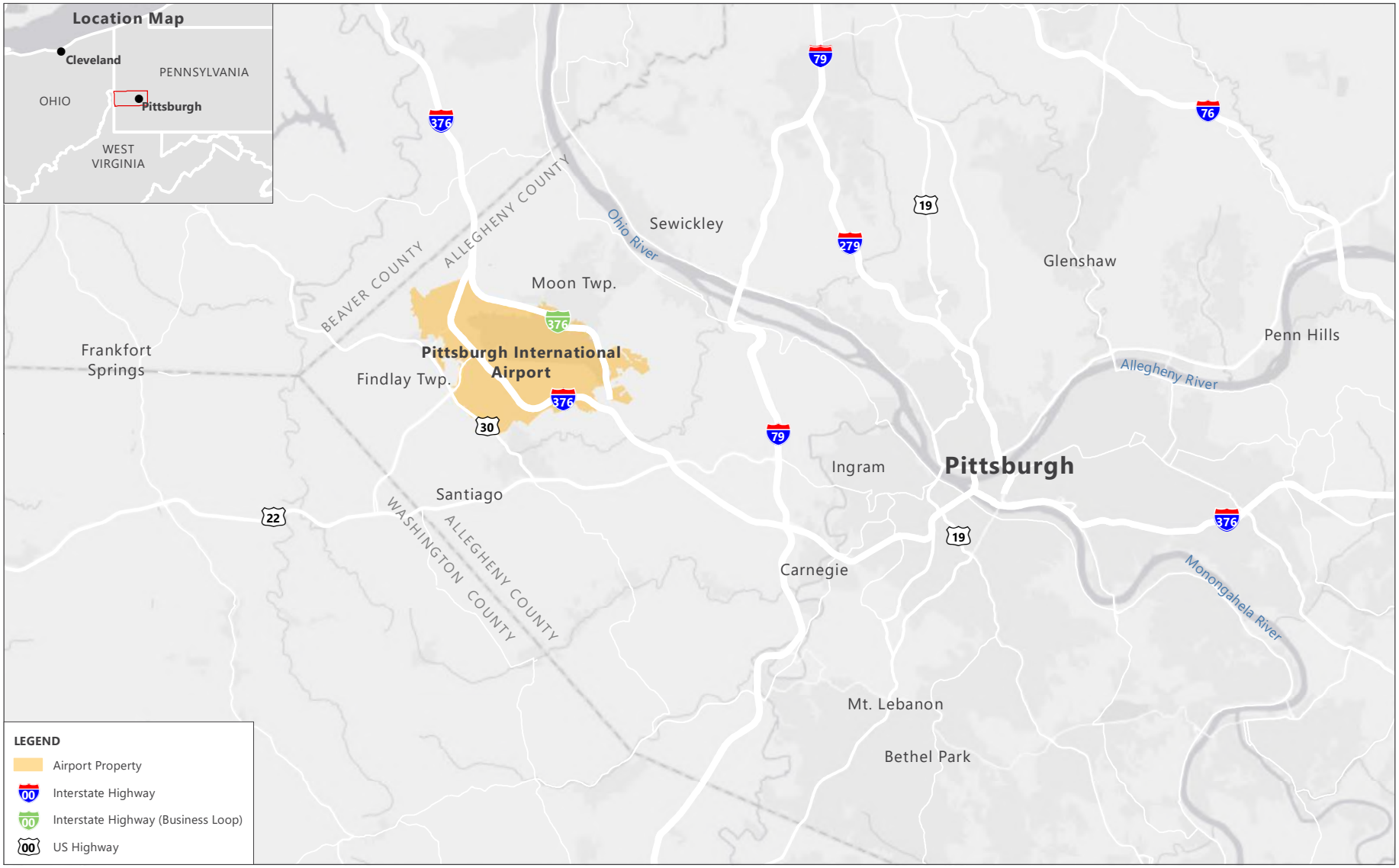
I certify that the information I have provided above is, to the best of my knowledge, correct. I also recognize and agree that no construction activity, including but not limited to site preparation, demolition, or land disturbance, shall proceed for the above proposed project(s) until FAA issues a final environmental decision for the proposed project(s), and until compliance with all other applicable FAA approval actions (e.g., ALP approval, airspace approval, grant approval) and special purpose laws has occurred.

Signature — April 23, 2020 (Date)

Eric Buncher
Name

Manager of Planning Services
Title

Allegheny County Airport Authority — 412-472-5692
Affiliation — Phone #



SOURCES: Esri, HERE, Garmin, OpenStreetMap Contributors, and the GIS User Community, January 2020 (basemap); US Census Bureau, TIGER/Line Shapefiles, 2019 (roads); Allegheny County Airport Authority, *Airport Layout Plan*, 2018 (Airport property).

NORTH 0 4 mi

EXHIBIT 1

REGIONAL MAP

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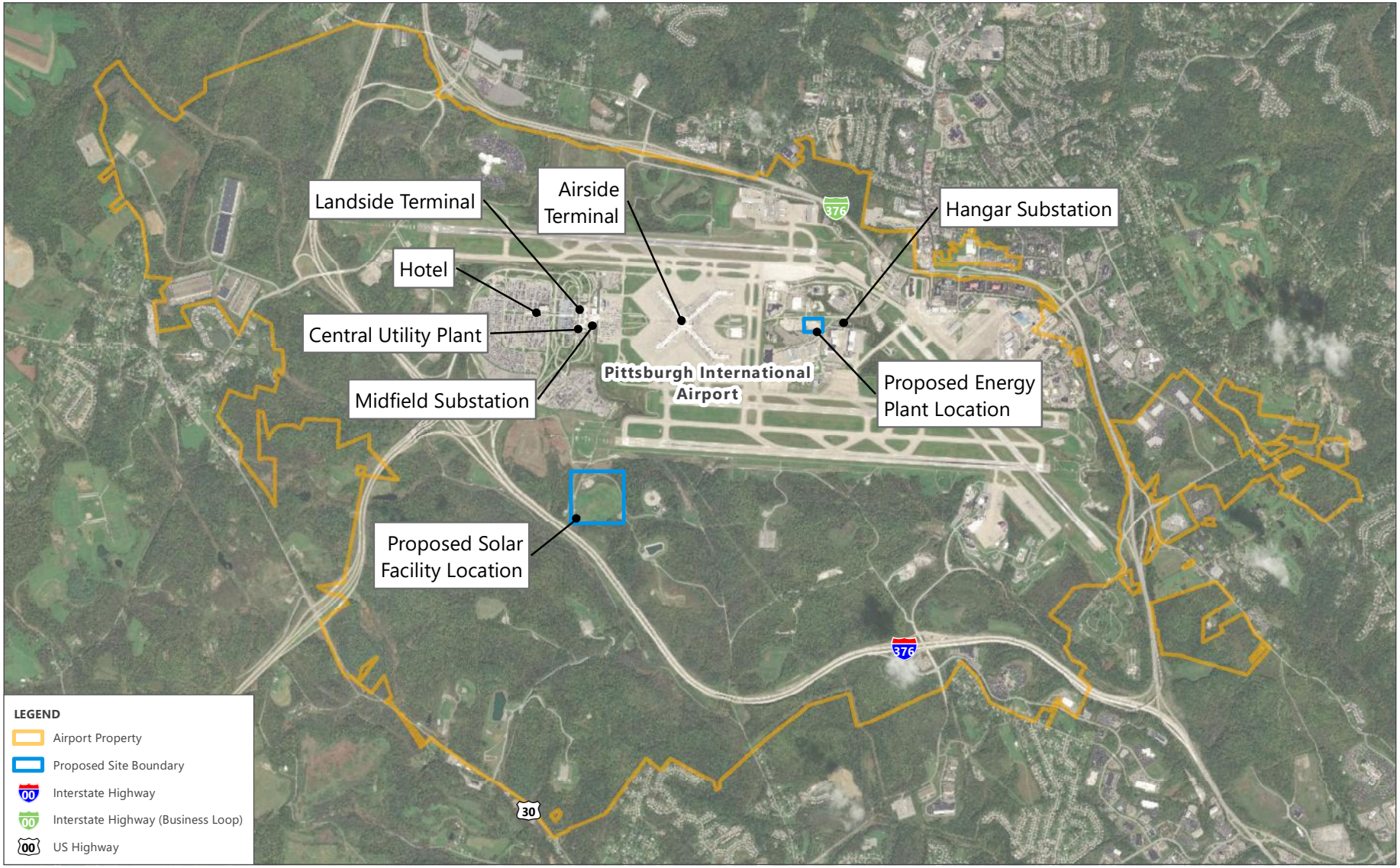

SOURCES: Esri, DigitalGlobe, Geoeye, Earthstar, October 2017 (basemap); US Census Bureau, TIGER/Line Shapefiles, 2019 (roads); Allegheny County Airport Authority, *Airport Layout Plan*, 2018 (Airport property); Ricondo & Associates, Inc., February 2020 (proposed site boundary).

EXHIBIT 2

PROPOSED ACTION LOCATION MAP

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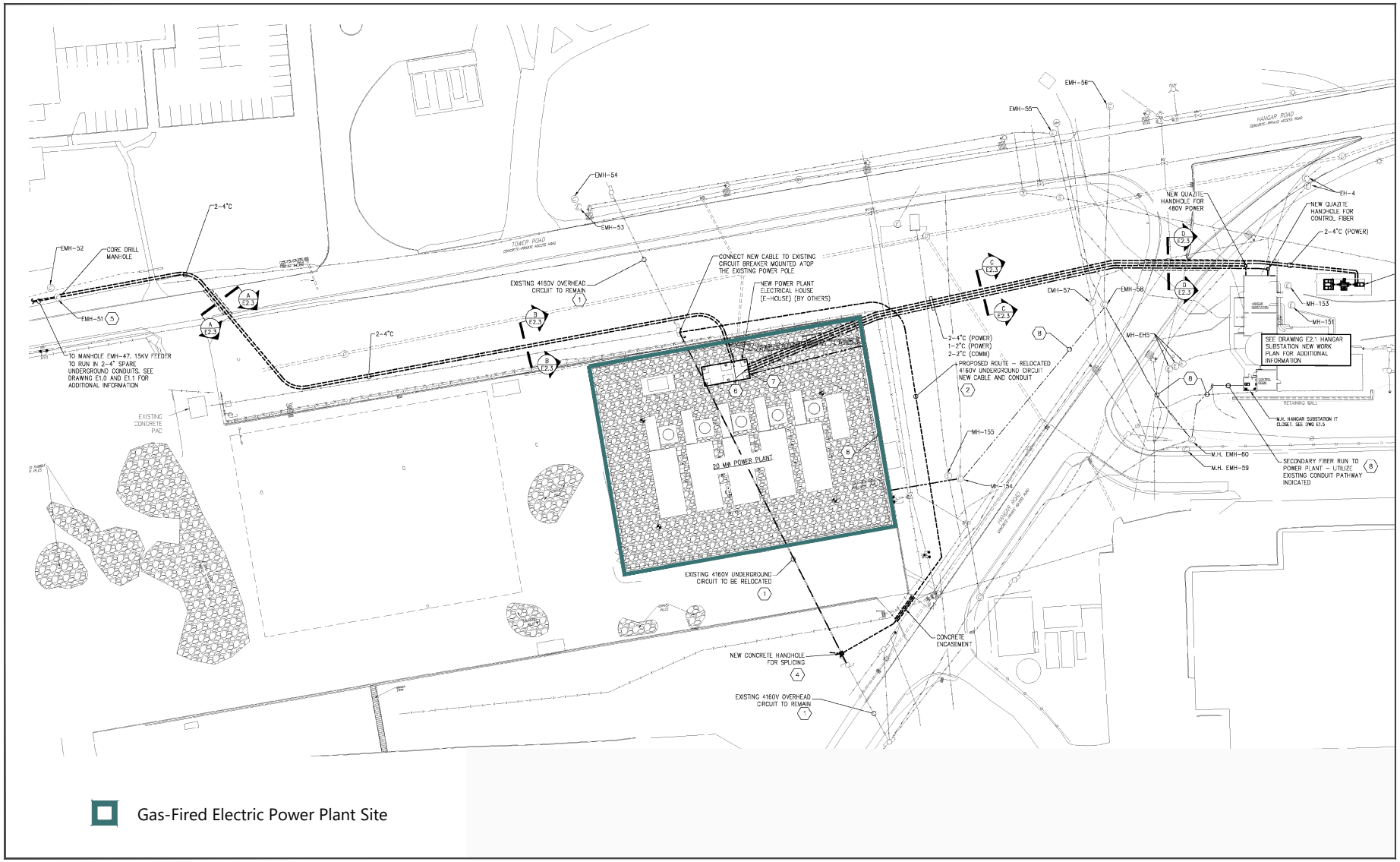


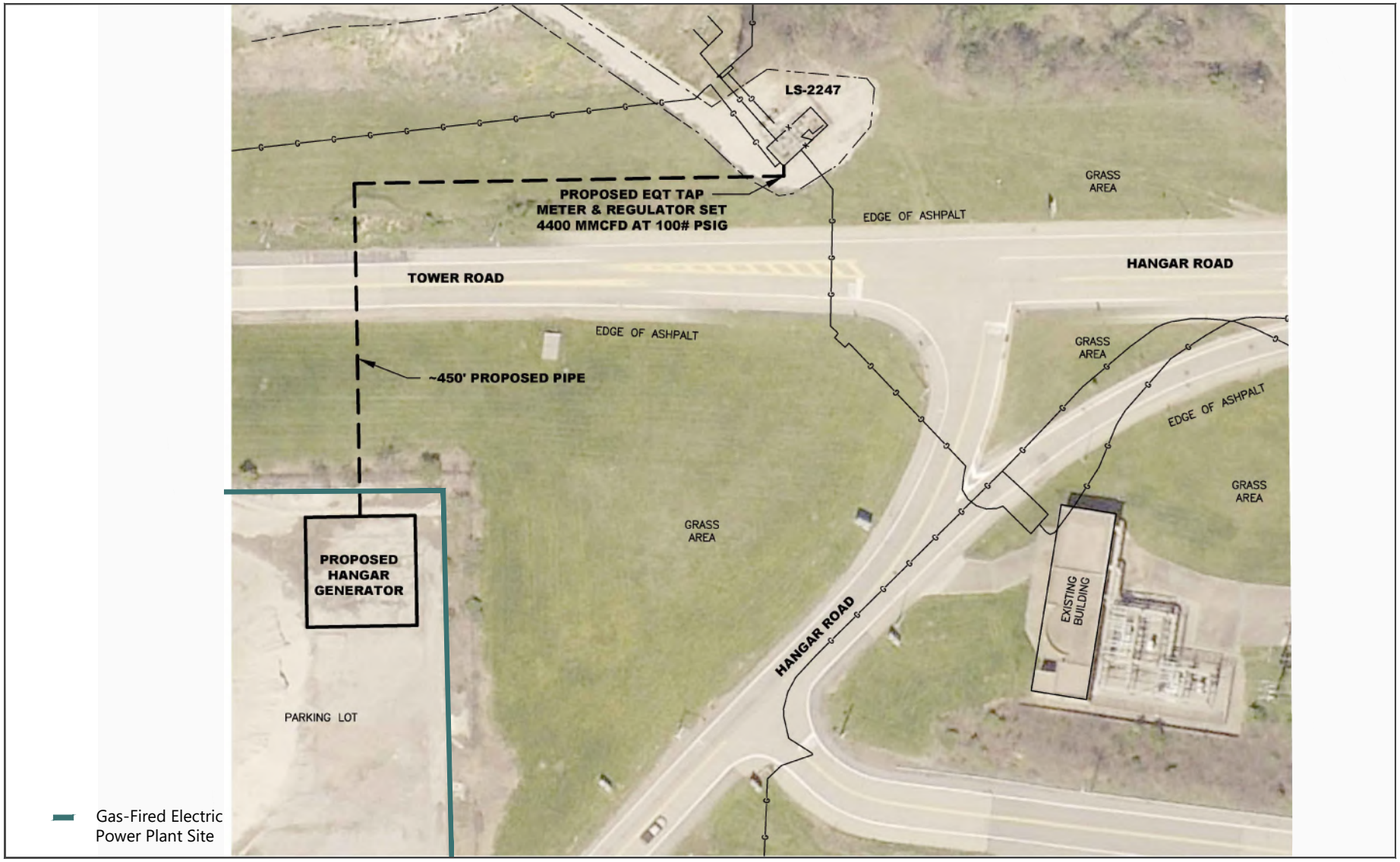
SOURCE: PJ Dick, PIT Microgrid Site Plans, 2020.

NORTH 0 140 ft

EXHIBIT 3

PROPOSED ACTION CONCEPTUAL PLAN -
NATURAL GAS-FIRED ELECTRIC POWER PLANT AND UTILITIES

Drawing: P:_PROJECTS\ACAA (Pittsburgh)\19011159-PIT Microgrid\01 - FAA Support Services\60-Environmental\04-Drawings&Models\PIT_Microgrid_EA_20200227.dwgLayout: Exhibit 3 - Gas Plant Plotted: Apr 15, 2020, 03:40PM



SOURCE: PJ Dick, PIT Microgrid Site Plans, 2020.

NORTH 0 85 ft

EXHIBIT 4

NATURAL GAS-FIRED ELECTRIC POWER PLANT - PROPOSED GAS LINE

Drawing: P:_PROJECTS\ACAA (Pittsburgh)\19011159-PIT Microgrid\01 - FAA Support Services\60-Environmental\04-Drawings&Models\PIT_Microgrid_EA_20200227.dwgLayout: Exhibit 4 - Gas Plant-GasLine Plotted: Apr 15, 2020, 03:12PM

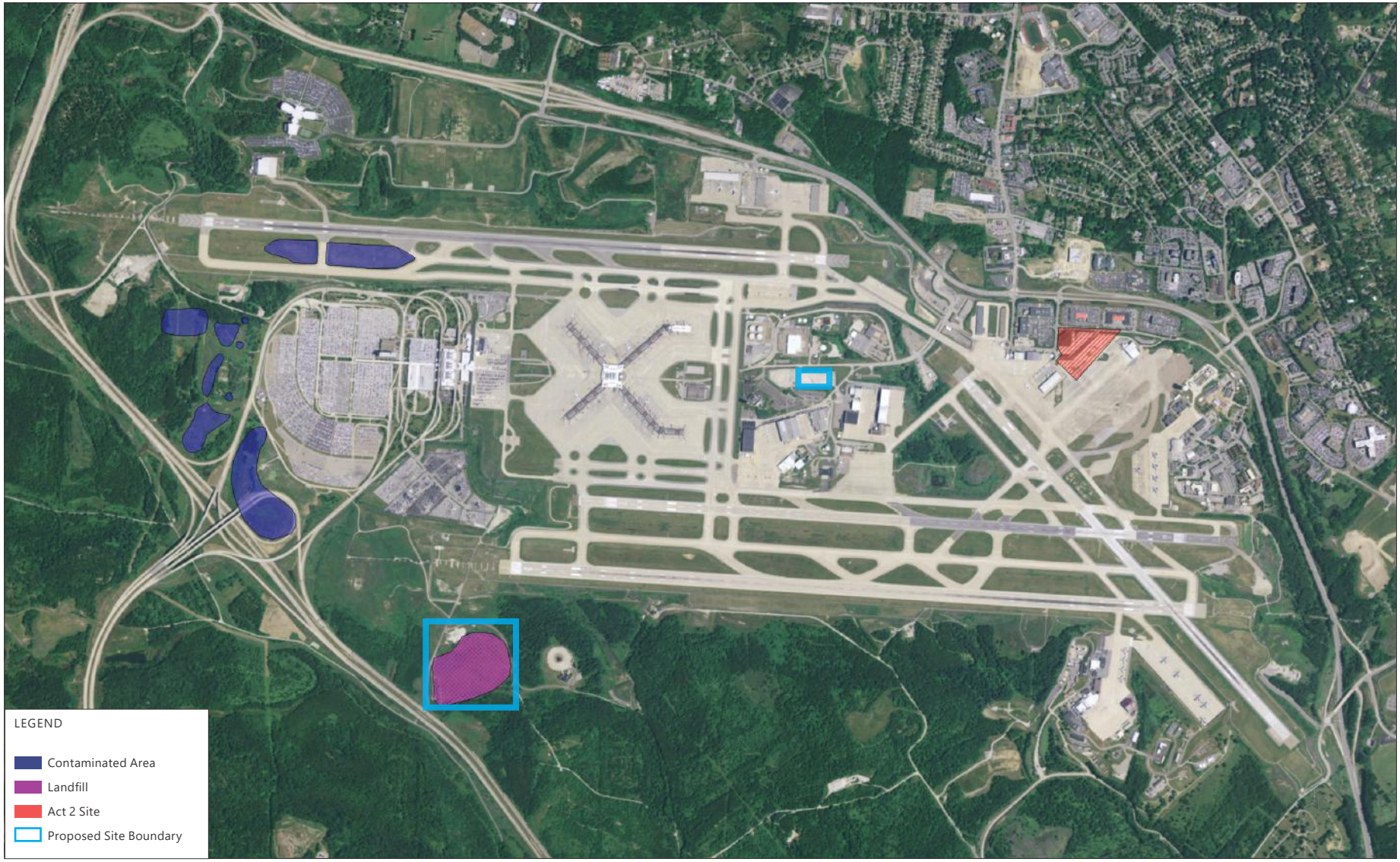
SOURCE: IMG Energy Solutions, *Attachment to the Form 7460 Notice of Proposed Construction*, December 13, 2019.

NORTH 0 Not to Scale

EXHIBIT 5

PROPOSED ACTION CONCEPTUAL PLAN - DIAGRAM OF SOLAR PV ARRAY

Drawing: P:_PROJECTS\ACAA (Pittsburgh)\19011159-PIT Microgrid\01 - FAA Support Services\60-Environmental\04-Drawings&Models\PIT_Microgrid_EA_20200227.dwgLayout: Exhibit 5 - Solar Plant Plotted: Apr 15, 2020, 03:28PM



SOURCE: Aerial imagery from ESRI Database, ESRI, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community, acquired April 20, 2016. Overlay information from Rhea Engineers and Consultants, Inc., Environmental Assessment for Oil and Gas Drilling at Pittsburgh International Airport, February 2014.

NORTH 0 Not To Scale

EXHIBIT 6

AREAS OF ENVIRONMENTAL CONCERN

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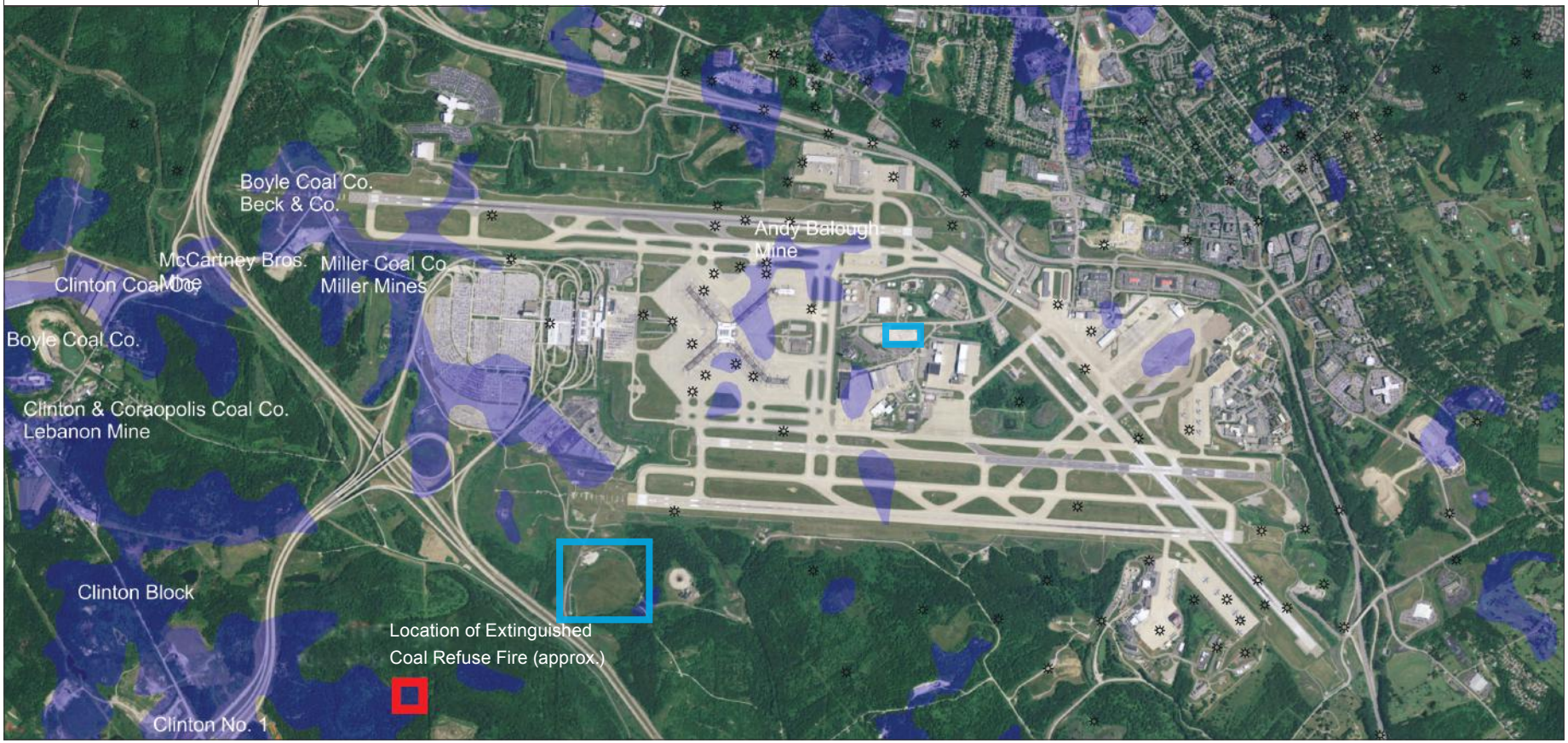

SOURCE: Aerial imagery from ESRI Database, ESRI, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community, acquired April 20, 2016.
Overlay information from WPA (Work Projects Administration) Mine Maps for Beaver Sheet 9, Sewickley Sheet 7, Burgettstown Sheet 3, and Carnegie Sheet 1.

EXHIBIT 7

PIT POTENTIAL MINING, AND OIL AND GAS EXTRACTION POTENTIAL HAZARDS

NORTH 0 Not To Scale

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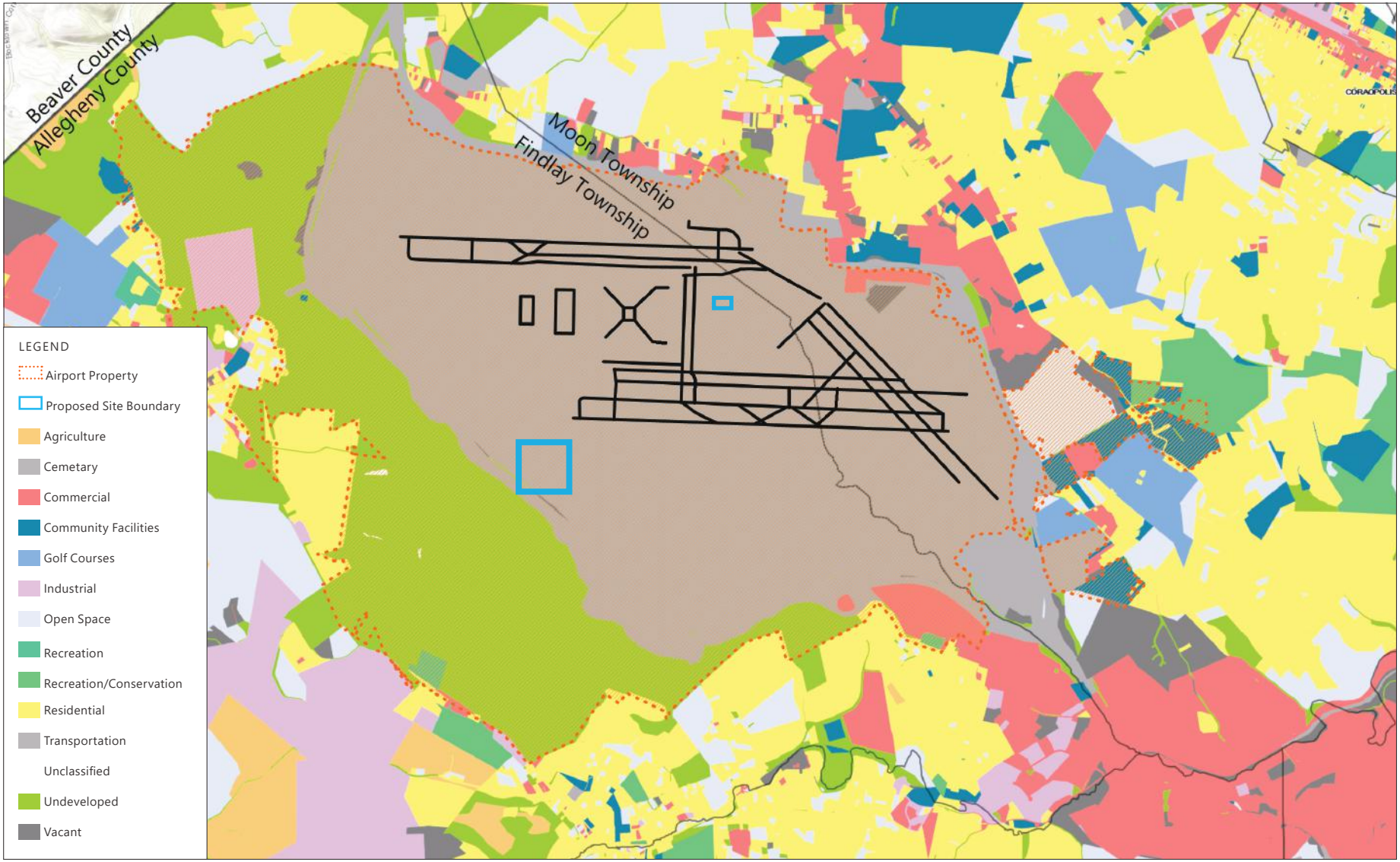


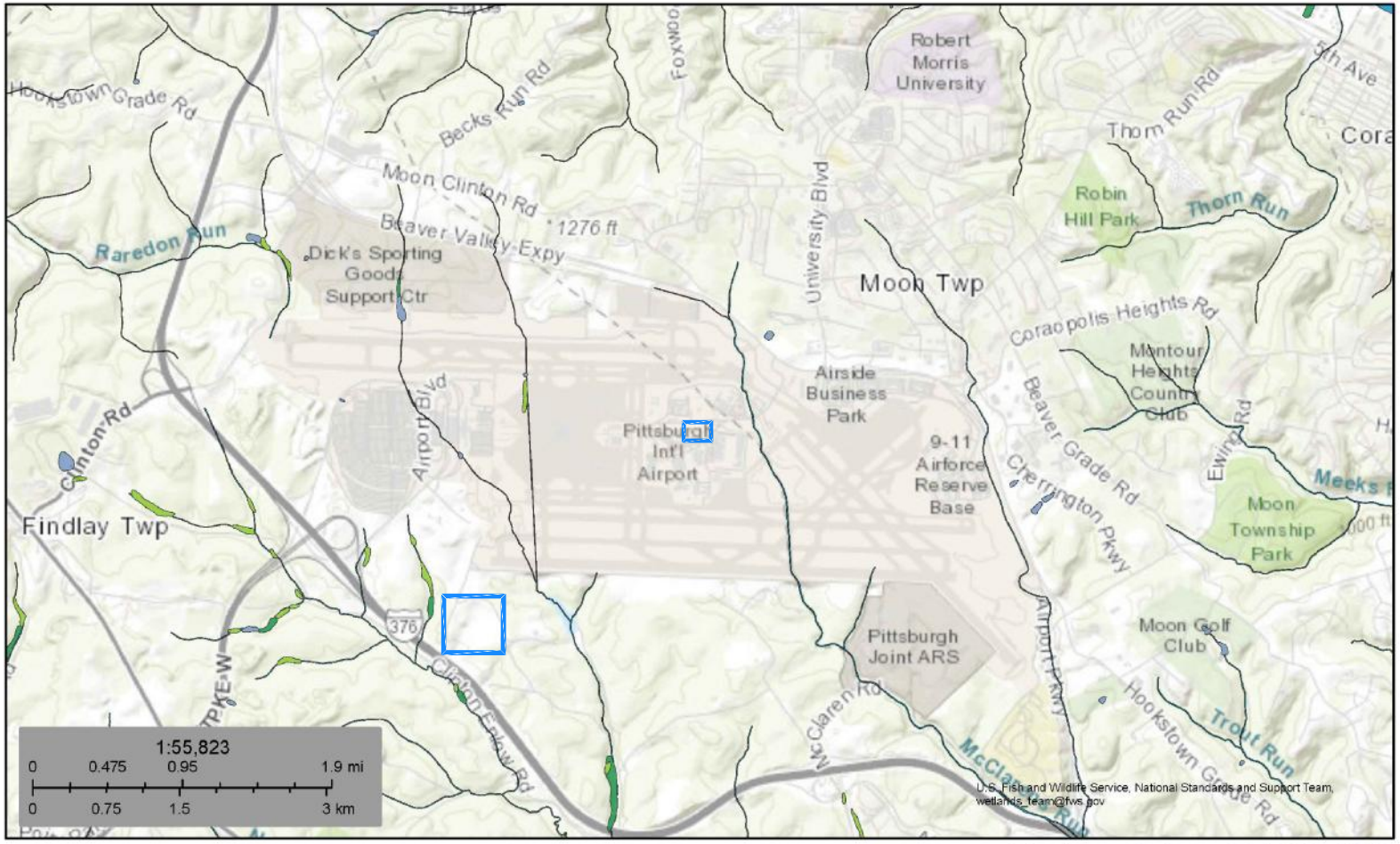
SOURCE: Allegheny Places, The Allegheny County Comprehensive Plan, webpage httpj/www.alleghenyplaces.com/comprehensive_plan/viewer.aspx PREPARED BY: Rhea Engineers and Consultants, August 2017.

EXHIBIT 8

PIT AREA LAND USES

NORTH 0 Not To Scale

ricondo:Shared:oDrive:Corporate:Creative Services:01 Projects:01 Client Projects:2020:PIT:PIT Terminal EA Exhibits 2020:PIT Terminal EA Exhibits 2020_working.indd



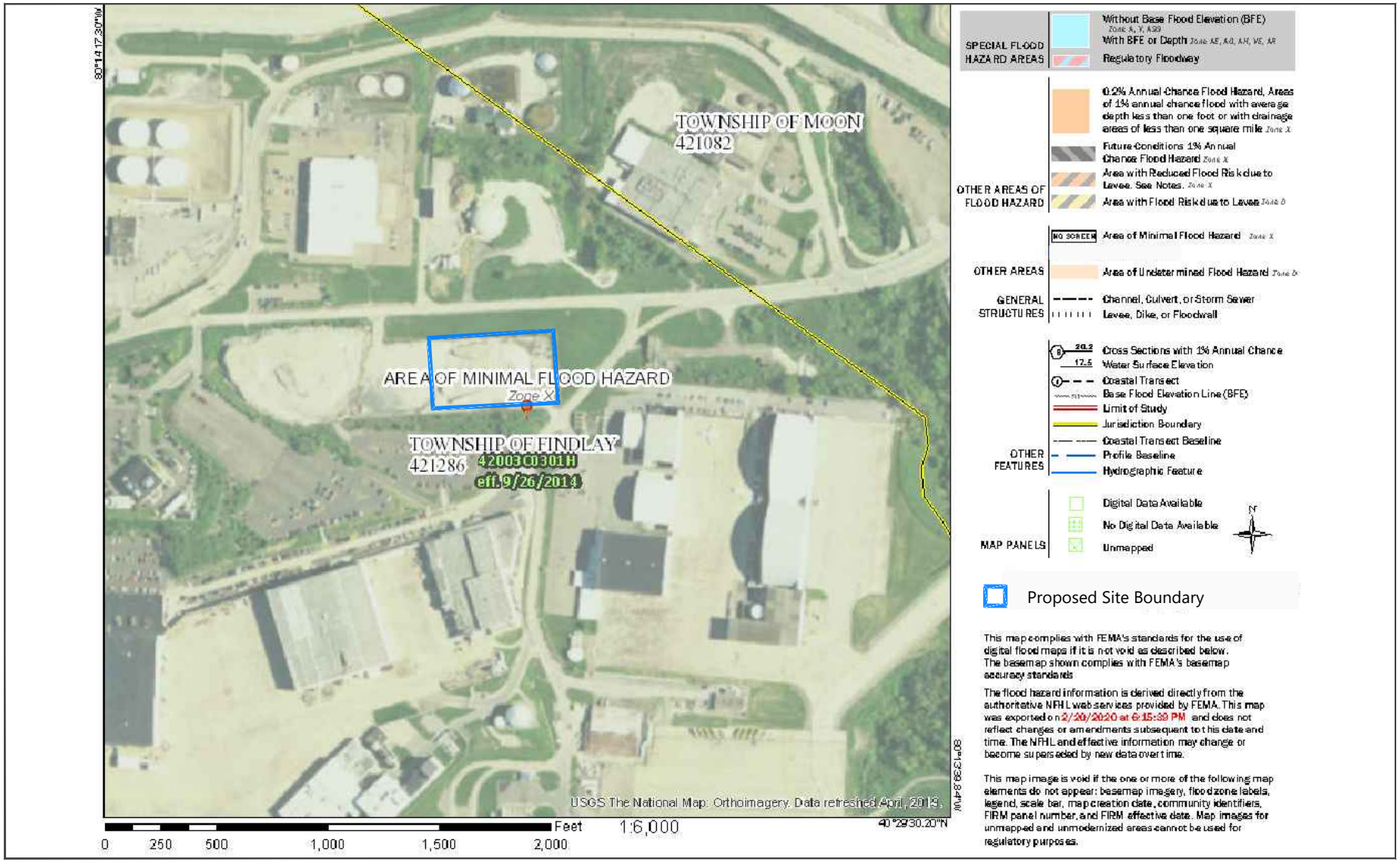
SOURCE: US Fish and Wildlife Service, National Wetlands Inventory, Accessed February 20, 2020.

NORTH 0 See Above

EXHIBIT 9

NATIONAL WETLANDS INVENTORY
WETLANDS AND SURFACE WATERS MAP

Drawing: P:_PROJECTS\ACAA (Pittsburgh)\19011159-PIT Microgrid\01 - FAA Support Services\60-Environmental\04-Drawings&Models\PIT_Microgrid_EA_20200227.dwgLayout: Exhibit 9 - NWI Plotted: Apr 15, 2020, 03:28PM



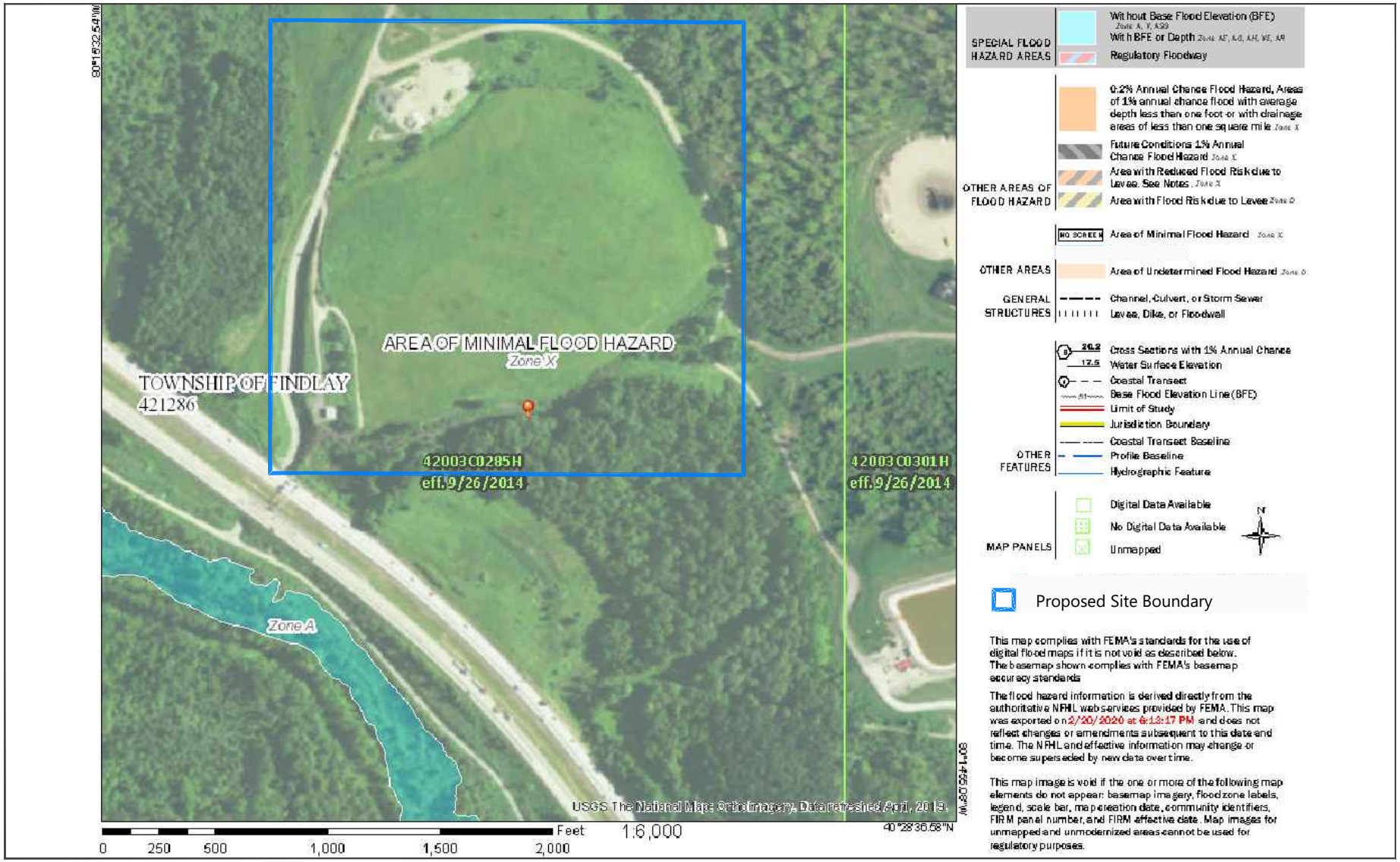
SOURCE: US Fish and Wildlife Service, National Wetlands Inventory, Accessed February 20, 2020.

NORTH 0 See Above

EXHIBIT 10

FEDERAL EMERGENCY MANAGEMENT AGENCY FLOOD INSURANCE RATE MAP - NATURAL GAS FIRED ELECTRIC POWER PLANT

Drawing: P:_PROJECTS\ACAA (Pittsburgh)\19011159-PIT Microgrid\01 - FAA Support Services\60-Environmental\04-Drawings&Models\PIT_Microgrid_EA_20200227.dwgLayout: Exhibit 10 - FEMA-Gas Plotted: Apr 15, 2020, 03:30PM



SOURCE: US Fish and Wildlife Service, National Wetlands Inventory, Accessed February 20, 2020.

NORTH 0 See Above

EXHIBIT 11

FEDERAL EMERGENCY MANAGEMENT AGENCY FLOOD INSURANCE RATE MAP - SOLAR PV ARRAY

Drawing: P:_PROJECTS\ACAA (Pittsburgh)\19011159-PIT Microgrid\01 - FAA Support Services\60-Environmental\04-Drawings&Models\PIT_Microgrid_EA_20200227.dwgLayout: Exhibit 11 - FEMA-Solar Plotted: Apr 15, 2020, 03:31PM

APPENDIX A

ForgeSolar Glare Analysis

FORGESOLAR GLARE ANALYSIS

Project: **Pittsburgh Airport**
Proposed solar PV site on capped landfill at Pittsburgh International Airport (PIT) at 25 degree tilt

Site configuration: **PIT Solar 1**
Analysis conducted by Nicholas Hanson (nick.hanson@imgmidstream.com) at 02:15 on 05 Dec, 2019.

U.S. FAA 2013 Policy Adherence

The following table summarizes the policy adherence of the glare analysis based on the 2013 U.S. Federal Aviation Administration Interim Policy 78 FR 63276. This policy requires the following criteria be met for solar energy systems on airport property:

- No "yellow" glare (potential for after-image) for any flight path from threshold to 2 miles
- No glare of any kind for Air Traffic Control Tower(s) ("ATCT") at cab height.
- Default analysis and observer characteristics (see list below)

ForgeSolar does not represent or speak officially for the FAA and cannot approve or deny projects. Results are informational only.

COMPONENT	STATUS	DESCRIPTION
Analysis parameters	PASS	Analysis time interval and eye characteristics used are acceptable
Flight path(s)	PASS	Flight path receptor(s) do not receive yellow glare
ATCT(s)	PASS	Receptor(s) marked as ATCT do not receive glare

Default glare analysis parameters and observer eye characteristics (for reference only):

- Analysis time interval: 1 minute
- Ocular transmission coefficient: 0.5
- Pupil diameter: 0.002 meters
- Eye focal length: 0.017 meters
- Sun subtended angle: 9.3 milliradians

FAA Policy 78 FR 63276 can be read at https://www.federalregister.gov/d/2013-24729

SITE CONFIGURATION

Analysis Parameters

DNI: peaks at 1,000.0 W/m^2
Time interval: 1 min
Ocular transmission coefficient: 0.5
Pupil diameter: 0.002 m
Eye focal length: 0.017 m
Sun subtended angle: 9.3 mrad
Site Config ID: 33923.6229

PV Array(s)

Name: PV array 1
Axis tracking: Fixed (no rotation)
Tilt: 25.0°
Orientation: 180.0°
Rated power: 3000.0 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	40.482577	-80.256099	1126.20	10.00	1136.20
2	40.481826	-80.256142	1119.12	10.00	1129.12
3	40.480651	-80.255713	1071.85	10.00	1081.85
4	40.480969	-80.253438	1138.12	10.00	1148.12
5	40.481907	-80.251893	1167.98	10.00	1177.99
6	40.483107	-80.252430	1147.05	10.00	1157.05
7	40.483544	-80.253578	1141.41	10.00	1151.41
8	40.483484	-80.254323	1140.65	10.00	1150.65
9	40.482968	-80.255112	1139.58	10.00	1149.58

Flight Path Receptor(s)

Name: FP 1
Description:
Threshold height: 50 ft
Direction: 92.1°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	40.486763	-80.252015	1134.57	50.00	1184.57
Two-mile	40.487828	-80.290049	1227.55	510.48	1738.03

Name: FP 2
Description:
Threshold height: 50 ft
Direction: 91.6°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	40.502368	-80.270470	1202.36	50.00	1252.36
Two-mile	40.503150	-80.308525	1136.29	669.53	1805.82

Name: FP 3
Description:
Threshold height: 50 ft
Direction: 310.3°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	40.479916	-80.204894	1113.58	50.00	1163.59
Two-mile	40.461227	-80.175858	988.67	728.37	1717.04

Name: FP 4
Description:
Threshold height: 50 ft
Direction: 271.1°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	40.485779	-80.210781	1122.56	50.00	1172.56
Two-mile	40.485224	-80.172729	1121.94	604.08	1726.02

Name: FP 5
Description:
Threshold height: 50 ft
Direction: 91.9°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	40.489984	-80.247968	1140.42	50.00	1190.42
Two-mile	40.490927	-80.286009	1117.67	626.21	1743.88

Name: FP 6
Description:
Threshold height: 50 ft
Direction: 272.6°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	40.488926	-80.209266	1136.61	50.00	1186.61
Two-mile	40.487625	-80.171243	1123.15	616.92	1740.07

Name: FP 7
Description:
Threshold height: 50 ft
Direction: 272.4°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	40.501449	-80.233529	1173.59	50.00	1223.59
Two-mile	40.500243	-80.195494	1084.91	692.13	1777.04

Name: FP 8
Description:
Threshold height: 50 ft
Direction: 139.7°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	40.496098	-80.225031	1146.72	50.00	1196.72
Two-mile	40.518145	-80.249656	1117.95	632.23	1750.18

Discrete Observation Receptors

Name	ID	Latitude (°)	Longitude (°)	Elevation (ft)	Height (ft)
1-ATCT	1	40.494652	-80.237800	1161.03	327.02

Map image of 1-ATCT

GLARE ANALYSIS RESULTS

Summary of Glare

PV Array Name	Tilt (°)	Orient (°)	"Green" Glare min	"Yellow" Glare min	Energy kWh
PV array 1	25.0	180.0	0	0	6,994,000.0

Total annual glare received by each receptor

Receptor	Annual Green Glare (min)	Annual Yellow Glare (min)
FP 1	0	0
FP 2	0	0
FP 3	0	0
FP 4	0	0
FP 5	0	0
FP 6	0	0
FP 7	0	0
FP 8	0	0
1-ATCT	0	0

Results for: PV array 1

Receptor	Green Glare (min)	Yellow Glare (min)
FP 1	0	0
FP 2	0	0
FP 3	0	0
FP 4	0	0
FP 5	0	0
FP 6	0	0
FP 7	0	0
FP 8	0	0
1-ATCT	0	0

Flight Path: FP 1

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 2

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 3

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 4

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 5

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 6

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 7

0 minutes of yellow glare
0 minutes of green glare

Flight Path: FP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: 1-ATCT

0 minutes of yellow glare
0 minutes of green glare

Assumptions

"Green" glare is glare with low potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
"Yellow" glare is glare with potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
Glare analyses do not account for physical obstructions between reflectors and receptors. This includes buildings, tree cover and geographic obstructions.
Several calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results for large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare.
The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size. Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)
Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
Glare vector plots are simplified representations of analysis data. Actual glare emanations and results may differ.
The glare hazard determination relies on several approximations including observer eye characteristics, angle of view, and typical blink response time. Actual results and glare occurrence may differ.
Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid based on aggregated research data. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.

APPENDIX B

Air Quality Analysis

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Appendix B Air Quality Analysis 1

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APPENDIX B AIR QUALITY ANALYSIS

B.1 INTRODUCTION

This document describes the methods used to calculate emissions of carbon monoxide (CO), volatile organic compounds (VOCs), oxides of nitrogen (NO_x), oxides of sulfur (SO_x), particulate matter less than ten microns in diameter (PM_{10}), particulate matter less than 2.5 microns in diameter ($PM_{2.5}$), and carbon dioxide equivalent (CO_{2e}) in support of the Environmental Assessment (EA) for construction of a natural gas-fired electric power plant and installation of a solar photovoltaic (PV) array (the Proposed Action) at Pittsburgh International Airport (the Airport).

The emissions analysis was conducted to develop emissions inventories pursuant to the National Environmental Policy Act of 1969 (NEPA), and to determine whether emissions associated with the Proposed Action would exceed applicable *de minimis* thresholds as documented in the U.S. Environmental Protection Agency (USEPA) general conformity regulations. Construction-related activities are anticipated to occur in 2020 and 2021.

B.2 REGULATORY SETTING

Under the federal Clean Air Act (CAA), as amended, the EPA has developed National Ambient Air Quality Standards (NAAQS) for the following air pollutants, referred to as criteria air pollutants: CO, nitrogen dioxide (NO_2), ozone (O_3), sulfur dioxide (SO_2), lead (Pb), PM_{10}, and $PM_{2.5}$. The CAA defines the need to establish two standards—primary standards, which define maximum concentrations of criteria air pollutants to protect public health, and secondary standards, which define maximum concentrations of criteria air pollutants to protect public welfare.

Individual states are required to identify general geographic areas where the NAAQS for these criteria air pollutants are not met. The USEPA designates such areas as nonattainment areas and qualifies the nonattainment status by severity of nonattainment ranging from marginal to moderate to serious to extreme nonattainment. Areas that were in nonattainment but have since attained the NAAQS are considered to be an attainment/maintenance area for several years before being designated as attainment. A state with a nonattainment or maintenance area must prepare a State Implementation Plan (SIP) that describes the programs and requirements that the state will implement to attain or maintain the NAAQS by the deadlines specified in the CAA, as well as subsequent related documents promulgated by the USEPA.

The CAA requires federal agencies to ensure that actions proposed to occur in a designated nonattainment or maintenance area conform to the appropriate SIP, also known as General Conformity. The General Conformity Rule establishes the *de minimis* levels by which a proposed action may show that it complies with the SIP's purpose of eliminating or reducing the severity and number of violations of the NAAQS and achieving expeditious attainment of such standards. Pursuant to FAA Order 1050.1F, a proposed action would generally be considered in compliance if it would not cause emissions that exceed NAAQS *de minimis* levels. If the proposed action's emissions exceed the *de minimis* levels, a conformity determination would be required.

The Pennsylvania Department of Environmental Protection's Bureau of Air Quality is responsible for achieving the goals of the CAA and the Pennsylvania Air Pollution Control Act. The bureau develops air quality regulations, conducts meteorological tracking and air quality modeling studies and reviews; develops transportation control measures, and other mobile source programs.

The Airport is in Allegheny County. For the NAAQS, Allegheny County is designated as marginal nonattainment for 8-hour ozone and moderate nonattainment for PM2.5. A portion of the county is also in nonattainment for SO_2. A

portion of Allegheny County was historically a nonattainment area for CO, but in January 2003 it was re-designated to attainment for the CO NAAQS and remains designated as a maintenance area.

B.3 METHODOLOGY

In support of evaluating air quality effects, an emissions inventory was prepared for the criteria air pollutants (or their precursor compounds) that may be affected by construction of the Proposed Action.

B.3.1 MODELS

The Airport Construction Emissions Inventory Tool (ACEIT) was used to estimate the construction emissions associated with the Proposed Action. ACEIT was developed in conjunction with the Transportation Research Board's Airport Cooperative Research Program Report 102, which provides guidance in developing airport construction emissions inventories.[1] ACEIT provides default values for most input data required to produce construction emissions inventories, including activity data and emission factors, and allows for the manipulation of various parameters to better define and refine a project analysis.

ACEIT calculates emissions for CO, VOC, NO_x, SO_2, PM_{10}, $PM_{2.5}$, carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) for both onroad and off-road construction sources.[2] The model uses the USEPA's nonroad equipment emissions model (NONROAD2008a) for nonroad construction vehicle/equipment emissions and the Motor Vehicle Emissions Simulator (MOVES2010b) for onroad vehicle emissions.[3] Because MOVES 2010b has been replaced with MOVES2014b, the latter model was used outside of the ACEIT model to derive onroad emission factors for use in this analysis. In addition to exhaust emissions, MOVES estimates fugitive emissions related to non-exhaust and non-equipment sources, including evaporative (VOC) emissions and brake and tire wear (PM) emissions. Fugitive emissions from other sources, including batch plants, asphalt drying, soil handling, and material movement, are also included in the model, using methodologies from the USEPA's AP-42.[4]

B.3.2 THRESHOLDS OF SIGNIFICANCE

The evaluation of significance involves identifying if the Proposed Action would cause pollutant concentrations to exceed one or more of the NAAQS for any of the time period(s) analyzed or would increase the frequency or severity of any such existing violations. Established under the CAA, the General Conformity Rule applies to proposed federal actions in a nonattainment or maintenance area if the total of direct and indirect emissions of the relevant criteria air pollutants and precursor pollutants caused by a project would equal or exceed defined *de minimis* amounts. If the project would cause an exceedance of *de minimis*, then the federal agency would need to make a determination of General Conformity. If project emissions would not exceed the *de minimis* thresholds, the federal agency can determine that the General Conformity Rule does not apply and no further analysis or documentation is required.

As a designated moderate nonattainment area for ozone, *de minimis* thresholds of 100 tons per year apply for emissions of VOC and NOx (ozone precursor pollutants). A *de minimis* threshold of 100 tons of CO per year is established because Allegheny County is a maintenance area for CO. The part of Allegheny County that includes the

[1] Transportation Research Board, Airport Cooperative Research Program Report 102, *Guidance for Estimating Airport Construction Emissions*, 2014.

[2] For purposes of this analysis, it was assumed that estimates of SO_X emissions are equal to calculated emissions of SO_2.

[3] The latest MOVES model incorporates the NONROAD2008a model for estimating emissions from nonroad construction vehicles and equipment.

[4] U.S. Environmental Protection Agency, AP-42, *Compilation of Air Pollutant Emission Factors*, Fifth Edition., January 1995, as amended.

Airport is in attainment with federal SO_2 standards, but for inventory purposes, emissions of SOx were estimated, and it was assumed that estimates of SO_x emissions are equal to calculated emissions of SO_2. A de minimis threshold or 100 tons per year of PM2.5 is also established, since Allegheny County is designated as nonattainment area for PM2.5. These applicable *de minimis* thresholds were compared to emissions associated with the Proposed Action. If the project emissions do not exceed the *de minimis* thresholds, the FAA can determine that the General Conformity Rule does not apply and no further analysis or documentation is required.

B.4 ASSUMPTIONS

Construction of the Proposed Action would result in short-term changes in air emissions from sources such as: exhaust emissions from nonroad construction equipment, haul trucks, and construction worker vehicles; fugitive VOC emissions from paving; and fugitive dust emissions from grading, materials handling, and vehicles traveling on paved and unpaved roads.

B.4.1 PROPOSED ACTION COMPONENTS

For purposes of this analysis, the Proposed Action was assumed to consist of the following components and schedule. Area estimates were used to scale construction activity in ACEIT and are consistent with information presented in Section 1 of this EA.

- **Power Plant Construction:** Construction of the natural gas-fired electric power plant includes the construction/installation of five generators, an electrical building, and a mechanical building. The site area is estimated at approximately 43,000 square feet, with the entire site assumed to comprise a poured concrete pad upon which the generators and buildings would be constructed. Each generator is estimated to be approximately 60 feet long and 20 feet wide (1,200 square feet). The electrical and mechanical buildings were each estimated to be approximately 1,000 square feet. Therefore, for purposes of emissions modeling, a total of approximately 8,000 square feet of building area would be constructed. Electrical and gas utility infrastructure would be located underground. The analysis assumes 1,300 linear feet of trenching at three feet wide and three feet deep to accommodate the utility connections. Construction of the entire natural gas-fired electric power plant project is assumed to occur from June 2020 to February 2021.
- **Solar PV Array Installation:** The Proposed Action includes the installation of 9,360 solar panels on an approximately 13-acre site. Since the project area covers a landfill area, no grading is anticipated since the soil cap covering the landfill is to be minimally disturbed. For purposes of this analysis, it was assumed that up to a quarter of the project site would require some amount of site preparation, such as tree/shrub removal, rough grading, landscaping, and the provision of utility service connections. Construction of the solar PV array is assumed to occur from June 2020 to February 2021.

B.4.2 CONSTRUCTION ACTIVITY

Construction emissions analyses generally require information such as the type of construction equipment to be used, the amount of time the equipment will operate, estimates of required construction material, areas to be paved, and the number of employees anticipated to be on site. Such data was largely unavailable for purposes of conducting this analysis. The use of the ACEIT was particularly appropriate for this analysis due to the model's ability to estimate nonroad and onroad activity data for a variety of standard airport projects, including associated activity types and the equipment used in each activity. Based on project dimensions, ACEIT scales these activities. **Table B-1** presents the construction activities that were assumed to comprise each project component.

TABLE B-1 PROPOSED ACTION PROJECT ACTIVITIES

CONSTRUCTION ACTIVITY BY PROJECT COMPONENT [1]		
Power Plant Paved Pad	**Power Plant Building Construction**	**Solar PV Array Installation**
Asphalt Placement	Concrete Foundations	Construction Mob & Layout
Clearing and Grubbing	Construction Mob & Layout	Site Clearing- Remove Trees & Shrubs
Drainage - 24 inch SICPP	Exterior Wall Framing	Landscaping (Curbing)
Drainage - 6 inch Perforated Underdrain	Interior Build-Out/ Finishes	Landscaping (Rough Grading)
Dust Control	Roofing	Landscaping (Top Soil Seed and Plantings)
Excavation (Borrow)	Security & Safety Systems	Underground Services to 5 ft. of Building
Excavation (Cut to Fill)	Structural Steel Erection	
Excavation (Topsoil Stripping)		
Fencing	**Power Plant Utility Connections**	
Grading	Drainage – 24-inch SICPP	
Hydroseeding	Hydroseeding	
Markings	Soil Erosion/Sediment Control	
Soil Erosion/Sediment Control	Topsoil Placement	
Subbase Placement	Drainage – 24-inch Reinforced Concrete Pipe	
Topsoil Placement	Drainage Structures	
Concrete Placement		
Lighting		
Sealing/Fuel Resistant		

NOTE:
1 It should be noted that the construction activities listed correspond to activities for which the Airport Construction Emissions Inventory Tool (ACEIT) model assigns construction activity, such as equipment types and hours. Due to the specialized nature of the construction/installation of the power plant generators and solar panels, it is recognized that the activities listed may not correspond directly to activities necessary to construct the project. However, these activities were selected to be representative of the level of activity required to complete the project for purposes of air quality modeling.
SOURCE: Ricondo & Associates, Inc., February 2020.

For each construction activity, default construction (nonroad) equipment and usage hours were assumed, as assigned by ACEIT. Default equipment usage hours are estimated in ACEIT based on the overall size of the project and activity rates based on expert engineering judgment. A summary of equipment types and usage hours for each construction year is presented in **Table B-2**.

TABLE B-2 NONROAD EQUIPMENT AND HOURS OF OPERATION

EQUIPMENT	2020 HOURS	2021 HOURS	EQUIPMENT	2020 HOURS	2021 HOURS
40 Ton Crane	240	240	Log Chipper	443	127
Air Compressor	16	--	Man Lift	1,200	1,200
Asphalt Paver	6	--	Man Lift (Fascia Construction)	120	120
Backhoe	1,650	700	Material Deliveries	8	8
Bob Cat	266	76	Mulcher	443	127
Bulldozer	443	127	Off-Road Truck	5	0
Chain Saw	13	--	Other General Equipment	296	32
Chain Saws	443	127	Pickup Truck	394	32
Chipper/Stump Grinder	13	--	Pumps	5	0
Compacting Equipment	266	76	Roller	591	154
Concrete Ready Mix Trucks	326	136	Rubber Tired Loader	16	--
Concrete Saws	16	--	Scraper	20	--
Concrete Truck	69	--	Seed Truck Spreader	177	51
Distributing Tanker	13	--	Skid Steer Loader	22	--
Dozer	181	27	Slip Form Paver	16	--
Dump Truck	162	30	Small Dozer	266	76
Dump Truck (12 cy)	151	--	Surfacing Equipment (Grooving)	24	--
Excavator	123	30	Survey Crew Trucks	121	42
Flat Bed or Dump Trucks	887	253	Ten Wheelers	443	127
Flatbed Truck	99	--	Tool Truck	400	400
Fork Truck	1,706	1,659	Tractor	887	253
Forktruck (Hoist)	887	253	Tractor Trailer- Material Delivery	1,092	435
Front Loader	443	127	Tractor Trailer- Steel Deliveries	16	16
Grader	5	--	Tractor Trailer with Boom Hoist- Delivery	266	76
Grub the site down 2'	443	127	Tractor Trailers Temp Facility	48	17
High Lift	440	440	Tractors/Loader/Backhoe	25	--
Hydroseeder	5	--	Water Truck	1,680	--
Loader	109	27	**Total**	**18,446**	**7,749**

SOURCE: Airport Construction Emissions Inventory Tool (ACEIT), based on project input selections by Ricondo & Associates, Inc., February 2020.

Onroad construction vehicle trips include construction worker vehicle trips to and from the job site, off site hauling trips, and material delivery trips. The number of roundtrips per year for each type of onroad activity was calculated within ACEIT based on project dimensions and required quantities of various construction materials. Default roundtrip distances were assumed. Vehicle miles traveled (VMT) for each onroad activity was calculated by multiplying the total number of vehicle roundtrips by the roundtrip distance. **Table B-3** summarizes the onroad activity for the Proposed Action.

TABLE B-3 ONROAD VEHICLE ACTIVITY ASSUMPTIONS

TRIP TYPE BY YEAR	EQUIPMENT CATEGORY	FUEL	ROUND TRIP DISTANCE (MILES)	ROUNDTRIPS PER YEAR	VEHICLE MILES TRAVELED
2020					
Concrete Delivery	Single Unit Short-haul Truck	Diesel	40	366	14,643
Construction Worker Trips	Passenger Car	Gasoline	30	18,750	562,500
Material Delivery	Combination Short-haul Truck	Diesel	40	62	2,479
Subbase Material Delivery	Single Unit Short-haul Truck	Diesel	40	195	7,808
			Total 2020	**19,373**	**587,430**
2021					
Concrete Delivery	Single Unit Short-haul Truck	Diesel	40	116	4,626
Construction Worker Trips	Passenger Car	Gasoline	30	2,107	63,210
Material Delivery	Combination Short-haul Truck	Diesel	40	224	8,960
Subbase Material Delivery	Single Unit Short-haul Truck	Diesel	40	62	2,466
			Total 2021	**2,508**	**79,262**

SOURCE: Airport Construction Emissions Inventory Tool (ACEIT), based on project input selections by Ricondo & Associates, Inc., December 2019.

The following types of onroad construction trips were assumed in the analysis:

- Cement delivery – Delivery of pre-mixed cement to the project site in 10-cubic-yard cement mixers for power plant pads/foundations.
- Construction worker trips – Travel of construction workers to/from the project site in passenger cars and truck.
- Material delivery – Delivery of general construction materials and supplies to the project site on large delivery/flatbed trucks. This includes delivery of the solar panels, electrical equipment, piping, and various building materials.
- Subbase material delivery – Delivery of base material used for concrete paving.

B.4.3 EMISSION FACTORS

Along with activity data, emission factors are key inputs for the estimation of construction emissions. ACEIT can produce emission factors for nonroad and onroad construction equipment, as well as fugitive sources, using USEPA-approved and industry standard models and methodologies. The integration of the USEPA's MOVES and NONROAD emissions models allows ACEIT to determine emission factors for all onroad and nonroad construction vehicles for which activity data for the Proposed Action was developed. However, as stated previously, ACEIT includes MOVES2010a, which has been replaced as the USEPA's approved model for developing onroad emissions with MOVES2014b. Therefore, onroad emission factors were developed using MOVES2014b and applied to estimates of VMT, as derived using ACEIT.

The following assumptions were used to develop appropriate emission factors for use in estimating construction emissions for the Proposed Action:

- Construction years—Vehicle age affects the emission factors assigned to a specific vehicle or piece of equipment. Emission factors were derived for each construction year: 2020 and 2021.

- Project location—Emission factors can be derived on a national or local basis. National average emission factors, as distributed to Allegheny County using default distribution assumptions, were assumed in this analysis.
- Equipment type—Default nonroad construction equipment was selected based on construction activities specific to each project component. Default onroad vehicles were assumed to include light-duty, gasoline passenger cars for construction worker trips, and heavy-duty, diesel long-haul trucks for material transport (i.e., 18-wheeler, tractor trailer, cement mixer, and dump truck).
- Fuel type—By default, all nonroad construction equipment was assumed to be diesel. Default fuel types for onroad vehicles were based on equipment type, as noted above.
- Fugitive emissions—Equipment-related emission factors for sources of fugitive emissions were derived from ACEIT for evaporative emissions, brake and tire-dust emissions, and re-suspended dust emissions. Dust emission factors in the analysis included dust emissions associated with activities such as earth moving, wind erosion, material handling, travel on paved and unpaved roads, demolition, and material batching.

Table B-4 presents the default nonroad equipment specifications assumed in the analysis, while **Table B-5** shows the nonroad emission factors for each piece of construction equipment by year and by season, as applicable.

TABLE B-4 NONROAD CONSTRUCTION EQUIPMENT SPECIFICATIONS

EQUIPMENT	FUEL	HORSE-POWER	LOAD FACTOR	EQUIPMENT	FUEL	HORSE-POWER	LOAD FACTOR
40 Ton Crane	Diesel	300	0.43	Log Chipper	Diesel	100	0.43
Air Compressor	Diesel	100	0.43	Man Lift	Diesel	75	0.21
Asphalt Paver	Diesel	175	0.59	Man Lift (Fascia Construction)	Diesel	75	0.21
Backhoe	Diesel	100	0.21	Material Deliveries	Diesel	600	0.59
Bob Cat	Diesel	75	0.21	Mulcher	Diesel	100	0.43
Bulldozer	Diesel	175	0.59	Off-Road Truck	Diesel	600	0.59
Chain Saw	Diesel	11	0.7	Other General Equipment	Diesel	175	0.43
Chain Saws	Diesel	11	0.7	Pickup Truck	Diesel	600	0.59
Chipper/Stump Grinder	Diesel	100	0.43	Pumps	Diesel	11	0.43
Compacting Equipment	Diesel	6	0.43	Roller	Diesel	100	0.59
Concrete Ready Mix Trucks	Diesel	600	0.59	Rubber Tired Loader	Diesel	175	0.59
Concrete Saws	Diesel	40	0.59	Scraper	Diesel	600	0.59
Concrete Truck	Diesel	600	0.59	Seed Truck Spreader	Diesel	600	0.59
Distributing Tanker	Diesel	600	0.59	Skid Steer Loader	Diesel	75	0.21
Dozer	Diesel	175	0.59	Slip Form Paver	Diesel	175	0.59
Dump Truck	Diesel	600	0.59	Small Dozer	Diesel	175	0.59
Dump Truck (12 cy)	Diesel	600	0.59	Surfacing Equipment (Grooving)	Diesel	25	0.59
Excavator	Diesel	175	0.59	Survey Crew Trucks	Diesel	600	0.59
Flat Bed or Dump Trucks	Diesel	600	0.59	Ten Wheelers	Diesel	600	0.59
Flatbed Truck	Diesel	600	0.59	Tool Truck	Diesel	600	0.59
Fork Truck	Diesel	100	0.59	Tractor	Diesel	100	0.21
Forktruck (Hoist)	Diesel	100	0.59	Tractor Trailer- Material Delivery	Diesel	600	0.59

EQUIPMENT	FUEL	HORSE-POWER	LOAD FACTOR	EQUIPMENT	FUEL	HORSE-POWER	LOAD FACTOR
Front Loader	Diesel	100	0.21	Tractor Trailer- Steel Deliveries	Diesel	600	0.59
Grader	Diesel	300	0.59	Tractor Trailer with Boom Hoist- Delivery	Diesel	600	0.59
Grub the site down 2'	Diesel	40	0.59	Tractor Trailers Temp Facility	Diesel	600	0.59
High Lift	Diesel	100	0.59	Tractors/Loader/Backhoe	Diesel	100	0.21
Hydroseeder	Diesel	600	0.59	Water Truck	Diesel	600	0.59
Loader	Diesel	175	0.59				

SOURCE: Airport Construction Emissions Inventory Tool (ACEIT).

TABLE B-5 NONROAD CONSTRUCTION EQUIPMENT EMISSION FACTORS

EQUIPMENT BY YEAR-SEASON	EMISSION FACTORS (GRAMS PER HORSEPOWER-HOUR)						
	CO	VOC	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_{2E}
2020							
40 Ton Crane	0.241	0.158	1.095	0.003	0.047	0.043	530.564
Air Compressor	1.105	0.209	1.794	0.003	0.158	0.145	589.735
Asphalt Paver	0.437	0.160	1.004	0.003	0.094	0.087	536.345
Backhoe	3.970	0.620	3.074	0.004	0.548	0.504	694.122
Bob Cat	4.304	0.837	4.674	0.004	0.629	0.578	693.462
Bulldozer	0.371	0.154	0.855	0.003	0.076	0.070	536.364
Chain Saw	293.535	61.888	1.323	0.140	9.748	8.968	685.996
Chain Saws	293.535	61.888	1.323	0.140	9.748	8.968	685.996
Chipper/Stump Grinder	1.698	0.350	3.014	0.003	0.294	0.271	589.309
Compacting Equipment	4.454	0.612	4.443	0.004	0.390	0.359	588.515
Concrete Ready Mix Trucks	0.220	0.142	0.628	0.003	0.025	0.023	536.401
Concrete Saws	0.523	0.168	3.313	0.003	0.072	0.066	595.649
Concrete Truck	0.220	0.142	0.628	0.003	0.025	0.023	536.401
Distributing Tanker	0.220	0.142	0.628	0.003	0.025	0.023	536.401
Dozer	0.371	0.154	0.855	0.003	0.076	0.070	536.364
Dump Truck	0.220	0.142	0.628	0.003	0.025	0.023	536.401
Dump Truck (12 cy)	0.220	0.142	0.628	0.003	0.025	0.023	536.401
Excavator	0.292	0.148	0.701	0.003	0.054	0.050	536.382
Flat Bed or Dump Trucks	0.220	0.142	0.628	0.003	0.025	0.023	536.401
Flatbed Truck	0.220	0.142	0.628	0.003	0.025	0.023	536.401
Fork Truck	0.464	0.141	0.404	0.003	0.022	0.020	595.731
Forktruck (Hoist)	0.464	0.141	0.404	0.003	0.022	0.020	595.731
Front Loader	3.970	0.620	3.074	0.004	0.548	0.504	694.122
Grader	0.243	0.148	0.754	0.003	0.038	0.035	536.383
Grub the site down 2'-0	0.523	0.168	3.313	0.003	0.072	0.066	595.649

EQUIPMENT BY YEAR-SEASON	EMISSION FACTORS (GRAMS PER HORSEPOWER-HOUR)						
	CO	VOC	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_{2E}
High Lift	0.464	0.141	0.404	0.003	0.022	0.020	595.731
Hydroseeder	0.220	0.142	0.628	0.003	0.025	0.023	536.401
Loader	0.478	0.165	1.117	0.003	0.105	0.097	536.332
Log Chipper	1.698	0.350	3.014	0.003	0.294	0.271	589.309
Man Lift	3.949	0.785	4.754	0.004	0.538	0.495	693.619
Man Lift (Fascia Construction)	3.949	0.785	4.754	0.004	0.538	0.495	693.619
Material Deliveries	0.220	0.142	0.628	0.003	0.025	0.023	536.401
Mulcher	1.698	0.350	3.014	0.003	0.294	0.271	589.309
Off-Road Truck	0.220	0.142	0.628	0.003	0.025	0.023	536.401
Other General Equipment	0.384	0.176	1.401	0.003	0.092	0.085	530.510
Pickup Truck	0.220	0.142	0.628	0.003	0.025	0.023	536.401
Pumps	4.459	0.640	4.594	0.004	0.418	0.384	588.429
Roller	1.304	0.176	1.307	0.003	0.157	0.144	595.622
Rubber Tired Loader	0.478	0.165	1.117	0.003	0.105	0.097	536.332
Scraper	0.545	0.154	1.354	0.003	0.080	0.074	536.363
Seed Truck Spreader	0.220	0.142	0.628	0.003	0.025	0.023	536.401
Skid Steer Loader	4.304	0.837	4.674	0.004	0.629	0.578	693.462
Slip Form Paver	0.437	0.160	1.004	0.003	0.094	0.087	536.345
Small Dozer	0.371	0.154	0.855	0.003	0.076	0.070	536.364
Surfacing Equipment (Grooving)	2.379	0.472	4.459	0.004	0.353	0.325	594.727
Survey Crew Trucks	0.220	0.142	0.628	0.003	0.025	0.023	536.401
Ten Wheelers	0.220	0.142	0.628	0.003	0.025	0.023	536.401
Tool Truck	0.220	0.142	0.628	0.003	0.025	0.023	536.401
Tractor	3.970	0.620	3.074	0.004	0.548	0.504	694.122
Tractor Trailer- Material Delivery	0.220	0.142	0.628	0.003	0.025	0.023	536.401
Tractor Trailer- Steel Deliveries	0.220	0.142	0.628	0.003	0.025	0.023	536.401
Tractor Trailer with Boom Hoist-Delivery	0.220	0.142	0.628	0.003	0.025	0.023	536.401
Tractor Trailers Temp Fac.	0.220	0.142	0.628	0.003	0.025	0.023	536.401
Tractors/Loader/Backhoe	3.970	0.620	3.074	0.004	0.548	0.504	694.122
Water Truck	0.220	0.142	0.628	0.003	0.025	0.023	536.401
2021							
40 Ton Crane	0.203	0.154	0.926	0.003	0.038	0.035	530.577
Backhoe	3.677	0.564	2.798	0.004	0.497	0.458	694.290
Bob Cat	4.005	0.768	4.522	0.004	0.577	0.531	693.671
Bulldozer	0.310	0.150	0.706	0.003	0.059	0.054	536.377
Chain Saws	293.535	61.888	1.323	0.140	9.748	8.968	685.996

EQUIPMENT BY YEAR-SEASON	EMISSION FACTORS (GRAMS PER HORSEPOWER-HOUR)						
	CO	VOC	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_{2E}
Compacting Equipment	4.455	0.606	4.412	0.004	0.380	0.350	588.533
Concrete Ready Mix Trucks	0.196	0.141	0.530	0.003	0.021	0.019	536.404
Dozer	0.310	0.150	0.706	0.003	0.059	0.054	536.377
Dump Truck	0.196	0.141	0.530	0.003	0.021	0.019	536.404
Excavator	0.248	0.145	0.582	0.003	0.041	0.038	536.390
Flat Bed or Dump Trucks	0.196	0.141	0.530	0.003	0.021	0.019	536.404
Fork Truck	0.441	0.140	0.363	0.003	0.018	0.017	595.732
Forktruck (Hoist)	0.441	0.140	0.363	0.003	0.018	0.017	595.732
Front Loader	3.677	0.564	2.798	0.004	0.497	0.458	694.290
Grub the site down 2'-0	0.445	0.159	3.228	0.003	0.057	0.053	595.674
High Lift	0.441	0.140	0.363	0.003	0.018	0.017	595.732
Hydroseeder	0.196	0.141	0.530	0.003	0.021	0.019	536.404
Loader	0.400	0.159	0.935	0.003	0.083	0.077	536.350
Log Chipper	1.582	0.327	2.789	0.003	0.270	0.248	589.378
Man Lift	3.684	0.722	4.590	0.004	0.493	0.454	693.810
Man Lift (Fascia Construction)	3.684	0.722	4.590	0.004	0.493	0.454	693.810
Material Deliveries	0.196	0.141	0.530	0.003	0.021	0.019	536.404
Mulcher	1.582	0.327	2.789	0.003	0.270	0.248	589.378
Off-Road Truck	0.196	0.141	0.530	0.003	0.021	0.019	536.404
Other General Equipment	0.331	0.168	1.203	0.003	0.077	0.071	530.533
Pickup Truck	0.196	0.141	0.530	0.003	0.021	0.019	536.404
Pumps	4.456	0.629	4.537	0.004	0.402	0.370	588.462
Roller	1.092	0.167	1.085	0.003	0.122	0.113	595.650
Seed Truck Spreader	0.196	0.141	0.530	0.003	0.021	0.019	536.404
Small Dozer	0.310	0.150	0.706	0.003	0.059	0.054	536.377
Survey Crew Trucks	0.196	0.141	0.530	0.003	0.021	0.019	536.404
Ten Wheelers	0.196	0.141	0.530	0.003	0.021	0.019	536.404
Tool Truck	0.196	0.141	0.530	0.003	0.021	0.019	536.404
Tractor	3.677	0.564	2.798	0.004	0.497	0.458	694.290
Tractor Trailer- Material Delivery	0.196	0.141	0.530	0.003	0.021	0.019	536.404
Tractor Trailer- Steel Deliveries	0.196	0.141	0.530	0.003	0.021	0.019	536.404
Tractor Trailer with Boom Hoist-Delivery	0.196	0.141	0.530	0.003	0.021	0.019	536.404
Tractor Trailers Temp Fac.	0.196	0.141	0.530	0.003	0.021	0.019	536.404
Tractors/Loader/Backhoe	3.677	0.564	2.798	0.004	0.497	0.458	694.290

SOURCE: Airport Construction Emissions Inventory Tool (ACEIT), using the U.S. Environmental Protection Agency NONROAD2008a emissions model.

Onroad vehicle emission factors by year are presented in **Table B-6**. Key assumptions and notes regarding the modeling of these factors are as follows:

- CO emission factors were modeled for winter; all other pollutant factors were modeled for summer
- Road type: urban unrestricted
- Fuel type: passenger car (gasoline); trucks (diesel)
- CO emission factors include running exhaust, crankcase running exhaust, and crankcase start exhaust
- VOC emission factors include running exhaust, evaporative permeation and fuel vapor venting, crankcase running exhaust, refueling displacement vapor loss, and refueling spillage loss
- NO_x emission factors include running exhaust and crankcase start exhaust
- SO_x emission factors include running exhaust and start exhaust
- PM emission factors include running exhaust, brakewear, tirewear, and crankcase running exhaust
- CO_{2e} emission factors include running exhaust

TABLE B-6 ONROAD CONSTRUCTION VEHICLE EMISSION FACTORS

	EMISSION FACTORS (GRAMS PER MILE)						
VEHICLE CATEGORY	CO	VOC	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_{2E}
2020							
Passenger Car	2.812	0.005	0.051	0.106	0.024	0.004	425.599
Single Unit Short-haul Truck	1.818	0.081	1.528	0.053	0.147	0.052	1,541.945
Combination Short-haul Truck	2.112	0.071	2.475	0.029	0.223	0.074	2,295.232
2021							
Passenger Car	2.755	0.004	0.042	0.107	0.020	0.004	406.936
Single Unit Short-haul Truck	1.656	0.070	1.345	0.052	0.125	0.043	1,509.299
Combination Short-haul Truck	1.921	0.063	2.161	0.029	0.189	0.063	2,272.667

SOURCE: Ricondo & Associates, Inc., February 2020, using the U.S. Environmental Protection Agency MOVES2014b emissions model.

Table B-7 indicates the types of fugitive emissions sources for which ACEIT calculated emissions based on project-specific specifications, as well as methodologies included in the U.S. EPA's AP-42.

TABLE B-7 FUGITIVE EMISSIONS SOURCES

PROJECT COMPONENT	ASPHALT DRYING (VOC)	ASPHALT STORAGE AND BATCHING (CO, VOC NO_X, SO_X, PM_{10})	MATERIAL MOVEMENT (PM_{10})	SOIL HANDLING (PM_{10})	UNSTABILIZED LAND AND WIND EROSION (PM_{10})	CONCRETE MIXING/ BATCHING (PM_{10})
Natural Gas-Fired Electric Power Plant	●	●	●	●	●	●
Solar PV Array			●	●	●	

SOURCE: Airport Construction Emissions Inventory Tool (ACEIT), based on project input selections by Ricondo & Associates, Inc., December 2019.

B.5 SUMMARY OF CONSTRUCTION EMISSIONS

Emissions for nonroad and onroad construction equipment were estimated using the following equations:

*Nonroad Equipment Emissions (tons/year) = emission factor (grams per horsepower-hour) * size (horsepower) * load factor * hours per year * (1 pound/453.592 grams) * 1 ton/2,000 pounds)*

*Onroad Vehicle Emissions (tons/year) = emission factor (grams per vehicle-mile) * miles per year * (1 pound/453.592 grams) * 1 ton/2,000 pounds)*

Table B-8 summarizes the annual emissions of criteria air pollutants and CO_{2e} estimated by source for construction of the Proposed Action, which would occur from 2020-2021.

TABLE B-8 ANNUAL POLLUTANT EMISSIONS DUE TO CONSTRUCTION OF THE PROPOSED ACTION

	EMISSIONS (TONS/YEAR)						METRIC TONS/YEAR
	CO	VOC	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_{2E}
Natural Gas-Fired Electric Power Plant Construction							
2020	2.263	1.921	1.132	0.022	0.216	0.059	1,005.942
2021	0.396	0.096	0.376	0.003	0.044	0.024	282.885
	2.659	**2.017**	**1.508**	**0.025**	**0.260**	**0.084**	**1,288.827**
Solar PV Array Installation							
2020	1.974	0.507	1.285	0.007	0.161	0.120	784.009
2021	0.568	0.167	0.320	0.004	0.045	0.032	249.685
	2.543	**0.674**	**1.605**	**0.011**	**0.206**	**0.152**	**1,033.694**

SOURCE: Ricondo & Associates, Inc., February 2020, based on inputs to the Airport Construction Emissions Inventory Tool (ACEIT), using the U.S. Environmental Protection Agency NONROAD2008a and MOVES2014b emissions models.

Table B-9 compares the maximum annual emissions with the applicable *de minimis* thresholds. Even with the short-term increase in emissions from the construction of the Proposed Action, emission levels would be well below *de minimis* thresholds. Changes in criteria air pollutant emissions due to construction of the Proposed Action would not result in an adverse effect on air quality.

TABLE B-9 PROPOSED ACTION CONSTRUCTION EMISSIONS SUMMARY AND COMPARISON TO DE MINIMIS

	EMISSIONS (TONS/YEAR)					
	CO	VOC	NO_X	SO_X[1]	PM_{10}	$PM_{2.5}$
Total Emission by Year						
2020	4.238	2.428	2.417	0.029	0.377	0.179
2021	0.964	0.263	0.696	0.007	0.089	0.056
de minimis Threshold	100.000	100.000	100.000	100.000	n.a.	100.000
Difference (Under) / Over de minimis threshold						
2020	(95.762)	(97.572)	(97.583)	(99.971)		(99.821)
2021	(99.036)	(99.737)	(99.304)	(99.993)		(99.944)
Significant?	**No**	**No**	**No**	**No**		**No**

NOTE:
n.a. – Not applicable
1 For purposes of this analysis, it was assumed that estimates of SO_x emissions are equal to calculated emissions of SO_2.
SOURCE: Ricondo & Associates, Inc., February 2020, based on inputs to the Airport Construction Emissions Inventory Tool (ACEIT), using the U.S. Environmental Protection Agency NONROAD2008a and MOVES2014b emissions models.

APPENDIX C

Pennsylvania Natural Diversity Index Search

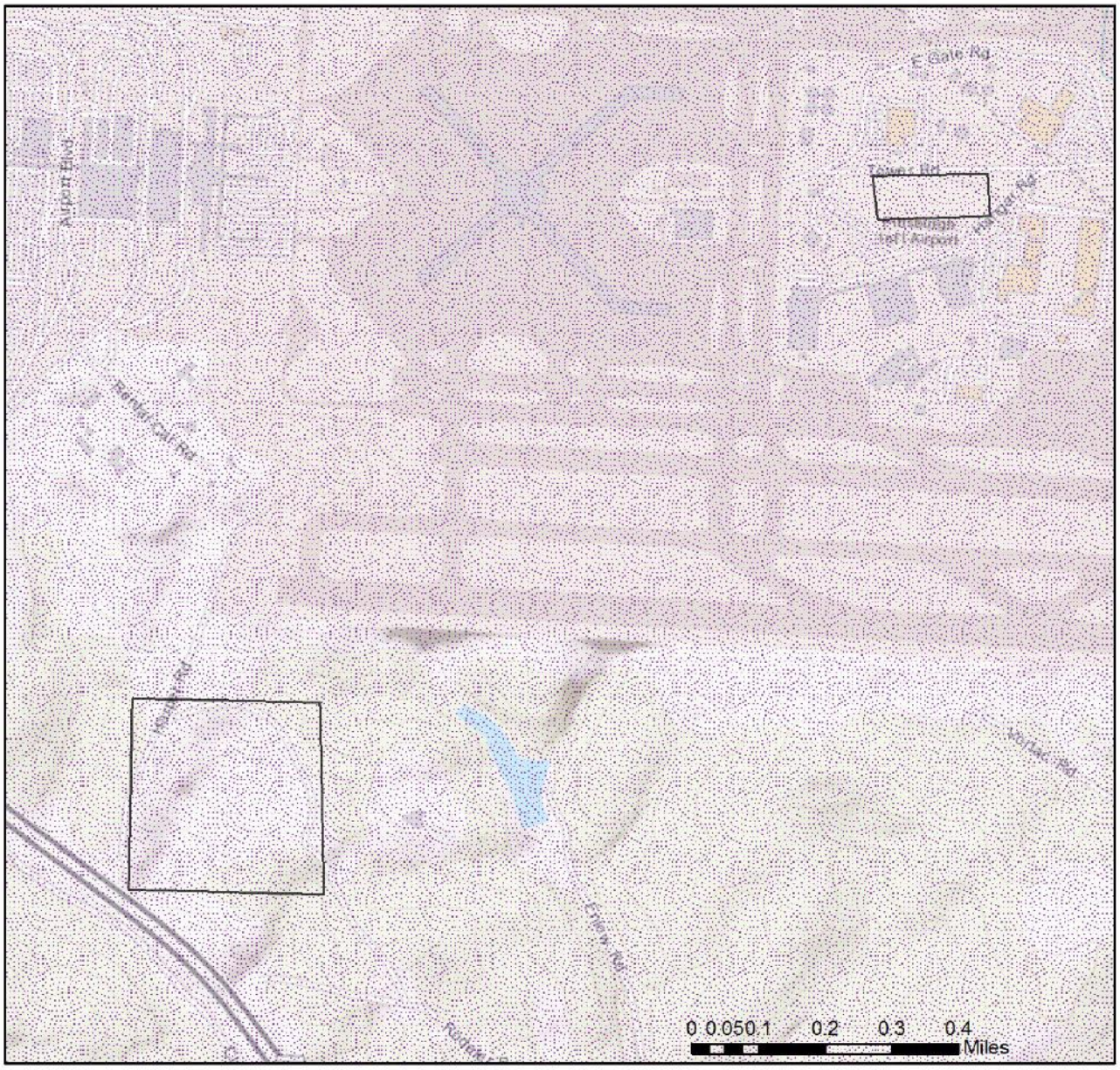
Introduction

This Conservation Planning Report compiles names, descriptions, maps, locations, measurements, links and references for Natural Heritage Areas (core and supporting habitats), Important Bird Areas, State Lands, and agency designated water resources that are coincident with an area of interest defined by the user of the Pennsylvania Conservation Explorer tool. For an overview and additional details, please be sure to visit the website at www.naturalheritage.state.pa.us and download the applicable County Natural Heritage Inventory report(s).

Site Area: 61.34 acres
County(s): Allegheny
Township/Municipality(s): FINDLAY
Quadrangle Name(s): CLINTON; OAKDALE
Watersheds HUC 8: Upper Ohio
Watersheds HUC 12: Montour Run
Decimal Degrees: 40.483739 N, -80.251595 W
Degrees Minutes Seconds: 40° 29' 1.4606" N, 80° 15' 5.7420" W

No summary table to report.

PIT Microgrid



Project Boundary

Supporting Landscapes

Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo,

For additional information about the Pennsylvania Natural Heritage Program, visit the website at www.naturalheritage.state.pa.us or you can email your questions and comments to RA-HeritageReview@pa.gov.

Pennsylvania Natural Heritage Program

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Environmental Review

- PGC Threatened and Endangered Species
- PGC Species of Special Concern
- PFBC Threatened and Endangered Species
- PFBC Species of Special Concern
- DCNR Threatened and Endangered Species
- DCNR Species of Special Concern
- Combined State Agency Species
- Federal Species
  - Running Buffalo Clover
  - Piping Plover Critical Habitat
  - Small-whorled Pogonia
  - Northeastern Bulrush
  - Eastern Massasauga
  - Bog Turtle
  - Bald Eagle
  - Indiana Bat
  - Northern Long-eared Bat
  - Federally-listed Aquatic Species - East
  - Federally-listed Aquatic Species - West

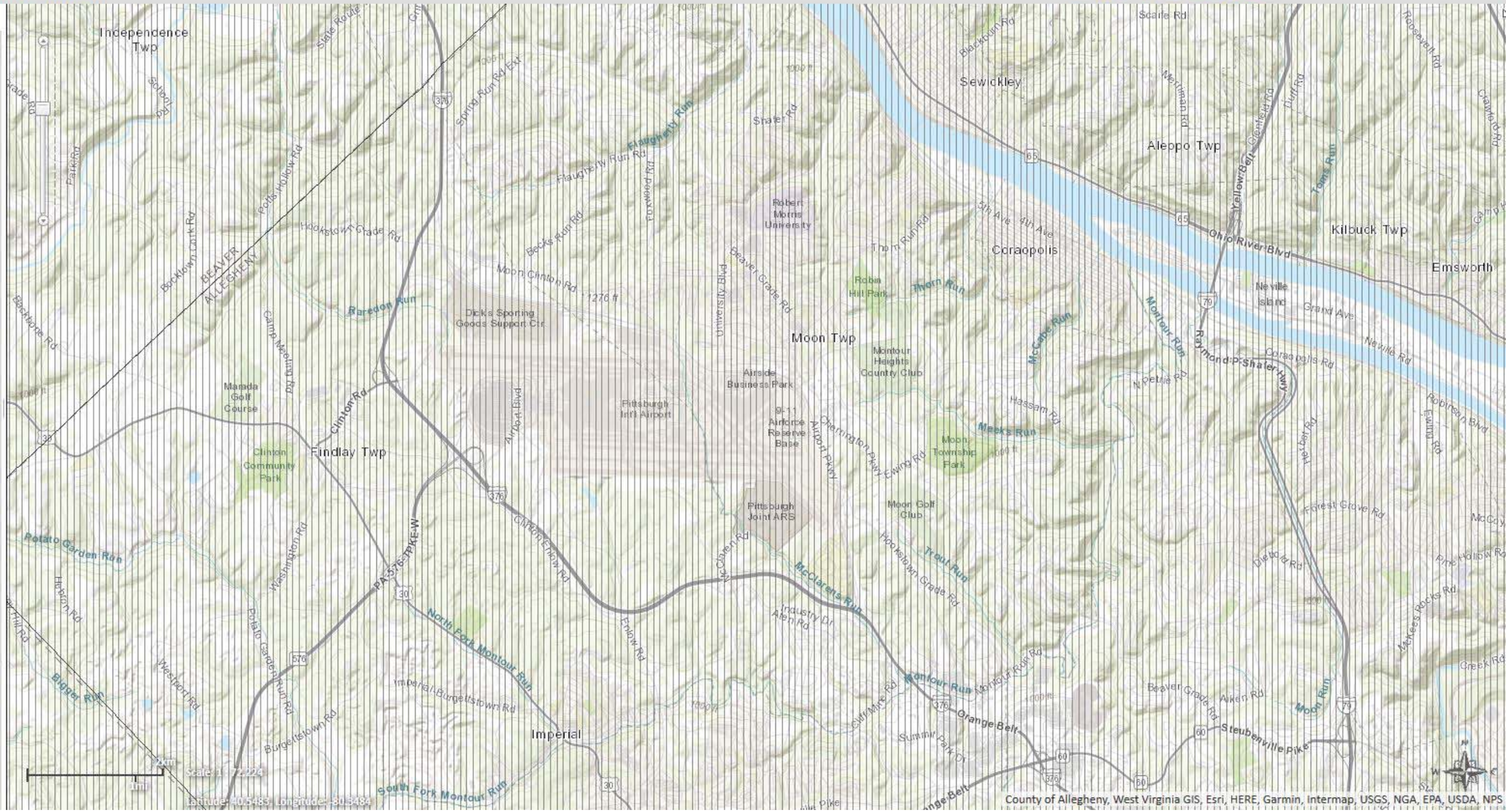
Conservation Planning

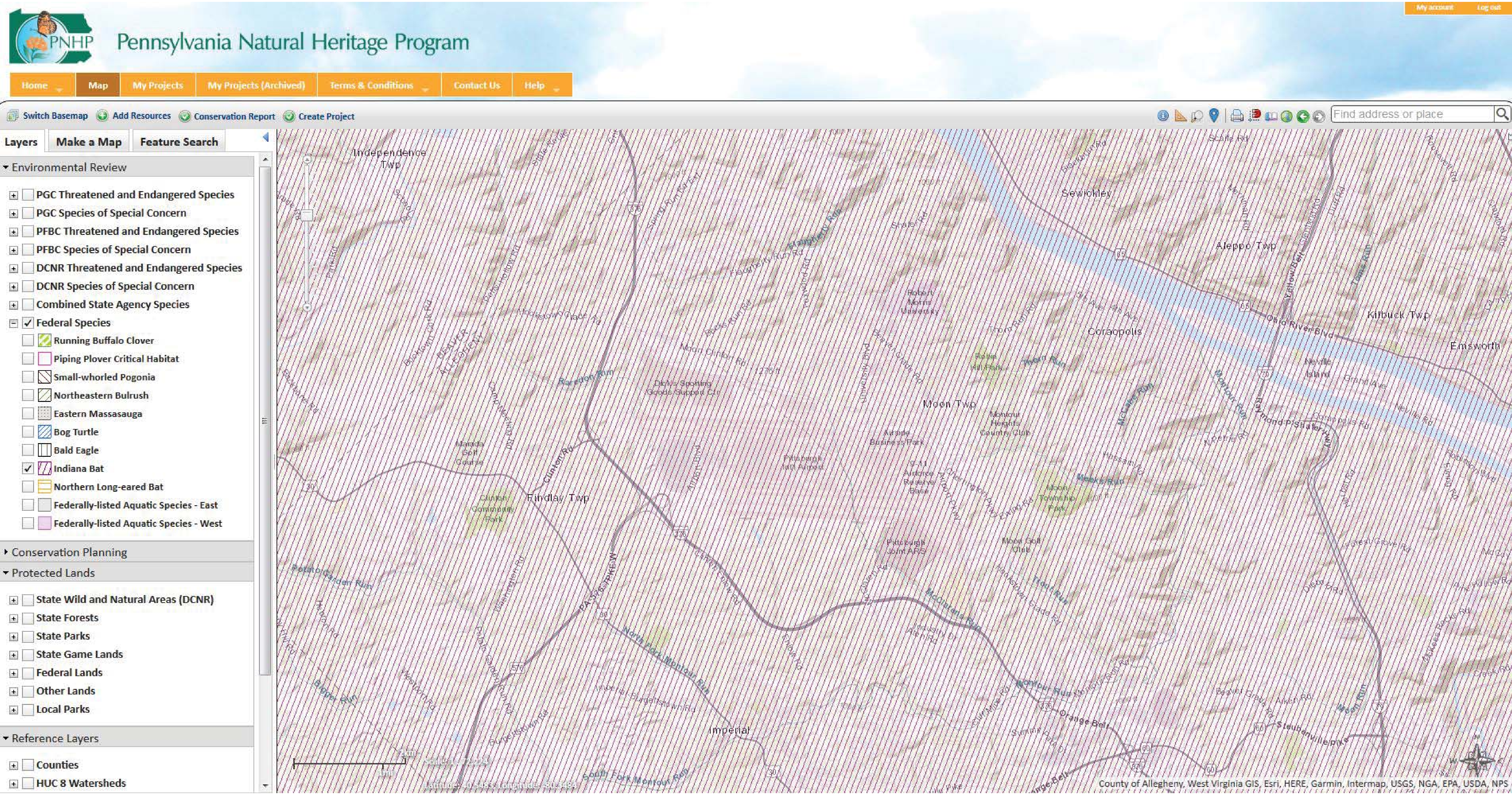
Protected Lands

- State Wild and Natural Areas (DCNR)
- State Forests
- State Parks
- State Game Lands
- Federal Lands
- Other Lands
- Local Parks

Reference Layers

- Counties
- HUC 8 Watersheds

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Aleppo Twp
Kilbuck Twp
Emsworth
Coraopolis
Neville Island
Ohio River Blvd
Robert Morris University
Moon Twp
Montour Heights Country Club
Airside Business Park
Pittsburgh Intl Airport
Findlay Twp
Clinton Community Park
Moon Township Park
Moon Golf Club
Pittsburgh Joint ARS
Imperial
North Fork Montour Run
South Fork Montour Run
Steubenville Pike
Orange Belt
County of Allegheny, West Virginia GIS, Esri, HERE, Garmin, Intermap, USGS, NGA, EPA, USDA, NPS

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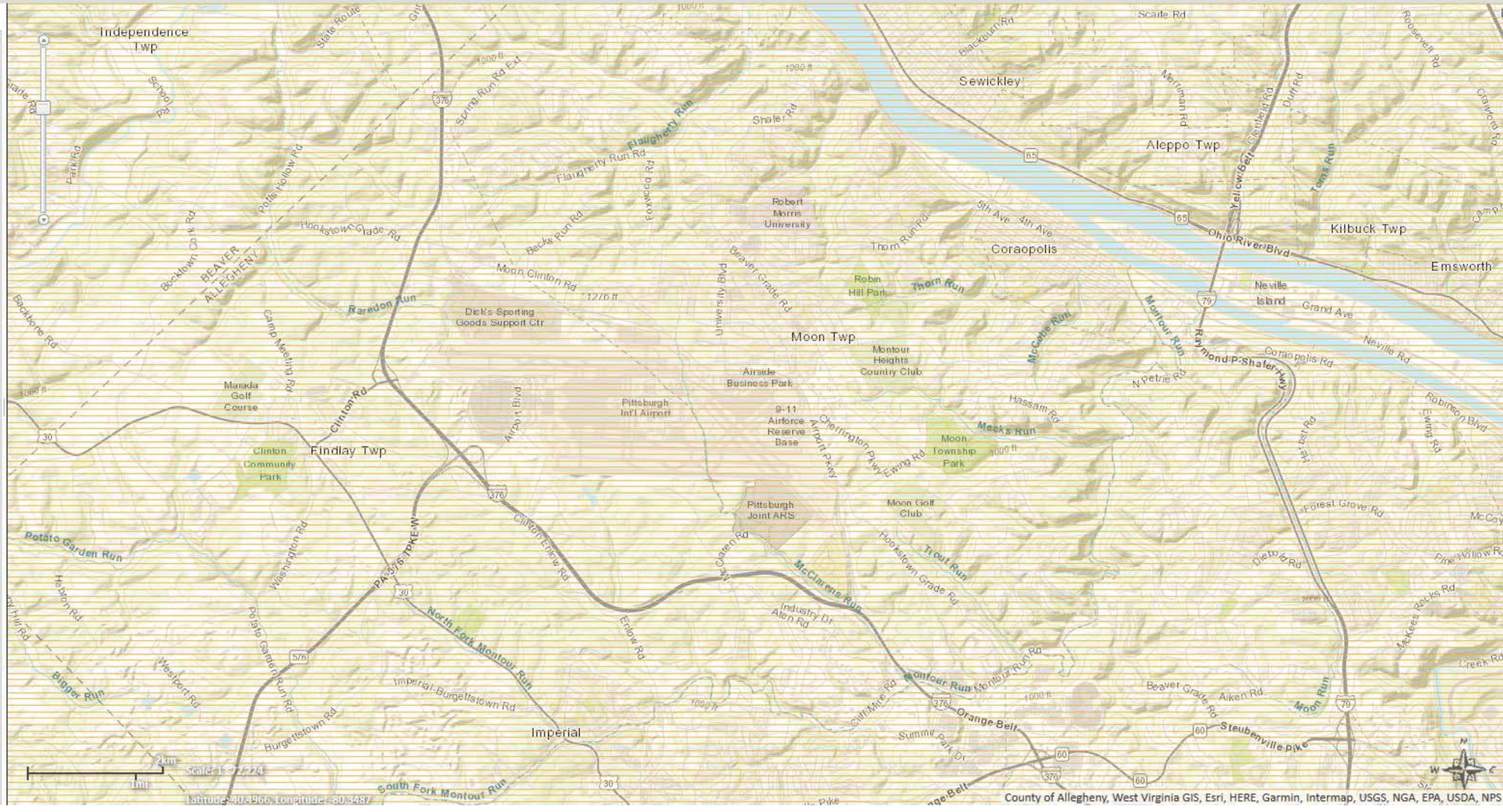

Pennsylvania Natural Heritage Program

Environmental Review

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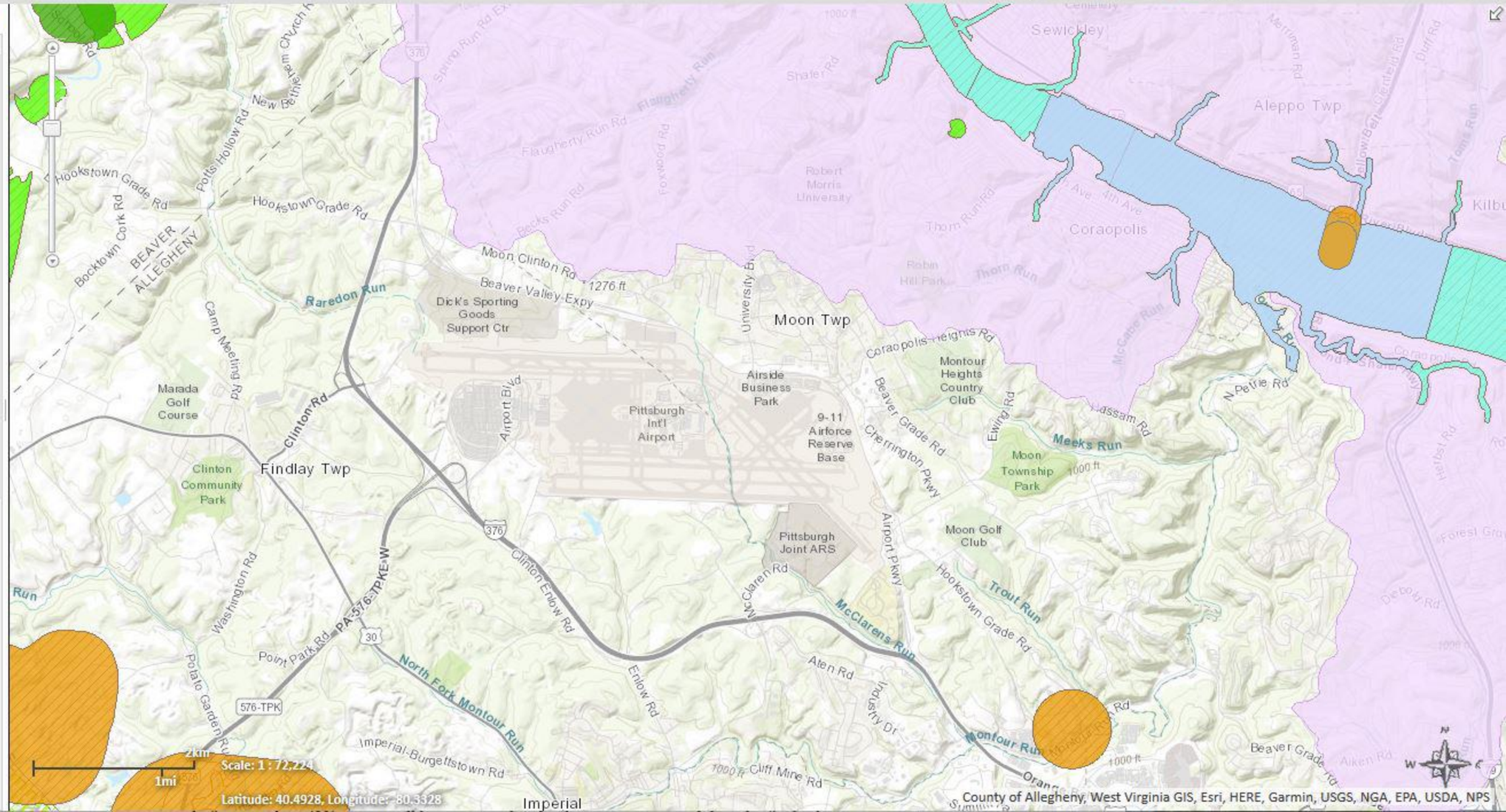
Conservation Planning

Protected Lands



APPENDIX D

Wetland Field Survey Reports

140 Lamplighter Drive I Morgantown, WV 26508 I (304) 308-3309

March 16, 2020

Mr. James J. Klacik, P.E.
Sheffler & Company, Inc.
1712 Mount Nebo Road
Sewickley, PA 15143-8526

Re: Regulated Waters Presence/Absence Investigation
Pittsburgh International Airport Micro Grid Project
Findlay Township, Allegheny County, Pennsylvania

Dear Mr. Klacik:

Palustris Environmental, LLC (Palustris) is pleased to provide you with this letter report summarizing a regulated waters presence/absence investigation recently completed at the above-referenced project area located west of the Tower Road and Hangar Road intersection in Findlay Township, Allegheny County, Pennsylvania. The Area of Investigation (AOI) is approximately 12.5 acres in size and is centered on approximate coordinates 40.495818N, 80.233637W (NAD83). The AOI consists of a parking lot, concrete rubble piles, public roadway, an electrical substation, forest, and open field. A Site Location Map is provided as Attachment 1 and an Existing Environmental Conditions aerial map is provided as Attachment 2.

Palustris investigated for any regulated waters within the AOI. The analyses contained in this document are relevant only in the context of the conditions of the AOI as observed at the time of this study. This letter report details the methodology and findings of the investigation conducted at the subject site.

METHODOLOGY

The study area was investigated for wetlands and other regulated waters on March 12, 2020, as defined by the 1987 Corps of Engineers Wetland Delineation Manual (1987 Manual), the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region Version 2.0 (Regional Supplement), and subsequent guidance. The 1987 Manual is the current Federal delineation manual used in the Clean Water Act Section 404 regulatory program for the identification and delineation of wetlands. The approach requires positive evidence of hydrophytic vegetation, hydric soils, and wetland hydrology for the determination that an area is a wetland.

