VERIFIED DIRECT TESTIMONY OF HANNAH PAWELCZYK

I. INTRODUCTION

Q1. Please state your name and business address.

A. My name is Hannah Pawelczyk, and my business address is One South Wacker Drive, Suite 1800, Chicago, Illinois 60606.

Q2. By whom are you employed and in what capacity?

A. I am employed by Invenergy LLC as Manager, Renewable Development. I have been delegated responsibility for the development of Trade Post Solar (the "Project") by Trade Post Solar LLC.

Q3. What is your educational background?

A. I have a Bachelor of Science in Mathematics from the University of Notre Dame and a Master of Business Administration with concentrations in Finance and Enterprise Risk Management from the Johns Hopkins University.

Q4. Please describe your employment history.

A. After gaining experience in the technology and utility industries, I started working at Invenergy in July 2018 as an Associate, Renewable Development, and started in my current role as Manager, Renewable Development in September 2020.

Q5. Have you previously testified before government bodies or agencies?

A. Yes, I submitted testimony in support of a petition for a declination of jurisdiction on behalf of Fairbanks Solar Energy Center LLC, another Invenergy subsidiary, in Cause No. 45254. I have also testified in front of county boards in Iowa regarding county approvals.

Q6. What is the purpose of your direct testimony in this proceeding?

A. The purpose of my direct testimony is to discuss the relief sought by Petitioner in this proceeding and to provide the Commission with information regarding the Petitioner and its proposed Project.

Q7. Please describe the Project's corporate structure.

A. The Project is owned by Petitioner Trade Post Solar LLC. Trade Post Solar LLC is a wholly-owned subsidiary of Invenergy Solar Development North America LLC ("ISDNA"), which in turn is a wholly-owned subsidiary of Invenergy Renewables LLC ("Invenergy Renewables"). Petitioner, ISDNA, and Invenergy Renewables are affiliates of Invenergy LLC ("Invenergy"). Invenergy is an Illinois limited liability company specializing in the development of large-scale renewable and other clean energy generation and storage facilities worldwide. Invenergy is headquartered in Chicago, Illinois. Invenergy has developed 176 projects worldwide totaling more than 27,000 megawatts ("MW"), including over 5,000 MW of solar projects. In the Midwest of the United States, Invenergy has developed nearly 10,000 MW of solar and wind projects.

Q8. What relief does Petitioner request of the Commission in this Cause?

A. Petitioner is requesting that the Commission decline to exercise jurisdiction pursuant to Ind. Code § 8-1-2.5-5 over Petitioner's construction, ownership, and operation of, and any other activity in connection with the Project, and to determine that the public interest will be served by the Commission's declining to exercise jurisdiction over Petitioner.

II. PROJECT DESCRIPTION AND PROJECT SITE

Q9. Please describe the Trade Post Solar project.

A. Trade Post Solar is a proposed solar generation facility that is anticipated to have the capability of generating up to approximately 200 megawatts ("MW") (nameplate capacity, alternating current) of electricity from approximately 501,592 solar panels. The Project is expected to have a Net Capacity Factor of approximately 26.19% percent. The Project will interconnect to American Electric Power's ("AEP") Sullivan 345 kV substation, within the footprint of PJM Interconnection ("PJM"). Construction of the Project is expected to commence by Q2 2022, and the Project is expected to achieve commercial operation by December 31, 2023 ("COD").

The Project is located entirely in Sullivan County, Indiana and will be located across approximately 1,500 acres to which Petitioner has or will have consensually obtained land rights. A preliminary site map depicting the approximate solar facility locations for the Project is attached as Petitioner's Attachment HP-1.

Q10. Is the Project similar to other electric generating plants for which the Commission has previously declined to exercise jurisdiction?

A. Yes. The Commission also issued orders declining much of its jurisdiction pursuant to Ind. Code § 8-1-2.5-5 over electric generating facilities proposed by several other renewable project entities. *See In the Matter of the Petition by NextEra Energy Bluff Point, LLC*, Cause No. 44299 (Apr. 3, 2013); *In the Matter of the Petition by Headwaters Wind Farm, LLC*, Cause No. 44358 (Sept. 19, 2013); *In the Matter of the Petition by Jordan Creek Wind Farm, LLC*, Cause No. 44978 (Dec. 20, 2017); *In the Matter of the Petition by Bitter Ridge Wind Farm, LLC*, Cause No. 45165 (March 20, 2019); *In the Matter of the Petition by Speedway Solar, LLC*, Cause No. 45230 (Sept. 18, 2019); *In the Matter of the Petition by Lone Oak Solar Energy LLC*, Cause No. 45255 (Oct. 29, 2019); *In the Matter of the*

Petition by Fairbanks Solar Energy Center LLC, Cause No. 45254 (Oct. 29, 2019); *In the Matter of the Petition by Riverstart Solar Park LLC*, Cause No. 45336 (June 3, 2020). The proposed Project is similar to these electric generating facilities in the sense that it will be a generator of electricity for sale in the wholesale power market, and it represents an increase in the amount of electricity generated in Indiana.

Q11. How will the Project generate electricity?

A. The Project will generate electricity via solar modules (*i.e.*, panels) located within the approximately 1,500-acre solar panel field. The solar field will include mounted photo voltaic ("PV") modules and inverters that will be configured in array blocks, as well as a main power transformer to transform voltage from 34.5kV to 345 kV. The PV modules will be constructed primarily of non-metallic materials such as silicon, monocrystalline glass, composite film, plastic, and epoxies, with an anodized aluminum frame. The panels will measure approximately 88 inches by 44 inches. The PV modules will be mounted on single-axis horizontal tracker mounting systems generally six to seven feet off the ground. The panels, at their highest point, will be up to approximately 20 feet off the ground. The module arrays will be arranged in north-south oriented rows, and drive motors will rotate the horizontally mounted solar panels from east to west to follow the sun (on a single axis) throughout the day. The highest point for a horizontal tracker will be achieved during the morning and evening hours when the trackers are tilted at their maximum angle.

Each array block will have Power Conversion Stations ("PCS") containing inverters and medium voltage transformers as well as other electrical equipment. Each PCS will also contain electrical and communication equipment to power and communicate with the tracker units. All electrical equipment will be housed in their respective protective

enclosures on concrete pads or precast vaults, or on posts. The collection system will transport the electricity from each array block to an onsite collector substation via underground 34.5 kV cabling. From there, the electricity will be stepped up to 345 kV. The Project will then interconnect to AEP's Sullivan 345 kV substation via an approximately 1 to 1.5 mile long 345 kV transmission line from the Project site.

Q12. Have the component pieces to construct the Project been secured?

A. No. Petitioner has not yet selected a final supplier and does not plan to do so until closer to the construction start date. Petitioner plans to procure panels and other equipment from established, tier 1 vendors with strong warranties and other provisions.

Q13. What evaluation has Petitioner undertaken to demonstrate the appropriateness of the Project site?

A. Based upon our due diligence and permitting work to date, no environmental issues are foreseen that would delay or prevent the permitting and construction of the Project within the timeline listed herein. Petitioner contracted with SWCA Environmental Consultants ("SWCA") to perform a Tier 1-2 Site Characterization Study ("SCS") of the Project site and surrounding area. As part of the SCS, SWCA performed a desktop review and field reconnaissance analyzing land cover, protected species' habitats, designated sensitive or critical areas, federal and state managed lands, and the potential for waters of the U.S. or Indiana, including wetlands, within the Project area and vicinity in accordance with the U.S. Fish and Wildlife Service's ("USFWS") Land-based Wind Energy Guidelines ("WEG") (USFWS 2012). Because USFWS has not yet developed a solar-specific guidance document, the WEG was used for the Project to provide a framework for environmental review. Further, as part of the SCS, the Petitioner consulted with USFWS

and Indiana Department of Natural Resources regarding natural resources within and surrounding the Project. The SCS is attached as Petitioner's Attachment HP-2. To identify wetlands, streams, and other regulated waters, Petitioner also contracted with SWCA to conduct a formal field delineation of these resources within the Project site; this work is currently ongoing. The methods of the field delineation are in accordance with USACE and Indiana Department of Environmental Management ("IDEM") policies. Westwood Professional Services, Inc. ("Westwood") performed a Cultural Resources Desktop Review to provide a preliminary review of desktop sources pertaining to cultural and historic resources with the potential to be located within the Project site or be impacted by the Project. The Cultural Resources Desktop Review is attached as Petitioner's Attachment HP-3. Petitioner also contracted with Westwood to perform a Phase 1 Environmental Site Assessment ("ESA") in accordance with ASTM Standard E 2247-16 and 40 CFR § 312 Subp. C. The ESA revealed no ASTM Recognized Environmental Conditions (RECs), no Controlled Recognized Environmental Conditions (CRECs) and no Historical Recognized Environmental Conditions (HRECs) in connection with the Project area. The ESA is attached as Petitioner's Attachment HP-4.

Q14. Will the Project use water and will there be any impact on local water supplies?

A. The Project will not use water in any significant quantities, and it will have negligible or no impact on local water supplies. Water will be used during construction, reclamation, and removal of Project facilities, primarily for dust control. After construction is completed, water may be used for panel washing, if necessary.

Q15. Will the Project have any substantial negative impact on any groundwater rights and obligations, or any streams and wetlands?

A. No. The Project will not have any substantial negative impacts on any groundwater rights, streams, or wetlands.

III. PUBLIC UTILITY STATUS AND PERMITTING ISSUES

Q16. Will Petitioner qualify as a public utility under Indiana law?

A. The Indiana Legislature has defined "public utility" to include any entity that owns, operates, manages or controls any plant or equipment within the State for the production of electricity. As described above, Petitioner intends to develop, own, and operate an electric generating facility. Thus, even though Petitioner does not intend to sell electricity directly to retail customers, it may fall within this very broad definition of "public utility" under Indiana law. As a public utility, Petitioner would then also meet the definition of an "energy utility" for purposes of Ind. Code § 8-1-2.5-5. This Indiana Code section permits an energy utility electing to be subject to this section to request the Commission to decline to exercise its jurisdiction with respect to the energy utility, which prompted the Petition in this case.

Q17. Has Petitioner applied for and obtained, or will Petitioner apply for and obtain, all necessary federal, state, and local permits needed for construction and operation of the Project?

A. Yes.

Q18. What local permits are required for the Project?

A. There are no local zoning permits or approvals required for the Project. The Project may require routine construction-related permits such as entrance permits as the Project gets closer to construction, and Petitioner will obtain these permits to the extent necessary.

Petitioner will also need to execute a Road Use Agreement with Sullivan County, and this agreement will be entered into prior to the start of construction.

Q19. Has Petitioner worked with Sullivan County to ensure the Project has local support?

A. Yes. Petitioner has worked with the Sullivan County Redevelopment Commission to ensure that the Project complies with any local requirements. The Sullivan County Council and Board of Commissioners have also been updated frequently on the Project's status. Initial feedback from Sullivan County officials and landowners in the Project area has been positive and supportive of the Project.

Q20. What steps has Petitioner taken to minimize any potential negative impacts on the local community?

A. Petitioner does not anticipate any negative impacts on the local community, but it has actively engaged Sullivan County officials to minimize any impacts. At the direction of Sullivan County leadership, Petitioner has maintained frequent communication (both in person and via phone) with the Sullivan County Redevelopment Commission's Director and has met with members of the Sullivan County Council and Board of Commissioners to keep County officials informed of the Project's status.

Q21. Are there any decommissioning requirements applicable to the Project even though Sullivan County has no zoning or other ordinance establishing decommissioning requirements?

A. Yes. Even though Sullivan County does not require Petitioner to enter into a decommissioning plan, Petitioner has voluntarily agreed to certain decommissioning requirements directly with landowners whose land will be impacted by the Project. Specifically, the landowner solar lease and easement agreement ("Agreement") entered

into with each landowner requires Petitioner to obtain and provide to each landowner a Removal Bond, defined as a letter of credit or similar financial assurance, in form and substance reasonably satisfactory to the landowner, securing performance of Petitioner's obligation to remove Project facilities from the landowner's property. The Removal Bond must be equal to the estimated amount, if any, by which the cost of removing the Project facilities exceeds the salvage value of such Project facilities. The Removal Bond must be obtained by Petitioner and provided to the landowner on or by the fifteenth (15th) anniversary of the Project's Operations Date, which is defined as the date which the Project begins production of electrical energy generated by substantially all of the Project's facilities or the sixth (6th) anniversary of the Agreement's effective date, whichever occurs first. The decommissioning security is intended primarily to cover the cost of removing project infrastructure and for restoring the leased premises to their preconstruction condition. Additionally, each landowner has the ability to terminate the Agreement early in the event Petitioner fails to commence construction within a certain amount of time. In the event of early termination, or upon expiration of the Agreement, Petitioner is required to remove the Project facilities and restore the landowner's property to a condition reasonably similar to its original condition at Petitioner's cost.

Q22. What State permits are required for the Project?

A. State requirements for this Project include the following:

- A National Pollutant Discharge Elimination System ("NPDES") general permit is required under Title 327 of the Indiana Administrative Code for the discharge of construction-related storm water ("Rule 5 permit"). Petitioner will submit a written construction plan to the local county Soil and Water Conservation District office in Sullivan County. Once the plan is approved, Petitioner will submit a Notice of Intent to the Indiana Department of Environmental Management ("IDEM") at least 48 hours prior to starting land-disturbing activities. After IDEM determines that Petitioner's

activity is covered by Rule 5, it will issue a public notice that a Rule 5 permit will be issued.

- Permits, as needed, from INDOT to allow Project electric lines and other facilities to cross state highways for driveways, road exits, etc. Petitioner will apply for these permits as they become necessary.

- Isolated wetlands are regulated by the IDEM under the State Isolated Wetlands Law and development activities conducted within the floodway of any waterway of the State are regulated by the IDNR under the Flood Control Act and the Floodplain Management Rule. The Project is being designed to avoid or minimize impacts to isolated wetlands and floodways. However, if construction within isolated wetlands or floodways cannot be avoided, Petitioner will obtain appropriate permits, if necessary, for the Project.

Q23. What federal requirements apply to the Project?

A. The Project will comply with the following federal requirements:

- Petitioner intends to self-certify as an exempt wholesale generator and apply for market-based rate authority under Federal Energy Regulatory Commission ("FERC") rules and regulations.

- If federal spill prevention, control and countermeasure ("SPCC") plan requirements for oil spills apply, Petitioner will prepare an SPCC plan.

- Development activities that affect wetlands and surface water features in the State of Indiana are regulated by USACE. A Water Quality Certification from IDEM is also required when applying for a federal permit. The Project is being designed to avoid impacts to wetlands and surface water features. If necessary, a USACE Nationwide Permit will be obtained in the event impacts to wetlands and surface water features cannot be avoided.

IV. INTERCONNECTION

Q24. How will the Project interconnect with the wholesale electric transmission grid?

A. The Project is sited near existing electric utility infrastructure – AEP's Sullivan 345 kV substation located in Sullivan County, Indiana. Solar panels will be installed on single-axis trackers. Structures supporting the PV modules will consist of steel piles (e.g., cylindrical pipes, H-beams, or similar). The proposed design is laid out primarily in approximately 4.2

MW increments (blocks), each 4.2 MW block will include an inverter-transformer station constructed on a pad that is to be generally located on the interior perimeters of each block. Cables will be installed to convey the direct current (DC) electricity from the panels to the inverters to convert the DC to alternating current (AC), which will then be carried to a substation located onsite which will transform voltage to 345 kV. An approximately 1 to 1.5 mile long transmission line will interconnect the Project's substation to AEP's Sullivan 345 kV substation.

Q25. What studies have been done regarding the interconnection with AEP?

A. AEP's transmission system is a part of the wholesale power grid controlled by PJM. A Feasibility Study was completed by PJM in October 2017. The Feasibility Study is attached as Petitioner's Attachment HP-5. PJM completed a System Impact Study in November 2020. The System Impact Study is attached as Petitioner's Attachment HP-6. A Facilities Study is expected to be completed by June 2021. Petitioner agrees to submit a copy of the Facilities Study as either a late-filed attachment or as an attachment to a quarterly report as part of the reporting requirements to which Petitioner agrees in this proceeding. Petitioner's queue position with PJM is AC2-157.

Q26. Has the Petitioner entered into an Interconnection Service Agreement?

A. The Interconnection Service Agreement ("ISA") is expected to be completed by July 2021 pursuant to Facilities Study completion. Petitioner agrees to submit a copy of the ISA once it is executed as either a late-filed attachment or as an attachment to a quarterly report as part of the reporting requirements to which Petitioner agrees in this proceeding.

Q27. Can the Project be interconnected without negatively impacting system performance?

A. Yes. The Feasibility Study and System Impact Study confirm that the Project's interconnection with the AEP transmission system will not negatively impact system performance.

V. THE PROJECT WILL SERVE THE PUBLIC INTEREST

Q28. Is there a need for electricity generated by the Project?

A. Yes. A growing number of companies have started to rely on renewable energy projects as a source for their electric needs or as a way to hedge against energy price volatility, and the Project is a good example of this. Petitioner has entered into a fifteen (15) year virtual power purchase agreement ("VPPA") for all 200 MW of the Project's nameplate power with a commercial and industrial ("C&I") company.

Q29. Please explain how a virtual power purchase agreement works.

A. Under a VPPA, an end-user company agrees to pay a renewable energy developer a fixed rate for electricity during the term of the contract while continuing to buy electricity from the local electric utility. The renewable energy developer then sells the power it generates into the grid where it is bought by consumers in the wholesale power market. If the wholesale market price is higher than the VPPA contract price, the company is entitled to the difference as determined every month during the contract's term. If the contract price is higher than the wholesale market price, the renewable energy developer bills the company for the difference. The VPPA results in the company guaranteeing a market for the electricity generated by the renewable energy developer. The VPPA is a win-win for Petitioner and the company. The long-term contract affords Petitioner the guaranteed market for the electricity generated, as well as the opportunity to make additional

investments in clean energy in Indiana, and specifically, Sullivan County. The long-term contract also enables the company to mitigate risk from electric price volatility, while assisting the company to achieve its increasingly important sustainability goals.

Q30. Will the development of additional generating capacity serve the public interest?

A. Yes, the public interest will be served in a number of important respects by the addition of the electric generating capacity represented by the Project. First, the public needs electricity. Second, the Project represents one of the most environmentally friendly means of generating electricity. Solar energy helps reduce the negative effects of electricity generation on the environment by being a source of clean power. Solar generation facilities do not release any pollutants, such as $S0_2$ (which may cause acid rain), NO_x (which may cause smog), mercury (which may cause neurological damage in fetuses and children), or CO_2 (a greenhouse gas that may contribute to global climate change). Third, the public in Indiana also may benefit from the efficiencies that flow from proximity to the source of generation; that is, because of the high cost of transmitting power over long distances, it is generally advantageous for load not to be located too far from its source. Fourth, landowners in the area of the Project will receive economic benefits from the placement of solar generation facilities on their properties. Fifth, local taxing bodies will receive new tax revenues. Sixth, approximately 200-250 temporary construction jobs and approximately two full-time operations and maintenance jobs will be created by the Project. Finally, solar energy provides greater energy security. It will diversify the region's and Indiana's electricity generation portfolio, protecting against volatile price spikes and risks from relying too heavily on just a few sources of generation. Solar energy is a domestic source of fuel, harnessed in this case within Indiana, and not subject to the geopolitical

complexities of foreign energy sources. Solar energy's renewable nature will help protect future generations from the risks of dwindling energy supplies.

Q31. In past Commission orders declining, in part, jurisdiction over renewable generation facilities, petitioners have waived the right to use eminent domain and to be exempt from local zoning, but retained the right to the use the public right-of-way, correct?

A. Yes.

Q32. Does Petitioner seek or need the power of eminent domain?

A. No.

Q33. Does Petitioner seek or need the power to be exempt from local zoning?

A. No.

Q34. Does Petitioner seek to retain the right to use public rights-of-way?

A. Yes, in a limited manner. Petitioner seeks to retain the right to use the public right-of-way within the Project area. Retention of the use of the public right-of-way will allow Petitioner to place certain of its collector lines and transmission lines in the public right-of-way. Additionally, retention of this right will clarify issues surrounding use of the public right-of-way for road crossings. I understand this is similar treatment given to other renewable energy projects in Indiana.

Q35. Is Petitioner asking this Commission to designate a service territory or establish electric rates?

A. No. By limiting its activities to the generation of electricity for sale in the wholesale market, Petitioner will not have any retail customers, nor will its sales be constrained by geography to the extent technology and the presence of transmission capacity allow. To the extent wholesale rates are not determined by the marketplace, they are regulated by FERC, which

preempts the jurisdiction of state regulatory bodies to regulate wholesale rates for electricity.

Q36. To whom will Petitioner sell the electricity generated by the Project?

A. As noted above, Petitioner has entered into a VPPA with a C&I company for the entirety of the Project's nameplate capacity.

VI. PROJECT TIMELINE AND CONSTRUCTION

Q37. What is the Project's planning timeline (after receiving all required regulatory approvals)?

A. The Project is anticipated to achieve COD by December 31, 2023.

Q38. Will Petitioner advise the Commission through notice of any change in the in-service date, which the Commission may use to refine its integrated resource planning for Indiana retail utilities?

A. Yes.

Q39. Does Petitioner have the ability to construct the Project?

A. Yes.

Q40. Who will have construction responsibility?

A. Petitioner is responsible for the construction of the Project, and it will hire an experienced contractor (or contractors) to perform engineering, procurement, and construction activities.

VII. PROJECT OWNERSHIP AND OPERATION

Q41. Will Petitioner own the Project?

A. Yes.

Q42. Has Petitioner's owner, Invenergy Renewables, or any of its other affiliates constructed or operated other electric generating facilities?

A. Yes. Petitioner's indirect parent company Invenergy Renewables has substantial experience financing, owning, and operating renewable energy assets worldwide. Invenergy Renewables' portfolio of renewable energy projects in operation, construction or contracted currently includes more than 80 wind and 30 solar projects in the United States that represent more than 20,400 MW of aggregate capacity A description of these projects can be found at the following website: https://invenergy.com/projects/overview

Q43. Will Petitioner operate the Project in a commercially reasonable manner and in accordance with good utility practice?

A. Yes. Invenergy is committed to operating its generating facilities, including solar facilities, in a commercially reasonable manner and in accordance with good utility practice.

Q44. Does Petitioner have the ability to finance the Project?

A. Yes. Invenergy has successfully financed over 25,200 MW of renewable and other clean energy generation and storage facilities worldwide, including 3,944 MW of solar projects, representing more than $43 billion in capital investment.

Q45. Will Petitioner have all the necessary financial, technical and managerial expertise to construct and operate the Project?

A. Yes.

Q46. What does Petitioner request with respect to any future transfer of its assets?

A. Petitioner requests that this Commission grant it treatment similar to that which the Commission has afforded in other similar declination of jurisdiction orders, *i.e.*, decline to require prior Commission approval of any transfers of ownership of Project assets or ownership interests in Petitioner involving: (l) the grant of a security interest, mortgage, deed of trust or other encumbrance to a bank or other lender or collateral agent, administrative agent or other security representative, or a trustee on behalf of bondholders in connection with any financing or refinancing (including any lease financing), or any investor, guarantor, equipment supplier or financing entity; (2) Petitioner, or an affiliate, becoming a debtor in possession; (3) a foreclosure (or deed in lieu of foreclosure) on the property owned by Petitioner; or (4) a transfer of all or a part of the ownership of Trade Post Solar or its assets to an affiliate of Petitioner.

Q47. Will Petitioner inform the Commission and the OUCC if and when Petitioner becomes an affiliate of a regulated Indiana retail utility?

A. Yes.

Q48. Will Petitioner establish and maintain a form of security to ensure that funds will be available in the event of abandonment, financial failure, and/or bankruptcy to return the Project site to its current condition?

A. Yes. As I discuss above, Petitioner is required to obtain a decommissioning security and comply with other decommissioning requirements in accordance with the landowner solar lease and easement agreement entered into with each landowner.

VIII. DECLINATION OF JURISDICTION

Q49. With regard to the requirements of Ind. Code § 8-1-2.5-5, do technological or operating conditions, competitive forces, or the extent of regulation by other state or federal regulatory bodies render the exercise, in whole or in part, of jurisdiction over Petitioner by the Commission unnecessary or wasteful?

A. Yes. The rules and regulations of the FERC, and other federal, state and local regulatory agencies adequately address concerns the Commission may otherwise have and protect the public interest regarding the future operation and wholesale transactions involving the Project. In addition, competitive forces in the wholesale power markets serve as an adequate check on these activities, particularly on the wholesale power price. Also, PJM is responsible for the safe and reliable operation and planning, including generation interconnection planning, of the electric transmission systems under their functional control, which includes the AEP transmission system to which the Project will interconnect. Further regulation of these matters by the Commission would be unnecessary and wasteful of the Commission's resources, and burdensome for Petitioner.

Q50. Will the Commission's declining to exercise, in whole or in part, its jurisdiction be beneficial for Petitioner, Petitioner's customers or Indiana, and promote the efficiency of Petitioner?

A. Yes. Petitioner would benefit from the ability to devote its efforts and resources to complying fully with the requirements of the federal, local, and other state regulatory agencies with jurisdiction over its operations, as well as the requirements of PJM, which would promote the efficiency of Petitioner's ongoing development and operation of the Project. Indiana will benefit from the generation of electric power from solar power generally, and this Project specifically. The exercise of jurisdiction by the Commission

would encumber Petitioner with duplicative requirements that are unnecessary in view of other regulatory requirements.

Q51. Would the exercise of Commission jurisdiction inhibit Petitioner in competing with other providers of functionally similar energy services or equipment?

A. Yes. Should the Commission exercise jurisdiction over Petitioner, the Commission would be placing Petitioner at a disadvantage with respect to other independent power producers such as wind projects over whom the Commission has declined to exercise jurisdiction. Such regulation would expose Petitioner to the risk of regulatory lag and hinder the quick implementation of business decisions in a highly competitive market, which would create a significant competitive disadvantage for Petitioner. In addition, the Commission's exercise of jurisdiction may compel Petitioner publicly to disclose proprietary information, to its disadvantage.

Q52. Does Petitioner agree to the same reporting requirements as have been established for other renewable generation facilities in Indiana?

A. Yes. Petitioner agrees to the following reporting obligations, which have generally been required of other renewable energy developers:

(a) **Initial Report.** Petitioner agrees to file an initial quarterly report that will provide, to the extent such information is known and available, the following:

(1) Project ownership and name(s) of the Solar Facility;

(2) Name, title, address, and phone number(s) for primary contact person(s) for the Solar Facility;

(3) Number and location of solar panels deployed;

(4) Anticipated total output of the Solar Facility;

(5) Manufacturer, model number and operational characteristics of solar panels;

(6) Connecting utility(s);

(7) Copy of any Interconnection System Impact Studies prepared by PJM;

(8) Expected in-service date (COD);

(9) An estimate of the engineering/construction timeline and critical milestones for the Solar Facility;

(10) The status of the Interconnection Service Agreement with PJM; and

(11) The information listed below in the Subsequent Reports section to the extent such information is available.

(b) **Subsequent Reports.** Petitioner agrees to file subsequent reports within thirty (30) days of the end of each calendar quarter until the quarter that occurs after commercial operation is achieved and that immediately precedes the annual report filing date of April 30th of each year. Thereafter, Petitioner will file reports on an annual basis in this Cause.

(1) Any changes of the information provided in the Initial Report;

(2) Any reports of Interconnection System Impact Studies not previously submitted to the Commission;

(3) Copy of the Interconnection Service Agreement as filed with FERC;

(4) Notice of the establishment of an independent financial instrument, including its form and amount;

(5) Achievement of construction milestones described in the Interconnection Service Agreement and such events as the procurement of major equipment, the receipt of major permits material to the construction and operation of the Solar Facility, construction start-up, initial energization and commercial operation; and

(6) When commercial operation is achieved, the nameplate existing for utility sales, contingency plans (if any) detailing response plans to emergency conditions as required by state or local units of government, the interconnecting transmission owner and/or PJM, and the Project's certified (or accredited) dependable capacity rating.

Q53. Does Petitioner also agree to the additional requirements concerning a material change in Project output or project modification or suspension under the terms of the Generator Interconnection Agreement?

A. Yes. Petitioner agrees to the following additional requirements: In the event that Petitioner intends to materially increase or decrease or otherwise materially change the Project's capacity or operation, the owner must obtain the Commission's prior approval. Petitioner considers a material change to include: an increase or decrease of greater than 5 MW in the Project's capacity; a change in operating entities; a transfer of ownership or assets, other than the activities identified in Q46 above; and changes identified in subsequent case law as constituting a material change. Petitioner will notify the Commission in the event that it modifies or suspends the Project under the terms of the Interconnection Service Agreement and does not reinstitute work within three years following commencement of such suspension. The Commission may, following notice to the Petitioner, proceed to issue an Order terminating the declination of jurisdiction set forth herein, if the Commission determines that the Petitioner has: (a) failed to enter into an agreement pursuant to PJM generator interconnection procedures; (b) suspended the project under the terms of the Interconnection Service Agreement and has not reinstated work within three years following commencement of such suspension; or (c) has otherwise suspended its efforts to complete the project within three years of this Order.

Q54. Does this conclude your direct testimony?

A. Yes, it does.

VERIFICATION

I affirm under the penalties of perjury that the foregoing representations are true to the best of my knowledge, information and belief.

By: Hannah Pawelczyk
Hannah Pawelczyk

LIST OF ATTACHMENTS

Attachment HP-1	Preliminary Site Map
Attachment HP-2	Site Characterization Study
Attachment HP-3	Cultural Resources Desktop Review
Attachment HP-4	Phase I Environmental Site Assessment
Attachment HP-5	Feasibility Study
Attachment HP-6	System Impact Study

ATTACHMENT HP-1

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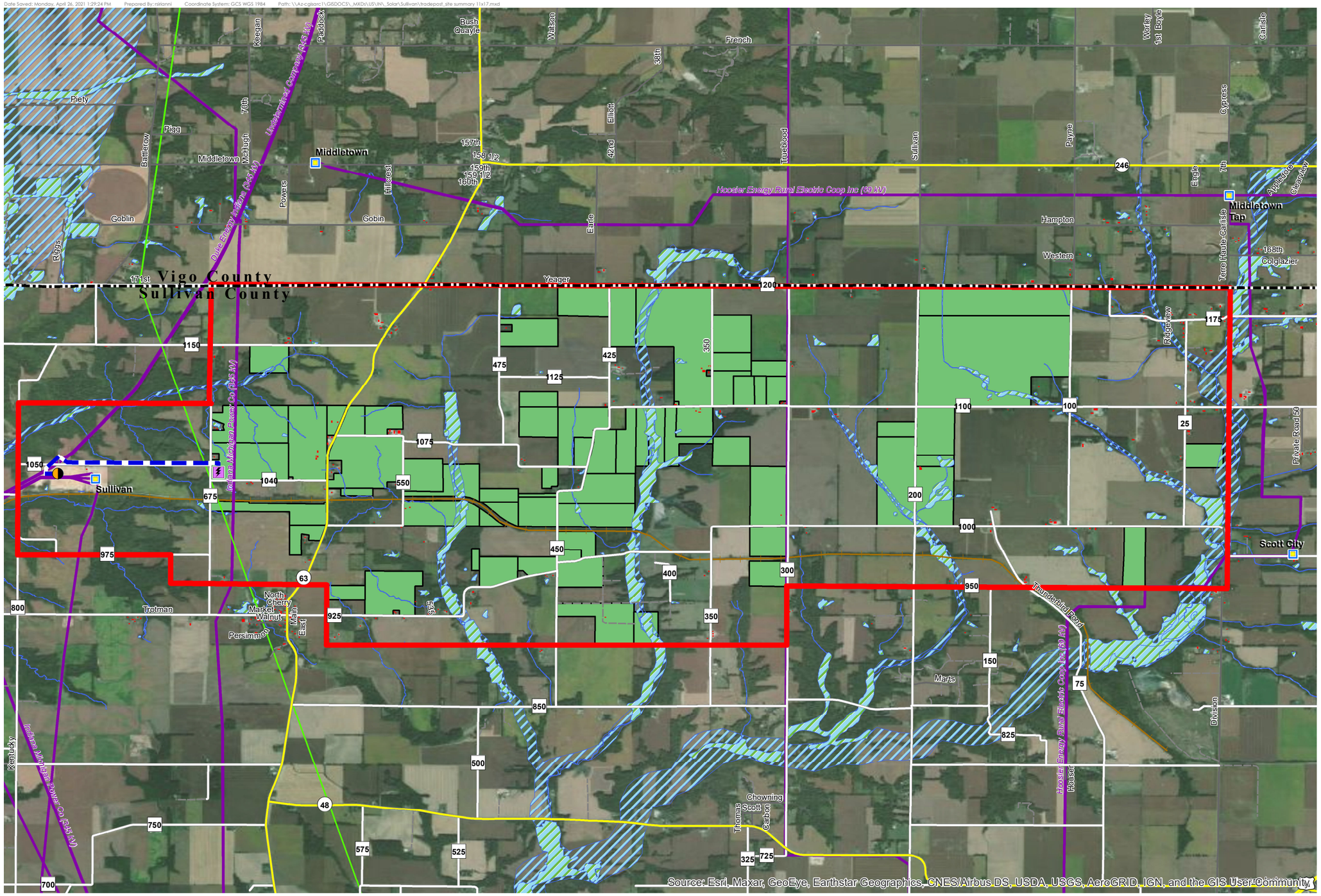

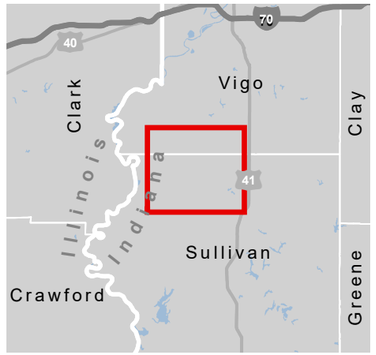

2,500 0 2,500
Feet

Legend

- Substation Location
- Point of Interconnection
- Substation
- Project Transmission Line

Road Classification

- US/State Route
- County Road
- Local Road
- Dirt/Unpaved Road
- Natural Gas Pipeline
- Transmission Line
- Railroad
- Flood Zone
- Wetlands
- Existing Structure
- County Boundary
- Project Boundary
- Proposed Solar Facilities

Preliminary Site Map

Trade Post Solar Energy Center | Sullivan County, Indiana

Rev. 00
April 26, 2021

Invenergy

SITE CHARACTERIZATION STUDY REPORT

TRADE POST SOLAR ENERGY CENTER SULLIVAN COUNTY, INDIANA

MARCH 2021

PREPARED FOR

Trade Post Solar LLC

PREPARED BY

SWCA Environmental Consultants

ATTACHMENT HP-2

SITE CHARACTERIZATION STUDY REPORT
TRADE POST SOLAR ENERGY CENTER
SULLIVAN COUNTY, INDIANA

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1 INTRODUCTION

On behalf of Trade Post Solar LLC, SWCA Environmental Consultants (SWCA) has prepared this Site Characterization Report as part of the environmental studies conducted for the Trade Post Solar Energy Center (Project). The Project is situated on approximately 12,573 acres of privately owned land (Project Area) and is located immediately north and east of the town of Fairbanks in Sullivan County, Indiana (Figure 1). Only approximately 1,500 acres will be used to host facilities within the total Project Area.

The objectives of this study were to provide information needed to address questions posed under the Tier 1 Preliminary Site Evaluation and Tier 2 Site Characterization Study tiers of the U.S. Fish and Wildlife Service's (USFWS) Land-Based Wind Energy Guidelines (USFWS 2012). The wind energy guidelines were used because the USFWS has not yet developed a similar tiered project development approach for solar development. A 2-mile (3.2-km) buffer surrounding the Project Area, referred to herein as the Study Area, also was assessed during the Tier 2 site characterization. Additional buffers beyond 2 miles were also utilized to screen for some resources, as described below.

2 METHODS

The preliminary site assessment and site characterization were completed using a combination of existing information obtained from publicly available sources, including reports, published literature, online databases, geographic information system (GIS) data, agency consultation, and field reconnaissance survey. Methods and results for assessment of wetlands and other waterbodies are included as Appendix A to this report.

2.1 Existing Information from Publicly Available Sources

Publicly available data sources described in Table 1 were used to complete a desktop review of resources within the Project Area, Study Area, and/or other buffer.

Table 1. Preliminary site assessment data sources by survey buffer for the Trade Post Solar Energy Center, Sullivan County, Indiana, 2021.

Data Type and Survey Buffer	Data Source
Land Cover and Use (2-mile buffer)	
Google Earth	Google 2021
U.S. Environmental Protection Agency (USEPA) Ecoregions	USEPA 2021
U.S. Geological Survey (USGS) National Land Cover Database (NLCD)	USGS 2021a
Species of Concern and Associated Habitats (2-mile buffer)	
National Audubon Society Christmas Bird Counts (CBC)	National Audubon Society 2021a
USFWS Birds of Conservation Concern (BCC)	USFWS 2008
USFWS Critical Habitat Mapper	USFWS 2021a
USFWS Information for Planning and Consultations (IPaC)	USFWS 2021b
USGS North American Breeding Bird Survey (BBS) Database	USGS 2021b
Raptor Nests (2-mile buffer)	
Project specific agency consultation	IDNR NHDC 2021
Wetlands and Waters (2-mile buffer)*	
U.S. Department of Agriculture (USDA) Web Soil Survey	USDA 2021
USFWS National Wetlands Inventory (NWI)	USFWS 2021c
USGS National Hydrography Dataset (NHD)	USGS 2021c

Data Type and Survey Buffer	Data Source
Bat Maternity Colonies (5-mile buffer)	
Project specific agency consultation	DNR NHDC 2021
Bat Hibernacula (20-mile buffer)	
Project specific agency consultation	IDNR NHDC 2021
Special Status Lands (10-mile buffer)	
National Audubon Society Important Bird Areas (IBAs)	National Audubon Society 2021b
National Conservation Easement Database (NCED)	NCED 2021
Project specific agency consultation	IDNR NHDC 2021
USGS Protected Areas Portal	USGS 2021d

* All desktop data assessed for NWI and NHD are included in Appendix A.

