DICKINSON WRIGHT PLLC

150 E. GAY STREET, 24TH FLOOR
COLUMBUS, OH 43215-3192
TELEPHONE: (614) 591-5461
FACSIMILE: (844) 670-6009
http://www.dickinsonwright.com

CHRISTINE M.T. PIRIK
CPirik@dickinsonwright.com

June 7, 2021

Ms. Tanowa Troupe, Secretary
Ohio Power Siting Board
Docketing Division
180 East Broad Street, 11th Floor
Columbus, Ohio 43215-3797

Re: Case No. 20-417-EL-BGN
In the Matter of the Application of Grover Hill Wind, LLC for a Certificate of Environmental Compatibility and Public Need to Construct a Wind-Powered Electric Generation Facility in Paulding County, Ohio

Supplement to Application – Road Use Agreement, Habitat Assessment, Transportation Study, FAA, SHPO Concurrence Letters, ODNR Review

Dear Ms. Troupe:

On March 3, 2021, Grover Hill Wind, LLC ("Applicant") filed an application with the Ohio Power Siting Board for a Certificate of Environmental Compatibility and Public Need to Construct a Wind-Powered Electric Generation Facility in Paulding County, Ohio ("Application").

Attached please find, as a supplement to the Application:

1. Attachment 1 - Updated Application Exhibit E, Road Use Agreement: The Road Use Agreement ("RUA") filed with the Application had not yet been executed. Attachment 1 contains the executed RUA, with the exception of the signatures, all other language in the RUA remains the same. Attachment 1 replaces and supersedes Application Exhibit E filed on May 3, 2021.

2. Attachment 2 – Updated Exhibit K, Habitat Assessment Report: As stated in the Application at page 3, the Habitat Assessment would be provided to OPSB once the necessary information from the agencies was received. Attachment 2 provides includes the Habitat Assessment Report dated June 2, 2021. Attachment 2 replaces and supersedes Application Exhibit K filed on May 3, 2021.

3. Attachment 3 – Exhibit F, Transportation Study: As stated in the Application at page 24, the Transportation Study would be provided to OPSB once it was complete. Attachment 3 includes the Pre-Construction Road Evaluation completed by American Engineering Testing, Inc., dated June 2, 2021.

4. Attachment 4 – Supplement to Exhibit Y, Airport Coordination: As stated in the Application at page 58, the Applicant would provide OPSB with coordination with the Federal Aviation Administration ("FAA") upon receipt. Attachment 4 includes the FAA's preliminary findings and notification dated June 2, 2021.

5. Attachment 5 – Supplement to Exhibit Q, Architecture and Archaeological Surveys: Attachment 5 includes to concurrence letters received from the State Historic Preservation Office ("SHPO") dated May 12, 2021 and June 4, 2021, respectively.

6. Attachment 6 – Supplement to Exhibit D, Agency Correspondence: Attachment 6 includes correspondence from the Ohio Department of Natural Resources regarding its review of the Project.

We are available, at your convenience, to answer any questions you may have.

Respectfully submitted,

/s/ *Christine M.T. Pirik*____
Christine M.T. Pirik (0029759)
(Counsel of Record)
Terrence O'Donnell (0074213)
William V. Vorys (0093479)
Matthew C. McDonnell (0090164)
Dickinson Wright PLLC
150 East Gay Street, Suite 2400
Columbus, Ohio 43215
Phone: (614) 591-5461
Email: cpirik@dickinsonwright.com
todonnell@dickinsonwright.com
wvorys@dickinsonwright.com
mmcdonnell@dickinsonwright.com
(*Counsel agrees to receive service by email.*)

Attorneys for Grover Hill Wind, LLC

Enclosures

CC: Jim O'Dell
Theresa White
Randall Schumacher
Jon Pawley

CERTIFICATE OF SERVICE

The Ohio Power Siting Board's e-filing system will electronically serve notice of the filing of this document on the parties referenced in the service list of the docket card who have electronically subscribed to these cases. In addition, the undersigned certifies that a copy of the foregoing document is also being served upon the persons below this 7th day of June, 2021.

/s/ Christine M.T. Pirik
Christine M.T. Pirik (0029759)

Counsel via email:
werner.margard@ohioattorneygeneral.gov

Administrative Law Judges via email:

greta.see@puco.ohio.gov
david.hicks@puco.ohio.gov

4816-0840-4201 v2 [73809-23]

Attachment 1

Updated Application Exhibit E
Road use Agreement – Executed

This document replaces and supersedes Application Exhibit E filed on May 3, 2021.

DICKINSON WRIGHT PLLC

AGREEMENT FOR USE, REPAIR AND IMPROVEMENTS OF ROADS

This Agreement for Use, Repair, and Improvement of Roads (this "Agreement") is made and entered into as of May 5th, 2021 (the "Effective Date") by and between Paulding County and Latty Township, all political subdivisions organized under the laws of the State of Ohio ("Local Parties"), and Grover Hill Wind, LLC., a Delaware limited liability company ("Developer"). Each of the Local Parties and Developer are sometimes referred to as a "Party" and collectively as the "Parties."

RECITALS

A. Local Parties are responsible for constructing, altering, improving, and maintaining Local Parties' Roads and are authorized to limit or prohibit classes, types, or weights of vehicles that travel on, over, and across Local Parties' Roads (defined below) and to issue road construction, driveway, right of way, and other use permits.

B. Developer plans to use Local Parties' Roads to transport items, including but not limited to products, equipment, materials, and supplies relating the construction, maintenance and operation of a wind energy project known as the "Grover Hill Wind Project" to be located in Paulding County, Ohio, substantially as depicted on the Wind Farm Site Layout attached as Exhibit A and incorporated herein by this reference (the "Wind Farm"), across and over certain Local Parties' Roads identified in Exhibit A.

C. Local Parties and Developer anticipate that as a result of Developer's use of Local Parties' Roads, accelerated deterioration of a portion of such Local Parties' Roads may occur.

D. Developer seeks from Local Parties, and Local Parties grant to Developer, subject to the terms and conditions of this Agreement, a right to use Local Parties' Roads for purposes of transporting products, equipment, materials, and supplies relating to construction and operation and maintenance of the Wind Farm ("Wind Farm Purposes").

NOW, THEREFORE, in consideration of the terms, conditions, and covenants contained herein, the Parties mutually agree as follows:

AGREEMENT

1. Definitions. Capitalized terms used but not otherwise defined in this Agreement shall have the following meanings:

"Access Road" means any road constructed, widened, or improved by Developer located on lands comprising the Wind Farm as depicted on the Wind Farm Site Layout attached as Exhibit A.

"Additional Maintenance" means grading, dust control, reshaping, repair, and/or modification performed on Local Parties' Roads in excess of the same operations performed as Routine Maintenance by Local Parties.

"County Road" means any street, road, or other public way, including shoulders, designated for the purpose of vehicular traffic and under the jurisdiction of Paulding County.

"County Road System" means all County Roads under the jurisdiction of Paulding County.

"Developer's Parties" means Developer's contractors, subcontractors, employees, agents, licensees, and representatives acting under the direction or control of Grantee for Wind Farm Purposes.

"Extraordinary Use" means any use beyond what is common or usual.

"Heavy Haul Route" means any Local Parties' road, bridge, ditch, culvert, or other structure used by Developer for Heavy Traffic. Heavy Haul Routes are identified in Exhibit B.

"Heavy Traffic" means any crane or any vehicle which is delivering heavy turbine components, aggregate or concrete.

"Local Parties' Roads" means any public roadway under the jurisdiction of any of the Local Parties.

"Road Prism" means the driving surface of a road (including constructed roadbed), shoulders, ditches including backslopes, fillslopes, curbs, gutters, storm drainage facilities and sidewalks.

"Routine Maintenance" means any grading, reshaping, repair, or modification of the Road Prism by Local Parties that would occur in the absence of the use of a Local Parties' Road, as indicated in a regular maintenance schedule, or at the same intervals or frequency as would normally be included in such a schedule.

"Township Road" means any street, road, or other public way, including shoulders, designated for the purpose of vehicular traffic and under the jurisdiction of the Township.

"Township Road System" means all Township Roads under the jurisdiction of the Township.

2. Grant by Local Parties; Acknowledgment by Developer

2.1 Local Parties hereby grant to Developer a right to use the Heavy Haul Routes for construction purposes subject to the conditions contained herein and without any further conditions or requirements other than those set forth in this Agreement. Local Parties acknowledge and affirm that as of the Effective Date, Developer is not required to obtain any additional licenses, permits, or approvals from Local Parties for the development, construction, operation, and maintenance of the Wind Farm. This Agreement shall not serve to relieve any operator of any Developer vehicle from complying with applicable vehicular safety regulations. Without limiting the generality of the foregoing, for the purposes of this Agreement, the maximum Heavy Traffic speed limit on any Heavy Haul Route is 40 mph or such lower speed limit as may be reasonably posted by Local Parties on a Heavy Haul Route. No construction related vehicle shall be permitted to park within Local Parties' Road rights of way, except for emergency situations. Developer understands and agrees that, although the Heavy Haul Routes are within the Local Parties' jurisdiction and are subject to normal traffic use, Developer shall be solely responsible for making improvements or modifications to such Heavy Haul Routes as Developer determines necessary prior to Developer's

Extraordinary Use of such roads, and for all costs of Additional Maintenance or repair to such Heavy Haul Route resulting from Developer's Extraordinary Use of such Heavy Haul Route.

2.2 Except for the use by Developer of state and federal highways, all Heavy Traffic related to the Wind Farm shall exclusively use Heavy Haul Routes, and shall not use routes other than those so designated on Exhibit B hereto. Local Parties and Developer acknowledge that as of the execution of this Agreement, Developer has not fully formulated the final haul routes to the Wind Farm for Heavy Traffic, and as such, Developer and Local Parties agree that if Developer needs to amend the designation of the Heavy Haul Routes, Developer and Local Parties shall meet and discuss in good faith Developer's proposed changes to the Heavy Haul Routes. Any new segments of public roads to be included as a Heavy Haul Route shall undergo engineering due diligence to determine if upgrades are necessary, at Developer's sole discretion. Local Parties' approval of a change to the Heavy Haul Routes shall not be unreasonably withheld, conditioned, or delayed. Developer shall repair any damage caused by Developer during any use of Local Parties' Roads other than the routes designated in the Heavy Haul Route in accordance with Exhibit E and the burden of proving such incidental road damage was not caused by Developer or Developer's Parties shall be on Developer.

3. Inspection and Documentation

3.1 Pre-Construction Inspection and Documentation. The Parties acknowledge that (a) Developer has submitted to Local Parties a map of the proposed Heavy Haul Routes as Exhibit B; (b) Developer and a representative designated by Local Parties will jointly inspect the Heavy Haul Routes no later than 45 days prior to Developer's pre-construction conference with the staff of the Ohio Power Siting Board as required by OAC 49-1701 et seq. [CECPN requirements #23 and 24] (such date, the "Pre-Construction Inspection Date") to determine the existing condition of the Road Prism of proposed Heavy Haul Routes and make a video record, and possibly, at Developer's sole discretion, use other evaluative techniques such as but not limited to core sampling, crown measurements, ground-penetrating radar, and other forms of analysis and documentation; and (c) each Party will receive a copy of the video record. Not less than fifteen (15) days prior to Developer's commencement of construction of the Wind Farm, Developer shall complete an inspection report describing the condition of each proposed Heavy Haul Route's Road Prism and attach and incorporate such report to this Agreement as Exhibit C (the "Pre-Construction Inspection Report"). The Pre-Construction Inspection Report shall identify any preexisting deficiencies in the Heavy Haul Routes that Developer determines, at its sole discretion, may interfere with its Wind Farm Purposes. Developer shall remedy all such preexisting deficiencies, if any, as set forth in the Pre-Construction Public Road Upgrade plans, to be prepared by Developer (if necessary) and incorporated herein as Exhibit D, prior to subjecting any such deficient portion of a Heavy Haul Route to Heavy Traffic. Exhibit D shall detail specifications of materials and engineering approved by Local Parties for remedying preexisting deficiencies, if any, as set forth in the Pre-Construction Public Road Upgrade plans. The preceding statement notwithstanding, all remedying of the preexisting deficiencies, if any, shall be approved by Local Parties and Road Agent prior to execution, and such remedying shall not inadvertently cause substantial degradation to other features of Local Parties' Road system.

3.2 Completion of Construction Inspection and Documentation. No more than fifteen (15) days after the Hauling Completion Date (defined below), Developer or its authorized representative and Local Parties shall jointly inspect each Heavy Haul Route identified in the Pre-Construction Inspection Report (the date of such joint inspection, the "Post-Construction Inspection Date"). Within forty five (45) days after the Post-Construction Inspection Date, Developer shall complete a report setting out (1) the condition of the Road Prism of each Heavy Haul Route used by Developer as of the Post-Construction Inspection Date as compared with its condition on the Pre-Construction Inspection Date, and (2) the estimated costs of any necessary Additional Maintenance or repair mutually agreed upon by the Parties (the "Post-Construction Inspection Report").

4. Completion of Hauling Activities. Upon completion by Developer of all hauling activities on Heavy Haul Routes, Developer shall notify Local Parties in writing via certified mail, return receipt requested, of such completion (the date of such notice, the "Hauling Completion Date"). If Developer seeks to use any Heavy Haul Route for Heavy Traffic following the Hauling Completion Date for the operation or maintenance of the Wind Farm (a) such use shall be subject to all applicable laws and regulations; (b) Developer shall, to the extent reasonably possible consult in advance with Local Parties regarding such use; and (c) to the extent such Heavy Traffic approaches the amount of work performed by Developer prior to the Hauling Completion Date, Developer shall work with Local Parties to develop a survey of the Heavy Haul Routes before and after such use, and to provide for the repair of any damage caused by Developer as shown by the difference between such surveys. All pre- and post-construction upgrades and/or repairs shall be completed by a pre-qualified roadway contractor as listed by the Ohio Department of Transportation, in accordance with Exhibit E. Exhibit E shall detail specifications of materials and engineering approved by Local Parties for pre- and post-construction upgrades and/or repairs. The preceding statement notwithstanding, all pre- and post-construction upgrades and/or repairs, if any, shall be approved by Local Parties and Road Agent prior to execution, and such upgrades and/or repairs shall not inadvertently cause substantial degradation to other features of Local Parties' Road system.

5. Road Agent. The Parties agree that the supervision of this Agreement may specifically include the appointment by Local Parties of a representative to act for and on behalf of Local Parties ("Road Agent"). However, in lieu of appointment of a Road Agent, the Parties may instead mutually agree to allow Developer to reimburse the Local Parties for the performance of the same tasks that would have been undertaken by a Road Agent had Local Parties appointed one; provided, however, Developer's reimbursement obligations shall not exceed the amount of $7,500.00 per month, which amount shall be split evenly between the Local Parties. If Local Parties opt to appoint a Road Agent, then the following provisions shall apply:

5.1. The appointment of a Road Agent shall be detailed in a consulting services agreement, in form and substance agreeable to Developer, between Local Parties and Road Agent ("Consulting Agreement"). The Consulting Agreement shall include detailed provisions regarding the authority of Road Agent to act on behalf of Local Parties. Developer shall reimburse Local Parties the fees earned and reasonable expenses incurred by Road Agent pursuant to and in accordance with the Consulting Agreement, up to a limit of $20,000.00 per month. Road Agent may spend time on a daily basis during the term of the

Consulting Agreement, as reasonably necessary, in reviewing road conditions, coordinating traffic, and monitoring the condition of culverts and drainage structures. The Parties anticipate that Road Agent will on average spend approximately twenty (20) hours per week in the performance of duties under the Consulting Agreement. In the event Road Agent spends more than 100 hours during any month performing duties under the Consulting Agreement, then the Parties shall meet and negotiate in good faith to address the reason(s) for the additional time, including the quality of performance by Developer and Developer Parties. If the Parties fail to reach a consensus regarding the basis for the extra time spent by Road Agent and/or a mutual plan for reduction of the same, then the Parties shall revert to the dispute resolution procedures of Section 12.2.3 of this Agreement.