Wetlands and watercourses are regulated within the Commonwealth of Pennsylvania by the United States Corps of Engineers (USACE) and the Pennsylvania Department of Environmental Protection (DEP). Both USACE and DEP define wetlands as those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. The DEP defines watercourses as a channel or conveyance of surface water having defined bed and banks, whether natural or artificial, with perennial or intermittent flow.

SITE DESCRIPTION

The AOI consists mostly of developed property. Vegetation in the AOI consists of grasses (*Poaceae* or *Gramineae* sp.), goldenrod (*Solidago* sp.), dandelion (*Taraxacum officinale*, FACU), ground ivy (*Glechoma hederacea*, FACU), narrow-leaved plantain (*Plantago lanceolata*, UPL), white clover (*Trifolium repens*, FACU), pokeweed (*Phytolacca americana*, FACU), black raspberry (*Rubus allegheniensis*, FACU), burdock (*Arctium minus*, FACU), black locust (*Robinia pseudoacacia*, FACU), staghorn sumac (*Rhus typhina*, NI), and black cherry (*Prunus serotina*, FACU).

140 Lamplighter Drive I Morgantown, WV 26508 I (304) 308-3309

The AOI drains to McClarens Run. McClarens Run is within the Montour Run watershed. The Montour Run basin is listed within the DEP's Chapter 93 Water Quality Standards for protection of Trout Stocking (TSF). No watercourses were observed within the AOI.

One suspect wet area was observed in a manmade drainage ditch in the southwest portion of the AOI, as represented by Study Plot 1 (Attachment 3). The suspect area was dominated by a hydrophytic dominant community of narrow-leaved cattail (*Typha angustifolia*, OBL) and included indicators of hydrology as the soils were saturated to the surface. However, the soils are not considered hydric as they were a light yellowish brown (2.5Y 6/3) compact silty clay from zero to six inches, and a light yellowish brown (2.5Y 6/3) compact silty clay with yellowish brown (10YR 5/8) mottles from six to 20 inches. Therefore, the suspect wet area in vicinity of Study Plot 1 is not considered a wetland because it does not contain all three of the necessary criteria to be determined a wetland.

No other areas of hydric soils or indicators of hydrology were observed within the AOI. Likewise, no hydrophytic dominated plant community was observed within the AOI. Therefore, the AOI is considered upland since no areas within the AOI contained the three necessary criteria for wetlands, including a hydrophytic dominated plant community, hydric soils, and indicators of hydrology. Color photographs of the project area are included as Attachment 4.

SUMMARY

Palustris Environmental, LLC investigated for the presence of regulated waters within a 12.5-acre Area of Investigation in Findlay Township, Allegheny County, Pennsylvania. No areas containing the three necessary criteria for wetlands were observed within the AOI. Additionally, no watercourses were observed.

I appreciate the opportunity to be of service to you. Should you have any questions regarding this investigation, please feel free to contact me at 304.308.3309.

Sincerely,
Palustris Environmental, LLC

Andrew J. Longenecker
Owner/Biologist

Attachment 1: Site Location Map
Attachment 2: Existing Environmental Conditions Map
Attachment 3: Wetland Determination Data Forms
Attachment 4: Site Photographs
Attachment 5: Investigator Resume

N
W E
S

0 2,000 4,000
Feet

McAlisters Crossroads
Reclaimed Strip Mine
Moon
Carnot
Twp High Sch
Findlay
GREATER PITTSBURGH INTERNATIONAL AIRPORT
US MIL RES
Montour Heights Country Club
Resurrection Cemetery
Golf Course
Strip Mine
Oil Well
Tank
Radar Towers
Pipeline

Legend

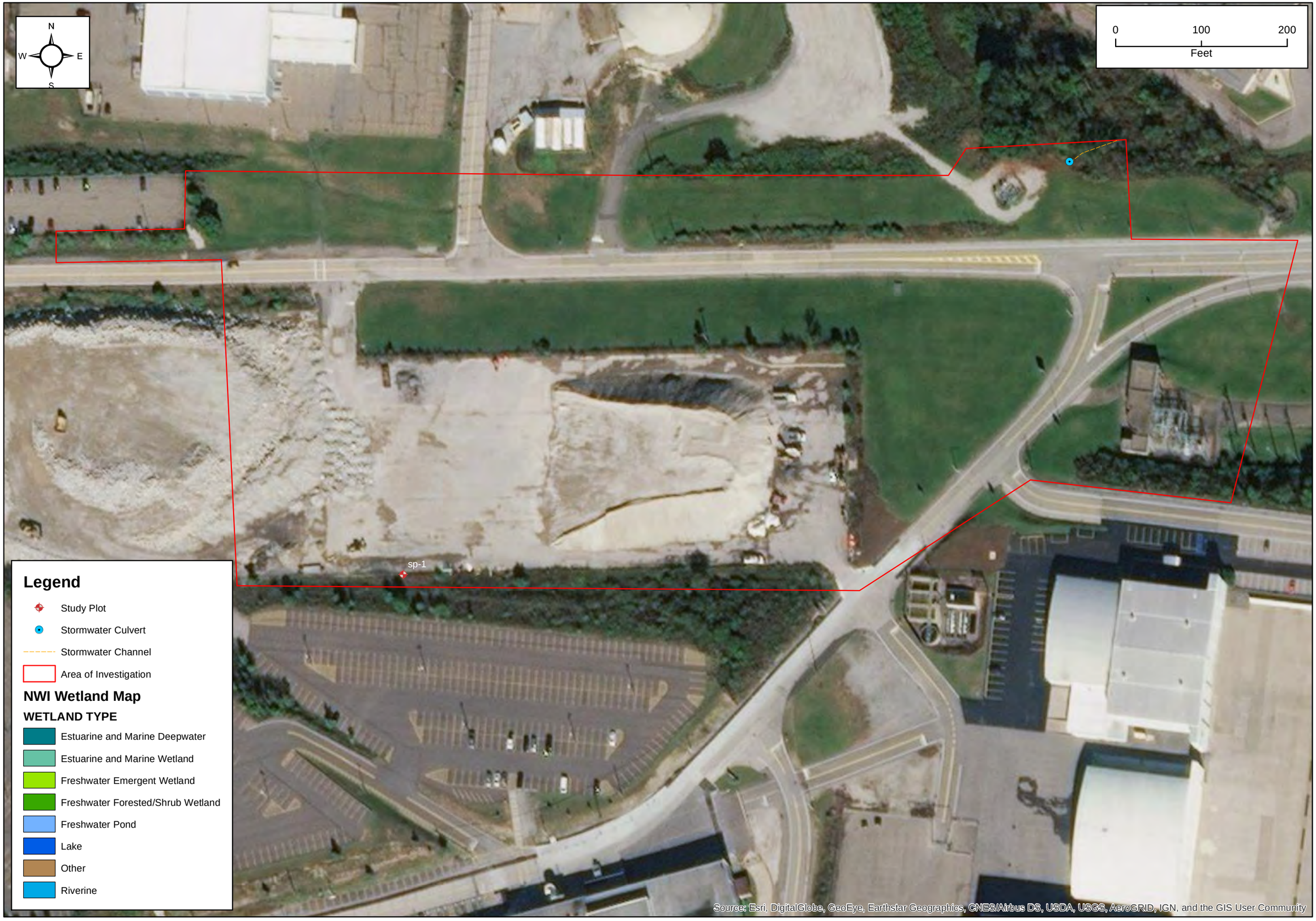
Area of Investigation

Sheffler & Company, Inc.
ENGINEERING • SURVEYING

Pittsburgh International Airport Micro Grid
20 MW Power Plant

Location Map
(Oakdale, PA Quad)
Findlay Township, Allegheny County, Pennsylvania

Date: 03/12/2020
A. Longenecker



Sheffler & Company, Inc.
ENGINEERING • SURVEYING

Pittsburgh International Airport Micro Grid
20 MW Power Plant

Existing Environmental Conditions Map
Findlay Township, Allegheny County, Pennsylvania

Date: 03/12/2020
A. Longenecker

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site:	Pittsburgh International Airport Micro Grid Project	**Sampling Date:**	March 12, 2020	**Sampling Point:**	sp-1
Applicant/Owner:		**Location:**	Findlay Township, Allegheny County, PA		
Investigator(s):	A. Longenecker	**Subregion (LRR or MLRA):**			
Landform (hillslope, terrace, etc.):		**Local relief (concave, convex, none):**	none		
Slope (%): NA	**Lat:** 40.4954708093522	**Long:**	-80.2344869593326	**Datum:**	NAD83
Soil Map Unit Name:	Urban land-Culleoka complex, gently sloping (UCB)	**NWI classification:**			

Are climatic / hydrologic conditions on the site typical for this time of year?	**Yes**	X	**No**		(If no, explain in Remarks.)		
Are "Normal Circumstances" present?	**Yes**	X	**No**				
Are Vegetation,	No	**Soil,**	No	**or Hydrology**	No	**significantly disturbed?**	
Are Vegetation,	No	**Soil,**	No	**or Hydrology**	No	**naturally problematic?**	

(If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS –

Hydrophytic Vegetation Present?	**Yes**	X	**No**		**Is the Sampled Area within a Wetland?**	**Yes**		**No**	X
Hydric Soil Present?	**Yes**		**No**	X					
Wetland Hydrology Present?	**Yes**	X	**No**		**If yes, optional Wetland Site ID:**				

Remarks: (Explain alternative procedures here or in a separate report.) *Suspect wet area in manmade drainage feature.*

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of 1 is required)				**Secondary Indicators (min. of 2 required)**	
	Surface Water (A1)		Aquatic Fauna (B13)		Surface Soil Cracks (B6)
	High Water Table (A2)		True Aquatic Plants (B14)		Drainage Patterns (B10)
X	Saturation (A3)		Hydrogen Sulfide Odor (C1)		Moss Trim Lines (B16)
	Water Marks (B1)		Oxidized Rhizospheres on Living Roots (C3)		Dry-Season Water Table (C2)
	Sediment Deposits (B2)		Presence of Reduced Iron (C4)		Crayfish Burrows (C8)
	Drift Deposits (B3)		Recent Iron Reduction in Tilled Soils (C6)		Saturation Visible on Aerial Imagery (C9)
	Algal Mat or Crust (B4)		Thin Muck Surface (C7)		Stunted or Stressed Plants (D1)
	Iron Deposits (B5)		Other (Explain in Remarks)		Geomorphic Position (D2)
	Inundation Visible on Aerial Imagery (B7)				Shallow Aquitard (D3)
	Water-Stained Leaves (B9)				Microtopographic Relief (D4)
					FAC-Neutral Test (D5)
					Sparsely Vegetated Concave Surface (B8)

Field Observations:											
Surface Water Present?	Yes		No	X	Depth (inches):						
Water Table Present?	Yes		No	X	Depth (inches):						
Saturation Present? (includes capillary fringe)	Yes	X	No		Depth (inches):	0	**Wetland Hydrology Present?**	**Yes**	X	**No**	

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

Remarks:

VEGETATION

Sampling Point:
sp-1

Tree Stratum	**(Plot size: 30')**	**Absolute % Cover**	**Dominant Species?**	**Indicator Status**
1.				
2.				
3.				
4.				
5.				
6.				
7.				
50% of Total Cover =			**=Total Cover**	
20% of Total Cover =				
Sapling Stratum	**(Plot size: 15')**	**Absolute % Cover**	**Dominant Species?**	**Indicator Status**
1.				
2.				
3.				
50% of Total Cover =			**=Total Cover**	
20% of Total Cover =				
Shrub Stratum	**(Plot size: 15')**	**Absolute % Cover**	**Dominant Species?**	**Indicator Status**
1.				
2.				
3.				
4.				
5.				
6.				
50% of Total Cover =			**=Total Cover**	
20% of Total Cover =				
Herb Stratum	**(Plot size: 5')**	**Absolute % Cover**	**Dominant Species?**	**Indicator Status**
1.	*Typha angustifolia*	100	Yes	OBL
2.				
3.				
4.				
5.				
6.				
7.				
8.				
50% of Total Cover = 50		100	**=Total Cover**	
20% of Total Cover = 20				
Woody Vine Stratum	**(Plot size: 15')**	**Absolute % Cover**	**Dominant Species?**	**Indicator Status**
1.				
2.				
3.				
4.				
5.				
50% of Total Cover =			**=Total Cover**	
20% of Total Cover =				

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100	(C)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		X 1=	
FACW species		X 2=	
FAC species		X 3=	
FACU species		X 4=	
UPL species		X 5=	
Totals (A)		(B)	
Prevalence Index =		B/A =	

Hydrophytic Vegetation Indicators:

X	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 Vegetation Strata:

Tree – Woody plants 3 in. or more in DBH, regardless of height.

Sapling/shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present?	**Yes**	X	**No**	

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

SOIL

Sampling Point: sp-1

Profile Description:

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	2.5Y 6/3	100					Silty Clay	Compact
6-20	2.5Y 6/3	98	10YR 5/8	2	C	M	Silty Clay	Compact

[1]Type; C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:				**Indicators for Problematic Hydric Soils[3]:**	
	Histosol (A1)		Dark Surface (S7)		2 cm Muck (A10) **(MLRA 147)**
	Histic Epipedon (A2)		Polyvalue Below Surface (S8) **(MLRA 147, 148)**		Coast Prairie Redox (A16) **(MLRA 147, 148)**
	Black Histic (A3)		Thin Dark Surface (S9) **(MLRA 147, 148)**		Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
	Hydrogen Sulfide (A4)		Loamy Gleyed Matrix (F2)		Very Shallow Dark Surface (TF12)
	Stratified Layers (A5)		Depleted Matrix (F3)		Other (Explain in Remarks)
	2 cm Muck (A10) **(LRR N)**		Redox Dark Surface (F6)		
	Depleted Below Dark Surface (A11)		Depleted Dark Surface (F7)		
	Thick Dark Surface (A12)		Redox Depressions (F8)		
	Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**		Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**		
	Sandy Gleyed Matrix (S4)		Umbric Surface (F13) **(MLRA 136, 122)**		
	Sandy Redox (S5)		Piedmont Floodplain Soils (F19) **(MLRA 148)**		
	Stripped Matrix (S6)		Red Parent Material (F21)**(MLRA 127, 147)**		

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

Restrictive Layer (if observed)		**Hydric Soil Present?**	**Yes**		**No**	X
Type						
Depth (inches):						

Remarks:

Photograph 1: West view of southwest portion of AOI.

Photograph 2: East view of southeast portion of AOI.

Photograph 3: West view of Study Plot 1.

Photograph 4: West view of northern portion of AOI.

Photograph 5: South view of eastern portion of AOI.

Andrew J. Longenecker
140 Lamplighter Drive, Morgantown, WV 26508
PHONE: (304) 308-3309; EMAIL: longenecker@palustrisenviro.com

EDUCATION

Marshall University, Huntington, WV 25755, *M.S., Biological Sciences, May 2000*
West Virginia University, Morgantown, WV 25605, B.S*., Wildlife and Fisheries Resources, May 1997*

EMPLOYMENT

June 2016-Present **Palustris Environmental, LLC** – Morgantown, WV
(FKA: Ajay Environmental Consulting, LLC)
Owner/Biologist
Provide environmental consulting services, including natural resource investigations, permitting services, Environmental Site Assessments, stream restoration, wetland mitigation design and monitoring, and threatened and endangered species investigations to clients across WV, PA, OH, KY, IN, and MD. Clients span the oil & gas industry (pipelines and pads), commercial and residential land development, and the transportation sector.

April 2013-June 2016 **CESO, Inc.** – Bridgeville, PA
Environmental Program Director
Created the environmental department at CESO, hiring and managing seven dedicated staff. Responsible for the management of all environmental related projects within CESO, with majority of projects related to regulated waters delineations and Nationwide Permit/PADEP Permit authorizations for Oil and Gas clients in Utica and Marcellus formations. Clients include energy and pipeline companies, as well as commercial development, throughout WV, PA, and OH. Project manager for several energy companies, with specific emphasis in WV and OH.

May 2012-April 2013 **Herbert, Rowland & Grubic, Inc.** – Morgantown, WV
Natural Resources Regional Service Group Manager
Responsible for the management of projects involving wetland identification and delineation, wetland mitigation design, permitting, bog turtle habitat screenings, Indiana bat habitat surveys, Phase I ESAs, and coordination with the various state and federal agencies over a multi-state area including PA, WV, and OH.

Sept. 2006-May 2012 **Liberty Environmental, Inc.** – Reading, PA
Project Manager, Pennsylvania Qualified Bog Turtle Surveyor
In charge of the day-to-day management of the Natural Resources Group with specific oversight of all wetland/ecological investigations, permitting, and site selection pertaining to the Marcellus and Utica shale formations, commercial and residential developments, and roadway design. Additional duties include wetland field delineations, regulated waters impact permitting, Phase I, II, and III Bog Turtle Surveys, Phase I ESAs, threatened/endangered/rare species investigations, habitat restoration plans, and groundwater sampling.

Sept. 2005-Sept. 2006 **Aqua-Terra Environmental Ltd.** – Reading, PA
Biologist
Experience in Bog Turtle Surveys, wetland delineation, permitting, and RTE species investigations.

February 2002-Sept. 2005 **Skelly and Loy, Inc.** – Harrisburg, PA
Wildlife Biologist/Environmental Scientist
Experience in wetland identification and delineation, study and evaluation of aquatic ecosystems, stream and river classification, threatened/endangered/rare species investigations, and environmental permitting and documentation. Assisted with biological assessments for benthic macroinvertebrates and fish, ambient water quality evaluations, and physical habitat evaluations. Participated in field surveys and radio telemetry studies for bog turtles. Field team leader that applied the principles of fluvial geomorphology to natural stream channel design projects. Routinely participated in site evaluation, stream type classification, regional curve development, restoration plan design, permitting, and construction management. Assessed watersheds, wrote comprehensive watershed plans, and assisted in Phase II bog turtle surveys.

June 2000-February 2002 **Berks County Conservancy –** Reading, PA
Natural Resource Specialist
Assessed watersheds and wrote comprehensive watershed plans, performed ecological surveys and sampling, conducted stream rehabilitation projects, monitored water quality, sampled benthic macro-invertebrates, GIS, bog turtle radio telemetry, bog turtle habitat assessment and protection, composed grant proposals, ran education programs, and conducted habitat workshops.

TRAINING

Ohio Rapid Assessment Method for Wetlands (ORAM)
Wetlands Construction Design, Rutgers NJAES Office of Continuing Professional Education
River Morphology and Applications; Applied Fluvial Geomorphology, Wildland Hydrology, Inc.
Natural Stream Design Workshop, Villanova University
ArcView – GIS, Penn State University
OSHA 8-Hour HAZWOPER Refresher
MSHA 24 Hour Apprentice Miner - Surface

RHEA
ENGINEERS & CONSULTANTS, INC.

April 8, 2020
Project No. 2241
Via Email

Mr. Brian Philiben
Managing Consultant
Ricondo
20 N Clark Street, Suite 1500
Chicago, IL 60602
bphiliben@ricondo.com

Re: Microgrid Solar PV Array Site – Field Summary Report
On-Call Planning and Environmental Services
Pittsburgh International Airport
Moon Township, Pennsylvania

Dear Mr. Philiben:

Rhea Engineers and Consultants, Inc. (Rhea) has completed a wetland investigation in support of the proposed Solar Photovoltaic (PV) Array Microgrid Project located on a capped and inactive landfill (henceforth referred to as "project site"), located south of the Pittsburgh International Airport (PIT) in Moon Township, PA (Figure 1).

SITE DESCRIPTION

The project site is roughly 30 acres in size, is located due south of PIT, and is bounded primarily by vacant, wooded land to the east, west, and south. Interstate 376 / Airport Expressway is located immediately to the south and Harper Road generally follows the perimeter of the landfill to the west, north, and east until it reaches the ARFF Fire Training Facility, located to the east of the project site. A man-made drainage swale encircles the entire landfill site. The swale surrounding the southern portion of the landfill is primarily lined with riprap, while the northern portion of the swale is primarily naturally vegetated. It should be noted that this investigation covers the entirety of the landfill boundary; however, Rhea understands that the proposed Solar PV Microgrid Project will be located primarily on the southern half of the landfill (Figure 1). Selected photographs of general site conditions (Photos #1 through #5) at the time of the wetland investigation are provided in Attachment A.

WETLAND INVESTIGATION

Rhea was tasked with conducting a wetland investigation of the project site, shown on Figure 1, using general guidelines outlined in the *US Army Corps of Engineers (USACE) Wetlands Delineation Manual* (Environmental Laboratory, 1987). USACE standards require that three criteria be met in order for an area to be classified as a jurisdictional wetland: the presence of hydric soils, the dominance of hydrophytic vegetation, and the evidence of wetland hydrology.

Prior to the field investigation, Rhea personnel reviewed available documentation in order to identify known wetland areas located at, or adjacent to, the project site. This search included a review of the National Wetland Inventory (NWI) database via the Wetland Mapper program, as well as a review of preliminary site development drawings and site topography. As a result of Rhea's preliminary data review, no known wetlands were identified within the project site.

Rhea's wetland investigation was completed at the project site on April 1, 2020. Mr. Zachary Wicks, Wetland Professional in Training (WPIT), and Mr. Michael Stoehr of Rhea conducted the investigation, which consisted of traversing the project site and performing a visual inspection of the site for indicators of wetland conditions. As a result of this investigation, 1 potential wetland area and 12 areas of concern (AOCs) related to significant standing water were identified. In addition, 1 area of potential acid mine drainage (AMD) was identified near the southernmost portion of the project site.

The potential wetland area identified by Rhea is approximately 596 square feet and is located within the man-made drainage swale in the northeastern portion of the project site (see Figure 1 and Attachment A - Photo #6). This potential wetland is outside of the proposed Solar PV Microgrid Project location; therefore, it is unlikely that impacts will occur as a result of site development activities.

Twelve AOCs pertaining to significant standing water within low-lying areas were identified throughout the project site. The majority of these areas were located to the north / east of the proposed Solar PV Microgrid Project footprint. Although heavy rains prior to the site visit may have accounted for much of the standing water present, it should be noted that most of the AOCs contained at least two inches of standing water. In addition, soft rush *(Juncus effuses)*, a common marsh plant known to grow in saturated soil or water, was present within each AOC (Photo #20). The AOCs, which range in size from approximately 167 square feet to 7,300 square feet, are identified on Figure 1 and in Attachment A as Photos #7 through #19). Rhea does not currently define these areas as wetlands; however, due

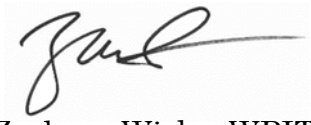
to their location on the landfill cap, it is recommended that they be addressed as necessary to encourage proper drainage before true wetlands can be established.

During the site visit, excess stormwater runoff was observed to be flowing from AOCs 10, 11, and 12 in a southward direction towards an outfall pipe located within the riprap-lined swale (see Photo #21). It is assumed that this pipe drains stormwater from the swales into the large retention pond / wetland area located south of the project boundary (Figure 1). A leachate sump was also observed at this location (Photo #22).

As a result of Rhea's site investigation, one area of stained soil possibly attributed to AMD was observed along the access road in the southernmost portion of the project site. The area, approximately 18 linear feet in length, is identified on Figure 1 and Photo #23.

Rhea is pleased to submit this Field Summary Report to Ricondo. If you have any questions or concerns regarding our findings and/or the information contained herein, please do not hesitate to contact me at your earliest convenience at zach.wicks@rhea.us and/or 724-443-4111.

Respectfully submitted,
Rhea Engineers & Consultants, Inc.

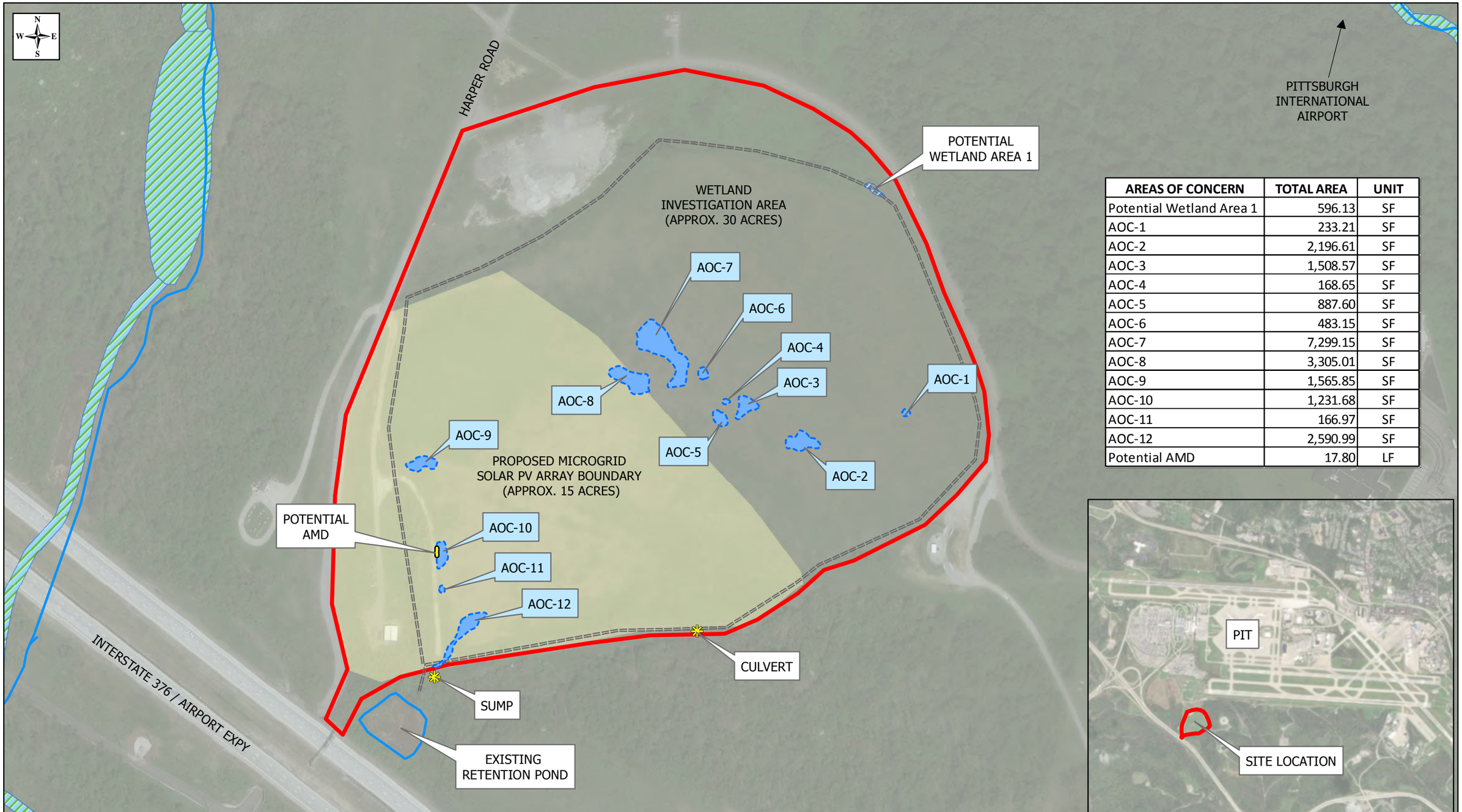


Zachary Wicks, WPIT
Project Manager/Scientist III

ZDW/mrs

Attachments:
Figure 1 – Site Layout Map
Attachment A – Site Photograph Log

FIGURES



AREAS OF CONCERN	TOTAL AREA	UNIT
Potential Wetland Area 1	596.13	SF
AOC-1	233.21	SF
AOC-2	2,196.61	SF
AOC-3	1,508.57	SF
AOC-4	168.65	SF
AOC-5	887.60	SF
AOC-6	483.15	SF
AOC-7	7,299.15	SF
AOC-8	3,305.01	SF
AOC-9	1,565.85	SF
AOC-10	1,231.68	SF
AOC-11	166.97	SF
AOC-12	2,590.99	SF
Potential AMD	17.80	LF

Legend

- Wetland Investigation Area
- Proposed Solar PV Facility
- Standing Water
- Potential Wetland Area
- Swale
- Chapter 93 Documented Stream
- National Wetland Inventory

Notes:
AMD = Acid Mine Drainage
AOC = Area of Concern
LF = Linear Feet
SF = Square Feet

0 100 200 400 Feet

RHEA ENGINEERS & CONSULTANTS, INC.

FIGURE 1

Site Layout Map
Microgrid Solar PV Array
Pittsburgh International Airport

Drawn By	Checked By	Date	Project	Sheet No.
ZW	MRS	4/7/20	2241	1

ATTACHMENT A

Site Photograph Log

ATTACHMENT A – SITE PHOTOGRAPH LOG

Photograph #1	Site Overview – center of site looking southwest

Photograph #2	Site Overview – southern portion of site looking northeast

ATTACHMENT A – SITE PHOTOGRAPH LOG

Photograph #3	Drainage swale, northern perimeter of the site

Photograph #4	Drainage swale, northeastern perimeter of the site

Photograph #5	Vegetated and riprap lined drainage swale, southeastern perimeter of site

Photograph #6	Potential Wetland 1 – northern perimeter of site in drainage swale

ATTACHMENT A – SITE PHOTOGRAPH LOG

Photograph #7	AOC-1: standing water/soft rush, eastern portion of site

Photograph #8	AOC-2: standing water/soft rush, eastern/central portion of site

Photograph #9	AOC-3: standing water/soft rush, eastern/central portion of site

Photograph #10	AOC-4: standing water/soft rush, eastern/central portion of site

Photograph #11	AOC-5: standing water/soft rush, eastern/central portion of site

Photograph #12	AOC-6: standing water/soft rush, central portion of site

Photograph #13	AOC-7: standing water/soft rush, central portion of site

Photograph #14	AOC-8: standing water/soft rush, central portion of site

Photograph #15	AOC-9: standing water/soft rush, southwestern portion of site

Photograph #16	AOC-10: standing water/soft rush, southwestern portion of site

Photograph #17	AOC-11: standing water/soft rush/cat-tails, southwestern portion of site

Photograph #18	AOC-12: standing water/soft rush, southern portion of site

Photograph #19	AOC-12: drainage pattern towards southern portion of site

Photograph #20	Soft rush *(Juncus effuses) observed within each AOC*

Photograph #21	Outfall pipe located at convergence of drainage swale, southernmost portion of site.

Photograph #22	Leachate sump, southern portion of site

Photograph #23	Stained soil possibly resulting from AMD, southern portion of site

Phase 1 EA FONSI

Department of Transportation
Federal Aviation Administration
Finding of No Significant Impact

LOCATION

Pittsburgh International Airport (PIT)
Pittsburgh, Allegheny County, Pennsylvania 15231

PROPOSED FEDERAL ACTION

Allow approval by the Federal Aviation Administration (FAA) of modifications to the Pittsburgh International Airport (PIT) Airport Layout Plan (ALP) to incorporate the proposed project; specifically the development of micro-grid consisting of an on-site natural gas-fired electric power plant and a Solar Photovoltaic (PV) array.

PROJECT DESCRIPTON (Refer to Section 2 of the Environmental Assessment)

The proposed project would consist of a 20 megawatt (MW) natural gas-fired electric power plant that would generate electricity through the combustion of natural gas to provide electricity to PIT. This part of the proposed project would consist of five generators, distribution equipment, an electrical building, and a mechanical building on a 0.9-acre site located outside of the Air Operations Area (AOA), approximately 2,000 feet east of the airside terminal and 800 feet east of Taxiway T. Electrical distribution lines would run from the natural gas-fired electric power plant to the existing substation. Approximately 1,300 linear feet of new underground conduit would be installed from the substation to existing duct banks. Additionally, approximately 450 linear feet of natural gas lines ranging in diameter from 8 inches to 12 inches, would be installed to provide gas to the generators.

The proposed project also includes a 3.0 MW Alternating Current (AC) solar PV array that would be located outside of the AOA on the southwest corner of airport property on a formerlandfill, approximately 1,600 feet south of the extended centerline of Runway 10R-28L and north of Interstate 376. The solar PV array would consist of 9,360 3.3-foot by 6.5-foot, 390-Watt solar panels covering approximately 13 acres. The panels would face south away from approaches to the east-west parallel runways.

PURPOSE AND NEED (Refer to Section 3 of the Environmental Assessment)

The Purpose of the proposed project is to ensure greater power reliability and energy sustainability, and to enhance public safety at PIT. The Need for the project is to prevent power outages such as those that have affected major airports across the nation, including Los Angeles International Airport and Hartsfield-Jackson Atlanta International Airport. This project will provide power redundancy and resiliency at PIT to ensure greater power reliability and uninterrupted operations for the airport and its passengers. In addition, this project will improve sustainability at the airport by providing a renewable energy source.

ALTERNATIVES (Refer to Section 5 of the Environmental Assessment)
Various sites on PIT were considered for the proposed project. Sites considered for the natural gas generators needed to be in close proximity to the existing electrical substation in order to provide a connection to the existing electrical utilities. The site also had to be outside the AOA and not disturb other airport or tenant facilities. No other sites were found to be suitable or feasible for the natural gas generators. The land where the solar PV array would be located is the only portion of PIT property that can accommodate the proposed solar PV array. As such, the proposed project is the only reasonable alternative that would provide power redundancy and resiliency to ensure greater power reliability and uninterrupted operations for the airport.

No Action Alternative
Under the No Action Alternative, an airport micro-grid would not be constructed and energy operations would continue to be provided by the existing power grid. The airport would remain vulnerable to power outages and operations disruptions. This alternative does not meet the project Purpose and Need and is not the FAA selected alternative.

Alternative 1- Proposed Project
The proposed project, as descripted in the Project Description, meets the Purpose and Need, would not affect airport operations, facilities or tenants and does not result in significant environmental impacts. It is the sponsor's preferred alternative and FAA's selected alternative.

DISCUSSION
The attached Environmental Assessment (EA) addresses the effect that the proposed project would have on the human and natural environment. The following impact categories highlight the analysis provided in the EA.

Assessment (Refer to Section 6 of the Environmental Assessment)
The impacts of the proposed federal action on noise, land use compatibility, social, indirect socioeconomic, air quality, water quality, DOT Section 4(f), historic and archaeological resources, biotic communities, endangered species, wetlands, floodplains, coastal zones, coastal barriers, wild and scenic rivers, prime and unique farmland, energy supply and natural resources, light emissions, solid waste impacts, hazardous materials, environmental justice, and cumulative impacts were evaluated in the Environmental Assessment. The results of these environmental studies are summarized below. It is the FAA's finding that the proposed project will not have any significant environmental impacts.

Air Quality
In accordance with the National Ambient Air Quality Standards (NAAQS), Allegheny County is in marginal nonattainment area for 8-hour Ozone and moderate nonattainment for $PM_{2.5}$. The County also has partial SO_2 nonattainment. The proposed project site falls within the SO_2 nonattainment area. Construction and Operations Emission inventories were conducted and concluded that the project would not result in a net total of direct or indirect emissions that exceed the threshold of the regulated air pollutants.

Climate
The proposed project would result in the net decrease of Green House Gases (GHG). The micro-grid would utilizes energy from solar PV array in addition to a natural gas-fired electric power plant. This would emit fewer emissions than the No Action alternative, which relies upon the electrical grid.

Biotic Resources
The proposed project would occur in portions of the airport that are currently disturbed and graded land and consist of maintained lawn and soil that was formerly used for construction staging and a closed, capped landfill. There would be no long-term or permanent loss of unlisted plants or wildlife species.

Threatened and Endangered Species
The project will not impact any federally or state-listed or proposed, threatened or endangered species of flora or fauna, nor will it impact any critical habitat. The project will not affect any species protected under the Migratory Bird Act.

Coastal Resources
The project is not located within the Coastal Barrier Resource System or designated coastal zone.

Section 4 (f) Resources
The proposed project would not have an impact on any publicly owned land from a public park, recreation area, or wildlife or waterfowl refuge of national, state, or local significance, or an historic site of national, state, or local significance. The U.S. Department of Transportation (DOT) Section 4(f) Resources on PIT property and around PIT include:

- The Great Allegheny Passage Montour Trail, including the Airport Link Trail;
- Clinton Community Park;
- Leopold Lake Park;
- Robin Hill Park;
- Moon Township Park;
- Moon Township Golf Club; and

Aten Road and Westbury Ballfields.
None of these resources are within the proposed project areas, or will indirectly be affected by the project. Therefore, there will be no use of a Section 4 (f) resource.

Farmlands
The proposed project does not involve acquisition of farmland, or use of farmland, that would be converted to non-agricultural use and is protected by the Federal Farmland Protection Policy Act.

Hazardous Materials
The proposed solar PV array component of the proposed project would be developed at the closed landfill site; however, this component would minimally disturb the soil cap of the landfill. The site would be closed to public access. The following permits would be obtained prior to any construction:

- Building Permit for the solar PV array from Findlay Township
- Landfill Minor Modification Permit from PA Department of Environmental Protection

Historical, Architectural, Archeological or Cultural Properties

Within the proposed project area, all of the historic farm structures that existed prior to the construction and operation of the existing airport no longer exist. Records and previous site work indicate there are no archaeological resources known to exist within the proposed project area.

Compatible Land Use

The project is located on airport property and will not disrupt communities or require any relocation of residents or businesses. The project will not create a wildlife hazard.

Energy Supply, Natural Resources, and Sustainable Design

The project will have minimal consumption of energy and other natural resources. It will not affect local public utility supplies. Operations of the proposed project would not change energy consumption of airport facilities. No increase in airport operations would occur as a result of implementation of the proposed project. Under the proposed project, PIT would shift some current energy consumption from existing energy resources to the proposed natural gas-fired electric power plant and solar PV array. This would result in a decrease in energy demand on local public utility suppliers.

Noise

This project will not cause noise sensitive areas to experience a permanent increase in the noise Day-Night-Level (DNL). The proposed project would occur in the middle of the PIT airfield. The area is adjacent to highway and undeveloped land. The nearest residential area is located approximately 4,000 feet north of the project area, and the nearest school is located approximately 1.3 miles northeast of the project area. Due to the distance of the project area to sensitive noise receptors, no noise impacts are anticipated. The increase in noise levels resulting from construction would be short term and minor in duration, and would not exceed applicable standards.

Socioeconomic, Environmental Justice, and Children's Health and Safety Risks

The Proposed project would be located entirely on existing PIT property, so there will be no disruption to communities. There will be increased traffic associated with construction related trips, however this will be temporary and will not affect the existing Level of Service.

Lighting Emissions and Visual Effects

There are no light-sensitive areas or residences in close proximity to the project site. The closest neighboring residences is about 4,000 feet from the project area. The natural gas-fired power plant would not be visible from any surrounding communities and the solar PV array will only be visible from Interstate 376.

Wetlands

To determine the presence or absence of wetlands, the U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) was used and a wetland investigation was conducted (March 2020) in accordance with the US Army Corps of Engineers Wetland Delineation Manual. No watercourses or areas of hydric soils or indicators of hydrology were observed in the natural gas-fired electric power plant portion or the solar PV array portion of the proposed project area. As such, no wetlands, or Waters of the U.S., were identified within the proposed project area. The

proposed project does not involve federal or state regulated wetlands or non-jurisdictional wetlands; therefore, no impacts to wetlands are anticipated.

Surface Water
There are no surface waters are located within the proposed project area. The site is previously disturbed and consists entirely of graded land and maintained lawn.

Ground Water
No public groundwater sources are located within PIT property. Within PIT property, groundwater is monitored for evaluation of contamination at the closed landfill and other locations where soil contamination is present. The proposed project would not include construction or operational activities that would have the potential to impact groundwater.

Wild and Scenic Rivers
There are no Wild and Scenic Rivers located within or near the project area.

Floodplains
Based on review of the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps, the proposed project is not located in or does not encroach upon any 100-year or 500-year floodplain.

Cumulative Impacts
The environmental analysis considered projects completed in the past five years, on-going projects, and planned projects for the next few years. As documented in the EA, the proposed project will not result in significant construction or operational impacts. Past projects also did not result in significant impacts and where needed, mitigation has taken place. Since the envisioned development is not yet planned, funded, or otherwise formalized, any potential impacts associated with development would be speculative and thereby were not considered. When considered cumulatively with other projects, this project will not result in significant environmental impacts.

PERMITS (Refer to Section 7 of the Environmental Assessment
The following permits and approval are anticipated:

- National Pollution Discharge Elimination System (NPDES) Individual Permit- Allegheny County Conservation District
- Findlay Township Building Permit-Solar PV Array
- Findlay Township Building Permit- Electric Power Plant
- Air Permit- Installation- Allegheny County Health Department
- Air Permit- Installation- Allegheny County Health Department
- Glint/Glare Analysis-FAA
- Hazardous/Residual Waste- PA Department of Environmental Protection
- Landfill Minor Modification Permit- PA Department of Environmental Protection

MITIGATION MEASURES (Refer to Section 8 of the Environmental Assessment)
There are no significant impacts associated with this project, so no mitigation measures are required. Compliance with all applicable federal, state, and local regulations and permit requirements will ensure no environmental impacts.

PUBLIC INVOLVEMENT (Refer to Section 9 of the Environmental Assessment)
Since the proposed project does not involve a new airport location, a new runway, or a major runway extension, and does not involve any special purpose laws, the requirement for "the opportunity for public hearing" of Chapter 4, "Public Participation", paragraphs 402 and 403, of FAA Order 5050.4B, does not apply. The FAA has determined that a public hearing is not appropriate for this action since the proposal does not have substantial environmental controversy. A copy of the EA and Finding of No Significant Impact (FONSI) will be made available for public review.

CONCLUSION AND APPROVAL
I have carefully and thoroughly considered the facts contained in the attached EA. Based on that information, I find the purposed Federal action is consistent with existing national environmental policies and objectives of Section 101 (a) of the National Environmental Policy Act of 1969 (NEPA) and other applicable environmental requirements. I also find the proposed Federal action with the required mitigation referenced above will not significantly affect the quality of the human environment or include any conditions requiring consultation pursuant to section 102(2)(c) of NEPA. As a result, FAA will not prepare an EIS for this action.

Recommended: SUSAN L MCDONALD Digitally signed by SUSAN L MCDONALD Date: 2020.05.06 07:54:34 -04'00' _____ _____
Susan L. McDonald — Date
Environmental Protection Specialist
Harrisburg ADO

Approved: RICKY W HARNER Digitally signed by RICKY W HARNER Date: 2020.05.08 16:23:33 -04'00' _____ _____
Rick Harner — Date
Manager, Harrisburg ADO

Disapproved: _____ _____
Rick Harner — Date
Manager, Harrisburg ADO

APPENDIX B

Pittsburgh International Airport
Environmental Assessment

Construction Emissions Update

Pittsburgh International Airport Environmental Assessment

Construction Emissions Update

Prepared for:

Rhea Engineers & Consultants, Inc.
333 Rouser Road
Moon Township, PA 15108

Prepared by:

Epsilon Associates, Inc.
3 Mill & Main Place, Suite 250
Maynard, MA 01754

July 7, 2023

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1.0 INTRODUCTION

The Pittsburgh Airport submitted an environmental assessment (EA) for a proposed microgrid project, consisting of an on-site natural gas-fired power plant and solar photovoltaic (PV) array. These energy sources are intended to provide electricity for Airport facilities and enhance energy security and resiliency. The project is intended to occur in two phases, with Phase I being the already-constructed natural gas-fired power plant and a 7.9-acre solar PV array and Phase II being an additional 11.6-acre solar PV array.[1]

The 2020 EA estimated construction emissions from air pollutants subject to the United States Environmental Protection Agency's (US EPA) general conformity regulations and *de minimis* thresholds. The Airport Construction Emissions Inventory Tool (ACEI Tool) was used to estimate construction emissions from the following pollutants: carbon monoxide (CO), volatile organic compounds (VOCs), nitrogen oxides (NO_x), particulate matter (PM2.5 and PM10), and sulfur dioxide (SO2). Greenhouse gas emissions were also calculated and are shown as carbon dioxide equivalence (CO2e).[2] Emissions, with units of tons per year, were compared to the applicable *de minimis* thresholds as documented in the US EPA's general conformity regulations.

The Federal Aviation Administration has requested an update to the construction emissions for Phase I and Phase II of the Project was completed using the latest version of the **MO**tor **V**ehicle **E**mission **S**imulator (MOVES). The following section describes the methods used. The actual operating emissions of the natural gas-fired power plant were also updated and are provided below.

[1] Phase I and II solar acreage from private email communication with Bill Johnson of Rhea Engineers and confirmation by Yashawin Harathi of IMG Solar on June 30th, 2023.

[2] CO2e includes carbon dioxide, methane, and nitrous oxides multiplied by their respective global warming potential.

2.0 METHODS

The ACEI Tool uses emission factors from earlier versions of MOVES, specifically the NONROAD2008a model and MOVES2014b. This updated analysis uses MOVES3.1 which allows for the calculation of onroad and nonroad vehicle emission factors in a combined software.[3]

2.1 Onroad Vehicles

Emission factors for five types of onroad vehicles were estimated. County-specific inputs were provided by the Pennsylvania Department of Environmental Protection's (PADEP) MOVES contractor for 2020, 2021, and 2024.[4] The years 2020 and 2021 were used to recreate the construction emissions from the already-built natural gas power plant and 7.9-acre solar PV array. Construction year 2024 was used to estimate construction emissions from the Phase II 11.6-acre solar array. If actual Phase II construction were to take place beyond 2024, estimated emissions would be lower, as MOVES assumes that older and dirtier vehicles are retired with each passing year. Therefore, the modeled construction of the Phase II solar PV array in 2024 is conservative. The average speed distribution, fuel types, meteorological data, and inspection and maintenance program, and other inputs were provided by the PADEP contractor and input into MOVES. Keeping consistent with how emissions were estimated using the ACEI Tool, emission factors for carbon monoxide were conservatively calculated during a winter month while all other pollutants were estimated during a summer month. A speed of 30 mph was used for all vehicle types, as a reasonable assumption for average speed on roadways. For more details about the MOVES settings used for these runs and the emission factor tables, refer to the attachment page A-8.

2.2 Offroad Vehicles

MOVES was run using default settings for offroad vehicles and the Allegheny County-specific meteorological data. Emission factors for carbon monoxide were estimated during a winter month while all other pollutants were modeled during the summer months. Each ACEI Tool equipment type was reassigned to match available offroad vehicle types in MOVES, since a one-to-one equipment mapping did not exist. Attachment page A-6 shows the reassignment of ACEI Tool offroad construction equipment to the equipment types available in MOVES3.1. The same load factors, hours, and horsepower were used as in the initial 2020 EA submittal and are shown on pages A-5 and A-6 in the attachment to this report. The Phase II offroad equipment hours are shown on page A-7. Offroad emission factors are shown in the tables in pages A-1 through A-3 in the attachment.[5]

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[3] MOVES and Related Models, EPA (2023). https://www.epa.gov/moves/latest-version-motor-vehicle-emission-simulator-moves

[4] Private email communication with Ying-Tzu Chung and Dan Szekeres of Michael Baker International on May 10th, 2023, and David Trostle (Mobile Sources Section Chief) of PADEP on May 9th, 2023.

[5] On pages A-1 thru A-4, the highlighted yellow rows for Passenger Truck indicate that these emission factors come from the onroad runs and have units of g/vmt instead of g/bhp-hr.

Because the project site is located on a capped landfill, physical disturbance of the site is not allowed and any fugitive dust emissions from construction work are considered negligible. Therefore, fugitive $PM_{2.5}$ and PM_{10} dust are not included in calculations.[6]

2.3 Division of Phase I Offroad Construction Emissions

The ACEI Tool allows the user to select different construction processes for the construction of the gas plant and the solar array. The solar PV Array Installation uses six built-in construction processes: Construction Mob & Layout, four different types of Landscaping, Site Clearing, and Underground Services. The gas-fired plant uses at least a dozen more construction processes built into the ACEI Tool. Since the equipment selection is automated through the ACEI Tool, a breakdown of equipment types and hours for each of the two project components is not available.

MOVES, on the other hand, does not use built-in construction activities, so the final emissions are not separated by project component. Therefore, to assign the calculated construction emissions to either the natural gas-fired power plant or solar PV array construction, we calculated ratios of the ACEI Tool-derived solar PV array emissions to the total emissions and applied them to the MOVES final emissions. The table showing these ratios is on page A-5 in the attachment to this report.

Separate Phase II offroad and onroad vehicle data were provided by IMG Solar, so no additional calculations were needed to break out the on- and offroad Phase II emissions (see attachments pages A-7 and A-9).

[6] Private email communication with Bill Johnson of Rhea Engineers, June 30th 2023.

3.0 RESULTS

The following sections provide the updated attainment status for Allegheny County, results from the updated construction emissions using MOVES3.1, and the updated operation emissions from year one of the natural gas-fired power plant.

3.1 Allegheny County Attainment Status

In 1970, the CAA was enacted by the U.S. Congress to protect the health and welfare of the public from the adverse effects of air pollution. As required by the CAA, the United States Environmental Protection Agency (EPA) promulgated National Ambient Air Quality Standards (NAAQS) for the following criteria pollutants: nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter (PM) (PM_{10} and $PM_{2.5}$), carbon monoxide (CO), ozone (O_3), and lead (Pb). US EPA reports air pollution concentrations with respect to how the health-based NAAQS are defined. These are called design values. For example, some standards are not to be exceeded such as the annual NO_2 standard, and some standards are compared to the 98th percentile of 24-hr averages or a 1-hr daily maximum, averaged over 3 years, such as the short-term $PM_{2.5}$ and the NO_2 standards respectively. The NAAQS are listed in Table 3-1. Pennsylvania has adopted their standards to be identical to NAAQS.[7]

Table 3-1 National Ambient Air Quality Standards (NAAQS)

Pollutant	Averaging Period	NAAQS (µg/m^3) *Primary*	NAAQS (µg/m^3) *Secondary*
NO_2	Annual (1)	100	Same
	1-hour (2)	188	None
SO_2	3-hour (3)	None	1300
	1-hour (4)	196	None
$PM_{2.5}$	Annual (1)	12	15
	24-hour (5)	35	Same
PM_{10}	24-hour (3)	150	Same
CO	8-hour (3)	10,000	Same
	1-hour (3)	40,000	Same
Ozone	8-hour (6)	147	Same
Pb	3-month (1)	0.15	Same

Source: http://www.epa.gov/ttn/naaqs/criteria.html and 310 CMR 6.04
(1) Not to be exceeded.
(2) 98th percentile of one-hour daily maximum concentrations, averaged over three years.
(3) Not to be exceeded more than once per year.
(4) 99th percentile of one-hour daily maximum concentrations, averaged over three years.
(5) 98th percentile, averaged over three years.
(6) Annual fourth-highest daily maximum eight-hour concentration, averaged over three years.

[7] https://www.dep.pa.gov/Business/Air/BAQ/PollutantTopics/Pages/Ambient-Standards.aspx

NAAQS specify concentration levels for various averaging times and include both "primary" and "secondary" standards. Primary standards are intended to protect human health, whereas secondary standards are intended to protect public welfare from any known or anticipated adverse effects associated with the presence of air pollutants, such as damage to vegetation.

The NAAQS also reflect various durations of exposure. The short-term periods (24 hours or less) refer to exposure levels not to be exceeded more than once a year. Long-term periods refer to limits that cannot be exceeded for exposure averaged over three months or longer.

The NAAQS are applicable to all the US and territories. An area that is not in compliance with the NAAQS is deemed in nonattainment. If there is insufficient data to determine compliance, then an area is deemed unclassified and is treated as if in compliance. Attainment with the NAAQS is based on data that is collected from a network of air monitoring sites across the country. The primary responsibility to ensure compliance with the NAAQS is assigned in the CAA to the individual states and any nonattainment areas require states to establish a State Implementation Plan (SIP) to reach compliance. The FAA is responsible for ensuring that Airport's actions conform with SIPs, which is also known as General Conformity (Title 40 CRF Part 93). The general conformity rules only apply to areas that have been deemed to be in nonattainment or in maintenance (i.e., areas that were formally in nonattainment but have been in attainment for a period of 10 to 20 years).

Although not considered a criteria air pollutant in terms of having an air quality standard protective of human or welfare effects, carbon dioxide (CO_2) is considered a greenhouse gas and analysis of CO_2 emissions is required.

3.1.1 Attainment Status and Conformity

The EPA is required to publish a list of the geographic areas that are either not in compliance or in compliance with the NAAQS (Section 107 of the 1977 CAA Amendments). The attainment status for Allegheny County is shown in Table 3-2. As the Table shows, Allegheny County is in Attainment for the NAAQS for four air pollutants: NO2, PM-10, CO, and Pb. The County is in moderate nonattainment for 24-hr PM2.5 for the whole county, marginal nonattainment for Ozone for the whole county, and nonattainment for SO2 for part of the county.

Table 3-2 NAAQS Attainment Status for Allegheny County, Pennsylvania

Pollutant	Allegheny County Attainment Status [1]
NO_2 (1-hour and annual)	Unclassifiable/Attainment
SO_2 (1-hr)	Nonattainment (partial county)
PM-2.5	Moderate Nonattainment (whole county)
PM-10 (24-hour)	Unclassifiable/Attainment
CO (1 and 8-hour)	Unclassifiable/Attainment
Ozone (8-hour)	Marginal Nonattainment (whole county) (2015)
Pb (rolling 3-month)	Unclassifiable/Attainment

Notes:
[1] Green Book, EPA (2023). "Pennsylvania Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants." source: https://www3.epa.gov/airquality/greenbook/anayo_pa.html

3.2 Updated Construction Emissions

Table 3-3 below summarizes the annual emissions from the Phase I natural gas plant and 7.9-acre solar PV array in 2020 and 2021 and the Phase II 11.6-acre solar PV array in 2023 and 2024 using MOVES3.1 software.

Table 3-3 Annual Pollutant Emissions During Phase I

	Emissions - Tons/Year							Metric tons/yr
	CO	VOCs	NOx	SO2	PM10	PM2.5	CO2 Equivalence	CO2 Equivalence
Phase I - Natural Gas Plant								
2020	3.46	0.77	2.61	4.5E-03	0.30	0.16	915	830
2021 [1]	0.57	0.10	1.08	7.8E-04	0.08	0.06	309	280
	4.03	**0.87**	**3.69**	**5.3E-03**	**0.38**	**0.22**	**1223**	**1110**
Phase I - Solar PV Array								
2020	3.02	0.20	2.97	1.4E-03	0.2	0.3	713	647
2021 [1]	0.82	0.18	0.92	1.0E-03	0.08	0.08	272	247
	3.84	**0.38**	**3.88**	**2.5E-03**	**0.30**	**0.40**	**985**	**894**
Phase II - Solar PV Array								
2024 [2]	**0.14**	**0.01**	**0.14**	**1.94E-04**	**0.01**	**0.01**	**52**	**48**

Table 3-3 Annual Pollutant Emissions During Phase I (Continued)

Notes:

1 2020 VOCs, SO2, and CH4 (part of CO2 equivalence) emission factors used for 2021 estimates due to missing data in MOVES for these pollutants.

2 2023 VOCs, SO2, and CH4 (part of CO2 equivalence) emission factors used for 2024 estimates due to missing data in MOVES for these pollutants.

Net emissions from the project would not exceed the applicable *de minimis* thresholds for Allegheny County. Project-related emissions from Phases I and II are shown, by year, in Table 3-4. The pollutant that comes closest to meeting its threshold is CO at 6.49 tons per year in 2020, which is still well-below the 100 ton per year standard.

Table 3-4 Comparison to *De Minimis* Thresholds

Year	Emissions - Tons/Year					
	CO	VOCs	NOx	SO2	PM10	PM2.5
2020	6.49	0.97	5.58	5.90E-03	0.53	0.48
2021	1.39	0.28	2.00	1.83E-03	0.15	0.14
2024	0.14	0.01	0.14	1.94E-04	0.01	0.01
de minimis threshold	100	100	100	100	n.a.	100
Difference Under/Over deminis threshold						
2020	-93.513	-99.025	-94.421	-99.994		-99.525
2021	-98.613	-99.717	-98.002	-99.998		-99.859
2024	-99.858	-99.986	-99.861	-100.000		-99.991

3.3 Operating Emissions Update

The previous 2020 EA submittal included anticipated operating emissions from the proposed power plant operation. Actual emissions for the first operating year of the power plant are shown below in Table 3-5.

Table 3-5 Annual Pollutant Emissions Due to the Operation of the Natural Gas-Fired Power Plant

	Natural Gas-Fired Electric Power Plant - Emissions (tons per year)					
	CO	VOC	NOx	SOx	PM10	PM2.5
Actual	2.89	3.26	9.34	0.326	5.51	5.51

4.0 CONCLUSIONS

An emissions update was completed for Phases I and II of the Pittsburgh International Airport EA consisting of the construction of a natural gas-fired power plant and solar PV array in 2020 and 2021 (Phase I, already completed) and the construction of a new solar PV array estimated in 2024 (Phase II). The U.S. EPA's MOVES model (version 3.1) was used to model emission factors for onroad and offroad vehicles using Allegheny County-specific inputs and default data. The re-modeling of the Phase I construction in 2020 and 2021 confirms that the project is well-below applicable *de minimis* thresholds and complies with general conformity. The modeling of the Phase II solar PV array to be constructed in future year 2024 shows that estimated emissions are well below *de minimis* thresholds as well.

Attachments

Offroad Emissions Factors
MOVES3.1

Equipment (ACEI Tool)	Equipment (MOVES)	COL NUM	HP	2020 Emission Factors (g/bhp-hr)						
				4	6	8	10	12	14	19
		Load Factor		CO	VOCs	Oxides of Nitrogen (NOx)	SO2	Primary PM10	Primary PM2.5	CO2 Equivalent
40 Ton Crane	Cranes	0.43	300	0.37406	0.08009	1.31432	1.58E-03	0.06717	0.06515	533.27907
Air Compressor	Air Compressors	0.43	100	0.80747	0.13953	2.36341	1.73E-03	0.13258	0.12860	574.24051
Asphalt Paver	Pavers	0.59	175	0.43294	0.06543	1.26005	1.57E-03	0.07920	0.07683	550.79895
Backhoe	Tractors/Loaders/Backhoes	0.21	100	2.45092	0.43690	2.91264	2.09E-03	0.41869	0.40613	665.26318
Bob Cat	Tractors/Loaders/Backhoes	0.21	75	2.45092	0.43690	2.91264	2.09E-03	0.41869	0.40613	665.26318
Bulldozer	Crawler Tractor/Dozers	0.59	175	0.47968	0.06597	1.25121	1.57E-03	0.07812	0.07578	539.77499
Chain Saw [1]	Chain Saws < 6 HP (com)	0.7	11	261.57884	73.61274	1.64161	4.42E-03	9.51226	8.75128	766.57856
Chain Saws [1]	Chain Saws < 6 HP (com)	0.7	11	261.57884	73.61274	1.64161	4.42E-03	9.51226	8.75128	766.57856
Chipper/Stump Grinder	Chippers/Stump Grinders (com)	0.43	100	1.32880	0.30273	3.87350	1.85E-03	0.24502	0.23767	551.32554
Compacting Equipment	Plate Compactors	0.43	6	2.28601	0.66935	4.13254	2.16E-03	0.25014	0.24264	589.86448
Concrete Ready Mix Trucks	Cement & Mortar Mixers	0.59	600	1.49910	0.36191	3.49737	1.87E-03	0.23728	0.23016	564.70841
Concrete Saws	Concrete/Industrial Saws	0.59	40	1.11936	0.15927	2.60481	1.77E-03	0.16483	0.15988	591.84482
Concrete Truck	Cement & Mortar Mixers	0.59	600	1.49910	0.36191	3.49737	1.87E-03	0.23728	0.23016	564.70841
Distributing Tanker	Off-highway Trucks	0.59	600	0.28128	0.05486	1.70910	1.50E-03	0.04545	0.04408	536.79392
Dozer	Crawler Tractor/Dozers	0.59	175	0.47968	0.06597	1.25121	1.57E-03	0.07812	0.07578	539.77499
Dump Truck	Dumpers/Tenders	0.59	600	3.37417	0.75863	4.00664	2.29E-03	0.51887	0.50331	684.32600
Dump Truck (12 cy)	Dumpers/Tenders	0.59	600	3.37417	0.75863	4.00664	2.29E-03	0.51887	0.50331	684.32600
Excavator	Excavators	0.59	175	0.28719	0.04450	0.84212	1.51E-03	0.05573	0.05405	541.92649
Flat Bed or Dump Trucks	Tractors/Loaders/Backhoes	0.59	600	2.45092	0.43690	2.91264	2.09E-03	0.41869	0.40613	665.26318
Flatbed Truck	Tractors/Loaders/Backhoes	0.59	600	2.45092	0.43690	2.91264	2.09E-03	0.41869	0.40613	665.26318
Fork Truck	Forklifts	0.59	100	0.24419	0.03324	1.22808	1.55E-03	0.03853	0.03738	574.05804
Forktruck (Hoist)	Forklifts	0.59	100	0.24419	0.03324	1.22808	1.55E-03	0.03853	0.03738	574.05804
Front Loader	Tractors/Loaders/Backhoes	0.21	100	2.45092	0.43690	2.91264	2.09E-03	0.41869	0.40613	665.26318
Grader	Graders	0.59	300	0.28030	0.04524	0.73475	1.51E-03	0.05617	0.05448	537.68473
Grub the site down 2'	Graders	0.59	40	0.28030	0.04524	0.73475	1.51E-03	0.05617	0.05448	537.68473
High Lift	Aerial Lifts	0.59	100	4.17397	0.98218	4.68218	2.29E-03	0.61820	0.59965	693.50275
Hydroseeder	Other Agricultural Equipment	0.59	600	1.41997	0.26115	3.15741	1.87E-03	0.26029	0.25248	542.65070
Loader	Tractors/Loaders/Backhoes	0.59	175	2.45092	0.43690	2.91264	2.09E-03	0.41869	0.40613	665.26318
Log Chipper	Chippers/Stump Grinders (com)	0.43	100	1.32880	0.30273	3.87350	1.85E-03	0.24502	0.23767	551.32554
Man Lift	Aerial Lifts	0.21	75	4.17397	0.98218	4.68218	2.29E-03	0.61820	0.59965	693.50275
Man Lift (Fascia Construction)	Aerial Lifts	0.21	75	4.17397	0.98218	4.68218	2.29E-03	0.61820	0.59965	693.50275
Material Deliveries	Off-highway Trucks	0.59	600	0.28128	0.05486	1.70910	1.50E-03	0.04545	0.04408	536.79392
Mulcher	Other Lawn & Garden Eqp. (com)	0.43	100	2.10043	0.47971	4.48327	2.07E-03	0.36857	0.35751	589.48737
Off-Road Truck	Off-highway Trucks	0.59	600	0.28128	0.05486	1.70910	1.50E-03	0.04545	0.04408	536.79392
Other General Equipment	Other Construction Equipment	0.43	175	0.87532	0.11986	1.89529	1.67E-03	0.13242	0.12844	537.68683
Pickup Truck [2]	Passenger Truck	0.59	600	6.224	0.414	0.675	2.95E-03	0.069	0.019	458.121
Pumps	Pumps	0.43	11	1.45972	0.34677	3.58193	1.85E-03	0.26572	0.25775	568.23240
Roller	Rollers	0.59	100	0.62311	0.08725	1.56832	1.63E-03	0.10897	0.10570	559.67660
Rubber Tired Loader	Rubber Tire Loaders	0.59	175	0.57674	0.08598	1.51059	1.61E-03	0.09797	0.09503	539.96386
Scraper	Scrapers	0.59	600	0.59157	0.07007	1.13762	1.59E-03	0.08517	0.08261	536.78666
Seed Truck Spreader	Other Lawn & Garden Eqp. (com)	0.59	600	2.10043	0.47971	4.48327	2.07E-03	0.36857	0.35751	589.48737
Skid Steer Loader	Skid Steer Loaders	0.21	75	3.31926	0.66803	3.89364	2.25E-03	0.52372	0.50801	693.71780
Slip Form Paver	Paving Equipment	0.59	175	0.80043	0.13175	1.87776	1.69E-03	0.14515	0.14080	556.64979
Small Dozer	Crawler Tractor/Dozers	0.59	175	0.47968	0.06597	1.25121	1.57E-03	0.07812	0.07578	539.77499
Surfacing Equipment (Grooving)	Surfacing Equipment	0.59	25	1.14948	0.16052	2.54947	1.74E-03	0.16535	0.16039	555.23879
Survey Crew Trucks	Off-highway Trucks	0.59	600	0.28128	0.05486	1.70910	1.50E-03	0.04545	0.04408	536.79392
Ten Wheelers	Off-highway Trucks	0.59	600	0.28128	0.05486	1.70910	1.50E-03	0.04545	0.04408	536.79392
Tool Truck	Off-highway Trucks	0.59	600	0.28128	0.05486	1.70910	1.50E-03	0.04545	0.04408	536.79392
Tractor	Tractors/Loaders/Backhoes	0.21	100	2.45092	0.43690	2.91264	2.09E-03	0.41869	0.40613	665.26318
Tractor Trailer- Material Delivery	Off-highway Trucks	0.59	600	0.28128	0.05486	1.70910	1.50E-03	0.04545	0.04408	536.79392
Tractor Trailer- Steel Deliveries	Off-highway Trucks	0.59	600	0.28128	0.05486	1.70910	1.50E-03	0.04545	0.04408	536.79392
Tractor Trailer with Boom Hoist- Delivery	Off-highway Trucks	0.59	600	0.28128	0.05486	1.70910	1.50E-03	0.04545	0.04408	536.79392
Tractor Trailers Temp Facility	Off-highway Trucks	0.59	600	0.28128	0.05486	1.70910	1.50E-03	0.04545	0.04408	536.79392
Tractors/Loader/Backhoe	Tractors/Loaders/Backhoes	0.21	100	2.45092	0.43690	2.91264	2.09E-03	0.41869	0.40613	665.26318
Water Truck	Off-highway Trucks	0.59	600	0.28128	0.05486	1.70910	1.50E-03	0.04545	0.04408	536.79392

Notes:

(1) Chain saws use gasoline instead of diesel fuel

(2) Highlighted yellow rows for Passenger Truck indicate that these emission factors come from the onroad runs and have units of g/vmt instead of g/bhp-hr

Offroad Emissions Factors
MOVES3.1

Equipment (ACEI Tool)	Equipment (MOVES)	2021 Emission Factors (g/bhp-hr)						
		4	6	8	10	12	14	19
		CO	VOCs	Oxides of Nitrogen (NOx)	SO2	Primary PM10	Primary PM2.5	CO2 Equivalent
40 Ton Crane	Cranes	0.32245	0.08009	1.14954	1.58E-03	0.05606	0.05438	533.31205
Air Compressor	Air Compressors	0.70058	0.13953	2.18068	1.73E-03	0.11407	0.11064	574.29954
Asphalt Paver	Pavers	0.36065	0.06543	1.11375	1.57E-03	0.06414	0.06221	550.82790
Backhoe	Tractors/Loaders/Backhoes	2.19175	0.43690	2.63047	2.09E-03	0.37028	0.35917	665.43780
Bob Cat	Tractors/Loaders/Backhoes	2.19175	0.43690	2.63047	2.09E-03	0.37028	0.35917	665.43780
Bulldozer	Crawler Tractor/Dozers	0.39392	0.06597	1.09025	1.57E-03	0.06341	0.06151	539.80515
Chain Saw [1]	Chain Saws < 6 HP (com)	261.57907	73.61287	1.64161	4.42E-03	9.51228	8.75129	766.58026
Chain Saws [1]	Chain Saws < 6 HP (com)	261.57907	73.61287	1.64161	4.42E-03	9.51228	8.75129	766.58026
Chipper/Stump Grinder	Chippers/Stump Grinders (com)	1.22404	0.30273	3.60972	1.85E-03	0.22414	0.21741	551.40552
Compacting Equipment	Plate Compactors	2.24784	0.66935	4.10584	2.16E-03	0.24059	0.23338	589.86513
Concrete Ready Mix Trucks	Cement & Mortar Mixers	1.41922	0.36191	3.33413	1.87E-03	0.22110	0.21447	564.76564
Concrete Saws	Concrete/Industrial Saws	0.97551	0.15927	2.47239	1.77E-03	0.14236	0.13809	591.89843
Concrete Truck	Cement & Mortar Mixers	1.41922	0.36191	3.33413	1.87E-03	0.22110	0.21447	564.76564
Distributing Tanker	Off-highway Trucks	0.22554	0.05486	1.61847	1.50E-03	0.03697	0.03586	536.81509
Dozer	Crawler Tractor/Dozers	0.39392	0.06597	1.09025	1.57E-03	0.06341	0.06151	539.80515
Dump Truck	Dumpers/Tenders	3.12471	0.75863	3.84372	2.29E-03	0.47736	0.46304	684.51256
Dump Truck (12 cy)	Dumpers/Tenders	3.12471	0.75863	3.84372	2.29E-03	0.47736	0.46304	684.51256
Excavator	Excavators	0.22635	0.04450	0.69658	1.51E-03	0.04288	0.04159	541.94928
Flat Bed or Dump Trucks	Tractors/Loaders/Backhoes	2.19175	0.43690	2.63047	2.09E-03	0.37028	0.35917	665.43780
Flatbed Truck	Tractors/Loaders/Backhoes	2.19175	0.43690	2.63047	2.09E-03	0.37028	0.35917	665.43780
Fork Truck	Forklifts	0.16040	0.03324	1.13367	1.55E-03	0.02305	0.02235	574.07786
Forktruck (Hoist)	Forklifts	0.16040	0.03324	1.13367	1.55E-03	0.02305	0.02235	574.07786
Front Loader	Tractors/Loaders/Backhoes	2.19175	0.43690	2.63047	2.09E-03	0.37028	0.35917	665.43780
Grader	Graders	0.22522	0.04524	0.59811	1.51E-03	0.04425	0.04293	537.70770
Grub the site down 2'	Graders	0.22522	0.04524	0.59811	1.51E-03	0.04425	0.04293	537.70770
High Lift	Aerial Lifts	3.78325	0.98218	4.43239	2.29E-03	0.55588	0.53920	693.80875
Hydroseeder	Other Agricultural Equipment	1.36548	0.26115	3.04166	1.87E-03	0.24963	0.24215	542.68870
Loader	Tractors/Loaders/Backhoes	2.19175	0.43690	2.63047	2.09E-03	0.37028	0.35917	665.43780
Log Chipper	Chippers/Stump Grinders (com)	1.22404	0.30273	3.60972	1.85E-03	0.22414	0.21741	551.40552
Man Lift	Aerial Lifts	3.78325	0.98218	4.43239	2.29E-03	0.55588	0.53920	693.80875
Man Lift (Fascia Construction)	Aerial Lifts	3.78325	0.98218	4.43239	2.29E-03	0.55588	0.53920	693.80875
Material Deliveries	Off-highway Trucks	0.22554	0.05486	1.61847	1.50E-03	0.03697	0.03586	536.81509
Mulcher	Other Lawn & Garden Eqp. (com)	1.97863	0.47971	4.32877	2.07E-03	0.34317	0.33287	589.58336
Off-Road Truck	Off-highway Trucks	0.22554	0.05486	1.61847	1.50E-03	0.03697	0.03586	536.81509
Other General Equipment	Other Construction Equipment	0.77254	0.11986	1.66216	1.67E-03	0.11672	0.11322	537.72704
Pickup Truck [2]	Passenger Truck	5.48288	0.36747	0.49975	2.81E-03	0.05954	0.01237	425.83800
Pumps	Pumps	1.34723	0.34677	3.38885	1.85E-03	0.24216	0.23490	568.31202
Roller	Rollers	0.50482	0.08725	1.40336	1.63E-03	0.08570	0.08313	559.71634
Rubber Tired Loader	Rubber Tire Loaders	0.49716	0.08598	1.34985	1.61E-03	0.08294	0.08045	539.99760
Scraper	Scrapers	0.49383	0.07007	0.96282	1.59E-03	0.07052	0.06841	536.81724
Seed Truck Spreader	Other Lawn & Garden Eqp. (com)	1.97863	0.47971	4.32877	2.07E-03	0.34317	0.33287	589.58336
Skid Steer Loader	Skid Steer Loaders	3.08471	0.66803	3.74557	2.25E-03	0.48483	0.47028	693.88283
Slip Form Paver	Paving Equipment	0.68741	0.13175	1.69897	1.69E-03	0.12212	0.11846	556.69622
Small Dozer	Crawler Tractor/Dozers	0.39392	0.06597	1.09025	1.57E-03	0.06341	0.06151	539.80515
Surfacing Equipment (Grooving)	Surfacing Equipment	1.04482	0.16052	2.38091	1.74E-03	0.14988	0.14538	555.28041
Survey Crew Trucks	Off-highway Trucks	0.22554	0.05486	1.61847	1.50E-03	0.03697	0.03586	536.81509
Ten Wheelers	Off-highway Trucks	0.22554	0.05486	1.61847	1.50E-03	0.03697	0.03586	536.81509
Tool Truck	Off-highway Trucks	0.22554	0.05486	1.61847	1.50E-03	0.03697	0.03586	536.81509
Tractor	Tractors/Loaders/Backhoes	2.19175	0.43690	2.63047	2.09E-03	0.37028	0.35917	665.43780
Tractor Trailer- Material Delivery	Off-highway Trucks	0.22554	0.05486	1.61847	1.50E-03	0.03697	0.03586	536.81509
Tractor Trailer- Steel Deliveries	Off-highway Trucks	0.22554	0.05486	1.61847	1.50E-03	0.03697	0.03586	536.81509
Tractor Trailer with Boom Hoist- Delivery	Off-highway Trucks	0.22554	0.05486	1.61847	1.50E-03	0.03697	0.03586	536.81509
Tractor Trailers Temp Facility	Off-highway Trucks	0.22554	0.05486	1.61847	1.50E-03	0.03697	0.03586	536.81509
Tractors/Loader/Backhoe	Tractors/Loaders/Backhoes	2.19175	0.43690	2.63047	2.09E-03	0.37028	0.35917	665.43780
Water Truck	Off-highway Trucks	0.00000	0.00000	0.00000	0.00E+00	0.00000	0.00000	0.00000

Notes:

(1) Chain saws use gasoline instead of diesel fuel

(2) Highlighted yellow rows for Passenger Truck indicate that these emission factors c

Equipment (ACEI Tool)	Equipment (MOVES)	2024 Emission Factors (g/bhp-hr)						
		2	3	4	5	6	7	11
		CO	VOCs	Oxides of Nitrogen (NOx)	SO2	Primary PM10	Primary PM2.5	CO2 Equivalent
40 Ton Crane	Cranes	0.21284	0.05218	0.76296	1.52E-03	0.03703	0.03592	533.32682
Air Compressor	Air Compressors	0.45921	0.09118	1.79639	1.65E-03	0.07275	0.07057	574.34982
Asphalt Paver	Pavers	0.20135	0.03983	0.80154	1.51E-03	0.03535	0.03429	550.83166
Backhoe	Tractors/Loaders/Backhoes	1.77351	0.30727	2.20165	2.01E-03	0.30149	0.29244	665.63545
Bob Cat	Tractors/Loaders/Backhoes	1.77351	0.30727	2.20165	2.01E-03	0.30149	0.29244	665.63545
Bulldozer	Crawler Tractor/Dozers	0.20524	0.03814	0.73619	1.49E-03	0.03381	0.03280	539.80948
Chain Saw (1)	Chain Saws < 6 HP (com)	261.57827	73.61290	1.64161	4.42E-03	9.51228	8.75130	766.57972
Chain Saws (1)	Chain Saws < 6 HP (com)	261.57827	73.61290	1.64161	4.42E-03	9.51228	8.75130	766.57972
Chipper/Stump Grinder	Chippers/Stump Grinders (com)	0.95209	0.23036	2.84695	1.77E-03	0.17119	0.16605	551.57130
Compacting Equipment	Plate Compactors	2.18263	0.67048	4.06144	2.16E-03	0.22548	0.21872	589.90789
Concrete Ready Mix Trucks	Cement & Mortar Mixers	1.22252	0.31087	2.92647	1.83E-03	0.18339	0.17788	564.91260
Concrete Saws	Concrete/Industrial Saws	0.61592	0.11187	2.17566	1.69E-03	0.08386	0.08134	591.93850
Concrete Truck	Cement & Mortar Mixers	1.22252	0.31087	2.92647	1.83E-03	0.18339	0.17788	564.91260
Distributing Tanker	Off-highway Trucks	0.10644	0.03639	1.44498	1.45E-03	0.02178	0.02113	536.81553
Dozer	Crawler Tractor/Dozers	0.20524	0.03814	0.73619	1.49E-03	0.03381	0.03280	539.80948
Dump Truck	Dumpers/Tenders	2.50172	0.58398	3.43412	2.24E-03	0.37573	0.36446	684.93725
Dump Truck (12 cy)	Dumpers/Tenders	2.50172	0.58398	3.43412	2.24E-03	0.37573	0.36446	684.93725
Excavator	Excavators	0.10414	0.02469	0.43160	1.46E-03	0.01872	0.01815	541.94514
Flat Bed or Dump Trucks	Tractors/Loaders/Backhoes	1.77351	0.30727	2.20165	2.01E-03	0.30149	0.29244	665.63545
Flatbed Truck	Tractors/Loaders/Backhoes	1.77351	0.30727	2.20165	2.01E-03	0.30149	0.29244	665.63545
Fork Truck	Forklifts	0.09015	0.02133	1.04891	1.52E-03	0.01171	0.01136	574.06461
Forktruck (Hoist)	Forklifts	0.09015	0.02133	1.04891	1.52E-03	0.01171	0.01136	574.06461
Front Loader	Tractors/Loaders/Backhoes	1.77351	0.30727	2.20165	2.01E-03	0.30149	0.29244	665.63545
Grader	Graders	0.10533	0.02447	0.31101	1.46E-03	0.02089	0.02026	537.70451
Grub the site down 2'	Graders	0.10533	0.02447	0.31101	1.46E-03	0.02089	0.02026	537.70451
High Lift	Aerial Lifts	2.75968	0.68944	3.77865	2.20E-03	0.39542	0.38355	694.51691
Hydroseeder	Other Agricultural Equipment	1.13818	0.21480	2.51671	1.82E-03	0.20628	0.20009	542.80762
Loader	Tractors/Loaders/Backhoes	1.77351	0.30727	2.20165	2.01E-03	0.30149	0.29244	665.63545
Log Chipper	Chippers/Stump Grinders (com)	0.95209	0.23036	2.84695	1.77E-03	0.17119	0.16605	551.57130
Man Lift	Aerial Lifts	2.75968	0.68944	3.77865	2.20E-03	0.39542	0.38355	694.51691
Man Lift (Fascia Construction)	Aerial Lifts	2.75968	0.68944	3.77865	2.20E-03	0.39542	0.38355	694.51691
Material Deliveries	Off-highway Trucks	0.10644	0.03639	1.44498	1.45E-03	0.02178	0.02113	536.81553
Mulcher	Other Lawn & Garden Eqp. (com)	1.62604	0.38241	3.87455	2.01E-03	0.27015	0.26205	589.83194
Off-Road Truck	Off-highway Trucks	0.10644	0.03639	1.44498	1.45E-03	0.02178	0.02113	536.81553
Other General Equipment	Other Construction Equipment	0.58095	0.08601	1.25862	1.60E-03	0.08823	0.08559	537.76488
Pickup Truck (2)	Passenger Truck	4.40981	0.26658	0.29523	2.66E-03	0.05788	0.01112	401.75600
Pumps	Pumps	1.07204	0.27155	2.88411	1.79E-03	0.18573	0.18016	568.49010
Roller	Rollers	0.30785	0.05606	1.05850	1.56E-03	0.05020	0.04870	559.72199
Rubber Tired Loader	Rubber Tire Loaders	0.31346	0.05696	0.95978	1.54E-03	0.05317	0.05158	540.01751
Scraper	Scrapers	0.25636	0.03993	0.54782	1.50E-03	0.03709	0.03598	536.82327
Seed Truck Spreader	Other Lawn & Garden Eqp. (com)	1.62604	0.38241	3.87455	2.01E-03	0.27015	0.26205	589.83194
Skid Steer Loader	Skid Steer Loaders	2.49574	0.51406	3.35795	2.18E-03	0.38887	0.37721	694.23608
Slip Form Paver	Paving Equipment	0.44085	0.08905	1.29773	1.59E-03	0.07277	0.07059	556.72101
Small Dozer	Crawler Tractor/Dozers	0.20524	0.03814	0.73619	1.49E-03	0.03381	0.03280	539.80948
Surfacing Equipment (Grooving)	Surfacing Equipment	0.74981	0.11921	1.90505	1.67E-03	0.10661	0.10342	555.34373
Survey Crew Trucks	Off-highway Trucks	0.10644	0.03639	1.44498	1.45E-03	0.02178	0.02113	536.81553
Ten Wheelers	Off-highway Trucks	0.10644	0.03639	1.44498	1.45E-03	0.02178	0.02113	536.81553
Tool Truck	Off-highway Trucks	0.10644	0.03639	1.44498	1.45E-03	0.02178	0.02113	536.81553
Tractor	Tractors/Loaders/Backhoes	1.77351	0.30727	2.20165	2.01E-03	0.30149	0.29244	665.63545
Tractor Trailer- Material Delivery	Off-highway Trucks	0.10644	0.03639	1.44498	1.45E-03	0.02178	0.02113	536.81553
Tractor Trailer- Steel Deliveries	Off-highway Trucks	0.10644	0.03639	1.44498	1.45E-03	0.02178	0.02113	536.81553
Tractor Trailer with Boom Hoist- Delivery	Off-highway Trucks	0.10644	0.03639	1.44498	1.45E-03	0.02178	0.02113	536.81553
Tractor Trailers Temp Facility	Off-highway Trucks	0.10644	0.03639	1.44498	1.45E-03	0.02178	0.02113	536.81553
Tractors/Loader/Backhoe	Tractors/Loaders/Backhoes	1.77351	0.30727	2.20165	2.01E-03	0.30149	0.29244	665.63545
Water Truck	Off-highway Trucks	0.10644	0.03639	1.44498	1.45E-03	0.02178	0.02113	536.81553

Notes:

(1) Chain saws use gasoline instead of diesel fuel

(2) Highlighted yellow rows for Passenger Truck indicate that these emission factors c

Offroad Emissions from ACEITool

Calculation of Fractions of Total Emissions from Solar Array Construction

	Emissions (tons/yr)						metric tons/yr
	CO	VOC	NOx	SOX	PM10	PM2.5	CO2E
NG Plant -2020	2.263	1.921	1.132	0.022	0.216	0.059	1005.942
Solar PV - 2020	1.974	0.507	1.285	0.007	0.161	0.12	784.009
TOTAL - 2020	4.237	2.428	2.417	0.029	0.377	0.179	1789.951
2020 Solar PV Ems. Fraction	*0.47*	*0.21*	*0.53*	*0.24*	*0.43*	*0.67*	*0.44*
NG Plant -2021	0.396	0.096	0.376	0.003	0.044	0.024	282.885
Solar PV - 2021	0.568	0.167	0.32	0.004	0.045	0.032	249.685
TOTAL - 2021	0.964	0.263	0.696	0.007	0.089	0.056	532.57
2021 Solar PV Ems. Fraction	*0.59*	*0.63*	*0.46*	*0.57*	*0.51*	*0.57*	*0.47*

Equipment Load Factors and Horsepower

EQUIPMENT	FUEL	HORSE-POWER	LOAD FACTOR	Notes:
40 Ton Crane	Diesel	300	0.43	
Air Compressor	Diesel	100	0.43	
Asphalt Paver	Diesel	175	0.59	
Backhoe	Diesel	100	0.21	
Bob Cat	Diesel	75	0.21	
Bulldozer	Diesel	175	0.59	
Chain Saw	Diesel	11	0.7	Run with Gasoline fuel in MOVES
Chain Saws	Diesel	11	0.7	Run with Gasoline fuel in MOVES
Chipper/Stump Grinder	Diesel	100	0.43	
Compacting Equipment	Diesel	6	0.43	
Concrete Ready Mix Trucks	Diesel	600	0.59	
Concrete Saws	Diesel	40	0.59	
Concrete Truck	Diesel	600	0.59	
Distributing Tanker	Diesel	600	0.59	
Dozer	Diesel	175	0.59	
Dump Truck	Diesel	600	0.59	
Dump Truck (12 cy)	Diesel	600	0.59	
Excavator	Diesel	175	0.59	
Flat Bed or Dump Trucks	Diesel	600	0.59	
Flatbed Truck	Diesel	600	0.59	
Fork Truck	Diesel	100	0.59	
Forktruck (Hoist)	Diesel	100	0.59	
Front Loader	Diesel	100	0.21	
Grader	Diesel	300	0.59	
Grub the site down 2'	Diesel	40	0.59	
High Lift	Diesel	100	0.59	
Hydroseeder	Diesel	600	0.59	
Loader	Diesel	175	0.59	
Log Chipper	Diesel	100	0.43	
Man Lift	Diesel	75	0.21	
Man Lift (Fascia Construction)	Diesel	75	0.21	
Material Deliveries	Diesel	600	0.59	
Mulcher	Diesel	100	0.43	
Off-Road Truck	Diesel	600	0.59	
Other General Equipment	Diesel	175	0.43	
Pickup Truck	Diesel	600	0.59	
Pumps	Diesel	11	0.43	
Roller	Diesel	100	0.59	
Rubber Tired Loader	Diesel	175	0.59	
Scraper	Diesel	600	0.59	
Seed Truck Spreader	Diesel	600	0.59	
Skid Steer Loader	Diesel	75	0.21	
Slip Form Paver	Diesel	175	0.59	
Small Dozer	Diesel	175	0.59	
Surfacing Equipment (Grooving)	Diesel	25	0.59	
Survey Crew Trucks	Diesel	600	0.59	
Ten Wheelers	Diesel	600	0.59	
Tool Truck	Diesel	600	0.59	
Tractor	Diesel	100	0.21	
Tractor Trailer- Material Delivery	Diesel	600	0.59	
Tractor Trailer- Steel Deliveries	Diesel	600	0.59	
Tractor Trailer with Boom Hoist- Delivery	Diesel	600	0.59	
Tractor Trailers Temp Facility	Diesel	600	0.59	
Tractors/Loader/Backhoe	Diesel	100	0.21	
Water Truck	Diesel	600	0.59	

Equipment Assignment and Hours

Phase I

Equipment (ACEITool)	2020 Hrs	2021 Hrs	MOVES3.1 Equipment Assignment
40 Ton Crane	240	240	Cranes
Air Compressor	16	--	Air Compressors
Asphalt Paver	6	--	Pavers
Backhoe	1,650	700	Tractors/Loaders/Backhoes
Bob Cat	266	76	Tractors/Loaders/Backhoes
Bulldozer	443	127	Crawler Tractor/Dozers
Chain Saw	13	--	Chain Saws < 6 HP (com)
Chain Saws	443	127	Chain Saws < 6 HP (com)
Chipper/Stump Grinder	13	--	Chippers/Stump Grinders (com)
Compacting Equipment	266	76	Plate Compactors
Concrete Ready Mix Trucks	326	136	Cement & Mortar Mixers
Concrete Saws	16	--	Concrete/Industrial Saws
Concrete Truck	69	--	Cement & Mortar Mixers
Distributing Tanker	13	--	Off-highway Trucks
Dozer	181	27	Crawler Tractor/Dozers
Dump Truck	162	30	Dumpers/Tenders
Dump Truck (12 cy)	151	--	Dumpers/Tenders
Excavator	123	30	Excavators
Flat Bed or Dump Trucks	887	253	Tractors/Loaders/Backhoes
Flatbed Truck	99	--	Tractors/Loaders/Backhoes
Fork Truck	1,706	1,659	Forklifts
Forktruck (Hoist)	887	253	Forklifts
Front Loader	443	127	Tractors/Loaders/Backhoes
Grader	5	--	Graders
Grub the site down 2'	443	127	Graders
High Lift	440	440	Aerial Lifts
Hydroseeder	5	--	Other Agricultural Equipment
Loader	109	27	Tractors/Loaders/Backhoes
Log Chipper	443	127	Chippers/Stump Grinders (com)
Man Lift	1,200	1,200	Aerial Lifts
Man Lift (Fascia Construction)	120	120	Aerial Lifts
Material Deliveries	8	8	Off-highway Trucks
Mulcher	443	127	Other Lawn & Garden Eqp. (com)
Off-Road Truck	5	0	Off-highway Trucks
Other General Equipment	296	32	Other Construction Equipment
Pickup Truck	394	32	Passenger Truck
Pumps	5	0	Pumps
Roller	591	154	Rollers
Rubber Tired Loader	16	--	Rubber Tire Loaders
Scraper	20	--	Scrapers
Seed Truck Spreader	177	51	Other Lawn & Garden Eqp. (com)
Skid Steer Loader	22	--	Skid Steer Loaders
Slip Form Paver	16	--	Paving Equipment
Small Dozer	266	76	Crawler Tractor/Dozers
Surfacing Equipment (Groovin	24	--	Surfacing Equipment
Survey Crew Trucks	121	42	Off-highway Trucks
Ten Wheelers	443	127	Off-highway Trucks
Tool Truck	400	400	Off-highway Trucks
Tractor	887	253	Tractors/Loaders/Backhoes
Tractor Trailer- Material Deliv	1,092	435	Off-highway Trucks
Tractor Trailer- Steel Deliverie	16	16	Off-highway Trucks
Tractor Trailer with Boom Hoi	266	76	Off-highway Trucks
Tractor Trailers Temp Facility	48	17	Off-highway Trucks
Tractors/Loader/Backhoe	25	--	Tractors/Loaders/Backhoes
Water Truck	--	--	Off-highway Trucks

Equipment Assignment and Hours

Phase II

Equipment	2024 - Total Hours
40 Ton Crane	16
Bob Cat	800
Concrete Truck	16
Dump Truck	8
Fork Truck- Telehandler	200
Survey Crew Trucks	40
Total	**1080**

Source: data from YH @ IMG Solar

Emission Factors for Onroad Vehicles - MOVES3.1

2020							
Vehicle Type	**CO2 Equivalence**	**Oxides of Nitrogen (NOx)**	**PM10**	**PM2.5**	**SO2**	**VOCs**	**CO**
Passenger Car	327	0.102	0.053	0.009	2.16E-03	0.125	2.89
Passenger Truck	458	0.675	0.069	0.019	2.95E-03	0.414	6.22
Single Unit Short-Haul Truck	1136	4.094	0.404	0.253	4.63E-03	0.636	1.85
Combination Short-Haul Truck	1974	10.386	0.881	0.596	6.82E-03	0.591	3.89
Combination Long-Haul Truck	2045	9.369	0.794	0.495	6.98E-03	0.447	3.81

2021							
Vehicle Type	**CO2 Equivalence**	**Oxides of Nitrogen (NOx)**	**PM10**	**PM2.5**	**SO2**	**VOCs**	**CO**
Passenger Car	315	0.085	0.052	0.008	2.09E-03	0.115	2.74
Passenger Truck	426	0.500	0.060	0.012	2.81E-03	0.367	5.48
Single Unit Short-Haul Truck	894	3.534	0.331	0.205	3.06E-03	0.354	1.76
Combination Short-Haul Truck	1920	9.596	0.815	0.538	6.58E-03	0.533	3.73
Combination Long-Haul Truck	2025	8.787	0.744	0.448	6.90E-03	0.413	3.72

2024							
Vehicle Type	**CO2 Equivalence**	**Oxides of Nitrogen (NOx)**	**PM10**	**PM2.5**	**SO2**	**VOCs**	**CO**
Passenger Car	291	0.050	0.052	0.008	1.93E-03	0.096	2.33
Passenger Truck	402	0.295	0.058	0.011	2.66E-03	0.267	4.41
Single Unit Short-Haul Truck	859	2.821	0.297	0.173	2.92E-03	0.268	1.53
Combination Short-Haul Truck	1846	7.555	0.644	0.381	6.28E-03	0.399	3.29
Combination Long-Haul Truck	1959	7.318	0.614	0.327	6.63E-03	0.320	3.46

Notes:

Carbon Monoxide run during January (winter)

All other pollutants run during July (summer)

30 mph for all emission rates

All pollutant processes selected for each pollutant

Phase II - Onroad vehicle miles traveled for 11.6-acre Solar PV Array Construction

Data source: *IMG Solar*

Future

Equipment Category	Fuel	Roundtrip Distance (Miles)	Roundtrips	Vehicle Miles Travelled	Notes
Single Unit Short-haul Truck	Diesel	30	6	180	Based upon multiple trips and 23 needed for racking and pads needed for electrical equipment on phase 1
Passenger Car	Gasoline	30	1040	31200	Avg 10 staff 4 days/week for 6 months
Combination Short-haul Truck	Diesel	30	52	1560	Estimate 2 deliveries per week for 6 months
Tractor Trailer	Diesel	300	6	1800	6 trucks for racking and driven post (RBI- phase 1)
Tractor Trailer	Diesel	100	15	1500	Estimate 15 container deliveries for phase 2 solar panels

APPENDIX C

Pennsylvania Natural Diversity Index Search

1. PROJECT INFORMATION

Project Name: **PIT Microgrid - Phase 2 Development**
Date of Review: **1/24/2023 05:25:53 PM**
Project Category: **Energy Storage, Production, and Transfer, Energy Production (generation), Solar Power Facility -- new or expansion**
Project Area: **20.01 acres**
County(s): **Allegheny**
Township/Municipality(s): **FINDLAY TOWNSHIP**
ZIP Code:
Quadrangle Name(s): **CLINTON**
Watersheds HUC 8: **Upper Ohio**
Watersheds HUC 12: **Montour Run**
Decimal Degrees: **40.482783, -80.253696**
Degrees Minutes Seconds: **40° 28' 58.201" N, 80° 15' 13.3044" W**

2. SEARCH RESULTS

Agency	Results	Response
PA Game Commission	No Known Impact	No Further Review Required
PA Department of Conservation and Natural Resources	No Known Impact	No Further Review Required
PA Fish and Boat Commission	No Known Impact	No Further Review Required
U.S. Fish and Wildlife Service	No Known Impact	No Further Review Required

As summarized above, Pennsylvania Natural Diversity Inventory (PNDI) records indicate no known impacts to threatened and endangered species and/or special concern species and resources within the project area. Therefore, based on the information you provided, no further coordination is required with the jurisdictional agencies. This response does not reflect potential agency concerns regarding impacts to other ecological resources, such as wetlands.

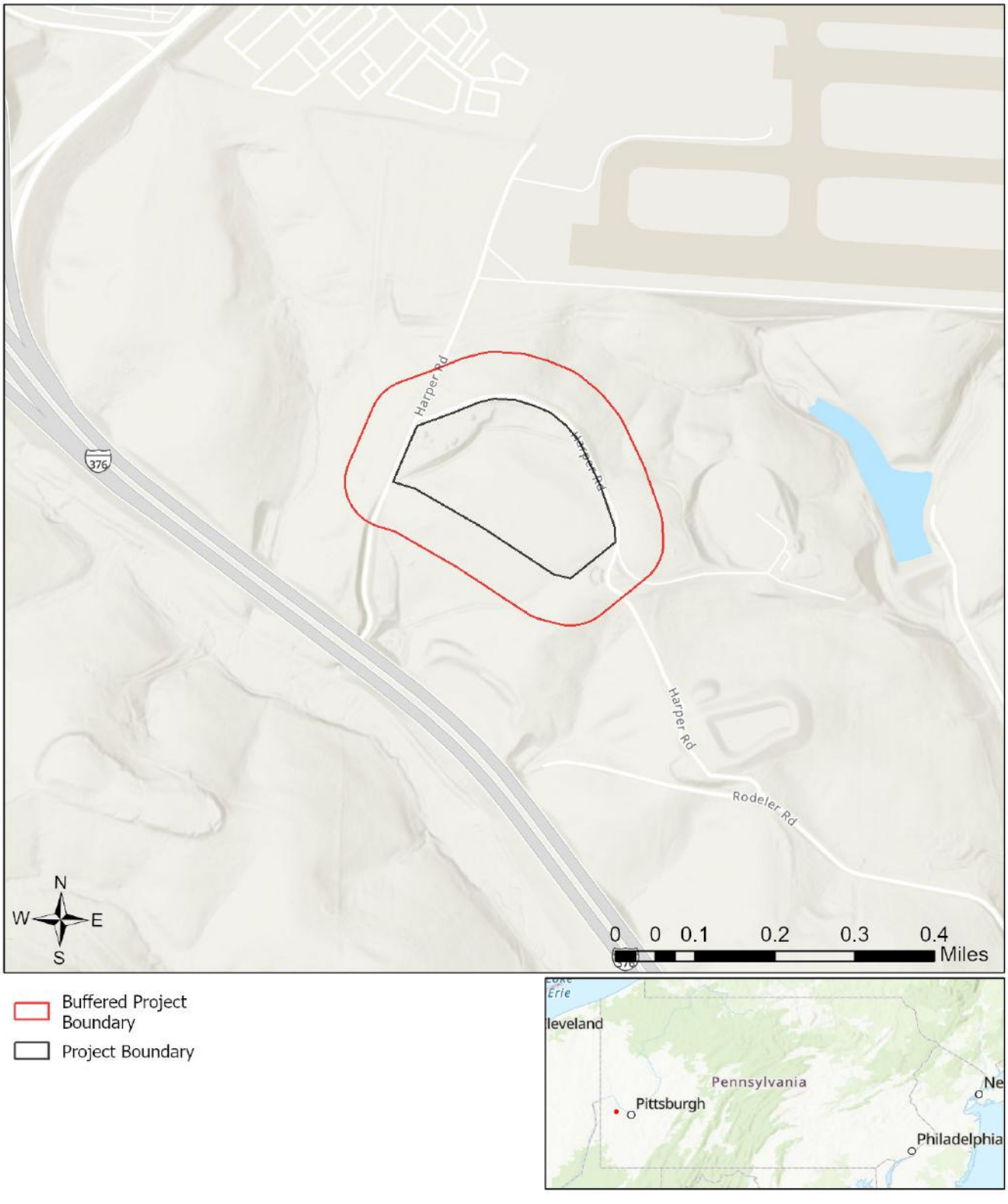
PIT Microgrid - Phase 2 Development

Buffered Project Boundary

Project Boundary

Sources: Esri, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap and the GIS user community

PIT Microgrid - Phase 2 Development



Sources: Esri, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap and the GIS user community

RESPONSE TO QUESTION(S) ASKED

Q1: The proposed project is in the range of the Indiana bat. Describe how the project will affect bat habitat (forests, woodlots and trees) and indicate what measures will be taken in consideration of this. Round acreages up to the nearest acre (e.g., 0.2 acres = 1 acre).
Your answer is: No forests, woodlots or trees will be affected by the project.

Q2: Is tree removal, tree cutting or forest clearing of 40 acres or more necessary to implement all aspects of this project?
Your answer is: No

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

PA Department of Conservation and Natural Resources
RESPONSE:
No Impact is anticipated to threatened and endangered species and/or special concern species and resources.

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:
No impacts to **federally** listed or proposed species are anticipated. Therefore, no further consultation/coordination under the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq. is required. Because no take of federally listed species is anticipated, none is authorized. This response does not reflect potential Fish and Wildlife Service concerns under the Fish and Wildlife Coordination Act or other authorities.

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. Two review options are available to permit applicants for handling PNDI coordination in conjunction with DEP's permit review process involving either T&E Species or species of special concern. Under sequential review, the permit applicant performs a PNDI screening and completes all coordination with the appropriate jurisdictional agencies prior to submitting the permit application. The applicant will include with its application, both a PNDI receipt and/or a clearance letter from the jurisdictional agency if the PNDI Receipt shows a Potential Impact to a species or the applicant chooses to obtain letters directly from the jurisdictional agencies. Under concurrent review, DEP, where feasible, will allow technical review of the permit to occur concurrently with the T&E species consultation with the jurisdictional agency. The applicant must still supply a copy of the PNDI Receipt with its permit application. The PNDI Receipt should also be submitted to the appropriate agency according to directions on the PNDI Receipt. The applicant and the jurisdictional agency will work together to resolve the potential impact(s). See the DEP PNDI policy at https://conservationexplorer.dcnr.pa.gov/content/resources.

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
Email: RA-HeritageReview@pa.gov

U.S. Fish and Wildlife Service
Pennsylvania Field Office
Endangered Species Section
110 Radnor Rd; Suite 101
State College, PA 16801
Email: IR1_ESPenn@fws.gov
NO Faxes Please

PA Fish and Boat Commission
Division of Environmental Services
595 E. Rolling Ridge Dr., Bellefonte, PA 16823
Email: RA-FBPACENOTIFY@pa.gov

PA Game Commission
Bureau of Wildlife Management
Division of Environmental Review
2001 Elmerton Avenue, Harrisburg, PA 17110-9797
Email: RA-PGC_PNDI@pa.gov
NO Faxes Please

7. PROJECT CONTACT INFORMATION

Name: Marcella G Johnson
Company/Business Name: Rhea Engineers & Consultants, Inc.
Address: 333 Rouser Road
City, State, Zip: Moon Township, PA 15108
Phone:(724) 443-4111 Fax:(724) 443-4187
Email: marcy.johnson@rhea.us

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.

Marcella Johnson 2/14/2023
applicant/project proponent signature date

APPENDIX D

Phase I PIT Microgrid Approved Permit Packages

Building Permit from Findlay Township

1271 Route 30
P.O. Box W
Clinton, Pennsylvania 15026
Phone: (724) 695-0500
Fax: (724) 695-1700
Website: www.findlay.pa.us

Township of Findlay

November 12, 2020

Attention: Mike Brady
PG Solar LLC
106 Isabella Street - Suite 600
Pittsburgh, PA 15212

RE: Pittsburgh International Airport - Harper Road

Dear Mr. Brady,

The Findlay Township Board of Supervisors, at their meeting of November 11, 2020, held a Pubic Hearing on your Conditional Use application. Upon hearing testimony from the Planning/Zoning Administrator and addressing any questions/concerns, the Board unanimously approved the construction of a 23,000 panel 9MW Solar Farm on a 26-acre parcel off of Harper Road for the Pittsburgh International Airport. The application was also recommended by the Findlay Township Planning Commission.

Sincerely,

Cheryl L. Rinehart

Cheryl L. Rinehart, Secretary
Findlay Township Board of Supervisors

clr

cc: Allegheny County Airport Authority
Findlay Township Planning Department

PADEP Landfill Minor Permit Modification Approval (Solid Waste Permit No. 101479)

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

January 7, 2021

VIA ELECTRONIC DELIVERY

Kevin Gurchak
Pittsburgh International Airport
1000 Airport Blvd
Pittsburgh, PA, 5231-1001

Re: Minor Permit Modification
Solar Array Project
Greater Pittsburgh International Airport Midfield Terminal Landfill
Findlay Township
Allegheny County
Authorization No. 1303557
APS No. 267717
I.D. No. 101479

Dear Mr. Gurchak:

Enclosed is a minor modification to the Solid Waste Permit No. 101479 for the post-closure land use of the Greater Pittsburgh International Airport Midfield Terminal Landfill, issued in accordance with Article V of the Solid Waste Management Act, 35 P.S. Sections 6018.101, et seq.

This modification approves the development of a solar power generation system with the installation of solar panels at the closed Midfield Terminal Landfill, as described in the application.

Compliance with the terms and conditions set forth in the permit is mandatory. You have the right to file an appeal as to the modified terms and conditions.

This authorization does not relieve the applicant from applying for and obtaining any additional permits or approvals from local, state or federal agencies required for this project. Please be advised that if any other permits are required for this project, they must be issued prior to undertaking the activities described in the permit application. Issuance of the enclosed permit(s) does not indicate an affirmative action on any other pending or future permit applications. If you are uncertain as to whether or not other permits are needed for this project, please use the Department's "Pre-Application Consultation Tool" (PACT) which can be found at http://www.ahs.dep.pa.gov/PACT/. The online tool is designed to quickly and easily assist potential applicants in determining which types of environmental permits, authorizations or notifications would be needed for specific projects. Based on the user's responses to a series of simple questions, PACT automatically provides an email response with information on permits and other information an applicant should consider.

Any person aggrieved by this action may appeal, pursuant to Section 4 of the Environmental Hearing Board Act, 35 P.S. Section 7514, and the Administrative Agency Law, 2 Pa. C.S. Chapter 5A, to the Environmental Hearing Board, Second Floor, Rachel Carson State Office Building, 400 Market Street, P.O. Box 8457, Harrisburg, PA 17105-8457, 717-787-3483. TDD users may contact the Board through the Pennsylvania Relay Service, 800-654-5984. Appeals must be filed with the Environmental Hearing Board within 30 days of receipt of written notice of this action unless the appropriate statute provides a different time period. Copies of the appeal form and the Board's rules of practice and procedure may be obtained from the Board. The appeal form and the Board's rules of practice and procedure are also available in braille or on audiotape from the Secretary to the Board at 717-787-3483. This paragraph does not, in and of itself, create any right of appeal beyond that permitted by applicable statutes and decisional law.

IF YOU WANT TO CHALLENGE THIS ACTION, YOUR APPEAL MUST REACH THE BOARD WITHIN 30 DAYS. YOU DO NOT NEED A LAWYER TO FILE AN APPEAL WITH THE BOARD.

IMPORTANT LEGAL RIGHTS ARE AT STAKE, HOWEVER, SO YOU SHOULD SHOW THIS DOCUMENT TO A LAWYER AT ONCE. IF YOU CANNOT AFFORD A LAWYER, YOU MAY QUALIFY FOR FREE PRO BONO REPRESENTATION. CALL THE SECRETARY TO THE BOARD (717-787-3483) FOR MORE INFORMATION.

If you have any questions about the enclosed permit or requirements of the Solid Waste Management Act, please contact Ihab Abdulfatah at *iabdulfata@pa.gov*.

Sincerely,

Sharon Svitek

Sharon Svitek
Program Manager
Bureau of Waste Management

Enclosure

cc: Allegheny County Health Department
Findlay Township
Mike Brady – IMG Energy Solutions
Duane Lanoue - Civil & Environmental Consultants, Inc.
Region
Chron
Permit Binder File
G. Holesh
A. Abdulfatah
Q. Cameron

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
WASTE MANAGEMENT

FORM NO. 13-A
MODIFICATION TO SOLID WASTE DISPOSAL AND/OR PROCESSING PERMIT

Under the provisions of Act 97, the Pennsylvania Solid Waste Management Act, the Act of July 7, 1980, P.L. 380, 35 P.S. §§ 6018.101, et seq., Solid Waste Permit Number 101479 issued on October 9, 1987 to County of Allegheny, Department of Aviation, for the operation of Greater Pittsburgh International Airport Midfield Terminal Solid Waste Disposal Site located in Findlay Township, Allegheny County is modified as follows:

1. This permit modifies Solid Waste Permit No. 101479 originally issued on October 9, 1987. It is issued in response to Solid Waste Management Application No. 101479 dated January 28, 2020 and designated as Authorization Request No. 1303557 for the post-closure use of the Airport Midfield Terminal Solid Waste Disposal Site for installation of solar panel arrays over two stages on the closed landfill. The plans and specifications in the application, including subsequent revisions and addendum(s) submitted to the initial application, are approved by the Department and are enforceable as a part of this permit amendment.

   This permit modification is issued based on the assumption that the information submitted in Solid Waste Management Permit Application No. 101479, designated as Authorization Request No. 1303557, referenced in Permit Condition No. 2, is accurate. Any inaccuracies found in this information may be grounds for the revocation or modification of this permit and potential enforcement action.

2. This approved application consists of design plans for the solar array and an engineer's report describing and supporting the design of the facility in addition to the following documents:

Form No./Letter	Form Title	Date (Revision)
Form GIF	Permit Application - General Information	01/28/2020 (07/07/2020)
Form A	Application for Municipal or Residual Waste Permit	01/28/2020 (10/02/2020)
Form B	Professional Certification	01/28/2020 (10/02/2020)
Form B1	Application Form Certification	01/28/2020 (10/02/2020)
Form HW-C	Compliance History	01/28/2020
Form I	Erosion and Sedimentation Controls	01/28/2020 (09/15/2020)
Form 28	Closure/Post-Closure Land Use Plan	01/28/2020 01/28/2020
Form 1	Facility Plan	(08/06/2020) (09/15/2020)
Bonding Worksheets		01/15/2020 (10/02/2020)

This modification shall be attached to the existing Solid Waste Permit described above and shall become a part thereof effective on 1/7/2021.