From these sources, SWCA created a land cover map; a map depicting BBS routes, CBC circles, and IBAs; a map showing special status lands; and a list of species of concern possibly occurring in the Project Area and their typical habitat requirements. Wildlife and plant species of concern, for the purposes of this report, are defined as:

- Threatened and endangered species pursuant to the Endangered Species Act of 1973 (ESA), Section 4, as amended;
- Species designated by the USFWS as Proposed, Candidate, Species of Concern, and Nonessential Experimental Populations;
- Indiana state-listed threatened, endangered, and special concern species protected under the 1973 Indiana Nongame and Endangered Species Conservation Act (IC 14-22-34);
- Bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) protected under the Bald and Golden Eagle Protection Act of 1940 (BGEPA); and
- BCC species as listed by the USFWS (2008) and defined as "species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the ESA of 1973."

SWCA submitted data requests to the USFWS and Indiana Department of Natural Resources (IDNR) Natural Heritage Data Center (NHDC) in December 2020, to obtain occurrence records for species of concern in the vicinity of the Project Area (i.e., all records including eagle nests within 2 miles, bat maternity colonies within 5 miles, and bat hibernacula within 20 miles). SWCA received a response from IDNR NHDC on January 5, 2021 (IDNR NHDC 2021); to date a response has not been received from USFWS. The information provided by each agency to date was incorporated into this assessment.

Public datasets were reviewed to identify special status lands (e.g., protected land, federal- and state-managed land) and any special status ecological communities (e.g., plant communities of concern) within 10 miles of the Project Area.

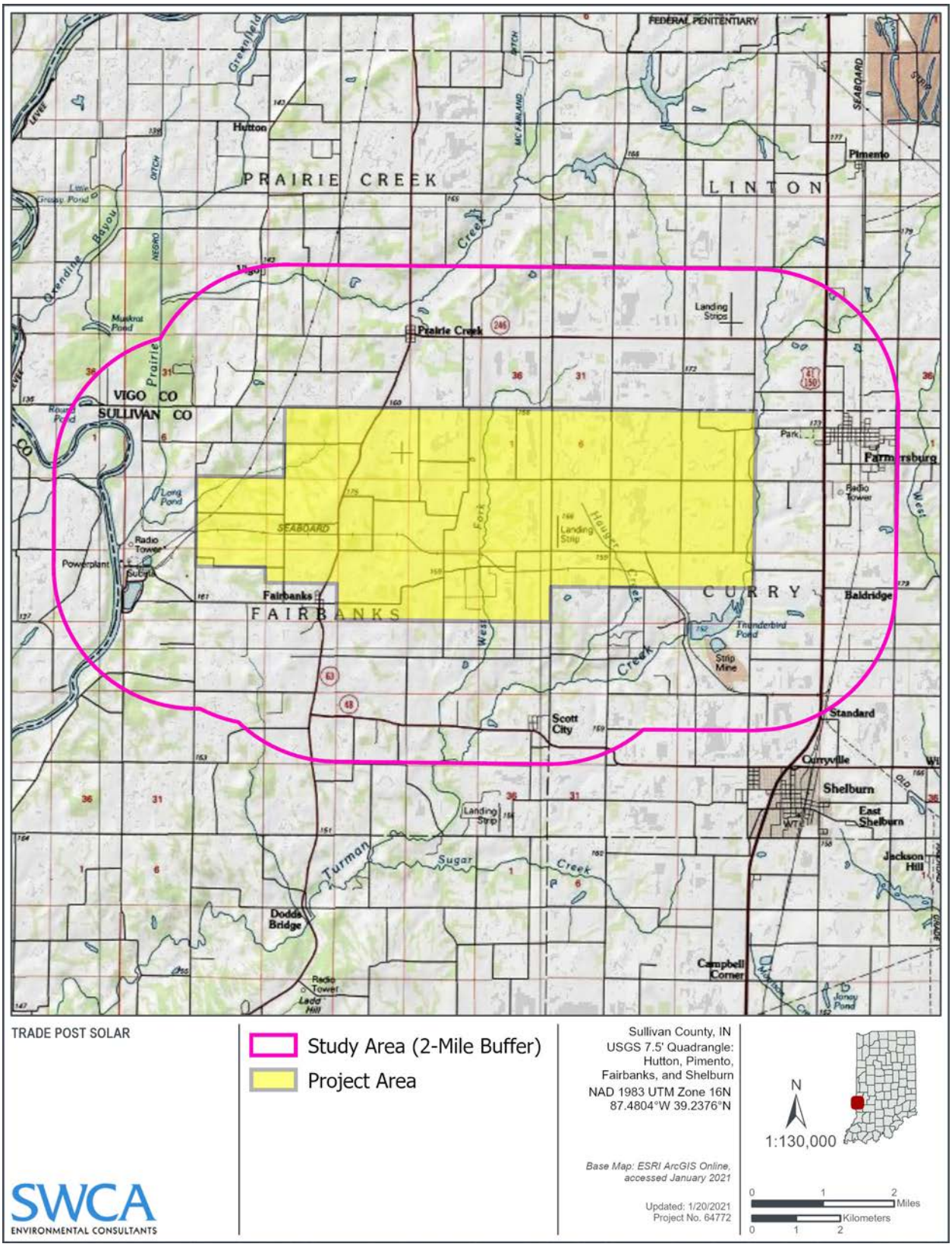

Figure 1. Trade Post Solar Energy Center location, Sullivan County, Indiana, 2021.

2.2 Field Reconnaissance

A field reconnaissance of the Study Area was conducted via pedestrian surveys on accessible land within the Project Area and public roads within the Study Area on January 20-22, 2021 to complete the following:

- Ground-truth NLCD land cover types and locations
- Document where land cover types provide habitat for wildlife and plant species of concern
- Ground-truth NWI and NHD mapped potential wetland locations
- Document readily observable features that may serve to attract wildlife, if any
- Record incidental plant and wildlife observations while in the Project Area

Based on field observations, the NLCD classification map units were either confirmed or reclassified to represent current land cover conditions. Readily identifiable land cover changes (e.g., areas that had been converted to cultivated crops) were recorded and mapped. These were mapped based on vegetative structure and dominant species composition. The boundaries were mapped in the field using a global positioning system (GPS) (where areas were accessible) or noted in field notes and on maps then finalized in GIS using current Google Earth imagery (Google 2021).

Prior to field reconnaissance, SWCA requested available data on the presence of raptor nests from the IDNR and the USFWS. The Study Area was then reviewed during the field reconnaissance for the presence of potential raptor nests. On accessible parcels within the Project Area, biologists conducted pedestrian surveys within forested areas to identify potential raptor nests. Forested areas on inaccessible parcels were observed using binoculars from public roads and/or parcels where access had been granted. For all nests identified during the survey, SWCA recorded nest characteristics, including any characteristics that may indicate species use, or status of the nest (i.e., actively used or not).

Based on any potentially suitable habitat observed during the field reconnaissance and other available species-specific life history information, SWCA determined the seasonal likelihood of occurrence within the Project Area of each wildlife and plant species of concern identified by USFWS and/or IDNR according to the categories listed below. The use of the term “Region”, below, is qualitative, at the judgement of reviewing biologists, and relative to the life-history of each species. It is loosely defined as an area within which habitat or other factors influence the likelihood of occurrence of the assessed species (e.g., a watershed for an aquatic species, or an ecoregion for a wide-ranging migratory species). Potential for occurrence categories are as follows:

- Known – the species has been documented by a reliable observer or records of such have been provided by relevant resource agency.
- High – potentially suitable habitat of high quality is present in any amount, or moderate quality habitat is abundant; and/or species is known to be regionally abundant.
- Moderate – potentially suitable habitat of moderate quality is present in any amount, or low-quality habitat is abundant; and/or species is known from the region, though may not be abundant.
- Low – potentially suitable habitat of low quality is present, though not abundant; and/or species is rare in the region.
- None – no potentially suitable habitat was observed; and/or species is believed extirpated in the region.

3 RESULTS

3.1 Land Cover

The Project Area lies within the Interior River Valleys and Hills Level III Ecoregion (USEPA 2021). In southwest Indiana, this Ecoregion generally follows the lower Wabash River drainage. The USEPA (2021) describes it as follows.

> *This broad, undulating lowland was formed in non-resistant, non-calcareous sedimentary rock. Large upland areas along the Wabash River are veneered by windblown material which thins eastward. Pre-Wisconsinan ice once covered much of the ecoregion and till deposits can be found locally north of the White River. Many wide, flat-bottomed, terraced valleys occur and are filled with alluvium as well as outwash, aeolian, and lacustrine deposits. Bottomland hardwood forests, swamps, and beech forests once grew on poorly-drained, nearly level sites along the Wabash and Ohio rivers whereas the upland areas had beech forests and oak-hickory forests. Patterns of land use are more varied than in the neighboring ecoregions. Drained alluvial soils are farmed for feed grains and soybeans. Undrained valley sites are used for forage crops, pasture, or woodlots; upland soils are used for mixed farming and livestock. Extensive strip mining as well as crop and livestock production have impacted stream water quality and stream habitat; sheet erosion can be severe on cultivated slopes.*

Field observations, Google Earth imagery (Google Earth 2021), and NLCD (USGS 2021a) mapping confirm this landscape has been significantly altered by farming practices. Elevation in the Project Area ranges from approximately 0 feet to 600 feet above mean sea level.

The Project Area contains 54 unique soil map units. Soils consist primarily of Reesville silt loam, 0 to 2 percent slopes (approximately 40% of the Project Area); Reesville silt loam, 2 to 5 percent slopes, eroded (approximately 7% of the Project Area); and Iona silt loam, 2 to 6 percent slopes, eroded (approximately 6% of the Project Area); none of which are considered hydric. The Project Area contains approximately 793 acres (approximately 6% of the Project Area) of mapped hydric soil units (USDA 2021).

The NLCD (USGS 2021a) land cover within the Study Area were ground-truthed and edited as needed to reflect current conditions (Table 2; Figure 2). Only minor discrepancies within the Project Area requiring correction were found; approximately 17 acres within the Project Area mapped as cultivated crops were identified to be pasture/hay (approximately 12 acres) or grassland/herbaceous (approximately 5 acres) during field reconnaissance. Land cover within the Project Area is dominated by cultivated crops (Table 2; Figure 2). Approximately 78% of the Project Area is comprised of cultivated crops or pasture/hay (Table 2).

Table 2. Field-verified NLCD land cover types within the Trade Post Solar Energy Center Project Area, Sullivan County, Indiana, 2021.

Cover Type	Acres	Percent (%)
Cultivated Crops	9,346	74
Deciduous Forest	2,016	16
Developed, Open Space	517	4
Pasture/Hay	441	4
Mixed Forest	84	1

Cover Type	Acres	Percent (%)
Developed, Low Intensity	64	1
Developed, High Intensity	35	<1
Developed, Medium Intensity	24	<1
Open Water	21	<1
Grassland/Herbaceous	18	<1
Barren Land	7	<1
Emergent Herbaceous Wetlands	<1	<1
Evergreen Forest	<1	<1
Total	**12,573**	**100**

The habitats observed within the Project Area during the field reconnaissance survey include two major types: cultivated crops and deciduous forests. The vast majority of the Project Area (approximately 78%) is devoted to agricultural practice in the form of row-cropping and pasture/hay. Crops observed during field reconnaissance were almost entirely corn (*Zea mays*) and soybean (*Glycine max*) crops. The monoculture patches of agricultural land within the Project Area provide limited suitable habitat for most species of concern. However, these fields may provide migration stopover habitat and foraging opportunity for migrating avian species.

Deciduous forest was observed within the Project Area in the form of fence rows, disjunct woodlots, and contiguous forested blocks. The contiguous forested blocks primarily occur within the western half of the Project Area. Stand ages ranged from early successional to mature second growth. There were no signs of commercial timber harvest. Upland forests were generally comprised of native hardwood species such as American sycamore (*Platanus occidentalis*), oak (*Quercus* sp.), maple (*Acer* sp.), and tulip poplar (*Liriodendron tulipifera*).

A higher proportion of forested areas was observed within the Study Area compared to the proportion of forested areas within the Project Area; however, the Study Area was still dominated by cultivated crops in the form of corn and soybeans. A slightly higher proportion of pasture/hay areas was also observed within the Study Area compared to the proportion of pasture/hay areas within the Project Area (see Figure 2).

SWCA also reviewed the Study Area for potential wildlife congregation areas, or unique habitat types that may serve as an attractant to wildlife in the region. No such areas were observed within the Project Area. The Fairbanks Landing Fish and Wildlife Area (FWA) is west of the Project Area within the Study Area. The Fairbanks Landing FWA is a property open to the public for hunting, though privately managed, and is situated along the riparian corridor of the Wabash River. It contains a mosaic of upland and wetland forest, openings, and old field providing a diverse array of habitat availability. However, these habitat types are relatively common along the Wabash River valley, and though they represent the highest quality and most diverse habitat within the Study Area, they are not likely to be considered a wildlife congregation area[1].

[1] The USFWS Land-Based Wind Energy Guidelines (USFWS 2012) include assessment of "known critical areas of wildlife congregation, including, but not limited to, maternity roosts, hibernacula, staging areas, winter ranges, nesting sites, migration stopovers or corridors, leks, or other areas of seasonal importance" and recommend site visits "to the extent practicable" should "adequately assess these issues for prospective site(s), evaluate the topography, physiographic features and uniqueness of the site in relation to the surrounding region to assess the potential for the project area to concentrate resident or migratory birds and bats."

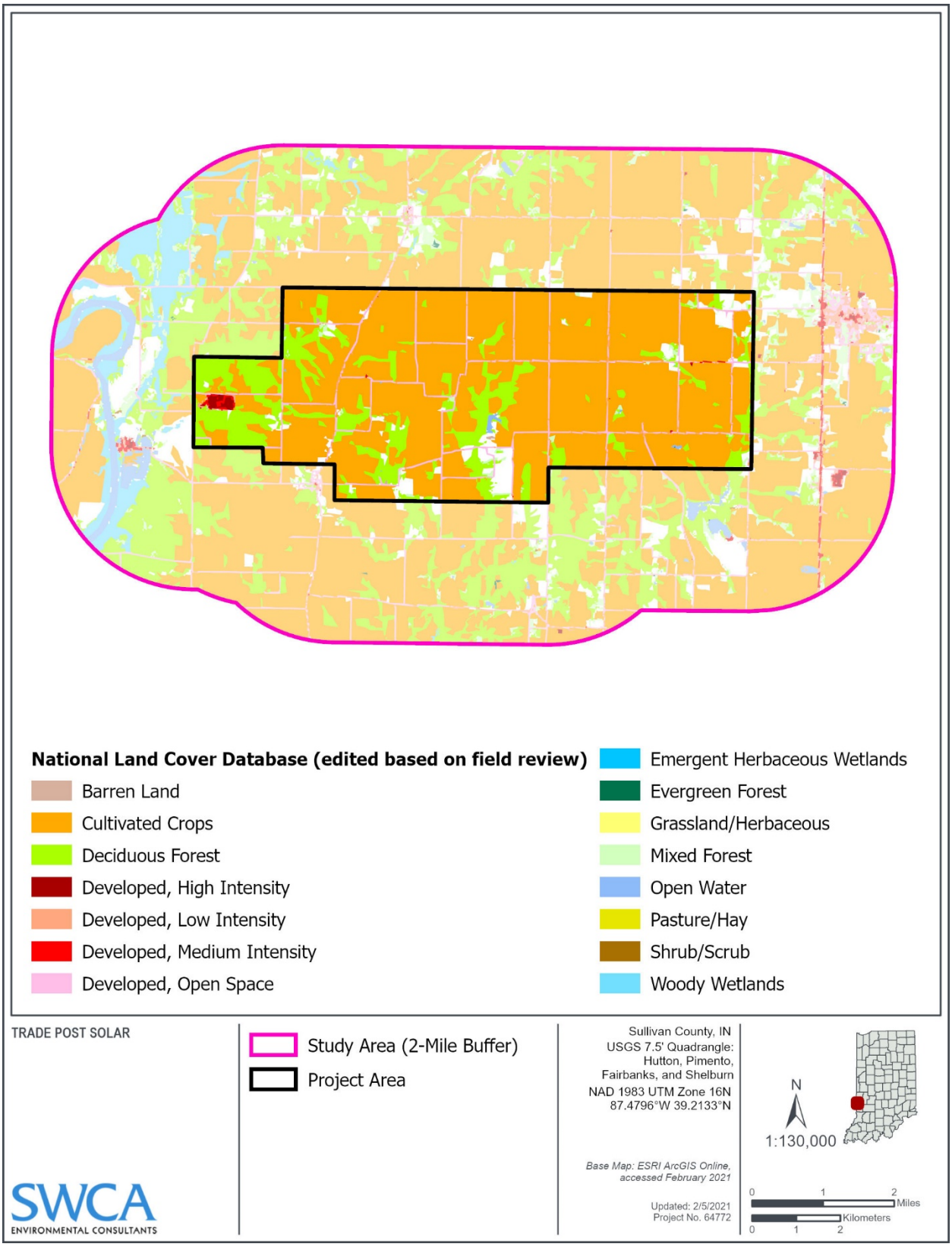

Figure 2. Field-verified NLCD land cover types within the Trade Post Solar Energy Center Project Area, Sullivan County, Indiana, 2021.

3.2 Wildlife and Plant Species

The USFWS IPaC resource list (USFWS 2021b) identified two bat species, one freshwater mussel, and 11 migratory bird species as having potential to be affected by activities in the Study Area. The IDNR NHDC (2021) reported a total of seven mammals, one bird, one reptile, one amphibian, two fish, one freshwater mussel, and two vascular plant species as having occurrence records within the Study Area. Indiana bat (*Myotis sodalis*), northern long-eared bat (*Myotis septentrionalis*), and bald eagle were identified by both USFWS (2021b) and IDNR NHDC (2021). Table 3 contains the species of concern, status, preferred habitat, and potential seasons of occurrence for species identified by USFWS (2021b) and IDNR NHDC (2021). Six mammal species, 19 bird species, and 21 plant species were incidentally observed during field reconnaissance, including the BGEPA-protected bald eagle and the BCC species red-headed woodpecker (*Melanerpes erythrocephalus*). All incidental wildlife and plant observations recorded during field reconnaissance are included in Appendix B.

Table 3. Species of concern, status, preferred habitat, and potential seasons of occurrence for species that are known or may occur within the Trade Post Solar Energy Center Project Area, Sullivan County, Indiana, 2021.

Common Name	Scientific Name	Status* and Record Source†	Habitat	Seasonal Potential for Occurrence in Project Area‡			
				Spring	Summer	Fall	Winter
MAMMALS							
American badger	*Taxidea taxus*	SC (IDNR)	Burrows in open, prairie-type habitat with well-drained soils (IDNR 2021a).	Low	Low	Low	Low
Eastern red bat	*Lasiurus borealis*	SC (IDNR)	Habitat includes a wide range of forested and semi-forested areas Spring/summer diurnal roosts usually are in foliage of numerous species of large hardwood trees with open understory. Individuals frequently switch roost sites in both summer and winter (NatureServe 2021a).	High	High	High	None
Evening bat	*Nycticeius humeralis*	SE (IDNR)	Occur in deciduous, mixed deciduous-coniferous, and pine-dominated forests. Roosts include cavities in live or dead trees, spaces behind loose tree bark, tree foliage, Spanish moss, leaf litter, rock crevices, abandoned burrows in the ground, and nooks, spaces, and crevices in many types of human-made structures; rarely caves. Individuals roosting in trees frequently change roosts (NatureServe 2021b).	High	High	High	None
Indiana bat	*Myotis sodalis*	FE, SE (IPaC, IDNR)	Forms colonies and forages in riparian and mature floodplain habitats. Nursery roost sites are usually located under loose bark or in hollows of trees near riparian habitat (USFWS 2006).	High	High	High	None

Common Name	Scientific Name	Status* and Record Source†	Habitat	Seasonal Potential for Occurrence in Project Area‡			
				Spring	Summer	Fall	Winter
Little brown bat	*Myotis lucifugus*	SE (IDNR)	Use a wide range of habitats and often use human-made structures for roosting and maternity sites; they also use caves and hollow trees (NatureServe 2021c).	High	High	High	None
Northern long-eared bat	*Myotis septentrionalis*	FT, SE (IPaC, IDNR)	Summer roosting in trees with loose bark over 3 inches in diameter and more rarely in anthropogenic structures like barns and sheds, winters in caves, forages in forest understory (USFWS 2021d).	High	High	High	None
Tri-colored bat	*Perimyotis subflavus*	SE (IDNR)	Maternity and other summer roosts are mainly in dead or live tree foliage, caves, mines, rock crevices, human-made structures, or tree cavities. Hibernation sites often are in caves, mines, cavelike tunnels, or box culverts under highways (NatureServe 2021d).	High	High	High	None
BIRDS							
Bald eagle	*Haliaeetus leucocephalus*	BGEPA (IPaC, IDNR)	Breeds in wetland habitats such as rivers, large lakes and marshes where fish are abundant, winters in upland terrestrial habitats. They are resident as long as there is open water where they can forage (USFWS 2021e).	Moderate	Moderate	Moderate	Known (SWCA)§
Blue-winged warbler	*Vermivora pinus*	BCC (IPaC)	Breeds in shrublands, scrubby areas, thickets, and forest edges. During migration they rest and forage in open woodlands, shrublands, thorn forests, gardens, and parks. Winters in Mexico and Central America (The Cornell Lab of Ornithology [Cornell] 2021a).	None	Low	Low	None

Common Name	Scientific Name	Status* and Record Source†	Habitat	Seasonal Potential for Occurrence in Project Area‡			
				Spring	Summer	Fall	Winter
Cerulean warbler	*Dendroica cerulea*	SE, BCC (IPaC)	Breeds in deciduous treetops and open understory, wet bottomlands, and dry slopes. Winter range includes the Northern Andes in Colombia, Venezuela, Ecuador, and northern Peru (Cornell 2021b).	None	Low	Low	None
Kentucky warbler	*Oporornis formosus*	BCC (IPaC)	Breeds in deciduous forests, stays near the ground and the lower levels of the forest, and nests on the ground. Winters in Mexico and Central America (Cornell 2021c).	None	Low	Low	None
Lesser yellowlegs	*Tringa flavipes*	BCC (IPaC)	A shorebird that inhabits marsh habitat. Only known from the Midwest as a migratory stopover species. Migrants use a wide variety of fresh and brackish wetlands, including mudflats, marshes, lake and pond edges, wet meadows, sewage ponds, and flooded agricultural fields such as rice paddies (Cornell 2021d).	Low	None	Low	None
Prairie warbler	*Dendroica discolor*	BCC (IPaC)	Various shrubby habitats, including regenerating forests, open fields, and Christmas-tree farms. Florida residents live in mangrove forests. Winters in Florida and the Caribbean (Cornell 2021e).	None	Low	Low	None
Red-headed woodpecker	*Melanerpes erythrocephalus*	BCC (IPaC)	Breeds in deciduous woodlands with oak or beech, groves of dead or dying trees, river bottoms, burned areas, clearings, farmland, grasslands with scattered trees, forest edges, and roadsides. Year-round resident in Indiana (Cornell 2021f).	High	High	High	Known (SWCA)§

Common Name	Scientific Name	Status* and Record Source†	Habitat	Seasonal Potential for Occurrence in Project Area‡			
				Spring	Summer	Fall	Winter
Rusty blackbird	*Euphagus carolinus*	BCC (IPaC)	Migrant in Indiana; breeds in wet forests, fens, bogs, muskeg, and beaver ponds; winters in swamps, wet woodlands, and pond edges (Cornell 2021g).	Low	None	Low	None
Semipalmated sandpiper	*Calidris pusilla*	BCC (IPaC)	A shorebird only known from the Midwest as a migratory stopover species. Migrating birds stop over at sewage ponds, ephemeral wetlands (rain pools), beaches, tidal mudflats and sandbars, and freshwater impoundments with shallow margins (Cornell 2021h).	Low	Low	Low	None
Smith's longspur	*Calcarius pictus*	BCC (IPaC)	Migrant in Indiana; during migration, uses grasslands, stubble fields, mowed fields at airports, and cattle pastures that are moderately to heavily grazed. Frequents grassy areas around remote lakes, often places where mosses also grow. (Cornell 2021i).	Low	None	Low	None
Wood thrush	*Hylocichla mustelina*	BCC (IPaC)	Inhabits mature deciduous and mixed forests. Less successful in fragmented forest habitat (Cornell 2021j).	Low	Moderate	Low	None
REPTILES							
Woodland box turtle	*Terrapene carolina carolina*	SC (IDNR)	Forests are the preferred habitat of the Eastern box turtle, although they may be found in grasslands and wetlands (INDR 2021b).	Moderate	Moderate	Moderate	Moderate
AMPHIBIANS							
Blanchard's cricket frog	*Acris blanchardi*	SC (IDNR)	Inhabits the edges of sunny marshes, marshy ponds, and small slow-moving streams (NatureServe 2021e).	Low	Low	Low	Low

Common Name	Scientific Name	Status* and Record Source†	Habitat	Seasonal Potential for Occurrence in Project Area‡			
				Spring	Summer	Fall	Winter
FISH							
Greater redhorse	*Moxostoma valenciennesi*	SE (IDNR)	Typical habitat is moderate to fast-flowing, medium-sized to large rivers; sometimes occurs in river reservoirs and large lakes; prefers clear water with substrates of clean sand, gravel, or boulders (NatureServe 2021f).	None	None	None	None
Spottail darter	*Etheostoma squamiceps*	DL (IDNR)	Habitat includes quiet rocky pools of headwaters, creeks, and small rivers with either large flat rocks or with bedrock bottom (NatureServe 2021g).	None	None	None	None
FRESHWATER MUSSELS							
Ohio pigtoe	*Pleurobema cordatum*	SC (IDNR)	Primarily inhabits large rivers but may be found in medium-sized rivers. Found in or immediately above riffles in heterogenous assemblages of gravel, cobble, and boulder. It is also tolerant of some reservoir environments (NatureServe 2021h).	None	None	None	None
Rabbitsfoot	*Theliderma cylindrica*	FT, SE (IPaC)	Small to medium sized streams and occasionally larger rivers with substrates generally consisting of gravel or sand (USFWS 2021f).	None	None	None	None
PLANTS							
Rose turtlehead	*Chelone obliqua var. speciosa*	WL (IDNR)	Primary habitat in Indiana is floodplain forests with ephemeral pools and seepage springs (NatureServe 2021i).	None	None	None	None
Secund's rush	*Juncus secundus*	SE (IDNR)	Inhabits dry, acidic soils and barrens (Homoya et al. 1995).	None	None	None	None

* FE = Federal Endangered, FT = Federal Threatened, SE = State Endangered, ST = State Threatened, SC = State Species of Concern, WL = State Watch List, DL = State Delisted, BGEPA = Bald and Golden Eagle Protection Act, BCC = Birds of Conservation Concern
† IPaC = USFWS 2021b, IDNR = IDNR NHDC 2021
‡ Spring = March through May, Summer = June through August, Fall = September through November, Winter = December through February
§ SWCA = Observed during SWCA field reconnaissance survey

3.2.1 *Federally Threatened and Endangered Species*

The USFWS IPaC resource list (2021b) identified the federally endangered Indiana bat, federally threatened northern long-eared bat, and federally threatened rabbitsfoot (*Theliderma cylindrica*) as having the potential to be affected by activities within the Study Area. These species, their habitats, and potential to occur in the Project Area are described below.

3.2.1.1 INDIANA BAT

The Indiana bat occurs over a range that extends from the east coast to Midwestern United States, including Indiana (USFWS 2006). Indiana bats roost and form maternity colonies under loose bark or in hollows and cavities of mature trees in the floodplain forest. Indiana bats utilize a variety of habitats to forage on flying insects found along rivers, lakes, open fields and uplands (USFWS 2006). In winter, Indiana bats primarily hibernate in caves in Kentucky, Indiana, and Missouri.

The Project Area is outside of the designated critical habitat for the Indiana bat (USFWS 2021a). Approximately 2,016 acres of deciduous forest, 84 acres of mixed forest, and less than 1 acre of evergreen forest are present within the Project Area (Table 2; Figure 2). These land cover types may represent suitable roosting and/or foraging habitat and were confirmed present within the Project Area during field reconnaissance. Potential roost trees for Indiana bats were also observed within the forested areas of the Project Area during field reconnaissance.

A review of cave and karst mapping indicates that there are no known caves in Sullivan County, and the nearest sinkhole (an indication of karst geology near the surface) is in extreme southeast Sullivan County. There are numerous mines in eastern Sullivan County. Portions of an approximately 1,535-acre underground coal mine with a hoist entrance north of Standard, active from 1959 to 1972, overlap with the Project Area and Study Area (IGS 2021). IDNR NHDC (2021) reported no known records of bat hibernacula within 20 miles of the Project Area. During winter, Indiana bats are not likely to hibernate in the Project Area because of the lack of suitable habitat (i.e., no caves or mine entrances).

According to IDNR NHDC (2021), there is a bat maternity colony located within the Fairbanks Landing FWA approximately 1.7 miles northwest of the Project Area along Prairie Creek in Vigo County, with Indiana bats having been captured around the colony. IDNR NHDC (2021) did not report any records of Indiana bats within the Project Area. Based on data reviewed, agency consultation, and field reconnaissance, the potential for occurrence of the Indiana bat within the forested portions of the Project Area is considered to be high during spring, summer, and fall and occurrence is not expected in the Project Area during winter (Table 3).

3.2.1.2 NORTHERN LONG-EARED BAT

The northern long-eared bat range extends throughout most of southern Canada, and the eastern and Midwestern United States (excluding parts of the southeast United States) (USFWS 2021g), primarily associated with North American forests (USFWS 2021d). Northern long-eared bat forages primarily within forest interiors, along linear features such as forest edges and streams, and over water sources such as ponds (Francl 2008; USFWS 2021d; Wisconsin Department of Natural Resources [WDNR] 2017). The northern long-eared bat spends summers in the forest interior and hibernates in caves and mines during winter months (WDNR 2017). The northern long-eared bat is similar to the Indiana bat in its use of caves and mines for winter hibernation. The northern long-eared bat requires very high humidity associated with selected hibernacula. After hibernation, the bats are found in wooded or semi-wooded habitats for the duration of the summer months. The northern long-eared bat utilizes crevices and loose bark on trees

(> 3.0 inches [7.6 centimeters]) in diameter at breast height) for roosting, although it is considered to be opportunistic and less selective than the Indiana bat. The northern long-eared bat may also roost more rarely in anthropogenic structures like barns and sheds (USFWS 2021d).

Numerous potential roost trees were observed throughout the forested areas within the Project Area during the field reconnaissance. IDNR NHDC (2021) reported no known records of bat hibernacula within 20 miles of the Project Area. During winter, northern long-eared bats are not likely to hibernate in the Project Area because of the lack of suitable habitat (i.e., no caves or mine entrances).

According to IDNR NHDC (2021), there is bat maternity colony located within the Fairbanks Landing FWA approximately 1.7 miles northwest of the Project Area along Prairie Creek in Vigo County, with northern long-eared bats having been captured around the colony. IDNR NHDC (2021) did not report any records of northern long-eared bats within the Project Area. Based on data reviewed, agency consultation, and field reconnaissance, the potential for occurrence of the northern long-eared bat within the forested portions of the Project Area is considered to be high during spring, summer, and fall and occurrence is not expected in the Project Area during winter (Table 3).

3.2.1.3 RABBITSFOOT

The rabbitsfoot is a mussel which inhabits small to medium sized streams and occasionally larger rivers with substrates generally consisting of gravel or sand (USFWS 2021f). The Study Area is outside of designated critical habitat for the species (USFWS 2021f). IDNR NHDC (2021) did not report any known records of rabbitsfoot within the Study Area. Based on habitat requirements and the lack of previous records within the Study Area, there is considered to be no likelihood of occurrence for this species within the Project Area during any season (Table 3).

3.2.2 *Bald and Golden Eagles*

Bald eagle habitat includes estuaries, large lakes, reservoirs, rivers and some seacoasts and marshes where they forage for fish. Bald eagles will also feed on waterfowl, turtles, rabbits, snakes, other small animals, and carrion (USFWS 2021e). Bald eagles require a combination of readily available prey, perching areas, and nesting sites. In winter, bald eagles congregate near open water in tall trees for spotting prey and night roosts for shelter (USFWS 2021e).

According to IDNR NHDC (2021), there have been two recorded bald eagle nest locations within the Study Area, both located in the vicinity of the Wabash River in the western portion of the Study Area, outside of the Project Area (Figure 3). The two nests were last observed in 2010 and 2017, respectively (IDNR NHDC 2021), and neither could be located from public roads or publicly accessible property during the field reconnaissance. While bald eagles could pass through the Project Area and were observed within the Study Area during field reconnaissance, no bald eagle nests were observed within the Project Area and Study Area during field reconnaissance. However, open water within the Project Area may provide potential foraging resources for bald eagles. Mature trees within the Project Area may provide roosting and nesting habitat for eagles. Based on data reviewed, agency consultation, and field reconnaissance, bald eagles are considered to have a moderate potential of occurrence in the Project Area in spring, summer, and fall, and the species is considered known during the winter (Table 3), however there is significantly higher quality habitat in the Study Area as compared to within the Project Area.

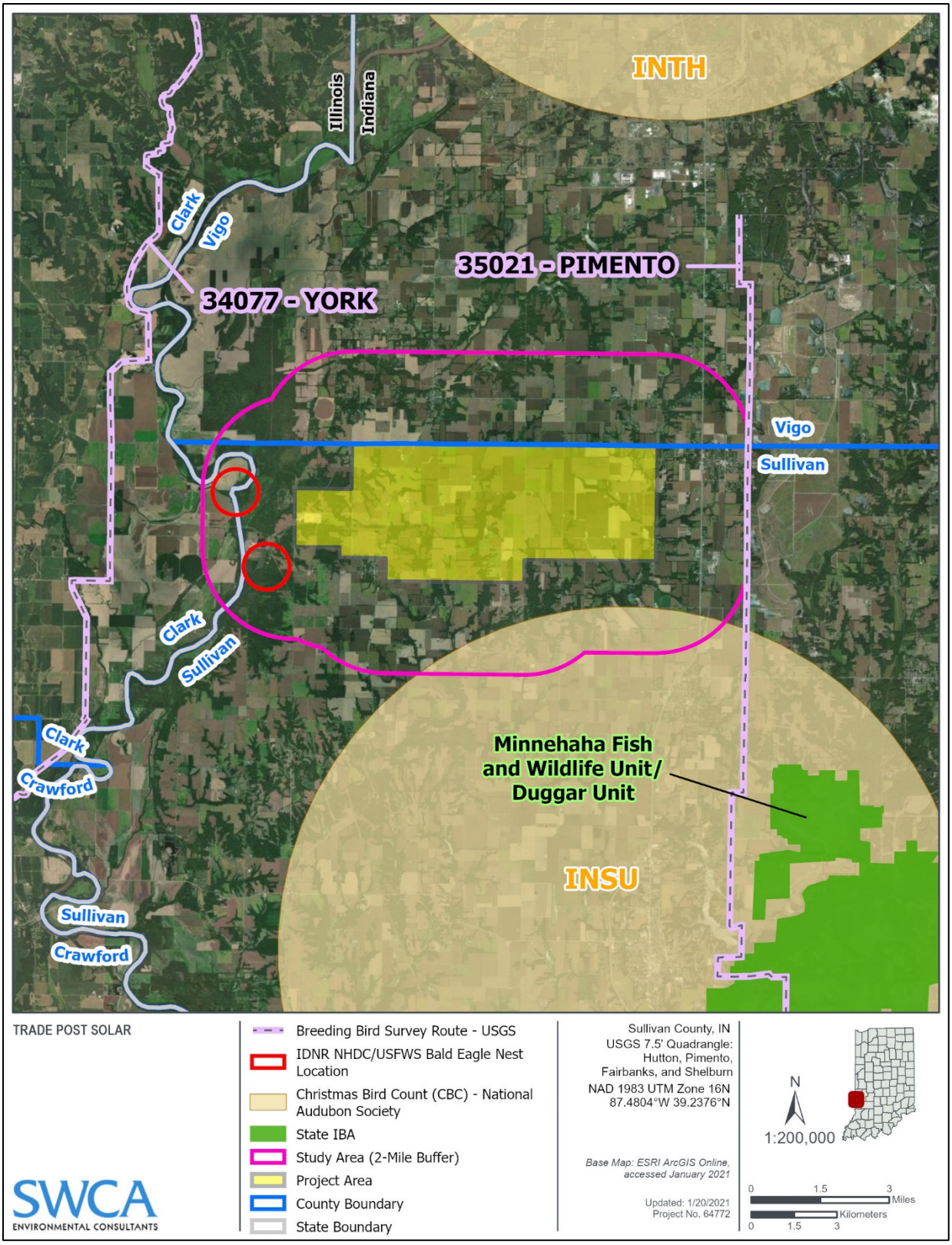

Figure 3. IDNR NHDC bald eagle nest locations, Breeding Bird Survey routes, Christmas Bird Count circles, and Important Bird Areas locations nearest to the Trade Post Solar Energy Center Project Area, Sullivan County, Indiana, 2021.