6. Road Restoration; Reimbursement

6.1 Road Restoration; Additional Maintenance. As consideration for all rights granted to Developer in this Agreement and for purposes of repairing Heavy Haul Route degradation caused by Developer's activities thereon, Developer shall within one year after the Hauling Completion Date (the "Maintenance Period") restore each Heavy Haul Route to its condition as of the Pre-Construction Inspection Date set forth in Section 3.1 above. In addition, Developer shall reimburse Local Parties for all mutually agreed-upon, commercially reasonable costs of Additional Maintenance performed by Local Parties as a result of Developer's activities hereunder and pursuant to the Post-Construction Inspection Report. Developer shall have no obligation or liability for any preexisting deficiencies or repair costs relating thereto save and except to the degree any such preexisting deficiency is exacerbated by Developer's activities. During the term of this Agreement, Developer shall conduct Routine Maintenance on Heavy Haul Routes that is necessitated by Developer's Extraordinary Use of such Heavy Haul Routes. Without limiting Developer's road restoration obligations set forth in this paragraph, upon written notice to Local Parties that Developer has ceased hauling activities on any Heavy Haul Route, Developer shall have no further obligation to perform any maintenance on such Heavy Haul Route. Additional Maintenance for the Heavy Haul Routes will consist of all labor, materials and equipment to either improve the current condition of the road as required prior to construction or to repair damage caused by Developer during construction of Wind Farm in accordance with the provisions of this Section 6.1.

6.1.1 Prior to commencement of any Additional Maintenance identified by the Post Construction Inspection Report, the Parties shall meet to review the scope of such Additional Maintenance. If Developer agrees, Developer shall perform (or cause to be performed) such Additional Maintenance in accordance with the above, except to the extent that the need for Additional Maintenance is not the fault of the Developer. Once the scope of any Additional Maintenance is agreed upon by the Parties, Developer shall solicit construction bids and begin the scope of work as soon as practical, having due regard for safety, weather, the presence of emergency conditions and the costs of such repairs. Alternatively, the Parties may mutually agree that Developer will provide compensation directly to Local Parties based on an agreed upon estimate for the Additional Maintenance, and in such case, Local Parties shall perform the Additional Maintenance.

6.2 Emergency Repairs. Notwithstanding the foregoing, in the event Developer is reasonably believed by Local Parties to have caused damage to Heavy Haul Routes of a magnitude sufficiently great to create a hazard to the motoring public, which in Local Parties' opinion warrants an immediate repair or road closing, Local Parties, after making a reasonable attempt to notify

Developer of the damage, may unilaterally make or authorize repair. Local Parties shall photograph, video record and otherwise document the conditions and make all such documentation available to Developer. Any such emergency repair shall be subject to post-repair negotiations by the Parties. If there is no agreement as to amounts due, the dispute will be subject to the dispute resolution provisions of Section 12.2.3 of this Agreement.

6.3 Escrow Account or Letter of Credit. No later than thirty (30) days prior to commencement of Wind Farm construction, Developer shall either (a) place a cash deposit in the amount of two hundred thousand dollars ($200,000) (the "Escrow Account") into an interest-bearing escrow account at a mutually acceptable financial institution (with any interest earned thereon payable to the Developer) pursuant to an Escrow Agreement substantially in the form attached hereto as Exhibit F to this Agreement, or (b) deposit with Local Parties a letter of credit naming the Local Parties as the sole beneficiary in form and substance reasonably acceptable to the Parties, issued by a mutually acceptable financial institution, and in the amount of $200,000 ("Letter of Credit").

Local Parties may draw upon Escrow Account or Letter of Credit, as applicable, only if and to the extent that Developer fails or refuses to perform repairs or to pay the cost of performing repairs as required under this Agreement and such failure or refusal continues for more than thirty (30) days after Local Parties' notice to Developer thereof, and then only to the extent County Engineer or a representative of the County's Board of Commissioners or the Township Trustees, as applicable, certifies that: (i) Local Parties have complied with the requirements of notifying Developer, (ii) Developer has failed or refused to perform repairs or to pay the cost of performing repairs, (iii) Local Parties have performed such work (or had such work performed for it), (iv) Local Parties have incurred expenses for the performance of such work, and (v) Local Parties have evidenced to Developer the amount of such expenses. If Local Parties draws upon the Escrow Account or Letter of Credit, Local Parties shall provide a full accounting of the amount of the draw(s) and costs of repair to Developer. Developer shall be required to replenish any withdrawn funds to maintain a balance of $200,000 at all times, subject to a maximum aggregate deposit of two million dollars ($2,000,000).

Developer shall maintain the Escrow Account or Letter of Credit until the end of the Maintenance Period. If Developer disagrees with Local Parties' use of any escrowed monies, Developer may seek recovery of same through the dispute resolution provisions of Section 12.2.3 of this Agreement and use those same provisions to seek declaratory relief relieving Developer of responsibility to replenish the Escrow Account or Letter of Credit by a like amount.

6.4 Reimbursement; Invoices; Disputed Amounts. Developer shall reimburse Local Parties for all reasonable, actual, third-party engineering fees and costs associated with their review and cooperation in preparing all reports set forth in Section 3 up to a maximum of $10,000.00. Local Parties' review of any permit application associated with Developer's use of Heavy Haul Routes and commercially reasonable monitoring of Heavy Haul Route conditions during the term of this Agreement by representatives other than Road Agent shall be addressed by the permit fees in section 6.7 below. Developer shall make payment to Local Parties upon receipt of detailed invoices supported by written documentation, including supporting time cards and invoices, of the work performed. Developer shall pay the invoiced amount to Local Parties within thirty (30) days from its receipt of the invoice. In the event of any disputed invoiced amount, Developer shall pay any undisputed portion of the invoiced amount and the dispute shall be resolved in accord with Section 12.2.3 of this Agreement.

6.5 Collection System Cabling and Communication Cabling. Local Parties acknowledge that Developer intends to install certain (i) wires, cables, conduits, and/or lines (and their associated equipment) related to the collection and transmission of electricity at a voltage of up to 138 kV from the Wind Farm and (ii) communication wires, cables, and/or lines relating to the Wind Farm (collectively, the "Installations") and may desire to route portions of the Installations below or above ground by boring underneath or overhanging roadways at locations adjacent to or under (including across) Local Parties' Roads. In connection with Installations, Local Parties hereby grant to Developer all such authorizations and approvals from Local Parties necessary to complete the Installations, subject only to Developer's obtaining such private land rights necessary to permit Developer to complete the Installations and make the modifications and improvements to Local Parties' Roads contemplated by this Agreement. For the avoidance of doubt, Developer may not run underground or aboveground utilities parallel with a public road within the public right of way for any distance greater than twenty (20) feet without Local Parties' written consent.

6.6 Warranties. The Parties acknowledge that, during the period commencing the day after the expiration of the Maintenance Period and continuing for one year thereafter (the "Post-Maintenance Period"), there may be (i) a need for Additional Maintenance on the Local Parties' Roads to remedy road damages that could not have reasonably been discovered prior to the expiration of the Maintenance Period, or (ii) a need for additional repair work in the event any Additional Maintenance completed by Developer pursuant to Section 6.1 above for road surface, subsurface, bridges, culverts, and drainage tiles is defective (excluding normal wear and tear). Within ten (10) days after the commencement of the Post-Maintenance Period, the Local Parties may elect either to (a) require Developer to pay a one-time sum of Eighty Thousand and No/100 Dollars ($80,000.00) directly to the Local Parties (which sum will be split evenly between the Local Parties) to cover any Additional Maintenance discovered to be necessary during the Post-Maintenance Period, in which case Local Parties shall perform the Additional Maintenance, or (b) notify Developer at any time during the Post-Maintenance Period that, in Local Parties' commercially reasonable judgment, Additional Maintenance is necessary, in which event Developer shall make repairs at its own cost. Local Parties shall notify Developer of its election pursuant to the foregoing sentence within ten (10) days after the commencement of the Post-Maintenance Period. In the event Local Parties elect to require Developer to pay the aforesaid $80,000.00, but no Additional Maintenance becomes necessary during the Post-Maintenance Period (or, any Additional Maintenance performed in the Post-Maintenance Period costs Local Parties less than $80,000.00), then Local Parties shall return all or any unused portion of said sum to Developer.

6.7 Permits and Governmental Approvals; Access Roads. Local Parties shall provide to Developer for a permit fee of one thousand dollars ($1,000.00) per wind turbine to be paid to Latty Township where the turbine is located and one thousand dollars ($1,000.00) per wind turbine to Paulding County, all permits, licenses, and governmental approvals required to develop, construct, operate and maintain the Wind Farm or move Developer's vehicles on Local Parties' Roads, including all overweight and oversize vehicle permits, as well as for all Access Road entrance permits, utility crossing permits, and right of way use permits, in such locations identified in Exhibit A. Developer shall coordinate with County Engineer on appropriate culvert sizes and design and configuration of any utility crossings.

6.8 Removal of Stone from Access Roads on Local Parties Roads. Unless needed by the Developer or Landowner involved, Developer grants that any removal of stone from the turn radius of Access Roads shall be donated to the Township Trustees. The Township Trustees shall give directions to Developer on placement of such stones at the time of removal. The Township Trustees also have the right to decline the donation of stone if not needed.

7. Consultation. If, at any point during the term of this Agreement, Local Parties believe Developer has failed to adequately comply with the provisions of this Agreement or local traffic regulations, then upon reasonable notice, the Parties shall engage in good faith discussions with regard to the applicability of those provisions.

7.1 Fines for Missing or Improper Use of Traffic Signs. Signs of all highway closures and work zones shall be in accordance with the Federal Highway Administration Manual On Uniform Traffic Control Devices (MUTCD). Local Parties shall post traffic signs, including signs advising "No Wind Farm Construction Traffic" at various locations as an aid to traffic management. In the event Developer or Developer's Parties move a traffic control device to accommodate its construction traffic, such device shall be immediately replaced by Developer in accordance with the MUTCD at its expense. No traffic control device shall be moved without permission of Local Parties. In the event this provision is violated by one of Developer's contractors or subcontractors, Local Parties may impose a fine of $500.00 per occurrence on Developer.

7.2 Fines for Violation of the Scheduled Heavy Haul Route, Speeding, and Parking in the Right of Way. In the event Heavy Traffic for the Wind Farm uses roads other than those approved in advance and as designated in Exhibit B, or travels on the Heavy Haul Route at a speed significantly in excess of 40 mph, or impedes the flow of normal traffic by parking in a road right of way, the following rules shall apply: Local Parties may give written notice to Developer of time and place of such offense, specific identity of vehicle and owner and/or operator and Local Parties may impose a fine of $500.00 per occurrence on Developer to be paid within thirty (30) days of the date of a written notice that a violation has occurred is provided to Developer. The form of notice required is attached hereto as Exhibit G.

8. Corporate Guaranty.

8.1 Grover Hill Parent, L.L.C., a Delaware limited liability company, is a corporate parent of Developer ("Parent"). Parent has the authority to execute this Agreement for the limited and sole purpose of providing the Corporate Guaranty contained within this Section 8.

8.2 Punctual Performance. Parent hereby guarantees the punctual performance by Developer of those non-monetary obligations contained within this Agreement and owed by Developer to Local Parties.

8.3 Collection. Parent hereby guarantees the collection of those monetary obligations which may become due and owing by Developer to Local Parties under this Agreement.

8.4 Conditions. Corporate Guaranty contained in this Section 8 shall be subject to the following conditions:

8.4.1 Local Parties shall look first to Developer for the performance and payment of all obligations due under this Agreement, and shall diligently pursue all remedies which may exist against Developer;

8.4.2 Parent reserves the right to notice of demand and to protest, and further reserves all legal and equitable defenses which may exist against any claim or demand.

8.4.3 Duration. Corporate Guaranty shall continue in force until all obligations of Developer have been satisfied or until Developer's liability to Local Parties under this Agreement has been completely discharged, whichever first occurs.

8.5 Substitution. While Corporate Guaranty remains in force, Parent shall have the right to name a substitute guarantor. Any substitute guarantor shall have a credit rating equal to or better than Parent.

8.6 Parent shall provide written notice to Local Parties of any substitute guarantor not later than thirty (30) days after said substitution is made, and shall at the same time provide Local Parties with evidence of the substitute guarantor's assumption of Corporate Guaranty required by this Section 8.

8.7 Notices required by this Section 8 may be provided to Local Parties in the manner and at the address provided herein. Any notice to Parent may be given in the manner provided herein and at the address provided as part of Parent's signature block which appears at the end of this Agreement.

9. Assumption of Risk. Local Parties make no representation as to the present or future conditions of Local Parties Roads or the character of the traffic on Local Parties Road. Developer assumes all risks of damage to property of or injury to, Developer's contractor or anyone acting under the authority granted to the Developer by this Agreement.

10. Indemnification.

10.1 Indemnification by Developer. Developer agrees and covenants to indemnify, defend, and save harmless Local Parties and its agents against and from any loss, damage, costs, charges, liability, claims, demands, or judgments, whether to persons or property, arising out of negligence on the part of Developer or anyone acting under the Developer's authority granted by this Agreement provided, however, that Developer's sole obligation with regard to damage to Local Parties' Roads shall be as expressly set forth in Section 6 of this Agreement.

10.2 Indemnification by Local Parties. To the extent allowed under applicable law, Local Parties agree and covenant to indemnify, defend, and save harmless Developer against and from any loss, damage, costs, charges, liability, claims, demands, or judgments, whether to persons or property, arising out of any negligence on the part of Local Parties or anyone acting under Local Parties' authority granted by this Agreement.

11. Termination.

11.1 Termination by Developer. This Agreement may be terminated by Developer upon notice by Developer to Local Parties, in accordance with Section 4, that Developer has permanently ceased Heavy Traffic on all Heavy Haul Routes.

11.2 Termination by Local Parties. This Agreement may be terminated by Local Parties upon the occurrence of any of the following events: (a) violation by Developer or any of its agents of any of the material terms of this Agreement; (b) failure by Developer to pay any invoice delivered by Local Parties not satisfiable by drawing upon the Escrow Account or Letter of Credit; or (c) upon threat of endangerment to the public health, safety or welfare. Notwithstanding the foregoing, in the event that a default by Developer described in subclauses (a) or (b) above shall have occurred and remains uncured, Local Parties shall notify Developer in writing of the default, which notice sets forth in reasonable detail the facts pertaining to the default. If Developer has not remedied the default within thirty (30) days after Developer receives the written notice, or, if cure will take longer than 30 days, if Developer has not begun diligently to undertake the cure and thereafter diligently prosecutes the cure to completion, then Local Parties shall have the right to terminate this Agreement.

11.3 Effect of Termination. Upon termination of this Agreement for any reason, Developer shall immediately discontinue hauling operations covered by this Agreement. Developer's obligations set forth in Section 4 and Section 6.1-6.6 shall survive termination of this Agreement.

12. Miscellaneous.

12.1 Notices. All notices or other communications required or permitted by this Agreement, including payments to Local Parties, shall be in writing and shall be deemed given when personally delivered to Local Parties or Developer, or in lieu of such personal service, five (5) days after deposit in the United States mail, first class, postage prepaid, certified; or the next business day if sent by reputable overnight courier, provided receipt is obtained and charges prepaid by the delivering party. Any notice shall be addressed as follows:

To Local Parties:

Paulding County Engineer's Office
801 W. Wayne Street
Paulding, Ohio 45879
Attn: Travis R. McGarvey, P.E., P.S.
Fax No.: 419-399-3363
E-mail: engineer@pauldingcountyoh.com

To Developer:

Grover Hill Wind, LLC
5 Greenwich Office Park
2nd Floor
Greenwich, CT, 06831
Attn: Will Ouyang
Phone: 203-485-5146
E-mail: wouyang@starwood.com

12.2 Force Majeure. As used in this Agreement, "Force Majeure Event" means, causes or events beyond the reasonable control of, and without the fault or negligence of, the Party claiming such Force Majeure Event, including, without limitation, natural disasters; fire; lightning strikes; earthquake; unavailability of equipment; acts of God; unusually or unseasonably severe actions of the elements such as snow, floods, hurricanes, or tornadoes; terrorism; war; riots or publics disorders; strikes or other labor disputes; and actions or failures to act (including expropriation and requisition) of any governmental agency, to the extent such cause or event prevents or delays performance of any obligation imposed on the Party claiming such Force Majeure Event. No Party will be in breach or liable for any delay or failure in its performance under this Agreement to the extent such performance is prevented or delayed due to a Force Majeure Event

12.3 Legal Matters.

12.3.1 Governing Law. This Agreement shall be governed by and interpreted in accordance with the laws of the State of Ohio.