Sharon Svitek
FOR THE DEPARTMENT OF ENVIRONMENTAL PROTECTION

Form No./Letter	Form Title	Date (Revision)
Correspondence	Incompleteness Review Letter (E-mail)	02/11/2020
Correspondence	Geotechnical Testing Work Plan	03/04/2020
Correspondence	Testing Work Plan Approval Letter	04/09/2020
Correspondence	Technical Deficiencies Letter 1 (E-mail)	03/06/2020
Correspondence	Response to technical deficiency letter 1	03/31/2020
Correspondence	Technical Deficiencies Letter 2 (E-mail)	08/28/2020

Drawing No.	Title	Date(Revision)
A-1	Site Location Map	01/15/2020
I-1.1	Existing Surface Water Control	01/15/2020
CS 1.0	Cover Sheet	01/15/2020 (07/30/2020)
E 1.0	Electrical Site Plan	01/15/2020 (07/30/2020)
E 2.0	Array Plan Stage 1 Only	01/15/2020 (07/30/2020)
E 3.0	Electrical Notes	01/15/2020 (07/30/2020)
E 4.0	Three-Line Diagram	01/15/2020 (07/30/2020)
E 5.0	Racking System	01/15/2020 (07/30/2020)
1-2.1	Existing Conditions	08/06/2020
1-2.2	Bottom of Liner System Grades	08/06/2020
1-2.3	Depth Above Bottom Of Liner System Isopach Contours	08/06/2020
Image 6.1	Map of Test Locations	08/06/2020
1- 4.1	Landfill Cross-Section Settlement Evaluation	08/06/2020
SG001	Cover Sheet	07/28/2020
SG003	Site Plan & Bill Of Materials	07/28/2020
SG101	Array 1: Component Layout	07/28/2020

3. The total bond liability of $ 214,533.00 shown by the Bonding Worksheets is approved in support of this minor modification. The Surety Bond No. 1090315, dated 12/03/2020, with PG Solar LLC as operator and Lexon Insurance Company as surety for the amount of $214,533.00 and executed between the permittee and the DEP is in support of the permit.

4. The DEP's acceptance of the overall cost estimate reflected in the Bonding Worksheets contained in the

application shall not be construed as approval of any particular cost item appearing therein. DEP reserves the right to question or reject any individual cost item, or documentary basis for that item, contained in the current cost estimate should that information be reproduced in a future cost estimate.

5. This permit modification does not relieve the Permittee, or any other person, of the responsibility to comply with all other applicable federal and state laws and regulations including, but not limited to, acquiring applicable permits and approvals, including local permits.

6. The Permittee shall ensure persons conducting activities at the PV Facility and Landfill are familiar with the applicable provisions of this permit and the approved plans, and that all work performed at the Landfill complies with Pennsylvania Solid Waste Regulations and the applicable requirements of this permit.

7. The Permittee shall maintain copies of this permit, the Application, the health and safety plan, and documentation that site personnel have been trained pursuant to the health and safety plan at the site during construction of the PV Facility.

8. Prior to commencing construction pursuant to the application and this permit, the Permittee shall notify Pennsylvania Department of Environmental Protection (DEP) and Allegheny County Health Department in writing of the scheduled date of the commencement of construction at the site. In addition, the notification shall include:
    a. The projected schedule for completion of the major construction milestones of the PV Facility.
    b. The name and contact information for the Engineer supervising the project.
    c. The name and contact information of an on-site contact for the project.
    d. A health and safety plan for DEP's files that includes instruction and training of all personnel working on the site regarding the potential health and safety hazards at the Landfill

9. Prior to commencing operation of the PV Facility, and no more than ninety (90) days after the date of completion of the construction of the PV Facility, the Permittee shall submit for review and approval by DEP a construction certification report, as an application, that includes, but is not limited to:
    a. As-built plans for the final as constructed PV Facility amended to incorporate all modifications and alterations, if any, made during construction;
    b. A narrative, prepared by the Engineer that discusses in part, any modifications made to the design of the PV Facility;
    c. Certifications by the Permittee and the Engineer.

10. On or before thirty (30) days after the date the PV Facility ceases operation, the Permittee shall submit to Pennsylvania DEP a plan for the decommissioning of the PV Facility and the restoration of the Landfill cap. The plan shall include, but not be limited to, a narrative and schedule for the decommissioning of the PV Facility and the restoration of the Landfill's cap.

11. All construction work shall be completed and conducted under the supervision of an independent Pennsylvania Registered Professional Engineer who shall have sufficient qualified staff on-site to provide field supervision and quality assurance/quality control for all construction activities.

12. The Permittee and the Engineer are responsible to ensure that all necessary precautions are taken to protect the health and safety of workers and the general public during the construction and operation of the PV Facility and during its decommissioning.

13. Prior to construction of the PV Facility, any suspect settlement areas on the Landfill project area shall be surveyed to determine the lowest spot. Any landfill project area that has undergone minor settlement shall be corrected by the placement of additional vegetative support soil to promote runoff and the area shall be reseeded. In case of Major settlement, the final cover system must be repaired to prevent water from ponding above the low permeability layer.

14. Vehicles operating on the Landfill cap shall only be operated and parked on designated access roads, except for low-pressure construction equipment, which may operate off the access roads. All operators of vehicles entering the capped area of the Landfill shall, prior to their arrival, be instructed by the Engineer or his/her designee and/or contractor of the requirements of this decision and permit, to avoid damage to the Landfill cap.

15. Only low ground pressure construction equipment may operate on the Landfill cap off of the access road, and only in accordance with the conditions of this permit.

16. All disturbance of the Landfill shall be limited to the proposed excavations and installations as depicted and described in the Application and this permit. The Permittee and any contractors performing work at the Landfill shall without delay notify the Engineer or his/her on-site representative upon encountering or damaging the base liner.

17. If the landfill base liner is damaged, the Permittee shall notify Pennsylvania DEP without delay and in no case later than the close of business of the next business day after it becomes aware of any incident or such damage.

18. The Permittee shall notify Pennsylvania DEP and Allegheny County Health Department within twenty- four (24) hours whenever possible, but in no case greater than within forty-eight (48) hours of the Permittee, the Engineer of Record or contractor(s), becoming aware of:

    a. The occurrence of any conditions or events that result in off-site nuisance conditions or a threat to the public health, safety, welfare or the environment;

    b. The receipt by the Permittee of any complaint of off-site nuisance conditions attributed to the PV Facility construction.

    This notification shall, at a minimum, include a description of the incident and/or complaint, the impact on the construction activities authorized by this decision, and a description of any corrective actions the Permittee has taken or intends to take to minimize the potential for a recurrence.

19. Waste generated by the installation of the PV Facility shall be taken off site for proper disposal or reuse according to applicable regulations or policies.

20. Pennsylvania DEP and its agents and employees shall have the right to inspect the Landfill, any equipment, structure or land located thereon, to take samples, to perform tests, and have access to and photocopy records, and to otherwise monitor compliance with this permit and all environmental laws and regulations administered by Pennsylvania DEP.

21. The Permittee shall not deviate from this permit and the approved design plans. The Permittee shall notify Pennsylvania DEP prior to any modification(s) of the design and of any significant changes in the project schedule. Pennsylvania DEP may, at its sole discretion, require the Permittee to submit an application for review and approval for any modification/alteration to the design. In the event that Pennsylvania DEP determines that a permit application is required for a modification, the Permittee shall submit such application to the Pennsylvania DEP.

22. During the first year after completion of construction of the PV Facility, the Permittee shall ensure that inspections of the Landfill final cover system are conducted on a quarterly basis. Inspections shall be conducted by a Third-Party Inspector. The Quarterly third-party inspection reports shall be submitted to Pennsylvania DEP within thirty (30) days of the date of each inspection. Following the first year of operation of the PV Facility, after the submittal of four quarterly third-party inspection reports, and if no problems have been documented, third-party inspections of the Landfill shall be performed least once every two calendar years and third-party inspection reports shall be submitted to Pennsylvania DEP within (30) days of the date of each inspection.

23. If there is a conflict between the application, its supporting documents and/or amendments and the terms and conditions of this permit, the terms and conditions of this permit shall apply.

24. This permit shall not be construed to supersede, amend, or authorize a violation of any of the provisions of any valid and applicable local law, ordinance, or regulations, providing that said local law, ordinance, or regulation is not preempted by the Pennsylvania Solid Waste Management Act, the Act of July 7, 1980, P.L. 380, No. 97, 35 P.S. §§ 6018.101, et seq., or the Municipal Waste Planning, Recycling and Waste Reduction Act of 1988, 53 P.S. §§ 4000.101-4000.1904.

25. Unless amended by this permit modification or previously approved permit modification, all design and operational requirements set forth in Solid Waste Permit No. 101479, issued on October 9, 1987 remain valid for this permit modification.

PADEP Landfill Minor Permit Modification Application (Solid Waste Permit No. 101479)

September 15, 2020

VIA ELECTRONIC COPY ONLY

Mr. Ihab A. Abdulfatah &
Mr. Gregory W. Holesh, P.E.
Waste Management Program
Pennsylvania Department of Environmental Protection
400 Waterfront Drive
Pittsburgh, PA 15222

Dear Messrs. Abdulfatah & Holesh:

Subject: Response to Technical Deficiency Letter
Solar Array for Pittsburgh Airport
Greater Pittsburgh International Airport Midfield Terminal Landfill
Findlay Township, Allegheny County, PA
Authorization No. 1303557
APS No. 267717
I.D. No. 101479
CEC Project 196-251

On behalf of the Greater Pittsburgh International Airport (GPIA), Civil & Environmental Consultants, Inc. (CEC) is submitting revisions to the Minor Permit Modification (MPM) Application for the Greater Pittsburgh International Airport Midfield Terminal Landfill. The Midfield Terminal Landfill is a closed landfill (Solid Waste Permit No. 101479) located off Harper Road, Pittsburgh, Findlay Township, Pennsylvania. This submittal provides revised sections only based on the comments provided in the Pennsylvania Department of Environmental Protection (PADEP) Technical Deficiency letter dated August 28, 2020.

The response to comments provided in the PADEP Technical Deficiency letter is provided in Attachment A.

The sections of the MPM Application dated August 7, 2020 have been revised to address comments provided in the PADEP Technical Deficiency letter. The following revised sections are included in Attachment B of this submittal:

- Project Summary - Revised - clarified language provided regarding the buffer depth between the bottom of the driven post and the liner system;
- Form A, B and B1- Revised - updated signature and date;

- Form 1, Attachment 1-1 - Revised - clarified language provided regarding the buffer depth between the bottom of the driven post and the liner system
- Form 1, Attachment 1-3 - Revised - provided calculation narrative and references for the driven post design including the geotechnical testing results, design calculations, and manufacturer's specifications; and
- Form 28, Attachment 28-2 – Revised - provided revised Bonding Worksheets.

The revised narrative is indicated using strikeout for deleted text and capitalized for new text. Additionally, revised pages are on green paper and changes have been highlighted in yellow. The revised Driven Post Design Calculations (Attachment 1-3) and the revised Bonding Worksheets (Attachment 28-2) are provided in their entirety without the revised text formatting.

The Response to Comments and revised sections of the MPM Application are being submitted electronically for your review. A hard copy can be provided at your request.

If you have any questions regarding this project, please contact Kevin Gurchak, Director, Environmental & Workplace Safety Allegheny County Airport Authority at 412-472-3575 or Duane Lanoue of CEC at (412) 429-2324.

Sincerely,

CIVIL & ENVIRONMENTAL CONSULTANTS, INC.

Abigail Wallace

Abigail Wallace, E.I.T.
Assistant Project Manager

Duane Lanoue, P.E.
Principal

Enclosures

cc: Kevin Gurchak, GPIA
Jamie Habberfield, IMG Energy Solutions
Joe Morinville, EIS Solar

ATTACHMENT A

RESPONSE TO OHIO EPA COMMENTS
DATED AUGUST 28, 2020

ATTACHMENT A
RESPONSE TO PADEP TECHNICAL DEFICIENCIES
DATED AUGUST 28, 2020
GREATER PITTSBURGH INTERNATIONAL AIRPORT
MIDFIELD TERMINAL LANDFILL

The Pennsylvania Department of Environmental Protection Bureau of Waste Management provided technical deficiencies to the revised Minor Permit Modification Application submitted on August 7, 2020 received in an email dated August 28, 2020. The PADEP comments are repeated below in italicized text with the response following in bold text.

1. *Ground-mounted supporting structures, and all parts thereof, shall be designed, constructed and installed to safely support all loads, including dead loads, snow loads, wind loads and seismic loads. The facility plan included in the application package does not state clearly that the driven posts are sufficient to support the PV system and the applicable live and dead loads. It also does not include interpretation of the various loads results and their relation with the corresponding loads recommended by the manufacturers of the PV panels and racking system. Please provide a brief engineering design report including, with sufficient clarity, the following:*

    - *Interpretation of the various loads calculations results*
    - *Interpretation of the driven post's loads testing results.*
    - *Manufacturer(s) mechanical specifications of the solar panels; the racking system; and the posts that will be used to construct the system.*
    - *Various dead and live loads capacities recommended by the manufacturer(s) for the solar panels, racking system, and the driven posts*
    - *The calculated loads (Wind loads, Snow loads, seismic loads)*
    - *The calculated loads supporting capacity of the driven posts*
    - *A conclusion summarizing the ability of driven posts foundation to support the components and to resist the applicable snow, seismic, wind, and uplift forces.*

RESPONSE: The Driven Post Design Calculation provided in Attachment 1-3 has been revised to address the requested items including a summary of the driven post load test results, structural analysis for the driven post and racking system components including wind, snow, dead and seismic loads, manufacturer's specifications, and a conclusion summarizing the ability of driven posts foundation to support the components and to resist the applicable snow, seismic, wind, and uplift forces.

2. *The facility plan indicates that the driven post will maintain at least 4 feet of separation above the existing 3.5-feet thick liner system. Downdrag due to settlement of the adjacent soil mass may induce additional loads in the piles and can result in further sinking of the posts overtime. DEP would like to know what mechanism would be implemented to prevent downdrag of the driven post and maintain the 4 feet of separation between the driven posts and the liner system.*

RESPONSE: The Project Summary and Attachment 1-1 have been revised to indicate that the separation thickness is 6 feet and that the separation thickness is provided to accommodate settlement of the driven post over time.

3. *The testing work does not include slope stability analysis. Please provide results of slope stability analysis or explain why it is not necessary to conduct the analysis.*

RESPONSE: Attachment 1-1 has been revised to provide a discussion regarding the site and project conditions which make a slope stability analysis unnecessary.

4. *Bond Calculation:*

With respect to bond calculation, submitted in attachment 28-2, DEP has the following comments:

- *Bond amount should include costs that may be associated with the closure, post- closure and monitoring of the solar power generation facility. Cost of leachate management should not be included in the bond calculation. Please include costs that are associated with closure of the power generation facility only.*

- *The calculated bond amount for the closure and post closure of the solar power generation facility is based on an estimate obtained from New York Solar Guide book, which does not contain any supporting documentation for the estimate. Supporting documentation for labor rates and cost data must be included with the recalculation.*

- *It is required that you provide bond calculations to account for the costs that would be incurred if the Department had to close and maintain the solar power generation facility until final closure status is reached. As a governmental agency, the Department would be required to use prevailing wage rates when taking steps to complete closure, post-closure, and final closure activities. Therefore, prevailing wage rates are to be used for the bond calculations.*

- *The cost of general labor, trucking cost, heavy construction equipment cost (loaders, excavators, graders…etc.) must be documented. Copies of cost documentations should be included with the submission.*

- *Decommissioning cost shall be determined by the cost of dismantling and loading the site materials in addition to the trucking costs. It should include the cost of: (1) Removal of*

racks wiring (2) Removal of cables (3) Removal of panels (4) Dismantling of racks (5) Removal and loading of racks plus trucking, (6) Removal of electrical equipment plus trucking (7) break up and removal of concrete structures (8) Removal of power poles (9) Removal of fence plus trucking (8) Grading cost, including equipment (9) Seeding of disturbed areas, including equipment.

- *Calculation of the cost of each task should have a short description of the task followed by cost calculation formula as in the example shown below:*

  ***Remove Panels task**:*
  ***Description**: The panels are clamped in. They slide in a rack. It takes approximately 10 minutes to remove each panel. There are 15,000 panels.*
  ***Cost formula**:(Number of panels / 6 panels/hr) *General Labor Rate$/hr = (15,000 panels / 6 panels/hr) * $55/hr = $137,500*

  at the end, all of the costs shall be added up and the total adjusted for inflation plus the contingency and administrative fees as shown in Bonding Worksheet L

RESPONSE: Bonding Worksheets I and L have been revised in response to this comment. Bonding Worksheet I has been revised to eliminate the associated leachate management costs. Bonding Worksheet L has been revised to include the revised costs for decommissioning the solar panel array, indicate the revised costs from Bonding Worksheet and I, and reflect updated contingency and administrative costs. The revised decommissioning costs are based on a Contractor estimate based on prevailing wages and includes cost of general labor, trucking cost, and heavy construction equipment. The Contractor's estimate provides the requested description for each cost item. The New York Solar Guide book reference as well as the other associated references for the decommissioning estimate are no longer applicable and have been removed.

196-251-RC MPM-AttA-9.15.20.docx

ATTACHMENT B
REVISED MPM APPLICATION

Revised Covers and Spines – ***Replace existing***

Revised Table of Contents – ***Replace existing***

Revised Project Summary – ***Replace existing***

Revised Form A – ***Insert behind existing Form A***

Revised Form B – ***Insert behind existing Form B***

Revised Form B1 – ***Insert behind existing Form B1***

Form 1 – ***Replace existing***
- **Revised Attachment 1-1 –** ***Replace existing***
- **Revised Attachment 1-3 –** ***Replace existing***

Form 28 – ***Replace existing***
- **Revised Attachment 28-2 –** ***Replace existing***

MINOR PERMIT MODIFICATION
GREATER PITTSBURGH INTERNATIONAL AIRPORT
MIDFIELD TERMINAL LANDFILL

FINDLAY TOWNSHIP, PA
SOLID WASTE PERMIT NO. 101479

PREPARED FOR:

PITTSBURGH
INTERNATIONAL AIRPORT

PITTSBURGH INTERNATIONAL AIRPORT
LANDSIDE TERMINAL, 4TH FLOOR MEZZ.
PITTSBURGH, PENNSYLVANIA, 15231

PREPARED BY

CIVIL & ENVIRONMENTAL CONSULTANTS, INC.
333 BALDWIN ROAD
PITTSBURGH, PA 15205

CEC PROJECT 196-521

JANUARY 2020; REVISED AUGUST 2020; REVISED SEPTEMBER 2020

PITTSBURGH
INTERNATIONAL AIRPORT

MINOR PERMIT MODIFICATION
GREATER PITTSBURGH INTERNATIONAL AIRPORT
MIDFIELD TERMINAL LANDFILL

FINDLAY TOWNSHIP, PA
SOLID WASTE PERMIT NO. 101479

CEC

January 2020
Revised August 2020
Revised September 2020

CEC
PROJECT
196-521

MINOR PERMIT MODIFICATION
GREATER PITTSBURGH INTERNATIONAL AIRPORT
MIDFIELD TERMINAL LANDFILL
FINDLAY TOWNSHIP, PA
SOLID WASTE PERMIT NO. 101479

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Item	Submittal
Permit Checklist	August 7, 2020
Project Summary	September 9, 2020
General Information Form – Authorization Application	August 7, 2020
Form A – Application for Municipal or Residual Waste Permit	September 9, 2020
Exhibit A-1 – USGS Location Map	August 7, 2020
Form B – Professional Certification	September 9, 2020
Form B-1 – Application for Certification	September 9, 2020
Form HW-C – Compliance History	August 7, 2020
Form I – Soil Erosion and Sedimentation Controls	August 7, 2020
Attachment I-1 – Surface Water Management and Soil Erosion and Sedimentation Control Plan	
Exhibit I-1.1 – Existing Surface Water Control Features	
Attachment I-2 – Existing Facility NPDES Permit	
Attachment I-3 – E&S Inspection Form	
Attachment I-4 – Chapter 102 Permitting for Solar Farms FAQ, Dated January 2, 2019	
Form 1 – Facility Plan	September 9, 2020
Attachment 1-1 – Facility Plan for Municipal Waste Facility	September 9, 2020
Attachment 1-2 – Drawings	August 7, 2020
Attachment 1-3 – Driven Post Design Calculations	September 9, 2020
Attachment 1-4 – Settlement Evaluation	August 7, 2020
Form 28 – Closure-Post Closure Land Use Plan	September 9, 2020
Attachment 28-1 – Post-Closure Land Use Plan	August 7, 2020
Attachment 28-2 – Bonding Worksheets	September 9, 2020

MINOR PERMIT MODIFICATION
GREATER PITTSBURGH INTERNATIONAL AIRPORT
MIDFIELD TERMINAL LANDFILL
FINDLAY TOWNSHIP, PA
SOLID WASTE PERMIT NO. 101479

PROJECT SUMMARY

The Greater Pittsburgh International Airport (GPIA) owns the Midfield Terminal Landfill located in Findlay Township, Allegheny Township, Pennsylvania. The Midfield Terminal Landfill is a 25.1 acre closed municipal solid waste landfill (Solid Waste Permit No. 101479) which is currently in post-closure care.

GPIA Midfield Terminal Landfill, is submitting this Minor Permit Modification Application (MPM) to the Pennsylvania Department of Environmental Protection Agency (PA DEP) requesting to develop solar power generation with the installation of solar panels at the closed Midfield Terminal Landfill. This Minor Permit Modification (MPM) Application for the Solar Array for Pittsburgh Airport includes construction and operation of the Solar Array for Pittsburgh Airport project.

The GPIA Midfield Terminal Landfill site was selected for the solar array project over other locations on airport property for the following reasons:

- It is a south facing slope;
- The site is an existing non-active landfill that has been closed for over 30 years;
- It is outside the Air Operations Area (AOA);
- A solar array on this site would not have a glint/glare impact on aircraft operations;
- It is front-facing to Interstate 376 and would be observed as travelers pass the airport, demonstrating GPIA commitment to sustainability;
- It can be connected to the Duquesne Light Company electric system; and
- It is a site where other development will not occur.

A solar power generation system producing approximately ~~7.3~~8.0-MW DC of total solar output is proposed for the Midfield Terminal Landfill. A series of solar panel arrays is being proposed

to be installed on the existing landfill cap over approximately ~~16.8~~19.6 acres of the landfill. The landfill's cap system consists of a 24-inch thick cover soil. The solar panel arrays will be constructed on driven post foundations which will penetrate the 24-inch soil cap to a depth of ~~up to 13~~ 7 feet. The BOTTOM OF THE driven post will ~~maintain~~ BE at least ~~4~~ 6 feet ~~of separation~~ above the existing 3.5-feet thick liner system, WHICH WILL ALLOW FOR ANY SETTLEMENT OF THE DRIVEN POST. Other ancillary features of the solar array including electrical conduit and control equipment will not penetrate the landfill cap. The solar panel arrays will be constructed in stages with the Stage I solar array installed over approximately ~~7.8~~8.0 acres and Stage II solar array installed over approximately ~~8.9~~11.6 acres.

This MPM Application includes the following forms:

- General Information Form – Authorization Application
- Form A – Application for Municipal or Residual Waste Permit
- Form B – Professional Certification
- Form B1 – Application Form Certification
- Form HW-C – Compliance History
- Form I – Soil Erosion and Sedimentation Controls
- Form 1 – Facility Plan
- Form 28 – Closure/Post-Closure Land Use Plan
- Landfill and Disposal Impoundments (Bonding Worksheets)

The forms and associated attachments are intended to provide the necessary information regarding the Solar Array for Pittsburgh Airport Project. A cover sheet is provided for each form, which indicates the attachments that are provided with it.

This MPM Application includes a set of drawings which are provided with Form 1 - Facility Plan, in Attachment 1-2.

FORM A
APPLICATION FOR MUNICIPAL OR RESIDUAL WASTE PERMIT

Prepared January 2020; Revised August 2020, Revised September 2020

Form A – Table of Contents

FORM A ..... This Permit Submission

Exhibit A-1.....USGS Location Map

2540-PM-BWM0357 Rev. 10/2016

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Coordination #

FORM A
APPLICATION FOR MUNICIPAL OR RESIDUAL WASTE PERMIT

This form must be fully and accurately completed. All required information must be typed or legibly printed in the spaces provided herein. Replacement/substitution of or attachment to this form is prohibited. Improperly completed forms may be rejected by the Department, may be considered to be violations of the Department's Rules and Regulations, and may result in assessment of fines and penalties.

SECTION A. APPLICANT IDENTIFIER (Check one of the boxes and identify both)

☒ Owner	Name: Greater Pittsburgh International Airport Midfield Terminal LF	Phone #: 412-472-3575
	Address: 1000 Airport Blvd, Pittsburgh, PA 15231	Email: KGurchak@FlyPittsburgh.com
☐ Operator	Name: Greater Pittsburgh International Airport Midfield Terminal LF	Phone #: 412-472-3575
	Address: 1000 Airport Blvd, Pittsburgh, PA 15231	Email: KGurchak@FlyPittsburgh.com

SECTION B. TYPE OF FACILITY

Municipal Waste Landfill	☒	Residual Waste Landfill	☐
Construction/Demolition Waste Landfill	☐	Class I	☐
Municipal Waste Composting Facility	☐	Class II	☐
Municipal Waste Incinerator or Resource Recovery Facility	☐	Class III	☐
Municipal Waste Demonstration Facility	☐	Residual Waste Disposal Impoundment	
Municipal Waste Transfer Facility	☐	Class I	☐
Municipal Waste Processing Facility	☐	Class II	☐
Other, Specify	☐	Residual Waste Composting Facility	☐
		Residual Waste Demonstration Facility	☐
		Residual Waste Transfer Facility	☐
		Residual Waste Incinerator or Other Processing Facility	☐
		Residual Waste Agricultural Utilization	☐
		Residual Waste Land Reclamation	☐
		Oil and Gas Wastewater Storage Impoundment	☐
		Other, Specify	☐

SECTION C. MAP LOCATION

U.S.G.S. Map Location of Facility (attach the map and identify location on the USGS map)

7.5" Map Name Clinton Quadrangle, PA

Center of Facility:

Latitude 40 ° 28 ' 55 " Longitude 80 ° 15 ' 15 "

SECTION D. GENERAL INFORMATION

Number of New Acres Proposed for Permit (Issued)
0 • 0

Number of Acres Proposed for Permit (New)
N/A •

Total Acres of the Property
37.7 •

Number of Previously Permitted Acres
25 •

Current Permit ID Number(s) 101479

SECTION E. AFFIDAVIT

COMMONWEALTH/STATE OF PENNSYLVANIA

ss:

COUNTY OF ALLEGHENY

Sworn and subscribed to before me this 10th day

of SEPTEMBER 19 2020

NOTARY PUBLIC

Commonwealth of Pennsylvania - Notary Seal
Edward D. Moeller, Notary Public
Allegheny County
My commission expires May 21, 2022
Commission number 1114076
Member, Pennsylvania Association of Notaries

My Commission Expires
MAY 21, 2022

Print or type name to be Signed: Kevin A. Gurchak Date

Date: 10 Sept 2020

I, (Signature of Applicant) do hereby certify pursuant to the penalties of 18 Pa. C.S.A. Section 4904 to the best of my knowledge, information, and belief that the information contained in this application is true and correct and is in conformance with 25 PA. Code Chapters 271 or 287, whichever is applicable, of the rules and regulations of the Department of Environmental Protection.

SECTION F. APPLICATION FEE

A. Municipal Facilities

i. Application for new permit, or repermitting. (ref. 271.128)

- ☐ $18,500 – Municipal Waste Landfill
- ☐ $19,250 – Construction/Demolition Waste Landfill
- ☐ $4,400 – Transfer Facility
- ☐ $1,900 – Incinerator or Resource Recovery Facility
- ☐ $4,000 – Other Municipal Waste Processing Facility, including Composting Facility
- ☐ $17,300 – Demonstration Facility

ii. Application for a major permit modification.

- ☐ $300 – Addition of types of waste not approved in the permit
- ☐ $7,800 – Municipal Waste Landfill and Construction/Demolition Waste Landfill
- ☐ $700 – Transfer Facility
- ☐ $1,500 – Incinerator or Resource Recovery Facility
- ☐ $700 – Other Municipal Waste Processing Facility, including Composting Facility
- ☐ $6,700 – Demonstration Facility

iii. ☐ $300 – Permit Reissuance

iv. ☐ $300 – Permit Renewal

v. ☒ $300 – Minor Permit Modification

SECTION F. APPLICATION FEE (Continued)

A. Residual Facilities

i. Application for new permit, or repermitting. (ref. 287.141)

- ☐ $25,900 – Residual Waste Landfill
- ☐ $8,500 – Residual Waste Disposal Impoundment
- ☐ $5,200 – Residual Waste Transfer Facility
- ☐ $8,300 – Residual Waste Noncaptive Incinerator
- ☐ $2,200 – Residual Waste Captive Incinerator
- ☐ $5,200 – Other Waste Processing Facility, including Composting Facility
- ☐ $8,500 – Residual Waste Demonstration Facility
- ☐ $5,100 – Residual Waste Land Reclamation
- ☐ $5,100 – Residual Waste Agricultural Utilization
- ☐ $8,500 – Oil and Gas Wastewater Storage Impoundment

ii. Application for a major permit modification.

- ☐ $600 – Addition of types of waste not approved in the permit
- ☐ $7,800 – Residual Waste Landfill
- ☐ $600 – Residual Waste Agricultural Utilization
- ☐ $1,900 – Residual Waste Land Reclamation
- ☐ $1,500 – Residual Waste Incinerator Facility
- ☐ $700 – Residual Waste Transfer or Other Processing Facility, including Composting Facility
- ☐ $5,800 – Residual Waste Demonstration Facility
- ☐ $4,600 – Residual Waste Disposal Impoundment
- ☐ $4,600 – Oil and Gas Wastewater Storage Impoundment

iii. ☐ $400 – Residual Waste Permit Reissuance

iv. ☐ $300 – Residual Waste Permit Renewal

v. ☐ $300 – Residual Waste Minor Permit Modification

SECTION G. PUBLIC NOTICE - SECTION 271.141 (MUNICIPAL), 287.151 (RESIDUAL)

For a new permit, major permit modification, permit renewal, permit reissuance, and submission of a closure plan, attach the proof of public notice for each of the following:

1. Newspaper - Attach the name of the newspaper, circulation location, copies of the notice, and dates of publication.
2. Municipality - Attach copies of the written notices sent to the host township and host county, and copies of the returned certified mail signature cards.
3. Contiguous Landowners - Attach copies of the written notice(s) sent to each landowner and copies of the returned certified mail signature cards.

SECTION H. MUNICIPAL WASTE MANAGEMENT PLANS AND PERMITS

For a new permit, major permit modification, permit renewal, or permit reissuance of a municipal waste landfill or resource recovery facility permit, is the proposed facility located in a county that has an approved municipal waste management plan that complies with Section 513 of Act 101? Yes ☐ No ☐

If the above answer is "yes", the applicant must complete form 46 - Relationship between Municipal Waste Management Plans and Permits.

NOTE: For each permit application, please submit the original (mark as such) and additional copies as requested by the Department's regional office.

FORM B
PROFESSIONAL CERTIFICATION

Prepared January 2020; Revised August 2020, Revised September 2020

Form B – Table of Contents

FORM B..... This Permit Submission

2540-PM-BWM0358 6/2005

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised January 2020, Rev August 2020 Rev Sept 2020
DEP USE ONLY
Date Received

FORM B
PROFESSIONAL CERTIFICATION

This form must be fully and accurately completed. All required information must be typed or legibly printed in the spaces provided. If additional space is necessary, identify each attached sheet as Form B, reference the item number and identify the date prepared. The "date prepared/revised" on any attached sheets needs to match the "date prepared/revised" on this page.

General References: Section 271.122, 287.122

SECTION A. SITE IDENTIFIER

Applicant/permittee: Greater Pittsburgh International Airport Midfield Terminal Landfillt

Site Name: GPIA Midfield Terminal Landfill

Facility ID (as issued by DEP): 244041

SECTION B. REGISTERED PROFESSIONAL ENGINEER

I, Duane Lanoue, P.E.
(Engineer's Name – Print or Type)

being a Registered Professional Engineer in accordance with the Pennsylvania Professional Engineer's Registration Law, do hereby certify to the best of my knowledge, information, and belief that the information contained in the accompanying application, plans, specifications, and reports has been prepared in accordance with accepted practice of engineering, are true and correct, and are in accordance with the Rules and Regulations of the Department of Environmental Protection. I also certify that those individuals indicated in the following paragraphs prepared this application under my supervision. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment.

Signature _____ Date 9-10-20

License Number PE-076388 Expiration Date 09-30-2021

Address 333 Baldwin Road
Pittsburgh, PA 15205

Telephone No. (412) 429-2324

SECTION C. SOIL SCIENTIST PROVIDING SOILS INFORMATION

I, _____ do hereby certify
(Soil Scientists Name – Print or Type)

to the best of my knowledge, information, and belief that the soils information contained in this application has been prepared in accordance with accepted practices of soil science and in accordance with the Rules and Regulations of the Department of Environmental Protection. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment.

Signature _____ Date _____

Address _____

_____

_____

Telephone No. (___) _____

SECTION D. REGISTERED PROFESSIONAL GEOLOGIST

I, _____ being a
(Hydrogeologist's Name – Print or Type)

Registered Professional Geologist in accordance with the Pennsylvania Professional Geologists Registration Law, do hereby certify to the best of my knowledge, information, and belief that the hydrogeology information contained in this application has been prepared in accordance with the accepted practices of hydrogeology and in accordance with the Rules and Regulations of the Department of Environmental Protection. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment.

Signature _____ Date _____

License Number _____ Expiration Date _____

Address _____

_____

_____

Professional Seal

Telephone No. (___) _____

FORM B1
APPLICATION FORM CERTIFICATION

Prepared January 2020; Revised August 2020, Revised September 2020

Form B1 – Table of Contents

FORM B1..... This Permit Submission

2540-PM-BWM0359 6/2005

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised January 2020. Rev August 2020 Rev Sept 2020
DEP USE ONLY
Date Received

FORM B1
APPLICATION FORM CERTIFICATION

This form must be fully and accurately completed. All required information must be typed or legibly printed in the spaces provided. If additional space is necessary, identify each attached sheet as Form B1, reference the item number and identify the date prepared. The "date prepared/revised" on any attached sheets needs to match the "date prepared/revised" on this page.

SECTION A. SITE IDENTIFIER

Applicant/permittee: Greater Pittsburgh International Airport Midfield Terminal Landfillt

Site Name: GPIA Midfield Terminal Landfill

Facility ID (as issued by DEP): 244041

SECTION B. CERTIFICATION

Professional Engineer

I, Duane Lanoue, P.E.
(Engineer's Name -Print or Type)

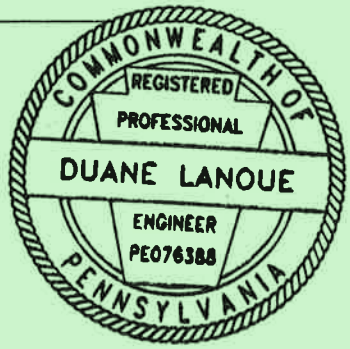
being a Registered Professional Engineer in accordance with the Pennsylvania Professional Engineer's Registration Law, do hereby certify that the forms used in the accompanying application have been reproduced under my supervision and have the same exact content and the same format as the forms prepared by the Department. I am aware that there are significant penalties for altering the content of the Department's forms, including the possibility of fines and imprisonment.

Signature _____ Date 9-10-20

License Number PE-076388 Expiration Date 09-30-2021

Address 333 Baldwin Road
Pittsburgh, PA 15205

Professional Seal



Telephone No. (412) 429-2324

FORM 1
FACILITY PLAN FOR MUNICIPAL SOLID WASTE FACILITY

Prepared January 2020; Revised August 2020, Revised September 2020

Form 1 – Table of Contents

FORM 1 ..... This Permit Submission

Attachment 1-1 .....Facility Plan for Municipal Solid Waste Facility

Attachment 1-2 .....Drawings

Attachment 1-3 ..... Driven Post Design Calculations

Attachment 1-4 ..... Settlement Evaluation

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
January 2020, Rev August 2020, Rev Sept 2020
Date Received

FORM 1
FACILITY PLAN

This form must be fully and accurately completed. All required information must be typed or legibly printed in the spaces provided. If additional space is necessary, identify each attached sheet as Form 1, reference the item number and identify the date prepared. The "date prepared/revised" on any attached sheets needs to match the "date prepared/revised" on this page.

General References: 273.112, 277.112, 279.102, 283.102

SECTION A. SITE IDENTIFIER

Applicant/permittee Greater Pittsburgh International Airport Midfield Terminal Landfillt

Site Name GPIA Midfield Terminal Landfill

Facility ID (as issued by DEP) 244041

SECTION B. **NARRATIVE**

Provide a narrative that describes the following:

1. General operational concept for proposed facility; including:
   a. Origin, composition, and weight or volume of solid waste*
   b. Type of liner system
   C. Proposed capacity of facility*
   d. Expected life of facility and size*
   e. Sequence and timing of solid waste disposal operations
2. A detailed description of the volume of soil needed to construct and operate the facility and of the method by which the soil will be delivered. The description will include the number of trucks, the access roads they will use, delivery times and any other information relevant to assessing the impacts of the operation.

*Complete page 2 of this form (Sections A, B, C, D & E)

SECTION C.

A. Origin, composition, and weight or volume of wastes

Waste Type	Origin	Composition	Present Weight or Volume (tons, cubic yards, gallons/yr)
1. Municipal	N/A	N/A	N/A
2. Construction/Demolition	N/A	N/A	N/A
3. Sewage/sludge	N/A	N/A	N/A
4. Residual	N/A	N/A	N/A
5. Other (Explain)	N/A	N/A	N/A

Additional Comments N/A - the facility is a closed landfill.

B. Proposed capacity of facility (tons, cubic yards, gallons/yr) N/A - the facility is a closed landfill. No additional capacity is proposed.

C. Daily Waste Quantities

1. Maximum daily volume or weight N/A

*2. Average daily volume or weight N/A

D. Expected life of facility (years) N/A - the facility is a closed landfill

E. Size of facility (acres) 37.7 acre landfill facity, 25.1 acres for solid waste disposal and 1.1 for sedimentation basin. 19.6 acres will be used for solar array project.

*Calculation of averaged daily volume or weight must be on a quarterly basis.

N/A

ATTACHMENT 1-1

FACILITY PLAN FOR MUNICIPAL SOLID WASTE FACILITY

MINOR PERMIT MODIFICATION
GREATER PITTSBURGH INTERNATIONAL AIRPORT
MIDFIELD TERMINAL LANDFILL
FINDLAY TOWNSHIP, PA
SOLID WASTE PERMIT NO. 101479

ATTACHMENT 1-1

FACILITY PLAN

1. General Operational Concept for Proposed Facility

A solar power generation system producing approximately ~~7.3~~8.0-MWDC of total solar output is proposed for the Midfield Terminal Landfill. A series of solar panel arrays is being proposed to be installed on the existing landfill cap over approximately ~~16.8~~19.6 acres of the landfill.

RBI Solar, Inc. (RBI) conducted the load testing in 19 locations over the landfill area to account for potential variations in the waste characteristics on June 2, 2020 in accordance with the Work Plan approved by the Pennsylvania Department of Environmental Protection (PADEP) on April 9, 2020. Three tests were performed at each location in order to determine the available axial (compression/dead load and tension/down drag) and lateral loads. CEC submitted a certification letter to the PADEP on June 18, 2020.

The landfill's cap system consists of a 24-inch thick cover soil. The solar panel arrays will be constructed on driven post foundations which will penetrate the 24-inch soil cap to a maximum depth ~~to be determined by a field study to determine the pullout design depth~~of 7 feet. The BOTTOM OF THE driven post will ~~maintain~~ BE at least ~~4~~ 6 feet ~~of separation~~ above the existing 3.5-feet thick liner system, WHICH WILL ALLOW FOR ANY SETTLEMENT OF THE DRIVEN POST. SETTLEMENT IS ANTICIPATED TO BE MINIMAL AND THE BOTTOM OF THE SOLAR PANELS ARE 3 FEET ABOVE THE GROUND SURFACE THEREBY MAXIMIZING THE SETTLEMENT OF THE DRIVEN POST TO 3 FEET, WHICH PROVIDES A MINIMUM SEPARATION OF 3 FEET THICK BETWEEN THE BOTTOM OF THE DRIVEN POST AND THE TOP OF THE LINER SYSTEM. Drawings are provided in Attachment 1-2 which provide the bottom of liner grades and a depth above the

bottom liner isopach. The solar array limit provided on the drawings is based on a minimum 16.5 feet of existing waste and liner thickness, which includes an allowance for driven post embedment depth of ~~9~~ 7 feet, ~~4~~ 6 feet separation above the liner, and the existing 3.5 feet thick liner system. Design calculations were performed to determine the maximum depth required to withstand axial and lateral loads for the posts and are provide in Attachment 1-3.

A settlement evaluation of the landfill is provided in Attachment 1-4 which compares the changes in the landfill topography between December 2010 and March 2020. The settlement evaluation shows that almost no settlement has occurred over that time period.

A SLOPE STABILITY ANALYSIS OF THE WASTE SLOPE HAS NOT BEEN PROVIDED DUE TO THE FOLLOWING CONDITIONS:

- THE SETTLEMENT OF THE WASTE MASS IS ESSENTIALLY COMPLETE AS SHOWN IN ATTACHMENT 1-4. THEREFORE ANY DIFFERENTIAL SETTLEMENT CONCERNS ARE NOT ANTICIPATED AND THE WASTE CONDITIONS CAN BE ASSUMED TO BE FULLY DECOMPOSED;
- THE EXISTING SLOPES ARE LESS THAN 15% AND ARE NOT CONSIDERED STEEP FOR WASTE OR SOIL SLOPES;
- THE FINAL COVER SYSTEM IS ENTIRELY SOIL AND NO INTERFACE ISSUES BETWEEN COMPONENTS ARE PRESENT;
- THE INSERTION OF THE DRIVEN POSTS INTO THE WASTE MASS DOES NOT PROVIDE A SUBSTANTIAL INCREASE IN LOAD; AND
- ROUTINE INSPECTION OF THE SOLAR ARRAY WILL BE PERFORMED TO IDENTIFY ANY NEED FOR ADDITIONAL BENTONITE AROUND THE POSTS TO PREVENT SURFACE WATER INFILTRATION.

Other ancillary features of the solar array including electrical conduit and control equipment will not penetrate the landfill cap. The solar panel arrays will be constructed in stages with the Stage I solar array installed over approximately ~~7.8~~8.0 acres and Stage II solar array installed over approximately ~~8.9~~11.6 acres.

~~The field study will be conducted to determine the pullout design depth of the driven posts. EIS will select ten locations spread over the landfill area. At each location, a post will be driven up to 13 feet into the waste using a GRT Pile Driver. Three tests will be performed in order to determine the pullout strength of the post. For the push test, a compressive form is applied to the~~

~~top of the post using the GRT Pile Driver in order to determine what downward load the soil/waste can resist. For the lateral test, incremental loads are applied to the embedded post and the lateral deflection in the post is measured at grade for each increment. The pull test consists of a tension force applied to the post in order to determine what uplift loads the soil/waste can resist.~~

~~Once the depth of the driven posts is determined, CEC will evaluate the waste thickness of the landfill and determine the area with waste depth that exceeds the maximum depth of the driven post plus the 4 feet buffer above the liner system. The solar array layout for both Stages I and II will be determined and a final layout will be developed.~~

As construction begins, a construction trailer will be mobilized to the project site and located outside the limits of the landfill. Deliveries of the solar panel system components will be arranged and the necessary construction equipment will be scheduled for mobilization to the project site. The layout of the solar panel arrays will be prepared, measured, and marked on the landfill.

A minimal amount of site work to prepare the site for the solar panel system is required and may include installation of erosion control measures, and construction of access roads and equipment pads. The existing access road will be utilized with any proposed access roads and equipment pads installed on the landfill cap with a dozer and vibratory roller. All vehicles and equipment with tires will be restricted to the access road. Only low ground pressure equipment will be allowed off of the access road onto the cap to minimize impact to the landfill cap.

After the site work is complete, the contractor will begin installing the driven posts. The posts will be placed into the array near their final design location. A crew will install the driven post in their final design location using a GRT Pile Driver. The topsoil/vegetation layer will be removed around the completed post where a layer of ~~A~~ bentonite clay chips or powder will be poured around the post. The topsoil/vegetative layer will be replaced over the bentonite clay chip of powder layer. This seal will ~~at the ground surface to~~ prevent any surface water infiltration at the base of the post. The racking system components will be delivered to the driven post location

with a skid steer or similar low-ground pressure equipment. The racking system is then assembled and readied for solar panel installation.

After the racking system is in position, the solar panels will be fastened to it and wired to aggregate the generated solar energy in combiner boxes. The boxes are wired to inverters where the DC current can be converted into an AC current for compatibility with the electricity supplied to the facility by the grid. The equipment pads will stage the inverter, transformer and data monitoring system. All AC wiring and DC feeders will be installed above the landfill final cover with the AC wiring placed in conduit and DC feeders placed in cable trays. The conduit and cable trays will be strapped to neoprene blocks. The AC wiring and DC feeders will be installed through culverts for protection at all road crossings. The conduit from the solar array and outside the limits of the landfill will be installed in below-ground trenches. The combiner boxes and transformers will also be located outside the landfill limits.

The AC cable is then wired from the transformers into the interconnection point located at the leachate treatment facility. The system is ready to be started-up and commissioned. The final step of the installation will be to have the inspection from the local jurisdiction and approval from the utility company to activate the system.

The solar panel array layout and proposed stages are presented on Drawing Nos. E 1.0 and E 2.0. Details of the solar panel array components are presented on Drawing No. E 5.0. The drawings are provided in Attachment 1-2.

The GPIA will document the installation of solar panel arrays in a Construction Record Documentation Report which will be submitted to the PADEP following completion of the project.

a. Origin, Composition, and Weight or Volume of Solid Waste

This site contains municipal solid waste relocated from an old municipal landfill near the airport midfield terminal in accordance with Solid Waste Disposal Facility Permit No. 101479. The

permit authorized the relocation of old municipal solid waste (MSW) from an old landfill within the Airport Midfield Terminal project. The permit authorized the infrastructure construction (liner, groundwater wells, leachate collection and management, surface water controls), waste relocation and capping to be completed between 10/9/1987 and 10/9/1989. The MSW was significantly decomposed at the time of relocation. The waste in the current Midfield Terminal Landfill has continued to decompose over the past 30 years. The maximum waste depth is estimated to be 85 feet. The volume of waste within the landfill is estimated to be 1,500,000 cy.

Due to the decomposed nature of the MSW in 1989, minimal landfill gas generation was anticipated. No gas collection and control system was included in the permit or installed for this landfill. No landfill gas migration or odor issues have been observed over the past 30 years.

Since the existing waste is significantly decomposed and the posts are made of aluminum, corrosion of the post should not be a concern.

b. Type of Liner System

The liner system for the existing closed landfill includes the following components, starting from top to bottom:

- 12-inch this protective cover layer;
- Drainage net and geotextile material leachate collection layer; and
- 30-inch thick soil blanket.

c. Proposed Capacity of Facility

Not applicable. The facility is a closed landfill. No facility capacity is proposed.

d. Expected Life and Size of Facility

Not applicable. The facility is a closed landfill.

The expected life of solar array facility is anticipated to be 35-40 years.

e. Sequence and Timing of Solid Waste Disposal Operations

Not applicable. The facility is a closed landfill.

2. A detailed description of the volume of soil needed to construct and operate the facility and of the method by which the soil will be delivered. The description will include the number of trucks, the access roads they will use, delivery times and any other information relevant to assessing the impacts of the operation.

Not applicable. The facility is a closed landfill.

ATTACHMENT 1-3

DRIVEN POST DESIGN CALCULATIONS

SUBJECT	**Driven Post Design Calculation**			PROJECT NO.	**RBI 2030237**
PROJECT	**Solar Array Project**			PAGE **1**	OF **7**
Pittsburgh International Airport					
MADE BY	**BDS**	DATE	**09/11/2020**	CHECKED BY	DATE

OBJECTIVE

The objective of this analysis is to determine the embedment depth of the driven post foundation for the solar panel racking system to safely support all loads, including dead loads, snow loads, wind loads and seismic loads.

The following documents are provided with this calculation:

- Attachment A – Pile Load Testing Report, June 18, 2020
- Attachment B – Structural Calculations, August 25, 2020
- Attachment C – Relevant Drawings
- Attachment D – Manufacturer Specifications

DRIVEN POST LOAD TESTING

RBI Solar, Inc. (RBI) conducted driven post load testing on April 9, 2020 at 19 locations over the landfill area to account for potential variations in the waste characteristics. Three tests were performed at each location in order to determine the available axial (compression/dead load and tension/down drag) and lateral loads. Additional information on the driven post load testing is provided in the Pile Load Testing Report. The Pile Load Testing Report was submitted to the PADEP on June 18, 2020. The Pile Load Testing Report is also provided in Attachment A.

A summary of the load test results are provided on pages 44 through 47 of the "Structural Calculations" provided in Attachment B. A figure showing the tested locations with the prefix "LT-" before each numbered test location is provided on page 47. Note the "LT-" prefix is excluded from the test locations in the data tables presented on pages 44 thru 46. For the uplift and compression results, the data is also plotted for clarity (see pages 44 and 45). Please note also that test location 19 is missing from the map of test locations presented on page 47. RBI Solar cropped-out this location from the map due to the error in the way the data was initially presented (See map below). This map was used to layout the locations to be tested prior to RBI Solar being on site.

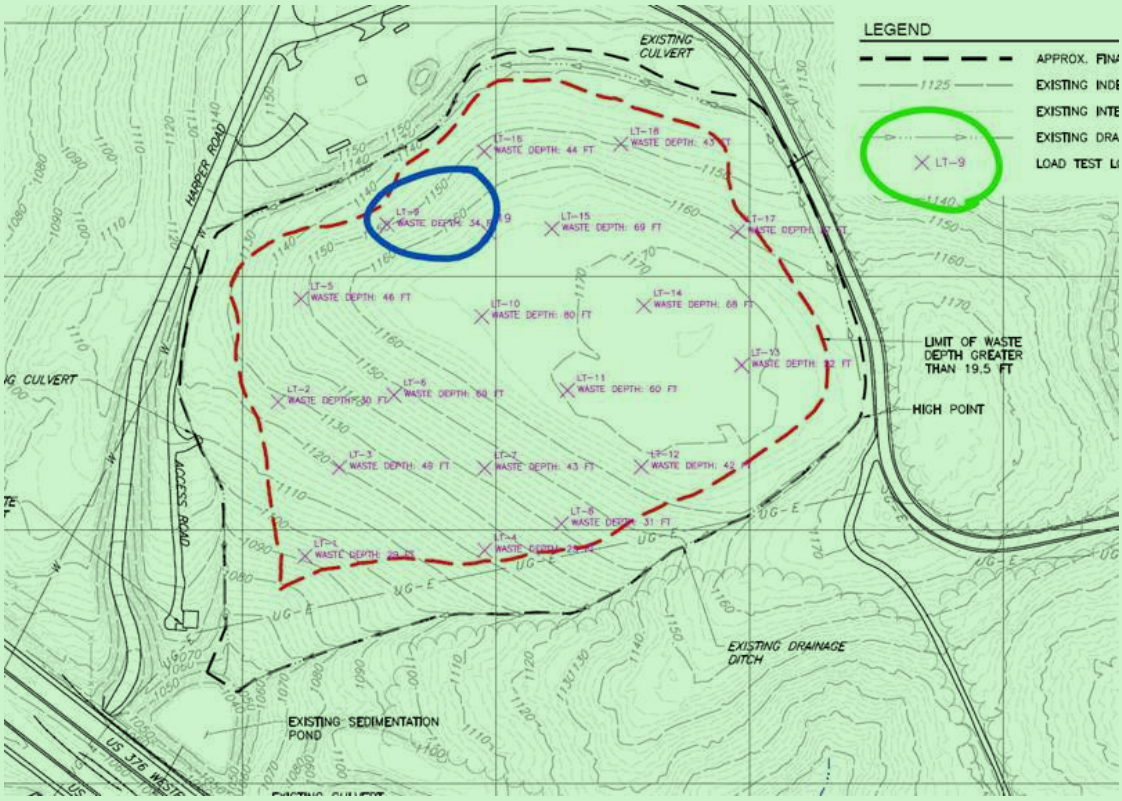


Figure 1 – Load Test Locations

Design Loads

For driven post embedment foundation design, RBI Solar considers the worst case scenario among uplift, compression and lateral loading. Using allowable stress design in accordance with the International Building Code (IBC 2015), RBI Solar determined the loads the racking structure is required to support. These loads are summarized in the respective factored load tables on pages 44 thru 46 (see example below).

Table 1 – Example Factored Load Table

Force (Factored) = Force (Unfactored) x 1.5			GRT Pressure Conversion: 6.48 kips = 1000 psi					
North			South			Interior		
Cantilever	Edge Span	Center Span	Cantilever	Edge Span	Center Span	Cantilever	Edge Span	Center Span
2 modules	5 modules	5 modules	2 modules	5 modules	5 modules	2 modules	5 modules	5 modules
Reactions	Post 2		Post 1			Post 1		Post 3
Force (Unfactored)	2.03 kips		1.96 kips			1.96 kips		1.45 kips
Force (Factored)	3.05 kips		2.94 kips			2.94 kips		2.18 kips
Pressure (Factored)	470 psi		454 psi			454 psi		336 psi

The unfactored force values in these tables are pulled from the respective reaction summaries for each array zone (see pages 7, 21 & 35). Note that RBI Solar considers a factor of safety of 1.5 for uplift and compression and a factor of safety of 2.0 for lateral design in accordance with IBC standards. The required factored-up loads (highlighted yellow in Table 1) are further divided into respective zones relative to location in the array with regards to wind exposure. These respective zones are conceptually illustrated in Figure 3 considering a rectangular array for simplicity (see pages 3, 17 and 31). Modifications are incorporated in the design to account for the actual shape of the array. To further clarify, Figure 3 should be viewed as the plan layout of the full solar array similar to sheet SG101 of the drawings (provided in Attachment C). The highlighted cells represent bays of the array or spans between posts. This is conceptually how zones are considered in the array for the purpose of our engineering calculations.

For this project, embedment design is based on the maximum of the 4 highlighted values in Table 1. As an example considering uplift only, the required design loading to design for is 470 psi. The design load is compared to the plotted and tabled load test data to determine the embedment required to resist uplift due to wind. As illustrated in the reference plot below (Figure 2), a post embedment ≥5’ – 0” is sufficient for the structure to resist wind uplift.

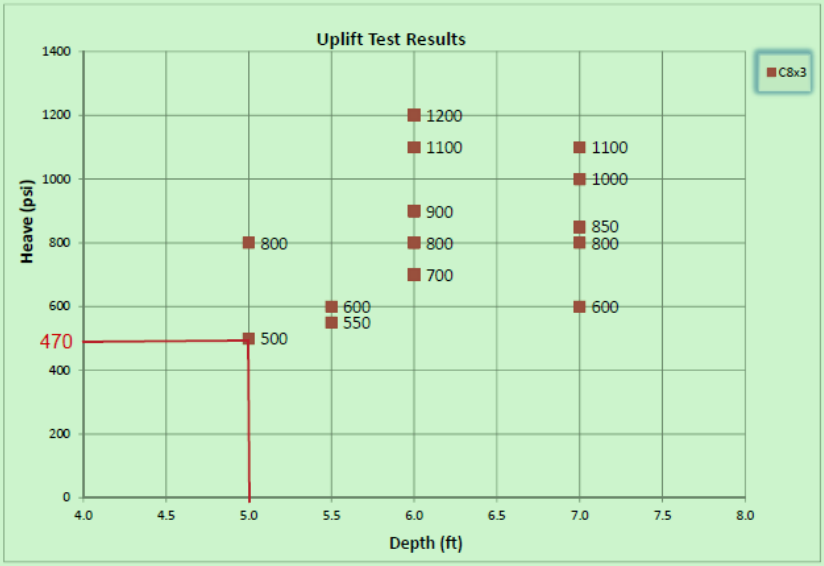


Figure 2 – Uplift Test Results

Similarly, we determine ≥5’ – 0” embedment is required to resist compression/ settlement of the post and ≥7’ – 0” embedment is required to maintain ≤1” lateral deflection at grade (per code) with the required factored lateral load of ~3000 lbs applied to the post at 4’ above grade for lateral design.

By comparison, the lateral design is governing since it requires the deepest embedment, and so the required minimum design embedment of the driven pile foundation of 7”-0” is specified.

It should be noted that the PSI is the hydraulic pressure of the pile driving machine where 1,000 psi is equivalent to 6,480 lbs.

METHODOLOGY

This calculation determines the embedment depth of the driven post foundation based on the available axial (compression/dead load and tension/down drag) and lateral loads as well as potential settlement of the driven post over time.

Member design is determined considering all failure modes and load cases and designing for the worst case stress ratio (applied member load/member capacity) using standard RBI posts. Splitting the array into zones (see Figure 3) allows RBI to optimize the layout to offer cost savings to the customer. (i.e. loading for Interior rows of an array is often significantly less than loading to North rows of the array due to shielding effects). Note the benefits of using a zoned wind loading approach greatly depends on the site location and rack section geometry. For the case of the Pittsburgh International Airport project, the maximum worst case load scenarios govern and there is no significant benefit from a zoned wind load approach. However, this is the RBI standard format for calculations. For the case of reviewing and checking the structural calculations, the maximum (i.e. worst case) loading from all 3 zones is considered.

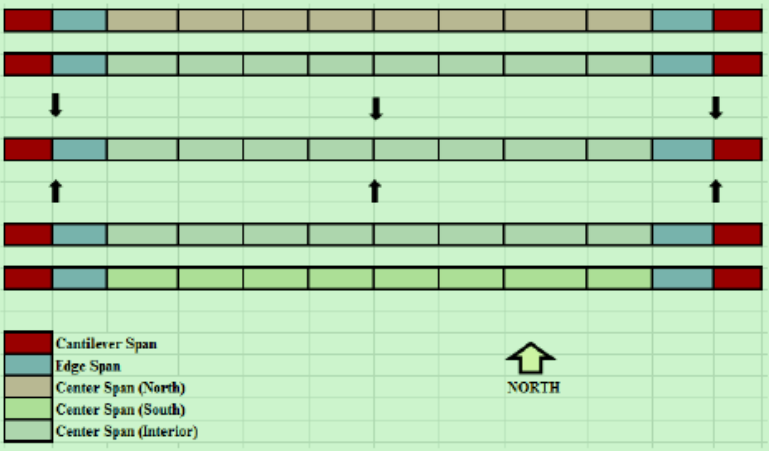


Figure 3 – Array Zones

Manufacturer's Mechanical Specifications

Per the VSUN module specifications, the maximum surface load is 5,400 Pa (112 psf). The maximum applied pressures due to wind and snow are significantly less than the maximum surface load specified in the module specification sheet. Manufacturer Specifications are provided in Attachment D.

Design Loads

Design loads are presented on the cover sheet SG001 of the project drawings by RBI Solar under the heading "Governing Code" at the bottom left corner of the drawing. Drawing SG001 is provided in Attachment C.

Alternate Foundation Designs

RBI Solar considers alternate foundations as an option for design in the event that refusal is encountered during install of driven post foundations and design embedment cannot be reached. The alternate foundation designs include spread footings and concrete piers. The alternate foundation design are provided for each zone in the calculations provided in Attachment B.

Components

The structural analysis is performed on the components of the racking system including the purlin brackets, top chord, knee brace, and mounting post as shown on the figure below:

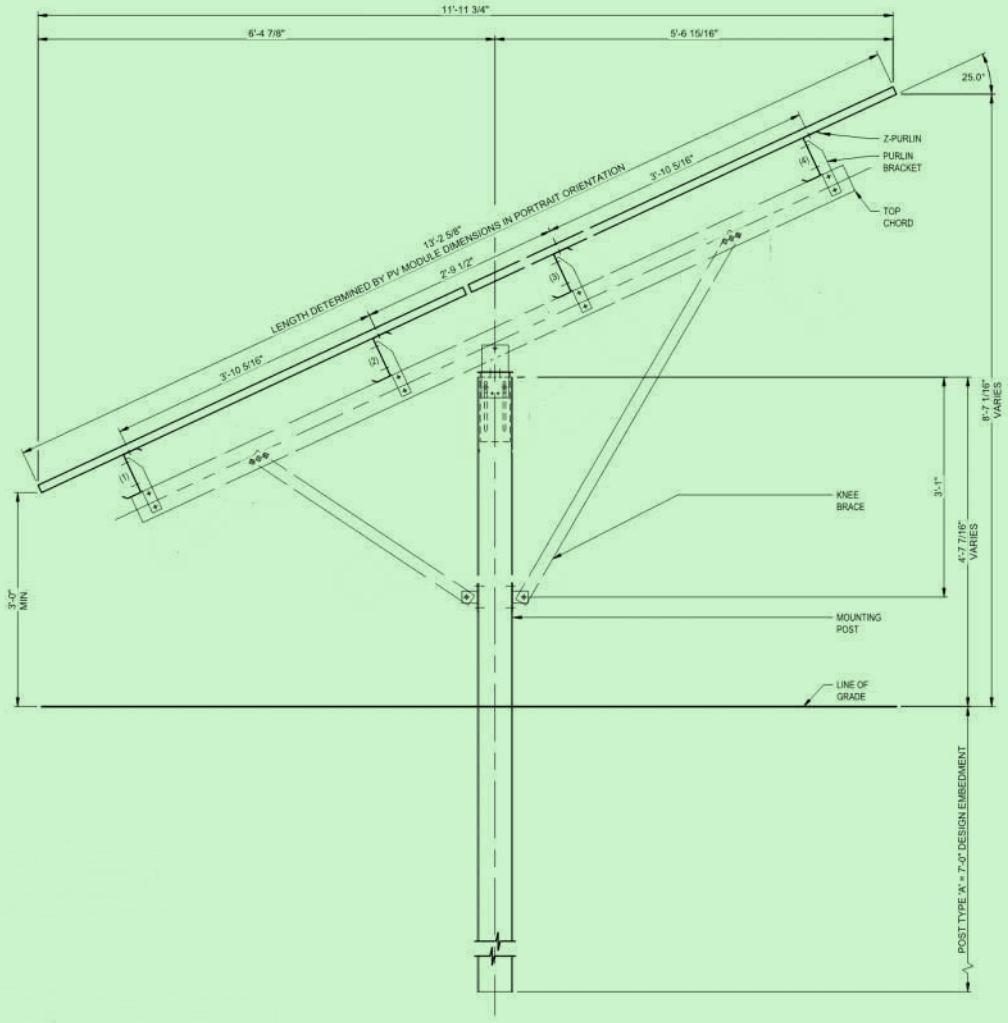


Figure 4 – Racking System Components

CALCULATION

The calculation was performed over three zones of the landfill. The calculation for the north zone driven post foundation and racking system is provided below.

A wind tunnel study was performed on the RBI racking system to determine applicable wind pressure coefficient for various wind zones as described above. The wind pressures were applied per Figure 3 on sheet 3 of 47 in calculations. The design wind, snow, dead load, etc. were applied as required per ASCE 7. The worst case load combinations were considered in each member design.

Potential Settlement Due to Downdrag

Settlement of the post is not calculated, but minimal settlement is expected based on load test results. Refer to page 45 of the attached structural calculations. During compression testing of the piles on site our pile driver reached the max driving pressure of 1,700 psi applied to the post vertically in compression with zero slip. Piles could only be driven to the required embedment by engaging the vibratory hammer on or post driving GRT. The pressure required to be resisted by the post is 790psi (unfactored). Therefore, the post will have minimal settlement in compression.

Assumptions and Member Section

Note: Conservatively, the perimeter posts (posts 1 & 2) in north and south zones were considered in the analysis. This is the reason for the same stress ratios

North:

Z-Purlin – Zee 6” x 2” x 0.55”(lips) x 16ga (55ksi)	SR = 0.92
Post - Cee 8x3x10ga (55ski)	SR = 0.95
Top Chord – 4” x 4.75” x 0.875 (lips) x 14ga. (55ksi)	SR = 0.73
Knee Brace – 2x2x15ga (50ksi)	SR = 0.58

South:

Z-Purlin – Zee 6” x 2” x 0.55”(lips) x 16ga (55ksi)	SR = 0.92
Post - Cee 8x3x10ga (55ski)	SR = 0.95
Top Chord – 4” x 4.75” x 0.875 (lips) x 14ga. (55ksi)	SR = 0.73
Knee Brace – 2x2x15ga (50ksi)	SR = 0.58

Interior (Center Span):

Z-Purlin – Zee 6” x 2” x 0.55”(lips) x 16ga (55ksi)	SR = 0.75
Post - Cee 8x3x10ga (55ski)	SR = 0.83
Top Chord – 4” x 4.75” x 0.875 (lips) x 14ga. (55ksi)	SR = 0.73 (Perimeter zone considered)
Knee Brace – 2x2x15ga (50ksi)	SR = 0.58 (Perimeter Zone Considered)

The calculations for the north, south and interior zones are provided in Attachment B.

CONCLUSIONS

Based on the calculations performed, the driven post foundation and supporting racking system components will include:

COMPONENT	MEMBER SECTION	QUANTITY
Driven Post Foundation	8” x 3” x 0.134” x 14ga steel C-Channel	840
Purlin	2” x 6” x 16ga Zee Shape with 0.55” Lips	3072
Top Chord	4” x 4.74” x 0.875” x 14ga steel C-Channel	840
Front & Back Knee Braces	2” x 2” x 15ga steel tube	840
Solar Panels		9360
Equipment Post Foundations	8” x 3” x 0.134” x 14ga steel C-Channel	50
Other components	Per Sheet SG003 of RBI Solar Project Drawings (Attachment C)	

Please refer to RBI Solar project drawings in Attachment C for additional information. Bill of materials is provided on sheet SG003 of the drawings excluding pricing.

The driven post foundation embedment will be a maximum of 7 feet below grade. The driven post foundation is anticipated to settle no more than 1 inch.

ATTACHMENT A

PILE LOAD TESTING REPORT

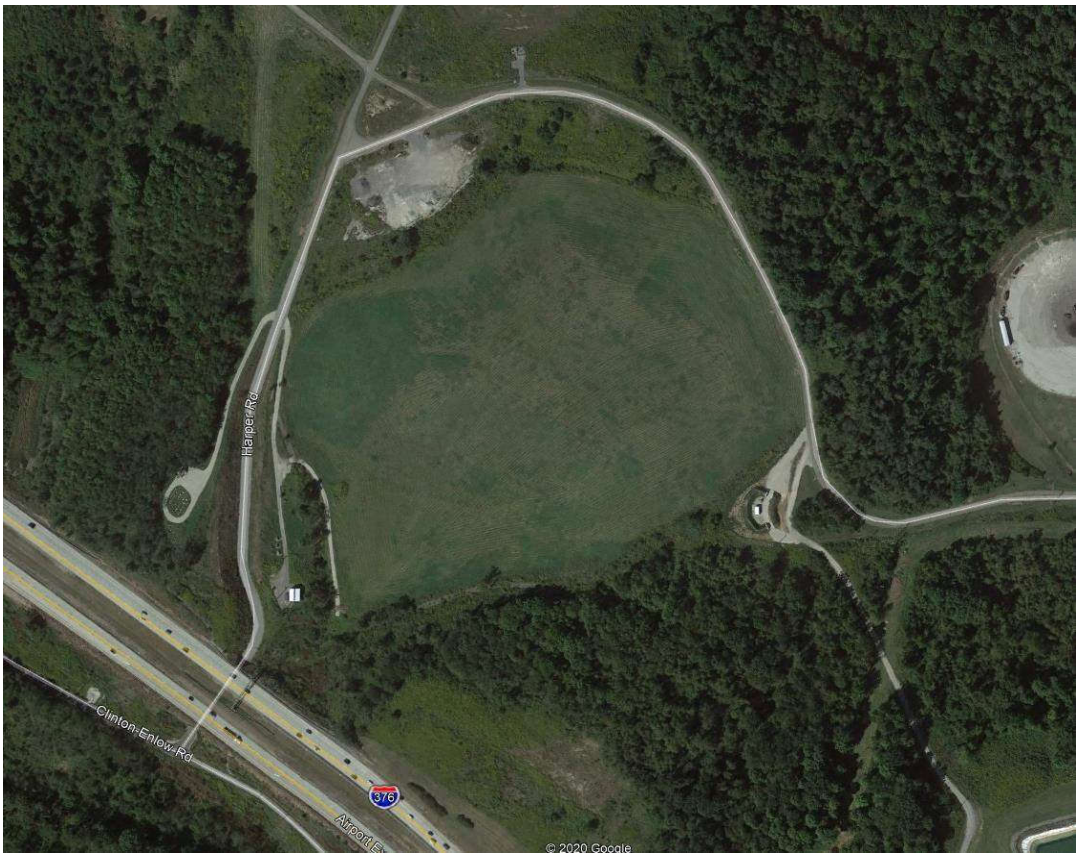
PILE LOAD TESTING REPORT

Report Created: Tuesday, June 09, 2020
Test Performed: Tuesday, June 02, 2020

Attn: **Energy Independent Solutions**

Re: **Pittsburgh Airport**
1000 Harper Rd.
Imperial, PA 15126

Utilitiy Locate Reference: 20201484133



6715 Steger Dr., Cincinnati, OH 45237 | Ph: 513-242-2051 | Fax: 513-242-0816

RBI SOLAR

CONTENTS

1. Scope of Work
2. Method Overview
3. Pile Testing and Observations
4. General Comments and Qualifications
5. Test Data
6. Map of Test Locations and Site Images

1. Scope of Work

RBI Solar, Inc. (RBI Solar) submits here the results of the pile load tests for the above referenced project. RBI Solar's personnel performed the tests on Tuesday, June 02, 2020 in accordance with the agreement between RBI Solar and Energy Independent Solutions. The following report summarizes the test methods utilized and the data collected in preparation for the proposed solar array site located in Imperial, PA.

RBI Solar's scope of work includes driving and testing piles in locations throughout the proposed array location as accessibility and terrain allow. The test piles are driven to various depths and are tested at each depth with vertical and lateral loads. The piles used during testing represent the piles that will be used in the design and construction of the pile foundation. The data collected will be used to evaluate the performance of the piles and soil on site and determine embedment depths.

The project will consist of approximately 3.7 MW DC solar PV. Fixed-tilt ground mounted foundations were tested.

2. Method Overview

The testing consists of three primary tests:

1. Static Axial Compressive Pile Load Testing (Push Test)
2. Lateral Pile Load Testing (Lateral Test) performed in general accordance with ASTM-D3966-07
3. Axial Uplift Pile Load Testing (Pull Test) performed in general accordance with ASTM-D3689-07

The Push Tests are performed by standing a pile vertically underneath the hammer of RBI Solar's pile driving machine and applying a constant downward force (see Figure 2.1) until the pile stops driving at which point the depth driven is recorded. Next, the hammer is engaged and the test pile is driven the remaining distance to reach the desired embedment depth. The final embedment depth, the drive rate, and any slip (downward movement after hammer is released) that occurs is recorded.

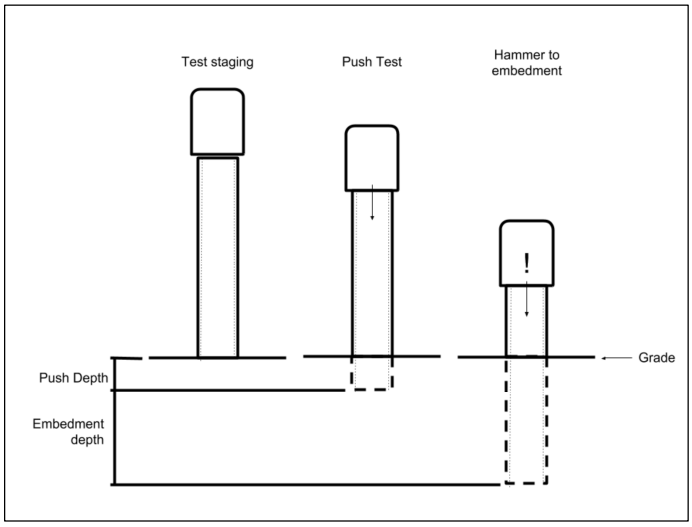


Figure 2.1: Push Test

The Lateral Tests are performed once the pile has reached the embedment depth or when the pile meets “refusal” and cannot be driven further into the ground by reasonable means. In cases where the test pile does not reach minimum embedment, Lateral Tests are typically abandoned. The test is performed by first connecting a scale between the test pile and the boom arm on the pile driver (see Figure 2.2). The scale allows the application of incremental lateral forces to the test pile. At each increment a measurement of the deflection of the embedded test pile at grade level is recorded. Once all lateral forces have been applied, the force load is released and the rebound of the test pile is measured in relation to the initial position.

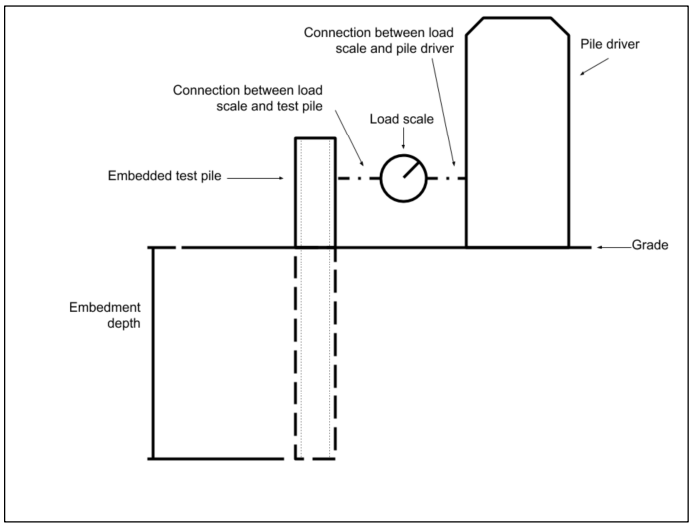


Figure 2.2: Lateral Test

The Pull Tests are performed by placing a boot around the test pile at grade level. The boot is attached to a hydraulic uplift arm on the pile driver via a chain or strap (see Figure 2.3). The hydraulic uplift arm is then engaged which applies a vertical tensile force to the embedded test pile. The force is gradually increased until test pile "releases" from the soil at which point pressure readings from the pile driver are recorded and then converted to applied forces by the RBI Engineering team post factum. During the Pull Test, the test pile may "heave" upward, but remain embedded afterwards. If this event occurs the force at which the test pile "heaved" and the distance it is displaced upward are recorded.

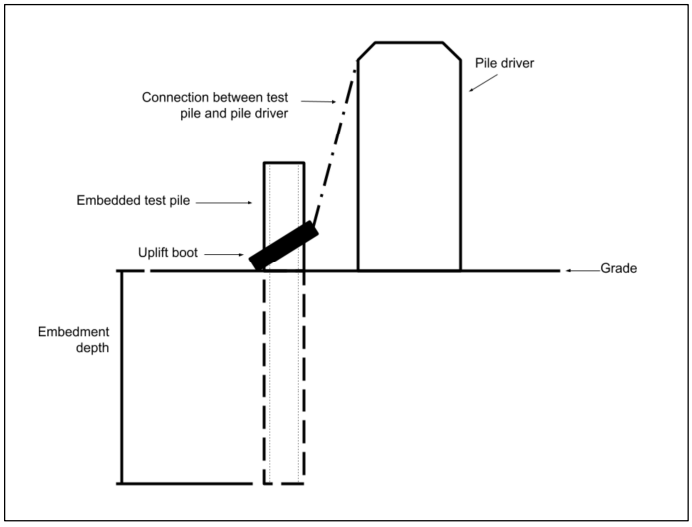


Figure 2.3: Pull Test

3. Pile Testing and Observations

The solar arrays will be set on a landfill near an airport. The proposed array location slopes down towards the south. The soil type was difficult to observe due to the requirement of leaving the posts in the ground after testing.

On the day of testing, there were no site features limiting access or maneuverability of the pile driver. Tests were performed on 19 embedded test piles in 19 locations (see map of test locations in Section 6) using 10 ga. C8"x3" steel piles during testing. The test piles were hammered at an average rate and were driven in to the ground plumb.

Soil samples were obtained from the site and sent to an environmental/geotechnical laboratory to verify corrosivity of the local soil. Results will be available approximately two weeks following testing.

No refusal was encountered during testing.

Test locations were limited to areas approved by the customer. Surface rock was observed in some areas.

4. General Comments and Qualifications

Test results presented in this report are representative of the test piles used, their embedment depth, and the subsurface conditions they were installed in. The results do not necessarily reflect variations that may exist between test locations, embedment depths, and different pile types. The results are specific to the design of RBI Solar's racking and piles and should not be used in the design of any other system or for any other pile profile.

This report is meant only to present the data collected during the pile load testing and present a broad overview of the tests performed. This report should not be used as a procedure for performing pile load testing nor should it be used to design or develop new testing procedures.

The data collected from the tests and included in this report is specific to the design of RBI Solar's racking and pile foundation design and should not be used in the design of any other system or for any other pile profile. RBI Solar is not responsible for any claims, damages, or liability associated with the interpretation of this data by any outside party. If you have received this report and are using it as the basis for design of any racking system or pile foundation other than RBI Solar's system, you are assuming all liability for the integrity of the system, misinterpretations of the data, and any failures of the design.

Tests performed in this report are designed to determine embedment depths for engineering purposes only. Test locations are selected to produce a broad view of the local soil conditions as they relate to pile embedment. Refusal rates encountered during testing are not predictive of actual refusal rates encountered during installation.

5. Test Data

Table 5.1: Compression Test Results						
Test	Pile Type	Push Pressure (psi)	Slip (ft.)	Push Depth (ft.)	Embed. Depth (ft.)	Refusal (*)
1	C8X3	1700	0.00	3.0	7.0	
2	C8X3	1700	0.00	1.0	6.0	
3	C8X3	1700	0.00	1.0	5.0	
4	C8X3	1700	0.00	1.5	7.0	
5	C8X3	1700	0.00	1.0	7.0	
6	C8X3	1700	0.00	1.0	6.0	
7	C8X3	1700	0.00	1.5	7.0	
8	C8X3	1700	0.00	2.0	5.5	
9	C8X3	1700	0.00	1.0	5.0	
10	C8X3	1700	0.00	2.0	6.0	
11	C8X3	1700	0.00	2.0	7.0	
12	C8X3	1700	0.00	1.0	6.0	
13	C8X3	1700	0.00	0.5	6.0	
14	C8X3	1700	0.00	1.0	7.0	
15	C8X3	1700	0.00	2.0	6.0	
16	C8X3	1700	0.00	1.0	6.0	
17	C8X3	1700	0.00	2.0	6.0	
18	C8X3	1700	0.00	1.0	6.0	
19	C8X3	1700	0.00	1.0	5.5	
Notes:						
A value of "N/A" indicates a test for this value was unable to be performed.						
A Refusal value of "*" indicates refusal was encountered at that test location.						

Table 5.2: Lateral Test Results												
Test	Pile Type	Load Height (ft.)	Embed. Depth (ft.)	Force (lbs.)	Deflection (in.)	Force (lbs.)	Deflection (in.)	Force (lbs.)	Deflection (in.)	Force (lbs.)	Deflection (in.)	Rebound (in.)
1	C8X3	4.0	7.0	**1000**	0.250	**2000**	0.625	**3000**	1.000	**4000**	1.375	0.625
2	C8X3	4.0	6.0	**1000**	0.125	**2000**	0.375	**3000**	0.750	**4000**	1.000	0.500
3	C8X3	4.0	5.0	**1000**	0.250	**2000**	0.625	**3000**	1.125	**4000**	1.500	0.625
4	C8X3	4.0	7.0	**1000**	0.250	**2000**	0.500	**3000**	0.750	**4000**	1.000	0.375
5	C8X3	4.0	7.0	**1000**	0.250	**2000**	0.500	**3000**	0.750	**4000**	1.000	0.500
6	C8X3	4.0	6.0	**1000**	0.250	**2000**	0.500	**3000**	0.750	**4000**	1.125	0.500
7	C8X3	4.0	7.0	**1000**	0.125	**2000**	0.250	**3000**	0.500	**4000**	0.750	0.375
8	C8X3	4.0	5.5	**1000**	0.250	**2000**	0.625	**3000**	1.000	**4000**	1.250	0.625
9	C8X3	4.0	5.0	**1000**	0.250	**2000**	0.625	**3000**	1.000	**4000**	1.375	0.625
10	C8X3	4.0	6.0	**1000**	0.250	**2000**	0.500	**3000**	0.750	**4000**	1.125	0.500
11	C8X3	4.0	7.0	**1000**	0.125	**2000**	0.375	**3000**	0.625	**4000**	0.875	0.375
12	C8X3	4.0	6.0	**1000**	0.250	**2000**	0.500	**3000**	0.750	**4000**	1.000	0.375
13	C8X3	4.0	6.0	**1000**	0.250	**2000**	0.375	**3000**	0.625	**4000**	1.000	0.375
14	C8X3	4.0	7.0	**1000**	0.125	**2000**	0.375	**3000**	0.625	**4000**	0.875	0.375
15	C8X3	4.0	6.0	**1000**	0.125	**2000**	0.375	**3000**	0.625	**4000**	0.875	0.375
16	C8X3	4.0	6.0	**1000**	0.250	**2000**	0.500	**3000**	0.750	**4000**	1.000	0.375
17	C8X3	4.0	6.0	**1000**	0.250	**2000**	0.500	**3000**	0.750	**4000**	1.125	0.500
18	C8X3	4.0	6.0	**1000**	0.125	**2000**	0.375	**3000**	0.625	**4000**	1.000	NA
19	C8X3	4.0	5.5	**1000**	0.250	**2000**	0.500	**3000**	0.625	**4000**	1.250	0.500
Notes:												
A value of "N/A" indicates a test for this value was unable to be performed.												

Table 5.3: Uplift Test Results					
Test	Pile Type	Embed. Depth (ft.)	Heave (psi)	Heave Displ. (in.)	Release (psi)
1	C8X3	7.0	NO HEAVE	NO HEAVE	600
2	C8X3	6.0	NO HEAVE	NO HEAVE	700
3	C8X3	5.0	NO HEAVE	NO HEAVE	800
4	C8X3	7.0	NO HEAVE	NO HEAVE	850
5	C8X3	7.0	NO HEAVE	NO HEAVE	800
6	C8X3	6.0	NO HEAVE	NO HEAVE	900
7	C8X3	7.0	NO HEAVE	NO HEAVE	1000
8	C8X3	5.5	NO HEAVE	NO HEAVE	550
9	C8X3	5.0	NO HEAVE	NO HEAVE	500
10	C8X3	6.0	NO HEAVE	NO HEAVE	900
11	C8X3	7.0	NO HEAVE	NO HEAVE	1000
12	C8X3	6.0	NO HEAVE	NO HEAVE	1200
13	C8X3	6.0	NO HEAVE	NO HEAVE	800
14	C8X3	7.0	NO HEAVE	NO HEAVE	1100
15	C8X3	6.0	NO HEAVE	NO HEAVE	1100
16	C8X3	6.0	NO HEAVE	NO HEAVE	800
17	C8X3	6.0	NO HEAVE	NO HEAVE	900
18	C8X3	6.0	NO HEAVE	NO HEAVE	900
19	C8X3	5.5	NO HEAVE	NO HEAVE	600
Notes:					
A Pull Release value of "NO PULL" indicates the removal of the pile from the soil required more force than could be measured.					
A Pull Release value of "STUCK" indicates the pile was unable to be removed from the soil.					
A value of "N/A" indicates a test for this data point was unable to be performed.					

6. Map of Test Locations and Site Images

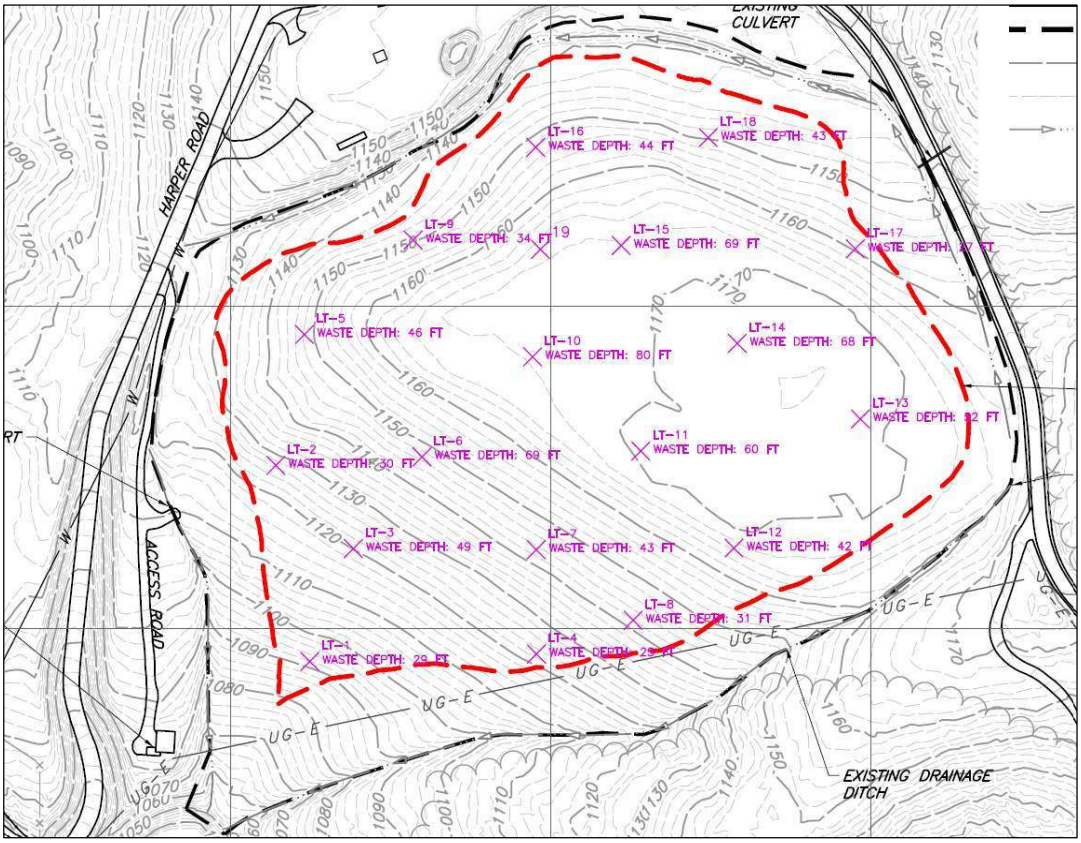


Image 6.1: Map of Test Locations

Image 6.2: Proposed Array Location

Image 6.3: Proposed Array Location

ATTACHMENT B

STRUCTURAL CALCULATIONS

JOB TITLE	PITTSBURGH AIRPORT		
JOB LOCATION	IMPERIAL, PA 15126		
JOB NO.	2030237	**SHEET NO.**	
CALCULATED BY	BDS	**DATE**	8/25/20
CHECKED BY		**DATE**	

STRUCTURAL CALCULATIONS

FOR

ENERGY INDEPENDENT SOLUTIONS, LLC

PITTSBURGH AIRPORT
IMPERIAL, PA 15126

RBI SOLAR

JOB TITLE	PITTSBURGH AIRPORT		
JOB LOCATION	IMPERIAL, PA 15126		
JOB NO.	2030237	SHEET NO.	
CALCULATED BY	BDS	DATE	8/25/2020
CHECKED BY		DATE	

VI. Seismic Loads:

Seismic Use Group I
Importance Factor (Ie) 1.00
Site Class D

Ss (0.2 sec) = 11.20 %g
S1 (1.0 sec) = 5.30 %g

Fa =	1.600	Sms =	0.179	Sds =	0.120	Design Category =	A
Fv =	2.400	Sm1 =	0.127	Sd1 =	0.085	Design Category =	B

Seismic Design Category = **B**

Number of Stories: 1
Structure Type: Light Frame
Plan Structural Irregularities: No plan Irregularity
Vertical Structural Irregularities: No vertical Irregularity

Flexible Diaphrams: No
Non-building Structure Type **Inverted Pendulum Systems**
Seismic resisting system: **Cantilevered column systems**
System Building Height Limit: **NL**
Actual Building Height (hn) = 6.5 ft

DESIGN COEFFICIENTS AND FACTORS

Response Modification Factor (R) = 2
System Over-Strength Factor (Ωo) = 2 Sds = 0.120
Deflection Amplification Factor (Cd) = 2 Sd1 = 0.085
Code Reference Section for Detailing : 12.2.5.3

PERMITTED ANALYTICAL PROCEDURES

Index Force Analysis (Seismic Categor Method Not Permitted

Simplified Analysis - Permitted
Design Base Shear V=1.2SdsW/R = 0.072W

Equivalent Lateral-Force An - Permitted
Building period coef. (C_T) = 0.020
Approx fundamental period (Ta) = $C_T h_n^x$ = 0.081 x= 0.75
Seismic response coef. (Cs) = SdsIe/R = 0.060
need not exceed Cs = Ie/RTa = 0.523
but not less than Cs = .044SdsIe 0.005
USE Cs = 0.060
Design Base Shear V = 0.060W

Model, Linear & Nonlinear Response A - Permitted (see code for procedure

DESIGN CRITERIA

North

Design Criteria:

Code:	**IBC 2015**
Dead Load:	4.2 psf
Roof Live Load:	0.0 psf
Ground Snow:	25.0 psf
Wind Speed:	105 mph (Exposure C Assumed)
Module Tilt:	25.0 deg
Purlin Trib Width:	3.01 ft (Horizontal Projection)

Snow Load Calculation: $p_f = 0.7C_sC_eC_tI_sp_g$

C_e =	0.9
C_t =	1.2
I_s =	0.8
C_s =	0.82
p_s =	**12.4 psf**

Wind Load Calculation: $q = 0.00256K_zK_dK_{zt}V^2$

K_z =	0.85
K_d =	0.85
K_{zt} =	1.0
q =	**20.4 psf**

Mean Roof Height = 6.5 ft (Per RWDI Wind Tunnel Analysis)

WIND TUNNEL COEFFICIENTS (RWDI)			TILT	
			25.0 deg	
PURLIN				
ZONE	**GCp Up**	**GCp Down**	**PSF Up**	**PSF Down**
Cantilever	-1.810	1.774	-36.9	36.2
Edge Span	-1.558	1.218	-31.8	24.8
North Row Center Span	-1.322	0.688	-27.0	14.0
South Row Center Span	-1.408	1.141	-28.7	23.3
Interior Center Span	-1.314	0.649	-26.8	13.2
TOP CHORD				
ZONE	**GCp Up**	**GCp Down**	**PSF Up**	**PSF Down**
Cantilever	-1.102	1.774	-22.5	36.2
Edge Span	-1.102	1.218	-22.5	24.8
North Row Center Span	-0.986	0.668	-20.1	13.6
South Row Center Span	-0.816	1.141	-16.6	23.3
Interior Row Center Span	-0.812	0.633	-16.6	12.9
BASE MOMENT				
ZONE	**GCmy (+)**	**GCmy (-)**	**q*GCmy (+)**	**q*GCmy (-)**
Cantilever	0.376	-0.159	7.7	-3.2
Edge Span	0.301	-0.128	6.1	-2.6
North Row Center Span	0.239	-0.122	4.9	-2.5
South Row Center Span	0.280	-0.064	5.7	-1.3
Interior Row Center Span	0.261	-0.122	5.3	-2.5

Note: See Figures 1 & 2 for clarity on zones

APPLIED LOADING		
DEAD LOAD:	5psf*Purlin Spacing/1000	0.014 klf
LIVE LOAD:	N/A	0.000 klf
SNOW:	P_s*Purlin Trib. Width/1000:	0.037 klf

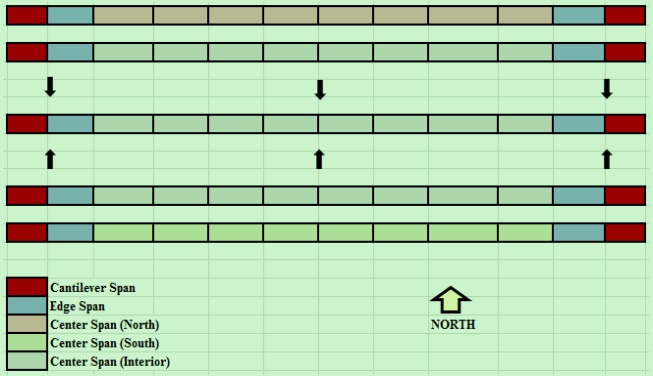


FIGURE 1

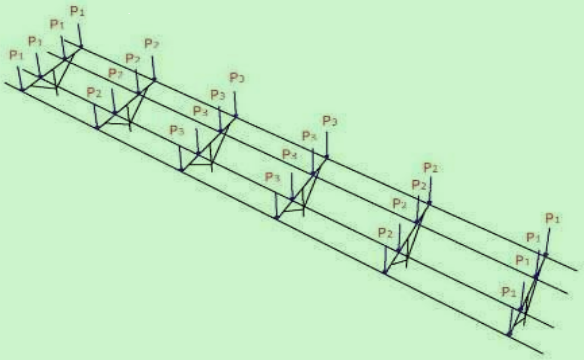


FIGURE 2

WIND: (Top Chord Pressures)	North
$P1_{up} = \frac{Upslope\ Length * q}{4}\left[Cantilever\ Width * GCp_{(cantilever)} + \frac{Edge\ Span\ Width}{2} * GCp_{(edge\ span)}\right]$	-1.133 kips
$P1_{down} = \frac{Upslope\ Length * q}{4}\left[Cantilever\ Width * GCp_{(cantilever)} + \frac{Edge\ Span\ Width}{2} * GCp_{(edge\ span)}\right]$	1.506 kips
$P2_{up} = \frac{Upslope\ Length * q}{4}\left[\frac{Edge\ Span\ Width}{2} * GCp_{(edge\ span)} + \frac{Center\ Span\ Width}{2} * GCp_{(center\ span)}\right]$	-1.193 kips
$P2_{down} = \frac{Upslope\ Length * q}{4}\left[\frac{Edge\ Span\ Width}{2} * GCp_{(edge\ span)} + \frac{Center\ Span\ Width}{2} *$	1.077 kips
$P3_{up} = \frac{Upslope\ Length * q}{4}[Center\ Span\ Width * GCp_{(center\ span)}]$	-1.126 kips
$P3_{down} = \frac{Upslope\ Length * q}{4}[Center\ Span\ Width * GCp_{(center\ span)}]$	0.763 kips

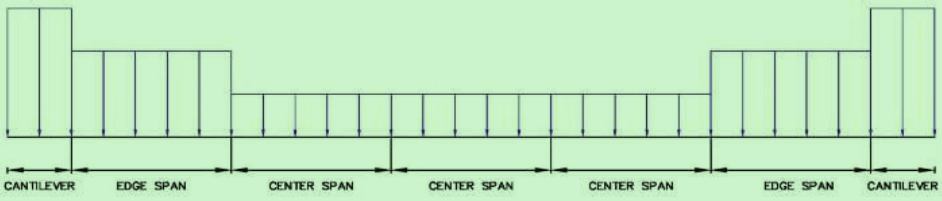


FIGURE 3

WIND: (Base Moments)

GC_{My}*q*A*Upslope Length

North		
POSITIVE		
Post 1	Post 2	Post 3
18.18 k-ft	16.31 k-ft	14.42 k-ft
NEGATIVE		
Post 1	Post 2	Post 3
-7.72 k-ft	-7.58 k-ft	-7.40 k-ft

PURLIN ANALYSIS

Purlin Selected=	6 z 16 ga (1)
Zone:	North
Purlin Spacing =	3.33 ft
Dead Load=	3.34 psf
Snow Load=	12.4 psf

(module wt + purlin self wt)

RBI SOLAR

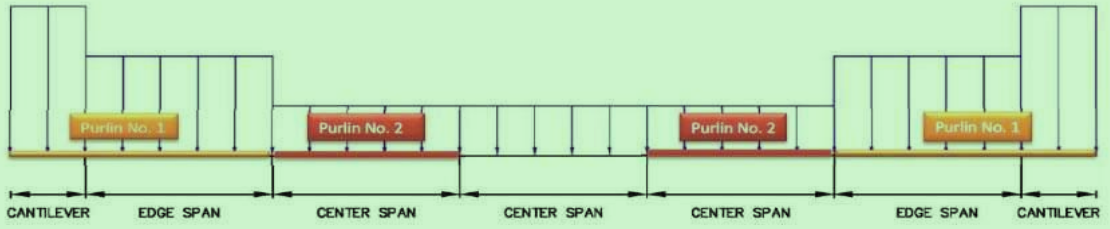


FIGURE 1

Strong Axis Applied Distributed Pressures

ASD Load Combos:	Cantilever		Edge Span		Center Span	
	positive, ↓	negative, ↑	positive, ↓	negative, ↑	positive, ↓	negative, ↑
D+0.6W=	24.74 psf	-	17.93 psf	-	11.45 psf	-
D+S=	13.21 psf	-	13.21 psf	-	13.21 psf	-
D+0.75(0.6W+S)=	26.95 psf	-	21.84 psf	-	16.98 psf	-
0.6D+0.6W=	-	-20.33 psf	-	-17.25 psf	-	-14.36 psf

Weak Axis Applied Distributed Pressures

ASD Load Combos:	Cantilever		Edge Span		Center Span	
	positive, ↓	negative, ↑	positive, ↓	negative, ↑	positive, ↓	negative, ↑
D+0.6W=	1.41 psf	-	1.41 psf	-	1.41 psf	-
D+S=	6.16 psf	-	6.16 psf	-	6.16 psf	-
D+0.75(0.6W+S)=	4.97 psf	-	4.97 psf	-	4.97 psf	-
0.6D+0.6W=	-	0.85 psf	-	0.85 psf	-	0.85 psf

Lengths

Cant. Length	6.78 ft
Edge Span Length	16.95 ft
Center Span Length	16.95 ft

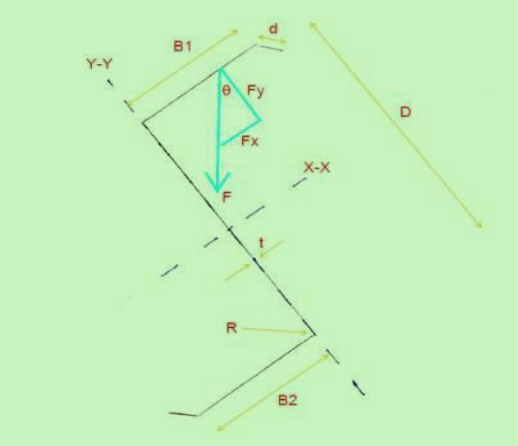


FIGURE 2

Purlin Properties

D=	6.00 in	Ix=	3.54 in^4
B1=	2.00 in	Iy=	0.60 in^4
B2=	2.00 in	Sx=	1.18 in^3
d=	0.55 in	Sy=	0.25 in^3
t=	0.06 in	C_R=	0.70
R=	0.13 in	Ωb =	1.67
Area=	0.65 in^2	Cm=	1
Wt per foot=	2.20 lb/ft	$Sy_{(group)}$=	13.81 in^3
Fy=	55 ksi	E=	29000 ksi
		Lu=	16.46 ft

ALL PRE-GALVANIZED PURLIN COIL MATERIAL IS PER ASTM A653 GRADE 55

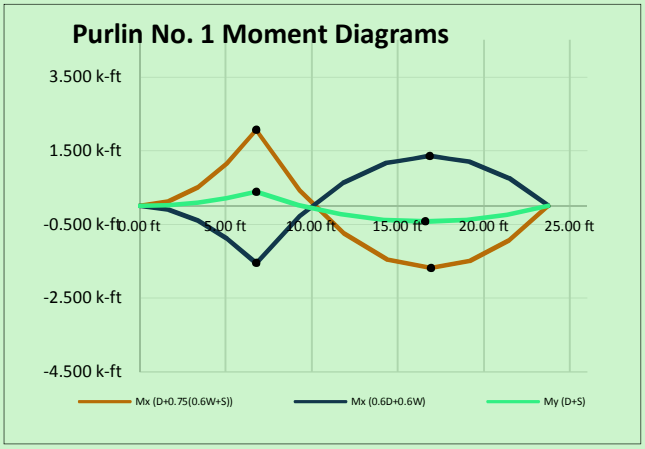
Per AISI F2.1, Mne = Sf * Fn

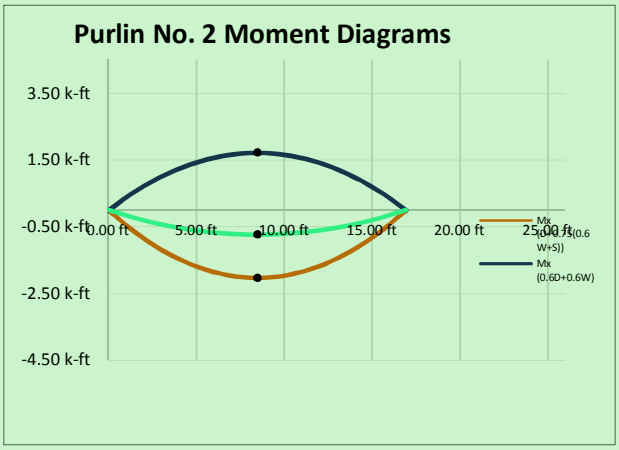
Fcre > 2.78 * Fy, Fn = Fy

lateral torsional buckling does not control

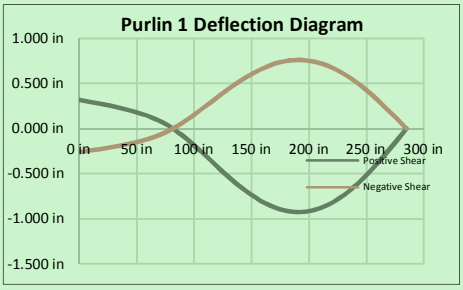
Stress Ratio Maximums					
North Zone	Purlin Stress Ratios: Positive Shear, ↓				
	Mx	My	Governing Load Combo	S.R. = (Mx/Max)+(My/May) ≤ 1.0	
Cantilever	2.06 k-ft	0.38 k-ft	D+0.75(0.6W+S)=	0.92	OK
Edge Span	1.68 k-ft	0.42 k-ft	D+0.75(0.6W+S)=	0.53	OK
Center Span	2.03 k-ft	0.59 k-ft	D+0.75(0.6W+S)=	0.65	OK

North Zone	Purlin Stress Ratios: Positive Shear, ↑				
	Mx	My	Governing Load Combo	S.R. = (Mx/Max)+(My/May) ≤ 1.0	
Cantilever	-1.55 k-ft	0.06 k-ft	0.6D+0.6W=	0.48	OK
Edge Span	-1.36 k-ft	0.07 k-ft	0.6D+0.6W=	0.60	OK
Center Span	-1.71 k-ft	0.10 k-ft	0.6D+0.6W=	0.76	OK

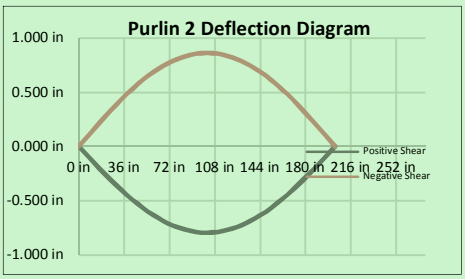




Deflection Checks			
Purlin No. 1			
Allowable Deflection =	L/120		
Maximum Cantilver Deflection =	0.32 in	L/509	OK
Maximum Span Deflection =	0.92 in	L/220	OK



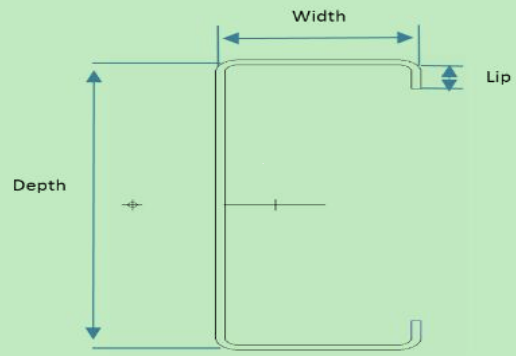
Purlin No. 2			
Allowable Deflection =	L/120		
Maximum Positive Deflection =	0.79 in	L/256	OK
Maximum Negative Deflection =	0.86 in	L/236	OK



CHANNEL COLUMN ANALYSIS

Post Section:	8"x 3" x 0.134"

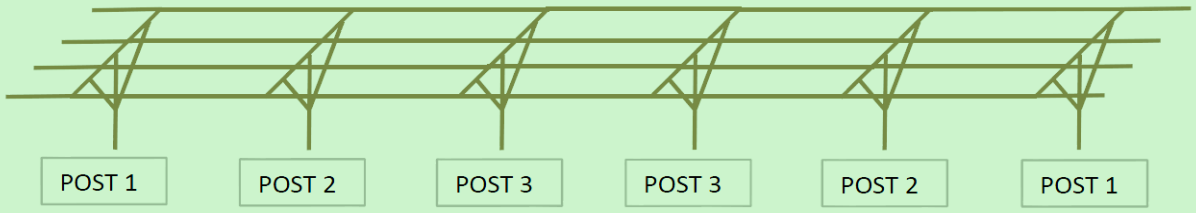
A =	1.96 in^2
D =	8.00 in
t =	0.134 in
W =	3.00 in
Lip =	0.80 in
Ix =	18.86 in^4
Iy =	2.19 in^4
Sx =	4.72 in^3
Sy =	1.03 in^3
Kx =	2.10
Ky =	1.20
Lx =	5.61 ft
Ly =	5.61 ft



Pa=	33.72 k	allowable axial load
Max=	11.74 k-ft	allowable major axis bending moment
May=	2.83 k-ft	allowable minor axis bending moment

	P	Mx	My	Load Combo
Max Required Strength:	**0.85 k**	**10.91 k-ft**	**0.00 k-ft**	**D+0.6W_up**
Post 1 Max Required Strength:	0.85 k	10.91 k-ft	0.00 k-ft	D+0.6W_up
Post 2 Max Required Strength:	0.94 k	9.78 k-ft	0.00 k-ft	D+0.6W_up
Post 3 Max Required Strength:	0.94 k	8.65 k-ft	0.00 k-ft	D+0.6W_up

Post 1 Max Stress Ratio	Post 2 Max Stress Ratio	Post 3 Max Stress Ratio
0.954	**0.861**	**0.765**
POST 1 GOVERNS		



North Reactions Summary

Max Uplift	
Post 1 =	-1.96 k
Post 2 =	-2.03 k ←
Post 3 =	-1.88 k

Max Down	
Post 1 =	5.00 k ←
Post 2 =	4.59 k
Post 3 =	4.08 k

Max Shear	
Post 1 =	1.53 k ←
Post 2 =	1.21 k
Post 3 =	1.14 k

Max Moment	
Post 1 =	10.91 k-ft ←
Post 2 =	9.78 k-ft
Post 3 =	8.65 k-ft

North Alternate Foundation Reactions

0.6D+0.6W_up (base moment)

	axial	shear	moment
Post 1 =	0.51 k	0.00 k	10.91 k-ft
Post 2 =	0.56 k	0.00 k	9.78 k-ft
Post 3 =	0.56 k	0.00 k	8.65 k-ft

D+0.75(S+0.6W_down)

	axial	shear	moment
Post 1 =	5.00 k	1.15 k	6.42 k-ft
Post 2 =	4.59 k	0.82 k	4.59 k-ft
Post 3 =	4.08 k	0.58 k	3.25 k-ft

0.6D+0.6W_up (uplift/shear)

	axial	shear	moment
Post 1 =	-1.96 k	-1.15 k	-6.44 k-ft
Post 2 =	-2.03 k	-1.21 k	-6.78 k-ft
Post 3 =	-1.88 k	-1.14 k	-6.40 k-ft

D+S

	axial	shear	moment
Post 1 =	3.11 k	0.00 k	0.00 k-ft
Post 2 =	3.46 k	0.00 k	0.00 k-ft
Post 3 =	3.46 k	0.00 k	0.00 k-ft

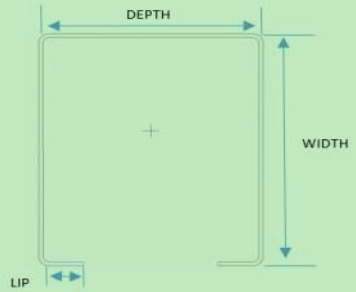
D+0.6W_down

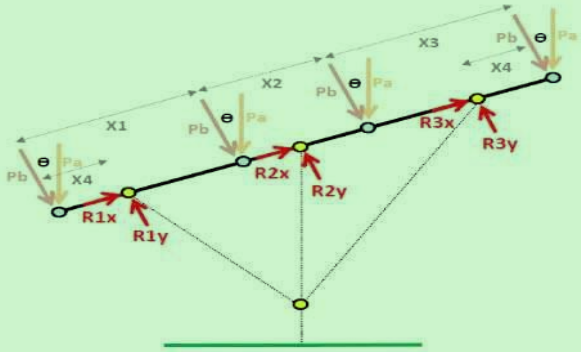
	axial	shear	moment
Post 1 =	4.12 k	1.53 k	8.56 k-ft
Post 2 =	3.28 k	1.09 k	6.12 k-ft
Post 3 =	2.60 k	0.77 k	4.34 k-ft