Golden eagles favor partially or completely open country, especially around mountains, hills, and cliffs. They use a variety of habitats ranging from arctic to desert, including tundra, shrublands, grasslands, coniferous forests, farmland, and areas along rivers and streams. Found mostly in the western half of the U.S., they are rare in eastern states (USFWS 2011). Golden eagles were not identified by USFWS (2021b) or IDNR NHDC (2021) as having potential to occur within the Study Area. However, as described in Section 3.2.7 below, the golden eagle has been recorded from the nearest CBC survey point; with a single individual golden eagle recorded in 1991 during the CBC surveys completed between 1987 and 2019 (National Audubon Society 2021a). Based on data reviewed and agency consultation, golden eagles have a low potential of occurrence in the Project Area and only during winter.

3.2.3 *State-listed Species*

IDNR NHDC (2021) reported known records of the state endangered evening bat (*Nycticeius humeralis*), state endangered little brown bat (*Myotis lucifugus*), state endangered tri-colored bat (*Perimyotis subflavus*), state endangered greater redhorse (*Moxostoma valenciennesi*), and state endangered Secund's rush (*Juncus secundus*) within the Study Area. The state endangered Cerulean warbler (*Dendroica cerulea*) was identified in the IPaC report (USFWS 2021b) as a BCC species that has the potential to be affected by activities within the Study Area, but no occurrence records for this species were reported by IDNR NHDC (2021) within the Study Area. Due to their federal listing status, the Indiana bat, northern long-eared bat, and rabbitsfoot were discussed in Section 3.2.1 above. No state-listed wildlife or plant species were observed in the Project Area during the field reconnaissance survey.

3.2.3.1 EVENING BAT

Evening bats occur in deciduous, mixed deciduous-coniferous, and pine-dominated forests. Roosts include cavities in live or dead trees, spaces behind loose tree bark, tree foliage, Spanish moss, leaf litter, rock crevices, abandoned burrows in the ground, and nooks, spaces, and crevices in many types of human-made structures; rarely caves. Individuals roosting in trees frequently change roosts (NatureServe 2021b). IDNR NHDC (2021) reported known records of evening bats within the Fairbanks Landing FWA approximately 1.7 miles northwest of the Project Area along Prairie Creek in Vigo County. Based on the data reviewed, agency consultation, and field reconnaissance, the potential for occurrence of the evening bat within the forested portions of the Project Area is considered to be high during spring, summer, and fall and occurrence is not expected in the Project Area during winter (Table 3).

3.2.3.2 LITTLE BROWN BAT

The little brown bat uses a wide range of habitats and often use human-made structures for roosting and maternity sites. They also use caves and hollow trees (NatureServe 2021c). IDNR NHDC (2021) reported known records of little brown bats within the Fairbanks Landing FWA approximately 1.7 miles northwest of the Project Area along Prairie Creek in Vigo County. Based on the data reviewed, agency consultation, and field reconnaissance, the potential for occurrence of the little brown bat within the forested portions of the Project Area is considered to be high during spring, summer, and fall and occurrence is not expected in the Project Area during winter (Table 3).

3.2.3.3 TRI-COLORED BAT

Tri-colored bat maternity and other summer roosts are mainly in dead or live tree foliage, caves, mines, rock crevices, human-made structures, or tree cavities. Hibernation sites often are in caves, mines, cavelike tunnels, or box culverts under highways (NatureServe 2021d). IDNR NHDC (2021) reported known records of tri-colored bats within the Fairbanks Landing FWA approximately 1.7 miles northwest of the Project Area along Prairie Creek in Vigo County. Based on the data reviewed, agency consultation,

and field reconnaissance, the potential for occurrence of the tri-colored bat within the forested portions of the Project Area is considered to be high during spring, summer, and fall and occurrence is not expected in the Project Area during winter (Table 3).

3.2.3.4 CERULEAN WARBLER

The cerulean warbler breeds in deciduous treetops and open understory, wet bottomlands, and dry slopes. Indiana is within the summer breeding range and spring/fall migration range of this species. Their winter range includes the Northern Andes in Colombia, Venezuela, Ecuador, and northern Peru (Cornell 2021b). IDNR NHDC (2021) did not report any known records of cerulean warbler within the Study Area. No cerulean warblers have been reported from the nearest BBS route (Section 3.2.6 below) and/or CBC circle (Section 3.2.7 below). Further, there are no eBird observations of cerulean warbler from the Study Area, though observations are reported in surrounding counties (Cornell 2021b). Based on the lack of known records within the Study Area, the potential for occurrence of the cerulean warbler within the Project Area is considered to be low during summer and fall, and occurrence is not expected in the Project Area during winter and spring (Table 3).

3.2.3.5 GREATER REDHORSE

Typical habitat for the greater redhorse is moderate to fast-flowing, medium-sized to large rivers. The species sometimes occurs in river reservoirs and large lakes. Greater redhorse prefer clear water with substrates of clean sand, gravel, or boulders (NatureServe 2021f). Greater redhorse was last reported observed in 1965 within Prairie Creek approximately 1.7 miles northwest of the Project Area (IDNR NHDC 2021). The streams within the Project Area are smaller and have slower flow regimes and lower water clarity than that likely to have been present within Prairie Creek at the time of the last observation of this species. Based on habitat requirements and the lack of recent records within the Study Area, there is considered to be no likelihood of occurrence for this species within the Project Area during any season (Table 3).

3.2.3.6 SECUND'S RUSH

Secund's rush inhabits dry, acidic soils and barrens (Homoya et al. 1995). Secund's rush was last reported observed in 1973 approximately 0.5 miles southwest of the Project Area (IDNR NHDC 2021). IDNR NHDC (2021) noted that "the T&E vascular plant occurrences are historical or do not occur precisely at the project site. Therefore, if [P]roject activities are limited to only within the proposed [P]roject [A]rea, no impacts are expected on these occurrences." No state-listed plant species were observed in the Project Area during the field reconnaissance survey. Based on agency consultation and the lack of recent occurrence records, there is considered to be no likelihood of the presence of Secund's rush within the Project Area during any season (Table 3).

3.2.4 *Federal and State Species of Concern*[2]

The USFWS (2021b) identified 10 BCC species as having the potential to be affected by activities within the Study Area (Section 3.2.5 below) but did not identify any additional federal species of concern. Species of concern are considered rare in Indiana but are not legally protected. The IDNR NHDC (2021) identified five wildlife species of special concern, American badger (*Taxidea taxus*), eastern red bat (*Lasiurus borealis*), woodland box turtle (*Terrapene carolina carolina*), Blanchard's cricket frog (*Acris blanchardi*), and Ohio pigtoe mussel (*Pleurobema cordatum*), as having occurrence records within the

[2] Federal Species of Concern is an informal term. It is not defined in the federal Endangered Species Act. The term commonly refers to species that are declining or appear to be in need of conservation to avoid listing.

Study Area; only the occurrence location for the woodland box turtle extends into the Project Area. The IDNR NHDC (2021) also identified the state watch list rose turtlehead (*Chelone obliqua var. speciosa*) and state delisted spottail darter (*Etheostoma squamiceps*) as having occurrence records within the Study Area but outside the Project Area. Federal and state species of concern, their habitat affinities, and their potential for seasonal occurrence within the Project Area are provided in Table 3.

3.2.5 *Birds of Conservation Concern*

The USFWS BCC (USFWS 2008) identifies species within ecological Bird Conservation Regions (BCRs) that are priorities for conservation action with the intent to prevent or remove the need for ESA listing by taking proactive management and conservation actions. The Project Area falls within the Central Hardwoods BCR 24 (USFWS 2008).

The USFWS IPaC resource list (USFWS 2021b) indicated that 10 BCCs have the potential to be affected by activities within the Study Area with varying seasons for potential occurrence (Table 3). The USFWS BCC species, their habitat affinities, and their potential for seasonal occurrence within the Project Area are listed in Table 3. Red-headed woodpecker was the only BCC observed within the Project Area during the field reconnaissance survey.

3.2.6 *Breeding Bird Survey*

The USGS BBS is a volunteer-based program designed to monitor the status and trends of North American breeding bird populations. Annual surveys are conducted, typically in June, along established 24.5-mile-long (39.4-km-long) road routes with 3-minute point counts performed every 0.5 mile (0.8 km). BBS data are used to monitor bird populations across North America and inform researchers and wildlife managers such as USFWS, state natural heritage programs, and bird conservation organizations of significant changes in bird population levels.

The nearest BBS Route (USGS 2021b) is located along the eastern boundary of the Study Area and is named the Pimento Route (35021) (Figure 3). The habitat along the Pimento Route is similar to that within the Project Area (i.e., primarily open agricultural fields) (Google Earth 2021). The ten most common species recorded on the breeding bird survey route from 2010 through 2019 are characteristic of open habitats within an agricultural landscape (Table 4). None of the ten most common species are BCC; however, the following species of concern have been recorded along this route from 2010 through 2019:

- Indiana state endangered northern harrier (*Circus cyaneus*);
- Indiana state endangered and USFWS BCC Henslow's sparrow (*Centronyx henslowii*);
- Indiana state species of special concern northern bobwhite (*Colinus virginianus*), black-billed cuckoo (*Coccyzus erythropthalmus*), American woodcock (*Scolopax minor*), great egret (*Ardea alba*), osprey (*Pandion haliaetus*), and grasshopper sparrow (*Ammodramus savannarum*);
- Indiana state species of special concern and USFWS BCC eastern whip-poor-will (*Antrostomus vociferus*); and
- USFWS BCC red-headed woodpecker, Bell's vireo (*Vireo bellii*), wood thrush (*Hylocichla mustelina*), Kentucky warbler (*Geothlypis formosa*), and prairie warbler (*Setophaga discolor*).

Another BBS Route, the York Route (34077), is located approximately 4 miles west of the Project Area (Figure 3).

Table 4. Ten most common species observed on the Pimento Breeding Bird Survey Route, 2010-2019.

Common Name	Scientific Name	Total Observed
American robin	*Turdus migratorius*	509
Indigo bunting	*Passerina cyanea*	461
Northern cardinal	*Cardinalis cardinalis*	458
Red-winged blackbird	*Agelaius phoeniceus*	412
Mourning dove	*Zenaida macroura*	333
European starling	*Sturnus vulgaris*	303
American crow	*Corvus brachyrhynchos*	223
Song sparrow	*Melospiza melodia*	210
Chipping sparrow	*Spizella passerina*	199
Carolina wren	*Thryothorus ludovicianus*	196

3.2.7 *Christmas Bird Counts*

The CBC is a volunteer-based census of birds within designated 15-mile-diameter (24.1-km-diameter) count circles performed annually during the early winter season. Volunteers count all birds detected within the count circle within a 24-hour period. Audubon and other organizations use CBC data to assess the health of bird populations, and to help guide conservation actions.

The nearest CBC survey point is the Sullivan County circle (INSU) centered approximately 8 miles southeast of the Project Area (Figure 3). The Sullivan County circle has a similar predominantly agricultural landscape to that found within the Project Area (Google 2021). The ten most common species observed at this site from 2010 through 2019 are birds that primarily utilize open spaces and water bodies (Table 5) (National Audubon Society 2021a). None of these species are of conservation concern; however, the following species of concern have been recorded at this site from 1987 through 2019:

- Indiana state endangered trumpeter swan (*Cygnus buccinator*), black-crowned night-heron (*Nycticorax nycticorax*), northern harrier, Virginia rail (*Rallus limicola*), and marsh wren (*Cistothorus palustris*);
- Indiana state endangered and USFWS BCC short-eared owl (*Asio flammeus*) and loggerhead shrike (*Lanius ludovicianus*);
- Indiana state species of special concern northern bobwhite, great egret, sharp-shinned hawk (*Accipiter striatus*), and sandhill crane (*Grus canadensis*);
- Indiana state species of special concern and USFWS BCC peregrine falcon (*Falco peregrinus*);
- USFWS BCC red-headed woodpecker, Le Conte's sparrow (*Ammodramus leconteii*), and rusty blackbird (*Euphagus carolinus*); and
- BGEPA bald eagle and golden eagle.

The Terre Haute CBC circle (INTH) is centered approximately 14.5 miles north of the Project Area (Figure 3).

Table 5. Ten most common species observed on National Audubon Society's Sullivan County Christmas Bird Count, 2010-2019.

Common Name	Scientific Name	Total Observed
Red-winged blackbird	*Agelaius phoeniceus*	28,530
European starling	*Sturnus vulgaris*	24,822
Ring-billed gull	*Larus delawarensis*	21,034
Canada goose	*Branta canadensis*	11,402
Mallard	*Anas platyrhynchos*	8,477
Common grackle	*Quiscalus quiscula*	7,812
Greater white-fronted goose	*Anser albifrons*	6,265
Snow goose	*Chen caerulescens*	4,386
American coot	*Fulica americana*	3,572
Mourning dove	*Zenaida macroura*	3,522

3.2.8 *Important Bird Areas*

The nearest IBA (National Audubon Society 2021b) is the Minnehaha FWA and the Dugger Unit of the Greene-Sullivan State Forest located approximately 5 miles southeast of the Project Area (Figure 3). This IBA contained over 10,000 acres of lands, including over 3,000 acres of undisturbed grasslands. The approximately 2,150-acre Dugger Unit of the Greene-Sullivan State Forest is owned and managed by IDNR (National Audubon Society 2021b). The Minnehaha FWA was previously leased and managed to IDNR, but Peabody Energy terminated the lease and the FWA was closed on April 1, 2016 (IDNR 2016); current ownership and/or management plans for the property are unknown. The IBA has been known for grassland specialist species and one of Indiana's most significant populations of raptors (National Audubon Society 2021b). The Project Area does not contain similarly expansive grassland areas or large wetland complexes, so while avian species identified at this IBA may be present within the Project Area, they are less likely.

3.2.9 *Species of Habitat Fragmentation Concern*

The USFWS Land-Based Wind Energy Guidelines define species of habitat fragmentation concern as "species of concern for which a relevant federal, state, tribal, and/or local agency has found that separation of their habitats into smaller blocks reduces connectivity such that the individuals in the remaining habitat segments may suffer from effects such as decreased survival, reproduction, distribution, or use of the area" (USFWS 2012). Neither the USFWS Indiana Ecological Services Field Office, USFWS Region 3, nor IDNR has a publicly available list of species of habitat fragmentation concern for Indiana.

Land cover within approximately 78% of the Project Area is currently cultivated crops or pasture/hay (Table 1; Figure 2). Most of the remaining natural land cover types (e.g., forest and wetlands) are already fragmented and of limited value to area-sensitive species. However, some area-sensitive species might still be found in the few larger, contiguous land cover features of their respective habitats.

Northern long-eared bats are considered a forest interior species. A study of northern long-eared bats within a managed forest in West Virginia found that this species forages in areas with forest patch sizes between 114 and 161 acres (Owen et al. 2003). Research conducted in Michigan and Prince Edward Island, Canada, within a landscape dominated by agricultural activity showed that northern long-eared

bats may use woodlots as small as 15 acres (Foster and Kurta 1999; Henderson and Broders 2008). There are multiple woodlots within the Project Area greater than 15 acres (Figure 2). Fragmentation of these forested areas may reduce their suitability as northern long-eared bat habitat.

The generally small patch sizes of forest and wide distribution of the cultivated cropland cover (see Figure 2 and Section 3.1) might preclude the avian species of concern identified in this study, which require contiguous areas of native habitats, from establishing breeding territories (Herkert 1994).

3.2.10 *Raptor Nest Survey*

IDNR NHDC (2021) provided known locations of two bald eagle nest locations within the Study Area (see Figure 3 and Section 3.2.2). No other raptor nest information was provided by IDNR NHDC. The reported bald eagle nests within the Study Area were last observed in 2010 and 2017, respectively (IDNR NHDC 2021), and neither could be located from public roads or publicly accessible property during the field reconnaissance. Two raptor nests were observed within the Study Area during field reconnaissance (Figure 4).

Nest 1 is located in the northeast portion of the Study Area approximately 700 feet east of Terre Haute-Carlisle Road and approximately 100 north of Nest 2. The nest was approximately 3 feet in diameter and 2 feet tall, located in the upper canopy of a deciduous tree on the edge of a woodlot. There was no indication of activity, although the nest appeared to be in good condition. The species that constructed the nest is unknown; however, the nest is far smaller than the size of those constructed by bald eagles, which are typically 4 to 5 feet in diameter and 2 to 4 feet deep (USFWS 2021e). Red-shouldered hawks were observed in the Study Area, though not in the nest. The characteristics of this nest are consistent with those known to have been built and used by red-shouldered hawks.

Nest 2 is located in the northeast portion of the Study Area approximately 700 feet east of Terre Haute-Carlisle Road and approximately 100 south of Nest 1. The nest was approximately 3 feet in diameter and 2 feet tall, located in the upper canopy of a deciduous tree on the edge of a woodlot, though Nest 2 sat lower in the canopy than Nest 1. There was no indication of activity, although the nest appeared to be in good condition. The species that constructed the nest is unknown; however, the nest is far smaller than the size of those constructed by bald eagles. Red-shouldered hawks were observed in the Study Area, though not in the nest. The characteristics of this nest are consistent with those known to have been built and used by red-shouldered hawks.

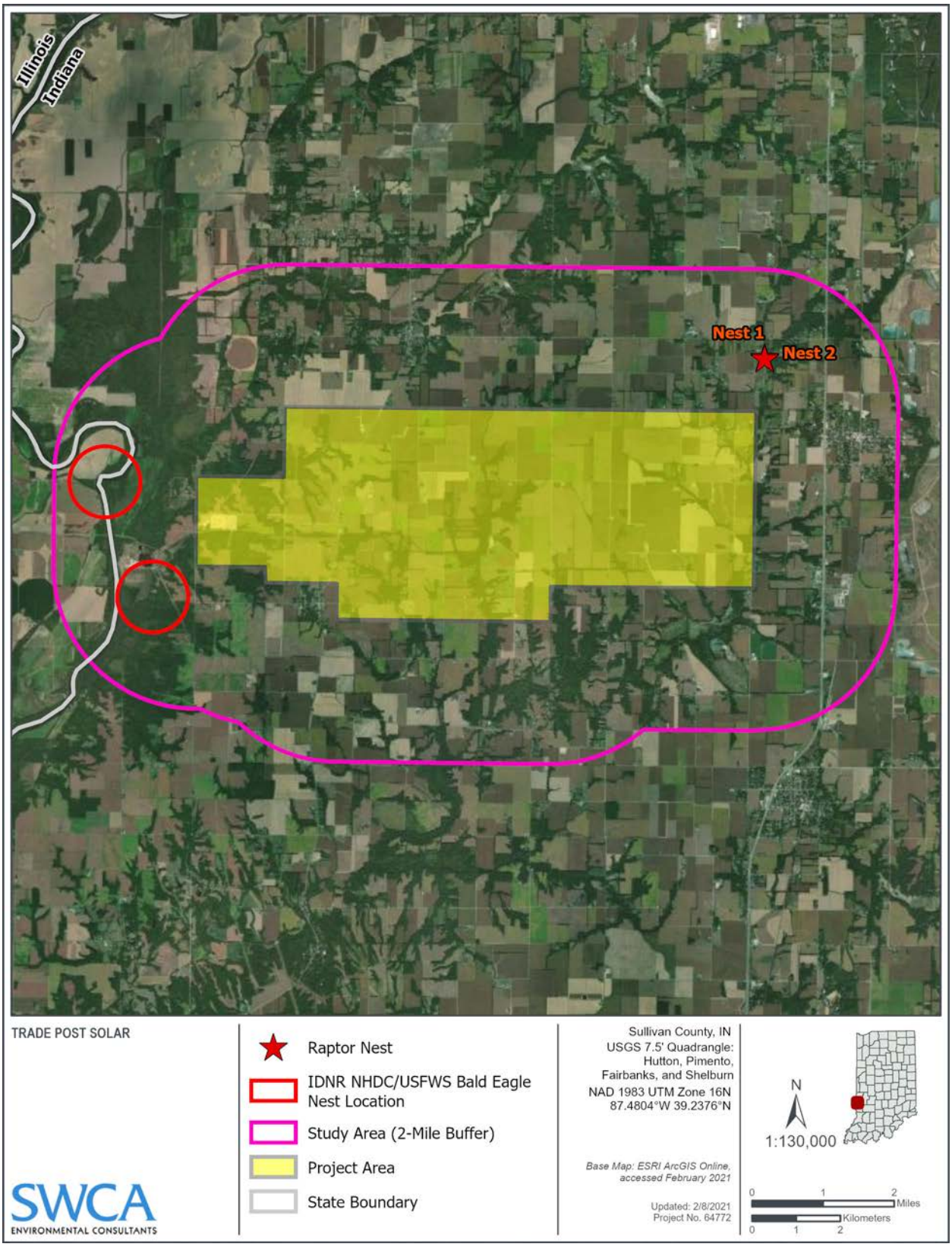

Figure 4. Raptor nest locations within the Trade Post Solar Energy Center Project Area, Sullivan County, Indiana, 2021.

3.3 Special Status Lands

The USFWS (2021b) IPaC resource list reported that no federal wilderness areas, wildlife refuges, or designated critical habitat are present within the Study Area. The Fairbanks Landing FWA was identified by IDNR NHDC (2021) as being within the Study Area; however, no IDNR-owed lands are present within the Project Area. Approximately 1,045 acres of the Fairbanks Landing FWA, managed by IDNR but owned by American Electric Power (AEP), are located within the western portion of the Project Area (Figure 5; IDNR 2021c). The Fairbanks Landing FWA Property Manager has indicated that there are no specific resource constraints or facilities (e.g., species management activities, public parking areas) in the vicinity of the existing AEP substation that would be impacted by the proposed Project (IDNR 2021d). No other designated conservation lands were identified within the Project Area (Figure 5; NCED 2021). The IDNR Fairbanks Landing Public Access Site (PAS), Prairie Creek Park (Vigo County Parks and Recreation), the Wabash River – Mount Carmel private conservation area, and seven properties with Natural Resources Conservation Service (NRCS) Wetlands Reserve Program (WRP) conservation easements are within the Study Area (Figure 5; NCED 2021; USGS 2021d). There are additional protected lands, primarily associated with the Wabash River, including state conservation areas; several county and city parks; and multiple privately-owned conservation easements located within 10 miles of the Project Area; however, none are within the Project Area (Figure 5; NCED 2021; USGS 2021d). No other unique ecological sites, geologic features, scenic rivers, state wildlife areas, nature preserves, national wildlife refuges, parks or forests, or other protected natural areas are located within 10 miles of the Project Area (Figure 5; USGS 2021d).

3.4 Plant Communities of Concern

IDNR NHDC (2021) and USFWS (2021b) did not identify any plant communities of concern within the Study Area. During field reconnaissance, no plant communities of concern were identified within the Project Area.

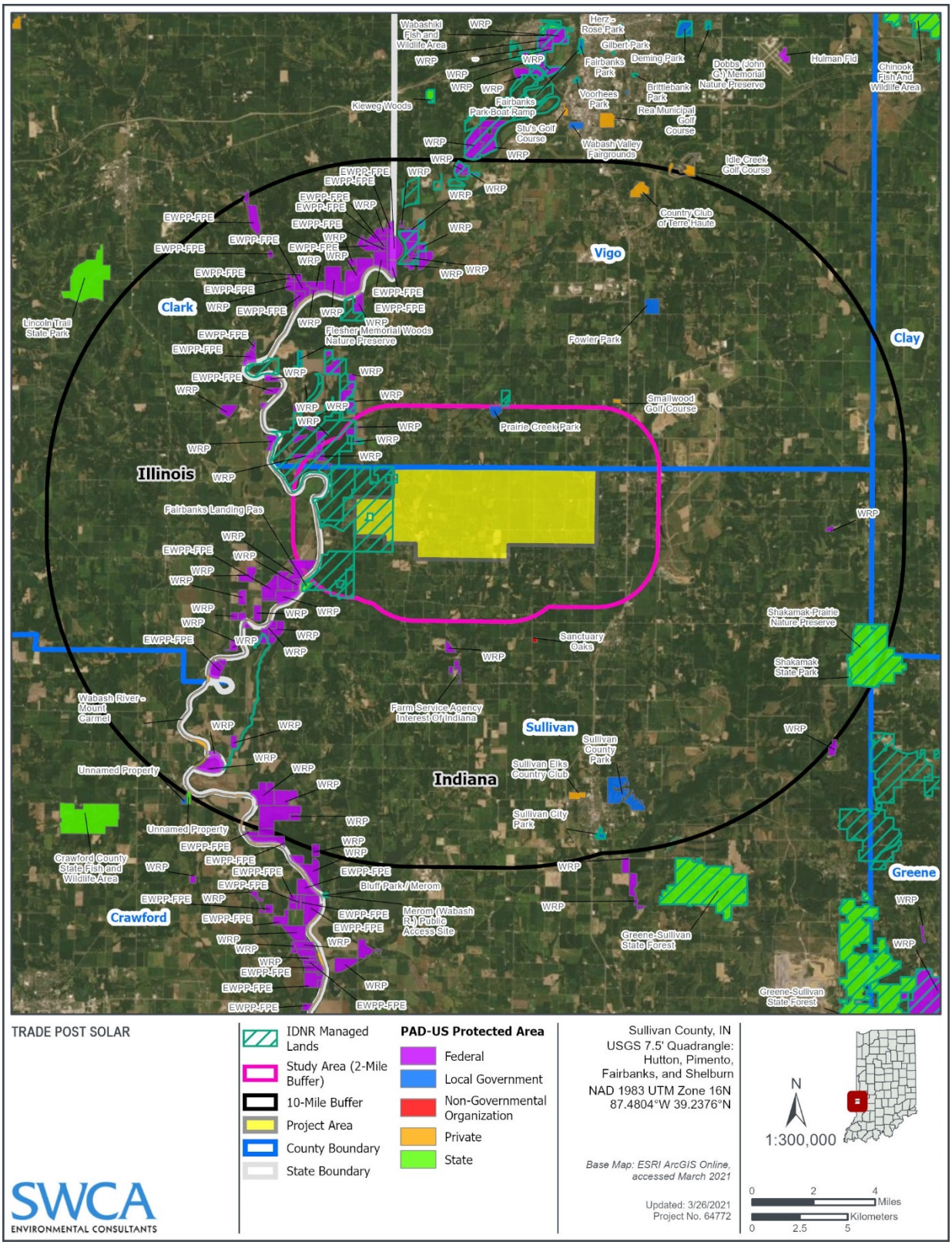

Figure 5. Special status lands near the Trade Post Solar Energy Center Project Area, Sullivan County, Indiana, 2021.

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APPENDIX A

Desktop Assessment of Potentially Jurisdictional Wetlands and Watercourses

DESKTOP ASSESSMENT OF POTENTIALLY JURISDICTIONAL WETLANDS AND WATERBODIES TRADE POST SOLAR ENERGY CENTER, SULLIVAN COUNTY, INDIANA

MARCH 2021

PREPARED FOR

Trade Post Solar LLC

PREPARED BY

SWCA Environmental Consultants

CONFIDENTIAL BUSINESS INFORMATION

ATTACHMENT HP-2

DESKTOP ASSESSMENT OF POTENTIALLY JURISDICTIONAL WETLANDS AND WATERBODIES TRADE POST SOLAR ENERGY CENTER, SULLIVAN COUNTY, INDIANA

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1 INTRODUCTION

On behalf of Trade Post Solar LLC, SWCA Environmental Consultants (SWCA) has prepared this desktop assessment of potentially jurisdictional wetlands and waterbodies as part of the environmental studies conducted for the Trade Post Solar Energy Center (Project). The Project is situated on approximately 12,573 acres of privately owned land (Project Area) and is located immediately north and east of the town of Fairbanks in Sullivan County, Indiana (Figure 1). Only approximately 1,500 acres will be used to host facilities within the total Project Area.

Some water resources within the proposed Project Area are likely to fall under the jurisdiction of the U.S. Army Corps of Engineers (USACE) and/or Indiana Department of Environmental Management (IDEM) jurisdiction under Sections 404 and 401 of the Clean Water Act (CWA).

The objective of this assessment was to use available desktop resources to identify wetlands and waterbodies within the Project Area that are potentially jurisdictional. Wetlands are identified based on three criteria: 1) the presence of hydrology showing regular inundation, 2) a predominance of hydrophytic (water loving) vegetation, and 3) soils characteristic of frequent saturation (i.e., hydric soils) (USACE 1987, 2010). Determination of the presence of these parameters requires field verification; however, desktop-level data can be used to identify areas where these parameters are likely present as presented in this report. This report summarizes the findings from a desktop assessment of potentially jurisdictional wetlands and waterbodies within the Project Area conducted as part of the site characterization. A 2-mile (3.2-km) buffer surrounding the Project Area, referred to herein as the Study Area, was also assessed.

2 METHODS

The desktop assessment of potentially jurisdictional wetlands and waterbodies was completed using a combination of existing information obtained from publicly available sources, including reports, published literature, online databases, and geographic information system (GIS) data.

The following publicly available data sources were used to complete a desktop review of water resources within the Project Area and/or Study Area:

- Google Earth (Google 2021)
- U.S. Department of Agriculture (USDA) Web Soil Survey (USDA 2021)
- U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) data (USFWS 2021)
- U.S. Geological Survey (USGS) National Hydrography Dataset (NHD) (USGS 2021)
- Federal Emergency Management Agency (FEMA) Flood Hazard Map Viewer (FEMA 2021)
- Indiana Department of Natural Resources (IDNR) Indiana Best Available Floodplain Mapping (IDNR 2021)

From these sources, SWCA created maps depicting areas with hydric soils; NWI wetlands, NHD waterbodies, and NHD streams; as well as mapping depicting where NWI wetlands and hydric soils overlap.

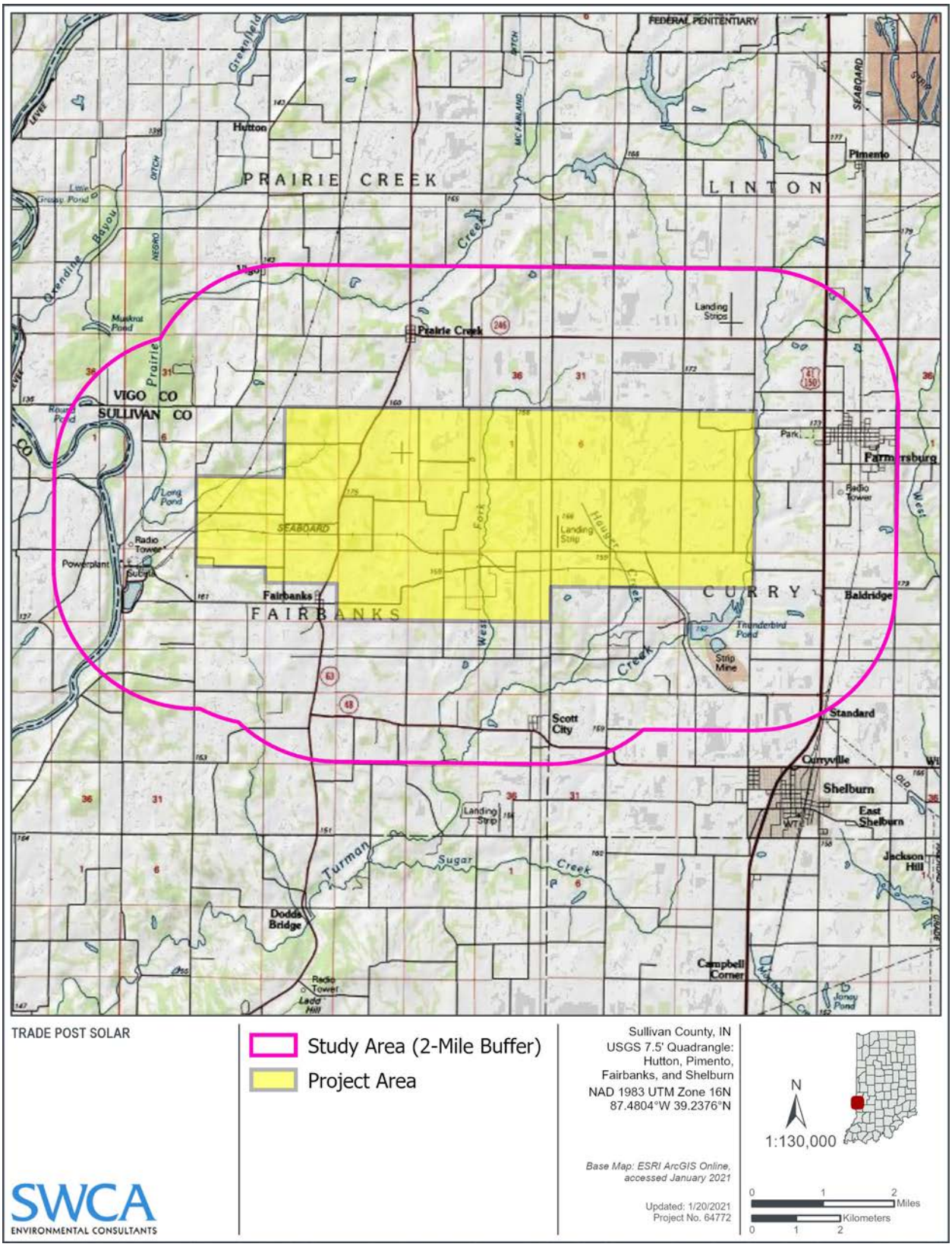

Figure 1. Trade Post Solar Energy Center location, Sullivan County, Indiana, 2021.

It is SWCA's professional opinion that the potential for the presence of potentially jurisdictional wetlands should be considered high in areas where mapped hydric soils and NWI wetland features overlap, moderate to high in areas of mapped NWI wetland features only, and low to moderate in areas of mapped hydric soils only.

3 RESULTS

3.1 Soils

The Project Area contains 54 unique soil map units. Soils consist primarily of Reesville silt loam, 0 to 2 percent slopes (approximately 40% of the Project Area); Reesville silt loam, 2 to 5 percent slopes, eroded (approximately 7% of the Project Area); and Iona silt loam, 2 to 6 percent slopes, eroded (approximately 6% of the Project Area); none of which are considered hydric (USDA 2021).

SWCA reviewed the soil map units within the Project Area to determine the presence of mapped hydric soil units. USDA (2021) data includes a "yes/no" hydric rating for all soil map units. Hydric soils are one component of jurisdictional wetlands. A hydric soil is a "soil that formed under the conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part" (USDA 2021). Figure 2 depicts the locations of the approximately 793 acres (approximately 6% of the Project Area) of mapped hydric soil units within the Project Area.

3.2 Wetlands and Waterbodies

A review of NWI maps (USFWS 2021) identified 36 freshwater forested/shrub wetlands (approximately 265 acres), 80 riverine wetlands (approximately 64 acres), 35 freshwater ponds (approximately 24 acres), and 8 freshwater emergent wetlands (approximately 7 acres) within the Project Area (Table 1; Figure 3). Figure 4 depicts the locations of hydric soils, NWI wetlands, and areas were NWI wetlands and hydric soils overlap. The Project Area contains approximately 4.6 acres across 9 areas considered high potential for the presence of potentially jurisdictional wetlands (i.e., where mapped hydric soils and NWI wetland features overlap), approximately 360 acres across 159 areas of moderate to high potential (i.e., mapped NWI wetland features), and approximately 793 acres across 54 areas of low to moderate potential (i.e., mapped hydric soils only) (Figure 4).

Table 1. NWI wetland types within the Trade Post Solar Energy Center Project Area, Sullivan County, Indiana, 2021.

Wetland Type	Number	Acres
Freshwater Forested/Shrub Wetland	36	265
Riverine	80	64
Freshwater Pond	35	24
Freshwater Emergent Wetland	8	7
Total	**159**	**360**

In the Project Area, there are 37 NHD waterbodies (USGS 2021) totaling approximately 23 acres and there are 1,169 NHD flowlines (USGS 2021) totaling approximately 135 miles (Figure 3). Named streams within the Project Area include Hauger Creek, South Prairie Creek, Turman Creek, Welsh Creek, and West Fork Turman Creek (Figure 3).