12.3.2 CONSEQUENTIAL DAMAGES. NOTWITHSTANDING ANYTHING TO THE CONTRARY IN THIS AGREEMENT, NEITHER PARTY SHALL BE ENTITLED TO, AND EACH PARTY HEREBY WAIVES ANY AND ALL RIGHTS TO RECOVER, CONSEQUENTIAL, INCIDENTAL, AND PUNITIVE OR EXEMPLARY DAMAGES, HOWEVER ARISING, WHETHER IN CONTRACT, IN TORT, OR OTHERWISE, UNDER OR WITH RESPECT TO ANY ACTION TAKEN IN CONNECTION WITH THIS AGREEMENT.

12.3.3 Dispute Resolution. In the event of any dispute relating to this Agreement or the Parties' respective rights, duties, and interests arising hereunder, the Parties shall endeavor to resolve such dispute through mutual negotiations conducted by officers from each Party. If the Parties are unable to resolve any such dispute through negotiations, the dispute shall be subject to arbitration to be conducted under the rules of the American Arbitration Association's construction industry arbitration rules.

12.4 Counterparts. This Agreement may be executed with counterpart signature pages and in duplicate originals, each of which shall be deemed an original, and all of which together shall constitute a single instrument.

IN WITNESS WHEREOF, the Parties have caused their authorized representatives to execute this Agreement for Use, Repair, and Improvement of Roads as of the date first above written.

Grover Hill Wind, LLC

Himanshu Saxena, CEO

COMMISSIONERS OF PAULDING COUNTY

Name: Mark Holtsberry

Name: Roy Klopfenstein

Name: Clint A. Vance

TRUSTEES OF LATTY TOWNSHIP

Name: Lyle EBEL

Name: Blake Sinn

Name: Jason A. Sheets (President)

PAULDING COUNTY ENGINEER

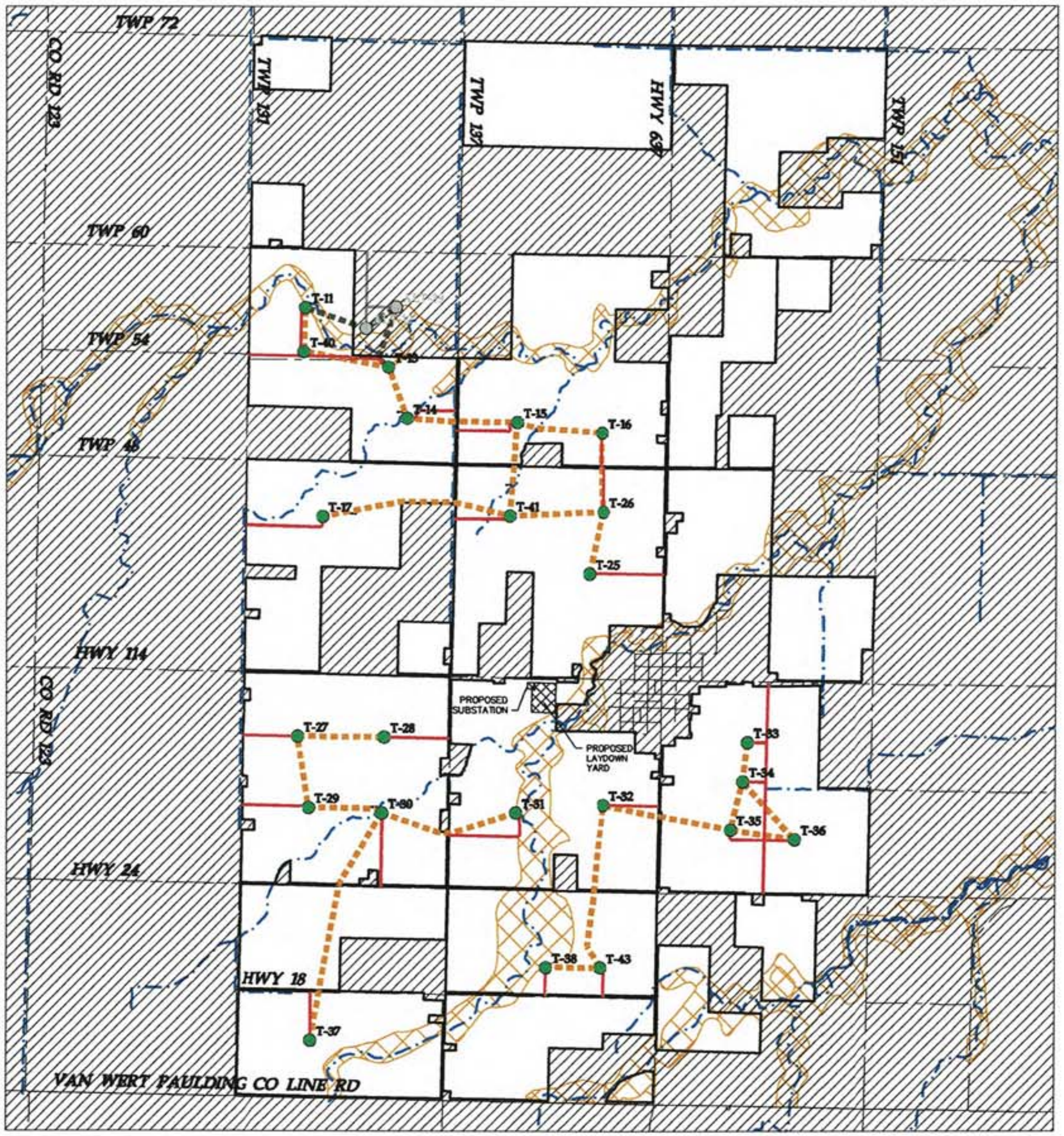
Name: Travis McGarvey

Approved as to Form: PAULDING COUNTY PROSECUTOR

Name: Joseph R. Burkard Date: 4-29-21

LIST OF EXHIBITS

© 2021 Westwood Professional Services, Inc.



LEGEND:

● T-XX	TURBINE LOCATION / TURBINE NUMBER
● T-XX (grey)	TURBINE LOCATION / TURBINE NUMBER
	PROPOSED ACCESS ROAD
	PROPOSED ACCESS ROAD – ALTERNATE
	PROPOSED CRANE PATH
	PROPOSED CRANE PATH – ALTERNATE
	EXISTING ROAD
	EXISTING GIS STREAM LINES
	OUTSIDE PROJECT BOUNDARY
	FEMA FLOODPLAIN

N

0' 1,500' 3,000' 4,500'

Westwood

Phone (952) 937-5150 12701 Whitewater Drive, Suite #300
Fax (952) 937-5822 Minnetonka, MN 55343
Toll Free (888) 937-5150 westwoodps.com

Westwood Professional Services, Inc.

Designed: AJW
Checked: SB
Drawn: AJW
As-Built Drawing:

Revisions:

#	DATE	DESCRIPTION
A	03/03/21	30% CIVIL CONSTRUCTION PLANS

Prepared for:

STARWOOD ENERGY GROUP
591 West Putnam Avenue
Greenwhich, CT 06830

Grover Hill Wind Project

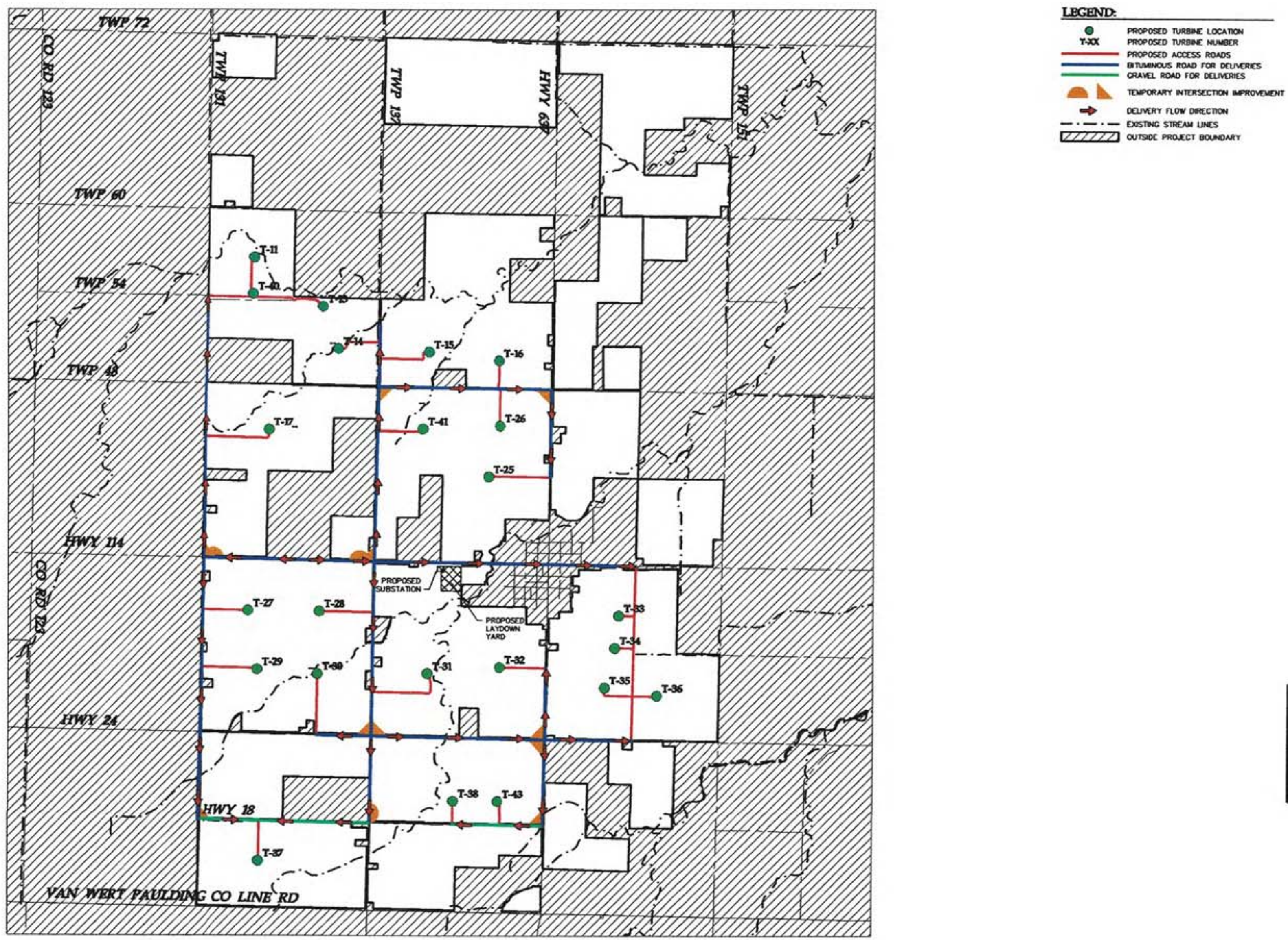
Paulding County, Ohio

Overall Civil Site Plan

30% Civil Plans
Not For Construction

Date: 03/03/2021
Sheet: 2 OF 19

0015695OA01.dwg



Westwood

Westwood Professional Services, Inc.

Designed: AJW
Checked: RP
Drawn: AJW
As-Built Drawing:

Revisions #	DATE	DESCRIPTION
A	05/04/21	30% CIVIL CONSTRUCTION PLANS

Prepared for:

STARWOOD ENERGY GROUP
591 West Putnam Avenue
Greenwich, CT 06830

Grover Hill Wind Project

Paulding County, Ohio

Delivery Flow Plan

30% Civil Plans
Not For Construction

Date: 05/04/2021
Sheet: 3 OF 19

0015895DF01.dwg

Attachment 2

Updated Exhibit K Habitat Assessment
Habitat Assessment Report
Grover Hill Request to Ohio Department of Natural Resources

DICKINSON WRIGHT PLLC

Westwood

2020-2021 HABITAT ASSESSMENT

Grover Hill Wind Energy Project

Paulding County, Ohio

June 2, 2021

2020-2021 Habitat Assessment

Grover Hill Wind Energy Project

Paulding County, Ohio

Prepared for:

STARWOOD ENERGY GROUP

Prepared by:

Westwood

Project Number: R0015695.00

Date: 6/2/2021

TABLE OF CONTENTS

TABLES

EXHIBITS

ACRONYMS AND ABBREVIATIONS

amsl	Above Mean Sea Level
ft	feet
m	meters
MRLC	Multi-Resolution Land Characteristics
MW	Megawatt
NLCD	National Land Cover Database
NOW	Northwest Ohio Wind
NRCS	Natural Resource Conservation Service
NWI	National Wetland Inventory
ODNR	Ohio Department of Natural Resources
Project	Grover Hill Wind Project
Starwood	Starwood Energy Group Global, LLC
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geologic Service
Westwood	Westwood Professional Services
WTG	Wind Turbine Generator

1.0 INTRODUCTION

Starwood Energy Group Global, LLC (Starwood) proposes to construct and operate the Grover Hill Wind Project (Project) in Paulding County, Ohio (**Exhibit 1.0a**). The Project Area consists of approximately 9,600acres (15 square miles) located in southern Paulding County, Ohio, approximately three miles east of the town of Haviland and six miles to the southeast of the town of Paulding. The town of Grover Hill is located within the east central portion of the Project Area (**Exhibit 1.0b**). The Project will be configured as a wind energy conversion facility with a total nameplate capacity of up to 150 megawatts (MW). Starwood continues to assess its turbine options, and is currently evaluating wind turbine generators (WTGs) with rated power outputs between 3.0 to 6.0 MW each, which may result in the installation of up to 23 wind turbines depending upon the model(s) selected and the final output of the Project. Additional facilities may include transmission line(s), access roads, electrical collection lines, an operations and maintenance facility, substation, and laydown area.

Westwood prepared this habitat assessment using a combination of desktop data and field data. The primary objective of this habitat assessment was to evaluate site characteristics to determine potential risks during the construction and operation phases of the Project as they pertain to biotic (living) and abiotic (non-living) resources that may occur within or near the Project Area.

2.0 PROJECT AREA

The Project Area is located in the Eastern Broadleaf Forest (Continental) Province (Bailey 1983). Elevation within the Project Area ranges from 709 feet to 735 feet above mean sea level (amsl) and topography is relatively flat (**Exhibit 2.0**). Portions of eight named waterways are located within the Project Area including Town Creek, Maddox Creek, Middle Creek, Hoaglin Creek, West Branch Creek, Prairie Creek, Dog Run, and Hog Run (**Exhibit 2.0**). Surface ownership in the Project Area is exclusively private. Several operating, utility-scale wind farms are located in the Project Area vicinity including the Northwest Ohio Wind Farm (NOW) (100MW), located directly west of the Project Area, Timber Road Wind Farm (100 MW), located west of NOW, and Blue Creek Wind Farm (304 MW), located to the south (**Exhibit 1.0b**).

3.0 LAND COVER TYPES

Land cover within the Project Area was mapped using the National Land Cover Dataset (NLCD) created by the Multi-Resolution Land Characteristics (MRLC) Consortium (Dewitz 2019). The

NLCD (Dewitz 2019) data was created using a 16-class land cover classification scheme that was applied across the United States at a spatial resolution of 30 meters and was created through a decision-tree classification of circa 2011 Landsat satellite data. Wetland data were supplemented with interpretation of aerial photographs and information from USFWS NWI maps (USFWS 2018). A total of seven land cover types were identified within the Project Area using NLCD data (Dewitz 2019). The seven land cover types included cultivated crops, developed areas, forest, herbaceous, woody wetlands, open water, and emergent herbaceous wetlands (**Exhibit 3.0**) (**Table 3.0**).