ROLL FORMED TOP CHORD ANALYSIS

Top Chord Section:	4" x 4.75" x 0.875" x 14ga

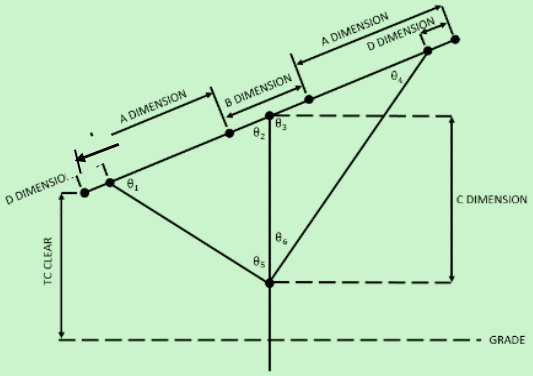
Depth=	4.00 in
Width=	4.75 in
Lip=	0.875 in
Thickness=	0.075 in
Steel=	A653 SS Grade 55
Moment Capacity, Mn =	3.15 k-ft
Shear Capacity, Vn =	12.42 k
Compressive Capacity, Pn =	15.48 k
Tensile Capacity, Pnt =	35.71 k

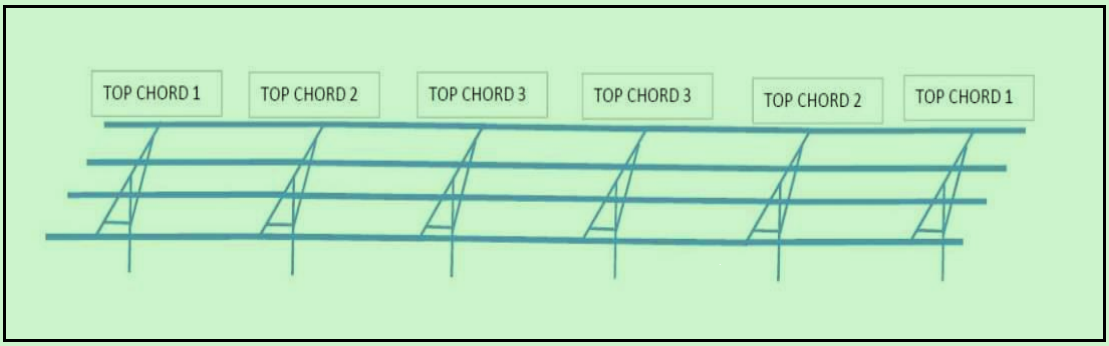


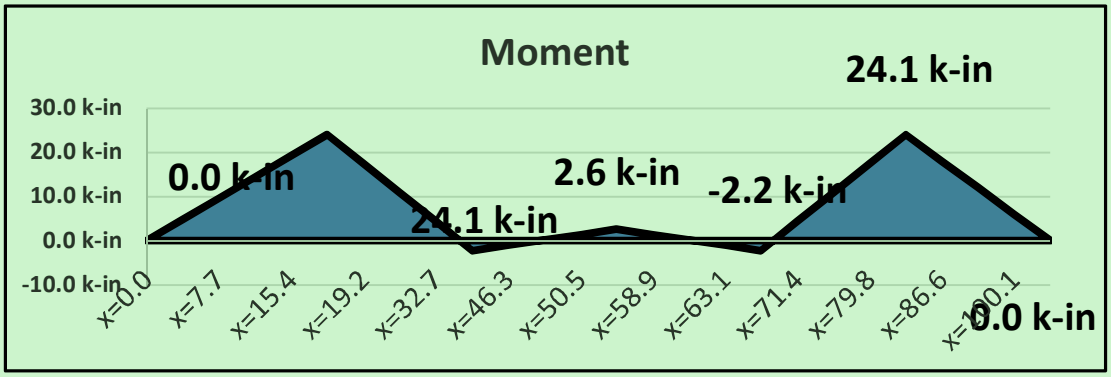


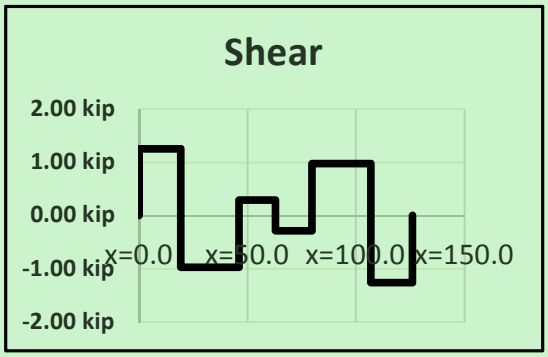
Code=	IBC 2015	ASCE 7-10		
Dead Load=	0.21 kip	Θ=	25.0 deg=	0.44 rad
Snow Load=	0.57 kip	Pa=	0.64 kip	global (snow and/or dead)
Wind_up=	-1.13 kip	Pb=	0.68 kip	local (wind)
Wind_down=	1.51 kip			
		X1=	46.30 in	
C dimension=	42.79 in	X2=	33.52 in	
D dimension=	19.20 in	X3=	46.30 in	
TC clear=	34.40 in	X4=	19.20 in	

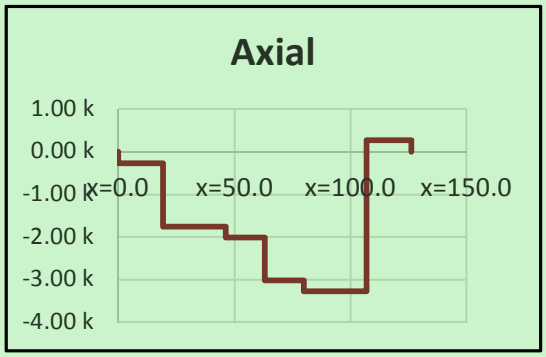
R1y=	2.22 kip
R2y=	0.57 kip
R3y=	2.22 kip
Θ1=	56.4 deg
Θ2=	65.0 deg
Θ3=	115.0 deg
Θ4=	32.0 deg
Θ5=	58.6 deg
Θ6=	33.0 deg











	Top Chord 1				RFTC
	Load Combo	Max Moment	Shear	Axial	S.R.
	D+0.6W_up	9.37 k-in	0.42 k	1.54 k	0.347
	D+0.6W_down	21.04 k-in	0.86 k	-3.03 k	0.641
	D+S	13.54 k-in	0.56 k	-1.70 k	0.406
	D+0.75(S+0.6W_up)	1.29 k-in	0.06 k	0.07 k	0.051
	D+0.75(S+0.6W_down)	24.09 k-in	0.97 k	-3.28 k	0.729
	0.6D+0.6W_up	10.84 k-in	0.49 k	1.74 k	0.399
	0.6D+0.6W_down	19.56 k-in	0.80 k	-2.85 k	0.597
max	**D+0.75(S+0.6W_down)**	**24.09 k-in**	**0.97 k**	**-3.28 k**	**0.729**

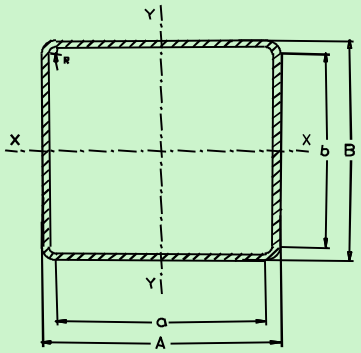
S.R. = (P/Pnt) + (Mx/Mn)

Knee Brace Design - Compression Member

Input Data

Member Section	2x2x15ga	
A = Tube Width	2	in
B = Tube Length	2	in
R = Corner Inner Radius	0.09375	in
t = Thickness	0.065	in
KL_x= Buckling around x-x	6.09	ft
KL_y= Buckling around y-y	6.09	ft
E = Modulus of Elasticity	29500	ksi
F_y = Yield Stress	50	ksi
G = Shear Modulus	11300	ksi

KNEE BRACES



Calculated Parameter

1- Properties of 90° corner		
r = R + t/2, Centerline of Dimension	0.126	in
u = π. r/2, Arc Length	0.198	in
c=0.637.r Distance of c.g. from center	0.080	in
2- Flat widths of flanges and webs		
Flat width of Dim. a= A - (2.r + t)	1.6825	in
Flat width of Dim. b= B - (2.r + t)	1.6825	in

Applied Forces

M	**0.0001**	kip.ft
P	**4.19**	kips

Calculation of I_x

Element	L, Length (in)		Y, Distance to the center (in)		L xY^2	I_x'
Flanges	2.a	3.365	B/2 - t/2	0.968	3.150	0.000
Web	2.b	3.365	0	0.000	0.000	0.794
Corners	4.u	0.793	b/2 + c	0.922	0.674	0.000
Sum	7.523		1.889		3.824	0.794

Calculation of I_y

Element	L, Length (in)		X, Distance to the center (in)		L x X^2	I_y'
Flanges	2.a	3.365	0	0.000	0.000	0.794
Web	2.b	3.365	A/2 - t/2	0.968	3.150	0.000
Corners	4.u	0.793	a/2 + c	0.922	0.674	0.000
Sum	7.523		1.889		3.824	0.794

Section Properties

A	L x t	0.4890	in^2
I_X	t x (L x Y^2 +I_x')	0.3001	in^4
I_Y	t x (L x X^2 +I_y')	0.3001	in^4
S_x	I_X /(B/2)	0.3001	in^3
S_Y	I_Y /(A/2)	0.3001	in^3
r_x	$(I_x/A)^{0.5}$	0.7834	in
r_Y	$(I_Y/A)^{0.5}$	0.7834	in

Nominal Buckling Stress			
KL_x/r_x		93.28	
KL_y/r_y		93.28	
KL/r		93.28	
F_e	$\pi^2 . E/(KL/r)^2$	33.46	ksi
λ_c	$(Fy/Fe)^{0.5}$	1.22	
F_n		26.75	ksi

Effective Area			
effective width of compression flange			
w/t = a/t		25.88	
λ	$1.052/(k)^{0.5} \times (w/t) \times (F_n/E)^{0.5}$	0.41	
ρ•	$(1-0.22/\lambda)/\lambda$	1.13	
a_e		1.68	in
effective width of web element			
w/t = b/t		25.88	
λ	$1.052/(k)^{0.5} \times (w/t) \times (F_n/E)^{0.5}$	0.41	
ρ•	$(1-0.22/\lambda)/\lambda$	1.13	
b_e		1.68	in

Allowable Axial Load			
A_e	$A_e = A - 2 \times t \times [(a-a_e) + (b-b_e)]$	0.49	in^2
P_n	$P_n = A_e \times F_n$	13.08	kips
Ω_c		1.80	
P_a	$= P_n / \Omega_c$	7.27	kips

Check Compression Stresses				
			Loads from Wind?	
C_{b1}	Cb1=(P / P_a)	0.58	NO	
			Allowable Stress Unity	1
		0.58	**Section is OK**	

Computing of M_{nx}

By using the effective width of compression flange and assuming
the web is fully effective, the neutral axis can be located as follow:

Element	L, Length (in)		y, Distance to top fiber (in)		L.y	$L.y^2$
C. Flanges	a_e	1.683	t/2	0.033	0.055	0.002
Web	2.b	3.365	B/2	1.000	3.365	3.365
C. Corners	2.u	0.397	c+t/2	0.113	0.045	0.005
T. Flanges	a_e	1.683	B-t/2	1.968	3.310	6.513
T.Corners	2.u	0.397	B-c-t/2	1.887	0.749	1.413
Sum	7.523		5.000		7.523	11.297

$y_{cg} =$ L.y/ L 1.000 Z=R+t 0.159 in

The max. stress of 50 ksi ocurs in the compression flange as assumed in the calculation

Check the effectiveness of the Web			
f_1	$(y_{cg}- Z)F_y/y_{cg}$	42.06	ksi
f_2	$- (B-y_{cg}- Z)F_y/y_{cg}$	-42.06	ksi
ψ•	f_2/f_1	-1.00	
k	$4+2(1-\psi)^3+2(1-\psi)$	24.00	
h/t	b_e/t	25.88	
λ	$1.052/(k)^{0.5}$ x (h/t) x $(f1/E)^{0.5}$	0.21	
ρ•	$(1-0.22 / \lambda) / \lambda$	-0.23	
b_e		1.68	in
b_1	$b_e/(3-\psi)$	0.42	in
b_2		0.84	in
b_1+b_2		1.26	in
$2\ I'_{web}$	$2(1/12)(b)^3$	0.79	in^4
$\Sigma(Ly^2)$		11.30	in^4
$(-)(\Sigma L)(y_{cg})^2$		7.52	in^4
I'_x		4.57	in^4
$I_x=I'_x.t$		0.30	in^4
$S_{ex}=I_x/y_{cg}$		0.30	in^3
C_b=1.0 for combined axial load and bending moment			
j	$2b^2d^2t/(b+d)$	0.31	in^4
S_f	fullS_x	0.30	in^4
L_u	$0.36C_b\pi.(E\ I.G.j)^{0.5}/(F_y.\ S_f)$	34.95	ft
F_e'	$C_b\pi.(E\ I.G.j)^{0.5}/(L.\ Sf)$	797.12	ksi
Allowable Bending Moment			
M_{nx}		1.237	kip.ft
Ω_b		1.670	
$M_a = M_{nx}/\Omega_b$		0.741	kip.ft

Check Stresses				
C_{mx}	$0.6-0.4*M_1/M_2$	0.60	Loads from Wind?	
C_{b1}	$(P / P_a) + (C_{mx}\ M_x / M_a)$	0.58	NO	
C_{b2}	$(P / P_a) + (M_x / M_a)$	0.58	Allowable Stress Unity	1
C_b	If$((P / P_a) <= 0.15, C_{b2}, C_{b1})$	0.58	**Section is OK**	

RBI SOLAR

Project: PITTSBURGH AIRPORT

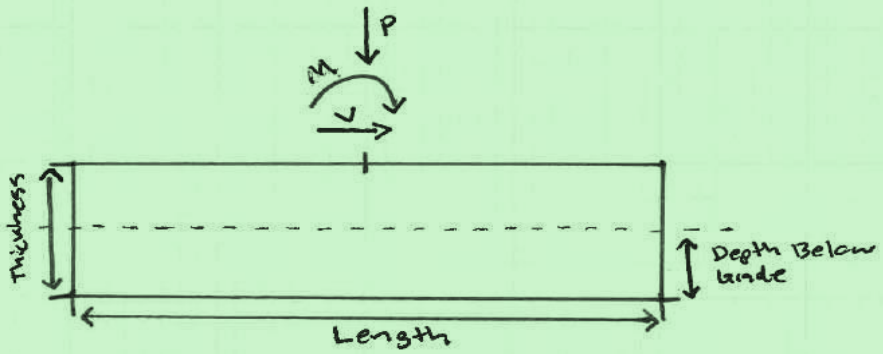
Customer: INDEPENDENT SOLUTIOI

ALTERNATE SPREAD FOOTING DESIGN

LOADING ZONE:	North
LENGTH:	6.00 ft
WIDTH:	6.00 ft
THICKNESS:	1.50 ft
DEPTH BELOW GRADE:	0.00 ft
CONCRETE STRENGTH:	2.50 ksi
SOIL DENSITY:	110 pcf
VOLUME:	54.00 ft^3
CONCRETE DENSITY:	150 pcf
FOOTING WEGHT:	8.10 kip

RACKING REACTIONS:	0.6D+0.6W_up (uplift/shear) <post 2>
AXIAL (P)=	-2.03 k
SHEAR (V)=	-1.21 k
MOMENT (M)=	-6.78 k-ft

ALLOWABLE BEARING=	1000 psf
MIN SAFETY FACTOR=	1.50
SLIDING COEFF=	0.50
SOIL WT=	0.00 k
PASSIVE PRESSURE=	0.00 k
RESISTING MOMENT=	24.30 k-ft



UPLIFT ANALYSIS:		
APPLIED UPLIFT=	2.03 kip	
FOOTING WEIGHT=	8.10 kip	
SAFETY FACTOR=	3.99	OK

SLIDING ANALYSIS:		
SHEAR=	1.21 kip	
NAGATIVE SLIDING FORCE=	3.04 kip	
SAFETY FACTOR=	2.51	OK

OVERTURNING ANALYSIS:		
RESISTING MOMENT=	24.30 k-ft	
OVERTURNING MOMENT=	14.68 k-ft	
OVERTURNING SAFETY FACTOR=	1.65	OK

BEARING PRESSURE:			
	AXIAL=	6.07 kip	
	MOMENT=	-6.78 k-ft	
	e=	1.12	
	ALLOWABLE BEARING=	1.000 ksf	
	Qmax=	0.358 ksf	
Qmax	≤	ALLOWABLE BEARING	OK

REINFORCEMENT:	
(6)	#4 BAR TOP AND BOTTOM, LONGITUDINAL AND TRANSVERSE
OR (5)	#5 BAR TOP AND BOTTOM, LONGITUDINAL AND TRANSVERSE

CONCRETE PIER DESIGN

LOADING ZONE: North

GOVERNING LOAD COMBINATION: D+0.6W_down

AXIAL= 4.12 kip (AXIAL COMPRESSION) post 1

SHEAR= 1.53 kip

MOMENT= 8.56 k-ft

AXIAL DESIGN:

PIER DIAMETER= 18.00 in

FILL DEPTH= 0 in

BEARING AREA= 1.77 ft^2

PILE PERIMETER= 4.71 ft

ALLOWABLE BEARING CAPACITY= 2000 psf

ALLOWABLE BEARING= 3.53 k

ALLOWABLE SKIN FRICTION (COMPRESSION)= 175 psf

ALLOWABLE SKIN FRICTION (UPLIFT)= 117 psf

REQUIRED PIER DEPTH= 0.71 ft

LATERAL DESIGN: (IBC SECTION 1807.3.2.1)

LATERAL BEARING CAPACITY= 200 psf/ft

HEIGHT OF POLE= 4 ft

ISOLATED POLE FACTOR= 2.00

EQUIVALENT SHEAR AT POLE HEIGHT= 3.67 kip

REQUIRED PIER DEPTH= 6.07 ft

NOTE FOR REVIEWER:
THE LATERAL ANALYSIS CONSIDERS BOTH THE SHEAR AND MOMENT AS AN EQUIVALENT SHEAR AT THE HEIGHT OF THE POLE.

FINAL PIER DESIGN:

PIER DIAMETER= 18 in

PIER DEPTH= 6.50 ft

PIER DEPTH + FILL DEPTH= 6.50 ft

POST SHALL BE EMBEDDED INTO CONCRETE A MINIMUM OF 5.5FT

DESIGN CRITERIA

South

Design Criteria:

Code:	**IBC 2015**
Dead Load:	4.2 psf
Roof Live Load:	0.0 psf
Ground Snow:	25.0 psf
Wind Speed:	105 mph (Exposure C Assumed)
Module Tilt:	25.0 deg
Purlin Trib Width:	3.01 ft (Horizontal Projection)

Snow Load Calculation: $p_f = 0.7C_sC_eC_tI_sp_g$

C_e =	0.9
C_t =	1.2
I_s =	0.8
C_s =	0.82
p_s =	**12.4 psf**

Wind Load Calculation: $q = 0.00256K_zK_dK_{zt}V^2$

K_z =	0.85
K_d =	0.85
K_{zt} =	1.0
q =	**20.4 psf**

Mean Roof Height = 6.5 ft (Per RWDI Wind Tunnel Analysis)

WIND TUNNEL COEFFICIENTS (RWDI)			TILT	
			25.0 deg	
PURLIN				
ZONE	**GCp Up**	**GCp Down**	**PSF Up**	**PSF Down**
Cantilever	-1.810	1.774	-36.9	36.2
Edge Span	-1.558	1.218	-31.8	24.8
North Row Center Span	-1.322	0.688	-27.0	14.0
South Row Center Span	-1.408	1.141	-28.7	23.3
Interior Center Span	-1.314	0.649	-26.8	13.2
TOP CHORD				
ZONE	**GCp Up**	**GCp Down**	**PSF Up**	**PSF Down**
Cantilever	-1.102	1.774	-22.5	36.2
Edge Span	-1.102	1.218	-22.5	24.8
North Row Center Span	-0.986	0.668	-20.1	13.6
South Row Center Span	-0.816	1.141	-16.6	23.3
Interior Row Center Span	-0.812	0.633	-16.6	12.9
BASE MOMENT				
ZONE	**GCmy (+)**	**GCmy (-)**	**q*GCmy (+)**	**q*GCmy (-)**
Cantilever	0.376	-0.159	7.7	-3.2
Edge Span	0.301	-0.128	6.1	-2.6
North Row Center Span	0.239	-0.122	4.9	-2.5
South Row Center Span	0.280	-0.064	5.7	-1.3
Interior Row Center Span	0.261	-0.122	5.3	-2.5

Note: See Figures 1 & 2 for clarity on zones

APPLIED LOADING		
DEAD LOAD:	5psf*Purlin Spacing/1000	0.014 klf
LIVE LOAD:	N/A	0.000 klf
SNOW:	P_s*Purlin Trib. Width/1000:	0.037 klf

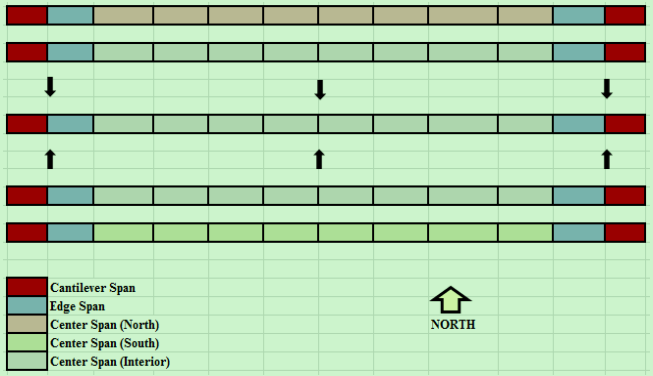


FIGURE 1

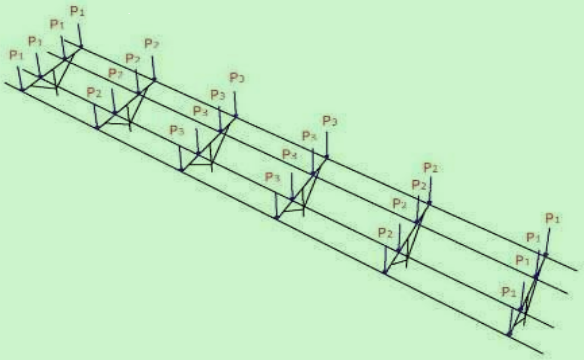


FIGURE 2

WIND: (Top Chord Pressures)	South
$P1_{up} = \frac{Upslope\ Length * q}{4}\left[Cantilever\ Width * GCp_{(cantilever)} + \frac{Edge\ Span\ Width}{2} * GCp_{(edge\ span)}\right]$	-1.133 kips
$P1_{down} = \frac{Upslope\ Length * q}{4}\left[Cantilever\ Width * GCp_{(cantilever)} + \frac{Edge\ Span\ Width}{2} * GCp_{(edge\ span)}\right]$	1.506 kips
$P2_{up} = \frac{Upslope\ Length * q}{4}\left[\frac{Edge\ Span\ Width}{2} * GCp_{(edge\ span)} + \frac{Center\ Span\ Width}{2} * GCp_{(center\ span)}\right]$	-1.096 kips
$P2_{down} = \frac{Upslope\ Length * q}{4}\left[\frac{Edge\ Span\ Width}{2} * GCp_{(edge\ span)} + \frac{Center\ Span\ Width}{2} *\right.$	1.347 kips
$P3_{up} = \frac{Upslope\ Length * q}{4}[Center\ Span\ Width * GCp_{(center\ span)}]$	-0.932 kips
$P3_{down} = \frac{Upslope\ Length * q}{4}[Center\ Span\ Width * GCp_{(center\ span)}]$	1.303 kips

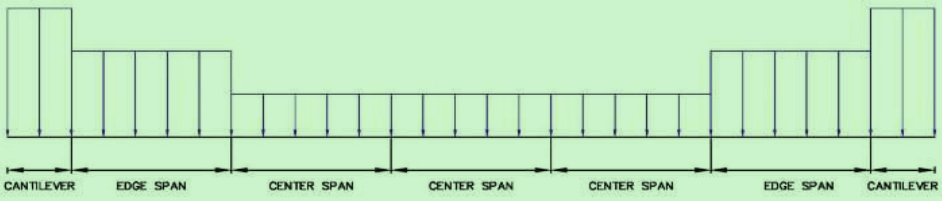


FIGURE 3

WIND: (Base Moments)

GC_{My}*q*A*Upslope Length

South		
POSITIVE		
Post 1	Post 2	Post 3
18.18 k-ft	17.56 k-ft	16.93 k-ft
NEGATIVE		
Post 1	Post 2	Post 3
-7.72 k-ft	-5.80 k-ft	-3.85 k-ft

PURLIN ANALYSIS

Purlin Selected=	6 z 16 ga (1)
Zone:	South
Purlin Spacing =	3.33 ft
Dead Load=	3.34 psf
Snow Load=	12.4 psf

(module wt + purlin self wt)

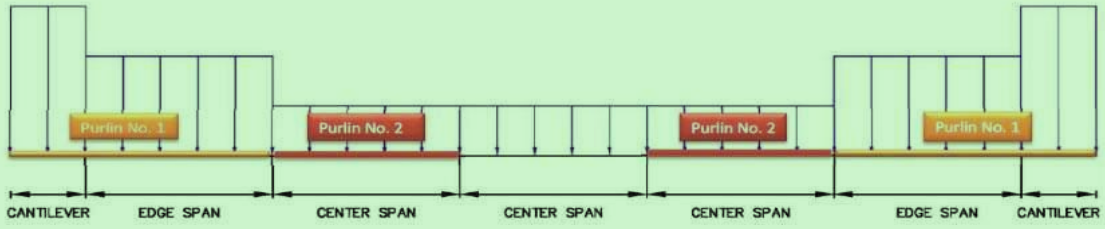


FIGURE 1

Strong Axis Applied Distributed Pressures

ASD Load Combos:	Cantilever		Edge Span		Center Span	
	positive, ↓	negative, ↑	positive, ↓	negative, ↑	positive, ↓	negative, ↑
D+0.6W=	24.74 psf	-	17.93 psf	-	16.98 psf	-
D+S=	13.21 psf	-	13.21 psf	-	13.21 psf	-
D+0.75(0.6W+S)=	26.95 psf	-	21.84 psf	-	21.13 psf	-
0.6D+0.6W=	-	-20.33 psf	-	-17.25 psf	-	-15.41 psf

Weak Axis Applied Distributed Pressures

ASD Load Combos:	Cantilever		Edge Span		Center Span	
	positive, ↓	negative, ↑	positive, ↓	negative, ↑	positive, ↓	negative, ↑
D+0.6W=	1.41 psf	-	1.41 psf	-	1.41 psf	-
D+S=	6.16 psf	-	6.16 psf	-	6.16 psf	-
D+0.75(0.6W+S)=	4.97 psf	-	4.97 psf	-	4.97 psf	-
0.6D+0.6W=	-	0.85 psf	-	0.85 psf	-	0.85 psf

Lengths

Cant. Length	6.78 ft
Edge Span Length	16.95 ft
Center Span Length	16.95 ft

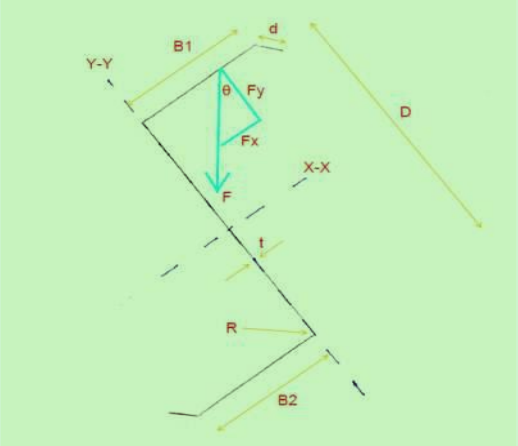


FIGURE 2

Purlin Properties

D=	6.00 in	Ix=	3.54 in^4
B1=	2.00 in	Iy=	0.60 in^4
B2=	2.00 in	Sx=	1.18 in^3
d=	0.55 in	Sy=	0.25 in^3
t=	0.06 in	C_R=	0.70
R=	0.13 in	Ωb =	1.67
Area=	0.65 in^2	Cm=	1
Wt per foot=	2.20 lb/ft	$Sy_{(group)}$=	13.81 in^3
Fy=	55 ksi	E=	29000 ksi
		Lu=	16.46 ft

ALL PRE-GALVANIZED PURLIN COIL MATERIAL IS PER ASTM A653 GRADE 55

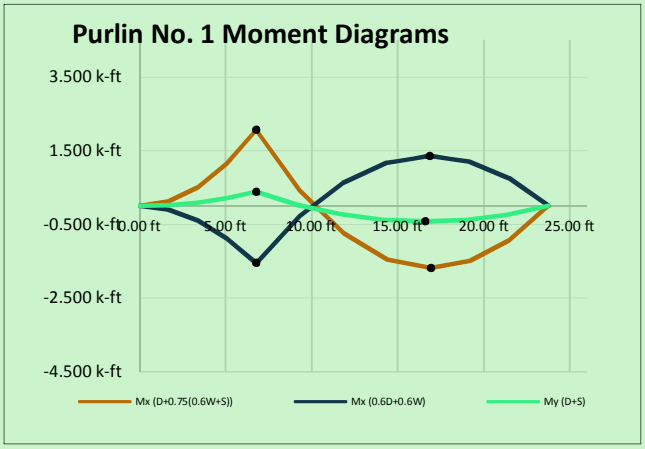
Per AISI F2.1, Mne = Sf * Fn

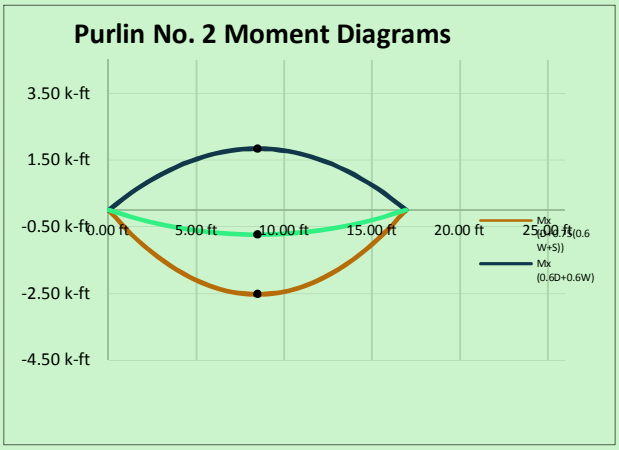
Fcre > 2.78 * Fy, Fn = Fy

lateral torsional buckling does not control

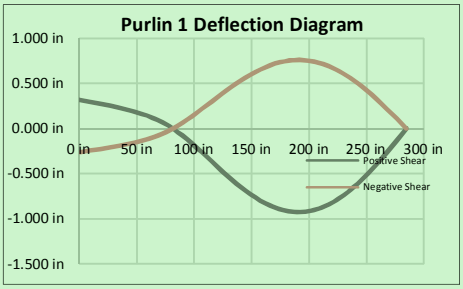
Stress Ratio Maximums					
South Zone	Purlin Stress Ratios: Positive Shear, ↓				
	Mx	My	Governing Load Combo	S.R. = (Mx/Max)+(My/May) ≤ 1.0	
Cantilever	2.06 k-ft	0.38 k-ft	D+0.75(0.6W+S)=	0.92	OK
Edge Span	1.68 k-ft	0.42 k-ft	D+0.75(0.6W+S)=	0.53	OK
Center Span	2.52 k-ft	0.59 k-ft	D+0.75(0.6W+S)=	0.80	OK

South Zone	Purlin Stress Ratios: Positive Shear, ↑				
	Mx	My	Governing Load Combo	S.R. = (Mx/Max)+(My/May) ≤ 1.0	
Cantilever	-1.55 k-ft	0.06 k-ft	0.6D+0.6W=	0.48	OK
Edge Span	-1.36 k-ft	0.07 k-ft	0.6D+0.6W=	0.60	OK
Center Span	-1.84 k-ft	0.10 k-ft	0.6D+0.6W=	0.82	OK

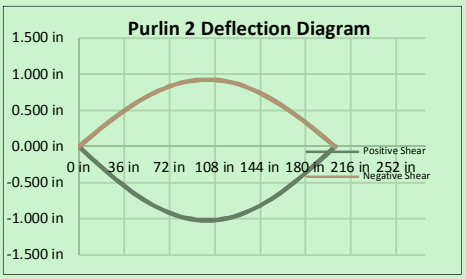




Deflection Checks			
Purlin No. 1			
Allowable Deflection =	L/120		
Maximum Cantilver Deflection =	0.32 in	L/509	OK
Maximum Span Deflection =	0.92 in	L/220	OK



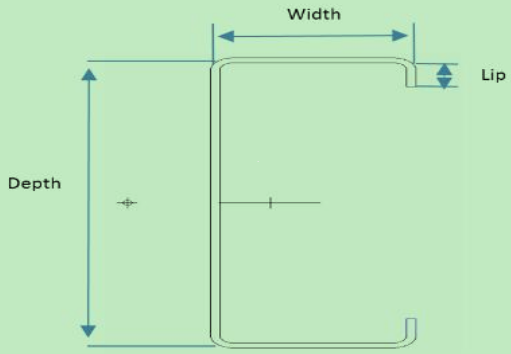
Purlin No. 2			
Allowable Deflection =	L/120		
Maximum Positive Deflection =	1.02 in	L/199	OK
Maximum Negative Deflection =	0.93 in	L/219	OK



CHANNEL COLUMN ANALYSIS

Post Section:	8"x 3" x 0.134"

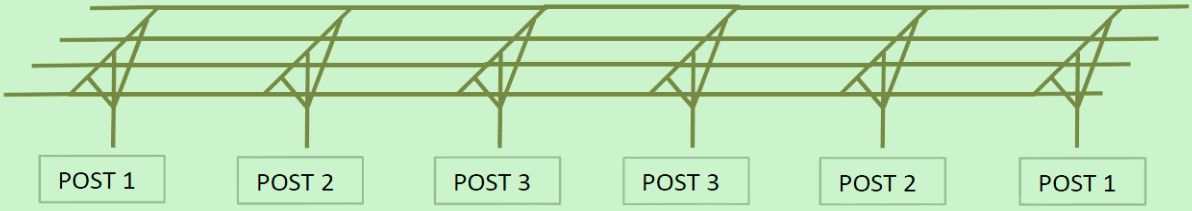
A =	1.96 in^2
D =	8.00 in
t =	0.134 in
W =	3.00 in
Lip =	0.80 in
Ix =	18.86 in^4
Iy =	2.19 in^4
Sx =	4.72 in^3
Sy =	1.03 in^3
Kx =	2.10
Ky =	1.20
Lx =	5.61 ft
Ly =	5.61 ft



Pa=	33.72 k	allowable axial load
Max=	11.74 k-ft	allowable major axis bending moment
May=	2.83 k-ft	allowable minor axis bending moment

	P	Mx	My	Load Combo
Max Required Strength:	**0.85 k**	**10.91 k-ft**	**0.00 k-ft**	**D+0.6W_up**
Post 1 Max Required Strength:	0.85 k	10.91 k-ft	0.00 k-ft	D+0.6W_up
Post 2 Max Required Strength:	0.94 k	10.54 k-ft	0.00 k-ft	D+0.6W_up
Post 3 Max Required Strength:	0.94 k	10.16 k-ft	0.00 k-ft	D+0.6W_up

Post 1 Max Stress Ratio	Post 2 Max Stress Ratio	Post 3 Max Stress Ratio
0.954	**0.925**	**0.893**
POST 1 GOVERNS		



South Reactions Summary

Max Uplift	
Post 1 =	-1.96 k
Post 2 =	-1.82 k
Post 3 =	-1.46 k

Max Down	
Post 1 =	5.00 k
Post 2 =	5.03 k
Post 3 =	4.96 k

Max Shear	
Post 1 =	1.53 k
Post 2 =	1.37 k
Post 3 =	1.32 k

Max Moment	
Post 1 =	10.91 k-ft
Post 2 =	10.54 k-ft
Post 3 =	10.16 k-ft

South Alternate Foundation Reactions

0.6D+0.6W_up (base moment)

	axial	shear	moment
Post 1 =	0.51 k	0.00 k	10.91 k-ft
Post 2 =	0.56 k	0.00 k	10.54 k-ft
Post 3 =	0.56 k	0.00 k	10.16 k-ft

D+0.75(S+0.6W_down)

	axial	shear	moment
Post 1 =	5.00 k	1.15 k	6.42 k-ft
Post 2 =	5.03 k	1.02 k	5.74 k-ft
Post 3 =	4.96 k	0.99 k	5.56 k-ft

0.6D+0.6W_up (uplift/shear)

	axial	shear	moment
Post 1 =	-1.96 k	-1.15 k	-6.44 k-ft
Post 2 =	-1.82 k	-1.11 k	-6.23 k-ft
Post 3 =	-1.46 k	-0.95 k	-5.30 k-ft

D+S

	axial	shear	moment
Post 1 =	3.11 k	0.00 k	0.00 k-ft
Post 2 =	3.46 k	0.00 k	0.00 k-ft
Post 3 =	3.46 k	0.00 k	0.00 k-ft

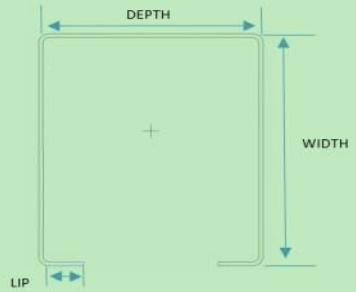
D+0.6W_down

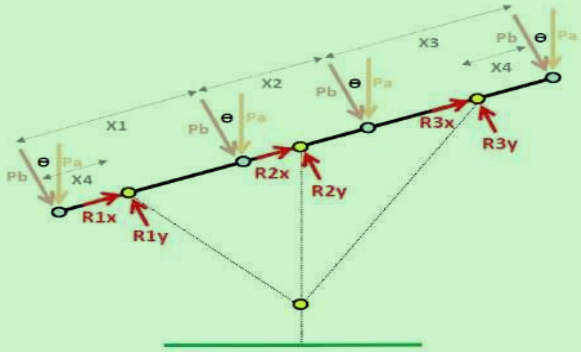
	axial	shear	moment
Post 1 =	4.12 k	1.53 k	8.56 k-ft
Post 2 =	3.87 k	1.37 k	7.66 k-ft
Post 3 =	3.78 k	1.32 k	7.41 k-ft

ROLL FORMED TOP CHORD ANALYSIS

Top Chord Section:	4" x 4.75" x 0.875" x 14ga

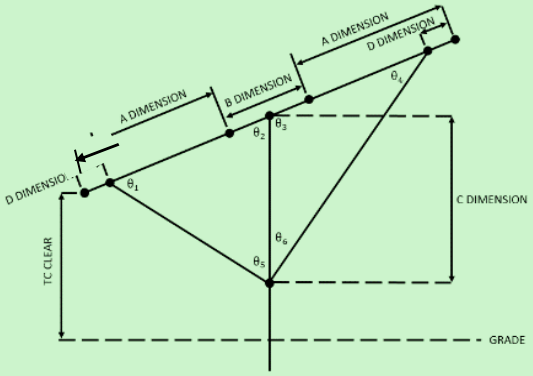
Depth=	4.00 in
Width=	4.75 in
Lip=	0.875 in
Thickness=	0.075 in
Steel=	A653 SS Grade 55
Moment Capacity, Mn =	3.15 k-ft
Shear Capacity, Vn =	12.42 k
Compressive Capacity, Pn =	15.48 k
Tensile Capacity, Pnt =	35.71 k

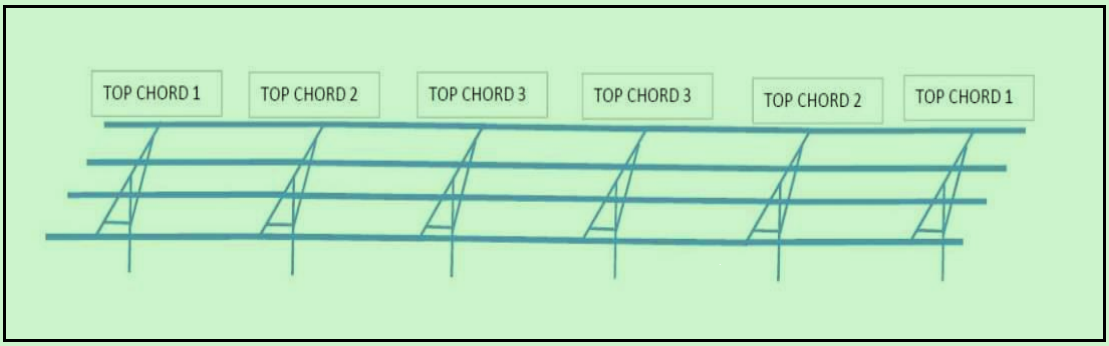


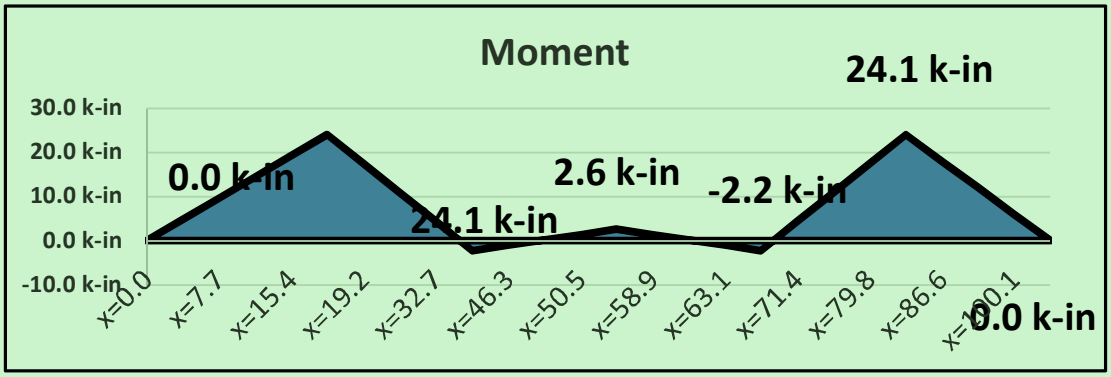


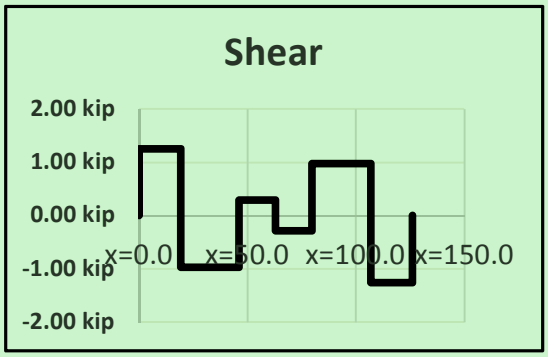
Code=	IBC 2015	ASCE 7-10		
Dead Load=	0.21 kip	Θ=	25.0 deg=	0.44 rad
Snow Load=	0.57 kip	Pa=	0.64 kip	global (snow and/or dead)
Wind_up=	-1.13 kip	Pb=	0.68 kip	local (wind)
Wind_down=	1.51 kip			
		X1=	46.30 in	
C dimension=	42.79 in	X2=	33.52 in	
D dimension=	19.20 in	X3=	46.30 in	
TC clear=	34.40 in	X4=	19.20 in	

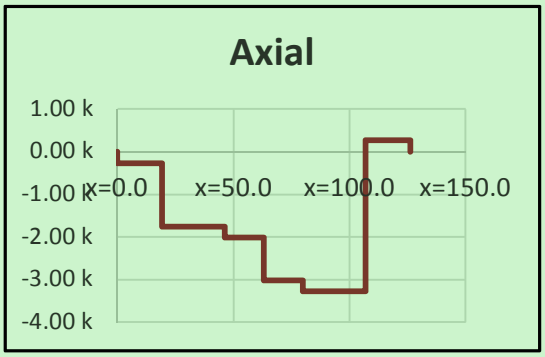
R1y=	2.22 kip
R2y=	0.57 kip
R3y=	2.22 kip
Θ1=	56.4 deg
Θ2=	65.0 deg
Θ3=	115.0 deg
Θ4=	32.0 deg
Θ5=	58.6 deg
Θ6=	33.0 deg











	Top Chord 1				RFTC
	Load Combo	Max Moment	Shear	Axial	S.R.
	D+0.6W_up	9.37 k-in	0.42 k	1.54 k	0.347
	D+0.6W_down	21.04 k-in	0.86 k	-3.03 k	0.641
	D+S	13.54 k-in	0.56 k	-1.70 k	0.406
	D+0.75(S+0.6W_up)	1.29 k-in	0.06 k	0.07 k	0.051
	D+0.75(S+0.6W_down)	24.09 k-in	0.97 k	-3.28 k	0.729
	0.6D+0.6W_up	10.84 k-in	0.49 k	1.74 k	0.399
	0.6D+0.6W_down	19.56 k-in	0.80 k	-2.85 k	0.597
max	**D+0.75(S+0.6W_down)**	**24.09 k-in**	**0.97 k**	**-3.28 k**	**0.729**

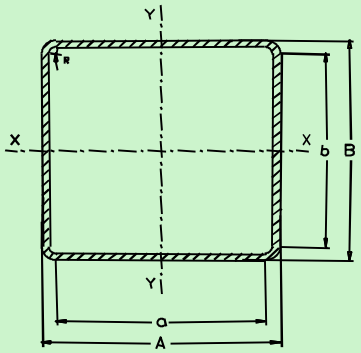
S.R. = (P/Pnt) + (Mx/Mn)

Knee Brace Design - Compression Member

Input Data

Member Section	2x2x15ga	
A = Tube Width	2	in
B = Tube Length	2	in
R = Corner Inner Radius	0.09375	in
t = Thickness	0.065	in
KL_x= Buckling around x-x	6.09	ft
KL_y= Buckling around y-y	6.09	ft
E = Modulus of Elasticity	29500	ksi
F_y = Yield Stress	50	ksi
G = Shear Modulus	11300	ksi

KNEE BRACES



Calculated Parameter

1- Properties of 90° corner		
r = R + t/2, Centerline of Dimension	0.126	in
u = π. r/2, Arc Length	0.198	in
c=0.637.r Distance of c.g. from center	0.080	in
2- Flat widths of flanges and webs		
Flat width of Dim. a= A - (2.r + t)	1.6825	in
Flat width of Dim. b= B - (2.r + t)	1.6825	in

Applied Forces

M	**0.0001**	kip.ft
P	**4.19**	kips

Calculation of I_x

Element	L, Length (in)		Y, Distance to the center (in)		L xY^2	I_x'
Flanges	2.a	3.365	B/2 - t/2	0.968	3.150	0.000
Web	2.b	3.365	0	0.000	0.000	0.794
Corners	4.u	0.793	b/2 + c	0.922	0.674	0.000
Sum	7.523		1.889		3.824	0.794

Calculation of I_y

Element	L, Length (in)		X, Distance to the center (in)		L x X^2	I_y'
Flanges	2.a	3.365	0	0.000	0.000	0.794
Web	2.b	3.365	A/2 - t/2	0.968	3.150	0.000
Corners	4.u	0.793	a/2 + c	0.922	0.674	0.000
Sum	7.523		1.889		3.824	0.794

Section Properties

A	L x t	0.4890	in^2
I_X	t x (L x Y^2 +I_x')	0.3001	in^4
I_Y	t x (L x X^2 +I_y')	0.3001	in^4
S_x	I_X /(B/2)	0.3001	in^3
S_Y	I_Y /(A/2)	0.3001	in^3
r_x	$(I_x/A)^{0.5}$	0.7834	in
r_Y	$(I_Y/A)^{0.5}$	0.7834	in

Nominal Buckling Stress			
KL_x/r_x		93.28	
KL_y/r_y		93.28	
KL/r		93.28	
F_e	$\pi^2 . E/(KL/r)^2$	33.46	ksi
λ_c	$(Fy/Fe)^{0.5}$	1.22	
F_n		26.75	ksi

Effective Area			
effective width of compression flange			
w/t = a/t		25.88	
λ	$1.052/(k)^{0.5} \times (w/t) \times (F_n/E)^{0.5}$	0.41	
ρ•	$(1-0.22/\lambda)/\lambda$	1.13	
a_e		1.68	in
effective width of web element			
w/t = b/t		25.88	
λ	$1.052/(k)^{0.5} \times (w/t) \times (F_n/E)^{0.5}$	0.41	
ρ•	$(1-0.22/\lambda)/\lambda$	1.13	
b_e		1.68	in

Allowable Axial Load			
A_e	$A_e = A - 2 \times t \times [(a-a_e) + (b-b_e)]$	0.49	in^2
P_n	$P_n = A_e \times F_n$	13.08	kips
Ω_c		1.80	
P_a	$= P_n / \Omega_c$	7.27	kips

Check Compression Stresses				
			Loads from Wind?	
C_{b1}	Cb1=(P / P_a)	0.58	NO	
			Allowable Stress Unity	1
		0.58	**Section is OK**	

Computing of M_{nx}

By using the effective width of compression flange and assuming
the web is fully effective, the neutral axis can be located as follow:

Element	L, Length (in)		y, Distance to top fiber (in)		L.y	$L.y^2$
C. Flanges	a_e	1.683	t/2	0.033	0.055	0.002
Web	2.b	3.365	B/2	1.000	3.365	3.365
C. Corners	2.u	0.397	c+t/2	0.113	0.045	0.005
T. Flanges	a_e	1.683	B-t/2	1.968	3.310	6.513
T.Corners	2.u	0.397	B-c-t/2	1.887	0.749	1.413
Sum	7.523		5.000		7.523	11.297

$y_{cg} =$ L.y/ L 1.000 Z=R+t 0.159 in

The max. stress of 50 ksi ocurs in the compression flange as assumed in the calculation

Check the effectiveness of the Web			
f_1	$(y_{cg}- Z)F_y/y_{cg}$	42.06	ksi
f_2	$- (B-y_{cg}- Z)F_y/y_{cg}$	-42.06	ksi
ψ•	f_2/f_1	-1.00	
k	$4+2(1-\psi)^3+2(1-\psi)$	24.00	
h/t	b_e/t	25.88	
λ	$1.052/(k)^{0.5}$ x (h/t) x $(f1/E)^{0.5}$	0.21	
ρ•	$(1-0.22 / \lambda) / \lambda$	-0.23	
b_e		1.68	in
b_1	$b_e/(3-\psi)$	0.42	in
b_2		0.84	in
b_1+b_2		1.26	in
$2\ I'_{web}$	$2(1/12)(b)^3$	0.79	in^4
$\Sigma(Ly^2)$		11.30	in^4
$(-)(\Sigma L)(y_{cg})^2$		7.52	in^4
I'_x		4.57	in^4
$I_x=I'_x.t$		0.30	in^4
$S_{ex}=I_x/y_{cg}$		0.30	in^3
C_b=1.0 for combined axial load and bending moment			
j	$2b^2d^2t/(b+d)$	0.31	in^4
S_f	fullS_x	0.30	in^4
L_u	$0.36C_b\pi.(E\ I.G.j)^{0.5}/(F_y.\ S_f)$	34.95	ft
F_e'	$C_b\pi.(E\ I.G.j)^{0.5}/(L.\ Sf)$	797.12	ksi
Allowable Bending Moment			
M_{nx}		1.237	kip.ft
Ω_b		1.670	
$M_a = M_{nx}/\Omega_b$		0.741	kip.ft

Check Stresses				
C_{mx}	$0.6-0.4*M_1/M_2$	0.60	Loads from Wind?	
C_{b1}	$(P / P_a) + (C_{mx}\ M_x / M_a)$	0.58	NO	
C_{b2}	$(P / P_a) + (M_x / M_a)$	0.58	Allowable Stress Unity	1
C_b	If$((P / P_a) <= 0.15, C_{b2}, C_{b1})$	0.58	**Section is OK**	

RBI SOLAR

Project: PITTSBURGH AIRPORT

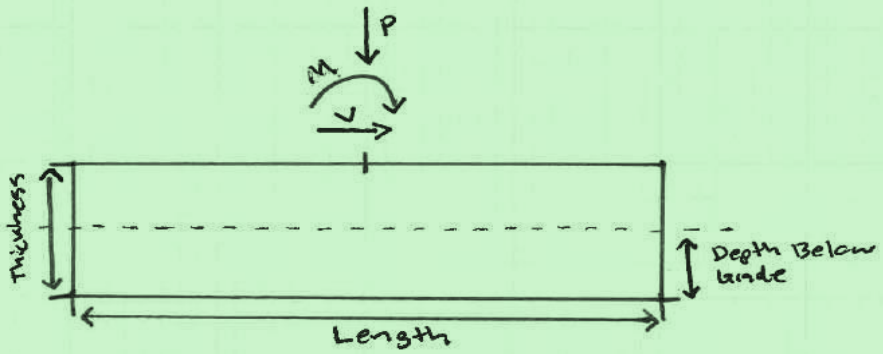
Customer: INDEPENDENT SOLUTIOI

ALTERNATE SPREAD FOOTING DESIGN

LOADING ZONE:	South
LENGTH:	5.75 ft
WIDTH:	5.75 ft
THICKNESS:	1.50 ft
DEPTH BELOW GRADE:	0.00 ft
CONCRETE STRENGTH:	2.50 ksi
SOIL DENSITY:	110 pcf
VOLUME:	49.59 ft^3
CONCRETE DENSITY:	150 pcf
FOOTING WEGHT:	7.44 kip

RACKING REACTIONS:	0.6D+0.6W_up (uplift/shear) <post 1>
AXIAL (P)=	-1.96 k
SHEAR (V)=	-1.15 k
MOMENT (M)=	-6.44 k-ft

ALLOWABLE BEARING=	1000 psf
MIN SAFETY FACTOR=	1.50
SLIDING COEFF=	0.50
SOIL WT=	0.00 k
PASSIVE PRESSURE=	0.00 k
RESISTING MOMENT=	21.39 k-ft



UPLIFT ANALYSIS:		
APPLIED UPLIFT=	1.96 kip	
FOOTING WEIGHT=	7.44 kip	
SAFETY FACTOR=	3.80	OK

SLIDING ANALYSIS:		
SHEAR=	1.15 kip	
NAGATIVE SLIDING FORCE=	2.74 kip	
SAFETY FACTOR=	2.39	OK

OVERTURNING ANALYSIS:		
RESISTING MOMENT=	21.39 k-ft	
OVERTURNING MOMENT=	13.79 k-ft	
OVERTURNING SAFETY FACTOR=	1.55	OK

BEARING PRESSURE:			
	AXIAL=	5.48 kip	
	MOMENT=	-6.44 k-ft	
	e=	1.18	
	ALLOWABLE BEARING=	1.000 ksf	
	Qmax=	0.374 ksf	
Qmax	≤	ALLOWABLE BEARING	OK

REINFORCEMENT:	
(6)	#4 BAR TOP AND BOTTOM, LONGITUDINAL AND TRANSVERSE
OR (5)	#5 BAR TOP AND BOTTOM, LONGITUDINAL AND TRANSVERSE

CONCRETE PIER DESIGN

LOADING ZONE: South

GOVERNING LOAD COMBINATION: D+0.6W_down

AXIAL= 4.12 kip (AXIAL COMPRESSION) post 1

SHEAR= 1.53 kip

MOMENT= 8.56 k-ft

AXIAL DESIGN:

PIER DIAMETER= 18.00 in

FILL DEPTH= 0 in

BEARING AREA= 1.77 ft^2

PILE PERIMETER= 4.71 ft

ALLOWABLE BEARING CAPACITY= 2000 psf

ALLOWABLE BEARING= 3.53 k

ALLOWABLE SKIN FRICTION (COMPRESSION)= 175 psf

ALLOWABLE SKIN FRICTION (UPLIFT)= 117 psf

REQUIRED PIER DEPTH= 0.71 ft

LATERAL DESIGN: (IBC SECTION 1807.3.2.1)

LATERAL BEARING CAPACITY= 200 psf/ft

HEIGHT OF POLE= 4 ft

ISOLATED POLE FACTOR= 2.00

EQUIVALENT SHEAR AT POLE HEIGHT= 3.67 kip

REQUIRED PIER DEPTH= 6.07 ft

NOTE FOR REVIEWER:
THE LATERAL ANALYSIS CONSIDERS BOTH THE SHEAR AND MOMENT AS AN EQUIVALENT SHEAR AT THE HEIGHT OF THE POLE.

FINAL PIER DESIGN:

PIER DIAMETER= 18 in

PIER DEPTH= 6.50 ft

PIER DEPTH + FILL DEPTH= 6.50 ft

POST SHALL BE EMBEDDED INTO CONCRETE A MINIMUM OF 5.5FT

DESIGN CRITERIA

Interior

Design Criteria:

Code:	**IBC 2015**
Dead Load:	4.2 psf
Roof Live Load:	0.0 psf
Ground Snow:	25.0 psf
Wind Speed:	105 mph (Exposure C Assumed)
Module Tilt:	25.0 deg
Purlin Trib Width:	3.01 ft (Horizontal Projection)

Snow Load Calculation: $p_f = 0.7C_sC_eC_tI_sp_g$

C_e =	0.9
C_t =	1.2
I_s =	0.8
C_s =	0.82
p_s =	**12.4 psf**

Wind Load Calculation: $q = 0.00256K_zK_dK_{zt}V^2$

K_z =	0.85
K_d =	0.85
K_{zt} =	1.0
q =	**20.4 psf**

Mean Roof Height = 6.5 ft (Per RWDI Wind Tunnel Analysis)

WIND TUNNEL COEFFICIENTS (RWDI)			TILT 25.0 deg	
PURLIN				
ZONE	**GCp Up**	**GCp Down**	**PSF Up**	**PSF Down**
Cantilever	-1.810	1.774	-36.9	36.2
Edge Span	-1.558	1.218	-31.8	24.8
North Row Center Span	-1.322	0.688	-27.0	14.0
South Row Center Span	-1.408	1.141	-28.7	23.3
Interior Center Span	-1.314	0.649	-26.8	13.2
TOP CHORD				
ZONE	**GCp Up**	**GCp Down**	**PSF Up**	**PSF Down**
Cantilever	-1.102	1.774	-22.5	36.2
Edge Span	-1.102	1.218	-22.5	24.8
North Row Center Span	-0.986	0.668	-20.1	13.6
South Row Center Span	-0.816	1.141	-16.6	23.3
Interior Row Center Span	-0.812	0.633	-16.6	12.9
BASE MOMENT				
ZONE	**GCmy (+)**	**GCmy (-)**	**q*GCmy (+)**	**q*GCmy (-)**
Cantilever	0.376	-0.159	7.7	-3.2
Edge Span	0.301	-0.128	6.1	-2.6
North Row Center Span	0.239	-0.122	4.9	-2.5
South Row Center Span	0.280	-0.064	5.7	-1.3
Interior Row Center Span	0.261	-0.122	5.3	-2.5

Note: See Figures 1 & 2 for clarity on zones

APPLIED LOADING		
DEAD LOAD:	5psf*Purlin Spacing/1000	0.014 klf
LIVE LOAD:	N/A	0.000 klf
SNOW:	P_s*Purlin Trib. Width/1000:	0.037 klf

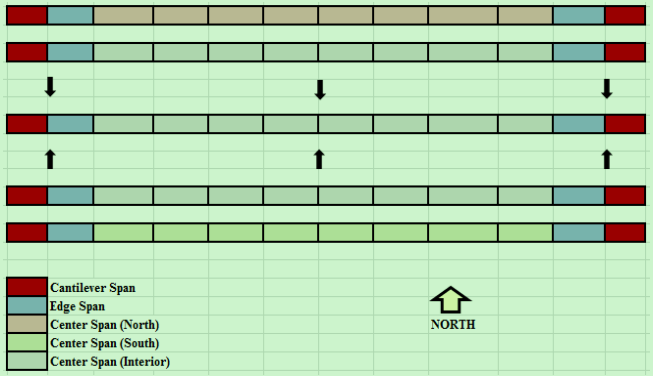


FIGURE 1

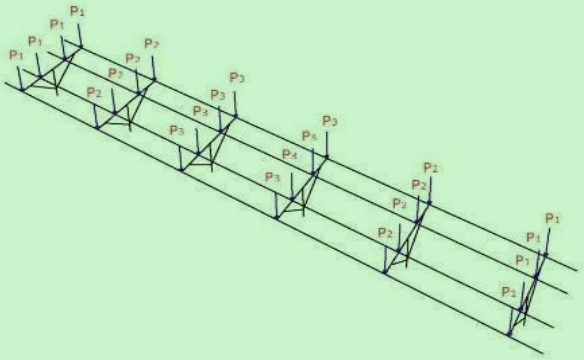


FIGURE 2

WIND: (Top Chord Pressures)	Interior
$P1_{up} = \frac{Upslope\ Length * q}{4}\left[Cantilever\ Width * GCp_{(cantilever)} + \frac{Edge\ Span\ Width}{2} * GCp_{(edge\ span)}\right]$	-1.133 kips
$P1_{down} = \frac{Upslope\ Length * q}{4}\left[Cantilever\ Width * GCp_{(cantilever)} + \frac{Edge\ Span\ Width}{2} * GCp_{(edge\ span)}\right]$	1.506 kips
$P2_{up} = \frac{Upslope\ Length * q}{4}\left[\frac{Edge\ Span\ Width}{2} * GCp_{(edge\ span)} + \frac{Center\ Span\ Width}{2} * GCp_{(center\ span)}\right]$	-1.094 kips
$P2_{down} = \frac{Upslope\ Length * q}{4}\left[\frac{Edge\ Span\ Width}{2} * GCp_{(edge\ span)} + \frac{Center\ Span\ Width}{2} *\right.$	1.057 kips
$P3_{up} = \frac{Upslope\ Length * q}{4}[Center\ Span\ Width * GCp_{(center\ span)}]$	-0.928 kips
$P3_{down} = \frac{Upslope\ Length * q}{4}[Center\ Span\ Width * GCp_{(center\ span)}]$	0.724 kips

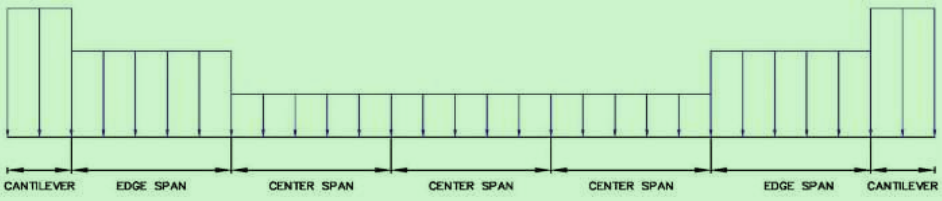


FIGURE 3

WIND: (Base Moments)

GC_{My}*q*A*Upslope Length

Interior		
POSITIVE		
Post 1	Post 2	Post 3
18.18 k-ft	16.97 k-ft	15.74 k-ft
NEGATIVE		
Post 1	Post 2	Post 3
-7.72 k-ft	-7.56 k-ft	-7.37 k-ft

PURLIN ANALYSIS

Purlin Selected=	6 z 16 ga (1)
Zone:	Interior
Purlin Spacing =	3.33 ft
Dead Load=	3.34 psf
Snow Load=	12.4 psf

(module wt + purlin self wt)

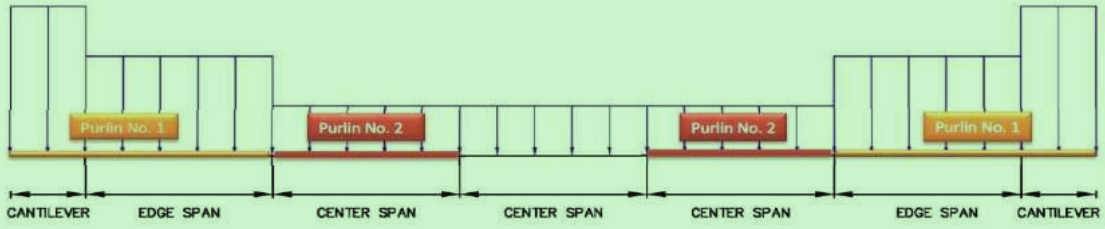


FIGURE 1

Strong Axis Applied Distributed Pressures

ASD Load Combos:	Cantilever		Edge Span		Center Span	
	positive, ↓	negative, ↑	positive, ↓	negative, ↑	positive, ↓	negative, ↑
D+0.6W=	24.74 psf	-	17.93 psf	-	10.97 psf	-
D+S=	13.21 psf	-	13.21 psf	-	13.21 psf	-
D+0.75(0.6W+S)=	26.95 psf	-	21.84 psf	-	16.62 psf	-
0.6D+0.6W=	-	-20.33 psf	-	-17.25 psf	-	-14.26 psf

Weak Axis Applied Distributed Pressures

ASD Load Combos:	Cantilever		Edge Span		Center Span	
	positive, ↓	negative, ↑	positive, ↓	negative, ↑	positive, ↓	negative, ↑
D+0.6W=	1.41 psf	-	1.41 psf	-	1.41 psf	-
D+S=	6.16 psf	-	6.16 psf	-	6.16 psf	-
D+0.75(0.6W+S)=	4.97 psf	-	4.97 psf	-	4.97 psf	-
0.6D+0.6W=	-	0.85 psf	-	0.85 psf	-	0.85 psf

Lengths

Cant. Length	6.78 ft
Edge Span Length	16.95 ft
Center Span Length	16.95 ft

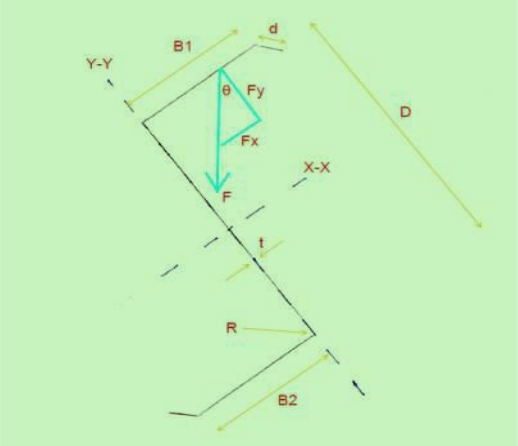


FIGURE 2

Purlin Properties

D=	6.00 in	Ix=	3.54 in^4
B1=	2.00 in	Iy=	0.60 in^4
B2=	2.00 in	Sx=	1.18 in^3
d=	0.55 in	Sy=	0.25 in^3
t=	0.06 in	C_R=	0.70
R=	0.13 in	Ωb =	1.67
Area=	0.65 in^2	Cm=	1
Wt per foot=	2.20 lb/ft	$Sy_{(group)}$=	13.81 in^3
Fy=	55 ksi	E=	29000 ksi
		Lu=	16.46 ft

ALL PRE-GALVANIZED PURLIN COIL MATERIAL IS PER ASTM A653 GRADE 55

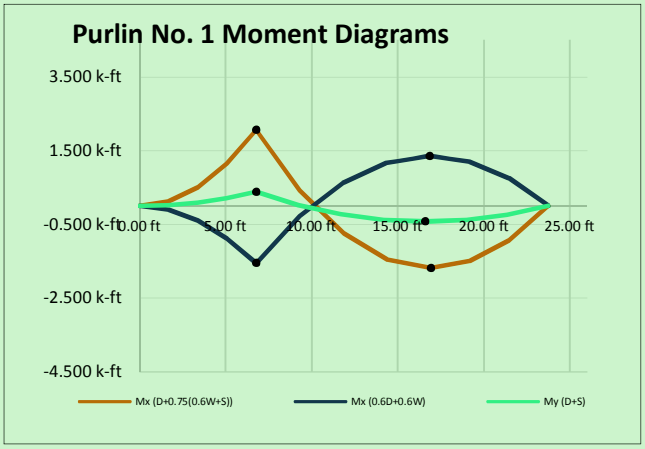
Per AISI F2.1, Mne = Sf * Fn

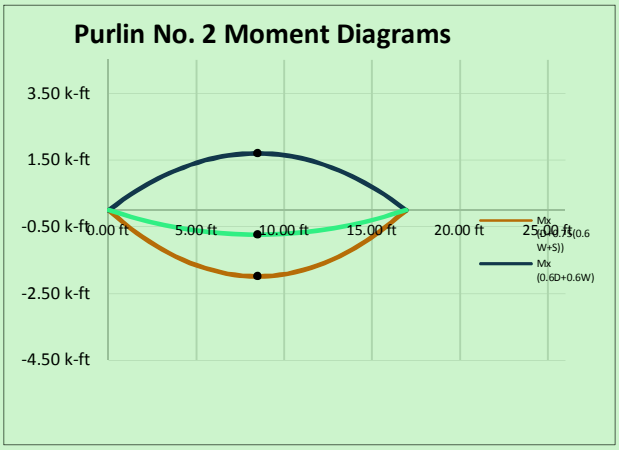
Fcre > 2.78 * Fy, Fn = Fy

lateral torsional buckling does not control

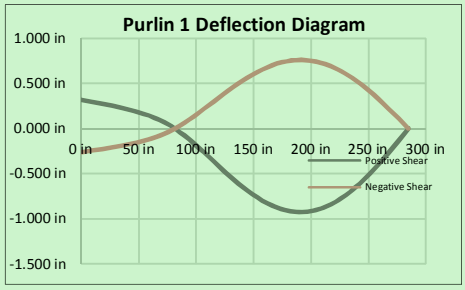
Stress Ratio Maximums					
Interior Zone	Purlin Stress Ratios: Positive Shear, ↓				
	Mx	My	Governing Load Combo	S.R. = (Mx/Max)+(My/May) ≤ 1.0	
Cantilever	2.06 k-ft	0.38 k-ft	D+0.75(0.6W+S)=	0.92	OK
Edge Span	1.68 k-ft	0.42 k-ft	D+0.75(0.6W+S)=	0.53	OK
Center Span	1.99 k-ft	0.59 k-ft	D+0.75(0.6W+S)=	0.64	OK

Interior Zone	Purlin Stress Ratios: Positive Shear, ↑				
	Mx	My	Governing Load Combo	S.R. = (Mx/Max)+(My/May) ≤ 1.0	
Cantilever	-1.55 k-ft	0.06 k-ft	0.6D+0.6W=	0.48	OK
Edge Span	-1.36 k-ft	0.07 k-ft	0.6D+0.6W=	0.60	OK
Center Span	-1.70 k-ft	0.10 k-ft	0.6D+0.6W=	0.75	OK

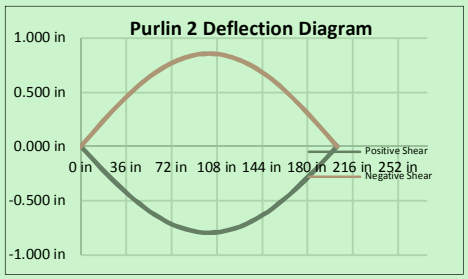




Deflection Checks			
Purlin No. 1			
Allowable Deflection =	L/120		
Maximum Cantilver Deflection =	0.32 in	L/509	OK
Maximum Span Deflection =	0.92 in	L/220	OK



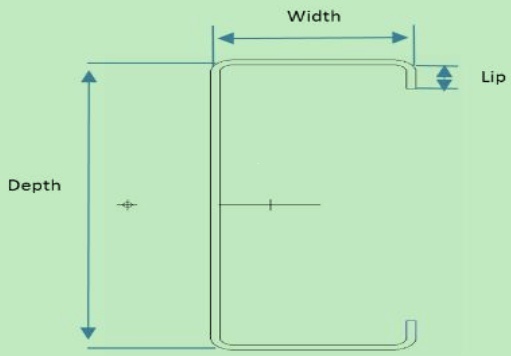
Purlin No. 2			
Allowable Deflection =	L/120		
Maximum Positive Deflection =	0.79 in	L/256	OK
Maximum Negative Deflection =	0.86 in	L/237	OK



CHANNEL COLUMN ANALYSIS

Post Section:	8"x 3" x 0.134"

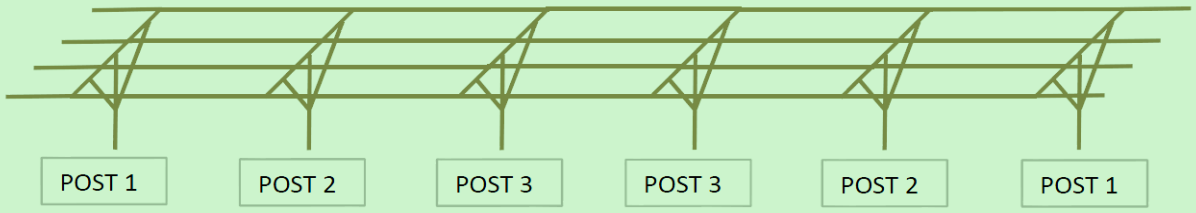
A =	1.96 in^2
D =	8.00 in
t =	0.134 in
W =	3.00 in
Lip =	0.80 in
Ix =	18.86 in^4
Iy =	2.19 in^4
Sx =	4.72 in^3
Sy =	1.03 in^3
Kx =	2.10
Ky =	1.20
Lx =	5.61 ft
Ly =	5.61 ft



Pa=	33.72 k	allowable axial load
Max=	11.74 k-ft	allowable major axis bending moment
May=	2.83 k-ft	allowable minor axis bending moment

	P	Mx	My	Load Combo
Max Required Strength:	**0.85 k**	**10.91 k-ft**	**0.00 k-ft**	**D+0.6W_up**
Post 1 Max Required Strength:	0.85 k	10.91 k-ft	0.00 k-ft	D+0.6W_up
Post 2 Max Required Strength:	0.94 k	10.18 k-ft	0.00 k-ft	D+0.6W_up
Post 3 Max Required Strength:	0.94 k	9.45 k-ft	0.00 k-ft	D+0.6W_up

Post 1 Max Stress Ratio	Post 2 Max Stress Ratio	Post 3 Max Stress Ratio
0.954	**0.895**	**0.832**
POST 1 GOVERNS		



Interior Reactions Summary

Max Uplift	
Post 1 =	-1.96 k ←
Post 2 =	-1.81 k
Post 3 =	-1.45 k

Max Down	
Post 1 =	5.00 k ←
Post 2 =	4.55 k
Post 3 =	4.01 k

Max Shear	
Post 1 =	1.53 k ←
Post 2 =	1.11 k
Post 3 =	0.94 k

Max Moment	
Post 1 =	10.91 k-ft ←
Post 2 =	10.18 k-ft
Post 3 =	9.45 k-ft

Interior Alternate Foundation Reactions

0.6D+0.6W_up (base moment)

	axial	shear	moment
Post 1 =	0.51 k	0.00 k	10.91 k-ft
Post 2 =	0.56 k	0.00 k	10.18 k-ft
Post 3 =	0.56 k	0.00 k	9.45 k-ft

D+0.75(S+0.6W_down)

	axial	shear	moment
Post 1 =	5.00 k	1.15 k	6.42 k-ft
Post 2 =	4.55 k	0.80 k	4.51 k-ft
Post 3 =	4.01 k	0.55 k	3.09 k-ft

0.6D+0.6W_up (uplift/shear)

	axial	shear	moment
Post 1 =	-1.96 k	-1.15 k	-6.44 k-ft
Post 2 =	-1.81 k	-1.11 k	-6.22 k-ft
Post 3 =	-1.45 k	-0.94 k	-5.27 k-ft

D+S

	axial	shear	moment
Post 1 =	3.11 k	0.00 k	0.00 k-ft
Post 2 =	3.46 k	0.00 k	0.00 k-ft
Post 3 =	3.46 k	0.00 k	0.00 k-ft

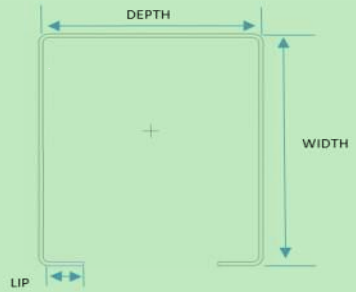
D+0.6W_down

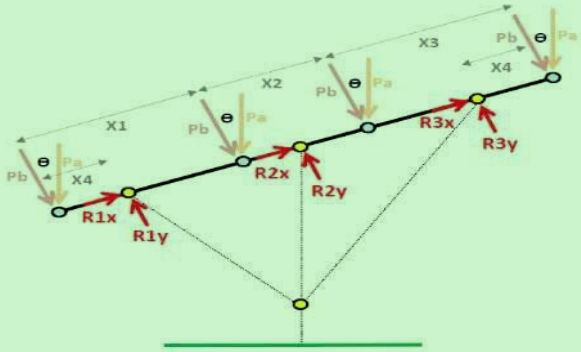
	axial	shear	moment
Post 1 =	4.12 k	1.53 k	8.56 k-ft
Post 2 =	3.24 k	1.07 k	6.01 k-ft
Post 3 =	2.52 k	0.73 k	4.11 k-ft

ROLL FORMED TOP CHORD ANALYSIS

Top Chord Section:	4" x 4.75" x 0.875" x 14ga

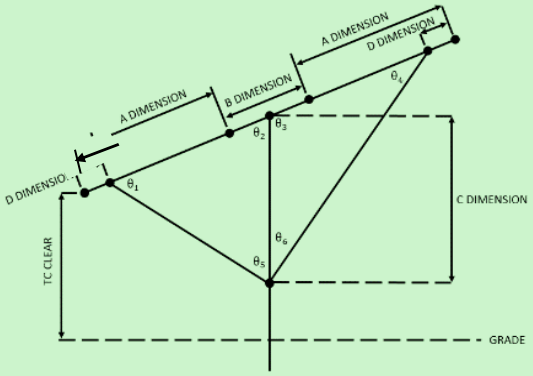
Depth=	4.00 in
Width=	4.75 in
Lip=	0.875 in
Thickness=	0.075 in
Steel=	A653 SS Grade 55
Moment Capacity, Mn =	3.15 k-ft
Shear Capacity, Vn =	12.42 k
Compressive Capacity, Pn =	15.48 k
Tensile Capacity, Pnt =	35.71 k

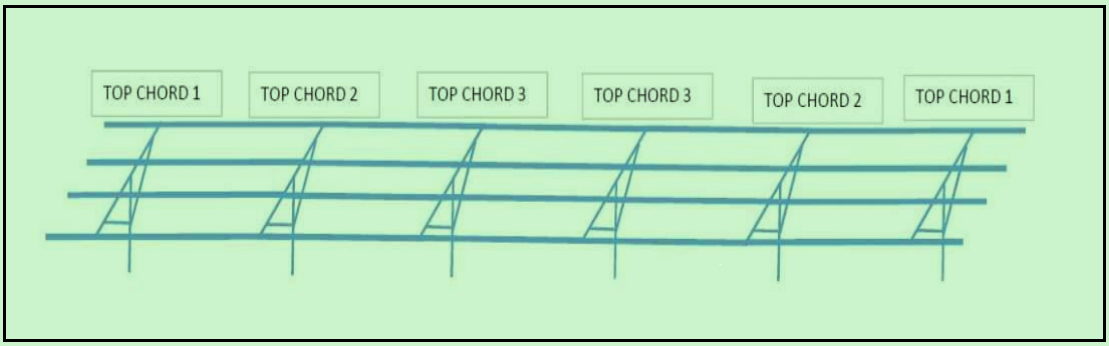


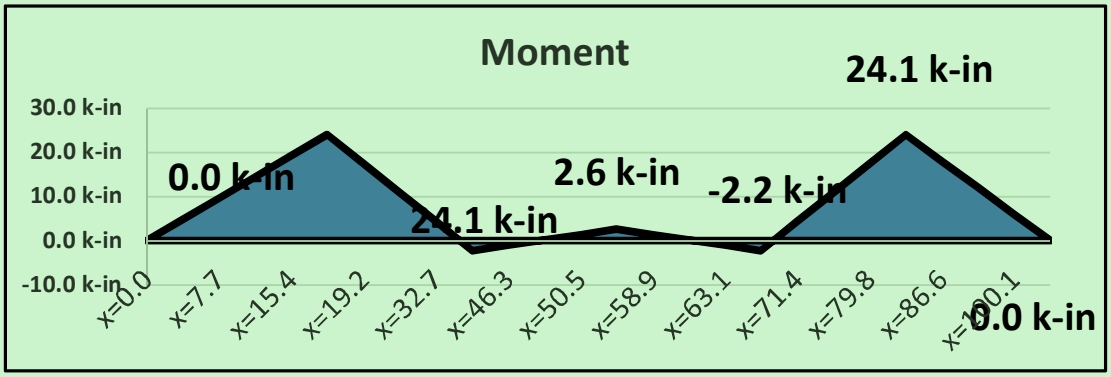


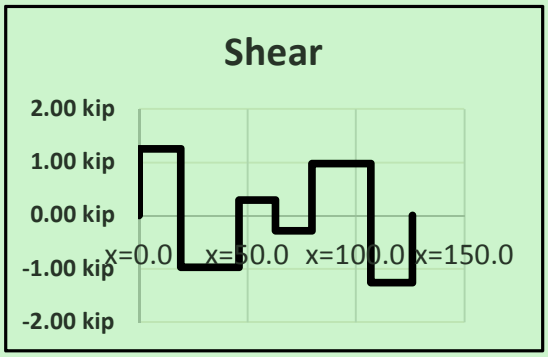
Code=	IBC 2015	ASCE 7-10		
Dead Load=	0.21 kip	Θ=	25.0 deg=	0.44 rad
Snow Load=	0.57 kip	Pa=	0.64 kip	global (snow and/or dead)
Wind_up=	-1.13 kip	Pb=	0.68 kip	local (wind)
Wind_down=	1.51 kip			
		X1=	46.30 in	
C dimension=	42.79 in	X2=	33.52 in	
D dimension=	19.20 in	X3=	46.30 in	
TC clear=	34.40 in	X4=	19.20 in	

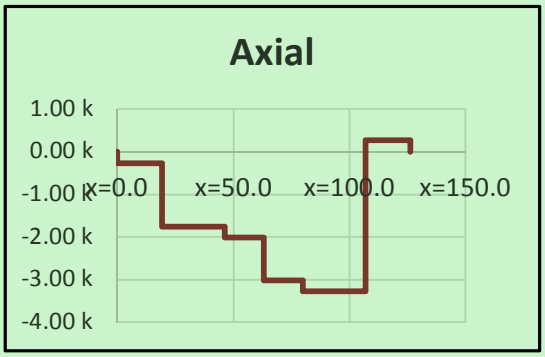
R1y=	2.22 kip
R2y=	0.57 kip
R3y=	2.22 kip
Θ1=	56.4 deg
Θ2=	65.0 deg
Θ3=	115.0 deg
Θ4=	32.0 deg
Θ5=	58.6 deg
Θ6=	33.0 deg











	Top Chord 1				RFTC
	Load Combo	Max Moment	Shear	Axial	S.R.
	D+0.6W_up	9.37 k-in	0.42 k	1.54 k	0.347
	D+0.6W_down	21.04 k-in	0.86 k	-3.03 k	0.641
	D+S	13.54 k-in	0.56 k	-1.70 k	0.406
	D+0.75(S+0.6W_up)	1.29 k-in	0.06 k	0.07 k	0.051
	D+0.75(S+0.6W_down)	24.09 k-in	0.97 k	-3.28 k	0.729
	0.6D+0.6W_up	10.84 k-in	0.49 k	1.74 k	0.399
	0.6D+0.6W_down	19.56 k-in	0.80 k	-2.85 k	0.597
max	**D+0.75(S+0.6W_down)**	**24.09 k-in**	**0.97 k**	**-3.28 k**	**0.729**

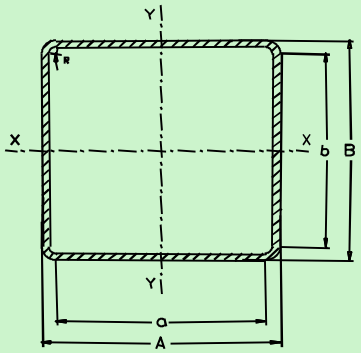
S.R. = (P/Pnt) + (Mx/Mn)

Knee Brace Design - Compression Member

Input Data

Member Section	2x2x15ga	
A = Tube Width	2	in
B = Tube Length	2	in
R = Corner Inner Radius	0.09375	in
t = Thickness	0.065	in
KL_x= Buckling around x-x	6.09	ft
KL_y= Buckling around y-y	6.09	ft
E = Modulus of Elasticity	29500	ksi
F_y = Yield Stress	50	ksi
G = Shear Modulus	11300	ksi

KNEE BRACES



Calculated Parameter

1- Properties of 90° corner		
r = R + t/2, Centerline of Dimension	0.126	in
u = π. r/2, Arc Length	0.198	in
c=0.637.r Distance of c.g. from center	0.080	in
2- Flat widths of flanges and webs		
Flat width of Dim. a= A - (2.r + t)	1.6825	in
Flat width of Dim. b= B - (2.r + t)	1.6825	in

Applied Forces

M	**0.0001**	kip.ft
P	**4.19**	kips

Calculation of I_x

Element	L, Length (in)		Y, Distance to the center (in)		$L x Y^2$	I_x'
Flanges	2.a	3.365	B/2 - t/2	0.968	3.150	0.000
Web	2.b	3.365	0	0.000	0.000	0.794
Corners	4.u	0.793	b/2 + c	0.922	0.674	0.000
Sum	7.523		1.889		3.824	0.794

Calculation of I_y

Element	L, Length (in)		X, Distance to the center (in)		$L x X^2$	I_y'
Flanges	2.a	3.365	0	0.000	0.000	0.794
Web	2.b	3.365	A/2 - t/2	0.968	3.150	0.000
Corners	4.u	0.793	a/2 + c	0.922	0.674	0.000
Sum	7.523		1.889		3.824	0.794

Section Properties

A	L x t	0.4890	in^2
I_X	$t x (L x Y^2 + I_x')$	0.3001	in^4
I_Y	$t x (L x X^2 + I_y')$	0.3001	in^4
S_x	$I_X /(B/2)$	0.3001	in^3
S_Y	$I_Y /(A/2)$	0.3001	in^3
r_x	$(I_x /A)^{0.5}$	0.7834	in
r_Y	$(I_Y /A)^{0.5}$	0.7834	in

Nominal Buckling Stress			
KL_x/r_x		93.28	
KL_y/r_y		93.28	
KL/r		93.28	
F_e	$\pi^2 . E/(KL/r)^2$	33.46	ksi
λ_c	$(Fy/Fe)^{0.5}$	1.22	
F_n		26.75	ksi

Effective Area			
effective width of compression flange			
w/t = a/t		25.88	
λ	$1.052/(k)^{0.5} \times (w/t) \times (F_n/E)^{0.5}$	0.41	
ρ•	$(1-0.22 / \lambda) / \lambda$	1.13	
a_e		1.68	in
effective width of web element			
w/t = b/t		25.88	
λ	$1.052/(k)^{0.5} \times (w/t) \times (F_n/E)^{0.5}$	0.41	
ρ•	$(1-0.22 / \lambda) / \lambda$	1.13	
b_e		1.68	in

Allowable Axial Load			
A_e	$A_e = A - 2 \times t \times [(a-a_e) + (b-b_e)]$	0.49	in^2
P_n	$P_n = A_e \times F_n$	13.08	kips
Ω_c		1.80	
$P_a = P_n / \Omega_c$		7.27	kips

Check Compression Stresses				
			Loads from Wind?	
C_{b1}	$Cb1=(P / P_a)$	0.58	NO	
			Allowable Stress Unity	1
		0.58	**Section is OK**	

Computing of M_{nx}

By using the effective width of compression flange and assuming
the web is fully effective, the neutral axis can be located as follow:

Element	L, Length (in)		y, Distance to top fiber (in)		L.y	$L.y^2$
C. Flanges	a_e	1.683	t/2	0.033	0.055	0.002
Web	2.b	3.365	B/2	1.000	3.365	3.365
C. Corners	2.u	0.397	c+t/2	0.113	0.045	0.005
T. Flanges	a_e	1.683	B-t/2	1.968	3.310	6.513
T.Corners	2.u	0.397	B-c-t/2	1.887	0.749	1.413
Sum	7.523		5.000		7.523	11.297

$y_{cg} = L.y/ L$ 1.000 Z=R+t 0.159 in

The max. stress of 50 ksi ocurs in the compression flange as assumed in the calculation

Check the effectiveness of the Web			
f_1	$(y_{cg}- Z)F_y/y_{cg}$	42.06	ksi
f_2	$- (B-y_{cg}- Z)F_y/y_{cg}$	-42.06	ksi
ψ•	f_2/f_1	-1.00	
k	$4+2(1-\psi)^3+2(1-\psi)$	24.00	
h/t	b_e/t	25.88	
λ	$1.052/(k)^{0.5}$ x (h/t) x $(f1/E)^{0.5}$	0.21	
ρ•	$(1-0.22 / \lambda) / \lambda$	-0.23	
b_e		1.68	in
b_1	$b_e/(3-\psi)$	0.42	in
b_2		0.84	in
b_1+b_2		1.26	in
$2\ I'_{web}$	$2(1/12)(b)^3$	0.79	in^4
$\Sigma(Ly^2)$		11.30	in^4
$(-)(\Sigma L)(y_{cg})^2$		7.52	in^4
I'_x		4.57	in^4
$I_x=I'_x.t$		0.30	in^4
$S_{ex}=I_x/y_{cg}$		0.30	in^3
C_b=1.0 for combined axial load and bending moment			
j	$2b^2d^2t/(b+d)$	0.31	in^4
S_f	fullS_x	0.30	in^4
L_u	$0.36C_b\pi.(E\ I.G.j)^{0.5}/(F_y.\ S_f)$	34.95	ft
F_e'	$C_b\pi.(E\ I.G.j)^{0.5}/(L.\ Sf)$	797.12	ksi
Allowable Bending Moment			
M_{nx}		1.237	kip.ft
Ω_b		1.670	
$M_a = M_{nx}/\Omega_b$		0.741	kip.ft

Check Stresses				
C_{mx}	$0.6-0.4*M_1/M_2$	0.60	Loads from Wind?	
C_{b1}	$(P / P_a) + (C_{mx}\ M_x / M_a)$	0.58	NO	
C_{b2}	$(P / P_a) + (M_x / M_a)$	0.58	Allowable Stress Unity	1
C_b	If$((P / P_a) <= 0.15, C_{b2}, C_{b1})$	0.58	**Section is OK**	

RBI SOLAR

Project: PITTSBURGH AIRPORT

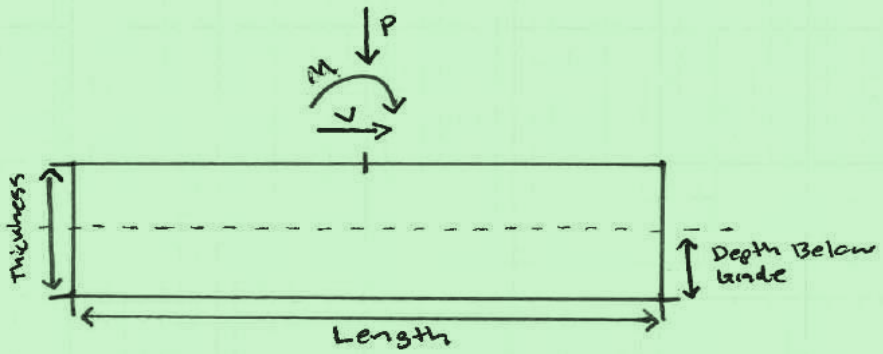
Customer: INDEPENDENT SOLUTIOI

ALTERNATE SPREAD FOOTING DESIGN

LOADING ZONE:	Interior
LENGTH:	5.75 ft
WIDTH:	5.75 ft
THICKNESS:	1.50 ft
DEPTH BELOW GRADE:	0.00 ft
CONCRETE STRENGTH:	2.50 ksi
SOIL DENSITY:	110 pcf
VOLUME:	49.59 ft^3
CONCRETE DENSITY:	150 pcf
FOOTING WEGHT:	7.44 kip

RACKING REACTIONS:	0.6D+0.6W_up (uplift/shear) <post 1>
AXIAL (P)=	-1.96 k
SHEAR (V)=	-1.15 k
MOMENT (M)=	-6.44 k-ft

ALLOWABLE BEARING=	1000 psf
MIN SAFETY FACTOR=	1.50
SLIDING COEFF=	0.50
SOIL WT=	0.00 k
PASSIVE PRESSURE=	0.00 k
RESISTING MOMENT=	21.39 k-ft



UPLIFT ANALYSIS:		
APPLIED UPLIFT=	1.96 kip	
FOOTING WEIGHT=	7.44 kip	
SAFETY FACTOR=	3.80	OK

SLIDING ANALYSIS:		
SHEAR=	1.15 kip	
NAGATIVE SLIDING FORCE=	2.74 kip	
SAFETY FACTOR=	2.39	OK

OVERTURNING ANALYSIS:		
RESISTING MOMENT=	21.39 k-ft	
OVERTURNING MOMENT=	13.79 k-ft	
OVERTURNING SAFETY FACTOR=	1.55	OK

BEARING PRESSURE:			
	AXIAL=	5.48 kip	
	MOMENT=	-6.44 k-ft	
	e=	1.18	
	ALLOWABLE BEARING=	1.000 ksf	
	Qmax=	0.374 ksf	
Qmax	≤	ALLOWABLE BEARING	OK

REINFORCEMENT:	
(6)	#4 BAR TOP AND BOTTOM, LONGITUDINAL AND TRANSVERSE
OR (5)	#5 BAR TOP AND BOTTOM, LONGITUDINAL AND TRANSVERSE

CONCRETE PIER DESIGN

LOADING ZONE: Interior

GOVERNING LOAD COMBINATION: D+0.6W_down

AXIAL=	4.12 kip	(AXIAL COMPRESSION)	post 1
SHEAR=	1.53 kip		
MOMENT=	8.56 k-ft		

AXIAL DESIGN:

PIER DIAMETER=	18.00 in	BEARING AREA=	1.77 ft^2
FILL DEPTH=	0 in	PILE PERIMETER=	4.71 ft

ALLOWABLE BEARING CAPACITY=	2000 psf
ALLOWABLE BEARING=	3.53 k
ALLOWABLE SKIN FRICTION (COMPRESSION)=	175 psf
ALLOWABLE SKIN FRICTION (UPLIFT)=	117 psf
REQUIRED PIER DEPTH=	0.71 ft

LATERAL DESIGN: (IBC SECTION 1807.3.2.1)

LATERAL BEARING CAPACITY=	200 psf/ft
HEIGHT OF POLE=	4 ft
ISOLATED POLE FACTOR=	2.00
EQUIVALENT SHEAR AT POLE HEIGHT=	3.67 kip
REQUIRED PIER DEPTH=	6.07 ft

NOTE FOR REVIEWER:
THE LATERAL ANALYSIS CONSIDERS BOTH THE SHEAR AND MOMENT AS AN EQUIVALENT SHEAR AT THE HEIGHT OF THE POLE.

FINAL PIER DESIGN:

PIER DIAMETER=	**18 in**
PIER DEPTH=	**6.50 ft**
PIER DEPTH + FILL DEPTH=	**6.50 ft**

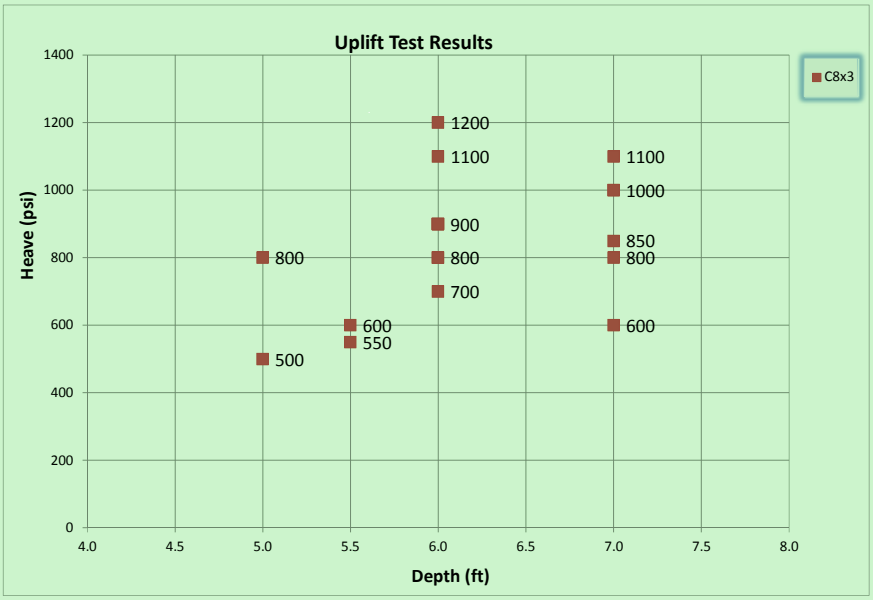
POST SHALL BE EMBEDDED INTO CONCRETE A MINIMUM OF 5.5FT

Job Number	2030237
Customer	Energy Independent Solns
Project Name	Pittsburgh Airport
Project Location	Imperial, PA
Test Date	06/02/20

Engineered Embedment	
Embedment	**7.0 Feet**
Post Type	**C8x3**

Uplift Test Results				
Test Location	**Pile Type**	**Depth (ft)**	**Heave (psi)**	**Release (psi)**
1	C8x3	7.0	600	600
2	C8x3	6.0	700	700
3	C8x3	5.0	800	800
4	C8x3	7.0	850	850
5	C8x3	7.0	800	800
6	C8x3	6.0	900	900
7	C8x3	7.0	1000	1000
8	C8x3	5.5	550	550
9	C8x3	5.0	500	500
10	C8x3	6.0	900	900
11	C8x3	7.0	1000	1000
12	C8x3	6.0	1200	1200
13	C8x3	6.0	800	800
14	C8x3	7.0	1100	1100
15	C8x3	6.0	1100	1100
16	C8x3	6.0	800	800
17	C8x3	6.0	900	900
18	C8x3	6.0	900	900
19	C8x3	5.5	600	600

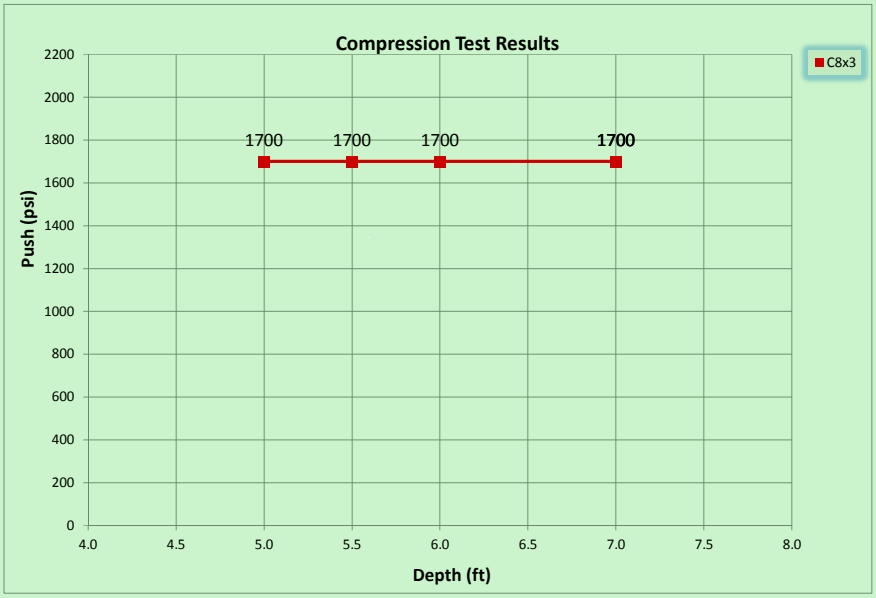
Uplift Test Notes
"Heave" represents the pressure at which the test pile shifted upward 1/2" or greater.
Posts that are "STUCK" could not be removed with the maximum measurable hydraulic pressure applied in uplift.
"N/A" signifies no data recorded at that test location.
No refusal was encountered during testing.



Force (Factored) = Force (Unfactored) x 1.5						**GRT Pressure Conversion: 6.48 kips = 1000 psi**		
North			**South**			**Interior**		
Cantilever	**Edge Span**	**Center Span**	**Cantilever**	**Edge Span**	**Center Span**	**Cantilever**	**Edge Span**	**Center Span**
2 modules	**5 modules**	**5 modules**	**2 modules**	**5 modules**	**5 modules**	**2 modules**	**5 modules**	**5 modules**
Reactions	**Post 2**		**Post 1**			**Post 1**		**Post 3**
Force (Unfactored)	2.03 kips		1.96 kips			1.96 kips		1.45 kips
Force (Factored)	3.05 kips		2.94 kips			2.94 kips		2.18 kips
Pressure (Factored)	**470 psi**		**454 psi**			**454 psi**		**336 psi**

Compression Test Results				
Test Location	Pile Type	Depth (ft)	Push Depth (ft)	Slip (ft)
1	C8x3	7.0	3.0	0.0
2	C8x3	6.0	1.0	0.0
3	C8x3	5.0	1.0	0.0
4	C8x3	7.0	1.5	0.0
5	C8x3	7.0	1.0	0.0
6	C8x3	6.0	1.0	0.0
7	C8x3	7.0	1.5	0.0
8	C8x3	5.5	2.0	0.0
9	C8x3	5.0	1.0	0.0
10	C8x3	6.0	2.0	0.0
11	C8x3	7.0	2.0	0.0
12	C8x3	6.0	1.0	0.0
13	C8x3	6.0	0.5	0.0
14	C8x3	7.0	1.0	0.0
15	C8x3	6.0	2.0	0.0
16	C8x3	6.0	1.0	0.0
17	C8x3	6.0	2.0	0.0
18	C8x3	6.0	1.0	0.0
19	C8x3	5.5	1.0	0.0

Compression Test Notes
Push value used throughout is 1700 psi.
"Push Depth" represents the initial depth the pile was embedded with hydraulic pressure prior to engaging the hammer on the pile driver.
No refusal was encountered during testing.



Force (Factored) = Force (Unfactored) x 1.5						GRT Pressure Conversion: 6.48 kips = 1000 psi		
North			South			Interior		
Cantilever	Edge Span	Center Span	Cantilever	Edge Span	Center Span	Cantilever	Edge Span	Center Span
2 modules	5 modules	5 modules	2 modules	5 modules	5 modules	2 modules	5 modules	5 modules
Reactions	Post 1		Post 2			Post 1		Post 3
Force (Unfactored)	5.00 kips		5.03 kips			5.00 kips		4.01 kips
Force (Factored)	7.50 kips		7.55 kips			7.50 kips		6.02 kips
Pressure (Factored)	1157 psi		1164 psi			1157 psi		928 psi

Lateral Test Results							
Test Location	Pile Type	Depth (ft)	Deflection (in)				Load Height (ft)
			1000 lbs	2000 lbs	3000 lbs	4000 lbs	
1	C8x3	7.0	0.250	0.625	1.000	1.375	4.0
2	C8x3	6.0	0.125	0.375	0.750	1.000	4.0
3	C8x3	5.0	0.250	0.625	1.125	1.500	4.0
4	C8x3	7.0	0.250	0.500	0.750	1.000	4.0
5	C8x3	7.0	0.250	0.500	0.750	1.000	4.0
6	C8x3	6.0	0.250	0.500	0.750	1.125	4.0
7	C8x3	7.0	0.125	0.250	0.500	0.750	4.0
8	C8x3	5.5	0.250	0.625	1.000	1.250	4.0
9	C8x3	5.0	0.250	0.625	1.000	1.375	4.0
10	C8x3	6.0	0.250	0.500	0.750	1.125	4.0
11	C8x3	7.0	0.125	0.375	0.625	0.875	4.0
12	C8x3	6.0	0.250	0.500	0.750	1.000	4.0
13	C8x3	6.0	0.250	0.375	0.625	1.000	4.0
14	C8x3	7.0	0.125	0.375	0.625	0.875	4.0
15	C8x3	6.0	0.125	0.375	0.625	0.875	4.0
16	C8x3	6.0	0.250	0.500	0.750	1.000	4.0
17	C8x3	6.0	0.250	0.500	0.750	1.125	4.0
18	C8x3	6.0	0.125	0.375	0.625	1.000	4.0
19	C8x3	5.5	0.250	0.500	0.625	1.250	4.0
Lateral Test Notes							
Lateral deflections were measured at grade.							
"N/A" signifies no data recorded at that test location.							
No refusal was encountered during testing.							

Force (Factored) = Force (Unfactored) x 2								
North			South			Interior		
Cantilever	Edge Span	Center Span	Cantilever	Edge Span	Center Span	Cantilever	Edge Span	Center Span
2 modules	5 modules	5 modules	2 modules	5 modules	5 modules	2 modules	5 modules	5 modules
Reactions	Post 1		Post 1			Post 1		Post 3
Force (Unfactored)	1.53 kips		1.53 kips			1.53 kips		0.94 kips
Force (Factored)	3.06 kips		3.06 kips			3.06 kips		1.88 kips

OK as per IBC 2012, Section 1810.3.3.2, in lateral deflection

6. Map of Test Locations and Site Images

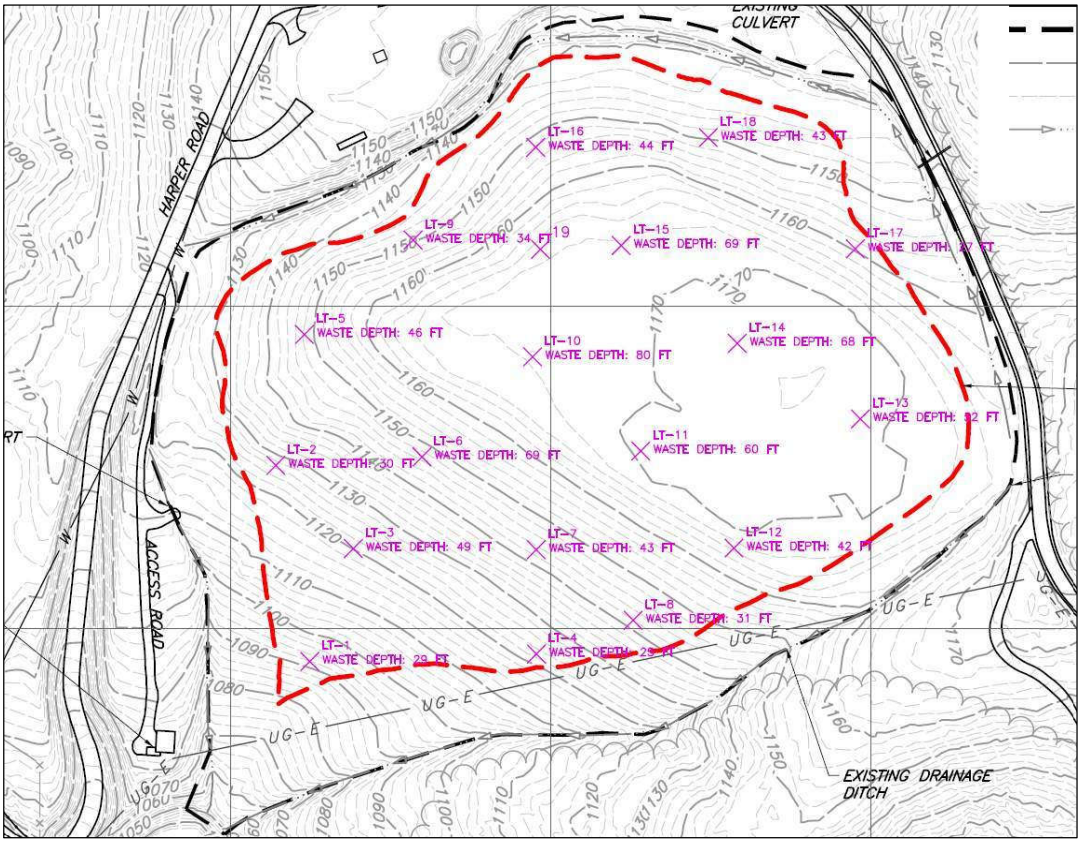


Image 6.1: Map of Test Locations

ATTACHMENT C

RELEVANT DRAWINGS

SG001
SG003
SG101

PHOTOVOLTAIC MODULE GROUND MOUNT SYSTEM

RBI SOLAR RACK MODEL: GM-2

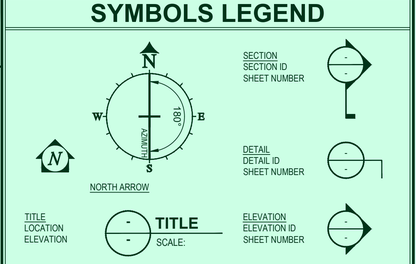
FOR

ENERGY INDEPENDENT SOLUTIONS, LLC

AT

PITTSBURGH AIRPORT
501 HARPER RD.
IMPERIAL, PA 15126
40.482143, -80.254150

SYMBOLS LEGEND



GOVERNING CODE

IBC 2015

RISK CATEGORY: I

DESIGN LOADS:

1. DEAD LOADS:
   - STRUCTURE: 2.0 PSF
   - GLAZING: 3.0 PSF
   - Σ 5.0 PSF
2. ROOF LIVE LOAD = 0 PSF
3. SNOW LOAD:
   - P_g = 25.0 PSF (GROUND SNOW)
   - P_f = 15.2 PSF (FLAT ROOF SNOW)
   - P_s = 12.4 PSF (SLOPED ROOF SNOW)
   - C_e = 0.90
   - C_t = 1.20
   - C_s = 0.82
   - I_s = 0.80
4. WIND LOAD: (MAIN WIND FORCE RESISTING SYSTEM)
   - V = 105 MPH
   - EXPOSURE: C
5. SEISMIC:
   - S_s = 0.112
   - S_1 = 0.053
   - S_{ds} = 0.120
   - S_{d1} = 0.085
   - I_{pe} = 1.00
   - SITE CLASS: D
   - SEISMIC DESIGN CATEGORY: B
   - SEISMIC FORCE RESISTING SYSTEM = CANTILEVERED COLUMN SYSTEM
   - DESIGN BASE SHEAR: V = 0.060*W, C_s = 0.060, R = 2.00
   - EQUIVALENT LATERAL FORCE ANALYSIS

VICINITY MAP

SHEET INDEX

SHT. No.	SHEET DESCRIPTION	REL. No.	SHT. No.	SHEET DESCRIPTION	REL. No.
SG001	COVER SHEET	1			
SG002	GENERAL NOTES/MODULE SPECIFICATION SHEETS	1			
SG003	SITE PLAN & BILL OF MATERIALS	1			
SG101	ARRAY: 1 COMPONENT LAYOUT	1			
SG201	ADDITIONAL POST DETAIL	1			
SG301	RACK SECTION & BAY PLAN VIEWS	1			
SG302	ALTERNATE FOUNDATIONS SECTIONS & DETAILS	1			
SG501	DETAILS	1			

CUSTOMER SPECIFICATIONS

NOTE:
THIS SUBMITTAL/CONSTRUCTION SET WAS PRODUCED FROM DOCUMENTS RECEIVED FROM CUSTOMER ON 07/14/2020.