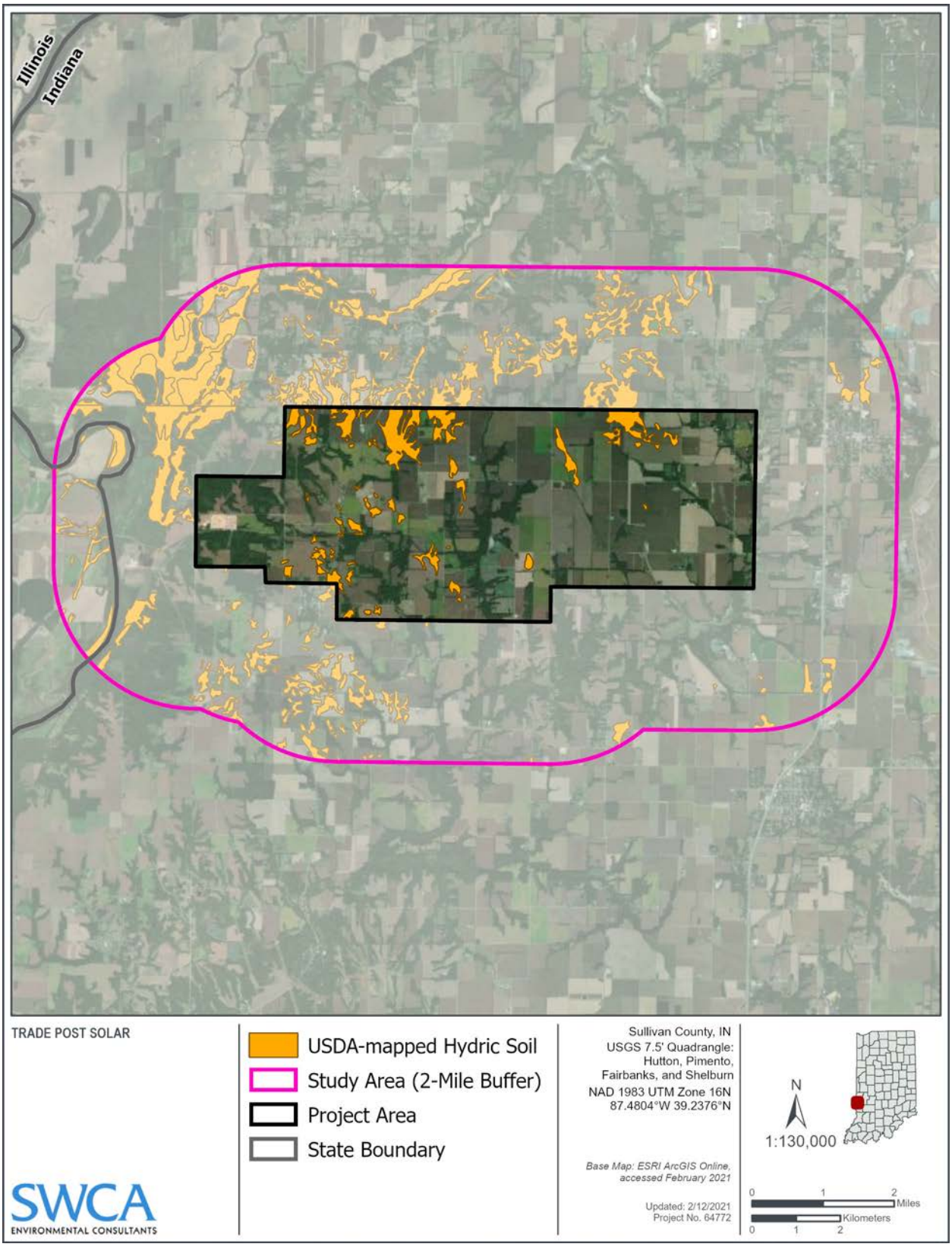

Figure 2. USDA-mapped hydric soils within the Trade Post Solar Energy Center Project Area, Sullivan County, Indiana, 2021.

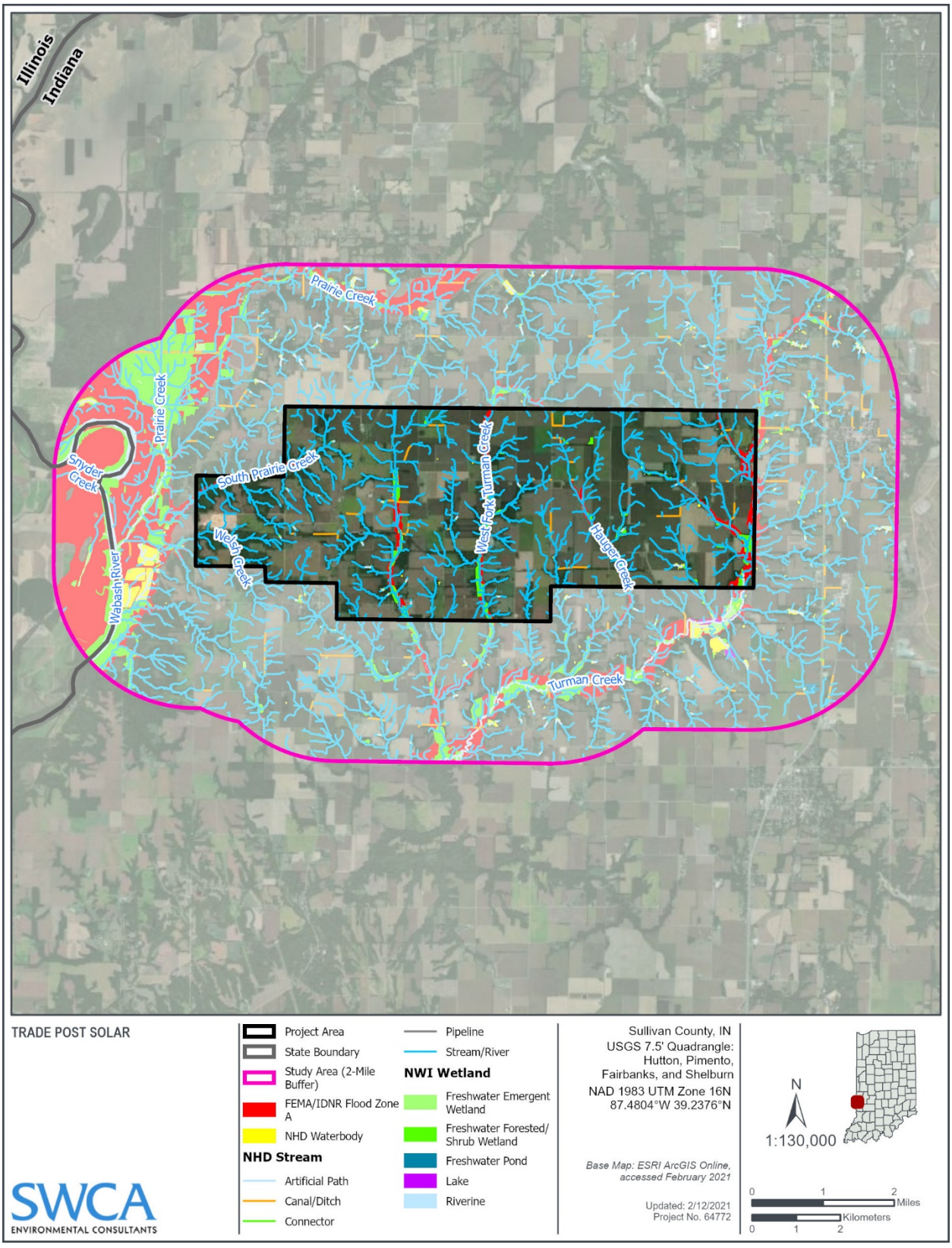

Figure 3. NWI and NHD features within the Trade Post Solar Energy Center Project Area, Sullivan County, Indiana, 2021.

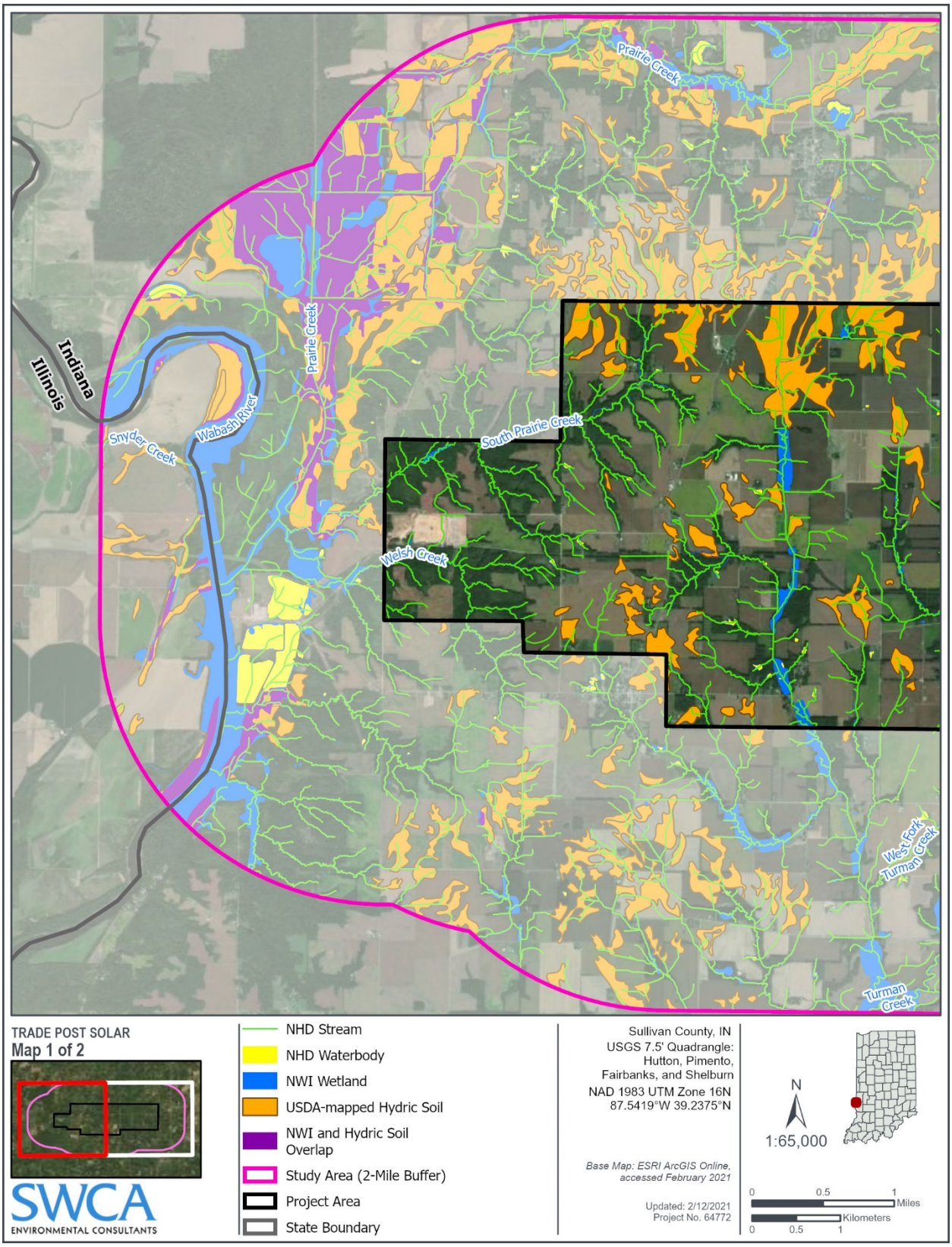

Figure 4a. Potential wetland and waterbody areas within the Trade Post Solar Energy Center Project Area, Sullivan County, Indiana, 2021.

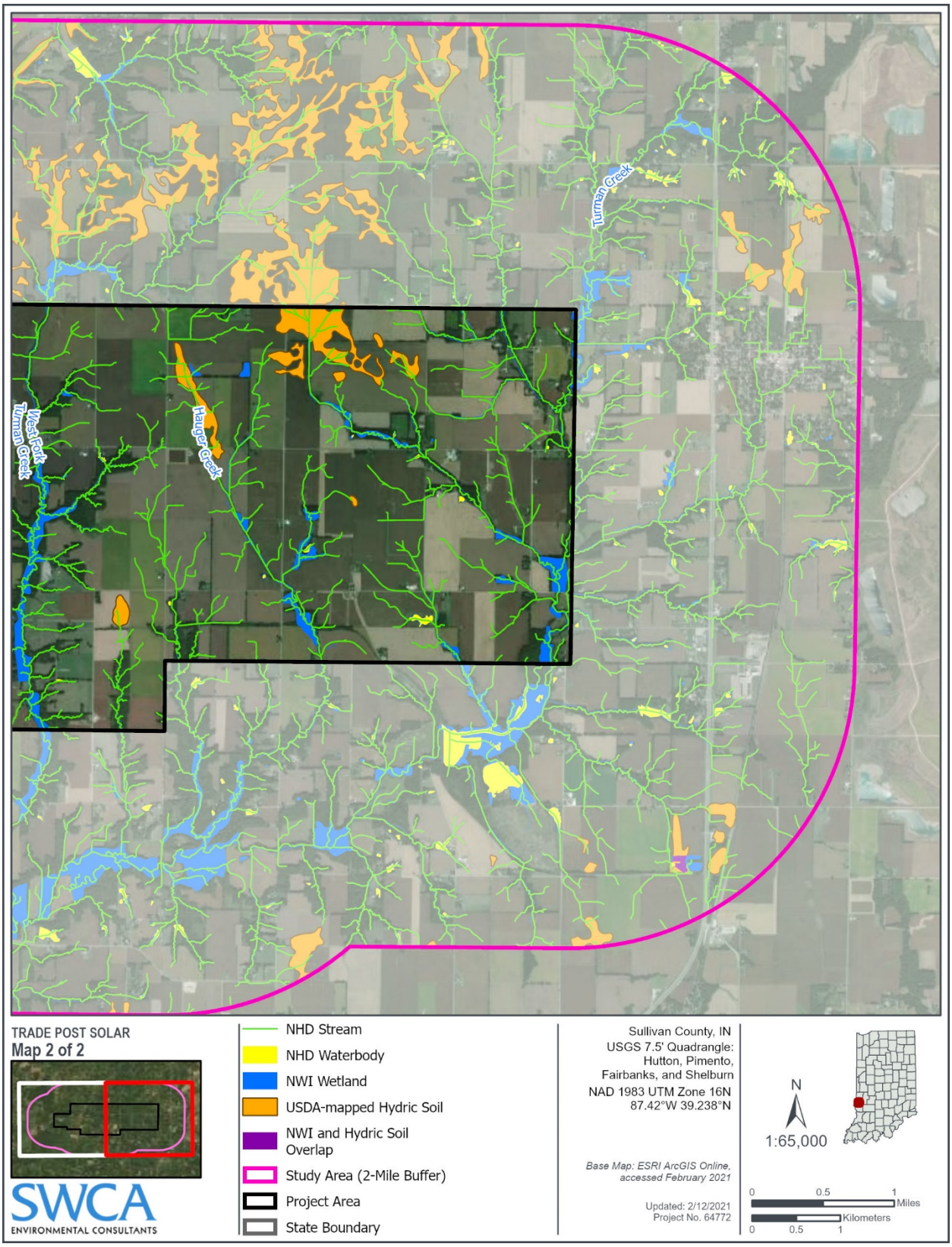

Figure 4b. Potential wetland and waterbody areas within the Trade Post Solar Energy Center Project Area, Sullivan County, Indiana, 2021.

The Indiana Best Available Floodplain Mapping (IDNR 2021) updates FEMA Flood Hazard Maps to include additional stream reaches with "Zone A" floodplains. The Project Area contains approximately 642 acres of mapped IDNR Zone A floodplains (Figure 3). These IDNR Zone A floodplain areas are associated with the following streams within the Project Area where the associated drainage area is 1 square mile or greater: Hauger Creek, South Prairie Creek, Turman Creek, West Fork Turman Creek, an unnamed tributary to West Fork Turman Creek in the west-central portion of the Project Area, and two unnamed tributaries to Turman Creek in the eastern portion of the Project Area (Figure 3). An IDNR Floodplain Analysis and Regulatory Assessment (FARA) is required for regulatory determination of floodplain boundaries.

4 SUMMARY

The Project Area lies within the Wabash River watershed, and most of the features identified appear to have some connection to that waterway. Therefore, the resources identified within the proposed Project Area as part of this desktop assessment are potentially subject to USACE and/or IDEM jurisdiction under Sections 401 and 404 of the CWA. The objective of this assessment was to ascertain the presence and extent of potential jurisdictional water resource areas. In SWCA's professional opinion, many physical features within the Project Area are likely to be considered waters of the U.S. or State (i.e., wetlands and waterbodies). This report does not serve as a delineation of the boundaries of waters of the U.S. or State or a determination of their jurisdictional status. Only completion of a formal wetland and waterbody delineation can provide a defensible determination of wetlands and waterbodies. Furthermore, only the USACE and/or IDEM have final and/or legal authority in determining the presence of jurisdictional waters of the U.S. or State and the extent of their boundaries.

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APPENDIX B

Incidental Wildlife and Plant Observations List

Table B-1. Incidental wildlife and plant observations within the Trade Post Solar Energy Center Project Area during field reconnaissance, January 20–23, 2021.

Common Name	Scientific Name
MAMMALS	
Coyote	*Canis latrans*
Domestic cat	*Felis catus*
Domestic dog	*Canis familiaris*
Fox squirrel	*Sciurus niger*
Raccoon	*Procyon lotor*
White tail deer	*Odocoileus virginianus*
BIRDS	
American crow	*Corvus brachyrhynchos*
American kestrel	*Falco sparverius*
Bald eagle*	*Haliaeetus leucocephalus*
Blue jay	*Cyanocitta cristata*
Canada goose	*Branta canadensis*
Downy woodpecker	*Dryobates pubescens*
European starling	*Sturnus vulgaris*
Great blue heron	*Ardea herodias*
Hooded merganser	*Lophodytes cucullatus*
House sparrow	*Passer domesticus*
Mallard	*Anas platyrhynchos*
Mourning dove	*Zenaida macroura*
Northern cardinal	*Cardinalis cardinalis*
Northern flicker	*Colaptes auratus*
Pileated woodpecker	*Dryocopus pileatus*
Red-headed woodpecker†	*Melanerpes erythrocephalus*
Red-shouldered hawk	*Buteo lineatus*
Red-tailed hawk	*Buteo jamaicensis*
Tufted titmouse	*Baeolophus bicolor*
Turkey vulture	*Cathartes aura*
PLANTS	
Boxelder	*Acer negundo*
Red maple	*Acer rubrum*
Silver maple	*Acer saccharinum*
Sugar maple	*Acer saccharum*
Pignut hickory	*Carya glabra*
Common hackberry	*Celtis occidentalis*

Common Name	Scientific Name
American beech	*Fagus grandifolia*
Soybean	*Glycine max*
Tulip poplar	*Liriodendron tulipifera*
American hophornbeam	*Ostraya virginiana*
Common reed	*Phragmites australis*
American sycamore	*Platanus occidentalis*
Kentucky blue grass	*Poa pratensis*
Northern white oak	*Quercus alba*
Northern red oak	*Quercus rubra*
Black willow	*Salix nigra*
Japanese bristlegrass	*Setaria faberi*
Basswood	*Tilia americana*
American elm	*Ulmus americana*
Riverbank grape	*Vitis riparia*
Corn	*Zea mays*

*Protected under BGEPA

†Bird of Conservation Concern

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April 26, 2021

Hannah Pawelczyk
Trade Post Solar LLC
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Chicago, IL 60606

Re: Preliminary Cultural Resources Desktop Review for the Trade Post Solar Project, Sullivan County, Indiana
File R0026264.01

Trade Post Solar LLC (Client) contracted Westwood Professional Services, Inc. (Westwood), to conduct a cultural resources desktop review for the proposed Trade Post Solar Energy Center (Project). Westwood understands that the Project is proposed to have a nameplate capacity of 200 MW in Indiana. We understand that project construction is targeted for a 2023 Commercial Operation Date (COD). The Project area is approximately 12,500 acres in size, contains approximately 500 individual parcels, and approximately 100 structures/dwellings/farmsteads in Sullivan County, Indiana (Sheets #1, #2, and #3). It was reported that only approximately 1,500 acres will be actually used to host solar facilities within the total Project area.

The review provides an inventory of restricted and publicly available previously recorded cultural resources within and one mile around the Project area (Table 1 and Table 2). The one-mile "buffer" was included to ascertain whether any recorded resources adjacent to the Project area might be physically or visually impacted by the proposed work, and to better indicate possible site types that may be located within the Project area.

Table 1: Sections with Portions in Project Area or One-Mile Buffer

Township	Range	Section(s) in Project	Section(s) in Buffer
9N	9W	4, 5, 6, 7, 8, 9, 16, 17, 18	3, 10, 15, 19, 20, 21, 22
9N	10W	1, 2, 3, 4, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17	5, 6, 7, 18, 19, 20, 21, 22, 23, 24
10N	9W	N/A	31, 32, 33, 34
10N	10W	N/A	32, 33, 34, 35, 36

To conduct the desktop review, Westwood Principal Investigator Rigden Glaab accessed the Indiana State Historic Architectural and Archaeological Research Database (SHAARD) of the Division of Historic Preservation and Archaeology (DHPA) on January 6, 2021. This was done to gather restricted and publicly available information on previously recorded cultural resources within and one-mile around the Project area (Sheets #1, #2, and #3). Restricted SHAARD access to this information was granted after Mr. Glaab became permitted through the Indiana DHPA. Rigden Glaab, M.A., RPA, meets the Secretary of Interior's Professional Qualification Standards for archaeology as stipulated in 36 CFR Part 61 and will serve as Principal Investigator for the Project.

A total of 185 sites were identified in the SHAARD database within the Project and one-mile buffer (Table 2). Of these 185 resources, there are seven bridges, 12 cemeteries, 59 Indiana Historic Sites and Structures Inventory (IHSSI) sites, and 107 sites are archaeological sites assigned Smithsonian Institution Trinomial System (SITS) numbers. No National Register of Historic Places (NRHP) listed properties are found in the Project area.

A total of 47 sites are directly within the Project boundary. These 47 sites consist of 16 IHSSI properties, six cemeteries, three bridges, and 22 archaeological sites. All of the IHSSI sites are *unevaluated* for the NRHP. Westwood recommends that these properties be evaluated by a qualified architectural historian for potential direct/indirect impacts by the Project. It is also recommended that the bridges and cemeteries in the Project be reviewed at the same time by this individual. The archaeological sites consist of a human burial (Site Su-0017), a cabin, a foundation, a historic trash scatter, and 18 prehistoric lithic scatters or encampments. The cabin (Site Su-0569) is "potentially eligible" for the NRHP, while the foundation (Site Su-0974), trash scatter (Site Su-0568), and two of the prehistoric lithic scatters/isolated finds (Su-0829 and Su-0973) are *not eligible* for the NRHP.

The remaining 16 prehistoric archaeological sites in the Project boundary are *unevaluated* for the NRHP, or additional data is needed for the original site form in the SHAARD database. Westwood reached out to the DHPA confirming information on whether these properties have been evaluated for the NRHP (Email 1/27/21). The DHPA responded, "F[f]or survey purposes, we evaluate any resource that is at least 40 years old or older (unlike the traditional 50 year cut off for the National Register) in order to extend the usefulness of the data. The Sullivan County survey was completed in 2001 so the cut-off date would have been 1960–1961. Therefore, the sites you were asking about would have been outside the scope of the survey at the time and have not been evaluated for the National Register."

It could be assumed in the Project boundary based on this information that the entries lacking eligibility information in SHAARD are *unevaluated* for the NRHP given that the majority of the archaeological surveys were conducted in 1973. As a general precaution, Westwood recommends that the Project consider avoiding the western extent of the current layout due to the high density of prehistoric resources in that area. In addition, Westwood recommends an archaeological survey based on these concentrations of archaeological sites. Additional details regarding the content of the sites discussed above is provided in Table 2. The client has confirmed they are avoiding these locations.

Table 2: Cultural Resources In Project Area and One-Mile Buffer in the SHAARD Database						
Site Number	**Author**	**Date**	**NRHP Status**	**IHHSI Status**	**Site Type**	**Project or Buffer**
153-198-10003	N/A	2001	Unevaluated	Outstanding	IHSSI (House)	**In Project**
153-198-10004	N/A	2002	Unevaluated	Notable	IHSSI (Brewer School)	**In Project**
153-198-10005	N/A	2001	Unevaluated	Contributing	IHSSI (House)	**In Project**
153-198-10007	N/A	2001	Unevaluated	Contributing	IHSSI (House)	**In Project**
153-198-10008	N/A	2001	Unevaluated	Contributing	IHSSI (Pogue Cemetery)	**In Project**
153-198-10009	N/A	2001	Unevaluated	Contributing	IHSSI (House)	**In Project**
153-512-05003	N/A	2001	Unevaluated	Contributing	IHSSI (Cemetery)	**In Project**
153-512-10001	N/A	2001	Unevaluated	Contributing	IHSSI (House)	**In Project**
153-583-05004	N/A	2001	Unevaluated	Contributing	IHSSI (House)	**In Project**
153-583-05005	N/A	2001	Unevaluated	Contributing	IHSSI (House)	**In Project**
153-583-05006	N/A	2001	Unevaluated	Contributing	IHSSI (House)	**In Project**
153-583-05013	N/A	2001	Unevaluated	Notable	IHSSI (Liberty Church of Christ and Liberty Cemetery)	**In Project**
153-583-05015	N/A	2001	Unevaluated	Notable	IHSSI (House)	**In Project**
153-583-05017	N/A	2001	Unevaluated	Contributing	IHSSI (House)	**In Project**
153-583-10010	N/A	2001	Unevaluated	Contributing	IHSSI (House)	**In Project**
153-583-10011	N/A	2001	Unevaluated	Contributing	IHSSI (House)	**In Project**
CR-77-17	N/A	2002	N/A	Contributing	Cemetery (Friendship Baptist)	**In Project**
CR-77-18	N/A	2002	N/A	Notable	Cemetery (Liberty Church)	**In Project**
CR-77-23	N/A	N/A	N/A	Not Rated	Cemetery (Debaun)	**In Project**
CR-77-28	N/A	N/A	N/A	N/A	Cemetery (Mound)	**In Project**

Table 2: Cultural Resources In Project Area and One-Mile Buffer in the SHAARD Database						
Site Number	**Author**	**Date**	**NRHP Status**	**IHHSI Status**	**Site Type**	**Project or Buffer**
CR-77-29	N/A	N/A	N/A	N/A	Cemetery (Mound)	**In Project**
CR-77-32	N/A	2002	N/A	Contributing	Cemetery (Pogue)	**In Project**
HB-1644	N/A	1984	N/A	Demolished	Bridges (260)	**In Project**
HB-1645	N/A	1984	N/A	Demolished	Bridges (276)	**In Project**
HB-2794	N/A	1989	N/A	Contributing	Bridges (259)	**In Project**
Su-0017	C. Tomak	1973	Unevaluated	N/A	Burial (Prehistoric)	**In Project**
Su-0018	C. Tomak	1973	Unevaluated	N/A	Camp (Prehistoric)	**In Project**
Su-0019	C. Tomak	1973	Unevaluated	N/A	Camp (Prehistoric)	**In Project**
Su-0020	C. Tomak	1973	Unevaluated	N/A	Camp (Prehistoric)	**In Project**
Su-0021	C. Tomak	1973	Unevaluated	N/A	Camp (Prehistoric)	**In Project**
Su-0022	C. Tomak	1973	Unevaluated	N/A	Flint/Broken Rock (Prehistoric)	**In Project**
Su-0023	C. Tomak	1973	Unevaluated	N/A	Camp (Prehistoric)	**In Project**
Su-0024	C. Tomak	1973	N/A	N/A	Camp (Prehistoric)	**In Project**
Su-0024_R1	Veronica Parsell	2014	N/A	N/A	Camp (Destroyed)	**In Project**
Su-0025	C. Tomak	1973	Unevaluated	N/A	Camp (Prehistoric)	**In Project**
Su-0026	C. Tomak	1973	Unevaluated	N/A	Camp (Prehistoric)	**In Project**
Su-0027	C. Tomak	1973	Unevaluated	N/A	Camp (Prehistoric)	**In Project**
Su-0028	C. Tomak	1973	Unevaluated	N/A	Camp (Prehistoric)	**In Project**
Su-0029	C. Tomak	1973	Unevaluated	N/A	Camp (Prehistoric)	**In Project**
Su-0038	C. Tomak	1973	Unevaluated	N/A	Camp (Prehistoric)	**In Project**

Table 2: Cultural Resources In Project Area and One-Mile Buffer in the SHAARD Database						
Site Number	**Author**	**Date**	**NRHP Status**	**IHHSI Status**	**Site Type**	**Project or Buffer**
Su-0204	Kinnaman	1973	Unevaluated	N/A	Camp (Prehistoric)	**In Project**
Su-0568	Rick Wappenstein	1999	Ineligible	N/A	Historic Scatter	**In Project**
Su-0569	Rick Wappenstein	1999	Potentially Eligible	N/A	Cabin	**In Project**
Su-0829	K. Lautzenheiser	2010	Ineligible	N/A	Isolated Find (Prehistoric)	**In Project**
Su-0972	N/A	N/A	N/A	N/A	Polygon	**In Project**
Su-0973	Veronica Parsell	2014	Ineligible	N/A	Prehistoric Isolate	**In Project**
Su-0974	Veronica Parsell	2014	Ineligible	N/A	Foundation (Historic)	**In Project**
153-198-10006	N/A	2001	N/A	Contributing	IHSSI (Bridge)	Buffer
153-198-10014	N/A	2001	N/A	Outstanding	IHSSI (Farm)	Buffer
153-198-10015	N/A	2001	N/A	Contributing	IHSSI (Riggs-Ernest Cemetery)	Buffer
153-198-10016	N/A	2001	N/A	Contributing	IHSSI (House)	Buffer
153-198-10017	N/A	N/A	N/A	N/A	IHSSI	Buffer
153-198-11001	N/A	2001	N/A	Contributing	IHSSI (House)	Buffer
153-198-11002	N/A	2001	N/A	Contributing	IHSSI (House)	Buffer
153-198-11003	N/A	2001	N/A	Contributing	IHSSI (Commercial Building)	Buffer
153-198-11004	N/A	2001	N/A	Notable	IHSSI (Fairbanks School)	Buffer
153-198-11005	N/A	2001	N/A	Contributing	IHSSI (House)	Buffer
153-198-11006	N/A	2001	N/A	Outstanding	IHSSI (Dr. Herbert Blad House)	Buffer
153-198-11007	N/A	2001	N/A	Outstanding	IHSSI (Fairbanks Methodist Church)	Buffer
153-198-11008	N/A	2001	N/A	Notable	IHSSI (Fairbanks Primitive Baptist Church)	Buffer

Table 2: Cultural Resources In Project Area and One-Mile Buffer in the SHAARD Database						
Site Number	**Author**	**Date**	**NRHP Status**	**IHHSI Status**	**Site Type**	**Project or Buffer**
153-198-11009	N/A	2001	N/A	Contributing	IHSSI (Fairbanks Feed Mill)	Buffer
153-198-11010	N/A	2001	N/A	Contributing	IHSSI (Pound Cemetery)	Buffer
153-512-05001	N/A	2001	N/A	Contributing	IHSSI (House)	Buffer
153-512-05002	N/A	2001	N/A	Contributing	IHSSI (House)	Buffer
153-512-06005	N/A	2001	N/A	Contributing	IHSSI (House)	Buffer
153-512-06006	N/A	N/A	N/A	N/A	IHSSI	Buffer
153-512-10002	N/A	2001	N/A	Contributing	IHSSI (Bridge)	Buffer
153-583-05007	N/A	2001	N/A	Contributing	IHSSI (West Lawn Cemetery)	Buffer
153-583-05012	N/A	2001	N/A	Contributing	IHSSI (House)	Buffer
153-583-05014	N/A	2001	N/A	Notable	IHSSI (House)	Buffer
153-583-05016	N/A	2001	N/A	Contributing	IHSSI (Farm)	Buffer
153-583-10012	N/A	2001	N/A	Contributing	IHSSI (House)	Buffer
153-583-10013	N/A	2001	N/A	Contributing	IHSSI (Annis School)	Buffer
167-291-50015	N/A	1981	N/A	Notable	IHSSI (Hunt House)	Buffer
167-291-50016	N/A	1981	N/A	Notable	IHSSI (House)	Buffer
167-512-50017	N/A	1981	N/A	Contributing	IHSSI (Pogue Farm)	Buffer
167-512-50019	N/A	1981	N/A	Contributing	IHSSI (House)	Buffer
167-512-51011	N/A	1981	N/A	Notable	IHSSI (Prairie Creek Church of Christ)	Buffer
167-512-51012	N/A	1981	N/A	Contributing	IHSSI (House)	Buffer
167-512-51013	N/A	1981	N/A	Notable	IHSSI (William P. and Nettie P. Ring House)	Buffer

Table 2: Cultural Resources In Project Area and One-Mile Buffer in the SHAARD Database						
Site Number	**Author**	**Date**	**NRHP Status**	**IHHSI Status**	**Site Type**	**Project or Buffer**
167-512-51014	N/A	1981	N/A	Contributing	IHSSI (House)	Buffer
167-512-51015	N/A	1981	N/A	Contributing	IHSSI (Perry Johnson and Tressie Gobin House)	Buffer
167-512-51016	N/A	1981	N/A	Contributing	IHSSI (House)	Buffer
167-512-51017	N/A	1981	N/A	Contributing	IHSSI (House)	Buffer
167-512-51018	N/A	1981	N/A	Contributing	IHSSI (House)	Buffer
167-512-51019	N/A	1981	N/A	Contributing	IHSSI (House)	Buffer
167-512-51020	N/A	1981	N/A	Contributing	IHSSI (Farm)	Buffer
167-512-51021	N/A	1981	N/A	Contributing	IHSSI (Warren Milton and Maggie Yeager Farm)	Buffer
167-512-55018	N/A	1982	N/A	Contributing	IHSSI (House)	Buffer
167-512-55019	N/A	1982	N/A	Contributing	IHSSI (House)	Buffer
CR-77-20	N/A	2002	N/A	Contributing	Cemetery (West Lawn)	Buffer
CR-77-21	N/A	N/A	N/A	N/A	Cemetery (Albee Mound)	Buffer
CR-77-25	N/A	2002	N/A	Contributing	Cemetery (Ernest Riggs)	Buffer
CR-77-26	N/A	2002	N/A	Contributing	Cemetery (Fairbanks-Pound)	Buffer
CR-77-33	N/A	N/A	N/A	N/A	Cemetery	Buffer
CR-77-34	N/A	N/A	N/A	N/A	Cemetery	Buffer
HB-1643	N/A	1986	N/A	Demolished	Bridges (258)	Buffer
HB-2795	N/A	1989	N/A	Contributing	Bridges (277)	Buffer
HB-2831	N/A	1990	N/A	Contributing	Bridges (54)	Buffer
HB-2832	N/A	1988	N/A	Contributing	Bridges (56)	Buffer
Su-0001	C. Tomak	1973	Unevaluated	N/A	Burial (Prehistoric)	Buffer
Su-0001_R1	C. Tomak	1973	Unevaluated	N/A	Mound (Prehistoric)	Buffer
Su-0002	C. Tomak	1973	Unevaluated	N/A	N/A	Buffer
Su-0006	Robert E. Pace	1967	N/A	N/A	Village (Prehistoric)	Buffer
Su-0006_R1	Keller	1973	N/A	N/A	Village (Prehistoric)	Buffer
Su-0009	Coffing/Pace	1967	N/A	N/A	Camp (Prehistoric)	Buffer
Su-0011	Robert E. Pace	1969	N/A	N/A	Camp (Prehistoric)	Buffer
Su-0016	C. Tomak	1973	Unevaluated	N/A	Camp (Prehistoric)	Buffer

Table 2: Cultural Resources In Project Area and One-Mile Buffer in the SHAARD Database						
Site Number	**Author**	**Date**	**NRHP Status**	**IHHSI Status**	**Site Type**	**Project or Buffer**
Su-0030	C. Tomak	1973	Unevaluated	N/A	Burial (Historic)	Buffer
Su-0031	C. Tomak	1973	Unevaluated	N/A	Camp (Prehistoric)	Buffer
Su-0032	C. Tomak	1973	Unevaluated	N/A	Camp (Prehistoric)	Buffer
Su-0033	C. Tomak	1973	Unevaluated	N/A	Camp (Prehistoric)	Buffer
Su-0034	C. Tomak	1973	Unevaluated	N/A	Camp (Prehistoric)	Buffer
Su-0035	C. Tomak	1973	Unevaluated	N/A	Camp (Prehistoric)	Buffer
Su-0036	C. Tomak	1973	Unevaluated	N/A	Camp (Prehistoric)	Buffer
Su-0037	C. Tomak	1973	Unevaluated	N/A	Camp (Prehistoric)	Buffer
Su-0039	C. Tomak	1973	Unevaluated	N/A	Cache (Prehistoric)	Buffer
Su-0040	C. Tomak	1973	Unevaluated	N/A	Camp (Prehistoric)	Buffer
Su-0041	C. Tomak	1973	Unevaluated	N/A	Camp (Prehistoric)	Buffer
Su-0043	C. Tomak	1973	Unevaluated	N/A	Camp (Prehistoric)	Buffer
Su-0044	C. Tomak	1973	Unevaluated	N/A	Camp (Prehistoric)	Buffer
Su-0045	C. Tomak	1973	Unevaluated	N/A	Camp (Prehistoric)	Buffer
Su-0046	C. Tomak	1973	Unevaluated	N/A	Camp (Prehistoric)	Buffer
Su-0047	C. Tomak	1973	Unevaluated	N/A	Camp (Prehistoric)	Buffer
Su-0048	C. Tomak	1973	Unevaluated	N/A	Camp (Prehistoric)	Buffer
Su-0049	C. Tomak	1973	Unevaluated	N/A	Camp (Prehistoric)	Buffer
Su-0050	C. Tomak	1973	Unevaluated	N/A	Camp (Prehistoric)	Buffer
Su-0051	C. Tomak	1973	Unevaluated	N/A	Camp (Prehistoric)	Buffer
Su-0052	C. Tomak	1973	Unevaluated	N/A	Camp (Prehistoric)	Buffer
Su-0053	C. Tomak	1973	Unevaluated	N/A	Camp (Prehistoric)	Buffer
Su-0054	C. Tomak	1973	Unevaluated	N/A	Camp (Prehistoric)	Buffer
Su-0056	Gary Apfelstadt	1973	Unevaluated	N/A	Camp (Prehistoric)	Buffer
Su-0063	Gary Apfelstadt	1973	Unevaluated	N/A	Camp (Prehistoric)	Buffer
Su-0066	Gary Apfelstadt	1973	Unevaluated	N/A	Camp (Prehistoric)	Buffer
Su-0068	N/A	N/A	Unevaluated	N/A	Camp	Buffer
Su-0195	Colleen Kinnaman	1973	Unevaluated	N/A	Camp (Prehistoric)	Buffer
Su-0198	Colleen Kinnaman	1973	Unevaluated	N/A	Camp (Prehistoric)	Buffer
Su-0199	Colleen Kinnaman	1973	Unevaluated	N/A	Camp (Prehistoric)	Buffer
Su-0200	Colleen Kinnaman	1973	Unevaluated	N/A	Camp (Prehistoric)	Buffer