Table 3.0: Land Cover Types in the Project Area

Land Cover Type	Area (Acres)	Percent of Total
Cultivated Crops	8,579	89.0
Developed	673	7.0
Forest	315	3.3
Herbaceous	92	0.9
Woody Wetlands	11	0.1
Open Water	8	< 0.1
Emergent Herbaceous Wetlands	7	< 0.1
Total	**9,685**	**100**

Land cover types based on data provided by the NLCD (Dewitz 2019) are defined as follows:

- **Cultivated Crops** – areas used for the production of annual crops, such as corn (Zea mays), soybean (Glycine max), tobacco (Nicotiana rustica), and cotton (Gossypium spp.), and perennial woody crops such as orchards and vineyards. Crop vegetation must account for more than 20 percent of total vegetation to meet this land cover designation. This land cover type also includes any land that is actively tilled. Within the Project Area the dominant crops are corn and soybean, and there are areas of alfalfa (Medicago sativa). Following crop harvest, fields are either left fallow or planted in cover crops such as white clover (Trifolium repens) or winter wheat (Triticum aestivum).

- **Developed** - areas with a mixture of constructed materials and manicured vegetation. Developed land includes open space (less than 20 percent impervious surfaces, usually large lot housing unit and parks), low intensity (20 - 49 percent impervious surfaces, usually single-family housing units), medium intensity (50 - 79 percent impervious surfaces, usually single-family housing units), and high intensity (80 – 100 percent imperious surfaces, usually housing complexes and commercial/industrial sites). Within the Project Area developed lands encompass approximately10 percent of total land cover. These areas consist of buildings, parking lots, paved and unpaved roads, residential dwellings, and lawns/landscaped areas. Most of developed land is located in the east-central portion of the Project Area in the town of Grover Hill. Vegetation within the developed areas include lawn grasses, native and ornamental tree and shrub species, and a variety of herbaceous weeds.

- **Forest** - areas dominated by trees (i.e., trees account for more than 20 percent of the total vegetation cover). This designation includes deciduous forest (more than 75 percent of tree species shed foliage seasonally), evergreen forest (more than 75 percent of tree species maintain their leaves all year), and mixed forest (neither deciduous nor evergreen species make up more than 75 percent of total tree cover). Forestland within the Project Area include wind breaks, riparian forests, and isolated woodlots. Wind breaks consist of narrow forested strips between cultivated crops. Wind breaks are typically narrow (i.e., less than 8-meters wide) and linear. Riparian forests are limited within the Project Area and are typically bordered by agricultural fields or residential land. Isolated woodlots within the Project Area are typically surrounded by cultivated crops or developed land. Tree species within the forested areas of the Project Area include walnut (Julgans spp.), oak (Quercus spp.), maple (Acer spp.), honey locust (Gleditsia tricanthos), elm (Ulmus spp.), shagbark hickory (Carya ovata), and beech (Fagus spp.).

- **Herbaceous** – areas dominated by graminoid or herbaceous vegetation, typically accounting for more than 80 percent of total vegetation. Herbaceous areas are not subject to intensive land management practices such as tilling but can be used for grazing.

- **Woody Wetlands** – areas where trees or shrubs account for more than 20 percent of vegetative cover and the soil is periodically saturated with or covered with water.

- **Open Water** – areas of open water, typically with less than 25 percent plant cover or bare soil.

- **Emergent Herbaceous Wetlands** – areas where perennial herbaceous vegetation accounts for more than 80 percent of plant cover and the soil is periodically saturated or under with water.

4.0 GEOLOGY

The Project Area is located in the Huron-Erie Lake Plains Physiographic Region within the Central Lowland Province of Ohio, more specifically the Paulding Clay Basin and Maumee Lake Plains (ODGS 1998). The Paulding Clay Basin contains lacustrine clay over clay till and Silurian-age dolomites. The Maumee Lake Plains contains silt, clay, and wave-planed clayey till over Silurian and Devonian-age carbonate rocks and shales. (ODGS 1998). The bedrock within the Project Area is Silurian-age and is composed of sedimentary rocks including dolomite, anhydrite, gypsum, salt, and shale (ODGS 2006).

4.1 Glacial Drift

Glacial drift is the distribution of glacially derived sediments and refers to the thickness of unconsolidated glacial gravel, sand, silt, or clay (ODGS 2004). Sinkholes commonly occur where glacial drift thickness is less than 20 feet in depth. Drift thickness varies within the Project Area from 15 to 47 feet (ODGS 2004).

4.2 Karst Terrain

Karsts are landforms that develop on, or in, limestone, dolomite, or gypsum by dissolution and are characterized by the presence of sinkholes, underground (or internal) drainage through solution-enlarged fractures (joints), or caves (ODGS 1999). There are no known karst areas within the Project Area.

5.0 SOILS

Soil types within the Project Area were described using the NRCS Web Soil Survey application and from the Soil Survey of Paulding County. Eighteen soil types were identified within the Project Area. The dominant soil types are Paulding clay and Latty silty clay, which account for approximately 53 percent and 22 percent of all soil types within the Project Area, respectively. Nappanee silty clay loam accounts for approximately 11 percent of all soils within the Project Area, Saranac silty clay loam accounts for approximately 6 percent, and Wabasha silty clay loam and Roselms silty clay account for approximately 2 percent, each. The remaining 12 soil types within the Project Area account for less than 2 percent of the Project Area each (NRCS 2019).

5.1 Highly Erodible Soils/Steep Slopes

Soils present in the Project Area are classified into Wind Erodibility Groups, which include soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas (NRCS 2019). Soils are assigned to groups 1-8, with group 1 soils being the most susceptible to wind erosion and group 8 soils being least susceptible. According to the NRCS Web Soil Survey, no soils within the Project Area are considered to be highly erodible and have Wind Erodibility Group ratings of 4-6.

5.2 Hydric Soils

Hydric soils are soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part of the soil, and are therefore either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation (Federal Register 1994). The Project Area is an area of predominately hydric soils suggesting that flooding has occurred regularly or that there are wetlands (NRCS 2019).

6.0 WETLANDS AND WATERBODIES

A preliminary desktop review of the Project Area for potential wetlands and waterbodies was performed using the USFWS (2018) NWI and USGS (2016) NHD geographic information system (GIS) data. Portions of eight named waterways were located within the Project Area including Town Creek, Maddox Creek, Middle Creek, Hoaglin Creek, West Branch Creek, Prairie Creek, Dog Run, and Hog Run (**Exhibit 4.0**). In addition, several unnamed waterways, a number of which are identified as agricultural ditches, are located throughout the Project Area.

6.1 Wetlands and Riparian Areas

In addition to the desktop wetland assessment, a field wetland delineation was conducted by Westwood on June 17, 2020 within a 1,801-acre construction corridor (Delineation Corridor) proposed for the Project. A total of 32 wetlands were delineated within the Delineation Corridor totaling 42.3 acres (**Table 6.0a**) (**Exhibit 4.0**). According to USFWS (2018) NWI data, 90 wetlands were identified within the Project Area, comprising approximately 216 acres or 2 percent of the Project Area (**Table 6.0b** and **Exhibit 4.0**).

Table 6.0a: Field-Delineated Wetlands within the Delineation Corridor	
Cowardin Wetland Type	**Area (Acres)**
PFO – Palustrine Forested	33.1
PEM – Palustrine Emergent	7.0
PUB – Palustrine Unconsolidated Bottom	2.2
Total	**42.3**

Table 6.0b: Desktop-Delineated Wetlands within the Project Area			
Wetland Type	**Number in Project Area**	**Total Area (Acres)**	**Percent of Project Area**
Freshwater Emergent Wetland	3	5.0	0.1
Riverine	40	73.0	0.8
Freshwater Pond	30	20.0	0.2
Freshwater Forested/ Shrub Wetland	17	118.0	1.2
Total	**90**	**216.0**	**2.3**

6.2 Surface Waters

The Project Area is located in the lower Auglaize River Watershed which flows into Lake Erie via the Maumee River (USGS 2016). The Auglaize River is located 4.2 miles northeast of the Project Area and is a tributary to the Maumee River. Waterways within the Project Area flow northeasterly into the Auglaize River via the Little Auglaize River, located approximately 2.6 miles northeast of the Project Area. Prairie Creek and Middle Creek are two of the three major tributaries that lead into the Little Auglaize River. The tributaries of Prairie Creek include Hoaglin and West Branch Creek, while tributaries of Middle Creek include Maddox and Town Creek, all of which have portions located in the Project Area (USGS 2019). No navigable waterways occur within the Project Area or surrounding area. However, a total of 11 watercourses were delineated within the Delineation Corridor.

6.3 Floodplains

According to FEMA Flood Rate Insurance Maps (FIRM) (panels 3907770150D and 3907770125C), the majority of the Project Area is located in Zone X, with areas near surface waters located in Zone A. Zone X indicates areas outside of the 500-year flood plain and there are no base flood elevations for Zone A (FEMA 1989) (**Exhibit 4.0**).

7.0 BIOLOGICAL RESOURCES

Fauna and flora within the Project Area are primarily comprised of species typically associated with agricultural landscapes. Species associated with wooded areas, wetlands, and watercourses may also occur within the Project Area.

Wildlife species including a variety of birds, bats, terrestrial, and aquatic species may use the Project Area for foraging, breeding, or stop-over purposes. Wildlife species that were observed during field surveys include bird species commonly associated with grassland and woodland areas (e.g., horned lark [Eremophila alpestris] and American robin [Turdus migratorius]), wild turkey (Meleagris gallopavo), Canada geese (Branta canadensis), and mallards(Anas platyrhynchos), and mammal species, including white-tailed deer (Odocoileus virginianus) and eastern cottontail rabbit (Sylvilagus floridanus). State- or federally protected species observed in the Project Area include northern harriers (Circus hudsonius), bald eagles (Haliaeetus luecocephalus), and sandhill cranes (Grus canadensis). Also, two state- and federally listed species that may occur within the Project Area include the Indiana bat (Myotis sodalis) and the northern long-eared bat (Myotis septentrionalis). Although the habitat within the Project Area is predominately agricultural, it is used by the state- or federally protected species mentioned above as they have been recorded within the Project Area

8.0 LITERATURE CITED

Dewitz, J., 2019, National Land Cover Database (NLCD) 2016 Products: U.S. Geological Survey data release, https://doi.org/10.5066/P96HHBIE.

Federal Emergency Management Agency. 1989. Flood Insurance Rate Map. Paulding County Ohio. Community Panel Number: 3907770125C. Available at: https://hazards-fema.maps.arcgis.com/apps/webappviewer/index.html?id=8b0adb51996444d4879338b5529aa9cd

Federal Emergency Management Agency. 1989. Flood Insurance Rate Map. Paulding County Ohio. Community Panel Number: 3907770150D. Available at: https://hazards-fema.maps.arcgis.com/apps/webappviewer/index.html?id=8b0adb51996444d4879338b5529aa9cd

Ohio Division of Geological Survey. 2006. Bedrock Geologic Map of Ohio: Ohio Department of Natural Resources. Division of Geological Survey Map BG-1, generalized page-size version with text, 2 p., scale 1:2,000,000. [Revised 2017.] Available at: http://geosurvey.ohiodnr.gov/portals/geosurvey/PDFs/BedrockGeology/BG-1_8.5x11.pdf

Ohio Division of Geological Survey. 2019. Karst Interactive Map. Ohio Department of Natural Resources. Available at: https://gis.ohiodnr.gov/website/dgs/karst_interactivemap/

Ohio Division of Geological Survey. 1999 [Revised 2002, 2006]. Known and Probable Karst in Ohio. Ohio Department of Natural Resources. Division of Geological Survey Map EG-1, generalized page-size version with text, 2 p., scale 1:2,000,000. Available at: https://geosurvey.ohiodnr.gov/portals/geosurvey/PDFs/Karst/karstmap.pdf

Ohio Division of Geological Survey. 1998. Physiographic Regions of Ohio: Ohio Department of Natural Resources. Division of Geological Survey, page-size map with text, 2 p., scale 1:2,100,00. Available at: http://geosurvey.ohiodnr.gov/portals/geosurvey/PDFs/Misc_State_Maps&Pubs/physio.pdf

Ohio Division of Geological Survey. 2004. Shaded Drift-Thickness Map of Ohio: Ohio Department of Natural Resources. Division of Geological Survey Map SG-3, generalized page-size version with text, 3 p., scale 1:2,000,000. Available at: http://geosurvey.ohiodnr.gov/portals/geosurvey/PDFs/Misc_State_Maps&Pubs/sg3map.pdf

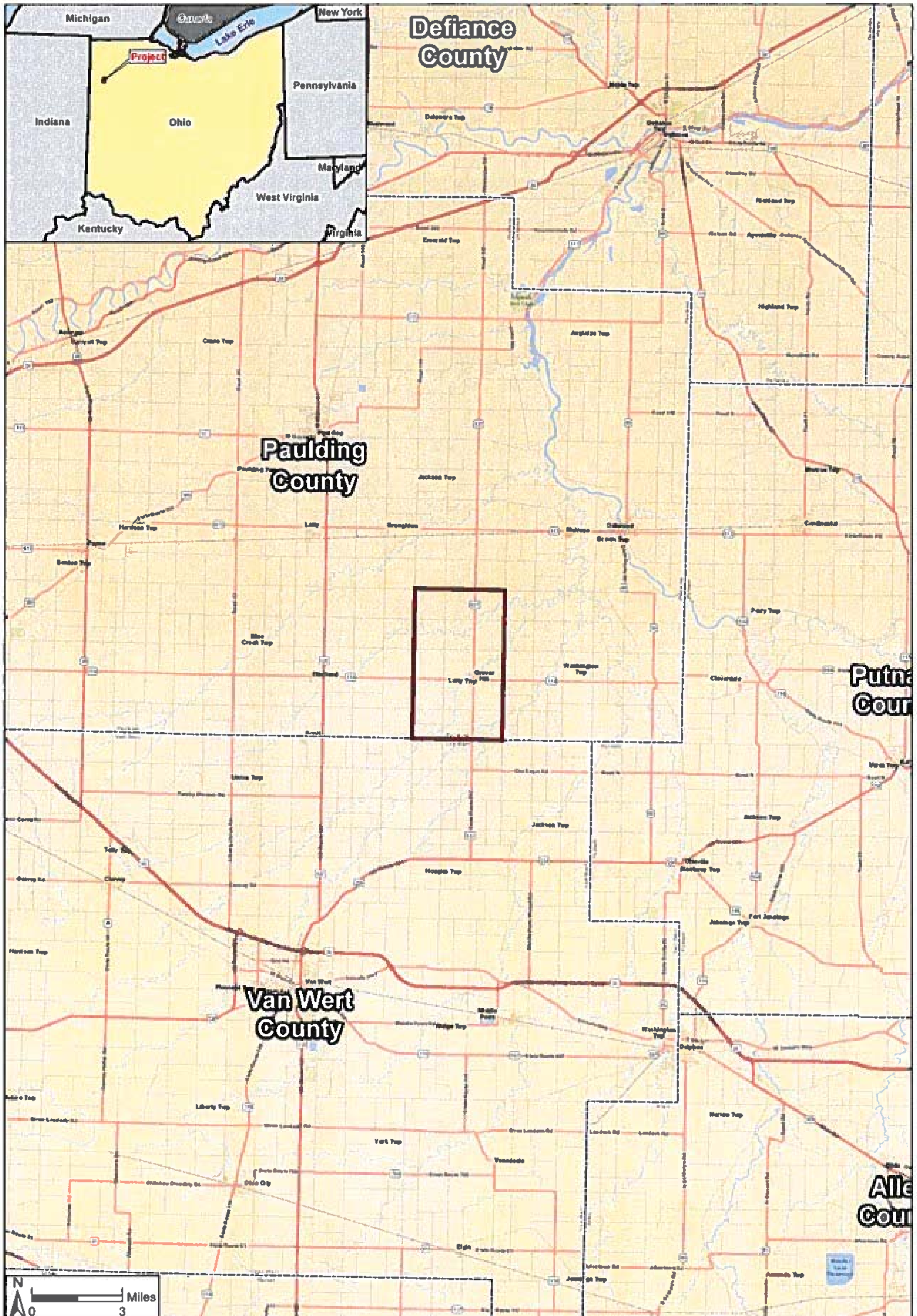
Natural Resources Conservation Service. 2019. Web Soil Survey, National Cooperative Soil Survey. Available at: https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx

U.S. Fish and Wildlife Service. 2021. Information for Planning and Consultation for Grover Hill Wind Farm.