PV MODULE MANUFACTURER	VSUN
PV MODULE MODEL #	VSUN380-72MH-DG
PV MODULE WATTAGE	380
# OF PV MODULES/STRING	26
# OF ACTIVE PV MODULES	9360
# OF INACTIVE PV MODULES	0
TOTAL # OF PV MODULES	9360
TOTAL PV SYSTEM WATTS	3.557 MW DC
TOPOGRAPHIC RELATIONSHIP	FOLLOW GRADE
ARRAY TILT	25° ±2°
MINIMUM MODULE CLEARANCE	3'-0"
ARRAY AZIMUTH	180° (NOT ADJUSTED FOR MAGNETIC DECLINATION)

RBI SOLAR
Total Solar Service: Design * Fabrication
Installation * Parts * Repair Service
5513 VINE STREET
CINCINNATI, OH 45217
513.242.2051
FAX: 513.242.0816

PROFESSIONAL SEAL

ENGINEER'S SEAL APPLIES TO DESIGN OF STRUCTURAL COMPONENTS ONLY

NOT FOR CONSTRUCTION

RBI SOLAR IS NOT RESPONSIBLE FOR CONSTRUCTION THAT IS BUILT FROM SET LABELED "NOT FOR CONSTRUCTION"

GROUND MOUNT FOR ENERGY INDEPENDENT SOLUTIONS, LLC

RELEASE RECORD

MARK	DATE	DESCRIPTION
1	07/28/20	90% REVIEW

PROJECT INFORMATION

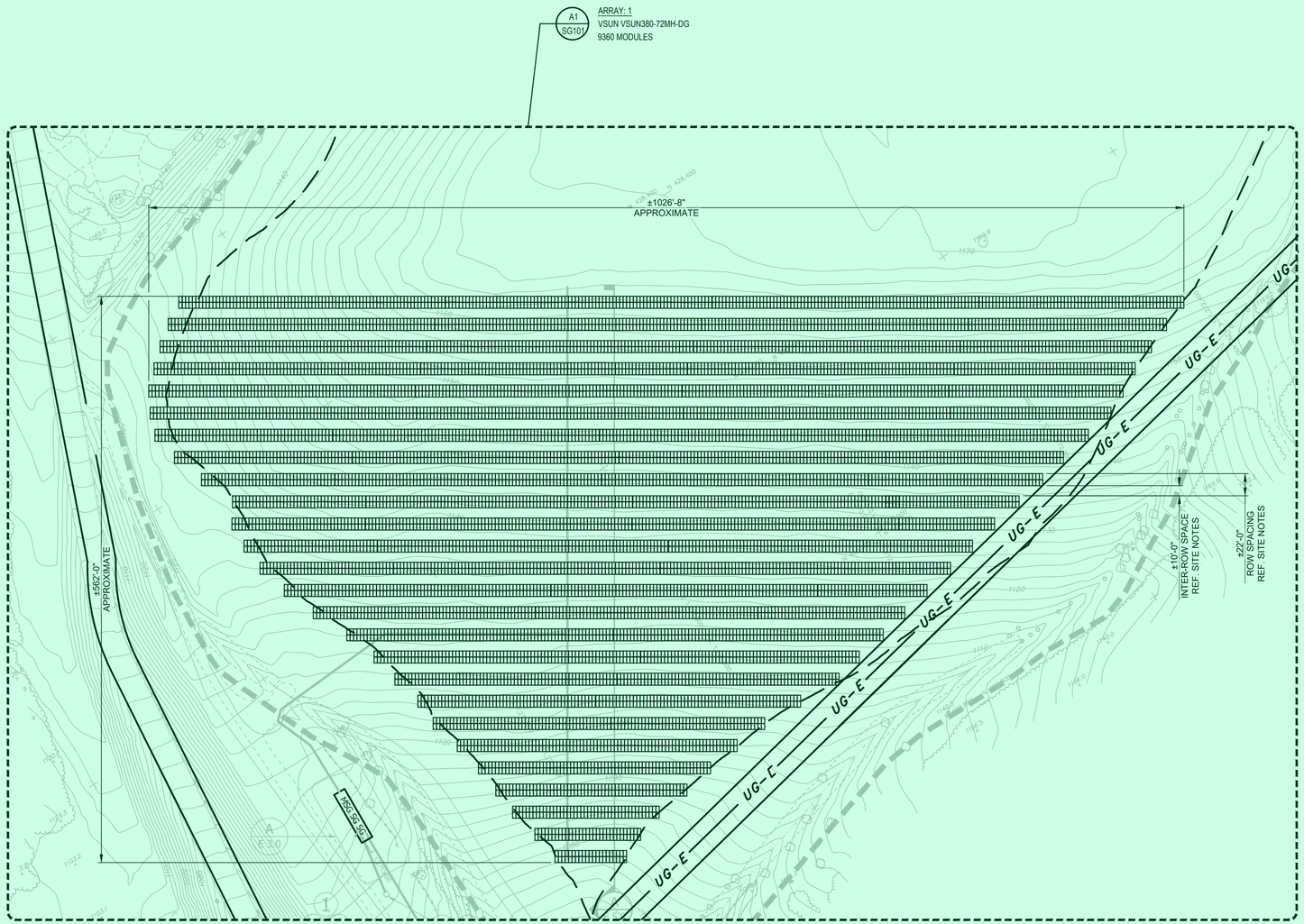
TITLE & ADDRESS:
PITTSBURGH AIRPORT
501 HARPER RD.
IMPERIAL, PA 15126

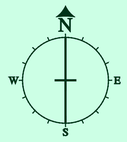
RBI SOLAR PROJECT No.: 2030237

DRAWN BY: KMF
REVIEWED BY: BDS

SHEET TITLE: COVER SHEET

SHEET No.: **SG001**





SITE NOTES

1. TOPOGRAPHY PROVIDED BY ENERGY INDEPENDENT SOLUTIONS, LLC ON 07/14/2020. DIMENSIONS SHOWN FOR REFERENCE ONLY. PRESUMPTIVE OR INADEQUATE TOPOGRAPHY USED FOR THIS DESIGN MAY REQUIRE ADDITIONAL MATERIALS. ACTUAL ON-SITE CONDITIONS SHALL BE FIELD VERIFIED AND RBI SOLAR SHALL BE NOTIFIED IF ON-SITE CONDITIONS ARE DIFFERENT THAN SHOWN OR PRESUMED.

BAY INFORMATION

TYPE	QTY.
BAY TYPE 5P2	216
BAY TYPE 6E2P2	72
BAY TYPE 6P2	408
BAY TYPE 6W2P2	72
TOTAL # OF BAYS	768

BILL OF MATERIALS

ITEM	QTY.
RACKING POST TYPE A	840
TOTAL # OF RACKING POSTS	840
EQUIPMENT POST TYPE -	50
TOTAL # OF EQUIPMENT POSTS	50
PURLINS:	
PURLIN MARK Z5	864
PURLIN MARK Z6E2	288
PURLIN MARK Z6	1632
PURLIN MARK Z6W2	288
TOTAL # OF PURLINS	3072
TOTAL # OF TOP CHORD ASSEMBLIES	840
TOTAL # OF STANDARD POST TOP ASSEMBLIES	696
TOTAL # OF EXTENDED POST TOP ASSEMBLIES	144
44" x 2" SQ. 15 GA. GALVANIZED KNEE BRACES	840
71 3/4" x 2" SQ. 15 GA. GALVANIZED KNEE BRACES	840
KNEE BRACE CLIPS	3360
3/4" X 5" MAGNI BOLT WITH NUT	1680
3/8" X 1 1/4" GALV. BOLT WITH NUT	8400
1/2" x 3" GALV. BOLT WITH NUT	1680
3/8" X 3/4" GALV. BOLT WITH NUT	13440
3/8" X 5" GALV. BOLT WITH NUT	840
3/8" GALV. WASHER	3360
#12 X 1 1/4" HEX HEAD TEK SCREW	1968
MODULE S.S. HARDWARE STACK (BOLT, 2 WASHER, FLANGE NUT)	37440

RBI SOLAR
Total Solar Service: Design * Fabrication
Installation * Parts * Repair Service
5513 VINE STREET
CINCINNATI, OH 45217
513.242.2051
FAX: 513.242.0816

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GROUND MOUNT
FOR
ENERGY INDEPENDENT SOLUTIONS, LLC

RELEASE RECORD

MARK	DATE	DESCRIPTION
1	07/28/20	90% REVIEW

PROJECT INFORMATION

TITLE & ADDRESS:
PITTSBURGH AIRPORT

501 HARPER RD.
IMPERIAL, PA 15126

RBI SOLAR PROJECT No.:
2030237

DRAWN BY: KMF
REVIEWED BY: BDS

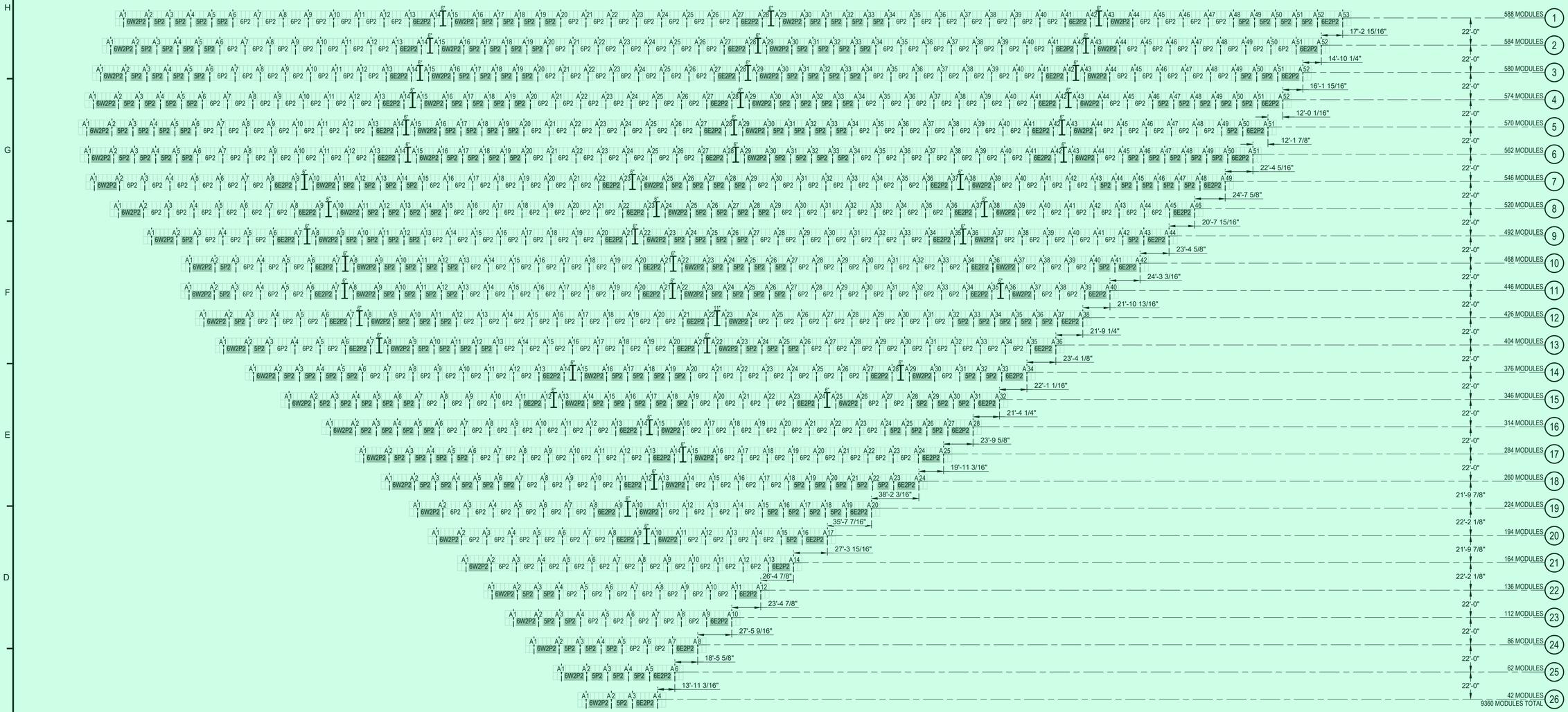
SHEET TITLE:
SITE PLAN &
BILL OF MATERIALS

SHEET No.:
SG003

A1
SCALE: 1/64" = 1'-0"

OVERALL SITE PLAN

S:\RBI Solar\Design\2020_jobs\2030237 - Energy Independent Solutions - Pittsburgh Airport\Drawings\2030237.dwg, 7/28/2020 2:20:16 PM, KFarris



LEGEND

'X'	SYMBOL REPRESENTS X" WIDE ROW BREAK PER DETAIL G9/SG301

POST SCHEDULE

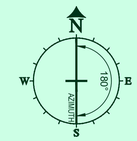
SYMBOL	MARK	DESCRIPTION	LENGTH	PIECES	DETAIL
'X' # 'X' # OR PER PLAN	A	W6x9	12'-2"	840	A6/SG301
	-	W6X9 EQUIPMENT POST (FIELD LOCATE)	11'-0"	50	A1/SG201

POST SETTING NOTES:
1. ALL POST DIMENSIONS SHOWN ARE CENTERLINE TO CENTERLINE OF POST WEB.
2. REFERENCE DETAIL A6/SG301 AND SHEET SG201 FOR ADDITIONAL INFORMATION ON REQUIRED POST EMBED DEPTHS.
3. POST LENGTH INCLUDES ADDITIONAL MATERIAL TO ALLOW FOR TOPOGRAPHICAL VARIANCE.

BAY SCHEDULE

BAYS				PURLINS			DETAIL
TYPE	QTY.	POST-POST	DESCRIPTION	MARK	#/BAY	PCS.	
5P2	216	SEE BAY PLAN	VSUN VSUN380-72MH-DG PORTRAIT MODULES 5 WIDE x 2 HIGH AND 25.0° TILT	Z5	4	864	A3/SG301
6E2P2	72	SEE BAY PLAN	VSUN VSUN380-72MH-DG PORTRAIT MODULES 6 WIDE x 2 HIGH WITH 2 CANTILEVER EAST SIDE AND 25.0° TILT	Z6E2	4	288	C3/SG301
6P2	408	SEE BAY PLAN	VSUN VSUN380-72MH-DG PORTRAIT MODULES 6 WIDE x 2 HIGH AND 25.0° TILT	Z6	4	1632	E3/SG301
6W2P2	72	SEE BAY PLAN	VSUN VSUN380-72MH-DG PORTRAIT MODULES 6 WIDE x 2 HIGH WITH 2 CANTILEVER WEST SIDE AND 25.0° TILT	Z6W2	4	288	G3/SG301

NOTES THIS BAY:
1. PURLINS ARE 2 1/2" x 7" x 2 1/2" ZEE 16 GA. GALVANIZED UNLESS NOTED OTHERWISE.
2. TOP CHORDS ARE 132 1/8" x 4" x 4 3/4" CEE 14 GA. GALVANIZED UNLESS NOTED OTHERWISE.
3. LOWER KNEE BRACES ARE 44" x 2" SQ. 15 GA. GALVANIZED UNLESS NOTED OTHERWISE.
4. UPPER KNEE BRACES ARE 71 3/4" x 2" SQ. 15 GA. GALVANIZED UNLESS NOTED OTHERWISE.
5. INSTALL EXTENDED POST TOP ASSEMBLY AT EACH ROW END UNDER CANTILEVER BAY TYPES.



A1
SCALE: 1" = 40'-0"

ARRAY: 1
COMPONENT LAYOUT

RBI SOLAR
Total Solar Service: Design * Fabrication
Installation * Parts * Repair Service
5513 VINE STREET
CINCINNATI, OH 45217
513.242.2051
FAX: 513.242.0816

PROFESSIONAL SEAL

ENGINEER'S SEAL APPLIES TO DESIGN OF STRUCTURAL COMPONENTS ONLY

NOT FOR CONSTRUCTION

RBI SOLAR IS NOT RESPONSIBLE FOR CONSTRUCTION THAT IS BUILT FROM SET LABELED "NOT FOR CONSTRUCTION"

GROUND MOUNT FOR ENERGY INDEPENDENT SOLUTIONS, LLC

RELEASE RECORD

MARK	DATE	DESCRIPTION
1	07/28/20	90% REVIEW

PROJECT INFORMATION

TITLE & ADDRESS:
PITTSBURGH AIRPORT
501 HARPER RD.
IMPERIAL, PA 15126

RBI SOLAR PROJECT No.: 2030237

DRAWN BY: KMF | REVIEWED BY: BDS

SHEET TITLE: ARRAY: 1 COMPONENT LAYOUT

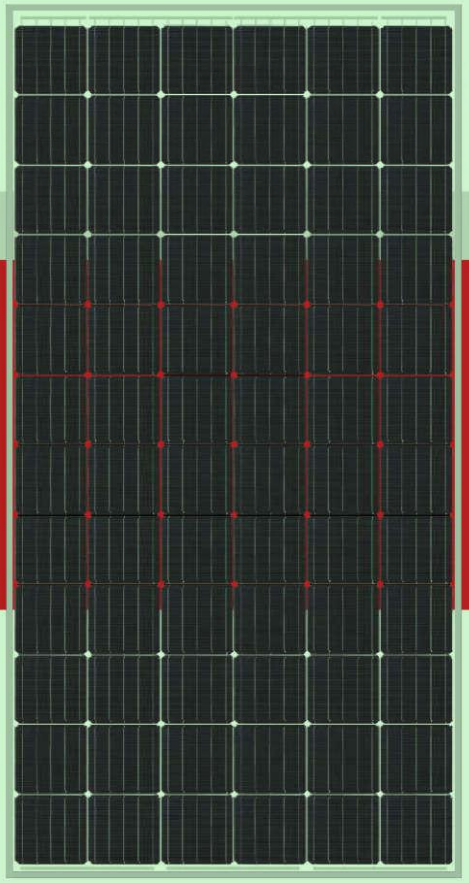
SHEET No.: **SG101**

ATTACHMENT D

MANUFACTURER'S SPECIFICATIONS

VSUN

Innovative & Smart



VSUN390-72BMH-DG

High Efficiency Low LID Bifacial PERC Technology

VSUN390-72BMH-DG VSUN385-72BMH-DG
VSUN380-72BMH-DG VSUN375-72BMH-DG

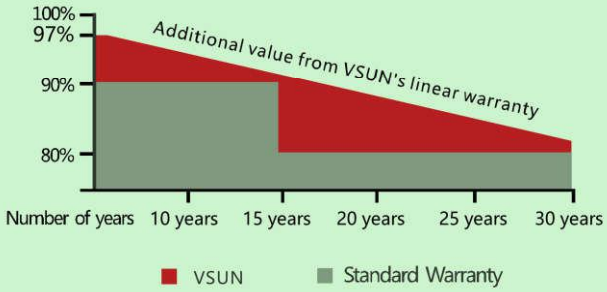
19.40%
Module efficiency

12years
Material & Workmanship warranty

390W
Highest power output

30years
Linear power output warranty

- P-type PERC bifacial cell technology
- Up to 30% more enegy yield due to the back side power generation
- Low LCOE
- Minimize micro-crack and free of snail trails
- Outstanding temperature coefficient
- Excellent performance under low light conditions
- Certified for salt/ammonia corrosion resistance
- Load certificates: wind to 2400Pa and snow to 5400Pa



Munich RE

- 12-year product warranty
- 30-year linear power output warranty

Invested by Fuji Solar, VSUN is a Japanese solar module solutions provider located in Tokyo that offers Japanese quality solar technologies globally. The group's business started in Japan in 2006, later spreading to North America, Southeast Asia, and EMEA.

Innovative & Smart – VSUN has been committed to providing greener, cleaner, and more intelligent renewable energy solutions. It is focusing on the new energy market and the development of customized and high-efficiency products.

Note:

All information and data are subject to change without notice.

A Sub-company of FUJI SOLAR

Engineered in Japan
vsun@vietnamsunergy.com
www.vsun-solar.com

Electrical Characteristics at Standard Test Conditions(STC)

Module Type	VSUN390-72BMH-DG	VSUN385-72BMH-DG	VSUN380-72BMH-DG	VSUN375-72BMH-DG
Maximum Power - Pmax (W)	390	385	380	375
Open Circuit Voltage - Voc (V)	49.3	49	48.8	48.5
Short Circuit Current - Isc (A)	10.11	10.03	9.94	9.85
Maximum Power Voltage - Vmpp (V)	40.6	40.4	40.2	39.9
Maximum Power Current - Impp (A)	9.61	9.53	9.46	9.4
Module Efficiency	19.40%	19.15%	18.91%	18.66%

Standard Test Conditions (STC): irradiance 1,000 W/m²; AM 1,5; module temperature 25°C. Tolerance of Pmpp: 0~+3%.

Measuring uncertainty of power: ±3%.

Electrical Characteristics with different rear side power gain(reference to 385 front)

Pmax (W)	Voc (V)	Isc (A)	Vmpp (V)	Impp (A)	Pmax gain
404	49.0	10.53	40.5	10.01	5%
424	49.0	11.03	40.5	10.48	10%
462	49.1	12.04	40.4	11.44	20%
481	49.1	12.54	40.4	11.91	25%

Temperature Characteristics

NOCT	45°C(±2°C)
Voltage Temperature Coefficient	-0.28%/°C
Current Temperature Coefficient	+0.0449%/°C
Power Temperature Coefficient	-0.367%/°C

Maximum Ratings

Maximum System Voltage [V]	1000/1500
Series Fuse Rating [A]	20
Bifaciality	70%±5%

Material Characteristics

Dimensions	2002×1004×35mm (L×W×H)
Weight	24.8kg
Frame	Silver anodized aluminum profile
Front Glass	High transparency,Antireflection coated,Semi-toughened safety glass,2.0mm
Cell Encapsulation	EVA (Ethylene-Vinyl-Acetate)
Back Glass	Semi-toughened safety glass,2.0mm
Cells	6×12 pieces bifacial monocrystalline solar cells series strings
Junction Box	Rated current≧13A, IP≧67
Cable&Connector	Length 500 mm, 1×4 mm², compatible with MC4

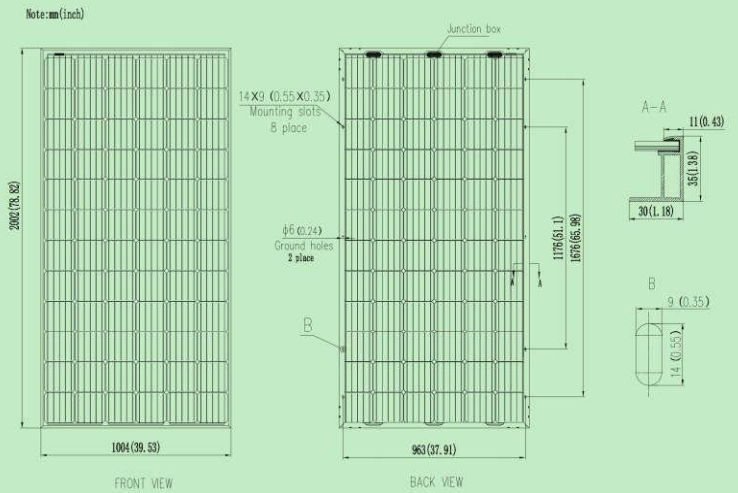
Packaging

Dimensions(L×W×H)	2030×1110×1140mm
Container 20'	300
Container 40'	660
Container 40'HC	715

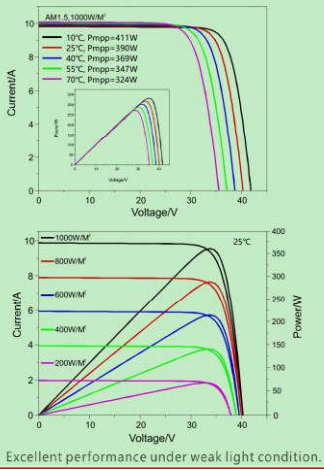
System Design

Temperature Range	-40 °C to + 85 °C
Withstanding Hail	Maximum diameter of 25 mm with impact speed of 23 m/s
Maximum Surface Load	5,400 Pa
Application class	class A

Dimensions



IV-Curves



Excellent performance under weak light condition.

Engineered in Japan
vsun@vietnamsunergy.com
www.vsun-solar.com

SG125HV

String Inverter for 1500 Vdc System

SUNGROW
Clean power for all

HIGH YIELD

- Patented five-level topology, max. efficiency 98.9 %, European efficiency 98.7 %, CEC efficiency 98.5 %
- Full power operation without derating at 50 ℃
- Patented anti-PID function

EASY O&M

- Virtual central solution, easy for O&M
- Compact design and light weight for easy installation

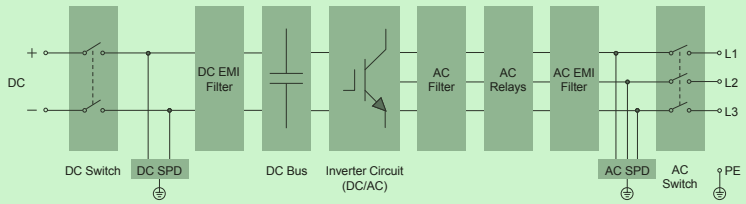
SAVED INVESTMENT

- DC 1500V,AC 600V, low system initial investment
- 1 to 5MW power block design for lower AC transformer and labor cost
- Max.DC/AC ratio up to 1.5

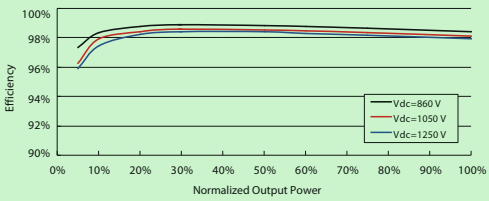
GRID SUPPORT

- Compliance with both IEC and UL safety,EMC and grid support regulations
- Low/High voltage ride through(L/HVRT)
- Active & reactive power control and power ramp rate control

CIRCUIT DIAGRAM



EFFICIENCY CURVE



Type designation	SG125HV
Input (DC)	
Max. PV input voltage	1500 V
Min. PV input voltage / Start-up input voltage	860 V / 920 V
Nominal PV input voltage	1050 V
MPP voltage range	860 – 1450 V
MPP voltage range for nominal power	860 – 1250 V
No. of independent MPP inputs	1
No. of DC inputs	1
Max. PV input current	148 A
Max. DC short-circuit current	250 A
Output (AC)	
AC output power	125 kVA @ 50 ℃
Max. AC output current	120 A
Nominal AC voltage	3 / PE, 600 V
AC voltage range	480 – 690 V
Nominal grid frequency / Grid frequency range	50 Hz / 45 – 55 Hz, 60 Hz / 55 – 65 Hz
THD	< 3 % (at nominal power)
DC current injection	< 0.5 % In
Power factor at nominal power / Adjustable power factor	> 0.99 / 0.8 leading - 0.8 lagging
Feed-in phases / connection phases	3 / 3
Efficiency	
Max. efficiency / European efficiency	98.9% / 98.7%
CEC efficiency	98.5%
Protection	
DC reverse connection protection	Yes
AC short-circuit protection	Yes
Leakage current protection	Yes
Grid monitoring	Yes
DC switch	Yes
AC switch	Yes
Q at night function	optional
Anti-PID function	Yes
Overvoltage protection	DC Type II / AC Type II
General Data	
Dimensions (W*H*D)	670*902*296 mm 26.4''*35.5''*11.7''
Weight	76 kg 167.5 lb
Isolation method	Transformerless
Degree of protection	IP 65 NEMA 4X
Night power consumption	< 4 W
Operating ambient temperature range	-30 to 60 ℃ (> 50 ℃ derating) -22 to 140 ℉ (> 122 ℉ derating)
Allowable relative humidity range (non-condensing)	0 – 100 %
Cooling method	Smart forced air cooling
Max. operating altitude	4000 m (> 3000 m derating) 13123 ft (> 9843 ft derating)
Display / Communication	LED, Bluetooth+APP / RS485
DC connection type	OT or DT terminal (Max. 185 mm² 350 Kcmil)
AC connection type	OT or DT terminal (Max. 185 mm² 350 Kcmil)
Compliance	UL1741, UL1741SA, IEEE1547, IEEE1547.1, CSA C22.2 107.1-01-2001, FCC Part15 Sub-part B Class A Limits, California Rule 21, IEC 62109-1/-2, IEC 61000-6-2/-4, IEC 61727, IEC62116, BDEW, EN50549,VDE-AR-N 4110:2018, VDE-AR-N 4120:2018, UNE 206007-1:2013, P.O.12.3, UTE C15-712-1:2013, CEI 0-16:2017, IEC 61683, PEA, NTCO
Grid Support	LVRT, HVRT, ZVRT, active & reactive power regulation, PF control, soft start/ stop

soltection™
by vynckier

Ungrounded 1500V Disconnect Combiner

CDF-U-HV & CDF-G-HV Series

The Soltection CDFU-HV Series combiner boxes provide unparalleled protection against the elements in a NEMA 4X enclosure. Utilizing only the highest quality components in a proven Vynckier ARIA and VJ enclosure, Soltection combiners enable the fastest installation by providing ample working space and a straightforward, simple layout that is easy for installers.

Standard Specifications

- cULus Listed
- Padlockable, hinged cover
- Tinned Copper Busbars
- Standard 5-Year Limited Warranty
- Installed Protective Devices (SPD)

Enclosure

- NEMA 4X Fiberglass
- Padlockable, hinged cover.
- Max Operating Temperature: 50°C
- Dimensions (LxW): See Configurator

Configuration

Electrical

- Maximum Voltage: 1500V
- Disconnect Sizes (Load Break): 250, 320, 400 A
- Number of Inputs: 8 to 32
- Terminals: Dual Listed for Copper or Aluminum, 90°C Rated

Options

- Installed NEMA 3R Breather/Drain
- Installed NEMA 4X Vent
- Mechanical Output Lugs / Dual Output Lugs
- Fuses: Certified 8, 10, 12, 15, 20, 25, 30, 32A
- Preinstalled harnesses / Whips
- Lexan Dead Front / Pre-Mounted Strut
- Custom inkjet logos and printing on enclosure
- Custom pre-drilled holes in enclosure and mounting options

Vynckier Enclosure Systems
271 McCarty Street, Houston, TX 77029
713.374.7850
www.vynckier.com

Publication Number: 800-0008-A

FORM 28
CLOSURE/POST – CLOSURE LAND USE PLAN

Prepared January 2020; Revised August 2020, Revised September 2020

Form 28 – Table of Contents

FORM 28 ..... This Permit Submission

Attachment 28-1 ..... Form 18R Narrative – Post-Closure Land Use Plan

Attachment 28-2 .....Bonding Worksheets

2540-PM-BWM0153 6/2005

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised January 2020, Rev Aug 2020, Rev Sept 2020
DEP USE ONLY
Date Received

FORM 28
CLOSURE/POST – CLOSURE LAND USE PLAN

This form must be fully and accurately completed. All required information must be typed or legibly printed in the spaces provided. If additional space is necessary, identify each attached sheet as Form 28, reference the item number and identify the date prepared. The "date prepared/revised" on any attached sheets needs to match the "date prepared/revised" on this page.

General References: 273.191, 273.192, 273.321, 273.322, 275.503, 277.191, 277.192, 277.321, 277.322

SECTION A. SITE IDENTIFIER

Applicant/permittee: Greater Pittsburgh International Airport Midfield Terminal Landfillt

Site Name: GPIA Midfield Terminal Landfill

Facility ID (as issued by DEP): 244041

SECTION B. POST-CLOSURE LAND USE PLAN

Give Location in Application Attachment 28-1

Instructions: Narrative shall be submitted which contains a detailed description of the proposed use of the facility following closure, including a discussion of the utility and capacity of the revegetated land to support a variety of alternative uses, and the relationship of the use to existing land use policies and plans. Attach appropriate documentation referencing "Form 28; Closure."

☐ 1. How the proposed post closure land use is to be achieved and the necessary support activities which maybe needed to achieve the proposed land use.

☐ 2. The consideration which has been given to making the proposed post closure land use consistent with landowner plans and applicable State and local land use plans and programs.

SECTION C. CLOSURE PLAN

Give Location in Application Attachment 28-1

Instructions: Narrative shall be submitted describing the activities that are proposed to occur during the post-closure period. Attach appropriate documentation referencing " Form 28; Closure." The plan shall include:

☐ 1. Plan for decontamination and removal of equipment, structures and related materials from the facility.

☐ 2. An estimate of the year in which final closure will occur, including an explanation of the basis forth e estimate.

☐ 3. If the facility will close in stages, a description of how and when the facility will begin and implement partial closure. (Schedule for closure)

☐ 4. A description of the steps necessary for closure if the facility closes prematurely.

☒ 5. A narrative description, including a schedule, of measures that are proposed to be carried out after closure at the facility, including measures relating to:

a. Water quality monitoring.
b. Gas control and monitoring,
c. Leachate collection, treatment, and pumping.
d. Erosion and sedimentation control.
e. Revegetation including maintenance of the final cover.
f. Access control.
g. Other maintenance activities.

☒ 6. Description of means by which funds will be made available to cover cost of post closure operations, which shall include an assessment of projected post closure maintenance costs, a description of how the necessary funds will be raised, a description of relevant legal documents, and a description of how he funds will be managed prior to closure.

☒ 7. The name, address, telephone number, and email address at which the operator can be reached during the post-closure period.

ATTACHMENT 28-2

BONDING WORKSHEETS

BONDING WORKSHEETS
FOR
Landfills and Disposal Impoundments

Revised November 2012

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AND WASTE MANAGEMENT

General Information

Permits: Please list all permits, approvals, licenses, registrations, other bonds, etc. for this facility.

I.D.#[1]	Authority[2]	Summary[3]

1. *List the permit I.D. number, registration number, etc. If there is no number, put in "none".*
2. *List the issuing authority's name, address and telephone number*
3. *List any closure features or monitoring requirements. As examples: For storage tanks, list the number, type and size of tanks. For NPDES permits list the number of outfalls to be monitored and ponds/plants to be maintained and/or closed.*

Date Prepared		I.D. Number
January 2020; Rev August 2020	COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION BUREAU OF WASTE MANAGEMENT	101479

BONDING WORKSHEET A
DECONTAMINATING THE FACILITY

Project Summary[1]:	Proposed develop solar power generation with the installation of solar panels at the closed Midfield Terminal Landfill. The facility is closed; therefore decontamination of the facility is not applicable. This worksheet includes the estimated cost for decommissioning of the solar arrays.

1. Maximum volume of solid waste required to be moved or disposed as part of closure (includes cost for solidification). _____
2. Estimated volume of contaminated soils or materials (from accidents, spills, prior remediation's). _____
3. Total volume of waste (line 1 + line 2). _____
4 Unit cost to dispose off-site (include any analyses or transportation cost). _____
5 Total cost to dispose of waste (line 3 x line 4). _____
6 Estimated volume of contaminated liquid generated during decontamination. _____
7. Unit cost to treat/dispose of contaminated liquids (including any transportation) _____
8. Total cost to dispose of contaminated liquids (line 6 x line 7). _____
9. Estimated volume of fill material _____
10. Unit cost of acquiring, transporting, placing and stabilizing (i.e. revegetating) fill material (include costs for off-site purchase if soil not available on-site). _____
11. Total cost to fill (line 9 x line 10). _____
12. Equipment decontamination cost _____LS

Total cost – all Worksheet A **$**_____
(Put final total on summary cost sheet – line 1)

[1] *List the areas/equipment that will need to be decontaminated and include any assumptions made. Multiple sheets should be used to estimate the costs for different areas.*

Civil & Environmental Consultants, Inc.

SUBJECT	**2020 Bonding Worksheets – Calculation Brief**	PROJECT NO.	**196-521**		
PROJECT	**Pittsburgh International Airport Midfield Terminal Landfill Solar Array Project**	PAGE	**1**	OF	**1**
MADE BY	**AAW**	DATE	**01/16/2020**	CHECKED BY	**DRL**
REVISED BY	**AAW**		**07/06/2020**	CHECKED BY	**DRL**

DATE **01/17/2020**

07/08/2020

CALCULATION BRIEF
BONDING WORKSHEET A
DECONTAMINATING THE FACILITY

OBJECTIVE: **Determine the total bond amount required for decontaminating the facility during closure under worst case conditions.**

METHODOLOGY: Estimate costs associated with decontaminating the facility, as required in DEP Bonding Worksheet A.

LINE ITEM ASSUMPTIONS AND CALCULATIONS:

The facility is closed; therefore decontamination of the facility is not applicable

Date Prepared		I.D. Number
Jan 2020	COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION BUREAU OF WASTE MANAGEMENT	101479

BONDING WORKSHEET B
CAP AND FINAL COVER PLACEMENT

How do I start? Select a likely "worst case" scenario where you would have a maximum amount of the facility open and in need of closure. Provide a description of the scenario with references to site development stages.

My approved cap and final cover design consists of (top to bottom):

24-inches (min) final soil cover

1. Volume of fill required for area not at final/intermediate grade, but would require filling prior to capping: _____ CY
2. Maximum area to be capped and covered (this should include all areas at final grade and not capped, intermediate grades and areas to be filled to get to intermediate grades then capped): _____ acres
3. Closure design, surveying and development of construction drawings (use $750.00/acre of number 2). $_____

   a. Construction and maintenance of access roads. $_____ LS

Material Volumes/Areas:

4. Earthen Materials
   a. Structural Fill _____ CY (Specification[1]) _____
   b. Intermediate Cover _____ CY (Specification[1]) _____
   c. Clay Cap Material _____ CY (Specification[1]) _____
   d. Final Cover Soil _____ CY (Specification[1]) _____
   e. Sand/Stone _____ CY (Specification[1]) _____
   f. Other _____ CY (Specification[1]) _____
5. Synthetic Materials
   a. Geotextile _____ Sq.Ft. (Type) _____
   b. FML _____ Sq.Ft. (Type) _____
   c. Drainage Layer _____ Sq.Ft. (Type) _____
   d. Other _____ Sq.Ft. (Type) _____
6. Cap Penetrations: Estimate the number of cap penetrations that will need to be installed for closure of the facility including, but not limited to gas extraction wells, cleanouts, valve pits, etc. _____

[1] *Provide a brief description of the material specification (i.e. ¾" minus, 12" minus – 12" lifts, etc.)*

Material Unit Costs:

7. Unit cost to place or regrade material to reach final grades (this may include additional waste placement to reach grade) _____ $/CY

Are sufficient soils available in permitted on-site borrow areas to complete job? (Attach maps that identify sources and stockpiles) _____

8. Earthen Materials	Stockpile	Borrow	Onsite	Offsite	Processing Req'd Yes	Processing Req'd No
a. Structural Fill	☐	☐	☐	☐	☐	☐
Unit cost to place[2] _____ $/CY						
b. Intermediate Cover	☐	☐	☐	☐	☐	☐
Unit cost to place[2] _____ $/CY						
c. Clay Cap Material	☐	☐	☐	☐	☐	☐
Unit cost to place[2] _____ $/CY						
d. Final Cover Soil	☐	☐	☐	☐	☐	☐
Unit cost to place[2] _____ $/CY						
e. Sand/Stone	☐	☐	☐	☐	☐	☐
Unit cost to place[2] _____ $/CY						
f. Other	☐	☐	☐	☐	☐	☐
Unit cost to place[2] _____ $/CY						

9. Synthetic Materials

a. Geotextile

Unit cost to place[3] _____ $/sq. ft.

b. FML

Unit cost to place[3] _____ $/sq. ft.

c. Drainage Layer

Unit cost to place[3] _____ $/sq. ft.

d. Other

Unit cost to place[3] _____ $/sq. ft.

[2] *The unit costs should include all associated costs including, but not limited to cost of material, excavation, transportation, processing and placement.*

[3] *The unit price should include the material cost, transportation cost, handling cost and installation cost.*

10. Cap Penetration Unit Cost

    List the unit cost to fabricate and install each cap penetration

    Unit cost to place _____ $/each

11. Unit cost to construct E & S structures
    (i.e. channels, letdowns, etc.) _____ $.acre

12. Revegetation Cost

    (Seeding rate used: _____ lbs/acre)

    (Lime rate used: _____ tons/acre)

    (Fertilizer rate used: _____ tons/acre)

    (Mulch rate used: _____ tons/acre)

    Unit cost to revegetate[3] _____ $/acre

13. Cost Summary

a.	Fill (line 1 x line 7)		$_____
b.	Construction Drawings (line 3)		$_____
c.	Construction Roads (line 3a)		$_____
d.	Structural Fill (line 4a x line 8a)		$_____
e.	Intermediate Cover (line 4b x line 8b)		$_____
f.	Clay Cap Material (line 4c x line 8c)		$_____
g.	Final Cover (line 4d x line 8d)		$_____
h.	Sand/Stone (line 4e x line 8e)		$_____
i.	Other (line 4f x line 8f)		$_____
j.	Geotextile (line 5a x line 9a)		$_____
k.	FML (line 5b x line 9b)		$_____
l.	Drainage Layer (line 5c x line 9c)		$_____
m.	Other (line 5d x line 9d)		$_____
n.	Penetrations (line 6 x line 10)		$_____
o.	E & S Structures (line 2 x line 11)		$_____
p.	Revegetation (line 12 x line 2)		$_____
		Subtotal	**$**_____
	CQA costs (use 5% of subtotal)		$_____
		Total	**$ 0**

(Place this total on Summary Cost Worksheet – line 2)

CALCULATION BRIEF
BONDING WORKSHEET B
CAP AND FINAL COVER PLACEMENT

OBJECTIVE: **Determine the total bond amount required for cap and final cover placement during closure under worst case conditions.**

METHODOLOGY: Estimate material quantities and installation costs associated with cap and final cover placement, as required in DEP Bonding Worksheet B.

LINE ITEM ASSUMPTIONS AND CALCULATIONS:

1. The landfill is closed. Final cover construction is complete; therefore Bonding Worksheet B is not applicable to the facility.

2. The annual cost to repair the final cover is included in Bonding Worksheet K.

3. The final cover design consists of the following:

    - 24 inches (min.) final cover soil;

Date Prepared		I.D. Number
Jan 2020	COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION BUREAU OF WASTE MANAGEMENT	101479

BONDING WORKSHEET C
GROUNDWATER MONITORING SYSTEM

1. Number of wells in the approved monitoring plan. _____
   a. Shallowest well depth _____ ft.
   b. Deepest well depth _____ ft.
   c. Average well depth _____ ft.
   d. Number with dedicated pumps _____
2. Unit cost to upgrade an existing well with a dedicated pump _____ $/well
3. Unit cost to install a well (assume average well depth, and include drilling, installation, developing and pump installation) _____ $/well
4. Number of wells to be installed (wells in the approved plan that haven't been installed) _____
5. Number of wells to be replaced over the life of the monitoring period (use 10% of line 1 and round up) _____
6. Number of pumps to be replaced/repaired (use 25% of line 1 over the monitoring period) _____
7. Unit cost to purge and sample a well (assume average well depth, and include methane monitoring, record keeping and shipping) _____ $/well
8. Unit cost to analyze sample(s)
   a. Quarterly (25 PA Code §273.284, §277.284 or §288.254) _____ $/well
   b. Annually (25 PA Code §273.284, §277.284 or §288.254) _____ $/well
9. Unit cost to analyze data (includes review of lab QA/QC data, database input, form completion, statistical analysis and data review) _____ $/well
10. Cost to purge, sample and analyze – quarterly (line 7 + line 8a + line 9) _____ $/well
11. Cost to purge, sample and analyze – annually (line 7 + line 8b + line 9) _____ $/well
12. Number of years of sampling (30 + time to close) _____ years

13. Cost Summary –Groundwater Monitoring System

a.	System upgrade ([line 1 – line 1d] x line 2)	$_____
b.	Wells to be Installed (line 3 x line 4)	$_____
c.	Wells to be replaced (line 3 x line 5)	$_____
d.	Pumps to be replaced (line 2 x line 6)	$_____
e.	Cost of Quarterly Monitoring (line 1 x "4" x line 10 x line 12)	$_____
f.	Cost of Annual Monitoring (line 1 x line 11 x line 12)	$_____
	Subtotal	**$_____**

Adjustment for resampling, assessments, etc.

a.	Use 0% of subtotal if no assessments in last 2 yrs.	
b.	Use 5% of subtotal if assessment in last 2 yrs.	
c.	Use 10% if currently in assessment, abatement or increase monitoring	$_____

Total **$ 0**

(Place this total on Summary Cost Worksheet – line 3)

CALCULATION BRIEF
BONDING WORKSHEET C
GROUNDWATER MONITORING SYSTEM

OBJECTIVE: **Determine the total bond amount required for the groundwater monitoring system during closure.**

METHODOLOGY: Estimate installation, maintenance, and sampling costs associated with the groundwater monitoring system, as required in DEP Bonding Worksheet C.

LINE ITEM ASSUMPTIONS AND CALCULATIONS:

Groundwater monitoring is not required at this facility: therefore Bonding Worksheet C is not applicable to the facility.

Date Prepared	COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION BUREAU OF WASTE MANAGEMENT	I.D. Number
Jan 2020		101479

BONDING WORKSHEET D
SURFACE WATER MONITORING

Solid Waste Surface Water Sampling

1.	Number of surface points monitored for Solid Waste Permit	0	
2.	Unit cost to sample a surface point (record keeping and shipping)	0	$/point
3.	Unit cost to analyze sample(s)		
	a. Quarterly (25 PA Code §273.284 or §288.254)	0	$/point
	b. Annually (25 PA Code §273.284 or §288.254)	0	$/point
4.	Unit cost to analyze data (includes review of lab QA/QC data, database input, form completion, and data review)	0	$/point
5.	Cost to sample and analyze – quarterly (line 2 + line 3a + line 4)	0	$/point
6.	Cost to sample and analyze – annually (line 2 + line 3b + line 4)	0	$/point
7.	Number of years of sampling (30 + time to close)	0 years	

NPDES Surface Discharge Sampling

8.	Number of outfalls monitored	0	
9.	Monitoring frequency (i.e. monthly, quarterly, etc)	0	
10.	Number of samples to be taken per point/year	0	
11.	Unit cost to sample a surface point (record keeping and shipping)	0	$/point
12.	Unit cost to analyze sample(s) (including data review and completing DMR)	0	$/point
13.	Number of years of sampling (30 + time to close)	N/A years	
14.	Cost Summary –Surface Water Monitoring		
	a. Cost of Quarterly Surface Water Monitoring (line 1 x “4” x line 5 x line 7)	$ 0	
	b. Cost of Annual Surface Water Monitoring (line 1 x line 6 x line 7)	$ 0	
	c. Cost of NPDES Monitoring (line 8 x line 10 x [line 11 + line 12] x line 13)	$ 0	
	d. NPDES renewals over post-closure period (includes application development, fees, etc.) use 10% of line 14c	$ 0	
	Subtotal$	**$ 0**	

Adjustment for resampling, assessments, etc.

a. Use 0% of subtotal if no assessments in last 2 yrs.

b. Use 5% of subtotal if assessment in last 2 yrs.

c. Use 10% if in assessment, abatement or increased monitoring $\$\underline{\quad 0}$

Total $\$\underline{\quad \mathbf{0}}$

(Place this total on Summary Cost Worksheet – line 4)

CALCULATION BRIEF
BONDING WORKSHEET D
SURFACE WATER MONITORING

OBJECTIVE: **Determine the total bond amount required for surface water monitoring during and after closure.**

METHODOLOGY: Estimate sampling costs associated with surface water monitoring as required in DEP Bonding Worksheet D.

LINE ITEM ASSUMPTIONS AND CALCULATIONS:

1. Line items 1 through 7 are not applicable since there are no solid waste surface water sampling locations at the facility.
8. Line items 8-14 are not applicable since the NPDES Surface Discharge Sampling costs are included in Bonding Worksheet I for leachate management. The costs for NPDES sampling has been included in the unit cost for treatment of leachate.

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BONDING WORKSHEET E
PRIVATE WATER SUPPLY MONITORING

1. Number of private water supplies monitored. _____

2. Unit cost to sample a well (include methane monitoring, record keeping and shipping) _____ $/well

3. Unit cost to analyze sample(s) quarterly (Act 101 Section 1103) _____ $/well

4. Unit cost to analyze data (includes review of lab QA/QC data, database input, form completion, and data review) _____ $/well

5. Total cost for quarterly sampling (line 2 + line 3 + line 4) _____ $/well

6. Number of years of sampling (30 + time to close) _____ years

7. Cost Summary –Private Water Supply Monitoring

   a. Cost of quarterly monitoring (line 5 x 4 x line 6) $_____

Total $ 0

(Place this total on Summary Cost Worksheet – line 5)

CALCULATION BRIEF
BONDING WORKSHEET E
PRIVATE WATER SUPPLY MONITORING

OBJECTIVE: **Determine the total bond amount required for the private water supply monitoring.**

METHODOLOGY: Estimate sampling and analysis costs associated with private water supply monitoring as required in DEP Bonding Worksheet E.

LINE ITEM ASSUMPTIONS AND CALCULATIONS:

The facility does not monitor private water supply wells; therefore Bonding Worksheet E is not applicable to the facility.

Date Prepared		I.D. Number
Jan 2020	COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION BUREAU OF WASTE MANAGEMENT	101479

BONDING WORKSHEET F
GAS MONITORING SYSTEM

1. Number of probes in the approved monitoring plan. _____
   a. Shallowest probe depth _____ ft.
   b. Deepest probe depth _____ ft.
   c. Average probe depth _____ ft.
   d. Number of probes installed _____
2. Unit cost to install a probe (including, drilling, and installation) _____ $/probe
3. Number of probes to be installed (probes in the approved plan that haven't been installed _____
4. Number of probes to be replaced over the life of the monitoring period (use 5% of line 1 and round up) _____
5. Unit cost to monitor a probe (include record keeping) _____ $/probe
6. Number of probes and structure monitoring events per year
7. Number of years of monitoring (30 + time to close) _____ years
8. Cost Summary –Gas Monitoring System
   a. System completion (line 3 x line 2) $ $_____
   b. Probe replacement (line 2 x line 4) $ $_____
   c. Probe Monitoring (line 1 x line 5 x line 6 x line 7) $_____

Subtotal **$**_____

Adjustment for resampling, assessments, etc.

a. Use 0% of subtotal if no assessments in last 2 yrs.
b. Use 5% of subtotal if assessment in last 2 yrs.
c. Use 10% if in assessment or increased monitoring

Total **$ 0**

(Place this total on Summary Cost Worksheet – line 6)

CALCULATION BRIEF
BONDING WORKSHEET F
GAS MONITORING SYSTEM

OBJECTIVE: **Determine the total bond amount required for the gas monitoring system.**

METHODOLOGY: Estimate sampling and analysis costs associated with gas monitoring system as required in DEP Bonding Worksheet F.

LINE ITEM ASSUMPTIONS AND CALCULATIONS:

This facility is a closed landfill consisting of decomposed municipal solid waste. Gas control monitoring is not required for this facility: therefore Bonding Worksheet F is not applicable to the facility.

Date Prepared		I.D. Number
Jan 2020	COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION BUREAU OF WASTE MANAGEMENT	101479

BONDING WORKSHEET G
GAS COLLECTION SYSTEM

1. Number of wells in the approved monitoring plan. _____
   a. Shallowest well depth _____ ft.
   b. Deepest well depth _____ ft.
   c. Average well depth _____ ft.
   d. Number of wells installed _____
   e. Number of pumping wells _____
2. Cost for flare or other control device installation $_____ LS
3. Unit cost to install a well (including, drilling, installation, and connection to active system) _____ $/well
4. Unit cost to install a gas well requiring liquid removal (including, drilling, installation, and connection to active system) _____ $/well
5. Number of wells to be installed (wells in the approved plan that haven't been installed)
6. Number of gas wells requiring liquid removal to be installed _____
7. Estimate the length of collection piping to be installed _____ LF
8. Unit cost to install collection piping (include excavation, pipe bedding, pipe, backfilling, regrading, revegetating, surveying and QA/QC) _____ $/LF
9. Number of wells to be replaced/repaired over the life of the monitoring period (use 10% of line 1 and round up) _____
10. Unit cost to monitor well and balance system monthly (include monitoring of methane, oxygen, carbon dioxide or nitrogen, temperature, pressure, and NSPS record keeping) _____ $/well
11. Unit cost to conduct surface monitoring (NSPS) _____ $/event
12. Control System Information _____
    a. number and size of blowers _____
    b. flare dimensions and capacity _____
    c. current flow rate _____
    d. other features _____
13. Cost of electricity to run system _____ $/year
14 Cost to maintain system (including daily check, weekly charts, maintenance, etc.) _____ $/year
15. Cost of annual blower maintenance (including greasing, bearing check and alignment) _____ $/year

16. Cost of stack testing (once per five years) _____ $/event
17. Estimate the volume of condensate generated per year _____ gallons
18. Cost of condensate management (including pumping, testing and treatment/disposal) _____ $/year
19. Number of years to run system (30 + time to close) _____ years
20. Cost Summary –Gas Collection System _____

System Installation

a. Additional well installation (line 5 x line 3) $_____

b. Additional pumping well installation (line 4 x line 6) $_____

c. Cost of collection piping (line 7 x line 8) $_____

d. Well replacement (line 3 x line 9) $_____

e. Enclosed ground flare system (line 2) $_____

System Installation Subtotal **$**_____
(sum lines a to e)

f. Cost of monitoring/balancing (line 1 x "12" x line 10 x line 19) $_____

g. Cost of surface monitoring (line 11 x "1.5" x line 19) $_____

h. Electric Cost (line 13 x line 19) $_____

i. System maintenance cost (line 14 x line 19) $_____

j. Blower maintenance cost (line 15 x line 19) $_____

k. Stack testing cost (line 16 x [line 19/5]) $_____

l. Condensate management cost (line 18 x line 19) $_____

System Monitoring and Maintenance Subtotal **$**_____
(sum lines f to l)

Adjustment for miscellaneous maintenance items (including; knockout pot maintenance, thermocouple replacement, flame detector replacement, flame arrester maintenance, flare maintenance, enrichment/startup gas replacement, pneumatic valve maintenance, sump maintenance, panel board maintenance, etc.)

a. Use 0% of subtotal if system[1] < 2yrs old

b. Use 5% of subtotal if system[1] is > 2 yrs old, but < 5yrs old

c. Use 10% if system[1] is > 5 yrs old

$_____

Total (Installation subtotal + M & M subtotal + Misc. Maintenance) **$** **0**
(Place this total on Summary Cost Worksheet – line 7)

[1] *The age of the system would be considered from the date that the active system went on-line. Expansions of the systems are assumed to occur, however, this does not change the age of the system unless a majority of the existing system is replaced/upgraded.*

CALCULATION BRIEF
BONDING WORKSHEET G
GAS COLLECTION SYSTEM

OBJECTIVE: **Determine the total bond amount required for the gas collection system.**

METHODOLOGY: Estimate installation, maintenance, and sampling costs associated with the gas collection system, as required in DEP Bonding Worksheet G.

LINE ITEM ASSUMPTIONS AND CALCULATIONS:

This facility is a closed landfill consisting of decomposed municipal solid waste. There is no gas collection system at the facility: therefore Bonding Worksheet G is not applicable to the facility.

Date Prepared		I.D. Number
Jan 2020	COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION BUREAU OF WASTE MANAGEMENT	101479

BONDING WORKSHEET H
OTHER MONITORING AND REPORTING

Please list the annual costs to maintain the following permits/registrations that apply. Additional space is provided for items applicable to your facility, but not listed.

1. Title V or other air permit (include the annual permit fee, cost to complete emissions inventory and emissions fees) $_____
2. NSPS Annual Report preparation cost $_____
3. Local permit or Host Agreement requirements $_____
4. UST/AST registration $_____
5. Other _____ $_____
6. Other _____ $_____
7. Other _____ $_____
8. Other _____ $_____
9. Other _____ $_____
10. Number of years of monitoring/maintenance (30 + time to close) _____ years

Total (sum of lines 1 to 9 x line 10) **$ 0**

(Place this total on Summary Cost Worksheet – line 8)

CALCULATION BRIEF
BONDING WORKSHEET H
OTHER MONITORING AND REPORTING

OBJECTIVE: **Determine the total bond amount required for other monitoring.**

METHODOLOGY: Estimate other monitoring costs as required in DEP Bonding Worksheet H.

LINE ITEM ASSUMPTIONS AND CALCULATIONS:

The facility does not maintain a Title V, NSPS, local or host agreement permits: therefore Bonding Worksheet H is not applicable to the facility.

Date Prepared
Jan 2020
Revised Sept 2020

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

I.D. Number
101479

BONDING WORKSHEET I
LEACHATE MANAGEMENT

Leachate Management System Narrative: Provide a detailed description of the leachate management system. You need to include all features of the system including but not limited to landfill sumps (with number and size of pumps and controllers), length of conveyance system, number and type of storage facilities, and treatment/disposal method. A schematic should be attached as back up.

1. Number of years of leachate management (30 years + closure period) — 35 years

2. Annual leachate volume generated — N/A gallons

3. Annual cost to manage leachate volume (include pump and pipe maintenance, electricity and monitoring)[1] — $ 0

Discharge to POTW

4. Unit cost to discharge leachate to a POTW — 0 $/gal

On-site Treatment (including pretreatment)

5. Unit cost for treatment of leachate (include equipment maintenance, electricity, personnel, chemicals, sludge disposal, etc.) — 0 $/gal

6. Annual cost to maintain NPDES permit (include sampling, analysis, report preparation, and factor in five year renewal application preparation and fees) — $ 0

Interim Trucking of Leachate

7. Unit cost to transport and dispose of leachate — 0 $/gal

8. NPDES Permit (cost to prepare application, fees and sampling/analysis) — $ 0

9. Cost to construct on-site treatment or pretreatment system or connection to POTW — $ 0

10. Unit cost for treatment of leachate (include equipment maintenance, electricity, personnel, chemicals, etc.) — 0 $/gal

11. Annual cost to maintain NPDES permit (include sampling, analysis, report preparation, and factor in five year renewal application preparation and fees) — $ 0

[1] *Does not include storage of leachate which is contained on Worksheet K*

12. Cost Summary:

a. Cost to manage/convey leachate (line 1 x line 3) $ $ 0

If discharge to POTW

b. Discharge to POTW cost (line 1 x line 2 x line 4) $ 0

If have on-site treatment

c. Treatment cost (line 1 x line 2 x line 5) $ 0

d. NPDES maintenance cost (line 1 x line 6) $ 0

If you currently truck leachate

e. Cost of trucking leachate for three years (line 2 x "3" x line 7) $ 0

f. NPDES permit (line 8) $ 0

g. Cost to construct on-site treatment system or connection to POTW (line 9) $ 0

h. Treatment cost ([line 1 – "3"] x line 2 x line 10) $ 0

i. NPDES maintenance cost ([line 1 – "3"] x line 11) $ 0

If you currently store leachate in impoundments

j. Size of pond(s) 0 acres

k. Estimate volume of material to be removed (including liner system and minimum of 12" of soil) 0 CY

l. Unit cost to dispose of materials (Worksheet A, line 4) 0 $/CY

m. Cost to dispose of materials (line k x line l) $ 0

n. Volume of structural backfill 0 CY

o. Cost for backfill (line n x Worksheet B, line 8a) $ 0

p. Revegetation cost $ 0 LS

Subtotal **$ 0**
(sum of a – i) +m+o+p)

Adjustment for maintenance, equipment replacement and contingencies, etc. Please note that these are cumulative and you must add all of the percentages that apply to arrive at the final adjustment percentage. The minimum adjustment is 10%.

a. Add 10% of subtotal if pumps are used to convey leachate.
b. Add 5 % of subtotal if flow volume to POTW is restricted.
c. Add 10% of subtotal if leachate is stored in ponds
d. Add 10% of subtotal if onsite treatment
e. Add 15% if trucking leachate
f. Add 10% if current leachate generation exceeds 5MG/year

Final adjustment factor: 0 %

g. Adjustment (subtotal x factor) $ 0

Total (subtotal + adjustment) **$ 0**
(Place this total on Summary Cost Worksheet – line 9)

Civil & Environmental Consultants, Inc.

SUBJECT	2020 Bonding Worksheets – Calculation Brief	PROJECT NO.	196-521		
PROJECT	Pittsburgh International Airport Midfield Terminal Landfill Solar Array Project	PAGE	1	OF	1
MADE BY	AAW	DATE	01/16/2020	CHECKED BY	DRL	DATE	01/17/2020
REVISED BY	AAW	DATE	09/09/2020	CHECKED BY	DRL	DATE	09/09/2020

CALCULATION BRIEF
BONDING WORKSHEET I
LEACHATE MANAGEMENT

OBJECTIVE: **Determine the total bond amount required for leachate management.**

METHODOLOGY: Estimate leachate management costs as required in DEP Bonding Worksheet I.

LINE ITEM ASSUMPTIONS AND CALCULATIONS:

The cost of leachate management has been removed from the bond calculation in response to the PADEP request dated August 28, 2020 since it is not associated with the closure, post-closure, and monitoring of the solar power generation facility.

Date Prepared		I.D. Number
Jan 2020	COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION BUREAU OF WASTE MANAGEMENT	101479

BONDING WORKSHEET J
BORROW AREA CLOSURE

How do I start? Select a likely "worst case" scenario where you would have a maximum amount of the borrow area open and in need of closure. Provide a description of the scenario with references to site development stages.

1. Size of borrow area _____ acres

2. Volume of material required for regrading: _____ CY

3. Unit cost to regrade (provide equipment and rates) _____ $/CY

Are sufficient soils available to complete job?
(list deficit amount and attach maps that identify sources and stockpiles)

4. Earthen Materials			Stockpile	Borrow	Onsite	Offsite	Processing Req'd Yes	Processing Req'd No
a. Structural Fill	_____	CY	☐	☐	☐	☐	☐	☐
b. Unit cost to place[1]	_____	$/CY						
c. Topsoil	_____	CY	☐	☐	☐	☐	☐	☐
d. Unit cost to place[1]	_____	$/CY						

5. Revegetation Cost

(Seeding rate used: _____ lbs/acre)
(Lime rate used: _____ tons/acre)
(Fertilizer rate used: _____ tons/acre)
(Mulch rate used: _____ tons/acre)

Unit cost to revegetate _____ $/acre

6. E & S Controls _____ $/acre

7. Bond Maintenance Cost (required if off-site borrow area) $_____ LS

8. Other costs (provide detail) $_____

[1] *The unit costs should include all associated costs including, but not limited to cost of material, excavation, transportation, processing and placement.*

9. Cost Summary

a.	Fill/Regrading (line 2 x line 3)	$_____
b.	Structural Fill (line 4a x line 4b)	$_____
c.	Topsoil (line 4c x line 4d)	$_____
d.	Revegetation (line 1 x line 5)	$_____
e.	E & S Controls (line 6)	$_____
f.	Bond maintenance (line 7)	$_____
g.	Other (line 8)	$_____
	Subtotal	**$**_____
	CQA/Project Management costs (use 5% of subtotal)	$_____
	Total	**$ 0**

(Place this total on Summary Cost Worksheet – line 10)

CALCULATION BRIEF
BONDING WORKSHEET J
BORROW AREA CLOSURE

OBJECTIVE: **Determine the total bond amount required for borrow area closure.**

METHODOLOGY: Estimate borrow area closure costs as required in DEP Bonding Worksheet J.

LINE ITEM ASSUMPTIONS AND CALCULATIONS:

The facility has no borrow areas: therefore Bonding Worksheet J is not applicable to the facility.

Date Prepared	COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION BUREAU OF WASTE MANAGEMENT	I.D. Number
Jan 2020		101479

BONDING WORKSHEET K
FACILITY MAINTENANCE COSTS

1.	Size of facility	26	acres
2.	Size of waste placement footprint	26	acres
3.	Size of borrow areas on site	0	acres
4.	Size of leachate ponds on site	0	acres
5.	Size of sedimentation ponds on site	1.1	acres
6.	Length of stormwater conveyance ditches	4,000	LF
7.	Number of years of site management (30 years + closure period)	35	years
8.	Annual Cost to repair cap and final cover[1]		
	a. Acres (use 1% of line 2)	0.26	acres
	b. Unit cost[2] to repair final cover	0	$/acre
	c. Unit cost[2] to repair cap	0	$/acre
	d. Unit cost[2] to repair vegetation	2,483	$/acre
	e. Total unit cost (line b + line c + line d)	2,483	$/acre
9.	Annual Cost to repair and maintain E&S facilities[1]		
	a. Channel repair length (use 3% of line 6)	120	LF
	b. Sedimentation pond repair volume (use 20% of line 5)	0.22	acres
	c. Unit cost[2] to repair channels	0	$/LF
	d. Unit cost[2] to repair ponds	0	$/acre
	e. Total annual cost (line a x line c) + (line b x line d)	0	$/YR
10.	Annual Cost to repair and maintain leachate ponds[1]		
	a. Leachate pond repair volume (use 20% of line 4)	0	acres
	b. Unit cost[2] to repair leachate pond(s)	0	$/acre
11.	Annual cost to repair and maintain leachate tanks		
	a. Number and size of tanks	0	
	b. Annual unit cost[1] to maintain tanks	$ 0	
12.	Annual cost to repair fences and gates (attach details)	$ 0	LS

[1] *After the site is stabilized, the Department may allow a reduction in these requirements.*
[2] *Please refer to the instructions. This estimate should reflect unit costs to bring in a contractor to complete the work and should include mobilization, equipment cost, operator costs, material costs and clean-up and inspection costs.*

13. Annual cost to maintain site roads

a.	Length of site roads[2]	750	LF
b.	Annual length of site roads to be repaired (2% of line 13a)	15	LF
c.	Unit cost to repair roads[1]	7.16	$/LF

14. Cost Summary – Facility Maintenance

a.	Cost to repair cap/cover (line 7 x line 8a x line 8e)	$	22,595
b.	Cost to maintain E&S facilities (line 7 x line 9e)	$	0
c.	Cost to maintain leachate ponds (line 7 x line 10a x line 10b)	$	0
d.	Cost to maintain leachate tanks (line 7 x line 11a x line 11b)	$	0
e.	Cost to repair fences and gates (line 7 x line 12)	$	0
f.	Cost to maintain site roads (line 7 x line 13b x line 13c)	$	3,759
	Subtotal	**$**	26,354

1. Please refer to the instructions. This estimate should reflect unit costs to bring in a contractor to complete the work and should include mobilization, equipment cost, operator costs, material costs and clean-up and inspection costs. Costs not incurred annually should be determine and divided among the years between events. The costs should also include replacements of pumps and meters, electricity used (pumps, heat tracing, etc.) valve replacement and sludge disposal.
2. This should include access to all maintenance and monitoring areas including but not limited to the disposal area, ponds, leachate conveyance system, tanks, discharge locations, gas extraction system wells, gas probes, groundwater monitoring system and surface water monitoring points.

   Adjustment for maintenance, equipment replacement and contingencies, etc. Please note that these are cumulative and you must add all of the percentages that apply to arrive at the final adjustment percentage. The minimum adjustment is 10%.

   a. Add 5% of subtotal if final slopes or benches have been modified from what is specified in 25 PA Code §273.234(f)
   b. Add 5% of subtotal if more than 30 % stormwater channels are unlined
   c. Add 5% of subtotal if the length of site access roads exceeds 5 miles
   d. Add 10% for mowing

   Final adjustment factor: 10 %

   e. Adjustment (subtotal x factor) $ 2,635

Total (subtotal + adjustment) **$ 28,990**

(Place this total on Summary Cost Worksheet – line 11)

[1] *After the site is stabilized, the Department may allow a reduction in these requirements.*

[2] *Please refer to the instructions. This estimate should reflect unit costs to bring in a contractor to complete the work and should include mobilization, equipment cost, operator costs, material costs and clean-up and inspection costs.*

CALCULATION BRIEF
BONDING WORKSHEET K
FACILITY MAINTENANCE COSTS

OBJECTIVE: **Determine the total bond amount required for facility maintenance.**

REFERENCES: 1. RSMeans, CostWorks Version 15.19, 2015.

METHODOLOGY: Estimate facility maintenance costs as required in DEP Bonding Worksheet K.

LINE ITEM ASSUMPTIONS AND CALCULATIONS:

1. The size of the facility (26 ac) was taken from Exhibit I-2.

2. The waste placement footprint (26 ac) was estimated from the approximate limit of waste shown on Exhibit I-2.

3. This line item is not applicable. There are no borrow areas.

4. This line item is not applicable; refer to Bonding Worksheet I for additional information.

5. The facility has one sedimentation pond, which is 1.1 acres.

6. The length of existing stormwater conveyance ditches (4,000 linear feet) was estimated from Exhibit I-2.

7. The number of years of onsite management assumes that most of the required 30 years of post-closure care are already completed. However, post-closure care will be required for the life of the solar array (35 years per industry standards).

8a. The value for this line item is calculated as instructed in Bonding Worksheet K.

8b. Based on the current conditions of the final cover system and the lack of maintenance required over the past several years due to established vegetation, no final cover maintenance is anticipated.

8c. Not applicable. There are no geosynthetic cap components.

8d. Revegetation costs were estimated using unit costs from Reference 1. The unit rate to apply fescue, including mulch and fertilizer, is $57.00/MSF. The cost per acre for revegetation is determined as follows.

Seeding/Fertilizing/Mulching Cost (32.91.19.14.2400) = ($57.00 / 1,000 sf) *43,560 sf/acre = **$2,483/acre**

8e. The value for this line item is calculated as instructed in Bonding Worksheet K.

9a. The value for this line item is calculated as instructed in Bonding Worksheet K.

9b. The value for this line item is calculated as instructed in Bonding Worksheet K.

9c. Based on the current conditions of the perimeter channels and the lack of maintenance required over the past several years due to established vegetation, no erosion and sedimentation control structure maintenance is anticipated.

9d. Based on the current conditions of the existing sediment basin and the lack of maintenance required over the past several years due to established vegetation, no sediment basin maintenance is anticipated.

9e. The value for this line item is calculated as instructed in Bonding Worksheet K.

10a. The value for this line item is calculated as instructed in Bonding Worksheet K.

10b. Not applicable. The facility has no leachate ponds.

11. Not applicable. The facility has no leachate storage tanks.

12. The applicable. The facility has no fencing.

13a. Length of access road to the leachate treatment facility (750 ft) was estimated from the Exhibit I-2. This does not include Harper Road or other GPIA access roads.

13b. The value for this line item is calculated as instructed in Worksheet K.

13c. The unit cost to repair roads assumes that work entails placing and grading road base (gravel). Cost is taken from Reference 1.

Site Road Repair (31.22.16.10.1050) = $2.93/sy * (1 sy / 9 sf) * 22 ft = $7.16/lf

14. The value for this line item is calculated as instructed in Worksheet K.

Date Prepared
January 2020
Rev August 2020
Rev Sept 2020

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

I.D. Number
101479

BONDING WORKSHEET L
SUMMARY COST WORKSHEET

Cost Summary - Landfills

1.	Decontaminating the Facility	$ 0
2.	Capping/Closure	$ 0
3.	Groundwater Monitoring System	$ 0
4.	Surface Water Monitoring	$ 0
5.	Private Water Supply Monitoring	$ 0
6.	Gas Monitoring	$ 0
7.	Gas Collection and Maintenance	$ 0
8.	Other Monitoring	$ 0
9.	Leachate Management	$ 0
10.	Borrow Area Closure	$ 0
11.	Maintenance Costs	$ 28,990
12.	Other Costs[1] Solar Array Decomissioning	$ 165,554
13.	Other Costs[1] Recycle/Resale Credits (not included in calculation for inflation, contingency, and administrative fees)	$ -297,209
	Subtotal	**$ -102,665**

Inflation

14.	Inflation rate (projected inflation for the next three years based on the inflation for the prior three years).	6.0 %
15.	Inflation cost for facility (subtotal x line 14)	$ 11,673

Contingency and administrative fees

16.	Administrative fees (5%) (subtotal x 0.05)	$ 9,727
17.	Project Management (5%) (subtotal x 0.05)	$ 9,727
18.	Contingency fee amount (subtotal x rate of contingency fee from Table 1)	$ 24,318

Total (subtotal + line 15 + line 16 + line 17 + 18) **$ -47,220**

[1] You should include any costs that would be incurred by the Department, but were not included in these sheets. Provide separate sheets for documentation.

CALCULATION BRIEF
BONDING WORKSHEET L
ITEM 12: OTHER COSTS

The decommissioning costs are based on a contractor estimate based on prevailing wages and includes cost of general labor, trucking cost, and heavy construction equipment. The Solar Decommissioning Work Plan prepared by EIS Solar is provided in Attachment A.

CALCULATION BRIEF
BONDING WORKSHEET L
ITEM 14: INFLATION RATE

OBJECTIVE: **Determine the projected inflation rate for the next three years based on the inflation rate for the prior three years as required in PADEP Bonding Worksheet L.**

REFERENCES:

1. Table 1.1.9 Implicit Price Deflators for Gross Domestic Product, Bureau of Economic Analysis, Last Revised December 20, 2019.

METHODOLOGY: Estimate the inflation rate using the Annual Implicit Price Deflator for Gross National Product published by the U.S. Department of Commerce.

LINE ITEM ASSUMPTIONS AND CALCULATIONS:

14. The previous three year inflation rate is determined by summing the Gross National Product published by the U.S. Department of Commerce. The table below presents the Gross National Product information for the years of 2016 to 2019:

	2016	2017	2018	2019
Gross National Product	105.759	107.731	110.320	112.257

The projected inflation rate for the next three years is calculated by:

$$= \frac{107.731 - 105.759}{105.759} + \frac{110.320 - 107.731}{110.320} + \frac{112.257 - 110.320}{112.257}$$

$$= 0.06 = 6\%$$

From Table 1 of the instructions for the Bonding Worksheets, the contingency fee required is 12.5%.

Note: Line items 14 through 18 were calculated based on the Worksheet L subtotal, not including the recycle/resale credits.

ATTACHMENT A

SOLAR DECOMMISSIONING WORK PLAN
PREPARED BY EIS SOLAR

ACAA Solar Decommissioning Work Plan

Presented To:

IMG Solar

Prepared By:

September 3,2020

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1.0 Introduction

Energy Independent Solutions ("EIS") has been retained by IMG Solar ("IMG") for their PG Solar project at the Pittsburgh International Airport ("ACAA") as the project's EPC contractor. Services include the engineering, procurement and construction of a multi-phase solar array located on a 26-acre plot of land bounded by Harper Road. The land on which the solar array will be built is a closed landfill owned by ACAA and monitored through a leachate treatment building.

IMG will be installing approximately 23,176 solar panels over two or more project phases with the ACAA. Phase I is expected to start into construction shortly after final permitting and will consist of 9,360, or 40% of the total panel count.

IMG, through their permitting application with the PA DEP Minor Permit Modification Application is required to complete a Post Closure Land Use Plan – Form 28 which includes an estimate for solar field decommissioning.

The following pages provide Customer with sufficient details on the labor, materials and rental costs to decommission and remove onsite solar materials located on the landfill property at the termination of all phases of the project. This summary and its working papers are limited to project scope located on the landfill and any electrical or mechanical connections that need to be safely terminated at the closest point of disconnect to the landfill. Work scope outside of the landfill boundary, or required to stay to support other airport operations, are noted in the assumptions section of this document.

Energy Independent Solutions

1.1 Corporate Overview

Founded in 2008 and headquartered in Pittsburgh, PA, Energy Independent Solutions, LLC is trusted by hundreds of Residences, Businesses, Farms and Municipal Buildings throughout Pittsburgh, Western Pennsylvania and beyond for Solar Power in Pittsburgh. We are a local Pittsburgh company with a track record of high-quality solar installations, solar service and the best solar field performance rating in the industry.

We have a high degree of confidence in our project cost estimates earned through over 600 successful solar installations and a deep bench in our long-term supply chain.

1.2 Energy Independent Solutions – Decommissioning Services

EIS has collaborated with Hanlon Electric and RBI Solar for a comprehensive solar decommissioning schedule that includes current time and cost estimates for labor, materials and equipment rental to safely decommission and remove the solar array anticipated to be built for the benefit of IMG and the ACAA. EIS has provided IMG with a work breakdown structure and work step narrative to be included in their Form 28 submission to the PA DEP. This is a site-specific decommissioning plan.

2.0 Project Narrative

2.1 Decommissioning Overview

At the project's end of life, AC electrical service will need to be disconnected between DLC's power pole and the solar array step-up transformer. AC service will remain with the leachate building as this is an operational building so all poles, gear pads, transformers and fencing will remain in service.

Once the AC system is disconnected, work can commence on preparing the solar array for removal. First, all DC positive and negative leads will be disconnected between panels and at all panel junction boxes. This work, and the AC disconnection work will be conducted by a qualified Electrician noted as the "Electricians & Telecommunications Installation Technician" by Allegheny County.

Once service is terminated, the electricians will leave site and all other work will be conducted by Class 01 Laborers. This will include the removal of all electrical wire, solar panels, solar racking and driven posts. Driven posts will be cut less than 12" above the ground to maximize recycling benefit and minimize the impact to the landfill. The remaining section of post will be driven between 8" and 12" below the ground surface, leaving a sufficient buffer to the landfill's 30" clay basin. Posts will be driven below grade by a track steer and all previous protrusions will be covered with a layer of bentonite clay to ensure the integrity of the landfill surface.

Once all posts are removed and remediated, contractor will overseed the entire landfill location with native seed to return the land to its pre-solar array state.

2.2 Required materials and rentals

To complete the work, it is expected that materials gathered for recycling will be loaded onto trucks and shipped offsite. Details for trucking costs is found in the work breakdown structure ("WBS") working papers, attached.

All disassembly of the solar array will be completed with contractor provided hand tools. The only other anticipated rental cost will be for a track steer mounted post driver. Rental of the track steer will also require a Class 01 Operator. Track steers are rented by the week and the remediation process is expected to take less than three days to complete. Details for the track steer costs are found in the WBS working papers and have been estimated for a full weeks' rental period.

3.0 Work Scope

This document covers the required areas of decommissioning services. In addition, all labor hours are based on a man-hour level of effort where two operators for one hour would equal two man-hours of effort.

3.1 Disconnect AC Service

An electrician will spend one day with two men to disconnect all AC service from the solar array to the transformer. AC service must remain operational as it is for building service. This means all poles, gear pads, transformers and fence will also remain in service. Anticipated duration is based on 16 man-hours of effort (completed in one day). Work scope will be to 1. Isolate and lock out solar array from electrical service 2. terminate all AC wiring, 3. gather electrical wiring between IMG's inverter skid and transformer, and 4. send wiring to recycling.

3.2 Disconnect all DC wiring

Laborers will begin by collecting all wire and wire trays, load materials onto trucks and send out for recycling. Anticipated effort for gathering all materials and load on a truck is based on 60 panels of wiring per man-hour. No special tools are required. Work scope will be to: 1. roll up DC wiring, 2. gather all wire trays, and 3. load onto recycling trailer.

3.3 Remove and send solar panels to reseller

Laborers will slide panels out of racks and load onto trucks to be picked up by a solar panel reseller. Anticipated effort for removing all solar panels and loading on a truck is based on 15 panels per man-hour. No special tools are required. Work scope will be to: 1. remove panel clips, 2. slide panel out of rack, and 3. load onto recycling trailer.

IMG Solar purchased VSUN390-72BMH-DG bifacial panels with a 30+ year economic life. The VSUN panels were purchased with a 30-year, linear power output warranty that states: ***"For Mono-crystalline Double glass Products (including bifacial monocrystalline): within the first year, the output power shall not be less than 97% of the minimum output power in VSUN's product datasheet, thereafter the loss of output power shall not exceed 0.48% per year, ending with 83% on the 30th year."*** IMG has provided the product datasheets as well as their VSUN purchased, Limited Warranty for PV Modules in Attachment B.

Solar panels are expected to have a minimum 40-year lifespan so there is real solar panel value to the project owner at the end of the project's life. IMG provided an exponential decay in value calculation where residual value is not linear and panels have a 2.5% residual value in 40 years. At the end of the initial 20-year contract term, it is expected that the solar panels will have a minimum of 12.2% of their initial value with 10 years of remaining warranty and over 88% of their initial capacity. At the end of 30 years, it is expected that the value will have dropped to 5.3% of the initial value or $0.022/watt and over 83% of their initial capacity.

IMG Solar has a 20-year project contract with two five-year extensions. To be conservative, 30-year salvage values were used in our analysis.

3.4 Dismantle racking and posts and send to recycling center

Laborers will dismantle racks and cut posts less than 12" from ground, load materials onto trucks and send out for recycling. Anticipated effort for gathering all materials and loading on a truck is based on 3 posts plus racking per man-hour. Grinding tool with metal cut-off wheel required. Note that approximately five feet of driven post will be available for recycling with less than eight feet remaining below grade. Work scope will be to: 1. cut racking into manageable pieces, 2. cut driven post, and 3. load onto recycling trailer.

3.5 Drive remaining post 8" – 12" below grade and cover with bentonite clay

Two laborers will follow operator, siting next post and preparing post for driving below grade. Once operator drives post below grade, laborers will cover hole with approximately two shovels of bentonite clay per hole. Anticipated duration is based on 38 posts per hour. Track steer with bucket, forks and pile driver attachment is required. Work scope will be to: 1. line up pile, 2. strike pile to required depth, and 3. spread bentonite clay over surface.

3.6 Remove inverter equipment

Two laborers will work for one day to demo the 24 inverters and columns. Unbolt inverters from Unistrut frame and load into universal pickup recycle truck. Unbolt or cut Unistrut frame into manageable pieces and load into metal recycle truck. Unbolt or cut columns and load into metal recycle truck.

3.7 Overseed landfill

Once all equipment removal and remediation are completed, an overseeding of the landfill shall be completed using seed for native vegetation. Work will be completed with a side-by-side vehicle with a seeding attachment. Anticipated duration is based on one laborer for an eight-hour day. Work scope will be to: 1. Fill seeding attachment with native seed, 2. Drive entire landfill in eight-foot paths spreading seed across entire approximate 26-acre field.

4.0 Labor and Rental Rates

Labor Rates were gathered from the 2020 Allegheny Labor Rate Schedule for Prevailing Wages. All labor classes anticipated for the decommissioning work scope have been included. Labor rates include both wages and benefits.

Equipment rental is based on actual contracted equipment rental prices for this project.

4.1 2020 Allegheny Labor Rates including Fringe

Description	Price
Electricians & Telecommunications Installation Technician	$66.20
Laborers (Class 01)	$38.99
Operators (Class 01)	$54.64

4.2 Equipment Rental

Description	Price
Track steer pile driver	$1,500/week
Recycling trucking costs	$250/load
Side-by-side with trailer	$1,000/week

5.0 Additional Assumptions & Clarifications

- Work scope does not include any transportation, meals or accommodations for subcontractor personnel required to be dispatched to Customer's solar array location.
- On site office space, telephones and telephone service will be made available to contractors by the ACAA during any onsite work required under this work plan.
- No contracts with suppliers for this work have been committed nor should they be assumed. Current labor rates are as published by Allegheny County and all material and rental costs are based on actual solar array supplier construction proposals.
- No costs are assumed for any additional labor or materials required for activities other than those specifically noted in this document.
- All concrete and fencing are part of the leachate building operations and will remain in service after decommissioning. Note that this equipment is also off-landfill.
- All solar panels will be removed and recycled
- All racking will be removed and recycled
- All driven posts will be removed and recycled
- All inverters will be removed and recycled
- DC wiring will be removed and recycled
- All AC wiring is off landfill
- All power poles are off landfill

6.0 Cost Estimate

The total cost of decommissioning is zero based on a net credit from the recycling and resale of solar materials. There is a significant cost buffer to a net zero decommissioning cost as noted, below. A complete cost breakdown can be found in Appendix A for labor, materials, rentals, recycling and resale credits for precious metals recovered in the recycling process and the resale of the solar panels at the end of the contract term with the ACAA. All costs are assumed in 2020 dollars.

Areas of Decommissioning		Labor	Equipment	Recycle/Resale Credits
3.1	AC Wiring Removal	$ 1,059	$ -	$ (976)
3.2	DC Wiring Removal	$ 15,061	$ 500	$ (35,816)
3.3	Panel Removal	$ 60,242	$ 6,816	$ (171,689)
3.4	Racking and Post Removal	$ 33,531	$ 6,250	$ (82,700)
3.5	Driven Post Below Grade and Capping	$ 9,004	$ 1,074	
3.6	Remove inverter equipment	$ 1,248	$ 500	$ (6,028)
3.7	Overseed landfill	$ 507	$ 2,170	$ -
	Subtotal:	$ 120,652	$ 17,310	$ (297,209)
	Inflation, Contingency and Admin fees	$ 24,130	$ 3,462	-
	Subtotal:	$ 144,782	$ 20,772	$ (297,209)
	Total cost/(benefit):			$ (131,655)
	% contingency for "net zero" decommissioning cost:			80%

7.0 Future Contract - Terms & Conditions

This project narrative may become the basis of a future decommissioning proposal from EIS and shall be treated as confidential with the exception of the sharing of its contents with the PA DEP and other parties involved in the submission of IMG Solar's initial project Form 28 for the PG Solar project at the Allegheny Country Airport Authority.

Any resulting contract or agreement from this workplan, shall be subject to terms and conditions to be mutually agreed upon.

8.0 Follow Up

Please contact the following person at Energy Independent Solutions for information regarding this workplan:

Joe Morinville, President
joe@eissolar.com

Cell: 412-855-7620

Attachment A – WBS Worksheets

Solar Decommissioning - Work Breakdown Structure - Labor and Materials

3.1 AC Wiring Removal

WBS 1:	isolate and lock-out/tag-out solar array		
WBS 2:	terminate all AC wiring		
WBS 3:	gather electrical wire from transformer to inverter skid		
WBS 4:	load wire onto recycling trailer		
Man-hours:	16		two electricians for one day
Labor Class:	A		
Labor Rate:	$ 66.20		
WBS cost:	$ 1,059		
Equipment Rental:	$ -		trailer rental costs combined with DC wiring costs, below

3.2 DC Wiring Removal

WBS 1:	pull wiring from wire trays	
WBS 2:	roll up DC wiring	
WBS 3:	gather all wire trays	
WBS 4:	load onto recycling trailer	
Number of Panels:	23,176	Phase I - 9,360 panels plus Phase II - up to 13,816 panels
Removal Rate:	60.0	panels of wiring per man-hour
Man-hours:	386	
Labor Class:	B	
Labor Rate:	$ 38.99	
WBS cost:	$ 15,061	
Equipment Rental:	$ 500	recycling trailer rental cost based on 2 trailers

3.3 Panel Removal

WBS 1:	Remove bolts/clips	
WBS 2:	Slide panel out of rack	
WBS 3:	Load onto recycling trailer	
Number of Panels:	23,176	Phase I - 9,360 panels plus Phase II - up to 13,816 panels
Removal Rate:	15.0	panels per man-hour
Man-hours:	1,545	
Labor Class:	B	
Labor Rate:	$ 38.99	
WBS cost:	$ 60,242	
Equipment Rental:	$ 6,816	recycling trailer rental cost based on 27 trailers

Solar Decommissioning - Work Breakdown Structure - Labor and Materials

3.4 Racking and Post Removal

WBS 1:	Cut racking into manageable pieces for trailer		
WBS 2:	Cut driven posts less that 12" from ground		
WBS 3:	Load onto recycling trailer		
Number of "systems":		860	each "system" equals 3 posts plus racking
Removal Rate:		1.0	system per man-hour
Man-hours:		860	
Labor Class:		B	
Labor Rate:	$	38.99	
WBS cost:	$	33,531	
Equipment Rental:	$	6,250	recycling trailer rental cost based on 25 trailers

3.5 Driven Post Below Grade and Capping

WBS 1:	drive track steer to pile		
WBS 2:	line up pile to driver		
WBS 3:	strike pile to required depth		
WBS 4:	spread bentonite clay over working surface		
Number of posts:		2,580	1,045 phase 1 and 1,535 phase 2
Pile Drive Rate:		38.0	posts per man-hour
Man-hours:		68	
Labor Class:		C	
Labor Rate:	$	54.64	
WBS cost:	$	3,710	Cost of track steer operator
Bentonite spread rate:		19.0	posts per man-hour
Man-hours:		136	
Labor Class:		B	
Labor Rate:	$	38.99	
WBS cost:	$	5,294	Cost of Laborers
Bentonite material rate:		0.05	ft3 per post
Bentonite cost:	$	450	per ton, delivered
Bentonite wt to volume:		37.0	lbs/ft3
Material cost:	$	1,074	
WBS Note:	Bentonite clay purchased in bulk		

Solar Decommissioning - Work Breakdown Structure - Labor and Materials

3.6 Remove inverter equipment

WBS 1:	unbolt inverters from unistrut		
WBS 2:	unbolt/cut unistrut into manageable pieces		
WBS 3:	unbolt/cut columns into manageable pieces		
WBS 4:	load onto recycling trailer		
Number of inverters:		48	
Removal Rate:		1.5	inverters and related structure/man-hour
Man-hours:		32	
Labor Class:		B	
Labor Rate:	$	38.99	
WBS cost:	$	1,248	
Equipment Rental:	$	500	recycling trailer rental cost based on 2 trailers

3.7 Overseed landfill

WBS 1:	fill seeding attachment		
WBS 2:	spread seeding material		
Number of acres:		26	
Coverage rate:		30	minutes per acre
Man-hours:		13	
Labor Class:		B	
Labor Rate:	$	38.99	
WBS cost:	$	507	
Seeding material cost:	$	1,170	assumes $45/acre for seeding materials
Equipment Rental:	$	1,000	assumes one week equipment rental

WBS Note: Overseed disturbed areas of landfill. Assumes overseed of entire propert

Solar Decommissioning - Recycling/Resale Credits

3.1 AC Wiring Removal

Est. Ft of Wire		800	
Weight per ft		2.00	lbs
Recycling value	$	0.61	$/lb
Recycling credit:	$	(976)	

WBS description: Recycling of insulated wire

3.2 DC Wiring Removal

Est. ft of #10 CU wire		610,000	ft
Est. ft of 350 KCMIL AL wire		138,000	ft
Weight per ft - CU		0.03150	lbs/ft
Weight per ft - AL		0.38800	lbs/ft
Recycling value - CU		0.61	$/lb
Recycling value - AL		0.45	$/lb
Recycling credit:	$	(35,816)	

WBS description: Recycling of insulated wire

3.3 Panel Removal

Number of Panels		23,176	
Panel Purchase Price	$	140.01	per panel
Economic Value Yr 21	$	17.08	12.2% per VSUN390 economic value worksheet
Economic Value Yr 31	$	7.42	5.3% per VSUN390 economic value worksheet
Resale credit:	$	(171,978)	assumes 20 year term plus two five year extensions

WBS description: Resale of 30+ year panels w/ 10 year remaining warranty at year 21

3.4 Racking and Post Removal

Number of post/rack systems		860	each system equals 3 posts plus racking
Weight per system		961.6	lbs
Recycling value	$	0.10	$/lb
Recycling credit:	$	(82,700)	

WBS description: Recycling of 827,000 lbs of steel materials

3.6 Remove inverter equipment

Number of beams		28	
Weight per beam		250	lbs
Steel Recycling value	$	0.10	$/lb
Recycling credit:	$	(700)	

WBS description: Recycling of steel materials

Number of inverters		48	
Weight per inverter		50	lbs
CU Recycling value	$	2.22	$/lb
Recycling credit:	$	(5,328)	

WBS description: Recycling of inverters for copper materials

VSUN390-72BMH-DG bi-facial panel - Exponential Decay in Value

Exponential decay

y=a*(1-r)^x

a = initial value

r = decay rate

x = number of time intervals that have passsed

Asssumptions

panels will lose 30% at original purchase after tax incentive

Terminal value of 2.5% of original investment in year 40

3,244,872*.025 = (3,244,872*.7)*(1-r)^40

r = 7.993% (based on terminal value of 2.5%) 0.008975

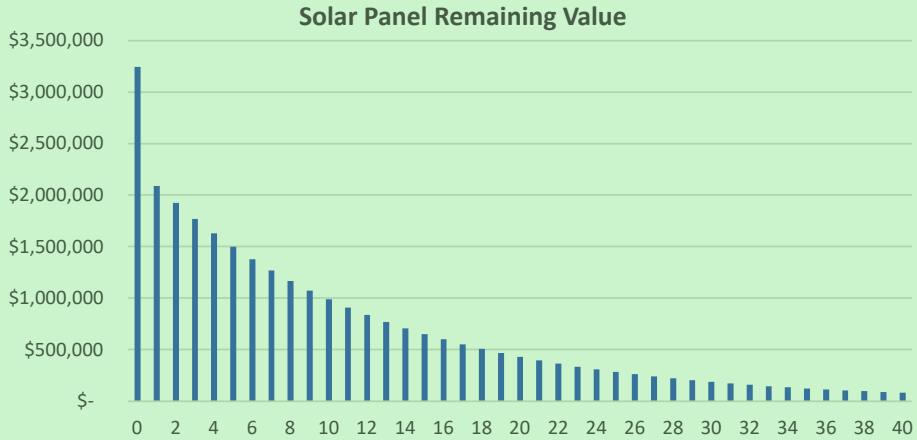
Formula

y=a*.7*(1-.07793)^x

a $ 3,244,872 (23,176 panels at $140.01/panel)

r 0.079930

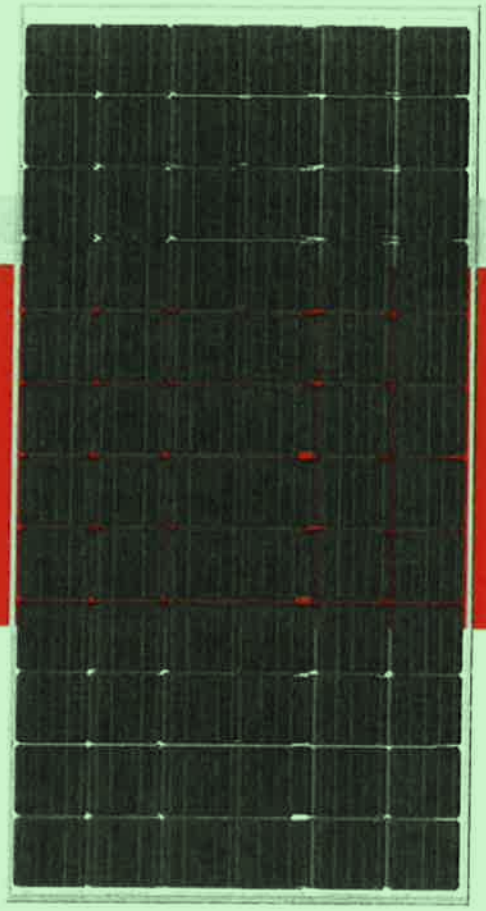
Year	Value	Year	Value	% Value
0	$ 3,244,872			
1	$ 2,089,856	21	$ 394,942	12.2%
2	$ 1,922,814	22	$ 363,375	
3	$ 1,769,124	23	$ 334,330	
4	$ 1,627,718	24	$ 307,607	
5	$ 1,497,614	25	$ 283,020	
6	$ 1,377,910	26	$ 260,398	
7	$ 1,267,773	27	$ 239,585	
8	$ 1,166,440	28	$ 220,435	
9	$ 1,073,207	29	$ 202,815	
10	$ 987,425	30	$ 186,604	
11	$ 908,500	31	$ 171,689	5.3%
12	$ 835,884	32	$ 157,966	
13	$ 769,072	33	$ 145,340	
14	$ 707,600	34	$ 133,723	
15	$ 651,041	35	$ 123,034	
16	$ 599,004	36	$ 113,200	
17	$ 551,125	37	$ 104,152	
18	$ 507,074	38	$ 95,827	
19	$ 466,543	39	$ 88,168	
20	$ 429,253	40	$ 81,120	



Attachment B – VSUN Datasheets and Limited Warranty for PV Modules

VSUN

Innovative & Smart



VSUN390-72BMH-DG

High Efficiency Low LID Bifacial PERC Technology

VSUN390-72BMH-DG VSUN385-72BMH-DG
VSUN380-72BMH-DG VSUN375-72BMH-DG

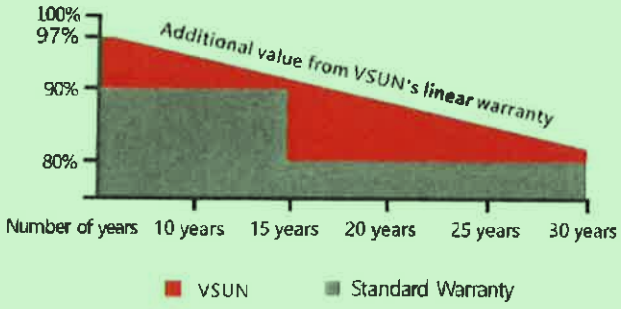
19.40%
Module efficiency

12years
Material & Workmanship warranty

390W
Highest power output

30years
Linear power output warranty

- P-type PERC bifacial cell technology
- Up to 30% more enegy yield due to the back side power generation
- Low LCOE
- Minimize micro-crack and free of snail trails
- Outstanding temperature coefficient
- Excellent performance under low light conditions
- Certified for salt/ammonia corrosion resistance
- Load certificates: wind to 2400Pa and snow to 5400Pa



Munich RE®

- 12-year product warranty
- 30-year linear power output warranty

Invested by Fuji Solar, VSUN is a Japanese solar module solutions provider located in Tokyo that offers Japanese quality solar technologies globally. The group's business started in Japan in 2006, later spreading to North America, Southeast Asia, and EMEA.

Innovative & Smart – VSUN has been committed to providing greener, cleaner, and more intelligent renewable energy solutions. It is focusing on the new energy market and the development of customized and high-efficiency products.

Note:

A Sub-company of FUJI SOLAR

MR

Electrical Characteristics at Standard Test Conditions(STC)

Module Type	VSUN390-72BMH-DG	VSUN385-72BMH-DG	VSUN380-72BMH-DG	VSUN375-72BMH-DG
Maximum Power - Pmax (W)	390	385	380	375
Open Circuit Voltage - Voc (V)	49.3	49	48.8	48.5
Short Circuit Current - Isc (A)	10.11	10.03	9.94	9.85
Maximum Power Voltage - Vmpp (V)	40.6	40.4	40.2	39.9
Maximum Power Current - Impp (A)	9.61	9.53	9.46	9.4
Module Efficiency	19.40%	19.15%	18.91%	18.66%

Standard Test Conditions (STC): irradiance 1,000 W/m²; AM 1.5; module temperature 25°C. Tolerance of Pmpp: 0~+3%.

Measuring uncertainty of power: ±3%.

Electrical Characteristics with different rear side power gain(reference to 385 front)

Pmax (W)	Voc (V)	Isc (A)	Vmpp (V)	Impp (A)	Pmax gain
404	49.0	10.53	40.5	10.01	5%
424	49.0	11.03	40.5	10.48	10%
462	49.1	12.04	40.4	11.44	20%
481	49.1	12.54	40.4	11.91	25%

Temperature Characteristics

NOCT	45°C(±2°C)
Voltage Temperature Coefficient	-0.28%/°C
Current Temperature Coefficient	+0.0449%/°C
Power Temperature Coefficient	-0.367%/°C

Maximum Ratings

Maximum System Voltage [V]	1000/1500
Series Fuse Rating [A]	20
Bifaciality	70%±5%

Material Characteristics

Dimensions	2002×1004×35mm (L×W×H)
Weight	24.8kg
Frame	Silver anodized aluminum profile
Front Glass	High transparency,Antireflection coated,Semi-toughened safety glass,2.0mm
Cell Encapsulation	EVA (Ethylene-Vinyl-Acetate)
Back Glass	Semi-toughened safety glass,2.0mm
Cells	6×12 pieces bifacial monocrystalline solar cells series strings
Junction Box	Rated current≧13A, IP≧67
Cable&Connector	Length 500 mm, 1×4 mm^2, compatible with MC4

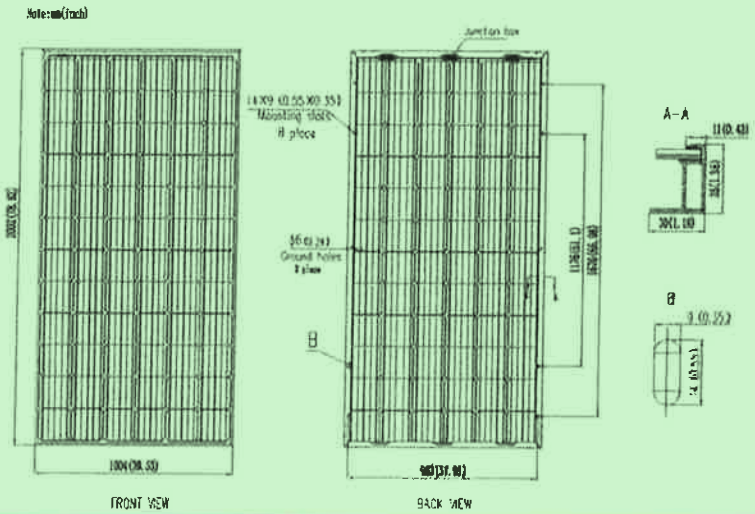
Packaging

Dimensions(L×W×H)	2030×1110×1140mm
Container 20'	300
Container 40'	660
Container 40'HC	715

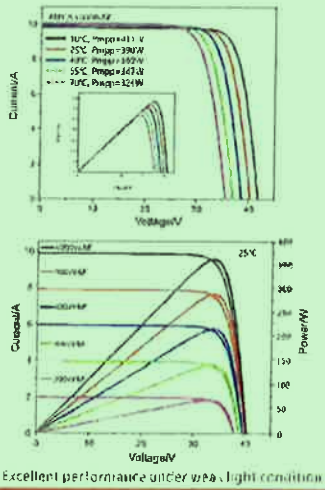
System Design

Temperature Range	-40 °C to + 85 °C
Withstanding Hail	Maximum diameter of 25 mm with impact speed of 23 m/s
Maximum Surface Load	5,400 Pa
Application class	class A

Dimensions



IV-Curves



Excellent performance under weak light condition

Limited Warranty for PV Modules

Subject to the conditions, exclusions and limitations set forth below, Vietnam Sunergy Joint Stock Company ("VSUN") hereby grants the following Limited Warranty for PV Modules (collectively, the "Limited Warranty") to the original end user purchaser installing (for its own use) (the "Customer") any of the specified (and no other) brand models of solar photovoltaic modules listed below (the "Product(s)"):

1. 12YearLimitedProductWarranty

VSUN warrants the Product(s) to be free from serious visual defects in materials and workmanship or cause abnormal power output under normal application and use, installation and service conditions as specified in VSUN's installation manual for a period of twelve (12) years from Warranty Start Date (as defined below). Claims under this warranty will be honored only if the Customer can provide the proof that said serious visual defects results exclusively from defects in materials or workmanship or cause abnormal power output occurred during the twelve-year period of this warranty under normal application, use, installation and service conditions specified in VSUN's installation manual.

This Limited Warranty does not warrant a specific power output, which shall be exclusively covered under clause 3 hereinafter ("Limited Power Warranty").

Note: Twelve years limited warranty for materials or workmanship just includes types of material provided by VSUN and does not include types of material provided by customers.

2. Limited Power Output Warranty

A. Under normal application, use, installation and service condition as specified in VSUN's installation manual, VSUN warrants that within a period of twenty-five years (25) or thirty years (30) after the Warranty Start Date,

For Mono-crystalline Products: within the first year, the output power shall not be less than 97% of the minimum output power in VSUN's product datasheet, thereafter the loss of output power shall not exceed 0.68% per year, ending with 80.68% in the 25th year.

For Polycrystalline Products: within the first year, the output power shall not be less than 97.5% of the minimum output power in VSUN's product datasheet, thereafter the loss of output power shall not exceed 0.7% per year, ending with 80.7% in the 25th year.

For Mono-crystalline Double glass Products (including bifacial monocrystalline): within the first year, the output power shall not be less than 97% of the minimum output power in VSUN's product datasheet, thereafter the loss of output power shall not exceed 0.48% per year, ending with 83% in the 30th year.

For Polycrystalline Double-glass Products: within the first year, the output power shall not be less than 97.5% of the minimum output power in VSUN's product datasheet, thereafter the loss of output power shall not exceed 0.5% per year, ending with 83% in the 30th year.

B. The DC power of a Product shall be tested at Standard Test Conditions (STC) by the third party accredited by VSUN (should be the same party with VSUN applied) which are: [a] light spectrum of AM 1.5, [b] an irradiation of 1,000 Watts per square meter and [c] temperature of 25°C ± 2°C. The measurements are carried out at the junction box terminals per the calibration and testing standards of VSUN valid at the date of manufacture of the PV Modules in accordance with IEC61215. The measurement uncertainty should be taken into consideration as ±3%.

C. The remedies set forth in Clause 7 are the sole and exclusive remedies provided under the limited Warranty. Customers shall notify VSUN or its authorized resellers in writing within 30 business days after the date when the malfunction or defects provided under this warranty have been found.

D. If the modules are used in high-temperature and high-humidity environment, please see the item in VSUN Crystalline Silicon PV Module Products Installation Manual.

3. Warranty Start Date

The Warranty Start Date shall be defined as the date of installation or 90 (ninety) days after the delivery by VSUN, whichever date is earlier.

4. Not Independent Warranties

The Customer has the right to pursue claims under each of the warranties set forth above; provided, however, that if claims arise under multiple limited warranties from a single incident, then if VSUN remedies such incidents as set forth above, VSUN shall be deemed to have resolved all applicable warranty claims arising from such incident.

5. Exclusions and Limitations

A. Warranty claims shall be filed in writing to VSUN or its authorized distributors within the applicable warranting period, without exception.

B. The Limited Warranty does not apply to any Products which have been subjected to:

(1) Alteration, repair or modification without the expressed, prior written consent of VSUN Solar.

(2) Removal of Product(s) and reinstallation at a new site.

(3) Non-observance of VSUN's Installation and User Manual. Particularly in the installation and maintenance, the products are subject to violent collision and trampled by the operator, and products are collided, scratched or squeezed.

(4) Misuse, abuse, neglect, or accident in storage, transportation, handling, installation, or application.

(5) Electrical surges, lightning, flood, fire, vandalism, tampering, accidental breakage, mold discoloration, or other events beyond VSUN's control, including without limitation any technological or physical event or condition that is not reasonably known or understood at the time the Customer purchased the Products.

(6) Installation on mobile platforms or in a marine environment; direct contact with corrosive agents or salt water; pest damage; or malfunctioning PV system components and other operating conditions, which are not expressly allowed in the Installation and User Manual.

(7) Alteration, removal or obliteration of the original Product label.

C. Warranty claim will not be honored if the type or serial number of the module(s) have been altered, removed or made illegible.

D. This "Limited Warranty for PV Modules" only applies for the conforming products.

E. Any additional Products provided, and any Product repaired or replaced, by VSUN under a warranty claim shall be covered by the same Limited Warranties and terms as the first Products purchased that were the subject of the claim; no warranty periods or terms shall be extended because of a warranty claim or remedy. VSUN shall make commercially reasonable efforts to replace defective Products with new or refurbished Products of the same or similar size and aesthetics but reserves the right to deliver another Product type in the event that VSUN has discontinued production of the Product type that is the subject of the warranty claim provided, that such other Product type is compatible to the Customer's PV System. Replaced Products and parts shall become the property of VSUN.

6. Repair, Replacement or Refund Remedy

A. If a Product, under normal application, use and service conditions, fails to conform to this 12 Year Limited Product Warranty during this twelve-year period, as Customer's sole and exclusive remedy under this Limited Warranty, VSUN will, in its sole discretion, either, with regard to the applicable Products:

i. Refund the Actual Cash Value of the defective Product(s) or the current market price of the relevant new Product(s) , For this purpose the Actual Cash Value is defined as the price at the time of purchase of the Product(s) reduced by an amount equal to 3.5%of that price per each 365 day period (and 16% of that price for the first year) following Warranty Start Date until the conclusion of the twenty-fifth period or thirtieth period;

ii. Repair the defective Product(s) at no charge; or replace the defective Product(s) or part thereof by a new or remanufactured equivalent at no charge.