Table 2: Cultural Resources In Project Area and One-Mile Buffer in the SHAARD Database						
Site Number	**Author**	**Date**	**NRHP Status**	**IHHSI Status**	**Site Type**	**Project or Buffer**
Su-0201	Colleen Kinnaman	1973	Unevaluated	N/A	Camp (Prehistoric)	Buffer
Su-0202	Colleen Kinnaman	1973	Unevaluated	N/A	Camp (Prehistoric)	Buffer
Su-0203	Colleen Kinnaman	1973	Unevaluated	N/A	Camp (Prehistoric)	Buffer
Su-0206	Colleen Kinnaman	1973	Unevaluated	N/A	Camp (Prehistoric)	Buffer
Su-0208	Colleen Kinnaman	N/A	Unevaluated	N/A	Camp (Prehistoric)	Buffer
Su-0209	Colleen Kinnaman	N/A	Unevaluated	N/A	Cemetery	Buffer
Su-0210	Colleen Kinnaman	N/A	Unevaluated	N/A	Camp (Prehistoric)	Buffer
Su-0211	Colleen Kinnaman	N/A	Unevaluated	N/A	Camp (Prehistoric)	Buffer
Su-0212	Colleen Kinnaman	N/A	Unevaluated	N/A	Camp (Prehistoric)	Buffer
Su-0728	Rick Wappenstein	1999	Ineligible	N/A	Historic Scatter	Buffer
Su-0986	John McGregor	1984	Unevaluated	N/A	Blacksmith Shop	Buffer
Su-0987	John McGregor	1984	Unevaluated	N/A	Mill	Buffer
Su-0988	John McGregor	1984	Unevaluated	N/A	Blacksmith Shop	Buffer
Su-0989	John McGregor	1984	Unevaluated	N/A	Mill	Buffer
Su-0990	John McGregor	1984	Unevaluated	N/A	Tannery	Buffer
Su-1136	John McGregor	1984	Unevaluated	N/A	Food Processing (Historic)	Buffer
Vg-1846	John McGregor	1984	N/A	N/A	Mill	Buffer
Vi-0024	Vernon Helmen	1949	N/A	N/A	Camp (Prehistoric)	Buffer
Vi-0128	Gary Apfelstadt	1973	N/A	N/A	Camp (Prehistoric)	Buffer
Vi-0136	Gary Apfelstadt	1973	N/A	N/A	Camp (Prehistoric)	Buffer

Table 2: Cultural Resources In Project Area and One-Mile Buffer in the SHAARD Database						
Site Number	**Author**	**Date**	**NRHP Status**	**IHHSI Status**	**Site Type**	**Project or Buffer**
Vi-0418	Dan Thiel, Mike Benson	1983	N/A	N/A	Camp (Prehistoric)	Buffer
Vi-0419	Dan Thiel, Mike Benson	1983	N/A	N/A	Camp (Prehistoric)	Buffer
Vi-0420	Dan Thiel, Mike Benson	1983	N/A	N/A	Camp (Prehistoric)	Buffer
Vi-0421	Dan Thiel, Mike Benson	1983	N/A	N/A	Camp (Prehistoric)	Buffer
Vi-0422	Dan Thiel, Mike Benson	1983	N/A	N/A	Camp (Prehistoric)	Buffer
Vi-0423	Dan Thiel, Mike Benson	1983	N/A	N/A	Camp (Prehistoric)	Buffer
Vi-0424	Dan Thiel, Mike Benson	1983	N/A	N/A	Camp (Prehistoric)	Buffer
Vi-0425	Dan Thiel, Mike Benson	1983	N/A	N/A	Camp (Prehistoric)	Buffer
Vi-0426	Dan Thiel, Mike Benson	1983	N/A	N/A	Camp (Prehistoric)	Buffer
Vi-0427	Dan Thiel, Mike Benson	1983	N/A	N/A	Camp (Prehistoric)	Buffer
Vi-0428	Dan Thiel, Mike Benson	1983	N/A	N/A	Hunting Camp (Prehistoric)	Buffer
Vi-0429	Dan Thiel, Mike Benson	1983	N/A	N/A	Camp (Prehistoric)	Buffer
Vi-0430	Dan Thiel, Mike Benson	1983	N/A	N/A	Camp (Prehistoric)	Buffer
Vi-0786	Rick Wappenstein	1999	Ineligible	Ineligible	Historic Scatter	Buffer
Vi-0787	Rick Wappenstein	1999	Ineligible	Ineligible	Historic Scatter	Buffer
Vi-0788	Rick Wappenstein	1999	Ineligible	Ineligible	Isolated Find (Prehistoric)	Buffer
Vi-0789	Rick Wappenstein	1999	Ineligible	Ineligible	Historic Scatter	Buffer
Vi-0800	Rick Wappenstein	1999	Ineligible	N/A	Polygon	Buffer
Vi-0853	Colleen Kinnaman Wells	2001	Indeterminate	Indeterminate	Farmstead	Buffer
Vi-1789	J. R. McGregor	1984	N/A	N/A	Mill (Destroyed)	Buffer

Table 2: Cultural Resources In Project Area and One-Mile Buffer in the SHAARD Database						
Site Number	**Author**	**Date**	**NRHP Status**	**IHHSI Status**	**Site Type**	**Project or Buffer**
Vi-1792	J. R. McGregor	1984	Unevaluated	N/A	Food Processing (Historic)	Buffer
Vi-1795	J. R. McGregor	1984	N/A	N/A	Blacksmith Shop (Destroyed)	Buffer
Vi-1796	J. R. McGregor	1984	N/A	N/A	Food Processing (Destroyed)	Buffer
Vi-1798	J. R. McGregor	1984	Unevaluated	N/A	Food Processing (Historic)	Buffer
Vi-1799	J. R. McGregor	1984	Unevaluated	N/A	Manufacturing Facility	Buffer
Vi-1800	J. R. McGregor	1984	Unevaluated	N/A	Archaeology (Saw Mill)	Buffer

Additional resources were inspected that include Bureau of Land Office (BLM) General Land Office (GLO) data, and historic aerial photographs of the Project from the Indiana Geological and Water Survey (IGWS) website through Indiana University, Bloomington. The BLM GLO data shows that numerous land patents have been issued historically in Township 9 North, Range 9 West, and Township 9 North, Range 10 West, with dates representing pulses of settlement between 1818 and 1854. Common family surnames include Annis, Debaun, Dicks, Dilley, Drake, Earnest, Frakes, Gordon, Gross, Harris, Hunt, Johnston, Lee, Liston, Mattix, Patton, Perry, Piety, Pogue, Ransford, Reynerson, Thompson, Trueblood, Weir, and Yeager. Patents can imply archaeological resources from this time era may be present within the Project boundaries. The GLO data will be of use corroborating any potential historic archaeological sites to possible ownership. No survey plats are present from the GLO data for the Project.

The IGWS aerial data shows that numerous historic farmsteads and related agrarian infrastructure is present throughout the Project with image dates of 1937, 1949, 1954, 1958, 1966, and 1974. As detail is grainy in these early images, these data will be most useful to identify tentative dates for historic sites encountered in the Project. The BLM and IGWS databases principally indicate the potential for unrecorded historic archaeological and architectural resources in the Project (e.g., farmsteads). In addition, the Project has potential for additional prehistoric cultural resources based on its upland setting relative to significant tributaries of the Wabash River. The results of this literature demonstrate the high concentration of previously recorded prehistoric resources in the western portions of the Project. Westwood recommends avoiding these areas while designing the Project. The client has confirmed they are avoiding these locations.

If the current Project is deemed a federal undertaking (requires a federal permit, license, or approval; is located on federally owned or managed land; or receives federal financial assistance), the scope of required cultural resource investigations will be determined by the functioning lead federal agency in cooperation with SHPO and pertinent Tribal Historic Preservation Offices (THPO) as defined in

Section 106 of the National Historic Preservation Act (NHPA) of 1966 (as amended), and additional investigation would be required.

Sincerely,

WESTWOOD PROFESSIONAL SERVICES

Rigden Glaab

Rigden A. Glaab, M.A., RPA
PRINCIPAL INVESTIGATOR
WESTWOOD PROFESSIONAL SERVICES, INC.

ATTACHMENT HP-3

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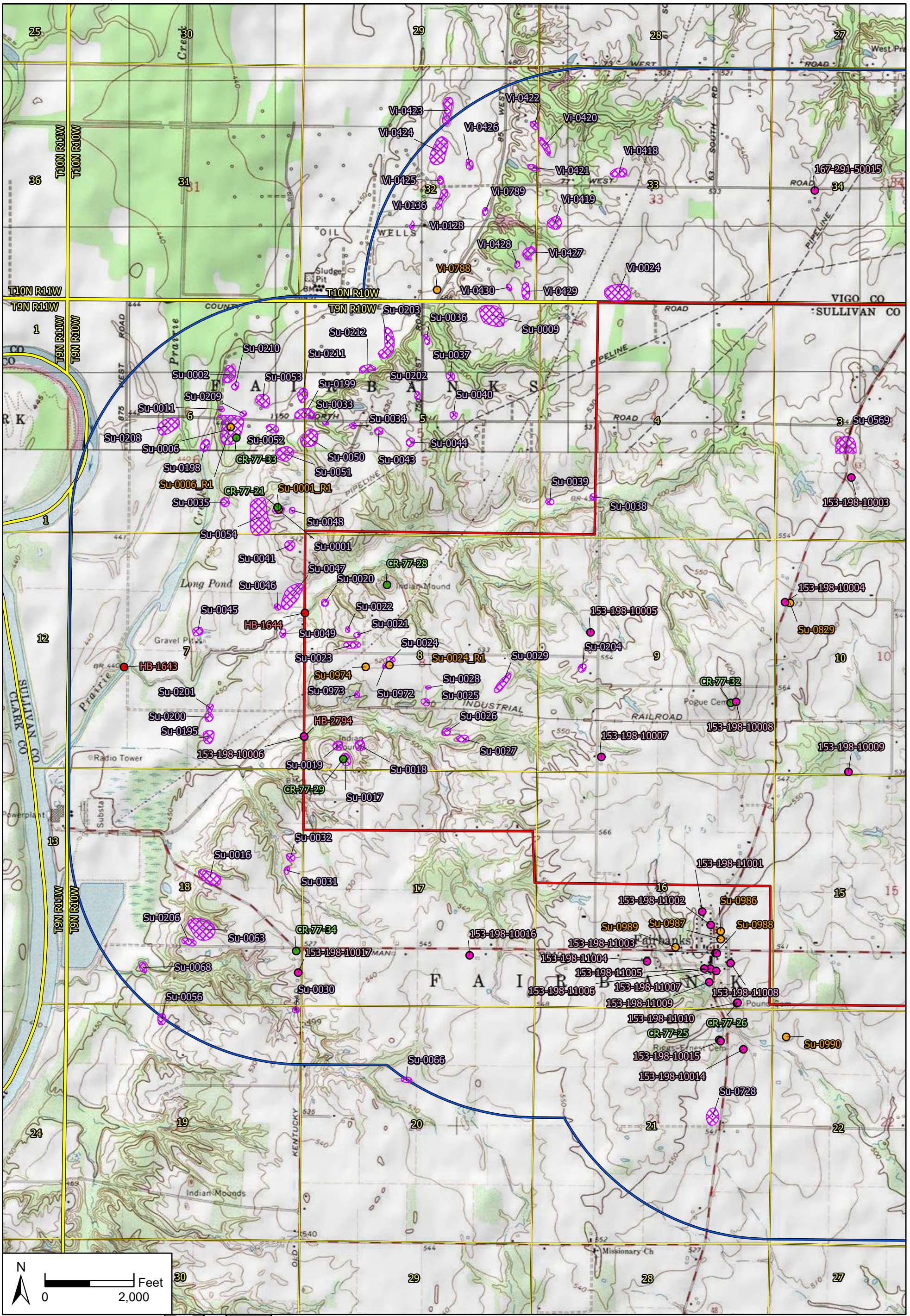

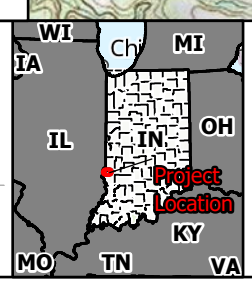

Data Source(s): Westwood (2021); IN DNR SHAARD (2020); Esri USGS Topo Basemap (Accessed 2021).

Westwood

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Westwood Professional Services, Inc.

Legend

- Archaeology Point
- Bridge
- Cemetery
- IHSSI
- Archaeology Area
- Project Area Boundary
- 1 Mile Buffer
- Township Boundary
- Section Boundary

Trade Post Solar Energy Center

Sullivan and Vigo Counties, Indiana

Archaeology and Structures

SHEET 001/003

ATTACHMENT HP-3

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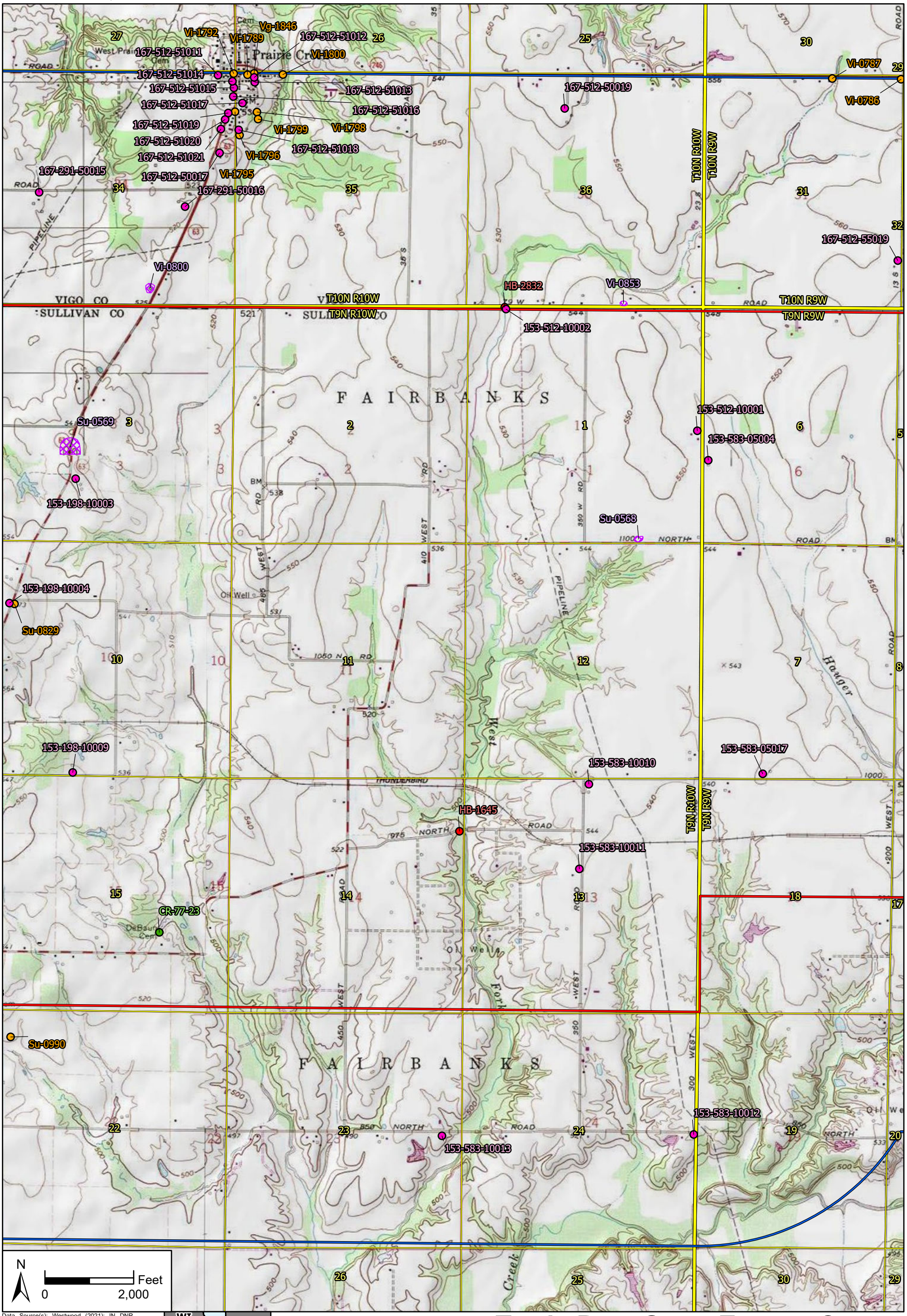

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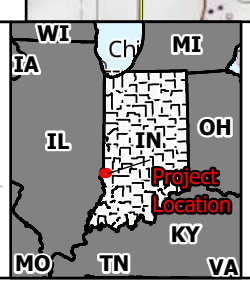

Legend

- Archaeology Point
- Bridge
- Cemetery
- IHSSI
- Archaeology Area
- Project Area Boundary
- 1 Mile Buffer
- Township Boundary
- Section Boundary

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Westwood Professional Services, Inc.

Trade Post Solar Energy Center

Sullivan and Vigo Counties, Indiana

Archaeology and Structures

SHEET 002/003

ATTACHMENT HP-3

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HB-2831
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T9N R9W
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SULLIVAN CO
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CURRY
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153-583-05012
153-583-05016
153-583-05014
HB-2795
Thunderbird Pond
SPILLWAY ELEV 499
CURRY
THUNDERBIRD

N
0
Feet
2,000

Data Source(s): Westwood (2021); IN DNR SHAARD (2020); Esri USGS Topo Basemap (Accessed 2021).

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WI MI IA IL IN OH KY MO TN VA Project Location

Legend

- Archaeology Point
- Bridge
- Cemetery
- IHSSI
- Archaeology Area
- Project Area Boundary
- 1 Mile Buffer
- Township Boundary
- Section Boundary

Trade Post Solar Energy Center

Sullivan and Vigo Counties, Indiana

Archaeology and Structures

SHEET 003/003

Westwood

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February 5, 2021

Ms. Hannah Pawelczyk
Trade Post Solar LLC
One South Wacker Drive, Suite 1800
Chicago, Illinois 60606

Re: Phase I Environmental Site Assessment for the Proposed Trade Post Solar Project
Sullivan County, Indiana
Project No. R0026264.01

Dear Ms. Pawelczyk,

Westwood Professional Services (Westwood) completed a Phase I Environmental Site Assessment (Phase I ESA) in conformance with the scope and limitations of ASTM Practice E2247-16. Any exceptions to or deletions from this practice are described in the report below. The Project Area is located in Sullivan County, Indiana and encompasses approximately 12,500 acres, of which currently ~2,785 acres are considered "participating" under long-term solar leases. It was reported that only approximately 1,500 acres will be actually used to host solar facilities within the total Site boundary.

This assessment has revealed no ASTM Recognized Environmental Conditions (RECs), no Controlled Recognized Environmental Conditions (CRECs) and no Historical Recognized Environmental Conditions (HRECs) in connection with the Subject Property.

If you have any questions or wish to discuss any particular aspect of the project, please feel free to call me at 952.697.5763. We look forward to being of continued service to you.

Sincerely,

Westwood Professional Services

Andy Brummer
Environmental Due Diligence Lead

ATTACHMENT HP-4

Proposed Trade Post Solar Project

PHASE I ENVIRONMENTAL SITE ASSESSMENT

Sullivan County, Indiana

February 5, 2021

PREPARED BY:

Westwood

PREPARED FOR:

Trade Post Solar LLC

Westwood

Phase I Environmental Site Assessment

Proposed Trade Post Solar Project
Sullivan County, Indiana

Prepared for:

Trade Post Solar LLC

One South Wacker Drive, Suite 1800

Chicago,Illinois 60606

(312) 429-2565

Prepared by:

Westwood Professional Services

12701 Whitewater Drive, Suite 300

Minnetonka, Minnesota 55343

(952) 937-5150

Project Number: R0026264.01
Date: February 5, 2021

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TABLE OF APPENDICES

1.0 EXECUTIVE SUMMARY

Westwood Professional Services (Westwood) conducted a Phase I Environmental Site Assessment (Phase I ESA) for Trade Post Solar LLC (User) in support of the leasing of approximately 2,785-acres of land in Sullivan County, Indiana (Exhibit 1). It is our understanding that the Site encompasses approximately 12,500 acres, of which currently ~2,785 acres are considered "participating" under long-term solar leases. It was reported that only approximately 1,500 acres will be actually used to host solar facilities within the total Site boundary. This Phase I ESA conforms to the scope and limitations of American Society for Testing and Materials (ASTM) Standard E2247-16 and 40 CFR § 312 Subp. C., All Appropriate Inquiries (AAI) Standards and Practices.

This assessment has revealed no ASTM Recognized Environmental Conditions (RECs), no Controlled Recognized Environmental Conditions (CRECs) and no Historical Recognized Environmental Conditions (HRECs) in connection with the Project Area.

2.0 INTRODUCTION

Westwood's scope of work for the Phase I Environmental Site Assessment (ESA) is based on the American Society for Testing and Materials (ASTM) Practice E2247-16: "Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process for Forestland or Rural Property." The purpose of this standard practice is to provide an alternative method to ASTM E1527 for good commercial and customary practice in the United State of America for conducting a Phase I ESA of forestland or rural property with respect to the range of contaminants within the scope of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and petroleum products. As such, the E2247-16 standard is intended to permit a user to satisfy one of the requirements to qualify for the innocent landowner, contiguous property owner, or bona fide prospective purchaser limitations to CERCLA liability. This most recent standard is designed to meet the criteria mandated by Congress for "all appropriate inquiry" as to the environmental condition of a property.

In defining a standard of good commercial and customary practice for conducting an environmental site assessment of a parcel of property, the goal of the ASTM practice is to identify recognized environmental conditions. The term *recognized environmental conditions* means the presence or likely presence of any hazardous substances or petroleum products in, on, or at a property; 1) due to a release to the environment; 2) under conditions indicative of a release to the environment; or 3) under conditions that pose a material threat of a future release to the environment. The term is not intended to include *de minimis conditions* that generally do not present a material risk of harm to public health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate government agencies. As defined in the standard, the term CREC means a recognized environmental condition resulting from a past release of hazardous substances or petroleum

products that has been addressed to the satisfaction of the applicable regulatory authority, with hazardous substances or petroleum products allowed to remain in place subject to the implementation of required controls. HRECs are those that were or would have been considered to be RECs in the past, but because of additional information or a change in conditions, may no longer be considered a REC.

2.1 Purpose

This Phase I ESA was conducted in association with the development of the proposed Trade Post Solar project area. For the purpose of this Phase I ESA, the terms "Project Area, Site, and Subject Property" refer to the aggregate of 49 parcels of land, totaling approximately 2,785-acres leased for solar energy and associated transmission infrastructure development. Although entire parcels of land are leased as part of the Project, the installation of Project infrastructure will only occur within designated construction areas.

Westwood performed the Phase I ESA in general accordance with ASTM Practice E2247-16 to determine if the Project Area is known to contain an existing release, past release, or a material threat of a release of hazardous substances or petroleum products into structures or into the ground, groundwater, or surface water. The Phase I ESA process does not include sampling, which may verify or evaluate the extent of suspected environmental impacts.

2.2 Scope of Services

The User authorized Westwood Professional Services, Inc. to conduct a Phase I ESA, which was performed in general accordance with Westwood Professional Services proposal, and considered the following:

Records Review – Westwood obtained and reviewed available records to identify RECs in connection with the Subject Property. Availability of records information varies from information source to information source, including government jurisdictions. The ASTM standard identifies record information from standard sources and the User. The environmental professional is required to review only record information that is reasonably ascertainable or practically reviewable. Westwood was able to review Subject Property historical operations back to 1937.

Site Reconnaissance – Westwood performed a site reconnaissance to visually observe RECs in connection with the Project Area during one or more site visit(s). Westwood observed structures on the Project Area to the extent that the view of such structures was not obstructed by water bodies, adjacent buildings, or other obstacles. If applicable, limitations are noted within the Phase I ESA report.

If applicable, the Subject Property, and structure exteriors, were visually observed. The interior of structures located on the Subject Property, including accessible common areas, were observed to the extent that such interiors were readily viewed through existing open doors.

Interviews – Westwood conducted interviews to obtain information indicating RECs in connection with the Subject Property. Westwood interviewed available past and present owners, operators, and occupants of the Subject Property. In cases where the Subject Property were not occupied, attempts were made to contact the landowners, property managers, or adjacent property owners. Westwood conducted interviews with state and/or local government officials, as applicable. Westwood requested that the User of this Phase I ESA complete a questionnaire

regarding the history and environmental conditions of the Subject Property. At the discretion of the environmental professional, Westwood conducted interviews by telephone, in person, or in writing.

Report – Westwood prepared this Phase I ESA report to generally follow the recommended report format of ASTM Practice E2247-16. This Phase I ESA report includes a scope of services, findings, opinions, and conclusions, which are supported by documentation collected during the assessment.

2.3 Significant Assumptions

Landowner contact information, boundaries of Subject Property, and information pertaining to leased lands associated with the Project were provided to Westwood by the User. Westwood assumes that all information supplied by interviewed landowners and government officials is true and accurate, to the best of their knowledge, at the time of this assessment. Westwood assumed the boundaries of the Project Area are relatively accurate based information supplied by the User. The identification of geologic or geotechnical hazards was beyond the scope of this agreement.

2.4 User Reliance

Westwood's findings and opinions are exclusively for the use of the User and its assignees. Westwood will not distribute or publish the Phase I ESA Report without the consent of the User, except as required by law or court order. The User, Trade Post Solar LLC, engaged Westwood to perform the Phase I ESA and no other party may rely on the Phase I ESA report without Westwood's written consent. The findings and opinions contained herein are limited to use by the User. Westwood's services for this project have been performed in a manner consistent with normal standards of the profession. No other warranty or guarantee, expressed or implied, is made.

3.0 PROJECT AREA DESCRIPTION

Mapped locations of the Site can be found in the Exhibits 1, 2 and 3.

Project Description

Project Name	Trade Post Solar Sullivan County, Indiana
Project Acreage	Approximately 2,785
Number of Parcels	Approximately 49 parcels
Site Access	Site access to the Project Area was generally provided by Indiana State Highway 63 and North County Road 300 West.
Site Soils	Based on the United Stated Department of Agriculture (USDA) Web Soil Survey, the Property Area is generally underlain by silt loam. Locally, geologic conditions consist of shale, sandstone, and mudstone.
Site Elevation	Approximately 500 -600 above mean sea level (amsl)
Site Topography	Relatively flat
Site Groundwater Flow	The general surficial groundwater flow direction in the vicinity of the Subject Property is expected to be to the west/southwest, towards the Wabash River. However, the local direction of groundwater flow may be affected by nearby streams, lakes, wells, and/or wetlands and may vary seasonally.
Current Use of Subject Property	Agricultural
Current Use of Adjacent Properties	Agricultural

3.1 Structures, Roads, and Improvements

Occupied and unoccupied building sites were scattered throughout the Project Area, as shown on Exhibit 3 and summarized below. Access to most building sites was via gravel and paved roads that bisect the Project Area. Major paved roads in the Project Area include Indiana State Highway 63 and North County Road 300 West. Gravel roads, minimum maintenance, and/or unimproved country roads were scattered through the site.

A total of 49 parcels were identified within the Project Area. A total of 13 building sites were identified within the Project Area by aerial photography and onsite field reconnaissance. Descriptions and locations of building sites located within the Project Area are provided in the table below.

Table 3.5-1: Building Sites Located within the Project Area

Parcel ID	Site ID	Latitude	Longitude	Notes/Description
P06	S01	39.2427	-87.515871	6 outbuildings, 3 grain bins, 1 dwelling
P11	S02	39.238352	-87.517707	4 outbuildings, 1 grain bin
P01	S03	39.220631	-87.485253	Oil well and pumpjack, active
P01	S04	39.220045	-87.483156	Oil well and pumpjack, active
P01	S05	39.220059	-87.480318	Oil well and pumpjack, active
P01	S06	39.219078	-87.483007	3 outbuildings and one inactive pumpjack
P25	S07	39.240341	-87.48539	3 grain bins
P31	S08	39.244009	-87.471576	3 outbuildings, 1 dwelling
P31	S09	39.244422	-87.469959	2 grain bins
P35	S10	39.249475	-87.469902	2 outbuildings
P44	S11	39.236637	-87.445666	1 dwelling, 1 outbuilding
P47	S12	39.237315	-87.444619	3 outbuildings, 1 grain bin
P49	S13	39.245145	-87.436694	3 grain bins

4.0 INFORMATION PROVIDED BY THE USER

Information provided by the User in regards to the Project Area is provided in the table below.

See Appendix A for a copy of the completed User Questionnaire.

Information Provided by the User

Title Records	No title information was provided by the User
Environmental Liens and Activity and Use Limitations	Information provided by the User indicates that to the User's knowledge, there are no known environmental liens or activity and use limitations associated with the Subject Properties.
Specialized Knowledge or Experience	The User communicated that they were unaware of any specialized knowledge or experience related to the Site or adjoining properties.

Information Provided by the User

Valuation Reduction for Environmental Issues	The User was not aware of any reduction in the value of the Subject Properties due to past or present environmental issues.
Commonly Known or Reasonably Ascertainable Information	The User communicated that they were unaware of commonly known or reasonably ascertainable information besides the information provided.
Degree of Obviousness	The User communicated that they are unaware of obvious indicators that point to the presence or likely presence of releases on the Site.
Subject Property Location Information	A kmz file depicting the Project Area boundaries was provided by the User.

5.0 RECORDS REVIEW

5.1 Sources of Environmental Records

EDR - Environmental Data Resources, Inc. (EDR) provided regulatory record sources listed in Section 8.2.1 of the ASTM Standard. The EDR report is included in Appendix B. A search of the ASTM minimum search distances was completed by EDR and applicable records were provided. EDR also provided Westwood with certain supplemental environmental database records that surpass the ASTM minimum standards. Any facilities identified by Westwood within the immediate vicinity of the Subject Property are discussed in the appropriate database section. The ASTM prescribed search radius for each database searched for records by EDR, the number of listings located on each database searched, and their appropriate locations with respect to the Subject Property, are summarized below. The listings are located as shown in the EDR report. Refer to the EDR report for a detailed description of each database that is searched in their evaluation, and the date of the last revision for each source searched by EDR.

5.1.1 Project Area

The Site is listed on the following federal and/or state databases in the EDR report:

- The Daryl A Drake property, located at 3591 West County Road 100 North, is listed on the Office of Indiana State Chemist Database (OISC). Government records indicate that the listing relates to a private applicator permit obtained by Daryl Drake. The permit allows for the application of pesticides or manure to property they own, rent, or otherwise control, for the purpose of producing an agricultural commodity.

The EDR report identified other listings located within the Project Boundary, but not within participating parcels. Regulatory listings noted adjoining the participating parcels are further explained in Section 5.1.2 below.

5.1.2 Adjoining Properties

The following listings were noted adjoining participating parcels and located within the project boundary:

The northeast adjoining property, Larry G Hunt, located at 11633 Indiana 63, was identified on the OISC database. Government records indicate that the listing is in regards to a private applicator permit obtained by Larry Hunt. According to the database, Mr. Hunt's license expires at the end of the year in 2025. Violations of the private applicator permit were not identified.

The south adjoining property, Joseph Noah Kincaid, located at 11248 North County Road 425, was identified on the OISC database. Government records indicate that the listing is in regards to a private applicator permit obtained by Joseph Kincaid. According to the report, Mr. Kincaid's license expires at the end of the year in 2021. Violations of the private applicator permit were not identified.

The west adjoining property, American Electric Power, located at 10777 North County Road 675 West, was identified on the Facility Index System / Facility Registry System (FINDS) database. Government records suggest that the site is of environmental interest to the State of Indiana. No other useful information was provided on this listing.

The south and east adjoining property, Farmserburg, IN 370 Satellite, located at 10254 Indiana 63, was identified on the Risk Management Plans (RMP), Tier 2 Facility Listing (TIER 2), and FINDS database. Government records indicate that the site previously stored ammonia, acetochlor, ethanol, kerosene, potassium salt, fuel oil #2, glyphosate acid, Guardsman Max, atrazine, and paraquat dichloride. Records indicate the site had risk management plans in place in the event of a spill or release of toxic material. Listings that indicated a spill or release of chemicals were not identified.

5.1.3 Surrounding Areas

Westwood reviewed the EDR report for facilities located beyond adjoining participating properties that may indicate a release or likely release of hazardous substances and/or petroleum products that may impact participating parcels. Based on factors that include regulatory status, distance from the Project Area, and/or location relative to the regional groundwater flow direction, no facilities are identified in the EDR report that warrant further consideration as potential recognized environmental conditions.

5.1.4 Orphan Sites

Orphan or unmappable Sites were identified within the EDR database. Based on factors that include regulatory status, distance from the Project Area, and/or location relative to the regional groundwater flow direction, no facilities are identified in the EDR report that warrant further consideration as potential recognized environmental conditions.

5.2 Additional Records Reviewed

Additionally, the Indiana Department of Environmental Management Online Map – online database was researched to identify any potential environmentally sensitive operations located at and/or within the vicinity of the Project Area that have not already been identified within the regulatory database report. The interactive map contains information about the following types of sites: Superfund sites, Brownfields/Voluntary Cleanup Program sites, Brownfield Assessments, and Petroleum and Hazardous Substance Storage Tank Facilities. Based on factors that include regulatory status, distance from the Project Area, and/or location relative to the regional groundwater flow direction, further regulatory file review was deemed unwarranted.

5.3 Historical Use Information for the Project Area

Historical resources and years reviewed are provided below. Westwood obtained historical aerial photographs associated with the Project Area from EDR. These aerial photographs are included in Appendix C.

Historical Resources Reviewed

Resource	2010's	2000's	1990's	1980's	1970's	1960's	1950's	1940's	1930's	1920's
Aerial Photographs	✔	✔	✔	✔	✔	✔	✔		✔	
Historic Topo Maps				✔	✔	✔	✔	✔		

5.3.1 Aerial Photographs

Westwood obtained historical aerial photographs associated with the Project Area from EDR. Based on landowner interviews and the aerial photography, the land use within the Project Area has been largely agricultural and used primarily for farming since at least the early-1900's. The earliest available photographs (1937) depicted the Project Area developed with cultivated agricultural land and farmsteads. In addition, numerous improved and unimproved roadways are depicted throughout the Project Area. In general, the Project Area has slowly progressed through the years with new farmsteads and associated buildings. No large industrial or commercial

developments occurred within the Subject Property boundary throughout the years reviewed. Due to the scale of the aerial photographs, it is hard to discern certain features at the Subject Properties.

5.3.2 Topographic Maps

Historical United States Geological Survey (USGS) Topographic mapping was reviewed online for the Subject Property through the USGS Historical Topographic Map Explorer website. Maps reviewed included the Shelburn, Hutsonville, Fairbanks, Terre Haute, and Indianapolis topographic maps for the years 1942, 1952, 1953, 1957, 1962, 1963, 1966, 1977, 1980, and 1986. The topographic maps reviewed were generally consistent with the above discussed aerial photographs.

5.4 Historical Use Information for Adjoining Properties

Westwood utilized historical aerial photographs, topographic maps, and personal interviews of landowners to determine the past use of the adjoining properties. These sources of information did not identify environmental conditions on adjoining properties that affect the potential for environmental risk related to the Project Area.

5.5 Previous Environmental Assessments

Westwood was not provided with any previous environmental assessments as part of this Phase I ESA.

6.0 SITE RECONNAISSANCE

On January 12, 2021, an environmental scientist from Westwood conducted the site reconnaissance of all the participating parcels within the Project Area. The site visit included review of the elements listed in Section 9 of the ASTM Standard. The objective of the site reconnaissance was to obtain information indicating the likelihood of identifying a REC in connection with the Subject Property. The following observations were visually observed and recorded during the site visit. Site photographs from the site reconnaissance are included in Appendix D. Westwood was unaccompanied during the Site reconnaissance.

6.1 Methods and Limiting Conditions

Westwood reviewed publicly available aerial photography prior to conducting the reconnaissance of the Project Area to identify areas of concern. A ground reconnaissance was then conducted by vehicle and by foot. Public and private roadways were driven within the Project Area to examine the building sites, property exteriors, and other features within the Project Area.

6.2 General Description of Structures

The Project Area primarily consists of agricultural land utilized for row crop production with rural farmsteads interspersed throughout (See Exhibits 1,2 and 3). A total of 13 current building sites were identified within the Project Area based on aerial photography, site reconnaissance, and landowner interviews. Additional structures ancillary to agricultural farming were also observed. Unoccupied buildings observed within the Project Area consisted of either abandoned farmsteads, livestock shelters, or outbuildings.