_____. 2018. National Wetlands Inventory (NWI). https://www.fws.gov/wetlands/.

U.S. Geological Survey. 2016. Water Resources of the United States. Hydrologic Unit Map. Available at: https://water.usgs.gov/GIS/regions.html

Map Document: N:\10015895.00\GIS\Analysis\210402_EM\proj\GH_NewHabitatExhibits_210601\GH_NewHabitatExhibits_210601.aprx 6/1/2021



Data Source(s): Westwood (2021); ESRI WMS World Streets Basemap (Accessed 2018)

Legend

- Project Area
- County Boundary
- State Boundary

Westwood

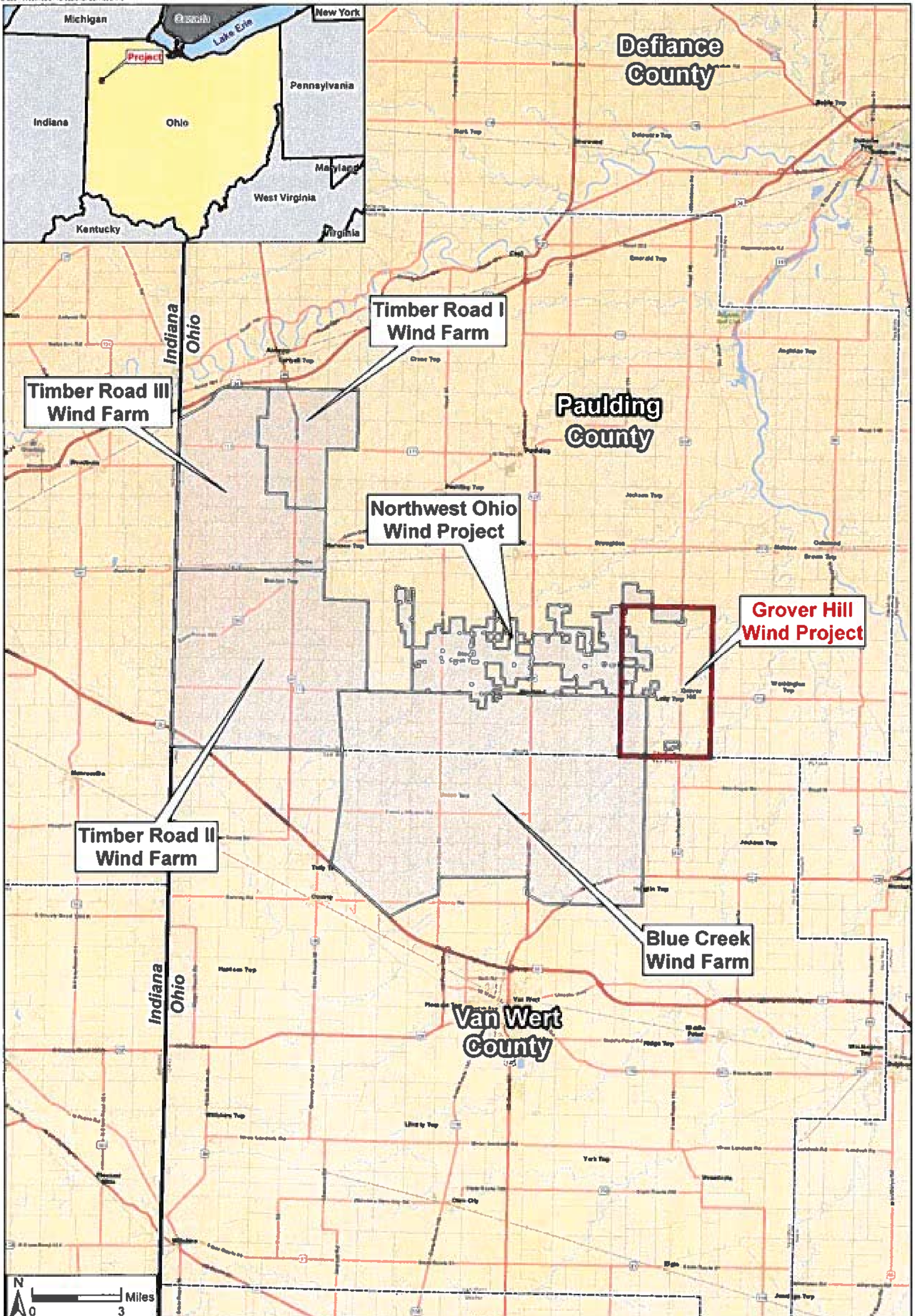
Westwood Professional Services, Inc.

Grover Hill Wind Project

Paulding County, Ohio

Project Vicinity

EXHIBIT 1.0a



Legend

Project Area

Nearby Operational Wind Farm Boundary

County Boundary

State Boundary

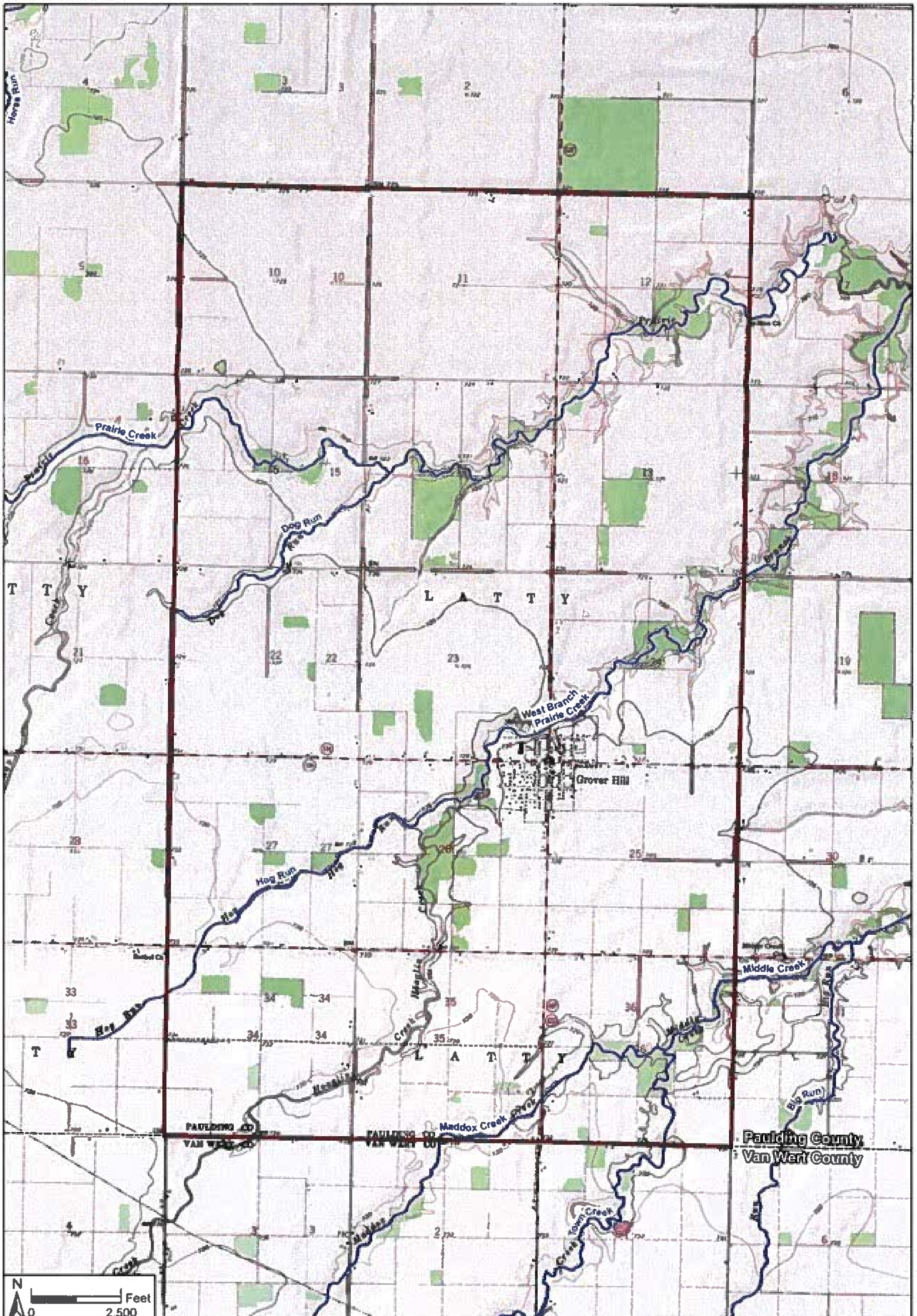
Westwood

Grover Hill Wind Project

Paulding County, Ohio

Project Area & Nearby Wind Farms

EXHIBIT 1.0b



Data Source(s): Westwood (2021); ESRI WMS; USGS Topo Basemap (Accessed 2018); Census Bureau (2017)

Legend

- Project Area
- County Boundary
- Major Drainage Feature

Grover Hill Wind Project

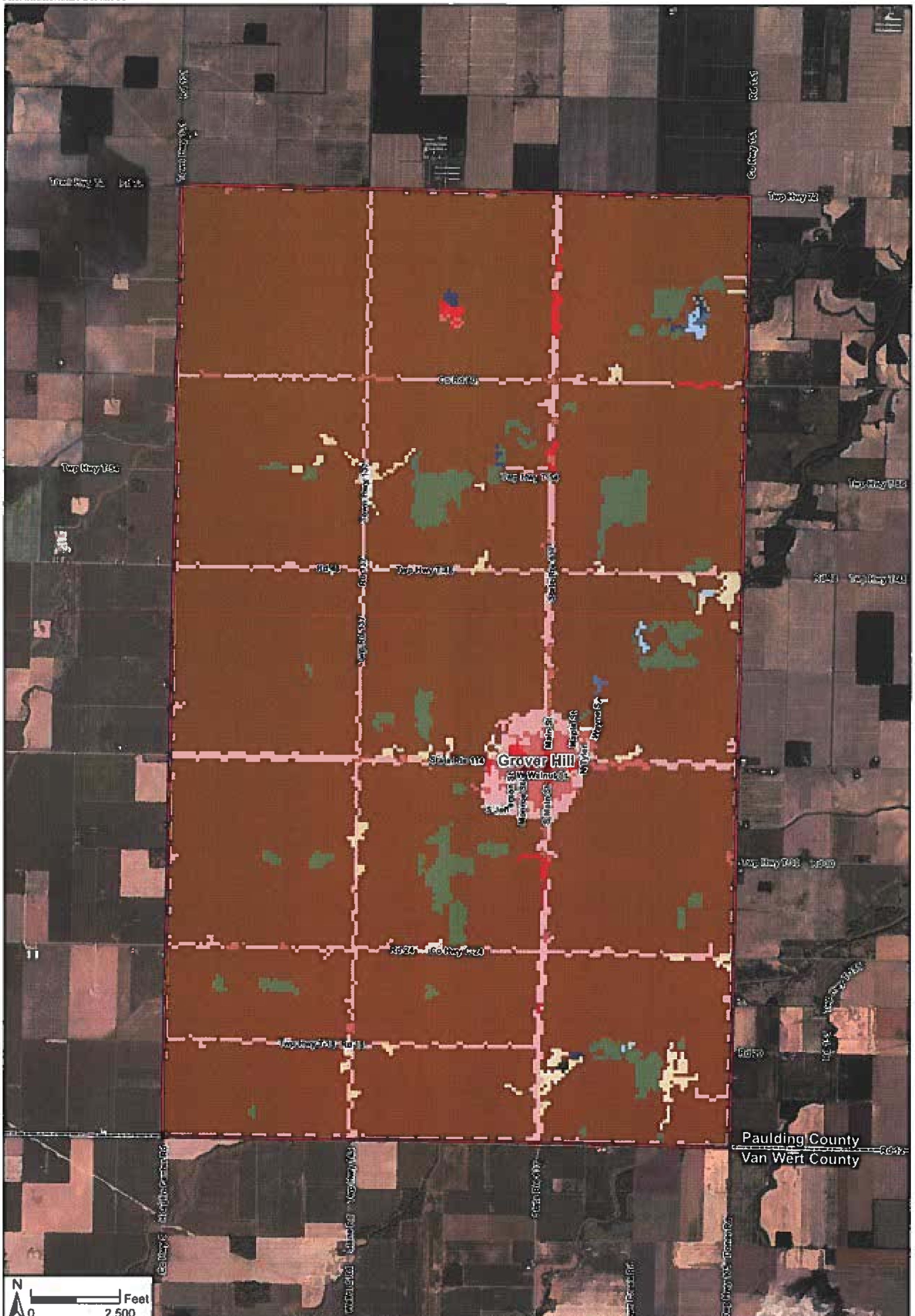
Paulding County, Ohio

Topography & Major Drainage Features

EXHIBIT 2.0

Westwood

Westwood Professional Services, Inc.



Data Source(s): Westwood (2021); ESRI WMS World Imagery Basemap (Accessed 2018); Census Bureau (2017); U.S. Geological Survey (2011)

Legend

- Project Area
- County Boundary
- Cultivated Crops
- Deciduous Forest
- Developed, Low Intensity
- Developed, Medium Intensity
- Developed, High Intensity
- Developed, Open Space
- Emergent Herbaceuous Wetlands
- Evergreen Forest
- Herbaceuous
- Mixed Forest
- Open Water
- Woody Wetlands

Westwood

Westwood Professional Services, Inc.

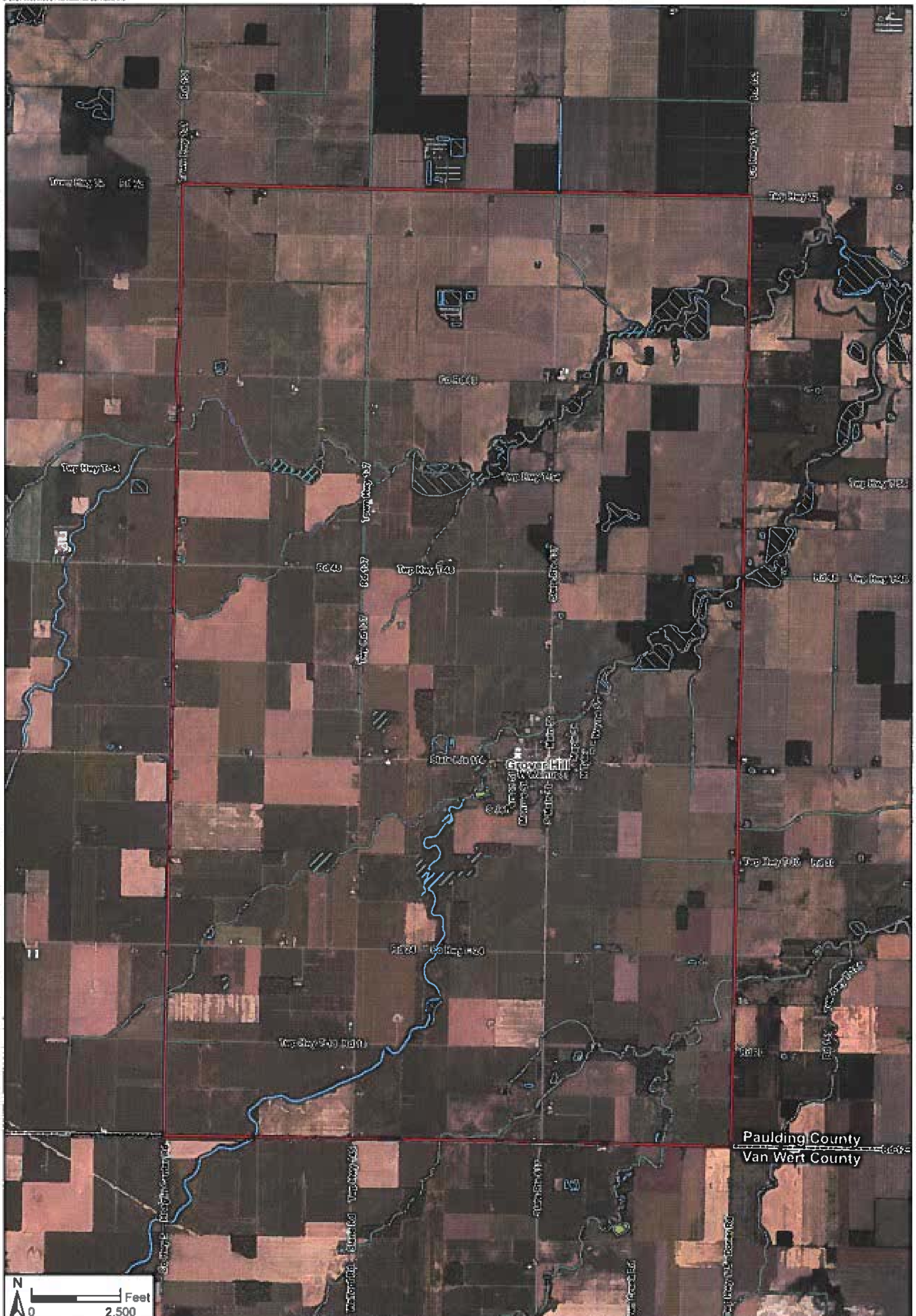
Grover Hill Wind Project

Paulding County, Ohio

Land Cover Types

EXHIBIT 3.0

Map Document: N:\0015895.00\GIS\Analysis\210402_EMB\pro\OH_NewHabitatExhibits_210601\OH_NewHabitatExhibits_210601.aprx 6/2/2021 8:31 AM



Data Source(s): Westwood (2021); ESRI World Imagery Basemap (Accessed 2018); Census Bureau (2017); U.S. Fish and Wildlife Service (2016); Ducks Unlimited (2018)

Legend

- Project Area
- County Boundary
- Delineated Watercourse
- Delineated Wetland
- NWI Wetland
- NHD Flowline
- NHD Waterbody

Westwood

Toll Free (888) 937-5150 westwoodps.com

Westwood Professional Services, Inc.