B. If a Product fails to conform to the Limited Power Output Warranty during the warranty period and if such decrease in power is due to defects in materials or workmanship under normal application, use and service conditions, as Customer's sole and exclusive remedy under this Limited Warranty, VSUN will, in its sole discretion, either, with regard to the applicable Products:

i. Repair the defective Product(s) at no charge; or replace the defective Product(s) or part thereof by a new or remanufactured equivalent at no charge;

ii. Providing Customer with additional Products to make up for such decrease in power, provided, it is possible for the Customer to mount such additional Products; or

iii. Refunding the decrease in power, based on the Actual Cash Value.

In the event that VSUN opts for options A (ii) or B(i) or B(ii), VSUN shall bear all insurance and transportation charges (except air freight), customs clearance and any other costs for returning the defective Product(s) to VSUN and shipping the repaired or replaced Product(s) to Customer. The costs and expenses for their removal, installation or reinstallation shall remain with Customer.

7. Limitation of Warranty Scope

This Limited Warranties as set forth herein are expressly in lieu of and exclude all other express or implied warranties, including but not limited to warranties of merchantability and of fitness for particular purpose, use, or application, and all other obligations or liabilities on the part of VSUN, unless such other obligations or liabilities are expressly agreed to in writing signed and approved by VSUN. VSUN Shall have no responsibility or liability whatsoever for damage or injury to persons or property, or for other loss or injury resulting from any cause whatsoever arising out of or related to the Product(s), including, without limitation, any defects in the module(s), or from use or installation. Under no circumstances shall VSUN be liable for incidental, consequential or special damages, howsoever caused. Loss of use, loss of profits, loss of production, and loss of revenues are therefore specifically but without limitation excluded. VSUN' s liability, if any, in damages or otherwise, shall not exceed the Actual Cash Value of the product(s) which is the subject of claim or dispute. FOR SALES TO U.S. ONLY: SOME STATES IN THE U.S. DO NOT ALLOW LIMITATIONS ON IMPLIED WARRANTIES OR THE EXCLUSION OF DAMAGES BYSTATE LAW. SO THE ABOVE LIMITATIONS OR EXCLUSIONS MAY NOT APPLYFOR YOU.

8. Transferability

This warranty is extended to the original end-user purchaser, and is transferable to any subsequent owner of the location or subsequent holder of the product when Product(s) remain at their original installed location upon satisfactory proof of succession or assignment.

9. Obtaining Warranty Performance

A. In order to obtain warranty service under the Limited Warranty, the Customer should promptly notify VSUN regional customer service center. Together with the notification, the Customer should enclose the evidence of the claim, such as the description of the defect, the complete serial number printed on the module label, the picture of the bar code, a copy of commercial invoice and the delivery date of its Products. Should the Products be returned for inspection, repair or replacement by VSUN, VSUN will provide the customer a Return Merchandise Authorization (RMA). VSUN will not accept the return of any modules without a RMA.

B. If VSUN determines that the Product is not defective or that a performance deficit is not covered under this warranty, VSUN will return the Product to Customer at Customer's expense and will have no further obligation for the repair, replacement, or refund.

Obtain VSUN customer service:
Add: Lot III - Dong Vang Area, Dinh Tram Industrial Zone, Viet Yen District, Bac Giang province, Vietnam
PC:230000 Tel: +84-02403.566.688
E-mail: vsun@vietnamsunergy.com Web: vsun-solar.com

10. Force Majeure

VSUN shall not be in any way responsible or liable to the Customer or any third-party for matters arising from any non-performance or delay in performance of any terms and conditions of sale, including this Limited Warranty, due to fire, flood, blizzard, hurricane, thunder, acts of God, changes of public policies, terrorism, war, riots, strikes, unavailability of suitable and sufficient labor or materials and other events which are out of control of VSUN.

Vietnam Sunergy Joint Stock Company
2020-01-01

ATTACHMENT B

BUREAU OF ECONOMIC ANALYSIS TABLE 1.1.9 DATED 12-20-2019

Bureau of Economic Analysis

Table 1.1.9. Implicit Price Deflators for Gross Domestic Product

[Index numbers, 2012=100]

Last Revised on: December 20, 2019 - Next Release Date January 30, 2020

Line		2012	2013	2014	2015	2016	2017	2018
Line								
1	**Gross domestic product**	**100.000**	**101.755**	**103.638**	**104.717**	**105.801**	**107.794**	**110.420**
2	**Personal consumption expenditures**	**100.000**	**101.346**	**102.830**	**103.045**	**104.091**	**105.929**	**108.143**
3	Goods	100.000	99.407	98.920	95.885	94.318	94.586	95.232
4	Durable goods	100.000	97.968	95.429	93.359	91.136	89.040	87.533
5	Nondurable goods	100.000	100.082	100.599	97.076	95.858	97.427	99.299
6	Services	100.000	102.316	104.804	106.704	109.120	111.793	114.851
7	**Gross private domestic investment**	**100.000**	**100.876**	**102.872**	**103.826**	**103.745**	**105.370**	**107.968**
8	Fixed investment	100.000	101.091	103.172	104.187	104.234	106.057	108.507
9	Nonresidential	100.000	100.251	101.469	102.042	101.146	102.116	103.515
10	Structures	100.000	101.455	107.198	109.598	109.958	112.952	117.062
11	Equipment	100.000	99.787	99.169	98.672	97.436	97.287	97.396
12	Intellectual property products	100.000	100.081	100.791	101.677	100.464	101.742	103.282
13	Residential	100.000	105.054	111.118	114.129	118.148	123.510	130.488
14	Change in private inventories	---	---	---	---	---	---	---
15	**Net exports of goods and services**	**---**	**---**	**---**	**---**	**---**	**---**	**---**
16	Exports	100.000	100.168	100.272	95.385	93.455	95.850	99.104
17	Goods	100.000	99.312	98.308	91.301	87.725	89.963	93.186
18	Services	100.000	102.099	104.708	104.582	106.331	109.078	112.389
19	Imports	100.000	98.636	97.854	89.947	86.696	88.622	91.181
20	Goods	100.000	98.054	96.738	87.581	83.797	85.693	88.153
21	Services	100.000	101.575	103.558	102.286	101.861	103.943	107.026
22	**Government consumption expenditures and gross investment**	**100.000**	**102.332**	**104.435**	**104.705**	**105.050**	**107.647**	**111.403**
23	Federal	100.000	100.931	102.632	103.282	103.900	106.040	109.336
24	National defense	100.000	100.609	102.056	102.402	102.776	104.518	107.609
25	Nondefense	100.000	101.476	103.593	104.718	105.701	108.435	112.040
26	State and local	100.000	103.279	105.645	105.677	105.854	108.731	112.772
	Addendum:							
27	Gross national product	100.000	101.754	103.626	104.679	105.759	107.731	110.320

Minor Source Operating Permit for Gas-Fired Power Plant from ACHD

AIR QUALITY PROGRAM
301 39th Street, Bldg. #7
Pittsburgh, PA 15201-1811

Minor Source Operating Permit

Issued To:	**Peoples Natural Gas Company, LLC**	**ACHD Permit #:**	**0967-OP22**
Facility:	**Peoples/IMG –** **Pittsburgh International Airport** 500 Tower Road Moon Township, PA 15108	**Date of Issuance:**	**August 24, 2022**
		Expiration Date:	**August 23, 2027**
		Renewal Date:	**February 23, 2027**

Issued By: _____
JoAnn Truchan, P.E.
Program Manager, Engineering

Prepared By: _____
Michael Dorman
Air Quality Engineer

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DATE SECTION(S)

I. CONTACT INFORMATION

Facility Location:	**Peoples/IMG – Pittsburgh International Airport** 500 Tower Road Moon Township, PA 15108
Permittee/Owner:	**Peoples Natural Gas Company, LLC** 375 North Shore Drive Pittsburgh, PA 15212
Permittee/Operator: **(if not Owner)**	
Responsible Official:	**Jeffry S. Nehr**
Title:	VP – Production & Business Development
Company:	Peoples Natural Gas Company, LLC
Address:	375 North Shore Drive Pittsburgh, PA 15212
Telephone Number:	412-244-2588
Fax Number:	
Facility Contact:	**Joseph Pezze**
Title:	Environmental Consultant
Telephone Number:	724-935-2730
Fax Number:	724-935-2730
E-mail Address:	**pezzejp@gmail.com**

AGENCY ADDRESSES:

ACHD Contact:	**Program Manager, Engineering** **Allegheny County Health Department** Air Quality Program 301 39th Street, Building #7 Pittsburgh, PA 15201-1811 aqpermits@alleghenycounty.us

II. FACILITY DESCRIPTION

This facility is a 22 mega-watt (MW) electric generating station on the grounds of Pittsburgh International Airport (PIT) in Moon Township, Allegheny County, PA. Peoples Natural Gas (Peoples) along with IMG Energy Solutions (IMG) installed five (5) Jenbacher J624 Natural Gas Engines that can produce up to 4.4MW per unit for a total of 22MW at the facility. Electricity is supplied to Pittsburgh International Airport and the PJM Energy Grid. Each engine is equipped with an oxidation catalyst and an SCR system to control emissions. The site contains a gas conditioning system that utilizes a desiccant system along with a small gas heater rated less than 0.5MM Btu/hr. Also, there are a number of tanks on-site for glycol, spent glycol, waste water, clean oil, waste oil, and urea.

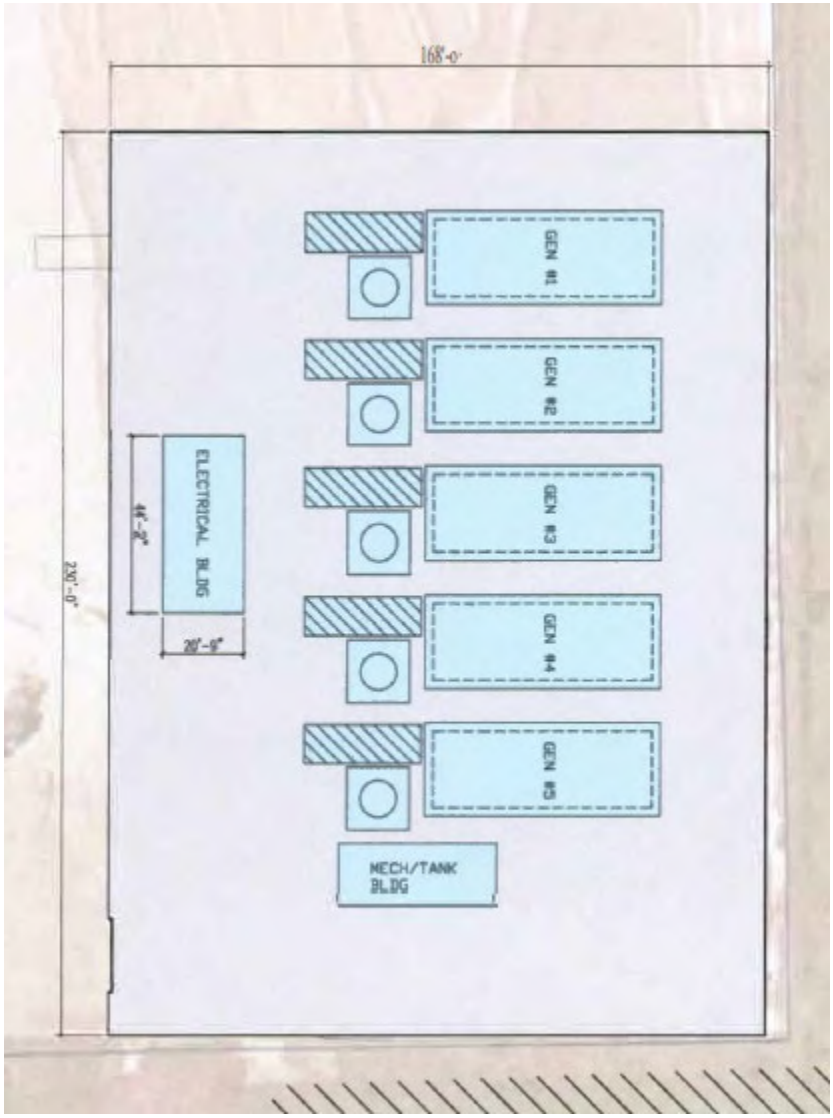
The Pittsburgh International Airport is a minor source of particulate matter (PM), particulate matter of 10 microns or less in diameter (PM_{10}), particulate matter of 2.5 microns or less in diameter ($PM_{2.5}$), sulfur dioxide (SO_2), carbon monoxide (CO), and hazardous air pollutants (HAPs), and a synthetic minor source of nitrogen oxides (NO_X) and volatile organic compounds (VOCs) as defined in section 2101.20 of Article XXI

The emission units regulated by this permit are summarized in Table II-1:

TABLE II-1: Emission Unit Identification

I.D.	SOURCE DESCRIPTION	CONTROL DEVICE(S)	MAXIMUM CAPACITY	FUEL/RAW MATERIAL	STACK I.D.
G-101	Jenbacher Generator ; Model: J624	Oxidation Catalyst and SCR	6,023 hp	Natural Gas	S101
G-102	Jenbacher Generator ; Model: J624	Oxidation Catalyst and SCR	6,023 hp	Natural Gas	S102
G-103	Jenbacher Generator ; Model: J624	Oxidation Catalyst and SCR	6,023 hp	Natural Gas	S103
G-104	Jenbacher Generator ; Model: J624	Oxidation Catalyst and SCR	6,023 hp	Natural Gas	S104
G-105	Jenbacher Generator ; Model: J624	Oxidation Catalyst and SCR	6,023 hp	Natural Gas	S105
T-201	Used Lube Oil Tank	None	2,600 gal	Used Lube Oil	NA
T-202	New Glycol Tank	None	1,000 gal	New Glycol	NA
T-203	Used Glycol Tank	None	1,000 gal	Used Glycol	NA
T-204	Urea Tank	None	5,200	Urea	NA

FLOW DIAGRAM



DECLARATION OF POLICY

Pollution prevention is recognized as the preferred strategy (over pollution control) for reducing risk to air resources. Accordingly, pollution prevention measures should be integrated into air pollution control programs wherever possible, and the adoption by sources of cost-effective compliance strategies, incorporating pollution prevention, is encouraged. The Department will give expedited consideration to any permit modification request based on pollution prevention principles.

The permittee is subject to the terms and conditions set forth below. These terms and conditions constitute provisions of *Allegheny County Health Department Rules and Regulations, Article XXI Air Pollution Control*. The subject equipment has been conditionally approved for operation. The equipment shall be operated in conformity with the plans, specifications, conditions, and instructions which are part of your application, and may be periodically inspected for compliance by the Department. In the event that the terms and conditions of this permit or the applicable provisions of Article XXI conflict with the application for this permit, these terms and conditions and the applicable provisions of Article XXI shall prevail. Additionally, nothing in this permit relieves the permittee from the obligation to comply with all applicable Federal, State and Local laws and regulations.

III. GENERAL CONDITIONS

1. Prohibition of Air Pollution (§2101.11)

It shall be a violation of this permit to fail to comply with, or to cause or assist in the violation of, any requirement of this permit, or any order or permit issued pursuant to authority granted by Article XXI. The permittee shall not willfully, negligently, or through the failure to provide and operate necessary control equipment or to take necessary precautions, operate any source of air contaminants in such manner that emissions from such source:

a. Exceed the amounts permitted by this permit or by any order or permit issued pursuant to Article XXI;
b. Cause an exceedance of the ambient air quality standards established by Article XXI §2101.10; or
c. May reasonably be anticipated to endanger the public health, safety, or welfare.

2. Definitions (§2101.20)

a. Except as specifically provided in this permit, terms used retain the meaning accorded them under the applicable provisions and requirements of Article XXI or the applicable federal or state regulation. Whenever used in this permit, or in any action taken pursuant to this permit, the words and phrases shall have the meanings stated, unless the context clearly indicates otherwise.

b. Unless specified otherwise in this permit or in the applicable regulation, the term "*year*" shall mean any twelve (12) consecutive months.

3. Conditions (§2102.03.c)

It shall be a violation of this permit giving rise to the remedies provided by Article XXI §2109.02, for any person to fail to comply with any terms or conditions set forth in this permit.

4. Certification (§2102.01)

Any report, or compliance certification submitted under this permit shall contain written certification by a responsible official as to truth, accuracy, and completeness. This certification and any other certification required under this permit shall be signed by a responsible official of the source, and shall state that, based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete.

5. Transfers (§2102.03.e)

This permit shall not be transferable from one person to another, except in accordance with Article XXI §2102.03.e and in cases of change-in-ownership which are documented to the satisfaction of the Department, and shall be valid only for the specific sources and equipment for which this permit was issued. The transfer of permits in the case of change-in-ownership may be made consistent with the administrative permit amendment procedure of Article XXI §2103.14.b. The required documentation and fee must be received by the Department at least 30 days before the intended transfer date.

6. Term (§2103.12.e, §2103.13.a)

a. This permit shall remain valid for five (5) years from the date of issuance, or such other shorter period if required by the Clean Air Act, unless revoked. The terms and conditions of an expired permit shall automatically continue pending issuance of a new operating permit provided the permittee has submitted a timely and complete application and paid applicable fees required under Article XXI Part C, and the Department through no fault of the permittee is unable to issue or deny a new permit before the expiration of the previous permit.

b. Expiration. Permit expiration terminates the source's right to operate unless a timely and complete renewal application has been submitted consistent with the requirements of Article XXI Part C.

7. Need to Halt or Reduce Activity Not a Defense (§2103.12.f.2)

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

8. Property Rights (§2103.12.f.4)

This permit does not convey any property rights of any sort, or any exclusive privilege.

9. Duty to Provide Information (§2103.12.f.5)

a. The permittee shall furnish to the Department in writing within a reasonable time, any information that the Department may request to determine whether cause exists for modifying, revoking and reissuing, or terminating the permit or to determine compliance with the permit. Upon request, the permittee shall also furnish to the Department copies of any records required to be kept by the permit.

b. Upon cause shown by the permittee the records, reports, or information, or a particular portion thereof, claimed by the permittee to be confidential shall be submitted to the Department in accordance with the requirements of Article XXI, §2101.07.d.4. Information submitted to the Department under a claim of confidentiality, shall be available to the US EPA and the PADEP upon

request and without restriction. Upon request of the permittee the confidential information may be submitted to the USEPA and PADEP directly. Emission data or any portions of any draft, proposed, or issued permits shall not be considered confidential.

10. Modification of Section 112(b) Pollutants which are VOCs or PM10 (§2103.12.f.7)

Except where precluded under the Clean Air Act or federal regulations promulgated under the Clean Air Act, if this permit limits the emissions of VOCs or PM_{10} but does not limit the emissions of any hazardous air pollutants, the mixture of hazardous air pollutants which are VOCs or PM_{10} can be modified so long as no permit emission limitations are violated. A log of all mixtures and changes shall be kept and reported to the Department with the next report required after each change.

11. Right to Access (§2103.12.h.2)

Upon presentation of credentials and other documents as may be required by law, the permittee shall allow authorized Department and other federal, state, county, and local government representatives to:

a. Enter upon the permittee's premises where a permitted source is located or an emissions-related activity is conducted, or where records are or should be kept under the conditions of the permit;
b. Have access to, copy and remove, at reasonable times, any records that must be kept under the conditions of the permit;
c. Inspect at reasonable times any facilities, equipment (including monitoring and air pollution control equipment), practices, or operations regulated or required under the permit; and
d. As authorized by either Article XXI or the Clean Air Act, sample or monitor at reasonable times substances or parameters for the purpose of assuring compliance with the permit or other applicable requirements.

12. Certification of Compliance (§2103.12.h.5,)

a. The permittee shall submit on an annual basis, a certification of compliance form with all terms and conditions contained in this permit, including emission limitations, standards, or work practices. The certification of compliance form shall be consistent with General Condition III.4 above and shall include the following information at a minimum:

1) The identification of each term or condition of the permit that is the basis of the certification;
2) The compliance status;
3) Whether any noncompliance was continuous or intermittent;
4) The method(s) used for determining the compliance status of the source, currently and over the reporting period consistent with the provisions of this permit; and
5) Such other facts as the Department may require to determine the compliance status of the source.

b. All certification of compliance forms must be submitted to the Department by February 28th of each year for the time period beginning January 1st and ending December 31st of the previous year. The first report shall be due February 28, 2023 for the time period beginning on the issuance date of this permit through December 31, 2022. Written notice required by Condition III.12.a above should be submitted online through the ACHD Air Quality Regulated Entities Portal (REP). If REP is not available, written notice should be sent to the Department at aqreports@alleghenycounty.us.

13. Record Keeping Requirements (§2103.12.j.1)

a. The permittee shall maintain records of required monitoring information that include the following:

1) The date, place as defined in the permit, and time of sampling or measurements;
2) The date(s) analyses were performed;
3) The company or entity that performed the analyses;
4) The analytical techniques or methods used;
5) The results of such analyses; and
6) The operating parameters existing at the time of sampling or measurement.

b. The permittee shall maintain and make available to the Department, upon request, records including computerized records that may be necessary to comply with the reporting and emission statements in Article XXI §2108.01.e. Such records may include records of production, fuel usage, maintenance of production or pollution control equipment or other information determined by the Department to be necessary for identification and quantification of potential and actual air contaminant emissions.

14. Retention of Records (§2103.12.j.2)

The permittee shall retain records of all required monitoring data and support information for a period of at least five (5) years from the date of the monitoring sample, measurement, report, or application. Support information includes all calibration and maintenance records and all original strip-chart recordings for continuous monitoring instrumentation, and copies of all reports required by this permit.

15. Reporting Requirements (§2103.12.k)

a. The permittee shall submit reports of any required monitoring at least every six (6) months. All instances of deviations from permit requirements must be clearly identified in such reports. All required reports must be certified by the Responsible Official.

b. Prompt reporting of deviations from permit requirements is required, including those attributable to upset conditions as defined in this permit and Article XXI §2108.01.c, the probable cause of such deviations, and any corrective actions or preventive measures taken.

c. All reports submitted to the Department shall comply with the certification requirements of General Condition III.4 above.

d. Semiannual reports required by this permit shall be submitted to the Department as follows:

1) One semiannual report is due by July 31st of each year for the time period beginning January 1st and ending June 30th of the current year.
2) One semiannual report is due by February 1st of each year for the time period beginning July 1st and ending December 31st of the previous year.

e. Written notice required by condition III.15.a above should be submitted online through the ACHD Air Quality Regulated Entities Portal (REP). If REP is not available, written notice should be sent to the Department at aqreports@alleghenycounty.us.

16. Severability Requirement (§2103.12.l)

The provisions of this permit are severable, and if any provision of this permit is determined by a court of competent jurisdiction to be invalid or unenforceable, such a determination will not affect the remaining provisions of this permit.

17. Existing Source Reactivations (§2103.13.d)

The permittee shall not reactivate any source that has been out of operation or production for a period of one year or more unless the permittee has submitted a reactivation plan request to, and received a written reactivation plan approval from, the Department. Existing source reactivations shall meet all requirements of Article XXI §2103.13.d.

18. Administrative Permit Amendment Procedures (§2103.14.b)

An administrative permit amendment may be made consistent with the procedures of Article XXI §2103.14.b and §2103.24.b. Administrative permit amendments are not authorized for any amendment precluded by the Clean Air Act or the regulations there under.

19. Revisions and Minor Permit Modification Procedures (§2103.14.c)

Sources may apply for revisions and minor permit modifications on an expedited basis in accordance with Article XXI §2103.14.c and §2103.24.a.

20. Significant Permit Modifications (§2103.14.d)

Significant permit modifications shall meet all requirements of the applicable subparts of Article XXI, Part C, including those for applications, fees, public participation, review by affected States, and review by EPA, as they apply to permit issuance and permit renewal. The approval of a significant permit modification, if the entire permit has been reopened for review, shall commence a new full five (5) year permit term. The Department shall take final action on all such permits within nine (9) months following receipt of a complete application.

21. Duty to Comply (§2103.12.f.1)

The permittee shall comply with all permit conditions and all other applicable requirements at all times. Any permit noncompliance constitutes a violation of the Clean Air Act, the Air Pollution Control Act, and Article XXI and is grounds for any and all enforcement action, including, but not limited to, permit termination, revocation and reissuance, or modification, and denial of a permit renewal application.

22. Renewals (§2103.13.b.)

Renewal of this permit is subject to the same fees and procedural requirements, including those for public participation and affected State and EPA review, that apply to initial permit issuance. The application for renewal shall be submitted at least six (6) months but not more than eighteen (18) months prior to expiration of this permit. The application shall also include submission of a supplemental compliance review as required by Article XXI §2102.01.

23. Reopenings for Cause (§2103.12.f.3, §2103.15.a)

a. This permit shall be reopened and reissued under any of the following circumstances:

1) Additional requirements under the Clean Air Act become applicable to a source. No such reopening is required if the effective date of the requirement is later than the date on which the permit is due to expire, unless the original permit or any of its terms and conditions has been extended solely due to the failure of the Department to act on a permit renewal application in a timely fashion.
2) Additional requirements, including excess emissions requirements, become applicable to an affected source under the acid rain program. Upon approval by the Administrator, excess emissions offset plans shall be deemed to be incorporated into this permit.
3) The Department or EPA determines that this permit contains a material mistake or that inaccurate statements were made in establishing the emissions standards or other terms or conditions of this permit.
4) The Administrator or the Department determines that this permit must be reissued or revoked to assure compliance with the applicable requirements.

b. This permit may be modified; revoked, reopened, and reissued; or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or of a notification of planned changes or anticipated noncompliance does not stay any permit condition. No permit revision shall be required, under any approved economic incentives, marketable permits, emissions trading, and other similar programs or processes, for changes that are provided for in this permit.

24. Annual Operating Permit Administration Fee (§2103.40)

In each year during the term of this permit, on or before December 31st, the permittee shall submit to the Department, in addition to any other applicable administration fees, an Annual Operating Permit Administration Fee in accordance with §2103.40. by check or money order payable to the "Allegheny County Air Pollution Control Fund" in the amount specified in the fee schedule applicable at that time.

25. Other Requirements not Affected (§2104.08, §2105.02)

Compliance with the requirements of this permit shall not in any manner relieve any person from the duty to fully comply with any other applicable Federal, State, or County statute, rule, regulation, or the like, including but not limited to the odor emission standards under Article XXI §2104.04, any applicable NSPSs, NESHAPs, MACTs, or Generally Achievable Control Technology (GACT) standards now or hereafter established by the EPA, and any applicable requirements of BACT or LAER as provided by Article XXI, any condition contained in any applicable Installation or Operating Permit and/or any additional or more stringent requirements contained in an order issued to such person pursuant to Article XXI Part I.

26. Termination of Operation (§2108.01.a)

In the event that operation of any source of air contaminants is permanently terminated, the person responsible for such source shall so report, in writing, to the Department within 60 days of such termination.

27. Tests by the Department (§2108.02.d)

Notwithstanding any tests conducted pursuant to Article XXI §2108.02, the Department or another entity designated by the Department may conduct emissions testing on any source or air pollution control equipment. At the request of the Department, the person responsible for such source or equipment shall provide adequate sampling ports, safe sampling platforms and adequate utilities for the performance of such tests.

28. Other Rights and Remedies Preserved (§2109.02.b)

Nothing in this permit shall be construed as impairing any right or remedy now existing or hereafter created in equity, common law or statutory law with respect to air pollution, nor shall any court be deprived of such jurisdiction for the reason that such air pollution constitutes a violation of this permit.

29. Enforcement and Emergency Orders (§2109.03, §2109.05)

a. The person responsible for this source shall be subject to any and all enforcement and emergency orders issued to it by the Department in accordance with Article XXI §2109.03, §2109.04 and §2109.05.

b. Upon request, any person aggrieved by an Enforcement Order or Emergency Order shall be granted a hearing as provided by Article XXI §2109.03.d; provided however, that an Emergency Order shall continue in full force and effect notwithstanding the pendency of any such appeal.

c. Failure to comply with an Enforcement Order or immediately comply with an Emergency Order shall be a violation of this permit thus giving rise to the remedies provided by Article XXI §2109.02.

30. Penalties, Fines, and Interest (§2109.07.a)

A source that fails to pay any fee required under this permit when due shall pay a civil penalty of 50% of the fee amount, plus interest on the fee amount computed in accordance with Article XXI §2109.06.a.4 from the date the fee was required to be paid. In addition, the source may have this permit revoked for failure to pay any fee required.

31. Appeals (§2109.10)

In accordance with State Law and County regulations and ordinances, any person aggrieved by an order or other final action of the Department issued pursuant to Article XXI or any unsuccessful petitioner to the Administrator under Article XXI Part C, Subpart 2, shall have the right to appeal the action to the Director in accordance with the applicable County regulations and ordinances.

32. Operational Flexibility (§2103.14.a)

a. The owner or operator shall not make any changes at this source, including trades of increases and decreases in emissions within the permitted source, without first obtaining a permit revision for such changes, unless:

1) The changes do not require an Installation Permit under §2102.04 of this Article or violate the terms of an Operating Permit or an Installation Permit;

2) The permit specifically allows for changes that do not cause specific emissions increases greater than a de minimis emission increase, and the changes do not exceed such emissions increase allowed under the permit, in accordance with General Condition III.33 below;
3) The changes do not violate major source applicable requirements or contravene federally enforceable permit terms and conditions that are monitoring (including test methods), recordkeeping, reporting, or compliance certification requirements; and
4) By no later than seven (7) days prior to the date on which the implementation of the proposed change is commenced, a written notification is submitted to the Department, for attachment to the Department's copy of the relevant permit, which includes:
   a) A brief description of the change within the permitted source;
   b) The date on which the change will occur;
   c) The pollutants emitted; and
   d) Any change in emissions.

33. De Minimis Emission Increases (§2103.14.e)

a. The Department may allow, as a condition of an Operating Permit, *de minimis* emission increases from a new or existing source up to the amounts authorized in condition III.33.d below.

b. A *de minimis* increase may not occur at a source if it either:
1) Increases the emissions of a pollutant regulated under Section 112 of the Clean Air Act (42 U.S.C.A. §7412) except as authorized in conditions III.33.d.4) and 5) below;
2) Subjects the source to the permit requirements of Article XXI, §§2102.05, 2102.06, or 2102.07 (relating to prevention of significant deterioration of air quality and major new source and major modification review); or
3) Violates an applicable requirement of this Article, the state Air Pollution Control Act, the Clean Air Act, or the regulations promulgated under the Air Pollution Control Act or the Clean Air Act.

c. The permittee shall provide the Department with 7 days prior written notice of any *de minimis* emission increase. The notice shall identify and describe the pollutants that will be emitted as a result of the *de minimis* emissions increase and provide emission rates in tons/year and in terms necessary to establish compliance consistent with any applicable requirement. The Department may disapprove or condition the *de minimis* emission increase at any time.

d. Except as provided in Condition III.33.e below, the maximum *de minimis* emission rate increases, as measured in tons/year, that may be authorized in the permit during the term of the permit are:
1) Four tons of carbon monoxide from an emissions unit during the term of the permit and 20 tons of carbon monoxide at the source during the term of the permit;
2) One ton of NO_X from an emissions unit during the term of the permit and 5 tons of NO_X at the source during the term of the permit;
3) One and six-tenths tons of oxides of sulfur from an emissions unit during the term of the permit and 8.0 tons of oxides of sulfur at the source during the term of the permit;
4) Six-tenths of a ton of PM_{10} from an emissions unit during the term of the permit and 3.0 tons of PM_{10} at the source during the term of the permit. This shall include emissions of a pollutant regulated under Section 112 of the Clean Air Act unless precluded by the Clean Air Act, the regulations thereunder, or Article XXI; and
5) One ton of VOC's from an emissions unit during the term of the permit and 5 tons of VOC's at the source during the term of the permit. This shall include emissions of a pollutant regulated

under Section 112 of the Clean Air Act unless precluded by the Clean Air Act, the regulations thereunder, or Article XXI.

e. The Department may allow, as a condition of an operating permit, installation of the minor sources exempted under §2102.04.a.5 of Article XXI.

f. *De minimis* emission threshold levels cannot be met by offsetting emission increases with emission decreases at the same emissions unit.

34. Circumvention (§2101.14)

For purposes of determining compliance with the provisions of this permit and Article XXI, no credit shall be given to any person for any device or technique, including but not limited to the operation of any source with unnecessary amounts of air, the combining of separate sources except as specifically permitted by Article XXI and the Department, the use of stacks exceeding Good Engineering Practice height as defined by regulations promulgated by the US EPA at 40 CFR §§51.100 and 51.110 and Subpart I, and other dispersion techniques, which without reducing the amount of air contaminants emitted, conceals or dilutes an emission of air contaminants which would otherwise violate the provisions of this Article; except that, for purposes of determining compliance with Article §2104.04 concerning odors, credit for such devices or techniques, except for the use of a masking agent, may be given.

35. Duty to Supplement and Correct Relevant Facts (§2103.11.d.2)

a. The permittee shall provide additional information as necessary to address requirements that become applicable to the source after the date it files a complete application but prior to the Department taking action on the permit application.

b. The permittee shall provide supplementary fact or corrected information upon becoming aware that incorrect information has been submitted or relevant facts were not submitted.

c. Except as otherwise required by this permit and Article XXI, the Clean Air Act, or the regulations thereunder, the permittee shall submit additional information as necessary to address changes occurring at the source after the date it files a complete application but prior to the Department taking action on the permit application.

d. The applicant shall submit information requested by the Department which is reasonably necessary to evaluate the permit application.

36. Effect (§2102.03.g.)

a. Except as specifically otherwise provided under Article XXI, Part C, issuance of a permit pursuant to Article XXI Part B or Part C shall not in any manner relieve any person of the duty to fully comply with the requirements of this permit, Article XXI or any other provision of law, nor shall it in any manner preclude or affect the right of the Department to initiate any enforcement action whatsoever for violations of this permit or Article XXI, whether occurring before or after the issuance of such permit. Further, except as specifically otherwise provided under Article XXI Part C the issuance of a permit shall not be a defense to any nuisance action, nor shall such permit be construed as a certificate of compliance with the requirements of this permit or Article XXI.

37. Installation Permits (§2102.04.a.1.)

It shall be a violation of this permit giving rise to the remedies set forth in Article XXI Part I for any person to install, modify, replace, reconstruct, or reactivate any source or air pollution control equipment which would require an installation permit or permit modification in accordance with Article XXI Part B or Part C.

IV. SITE LEVEL TERMS AND CONDITIONS

1. Reporting of Upset Conditions (§2103.12.k.2)

The permittee shall promptly report all deviations from permit requirements, including those attributable to upset conditions as defined in Article XXI §2108.01.c, the probable cause of such deviations, and any corrective actions or preventive measures taken.

2. Visible Emissions (§2104.01.a)

Except as provided for by Article XXI §2108.01.d pertaining to a cold start, no person shall operate, or allow to be operated, any source in such manner that the opacity of visible emissions from a flue or process fugitive emissions from such source, excluding uncombined water:

a. Equal or exceed an opacity of 20% for a period or periods aggregating more than three (3) minutes in any sixty (60) minute period; or,

b. Equal or exceed an opacity of 60% at any time.

3. Odor Emissions (§2104.04) (County-only enforceable)

No person shall operate, or allow to be operated, any source in such manner that emissions of malodorous matter from such source are perceptible beyond the property line.

4. Materials Handling (§2104.05)

The permittee shall not conduct, or allow to be conducted, any materials handling operation in such manner that emissions from such operation are visible at or beyond the property line.

5. Operation and Maintenance (§2105.03)

All air pollution control equipment required by this permit or any order under Article XXI, and all equivalent compliance techniques approved by the Department, shall be properly installed, maintained, and operated consistently with good air pollution control practice.

6. Open Burning (§2105.50)

No person shall conduct, or allow to be conducted, the open burning of any material, except where the Department has issued an Open Burning Permit to such person in accordance with Article XXI §2105.50 or where the open burning is conducted solely for the purpose of non-commercial preparation of food for human consumption, recreation, light, ornament, or provision of warmth for outside workers, and in a manner which contributes a negligible amount of air contaminants.

7. Shutdown of Control Equipment (§2108.01.b)

a. In the event any air pollution control equipment is shut down for reasons other than a breakdown, the person responsible for such equipment shall report, in writing, to the Department the intent to shut down such equipment at least 24 hours prior to the planned shutdown. Notwithstanding the submission of such report, the equipment shall not be shut down until the approval of the Department is obtained; provided, however, that no such report shall be required if the source(s)

served by such air pollution control equipment is also shut down at all times that such equipment is shut down.

b. The Department shall act on all requested shutdowns as promptly as possible. If the Department does not take action on such requests within ten (10) calendar days of receipt of the notice, the request shall be deemed denied, and upon request, the owner or operator of the affected source shall have a right to appeal in accordance with the provisions of Article XI.

c. The prior report required by Site Level Condition IV.7.a above shall include:

1) Identification of the specific equipment to be shut down, its location and permit number (if permitted), together with an identification of the source(s) affected;
2) The reasons for the shutdown;
3) The expected length of time that the equipment will be out of service;
4) Identification of the nature and quantity of emissions likely to occur during the shutdown;
5) Measures, including extra labor and equipment, which will be taken to minimize the length of the shutdown, the amount of air contaminants emitted, or the ambient effects of the emissions;
6) Measures which will be taken to shut down or curtail the affected source(s) or the reasons why it is impossible or impracticable to shut down or curtail the affected source(s) during the shutdown; and
7) Such other information as may be required by the Department.

d. Written notice required by condition IV.7.a above should be submitted online through the ACHD Air Quality Regulated Entities Portal (REP). If REP is not available, written notice should be sent to the Department at aqreports@alleghenycounty.us.

8. Breakdowns (§2108.01.c)

a. In the event that any air pollution control equipment, process equipment, or other source of air contaminants breaks down in such manner as to have a substantial likelihood of causing the emission of air contaminants in violation of this permit, or of causing the emission into the open air of potentially toxic or hazardous materials, the person responsible for such equipment or source shall immediately, but in no event later than sixty (60) minutes after the commencement of the breakdown, notify the Department of such breakdown and shall, as expeditiously as possible but in no event later than seven (7) days after the original notification, provide written notice to the Department.

b. To the maximum extent possible, all oral and written notices required shall include all pertinent facts, including:

1) Identification of the specific equipment which has broken down, its location and permit number (if permitted), together with an identification of all related devices, equipment, and other sources which will be affected.
2) The nature and probable cause of the breakdown.
3) The expected length of time that the equipment will be inoperable or that the emissions will continue.
4) Identification of the specific material(s) which are being, or are likely to be emitted, together with a statement concerning its toxic qualities, including its qualities as an irritant, and its potential for causing illness, disability, or mortality.
5) The estimated quantity of each material being or likely to be emitted.

6) Measures, including extra labor and equipment, taken or to be taken to minimize the length of the breakdown, the amount of air contaminants emitted, or the ambient effects of the emissions, together with an implementation schedule.
7) Measures being taken to shut down or curtail the affected source(s) or the reasons why it is impossible or impractical to shut down the source(s), or any part thereof, during the breakdown.

c. Notices required shall be updated, in writing, as needed to advise the Department of changes in the information contained therein. In addition, any changes concerning potentially toxic or hazardous emissions shall be reported immediately. All additional information requested by the Department shall be submitted as expeditiously as practicable.

d. Unless otherwise directed by the Department, the Department shall be notified whenever the condition causing the breakdown is corrected or the equipment or other source is placed back in operation by no later than 9:00 AM on the next County business day. Within seven (7) days thereafter, written notice shall be submitted pursuant to Paragraphs a and b above.

e. Breakdown reporting shall not apply to breakdowns of air pollution control equipment which occur during the initial startup of said equipment, provided that emissions resulting from the breakdown are of the same nature and quantity as the emissions occurring prior to startup of the air pollution control equipment.

f. In no case shall the reporting of a breakdown prevent prosecution for any violation of this permit or Article XXI.

g. Written notice required by Condition IV.8.a above should be submitted online through the ACHD Air Quality Regulated Entities Portal (REP). If REP is not available, written notice should be sent to the Department at aqreports@alleghenycounty.us.

9. Cold Start (§2108.01.d)

In the event of a cold start on any fuel-burning or combustion equipment, except stationary internal combustion engines and combustion turbines used by utilities to meet peak load demands, the person responsible for such equipment shall report in writing to the Department the intent to perform such cold start at least 24 hours prior to the planned cold start. Such report shall identify the equipment and fuel(s) involved and shall include the expected time and duration of the startup. Upon written application from the person responsible for fuel-burning or combustion equipment which is routinely used to meet peak load demands and which is shown by experience not to be excessively emissive during a cold start, the Department may waive these requirements and may instead require periodic reports listing all cold starts which occurred during the report period. The Department shall make such waiver in writing, specifying such terms and conditions as are appropriate to achieve the purposes of Article XXI. Such waiver may be terminated by the Department at any time by written notice to the applicant. Written notice should be submitted online through the ACHD Air Quality Regulated Entities Portal (REP). If REP is not available, written notice should be sent to the Department at aqreports@alleghenycounty.us.

10. Monitoring of Malodorous Matter Beyond Facility Boundaries (§2104.04)

The permittee shall take all reasonable action as may be necessary to prevent malodorous matter from becoming perceptible beyond facility boundaries. Further, the permittee shall perform such observations as may be deemed necessary along facility boundaries to ensure that malodorous matter beyond the facility boundary in accordance with Article XXI §2107.13 is not perceptible and record all findings and corrective

action measures taken.

11. Orders (§2108.01.f)

In addition to meeting the requirements of General Condition III.26 and Site Level Conditions IV.7 through IV.10 above, inclusive, the person responsible for any source shall, upon order by the Department, report to the Department such information as the Department may require in order to assess the actual and potential contribution of the source to air quality. The order shall specify a reasonable time in which to make such a report.

12. Violations (§2108.01.g)

The failure to submit any report or update thereof required by General Condition III.26 and Site Level Conditions IV.7 through IV.11 above, inclusive, within the time specified, the knowing submission of false information, or the willful failure to submit a complete report shall be a violation of this permit giving rise to the remedies provided by Article XXI §2109.02.

13. Emissions Testing (§2108.02)

a. **Orders:** The person responsible for any source shall, upon order by the Department, conduct, or cause to be conducted, such emissions tests as specified by the Department within such reasonable time as is specified by the Department. Test results shall be submitted in writing to the Department within 20 days after completion of the tests, unless a different period is specified in the Department's order. Emissions testing shall comply with all applicable requirements of Article XXI §2108.02.e.

b. **Tests by the Department:** Notwithstanding any tests conducted pursuant to this permit, the Department or another entity designated by the Department may conduct emissions testing on any source or air pollution control equipment. At the request of the Department, the permittee shall provide adequate sampling ports, safe sampling platforms and adequate utilities for the performance of such tests.

c. **Testing Requirements:** No later than 45 days prior to conducting any tests required by this permit, the person responsible for the affected source shall submit for the Department's approval a written test protocol explaining the intended testing plan, including any deviations from standard testing procedures, the proposed operating conditions of the source during the test, calibration data for specific test equipment and a demonstration that the tests will be conducted under the direct supervision of persons qualified by training and experience satisfactory to the Department to conduct such tests. In addition, at least 30 days prior to conducting such tests, the person responsible shall notify the Department in writing of the time(s) and date(s) on which the tests will be conducted and shall allow Department personnel to observe such tests, record data, provide pre-weighed filters, analyze samples in a County laboratory and to take samples for independent analysis. Test results shall be comprehensively and accurately reported in the units of measurement specified by the applicable emission limitations of this permit.

d. Test methods and procedures shall conform to the applicable reference method set forth in this permit or Article XXI Part G, or where those methods are not applicable, to an alternative sampling and testing procedure approved by the Department consistent with Article XXI §2108.02.e.2.

e. **Violations:** The failure to perform tests as required by this permit or an order of the Department,

the failure to submit test results within the time specified, the knowing submission of false information, the willful failure to submit complete results, or the refusal to allow the Department, upon presentation of a search warrant, to conduct tests, shall be a violation of this permit giving rise to the remedies provided by Article XXI §2109.02.

14. Abrasive Blasting (§2105.51)

a. Except where such blasting is a part of a process requiring an operating permit , no person shall conduct or allow to be conducted, abrasive blasting or power tool cleaning of any surface, structure, or part thereof, which has a total area greater than 1,000 square feet unless such abrasive blasting complies with all applicable requirements of Article XXI §2105.51.

b. In addition to complying with all applicable provisions of §2105.51, no person shall conduct, or allow to be conducted, abrasive blasting of any surface unless such abrasive blasting also complies with all other applicable requirements of Article XXI unless such requirements are specifically addressed by §2105.51.

15. Asbestos Abatement (§2105.62, §2105.63)

In the event of removal, encasement, or encapsulation of Asbestos-Containing Material (ACM) at a facility or in the event of the demolition of any facility, the permittee shall comply with all applicable provisions of Article XXI §2105.62 and §2105.63.

16. Volatile Organic Compound Storage Tanks (§2105.12.a)

No person shall place or store, or allow to be placed or stored, a volatile organic compound having a vapor pressure of 1.5 psia or greater under actual storage conditions in any aboveground stationary storage tank having a capacity equal to or greater than 2,000 gallons but less than or equal to 40,000 gallons, unless there is in operation on such tank pressure relief valves which are set to release at the higher of 0.7 psig of pressure or 0.3 psig of vacuum or at the highest possible pressure and vacuum in accordance with State or local fire codes, National Fire Prevention Association guidelines, or other national consensus standard approved in writing by the Department. Petroleum liquid storage vessels that are used to store produced crude oil and condensate prior to lease custody transfer are exempt from these requirements.

17. Fugitive Emissions (§2105.49)

The person responsible for a source of fugitive emissions, in addition to complying with all other applicable provisions of this permit shall take all reasonable actions to prevent fugitive air contaminants from becoming airborne. Such actions may include, but are not limited to:

a. The use of asphalt, oil, water, or suitable chemicals for dust control;
b. The paving and maintenance of roadways, parking lots and the like;
c. The prompt removal of earth or other material which has been deposited by leaks from transport, erosion or other means;
d. The adoption of work or other practices to minimize emissions;
e. Enclosure of the source; and
f. The proper hooding, venting, and collection of fugitive emissions.

18. Episode Plans (§2106.02)

The permittee shall upon written request of the Department, submit a source curtailment plan, consistent with good industrial practice and safe operating procedures, designed to reduce emissions of air contaminants during air pollution episodes. Such plans shall meet the requirements of Article XXI §2106.02.

19. New Source Performance Standards (§2105.05)

a. It shall be a violation of this permit giving rise to the remedies provided by §2109.02 of Article XXI for any person to operate, or allow to be operated, any source in a manner that does not comply with all requirements of any applicable NSPS now or hereafter established by the EPA, except if such person has obtained from EPA a waiver pursuant to Section 111 or Section 129 of the Clean Air Act or is otherwise lawfully temporarily relieved of the duty to comply with such requirements.

b. Any person who operates, or allows to be operated, any source subject to any NSPS shall conduct, or cause to be conducted, such tests, measurements, monitoring and the like as is required by such standard. All notices, reports, test results and the like as are required by such standard shall be submitted to the Department in the manner and time specified by such standard. All information, data and the like which is required to be maintained by such standard shall be made available to the Department upon request for inspection and copying.

20. National Emission Standards for Hazardous Air Pollutants (§2104.08)

The permittee shall comply with each applicable emission limitation, work practice standard, and operation and maintenance requirement of 40 CFR Part 63, Subpart ZZZZ – *National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines (RICE)*.

V. EMISSION UNIT LEVEL TERMS AND CONDITIONS

A. Process P-001: Generators G-101, G-102, G-103, G-104 and G-105

Process Description:	Natural Gas-fired Generators
Facility ID:	G-101, G-102, G-103, G-104 and G-105
Manufacturer/Model	Jenbacher; Model: J624
Max. Design Rate:	6,023 hp
Fuel Consumption:	33.385 MMBtu/hr (5,543 Btu/bhp-hr)
Primary Fuel:	Natural Gas
Control Device:	Oxidation Catalyst and SCR

1. Restrictions:

a. The engines shall combust only natural gas. (§2103.12.a.2.D, §2104.03.a, IP 0967-I001.V.A.1.a)

b. Each engine shall be equipped with an oxidation catalyst and SCR. (§2103.12.a.2.D, IP 0967-I001.V.A.1.b)

c. The permittee shall install instrumentation to continuously measure and record: (§2103.12.a.2.D, IP 0967-I001.V.A.1.c)

1) The inlet temperature of each oxidation catalyst and SCR; and
2) The differential pressure across each oxidation catalyst and SCR.

d. Each engine, oxidation catalyst and SCR shall be constructed, operated and maintained according to manufacturers' specifications. (§2103.12.a.2.D, IP 0967-I001.V.A.1.d)

e. The NO_X emissions shall not exceed 0.058 g/bhp-hr for each of the Jenbacher J624 engines. (§2103.12.a.2.D, 40 CFR §60.4233(e) , IP 0967-I001.V.A.1.e)

f. Particulate matter emissions shall not exceed 0.012 lb/MMBtu. (§2103.12.a.2.D, IP 0967-I001.V.A.1.f)

g. The permittee shall operate and maintain each natural gas–fired engine with their oxidation catalysts and SCRs such that they maintain the following emissions standards over the entire life of the engine. Meeting these emission standards demonstrates compliance with the limitations of 40 CFR Part 60 Subpart JJJJ Table 1. (40 CFR §60.4233(e), 40 CFR §60.4234, §2103.12.a.2.D, IP 0967-I001.V.A.1.g)

1) NOx ≤ 0.058 g/HP-hr;
2) CO ≤ 0.079 g/HP-hr; and
3) VOC ≤ 0.021 g/HP-hr;

h. Each engine shall have a non-resettable hour meter. (§2103.12.a.2.D, IP 0967-I001.V.A.1.h)

i. Visible emissions shall not equal or exceed: (§2103.12.a.2.D, §2104.01.a, IP 0967-I001.V.A.1.i)

1) An opacity of 10% for a period or periods aggregating more than three (3) minutes in any 60-minute period; or

2) An opacity of 30% at any time.

j. Emissions from Engines G-101, G-102, G-103, G-104 and G-105 shall not exceed the limitations in Table V-A-1 below. (§2103.12.a.2.D, §2104.03.a, IP 0967-I001.V.A.1.j)

TABLE V-A-1: Emission Units G-101, G-102, G-103, G-104 and G-105 Emission Limitations

POLLUTANT	HOURLY EMISSION LIMIT SINGLE GENERATOR (lb/hr)	ANNUAL EMISSION LIMIT SINGLE GENERATOR (tons/yr)[1]	ANNUAL EMISSION LIMIT COMBINED GENERATORS (tons/year)[1]
$PM^{2,3}$	0.40	1.75	8.77
PM_{10}^{23}	0.40	1.75	8.77
$PM_{2.5}$	0.40	1.75	8.77
SO_X	0.02	0.09	0.43
NO_X	0.77	3.37	16.87
CO	1.05	4.59	22.97
VOCs	0.28	1.22	6.11
HCHO	0.12	0.52	2.62

[1] A year is defined as any 12 consecutive months
[2] All particulate is considered $PM_{2.5}$. $PM_{2.5}$ is total particulate
[3] PM, PM_{10} and $PM_{2.5}$ emissions include both filterable and condensable particulate

2. Testing Requirements:

a. Emissions testing shall be performed in accordance with the Site Level Condition IV.13 above and §2108.02 for ("Emissions Testing Requirements"). (§2103.12.h, §2108.02, IP 0967-I001.V.A.2.a)

b. Emission testing shall be performed at least once every 8,760 hours or three (3) years, whichever comes first. (40 CFR §60.4243(a)(2)(iii), §2103.12.h.1, §2108.02, IP 0967-I001.V.A.2.b)

c. The permittee shall test each engine for the following emissions: (40 CFR Part 60 Appendix A, 40 CFR §60.4244, 40 CFR Part 60 Subpart JJJJ Table 2, §2107.02, §2107.03, §2107.04, §2107.05, §2108.02, IP 0967-I001.V.A.2.c)

1) NO_X: (Methods, 7E or 40 CFR 63 Method 320);
2) CO: (Methods 10 or 40 CFR 63 Method 320);
3) VOCs: (Method 25A and 18 or 40 CFR 63 Method 320); and
4) Formaldehyde: (Method 1, 2, 3, 4, 320).

d. The permittee shall conduct each performance test according to the following conditions: (40 CFR §60.4244(a), §60.4244(b), §60.4244(c), §2108.02, IP 0967-I001.V.A.2.d)

1) Each test must be conducted within 10% of 100% peak (or the highest achievable) load;
2) According to the requirements of 40 CFR §60.8;

3) Under the specific conditions specified in Table 2 of 40 CFR Part 60 Subpart JJJJ;
4) Not during periods of startup, shutdown or malfunction;
5) Each performance test shall consist of three (3) separate test runs; and
6) Each test run shall last at least an hour.

e. The permittee shall determine compliance with: (40 CFR §60.4244, §2108.02, IP 0967-I001.V.A.2.e)

1) NO_X mass per unit output emission limitation using the following equation: (§60.4244(d))

$$\text{ER} = \frac{C_d \times (1.912 \times 10^{-3}) \times Q \times T}{\text{HP} - \text{hr}}$$

Where:
ER = Emission rate of NO_X in g/HP-hr.
C_d = Measured NO_X concentration in parts per million by volume (ppmv).
1.912 × 10−3 = Conversion constant for ppm NO_X to grams per standard cubic meter at 20 degrees Celsius.
Q = Stack gas volumetric flow rate, in standard cubic meter per hour, dry basis.
T = Time of test run, in hours.
HP-hr = Brake work of the engine, horsepower-hour (HP-hr)

2) CO mass per unit output emission limitation using the following equation: (§60.4244(e))

$$\text{ER} = \frac{C_d \times (1.164 \times 10^{-3}) \times Q \times T}{\text{HP} - \text{hr}}$$

Where:
ER = Emission rate of CO in g/HP-hr.
C_d = Measured CO concentration in parts per million by volume (ppmv).
1.164 × 10−3 = Conversion constant for ppm CO to grams per standard cubic meter at 20 degrees Celsius.
Q = Stack gas volumetric flow rate, in standard cubic meter per hour, dry basis.
T = Time of test run, in hours.
HP-hr = Brake work of the engine, horsepower-hour (HP-hr)

3) VOC mass per unit output emission limitation using the following equation: (§60.4244(f))

$$\text{ER} = \frac{C_d \times (1.833 \times 10^{-3}) \times Q \times T}{\text{HP} - \text{hr}}$$

Where:
ER = Emission rate of VOC in g/HP-hr.
C_d = Measured VOC concentration in parts per million by volume (ppmv).
1.833 × 10−3 = Conversion constant for ppm NOX to grams per standard cubic meter at 20 degrees Celsius.
Q = Stack gas volumetric flow rate, in standard cubic meter per hour, dry basis.
T = Time of test run, in hours.
HP-hr = Brake work of the engine, horsepower-hour (HP-hr)

f. All stack test report(s) shall be submitted to the Department within 60 days after the completion of the stack testing. (40 CFR §60.4245(d), §2108.02, IP 0967-I001.V.A.2.f)

g. The Department reserves the right to require emissions testing sufficient to assure compliance with the terms and conditions of this permit. Such testing shall be performed in accordance with Article XXI §2108.02. (§2103.12.h.1, §2108.02, IP 0967-I001.V.A.2.g)

3. Monitoring Requirements:

a. The permittee shall monitor the following for each of the natural gas fired engines on a monthly basis: (§2103.12.i, IP 0967-I001.V.A.3.a)

1) Fuel consumption; and
2) Operating hours.

b. The permittee shall conduct a weekly facility-wide inspection during daylight hours while the sources are in operation. The inspection shall include: (§2103.12.i, IP 0967-I001.V.A.3.b)

1) Observation for visible stack emissions;
2) Determination of malodors at the property line; and
3) Any equipment malfunctions.

c. The permittee shall continuously monitor: (§2103.12.i, IP 0967-I001.V.A.3.c)

1) The inlet temperature of each oxidation catalyst and SCR; and
2) The differential pressure across each oxidation catalyst and SCR.

4. Record Keeping Requirements:

a. The permittee shall record the following for each of the natural gas fired engines on a monthly basis: (§2103.12.j, IP 0967-I001.V.A.4.a)

1) Fuel consumption; and
2) Operating hours.

b. The permittee shall keep a record of the following: (40 CFR §60.4245, §2103.12.j, IP 0967-I001.V.A.4.b)

1) A description of each time maintenance was done at the facility;
2) Each time maintenance was done on an engine; and
3) Documentation that each engine meets the emission standards.

c. The permittee shall maintain a log of the inspections required by Condition V.A.3.b above. (§2103.12.j, IP 0967-I001.V.A.4.c)

d. The permittee shall record: (§2103.12.j, IP 0967-I001.V.A.4.d)

1) The inlet temperature of each oxidation catalyst; and
2) The differential pressure across each oxidation catalyst.

e. The results of inspections, episodes of non-compliance and corrective actions taken shall be recorded upon occurrence. (§2103.12.j, IP 0967-I001.V.A.4.e)

f. The permittee shall retain records of all required monitoring data and support information for at least five (5) years. (§2103.12.j, IP 0967-I001.V.A.4.f)

5. Reporting Requirements:

a. The permittee shall submit semiannual reports to the Department in accordance with General Condition III.15 above. (§2103.12.k, IP 0967-I001.V.A.5.a)

b. The permittee shall report: (§2103.12.k, 40 CFR §60.4245(a)(2) , IP 0967-I001.V.A.5.b)

1) The inlet temperature of each oxidation catalyst;
2) The differential pressure across each oxidation catalyst.
3) Monthly fuel usage;
4) Monthly hours of operation;
5) Maintenance conducted on the generator engine; and
6) Instances of non-compliance.

c. Reporting instances of non-compliance does not relieve the permittee of the requirement to report breakdowns in accordance with Site Level Condition IV.8 above. (§2103.12.k, IP 0967-I001.V.A.5.c)

6. Work Practice Standard:

a. Generators G-101 through G-105 shall be: (§2103.12.a.2.D, IP 0967-I001.V.A.6.a)

1) Operated in such a manner as not to cause air pollution that exceeds the permitted limits;
2) Operated and maintained in a manner consistent with good operating and maintenance practices; and
3) Operated and maintained in accordance with the manufacturer's specifications and the applicable terms and conditions of this permit.

VI. MISCELLANEOUS

A. Process T-201: Used Lube Oil Tank

Process Description: Used Lube Oil Tank
Facility ID: T-201
Capacity: 2,600 gal
Raw Materials: Used Lube Oil
Control Device(s): None

1. Restrictions:

a. The used lube oil tank shall have a submerged fill pipe. (§2103.12.a.2.D, IP 0967-I001.VI.B.1.a)

b. The used lube oil tank shall have all openings to atmosphere covered when not in use. (§2103.12.a.2.D, IP 0967-I001.VI.B.1.b)

2. Testing Requirements:

The Department reserves the right to require emissions testing sufficient to assure compliance with the terms and conditions of this permit. Such testing shall be performed in accordance with Article XXI §2108.02. (§2103.12.h.1, §2108.02, IP 0967-I001.VI.B.2)

3. Monitoring Requirements:

The permittee shall monitor the used lube oil tank throughput. (§2103.12.i, IP 0967-I001.VI.B.3)

4. Record Keeping Requirements:

a. The permittee shall record the throughput of the used lube oil on a monthly basis. (§2103.12.j, IP 0967-I001.VI.B.4.a)

b. The results of inspections, episodes of non-compliance and corrective actions taken shall be recorded upon occurrence. (§2103.12.j, IP 0967-I001.VI.B.4.b)

5. Reporting Requirements:

a. The permittee shall submit semiannual monitoring reports (including instances of noncompliance) to the department in accordance with General Condition III.15 above. (§2103.12.k, IP 0967-I001.VI.B.5.a)

b. Monthly throughput of the used lube oil tank shall be reported to the Department on a semi-annual basis in accordance with General Condition III.15 above. (§2103.12.k, IP 0967-I001.VI.B.5.b)

c. Reporting instances of non-compliance semiannually, does not relieve the permittee of the requirement to report breakdowns in accordance with Condition IV.8 above, if appropriate. (§2103.12.k, IP 0967-I001.VI.B.5.c)

B. Process T-202: New Glycol Tank

Process Description: New Glycol Tank
Facility ID: T-202
Capacity: 1,000 gal
Raw Materials: New Glycol
Control Device(s): None

1. Restrictions:

a. The new glycol tank shall have a submerged fill pipe. (§2103.12.a.2.D, IP 0967-I001.VI.C.1.a)

b. The new glycol tank shall have all openings to atmosphere covered when not in use. (§2103.12.a.2.D, IP 0967-I001.VI.C.1.b)

2. Testing Requirements:

The Department reserves the right to require emissions testing sufficient to assure compliance with the terms and conditions of this permit. Such testing shall be performed in accordance with Article XXI §2108.02. (§2103.12.h.1, §2108.02, IP 0967-I001.VI.C.2)

3. Monitoring Requirements:

The permittee shall monitor the new glycol tank throughput. (§2103.12.i, IP 0967-I001.VI.C.3)

4. Record Keeping Requirements:

a. The permittee shall record the throughput of the new glycol on a monthly basis. (§2103.12.j, IP 0967-I001.VI.C.4.a)

b. The results of inspections, episodes of non-compliance and corrective actions taken shall be recorded upon occurrence. (§2103.12.j, IP 0967-I001.VI.C.4.b)

5. Reporting Requirements:

a. The permittee shall submit semiannual monitoring reports (including instances of noncompliance) to the department in accordance with General Condition III.15 above. (§2103.12.k, IP 0967-I001.VI.C.5.a)

b. Monthly throughput of the new glycol tank shall be reported to the Department on a semi-annual basis in accordance with General Condition III.15 above. (§2103.12.k, IP 0967-I001.VI.C.5.b)

c. Reporting instances of non-compliance semiannually, does not relieve the permittee of the requirement to report breakdowns in accordance with Condition IV.8 above, if appropriate. (§2103.12.k, IP 0967-I001.VI.C.5.c)

C. Process T-203: Used Glycol Tank

Process Description: Used Glycol Tank
Facility ID: T-203
Capacity: 1,000 gal
Raw Materials: Used Glycol
Control Device(s): None

1. Restrictions:

a. The used glycol tank shall have a submerged fill pipe. (§2103.12.a.2.D, IP 0967-I001.VI.D.1.a)

b. The used glycol tank shall have all openings to atmosphere covered when not in use. (§2103.12.a.2.D, IP 0967-I001.VI.D.1.b)

2. Testing Requirements:

The Department reserves the right to require emissions testing sufficient to assure compliance with the terms and conditions of this permit. Such testing shall be performed in accordance with Article XXI §2108.02. (§2103.12.h.1, §2108.02, IP 0967-I001.VI.D.2)

3. Monitoring Requirements:

The permittee shall monitor the used glycol tank throughput. (§2103.12.i, IP 0967-I001.VI.D.3)

4. Record Keeping Requirements:

a. The permittee shall record the throughput of the used glycol on a monthly basis. (§2103.12.j, IP 0967-I001.VI.D.4.a)

b. The results of inspections, episodes of non-compliance and corrective actions taken shall be recorded upon occurrence. (§2103.12.j, IP 0967-I001.VI.D.4.b)

5. Reporting Requirements:

a. The permittee shall submit semiannual monitoring reports (including instances of noncompliance) to the department in accordance with General Condition III.15 above. (§2103.12.k, IP 0967-I001.VI.D.5.a)

b. Monthly throughput of the used glycol tank shall be reported to the Department on a semi-annual basis in accordance with General Condition III.15 above. (§2103.12.k, IP 0967-I001.VI.D.5.b)

c. Reporting instances of non-compliance semiannually, does not relieve the permittee of the requirement to report breakdowns in accordance with Condition IV.8 above, if appropriate. (§2103.12.k, IP 0967-I001.VI.D.5.c)

D. Process T-204: Urea Tank

Process Description: Urea Tank
Facility ID: T-204
Capacity: 2,200 gal
Raw Materials: Urea
Control Device(s): None

1. Restrictions:

a. The urea tank shall have a submerged fill pipe. (§2103.12.a.2.D, IP 0967-I001.VI.E.1.a)

b. The urea tank shall have all openings to atmosphere covered when not in use. (§2103.12.a.2.D, IP 0967-I001.VI.E.1.b)

2. Testing Requirements:

The Department reserves the right to require emissions testing sufficient to assure compliance with the terms and conditions of this permit. Such testing shall be performed in accordance with Article XXI §2108.02. (§2103.12.h.1, §2108.02, IP 0967-I001.VI.E.2)

3. Monitoring Requirements:

The permittee shall monitor the urea tank throughput. (§2103.12.i, IP 0967-I001.VI.E.3)

4. Record Keeping Requirements:

a. The permittee shall record the throughput of the urea on a monthly basis. (§2103.12.j, IP 0967-I001.VI.E.4.a)

b. The results of inspections, episodes of non-compliance and corrective actions taken shall be recorded upon occurrence. (§2103.12.j, IP 0967-I001.VI.E.4.b)

5. Reporting Requirements:

a. The permittee shall submit semiannual monitoring reports (including instances of noncompliance) to the department in accordance with General Condition III.15 above. (§2103.12.k, IP 0967-I001.VI.E.5.a)

b. Monthly throughput of the urea tank shall be reported to the Department on a semi-annual basis in accordance with General Condition III.15 above. (§2103.12.k, IP 0967-I001.VI.E.5.b)

c. Reporting instances of non-compliance semiannually, does not relieve the permittee of the requirement to report breakdowns in accordance with Condition IV.8 above, if appropriate. (§2103.12.k, IP 0967-I001.VI.E.5.c)

VII. ALTERNATIVE OPERATING SCENARIOS

There are no alternative operating scenarios for this Installation

VIII. EMISSIONS LIMITATIONS SUMMARY

The annual emission limitations for the Peoples/IMG – Pittsburgh International Airport facility are summarized in the following table:

TABLE VIII-1: Emission Limitations Summary

POLLUTANT	ANNUAL EMISSION LIMIT (tons/year)*
PM	8.77
PM_{10}	8.77
$PM_{2.5}$	8.77
SO_X	0.43
NO_X	16.87
CO	22.97
VOCs	6.11
HCHO	2.62

* A year is defined as any consecutive 12-month period.

APPENDIX E

PA SHPO Section 106 Letter

Pennsylvania State Historic Preservation Office
PENNSYLVANIA HISTORICAL AND MUSEUM COMMISSION

June 28, 2023

Nadia Johnson
Rhea Engineers and Consultants, Inc.
333 Rouser Road
Suite 301
Moon Township PA 151080000

RE: ER Project # 2023PR03076.001, Pittsburgh International Airport Solar PV Array Phase 2, Federal Aviation Administration, Findlay Township, Allegheny County

Dear Nadia Johnson:

Thank you for submitting information concerning the above referenced project. The Pennsylvania State Historic Preservation Office (PA SHPO) reviews projects in accordance with state and federal laws. Section 106 of the National Historic Preservation Act of 1966, and the implementing regulations (36 CFR Part 800) of the Advisory Council on Historic Preservation, is the primary federal legislation. The Environmental Rights amendment, Article 1, Section 27 of the Pennsylvania Constitution and the Pennsylvania History Code, 37 Pa. Cons. Stat. Section 500 et seq. (1988) is the primary state legislation. These laws include consideration of the project's potential effects on both historic and archaeological resources.

Above Ground Resources
No Above Ground Concerns - Environmental Review - No Historic Properties - Above Ground

Based on the information received and available in our files, it is our opinion that there are no above ground historic properties (resources listed in or eligible for listing in the National Register) present in the project area of potential effect. Therefore, no above ground historic properties will be affected by the proposed project. Should the scope of the project change and/or new information be brought to your attention regarding historic properties located within the project area of potential effect, please reinitiate consultation with our office using PA-SHARE.

For questions concerning above ground resources, please contact Cheryl Nagle at chnagle@pa.gov.

Archaeological Resources
No Archaeological Concerns - Environmental Review - No Effect - Archaeological

Based on the information received and available in our files, in our opinion, the proposed project should have No Effect on archaeological resources. Our analysis indicates that archaeological resources are potentially located in this project area. Should the scope of

the project be amended to include additional ground-disturbing activity and/or should you be made aware of historic property concerns, you will need to reinitiate consultation with our office using PA-SHARE.

For questions concerning archaeological resources, please contact Kristen Walczesky at kwalczesky@pa.gov.

Sincerely,

Emma Diehl
Environmental Review Division Manager

APPENDIX F

EJScreen Reports

EJScreen Report (Version 2.11)

EJScreen ACS Summary Report

EJScreen Census 2010 Summary Report

EJScreen Report (Version 2.11)

EJScreen Report (Version 2.11)

the User Specified Area, PENNSYLVANIA, EPA Region 3

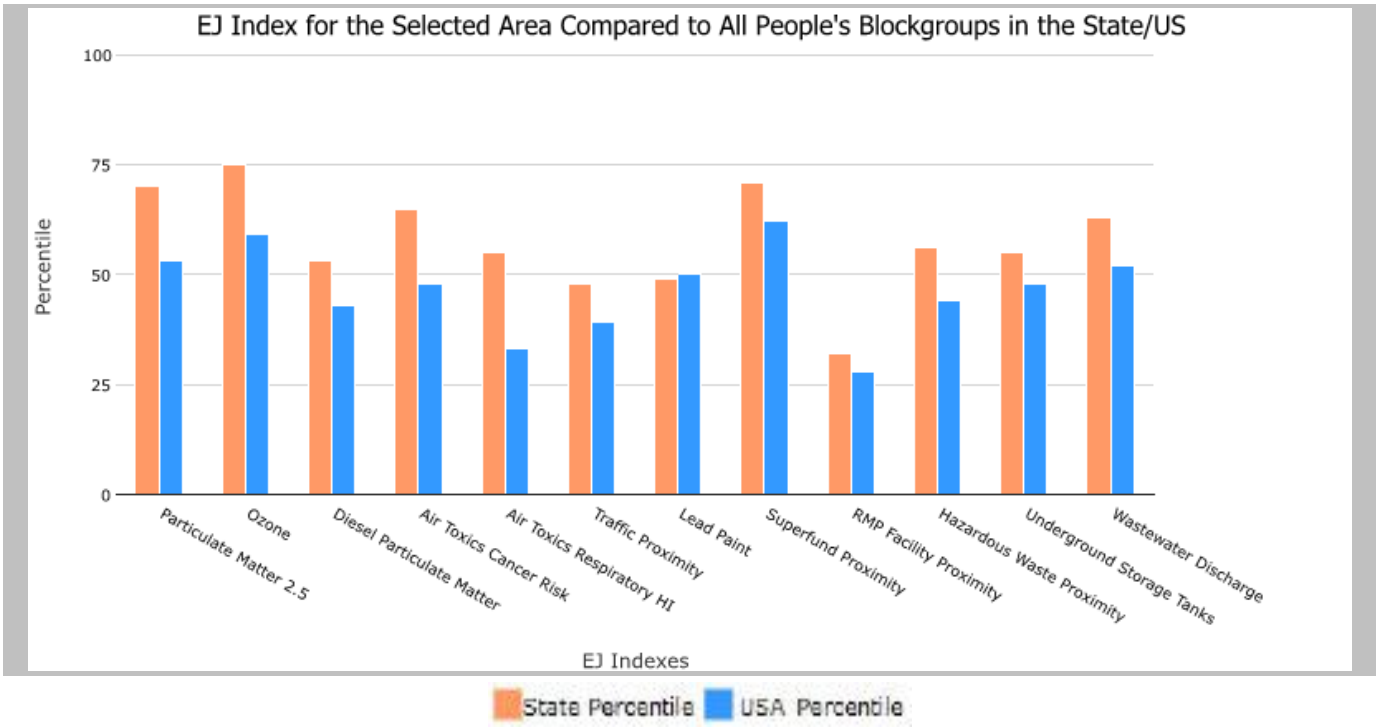
Approximate Population: 32,139

Input Area (sq. miles): 42.92

Pittsburgh International Airport

Selected Variables	State Percentile	USA Percentile
Environmental Justice Indexes		
Particulate Matter 2.5 EJ index	70	53
Ozone EJ index	75	59
Diesel Particulate Matter EJ index*	53	43
Air Toxics Cancer Risk EJ index*	65	48
Air Toxics Respiratory HI EJ index*	55	33
Traffic Proximity EJ index	48	39
Lead Paint EJ index	49	50
Superfund Proximity EJ index	71	62
RMP Facility Proximity EJ index	32	28
Hazardous Waste Proximity EJ index	56	44
Underground Storage Tanks EJ index	55	48
Wastewater Discharge EJ index	63	52

EJ Indexes - The EJ indexes help users screen for potential EJ concerns. To do this, the EJ index combines data on low income and people of color populations with a single environmental indicator.



*Diesel particular matter, air toxics cancer risk, and air toxics respiratory hazard index are from the EPA's Air Toxics Data Update, which is the Agency's ongoing, comprehensive evaluation of air toxics in the United States. This effort aims to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that the air toxics data presented here provide broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. Cancer risks and hazard indices from the Air Toxics Data Update are reported to one significant figure and any additional significant figures here are due to rounding. More information on the Air Toxics Data Update can be found at: https://www.epa.gov/haps/air-toxics-data-update.

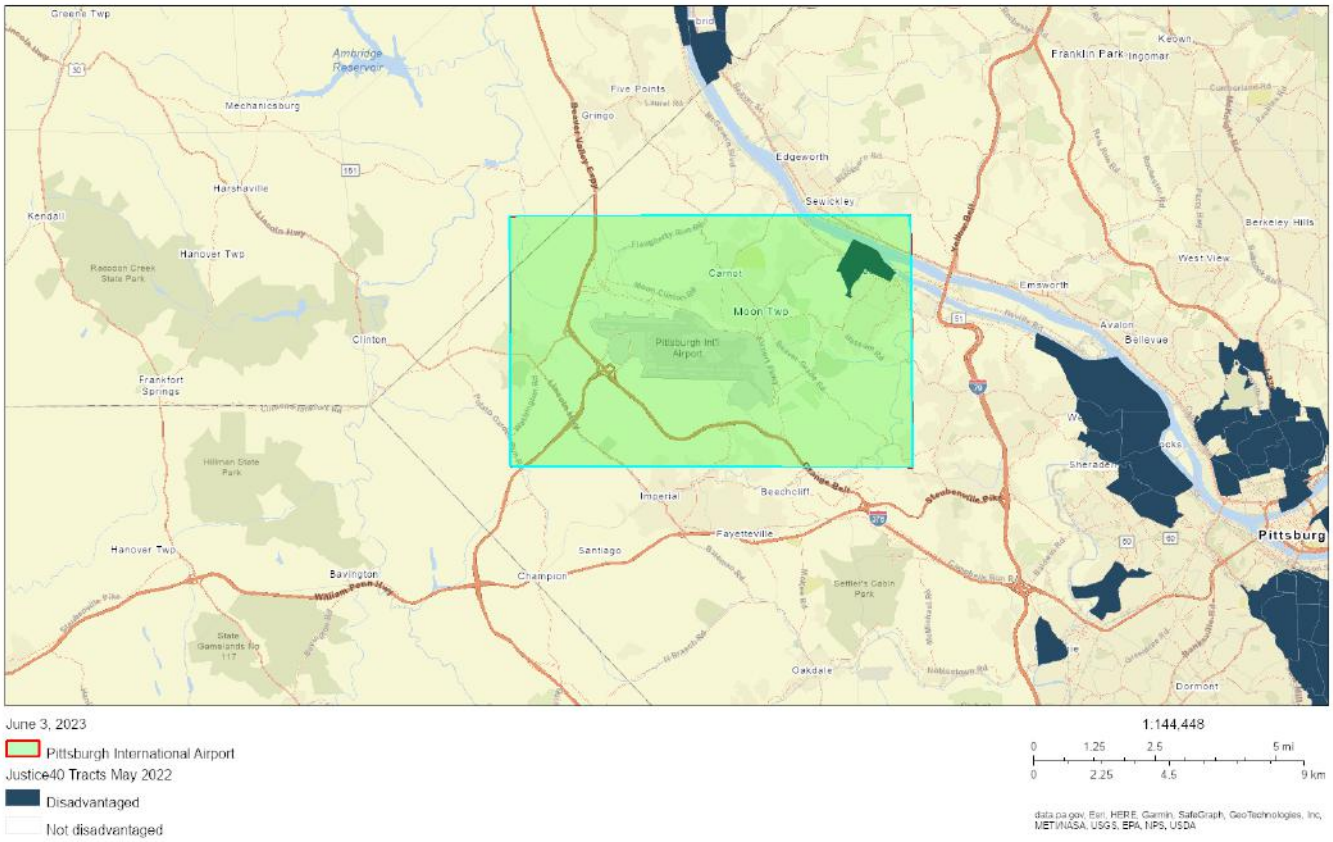
EJScreen Report (Version 2.11)

the User Specified Area, PENNSYLVANIA, EPA Region 3

Approximate Population: 32,139

Input Area (sq. miles): 42.92

Pittsburgh International Airport



Sites reporting to EPA	
Superfund NPL	1
Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDF)	1

EJScreen Report (Version 2.11)

the User Specified Area, PENNSYLVANIA, EPA Region 3

Approximate Population: 32,139

Input Area (sq. miles): 42.92

Pittsburgh International Airport

Selected Variables	Value	State Avg.	%ile in State	USA Avg.	%ile in USA
Pollution and Sources					
Particulate Matter 2.5 (µg/m^3)	9.29	8.7	80	8.67	71
Ozone (ppb)	45.3	42.1	98	42.5	78
Diesel Particulate Matter* (µg/m^3)	0.226	0.27	41	0.294	<50th
Air Toxics Cancer Risk* (lifetime risk per million)	39	31	90	28	95-100th
Air Toxics Respiratory HI*	0.32	0.32	71	0.36	50-60th
Traffic Proximity (daily traffic count/distance to road)	230	660	45	760	49
Lead Paint (% Pre-1960 Housing)	0.34	0.47	35	0.27	61
Superfund Proximity (site count/km distance)	0.58	0.18	93	0.13	95
RMP Facility Proximity (facility count/km distance)	0.15	0.82	21	0.77	27
Hazardous Waste Proximity (facility count/km distance)	0.81	1.5	53	2.2	52
Underground Storage Tanks (count/km^2)	2.2	3.6	57	3.9	61
Wastewater Discharge (toxicity-weighted concentration/m distance)	0.28	77	86	12	89
Socioeconomic Indicators					
Demographic Index	19%	26%	49	35%	30
Supplemental Demographic Index	10%	13%	36	15%	33
People of Color	19%	24%	62	40%	37
Low Income	16%	28%	30	30%	28
Unemployment Rate	5%	5%	56	5%	56
Limited English Speaking Households	2%	2%	74	5%	62
Less Than High School Education	4%	9%	31	12%	29
Under Age 5	5%	5%	53	6%	49
Over Age 64	19%	18%	55	16%	63
Low Life Expectancy	19%	20%	44	20%	45

EJScreen Report (Version 2.11)

the User Specified Area, PENNSYLVANIA, EPA Region 3

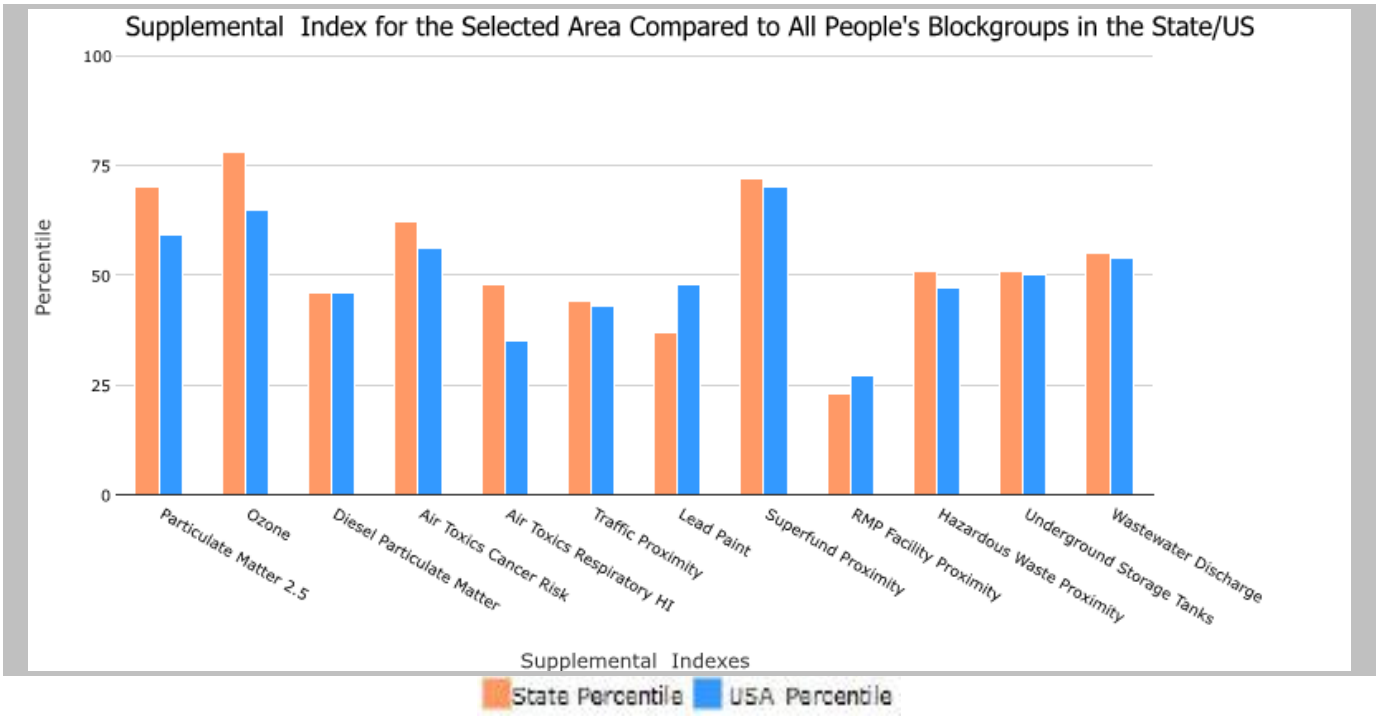
Approximate Population: 32,139

Input Area (sq. miles): 42.92

Pittsburgh International Airport

Selected Variables	State Percentile	USA Percentile
Supplemental Indexes		
Particulate Matter 2.5 Supplemental Index	70	59
Ozone Supplemental Index	78	65
Diesel Particulate Matter Supplemental Index*	46	46
Air Toxics Cancer Risk Supplemental Index*	62	56
Air Toxics Respiratory HI Supplemental Index*	48	35
Traffic Proximity Supplemental Index	44	43
Lead Paint Supplemental Index	37	48
Superfund Proximity Supplemental Index	72	70
RMP Facility Proximity Supplemental Index	23	27
Hazardous Waste Proximity Supplemental Index	51	47
Underground Storage Tanks Supplemental Index	51	50
Wastewater Discharge Supplemental Index	55	54

Supplemental Indexes - The supplemental indexes offer a different perspective on community-level vulnerability. They combine data on low-income, limited English speaking, less than high school education, unemployed, and low life expectancy populations with a single environmental indicator.



This report shows the values for environmental and demographic indicators, EJScreen indexes, and supplemental indexes. It shows environmental and demographic raw data (e.g., the estimated concentration of ozone in the air), and also shows what percentile each raw data value represents. These percentiles provide perspective on how the selected block group or buffer area compares to the entire state, EPA region, or nation. For example, if a given location is at the 95th percentile nationwide, this means that only 5 percent of the US population has a higher block group value than the average person in the location being analyzed. The years for which the data are available, and the methods used, vary across these indicators. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJScreen documentation for discussion of these issues before using reports. For additional information, see: www.epa.gov/environmentaljustice.

EJScreen ACS Summary Report

EJSCREEN ACS Summary Report

Location: User-specified polygonal location
Ring (buffer): 0-miles radius
Description: Pittsburgh International Airport

Summary of ACS Estimates	2016 - 2020
Population	32,139
Population Density (per sq. mile)	791
People of Color Population	6,033
% People of Color Population	19%
Households	13,510
Housing Units	14,850
Housing Units Built Before 1950	3,232
Per Capita Income	43,941
Land Area (sq. miles) (Source: SF1)	40.65
% Land Area	99%
Water Area (sq. miles) (Source: SF1)	0.52
% Water Area	1%

	2016 - 2020 ACS Estimates	Percent	MOE (±)
Population by Race			
Total	32,139	100%	1,260
Population Reporting One Race	31,111	97%	3,141
White	26,424	82%	1,263
Black	2,109	7%	446
American Indian	10	0%	17
Asian	1,553	5%	295
Pacific Islander	0	0%	11
Some Other Race	1,015	3%	1,109
Population Reporting Two or More Races	1,029	3%	178
Total Hispanic Population	476	1%	95
Total Non-Hispanic Population	31,663		
White Alone	26,106	81%	1,263
Black Alone	2,077	6%	440
American Indian Alone	9	0%	17
Non-Hispanic Asian Alone	1,553	5%	295
Pacific Islander Alone	0	0%	11
Other Race Alone	931	3%	1,109
Two or More Races Alone	987	3%	178
Population by Sex			
Male	15,804	49%	342
Female	16,336	51%	1,084
Population by Age			
Age 0-4	1,575	5%	151
Age 0-17	6,158	19%	285
Age 18+	25,981	81%	1,096
Age 65+	5,980	19%	1,082

Data Note: Detail may not sum to totals due to rounding. Hispanic population can be of any race.
N/A means not available. **Source:** U.S. Census Bureau, American Community Survey (ACS) 2016 - 2020 .

EJSCREEN ACS Summary Report

Location: User-specified polygonal location
Ring (buffer): 0-miles radius
Description: Pittsburgh International Airport

	2016 - 2020 ACS Estimates	Percent	MOE (±)
Population 25+ by Educational Attainment			
Total	22,144	100%	1,091
Less than 9th Grade	483	2%	258
9th - 12th Grade, No Diploma	396	2%	76
High School Graduate	4,727	21%	178
Some College, No Degree	3,028	14%	208
Associate Degree	2,176	10%	132
Bachelor's Degree or more	11,333	51%	1,081
Population Age 5+ Years by Ability to Speak English			
Total	30,565	100%	1,258
Speak only English	27,220	89%	1,251
Non-English at Home[1+2+3+4]	3,344	11%	1,077
[1]Speak English "very well"	1,778	6%	177
[2]Speak English "well"	1,328	4%	1,077
[3]Speak English "not well"	177	1%	56
[4]Speak English "not at all"	62	0%	83
[3+4]Speak English "less than well"	238	1%	83
[2+3+4]Speak English "less than very well"	1,567	5%	1,077
Linguistically Isolated Households*			
Total	226	100%	72
Speak Spanish	44	20%	37
Speak Other Indo-European Languages	41	18%	37
Speak Asian-Pacific Island Languages	42	19%	47
Speak Other Languages	98	43%	65
Households by Household Income			
Household Income Base	13,510	100%	1,059
< $15,000	666	5%	136
$15,000 - $25,000	908	7%	141
$25,000 - $50,000	2,491	18%	235
$50,000 - $75,000	2,847	21%	1,079
$75,000 +	6,598	49%	231
Occupied Housing Units by Tenure			
Total	13,510	100%	1,059
Owner Occupied	9,530	71%	1,060
Renter Occupied	3,980	29%	239
Employed Population Age 16+ Years			
Total	26,668	100%	1,238
In Labor Force	18,214	68%	1,071
Civilian Unemployed in Labor Force	825	3%	224
Not In Labor Force	8,454	32%	323

Data Note: Datail may not sum to totals due to rounding. Hispanic population can be of anyrace.
N/A means not available. **Source:** U.S. Census Bureau, American Community Survey (ACS)
*Households in which no one 14 and over speaks English "very well" or speaks English only.

EJSCREEN ACS Summary Report

Location: User-specified polygonal location
Ring (buffer): 0-miles radius
Description: Pittsburgh International Airport

	2016 - 2020 ACS Estimates	Percent	MOE (±)
Population by Language Spoken at Home*			
Total (persons age 5 and above)	30,175	100%	1,213
English	27,105	90%	1,243
Spanish	342	1%	99
French, Haitian, or Cajun	119	0%	124
German or other West Germanic	92	0%	37
Russian, Polish, or Other Slavic	80	0%	50
Other Indo-European	664	2%	150
Korean	35	0%	31
Chinese (including Mandarin, Cantonese)	176	1%	121
Vietnamese	51	0%	59
Tagalog (including Filipino)	13	0%	15
Other Asian and Pacific Island	356	1%	193
Arabic	288	1%	179
Other and Unspecified	853	3%	1,079
Total Non-English	3,070	10%	1,737

Data Note: Detail may not sum to totals due to rounding. Hispanic popultion can be of any race.
N/A meansnot available. **Source:** U.S. Census Bureau, American Community Survey (ACS) 2016 - 2020.
*Population by Language Spoken at Home is available at the census tract summary level and up.

EJScreen Census 2010 Summary Report

EJSCREEN Census 2010 Summary Report

Location: User-specified polygonal location
Ring (buffer): 0-miles radius
Description: Pittsburgh International Airport

Summary	Census 2010
Population	30,588
Population Density (per sq. mile)	743
People of Color Population	3,805
% People of Color Population	12%
Households	12,774
Housing Units	13,961
Land Area (sq. miles)	41.17
% Land Area	99%
Water Area (sq. miles)	0.51
% Water Area	1%

Population by Race	Number	Percent
Total	30,588	-------
Population Reporting One Race	29,965	98%
White	27,106	89%
Black	1,798	6%
American Indian	33	0%
Asian	794	3%
Pacific Islander	13	0%
Some Other Race	221	1%
Population Reporting Two or More Races	623	2%
Total Hispanic Population	569	2%
Total Non-Hispanic Population	30,019	98%
White Alone	26,783	88%
Black Alone	1,763	6%
American Indian Alone	30	0%
Non-Hispanic Asian Alone	788	3%
Pacific Islander Alone	13	0%
Other Race Alone	81	0%
Two or More Races Alone	561	2%

Population by Sex	Number	Percent
Male	15,102	49%
Female	15,486	51%

Population by Age	Number	Percent
Age 0-4	1,689	6%
Age 0-17	6,400	21%
Age 18+	24,188	79%
Age 65+	4,322	14%

Households by Tenure	Number	Percent
Total	12,774	
Owner Occupied	8,494	66%
Renter Occupied	4,280	34%

Data Note: Detail may not sum to totals due to rounding. Hispanic population can be of any race.
Source: U.S. Census Bureau, Census 2010 Summary File 1.

APPENDIX G

Microgrid Phase 2 Solar PV Solar Array Site – Field Summary Report (Wetlands)

USACE Opinion on Wetland and Standing Water Areas

Microgrid Phase 2 Solar PV Solar Array Site – Field Summary Report (Wetlands)

RHEA
ENGINEERS & CONSULTANTS, INC.

January 25, 2023
Project No. 2416
Via Email

Mr. Jamie Habberfield
Senior Manager, Business Development
IMG Energy Solutions
106 Isabella Street, Suite 600
Pittsburgh, PA 15212
jamie.habberfield@imgenergysolutions.com

Re: Phase 2 Solar PV Array Site – Field Summary Report
On-Call Planning and Environmental Services
Pittsburgh International Airport
Moon Township, Pennsylvania

Dear Mr. Habberfield:

Rhea Engineers & Consultants, Inc. (Rhea) has completed a wetland investigation in support of the Proposed Solar Photovoltaic (PV) Array Phase 2 Project located on the northeast portion of a capped and inactive landfill (henceforth referred to as "project site"), located south of the Pittsburgh International Airport (PIT) in Moon Township, PA (Figure 1). Selected photographs of general site conditions (Photos #1 through #9) at the time of the wetland investigation are provided in Attachment A.

SITE DESCRIPTION

The Phase 2 project site is roughly 11.6 acres in size, is located due south of PIT, and is bounded primarily by vacant, wooded land to the east and west. To the south, the project site is bounded by solar panels constructed during Phase 1 of this project (Photo #1). Interstate 376 / Airport Expressway is located immediately to the south and Harper Road generally follows the perimeter of the landfill to the west, north, and east until it reaches the ARFF Fire Training Facility, located to the east of the project site. A pile of concrete debris from airport construction projects sits adjacent to but not within the site on the west side (Photo #2). A man-made drainage swale encircles the entire landfill site (Photo #3). The swale surrounding the southern portion of the landfill is primarily lined with riprap, while the northern portion of the swale is primarily naturally vegetated. This investigation covers the northern half of the landfill bounded by the swale where the proposed installation of solar panels are to be located (Figure 1).

WETLAND INVESTIGATION

On April 1, 2020, Mr. Zachary Wicks, Professional Wetland Scientist (PWS), performed a wetland investigation of the entire PV Solar Array site prior to the construction of the Phase 1 portion of the site. As a result, one wetland area and twelve areas of concern (AOCs) related to significant standing water with potential to eventually develop into natural wetlands were identified (Figure 2). Soft rush, a common wetland plant known to grow in saturated soil or water, was present within each AOC. The AOCs ranged in size from approximately 167 square feet to 7,300 square feet (Figure 2). Though they were not defined as true wetlands, Rhea recommended that they be treated to encourage proper drainage before true wetlands were established on the landfill cap.

The observed wetland area identified by Rhea was located within the man-made drainage swale adjacent to the northeastern portion of the project site – the area to be developed during Phase 2 of construction (Figure 2). Rhea noted that because the wetland was outside of the proposed Solar PV Project location and within the drainage swale, impacts due to site development activities were unlikely. Because impacts were unlikely, a full delineation soil testing was not completed in the Phase 1 investigation.

For this project, Rhea was tasked with conducting a follow-up wetland investigation of the project site (Figure 1) using general guidelines outlined in the *US Army Corps of Engineers (USACE) Wetlands Delineation Manual* (Environmental Laboratory, 1987). USACE standards require that three criteria be met in order for an area to be classified as a jurisdictional wetland: the presence of hydric soils, the dominance of hydrophytic vegetation, and the evidence of wetland hydrology.

Prior to the field investigation, Rhea personnel reviewed available documentation in order to identify known wetland areas located at, or adjacent to, the project site. This search included a review of the National Wetland Inventory (NWI) database via the Wetland Mapper program, as well as a review of preliminary site development drawings, site topography, and field notes from Rhea's previous Phase 1 site investigation in April 2020. As a result of Rhea's preliminary data review, one potential wetland area was identified and was further reviewed in the field.

On January 5, 2023, Mr. Wicks, PWS, and Ms. Julia Biertempfel of Rhea conducted the follow-up investigation, which consisted of traversing the project site, performing a visual inspection of the site for indicators of wetland conditions, and reassessing areas previously identified as potential wetlands or AOCs during the

previous site visit (Figure 2). As a result of this investigation, the previously-identified wetland was still observed to be present and is further discussed below.

The previously identified wetland area observed by Rhea is approximately 596 square feet and is located within the man-made drainage swale in the northeastern portion of the project site (see Figure 1 and Attachment A - Photos #10 - 12). Ponded water was present and wetland vegetation, including cattails and various hydric sedges (Photo #12), dominated the area. This observed wetland is not inside the project construction area (Figure 1) and rests within the drainage swale. Because construction or vehicle movement is unlikely to occur outside the project within the drainage swale and because the wetland sits well outside the construction area, it is unlikely that impacts to this wetland will occur due to development activities. It should be noted that soil conditions were not tested within the wetland because the area is unlikely to be disturbed and will not be a concern. If any disturbance to this location is anticipated, a full wetland delineation of the observed wetland may be completed upon request.

As noted above, twelve AOCs pertaining to significant standing water within low-lying areas with potential to become natural wetlands were identified throughout the project site in the Phase 1 investigation (see Figure 2). Rhea's follow-up field investigation of the eight AOCs in the Phase 2 site acreage concluded that none of these previous AOCs have developed into wetlands since the 2020 investigation. Though portions of the project site had standing water at the time of the visit, heavy rainfall prior to the site visit may account for some of the standing water present (Photos #5 - #9). Topsoil, seed, and hay observed within many of these areas indicates that there had been an attempt to regrade, reseed, and improve drainage within the project site. Though various hydric sedges were present in portions of previous AOCs, wetland vegetation was not dominant in these areas (Photo #6).

Rhea is pleased to submit this Field Summary Report to IMG Energy Solutions. If you have any questions or concerns regarding our findings and/or the information contained herein, please do not hesitate to contact me at your earliest convenience at zach.wicks@rhea.us and/or 724-443-4111.

Respectfully submitted,
Rhea Engineers & Consultants, Inc.

Zachary Wicks, PWS
Project Manager/Scientist III

RHĒA

jeb/zdw

Attachments:
Figure 1 – Phase 2 Site Layout Map
Figure 2 – Phase 1 Site Findings
Attachment A – Site Photograph Log

FIGURES

Legend

Wetland
Project Boundary
Swale
Phase 2 Area

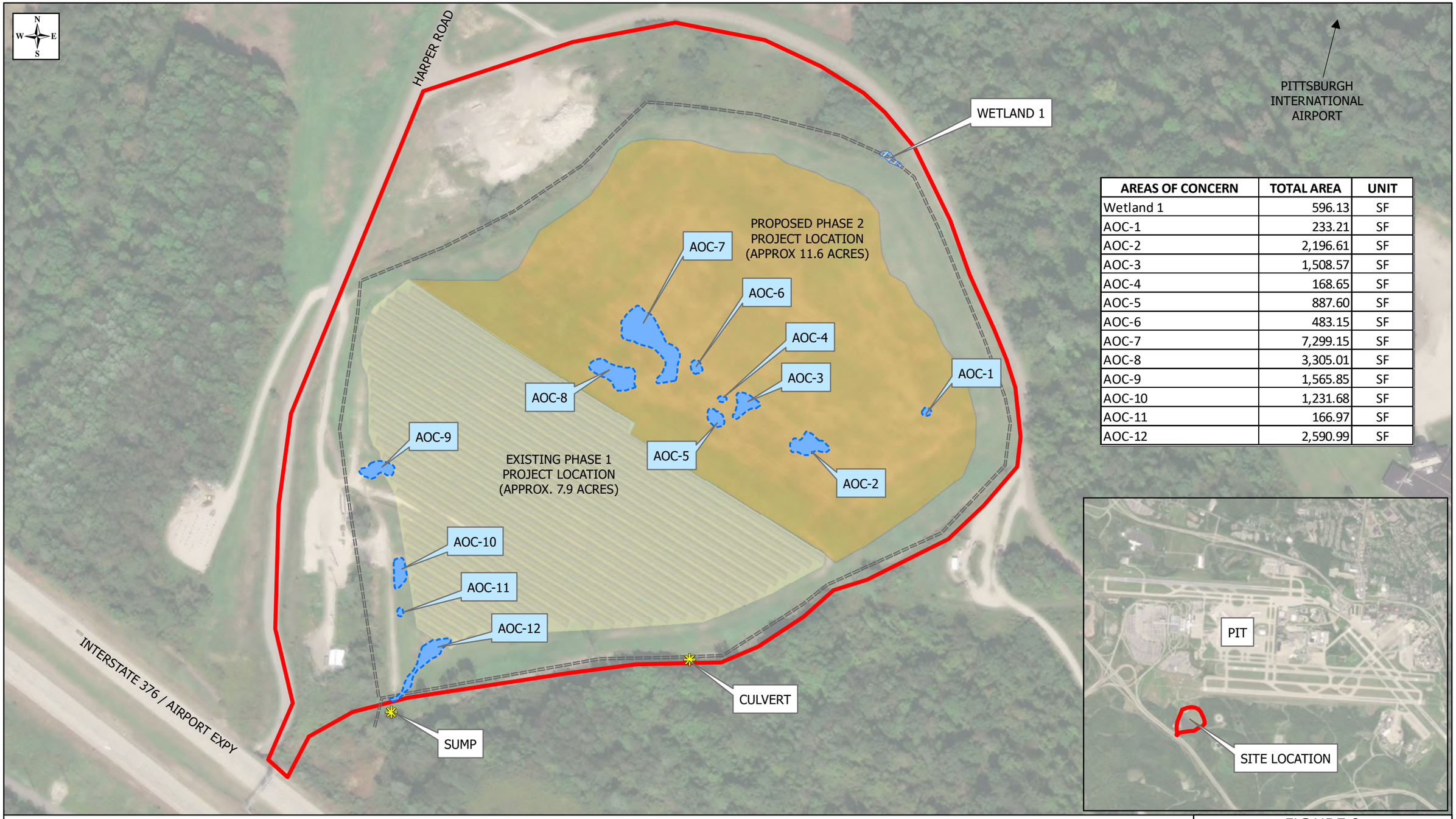
0 100 200 400 Feet

RHEA ENGINEERS & CONSULTANTS, Inc.

FIGURE 1

Phase 2 Site Layout Map
Phase 2 Solar PV Array
Pittsburgh International Airport

Drawn By	Checked By	Date	Project	Sheet No.
NEJ	JEB	02/17/2023	2416	1 of 2



AREAS OF CONCERN	TOTAL AREA	UNIT
Wetland 1	596.13	SF
AOC-1	233.21	SF
AOC-2	2,196.61	SF
AOC-3	1,508.57	SF
AOC-4	168.65	SF
AOC-5	887.60	SF
AOC-6	483.15	SF
AOC-7	7,299.15	SF
AOC-8	3,305.01	SF
AOC-9	1,565.85	SF
AOC-10	1,231.68	SF
AOC-11	166.97	SF
AOC-12	2,590.99	SF

Legend

- Standing Water
- Wetland
- Swale
- Project Boundary
- Proposed Phase 2 Area
- Existing Phase 1 Solar PV Facility

Notes:
AOC = Area of Concern
SF = Square Feet

0 100 200 400 Feet

RHEA ENGINEERS & CONSULTANTS, INC.

FIGURE 2

Phase 1 Site Findings
Phase 2 Solar PV Array
Pittsburgh International Airport

Drawn By	Checked By	Date	Project	Sheet No.
ETH	JEB	02/17/2023	2416	2 of 2

ATTACHMENT A

Site Photograph Log

ATTACHMENT A – SITE PHOTOGRAPH LOG

Photograph #1	Site Overview – view of solar panels on the southern boundary of the site, facing south

ATTACHMENT A – SITE PHOTOGRAPH LOG

Photograph #2	Site Overview – concrete debris adjacent to the project boundary on the west side, facing northwest

ATTACHMENT A – SITE PHOTOGRAPH LOG

Photograph #3	Drainage swale with pooled water, western edge of the site

ATTACHMENT A – SITE PHOTOGRAPH LOG

Photograph #4	Site Overview – northernmost point facing south

ATTACHMENT A – SITE PHOTOGRAPH LOG

Photograph #5	Site conditions – standing water pooled in depressions

Photograph #6	Site conditions - Standing water with sedges around a previous area of concern (AOC)

ATTACHMENT A – SITE PHOTOGRAPH LOG

Photograph #7	Site conditions - visible attempts to regrade and reseed a previous AOC

ATTACHMENT A – SITE PHOTOGRAPH LOG

Photograph #8	Site conditions – evidence of treating previous AOCs

ATTACHMENT A – SITE PHOTOGRAPH LOG

Photograph #9	Site conditions – evidence of treating previous AOCs

Photograph #10	Previously Identified Wetland 1: overview facing north

Photograph #11	Previously Identified Wetland 1: overview facing west

Photograph #12	Previously Identified Wetland 1: wetland vegetation including cattails

USACE Opinion on Wetland and Standing Water Areas

From: Vipperman, Abigail C (Abbey) CIV USARMY CELRP (USA)
To: Davis-Jenkins, Heather F (FAA)
Subject: RE: Wetland and Standing Water Areas
Date: Friday, March 24, 2023 3:31:29 PM

Thank you!

I agree with the delineation. No federal permit needed.

Have a nice weekend,

Abbey Vipperman
Regulatory Division
US Army Corps of Engineers – Pittsburgh District
Phone: (412) 525-9469

From: Davis-Jenkins, Heather F (FAA) <heather.f.davis-jenkins@faa.gov>
Sent: Friday, March 24, 2023 3:16 PM
To: Vipperman, Abigail C (Abbey) CIV USARMY CELRP (USA) <Abigail.C.Vipperman@usace.army.mil>
Subject: [Non-DoD Source] RE: Wetland and Standing Water Areas

Hi Abigail-

Attached are the photos from their report.

I needed them to resubmit it since the photo pages were showing up blank.

Apologies for the inconvenience.

Heather Davis-Jenkins, CFM
Environmental Protection Specialist

Harrisburg Airports District Office
3905 Hartzdale, Dr. Ste 508
Camp Hill, PA 17011
Heather.F.Davis-Jenkins@faa.gov
(717) 730-2835
(717) 730-2838 (fax)

From: Vipperman, Abigail C (Abbey) CIV USARMY CELRP (USA)
<Abigail.C.Vipperman@usace.army.mil>
Sent: Friday, March 24, 2023 3:00 PM
To: Davis-Jenkins, Heather F (FAA) <heather.f.davis-jenkins@faa.gov>
Subject: RE: Wetland and Standing Water Areas

Hello and happy Friday!

I see there is one wetland delineated onsite and then this statement: “This project does not qualify for an Army Corps of Engineers General permit because no impact to the observed wetland within the Proposed Project Area will take place.” If there are no stream or wetland impacts proposed and the aquatic resources are being avoided completely, you do not need a federal permit. I am not sure what the state requirements are, so please reach out to the PADEP on their permitting process.

I see there were also 12 AOCs (areas of concern) where wetlands may form, the report references photos of these sites. Could you send me those photos and the associated wetland delineation forms?

Thank you,

Abbey Vipperman
Regulatory Division
US Army Corps of Engineers – Pittsburgh District
Phone: (412) 525-9469

From: Davis-Jenkins, Heather F (FAA) <heather.f.davis-jenkins@faa.gov>
Sent: Friday, March 24, 2023 10:37 AM
To: Vipperman, Abigail C (Abbey) CIV USARMY CELRP (USA) <Abigail.C.Vipperman@usace.army.mil>
Subject: [Non-DoD Source] Wetland and Standing Water Areas

Hi Abigail-

Sorry for bothering you.

I have a question regarding wetland and standing water areas.

A consultant completed a report regarding an area that they want to install solar panels on.

They are claiming the wetland area identified is out of the project area and a non-issue.

They also identified standing water areas, but claim they are non-issues.

My question is, shouldn’t this be submitted to either your office of PA DEP’s office for concurrence?

Thanks in advance for any insight you can provide.

Take care and have a great weekend!

Heather Davis-Jenkins, CFM

Environmental Protection Specialist

Harrisburg Airports District Office
3905 Hartzdale, Dr. Ste 508
Camp Hill, PA 17011
Heather.F.Davis-Jenkins@faa.gov
(717) 730-2835
(717) 730-2838 (fax)

APPENDIX H

Phase 2 Section 163 Consultation

U.S. Department
of Transportation
**Federal Aviation
Administration**

Eastern Region Airports Division

1 Aviation Plaza
Jamaica, NY 11434-4809
(718) 553-3330 (office)

August 9, 2022

Chad A. Willis, A.A.E.
Director, Planning
Allegheny County Airport Authority
Pittsburgh International Airport
Landside Terminal, 4th Floor Mezz.
P.O. Box 12370
Pittsburgh, PA 15231-0370

Subject: Determination of Federal Aviation Administration (FAA) Approval Authority – Solar Array Phase 2, Pittsburgh International Airport (PIT), Pittsburgh, PA

Dear Mr. Willis:

This determination outlines FAA approval authority for the proposed development of the Solar Array Phase 2 at PIT. This is depicted on the enclosed Airport Layout Plan (ALP), Exhibit "A" Airport Property Map, and Solar Array Phase 2 Project Sketch.

Background

Federal law requires the FAA to determine if the agency has approval authority for certain airport projects. The FAA Reauthorization Act of 2018 (P.L. 115-254) was signed into law on October 5, 2018. In general, Section 163(a) of the Act focuses the FAA's approval authority on the following areas:

1. To ensure the safe and efficient operation of aircraft or safety of people and property on the ground related to aircraft operations;
2. To regulate land or a facility acquired or modified using federal funding;
3. To ensure an airport owner or operator receives not less than fair market value (FMV) in the context of a commercial transaction for the use, lease, encumbrance, transfer, or disposal of land, any facilities on such land, or any portion of such land or facilities;
4. To ensure that that airport owner or operator pays not more than FMV in the context of a commercial transaction for the acquisition of land or facilities on such land;
5. To enforce any terms contained in a Surplus Property Act instrument of transfer; and
6. To exercise any authority contained in 49 U.S.C. § 40117 on Passenger Facility Charges (PFC).

In addition, Section 163(c) preserves the statutory revenue use restrictions on the use of revenues generated by the use, lease, encumbrance, transfer, or disposal of the land, as set forth in 49 U.S.C. §§ 47107(b) and 47133.