Active farmsteads were generally serviced by private domestic water wells and private on-site septic systems. Most farmsteads within the Project Area were heated with liquid propane (LP) fired-furnaces utilizing on-site aboveground storage tanks (ASTs). Overhead electrical transmission lines were observed throughout the Subject Property running along roads with large distribution lines running through some agricultural fields. Four pumpjacks were located on one participating parcel, with the petroleum product from the pumpjacks being stored on an adjoining parcel. Three of the pumpjacks appeared active, but only two were pumping at the time of the Site reconnaissance.

6.3 Potable Water Supply

No public or rural water system was noted within the Project Area and water was supplied to the Project Area by private water wells, which were observed within the Project Area. Some of the farmsteads make use of one or more private water wells for watering cattle or irrigation. Information regarding water wells on leased lands was requested from landowners during landowner interviews.

6.4 Sewage Disposal System

No municipal or shared sewage disposal systems occupied the Project Area and each residence uses its own private on-site septic system for sewage disposal.

6.5 Hazardous Substances and Petroleum Products

During the site reconnaissance, Westwood observed evidence of hazardous substances and/ or petroleum products within the Project Area. General housekeeping and farm maintenance supplies consisting of petroleum-based products and cleaners were generally observed. These substances were stored within containers of various sizing including, retail size, 55-gallon drums, totes, and ASTs. The containers appeared to be in relatively good condition and no evidence of significant staining or spills were observed on the ground within the immediate vicinity of these containers. Most chemical containers were noted within buildings or located immediately outside.

One natural gas pipeline was identified as crossing through participating parcels. The pipeline is buried underground and was not observed at the time of the reconnaissance. See Exhibit 2 and 3 for the pipeline location.

6.6 Storage Tanks

Most residences within the Project Area were heated with LP furnaces utilizing on-site privately-owned ASTs. Due to the gaseous contents of the propane tanks at atmospheric pressure, Westwood does not consider the use of privately owned propane tanks as a REC to the Subject Property. ASTs containing petroleum products were observed at several of the farmsteads located within the Project Area and near oil pumpjacks. These ASTs were generally used to store fuel utilized in the on-site agricultural equipment or as storage for the extracted oil. All active petroleum ASTs were observed to be in good condition with no apparent signs of major leaking or staining.

No underground storage tanks (USTs) were observed during the site reconnaissance. ASTs observed during the Subject Property reconnaissance are provided in the table below.

Table 6.7-1: Above Ground Storage Tanks

Parcel ID	Building Site ID	Longitude	Latitude	Field Note	REC
P06	S01	-87.5159	39.24262	3 ASTs	No
P01	S05	-87.4805	39.22008	1 old AST	No
P31	S08	-87.4716	39.24408	3 ASTs	No
P47	S12	-87.4445	39.23696	2 ASTs	No

6.7 Odors

A strong petroleum smell was encountered during the site reconnaissance near site ID S05. It was unclear where the odor was originating from but was strongest around the oil pumpjack and associated infrastructure. No petroleum products were observed to have leaked or spilled from any of the equipment. No other odors were noted at the Site.

6.8 Pools of Liquid

Pools of liquid likely to contain hazardous substances or petroleum products were not observed during the site reconnaissance.

6.9 Drums

Westwood observed drums on several of the farmsteads. Many of the drums were abandoned and unmarked, while others appeared to be active. The observed drums were either empty or showed no signs of leaking and were generally in good condition (See Exhibit 3 and Site Photographs in Appendix D). Observed drums are listed in the table below.

Table 6.10-1: Drums

Parcel ID	Building Site ID	Latitude	Longitude	Field Note	REC
P06	S01	39.24271	-87.5159	Drums scattered throughout property	No
P47	S12	39.23694	-87.4446	Drums scattered throughout property	No

6.10 Electrical or Hydraulic Equipment

Numerous pole-mounted electrical transformers were observed on the farmsteads within the Project Area during the site visit. The transformers appeared to be in good condition with no obvious signs of major leakage; however, it is unknown if the transformers contain polychlorinated biphenyls (PCBs). No underground hydraulic equipment was observed within the Project Area during the site visit and no other obvious PCB-containing electrical or hydraulic equipment was noted during the Site visit.

6.11 Exterior Observations

Westwood observed evidence of minor soil staining, storage tanks, and dumping of solid waste debris items that generally included building materials (i.e. primarily scrap lumber and metal, roofing materials, etc.), household appliances, scrap tires, old automobiles, and discarded farm equipment throughout the Project Area. See Appendix D Site Photographs and Exhibit 3 for additional information.

6.11.1 Pits, Ponds, or Lagoons

No pits, ponds, or lagoons of used in connection with waste disposal or waste treatment were observed within the Project Area.

6.11.2 Stained Soil or Pavement

During the site reconnaissance, no evidence of significant chemical and/or petroleum staining was observed on the soil or pavement. Minor staining was generally noted in areas where farm equipment was maintained or where ASTs were located.

6.11.3 Stressed Vegetation

Westwood did not observe any significant areas of stressed vegetation due to chemical spillage or use within the Project Area.

6.11.4 Possible Fill Material or Buried Solid Waste

Westwood observed no areas that appeared to contain buried solid waste and fill soil of unknown origin was generally not observed at the Project Area.

6.11.5 Solid Waste Areas, Burn Barrels, and Burn Pits

Westwood observed discarded waste materials within the Project Area and generally included discarded tires; household trash and appliances; miscellaneous building materials (i.e. scrap metal, asphalt, shingles, concrete debris, and wood); abandoned automobiles and farm equipment. All of the waste material locations were relatively small, localized areas and none were large solid waste dump areas indicative of public use. In general, no evidence of large spills or releases of hazardous or petroleum product were observed. Additionally, one burn barrel and one burn pit was observed at the Subject Property. The burn pit and burn barrel appear to be localized and not utilized as public burn areas. Areas observed with solid waste are listed in Table 6.12.5-1 and areas with burn barrels and burn pits are listed in Table 6.12.5-2 below.

Table 6.12.5-1: Solid Waste Storage Areas

Parcel ID	Building Site ID	Latitude	Longitude	Field Note	REC
P06	S01	39.2427	-87.5159	Farm equipment, metal, old containers, old automobiles	No
P11	S02	39.23844	-87.5175	Metal, old drums, wood, tires	No
P25	S07	39.24047	-87.4851	Old farm equipment	No
P47	S12	39.2369	-87.4444	Metal, tires, farm equipment, wood	No

Table 6.12.5-2: Burn Barrels and Burn Pits

Parcel ID	Building Site ID	Latitude	Longitude	Field Note	REC
P25	S07	39.24036	-87.4853	One burn barrel	No
P47	S12	39.23695	-87.4444	Burn pit	No

No other significant waste stream generation or storage was observed on the Project Area at the time of Westwood's site reconnaissance. Westwood expects that normal household waste is generated by the private residences located within the Project Area.

6.11.6 Wastewater

Westwood observed no evidence of wastewater being discharged into a drain, ditch, underground injection system, or stream on or adjoining the Project Area.

6.11.7 Wells

Westwood observed evidence of oil wells and pumpjacks at the Site during the site reconnaissance. Three oil wells and associated pumpjacks were identified on Parcel P01. Two of the wells were actively pumping while the other one was not pumping and inactive at the time of the reconnaissance. The wells appeared to be transporting the oil through a pipe system to a storage tank located north of the parcel on an adjoining, non-participating parcel. All of the wells appeared to be in good condition and did not show any signs of major leaks or stains. In addition, one inactive pumpjack was noted and did not appear connected to a well.

6.11.8 Septic Systems

Current property owners indicated that private residences and farmsteads within the Project Area were connected to on-site septic systems. No septic systems were inspected during the site reconnaissance. In addition, no cesspools were observed.

6.12 Interior Observations

A number of buildings and/or other improvements were observed throughout the Project Area. Due to the number of properties and the size of the Project Area, Westwood limited the review of building interiors to those buildings with open doors. Interior observations are discussed below.

6.12.1 Heating and Cooling System

Active residences appeared to use liquid propane stored in ASTs for residential heating needs. It is unknown whether residential homes and farmsteads had cooling systems.

6.12.2 Stains or Corrosion

No significant evidence of staining or corrosion was observed on floors, walls, or ceilings at the Subject Property at the time of the site reconnaissance.

6.12.3 Drains and Sumps

No floor drains or sumps were observed at the Subject Property during the site visit.

7.0 INTERVIEWS

7.1 Landowners

Westwood attempted to interview each of the landowner contacts provided by the User. As of February 4, 2021, five of the landowners had responded. Landowners were asked questions pertaining to knowledge of current or historical conditions, environmental events, or situations that present a REC in the areas potentially subject to development. Questionnaire results are summarized in the table below.

Table 7.1-1: Landowner Questionnaire Responses

Landowner	Address	Respondent	Significant Comments
Lee O Sluder Trust	536 Francis Avenue Terre Haute, IN 47850	Lee O. Sluder	No known environmental issues.
Mary Jean Cregg & Sandra Sue Jones	12230 West 525 Columbus, IN 47201	Ron Biesboer	No known environmental issues.
Drake Family Farms	5572 W County Road 1075 Farmersburg, IN 47850	Harley Drake	No known environmental issues.
Daryl A. Drake	3591 W County Road 1100 Farmersburg, IN 47850	Daryl A. Drake	No known environmental issues.
Dixie Lee Means	2928 Gaslight Drive South Daytona, FL 32119	Dixie Means	No known environmental issues.

7.2 Local Government Officials

Westwood contacted Ryan Irish from the Sullivan County Health Department, on February 5, 2021 for the purpose of conducting a records search of past or current environmental concerns associated with the Subject Property. Mr. Irish was unaware of any past or current uses of the property that might be associated with risks of environmental contamination, unaware of any specific hazardous chemicals or materials that are present or once were present at the property, unaware of any chemical, petroleum product, or hazardous material spills or releases at the property (such as oil, gas, diesel, herbicide, pesticide, other farm chemicals, lead-based paint, or asbestos) recently or in the past, unaware of any hazardous substance or petroleum products, tires, automotive batteries, or any other waste materials have been dumped above ground, buried and/or burned on the property or any environmental cleanups that have taken place on the property at the Subject Property.

8.0 LIMITATIONS, DEVIATIONS, AND DATA GAPS

Westwood based the findings and conclusions of this Phase I ESA on the procedures described in ASTM Standard E2247-16, information and observations collected during those procedures, and Westwood's interpretation of that information. The findings of this Phase I ESA are limited to the specific Project Area described in this report, and by the accuracy and completeness of information provided by others.

A Phase I ESA does not entirely eliminate uncertainty regarding the potential for RECs in connection with the Project Area. Performance of ASTM Standard E2247-16 is intended to reduce, but not eliminate, uncertainty regarding the potential for RECs in connection with the Subject Properties within reasonable limits of time and cost. For this Phase I ESA, Westwood applied the degree of care and skill ordinarily exercised under similar conditions by reputable members of the environmental profession in the project's location. No warranty or guarantee, expressed or implied, is made.

Several caveats are inherent in conducting this or any other environmental due diligence examination:

1. It is difficult to predict which, if any, identified potential problems will become actual problems in the future. Federal and state regulations continually change as do the enforcement priorities of the applicable government agencies involved.
2. There is always the possibility that sources of future environmental liability have yet to manifest themselves to the point where they are reasonably identifiable through an external investigation such as the one conducted for this assessment.

3. The results of Westwood's investigation represent the applications of a variety of technical disciplines to material facts and conditions associated with the Subject Property. Many of these facts and conditions are subject to change over time. Therefore, the findings and opinions expressed within this document must be viewed in this context.
4. Westwood is not responsible for conditions or consequences arising from relevant facts that were concealed, withheld, or not fully disclosed.
5. Properties adjoining the Subject Property were only unobtrusively and visually inspected. Westwood cannot be held responsible for identifying conditions on adjoining properties that were not conspicuous at the time of the site inspection.

The following limiting conditions and/or data gaps were encountered:

- Due to the large size of the Project Area, Westwood was unable to view the entire Project Area without limitation. However, Westwood viewed the Project Area from land section borders, corners, and accessible roads. Westwood also made attempts, where possible, to view unusual terrain, soil and/or rock piles, and existing and former building sites.
- The observation of the building interiors was limited to those buildings with open doors. No private residences or agricultural structures were entered or assessed during this investigation. All observations of these areas were made from a distance.
- Observation of the Project Area was limited due to dense vegetation in areas, limiting ground visibility.

The identified limiting condition and data gaps did not affect the environmental professional's ability to render opinions regarding conditions indicative of a release or threatened release

The following information is not contained in the ASTM Standard E2247-16 and is not included in this Phase I ESA report:

- Asbestos Containing Building Materials
- Wetlands
- Industrial Hygiene
- Radon
- Regulatory Compliance
- Health and Safety
- Lead-Based Paint
- Cultural and Historic Resources
- Ecological Resources
- Lead in Drinking Water
- Indoor Air Quality
- Endangered Species
- Biological Agents
- High Voltage Power Lines
- Mold

This Phase I ESA does not include any testing or sampling of materials (e.g., soil, water, air, or building materials).

9.0 FINDINGS

Westwood's findings identify all potential RECs, CRECs and HRECs through information uncovered during site reconnaissance or provided by the User, landowner, government official, EDR report, or other sources. All findings listed in Section 9.0 that require further discussion are elaborated upon in Section 10.0 to either dismiss the finding or label it as a REC (10.1), CREC (10.2), HREC (10.3), *De Minimis* Condition (10.4) or an Additional Consideration (10.5).

Westwood makes the following findings based on this Phase I ESA:

- The government database records review identified regulated facilities within participating parcels and within the vicinity of the Project Area.
- The Project Area has been used for agricultural purposes associated with livestock and row crop production since at least 1937.
- Westwood observed ASTs at the Site. The ASTs generally appeared to be in good condition with no evidence of significant leaks or spillage. No USTs were reported or observed at the Site.
- Four oil wells and associated pumpjacks were identified on parcel P01 of the participating parcels. Two of the pumpjacks were actively pumping while the other two were inactive. The wells and pumpjacks generally appeared to be in good condition with no evidence of significant leaks or spills.
- Westwood observed 55-gallon storage drums throughout the Project Area during the site reconnaissance; however, the drums generally appeared to be empty and/or showed no signs of significant leaks or spillage.
- Solid waste was observed at numerous parcels throughout the Project Area. Solid waste items observed consisted primarily of discarded tires; household trash, appliances and miscellaneous building materials.
- One burn barrel and one burn pit were observed at the Subject Property. The barrel and burn pit areas appeared to be localized and not utilized as public burn areas. In addition, no hazardous materials or chemical containers were observed within these areas.
- Westwood observed evidence of hazardous substances and/or petroleum products within the Project Area during the reconnaissance. At the time of the Site reconnaissance, the substances and petroleum products appeared to be in good condition with no signs of major spills or leaks.

10.0 OPINIONS

According to the User, the Phase I ESA was conducted in association with the development of the Subject Property. Opinions expressed herein are influenced by the stated reason for conducting the Phase I ESA. Furthermore, the expressed opinions might not be applicable to alternate reasons for reliance on the content of the Phase I ESA.

10.1 Recognized Environmental Conditions

The term RECs means the presence or likely presence of any hazardous substances or petroleum products in, on, or at a property: (1) due to any release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment. De minimis conditions are not recognized environmental conditions. The term includes hazardous substances or petroleum products even under conditions in compliance with laws. The term is not intended to include de minimis conditions that generally do not present a material risk of harm to public health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate government agencies.

No RECS were identified in preparation of this Phase I ESA.

10.2 Historical Recognized Environmental Conditions (HRECs)

HRECs are those that were or would have been considered to be RECs in the past, but because of additional information or a change in conditions, may no longer be considered a REC.

No HRECS were identified in preparation of this Phase I ESA.

10.3 Controlled Recognized Environmental Conditions (CRECs)

A controlled recognized environmental condition is defined by ASTM Practice E2247-16 as “a recognized environmental condition resulting from a past release of hazardous substances or petroleum products that has been addressed to the satisfaction of the applicable regulatory authority, with hazardous substances or petroleum products allowed to remain in place subject to the implementation of required controls.”

No CRECS were identified in preparation of this Phase I ESA.

10.4 De Minimis Conditions

A de minimis condition is one that generally does not pose a threat to human health or the environment and that would generally not trigger an enforcement action if brought to the attention of an applicable regulatory agency. Conditions determined to be de minimis are not RECs. No de minimus conditions were noted during this assessment.

10.5 Additional Considerations

An additional consideration is a condition that does not meet the definition of a REC, CREC, or HREC, but, in our opinion, should be brought to the attention of the User.

- Based on our Site reconnaissance, four oil wells exist at the Site. If these wells are encountered during future Site development activities, we recommend that they be properly abandoned in accordance with local city, county, and/or state regulations.

11.0 CONCLUSIONS AND RECOMMENDATIONS

Westwood performed a Phase I ESA of the Project Area, which includes approximately 2,785-acres of leased land for the operation of the proposed Trade Post Solar project area. This Phase I ESA was conducted in conformance with the scope and limitations of ASTM Standard E2247-16. Exceptions to, or deletions from, this practice are described in Section 8.0 of the Phase I ESA. Our assessment revealed no RECs in connection with the Project Area.

No additional investigation is recommended at this time. Westwood's conclusions are based on the avoidance of farmstead and structures during the redevelopment of the Project Area as a solar energy generation project. This report documents the condition of the Project Area at the time of Westwood's site reconnaissance and documents that Trade Post Solar LLC has completed steps to comply with the AAI procedure.

12.0 REFERENCES

Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process for Forestland or Rural Property ASTM E2247-16

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13.0 ENVIRONMENTAL PROFESSIONAL STATEMENT AND QUALIFICATIONS

We declare that, to the best of our professional knowledge and belief, we meet the definition of environmental professional as defined in §312.10 of 40 CFR § 312. We have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the Project Area. We have developed and performed the all appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312. Resumes are available upon request.

Table 13.0-1: Qualifications of Environmental Professionals

Name	Degrees	Years' Experience	Role on Project
Jack Belvedere	BS, Environmental Science	3	Report Preparation Site Reconnaissance
Andy Brummer	BS, Biology	18	Peer Review Quality Assurance

Prepared and Reviewed by:

Jack Belvedere
Environmental Scientist
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Andy Brummer
Environmental Due Diligence Lead
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[APPENDICES REMOVED]

Generation Interconnection Feasibility Study Report

For

PJM Generation Interconnection Request Queue Position AC2-157

Sullivan 345 kV

October 2017

Preface

The intent of the feasibility study is to determine a plan, with ballpark cost and construction time estimates, to connect the subject generation to the PJM network at a location specified by the Interconnection Customer. The Interconnection Customer may request the interconnection of generation as a capacity resource or as an energy-only resource. As a requirement for interconnection, the Interconnection Customer may be responsible for the cost of constructing: (1) Direct Connections, which are new facilities and/or facilities upgrades needed to connect the generator to the PJM network, and (2) Network Upgrades, which are facility additions, or upgrades to existing facilities, that are needed to maintain the reliability of the PJM system.

In some instances a generator interconnection may not be responsible for 100% of the identified network upgrade cost because other transmission network uses, e.g. another generation interconnection, may also contribute to the need for the same network reinforcement. The possibility of sharing the reinforcement costs with other projects may be identified in the feasibility study, but the actual allocation will be deferred until the impact study is performed.

The Feasibility Study estimates do not include the feasibility, cost, or time required to obtain property rights and permits for construction of the required facilities. The project developer is responsible for the right of way, real estate, and construction permit issues. For properties currently owned by Transmission Owners, the costs may be included in the study.

General

The Interconnection Customer (IC) proposes to install PJM Project #AC2-157, a 200.0 MW (76.0 MW Capacity) solar generating facility in Sullivan, IN (see Figure 2). The point of interconnection will be a direct connection to AEP's Sullivan 345 kV substation (see Figure 1).

The requested in service date is December 31, 2020.

Attachment Facilities

Point of Interconnection (Sullivan 345 kV Substation)

To accommodate the interconnection at the Sullivan 345 kV substation, the substation will have to be expanded requiring the installation of one (1) 345 kV circuit breaker (see Figure 1). Installation of associated protection and control equipment, 345 kV line risers, SCADA, and 345 kV revenue metering will also be required.

Sullivan Station Work:

- Install one (1) new 345 kV circuit breaker and associated bus work. Installation of associated protection and control equipment, 345 kV line risers, SCADA, and 345 kV revenue metering will also be required.
    - **Estimated Station Cost: $2,500,000**

Non-Direct Connection Cost Estimate

The total preliminary cost estimate for Non-Direct Connection work is given in the following tables below:

For AEP building Direct Connection cost estimates:

Description	Estimated Cost
345 kV Revenue Metering	**$350,000**
Upgrade line protection and controls at the expanded Sullivan 345 kV substation.	**$500,000**
Total	**$850,000**

Table 1

Interconnection Customer Requirements

It is understood that The IC is responsible for all costs associated with this interconnection. The cost of the IC's generating plant and the costs for the line connecting the generating plant to the Sullivan 345 kV substation are not included in this report; these are assumed to be the IC's responsibility.

The Generation Interconnection Agreement does not in or by itself establish a requirement for American Electric Power to provide power for consumption at the developer's facilities. A separate agreement may be reached with the local utility that provides service in the area to ensure that infrastructure is in place to meet this demand and proper metering equipment is installed. It is the responsibility of the developer to contact the local service provider to determine if a local service agreement is required.

Requirement from the PJM Open Access Transmission Tariff:

1. An Interconnection Customer entering the New Services Queue on or after October 1, 2012 with a proposed new Customer Facility that has a Maximum Facility Output equal to or greater than 100 MW shall install and maintain, at its expense, phasor measurement units (PMUs). See Section 8.5.3 of Appendix 2 to the Interconnection Service Agreement as well as section 4.3 of PJM Manual 14D for additional information.

Revenue Metering and SCADA Requirements

PJM Requirements

The Interconnection Customer will be required to install equipment necessary to provide Revenue Metering (KWH, KVARH) and real time data (KW, KVAR) for IC's generating Resource. See PJM Manuals M-01 and M-14D, and PJM Tariff Sections 24.1 and 24.2.

AEP Requirements

The Interconnection Customer will be required to comply with all AEP Revenue Metering Requirements for Generation Interconnection Customers. The Revenue Metering Requirements may be found within the "Requirements for Connection of New Facilities or Changes to Existing Facilities Connected to the AEP Transmission System" document located at the following link:

http://www.pjm.com/~/media/planning/plan-standards/private-aep/aep-interconnection-requirements.ashx

Network Impacts

The Queue Project AC2-157 was evaluated as a 200.0 MW (Capacity 76.0 MW) injection at the Sullivan 345 kV substation in the AEP area. Project AC2-157 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AC2-157 was studied with a commercial probability of 53%. Potential network impacts were as follows:

Base Case Used

Summer Peak Analysis – 2020 Case

Contingency Descriptions

The following contingencies resulted in overloads:

Contingencies	
Contingency Name	**Description**
8901	CONTINGENCY '8901' OPEN BRANCH FROM BUS 243216 TO BUS 247712 CKT 1 / 243216 05DARWIN 345 247712 05SULLIVAN 345 1 OPEN BRANCH FROM BUS 243217 TO BUS 247712 CKT 1 / 243217 05DEQUIN 345 247712 05SULLIVAN 345 1 END
16_B2_TOR1683	CONTINGENCY '16_B2_TOR1683' OPEN BRANCH FROM BUS 243209 TO BUS 243210 CKT 1 / 243209 05ROCKPT 765 243210 05SULLIVAN 765 1 END
1760_C2_05JEFRSO 765-A	CONTINGENCY '1760_C2_05JEFRSO 765-A' OPEN BRANCH FROM BUS 243207 TO BUS 243208 CKT 1 / 243207 05GRNTWN 765 243208 05JEFRSO 765 1 OPEN BRANCH FROM BUS 242924 TO BUS 243208 CKT 1 / 242924 05HANG R 765 243208 05JEFRSO 765 1 END
363_B2_TOR1682	CONTINGENCY '363_B2_TOR1682' OPEN BRANCH FROM BUS 243208 TO BUS 243209 CKT 1 / 243208 05JEFRSO 765 243209 05ROCKPT 765 1 END
4704_C2_05DEQUIN 345-B1	CONTINGENCY '4704_C2_05DEQUIN 345-B1' OPEN BRANCH FROM BUS 243217 TO BUS 243878 CKT 1 / 243217 05DEQUIN 345 243878 05MEADOW 345 1 OPEN BRANCH FROM BUS 243217 TO BUS 249525 CKT 1 / 243217 05DEQUIN 345 249525 08WESTWD 345 1 END
6472_B2_TOR15258	CONTINGENCY '6472_B2_TOR15258' OPEN BRANCH FROM BUS 243217 TO BUS 243878 CKT 1 / 243217 05DEQUIN 345 243878 05MEADOW 345 1 END
6485_C2_05DEQUIN 345-C1	CONTINGENCY '6485_C2_05DEQUIN 345-C1' OPEN BRANCH FROM BUS 243217 TO BUS 243878 CKT 2 / 243217 05DEQUIN 345 243878 05MEADOW 345 2

Contingencies	
Contingency Name	**Description**
	OPEN BRANCH FROM BUS 243217 TO BUS 249525 CKT 1 / 243217 05DEQUIN 345 249525 08WESTWD 345 1 END
6490_B2_TOR16000	CONTINGENCY '6490_B2_TOR16000' OPEN BRANCH FROM BUS 243217 TO BUS 243878 CKT 2 / 243217 05DEQUIN 345 243878 05MEADOW 345 2 END
8648_C2_05JEFRSO 765-B1	CONTINGENCY '8648_C2_05JEFRSO 765-B1' OPEN BRANCH FROM BUS 243208 TO BUS 243209 CKT 1 / 243208 05JEFRSO 765 243209 05ROCKPT 765 1 OPEN BRANCH FROM BUS 243208 TO BUS 242865 CKT 2 / 243208 05JEFRSO 765 242865 05JEFRSO 345 2 OPEN BRANCH FROM BUS 242865 TO BUS 248000 CKT Z1 / 242865 05JEFRSO 345 248000 06CLIFTY 345 Z1 END
8649_B2_TOR546	CONTINGENCY '8649_B2_TOR546' OPEN BRANCH FROM BUS 242924 TO BUS 243208 CKT 1 / 242924 05HANG R 765 243208 05JEFRSO 765 1 END
8807_B2	CONTINGENCY '8807_B2' OPEN BRANCH FROM BUS 243878 TO BUS 255205 CKT 1 / 243878 05MEADOW 345 255205 17REYNOLDS 345 1 END
8905_B2_TOR1697	CONTINGENCY '8905_B2_TOR1697' OPEN BRANCH FROM BUS 243217 TO BUS 247712 CKT 1 / 243217 05DEQUIN 345 247712 05SULLIVAN 345 1 END
8906_C2_05SULLIVAN 345-C	CONTINGENCY '8906_C2_05SULLIVAN 345-C' OPEN BRANCH FROM BUS 243216 TO BUS 247712 CKT 1 / 243216 05DARWIN 345 247712 05SULLIVAN 345 1 OPEN BRANCH FROM BUS 243217 TO BUS 247712 CKT 1 / 243217 05DEQUIN 345 247712 05SULLIVAN 345 1 END

Table 2

Generator Deliverability

(Single or N-1 contingencies for the Capacity portion only of the interconnection)

Multiple Facility Contingency

(Double Circuit Tower Line, Fault with a Stuck Breaker, and Bus Fault contingencies for the full energy output)

None

Contribution to Previously Identified Overloads

(This project contributes to the following contingency overloads, i.e. "Network Impacts", identified for earlier generation or transmission interconnection projects in the PJM Queue)

AC2-157 Contribution to Previously Identified Overloads															
	Contingency		Affected	Facility	Bus				Loading		Rating		MW	FG
#	Type	Name	Area	Description	From	To	Cir.	PF	Initial	Final	Type	MVA	Con.	App.
1	LFFB	1760_C2_05JEFRSO 765-A	AEP - OVEC	05JEFRSO-06CLIFTY 345 kV line	242865	248000	Z1	DC	124.05	125.78	ER	2045	35.33	1
2	N-1	363_B2_TOR1682	AEP - AEP	05DARWIN-05EUGENE 345 kV line	243216	243221	1	DC	118.62	119.96	NR	971	12.97	2
3	N-1	16_B2_TOR1683	AEP - AEP	05DARWIN-05EUGENE 345 kV line	243216	243221	1	DC	104.34	106.04	NR	971	16.49	
4	LFFB	8648_C2_05JEFRSO 765-B1	AEP - AEP	05DARWIN-05EUGENE 345 kV line	243216	243221	1	DC	101.71	104.13	ER	1419	34.39	
5	LFFB	6485_C2_05DEQUIN 345-C1	AEP - AEP	05DEQUIN-05MEADOW 345 kV line	243217	243878	1	DC	107.12	108.45	ER	1959	25.95	3
6	LFFB	4704_C2_05DEQUIN 345-B1	AEP - AEP	05DEQUIN-05MEADOW 345 kV line	243217	243878	2	DC	152.71	154.6	ER	1304	24.66	4
7	LFFB	8648_C2_05JEFRSO 765-B1	AEP - MISO NIPS	05MEADOW-17REYNOLDS 345 kV line	243878	255205	1	DC	100.28	101.32	ER	2938	30.5	5
8	N-1	363_B2_TOR1682	AEP - AEP	05SULLIVAN-05DARWIN 345 kV line	247712	243216	1	DC	118.62	119.96	NR	971	12.97	6
9	N-1	16_B2_TOR1683	AEP - AEP	05SULLIVAN-05DARWIN 345 kV line	247712	243216	1	DC	104.34	106.04	NR	971	16.49	
10	LFFB	8648_C2_05JEFRSO 765-B1	AEP - AEP	05SULLIVAN-05DARWIN 345 kV line	247712	243216	1	DC	101.71	104.13	ER	1419	34.39	
11	LFFB	8648_C2_05JEFRSO 765-B1	AEP - AEP	05SULLIVAN-05DEQUIN 345 kV line	247712	243217	1	DC	101.7	103.58	ER	1304	24.61	7
12	N-1	16_B2_TOR1683	AEP - AEP	05SULLIVAN-05DEQUIN 345 kV line	247712	243217	1	DC	101.92	103.08	NR	971	11.23	
13	LFFB	8906_C2_05SULLIVAN 345-C	AEP - MISO AMIL	05SULLIVAN-7CASEY 345 kV line	247712	346809	1	DC	108.59	113.19	ER	1466	67.5	8
14	DCTL	8901	AEP - MISO AMIL	05SULLIVAN-7CASEY 345 kV line	247712	346809	1	DC	108.59	113.19	ER	1466	67.5	
15	N-1	363_B2_TOR1682	LGEE - OVEC	7TRIMBLE-06CLIFTY 345 kV line	324114	248000	1	DC	169.72	170.32	ER	1370	8.27	9

Table 3

Steady-State Voltage Requirements

None

Short Circuit

(Summary of impacted circuit breakers)

New circuit breakers found to be over-duty:

None

Delivery of Energy Portion of Interconnection Request

PJM also studied the delivery of the energy portion of this interconnection request. Any problems identified below are likely to result in operational restrictions to the project under study. The developer can proceed with network upgrades to eliminate the operational restriction at their discretion by submitting a Merchant Transmission Interconnection request.

Note: Only the most severely overloaded conditions are listed below. There is no guarantee of full delivery of energy for this project by fixing only the conditions listed in this section. With a Transmission Interconnection Request, a subsequent analysis will be performed which shall study all overload conditions associated with the overloaded element(s) identified.

AC2-157 Delivery of Energy Portion of Interconnection Request													
	Contingency		Affected		Bus				Loading		Rating		MW
#	Type	Name	Area	Facility Description	From	To	Cir.	PF	Initial	Final	Type	MVA	Con.
1	N-1	8649_B2_TOR546	AEP - OVEC	05JEFRSO-06CLIFTY 345 kV line	242865	248000	Z1	DC	108.81	109.1	NR	1756	26.29
2	N-1	363_B2_TOR1682	AEP - AEP	05DARWIN-05EUGENE 345 kV line	243216	243221	1	DC	145.67	149.18	NR	971	34.13
3	N-1	6490_B2_TOR16000	AEP - AEP	05DEQUIN-05MEADOW 345 kV line	243217	243878	1	DC	145.25	147.07	NR	1409	25.74
4	N-1	6472_B2_TOR15258	AEP - AEP	05DEQUIN-05MEADOW 345 kV line	243217	243878	2	DC	198.97	201.49	NR	971	24.42
5	N-1	8905_B2_TOR1697	AEP - AEP	05EUGENE-05DEQUIN 345 kV line	243221	243217	1	DC	139.44	140.16	NR	971	15.56
6	N-1	8807_B2	AEP - AEP	05MEADOW-05OLIVE 345 kV line	243878	243229	1	DC	131.08	131.69	NR	971	13.21
7	N-1	363_B2_TOR1682	AEP - MISO NIPS	05MEADOW-17REYNOLDS 345 kV line	243878	255205	1	DC	133.63	135.03	NR	2114	29.41
8	N-1	363_B2_TOR1682	AEP - AEP	05SULLIVAN-05DARWIN 345 kV line	247712	243216	1	DC	145.67	149.18	NR	971	34.13
9	N-1	363_B2_TOR1682	AEP - AEP	05SULLIVAN-05DEQUIN 345 kV line	247712	243217	1	DC	132.04	134.53	NR	971	24.21
10	N-1	363_B2_TOR1682	AEP - MISO AMIL	05SULLIVAN-7CASEY 345 kV line	247712	346809	1	DC	100.46	104.77	NR	1334	57.5
11	N-1	363_B2_TOR1682	AEP - BREC	05ROCKPT-7COLEMAN 345 kV line	247851	340563	1	DC	122.3	124.33	NR	1409	28.56
12	N-1	363_B2_TOR1682	LGEE - OVEC	7TRIMBLE-06CLIFTY 345 kV line	324114	248000	1	DC	182.41	183.12	ER	1370	21.76

AC2-157 Delivery of Energy Portion of Interconnection Request														
	Contingency		Affected		Bus				Loading		Rating		MW
#	Type	Name	Area	Facility Description	From	To	Cir.	PF	Initial	Final	Type	MVA	Con.
13	N-1	363_B2_TOR1682	AEP - AEP	AB2-028 TAP-05DESOTO 345 kV line	923880	243218	1	DC	108.85	109.53	NR	1016	15.39

Table 4

New System Reinforcements

(Upgrades required to mitigate reliability criteria violations, i.e. Network Impacts, initially caused by the addition of this project generation)

None

Contribution to Previously Identified System Reinforcements

(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project. This project may have a % allocation cost responsibility which will be calculated and reported for the Impact Study)

1. To relieve all AEP (and AEP tie line) constraints identified in this report:
    a. The planned upgrade is to build a new Sullivan – Reynolds 765 kV line (N5034). The need is driven by the X3-028 MTX project.
        i. Sullivan – Reynolds 765 kV line: $442 million
        ii. Work at Sullivan Station: $6 million
        iii. Work at Reynolds Station: $16 million
        iv. Total Cost: $464 million
        v. It would take (3) three to (4) four years to build the Sullivan - Reynolds 765 kV line from the time the CSA is signed. AC1-157 will need this project in-service in order to be fully deliverable to the PJM system.
        vi. AB1-087 will receive cost allocation.

2. To relieve the Trimble – Clifty 345 kV line constraint identified: A second Trimble – Clifty 345 kV line would need to be built.
    a. Total Cost: $59 million.
    b. The AC2-157 will receive cost allocation.

3. Supplemental project S1094 (AEP portion of work for MISO Duff-Rockport-Coleman project). The projected in-service date of S1094 is presently January 2021. AEP is responsible for this cost ($85.3M).
    a. The expected cost responsibility for AC2-157 is $0. AC2-157 will need the S1094 project in-service in order to be fully deliverable to the PJM system.

Schedule

It is anticipated that the time between receipt of executed agreements and Commercial Operation may range from 12 to 18 months if no line work or associated network upgrades caused by the X3-028 project are required. If line work is required, construction time would be between 36 to 48 months after signing an Interconnection Construction Service Agreement (ICSA).

Note: The time provided between anticipated normal completion of System Impact, Facilities Studies, subsequent execution of ISA and ICSA documents, and the proposed In-Service Date is shorter than usual and may be difficult to achieve.

Conclusion

Based upon the results of this Feasibility Study, the construction of the 200.0 MW (76.0 MW Capacity) solar generating facility of The IC (PJM Project #AC2-157) will require the following additional interconnection charges. This plan of service will interconnect the proposed solar generating facility in a manner that will provide operational reliability and flexibility to both the AEP system and the The IC generating facility.

Cost Breakdown for Point of Interconnection (Sullivan 345 kV Substation)		
Attachment Cost	Expand Sullivan 345 kV Substation	**$2,500,000**
Non-Direct Connection Cost Estimate	345 kV Revenue Metering	**$350,000**
	Upgrade line protection and controls at the expanded Sullivan 345 kV substation.	**$500,000**
	Contribution to Previously Identified System Reinforcements *(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project. This project may have a % allocation cost responsibility which will be calculated and reported for the Impact Study)*	**$523,000,000**
	Total Estimated Cost for Project AC2-157	**$526,350,000**

Table 5

The estimates are preliminary in nature, as they were determined without the benefit of detailed engineering studies. Final estimates will require an on-site review and coordination to determine final construction requirements.