Grover Hill Wind Project

Paulding County, Ohio

Wetlands & Other Waterbodies

EXHIBIT 4.0

Dean Sather

From:	Shelby Kilibarda
Sent:	Friday, February 26, 2021 8:46 AM
To:	environmentalreviewrequest@dnr.state.oh.us
Subject:	Environmental Review Request - Grover Hill Wind Project
Attachments:	20-082; Westwood PS- Grover Hill Wind Project Comments.pdf; GH_Habitat_Ex2 _ProjectSiteMap_191219.pdf; GH_Habitat_Ex3_Topography&DrainageFeatures_ 191218.pdf; GH_Habitat_Ex4_WetlandsMap_191219.pdf; GH_Habitat_Ex5_WindsFarms_ 191219.pdf; GH_Habitat_Ex6_LandCoverMap_191219.pdf; GH_Habitat_Ex1 _ProjectVicinityMap_191220.pdf; GH_ProjectBoundary_200915.zip

To whom it may concern,

Westwood Professional Services is requesting an updated Environmental Review for the Grover Hill Wind Project in Paulding County, Ohio.

Starwood Energy Group Global, LLC (Starwood) proposes to construct and operate the Grover Hill Wind Project (Project) in Paulding County, Ohio (Exhibit 1). The Project Area consists of approximately 9,685 acres (15 square miles) located in southern Paulding County, Ohio, approximately 3 miles east of the town of Haviland and 6 miles to the southeast of the town of Paulding. The town of Grover Hill is located within the central portion of the Project Area (Exhibit 2). The Project will be configured as a wind energy conversion facility with a potential total nameplate capacity of 150 megawatts (MW). Starwood continues to assess its turbine options, and is currently evaluating wind turbine generators (WTGs) with rated power outputs between 3.0 to 6.0 MW each, which could result in the installation of 25 wind turbines, depending upon the model(s) selected and the final output of the Project. Additional facilities may include transmission line, access roads, electrical collection lines, an operations and maintenance facility, substation, and laydown area.

Topography is relatively flat; no buttes, rolling hills, or draws exist (Exhibit 3). Portions of eight named waterways are located within the Project Area including Town Creek, Maddox Creek, Middle Creek, Hoaglin Creek, West Branch Creek, Prairie Creek, Dog Run, and Hog Run (Exhibit 4). Surface ownership in the Project Area is exclusively private. Several operating, utility-scale wind farms are located in the Project Area vicinity including the Northwest Ohio Wind Farm (NOW) (100MW), located directly west of the Project Area, Timber Road Wind Farm (100 MW), located west of NOW, and Blue Creek Wind Farm (304 MW), located to the south (Exhibit 5).

A total of seven principal land cover types are recognized and mapped within the Project Area. These include cultivated crops, developed areas, forest, herbaceous, woody wetlands, open water, and emergent herbaceous wetlands (Exhibit 6).

Please let me know if you have any questions.

Thank you,

Shelby Kilibarda
Environmental Scientist
shelby.kilibarda@westwoodps.com

direct (952) 906-7440
main (952) 937-5150
cell (651) 206-6123

Westwood
12701 Whitewater Drive, Suite 300
Minnetonka, MN 55343

Attachment 3

Exhibit F

Transportation Study

American Engineering Testing, Inc.

June 2, 2021

AMERICAN ENGINEERING TESTING, INC.

CONSULTANTS
- ENVIRONMENTAL
- GEOTECHNICAL
- MATERIALS
- FORENSICS

PRE-CONSTRUCTION ROAD EVALUATION

Grover Hill Wind Project

Paulding County, Ohio

AET Report No. P-0001619A

Date:

June 2, 2021

Prepared for:

Westwood Professional Services, Inc.
12701 Whitewater Drive, Suite 300
Minnetonka, MN 55343

www.amengtest.com

AMERICAN ENGINEERING TESTING, INC.

CONSULTANTS
- ENVIRONMENTAL
- GEOTECHNICAL
- MATERIALS
- FORENSICS

June 2, 2021

Westwood Professional Services, Inc.
12701 Whitewater Drive, Suite 300
Minnetonka, MN 55343

Attn: Mr. Steve Battaglia, PE

RE: Report of Pre-construction Road Evaluation
Grover Hill Wind Project
Paulding County, Ohio
AET Project No. P-0001619A

Dear Mr. Battaglia:

This report presents the results of the pavement testing and analysis project that AET performed on the proposed haul roads for the pre-construction phase of the Grover Hill Wind Project in Paulding County, Ohio.

Per your request, we are submitting this report to you electronically.

Please contact me if you have any questions about this report.

Sincerely,

American Engineering Testing, Inc.

Chunhua Han, Ph.D.
Principal Engineer, Pavement Division
Phone: (651) 603-6631
Fax: (651) 659-1347
E-mail: chan@amengtest.com

AMERICAN ENGINEERING TESTING, INC.

SIGNATURE PAGE

Prepared for

Westwood Professional Services, Inc.
12701 Whitewater Drive, Suite 300
Minnetonka, MN 55343

Attn: Mr. Steve Battaglia

Prepared by

American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, MN 55114
(651) 659-9001

Report authored by

Chunhua Han, Ph.D.
Principal Engineer, Pavement Division

Peer reviewed by

STATE OF OHIO
6/2/21
DEREK
TOMPKINS
E-83874
REGISTERED
PROFESSIONAL ENGINEER

Derek Tompkins, Ph.D., P.E. lic exp
Principal Civil Engineer 12/31/21

Ohio Engineers and Surveyors Board
Firm Registration No. COA.04601

TABLE OF CONTENTS

1.0 INTRODUCTION

Grover Hill Wind, LLC (GHW) is evaluating public roads for potential use as haul routes for the construction of the Grover Hill Wind Project ("Project") in Paulding County, Ohio. To assist in the evaluation, GHW has retained Westwood Professional Services (WPS) and American Engineering Testing, Inc. (AET), to evaluate the proposed haul routes. AET was authorized to perform geotechnical exploration and nondestructive pavement testing at the site and evaluate the suitability of Project roads as construction haul routes. This report (AET P-0001619A) describes our structural and condition evaluation of Project roads.

2.0 SCOPE OF SERVICES

The authorized scope consists of the following:

- Direct push soil sampling (referred to as "soil borings") to a depth of approximately 4-feet along the Project roads
- Falling weight deflectometer (FWD) testing of the Project roads
- Ground penetrating radar (GPR) testing on the Project roads
- Digital video logging (DVL) of Project roads using a digital video camera
- Engineering evaluation of the Project roads using DVL, GPR, FWD and soil boring data to (a) assess ability of the roads to sustain wind farm construction loads and (b) identify pre-construction road sections that are susceptible to significant damage
- Production of the report summarizing evaluations of Project roads

These services are exclusively intended to evaluate the Project roads. The scope is not intended to explore for the presence or extent of environmental contamination in the soil or groundwater. Specific details on test procedures, test results, and analysis performed are described in the sections below and in appendices to this report.

3.0 PROJECT INFORMATION

3.1 Project locations and roads

The Project is located within approximately 9,600 acres of privately-owned agricultural land east of the City of Grover Hill in Paulding County, Ohio (Figure 1). The project area is generally situated east of State Route SR-637 and bisected by SR-114, as shown in the figures attached to this report.

3.2 Conventional traffic on project roads

The primary transportation arteries through the project area in Paulding County include SR-637, SR-114, County Route C-24, and Township Route T-137. The following items describe the most current traffic data for Project roads according to information from the Ohio Department of Transportation (ODOT).

- The 2020 annual average daily traffic (AADT) for SR-637 within the Project was 1,062 and 1,153 vehicles per day with 9 and 14 percent commercial truck traffic, respectively.
- The 2020 AADT for SR-114 within the Project was 905 vehicles per day with 17 percent truck traffic.
- ODOT traffic information was not available for county roads within the Project. However, the 2020 and 2021 AADT for county roads near the Project ranged from 89 and 307 vehicles per day. For county roads, we have assumed an AADT of 200 vehicles per day with 12 percent truck traffic.
- ODOT traffic information was not available for township roads within the Project, so we have assumed an AADT of 80 vehicles per day and 12 percent truck traffic for roads.

3.3 Anticipated traffic due to construction

The project will require the use of public roads to deliver supplies and materials to the work sites during the construction, which is proposed to start as early as quarter four of 2022. WPS provided a transportation route plan dated March 4, 2021, for construction truck traffic on Project road sections. This information – and any subsequent updates to the delivery plan – do not materially affect our engineering evaluation of the road sections.

4.0 SUBSURFACE EXPLORATION, ROAD TESTING, AND RESULTS

To facilitate testing, condition rating, and analysis, AET allocated the Project roads (totaling approximately 10.5 centerline miles) into 15 sections according to road type, road condition, and anticipated construction traffic. Three road types were encountered at the Project.

- A road surfaced with an asphalt concrete wearing course, or “bituminous pavement” (BP)
- A road surfaced with a chip seal or seal coat treatment, or “chip seal” (CS)
- A road surfaced with dirt, or “dirt road” (DR)

Tests and test results on Project roads are described in the subsections below and summarized in Table 4.1.

4.1 Subsurface conditions

Twenty (20) soil borings and three (3) corings were performed along selected Project roads. AET contacted Ohio One-Call to avoid public underground utilities in subsurface test locations. Subsurface explorations at the Project took place on May 4 and 5, 2021, using direct push sampling (to a depth of approximately 4 feet) or coring in the right wheel path. After samples were obtained, boring/coring holes were backfilled with a combination of soil cuttings and cold mix asphalt to match the existing pavement profile. Collected samples were analyzed in our laboratory to evaluate pavement and soil layering, classification, and moisture content, as reported in boring logs appended to this report (Appendix A). Our boring logs describe the following general features of Project road sections by road type.

- BP sections had a bituminous thickness of 5 to 7 inches. The base material under BP pavements generally consisted of gravelly silty sand meeting the AASHTO A-1-b classification and ranged from 5 to 13 inches in thickness except for boring B-09 in which base material consisted of gravelly clayey sand meeting the AASHTO A-6 classification.
- CS sections had a composite bituminous thickness of 0.5 to 4 inches. The base material under CS sections consisted of gravelly silty sand meeting the AASHTO A-1 classification and ranged from 5 to 15 inches in thickness.
- DR sections had an aggregate surface thickness of 6 in the wheel path and 12 inches in the gravel portion of the section. Aggregate surfacing on DR sections generally classified as A-1-b according to the AASHTO classification system. Geotextile fabric was identified in boring B-10 at a depth of 6 inches below the existing road surface. Lab tests performed on select aggregate surfacing material indicate they are non-plastic and have a moisture and fines content of 4 and 10 percent, respectively.
- We observed that the primary soils within the upper subgrade zone on all Project road sections consisted of cohesive lean clays meeting the AASHTO A-6 and A-7-6 (plastic) soil categories. The moisture content of tested subgrade soil was 25 percent with a plasticity index (PI) of 29 and a fines content of approximately 81 percent.

Detailed results of subsurface testing are provided in Appendix A, which includes descriptions of our geotechnical drilling procedure and boring logs.

4.2 Surface course thickness (ground penetrating radar)

The road layer thickness testing program involves the use of a high-speed (air coupled) GPR antenna to collect pavement data that is later analyzed to evaluate layer thicknesses. AET performed GPR testing on approximately 21 lane miles of Project roads on April 27 and May 18, 2021, using a 2 GHz antenna, which allows material layer measurements at depths of 18 inches with a resolution of approximately one-half inch.

Our analysis of collected GPR data (summarized by road section in Tables 4.1 and 4.2) included statistical analysis to determine 15th-percentile values for each section. Engineers often use the 15th percentile value – instead of an average or mean (the 50th percentile value) – as a structural “safety factor” to represent layer thickness for pavement design purposes.

- The thickness of surfacing on BP sections ranged from of 3.4 to 4.5 inches.
- The thickness of aggregate base underlying the pavement on BP sections ranged from 6.3 to 8.7 inches.

- The thickness of composite surfacing on CS sections ranged from of 0.8 to 3.6 inches. This is reported as a composite thickness due to layering of seal treatments.
- The thickness of aggregate base underlying the seal treatments (or composite layers) on CS sections ranged from 5.6 to 11.5 inches.
- The thickness of aggregate surfacing on DR sections ranged from 3.5 to 4.7 inches in the areas without vegetation.

Assessing layer thicknesses is a matter of engineering judgement. The distinction between layers in the road is not always explicit. Factors influencing definition of radar scans include ambient electromagnetic interference, the presence of moisture, the presence of voids, and the similarity of material layer type between layers. More specific detail, including statistical analysis of GPR data describing average thickness and variability by section, is provided in Appendix B.

4.3 Pavement strength (falling weight deflectometer)

Deflection testing was performed on 10.5 centerline miles of Project roads on April 27 and May 18, 2021, using a Dynatest 8002 falling weight deflectometer (FWD). Locations of FWD tests are indicated in Figure 1. Collected FWD data – along with information about the pavement layer thicknesses (from Project boring logs and GPR analysis), materials (from Project boring logs), and ambient test conditions – are used to estimate the elastic stiffness of pavement layers using backcalculation analysis according to the American Association of State Highway and Transportation Officials (AASHTO) method. This analysis also accounts for allowable spring axle loads for a roadway (*AASHTO Guide for Design of Pavement Structures*, 1993).

Our backcalculation results were used to estimate the effective subgrade resilient modulus (MR), AASHTO structural number value (SN) for BP and CS sections, granular equivalency (GE) for DR sections, and spring-time load capacity of Project road sections. As with GPR-based thickness analysis results, the results of backcalculation analysis of collected Project FWD data are summarized below (and in Tables 4.1 and 4.2) using 15th-percentile values.

- The subgrade MR for all sections ranged from 4.1 to 6.6 ksi.
- The SN value for the BP and CS sections ranged from 0.7 to 1.8 inches.
- The GE value for the DR sections ranged from 0.4 to 0.5 inches.
- The spring-time load capacity rating of BP sections ranged from 5.2 to 7.5 tons/axle.
- The spring-time load capacity rating of CS sections ranged from 3.9 to 8.6 tons/axle.
- The spring-time load capacity rating of DR sections ranged from 2.7 to 3.2 tons/axle.

Details of the FWD testing and analysis are provided in Appendix C.