The law limits FAA authority to directly or indirectly regulate an airport operator's transfer or disposal of certain types of airport land. Section 163(d) of the Act also limits FAA's review and approval authority for ALPs to those portions of ALPs, or ALP updates or revisions that:

1. Materially impact the safe and efficient operation of aircraft at, to, or from the airport;
2. Adversely affect the safety of people or property on the ground adjacent to the airport as a result of aircraft operations; or
3. Adversely affect the value of prior Federal investments to a significant extent.

Proposed Project

The project is development of a solar array (phase 2) facility which would be contiguous with PIT's current solar array facility, as depicted on the enclosed Solar Array Phase 2 project sketch. The project is located southwest of the Runway 10R threshold, well outside of the Runway Protection Zone (RPZ) and Airport Operations Area (AOA) fence.

The energy from the facility will be used off-airport property, with the airport receiving credits for generated energy. The proposed area is not needed to accommodate current or future aeronautical demand. You have indicated the project will be privately funded.

FAA Determination on the Airport Layout Plan

For the purpose of determining whether the proposed project requires FAA ALP approval, we have determined the proposed project would have no material impact on aircraft operations, at, to, or from the airport; would not affect the safety of people and property on the ground adjacent to the airport as a result of aircraft operations; and would not have an adverse effect on the value of prior Federal investments to a significant extent. Therefore, the FAA does not have the authority to approve or disapprove changes to the ALP for the proposed project.

FAA Authority to Regulate Land Use

The property where the project is located covers multiple airport parcels acquired with federal funds. The parcels are depicted on the enclosed Exhibit "A" and listed below:

Record Number	Airport Parcel	FAA Grant	Deed Recorded	Acreage
00247	440	ADAP 8-24-0081-03	05/20/70	0.852
00263	433	ADAP 8-24-0081-03	06/12/70	4.45
00296	442	ADAP 8-24-0081-03	08/14/70	1.2145
00345	441	ADAP 8-24-0081-03	10/20/71	0.463
00377	444	ADAP 8-24-0081-03	02/05/71	1.8
00386	439	ADAP 8-24-0081-03	02/25/71	0.9424
00387	449	ADAP 8-24-0081-03	02/25/71	2.2652
00388	448	ADAP 8-24-0081-03	02/25/71	3.1441
00429	443	ADAP 8-24-0081-03	07/15/71	1.7
00496	450	ADAP 8-24-0081-04	06/15/72	7.0

Section 163(b) establishes FAA's authority to regulate land or a facility acquired or modified using federal funding. The FAA considers the proposed solar array to be a non-aeronautical land use. FAA Order 5190.6 requires FAA approval for the sale, disposal, or modification of land acquired with federal funds. Therefore, FAA will require a release of obligations in order for these parcels to be used for a non-aeronautical purpose. A release request in accordance with FAA Order 5190.6, Chapter 22, is required for these parcels.

Project Funding Source(s)

The FAA has approval authority for any projects funded through the Airport Improvement Program (AIP), any other FAA-administered grant-in-aid program, and PFCs. In this case, neither FAA funding nor PFCs are anticipated for this project.

Applicability of the National Environmental Policy Act (NEPA)

The FAA's authority to approve a release of the sponsor's federal obligations for the subject parcel, and any other Federal approvals associated with the project (such as funding under the AIP or PFC programs), are federal actions subject to NEPA. Please contact Heather Davis-Jenkins, Environmental Specialist, Harrisburg Airports District Office (HAR-ADO) to coordinate the appropriate level of environmental review.

Sponsor Obligations Still In Effect

This determination only addresses FAA's approval authority for this project. It is not a determination that the project complies with the sponsor's federal grant assurances. This determination is based solely on the description of the project as currently conceived. If the location, height, or physical dimensions of the project as currently conceived materially change, you must seek a new Section 163 determination for the revised project. To the extent that the exact height of the facilities proposed in the project remain unknown at this time, this determination is predicated on the understanding that the project will not impact any approach or departure surface and/or procedure, or otherwise interfere with the functionality of navigational aids or Air Traffic Control facilities. Similarly, if the nature of the proposed use of the subject property were to change (e.g., aeronautical use to non-aeronautical use or vice versa, aircraft hangar to cargo facility or vice versa) the sponsor is also required to seek a new Section 163 determination. The sponsor must comply with all of its Federal grant obligations, including but not limited to Grant Assurance #5, *Preserving Rights and Powers*; Grant Assurance #19, *Operation and Maintenance*; Grant Assurance #20, *Hazard Removal and Mitigation*; Grant Assurance #21, *Compatible Land Use*; and Grant Assurance #25 *Airport Revenue*.

Federally-obligated airports with Air Traffic Control Towers (ATCT) must submit a Notice of Proposed Construction or Alteration (FAA Form 7460-1) for any proposed on-airport solar energy system. Sponsors must assert they conducted a sufficient analysis of the potential for ocular impact (glint and glare) and conclude there is no potential for ocular impact to the airport's

ATCT cab. Airport sponsors are also responsible for reorienting solar energy systems if there is glint or glare to the ATCT after a system is installed.[1]

Section 163 and Grant Assurance 25 require the airport sponsor to receive not less than fair market value for the use, lease, encumbrance, transfer, or disposal of land, any facilities on such land, or any portion of such land or facilities. The sponsor must ensure all revenue generated as a result of this project are only expended for the capital or operating costs of the airport, the local airport system, or other local facilities which are owned or operated by the airport, and which are directly and substantially related to the air transportation of passengers or property, or for noise mitigation purposes on or off the airport.

The sponsor is also responsible for complying with all federal, state, and local environmental laws and regulations.

Additionally, any development on this parcel is subject to airspace review under the requirements of 14 Code of Federal Regulations (CFR) Part 77, and Grant Assurance 29 requires the airport to update and maintain a current ALP. Please submit an updated ALP and Exhibit "A" property map to HAR-ADO if the project is completed.

This is a preliminary determination. It does not constitute a final agency action or an "order issued by the Secretary of Transportation" under 49 U.S.C. § 46110.

For any questions, please contact Charles Sacavage, Senior Project Engineer, HAR-ADO at (717) 730-2834 or via email at charles.l.sacavage@faa.gov.

Sincerely,

DAVID A FISH Digitally signed by DAVID A FISH
Date: 2022.08.09 10:07:35 -04'00'

David A. Fish
Director, Eastern Region Airports Division

Enclosures

[1] For additional information, see FAA's Policy on Review of Solar Energy System Projects on Federally-Obligated Airports (https://www.federalregister.gov/documents/2021/05/11/2021-09862/federal-aviation-administration-policy-review-of-solar-energy-system-projects-on-federally-obligated).

Airport Layout Plan

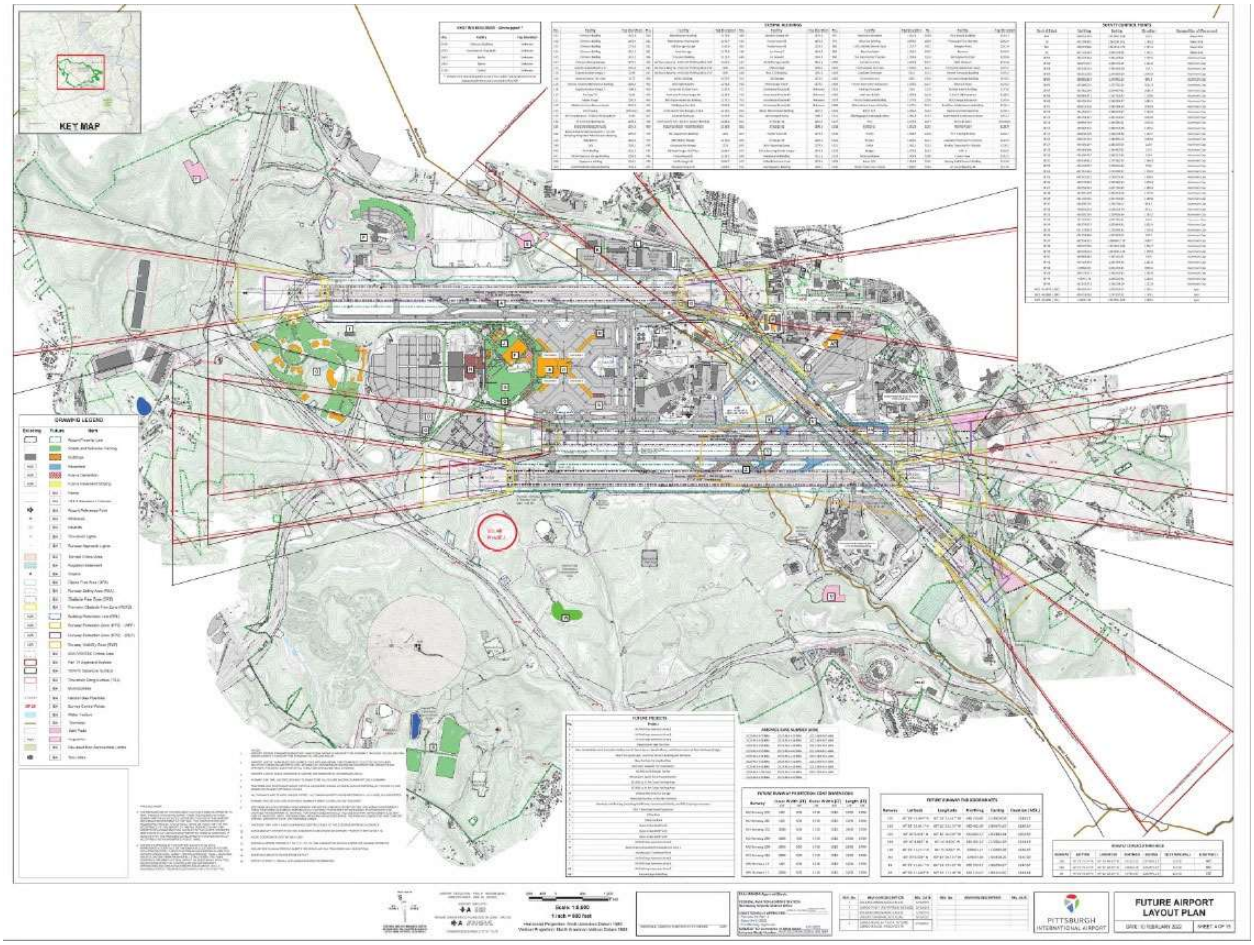
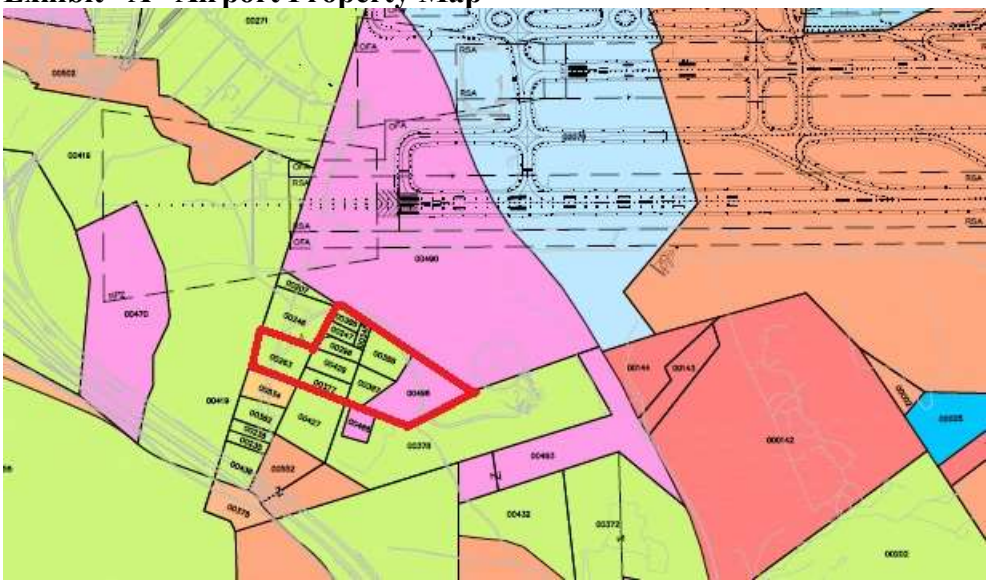
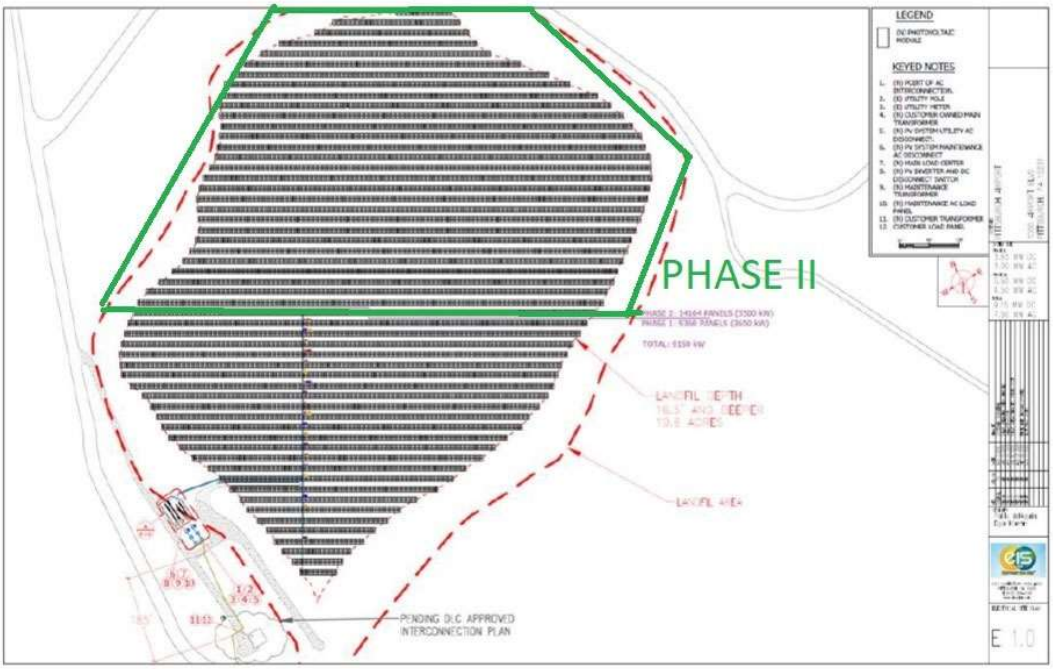


Exhibit "A" Airport Property Map



Solar Array Phase 2 Project Sketch



Pittsburgh International Airport
Landside Terminal, 4th Floor Mezz.
PO Box 12370 | Pittsburgh, PA 15231-0370
(412) 472-3500 | FLYPITTSBURGH.COM

APPENDIX I

Land Release Request for Non-Aeronautical Use, PIT, Solar Project Area

PITTSBURGH
INTERNATIONAL AIRPORT

May 12th, 2023

Charles L. Sacavage, P.E.
Harrisburg Airports District Office
Federal Aviation Administration
3905 Hartzdale Drive, Suite 508
Camp Hill, PA 17011

Subject: Land Release Request for Non-Aeronautical Use
PIT, Solar Project Area

Dear Mr. Sacavage:

The Allegheny County Airport Authority (ACAA) requests the Solar Project Area parcels (the "Property") on Pittsburgh International Airport (PIT) property be released for non-aeronautical use.

Please consider this letter a formal request to revise the ALP to allow the Property to be utilized for non-aeronautical use. Following are supporting documents needed to support this request.

We understand that this is a request for release of the use of the Property from aeronautic to non-aeronautic and does not constitute a release from grant assurances.

Please let us know if you require anything further.

Sincerely,

Justin Stascak

Justin Stascak
Project Manager, Environmental Planning
Allegheny County Airport Authority

Enclosures:
FAA Eastern Region Land Release Request
Exhibit A: Property Map
Exhibit B: Appraisal
Exhibit C: Metes and Bounds Description
Exhibit D: Site Location and Site Map
Exhibit E: Lease Agreement

Pittsburgh International Airport
Landside Terminal, 4th Floor Mezz.
PO Box 12370 | Pittsburgh, PA 15231-0370
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FAA EASTERN REGION AIRPORTS DIVISION
LAND RELEASE REQUEST
FOR NON-AERONAUTICAL PURPOSE

PITTSBURGH INTERNATIONAL AIRPORT
Solar Project Area

a) What agreements(s) with the United States are involved?

AIP Federal Grant Assurances

b) What specifically is being requested (long-term lease for non-aeronautical purpose, release, transfer, sale, etc.)?

Land release for long-term lease for non-aeronautical purpose.

c) Why the release, modification, amendment or other action is requested?

The Allegheny County Airport Authority (ACAA) requests parcels be released for long-term lease for solar energy capture.

d) What facts and circumstances justify the request?

ACAA will lease this property to grow airport revenues by reducing electricity usage. The property serves no aeronautic purpose, present or future.

e) What requirements of the sale or local law should be provided for in the language of a FAA issued document if the request is consented to or granted?

The FAA releases ACAA from the obligation to Solar Project Area property for aeronautical use.

f) What property or facilities are involved?

The Solar Project Area is outlined in red on Exhibit A: PIT Land Release Request Non-Aeronautical Use Airport Property Map. The Solar Project Area includes both Phase 1 and Phase 2. Phase 1 was completed in 2021 and Phase 2 is planned for 2024. The property containing both Solar areas is roughly 20 acres of vacant land approximately 1,200 feet south of PIT runway 10R/28L, and south of I-376. No facilities are involved. The appraisal contained approximately 41 acres of land but only 20 acres atop the landfill ended up being utilized for this development. Additionally, the ground lease agreement in place is tied to both Solar Phases.

g) How was the property acquired or obtained by the airport owner?

As shown on Exhibit A, historic properties included in Solar Project Area are 0247, 0263, 0296, 0345, 0362, 0377, 0378, 0387, 0388, 0427, 0429, 0466, 0496, 0534, and 0552.

Historic parcels 0247, 0263, 0296, 0345, 0362, 0377, 0378, 0387, 0388, 0427 and 0429 were acquired in 1970 and 1971 with a FAA project 08-42-081-03. Historic properties 0466 and 0496 were acquired in 1971 and 1972 with FAA Project 8-42-081-04. Historic parcels 0534 and 0552 was acquired in 1973, without an FAA project and as surplus property from a declaration of taking.

h) What is the present condition and what present use is made of any property or facilities?

The property was vacant, not used, and not developed prior to the solar panel installation. Currently, Phase 1 is operational with Phase 2 construction to begin in 2024.

i) What use or disposition will be made of the property or facilities?

The property will be leased for 20 years to construct, operate, and maintain solar panels.

j) What is the Fair Market Value (FMV) of the property or facilities? (include copy of current appraisal)

Appraised estimated fair market value is $0.12 per square foot per annum effective April 30, 2018, per Exhibit B. The appraisal performed was for 41 acres, but only 20 acres atop the landfill ended up being utilized for this development. Additionally, the appraisal and ground lease that was established in 2019 included both Phase 1 and Phase 2 Solar Project Areas.

k) What proceeds are expected from the use or disposition or use of the property and what will be done with any net revenues derived? (certify compliance with FAA's revenue Use Policy dated 2/16/1999)

Annual rental income to ACAA for the Solar Project Area will be at fair market value to generate revenue for the airport.

l) Provide a comparison of the relative advantage or benefit to the airport from the sale or other disposition as opposed to retention for rental income.

Property will be retained by the airport for long-term energy resiliency.

m) Provide a plan identifying the intangible benefits (see FAA's Revenue Use Policy, dated 2/16/1999), If any, accruing to the airport, the amount attributed to the intangible benefits of the merit of their application as an offset against the FMV of the property to be released.

The Solar Project Area will help reduce ACAAs carbon footprint through clean renewable energy, mitigate climate change, and lead to better health outcomes by limiting pollution on a localized basis. Fair market value will be received.

n) Provide the metes and bounds description of the property to be released.

See Exhibit C

o) A sketch or drawing of the property and its location.

See Exhibit D

p) Environmental review status and determination if applicable.

A Short Form Environmental Assessment for the development of Microgrid, which includes Phase 1 of the Solar Project Area became a federal document when it was signed by responsible FAA official, Susan L. McDonald on May 11, 2020. A Finding of No Significant Impact was approved and signed by responsible FAA official, R. Harner on May 8, 2020. A Supplemental Environmental Assessment for Solar Phase 2 is currently being drafted as it was determined that both Phases are connected through the same lease agreement. A response and determination for the Supplemental Environmental Assessment is pending.

Exhibit A

EXISTING EASEMENTS		
REFERENCE NUMBER	ACREAGE	PURPOSE
A*	7.2	R/W 28C-RPZ
B	20.8	R/W 32-RPZ
F	19.6	R/W 27-RPZ

PROPOSED ACQUISITION		
REFERENCE NUMBER	ACREAGE	PURPOSE
A*	7.2	R/W 28C-RPZ
D	5.1	R/W 28C-RPZ
E	2.2	R/W 28C-RPZ
G	12.8	R/W 32-RPZ

* See notes for details on area A

RELEASED NON-AERONAUTICAL LANDS	
No.	FACILITY
RNL1	Dick's Sporting Goods Development Area
RNL2	Clinton Commerce Park Phase I
RNL3	Clinton Commerce Park Phase II
RNL4	Industry Drive Development Area
RNL5	Cherrington Office Park
RNL6	Airside Business Park
RNL7	Operations Control Center Development Area
RNL8	Findlay Township Fire Station
RNL9	Moon Township Maintenance Building
RNL10	Crown Castle Tower Site
RNL11	Crown Communications
RNL12	Moon Township Park
RNL13	Findlay Township Park Parcel 1
RNL14	Findlay Township Park Parcel 2
RNL15	Findlay Township Ball Field
RNL16	Skyview Business Park

DRAWING LEGEND	
ITEM	
AIRPORT PROPERTY LINE	
AIRFIELD PAVEMENT	
FUTURE PROJECTS	
RPZ	
RSA/OFA	
EXISTING AVIGATION EASEMENT	
FUTURE PROPERTY ACQUISITION (FEE SIMPLE)	
RELEASED NON-AERONAUTICAL LANDS	
FUTURE AIRPORT PROPERTY LINE	
PARCEL BOUNDARY/NUMBER	00566

FAA PROPERTY INTEREST LEGEND

- AREA 1 – (12/31/41 TO 06/19/46) FEE TITLE, ACQUIRED AS SURPLUS PROPERTY, TYPE: ABSOLUTE OWNERSHIP, 284 ACRES
- AREA 2 – (12/20/54), TAKEN BY U.S.A., ACQUIRED AS SURPLUS PROPERTY, TYPE: ABSOLUTE OWNERSHIP, 14 ACRES
- AREA 3 – (12/30/57 TO 06/02/59), F.A.A. GRANT – 9–36–029–15, ACQUIRED FOR AIRPORT DEVELOPMENT, TYPE: ABSOLUTE OWNERSHIP, 9 ACRES
- AREA 4 – (01/58), (COULD NOT BE DETERMINED), ACQUIRED AS SURPLUS PROPERTY, TYPE: ABSOLUTE OWNERSHIP, 162 ACRES
- AREA 5 – (03/04/58 TO 07/07/64), F.A.A. GRANT – 9–36–029–13, ACQUIRED FOR AIRPORT DEVELOPMENT, TYPE: ABSOLUTE OWNERSHIP, 20 ACRES
- AREA 6 – (07/58), F.A.A. GRANT – 9–36–029–C415, ACQUIRED FOR AIRPORT DEVELOPMENT, TYPE: ABSOLUTE OWNERSHIP, 12 ACRES
- AREA 7 – (08/11/58), F.A.A. GRANT – 9–36–029–C415, ACQUIRED FOR AIRPORT DEVELOPMENT, TYPE: ABSOLUTE OWNERSHIP, 43 ACRES
- AREA 8 – (06/09/68 TO 12/11/72), F.A.A. GRANT – 9–36–029–C213, ACQUIRED FOR AIRPORT DEVELOPMENT, TYPE: ABSOLUTE OWNERSHIP, 11 ACRES
- AREA 9 – (06/19/68), F.A.A. GRANT – 9–36–029–C413 (NO PARCELS FOUND UNDER THIS PROJECT)
- AREA 10 – (06/19/68 TO 10/06/76), F.A.A. GRANT – 8–42–0081–03, ACQUIRED FOR AIRPORT DEVELOPMENT, FEE SIMPLE, 5,025 ACRES
- AREA 11 – (03/20/69 TO 02/25/87), FEE TITLE, ACQUIRED AS SURPLUS PROPERTY, TYPE: ABSOLUTE OWNERSHIP, 573 ACRES
- AREA 12 – (03/20/69) F.A.A. GRANT – 5–42–0082–02
- AREA 13 – (04/25/69 TO 03/30/72), F.A.A. GRANT – 8–42–0081–04, ACQUIRED FOR AIRPORT DEVELOPMENT, TYPE: ABSOLUTE OWNERSHIP, 801 ACRES
- AREA 14 – (07/08/71 TO 03/30/73), F.A.A. GRANT – 9–36–029–17, ACQUIRED FOR AIRPORT DEVELOPMENT, TYPE: ABSOLUTE OWNERSHIP, 55 ACRES
- AREA 15 – (01/10/79 TO 09/29/81), F.A.A. GRANT – 6–42–0081–14, ACQUIRED FOR AIRPORT DEVELOPMENT, TYPE: ABSOLUTE OWNERSHIP, 143 ACRES
- AREA 16 – (07/31/79 TO 10/12/79), F.A.A. GRANT – 6–42–0081–14, ACQUIRED FOR AIRPORT DEVELOPMENT, TYPE: ABSOLUTE OWNERSHIP, 33 ACRES
- AREA 17 – (09/25/80 TO 08/05/81), F.A.A. GRANT – 6–42–0081–12, ACQUIRED FOR AIPRORT DEVELOPMENT, TYPE: ABSOLUTE OWNERSHIP, 26 ACRES
- AREA 18 – (08/05/81), OVERHEAD EASEMENT ONLY, F.A.A. GRANT – 6–42–0081–12, ACQUIRED FOR AIRPORT DEVELOPMENT, 7 ACRES
- AREA 19 – (05/28/81 TO 03/07/85), F.A.A. GRANT – 6–42–0081–21
- AREA 20 – (04/18/84), OVERHEAD EASEMENT ONLY, F.A.A. GRANT – 6–42–0081–21, ACQUIRED FOR AIRPORT DEVELOPMENT, 26 ACRES
- AREA 21 – (06/17/82 TO 02/24/88), F.A.A. GRANT – 6–42–0081–24, ACQUIRED FOR AIRPORT DEVELOPMENT, TYPE: ABSOLUTE OWNERSHIP, 280 ACRES
- AREA 22 – (05/07/85 TO 12/15/88), F.A.A. GRANT – 3–42–0081–04, ACQUIRED FOR AIRPORT DEVELOPMENT, TYPE: ABSOLUTE OWNERSHIP, 357 ACRES
- AREA 23 – (11/20/86 TO 04/19/89), F.A.A. GRANT – 3–42–0081–06, ACQUIRED FOR AIRPORT DEVELOPMENT, TYPE: AB SOLUTE OWNERSHIP, 1 ACRE
- AREA 24 – (09/15/88 TO 06/24/92), OVERHEAD EASEMENT INVERSE, CONDEMNATION CASES, F.A.A. GRANT – 3–42–0081–15, F.A.A. GRANT – 3–42–0081–19, F.A.A. GRANT – 3–42–0081–24, F.A.A. GRANT – 3–42–0081–30-92, ACQUIRED FOR AIRPORT DEVELOPMENT, 1,915 ACRES
- AREA 25 – (10/26/89 TO 12/04/92), F.A.A. GRANT – 3–42–0081–15–88, F.A.A. GRANT – 3–42–0081–19–89, F.A.A. GRANT – 3–42–0081–24–90, F.A.A. GRANT – 3–42–0081–30–92, ACQUIRED FOR AIRPORT DEVELOPMENT, TYPE: ABSOLUTE OWNERSHIP, 2 ACRES
- AREA 26 – (01/01/89 TO 12/31/01), F.A.A. GRANT – 3–42–0081–15–88, F.A.A. GRANT – 3–42–0081–19–89, F.A.A. GRANT – 3–42–0081–30–92, F.A.A. GRANT – 3–42–0081–38–95, F.A.A. GRANT – 3–42–0081–43–96, F.A.A. GRANT – 3–42–0081–45–98, F.A.A. GRANT – 3–42–0081–51–99, F.A.A. GRANT – 3–42–0081–59–01, ACQUIRED FOR AIRPORT DEVELOPMENT, TYPE: ABSOLUTE OWNERSHIP, 193 ACRES
- AREA 27 – (08/27/09), TRANSFERRED FROM REDEVELOPMENT AUTHORITY OF ALLEGHENY COUNTY
- N/A – (05/13/77 TO 07/29/02), F.A.A. GRANT – 6–42–0081–12, ACQUIRED FOR AIRPORT DEVELOPMENT, TYPE: ABSOLUTE OWNERSHIP

NOTES:

1. AIRPORT NO. 296; THE MANUFACTURER LIGHT AND HEAT CO: NOT ACQUIRED.
2. AIRPORT PROPERTY NO. 294 D: FINDLAY TOWNSHIP WATER AUTHORITY: NOT ACQUIRED.
3. OUTSALE TO COLUMBIA GAS TRANS. CORP. – NOT ACQUIRED.
4. PROPERTIES OF V. RASPAT – NOT ACQUIRED.
5. PRIVATE CEMETERY – NOT ACQUIRED.
6. AIRPORT PROPERTY NO. 264 A: FINDLAY TOWNSHIP WATER AUTHORITY – NOT ACQUIRED.
7. EXISTING EASEMENT A WILL BE ACQUIRED (FEE SIMPLE) IN THE FUTURE.

THIS OVERALL AIRPORT PROPERTY PLAN HAS BEEN COMPLIED FROM MAPS AVAILABLE FROM VARIOUS SOURCES. THESE MAPS WERE OF VARIOUS SCALES AND ORIENTATIONS AND COMPILED FOR A NUMBER OF DIFFERING PURPOSES. A BREAKDOWN OF THE SPECIFIC PROPERTY ACQUISION DATA FOR EACH OF THE AREAS SHOWN ON THIS PLAN IS CONTAINED WITHIN THE DATABASE ENTITLED "EXHIBIT A".

PREVAILING WINDS

810 405 0 810 1620 '

TRUE NORTH

MAG. DEC. 8.2° W (DEC. 2005)

Path: \\Pitfile\Departments\Planning\GIS\Data\VendorGIS\Ricondo\ALP Update\PIT_TransmittalToACCA_20230130\PIT_Sheet15_20221028.aprx

FAA DISCLAIMER

1. THE PREPARATION OF THIS DOCUMENT MAY HAVE BEEN SUPPORTED, IN PART, THROUGH A PLANNING GRANT FROM THE FEDERAL AVIATION ADMINISTRATION AS PROVIDED UNDER SECTION 505 OF THE AIRPORT AND AIRWAY IMPROVEMENT ACT OF 1982. THE CONTENTS DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF THE FAA. ACCEPTANCE OF THIS REPORT BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITTMENT ON THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED THEREIN, NOR DOES THIS INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE WITH APPRORIATE PUBLIC LAWS.

2. THE FAA'S APPROVAL OF THIS AIRPORT LAYOUT PLAN (ALP) REPRESENTS ACCEPTANCE OF THE GENERAL LOCATION OF FUTURE FACILITIES DEPICTED DURING THE PRELIMINARY DESIGN PHASE, THE AIRPORT OWNER SHALL SUBMIT, FOR FAA APPROVAL: FINAL LOCATIONS, HEIGHTS, AND EXTERIOR FINISH OF ALL STRUCTRURES. THE FAA'S CONCERNS ARE OBSTRUCTIONS, IMPACT ON ELECTRONIC FACILITIES, AND ADVERSE IMPACT ON CONTROLLER VIEW OF AIRCRAFT APPROACHES AND GROUND MOVEMENT AREAS WHICH COULD ADVERSELY AFFECT THE SAFETY, EFFICIENCY, OR UTILITY OF THE AIRPORT.

REV. No.	REVISION DESCRIPTION	REV. DATE	REV. No.	REVISION DESCRIPTION	REV. DATE
1	RNL 8/9/10 RELEASED AS NON–AERO LAND	5/6/2019			
2	RNL 11–15 RELEASED AS NON–AERO LAND	7/25/2019			
3	RNL 16 RELEASED AS NON–AERO LAND	2/9/2023			

PITTSBURGH INTERNATIONAL AIRPORT

EXHIBIT A: AIRPORT PROPERTY MAP

DATE: 9 FEBRUARY 2023

SHEET: 1 OF 6

Exhibit B

Micro Grid Airport Land Rental Survey

Pittsburgh International Airport
Findlay Township, Allegheny County, Pennsylvania 15122

NKF Job No.: 133-2018-0222

Appraisal Report Prepared For:

David Storer
Allegheny County Airport Authority
Landside Terminal, 4th Floor Mezz.
Pittsburgh, PA 15231

Prepared By:

Newmark Knight Frank
Valuation & Advisory

2591 Wexford-Bayne Road, Suite 102
Sewickley, PA 15143,

Newmark Knight Frank

Newmark
Knight Frank

April 30, 2018

David Storer
Allegheny County Airport Authority
Landside Terminal, 4th Floor Mezz.
Pittsburgh, PA 15231

RE: Market Rental Survey of Vacant Land known as Micro Grid Airport Land Rental Survey located at Pittsburgh International Airport, Findlay Township, Allegheny County, Pennsylvania 15122

NKF Job No.: 133-2018-0222

Newmark Knight Frank Valuation & Advisory, LLC (herein "Firm" or "NKF") has developed a rental survey of the referenced property and the results are presented in the following report.

The subject is a parcel of vacant land containing an area of 41.0014 acres, or 1,786,022 square feet. The property is zoned HI, Heavy Industrial, which permits industrial..

Key Investment Considerations

- The subject parcels are located within the boundaries of the Pittsburgh International Airport.

Based on the analysis contained in the following report, the opinion of value for the various subject properties are:

Market Value Rental Conclusions

Property	Interest Appraised	Date of Value	Annual Rental Value Conclusion
Substation Parcels	Fee Simple	April 13, 2018	$8,800
Solar Panel Parcel	Fee Simple	April 13, 2018	$32,700
Cooling Tower Parcel	Fee Simple	April 13, 2018	$12,500

Extraordinary Assumptions

The value conclusions are subject to the following extraordinary assumptions that may affect the assignment results. An extraordinary assumption is uncertain information accepted as fact. If the assumption is found to be false as of the effective date of the appraisal, it may affect our value conclusions.

- No legal descriptions or other information regarding sizes and other physical characteristics of the subject parcels were available. This information used in this report was obtained through estimation and representations made by the client. Should actual site sizes and other data deviate from these estimations, the value conclusions in this report may be affected.

Hypothetical Conditions

The value conclusions are not based on any hypothetical conditions that may affect the assignment results. A hypothetical condition is a condition contrary to known fact on the effective date of the appraisal but is supposed for the purpose of analysis.

- None

Prior Services

NKF has not previously conducted a market land rental survey of the subject properties.

Client Reliance Statement

The appraisal was developed based on, and this report has been prepared in conformance with, the guidelines and recommendations set forth in the Uniform Standards of Professional Appraisal Practice (USPAP), the requirements of the Code of Professional Ethics and Standards of Professional Appraisal Practice of the Appraisal Institute and Title XI of the Financial Institution Reform, Recovery and Enforcement Act (FIRREA) of 1989.

CERTIFICATION

We certify that, to the best of our knowledge and belief:

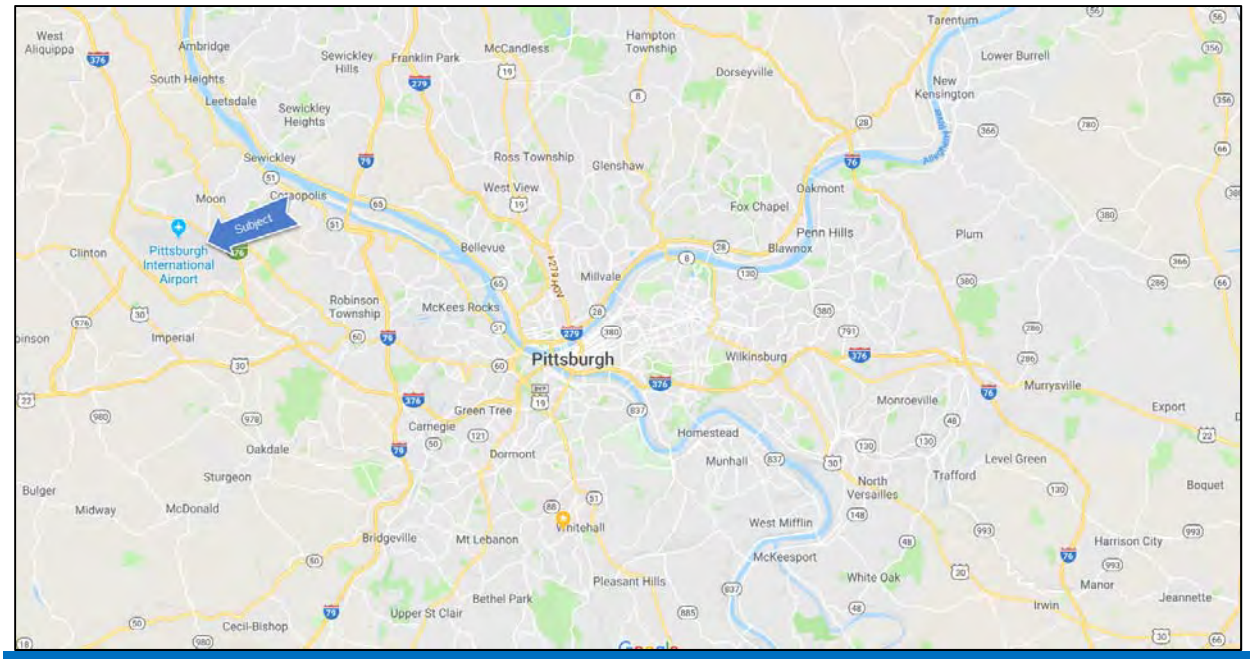
1. The statements of fact contained in this report are true and correct.
2. The reported analyses, opinions, and conclusions are limited only by the reported assumptions and limiting conditions and are our personal, impartial and unbiased professional analyses, opinions, and conclusions.
3. We have no present or prospective interest in in the property that is the subject of this report and no personal interest in with respect to the parties involved.
4. We have no bias with respect to the property that is the subject of this report or to the parties involved with this assignment.
5. Our engagement in this assignment was not contingent upon developing or reporting predetermined results.
6. Our compensation for completing this assignment is not contingent upon the development or reporting of a predetermined value or direction in value that favors the cause of the client, the amount of the value opinion, the attainment of a stipulated result, or the occurrence of a subsequent event directly related to the intended use of this appraisal.
7. This appraisal assignment was not based upon a requested minimum valuation, a specific valuation, or the approval of a loan.
8. Our analyses, opinions, and conclusions were developed, and this report has been prepared, in conformity with the Uniform Standards of Professional Appraisal Practice, as well as the requirements of the State of Pennsylvania.
9. The reported analyses, opinions, and conclusions were developed, and this report has been prepared, in conformity with the Code of Professional Ethics and Standards of Professional Appraisal Practice of the Appraisal Institute.
10. The use of this report is subject to the requirements of the Appraisal Institute relating to review by its duly authorized representatives.
11. As of the date of this report, John P. Sozansky, MAI, has completed the continuing education program for Designated Members of the Appraisal Institute.
12. As of the date of this report, John P. Sozansky, MAI, has completed the Standards and Ethics Education Requirements for Practicing Affiliates of the Appraisal Institute
13. John P. Sozansky, MAI, made a personal inspection of the property that is the subject of this report.
14. We have experience in appraising land properties similar to the subject in western Pennsylvania and are in compliance with the Competency Rule of USPAP.
15. No one provided significant real property appraisal assistance to the person(s) signing this certification.
16. The Firm operates as an independent economic entity. Although employees of other service lines or affiliates of the Firm may be contacted as a part of our routine market research investigations, absolute client confidentiality and privacy were maintained at all times with regard to this assignment without conflict of interest.

17. Within this report, "Newmark Knight Frank", “NKF Valuation & Advisory”, “NKF, Inc.”, and similar forms of reference refer only to the appraiser(s) who have signed this certification and any persons noted above as having provided significant real property appraisal assistance to the persons signing this report.

18. We have not performed any services, as an appraiser or in any other capacity, regarding the property that is the subject of this report within the three-year period immediately preceding acceptance of this assignment.

John P. Sozansky, MAI
Certified General Real Estate Appraiser
Pennsylvania Certificate # GA-000890-L
Telephone: 724-742-3344
Email: jsozansky@irr.com

Aerial Photo



Location Map

Substation Parcel
(Photo Taken on April 13, 2018)

Substation Parcel
(Photo Taken on April 13, 2018)

Substation Parcel
(Photo Taken on April 13, 2018)

Substation Parcel
(Photo Taken on April 13, 2018)

Substation Parcels
(Photo Taken on April 13, 2018)

Substation Tower Parcel
(Photo Taken on April 13, 2018)

Solar Panel Site
(Photo Taken on April 13, 2018)

Solar Panel Parcel
(Photo Taken on April 13, 2018)

Solar Panel Parcel
(Photo Taken on April 13, 2018)

Cooling Tower Parcel
(Photo Taken on April 13, 2018)

Cooling Tower Parcel
(Photo Taken on April 13, 2018)

Cooling Tower Parcel
(Photo Taken on April 13, 2018)

Executive Summary

Property Name	Micro Grid Airport Land Rental Survey
Address	Pittsburgh International Airport Findlay Township, Allegheny County, Pennsylvania
Property Type	Land - Airport/ Airplane Hangar
Owner of Record	Allegheny County Airport Authority
Tax ID	696-D-396 (partial)
Land Area - Total	41.0014 acres; 1,786,022 SF
Cooling Tower Parcel	1.80 acres; 78,408 SF
Substation Parcels	1.6914 acres; 73,678 SF
Solar Panel Site	37.5064 acres; 1,633,778 SF
Zoning Designation	HI, Heavy Industrial
Highest and Best Use	Airport-Related
Exposure Time; Marketing Period	12 months; 12 months
Effective Date of the Appraisal	April 13, 2018
Date of the Report	April 30, 2018

The values reported above are subject to the definitions, assumptions, and limiting conditions set forth in the accompanying report of which this summary is a part. No party other than Allegheny County Airport Authority may use or rely on the information, opinions, and conclusions contained in the report. It is assumed that the users of the report have read the entire report, including all of the definitions, assumptions, and limiting conditions contained therein.

Extraordinary Assumptions and Hypothetical Conditions

The value conclusions are subject to the following extraordinary assumptions that may affect the assignment results. An extraordinary assumption is uncertain information accepted as fact. If the assumption is found to be false as of the effective date of the appraisal, it may affect our value conclusions.

1. No legal descriptions or other information regarding sizes and other physical characteristics of the subject parcels were available. This information used in this report was obtained through estimation and representations made by the client. Should actual site sizes and other data deviate from these estimations, the value conclusions in this report may be affected.

The value conclusions are based on the following hypothetical conditions that may affect the assignment results. A hypothetical condition is a condition contrary to known fact on the effective date of the appraisal but is supposed for the purpose of analysis.

1. None

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Addenda
A. Definitions
B. Engagement Letter
C. Appraiser Qualifications and Licenses

Introduction

OWNERSHIP HISTORY

The current owner is Allegheny County Airport Authority. To the best of our knowledge, no sale or transfer of ownership has taken place within the three-year period prior to the effective date of the appraisal.

Pending Transactions

To the best of our knowledge, the property is not subject to an agreement of sale or an option to buy, nor is it listed for sale, as of the effective appraisal date.

INTENDED USE AND USER

The intended use and user of our report are specifically identified in our report as agreed upon in our contract for services and/or reliance language found in the report. No other use or user of the report is permitted by any other party for any other purpose. Dissemination of this report by any party to non-client, non-intended users does not extend reliance to any other party and Newmark Knight Frank will not be responsible for unauthorized use of the report, its conclusions or contents used partially or in its entirety.

- The intended use of the appraisal is for property disposition purposes and no other use is permitted.
- The client and intended user is Allegheny County Airport Authority.

DEFINITION OF VALUE

Market value is defined as:

“The most probable price which a property should bring in a competitive and open market under all conditions requisite to a fair sale, the buyer and seller each acting prudently and knowledgeably, and assuming the price is not affected by undue stimulus. Implicit in this definition is the consummation of a sale as of a specified date and the passing of title from seller to buyer under conditions whereby:

- Buyer and seller are typically motivated;
- Both parties are well informed or well advised, and acting in what they consider their own best interests;
- A reasonable time is allowed for exposure in the open market;
- Payment is made in terms of cash in U.S. dollars or in terms of financial arrangements comparable thereto; and

- The price represents the normal consideration for the property sold unaffected by special or creative financing or sales concessions granted by anyone associated with the sale."

(Source: Code of Federal Regulations, Title 12, Chapter I, Part 34.42[g]; also Interagency Appraisal and Evaluation Guidelines, Federal Register, 75 FR 77449, December 10, 2010, page 77472)

REPORT

This market study is presented in the form of an summary report, which is intended to comply with the reporting requirements set forth under Standards Rule 2-2(a) of USPAP. This report incorporates practical explanation of the data, reasoning and analysis that were used to develop the opinion of value.

PURPOSE OF THE APPRAISAL

The purpose of the appraisal is to develop an opinion of the market rent level of the property as of the effective date of the appraisal, April 13, 2018. The date of the report is April 30, 2018.

SCOPE OF WORK

Extent to Which the Property is Identified

- Estimated size via aerial photographs

Extent to Which the Property is Inspected

John P. Sozansky, MAI, conducted an on-site inspection of the property on April 13, 2018.

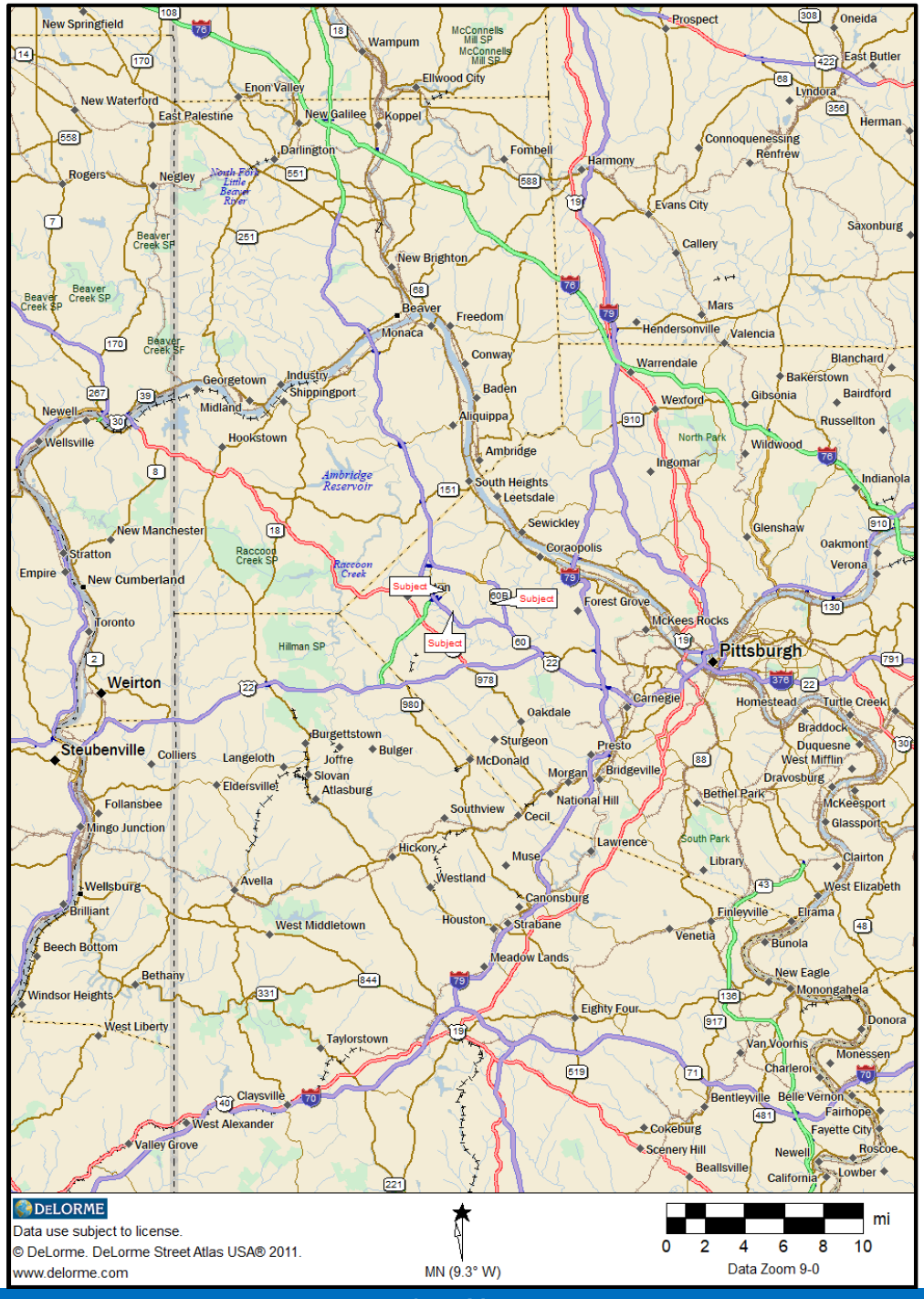
Type and Extent of the Data Researched

- Neighborhood and land use trends;
- Market trends relative to the subject property type;
- Flood zone status;
- Zoning requirements and compliance;
- Real estate tax data;
- Comparable rental data;

Type and Extent of Analysis Applied

We analyzed the property and market data gathered through the use of appropriate, relevant, and accepted market-derived methods and procedures. Further, we employed the appropriate and relevant approaches to value, and correlated and reconciled the results into an estimate of market value, as demonstrated within the appraisal report.

Economic Analysis



Area Map

AREA ANALYSIS

The subject is located in the Pittsburgh PA Metropolitan Statistical Area, hereinafter called the Pittsburgh MSA, as defined by the U.S. Office of Management and Budget. The Pittsburgh MSA is 5,281 square miles in size, and is the 26th most populous metropolitan area in the nation.

Moody's Analytics / Précis® Metro Moody's Analytics' Economy.com provides the following Pittsburgh metro area economic summary as of January 2018. The full Moody's Economy.com report is presented in the addenda.

2011	2012	2013	2014	2015	2016	INDICATORS	2017	2018	2019	2020	2021	2022
122.9	126.7	128.8	132.1	136.4	138.3	**Gross metro product (C09$ bil)**	141.7	146.2	148.8	149.6	153.5	157.1
3.0	*3.0*	*1.7*	*2.6*	*3.2*	*1.4*	*% change*	*2.4*	*3.2*	*1.8*	*0.5*	*2.6*	*2.3*
1,144.7	1,157.2	1,157.5	1,159.7	1,161.7	1,163.0	**Total employment (ths)**	1,174.8	1,188.9	1,197.2	1,197.9	1,203.8	1,213.8
1.7	*1.1*	*0.0*	*0.2*	*0.2*	*0.1*	*% change*	*1.0*	*1.2*	*0.7*	*0.1*	*0.5*	*0.8*
7.3	7.1	6.6	5.6	5.3	5.7	**Unemployment rate (%)**	5.0	4.4	4.4	4.9	5.1	5.1
5.4	3.8	0.3	3.7	3.9	0.7	**Personal income growth (%)**	3.1	5.0	5.0	4.1	4.1	4.1
48.7	50.2	51.4	52.6	54.1	56.1	**Median household income ($ ths**	59.1	61.5	63.9	66.2	68.5	70.9
2,360	2,361	2,361	2,358	2,351	2,343	**Population (ths)**	2,347	2,350	2,349	2,347	2,344	2,343
0.1	*0.1*	*0.0*	*-0.1*	*-0.3*	*-0.4*	*% change*	*0.2*	*0.1*	*0.0*	*-0.1*	*-0.1*	*-0.1*
7.3	4.6	3.9	0.3	-2.6	-4.0	**Net migration (ths)**	8.8	6.9	3.7	1.9	1.5	3.5
2,654	2,918	3,258	3,089	3,293	3,015	**Single-family permits (#)**	3,579	4,477	5,280	5,436	6,073	6,249
260.0	548.0	1,312.0	1,110.0	1,971.0	1,388.0	**Multifamily permits (#)**	1,628.3	386.2	219.8	168.4	240.5	334.9
164	166	171	176	183	191	**FHFA house price (1995Q1=100)**	198	202	201	203	208	214

Recent Performance

Pittsburgh's economy is growing again as the metro area finally moves beyond the energy bust. A surge of job creation since mid-2017 puts year-ago payroll growth well ahead of the Pennsylvania and U.S. averages and marks PIT's best performance since 2012. This has pushed the unemployment rate below 5% for the first time since before the Great Recession and stirred stronger wage growth. Growth in private services is strong and is tracking the U.S. and state averages. The biggest change compared with a year ago is that goods-producing industries are no longer major drags. As in much of the state, local government remains a sore spot as the cost of underfunded pensions crowds out hiring. The out-migration of thousands of unemployed energy sector workers and the last few years of lackluster labor market performance have kept the housing market in check. Single-family price appreciation lags that in the state, and permitting has yet to return to pre-crash levels.

Population

Population Trends

	Population			Compound Ann. % Chng	
	2010 Census	2018 Estimate	2023 Projection	2010 - 2018	2018 - 2023
Metropolitan Area - Pittsburg	2,356,285	2,378,076	2,388,801	0.1%	0.1%
State - Pennsylvania	12,702,379	12,976,662	13,138,130	0.3%	0.2%
USA - United States	308,745,538	327,514,334	341,323,594	0.7%	0.8%

Source: ESRI

Employment

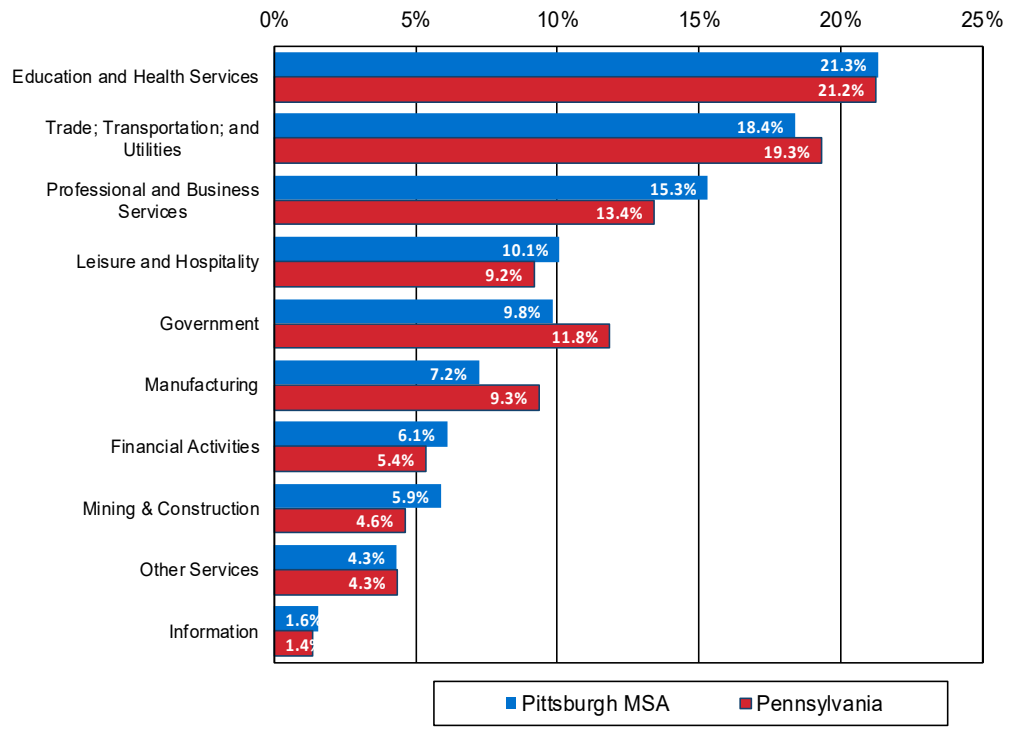
Employment Trends

	Total Employment (Year End)				Unemployment Rate (Ann. Avg.)	
Year	Pittsburgh MSA	% Change	Pennsylvania	% Change	Pittsburgh MSA	Pennsylvania
2007	1,156,700		5,866,000		4.4%	4.4%
2008	1,149,600	-0.6%	5,795,400	-1.2%	5.1%	5.3%
2009	1,124,800	-2.2%	5,633,600	-2.8%	7.3%	8.1%
2010	1,143,300	1.6%	5,711,800	1.4%	8.0%	8.5%
2011	1,159,800	1.4%	5,758,500	0.8%	7.4%	7.9%
2012	1,165,600	0.5%	5,781,700	0.4%	7.2%	7.8%
2013	1,164,500	-0.1%	5,801,000	0.3%	6.8%	7.4%
2014	1,170,500	0.5%	5,879,400	1.4%	5.6%	5.9%
2015	1,169,800	-0.1%	5,914,100	0.6%	5.3%	5.3%
2016	1,170,300	0.0%	5,957,100	0.7%	5.7%	5.4%
2017	1,193,900	2.0%	6,037,800	1.4%	5.0%	4.9%
Overall Change 2007-2017	37,200	3.2%	171,800	2.9%		
Avg Unemp. Rate 2007-2017					6.2%	6.4%
Unemployment Rate - February 2018					4.1%	4.8%

Source: Bureau of Labor Statistics and Economy.com. Employment figures are from the Current Employment Survey (CES). Unemployment rates are from the Current Population Survey (CPS). The figures are not seasonally adjusted.

Employment Sectors

Employment Sectors - 2017



Source: Bureau of Labor Statistics and Economy.com

Major Employers

Major Employers - Metropolitan Area - Pittsburgh, PA Metropolitan Statistical Area

	Name	Number of Employees
1	UPMC	46,480
2	Highmark Health	20,497
3	U.S. Government	18,199
4	Commonwealth of Pennsylvania	16,580
5	University of Pittsburgh	12,047
6	PNC Financial Services Group Inc.	11,953
7	Giant Eagle Inc.	9,902
8	Wal-Mart Stores Inc.	9,000
9	Allegheny County	7,044
10	BNY Mellon	7,000

Source: Pittsburgh Business Times Book of List 2017-2018

Analysis

Healthcare

An aging population will keep demand for medical services growing steadily, and large healthcare institutions with the financial wherewithal to invest will ensure supply keeps up. Healthcare employment grew at a modest pace in 2017, but a more complete count of jobs from the Quarterly Census of Employment and Wages suggests that gains will be revised upward. This is consistent with the strong underlying fundamentals.

On the demand side, Pittsburgh's above-average share of seniors will sustain demand for healthcare despite the declining overall population. On the supply side, the metro area's healthcare institutions are well-positioned to invest and expand to meet new demand. For example, over the next five years alone, UPMC will spend $2 billion on three new specialty hospitals. Ongoing investments support the forecast for healthcare payrolls to continue outpacing overall job growth.

Education

Higher education faces a challenging environment but will remain an important driver as institutions generate a skilled workforce and leading researchers. Colleges and universities across Pennsylvania are struggling with a declining college-age population. The population age 20 to 24 has shrunk by 7% in Pittsburgh since 2011, and further declines are on the horizon. This bodes poorly for private education employment, which has rebounded over the last year but is not expected to surpass its 2011 peak.

However, Pittsburgh's leading educational institutions will remain important to the economy. Carnegie Mellon, for example, has played an instrumental role in growing Pittsburgh's high-tech scene, supplying new graduates and experienced researchers to artificial intelligence, robotics and other startups. Unlike some struggling colleges in the state, Pittsburgh's educational institutions are in healthy financial shape and will remain crucial economic assets despite the lack of underlying demand growth.

Natural Resources and Mining

The worst has passed for natural resources and mining, but significant growth in employment is not expected. With energy prices firming, the rapid natural gas industry job losses of the past few years have abated. However, productivity gains mean that output can increase with fewer workers than before. As a result, employment will not return to its 2014 peak, but downstream industries will reap some spillover benefits. For example, Shell's $6 billion ethane cracker will utilize natural gas and employ hundreds.

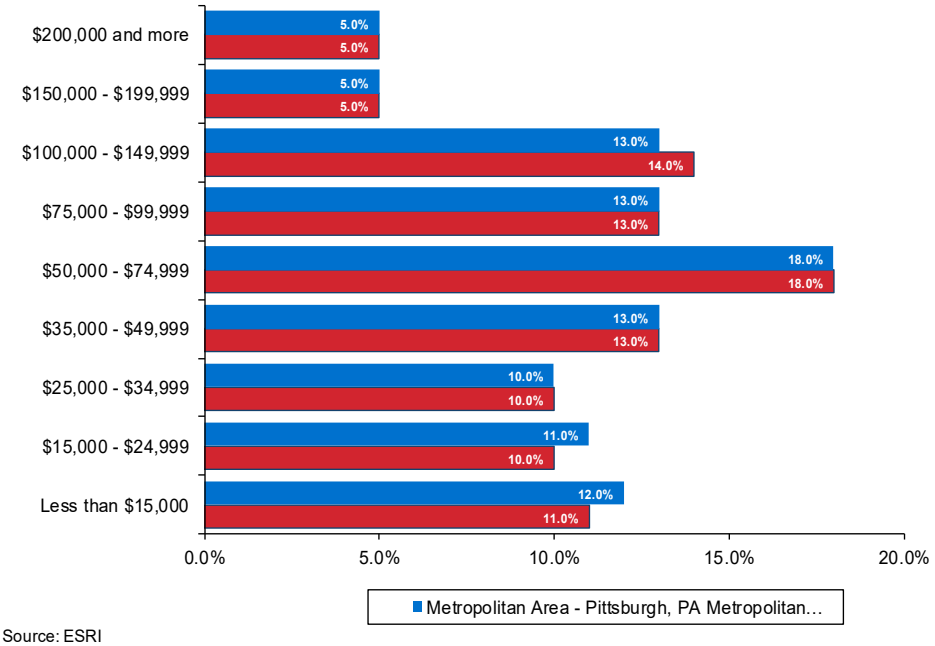
Household Income

Median Household Income - 2018

	Median
Metropolitan Area - Pittsburgh, PA Metropolitan Statistical Ar	$54,129
State - Pennsylvania	$56,184
Comparison of Metropolitan Area - Pittsburgh, PA Metropolita	- 3.7%

Source: ESRI

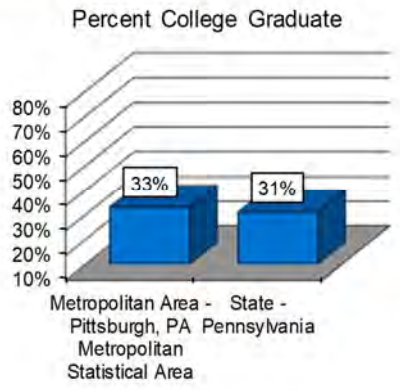
Household Income Distribution - 2018

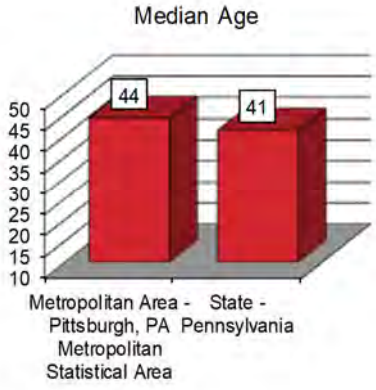


Source: ESRI

Education and Age

Education & Age - 2018





Source: ESRI

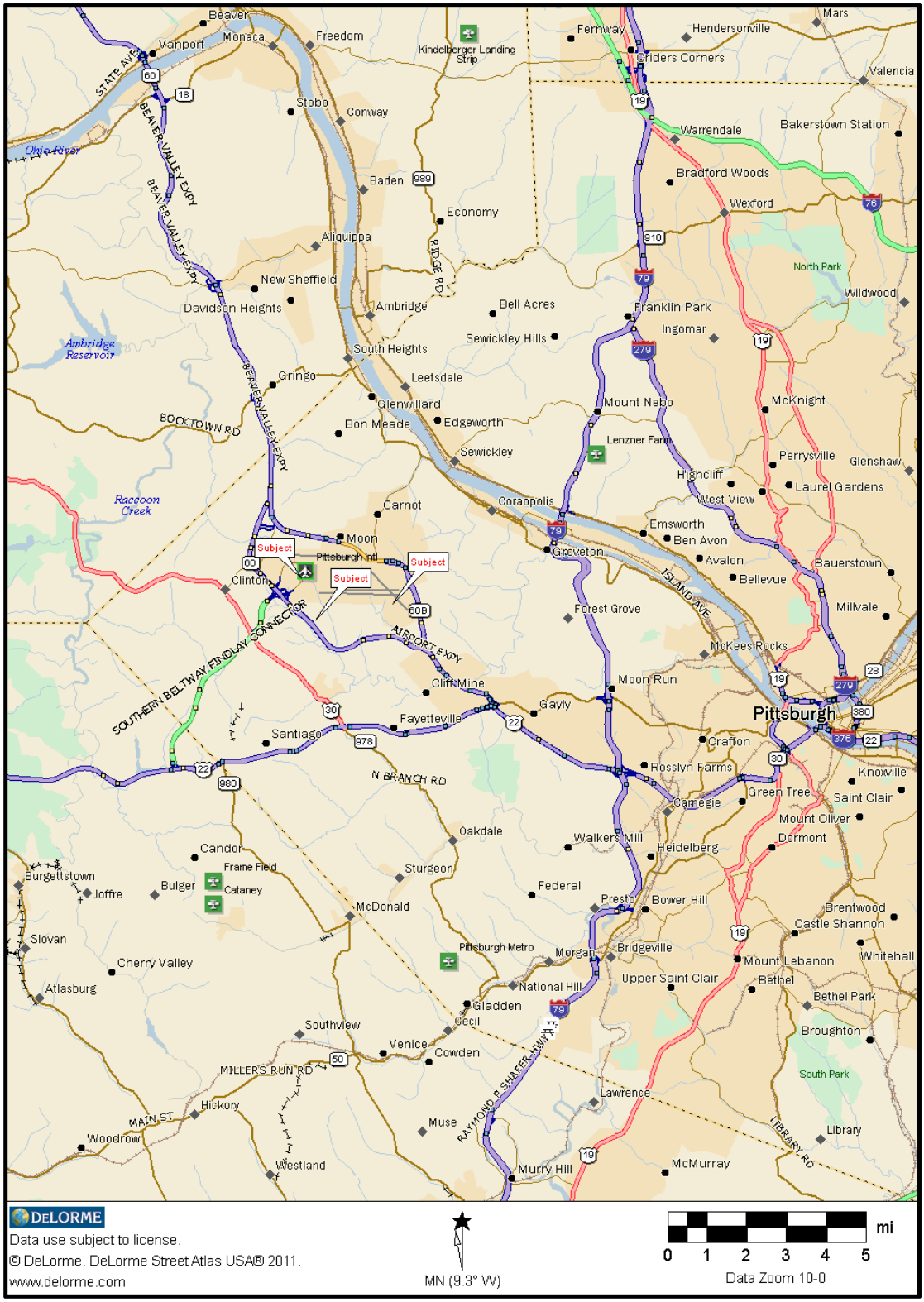
Conclusion

The Pittsburgh MSA economy will be affected by a stable to slightly growing population base and a higher level of educational attainment. The Pittsburgh MSA experienced growth in the number of jobs and has maintained a generally lower unemployment rate than Pennsylvania over the past decade. Moreover, the Pittsburgh MSA exhibits both a higher rate of GDP growth and a higher level of GDP per capita than Pennsylvania overall. We anticipate that the Pittsburgh MSA economy will improve and employment will grow, strengthening the demand for real estate.

Led by healthcare and high tech, economic growth in Pittsburgh will build momentum in the coming year and keep pace with that in Pennsylvania. In the long run, Pittsburgh's weak demographics will keep it in the nation's shadow.

It is anticipated that the Pittsburgh MSA economy will grow, strengthening the demand for real estate.

Regional Map



SURROUNDING AREA ANALYSIS

Boundaries

The three parcels that make up the subject are located within the bounds of the Pittsburgh International Airport in Findlay Township and Moon Township, Allegheny County, Pennsylvania. Portions of Findlay Township and Moon Township generally form the surrounding area. A map identifying the location of the property follows this section.

Access and Linkages

Primary highway access to the area is via I-376, the Parkway West, which splits into Business I-376 three miles east of the subject. A variety of secondary roads including University Boulevard, Beaver Grade Road and Thorne Run Road facilitate transportation through the area.

Public transportation is provided by the Port Authority of Allegheny County, providing bus service throughout the region to primary retail and employment centers. Overall, the primary mode of transportation in the area is the automobile.

Demand Generators

Major employers include the Pittsburgh International Airport, the Bayer Corporation, GSK, and Robert Morris University. Complementary retail and commercial services are scattered along the Parkway West.

Land Use

The area is suburban in character and approximately 75% developed. Land uses immediately surrounding the subject are airport-related with typical ages of building improvements ranging from 10 to 50 years. Other land use characteristics are summarized in the following table.

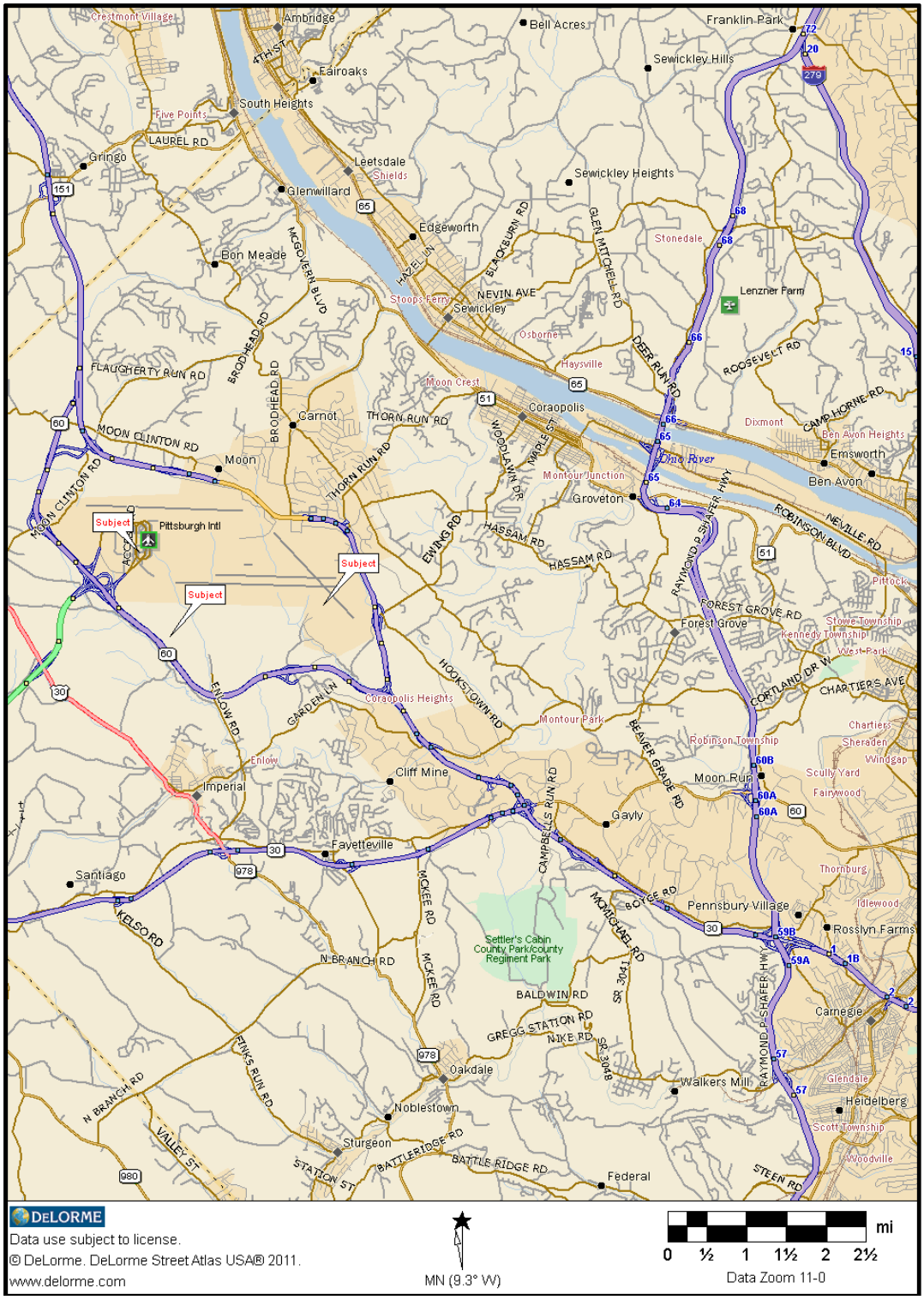
Surrounding Area Land Uses	
Character of Area	Suburban
Predominant Age of Improvements	20 years
Predominant Quality and Condition	Average
Approximate Percent Developed	75%
Infrastructure/Planning	Average
Predominant Location of Undeveloped Land	North
Prevailing Direction of Growth	North

Outlook and Conclusions

The area is in the stable stage of its life cycle. Recent development activity has been limited. We anticipate that property values will remain stable in the near future.

Surrounding Area Attribute Ratings	
Highway Access	Average
Demand Generators	Above Average
Convenience to Support Services	Above Average
Convenience to Public Transportation	Average
Employment Stability	Average
Police and Fire Protection	Average
Property Compatibility	Average
General Appearance of Properties	Average
Appeal to Market	Average
Price/Value Trend	Average

Surrounding Area Map



Land Description and Analysis

The subject parcels are assumed to be connected to all public utilities.

COOLING TOWER PARCEL

The Cooling Tower parcel is situated near the commercial vehicle driveway on the east side of the airport terminal. The parcel is irregular, contains 1.80 acres (estimated) and is below average in utility due to its location adjacent to a cooling tower and service vehicle garage. The fronting drive is an access road to runway service areas. Access is provided by a nearby commercial curb drive next to the landside terminal.


Subject

SOLAR PANEL PARCEL

The Solar Panel parcel is situated on the south side of the main runways in an undeveloped, cleared and sloping area. The parcel was used as a landfill for municipal waste excavated from the site of the terminal. The parcel is essentially round in shape, contains 35.19 acres (estimated) and is considered of minimal utility due to its location in an undeveloped area with poor access and no frontage on any significant road. The fronting drive is an access road to former emergency training facilities. Access is provided by lightly traveled and restricted access road to support facilities for the airport along but not connected to I-376.


Pittsburgh International Ai
Subject

SUBSTATION PARCELS

The Substation parcels are situated adjacent to a West Penn Power substation at the south eastern and western corners of the intersection of Tower Drive with Hangar Road to the east of the main runways in an area developed with hangars and light industrial warehouses. The subject consists of three parcels surrounding by these municipal roads. The parcels are irregular in shape and contain 1.6914 acres, or 73,678 square feet (estimated). The parcels are limited in utility due to their shape and intervening roadways. The fronting roads are municipal streets and appears to offer reasonable access to the properties. These roads connect to I-376 Business at a signalized intersection approximately ½ mile to the northwest.

EASEMENTS, ENCROACHMENTS AND RESTRICTIONS

The uses of subject Micro Grid parcels are tightly-controlled by a variety of restrictions in place due to the location of the properties on the grounds of the Pittsburgh International Airport. These restrictions clearly affect market value. All transactions relative to the underlying use and potential improvements on the parcels in the airport are subject to review and Allegheny County Airport Authority approval.

We have assumed no adverse impacts from easements, encroachments, or restrictions, and further, that the subject has clear and marketable title.

ENVIRONMENTAL ISSUES

No environmental issues were observed or reported. NKF is not qualified to detect the existence of any potentially hazardous materials such as lead paint, asbestos, urea formaldehyde foam insulation, or other potentially hazardous construction materials on or in the subject property. The existence of such substances may affect the value of the property. For the purpose of this assignment, we have specifically assumed that any hazardous materials that would cause a loss in value do not affect the subject.

OTHER USE RESTRICTIONS

All land areas within the boundaries of the Pittsburgh International Airport are owned and controlled by the Allegheny County Airport Authority. The area is also governed by the FAA through a variety of regulations. We are not aware of any other land use regulations that would affect the property.

CONCLUSION

Overall, the physical characteristics of the parcels and the availability of utilities result in functional utility suitable for a limited number of airport-related uses. We are not aware of any other particular restrictions on development.

SITE PLAN

Not Available

REAL ESTATE TAXES

All of the parcels are assessed under Tax Parcel 696-D-396, which encompasses all of the land of the Pittsburgh International Airport. The subject parcels are not separately assessed. The scheduled real estate assessment for the current tax year are shown in the following table. **It should be noted that the Board of Assessment in Allegheny County has determined that properties under the authority of the Allegheny County Airport Authority are exempt from taxation.**

Taxes and Assessments - 2018

	Assessed Value			Taxes and Assessments	
Tax ID	Land	Improvements	Total	Tax Rate	Ad Valorem Taxes
696-D-396	$114,689,800	$0	$114,689,800	0.000000%	$0

Zoning

Zoning Summary	
Zoning Jurisdiction	Findlay Township
Zoning Designation	HI
Description	Heavy Industrial
Legally Conforming?	NA
Zoning Change Likely?	No
Permitted Uses	Industrial

We are not experts in the interpretation of zoning ordinances. An appropriately qualified land use attorney should be engaged if a determination of compliance with zoning is required.

CONCLUSION

The subject is zoned for heavy industrial use by Findlay Township, however, all uses with the boundaries of the Pittsburgh International Airport are under the control of the Allegheny County Airport Authority. All uses in the airport are airport-related or the surrounding area is vacant.

Methodology

COST APPROACH

The cost approach is based on the proposition that the informed purchaser would pay no more for the subject than the cost to produce a substitute property with equivalent utility. This approach is particularly applicable when the property being appraised involves relatively new improvements that represent the highest and best use of the land, or when it is improved with relatively unique or specialized improvements for which there exist few sales or leases of comparable properties.

SALES COMPARISON APPROACH

The sales comparison approach utilizes sales of comparable properties, adjusted for differences, to indicate a value for the subject. Valuation is typically accomplished using physical units of comparison such as price per square foot, price per unit, price per floor, etc., or economic units of comparison such as gross rent multiplier. Adjustments are applied to the physical units of comparison derived from the comparable sale. The unit of comparison chosen for the subject is then used to yield a total value.

INCOME CAPITALIZATION APPROACH

The income capitalization approach reflects the subject's income-producing capabilities. This approach is based on the assumption that value is created by the expectation of benefits to be derived in the future. Specifically estimated is the amount an investor would be willing to pay to receive an income stream plus reversion value from a property over a period of time. The two common valuation techniques associated with the income capitalization approach are direct capitalization and the discounted cash flow (DCF) analysis.

Approaches to Value

Approach	Applicability to Subject	Use in Assignment
Cost Approach	Not Applicable	Not Utilized
Sales Comparison Approach	Applicable	Utilized
Income Capitalization Approach	Not Applicable	Not Utilized

The subject property consists of airport land proposed for lease. The cost approach is not utilized as the subject property is only the underlying land. The sales comparison approach is utilized as ground leases vary significantly. However, the sales comparison approach is utilized to provide market rental levels in fee simple. The income capitalization approach is not developed since the assignment concern only of determining underlying land lease rates.

Market Rent Analysis

The land within the Pittsburgh International Airport is leased as is typical for most airports. To estimate market rent for the subject, we searched for comparable rentals within the following parameters:

- Location: Pittsburgh International Airport proximity
- Property Type: Vacant land or underlying land
- Size: Not considered in rental analysis since the potential uses of the property have not been determined.
- Date: No specific time frame due to the very limited number of leases actually signed.

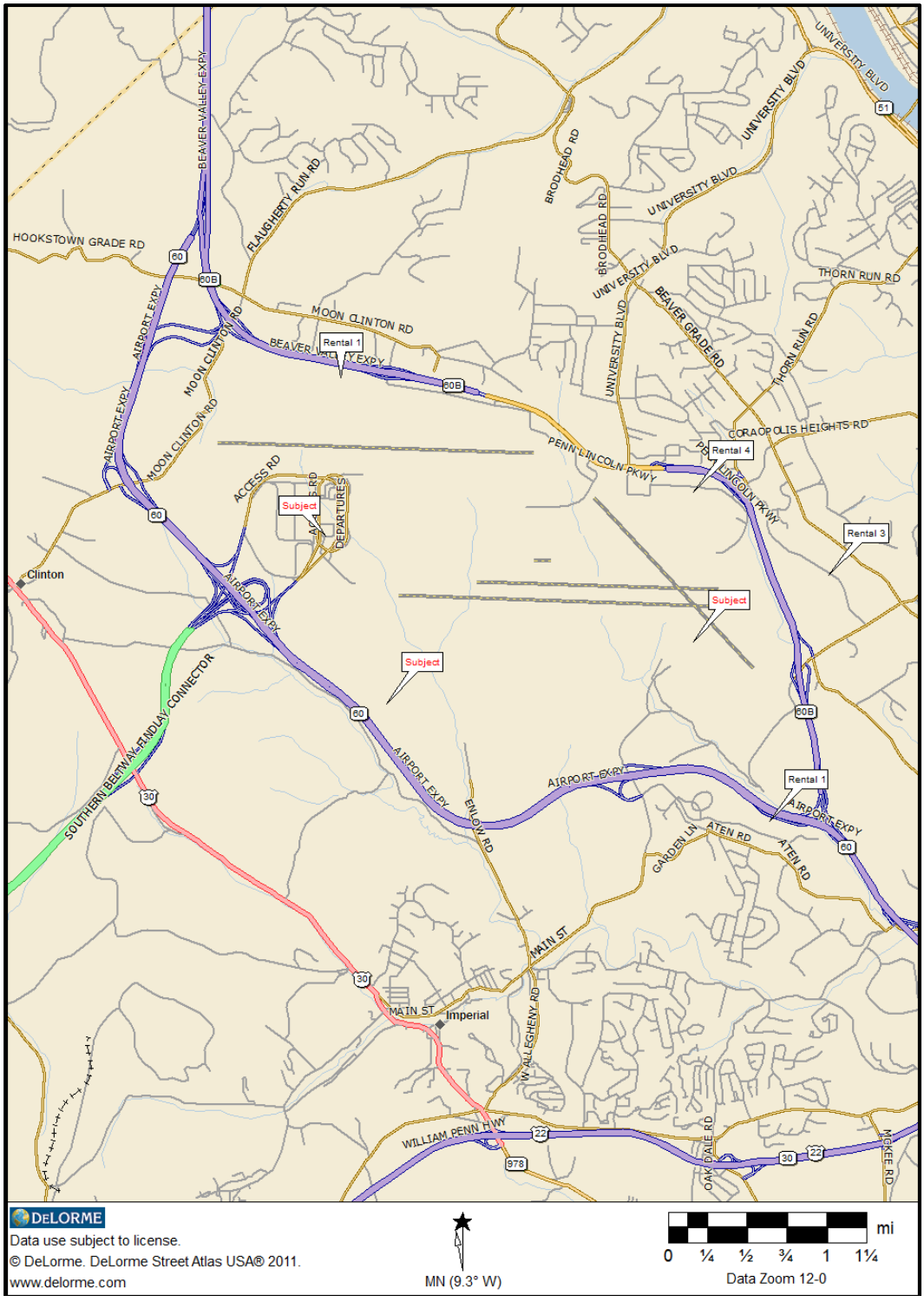
Comparable rentals considered most relevant are summarized in the table on the following page.

COMPETITIVE LEASE SUMMARIES

Lease Information - Allegheny County Airport Authority

Tenant	Term	Years	Rate per SF	Current Rate per SF
Dick's Sporting Goods 1256 Court Dr. Coraopolis, PA Leased Premises: 116 acres Runway Frontage and Non Runway Frontage Proposed Improvements: 670,000 SF Office Building 59,560 SF Hangar Comments: Rent was phased in as improvements were completed	359 months	Yrs. 1- 5 Yrs. 6- 10 Yrs. 11- 15 Yrs. 16 -- 20 Yrs. 21- 25 Yrs. 26 - 29	$0.115 $0.133 $0.155 $0.179 $0.207 $0.241	$0.133
Various Office Tenants Industry Drive Findlay Township, PA Leased Premises: 8 to 10.5 acres Non-Runway Proposed Improvements: 60,256 SF to 87,594 SF Office Buildings	360 to 600 months (with options) Starts 2015	Yrs. 1- 5 Yrs. 6- 10 Yrs. 11- 15 Yrs. 16 -- 20 Yrs. 21- 25 Yrs. 25- 26	$0.220 $0.250 $0.280 $0.310 $0.340 $0.370	$0.220
Various Office Tenants Cherrington Parkway Moon Township, PA Leased Premises: 6.7 to 11 acres Non-Runway Proposed Improvements: 53,000 SF to 66,978 SF Office Buildings	600 months (with options); Starts 2014	Yrs. 1- 5 Yrs. 6- 10 Yrs. 11- 15 Yrs. 16 -- 20 Yrs. 21- 25 Yrs. 25- 26	$0.180 $0.202 $0.224 $0.246 $0.268 $0.290	$0.180
Lease for Mylan (formerly Heinz) Hangar Wright Brothers Dr. Pittsburgh International Airport Moon Township, PA Leased Premises: 153,331 SF Land Area; Runway located Improvements: A 41,336 SF Hangar; The hangar was subsequently completely renovated.	359 months Starts 2014	Yrs. 1- 5	$0.250	CPI Increase

Comparable Rentals Map



Rental Analysis Factors

The following elements of comparison are considered in our analysis of the comparable rentals:

Rental Analysis Factors	
Expense Structure	Division of expense responsibilities between landlord and tenants.
Conditions of Lease	Extraordinary motivations of either landlord or tenant to complete the transaction.
Market Conditions	Changes in the economic environment over time that affect the appreciation and depreciation of real estate.
Location	Market or submarket area influences on rent; surrounding land use influences.
Access/Exposure	Convenience to transportation facilities; ease of site access; visibility from main thoroughfares; traffic counts.
Size	Difference in rental rates that is often attributable to variation in sizes of leased space. Size is not considered due to the lack of projected uses.
Physical Features	Physical features are given very limited consideration due to the lack of significant potential uses.
Economic Characteristics	Variations in rental rate attributable to such factors as free rent or other concessions, pattern of rent changes over lease term, or tenant improvement allowances.

A review of the comparables reveals that ground leases in this market are typically structured on a absolute net lease basis with tenants paying for all expenses including real estate taxes, insurance, utilities, and repairs/maintenance. The property owner is usually responsible only a very limited property management fee. All of the lease rates have similar expense arrangements. All leased properties are considered similar in zoning and Airport development restrictions.

Analysis of Comparable Rentals

Rent 1 is the 2009 lease of 116 acres to Dick's Sporting Goods, located at 345 Court St., Coraopolis, Allegheny County, PA. The rent is $0.115/SF/yr. per square foot, for an absolute net lease. The tenant constructed a 670,000 square foot headquarters building and a 52,560 square foot hangar adjacent to a runway.

Rent 2 is the 2015 land leases for office properties in the Airport Business Park along Industry Drive in Findlay Township. Two leases of 8.90 and 10.5 acres at a rate of $0.225 per SF of land were written. Terms were of 30 and 50 years with bumps of $0.03 every five years. The leases do not include runway frontage.

Rent 3 is the 2014 through 2016 land leases for office properties in the Cherrington Office Park along Cherrington Parkway in Moon Township. Three leases ranging from 6.70 to 11.0 acres were written at a rate of $0.18 per SF of land. All terms were for 50 years with bumps of $0.022 every four years. The leases do not include runway frontage.

Rent 4 is the extension of the October 2008 facility lease to the H.J. Heinz Company to MP Air Inc. which is a subsidiary of Mylan Labs. The rate of the lease is $0.25 for the building area of 41,336 square feet with the requirement that the existing hangar be fully renovated. The lease extension had a term of 29 years, 11 months.

SUBSTATION PARCELS

Factor	Issues	Impact on Value
Location	The location of the subject at the east side of the Pittsburgh International Airport is considered average for support and related airport services.	↔
Access/Exposure	The parcels will be considered average in access/exposure compared to other competitive sites at the airport.	↔
Size	The size of the site is not considered since conventional developmental uses are not considered in this analysis.	NA
Use	The subject is extremely limited in potential development use for a variety of reasons. Negative adjustments are made to all comparables.	↓
Physical Features	The physical features of the subject are given limited consideration due to the lack of a specific potential use.	NA

The following table summarizes the adjustments we make to each rental comparable.

Rental Adjustment Grid - Substation Parcels					
	Subject	Comparable 1	Comparable 2	Comparable 3	Comparable 4
Property Name	Substation Parcel	Dick's Sporting Goods Site	Office Tenants	Office Building Tenants	Mylan (Former Heinz) Hangar
Address	Pittsburgh International Airport	345 Court St.	Industry Drive	Cherrington Parkway	Airport
City	Findlay Township	Coraopolis	Findlay Township	Moon Township	Moon Township
County	Allegheny	Allegheny	Allegheny	Allegheny	Allegheny
State	PA	PA	PA	PA	PA
Lease Start Date		2009	2015	2014	2005
Lease Term (Months)		359	360- 600	600	300
Leased SF	73,678	5,052,960	457,382	479,160	153,331
Term (months)		360	360 - 600	600	360
Lease Type	Absolute Net	Absolute Net	Absolute Net	Absolute Net	Absolute Net
Base Rent/SF/Yr		**$0.12**	**$0.22**	**$0.18**	**$0.25**
Expense Structure					
$ Adjustment		–	–	–	–
Conditions of Lease					
% Adjustment		–	–	–	–
Market Conditions		Jul-05	Jul-05	Jul-05	Jun-05
Annual % Adjustment		–	–	–	–
Cumulative Adjusted Rent		**$0.12**	**$0.22**	**$0.18**	**$0.25**
Location		–	–	–	–
Access/Exposure		–	–	–	–
Size			–	–	
Use		-35%	-35%	-35%	-35%
Physical Features		–	–	–	–
Net $ Adjustment		-$0.04	-$0.08	-$0.06	-$0.09
Net % Adjustment		-35%	-35%	-35%	-35%
Final Adjusted Price		**$0.07**	**$0.14**	**$0.12**	**$0.16**
Overall Adjustment		-35%	-35%	-35%	-35%

Range of Adjusted Rents	**$0.07 - $0.16**
Average	**$0.12**
Indicated Rent	**$0.12**

Market Rent Conclusion

After analysis, the overall range is $0.07 - $0.16 per square foot per year with an average of $0.12 per square foot. All of the comparables are considered relevant due to the very limited number of similar properties. Based on the preceding analysis of comparable rentals, we conclude market lease terms for the subject as follows:

Concluded Market Lease Terms

Space Type	SF	Market Rent	Measure	Rent Escalations	Lease Type	Lease Term (Mos.)
Substation Parcel	73,678	$0.12	$/SF/Yr	CPI - Every Five Years	Absolute Net	600

Potential Gross Rent

		Potential Rent at Contract	
Space Type	SF	Annual Rent /SF	$/Year
Solar Panel Parcel	73,678	$0.12	$8,841
Total Subject	73,678	$0.12	$8,841

[1] Contract rent for leased space; vacant space at market.

Based on the preceding analysis of comparable rentals, we conclude a market annual lease rate for the subject is $8,841, rounded to $8,800.

SOLAR PANEL PARCEL

Factor	Issues	Impact on Value
Location	The location of the subject at the extreme southwest side of the Pittsburgh International Airport is considered poor for any purpose. Both location and access/exposure are considered in a single adjustment.	↓
Access/Exposure	The parcel is considered poor in access/exposure compared to other competitive sites at the airport.	↓
Size	The size of the site is not considered since conventional developmental uses are not considered in this analysis.	NA
Use	The subject is extremely limited in potential development use for a variety of reasons. Negative adjustments are made to all comparables.	↓
Physical Features	The physical features of the subject are given limited consideration due to the lack of a specific potential use.	NA

The following table summarizes the adjustments we make to each rental comparable.

Rental Adjustment Grid - Solar Panel Parcel					
	Subject	Comparable 1	Comparable 2	Comparable 3	Comparable 4
Property Name	Solar Panel Parcel	Dick's Sporting Goods Site	Office Tenants	Office Building Tenants	Mylan (Former Heinz) Hangar
Address	Pittsburgh International Airport	345 Court St.	Industry Drive	Cherrington Parkway	Airport
City	Findlay Township	Coraopolis	Findlay Township	Moon Township	Moon Township
County	Allegheny	Allegheny	Allegheny	Allegheny	Allegheny
State	PA	PA	PA	PA	PA
Lease Start Date		2009	2015	2014	2005
Lease Term (Months)		359	360- 600	600	300
Leased SF	1,633,936	5,052,960	457,382	479,160	153,331
Term (months)		360	360 - 600	600	360
Lease Type	Absolute Net	Absolute Net	Absolute Net	Absolute Net	Absolute Net
Base Rent/SF/Yr		**$0.12**	**$0.22**	**$0.18**	**$0.25**
Expense Structure					
$ Adjustment		–	–	–	–
Conditions of Lease					
% Adjustment		–	–	–	–
Market Conditions		Jul-05	Jul-05	Jul-05	Jun-05
Annual % Adjustment		–	–	–	–
Cumulative Adjusted Rent		**$0.12**	**$0.22**	**$0.18**	**$0.25**
Location		-50%	-50%	-50%	-50%
Access/Exposure		–	–	–	–
Size			–	–	
Use		-40%	-40%	-40%	-40%
Physical Features		–	–	–	–
Net $ Adjustment		-$0.10	-$0.20	-$0.16	-$0.23
Net % Adjustment		-90%	-90%	-90%	-90%
Final Adjusted Price		**$0.01**	**$0.02**	**$0.02**	**$0.03**
Overall Adjustment		-90%	-90%	-90%	-90%

Range of Adjusted Rents	**$0.01 - $0.03**
Average	**$0.02**
Indicated Rent	**$0.02**

Market Rent Conclusion

After analysis, the overall range is $0.01 - $0.03 per square foot per year with an average of $0.02 per square foot. All of the comparables are considered relevant due to the very limited number of similar properties. Based on the preceding analysis of comparable rentals, we conclude market lease terms for the subject as follows:

Concluded Market Lease Terms

Space Type	SF	Market Rent	Measure	Rent Escalations	Lease Type	Lease Term (Mos.)
Solar Panel Parcel	1,633,936	$0.02	$/SF/Yr	CPI - Every Five Years	Absolute Net	600

Potential Gross Rent

		Potential Rent at Contract	
Space Type	SF	Annual	$/SF/Yr
Solar Panel Parcel	1,633,936	$0.02	$32,679
Total Subject	1,633,936	$0.02	$32,679

Based on the preceding analysis of comparable rentals, we conclude a market annual lease rate for the subject is $32,679, rounded to $32,700.

COOLING TOWER PARCEL

The following factors are considered in the evaluation of the land rental of this parcel.

Factor	Issues	Impact on Value
Location	The location of the subject adjacent to the terminal of the Pittsburgh International Airport is considered above-average. Both location and access/exposure are considered in a single adjustment.	↑
Access/Exposure	The parcel is considered average in access/exposure compared to other competitive sites at the airport.	↔
Size	The size of the site is not considered since conventional developmental uses are not considered in this analysis.	NA
Use	The subject is considered limited in potential development use for a variety of reasons including the proximity of various structures. Negative adjustments are made to all comparables.	↓
Physical Features	The physical features of the subject are given limited consideration due to the lack of a specific potential use.	NA

The following table summarizes the adjustments we make to each rental comparable.

Rental Adjustment Grid - Cooling Tower Parcel					
	Subject	Comparable 1	Comparable 2	Comparable 3	Comparable 4
Property Name	Cooling Tower Parcel	Dick's Sporting Goods Site	Office Tenants	Office Building Tenants	Mylan (Former Heinz) Hangar
Address	Pittsburgh International Airport	345 Court St.	Industry Drive	Cherrington Parkway	Airport
City	Findlay Township	Coraopolis	Findlay Township	Moon Township	Moon Township
County	Allegheny	Allegheny	Allegheny	Allegheny	Allegheny
State	PA	PA	PA	PA	PA
Lease Start Date		2009	2015	2014	2005
Lease Term (Months)		359	360- 600	600	300
Leased SF	78,408	5,052,960	457,382	479,160	153,331
Term (months)		360	360 - 600	600	360
Lease Type	Absolute Net	Absolute Net	Absolute Net	Absolute Net	Absolute Net
Base Rent/SF/Yr		**$0.12**	**$0.22**	**$0.18**	**$0.25**
Expense Structure					
$ Adjustment		–	–	–	–
Conditions of Lease					
% Adjustment		–	–	–	–
Market Conditions		Jul-05	Jul-05	Jul-05	Jun-05
Annual % Adjustment		–	–	–	–
Cumulative Adjusted Rent		**$0.12**	**$0.22**	**$0.18**	**$0.25**
Location					
Access/Exposure		25%	25%	25%	25%
Size			–	–	
Use		-40%	-40%	-40%	-40%
Physical Features		–	–	–	–
Net $ Adjustment		-$0.02	-$0.03	-$0.03	-$0.04
Net % Adjustment		-15%	-15%	-15%	-15%
Final Adjusted Price		**$0.10**	**$0.19**	**$0.15**	**$0.21**
Overall Adjustment		-15%	-15%	-15%	-15%

Range of Adjusted Rents	**$0.10 - $0.21**
Average	**$0.16**
Indicated Rent	**$0.16**

Market Rent Conclusion

After analysis, the overall range is $0.10 - $0.21 per square foot per year with an average of $0.16 per square foot. All of the comparables are considered relevant due to the very limited number of similar properties. Based on the preceding analysis of comparable rentals, we conclude market lease terms for the subject as follows:

Concluded Market Lease Terms

Space Type	SF	Market Rent	Measure	Rent Escalations	Lease Type	Lease Term (Mos.)
Cooling Tower Parcel	78,408	$0.16	$/SF/Yr	CPI - Every Five Years	Absolute Net	600

Potential Gross Rent

		Potential Rent at Contract	
Space Type	SF	Annual Rent/SF	$/Year
Cooling Tower Parcel	78,408	$0.16	$12,545
Total Subject	78,408	$0.16	$12,545

Based on the preceding analysis of comparable rentals, we conclude an annual market lease amount of $12,545, rounded to $12,500.

MARKET RENTAL VALUE CONCLUSION

Based on the preceding valuation analysis and subject to the definitions, assumptions, and limiting conditions expressed in the report, our opinion of value is as follows:

Market Value Rental Conclusions

Property	Interest Appraised	Date of Value	Annual Rental Value Conclusion
Substation Parcels	Fee Simple	April 13, 2018	$8,800
Solar Panel Parcel	Fee Simple	April 13, 2018	$32,700
Cooling Tower Parcel	Fee Simple	April 13, 2018	$12,500

Extraordinary Assumptions and Hypothetical Conditions

The value conclusions are subject to the following extraordinary assumptions that may affect the assignment results. An extraordinary assumption is uncertain information accepted as fact. If the assumption is found to be false as of the effective date of the appraisal, it may affect our value conclusions.

1. No legal descriptions or other information regarding sizes and other physical characteristics of the subject parcels were available. This information used in this report was obtained through estimation and representations made by the client. Should actual site sizes and other data deviate from these estimations, the value conclusions in this report may be affected.

The value conclusions are based on the following hypothetical conditions that may affect the assignment results. A hypothetical condition is a condition contrary to known fact on the effective date of the appraisal but is supposed for the purpose of analysis.

1. None

Assumptions and Limiting Conditions

The Appraisal contained in this Report (herein "Report") is subject to the following assumptions and limiting conditions:

1. Unless otherwise stated in this report, title to the property which is the subject of this report (herein "Property") is assumed to be good and marketable and free and clear of all liens and encumbrances and that there are no recorded or unrecorded matters or exceptions to title that would adversely affect marketability or value. No responsibility is assumed for the legal description, zoning, condition of title or any matters which are legal in nature or otherwise require expertise other than that of a professional real estate appraiser. This report shall not constitute a survey of the Property.
2. Unless otherwise stated in this report, it is assumed: that the improvements on the Property are structurally sound, seismically safe and code conforming; that all building systems (mechanical/electrical, HVAC, elevator, plumbing, etc.) are in good working order with no major deferred maintenance or repair required; that the roof and exterior are in good condition and free from intrusion by the elements; that the Property and improvements conform to all applicable local, state, and federal laws, codes, ordinances and regulations including environmental laws and regulations. No responsibility is assumed for soil or subsoil conditions or engineering or structural matters. The Property is appraised assuming that all required licenses, certificates of occupancy, consents, or other legislative or administrative authority from any local, state, or national government or private entity or organization have been or can be obtained or renewed for any use on which the value estimates contained in this report is based, unless otherwise stated. The physical condition of the Property reflected in this report is solely based on a visual inspection as typically conducted by a professional appraiser not someone with engineering expertise. Responsible ownership and competent property management are assumed.
3. Unless otherwise stated in this report, this report did not take into consideration the existence of asbestos, PCB transformers or other toxic, hazardous, or contaminated substances or underground storage tanks, or the cost of encapsulation, removal or remediation thereof. Real estate appraisers are not qualified to detect such substances. The presence of substances such as asbestos, urea formaldehyde foam insulation, contaminated groundwater or other potentially hazardous materials and substances may adversely affect the value of the Property. Unless otherwise stated in this report, the opinion of value is predicated on the assumption that there is no such material or substances at, on or in the Property.

4. All statements of fact contained in this report as a basis of the analyses, opinions, and conclusions herein are true and correct to the best of the appraiser's actual knowledge and belief. The appraiser is entitled to and relies upon the accuracy of information and material furnished by the owner of the Property or owner's representatives and on information and data provided by sources upon which members of the appraisal profession typically rely and that are deemed to be reliable by such members. Such information and data obtained from third party sources are assumed to be reliable and have not been independently verified. No warranty is made as to the accuracy of any of such information and data. Any material error in any of the said information or data could have a substantial impact on the conclusions of this Report. The appraiser reserves the right to amend conclusions reported if made aware of any such error.

5. The opinion of value stated in this report is only as of the date of value stated in this report. An appraisal is inherently subjective and the conclusions stated apply only as of said date of value, and no representation is made as to the effect of subsequent events. This report speaks only as of the date hereof.

6. Any projected cash flows included in the analysis are forecasts of estimated future operating characteristics and are predicated on the information and assumptions contained within this report. Any projections of income, expenses and economic conditions utilized in this report are not predictions of the future. Rather, they are estimates of market expectations of future income and expenses. The achievement of any financial projections will be affected by fluctuating economic conditions and is dependent upon other future occurrences that cannot be assured. Actual results may vary from the projections considered herein. There is no warranty or assurances that these forecasts will occur. Projections may be affected by circumstances beyond anyone's knowledge or control. Any income and expense estimates contained in this report are used only for the purpose of estimating value and do not constitute predictions of future operating results.

7. The analyses contained in this report may necessarily incorporate numerous estimates and assumptions regarding Property performance, general and local business and economic conditions, the absence of material changes in the competitive environment and other matters. Some estimates or assumptions, however, inevitably will not materialize, and unanticipated events and circumstances may occur; therefore, actual results achieved during the period covered by the analysis will vary from estimates, and the variations may be material.

8. All prospective value opinions presented in this report are estimates and forecasts which are prospective in nature and are subject to considerable risk and uncertainty. In addition to the contingencies noted in the preceding paragraphs, several events may occur that could substantially alter the outcome of the estimates such as, but not limited to changes in the economy, interest rates, capitalization rates, behavior of consumers, investors and lenders, fire and other physical destruction, changes in title or conveyances of easements and deed restrictions, etc. In making prospective estimates and forecasts, it is assumed that conditions reasonably foreseeable at the present time are consistent or similar with the future.

9. The allocations of value for land and improvements must not be used in conjunction with any other appraisal and are invalid if so used. This report shall be considered only in its entirety. No part of this report shall be utilized separately or out of context.

10. Neither all nor any part of the contents of this report (especially any conclusions as to value, the identity of the appraiser, or any reference to the Appraisal Institute) shall be disseminated through advertising media, public relations media, news media or any other means of communication (including without limitation prospectuses, private offering memoranda and other offering material provided to prospective investors) without the prior written consent of the Firm. Possession of this report, or a copy hereof, does not carry with it the right of publication.

11. Client and any other Intended User identified herein (should consider this report and the opinion of value contained herein as only one factor together with its own independent considerations and underwriting guidelines in making any decision or investment or taking any action regarding the Property. Client agrees that Firm shall not be responsible in any way for any decision of Client or any Intended User related to the Property or for the advice or services provided by any other advisors or contractors. The use of this report and the appraisal contained herein by anyone other than an Intended User identified herein, or for a use other than the Intended Use identified herein, is strictly prohibited. No party other than an Intended User identified herein may rely on this report and the appraisal contained herein.

12. Unless otherwise stated in the agreement to prepare this report, the appraiser shall not be required to participate in or prepare for or attend any judicial, arbitration, or administrative proceedings.

13. The Americans with Disabilities Act (ADA) became effective January 26, 1992. No survey or analysis of the Property has been made in connection with this report to determine whether the physical aspects of the improvements meet the ADA accessibility guidelines. No expertise in ADA issues is claimed, and the report renders no opinion regarding the Property's compliance with ADA regulations. Inasmuch as compliance matches each owner's financial ability with the cost to cure the non-conforming physical characteristics of a property, a specific study of both the owner's financial ability and the cost to cure any deficiencies would be needed for the Department of Justice to determine compliance.

14. Acceptance and/or use of this report constitutes full acceptance of these Assumptions and Limiting Conditions and any others contained in this report, including any Extraordinary Assumptions and Hypothetical Conditions, and is subject to the terms and conditions contained in the agreement to prepare this report and full acceptance of any limitation of liability or claims contained therein.

Addendum A

Definitions

The following definitions are derived from The Dictionary of Real Estate Appraisal, 6th ed. (Chicago: Appraisal Institute, 2015).

- ***Absorption Period:*** The actual or expected period required from the time a property, group of properties, or commodity is initially offered for lease, purchase, or use by its eventual users until all portions have been sold or stabilized occupancy has been achieved.

- ***Absorption Rate:*** ***1)*** Broadly, the rate at which vacant space in a property or group of properties for sale or lease has been or is expected to be successfully sold or leased over a specified period of time. ***2)*** In subdivision analysis, the rate of sales of lots or units in a subdivision.

- ***Ad Valorem Tax:*** A tax levied in proportion to the value of the thing(s) being taxed. Exclusive of exemptions, use-value assessment provisions, and the like, the property tax is an ad valorem tax. (International Association of Assessing Officers [IAAO])

- ***Assessed Value:*** The value of a property according to the tax rolls in ad valorem taxation; may be higher or lower than market value, or based on an assessment ratio that is a percentage of market value.

- ***Cash Equivalency:*** An analytical process in which the sale price of a transaction with nonmarket financing or financing with unusual conditions or incentives is converted into a price expressed in terms of cash or its equivalent.

- ***Contract Rent:*** The actual rental income specified in a lease.

- ***Disposition Value:*** The most probable price that a specified interest in property should bring under the following conditions: ***1)*** Consummation of a sale within a specified time, which is shorter than the typical exposure time for such a property in that market. ***2)*** The property is subjected to market conditions prevailing as of the date of valuation. ***3)*** Both the buyer and seller are acting prudently and knowledgeably. ***4)*** The seller is under compulsion to sell. ***5)*** The buyer is typically motivated. ***6)*** Both parties are acting in what they consider to be their best interests. ***7)*** An adequate marketing effort will be made during the exposure time. ***8)*** Payment will be made in cash in US dollars (or the local currency) or in terms of financial arrangements comparable thereto. ***9)*** The price represents the normal consideration for the property sold, unaffected by special or creative financing or sales concessions granted by anyone associated with the sale. This definition can also be modified to provide for valuation with specified financing terms.

- ***Effective Rent:*** Total base rent, or minimum rent stipulated in a lease, over the specified lease term minus rent concessions; the rent that is effectively paid by a tenant net of financial concessions provided by a landlord.

- ***Excess Land:*** Land that is not needed to serve or support the existing use. The highest and best use of the excess land may or may not be the same as the highest and best use of the improved parcel. Excess land has the potential to be sold separately and is valued separately. See also ***surplus land.***

- ***Excess Rent:*** The amount by which contract rent exceeds market rent at the time of the appraisal; created by a lease favorable to the landlord (lessor) and may reflect unusual management, unknowledgeable or unusually motivated parties, a lease execution in an earlier, stronger rental market, or an agreement of the parties.

- ***Exposure Time:*** ***1)*** The time a property remains on the market. ***2)*** [The] estimated length of time that the property interest being appraised would have been offered on the market prior to the hypothetical consummation of a sale at market value on the effective date of the appraisal.