Figure 1: Point of Interconnection (Sullivan 345 kV Substation)

Single-Line Diagram

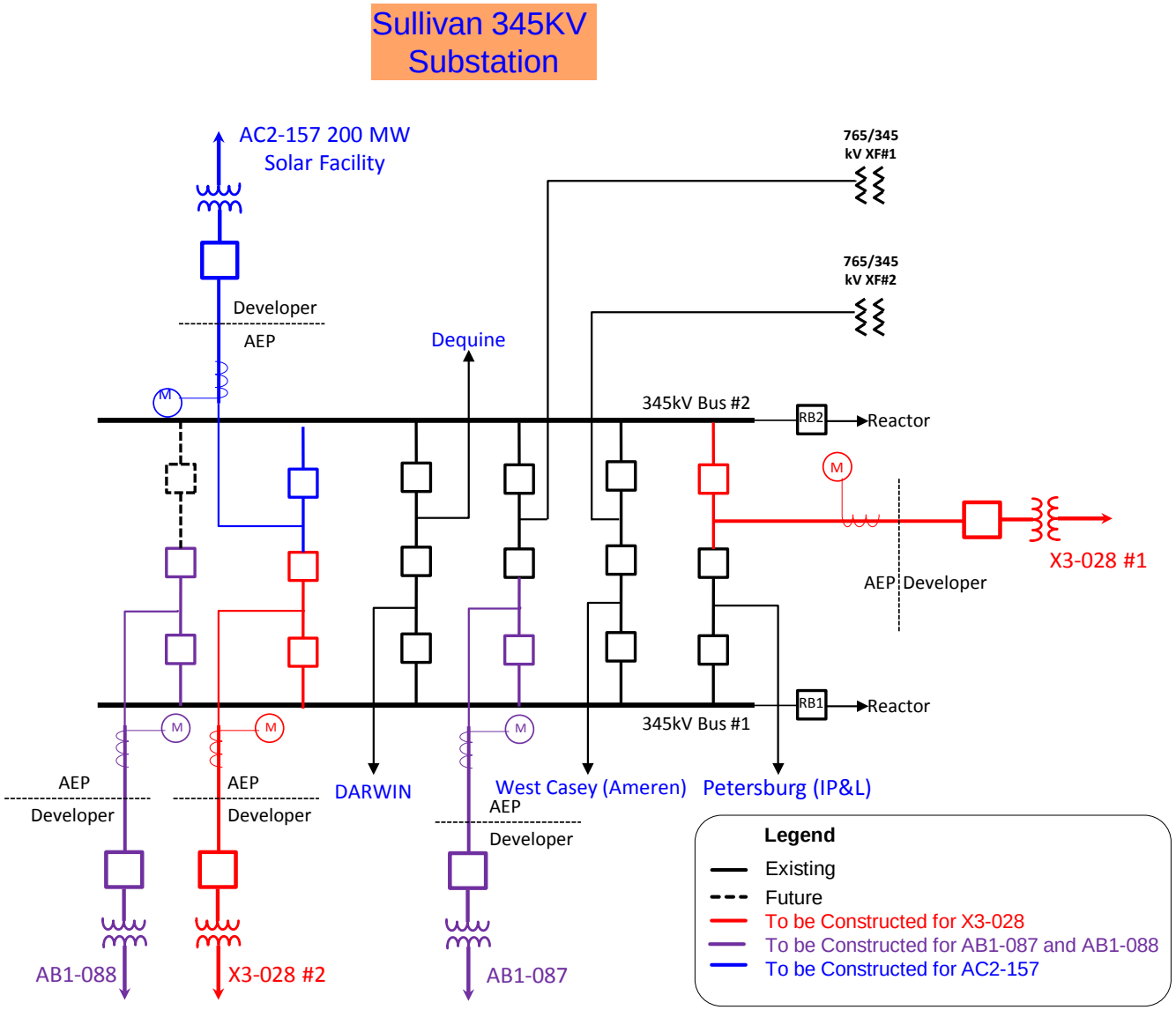
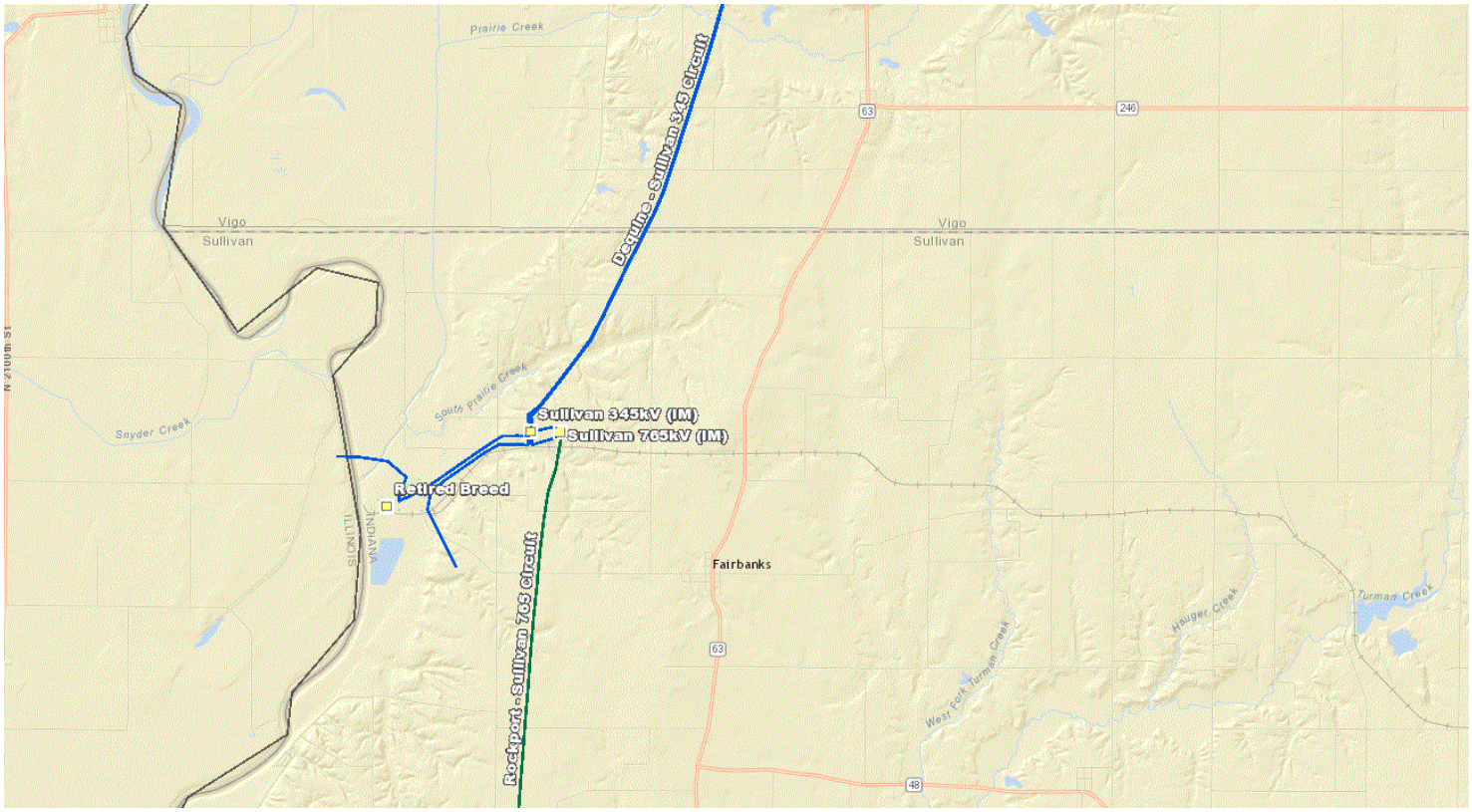


Figure 2: Point of Interconnection (Sullivan 345 kV Substation)



Appendices Primary POI Sullivan 345 kV

The following appendices contain additional information about each flowgate presented in the body of the report. For each appendix, a description of the flowgate and its contingency was included for convenience. However, the intent of the appendix section is to provide more information on which projects/generators have contributions to the flowgate in question. Although this information is not used "as is" for cost allocation purposes, it can be used to gage other generators impact.

It should be noted the generator contributions presented in the appendices sections are full contributions, whereas in the body of the report, those contributions take into consideration the commercial probability of each project.

Appendix 1

(AEP - OVEC) The 05JEFRSO-06CLIFTY 345 kV line (from bus 242865 to bus 248000 ckt Z1) loads from 124.05% to 125.78% (**DC power flow**) of its emergency rating (2045 MVA) for the line fault with failed breaker contingency outage of '1760_C2_05JEFRSO 765-A'. This project contributes approximately 35.33 MW to the thermal violation.

CONTINGENCY '1760_C2_05JEFRSO 765-A'
OPEN BRANCH FROM BUS 243207 TO BUS 243208 CKT 1 / 243207 05GRNTWN 765 243208 05JEFRSO 765 1
OPEN BRANCH FROM BUS 242924 TO BUS 243208 CKT 1 / 242924 05HANGR 765 243208 05JEFRSO 765 1
END

Bus Number	*Bus Name*	*Full Contribution*
247900	*05FR-11G E*	*5.18*
247901	*05FR-12G E*	*5.09*
247902	*05FR-21G E*	*5.44*
247903	*05FR-22G E*	*5.21*
247904	*05FR-3G E*	*10.56*
247905	*05FR-4G E*	*7.94*
247906	*05MDL-1G E*	*9.05*
247907	*05MDL-2G E*	*4.49*
247912	*05MDL-3G E*	*4.69*
247913	*05MDL-4G E*	*4.48*
243442	*05RKG1*	*69.93*
243443	*05RKG2*	*68.87*
932341	*AC2-147 C*	*0.38*
932342	*AC2-147 E*	*0.62*
932351	*AC2-148 C*	*0.39*
932352	*AC2-148 E*	*0.63*
932371	*AC2-150 C*	*0.39*
932372	*AC2-150 E*	*0.63*
932391	*AC2-152 C*	*0.22*
932392	*AC2-152 E*	*0.37*
932441	*AC2-157 C*	*13.42*
932442	*AC2-157 E*	*21.9*
274832	*ANNAWAN ; 1U*	*5.47*
294401	*BSHIL;1U E*	*4.39*
294410	*BSHIL;2U E*	*4.39*
274890	*CAYUG;1U E*	*6.72*
274891	*CAYUG;2U E*	*6.72*
274849	*CRESCENT ;1U*	*2.99*
274859	*EASYR;U1 E*	*4.84*
274860	*EASYR;U2 E*	*4.84*
990901	*L-005 E*	*6.72*

293516	*O-009 E1*	*4.3*
293517	*O-009 E2*	*2.19*
293518	*O-009 E3*	*2.41*
293715	*O-029 E*	*4.6*
293716	*O-029 E*	*2.52*
293717	*O-029 E*	*2.32*
293771	*O-035 E*	*3.25*
296308	*R-030 C1*	*1.97*
296271	*R-030 C2*	*1.97*
296125	*R-030 C3*	*1.99*
296309	*R-030 E1*	*7.86*
296272	*R-030 E2*	*7.86*
296128	*R-030 E3*	*7.96*
247556	*T-127 C*	*1.15*
247943	*T-127 E*	*4.59*
274853	*TWINGROVE;U1*	*10.25*
274854	*TWINGROVE;U2*	*10.25*
276150	*W2-048 E*	*4.49*
905081	*W4-005 C*	*3.14*
905082	*W4-005 E*	*21.03*
909052	*X2-022 E*	*13.56*
900404	*X3-028 C*	*264.96*
900405	*X3-028 E*	*353.28*
913222	*Y1-054 E*	*-1.35*
247629	*Y3-038*	*11.68*
915662	*Y3-099 E*	*0.15*
915672	*Y3-100 E*	*0.15*
LTF	*Z1-043*	*14.05*
916182	*Z1-065 E*	*0.38*
916272	*Z1-080 E*	*0.3*
LTF	*Z1-112*	*5.89*
920792	*Z2-087 C*	*1.54*
920793	*Z2-087 E*	*10.32*
LTF	*AA1-001*	*5.9*
LTF	*AA1-071*	*3.93*
921632	*AA1-146*	*8.04*
921682	*AA2-030*	*8.04*
921702	*AA2-039 C*	*1.07*
921703	*AA2-039 E*	*7.16*
922592	*AB1-006 C*	*1.47*
922593	*AB1-006 E*	*9.86*
922982	*AB1-087 C OP*	*97.15*
922992	*AB1-088 C OP*	*97.15*
LTF	*AB2-013*	*8.27*
924041	*AB2-047 C OP*	*1.94*

924042	*AB2-047 E OP*	*13.01*
924261	*AB2-070 C OP*	*1.84*
924262	*AB2-070 E OP*	*12.33*
925161	*AB2-173 C*	*1.43*
925242	*AB2-178 E*	*1.44*
LTF	*AC1-002*	*40.98*
925581	*AC1-033 C*	*0.72*
925582	*AC1-033 E*	*4.81*
927331	*AC1-040 C*	*15.07*
927332	*AC1-040 E*	*24.59*
925771	*AC1-053 C*	*1.84*
925772	*AC1-053 E*	*12.33*
926821	*AC1-168 C OP*	*0.53*
926822	*AC1-168 E OP*	*3.58*
926841	*AC1-171 C OP*	*0.62*
926842	*AC1-171 E OP*	*4.17*
926981	*AC1-185 1*	*0.3*
926982	*AC1-185 2*	*0.3*
926983	*AC1-185 3*	*0.3*
926984	*AC1-185 4*	*0.3*
926985	*AC1-185 5*	*0.3*
926986	*AC1-185 6*	*0.3*
926987	*AC1-185 7*	*0.3*
926988	*AC1-185 8*	*0.3*
927201	*AC1-214 C*	*1.08*
927202	*AC1-214 E*	*3.28*

Appendix 2

(AEP - AEP) The 05DARWIN-05EUGENE 345 kV line (from bus 243216 to bus 243221 ckt 1) loads from 118.62% to 119.96% (**DC power flow**) of its normal rating (971 MVA) for the single line contingency outage of '363_B2_TOR1682'. This project contributes approximately 12.97 MW to the thermal violation.

CONTINGENCY '363_B2_TOR1682'
OPEN BRANCH FROM BUS 243208 TO BUS 243209 CKT 1 / 243208 05JEFRSO 765 243209 05ROCKPT 765 1
END

Bus Number	*Bus Name*	*Full Contribution*
243442	*05RKG1*	*24.27*
243443	*05RKG2*	*23.9*
932441	*AC2-157 C*	*12.97*
900405	*X3-028 E*	*341.3*
247629	*Y3-038*	*4.05*
922982	*AB1-087 C OP*	*93.86*
922992	*AB1-088 C OP*	*93.86*
927331	*AC1-040 C*	*5.38*

Appendix 3

(AEP - AEP) The 05DEQUIN-05MEADOW 345 kV line (from bus 243217 to bus 243878 ckt 1) loads from 107.12% to 108.45% (**DC power flow**) of its emergency rating (1959 MVA) for the line fault with failed breaker contingency outage of '6485_C2_05DEQUIN 345-C1'. This project contributes approximately 25.95 MW to the thermal violation.

CONTINGENCY '6485_C2_05DEQUIN 345-C1'
OPEN BRANCH FROM BUS 243217 TO BUS 243878 CKT 2 / 243217 05DEQUIN 345 243878 05MEADOW 345 2
OPEN BRANCH FROM BUS 243217 TO BUS 249525 CKT 1 / 243217 05DEQUIN 345 249525 08WESTWD 345 1
END

Bus Number	*Bus Name*	*Full Contribution*
243859	*05FR-11G C*	*1.83*
247900	*05FR-11G E*	*44.67*
243862	*05FR-12G C*	*1.8*
247901	*05FR-12G E*	*43.93*
243864	*05FR-21G C*	*1.92*
247902	*05FR-21G E*	*46.95*
243866	*05FR-22G C*	*1.84*
247903	*05FR-22G E*	*44.96*
243870	*05FR-3G C*	*3.72*
247904	*05FR-3G E*	*91.06*
243873	*05FR-4G C*	*2.88*
247905	*05FR-4G E*	*68.46*
932441	*AC2-157 C*	*9.86*
932442	*AC2-157 E*	*16.09*
998111	*J468*	*3.01*
998112	*J468 E*	*17.07*
998120	*J515*	*61.09*
961651	*J642*	*10.8*
900404	*X3-028 C*	*194.61*
900405	*X3-028 E*	*259.48*
701171	*Y4-018 C*	*1.07*
701172	*Y4-018 E*	*4.29*
701461	*Y4-047*	*16.39*
701471	*Y4-048*	*18.46*
701481	*Y4-049*	*3.55*
701842	*Y4-085 E*	*1.07*
LTF	*AA1-001*	*4.37*
922982	*AB1-087 C OP*	*71.36*
922992	*AB1-088 C OP*	*71.36*
LTF	*AC1-002*	*30.06*

Appendix 4

(AEP - AEP) The 05DEQUIN-05MEADOW 345 kV line (from bus 243217 to bus 243878 ckt 2) loads from 152.71% to 154.6% (**DC power flow**) of its emergency rating (1304 MVA) for the line fault with failed breaker contingency outage of '4704_C2_05DEQUIN 345-B1'. This project contributes approximately 24.66 MW to the thermal violation.

CONTINGENCY '4704_C2_05DEQUIN 345-B1'
OPEN BRANCH FROM BUS 243217 TO BUS 243878 CKT 1 / 243217 05DEQUIN 345 243878 05MEADOW 345 1
OPEN BRANCH FROM BUS 243217 TO BUS 249525 CKT 1 / 243217 05DEQUIN 345 249525 08WESTWD 345 1
END

Bus Number	*Bus Name*	*Full Contribution*
243859	*05FR-11G C*	*1.74*
247900	*05FR-11G E*	*42.46*
243862	*05FR-12G C*	*1.71*
247901	*05FR-12G E*	*41.75*
243864	*05FR-21G C*	*1.82*
247902	*05FR-21G E*	*44.62*
243866	*05FR-22G C*	*1.74*
247903	*05FR-22G E*	*42.73*
243870	*05FR-3G C*	*3.53*
247904	*05FR-3G E*	*86.54*
243873	*05FR-4G C*	*2.74*
247905	*05FR-4G E*	*65.07*
932441	*AC2-157 C*	*9.37*
932442	*AC2-157 E*	*15.29*
998111	*J468*	*2.86*
998112	*J468 E*	*16.22*
998120	*J515*	*58.06*
961651	*J642*	*10.26*
900404	*X3-028 C*	*184.95*
900405	*X3-028 E*	*246.6*
701171	*Y4-018 C*	*1.02*
701172	*Y4-018 E*	*4.07*
701461	*Y4-047*	*15.57*
701471	*Y4-048*	*17.55*
701842	*Y4-085 E*	*1.01*
LTF	*AA1-001*	*4.15*
922982	*AB1-087 C OP*	*67.82*
922992	*AB1-088 C OP*	*67.82*
LTF	*AC1-002*	*28.57*

Appendix 5

(AEP - MISO NIPS) The 05MEADOW-17REYNOLDS 345 kV line (from bus 243878 to bus 255205 ckt 1) loads from 100.28% to 101.32% (**DC power flow**) of its emergency rating (2938 MVA) for the line fault with failed breaker contingency outage of '8648_C2_05JEFRSO 765-B1'. This project contributes approximately 30.5 MW to the thermal violation.

CONTINGENCY '8648_C2_05JEFRSO 765-B1'
OPEN BRANCH FROM BUS 243208 TO BUS 243209 CKT 1 / 243208 05JEFRSO 765 243209 05ROCKPT 765 1
OPEN BRANCH FROM BUS 243208 TO BUS 242865 CKT 2 / 243208 05JEFRSO 765 242865 05JEFRSO 345 2
OPEN BRANCH FROM BUS 242865 TO BUS 248000 CKT Z1 / 242865 05JEFRSO 345 248000 06CLIFTY 345 Z1
END

Bus Number	*Bus Name*	*Full Contribution*
243859	*05FR-11G C*	*1.63*
247900	*05FR-11G E*	*39.88*
243862	*05FR-12G C*	*1.61*
247901	*05FR-12G E*	*39.22*
243864	*05FR-21G C*	*1.71*
247902	*05FR-21G E*	*41.92*
243866	*05FR-22G C*	*1.64*
247903	*05FR-22G E*	*40.14*
243870	*05FR-3G C*	*3.32*
247904	*05FR-3G E*	*81.29*
243873	*05FR-4G C*	*2.57*
247905	*05FR-4G E*	*61.12*
246909	*05MDL-1G C*	*3.94*
247906	*05MDL-1G E*	*96.32*
246910	*05MDL-2G C*	*1.97*
247907	*05MDL-2G E*	*47.77*
246976	*05MDL-3G C*	*1.97*
247912	*05MDL-3G E*	*49.94*
246979	*05MDL-4G C*	*3.94*
247913	*05MDL-4G E*	*47.65*
243442	*05RKG1*	*26.02*
243443	*05RKG2*	*25.62*
932441	*AC2-157 C*	*11.59*
932442	*AC2-157 E*	*18.91*
998111	*J468*	*2.83*
998112	*J468 E*	*16.05*
998120	*J515*	*55.03*
247556	*T-127 C*	*12.22*
247943	*T-127 E*	*48.88*

900404	*X3-028 C*	*228.78*
900405	*X3-028 E*	*305.04*
247629	*Y3-038*	*4.34*
701171	*Y4-018 C*	*0.95*
701172	*Y4-018 E*	*3.8*
701461	*Y4-047*	*14.76*
701471	*Y4-048*	*17.16*
701842	*Y4-085 E*	*1.11*
LTF	*AA1-001*	*5.38*
922592	*AB1-006 C*	*15.68*
922593	*AB1-006 E*	*104.95*
922982	*AB1-087 C OP*	*83.89*
922992	*AB1-088 C OP*	*83.89*
LTF	*AC1-002*	*37.18*
927331	*AC1-040 C*	*6.31*
927332	*AC1-040 E*	*10.3*

Appendix 6

(AEP - AEP) The 05SULLIVAN-05DARWIN 345 kV line (from bus 247712 to bus 243216 ckt 1) loads from 118.62% to 119.96% (**DC power flow**) of its normal rating (971 MVA) for the single line contingency outage of '363_B2_TOR1682'. This project contributes approximately 12.97 MW to the thermal violation.

CONTINGENCY '363_B2_TOR1682'
OPEN BRANCH FROM BUS 243208 TO BUS 243209 CKT 1 / 243208 05JEFRSO 765 243209 05ROCKPT 765 1
END

Bus Number	*Bus Name*	*Full Contribution*
243442	*05RKG1*	*24.27*
243443	*05RKG2*	*23.9*
932441	*AC2-157 C*	*12.97*
900405	*X3-028 E*	*341.3*
247629	*Y3-038*	*4.05*
922982	*AB1-087 C OP*	*93.86*
922992	*AB1-088 C OP*	*93.86*
927331	*AC1-040 C*	*5.38*

Appendix 7

(AEP - AEP) The 05SULLIVAN-05DEQUIN 345 kV line (from bus 247712 to bus 243217 ckt 1) loads from 101.7% to 103.58% (**DC power flow**) of its emergency rating (1304 MVA) for the line fault with failed breaker contingency outage of '8648_C2_05JEFRSO 765-B1'. This project contributes approximately 24.61 MW to the thermal violation.

CONTINGENCY '8648_C2_05JEFRSO 765-B1'
OPEN BRANCH FROM BUS 243208 TO BUS 243209 CKT 1 / 243208 05JEFRSO 765 243209 05ROCKPT 765 1
OPEN BRANCH FROM BUS 243208 TO BUS 242865 CKT 2 / 243208 05JEFRSO 765 242865 05JEFRSO 345 2
OPEN BRANCH FROM BUS 242865 TO BUS 248000 CKT Z1 / 242865 05JEFRSO 345 248000 06CLIFTY 345 Z1
END

Bus Number	*Bus Name*	*Full Contribution*
932441	*AC2-157 C*	*9.35*
932442	*AC2-157 E*	*15.26*
900404	*X3-028 C*	*184.59*
900405	*X3-028 E*	*246.12*
247629	*Y3-038*	*3.21*
922982	*AB1-087 C OP*	*67.68*
922992	*AB1-088 C OP*	*67.68*
927331	*AC1-040 C*	*4.47*
927332	*AC1-040 E*	*7.3*

Appendix 8

(AEP - MISO AMIL) The 05SULLIVAN-7CASEY 345 kV line (from bus 247712 to bus 346809 ckt 1) loads from 108.59% to 113.19% (**DC power flow**) of its emergency rating (1466 MVA) for the line fault with failed breaker contingency outage of '8906_C2_05SULLIVAN 345-C'. This project contributes approximately 67.5 MW to the thermal violation.

CONTINGENCY '8906_C2_05SULLIVAN 345-C'
OPEN BRANCH FROM BUS 243216 TO BUS 247712 CKT 1 / 243216 05DARWIN 345 247712 05SULLIVAN 345 1
OPEN BRANCH FROM BUS 243217 TO BUS 247712 CKT 1 / 243217 05DEQUIN 345 247712 05SULLIVAN 345 1
END

Bus Number	*Bus Name*	*Full Contribution*
243442	*05RKG1*	*31.47*
243443	*05RKG2*	*30.99*
932441	*AC2-157 C*	*25.65*
932442	*AC2-157 E*	*41.85*
998321	*J496*	*8.03*
998571	*J537*	*10.53*
998581	*J538*	*7.77*
961341	*J601*	*5.29*
961351	*J602*	*10.09*
900404	*X3-028 C*	*506.28*
900405	*X3-028 E*	*675.04*
247629	*Y3-038*	*5.25*
701261	*Y4-027 C*	*0.2*
701262	*Y4-027 E*	*0.81*
701341	*Y4-035 C*	*0.07*
701342	*Y4-035 E*	*0.28*
701421	*Y4-043 C*	*0.04*
701422	*Y4-043 E*	*0.13*
701431	*Y4-044 C*	*1.57*
701432	*Y4-044 E*	*4.7*
701491	*Y4-050 C*	*1.05*
701492	*Y4-050 E*	*3.14*
701531	*Y4-054 C*	*0.54*
701532	*Y4-054 E*	*1.63*
701571	*Y4-058*	*5.28*
701581	*Y4-059*	*15.79*
701601	*Y4-061*	*7.93*
701701	*Y4-071*	*1.55*
701781	*Y4-079*	*5.51*
701791	*Y4-080*	*1.59*
701842	*Y4-085 E*	*1.03*

701881	*Y4-089*	*7.9*
701891	*Y4-090*	*1.56*
916522	*Z1-108 E*	*1.19*
LTF	*AA1-051*	*6.23*
LTF	*AA1-055*	*185.08*
922982	*AB1-087 C OP*	*185.64*
922992	*AB1-088 C OP*	*185.64*
927331	*AC1-040 C*	*6.97*
927332	*AC1-040 E*	*11.37*
LTF	*AC1-056*	*16.83*

Appendix 9

(LGEE - OVEC) The 7TRIMBLE-06CLIFTY 345 kV line (from bus 324114 to bus 248000 ckt 1) loads from 169.72% to 170.32% (**DC power flow**) of its emergency rating (1370 MVA) for the single line contingency outage of '363_B2_TOR1682'. This project contributes approximately 8.27 MW to the thermal violation.

CONTINGENCY '363_B2_TOR1682'
OPEN BRANCH FROM BUS 243208 TO BUS 243209 CKT 1 / 243208 05JEFRSO 765 243209 05ROCKPT 765 1
END

Bus Number	*Bus Name*	*Full Contribution*
243442	*05RKG1*	*32.93*
243443	*05RKG2*	*32.43*
342900	*1COOPER1 G*	*2.64*
342903	*1COOPER2 G*	*5.13*
342918	*1JKCT 1G*	*2.08*
342921	*1JKCT 2G*	*2.08*
342924	*1JKCT 3G*	*2.08*
342927	*1JKCT 4G*	*1.38*
342930	*1JKCT 5G*	*1.38*
342933	*1JKCT 6G*	*1.38*
342936	*1JKCT 7G*	*1.38*
342939	*1JKCT 9G*	*1.41*
342942	*1JKCT 10G*	*1.41*
342945	*1LAUREL 1G*	*1.49*
931551	*AC2-075 C*	*4.67*
931871	*AC2-114 C*	*3.65*
932441	*AC2-157 C*	*8.27*
274650	*KINCAID ;1U*	*5.53*
900405	*X3-028 E*	*217.56*
LTF	*Y2-006*	*16.21*
247629	*Y3-038*	*5.5*
LTF	*Z1-046*	*18.6*
LTF	*AA1-001*	*6.07*
LTF	*AA1-004*	*15.39*
922982	*AB1-087 C OP*	*59.83*
922992	*AB1-088 C OP*	*59.83*
924261	*AB2-070 C OP*	*1.32*
LTF	*AC1-002*	*42.39*
927331	*AC1-040 C*	*9.49*
925771	*AC1-053 C*	*1.32*
925981	*AC1-074 C OP*	*4.67*

Generation Interconnection System Impact Study Report

For

PJM Generation Interconnection Request Queue Position AC2-157

Sullivan 345 kV

November 2020

Preface

The intent of the System Impact Study is to determine a plan, with approximate cost and construction time estimates, to connect the subject generation interconnection project to the PJM network at a location specified by the Interconnection Customer. As a requirement for interconnection, the Interconnection Customer may be responsible for the cost of constructing: (1) Direct Connections, which are new facilities and/or facilities upgrades needed to connect the generator to the PJM network, and (2) Network Upgrades, which are facility additions, or upgrades to existing facilities, that are needed to maintain the reliability of the PJM system. All facilities required for interconnection of a generation interconnection project must be designed to meet the technical specifications (on PJM web site) for the appropriate transmission owner.

In some instances a generator interconnection may not be responsible for 100% of the identified network upgrade cost because other transmission network uses, e.g. another generation interconnection or merchant transmission upgrade, may also contribute to the need for the same network reinforcement.

The System Impact Study estimates do not include the feasibility, cost, or time required to obtain property rights and permits for construction of the required facilities. The project developer is responsible for the right of way, real estate, and construction permit issues. For properties currently owned by Transmission Owners, the costs may be included in the study.

General

Invenergy Solar Development North America, LLC (Invenergy) proposes to install PJM Project #AC2-157, a 200.0 MW (76.0 MW Capacity) solar generating facility in Sullivan, IN (see Figure 2). The point of interconnection will be a direct connection to AEP's Sullivan 345 kV substation (see Figure 1).

The requested in service date is December 31, 2020.

Attachment Facilities

Point of Interconnection (Sullivan 345 kV)

To accommodate the interconnection at the Sullivan 345 kV substation, the Sullivan substation will have to be expanded requiring two (2) additional 345 kV circuit breaker (see Figure 1). Installation of associated protection and control equipment, 345 kV line risers, SCADA, and 345 kV revenue metering will also be required.

Station Work and Cost:

- Install two (2) new 345 kV circuit breaker and associated bus work. Installation of associated protection and control equipment, 345 kV line risers, SCADA, and 345 kV revenue metering will also be required.
    - **Estimated Station Cost: $3,500,000**

Non-Direct Connection Cost Estimate

The total preliminary cost estimate for Non-Direct Connection work is given in the following tables below:

For AEP building Direct Connection cost estimates:

Description	Estimated Cost
345 kV Revenue Metering	**$350,000**
Total	**$350,000**

Table 1

Interconnection Customer Requirements

It is understood that Invenergy is responsible for all costs associated with this interconnection. The cost of Invenergy's generating plant and the costs for the line connecting the generating plant to the Sullivan 345 kV substation are not included in this report; these are assumed to be Invenergy's responsibility.

The Generation Interconnection Agreement does not in or by itself establish a requirement for American Electric Power to provide power for consumption at the developer's facilities. A separate agreement may be reached with the local utility that provides service in the area to ensure that infrastructure is in place to meet this demand and proper metering equipment is installed. It is the responsibility of the developer to contact the local service provider to determine if a local service agreement is required.

Requirement from the PJM Open Access Transmission Tariff:

An Interconnection Customer entering the New Services Queue on or after October 1, 2012 with a proposed new Customer Facility that has a Maximum Facility Output equal to or greater than 100 MW shall install and maintain, at its expense, phasor measurement units (PMUs). See Section 8.5.3 of Appendix 2 to the Interconnection Service Agreement as well as section 4.3 of PJM Manual 14D for additional information.

Revenue Metering and SCADA Requirements

PJM Requirements

The Interconnection Customer will be required to install equipment necessary to provide Revenue Metering (KWH, KVARH) and real time data (KW, KVAR) for IC's generating Resource. See PJM Manuals M-01 and M-14D, and PJM Tariff Sections 24.1 and 24.2.

AEP Requirements

The Interconnection Customer will be required to comply with all AEP Revenue Metering Requirements for Generation Interconnection Customers. The Revenue Metering Requirements may be found within the "Requirements for Connection of New Facilities or Changes to Existing Facilities Connected to the AEP Transmission System" document located at the following link:

http://www.pjm.com/~/media/planning/plan-standards/private-aep/aep-interconnection-requirements.ashx

Network Impacts

The Queue Project AC2-157 was evaluated as a 200.0 MW (Capacity 76.0 MW) injection into the Sullivan 345 kV substation in the AEP area. Project AC2-157 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AC2-157 was studied with a commercial probability of 100%. Potential network impacts were as follows:

Summer Peak Analysis - 2020

Generator Deliverability

(Single or N-1 contingencies for the Capacity portion only of the interconnection)

None

Multiple Facility Contingency

(Double Circuit Tower Line, Fault with a Stuck Breaker, and Bus Fault contingencies for the full energy output)

1. (AEP - MISO NIPS) The 05MEADOW-17REYNOLDS 345 kV line (from bus 243878 to bus 255205 ckt 1) loads from 99.15% to 100.66% (AC power flow) of its emergency rating (2627 MVA) for the line fault with failed breaker contingency outage of 'ADD615'. This project contributes approximately 31.91 MW to the thermal violation.

CONTINGENCY 'ADD615'
OPEN BRANCH FROM BUS 243208 TO BUS 243209 CKT 1
OPEN BRANCH FROM BUS 243208 TO BUS 243207 CKT 1
END

Contribution to Previously Identified Overloads

(This project contributes to the following contingency overloads, i.e. "Network Impacts", identified for earlier generation or transmission interconnection projects in the PJM Queue)

1. (AEP - OVEC) The 05JEFRSO-06CLIFTY 345 kV line (from bus 242865 to bus 248000 ckt Z1) loads from 105.9% to 108.36% (AC power flow) of its emergency rating (2045 MVA) for the line fault with failed breaker contingency outage of '1760_C2_05JEFRSO 765-A'. This project contributes approximately 47.58 MW to the thermal violation.

CONTINGENCY '1760_C2_05JEFRSO 765-A'
OPEN BRANCH FROM BUS 243207 TO BUS 243208 CKT 1 / 243207 05GRNTWN 765 243208 05JEFRSO 765 1
OPEN BRANCH FROM BUS 242924 TO BUS 243208 CKT 1 / 242924 05HANGR 765 243208 05JEFRSO 765 1
END

Please refer to Appendix 1 for a table containing the generators having contribution to this flowgate.

2. (AEP - AEP) The 05DEQUIN-05MEADOW 345 kV line (from bus 243217 to bus 243878 ckt 2) loads from 126.35% to 128.32% (AC power flow) of its emergency rating (1304 MVA) for the line fault with failed breaker contingency outage of '4704_C2_05DEQUIN 345-B1'. This project contributes approximately 24.8 MW to the thermal violation.

CONTINGENCY '4704_C2_05DEQUIN 345-B1'
OPEN BRANCH FROM BUS 243217 TO BUS 243878 CKT 1 / 243217 05DEQUIN 345 243878 05MEADOW 345 1
OPEN BRANCH FROM BUS 243217 TO BUS 249525 CKT 1 / 243217 05DEQUIN 345 249525 08WESTWD 345 1
END

Please refer to Appendix 2 for a table containing the generators having contribution to this flowgate.

3. (AEP - MISO NIPS) The 05MEADOW-17REYNOLDS 345 kV line (from bus 243878 to bus 255205 ckt 1) loads from 101.23% to 102.77% (AC power flow) of its emergency rating (2627 MVA) for the line fault with failed breaker contingency outage of '8648_C2_05JEFRSO 765-B1'. This project contributes approximately 35.37 MW to the thermal violation.

CONTINGENCY '8648_C2_05JEFRSO 765-B1'
OPEN BRANCH FROM BUS 243208 TO BUS 243209 CKT 1 / 243208 05JEFRSO 765 243209 05ROCKPT 765 1
OPEN BRANCH FROM BUS 243208 TO BUS 242865 CKT 2 / 243208 05JEFRSO 765 242865 05JEFRSO 345 2
OPEN BRANCH FROM BUS 242865 TO BUS 248000 CKT Z1 / 242865 05JEFRSO 345 248000 06CLIFTY 345 Z1
END

Please refer to Appendix 3 for a table containing the generators having contribution to this flowgate.

4. (AEP - MISO NIPS) The 05MEADOW-17REYNOLDS 345 kV line (from bus 243878 to bus 255205 ckt 1) loads from 101.23% to 102.77% (AC power flow) of its emergency rating (2627 MVA) for the line fault with failed breaker contingency outage of 'ADD614'. This project contributes approximately 35.37 MW to the thermal violation.

CONTINGENCY 'ADD614'
OPEN BRANCH FROM BUS 243208 TO BUS 243209 CKT 1
OPEN BRANCH FROM BUS 243208 TO BUS 242865 CKT 2
END

5. (OVEC - OVEC) The 06CLIFTY-06DEARB1 345 kV line (from bus 248000 to bus 248001 ckt 1) loads from 118.54% to 119.63% (AC power flow) of its emergency rating (956 MVA) for the line fault with failed breaker contingency outage of '1760_C2_05JEFRSO 765-A'. This project contributes approximately 12.19 MW to the thermal violation.