4.4 Road condition

High-resolution DVL data was collected on April 27 and May 18, 2021, for 10.5 centerline miles of roads in the Project. An AET pavement engineer used DVL data to rate paved roads in general accordance with ASTM D6433-11 and unpaved roads according to the Department of Army (DA) TM 5-626 standard method. These procedures result in a pavement condition index (PCI) or an unsurfaced road condition index (URCI). This index describes road condition on a scale of 0 to 100, where 100 corresponds to newly constructed roads and values less than 25 correspond to roads in need of immediate rehabilitation or reconstruction. Furthermore, the index corresponds to qualitative descriptions of pavement condition: “Good” 70-100; “Fair” 55-69; “Poor” 40-54; “Very Poor” 25-39; “Serious” 10-24; and “Failed” 0-9. The overall condition of Project roads by road type is summarized below.

- BP sections were rated an average of PCI of 65. The predominant distresses encountered on BP sections were longitudinal and traverse cracking and edge cracking of varying severity. Alligator cracking was also observed to a lesser degree.
- CS sections were rated an average of PCI of 70. The predominant distresses encountered on CS sections were longitudinal and transverse cracking, edge cracking, alligator cracking and weathering. Raveling was also observed to a lesser degree.
- DR sections were rated an average of PCI of 23. The predominant distresses encountered on DR sections were rutting and a lack of aggregate. Lack of crown and poor drainage were also observed.

Tables 4.1 and 4.2 indicate the PCI/UCRI rating for the fifteen sections selected by WPS for evaluation. More detail on the surface condition rating by road section is provided in Appendix D.

4.5 Summary results of testing and road condition rating

As noted above, all road test and survey results, including summary analysis of test data, are reported in Tables 4.1 through 4.2 for a total of 15 sections, 3 of which are BP, 10 of which are CS and 2 of which are DR.

Table 4.1. Summary of test results and analysis for paved road sections (sorted by road and termini)

Sect ID	Road	Termini		Length (mi)	Type	PCI	15th Percentile Values				
		From	To				Surface Thickness (in)	Base Thickness (in)	Subgrade MR (ksi)	Effective SN (in)	Spring Load Capacity (tons/axle)
1	C-24	0.5 MI W	T-137	0.3	BP	68	3.4	8.7	4.9	1.6	6.8
2	C-24	T-137	SH-637	1.0	BP	53	3.4	8.2	5.4	1.6	7.5
3	C-24	SH-637	0.5 MI E	0.5	BP	74	4.5	6.3	4.1	1.2	5.2
4	T-18	T-131	0.25 MI E	0.4	CS	70	3.6	7.1	5.0	1.4	7.2
7	T-48	T-137	SH-637	1.0	CS	79	2.4	9.2	4.1	1.8	8.1
8A	T-131	T-18	C-24	0.5	CS	68	2.4	5.6	4.2	0.7	3.9
8B	T-131	C-24	SH-114	1.0	CS	76	0.9	11.5	5.1	1.1	4.6
9	T-131	SH-114	T-48	1.0	CS	78	0.8	10.1	5.3	1.1	5.8
10	T-131	T-48	T-54	0.6	CS	76	1.6	7.3	4.2	1.2	8.3
11	T-137	T-18	C-24	0.6	CS	73	0.9	8.5	5.2	1.1	6.3
12	T-137	C-24	SH-114	1.0	CS	75	0.9	10.9	4.9	1.5	8.6
13	T-137	SH-114	T-48	1.0	CS	56	1.0	6.9	4.5	0.8	4.7
14	T-137	T-48	0.5 MI N	0.5	CS	48	1.0	9.5	6.2	1.0	5.4

Table 4.2. Summary of test results and analysis for unpaved road sections (sorted by road and termini)

Sect ID	Road	Termini		Length (mi)	Type	URCI	15th Percentile Values				
		From	To				Surface Thickness (in)	Base Thickness (in)	Subgrade MR (ksi)	Effective GE (in)	Spring Load Capacity (tons/axle)
5	T-18	0.75 MI W	T-137	0.8	DR	23	3.5	--	6.6	0.4	2.7
6	T-18	0.5 MI W	SH-637	0.5	DR	23	4.7	--	6.3	0.5	3.2

5.0 EVALUATION OF ROAD CONDITION

5.1 Summary evaluation

We evaluated the performance of the roads as haul routes given our testing, surveys, and analysis of collected data, as summarized in Table 4.1 and 4.2 above. Important information regarding risk management and proper use of this evaluation is given in Appendix E, "Geotechnical Report Limitations and Guidelines for Use."

5.2 Structural properties of road subgrade

The predominant subgrade types for the selected roads are lean clays meeting an AASHTO A-6 or A-7-6 classification. Our FWD backcalculation analysis of the structural properties of the subgrade determined that subgrade soils under Project roads will provide fair to good support in the spring months, when thawing soils become saturated and compromised in strength. All roads had an average 15th-percentile value of 5.1 ksi.

Generally, we judge that roads with subgrade MR values less than 4 ksi are at a higher risk of subgrade support problems during truck hauling, particularly on the areas of the tested roads associated with lower MR relative to other areas. These sections may deserve additional consideration of materials, location, loading conditions, and other factors that affect performance and service life.

5.3 Structural properties of road surface layers

We anticipate that the structural capacity of the road surfacing will vary with changes in subgrade support, noted in Section 5.2, and surfacing thickness.

- The paved sections have an average 15th-percentile structural number of 1.2 inches, with minimum and maximum SN of 0.7 and 1.8 inches, respectively. A typical structural number for bituminous pavements of low volume roads ranges from 2 to 4 inches.
- The unpaved sections have an average 15th-percentile GE of 0.5 inches. In general, non-paved roads with a GE of less than 7 inches are not suitable for trucking without receiving structural improvements.
- Because SN and GE do not account for the structural contributions of the prepared subgrade, these engineering quantities should be considered alongside the subgrade MR, particularly when SN and GE values are low.
- The spring load rating accounts for the combined structural capacity of the pavement and foundation. The paved sections in the Project have a 15th percentile spring load capacity of between 3.9 and 8.6 tons per axle. The unpaved (DR) sections had a 15th percentile ton rating of 2.7 and 3.2 tons/axle.

5.4 Suitability of roads as haul routes

We judge that the selected road sections may require improvements to serve as haul routes for construction operations. This judgment considers condition and estimated structural capacity for the tested, evaluated roads. More information on the use of the selected Project road sections as haul routes and structural improvements (where appropriate) is discussed in AET Report No. P-0001619B.

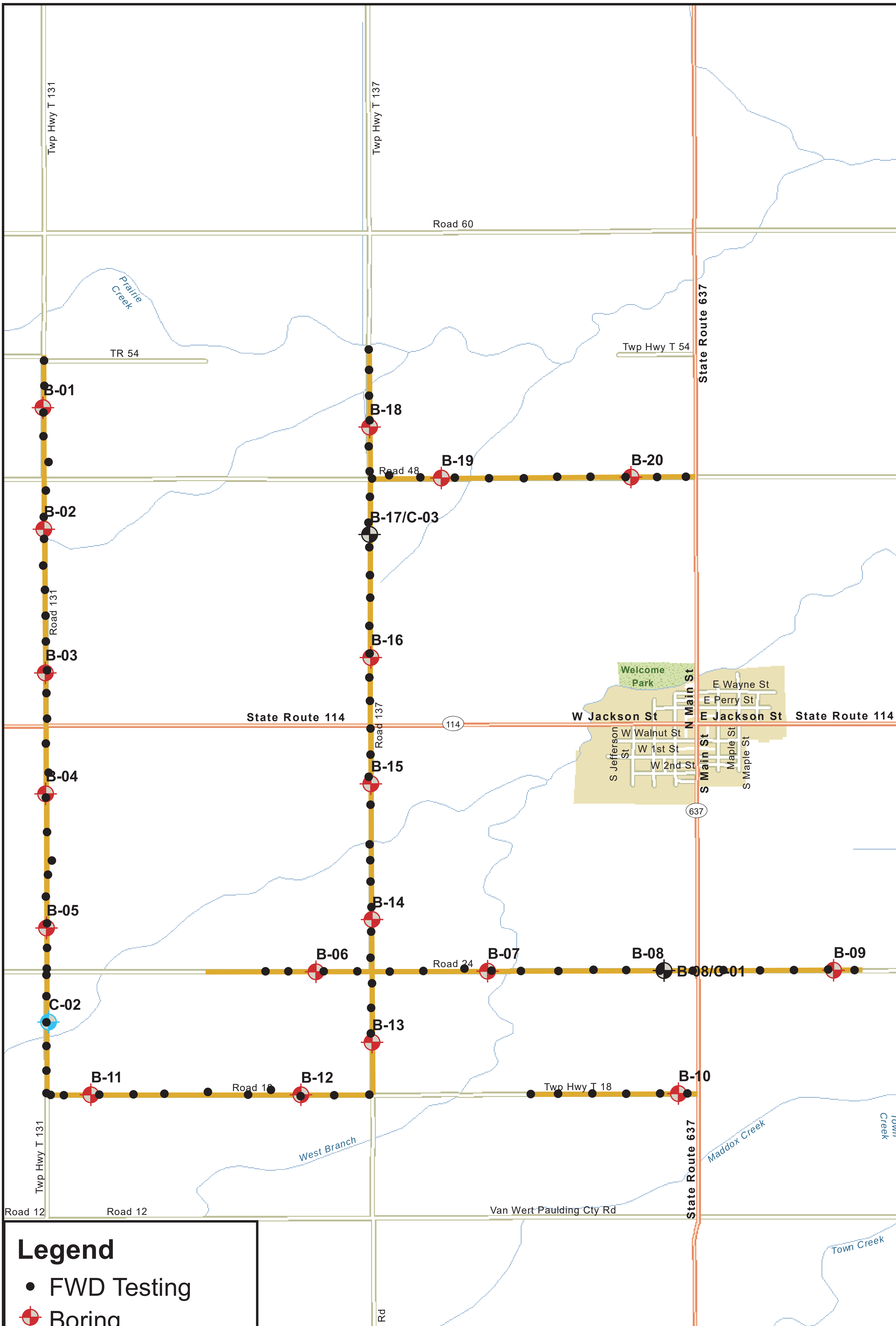
6.0 TEST STANDARDS

When we refer to a test standard (e.g. ASTM, AASHTO) in this report, we mean that our services were performed in general accordance with that standard. Compliance with any other standards referenced within the specified standard is neither inferred nor implied.

7.0 LIMITATIONS

Within the limitations of scope, budget, and schedule, we have endeavored to provide our services according to generally accepted geotechnical engineering practices at present time and this location. Other than this, no warranty, express or implied, is intended. Important information regarding risk management and proper use of this report is given in Appendix C, “Geotechnical Report Limitations and Guidelines for Use.”

FIGURES



American Engineering Testing, Inc

Map Reference:

N

0 0.125 0.25

Miles

Figure 1

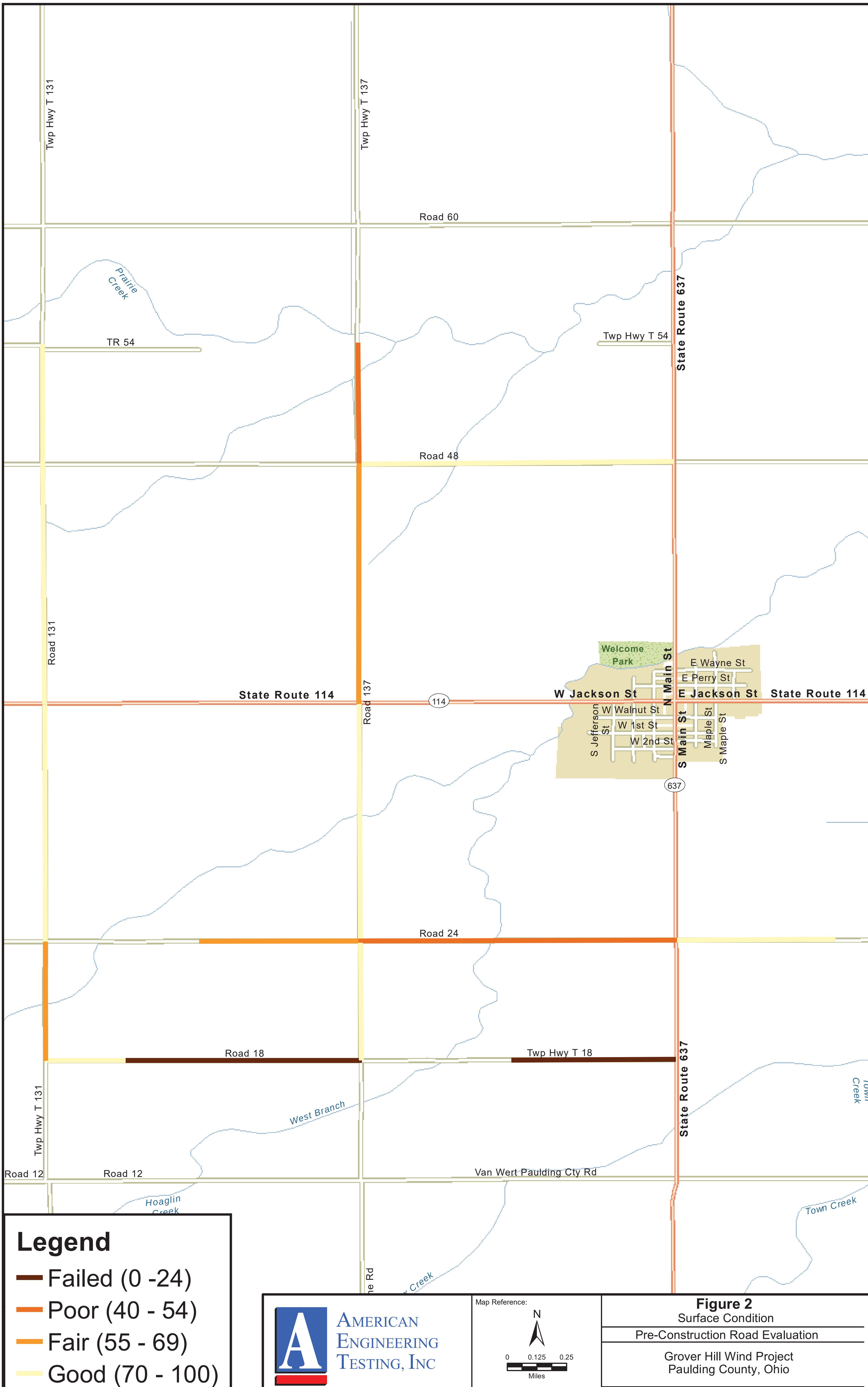
Testing Locations

Pre-Construction Road Evaluation

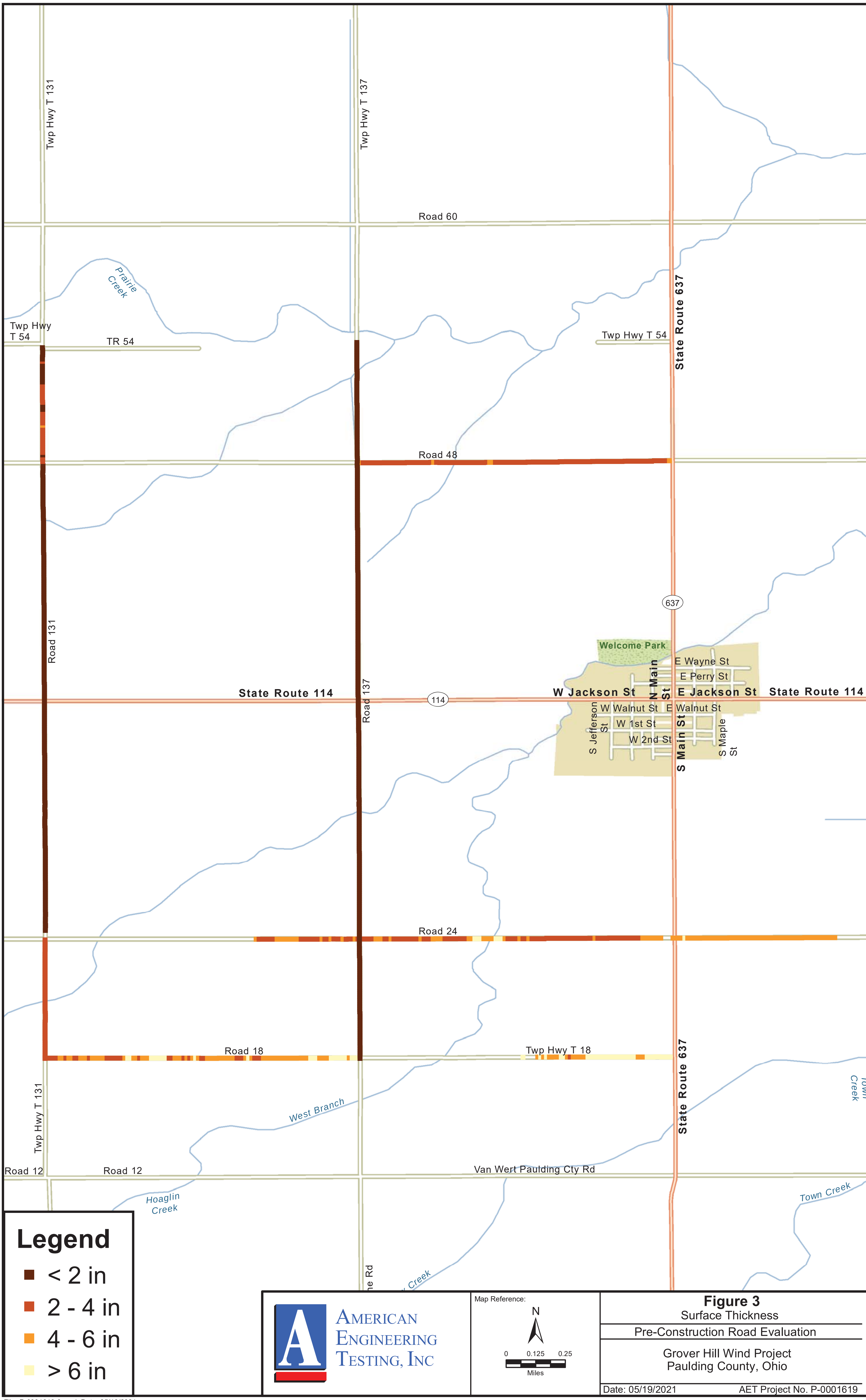
Grover Hill Wind Project
Paulding County, Ohio