- ***Extraordinary Assumption:*** An assumption, directly related to a specific assignment, as of the effective date of the assignment results, which, if found to be false, could alter the appraiser's opinions or conclusions. See also ***hypothetical condition.***

- ***Fee Simple Estate:*** Absolute ownership unencumbered by any other interest or estate, subject only to the limitations imposed by the governmental powers of taxation, eminent domain, police power, and escheat.

- ***Floor Area Ratio (FAR):*** The relationship between the above-ground floor area of a building, as described by the zoning or building code, and the area of the plot on which it stands; in planning and zoning, often expressed as a decimal, e.g., a ratio of 2.0 indicates that the permissible floor area of a building is twice the total land area.

- ***Frictional Vacancy:*** The amount of vacant space needed in a market for its orderly operation. Frictional vacancy allows for move-ins and move-outs.

- ***Full Service Lease:*** See ***gross lease.***

- ***General Vacancy:*** A method of calculating any remaining vacancy and collection loss considerations when using discounted cash flow (DCF) analysis, where turnover vacancy has been used as part of the income estimate. The combined effects of turnover vacancy and general vacancy relate to total vacancy and collection loss.

- ***Going-Concern Premise:*** One of the premises under which the total assets of a business can be valued; the assumption that a company is expected to continue operating well into the future (usually indefinitely).

- ***Going Concern Value:*** An outdated label for the market value of all the tangible and intangible assets of an established and operating business with an indefinite life, as if sold in aggregate; more accurately termed the market value of the going concern or market value of the total assets of the business.

- ***Gross Building Area (GBA):*** ***1)*** Total floor area of a building, excluding unenclosed areas, measured from the exterior of the walls of the above grade area. This includes mezzanines and basements if and when typically included in the market area of the type of property involved. ***2)*** Gross leasable area plus all common areas. ***3)*** For residential space, the total area of all floor levels measured from the exterior of the walls and including the superstructure and substructure basement; typically does not include garage space.

- ***Gross Lease:*** A lease in which the landlord receives stipulated rent and is obligated to pay all of the property's operating and fixed expenses; also called full-service lease.

- ***Hypothetical Condition:*** ***1)*** A condition that is presumed to be true when it is known to be false. (Appraisal Institute: The Standards of Valuation Practice [SVP]) ***2)*** A condition, directly related to a specific assignment, which is contrary to what is known by the appraiser to exist on the effective date of the assignment results, but is used for the purpose of analysis. See also ***extraordinary assumption.***

- ***Intended Users:*** ***1)*** The party or parties the valuer intends will use the report. (SVP) ***2)*** The client and any other party as identified, by name or type, as users of the appraisal or appraisal review report by the appraiser on the basis of communication with the client at the time of the assignment. (USPAP, 2016-2017 ed.)

- ***Investment Value:*** ***1)*** The value of a property to a particular investor or class of investors based on the investor's specific requirements. Investment value may be different from market value because it depends on a set of investment criteria that are not necessarily typical of the market. ***2)*** The value of an asset to the owner or a prospective owner for individual investment or operational objectives. (International Valuation Standards [IVS])

- ***Land-to-Building Ratio:*** The proportion of land area to gross building area; one of the factors determining comparability of properties.

- ***Lease:*** A contract in which the rights to use and occupy land, space, or structures are transferred by the owner to another for a specified period of time in return for a specified rent.

- ***Leased Fee Interest:*** The ownership interest held by the lessor, which includes the right to receive the contract rent specified in the lease plus the reversionary right when the lease expires.

- ***Leasehold Interest:*** The right held by the lessee to use and occupy real estate for a stated term and under the conditions specified in the lease.

- ***Lessee:*** One who has the right to occupancy and use of the property of another for a period of time according to a lease agreement.

- ***Lessor:*** One who conveys the rights of occupancy and use to others under a lease agreement.

- ***Liquidation Value:*** The most probable price that a specified interest in property should bring under the following conditions: ***1)*** Consummation of a sale within a short time period. ***2)*** The property is subjected to market conditions prevailing as of the date of valuation. ***3)*** Both the buyer and seller are acting prudently and knowledgeably. ***4)*** The seller is under extreme compulsion to sell. ***5)*** The buyer is typically motivated. ***6)*** Both parties are acting in what they consider to be their best interests. ***7)*** A normal marketing effort is not possible due to the brief exposure time. ***8)*** Payment will be made in cash in US dollars (or the local currency) or in terms of financial arrangements comparable thereto. ***9)*** The price represents the normal consideration for the property sold, unaffected by special or creative financing or sales concessions granted by anyone associated with the sale. This definition can also be modified to provide for valuation with specified financing terms.

- ***Market Rent:*** The most probable rent that a property should bring in a competitive and open market reflecting the conditions and restrictions of a specified lease agreement, including the rental adjustment and revaluation, permitted uses, use restrictions, expense obligations, term, concessions, renewal and purchase options, and tenant improvements (TIs).

- ***Market Value:*** A type of value that is the major focus of most real property appraisal assignments. Both economic and legal definitions of market value have been developed and refined, such as the following. ***1)*** The most widely accepted components of market value are incorporated in the following definition: The most probable price, as of a specified date, in cash, or in terms equivalent to cash, or in other precisely revealed terms, for which the specified property rights should sell after reasonable exposure in a competitive market under all conditions requisite to a fair sale, with the buyer and seller each acting prudently, knowledgeably, and for self-interest, and assuming that neither is under undue duress. ***2)*** Market value is described, not defined, in the Uniform Standards of Professional Appraisal Practice (USPAP) as follows: A type of value, stated as an opinion, that presumes the transfer of a property (i.e., a right of ownership or a bundle of such rights), as of a certain date, under specific conditions set forth in the definition of the term identified by the appraiser as applicable in an appraisal. [1]

- ***Market Value of the Going Concern:*** The market value of an established and operating business including the real property, personal property, financial assets, and the intangible assets of the business.

- ***Marketing Time:*** An opinion of the amount of time it might take to sell a real or personal property interest at the concluded market value level during the period immediately after the effective date of an appraisal. Marketing time differs from exposure time, which is always presumed to precede the effective date of an appraisal.

[1] The actual definition of value used for this appraisal is contained within the body of the report. The definition of market value given above is general in viewpoint and is only provided for amplification.

- ***Modified Gross Lease:*** A lease in which the landlord receives stipulated rent and is obligated to pay some, but not all, of the property's operating and fixed expenses. Since assignment of expenses varies among modified gross leases, expense responsibility must always be specified. In some markets, a modified gross lease may be called a double net lease, net net lease, partial net lease, or semi-gross lease.

- ***Net Lease:*** A lease in which the landlord passes on all expenses to the tenant. See also ***gross lease; modified gross lease.***

- ***Net Net Net Lease:*** An alternative term for a type of net lease. In some markets, a net net net lease is defined as a lease in which the tenant assumes all expenses (fixed and variable) of operating a property except that the landlord is responsible for structural maintenance, building reserves, and management; also called NNN lease, triple net lease, or fully net lease.

- ***Occupancy Rate:*** ***1)*** The relationship or ratio between the potential income from the currently rented units in a property and the income that would be received if all the units were occupied. ***2)*** The ratio of occupied space to total rentable space in a building.

- ***Overage Rent:*** The percentage rent paid over and above the guaranteed minimum rent or base rent; calculated as a percentage of sales in excess of a specified breakpoint sales volume.

- ***Percentage Rent:*** Rental income received in accordance with the terms of a percentage lease; typically derived from retail store and restaurant tenants and based on a certain percentage of their gross sales.

- ***Prospective Opinion of Value:*** A value opinion effective as of a specified future date. The term does not define a type of value. Instead, it identifies a value opinion as being effective at some specific future date. An opinion of value as of a prospective date is frequently sought in connection with projects that are proposed, under construction, or under conversion to a new use, or those that have not yet achieved sellout or a stabilized level of long-term occupancy.

- ***Rentable Area:*** For office or retail buildings, the tenant's pro rata portion of the entire office floor, excluding elements of the building that penetrate through the floor to the areas below. The rentable area of a floor is computed by measuring to the inside finished surface of the dominant portion of the permanent building walls, excluding any major vertical penetrations of the floor. Alternatively, the amount of space on which the rent is based; calculated according to local practice.

- ***Retrospective Value Opinion:*** A value opinion effective as of a specified historical date. The term retrospective does not define a type of value. Instead, it identifies a value opinion as being effective at some specific prior date. Value as of a historical date is frequently sought in connection with property tax appeals, damage models, lease renegotiation, deficiency judgments, estate tax, and condemnation. Inclusion of the type of value with this term is appropriate, e.g., "retrospective market value opinion."

- ***Shell Rent:*** The typical rent paid for retail, office, or industrial tenant space based on minimal "shell" interior finishes (called vanilla finish or white wall finish in some areas). Usually the landlord delivers the main building shell space or some minimum level of interior build-out, and the tenant completes the interior finish, which can include wall, ceiling, and floor finishes, mechanical systems, interior electricity, and plumbing. Typically these are long-term leases with tenants paying all or most property expenses.

- ***Surplus Land:*** Land that is not currently needed to support the existing use but cannot be separated from the property and sold off for another use. Surplus land does not have an independent highest and best use and may or may not contribute value to the improved parcel. See also ***excess land.***

- ***Turnover Vacancy:*** A method of calculating vacancy allowance that is estimated or considered as part of the potential income estimate when using discounted cash flow (DCF) analysis. As units or suites turn over and are available for re-leasing, the periodic vacancy time frame (vacancy window) to release the space is considered.

- ***Usable Area:*** ***1)*** For office buildings, the actual occupiable area of a floor or an office space; computed by measuring from the finished surface of the office side of corridor and other permanent walls, to the center of partitions that separate the office from adjoining usable areas, and to the inside finished surface of the dominant portion of the permanent outer building walls. Sometimes called net building area or net floor area. See also floor area. ***2)*** The area that is actually used by the tenants measured from the inside of the exterior walls to the inside of walls separating the space from hallways and common areas.

- ***Use Value:*** The value of a property assuming a specific use, which may or may not be the property's highest and best use on the effective date of the appraisal. Use value may or may not be equal to market value but is different conceptually. See also ***value in use.***

- ***Value In Use:*** The value of a property assuming a specific use, which may or may not be the property's highest and best use on the effective date of the appraisal. Value in use may or may not be equal to market value but is different conceptually. See also ***use value.***

- ***Value Indication:*** A valuer's conclusion of value resulting from the application of an approach to value, e.g., the value indication by the sales comparison approach.

Addendum B

Engagement Letter

Integra Realty Resources
Pittsburgh

2591 Wexford-Bayne Road
Suite 102
Sewickley, PA 15143

T 724.742.3300
F 724.742.3390
info@irr.com
www.irr.com

Via Email: dstorer@flypittsburgh.com

April 6, 2018

Mr. David Storer
Manager of Real Estate Development
Allegheny County Airport Authority
Pittsburgh International Airport
Landside Terminal, 4th Floor Mezzanine
P.O. Box 12370
Pittsburgh, PA 15231-0370

SUBJECT: Market Rent Study

Dear Mr. Storer:

Integra Realty Resources – Pittsburgh appreciates the opportunity to provide this proposal for valuation services. The subject property consists of three micro grid sites owned by the Allegheny County Airport Authority. Specifically the properties are identified as indicated on the attached site plan (Attachment II).

We understand the objective of this assignment will be to provide the market rent of the fee simple estate for each of the identified sites. We will provide 3 separate values. The intended use of the appraisals is for internal valuation. The use of the appraisals by anyone other than you is prohibited. The appraisals will be prepared in conformance with and subject to, the Code of Professional Ethics and Standards of Professional Appraisal Practice of the Appraisal Institute, the Uniform Standards of Professional Appraisal Practice (USPAP) developed by the Appraisal Standards Board of the Appraisal Foundation. The Ethics Rule of USPAP requires us to disclose to you any prior services we have performed regarding the Subject Property within a three year period immediately preceding the acceptance of this assignment, either as an appraiser or in any other capacity. We have not provided valuation services to either of these properties.

In accordance with our correspondence, the scope of this assignment will require IRR – Pittsburgh to consider all relevant and applicable approaches to value as determined during the course of our research, Subject Property analysis and preparation of the reports. The appraisals will be communicated in Appraisal Report – Standard Format. All work will be performed under the direct supervision of the undersigned, together with other staff members. The appraisals and this letter agreement will be subject to our standard assumptions and limiting conditions a copy of which is attached as Attachment I.

The fee for this assignment will be $3,600 and the delivery date will be three weeks, provided we are in receipt of your acceptance of this letter agreement, but subject to extension based upon late delivery of the requested data and scheduled access for inspection. The fees will be due and payable within 30 days of the delivery of the reports. It is understood that simple interest of 15% per annum will accrue on any unpaid balance for compensation due, subject to reduction pursuant to any applicable usury law. We shall also be entitled to recover our costs (including attorneys' fees), associated with collecting any amounts owed or otherwise incurred in connection with this assignment. If the assignment is cancelled by either party prior to completion, you agree to pay us for all our expenses and our time to date based upon the percentage of work completed. Upon default, we shall be permitted to file a lien against the Subject Property for any amounts owed pursuant to this engagement.

Two copies of each appraisal report will be provided. The delivery date is contingent upon the absence of events outside our control, timely access for inspection of the Subject Property, as well as our receipt of all requested information necessary to complete the assignment.

In the event we receive a subpoena or are called to testify in any litigation, arbitration or administrative hearing of any nature whatsoever as a result of this engagement or the related report, to which we are not a party, you agree to pay our then current hourly rates for such preparation and presentation of testimony. You agree the : (i) the data collected by us in this assignment will remain our property; and (ii) with respect to any data provided by you, IRR – Pittsburgh and its partner companies may utilize, sell and include such data (either in the aggregate or individually), in the Integra database and for use in derivate products. You agree that all data already in public domain may be utilized on an unrestricted basis.

Finally, you agree that we may use commercially available as well as proprietary software programs to perform your assignment (web based and others).

Mr. David Storer
April 6, 2018
Page 3

Please be advised that substantially all of the assets of Integra Realty Resources Pittsburgh LLC are being acquired by Newmark Knight Frank Valuation & Advisory (East), LLC ("Newmark"). We anticipate closing the acquisition during April 2018. In the event that completion of the appraisal is to occur after closing of such acquisition, by signing below, you hereby consent to the assignment of this agreement to Newmark upon closing of such acquisition.

If you are in agreement with the terms set forth in this letter and wish to proceed with the engagement, please sign below and return one copy to us. Thank you for this opportunity to be of service and we look forward to working with you.

Sincerely,

INTEGRA REALTY RESOURCES PITTSBURGH

Douglas A. Herold, MAI
Managing Director

Attachments

AGREED AND ACCEPTED THIS 6 **DAY OF** April **, 2018**

BY:

David Storer
Signature

David Storer
Name (print)

ACAA
Company (print)

Addendum C

Appraiser Qualifications and Licenses

John P. Sozansky, MAI

2591 Wexford-Bayne Road
Suite 102
Sewickley, PA 15143

T 724-742-3300
F 724-742-3390

Experience

Vice President for Newmark Knight Frank, based in the Pittsburgh, Pennsylvania office; Mr. Sozansky has been engaged in commercial real estate valuation and consultation since 1992 and has completed hundreds of appraisals, appraisal reviews and consulting assignments on various types of property throughout Pennsylvania, New York, West Virginia and Ohio.

Mr. Sozansky was associated with Investment Realty Consultants in Palm Beach Gardens, Florida as a commercial appraiser from 1990 through 1992. From 1986 to 1989, he was associated with Savings of America in Pompano Beach, Florida in an appraisal review position where he specialized in residential portfolio analysis for properties throughout Florida, North Carolina, New York and Connecticut. From 1984 through 1986, Mr. Sozansky specialized in the appraisal of residential properties throughout Broward, Dade, West Palm, St. Lucie and Martin Counties in Florida. Prior to 1984, Mr. Sozansky, as a real estate agent and broker, sold and leased commercial real estate in Pittsburgh and Greensburg, Pennsylvania and Deerfield Beach, Florida.

Mr. Sozansky has qualified as an expert witness in quasi-judicial proceedings in various counties in Pennsylvania including Allegheny, Butler, Beaver, Clearfield, and Dade County, Florida and has written or collaborated on appraisals for hundreds of public entities, firms, and lending institutions.

Mr. Sozansky specializes in lodging properties and has appraised a variety of limited and full service franchised large and small hotels as well as independent, bed and breakfast properties. Additional areas of expertise include industrial and special use properties.

Professional Activities & Affiliations

Appraisal Institute, Member (MAI)
Member: Appraisal Institute (Pittsburgh Metro Chapter) - President 2007, Legislative Director 2000-2010

Leadership Development Advisory Council - Discussion Leader (2004)

Licenses

Pennsylvania, Certified General Real Estate Appraiser, GA-000890-L, Expires June 2019

Education

Graduate of the University of Pittsburgh, Bachelor of Arts

Successfully completed the following courses as well as numerous other seminars sponsored by the Appraisal Institute:

- Appraisal Principals
- Standards of Professional Practice
- Basic Valuation Procedures
- Capitalization Theory and Techniques, Part A
- Capitalization Theory and Techniques, Part B
- Residential Valuation

John P. Sozansky, MAI

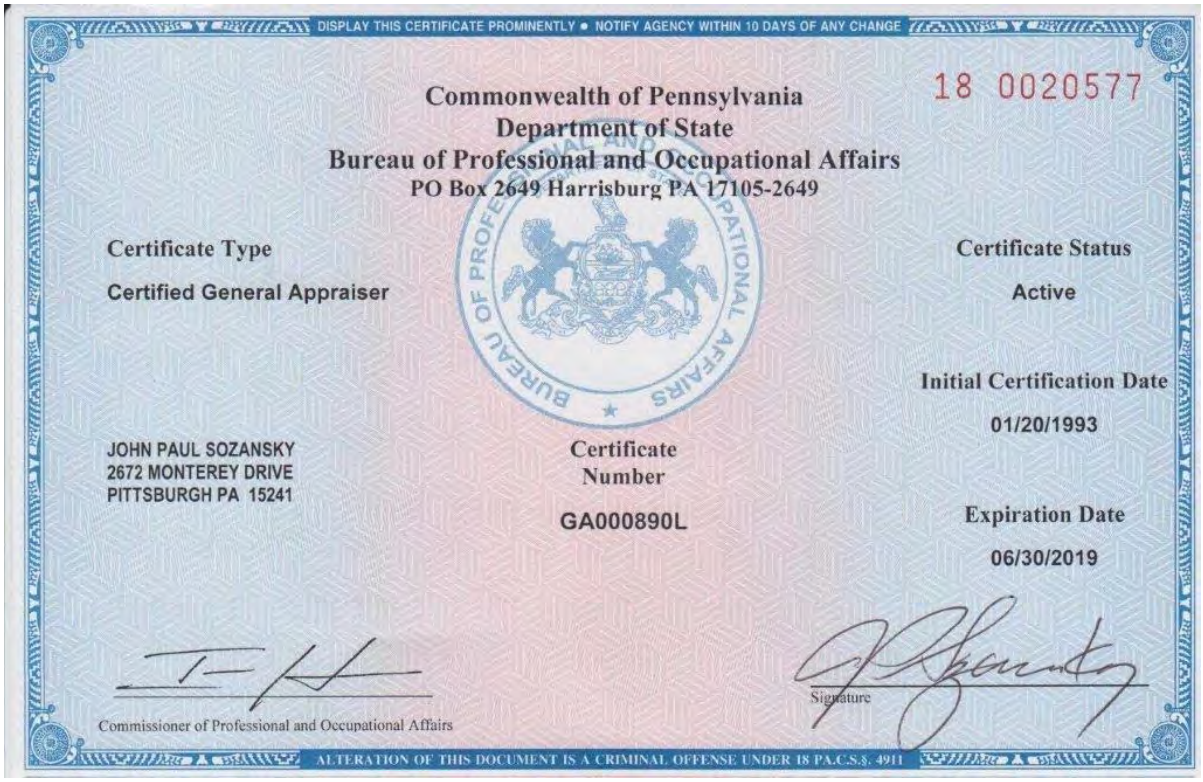
Education (Cont'd)

- Report Writing and Valuation Analysis
- Advanced Applications
- Advanced Condemnation Appraising
- Regression Analysis
- Hotel Valuation (HVS Course)

In addition, Mr. Sozansky has attended a variety of conferences and seminars on topics including hotel data and industry forecasting.

2591 Wexford-Bayne Road
Suite 102
Sewickley, PA 15143

T 724-742-3300
F 724-742-3390



DISPLAY THIS CERTIFICATE PROMINENTLY • NOTIFY AGENCY WITHIN 10 DAYS OF ANY CHANGE

18 0020577

Commonwealth of Pennsylvania
Department of State
Bureau of Professional and Occupational Affairs
PO Box 2649 Harrisburg PA 17105-2649

Certificate Type
Certified General Appraiser

Certificate Status
Active

Initial Certification Date
01/20/1993

JOHN PAUL SOZANSKY
2672 MONTEREY DRIVE
PITTSBURGH PA 15241

Certificate Number
GA000890L

Expiration Date
06/30/2019

Commissioner of Professional and Occupational Affairs

Signature

ALTERATION OF THIS DOCUMENT IS A CRIMINAL OFFENSE UNDER 18 PA.C.S.S. 4911

Exhibit C

Metes and bounds description of land being requested to release for nonaeronautical use:

Solar Project Area

All that certain area for the Solar Project Area, situated in the Township of Findlay, County of Allegheny, Commonwealth of Pennsylvania, more particularly described as follows:

Beginning at the intersection of Harper Rd. and Clinton-Enlow Rd., variable width, said point being S 37° 48' 57" W 102.15' from the center of the I-376 Corridor,

thence N 49° 16' 06" E 492.06' to the southeast corner of the Solar Project Area, said point also being the Point of Beginning;

thence north along the easterly side of the Solar Project Area the following 4 courses and distances to the northwest corner of the Solar Project Area:

1. N 9° 18' 18" W 592.68'
2. N 46° 40' 50" E 150.48'
3. N 77° 31' 21" E 175.04'
4. N 42° 15' 05" E 352.03'

thence continuing along the northern boundary of the solar panel area the following 3 courses and distances to northeast corner of the Solar Project Area:

1. N 80° 46' 16" E 101.95'
2. S 70° 22' 52" E 269.92'
3. S 59° 42' 43" E 169.03'

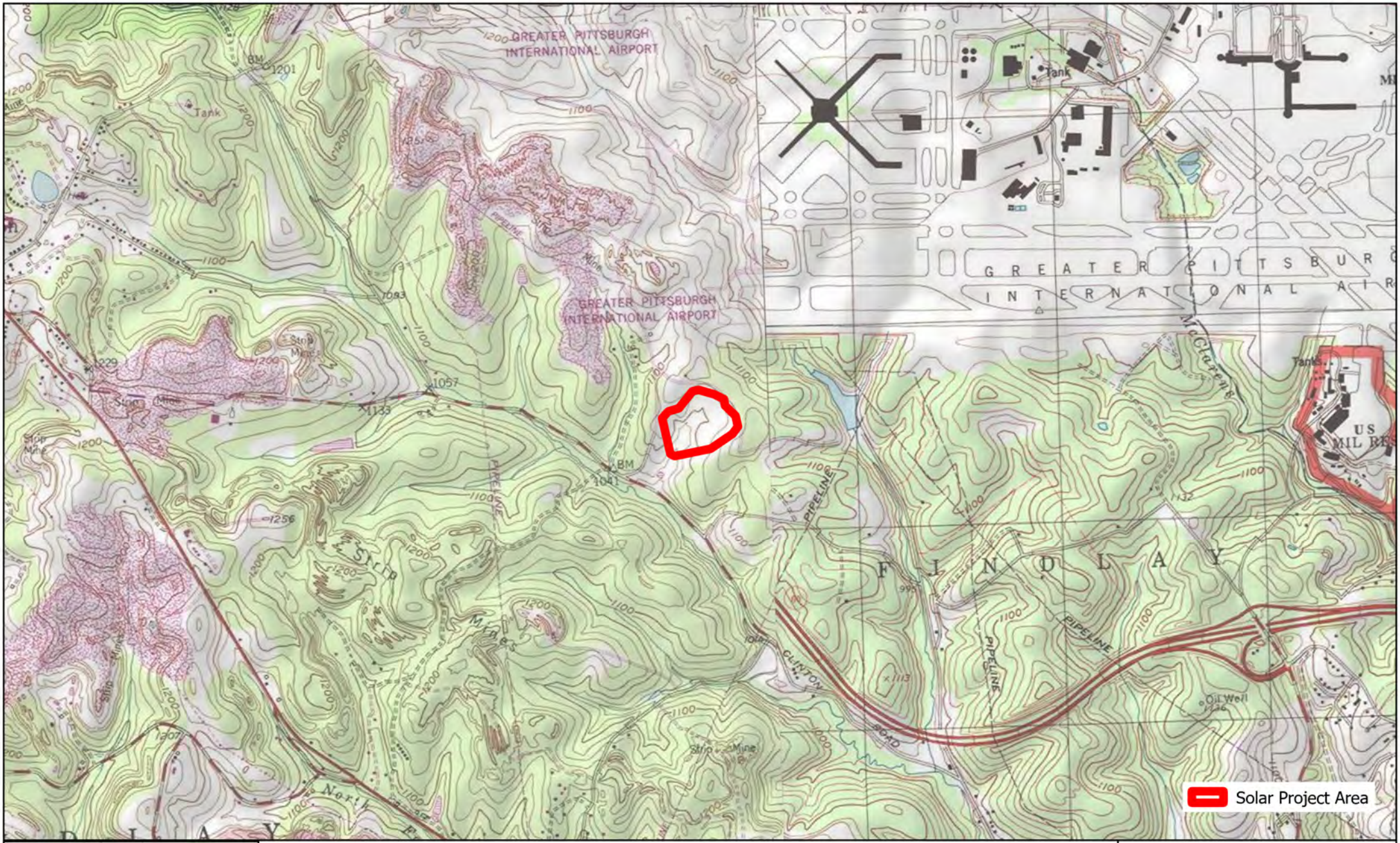
thence in a southerly direction along the westerly boundary of the Solar Project Area the following 6 courses and distances:

1. S 5° 40' 20" E 106.05'
2. S 41° 49' 55" E 238.19'
3. S 8° 47' 04" E 176.41'
4. S 40° 10' 57" W 146.97'
5. S 59° 28' 28" W 428.15'
6. S 82° 10' 38" W 594.24'

Thence N 58° 09' 15" W 77.72' along the southern boundary of the Solar Project Area to the Point of Beginning, containing 20 acres.

Bearings based on Pennsylvania State Plan NAD83 South.

Exhibit D



PIT: Solar Project Area

Data Sources: Copyright:© 2013 National Geographic Society, i-cubed, data.pa.gov, Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, Esri, USGS, ACAA

80

Miles

Folder: G:\GIS\Working Maps\PIT\

ALLEGHENY COUNTY AIRPORT AUTHORITY

PITTSBURGH INTERNATIONAL AIRPORT

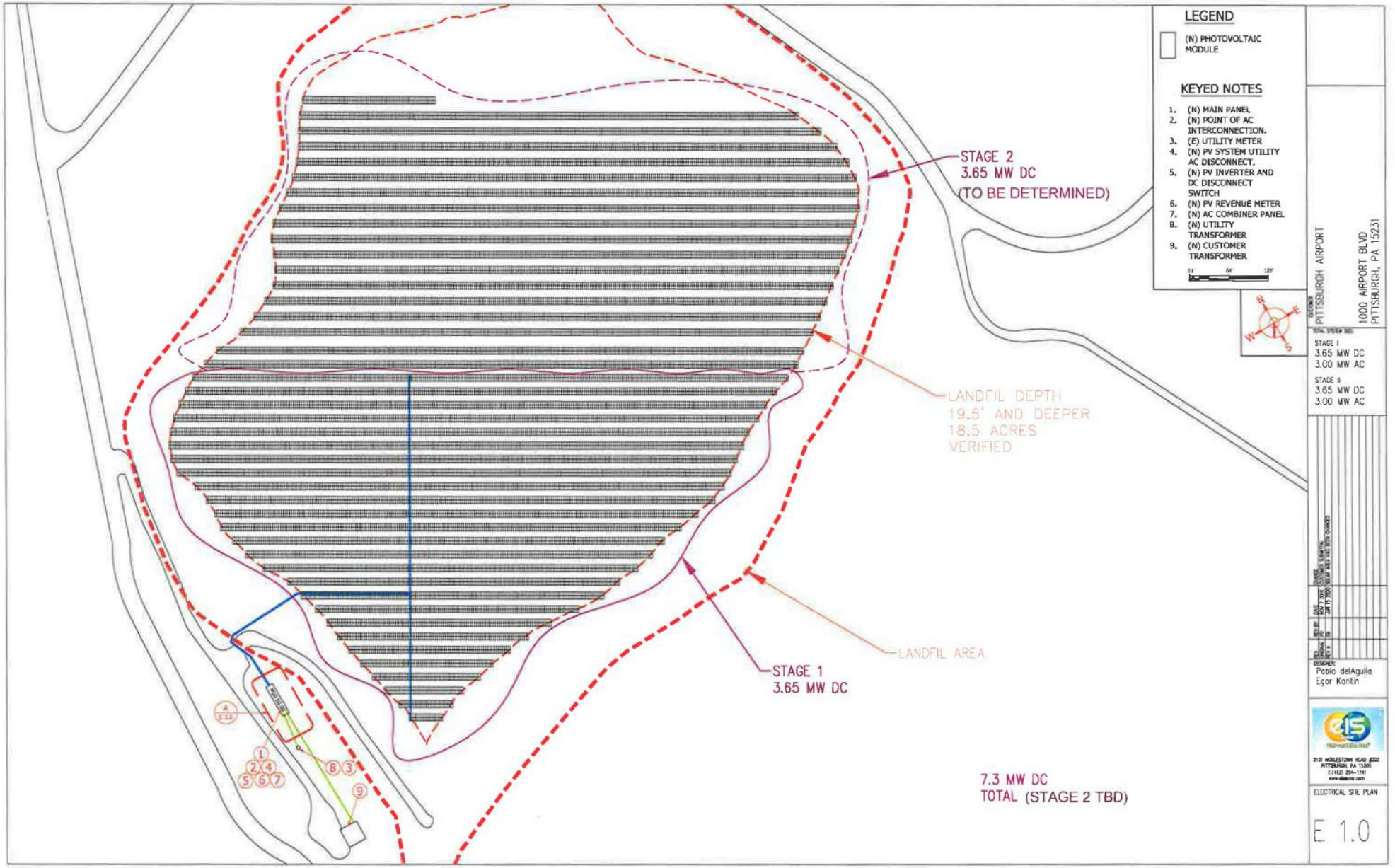

LEGEND
(N) PHOTOVOLTAIC MODULE
KEYED NOTES
1. (N) MAIN PANEL
2. (N) POINT OF AC INTERCONNECTION.
3. (E) UTILITY METER
4. (N) PV SYSTEM UTILITY AC DISCONNECT.
5. (N) PV INVERTER AND DC DISCONNECT SWITCH
6. (N) PV REVENUE METER
7. (N) AC COMBINER PANEL
8. (N) UTILITY TRANSFORMER
9. (N) CUSTOMER TRANSFORMER
STAGE 2
3.65 MW DC
(TO BE DETERMINED)
LANDFIL DEPTH
19.5' AND DEEPER
18.5 ACRES
VERIFIED
LANDFIL AREA
STAGE 1
3.65 MW DC
7.3 MW DC
TOTAL (STAGE 2 TBD)
PITTSBURGH AIRPORT
1000 AIRPORT BLVD
PITTSBURGH, PA 15231
STAGE I
3.65 MW DC
3.00 MW AC
STAGE II
3.65 MW DC
3.00 MW AC
DESIGNER:
Pablo delAguila
Egor Kantin
ELECTRICAL SITE PLAN
E 1.0

Exhibit E

ALLEGHENY COUNTY AIRPORT AUTHORITY
PITTSBURGH INTERNATIONAL AIRPORT
ALLEGHENY COUNTY AIRPORT

APPROVAL NO: **704-19** DATE AUTHORIZED: **10/18/2019**

REQUESTING DEPARTMENT: **Engineering & Construction** PROCESSING DATE: **11/05/2019**

CONTRACT#

4353

VENDOR NAME: **Peoples Natural Gas Company, LLC**

DESCRIPTION: **Ground Lease Agreement for the solar facility associated with the PIT Microgrid. The term of the agreement will be from 10/24/2019 to 06/01/2021. Yearly revenue will be $10,000.00.**

Fully executed copies of the above-referenced agreement are returned herewith. You are requested to refer to the Contract number given above on any correspondence relating to your agreement.

CC: Woodrow, Sparks, Moeller, File

GROUND LEASE AGREEMENT

between

ALLEGHENY COUNTY AIRPORT AUTHORITY

and

PEOPLES NATURAL GAS COMPANY, LLC

(Solar Facility)

GROUND LEASE

THIS GROUND LEASE AGREEMENT, hereinafter referred to as the "Ground Lease", made this 24th day of October, 2019, by and between THE ALLEGHENY COUNTY AIRPORT AUTHORITY, a body politic, organized under the Municipal Authorities Act of 1945, hereinafter referred to as "Lessor",

AND

PEOPLES NATURAL GAS COMPANY LLC, a limited liability company organized under the laws of the Commonwealth of Pennsylvania, hereinafter referred to as "Lessee". Lessor and Lessee hereinafter are each referred to as a "Party" and collectively as the "Parties".

WITNESSETH:

WHEREAS, the County of Allegheny (hereinafter referred to as "County") is the owner of the property in and around Pittsburgh International Airport (hereinafter referred to as the "Airport"); and

WHEREAS, the County transferred the operation of the Airport to Lessor and leased the property in and around the Airport to Lessor, as more specifically set forth in the Airport Operation Management and Transfer Agreement and Lease dated September 16, 1999, as amended (hereinafter referred to as the "Transfer Agreement"); and

WHEREAS, in the event County becomes the sponsor of the Airport at the termination of the Transfer Agreement and reassumes operation, management and possession of the Airport, County may succeed to Lessor's position pursuant to this Ground Lease and have all rights and

remedies set forth herein without further action required of Lessee and Lessee's use and possession shall not be disturbed or affected thereby; and

WHEREAS, Lessee proposes to lease the Leased Premises (as hereinafter defined) from Lessor for the purposes set forth herein and Lessor proposes to lease said Leased Premises to Lessee as described in the terms and conditions contained in this Ground Lease, subject to all required Approvals (as hereinafter defined) for the development of the Improvements (as hereinafter defined) for the Approved Uses (as hereinafter defined).

NOW, THEREFORE, for valuable consideration, the receipt and sufficiency of which is hereby acknowledged, and intending to be legally bound, Lessor and Lessee agree as follows:

1. DEFINITIONS.

Unless otherwise specified herein:

1.1 "Airport Regulations" means those certain rules and regulations, as the same may be amended from time to time, which generally govern the operations and other activities which may take place on the Airport. The Airport Regulations serve as minimum regulations designed to protect and promote the safety of the users of the Airport. As an example the Airport Regulations include but are not limited to the Wildlife Hazard Management Plan (as described in detail in the Airport Regulations) and applicable security regulations promulgated by the Lessor from time to time, and the Design Standards.

1.3 "Approval(s)" means those approvals as required: 1) under the Transfer Agreement; 2) by the Federal Aviation Administration; and 3) such other approvals as set forth in §4.2.

1.4 "Approved Uses" has the meaning described in §2.3 herein.

1.5 "Avigation Right of Way" has the meaning described in §16.6 herein.

1.6 Intentionally Omitted

1.7 "Commencement Date" shall mean the date upon which Lessee takes possession of the Leased Premises.

1.8 "Condemnation" means any taking of property by eminent domain or property that is conveyed in lieu of eminent domain or under threat of eminent domain.

1.9 "County" means Allegheny County, Pennsylvania.

1.10 "Delivery Date" means the date that Lessor delivers the Leased Premises to Lessee.

1.11 "Delivery Requirements" – omitted intentionally

1.12 "Design Standards" shall mean the written and graphic requirements and principals, prepared for Lessor and as periodically updated, that address aesthetic, functional and operational issues associated with the Improvements including, without limitation by way of example, site layout, access circulation, architecture, utilities, landscaping, lighting and signage, noise abatement and vibration reduction, all as more specifically set forth in in the Lessor's Design Guidelines.

1.13 "Solar Facility" means the Solar Facility to be developed as one solar array located on approximately 20 acres at Pittsburgh International Airport near Route 376 and as more fully described in Exhibit C to the Energy Services Agreement.

1.14 "Energy Services Agreement" means the Agreement of even date herewith between Lessor and Lessee setting forth the terms and conditions for the development of the Solar Facility.

1.15 "Execution Date" means the date the last party to this Agreement executes.

1.16 "Federal Aviation Administration" or "FAA" means the Federal Aviation Administration within the Department of Transportation of the United States, and any entity which might, by operation of law, succeed to any or all of the rights, powers and duties now residing with it.

1.17 "Impositions" means all taxes, payments in-lieu of taxes, assessments, levies, fees, municipal water and sewer rents and charges, and all other governmental charges, general and special, ordinary and extraordinary, foreseen and unforeseen, which are at any time after the Execution Date, imposed or levied upon or assessed against (A) the Leased Premises, (B) Lessee's operations of the Improvements, or (C) this Ground Lease or the leasehold estate hereby created.

1.18 "Improvements" shall include, without limitation, the Solar Facility and any and all buildings, lighting, parking, landscaping, infrastructure improvements and the like, constructed by or for Lessee on the Leased Premises. All Improvements shall be designed and constructed in conformance with the Plans set forth in the Energy Services Agreement and, to the extent applicable, the "Design Standards".

1.19 "Institutional Lender" means a (i) savings bank, savings and loan association, commercial bank, commercial finance company, trust company, capital markets entity underwritten or sponsored by a recognized national capital markets financial firm or insurance

company, or (ii) another lender of substance satisfactory to Lessor, which performs functions similar to those enumerated in Item (i) of this Section.

1.20 "Law" means any treaty, federal, state or local, statute, law, ordinance, regulation, judgment, order or other law that is subject to a publicly noticed hearing and comment process, presently in effect or hereinafter enacted, made or issued, whether or not presently contemplated.

1.21 "Leased Premises" means the real property demised to Lessee hereunder, as described and depicted on Exhibit A and further described in Section 2.1. The term "Leased Premises" shall not be deemed to include the subsurface rights (other than the right of structural support and other rights to build Improvements below the surface as set forth in this Ground Lease) and specifically excludes any mineral rights underlying any portion of the Leased Premises.

1.22 "Lease Year" means the twelve (12) month period commencing on the Rent Commencement Date and each subsequent 12-month period during the Term commencing on the anniversary date of the Rent Commencement Date.

1.23 "Materials of Environmental Concern" has the meaning set forth in §10.1.C.

1.24 "Rent" shall mean the Base Rent set forth in §5.

1.25 "Rent Commencement Date" has the meaning described in §5.1.

1.26 "Term" shall have the meaning set forth in §3.1.

2. LEASED PREMISES.

2.1 Leased Premises. Lessor hereby agrees to, as of the Execution Date, lease the Leased Premises to Lessee, subject to all of the terms, conditions and approvals contained herein. The

Leased Premises are comprised of the area of land shown in Exhibit A, attached hereto and incorporated herein.

2.2 As is Condition. The Leased Premises are leased to Lessee in its existing condition including any Materials of Environmental Concern located in, on, about or under the Leased Premises without representation or warranty by Lessor or the County, except as otherwise provided elsewhere herein, (provided however, that Lessor shall be obligated to provide notice to Lessee of any known Materials for Environmental Concern located in, on, or about or under the Leased Premises existing as of the Execution Date) and subject to all applicable Laws now or hereafter in effect. Lessee shall do all things necessary to prepare the Leased Premises for the construction of the Improvements including, without limitation, the design and construction of all site utilities and infrastructure within the Leased Premises which are Lessor's sole responsibility.

2.3 Use.

(a) Lessee shall use the Leased Premises only in connection with the construction, operation and maintenance of, the Solar Facility and for no other use unless approved in writing by the Chief Executive Officer.

(b) Under no circumstances shall any portion of the Leased Premises be used for any use generally associated with (1) the sale or warehousing of pornographic materials, illegal gambling activities, (2) the placement of cell towers or antennae, except as approved and permitted, (3) any activity that would interfere with the safe operation of the Airport per any applicable Laws or Airport Regulations, (4) the placement of billboards or other forms of outdoor

advertising from which Lessor would otherwise derive revenue, or any residential use all of which are specifically prohibited.

(c) Lessee agrees that the construction, operation and use of the Solar Facility shall not unreasonably conflict with the operation of the Airport or endanger the health, safety and well-being of the public and shall comply with all applicable Laws.

2.4 Quiet Enjoyment. Lessor represents and warrants that it has the authority pursuant to the Transfer Agreement to enter into this Ground Lease and to bind the County, as owner of the fee estate to the terms hereof. Furthermore, so long as Lessee is not in default and Lessor has not given notice to effect its remedies hereunder, neither the County nor Lessor shall interfere with the peaceful and quiet enjoyment of the Leased Premises by Lessee, subject to:

(i) Lessor's retention of the Avigation Right of Way as set forth in §16.5;

(ii) any easements, reversions, rights of way, and licenses (either recorded or unrecorded), existing as of the Execution Date or as required by the FAA or evident from any inspection of the Leased Premises;

(iii) the normal activity (including noise, vibration, traffic and parking) associated with the Airport;

(iv) all Laws in effect now or in the future;

(v) Lessor's reservation of easements for (I) vehicular and pedestrian access across the Leased Premises for routine safety and wildlife control purposes, and (II) the installation and maintenance of utilities for the benefit of other property owned by Lessor which

are expressly subject to the condition that the use thereof shall not interfere with the Improvements and the Approved Use and be so located at the perimeters of the Leased Premises as to not interfere with any future Improvements that could be legally constructed within the Leased Premises and any construction, repair or maintenance work thereon shall be accomplished with commercially reasonable efforts to minimize disruption to the use of the operations of the Approved Use;

(vi) any right to access or remove any of the subsurface minerals or materials except to the extent such removal would impair the structural integrity of the Improvements or otherwise disturb the surface of the Leased Premises or disrupt the operations of the Approved Use.

2.5 Right of Entry. Lessor may at any time during the Term hereof, upon reasonable advance notice and at reasonable times, enter upon and examine the Leased Premises and Improvements as long as such examination shall not unreasonably interfere with the operation of the Improvements.

3. **TERM.**

3.1 Term. The Term shall be for a period commencing on the Delivery Date and continuing for the term of the Energy Services Agreement or until sooner terminated or extended as provided for in the Energy Services Agreement, including the Option periods granted thereunder. Although, as more particularly set forth herein, the obligation to pay Rent does not commence until the Rent Commencement Date.

4. DESIGN AND CONSTRUCTION.

4.1 Lessee's Duty to Construct. Lessee shall, at its sole risk, cost and expense, have the duty and obligation to oversee and manage the design, construction, and installation of the Improvements in accordance with the terms and conditions contained in the Energy Services Agreement and this Ground Lease.

4.2 Permits and Approvals. Lessee shall be responsible, at its sole cost and expense, for obtaining all necessary zoning, Site Plan, building, land development, FAA Part 77, environmental and other related permits and approvals from any state or local governmental entity having jurisdiction over the development of the Leased Premises and construction of the Solar Facility and Improvements. Lessee shall make timely and good faith efforts to secure all such permits and Approvals and shall inform the Authority within 3 business days prior to the submittal of each permit application and inform the Authority of when each permit has been received and provide the Authority a copy of each permit. Should Lessor's review produce any reasonable comments, such comments shall be promptly (and in no event beyond 3 business days) provided to Lessee such that the timing of the submission of such Approvals shall not be unreasonably delayed. The issuance of all Approvals are conditions of this Ground Lease and shall be applied for and pursued diligently and in good faith by the Parties hereto inclusive of any necessary cooperation between the Parties related thereto.

4.3 Construction In Compliance with Laws, Regulations and Approved Plans. Lessee shall design and construct the Solar Facility and all Improvements in compliance in all material respects with applicable Laws, the Energy Services Agreement and including, without limitation,

to the extent applicable to the Leased Premises, FAA requirements regarding height, lighting, reflectivity, electromagnetic radiation, electronic or microwave emissions, and radio signals, other FAA requirements, and the regulations and requirements of all other federal, state and local governmental entities having jurisdiction. Lessee shall design and construct all Improvements in conformance with the Design Standards. Lessor may, at any time and at its sole discretion, waive any of the Design Standards.

4.4 Review and Approval. Lessor and Lessee acknowledge that the Leased Premises is a part of Lessor's planned commercial, industrial and aviation-related development at the Airport. In addition, it is the intention of Lessor and Lessee that the exact configuration and master planning of the Leased Premises shall be reasonably compatible with the land use planning of the entire Airport. Accordingly, all site and exterior elevation drawings and renderings with respect to the construction of the Solar Facility and any other Improvements to be constructed, which Lessee may from time to time prepare for the development of the Leased Premises, shall be reviewed in accordance with and pursuant to the Design Standards. Lessee shall submit all design and construction documents prepared for the development of the Leased Premises and the construction of the Improvements to Lessor for review. Lessor shall notify Lessee of the results of the review of the submittals and any required revisions of such submittals within thirty (30) days of Lessor's receipt of such submittals from the Lessee

4.5 No Waiver/No Liability. No review or approval by Lessor of Lessee's plans, drawings or specifications, change orders, construction schedule, nor inspection by Lessor of the construction work or materials, shall waive or release any obligation of Lessee hereunder, nor

cause Lessor to assume any risk or liability relating to that construction, work or materials, and Lessee shall not make any claim against Lessor on account of such review, approval, change order, schedule or inspection.

4.6 Receipt of Insurance Certificates. All relevant insurance policies, as more specifically set forth in §7 herein, must be procured and certificates of insurance must be provided to Lessor before construction commences.

4.7 Construction, Easements and Rights of Way. The Parties hereto shall cooperate with each other and execute documents, as needed, relating to construction easements and rights-of-way, which will not otherwise unreasonably interfere with the operation of the Airport.

4.8 Compliance with Laws. During construction, Lessee, its contractors, subcontractors and agents shall comply with all Laws, including, without limitation, applicable Airport Regulations and reasonable directives of Lessor as to the conduct of their work, and shall keep and maintain all of their equipment, materials, supplies, tools, work trailers, and the like upon the Leased Premises or another mutually agreeable site. Lessee shall be responsible for all security on the Leased Premises and Lessor shall have no liability to Lessee, its employees, agents, contractors or subcontractors for any losses to persons or property as a result of personal injury, theft, vandalism, malicious mischief, trespass and the like, excepting any losses occurring as a result of Lessor's, including its contractors, subcontractors and agents, negligence or intentional misconduct.

4.9 Good and Workmanlike Manner. Lessee shall design and construct all work upon the Leased Premises in a good and workmanlike manner employing materials that are of good quality

and new in accordance with the Energy Services Agreement and, to the extent applicable, the Design Standards.

4.10 Waiver of Mechanics Liens. Lessee shall be solely responsible for payments to contractors for all construction. Lessee shall not permit to be created or to remain undischarged, any liens, encumbrances or charges arising out of any work of any contractor, mechanic, laborer or materialman which might be or become a lien, encumbrance or charge upon the Leased Premises. If any lien or notice of lien on account of an alleged debt of Lessee or any notice of contract by a party engaged by Lessee or Lessee's contractor to work in the Leased Premises is filed or received by Lessee, Lessee shall, within sixty (60) days after notice of the filing thereof, cause the same to be discharged of record by payment, deposit, bond, order of a court of competent jurisdiction or otherwise or provide title insurance coverage reasonably acceptable to Lessor. Notwithstanding the foregoing, Lessee may contest the accuracy or validity of any lien, but shall indemnify, defend and hold harmless the County and Lessor, its officials, agents and employees and the Leased Premises from any claim and liability for any lien (except those imposed because of any action by or on behalf of Lessor). Failure to discharge the lien within the times set forth above shall be deemed an Event of Default.

4.11 Inspection of Construction. Lessor shall have, at reasonable times and upon reasonable advance notice, the right to inspect the construction of the Improvements to insure that all of the terms and conditions contained herein are complied with. The Lessee will provide Lessor with all current occupancy permits and as-built drawings (in auto CAD or microstation format) for the Improvements within 30 day of Lessees receipt of the same.

4.12 Time for Commencement of Construction Lessee shall commence construction within such time as is sufficient to complete construction of the Solar Facility and be operational in accordance with the terms of the Energy Services Agreement.

4.13 Failure to Construct. Intentionally Omitted

4.14 Lessee's Duty to Restore. Lessee shall restore the adjacent land to the Leased Premises that was impacted by Lessee's construction of the Improvements as well as other areas impacted by Lessee's construction of the Improvements including Lessee's construction easements, rights-of-way and the like to as good condition that existed prior to construction, as reasonably determined by Lessor.

4.15 Insurance and Bonds. Prior to the commencement of construction of any of the Improvements, Lessee shall provide Lessor with a certificate of insurance certifying that Lessee and/or its contractors and subcontractors have the insurance coverage and limits required under Article 12 of the Energy Service Agreement naming Lessor and County as additional insureds and containing a notice of cancellation clause providing for thirty (30) days prior notice of cancellation. Additionally, Lessee shall be responsible to obtain or to cause to be obtained a performance bond or letter of credit, reasonably acceptable to Lessor, prior to commencement of construction, ensuring the completion of the Improvements. Alternatively, Lessee may issue its completion guaranty in form and substance acceptable to the Lessor.

5. RENT.

5.1 Base Rent. Lessee shall pay to Lessor a base rent of Ten Thousand and 00/100 Dollars ($10,000) per annum commencing on the date of (a) the issuance of occupancy permit(s)

necessary for the occupancy of the Improvements (whether temporary or permanent), (b) the actual occupancy of the Improvements, or (c) twelve (12) months from the Delivery Date, whichever first occurs (the "Rent Commencement Date"), and continuing annually thereafter for the remainder of the Term (the "Base Rent") at Lessor's address set forth above or at such other addresses as may be designated in writing to Lessee.

Rent payments shall be on an annual basis made on or before the first day of each Lease Year, without invoice, demand or setoff unless otherwise expressly provided herein. If Lessee fails to pay Rent within thirty (30) days of the date that payment is due, then it shall pay Lessor in addition to any other payment due, an interest charge of the prime rate of interest announced from time to time by the Wall Street Journal plus two percent (2%) of the Rent which is late, and reasonable attorney fees incurred by Lessor in attempting to obtain payment. The CEO may, from time to time, in his or her discretion, waive the interest charge in a particular instance. Payments shall be made in lawful tender of the United States of America by check payable to the Allegheny County Airport Authority.

Lessor and Lessee hereby acknowledge and agree that the Rent constitutes a "fair market rent" and was negotiated in an "arms-length" transaction.

6. TAXES, MAINTENANCE AND UTILITIES.

6.1 Net Lease. This Ground Lease is a triple net lease and shall in every sense be without cost to Lessor except as expressly described in this Ground Lease or the Energy Services Agreement. Except as expressly described in this Ground Lease or the Energy Services Agreement, it shall be the sole responsibility of Lessee as further specified in this Ground Lease

and the Energy Services Agreement to keep, maintain, repair and operate the entirety of the Leased Premises and all Improvements and facilities placed thereon at Lessee's sole cost and expense including, without limitation, the cost of insurance, utilities and Impositions levied upon the Leased Premises and Improvements, as well as any landscaping existing or to be installed on the Leased Premises. The foregoing provisions shall not be construed to impose upon Lessee the costs of administering the Ground Lease, such as appraisal fees and the costs of professionals and consultants retained by Lessor.

6.2 Taxes and Assessments.

(a) Except as otherwise provided herein, Lessee shall pay or cause to be paid, prior to delinquency, the Impositions. Lessee will furnish to Lessor, promptly after demand therefor, proof of payment of all Impositions which are payable by Lessee. To the extent permitted, Lessee may pay such Impositions in installments. Lessee shall be liable only for Impositions which become due and payable during and applicable to the Term.

(b) Lessor shall pay or cause to be paid all Impositions, if any, in respect of or related to the Leased Premises for the period up to and including the Execution Date. Lessee shall pay or cause to be paid when due all Impositions in respect of or related to the Leased Premises for the period between the Execution Date and the expiration of the Term.

(c) In the event that the Leased Premises is not designated as a separate parcel for real estate tax purposes for any reason, Lessee shall pay or cause to be paid when due a portion of all Impositions on the larger tax parcel of which the Leased Premises is a part, determined as follows:

(i) Lessee shall pay the portion of the Impositions attributable to the land value of the Leased Premises and value of the Improvements as determined by the appropriate tax authority pursuant to a written request made by Lessee for such apportionment (Lessee may appeal any such determination thereof as allowed by Law as provided herein); or

(ii) In the event that the taxing authority shall fail or refuse to provide the apportionment described in subsection (i) above, then Lessee shall pay the portion of the Impositions attributable to the taxable land value of the Leased Premises and taxable value of Improvements as reasonably agree by Lessor and Lessee in good faith.

(d) Lessee shall pay or cause to be paid when due all taxes or charges now or hereafter imposed with respect to any business conducted on the Leased Premises by Lessee or any fixtures or personal property included in or on the Leased Premises and used in connection with the Leased Premises or any such business.

(e) Upon the expiration or termination of this Ground Lease for any reason, Lessee shall pay Lessor an amount equal to all Impositions due hereunder in respect of or related to the Leased Premises between the Execution Date and the expiration of the Term, prorated to the date of expiration or termination, as the case may be, based upon the most recent tax rates and property valuations available. The proration of Impositions at the termination or expiration of this Ground Lease shall be subject to readjustment after termination or expiration based upon the Impositions actually levied in respect of or related to the Leased Premises. Any such readjustment after the termination or expiration of this Ground Lease shall be repaid to Lessee or paid to Lessor,

as applicable, within forty-five (45) days after either Party's initial receipt of the actual levies of Impositions to provide for time to calculate the under or over payment(s).

(f) In the event that the Leased Premises is designated as a separate parcel or given a separate tax identification number, Lessee shall pay or cause to be paid directly to the appropriate taxing authority the Impositions for payment of which Lessee is responsible pursuant to this Section. In addition, Lessee shall prepare and file any statement, report, return or other document which may be required by any Laws in connection with any Impositions or other charges payable by Lessee under this Ground Lease. Also, Lessee shall, upon request of Lessor, furnish Lessor with copies of receipts or certificates evidencing payment of all Impositions payable by Lessee under this Ground Lease.

(g) In the event that the Leased Premises is not designated as a separate parcel or given a separate tax identification number, Lessor shall deliver to Lessee a copy of the real estate tax and assessment invoices after they are received periodically by Lessor together with a notice indicating the portion of such taxes and assessments for the payment of which Lessee is responsible pursuant to this Section based on Section 6.2. (c) (i) or (ii). Lessor shall pay the entirety of taxes that are due and owing to the appropriate taxing body prior to the date such payment is due and payable; and on or prior to the later of (i) thirty (30) days after receipt of such invoices and notice or (ii) ten (10) days prior to the date such payment is due and payable to the appropriate taxing body, Lessee shall pay or cause to be paid to Lessor the amount so indicated.

(h) Lessee may contest any increases to Impositions and may withhold the payment thereof if such withholding is not in violation of Laws and such withholding does not

result in the placement of a tax lien upon the Leased Premises, however, if no such withholding is permitted by Laws or such withholding results in the placement of a tax lien upon the Leased Premises, then Lessee may pay such Impositions under protest. Lessor has no obligation to object to any increase in any Impositions unless the only possible procedure for objecting is by and through the action of Lessor in which case Lessor shall cooperate by counter-signing any documentation of such protest as prepared by Lessee as is reasonable and customary under the circumstances.

6.3 Maintenance and Repair.

(a) Lessee, at its own expense, shall maintain, or cause to be maintained, the Leased Premises and the Solar Facility in good repair and condition, and in compliance with reasonable directives from Lessor, Airport Regulations and according to all applicable Laws except for ordinary wear and tear and as set forth in the Energy Services Agreement. Lessor shall not be required to maintain, repair or replace the Leased Premises or Improvements or any part thereof. Lessee waives any right to require Lessor to maintain or repair the Leased Premises or Improvements, or to make repairs at the expense of Lessor pursuant to any Laws or any contract, agreement, covenant, condition or restriction.

(b) If Lessee refuses or neglects to repair or maintain the Leased Premises or Improvements in violation of this Ground Lease, the Energy Services Agreement or applicable Law, or if Lessor must make any repair necessitated by the misconduct of Lessee as provided herein, then Lessor with advanced notice to Lessee and the passage of a reasonable period of time (which, except in the case of an emergency, shall not be less than 10 days or more than thirty (30)

days) for Lessee to cure the matter or to present a plan, satisfactory to Lessor, to cure the matter detailed in such notice, may make such repair on Lessee's behalf. Such repairs, unless they are to remedy an emergency, shall be let for bid to third parties and subject to the bidding procedures normally associated with Lessor work in accordance with Act 22 of 2001, the Municipal Authorities Act of 1945 (the "Act") and all other applicable Laws. Lessee shall reimburse Lessor for the actual cost of such repair, direct costs of tools, equipment and materials, if done by Lessor's personnel, or for Lessor's out-of-pocket costs if done by an independent contractor.

6.4 Permitted Contests. Notwithstanding any provision hereof to the contrary, Lessee shall not be required, nor shall Lessor have the right to require Lessee, to pay, discharge or remove any tax, assessment, levy, fee, rent (except for the Rent due Lessor hereunder), charge, lien or encumbrance, or to comply with any Laws applicable to the Leased Premises and/or Improvements for the use thereof, as long as Lessee shall contest, in the name or on behalf of Lessor or County or Lessee, the existence, amount or validity thereof by appropriate proceedings which (i) shall prevent the collection of or other realization upon the tax, assessment, levy, fee, rent, charge, lien or encumbrance so contested, (ii) shall prevent the sale, forfeiture or loss of the Leased Premises to satisfy the same or Laws, (iii) shall not affect the payment of any sums required to be paid by Lessee hereunder and (iv) shall not subject Lessor to the risk of any criminal liability or civil liability, or violate the FAA grant assurances or otherwise affect Lessor's status as "Airport Sponsor", the entity to whom the FAA has granted a certificate of sponsorship for, and is charged with the control of, the Airport. Lessee shall give such security as may be reasonably required by Lessor to (a) insure ultimate payment of such tax, assessment, levy, fee, rent, charge, lien or

encumbrance and compliance with Laws and (b) prevent any sale or forfeiture of the Leased Premises or any portion thereof.

6.5 Utilities. INTENTIONALLY OMITTED

6.6 Trash, Garbage, Etc. Lessee shall provide complete, proper arrangements for the adequate sanitary handling of all trash, garbage and other refuse caused as a result of the operation of the Solar Facility. Lessee shall provide and use suitable covered metal receptacles for all such garbage, trash and other refuse. Piling of boxes, cartons, barrels or other similar items in an unsightly or unsafe manner, on or about the Leased Premises, shall not be permitted. Lessee shall comply with all of the applicable Laws and Airport Regulations relating to collection, recycling and removal of trash, garbage, waste and the like.

(a) Electronic Emissions. Lessee covenants and agrees that no equipment or fixtures shall be installed or operated on the Leased Premises which would produce electromagnetic radiation or radio signals, telecommunication signals, or the like, that would interfere with aircraft communications or violate any FAA rules and regulations.

6.7 Security and Safety. Lessee shall comply with the Airport Regulations and directives, including but not limited to the security plan, Wildlife Hazard Management Plan and with all rules regulations and directives of the FAA and other federal, state, County and municipal governments and agencies from time to time in effect, relating to the safety and security of the Airport.

6.8 Lighting/Reflective Material. Lessee shall not install any additional lighting or reflective material unless approved in advance by Lessor and the FAA.

6.9 Common Area Maintenance. INTENTIONALLY OMITTED.

6.10 Adjustment Mechanism. INTENTIONALLY OMITTED.

7. INSURANCE, DAMAGE AND INDEMNIFICATION.

7.1 Liability Insurance. Lessee, at its own expense, shall at all times maintain, or cause to be maintained, the insurance required under the Energy Services Agreement.

7.2 Fire Insurance and Other Insurance. INTENTIONALLY OMITTED.

7.3 Additional Insureds. Lessee will cause Lessor and County to be named as additional insureds as their interests may appear on all insurance policies and in any "wrap-up insurance" purchased by Lessee during the construction of the Improvements, without either of them having any obligations, including, without limitation, the obligation to pay premiums. Companies permitted to insure risks in Pennsylvania and having a Best Rating of AAA shall issue such insurance. Every policy shall provide that: (i) it will not be canceled or amended except after thirty (30) days' written notice to and consent of Lessor and County and, if available, that it shall not be invalidated by any negligent act or omission of Lessor, County or Lessee, nor by occupancy or use of the Leased Premises or the Improvements for purposes more hazardous than permitted by such policy, nor by any foreclosure or other proceedings relating to the Leased Premises or the Improvements, nor by change in title to or ownership of the Leased Premises or the Improvements; and (ii) the insurer thereunder waives all rights of subrogation against Lessor and/or County.

7.4 Certificate of Insurance/Policies. Lessee shall deliver, or cause to be delivered, to Lessor copies of the applicable insurance policies or original or duplicate certificates of insurance, satisfactory to Lessor, evidencing the existence of all insurance which is required to be maintained by Lessee hereunder.

7.5 Damage or Destruction.

(a) Excepting events of Condemnation and Force Majeure events, which shall be governed by Section 2.5 and Article II (respectively) of the ESA, if at any time from and after the Execution Date the Solar Facility is substantially damaged or destroyed, in whole or in part, by any casualty, Lessee shall promptly give written notice thereof to Lessor. If the period to restore the Solar Facility, in the reasonable opinion of Lessee, will be less than one hundred eighty (180) days, then Lessee, unless otherwise set forth herein, shall replace or repair or cause to be replaced or repaired the Solar Facility and any other Improvements that are damaged or destroyed as set forth herein. All proceeds of insurance resulting from the claims of such losses shall be paid to the benefit of Lessor or Lessee, as their interests may appear and applied as reimbursement to Lessee for payment of the cost of the replacement or repair of the Leased Premises, Solar Facility and any other Improvements damaged or destroyed.

(b) If the Solar Facility or other Improvements are substantially damaged or destroyed and Lessee undertakes the replacement or repair of the Solar Facility or other Improvements pursuant to Subsection 7.5 (a), but the insurance proceeds are not sufficient to pay in full the costs of such replacement or repair, Lessee will nonetheless complete the work and pay that portion of the costs thereof in excess of the amount of the insurance proceeds.

(c) Any balance of such insurance proceeds remaining after Lessee certifies to Lessor that such replacement or repair has been substantially completed as required by 7.5(a) or 7.5(b) above shall be paid to Lessee.

(d) If the Solar Facility or other Improvements are damaged or destroyed, in whole or in part, by any casualty and the period to restore the Leased Premises, in the reasonable opinion of Lessee, will be one hundred eighty (180) days or longer, then Lessee shall have the option to rebuild or repair such damage, or to terminate this Ground Lease by providing written notice to Lessor within sixty (60) days after the date of casualty. If Lessee elects to terminate this Ground Lease, then (a) this Ground Lease shall terminate and Rent and all additional charges shall be abated as of the date of damage to the Leased Premises, Solar Facility and/or other Improvements; and (b) the insurance proceeds shall be applied as follows:

(i) To demolition and cleanup (including environmental cleanup and remediation) of the Leased Premises and damaged Improvements;

(ii) To Lessee and Lessor as follows: Lessor shall receive a portion determined by multiplying the balance by a fraction, the numerator of which is the number of calendar months which passed since the Rent Commencement Date, and the denominator of which is the total number of months in Term applicable to the portion of the Leased Premises being terminated with the remainder of any such balance to be paid to Lessee.

(e) Before the commencement of any replacement or repair of the damaged Solar Facility or other Improvements as permitted by this Section, detailed plans and specifications shall be filed with and approved by the Chief Executive Officer, which approval shall not be unreasonably withheld. Promptly after receiving the Chief Executive Officer's approval of such plans and specifications, Lessee shall commence such replacement or repair and shall prosecute the same to completion with promptness and due diligence. Inasmuch as Lessor has required

Lessee to provide insurance as set forth in §7 herein, to insure the Leased Premises, Solar Facility and/or Improvements and the risks inherent thereto, there shall be no abatement of Rent pending replacement or repairs pursuant hereto.

7.6 Indemnification. Unless caused by the negligence or tortious actions of the County and/or the Lessor, Lessee shall indemnify, protect, defend and hold the County and Lessor, jointly and severally, and their elected officials, appointed officials, officers, agents and employees, completely harmless from and against all liability, losses, suits, claims (including, without limitation, third party claims for personal injury or real or personal property damage), judgments, fines, actions, administrative proceedings, penalties or demands: (i) arising from injury or death of any person or damage to any property, including all reasonable costs for investigation and defense thereof (including attorney fees, court costs, and expert fees) unless such injury, death or damage is caused by the sole negligence of Lessor and (ii) arising from Lessee's use or occupancy of the Leased Premises Lessor shall give notice to Lessee of any such liability, loss, suit, claim or demand, and Lessee shall defend same using legal counsel reasonably acceptable to Lessor. The provision of this Section shall survive the expiration or early termination of this Ground Lease.

7.7 Sublease Provisions. INTENTIONALLY OMITTED.

8. SUBLEASES AND ASSIGNMENT.

8.1 Subleases and Assignments. The provisions of Section 16.1 of the Energy Services Agreement shall control assignment or subletting any portion of the Leased Premises subject to Section 8.4.

8.2 Lessee's Liability. INTENTIONALLY OMITTED.

8.3 Subordination to Ground Lease. INTENTIONALLY OMITTED.

8.4 Lessor: Right to Assign. Lessor may, at any time, assign or delegate any or all of its rights hereunder and such assignee shall assume all of the rights, remedies, covenants, and obligations of Lessor.

9. **LEASEHOLD MORTGAGES.** INTENTIONALLY OMITTED.

10. **ENVIRONMENTAL MATTERS.**

10.1 Definitions.

(a) "Environmental Claim" shall mean any claim, action, cause of action, litigation, investigation or notice (written or oral) by any person or entity alleging potential liability (including, without limitation, potential liability for investigatory costs, cleanup costs, governmental response costs, natural resources damages, property damages, personal injuries, or penalties) which arises out of, is based upon, or results from (a) the presence or release of any Material of Environmental Concern (as defined herein) on the Leased Premises and/or Improvements, regardless of ownership thereof, or (b) circumstances forming the basis of any violation, or alleged violation, or any Environmental Law (as defined herein), in each case due only to actions, activities, circumstances, conditions, events, or incidents with respect to the Leased Premises and/or Improvements, or to Materials of Environmental Concern generated, transported, released from or otherwise physically related to the Leased Premises and/or Improvements.

(b) "Environmental Law" shall mean any federal, state, or local statute, regulation, ordinance, or common law, any compact, or any judicial or administrative decree, decision, order, or permit with respect to protection of human health, or the environment

(including, without limitation, ambient or indoor air, surface water, ground water, land surface, subsurface strata) now or hereinafter in effect, including, without limitation, laws and regulations relating to releases or threatened releases of Materials of Environmental Concern, or otherwise relating to the manufacture, processing, distribution, use, treatment, storage, disposal, transportation, or handling of Materials of Environmental Concern, including, without limitation, the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§ 9601, et seq. (hereinafter sometimes referred to as "CERCLA"); the Federal Water Pollution Control Act, 33 U.S.C. §§1251, et seq.; the Clean Air Act, 42 U.S.C.§§ 7401, et seq.; the Resource Conservation and Recovery Act, 42 U.S.C. §§ 6901, et seq.; the Safe Drinking Water Act, 42 U.S.C. §§300f, et seq.; the Toxic Substances Control Act, 15 U.S.C. §§ 2601, et seq.; the Emergency Planning and Community Right-to-Know Act of 1986, 42 U.S.C. §§ 1101, et seq.; and the Occupational Safety and Health Act of 1970; and analogous state laws.

(c) "Materials of Environmental Concern" shall mean any chemicals, pollutants, contaminants, wastes, hazardous wastes, hazardous materials, toxic substances, hazardous substances as defined under any Environmental Law, PCBs, lead paint, asbestos, urea formaldehyde, and, to the extent not naturally occurring and in its natural state on the Leased Premises, petroleum, petroleum products, coal, coke, coal tar, or coal tar byproducts.

10.2 Lessee's Responsibilities.

(a) Lessee shall be responsible for complying with all Environmental Laws with regard to any and all activities at, or related to, the Leased Premises during the Term including, without limitation, those Environmental Laws concerning the use of Materials of

Environmental Concern at the Leased Premises during and after the construction of Improvements on the Leased Premises, by Lessee and by any employee, servant, agent, contractor, subcontractor and invitee thereof.

(b) Lessee shall not cause, either directly or indirectly, any condition that could give rise to an Environmental Claim on, under, in or about the Leased Premises and/or Improvements, nor will Lessee violate any Environmental Law or other governmental requirement relating to: (i) the emission, discharge, storage, containment or release of any Materials of Environmental Concern into the environment on, under, in or about the Leased Premises and/or Improvements; or, (ii) the generation, treatment, storage, transportation or disposal of any Materials of Environmental Concern on, in, over or from the Leased Premises and/or Improvements.

(c) When required to do so by any Federal, state or local government pursuant to the applicable Environmental Laws, Lessee shall abate, remediate and/or remove all Materials of Environmental Concern, unless the same were (i) on the Leased Premises prior to the Execution Date or caused by the County or the Lessor.

(d) Lessee shall indemnify, defend and hold harmless Lessor, County, their elected officials, Board Members, appointed officials, employees, agents, officers and directors from and against all claims, demands, penalties, fines, liabilities, settlements, damages, costs or expenses of whatever kind or nature, including reasonable attorney fees, fees of environmental consultant and laboratory fees, known or unknown, contingent or otherwise, arising out of or in connection with any violation of any Environmental Laws by Lessee, its assigns, sublessees or

successors in interest with respect to the Leased Premises and/or Improvements, during the Term hereof after the Delivery Date or with respect to the use, storage, presence, disposal, transportation, release or threatened release of any Materials of Environmental Concern or with respect to the remediation, abatement or removal of any Materials of Environmental Concern at any time. Notwithstanding anything to the contrary contained in this Ground Lease, Lessee shall have no obligation or liability whatsoever with respect to (i) any pre-existing Materials of Environmental Concern; or (ii) the presence or release of any Materials of Environmental Concern that was caused by a party other than the Lessee or its agents, contractors or subtenants. Lessee shall not be responsible for the remediation of any Matters of Environmental Concern caused by Lessor or its employees, contractors or tenants.

(e) Lessee shall, at all times prior to the expiration of the Term, provide Lessor, within thirty (30) days of request thereof, any environmental reports or studies in its possession.

(f) This Section 10 shall survive the termination of this Ground Lease.

11. EVENTS OF DEFAULT, TERMINATION, REMEDIES

11.1 Event of Default. Each of the following events shall be an "Event of Default" hereunder:

(a) If Lessee shall fail to pay any (i) installment of Rent or (ii) other payment required to be paid by Lessee under this Ground Lease for a period of ten (10) days; after written notice from Lessor to Lessee of such failure (except if Lessor has properly given such notice on two (2) separate occasions during the immediately preceding twelve (12) month period, then the Event of Default hereunder shall be failure of payment within ten (10) days of when due);

(b) If Lessee shall fail to observe or perform one or more of the other terms, conditions, covenants or agreements of this Ground Lease and/or the Energy Services Agreement and Lessee has not provided Lessor with notification of a dispute and such failure shall continue for a period of thirty (30) days after written notice thereof by Lessor to Lessee, or such longer period if permitted by the Energy Services Agreement, specifying such failure, unless such failure requires work to be performed, acts to be done, or conditions to be removed which cannot by their nature reasonably be performed, done or removed, as the case may be, within such thirty (30) day period. If such work to be performed, acts to be done, or conditions to be removed cannot be completed within thirty (30) days after written notice, no Event of Default shall be deemed to exist as long as Lessee shall have commenced doing the same within such thirty (30) day period and shall diligently and continuously prosecute the same to completion within ninety (90) days of said notice. If the work to be performed, acts to be done, or conditions to be removed require more than ninety (90) days for completion, as, by way of example and not limitation, in the case of the reconstruction of some or all of the Improvements to the Leased Premises, Lessee shall notify Lessor, in writing and within thirty (30) days of said notice, of a commercially reasonable period of time necessary to complete such work, in which case no Event of Default shall be deemed to exist for so long as Lessee shall diligently and continuously prosecute the same to completion;

(c) Unless Lessee has properly disputed a default, if Lessee shall fail to cure a default under the Energy Services Agreement, utility charge, tax fee, contract amount, expense related to the Leased Premises or the like which give rise to foreclosure or similar remedies or if Lessee admits, in writing that it is unable to pay its debts;

(d) If Lessee shall abandon the Leased Premises before the expiration or termination of the Term of this Ground Lease and not be providing maintenance to avoid the Improvements becoming deteriorated after notice from the Lessor

(e) If the Leased Premises, Improvements or the estate of Lessee hereunder shall be assigned, subleased, transferred, mortgaged or encumbered without Lessor's approval where required by the Lease or otherwise without compliance with the provisions of this Ground Lease applicable thereto;

(f) If a levy under execution or attachment shall be made against Lessee or its property that is the subject of this Ground Lease and such execution or attachment shall not be vacated or removed by court order, bonding or otherwise within a period of thirty (30) days; or

(g) If there shall be an Event of Default any material provision of this Lease more than three (3) times during any twelve (12) consecutive month period, irrespective of Lessee's cure of such Event of Default in each such instance.

11.2 Termination. If an Event of Default described in §11.1 herein shall occur and Lessor at any time thereafter, at its option, gives written notice to Lessee stating that this Ground Lease and the Term shall expire and terminate on the date specified in such notice, which date shall be not less than ninety (90) days after the giving of such notice, and if, on the date specified in such notice, Lessee shall have failed to cure the default which was the basis for the Event of Default, then this Ground Lease and Term and all of Lessee's rights under this Ground Lease shall expire and terminate as of the date specified in the notice given pursuant to this §11.2 and Lessee shall

the remove the Solar Facility as addressed in Article 6 of the Energy Services Agreement and surrender the Leased Premises but Lessee shall remain liable as hereinafter provided.

11.3 Remedies.

(a) Lessor's Remedies. Should an Event of Default occur under this Ground Lease, Lessor may pursue any or all of the remedies set forth below.

(i) Besides all other rights or remedies it may have by law and in equity Lessor shall have the right: (i) to declare all Rent and other payments for the entire unexpired term of this Lease at once due and payable and if not paid forthwith upon Lessor's demand then to resort to legal process for collection of all accelerated payments due under this Lease; or (ii) terminate this Lease and resort to legal process for collection of damages and/or eviction.

(ii) Lessor may terminate this Lease by giving five (5) days written notice of such termination to Lessee, whereupon this Lease shall automatically cease and terminate and removal of the Solar Facility shall occur as addressed in Article 6 of the Energy Services Agreement.

(iii) Should this Ground Lease be terminated before the expiration of the Term by reason of an Event of Default as hereinabove provided, or if Lessee shall abandon or vacate the Leased Premises before the expiration or termination of the Term of this Ground Lease, Lessor shall have the option to relet the Leased Premises to a new energy services provider for such rent and upon such terms as are not unreasonable under the circumstances if the full Rent reserved under the Ground Lease (and any of the costs, expenses or damages indicated below) shall not be realized by Lessor, Lessee shall be liable for all damages sustained by Lessor,

including without limitation deficiency in Rent, reasonable attorneys' fees, brokerage fees, and expenses.

(iv) Any damage or loss of Rent sustained by Lessor may be recovered by Lessor, at Lessor's option, at the time of reletting, or in separate actions, from time to time, as said damage shall have been made more easily ascertainable by successive relettings, or at Lessor's option in a single proceeding deferred until the expiration of the Term (in which event Lessee hereby agrees that the cause of action shall not be deemed to have accrued until the date of expiration of said Term) or in a single proceeding prior to either the time of reletting or the expiration of the Term.

(v) Mention in this Ground Lease of any particular remedy shall not preclude Lessor from any other remedy, in law or in equity Lessee hereby expressly waives any and all rights of redemption granted by or under any present or future laws in the event of Lessee being evicted or dispossessed for any cause, or in the event of Lessor obtaining possession of the Leased Premises by reason of Lessee's violation of any term or condition of this Ground Lease.

(vi) If Lessee shall be in Default hereunder, Lessor shall have the option, upon ten (10) days written notice to Lessee, to cure said Default for the account of and at the expense of the Lessee. No such notice shall be required for emergency repairs. In the event Lessor shall expend any sums in curing a Lessee Default as herein provided, Lessee shall reimburse Lessor for costs so incurred within ten (10) days after the date of Lessee's receipt of a statement from Lessor, and if such amount is not paid when due then such amount shall bear interest at a rate equal to two percent (2%) per annum in excess of the prime rate of interest announced from time to time

in the Wall Street Journal, but not in excess of the maximum legal rate, from the date of receipt of such statement until the date paid plus any reasonable attorneys' fees.

11.4 Self-Help. Notwithstanding anything in this Ground Lease to the contrary, if Lessee fails to perform any agreement or obligation on its part to be performed under this Ground Lease, Lessor shall have the right (i) if no emergency exists, to perform the same after giving thirty (30) days written notice to Lessee, except to the extent such obligation is not capable of cure within a thirty-day period and Lessee commences and diligently pursues such cure within thirty days, and (ii) in any emergency situation, to perform the same immediately without notice or delay. For the purpose of rectifying an Event of Default of Lessee, Lessor shall have the right to enter upon such portions of the Leased Premises as may be necessary to cure the Event of Default. Lessee shall on demand reimburse Lessor for the costs and expenses incurred by Lessor in rectifying the Events of Default as aforesaid, including reasonable attorneys' fees, together with interest thereon at the rate which is two percent (2%) in excess of the Prime Rate as published in the Wall Street Journal. Any act or thing done by Lessor pursuant to this Section shall not constitute a waiver of any such Event of Default or a waiver of any covenant, term, or condition herein contained or the performance thereof.

11.5 Remedies Cumulative. No reference to any specific right or remedy shall preclude Lessor from exercising any other right, or from having any other remedy or from maintaining any action to which it may otherwise be entitled by law or in equity No failure by Lessor to insist upon the strict performance of any agreement, term, covenant or condition hereof, or to exercise any right or remedy consequent upon a breach thereof, and no acceptance of full or partial Rent by

Lessor during the continuance of any such breach shall constitute a waiver of any such breach, agreement, term, covenant or condition. No waiver by Lessor of any breach by Lessee under this Ground Lease shall affect or alter this Ground Lease in any way whatsoever. Lessor shall be entitled to injunctive relief in case of the violation or threatened violation, of any of the provisions hereof or to a decree compelling performance of any of the provision hereof.

12. CONDEMNATION.

12.1 Condemnation. In the event of condemnation, the provisions of the Energy Services Agreement shall apply.

12.2 Title Upon Termination. Upon the expiration of the Term of this Ground Lease or upon its termination for any other reason whatsoever removal of the Solar Facility shall occur as addressed in Article 6 of the Energy Services Agreement.

12.3 Right of First Offer. The terms of the Right of First Refusal of the Energy Services Agreement shall apply.

13. SURRENDER OF PREMISES AND IMPROVEMENTS, HOLDOVER.

13.1 Surrender upon Termination. Upon the expiration of the Term or termination of this Ground Lease or the Energy Services Agreement for any reason whatsoever and subject to the other provisions contained in this Ground Lease and the Energy Services Agreement, the provisions of Section 6.4 of the Energy Services Agreement shall control.

14. CIVIL RIGHTS

14.1 Civil Rights I. To the extent that the following provisions may be applicable to Lessee's activities pursuant to this Ground Lease and their inclusion herein required by the United States Government, Lessee agrees to observe and comply as follows:

Lessee understands that Lessor in the operation and use of Lessor's facilities, is committed to an affirmative action program and will not on the grounds of race, color, religion, sex, or national origin, discriminate or permit discrimination against any person or group of persons in the manner prohibited by Part 21 of the DOT Regulations. Lessee hereby agrees that at the premises of its employment office, if any, shall be posted to such effect as required by such regulation. Lessee represents and warrants that, to the extent required by Law, it has an affirmative action plan in compliance with Federal rules and regulations of the Equal Employment Opportunity Commission and the Office of Federal Contract Compliance.

14.2 Civil Rights II. To the extent that the following provisions may be applicable to Lessee's activities pursuant to this Ground Lease and their inclusion herein required by the United States Government, Lessee agrees to observe and comply as follows:

Lessee agrees that in all of its activities pursuant to or in connection with this Ground Lease and in all of the operations on and about the Leased Premises and Improvements:

(a) Lessee will furnish service on a fair, equal, and not unjustly discriminatory basis to all users thereof.

(b) Lessee will charge fair, reasonable, and not unjustly discriminatory prices for each unit or service; provided that Lessee may be allowed to make reasonable and

nondiscriminatory discounts, rebates, or other similar types of price reductions to volume purchasers.

14.3 Civil Rights III. To the extent that the following provisions may be applicable to Lessee's activities pursuant to this Ground Lease and their inclusion herein required by the United States Government, Lessee agrees to observe and comply as follows:

Lessee, for itself, its successors in interest, and its assigns, as a part of the consideration hereof, does hereby covenant and agree that in the event facilities are constructed, maintained, or otherwise operated on the said property described in this Ground Lease for a purpose for which a Lessor program or activity is extended or for another purpose involving the provision of similar services or benefits, Lessee shall maintain and operate such facilities and services in compliance with all other requirements imposed pursuant to Title 49, Code of Federal Regulations, Department of Transportation, Subtitle A, Office of the Secretary, Part 21, Nondiscrimination in Federally assisted program of the Department of Transportation-Effectuation of Title IV of the Civil Rights Act of 1964, and as said Regulations may be amended.

In the event of breach of any of the above nondiscrimination covenants, Lessor shall have the right to terminate the Ground Lease and to reenter and repossess the approved locations, and hold the same as if said Ground Lease had never been made or issued, except that at no time may Lessor exert dominion and control over Lessee-owned equipment, facilities and wiring.

14.4 Civil Rights IV.

(a) Lessee shall comply with the regulations relative to nondiscrimination in Federally-assisted programs of the Department of Transportation ("DOT") Title 49, Code of Federal Regulations, Part 21, as they may be amended from time to time, (hereinafter referred to as the "DOT Regulations"), which are herein incorporated by reference and made a part of this Ground Lease.

(b) Lessee, with regard to the work performed by it during the Ground Lease, shall not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment.

Lessee shall not participate either directly or indirectly in the discrimination prohibited by Section 21.5 of the DOT Regulations, including employment practices when the contract covers a program set forth in Appendix B of the DOT Regulations.

(c) In all solicitations either by competitive bidding or negotiations made by Lessee for work to be performed under a subcontract, including procurements of materials or leases of equipment, each potential subcontractor or supplier shall be notified by Lessee of Lessee's obligations under this Ground Lease and the DOT Regulations relative to nondiscrimination on the grounds of race, color, sex, or national origin.

(d) Lessee shall provide all information and reports required by the DOT Regulations or directive issued pursuant thereto. Lessee shall permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by Lessor or the FAA to be pertinent to ascertain compliance with such DOT Regulations, orders, and instructions.

Where any information required of Lessee is in the exclusive possession of another who fails or refuses to furnish this information, Lessee shall so certify to Lessor or the FAA as appropriate and shall set forth what efforts Lessee has made to obtain this information.

(e) In the event of Lessee's noncompliance with the nondiscrimination provisions of this Ground Lease, Lessor may impose such sanctions as it or the FAA may determine to be appropriate, including, but not limited to:

(i) Withholding any payments which may be due to Lessee under the Ground Lease until Lessee complies, and/or

(ii) Cancellation, termination, or suspension of this Ground Lease, in whole or in part.

(f) Lessee shall include the provisions of subsections (A) through (E) in every sublease or subcontract, including procurements of materials and leases of equipment, unless exempt by the DOT Regulations and directives issued pursuant thereto. Lessee shall take such action with respect to any subcontract or procurement as Lessor or the FAA may direct as a means of enforcing such provisions including sanctions for noncompliance; provided, however, that in the event Lessee becomes involved in, or is threatened with, litigation with a subcontractor or supplier as a result of such direction, Lessee may request Lessor to enter into such litigation to protect the interests of Lessor; and, in addition, Lessee may request the United States to enter into such litigation to protect the interests of the United States.

14.5 Civil Rights V. To the extent that the following provisions may be applicable to Lessee's activities pursuant to this Ground Lease and their inclusion herein required by the United States Government, Lessee agrees to observe and comply as follows:

Lessee assures that no person shall be excluded on these grounds from participating in or receiving the services of any program or activity covered by this subpart. Lessee assures that it will require that its covered sub-organizations provide assurances to Lessee that they require assurances from their sub-organizations, as required by 14 CFR Part 152, Subpart E, to the same effect. Lessee assures that it shall furnish to the United States Government, the County, or Lessor, whichever is required, any and all documents, reports and records; including but not limited to, an affirmative action plan, Form EEO-a, the submission of which are required by 14 CFR part 152, Subpart E.

The incorporation of these provisions is required by the FAA pursuant to the 14 CFR Part 152 (45 Federal Regulation 10184, February 4, 1980) as a condition of and prerequisite to Lessor's receiving Federal assistance in connection with the Airport.

15. MBE/WBE AND DBE REQUIREMENTS

15.1 Minority Business Enterprise/Women Business Enterprise Requirements.

(a) Lessee, in order to promote the program and policies adopted by the County Board of Commissioners on August 21, 1980, at Agenda no. 1118-80, shall utilize Minority/Women Business Enterprise (MBE/WBEs) as defined pursuant to 49 Code of Federal Regulations, Part 23, issued by the DOT, in the construction of the Improvements on the Leased

Premises. Utilization of MBE/WBEs will be on a direct contract basis with Lessee, any sublessee, and/or subcontractors through Lessee's or any sublessee's prime contractors.

(b) Lessee understands and agrees that all MBE/WBE contractors and subcontractors utilized, and contracts and subcontracts entered into in accordance with the MBE/WBE provisions contained herein, shall comply with the promulgated MBE/WBE program of Allegheny County and the Disadvantaged Business Enterprise (DBE) program of Lessor, as adopted and which may from time to time be amended.

(c) If Lessee cannot meet the established MBE/WBE or DBE guidelines as set forth above, Lessee shall submit, in writing, a statement describing the reason(s) why it cannot comply with such MBE/WBE or DBE guidelines.

15.2 Disadvantaged Business Enterprise Requirements. Lessee shall provide for participation by certified DBEs in the design, construction management and construction of the Improvements to the Leased Premises. Lessee shall take any necessary and reasonable steps, in accordance with Title 49, Code of Federal Regulations, Part 23, as amended, to ensure that DBEs have the maximum opportunity to compete for and perform contracts.

16. FAA REQUIREMENTS.

16.1 Landing Area Development. Lessor reserves the right to further develop or improve the landing area of the Airport as it sees fit, regardless of the desires or opinions of Lessee, and without interference or hindrance by Lessee. (FAA Order 5190.6B - AGL-600).

16.2 Landing Area Maintenance. Lessor reserves the right, but shall not be obligated to Lessee, to maintain and keep in repair the landing area of the Airport and all publicly owned

facilities of the Airport, together with the right to direct and control all activities of Lessee in this regard. (FAA Order 5190.6B - AGL-600).

16.3 Subordination to FAA Agreements. This Ground Lease shall be subordinate to the provisions of and requirements of any existing or future agreement between Lessor and the United States relative to the development, operation, or maintenance of the Airport. (FAA Order 5190.6AB- AGL-600).

16.4 Notification of Alteration of Improvements. Lessee agrees to comply with the notification and review requirements contained in Part 77 of the Federal Aviation Regulations in the event that any future structure or building is planned for the Leased Premises, or in the event of any modification or alteration of any future building or structure situated on the Leased Premises.

16.5 Right of Flight. There is hereby reserved to Lessor, its successors and assigns, for the use and benefit of the public, a right of flight for the passage of aircraft in the airspace above the Leased Premises. This public right of flight shall include the right to cause in said airspace any noise inherent in the operation of any aircraft used for navigation or flight through the said airspace or landing at, taking off from, or operation on the Airport.

16.6 Avigation Right-of-Way. The right of free passage of aircraft shall be in the airspace over the above described property at a height of 1290 ft. above mean sea level to an infinite height above said mean sea level and shall be for the exclusive benefit of Lessor, its successors and assigns (the "Avigation Right of Way"). Further, the rights granted pursuant to this Section 16.6 shall include the right to cause or deposit in all airspace above the surface of the Leased Premises

and on the Leased Premises such noise, vibrations, fumes, dust, fuel particles and other effects that may be caused by the passage of the aircraft over the Leased Premises or adjoining property; and by the operation of the aircraft landing at, or taking off from, or otherwise operating at or on said Airport. Lessee does hereby waive, remise and release any right or cause of action which it now has or may have in the future against Lessor, its successors and assigns, due to such noise, vibrations, fumes, dust, fuel particles and all other surface effects that may be caused or may have been caused by the operation of aircraft passing over the Leased Premises or adjoining property, or landing at, or taking off from, or otherwise operating at or on said Airport.

Lessor shall have the continuing right to prevent the erection or growth upon the Leased Premises of any building, structure, trees or any other object extending into the airspace above said surface at a height of mean sea level of 1290 ft. and to remove from said airspace, or at the sole option of Lessor, to mark and light as obstructions to air navigation, any such building, structure, trees or other objects now upon, or which in the future may be upon the Leased Premises, together with the right of ingress to and egress from and passage over all the Leased Premises (airspace and surface space) for such purposes.

In the event Lessee (or anyone holding through Lessee) interferes with Lessor's right of free passage, Lessor reserves the right upon advance notice and opportunity for cure to enter upon the Leased Premises and to remove the offending structure or object and cut the offending tree, all of which shall be at the expense of Lessee.

16.7 Non-Interference. Lessee by accepting this Ground Lease agrees for itself, its successors and assigns that it will not make use of the Leased Premises in any manner that might

interfere with the landing and taking off of aircraft from the Airport or otherwise constitute a hazard. In the event the aforesaid covenant is breached, Lessor reserves the right upon advance notice and opportunity for cure to enter upon the Leased Premises and cause the abatement of such interference at the expense of Lessee.

16.8 War and National Emergency. This Ground Lease and all the provisions hereof shall be subject to whatever right the United States Government now has or in the future may have or acquire affecting the control, operation, regulation, and taking over of said Airport or the exclusive or non-exclusive use of the Airport by the United States during the time of war or national emergency.

16.9 Reversion for Aeronautical Purposes. Lessee agrees that Lessor may terminate this Ground Lease at any time that Lessor determines that the Leased Premises will be required for aeronautical purposes. In such event, Lessee agrees to release Lessor from any claims or liabilities resulting from such Ground Lease termination, other than a claim for equitable just compensation for all costs and damages associated with the relocation of the Premises and the Solar Facility. Upon Ground Lease termination the Leased Premises and all rights therein will revert to Lessor. In the event that Lessor exercises such reverter rights, Lessee shall be entitled to equitable just compensation for all costs and damages associated with the relocation of the Premises and the Solar Facility determined in accordance with the Condemnation provisions of Section 12 of this Ground Lease.

17. MISCELLANEOUS.

17.1 Force Majeure.

(a) Neither Party shall be liable to the other for any failure, delay or interruption in performance caused by circumstances beyond its control, including without limitation, acts of God, strikes, boycotts, picketing, slowdowns, work stoppages or labor troubles of any other type (collectively, "Force Majeure"), whether affecting the Parties, their contractors or subcontractors. Nothing in this Section abates, postpones or diminishes Lessee's obligation to make payments due Lessor hereunder.

(b) Neither Party shall be obligated to supply any service when and to the extent that supplying that service or using any component necessary therefor is prohibited or rationed by any government or Law. If such particular Law does not bind Lessor, but Lessor nonetheless deems compliance therewith to be in the public interest, it shall not be obligated to supply the service.

17.2 Personal Liability. No elected official, appointed official, director, officer, agent or employee of County and/or Lessor shall be charged personally or held contractually liable by or to Lessee under any term or provision of this Ground Lease, or because of any breach hereof, or because of its or their execution, approval, or attempted execution of this Ground Lease.

17.3 Interpretation.

(a) The headings of the various sections and exhibits of this Ground Lease have been inserted for reference only and shall not have the effect of modifying the express provisions of this Ground Lease. The wording of this Ground Lease shall be interpreted simply, according to

its fair meaning, and not strictly for or against either Party. Words denoting persons shall include firms, partnerships, corporations, associations, trusts and other legal entities, as well as natural persons. Words importing the singular include the plural and vice versa, and words devoting the masculine gender mean, where appropriate, the feminine or neuter gender.

(b) This Ground Lease shall be construed without regard to the identity of the person who drafted the various provisions hereof. Each and every provision of this Ground Lease shall be construed as though all Parties hereto participated equally in the drafting thereof. As a result of the foregoing, any rule or construction that a document is to be construed against the drafting Party shall not be applicable.

17.4 Notices. All notices required to be given or made by Lessee to Lessor pursuant to this Ground Lease shall be in writing by certified mail with return receipt, or by receipted overnight courier service with a copy to be sent by fax or e-mail and shall be sent to:

Allegheny County Airport Authority
c/o Senior Vice President of Development
Landside Building
P.O. Box 12370
Pittsburgh International Airport
Pittsburgh, PA 15231-0370

with a copy sent to:

Saul Ewing Arnstein & Lehr LLP
One PPG Place, 30th Floor
Pittsburgh, PA 15222
Attn.: Jeffrey W. Letwin, Esquire

or to such other place as the Chief Executive Officer of Lessor may from time to time designate in writing.

All notices and payments required to be given by Lessor to Lessee pursuant to this Ground Lease may be given or made to:

Jeffrey Nehr, Vice President of Business Development
Peoples Natural Gas Company LLC
375 North Shore Drive
Pittsburgh, PA 15212

with a copy sent to:

Jennifer Petrisek, Sr. Counsel
Peoples Natural Gas Company LLC
375 North Shore Drive
Pittsburgh, PA 15212

or such other place as Lessee may from time to time designate in writing.

Notices shall be deemed delivered on the date presented for receipt, which must be on a regular business day.

17.5 Failure to Exercise Rights. Failure of either Party to exercise their respective rights under the terms of this Ground Lease on any one occasion shall not be construed as a waiver on any subsequent occasion. No provision of this Ground Lease shall be waived or altered except by writing, endorsed hereon, or attached hereto.

17.6 No Co-Partnership. It is understood and agreed that nothing herein contained is intended or shall be construed to in any respect create or establish the relationship of co-partners between Lessee and Lessor or County, or as constituting Lessee as the general representative or agent of Lessor or County for any purpose whatsoever.

17.7 Compliance with Laws. Lessee shall comply with all present and future Laws applicable to or directly or indirectly affecting Lessee or its operations on the Leased Premises; provided, that Lessee may, at its own sole risk and cost, contest the applicability or legal validity of any Law by appropriate administrative or judicial procedure.

(a) Lessee shall defend, indemnify and hold harmless Lessor and/or County, its elected or appointed officials, officers, agents and employees, from and against any claim, damages, liability, suit, lien, judgment and the like, including any claim for contribution or indemnification, caused by or arising out of any violation of any Law by Lessee or its agents, unless the violation was caused by Lessor or County, or their agents. Lessee's obligation under this Section includes without limitation all reasonable attorney fees and investigation expenses, incurred by Lessor or County in handling and defending against such claim, damages, liability, suit, lien, judgment and the like.

17.8 Memorandum of Ground Lease. Promptly after the execution of this Ground Lease, Lessor and Lessee shall record with the Allegheny County Department of Real Estate Office, a Memorandum of Ground Lease and any supplement, amendment or addition thereto as Lessee or any Leasehold Mortgagee may request.

17.9 Conflict of Interest. To the best of Lessee's knowledge, information and belief, no officer or employer of County or Lessor is directly or indirectly a party to or otherwise interested in this Ground Lease. Neither ownership of stock in a publicly traded corporation nor representation of legal counsel shall violate this Section.

17.10 Counterparts. This Ground Lease may be executed in two or more counterparts and shall be deemed effective when and only when one or more of such counterparts shall have been signed by or on behalf of each of the Parties hereto (although it shall not be necessary that any single counterpart be signed by or on behalf of each of the Parties hereto, and all such counterparts shall be deemed to constitute but one and the same instrument) and shall have been delivered by each of the Parties to the other.

17.11 Separability, Applicable Law, Binding Effect.

(a) Each provision hereof shall be separate and independent. If any provision or the application thereof to any person or circumstance becomes invalid to any extent or unenforceable, the remaining provisions, or the application of such provision to persons or circumstances other than those as to which it is invalid or unenforceable, shall not be affected thereby. All provisions of this Ground Lease shall be binding upon, inure to the benefit of, and be enforceable by, the respective successors and assigns of Lessor, and Lessee to the same extent as if each such successor and assign were named as a party hereto.

(b) The laws of the Commonwealth of Pennsylvania shall govern this Ground Lease.

(c) This Ground Lease and the Energy Services Agreement constitute the entire agreements of the Parties on the subject matter hereof, and may not be modified or discharged except by written amendment duly executed by both Parties.

17.12 Brokerage Commission. Lessor and Lessee each represent and warrant to the other that neither of them has dealt with any persons other than each other in connection with this

transaction, and each Party shall indemnify the other against any claim for commission or fee made by any person based on dealings with the indemnifying Party.

[Signature Page Follows]

IN WITNESS WHEREOF, the Parties have duly executed this Ground Lease, intending themselves to be bound, as of the date first written herein.

ATTEST:

Ashley Henry Shook, Secretary

ALLEGHENY COUNTY AIRPORT AUTHORITY

By: Christina A. Cassotis, Chief Executive Officer

APPROVED AS TO FORM:

Jeffrey W. Letwin, Esquire, Solicitor

WITNESS:

By

Name

Title Vice President, Business Dev

PEOPLES NATURAL GAS COMPANY, LLC

By

Name MORGAN K. O'BRIEN

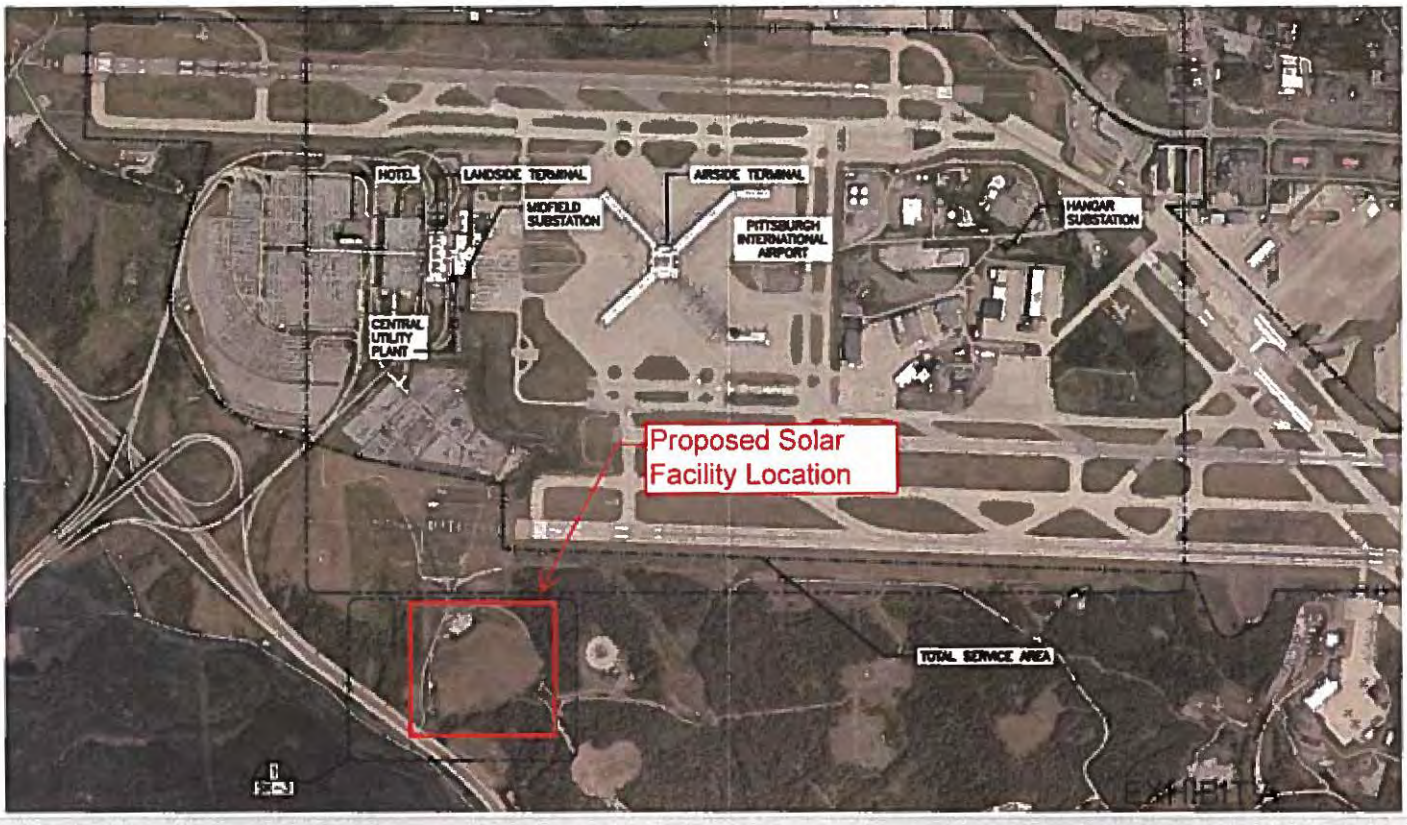
Title PRESIDENT & CEO

10/14/19

EXHIBIT A

DESCRIPTION OF LEASED PREMISES [1]

[1]Environmental Statement: The proposed solar farm will be located on top of the non-active solid waste landfill at the Pittsburgh International Airport. This non-active landfilled, permitted by the then Pennsylvania Department of Environmental Resources (PADER), was constructed under Permit Number 101479 and designed to manage municipal-type waste that was encountered during the construction of the Midfield Terminal.


HOTEL
LANDSIDE TERMINAL
AIRSIDE TERMINAL
MIDFIELD SUBSTATION
PITTSBURGH INTERNATIONAL AIRPORT
HANGAR SUBSTATION
CENTRAL UTILITY PLANT
Proposed Solar Facility Location
TOTAL SERVICE AREA

ALLEGHENY COUNTY AIRPORT AUTHORITY
OFFICIAL REQUEST FOR ADMINISTRATIVE ACTION

ACTION NUMBER **704-19**

☒ BOARD ☐ CHIEF EXECUTIVE OFFICER

DEPARTMENT: Engineering & Construction

CONTACT: Tom Woodrow, P.E. TMW EXT. #3667

SIGNATURE: _____
Chief Development Officer

Chief Financial Officer: _____

Chief Commercial Officer: _____

Chief Executive Officer: _____

DATE RECEIVED BY:
CONTRACT ADMINISTRATOR
LEGAL DEPARTMENT 10/14/2019
HUMAN LEGAL DEPARTMENT
OCT 14 2019 PM3:08

EST. COST:

Funding	
FAA	
State	
Authority	
Other	

EST REVENUE: $10,000.00/annually

CHECK APPROPRIATE BOX:
Operating ☐ Grant ☐ Capital ☐ Capital TMP ☐

FOC Approval Date (TMP only) _____

FINANCIAL/PROJECT CODES:

INCLUDED IN BUDGET: YES ☐ NO ☐

SUMMARY: Request authorization from the Allegheny County Airport Authority Board of Directors for the Chief Executive Officer to enter into a Ground Lease with Peoples Natural Gas Company LLC (PNG) for the Solar Facility associated with the PIT Microgrid Project. The Ground Lease will begin on the date of execution and shall be for a term of 20 years from the energy services commencement date which is expected to be June 1, 2021. The total yearly revenue will be $10,000.00.

EXPLANATION: The Ground Lease is necessary in order for Peoples Natural Gas Company LLC (PNG) to design, permit, procure, construct, own, operate, and maintain the Solar Facility associated with the PIT Microgrid Project.

Funding Source: N/A

The Engineering & Construction Department has reviewed this request and found it to be reasonable, necessary, and justified.

COMMITTEE RECOMMENDATION: ☒ APPROVED ☐ DENIED AMW INITIAL ☐ NOT REQUIRED CEO Signature Only

BOARD AUTHORIZATION: ☒ APPROVED AS SUBMITTED ☐ DENIED

DBE PARTICIPATION: N/A

DBE COMMENTS: N/A

CERTIFIED AS TO APPROVAL: _____
Christina A. Cassotis
Chief Executive Officer

APPROVAL DATE: OCT 18 2019

APPENDIX J

Public Consultation

Public Notice from the Pittsburgh Post-Gazette
October 26 - December 1, 2023

Legal Notice

Public Notice – Allegheny County Airport Authority – IMG Solar – Draft Supplemental Environmental Assessment for Phase 2 PV Solar Array Project at Pittsburgh International Airport In accordance with the National Environmental Policy Act (NEPA), the Allegheny County Airport Authority (ACAA) has released a Draft Supplemental Environmental Assessment (EA) for the proposed Phase 2 Photovoltaic (PV) Solar Array Project at Pittsburgh International Airport (PIT). This project is the second phase to an existing 3 megawatt (MW) PV solar array, owned and operated by IMG Energy Solutions (IMG), and is located on Airport property in Findlay Township, immediately east of Harper Road and north of the Airport Expressway (Interstate 376). The Phase 2 PV Solar Array will cover approximately 11.6 acres, generate 4.7 MW of power, and be net metered to provide additional power redundancy and resiliency, while also contributing to better sustainability efforts at PIT. The Draft Supplemental EA will be available for public review through November 30, 2023 at the following locations: Online at **https://flypittsburgh.com /acaacorporate/about /environmental/** and physical copies available for review at PIT, Landside Terminal, 4th Floor Mezzanine, Pittsburgh, PA 15231. If you intend to view the document at the location above, please contact Justin Stascak at **jstascak@flypittsburgh.com** or 412-472-5885 to schedule an appointment at least one day before your visit. Comments regarding the information disclosed in the Draft Supplemental EA can be emailed to **jstascak@flypittsburgh.com** or mailed to ATTN: Mr. Justin Stascak, Allegheny County Airport Authority, Pittsburgh International Airport Landside Terminal, 4th Floor, Mezz, PO Box 12370, Pittsburgh, PA 15231. Comments must be submitted by November 30, 2023. Before including your address, phone number, email address, or other personal identifying information in your comment, be advised that your entire comment – including your personal identifying information – may be made publicly available at any time. While you can ask the ACAA in your comment to withhold from public review your personal identifying information, the ACAA cannot guarantee that it will be able to do so.

ALLEGHENY COUNTY AIRPORT AUTHORITY

PITTSBURGH INTERNATIONAL AIRPORT
ALLEGHENY COUNTY AIRPORT

October 26, 2023

Public Notice
Pittsburgh International Airport
IMG Energy Solutions – Phase 2 PV Solar Array Project
Draft Supplemental Environmental Assessment
Available for Review and Comment

In accordance with the National Environmental Policy Act of 1969 (NEPA), the Allegheny County Airport Authority (ACAA) has released a Draft Supplemental Environmental Assessment (EA) for the proposed Phase 2 Photovoltaic (PV) Solar Array Project at Pittsburgh International Airport (PIT). This project is the second phase to an existing 3-megawatt (MW) PV solar array, owned and operated by IMG Energy Solutions (IMG), and is located on Airport property in Findlay Township, immediately east of Harper Road and north of the Airport Expressway (Interstate 376). The Phase 2 PV Solar Array will cover approximately 11.6 acres, generate 4.7 MW of power, and be net metered to provide additional power redundancy and resiliency, while also contributing to better sustainability efforts at PIT.

The Draft Supplemental EA is consistent with FAA Order 1050.1F, Environmental Impacts: Policies and Procedures, and with existing national environmental policies and objectives set forth in Section 101 of NEPA, 42 U.S.C. § 4321 et seq., Council on Environmental Quality regulations, 40 C.F.R. Parts 1500-1508, and all other applicable special purpose laws. The Draft Supplemental EA evaluates the potential environmental effects of the proposed project and has been prepared pursuant to the requirements of Section 102(2)(c) of NEPA.

The Draft Supplemental EA is available for review through November 30, 2023. Physical copies are available for review at PIT, Landside Terminal, 4th Floor Mezzanine, Pittsburgh, PA 15231. If viewing the document at PIT, please contact Justin Stascak at jstascak@flypittsburgh.com or 412-472-5885 to schedule an appointment at least one day before your visit. Comments regarding the information disclosed in the Draft Supplemental EA can be emailed to jstascak@flypittsburgh.com or mailed to ATTN: Mr. Justin Stascak, Allegheny County Airport Authority, Pittsburgh International Airport Landside Terminal, 4th Floor, Mezz, PO Box 12370, Pittsburgh, PA 15231. Comments must be submitted by November 30, 2023.

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