CONTINGENCY '1760_C2_05JEFRSO 765-A'
OPEN BRANCH FROM BUS 243207 TO BUS 243208 CKT 1 / 243207 05GRNTWN 765 243208 05JEFRSO 765 1
OPEN BRANCH FROM BUS 242924 TO BUS 243208 CKT 1 / 242924 05HANGR 765 243208 05JEFRSO 765 1
END

Please refer to Appendix 4 for a table containing the generators having contribution to this flowgate.

6. (LGEE - OVEC) The 7TRIMBLE-06CLIFTY 345 kV line (from bus 324114 to bus 248000 ckt 1) loads from 162.05% to 163.24% (AC power flow) of its emergency rating (1370 MVA) for the line fault with failed breaker contingency outage of 'ADD615'. This project contributes approximately 19.28 MW to the thermal violation.

CONTINGENCY 'ADD615'
OPEN BRANCH FROM BUS 243208 TO BUS 243209 CKT 1
OPEN BRANCH FROM BUS 243208 TO BUS 243207 CKT 1
END

Please refer to Appendix 5 for a table containing the generators having contribution to this flowgate.

7. (LGEE - OVEC) The 7TRIMBLE-06CLIFTY 345 kV line (from bus 324114 to bus 248000 ckt 1) loads from 142.32% to 142.83% (AC power flow) of its emergency rating (1370 MVA) for the single line contingency outage of '363_B2_TOR1682'. This project contributes approximately 5.71 MW to the thermal violation.

CONTINGENCY '363_B2_TOR1682'
OPEN BRANCH FROM BUS 243208 TO BUS 243209 CKT 1 / 243208 05JEFRSO 765 243209 05ROCKPT 765 1
END

Steady-State Voltage Requirements
(Results of the steady-state voltage studies should be inserted here)

None

Short Circuit
(Summary of impacted circuit breakers)

None

Stability and Reactive Power Requirement
(Results of the dynamic studies should be inserted here)

Stability Study - Evaluation Criteria

This study is focused on AC2-157, along with the rest of the PJM system, maintaining synchronism and having all states return to an acceptable new condition following the disturbance. The recovery criteria applicable to this study are as per PJM's Regional Transmission Planning Process and Transmission Owner criteria:

a) The system with AC2-157 included is transiently stable and post-contingency oscillations should be positively damped with a damping margin of at least 3% for local and interarea modes.

b) AC2-157 is able to ride through faults (except for faults where protective action trips AC2-157).

c) Following fault clearing, all bus voltages recover to a minimum of 0.7 per unit after 2.5 seconds (except where protective action isolates that bus).

d) No transmission element trips, other than those either directly connected or designed to trip as a consequence of that fault.

Stability Study - Summary of Results

Plots from the dynamic simulations are provided in Attachment 3, with results summarized in Table 5 through Table 14.

The reactive power capability of AC2-157 meets the 0.95 leading PF requirement; however, it is does NOT meet the lagging PF requirement at the high-voltage side of the main transformer.

All criteria have been met for the contingencies tested.

It was found that:

- Network non-convergence was observed for multiple contingencies as summarized in the Table 4.

Table 4: Summary of network non-convergence

Contingency	Time [s]	Unit	Bus
P1.01 ~ P1.09*	0.4917 ~ 0.5125	AC2-157	933447
	0.5 ~ 0.5708	J1180	41800
P1.10 ~ P1.24* & P2.01 ~ P2.04* & & P7.02 ~ P7.03*	0.4917 ~ 0.5708	J1180	41800
P4.01 ~ P4.39*	0.4917 ~ 0.7625	J1180	41800
P7.01*	0.4917 ~ 0.5125	AC2-157	933447
	0.500 ~ 0.5708	J1180	41800

*Non-convergence during fault, that should not be a problem if it recovers back after the fault is removed.

- The active power of AC2-157 units did not recover to the pre-fault value in the contingencies that the AC2-157 Eterm is reduced to values less than 1 p.u. Therefore, CON(J+6) in the AC2-157 inverter model, i.e., Lvpnt1, High Voltage point for Low Voltage Active Current Management in the REGCAU1 module, was changed to 0.9 pu from the original 1 pu value. This change resolved the active power recovery issue of AC2-157.
- Contingencies P1.15, P4.24, and P6.ME.01 ~ P6.ME.03 (prior outage of Rockport – Jefferson 765 kV circuit) showed tripping issue for Rockport G1 and G2 units. Contingency P6.ME.02 showed tripping issue for AB1-087 and AB1-088 units and Rockport G1 and G2 units. AC2-157 was also tripped by undervoltage relay in contingencies P6.ME.01 ~ P6.ME.03. These contingencies were tested after activation of the fast-valving special protection scheme (SPS) at Rockport units. The fast-valving SPS resolved the tripping issue of Rockport G1 and G2 units in the contingencies P1.15 and P4.24. However, in the contingencies P6.ME.01 – P6.ME.03, with the fast-valving SPS,

the Rockport G1 and G2 units and AB1-087 and AB1-088 units still tripped due to angle deviation. AC2-157 units was also tripped by undervoltage relay in the contingencies P6.ME.01 ~ P6.ME.03 with the fast-valving SPS. For these contingencies, a user-defined model has been used for the Rockport units in order to enable the testing of the fast-valving SPS.

- During the AB1-087_088 sutdy, the contingencies P6.ME.01 – P6.ME.04 (prior outage of Rockport – Jefferson 765 kV circuit) exhibited the tripping issue of Rockport units G1 and G2 even with the active fast-valving SPS. Please note that P6.ME.01 – P6.ME.04 were tested with HSR scheme in AB1-087_088 study and thus, P6.ME.04 also showed tripping issue. Therefore, the tripping issue of Rockport units G1 and G2 in these contingencies is a pre-existing issue and it is not attributable to addition of AC2-157 units. Furthermore, the prior outage cases have been tested for informational purposes and no mitigation is required.

Stability Study - Recommendations and Mitigations

No mitigations were found to be required due to instability; however, it was observed that the AC2-157 plant is deficient in lagging power factor requirement at the high-voltage side of the main transformer by 5.46 MVAr. This may need to be addressed through reactive compensation.

Affected System Analysis & Mitigation

LGEE Impacts:

A potential constraint was identified by PJM on the Trimble – Clifty 345 kV line (LG&E/OVEC tie line). The upgrade (LG&E) on the Trimble – Clifty 345 kV line, if determined to be a constraint by LG&E, is to reconductor the line with a high temperature conductor and upgrade necessary terminal equipment to achieve ratings of 2610/2610 MVA SN/SE. Cost estimate is $17.4M with a time estimate of 18 months. An LG&E affected system study is required to determine if the AC2-157 queue project causes any impacts on the LG&E system, including the Trimble-Clifty LG&E-OVEC tie line. Final LG&E Impacts and necessary LG&E system upgrade(s) will be determined once the LG&E affected system study is completed by LG&E.

AC2-157 will be required to sign onto an LG&E Affected System Study.

MISO Impacts:

None

Duke, Progress & TVA Impacts:

None

OVEC Impacts:

None

Delivery of Energy Portion of Interconnection Request

PJM also studied the delivery of the energy portion of this interconnection request. Any problems identified below are likely to result in operational restrictions to the project under study. The developer can proceed with network upgrades to eliminate the operational restriction at their discretion by submitting a Merchant Transmission Interconnection request.

Note: Only the most severely overloaded conditions are listed below. There is no guarantee of full delivery of energy for this project by fixing only the conditions listed in this section. With a Transmission Interconnection Request, a subsequent analysis will be performed which shall study all overload conditions associated with the overloaded element(s) identified.

1. (AEP - AEP) The 05DEQUIN-05MEADOW 345 kV line (from bus 243217 to bus 243878 ckt 2) loads from 121.8% to 123.77% (AC power flow) of its normal rating (1304 MVA) for the single line contingency outage of '6472_B2_TOR15258'. This project contributes approximately 24.54 MW to the thermal violation.

CONTINGENCY '6472_B2_TOR15258'
OPEN BRANCH FROM BUS 243217 TO BUS 243878 CKT 1 / 243217 05DEQUIN 345 243878 05MEADOW 345 1
END

2. (LGEE - OVEC) The 7TRIMBLE-06CLIFTY 345 kV line (from bus 324114 to bus 248000 ckt 1) loads from 135.69% to 136.62% (AC power flow) of its emergency rating (1370 MVA) for the single line contingency outage of '363_B2_TOR1682'. This project contributes approximately 15.03 MW to the thermal violation.

CONTINGENCY '363_B2_TOR1682'
OPEN BRANCH FROM BUS 243208 TO BUS 243209 CKT 1 / 243208 05JEFRSO 765 243209 05ROCKPT 765 1
END

Light Load Analysis

Not Applicable

New System Reinforcements

(Upgrades required to mitigate reliability criteria violations, i.e. Network Impacts, initially caused by the addition of this project generation)

None

Contribution to Previously Identified System Reinforcements

(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project. This project may have a % allocation cost responsibility which will be calculated and reported for the Impact Study)
(Summary form of Cost allocation for transmission lines and transformers will be inserted here if any)

1. To relieve the Jefferson – Clifty 345 kV line overloads: Clifty-end SE rating is 2045 MVA SE. There is a 2018 baseline upgrade B2878 to replace the Clifty riser and increase the SE rating to match the Jefferson-end SE rating of 2354 MVA SE which would be sufficient for AC2-157. Baseline upgrade B2878 is now in-service. AEP will need to confirm the new SE rating during the Facilities Study to ensure no additional upgrade is required for AC2-157.

2. To relieve the Trimble – Clifty 345 kV line overload:

A potential constraint was identified by PJM on the Trimble – Clifty 345 kV line (LG&E/OVEC tie line). The upgrade (LG&E) on the Trimble – Clifty 345 kV line, if determined to be a constraint by LG&E, is to reconductor the line with a high temperature conductor and upgrade necessary terminal equipment to achieve ratings of 2610/2610 MVA SN/SE. Cost estimate is $17.4M with a time estimate of 18 months. An LG&E affected system study is required to determine if the AC2-157 queue project causes any impacts on the LG&E system, including the Trimble-Clifty LG&E-OVEC tie line. Final LG&E Impacts and necessary LG&E system upgrade(s) will be determined once the LG&E affected system study is completed by LG&E.
AC2-157 will be required to sign onto an LG&E Affected System Study.

No OVEC end upgrades are required.

3. To relieve the Clifty – Dearborn 345 kV line overload:

   There is a planned 2018 baseline upgrade, B2943, to perform a LIDAR study on the line. LIDAR study results show that various mitigations are required involving various structures. The new expected SE rating is 1251 MVA SE. Expected completion date of the B2943 work is 4/15/2020.
   The LIDAR study and results of the LIDAR study should be confirmed during the Facilities Study phase of AC2-157 in order to conclude that no additional work scope is required beyond B2943 that AC2-157 may be responsible for.

   AC2-157 will need an interim study if coming into service prior to completion of baseline upgrade B2943.

4. To relieve the Dequine – Meadowlake 345 kV line #2 overload:

   The Dequine stuck breaker contingency causing the overload is no longer valid due to the completion of PJM netowrk upgrades N5817 and N5818 which added a 345 kV breaker at Dequine (breaker ‘D’). AC2-157 has no cost responsibility for this upgrade.

5. To relieve the Meadowlake – Reynolds 345 kV line #1 overload:

   PJM Baseline Upgrade B2449 – Rebuild the 7-mile 345 kV line between Meadowlake and Reynolds 345 kV stations. This upgrade is presently in-service.
   AC2-157 will have no cost responsibility for this upgrade.

   PJM Supplemental Project S1141 – Loop in the Meadowlake – Olive 345 kV circuit into Reynolds. This upgrade is presently in-service. AC2-157 will have no cost responsibility for this upgrade.

Schedule

It is anticipated that the time between receipt of executed agreements and Commercial Operation may range from 12 to 18 months if no line work is required. If line work is required, construction time would be between 24 to 36 months after signing an interconnection agreement.

Note: The time provided between anticipated normal completion of System Impact, Facilities Studies, subsequent execution of ISA and ICSA documents, and the proposed Backfeed Date is shorter than usual and may be difficult to achieve.

Conclusion

Based upon the results of this System Impact Study, the construction of the 200.0 MW (76.0 MW Capacity) solar generating facility of Invenergy (PJM Project #AC2-157) will require the following additional interconnection charges. This plan of service will interconnect the proposed solar generating facility in a manner that will provide operational reliability and flexibility to both the AEP system and the Invenergy generating facility.

Cost Breakdown for Point of Interconnection (Sullivan 345 kV Substation)			
Type of Network Upgrade	**Network Upgrade #**	**Description**	**Estimated Cost**
Attachment Cost	**n6049**	Expand the Sullivan 345 kV Substation	$3,500,000
Attachment Cost	**n6050**	345 kV Revenue Metering	$350,000
Non-Direct Connection Cost Estimate	**N5469**	Reconductor Trimble - Clifty 345 kV line	$17,400,000
	Total Estimated Cost for Project AC2-157		**$21,250,000**

Table 2

The estimates are preliminary in nature, as they were determined without the benefit of detailed engineering studies. Final estimates will require an on-site review and coordination to determine final construction requirements.

Figure 1: Point of Interconnection (Sullivan 345 kV Substation)

Single-Line Diagram

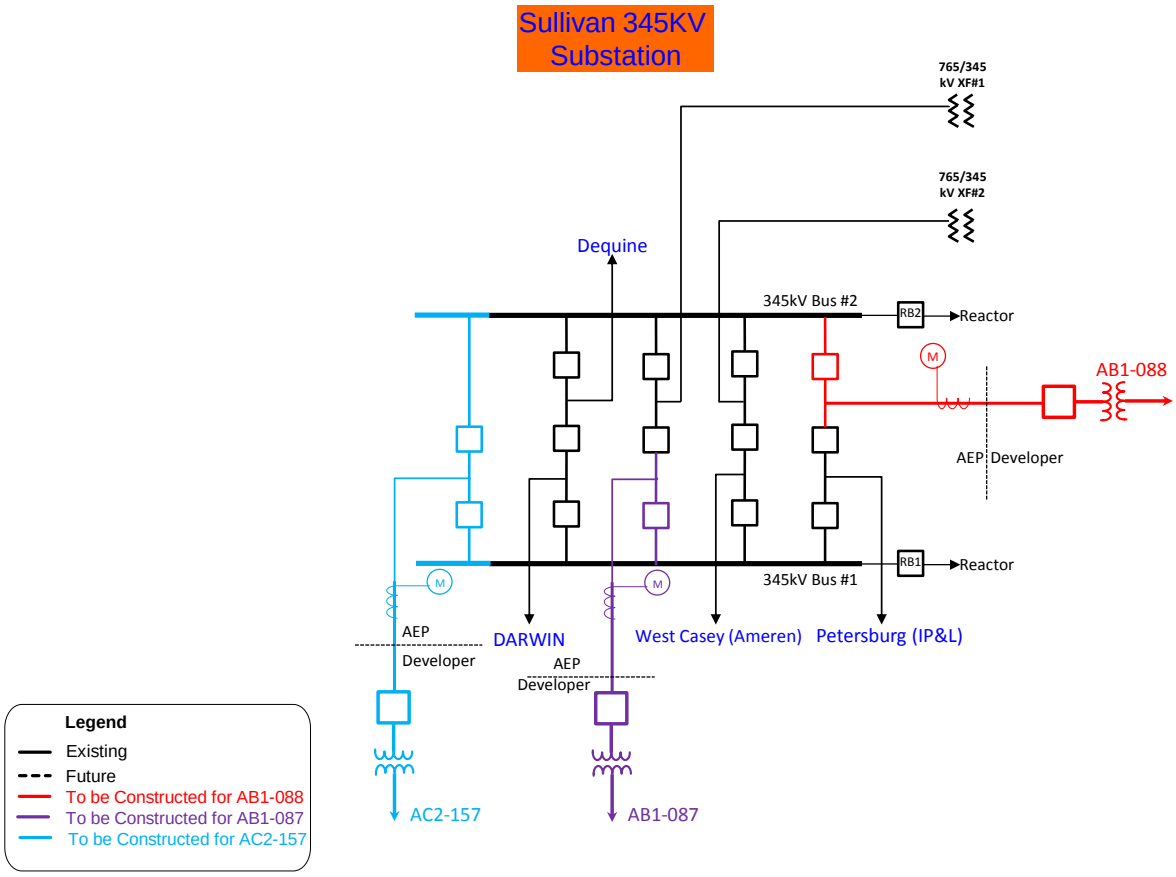
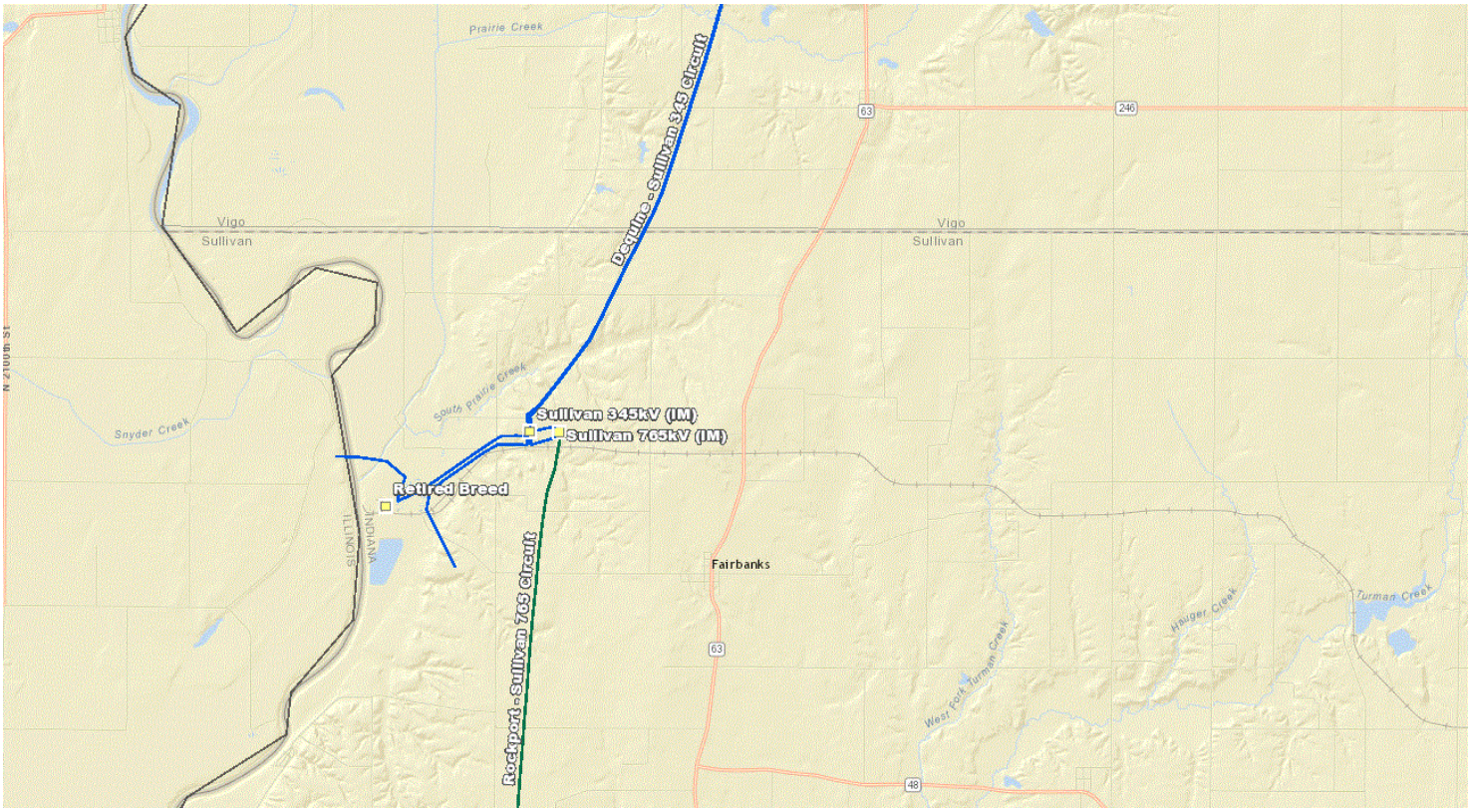


Figure 2: Point of Interconnection (Sullivan 345 kV Substation)



Appendices

The following appendices contain additional information about each flowgate presented in the body of the report. For each appendix, a description of the flowgate and its contingency was included for convenience. However, the intent of the appendix section is to provide more information on which projects/generators have contributions to the flowgate in question. All New Service Queue Requests, through the end of the Queue under study, that are contributors to a flowgate will be listed in the Appendices. Please note that there may be contributors that are subsequently queued after the queue under study that are not listed in the Appendices. Although this information is not used "as is" for cost allocation purposes, it can be used to gage the impact of other projects/generators.

It should be noted the project/generator MW contributions presented in the body of the report and appendices sections are full contributions, whereas the loading percentages reported in the body of the report, take into consideration the commercial probability of each project as well as the ramping impact of "Adder" contributions.

Appendix 1

(AEP - OVEC) The 05JEFRSO-06CLIFTY 345 kV line (from bus 242865 to bus 248000 ckt Z1) loads from 105.9% to 108.36% (AC power flow) of its emergency rating (2045 MVA) for the line fault with failed breaker contingency outage of '1760_C2_05JEFRSO 765-A'. This project contributes approximately 47.58 MW to the thermal violation.

CONTINGENCY '1760_C2_05JEFRSO 765-A'
OPEN BRANCH FROM BUS 243207 TO BUS 243208 CKT 1 / 243207 05GRNTWN 765 243208 05JEFRSO 765 1
OPEN BRANCH FROM BUS 242924 TO BUS 243208 CKT 1 / 242924 05HANGR 765 243208 05JEFRSO 765 1
END

Bus Number	*Bus Name*	*Full Contribution*
247900	*05FR-11G E*	*6.24*
247901	*05FR-12G E*	*6.14*
247902	*05FR-21G E*	*6.56*
247903	*05FR-22G E*	*6.28*
247904	*05FR-3G E*	*12.72*
247905	*05FR-4G E*	*9.57*
247906	*05MDL-1G E*	*10.8*
247907	*05MDL-2G E*	*5.36*
247912	*05MDL-3G E*	*5.6*
247913	*05MDL-4G E*	*5.34*
243442	*05RKG1*	*123.28*
243443	*05RKG2*	*121.41*
932601	*AC2-080 C O1*	*1.47*
932602	*AC2-080 E O1*	*9.83*
933391	*AC2-152 C*	*0.25*
933392	*AC2-152 E*	*0.41*
933441	*AC2-157 C*	*18.08*
933442	*AC2-157 E*	*29.5*
294401	*BSHIL;1U E*	*4.74*
294410	*BSHIL;2U E*	*4.74*
274890	*CAYUG;1U E*	*7.49*
274891	*CAYUG;2U E*	*7.49*
274849	*CRESCENT ;1U*	*3.23*
998111	*J468*	*1.87*
998112	*J468*	*10.58*
990901	*L-005 E*	*7.27*
293516	*O-009 E1*	*4.62*
293517	*O-009 E2*	*2.35*
293518	*O-009 E3*	*2.58*

293715	*O-029 E*	*4.93*
293716	*O-029 E*	*2.71*
293717	*O-029 E*	*2.49*
293771	*O-035 E*	*3.51*
247556	*T-127 C*	*1.37*
247943	*T-127 E*	*5.48*
274853	*TWINGROVE;U1*	*11.42*
274854	*TWINGROVE;U2*	*11.42*
276150	*W2-048 E*	*4.99*
905082	*W4-005 E*	*23.43*
909052	*X2-022 E*	*14.98*
913222	*Y1-054 E*	*-1.26*
247629	*Y3-038*	*3.36*
915662	*Y3-099 E*	*0.13*
915672	*Y3-100 E*	*0.13*
916182	*Z1-065 E*	*0.36*
920792	*Z2-087 C*	*1.72*
920793	*Z2-087 E*	*11.49*
LTF	*AA1-001*	*5.6*
LTF	*AA1-071*	*3.89*
921702	*AA2-039 C*	*1.16*
921703	*AA2-039 E*	*7.74*
922592	*AB1-006 C*	*1.76*
922593	*AB1-006 E*	*11.77*
922982	*AB1-087 C OP*	*130.85*
922992	*AB1-088 C OP*	*130.85*
924041	*AB2-047 C OP*	*2.17*
924042	*AB2-047 E OP*	*14.49*
924261	*AB2-070 C OP*	*2.05*
924262	*AB2-070 E OP*	*13.75*
925242	*AB2-178 E*	*1.33*
926321	*AC1-033 C*	*0.78*
926322	*AC1-033 E*	*5.2*
926521	*AC1-053 C*	*2.06*
926522	*AC1-053 E*	*13.79*
927781	*AC1-168 C OP*	*0.59*
927782	*AC1-168 E OP*	*3.97*
927811	*AC1-171 C OP*	*0.68*
927812	*AC1-171 E OP*	*4.52*
928251	*AC1-214 C OP*	*1.13*
928252	*AC1-214 E OP*	*3.58*

Appendix 2

(AEP - AEP) The 05DEQUIN-05MEADOW 345 kV line (from bus 243217 to bus 243878 ckt 2) loads from 126.35% to 128.32% (AC power flow) of its emergency rating (1304 MVA) for the line fault with failed breaker contingency outage of '4704_C2_05DEQUIN 345-B1'. This project contributes approximately 24.8 MW to the thermal violation.

CONTINGENCY '4704_C2_05DEQUIN 345-B1'
OPEN BRANCH FROM BUS 243217 TO BUS 243878 CKT 1 / 243217 05DEQUIN 345 243878 05MEADOW 345 1
OPEN BRANCH FROM BUS 243217 TO BUS 249525 CKT 1 / 243217 05DEQUIN 345 249525 08WESTWD 345 1
END

Bus Number	*Bus Name*	*Full Contribution*
243859	*05FR-11G C*	*2.05*
247900	*05FR-11G E*	*42.46*
243862	*05FR-12G C*	*2.02*
247901	*05FR-12G E*	*41.76*
243864	*05FR-21G C*	*2.15*
247902	*05FR-21G E*	*44.63*
243866	*05FR-22G C*	*2.06*
247903	*05FR-22G E*	*42.74*
243870	*05FR-3G C*	*4.17*
247904	*05FR-3G E*	*86.56*
243873	*05FR-4G C*	*3.23*
247905	*05FR-4G E*	*65.08*
933441	*AC2-157 C*	*9.42*
933442	*AC2-157 E*	*15.37*
998111	*J468*	*2.85*
998112	*J468*	*16.17*
998120	*J515*	*57.93*
971511	*J754*	*7.42*
971512	*J754*	*29.68*
701171	*Y4-018 C*	*1.02*
701172	*Y4-018 E*	*4.06*
LTF	*AA1-001*	*4.12*
922982	*AB1-087 C OP*	*68.19*
922992	*AB1-088 C OP*	*68.19*

Appendix 3

(AEP - MISO NIPS) The 05MEADOW-17REYNOLDS 345 kV line (from bus 243878 to bus 255205 ckt 1) loads from 101.23% to 102.77% (AC power flow) of its emergency rating (2627 MVA) for the line fault with failed breaker contingency outage of '8648_C2_05JEFRSO 765-B1'. This project contributes approximately 35.37 MW to the thermal violation.

CONTINGENCY '8648_C2_05JEFRSO 765-B1'
OPEN BRANCH FROM BUS 243208 TO BUS 243209 CKT 1 / 243208 05JEFRSO 765 243209 05ROCKPT 765 1
OPEN BRANCH FROM BUS 243208 TO BUS 242865 CKT 2 / 243208 05JEFRSO 765 242865 05JEFRSO 345 2
OPEN BRANCH FROM BUS 242865 TO BUS 248000 CKT Z1 / 242865 05JEFRSO 345 248000 06CLIFTY 345 Z1
END

Bus Number	*Bus Name*	*Full Contribution*
243859	*05FR-11G C*	*1.95*
247900	*05FR-11G E*	*40.36*
243862	*05FR-12G C*	*1.92*
247901	*05FR-12G E*	*39.69*
243864	*05FR-21G C*	*2.05*
247902	*05FR-21G E*	*42.42*
243866	*05FR-22G C*	*1.96*
247903	*05FR-22G E*	*40.62*
243870	*05FR-3G C*	*3.97*
247904	*05FR-3G E*	*82.27*
243873	*05FR-4G C*	*3.07*
247905	*05FR-4G E*	*61.85*
246909	*05MDL-1G C*	*4.69*
247906	*05MDL-1G E*	*97.1*
246910	*05MDL-2G C*	*2.34*
247907	*05MDL-2G E*	*48.15*
246976	*05MDL-3G C*	*2.34*
247912	*05MDL-3G E*	*50.34*
246979	*05MDL-4G C*	*4.69*
247913	*05MDL-4G E*	*48.03*
243442	*05RKG1*	*45.01*
243443	*05RKG2*	*44.33*
933441	*AC2-157 C*	*13.44*
933442	*AC2-157 E*	*21.93*
998120	*J515*	*57.08*
971511	*J754*	*7.24*
971512	*J754*	*28.97*

247556	*T-127 C*	*12.32*
247943	*T-127 E*	*49.27*
247629	*Y3-038*	*1.23*
LTF	*AA1-001*	*5.62*
922592	*AB1-006 C*	*15.81*
922593	*AB1-006 E*	*105.79*
922982	*AB1-087 C OP*	*97.28*
922992	*AB1-088 C OP*	*97.28*

Appendix 4

(OVEC - OVEC) The 06CLIFTY-06DEARB1 345 kV line (from bus 248000 to bus 248001 ckt 1) loads from 118.54% to 119.63% (AC power flow) of its emergency rating (956 MVA) for the line fault with failed breaker contingency outage of '1760_C2_05JEFRSO 765-A'. This project contributes approximately 12.19 MW to the thermal violation.

CONTINGENCY '1760_C2_05JEFRSO 765-A'
OPEN BRANCH FROM BUS 243207 TO BUS 243208 CKT 1 / 243207 05GRNTWN 765 243208 05JEFRSO 765 1
OPEN BRANCH FROM BUS 242924 TO BUS 243208 CKT 1 / 242924 05HANGR 765 243208 05JEFRSO 765 1
END

Bus Number	*Bus Name*	*Full Contribution*
243442	*05RKG1*	*28.86*
243443	*05RKG2*	*28.42*
933441	*AC2-157 C*	*4.63*
933442	*AC2-157 E*	*7.56*
247629	*Y3-038*	*0.79*
922982	*AB1-087 C OP*	*33.53*
922992	*AB1-088 C OP*	*33.53*

Appendix 5

(LGEE - OVEC) The 7TRIMBLE-06CLIFTY 345 kV line (from bus 324114 to bus 248000 ckt 1) loads from 162.05% to 163.24% (AC power flow) of its emergency rating (1370 MVA) for the line fault with failed breaker contingency outage of 'ADD615'. This project contributes approximately 19.28 MW to the thermal violation.

CONTINGENCY 'ADD615'
OPEN BRANCH FROM BUS 243208 TO BUS 243209 CKT 1
OPEN BRANCH FROM BUS 243208 TO BUS 243207 CKT 1
END

Bus Number	*Bus Name*	*Full Contribution*
247900	*05FR-11G E*	*4.66*
247901	*05FR-12G E*	*4.58*
247902	*05FR-21G E*	*4.9*
247903	*05FR-22G E*	*4.69*
247904	*05FR-3G E*	*9.5*
247905	*05FR-4G E*	*7.14*
247906	*05MDL-1G E*	*8.57*
247907	*05MDL-2G E*	*4.25*
247912	*05MDL-3G E*	*4.44*
247913	*05MDL-4G E*	*4.24*
342900	*1COOPER1 G*	*2.98*
342903	*1COOPER2 G*	*5.78*
342918	*1JKCT 1G*	*2.27*
342921	*1JKCT 2G*	*2.27*
342924	*1JKCT 3G*	*2.27*
342933	*1JKCT 6G*	*1.51*
342936	*1JKCT 7G*	*1.51*
342945	*1LAUREL 1G*	*1.67*
932551	*AC2-075 C*	*0.99*
932552	*AC2-075 E*	*0.5*
932881	*AC2-115 1*	*1.08*
932891	*AC2-115 2*	*1.08*
932921	*AC2-116*	*0.38*
933341	*AC2-147 C*	*0.42*
933342	*AC2-147 E*	*0.69*
933351	*AC2-148 C*	*0.43*
933352	*AC2-148 E*	*0.7*
933371	*AC2-150 C*	*0.43*
933372	*AC2-150 E*	*0.7*
933391	*AC2-152 C*	*0.23*
933392	*AC2-152 E*	*0.38*

933401	*AC2-153 C*	*0.2*
933402	*AC2-153 E*	*0.33*
933431	*AC2-156 C O1*	*0.39*
933432	*AC2-156 E O1*	*0.64*
933441	*AC2-157 C*	*7.33*
933442	*AC2-157 E*	*11.96*
294401	*BSHIL;1U E*	*4.73*
294410	*BSHIL;2U E*	*4.73*
274890	*CAYUG;1U E*	*6.94*
274891	*CAYUG;2U E*	*6.94*
274849	*CRESCENT ;1U*	*3.2*
274859	*EASYR;U1 E*	*5.37*
274860	*EASYR;U2 E*	*5.37*
290051	*GSG-6; E*	*4.74*
971521	*J759*	*9.64*
971531	*J762*	*29.93*
971571	*J783*	*9.69*
990901	*L-005 E*	*7.21*
290108	*LEEDK;1U E*	*10.64*
274850	*MENDOTA H;RU*	*2.73*
293061	*N-015 E*	*6.03*
293516	*O-009 E1*	*4.73*
293517	*O-009 E2*	*2.4*
293518	*O-009 E3*	*2.64*
293715	*O-029 E*	*5.05*
293716	*O-029 E*	*2.77*
293717	*O-029 E*	*2.55*
293771	*O-035 E*	*3.48*
293644	*O22 E1*	*4.26*
293645	*O22 E2*	*8.27*
290021	*O50 E*	*8.62*
294392	*P-010 E*	*7.66*
294763	*P-046 E*	*4.39*
274830	*PWR VTREC;1U*	*2.69*
274831	*PWR VTREC;2U*	*2.69*
274722	*S-055 E*	*4.68*
295111	*SUBLETTE E*	*1.23*
247556	*T-127 C*	*1.09*
247943	*T-127 E*	*4.35*
274853	*TWINGROVE;U1*	*10.32*
274854	*TWINGROVE;U2*	*10.32*
276150	*W2-048 E*	*4.44*
905082	*W4-005 E*	*20.94*

295109	*WESTBROOK E*	*2.54*
909052	*X2-022 E*	*13.33*
920462	*Y2-103*	*18.72*
920472	*Y3-013 1*	*1.56*
920482	*Y3-013 2*	*1.56*
920492	*Y3-013 3*	*1.56*
915662	*Y3-099 E*	*0.11*
915672	*Y3-100 E*	*0.11*
701842	*Y4-085 E*	*1.59*
916502	*Z1-106 E1*	*0.51*
916504	*Z1-106 E2*	*0.51*
916522	*Z1-108 E*	*1.04*
920782	*Z2-081*	*0.71*
920792	*Z2-087 C*	*1.58*
920793	*Z2-087 E*	*10.55*
LTF	*AA1-001*	*6.87*
920932	*AA1-018 C*	*1.02*
920933	*AA1-018 E*	*6.83*
LTF	*AA1-071*	*4.69*
921632	*AA1-146*	*8.95*
921682	*AA2-030*	*8.95*
921702	*AA2-039 C*	*1.15*
921703	*AA2-039 E*	*7.72*
922183	*AA2-123 E*	*1.06*
922592	*AB1-006 C*	*1.39*
922593	*AB1-006 E*	*9.34*
922982	*AB1-087 C OP*	*53.03*
922992	*AB1-088 C OP*	*53.03*
923002	*AB1-089 C*	*29.68*
930761	*AB1-122 1*	*29.27*
930762	*AB1-122 2*	*29.89*
924041	*AB2-047 C OP*	*1.98*
924042	*AB2-047 E OP*	*13.28*
924261	*AB2-070 C OP*	*1.83*
924262	*AB2-070 E OP*	*12.22*
924471	*AB2-096*	*18.69*
925161	*AB2-173 C*	*1.6*
925242	*AB2-178 E*	*1.07*
925301	*AB2-191 C*	*0.45*
925302	*AB2-191 E*	*0.63*
926321	*AC1-033 C*	*0.78*
926322	*AC1-033 E*	*5.19*
926521	*AC1-053 C*	*1.83*

926522	*AC1-053 E*	*12.27*
926731	*AC1-074 C OP*	*4.16*
926732	*AC1-074 E OP*	*1.78*
927081	*AC1-109*	*1.52*
927101	*AC1-110*	*1.53*
927121	*AC1-111*	*1.83*
927191	*AC1-113*	*1.08*
927211	*AC1-114*	*1.08*
927781	*AC1-168 C OP*	*0.58*
927782	*AC1-168 E OP*	*3.9*
927811	*AC1-171 C OP*	*0.65*
927812	*AC1-171 E OP*	*4.37*
927951	*AC1-185*	*2.69*
928141	*AC1-204*	*28.16*
928142	*AC1-204*	*28.16*
928251	*AC1-214 C OP*	*1.12*
928252	*AC1-214 E OP*	*3.55*