Date: 05/25/2021 AET Project No. P-0001619

File: P-0001619-1.mxd Date: 05/25/2021



File: P-0001619-2.mxd Date: 05/21/2021



AMERICAN ENGINEERING TESTING, INC

Map Reference:

N

0 0.125 0.25

Miles

Figure 3

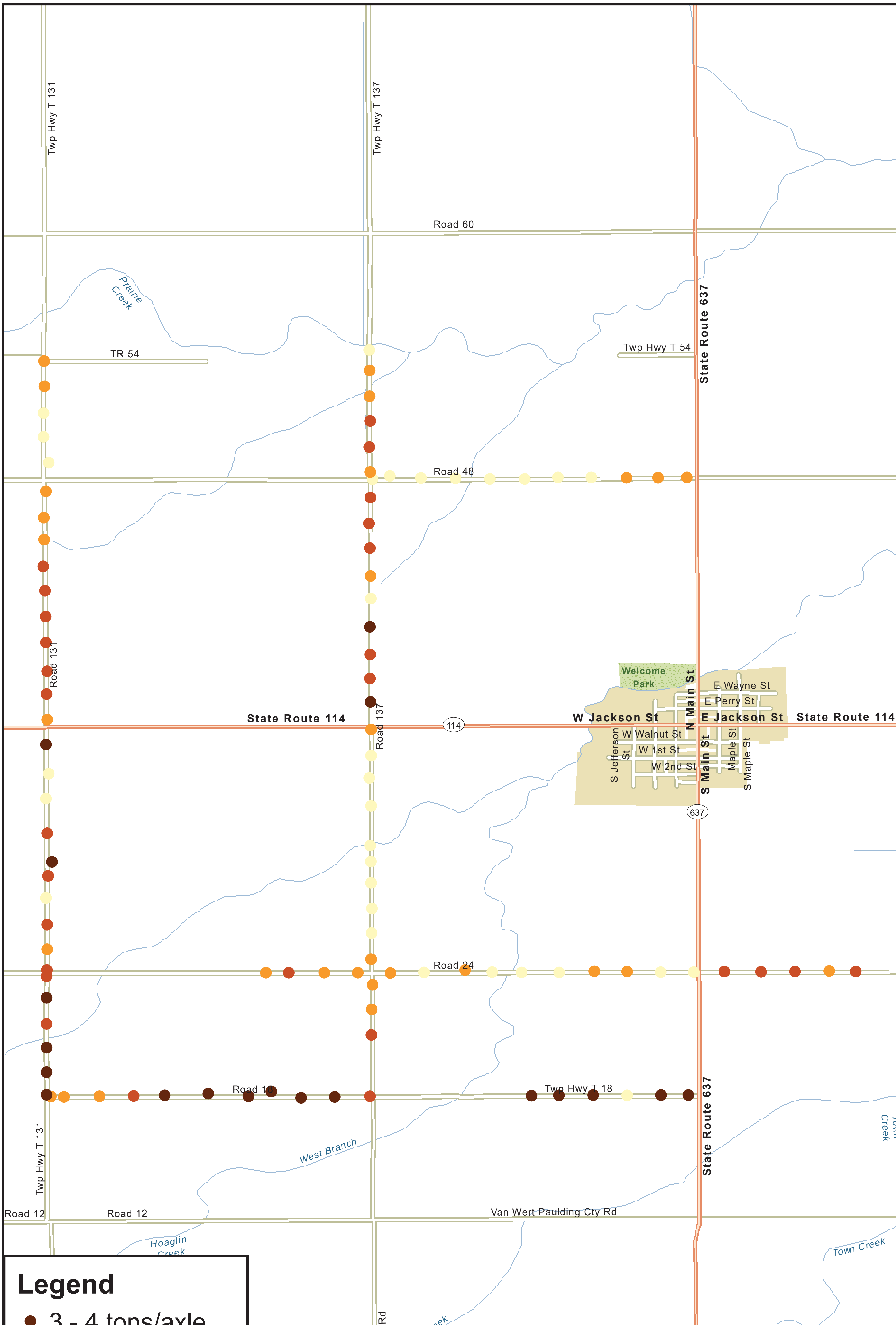
Surface Thickness

Pre-Construction Road Evaluation

Grover Hill Wind Project
Paulding County, Ohio

Date: 05/19/2021 AET Project No. P-0001619

File: P-0001619-3.mxd Date: 05/19/2021



Legend

- 3 - 4 tons/axle
- 5 - 6 tons/axle
- 7 - 8 tons/axle
- 9 - 10+ tons/axle

American Engineering Testing, Inc

Map Reference:

N

0 0.125 0.25
Miles

Figure 4
Spring Load Capacity

Pre-Construction Road Evaluation

Grover Hill Wind Project
Paulding County, Ohio

Date: 05/21/2021 AET Project No. P-0001619

File: P-0001619-4B.mxd Date: 05/21/2021

APPENDIX A

Geotechnical Field Exploration and Testing

Grover Hill Wind Project
Paulding County, Ohio

AET Report No. P-0001619A

Appendix A
Geotechnical Field Exploration and Testing
AET Report No. P-0001619A

A.1 FIELD EXPLORATION

The subsurface conditions at the site were explored by drilling and sampling twenty (20) direct push soil borings and three (3) pavement cores. The locations of the borings appear on Figure 1, preceding the Subsurface Boring Logs in this appendix.

A.2 SAMPLING METHODS

A.2.1 Direct Push Samples (DP)

Sample types described as "DP" on the boring logs are continuous core samples collected by the direct push method. The method consists of a 2.125 inch OD outer casing with an inner 1.5-inch ID plastic tube driven continuously into the ground.

A.2.2 Sampling Limitations

Unless observed in a sample, contacts between soil layers are estimated based on the spacing of samples and the action of drilling tools. Cobbles, boulders, and other large objects generally cannot be recovered from test borings, and they may be present in the ground even if they are not noted on the boring logs.

Determining the thickness of "topsoil" layers is usually limited, due to variations in topsoil definition, sample recovery, and other factors. Visual-manual description often relies on color for determination, and transitioning changes can account for significant variation in thickness judgment. Accordingly, the topsoil thickness presented on the logs should not be the sole basis for calculating topsoil stripping depths and volumes. If more accurate information is needed relating to thickness and topsoil quality definition, alternate methods of sample retrieval and testing should be employed.

A.3 CLASSIFICATION METHODS

Soil descriptions shown on the boring logs are based on the Unified Soil Classification (USC) system. The USC system is described in ASTM: D2487 and D2488. Where laboratory classification tests (sieve analysis or Atterberg Limits) have been performed, accurate classifications per ASTM: D2487 are possible. Otherwise, soil descriptions shown on the boring logs are visual-manual judgments. Charts are attached which provide information on the USC system, the descriptive terminology, and the symbols used on the boring logs.

Visual-manual judgment of the AASHTO Soil Group is also noted as a part of the soil description. A chart presenting details of the AASHTO Soil Classification System is also attached.

The boring logs include descriptions of apparent geology. The geologic depositional origin of each soil layer is interpreted primarily by observation of the soil samples, which can be limited. Observations of the surrounding topography, vegetation, and development can sometimes aid this judgment.

A.4 WATER LEVEL MEASUREMENTS

The ground water level measurements are shown at the bottom of the boring logs. The following information appears under "Water Level Measurements" on the logs:

- Date and Time of measurement
- Sampled Depth: lowest depth of soil sampling at the time of measurement
- Casing Depth: depth to bottom of casing or hollow-stem auger at time of measurement
- Cave-in Depth: depth at which measuring tape stops in the borehole
- Water Level: depth in the borehole where free water is encountered
- Drilling Fluid Level: same as Water Level, except that the liquid in the borehole is drilling fluid

The true location of the water table at the boring locations may be different than the water levels measured in the boreholes. This is possible because there are several factors that can affect the water level measurements in the borehole. Some of these factors include: permeability of each soil layer in profile, presence of perched water, amount of time between water level readings, presence of drilling fluid, weather conditions, and use of borehole casing.

A.5 LABORATORY TEST METHODS

A.5.1 Water Content Tests
Conducted per AET Procedure 01-LAB-010, which is performed in general accordance with ASTM: D2216 and AASHTO: T265.

A.5.2 Atterberg Limits Tests
Conducted per AET Procedure 01-LAB-030, which is performed in general accordance with ASTM: D4318 and AASHTO: T89, T90.

A.5.3 Sieve Analysis of Soils (thru #200 Sieves)
Conducted per AET Procedure 01-LAB-040, which is performed in general conformance with ASTM: D6913, Method A.

A.6 TEST STANDARD LIMITATIONS

Field and laboratory testing is done in general conformance with the described procedures. Compliance with any other standards referenced within the specified standard is neither inferred nor implied.

A.7 SAMPLE STORAGE

Unless notified to do otherwise, we routinely retain representative samples of the soils recovered from the borings for a period of 30 days.

BORING LOG NOTES

DRILLING AND SAMPLING SYMBOLS

Symbol	Definition
B,H,N:	Size of flush-joint casing
CA:	Crew Assistant (initials)
CAS:	Pipe casing, number indicates nominal diameter in inches
CC:	Crew Chief (initials)
COT:	Clean-out tube
DC:	Drive casing; number indicates diameter in inches
DM:	Drilling mud or bentonite slurry
DR:	Driller (initials)
DS:	Disturbed sample from auger flights
FA:	Flight auger; number indicates outside diameter in inches
HA:	Hand auger; number indicates outside diameter
HSA:	Hollow stem auger; number indicates inside diameter in inches
LG:	Field logger (initials)
MC:	Column used to describe moisture condition of samples and for the ground water level symbols
N (BPF):	Standard penetration resistance (N-value) in blows per foot (see notes)
NQ:	NQ wireline core barrel
PQ:	PQ wireline core barrel
RD:	Rotary drilling with fluid and roller or drag bit
REC:	In split-spoon (see notes) and thin-walled tube sampling, the recovered length (in inches) of sample. In rock coring, the length of core recovered (expressed as percent of the total core run). Zero indicates no sample recovered.
REV:	Revert drilling fluid
SS:	Standard split-spoon sampler (steel; 1⅜" is inside diameter; 2" outside diameter); unless indicated otherwise
SU	Spin-up sample from hollow stem auger
TW:	Thin-walled tube; number indicates inside diameter in inches
WASH:	Sample of material obtained by screening returning rotary drilling fluid or by which has collected inside the borehole after "falling" through drilling fluid
WH:	Sampler advanced by static weight of drill rod and 140-pound hammer
WR:	Sampler advanced by static weight of drill rod
94mm:	94 millimeter wireline core barrel
$\underline{\blacktriangledown}$:	Water level directly measured in boring
$\underline{\nabla}$:	Estimated water level based solely on sample appearance

TEST SYMBOLS

Symbol	Definition
CONS:	One-dimensional consolidation test
DEN:	Dry density, pcf
DST:	Direct shear test
E:	Pressuremeter Modulus, tsf
HYD:	Hydrometer analysis
LL:	Liquid Limit, %
LP:	Pressuremeter Limit Pressure, tsf
OC:	Organic Content, %
PERM:	Coefficient of permeability (K) test; F - Field; L - Laboratory
PL:	Plastic Limit, %
q_p:	Pocket Penetrometer strength, tsf (<u>approximate</u>)
q_c:	Static cone bearing pressure, tsf
q_u:	Unconfined compressive strength, psf
R:	Electrical Resistivity, ohm-cms
RQD:	Rock Quality Designation of Rock Core, in percent (aggregate length of core pieces 4" or more in length as a percent of total core run)
SA:	Sieve analysis
TRX:	Triaxial compression test
VSR:	Vane shear strength, remoulded (field), psf
VSU:	Vane shear strength, undisturbed (field), psf
WC:	Water content, as percent of dry weight
%-200:	Percent of material finer than #200 sieve

STANDARD PENETRATION TEST NOTES

The standard penetration test consists of driving the sampler with a 140 pound hammer and counting the number of blows applied in each of three 6" increments of penetration. If the sampler is driven less than 18" (usually in highly resistant material), permitted in ASTM:D1586, the blows for each complete 6" increment and for each partial increment is on the boring log. For partial increments, the number of blows is shown to the nearest 0.1' below the slash.

The length of sample recovered, as shown on the "REC" column, may be greater than the distance indicated in the N column. The disparity is because the N-value is recorded below the initial 6" set (unless partial penetration defined in ASTM:D1586 is encountered) whereas the length of sample recovered is for the entire sampler drive (which may even extend more than 18").

AASHTO SOIL CLASSIFICATION SYSTEM

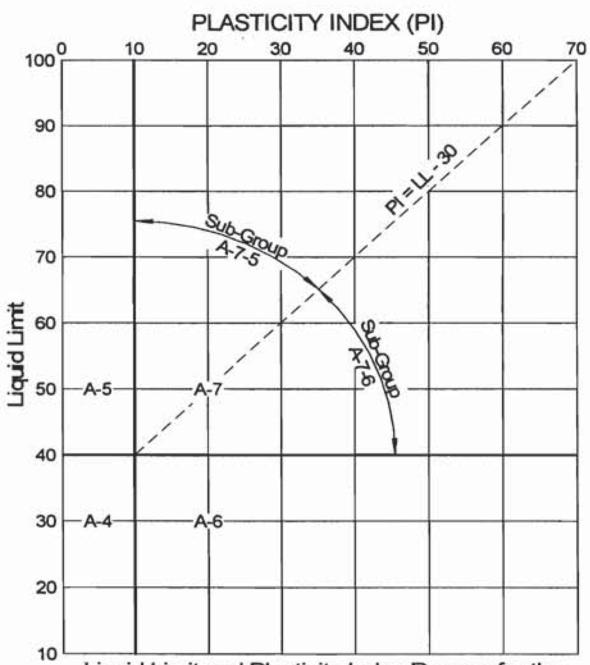
AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS

Classification of Soils and Soil-Aggregate Mixtures

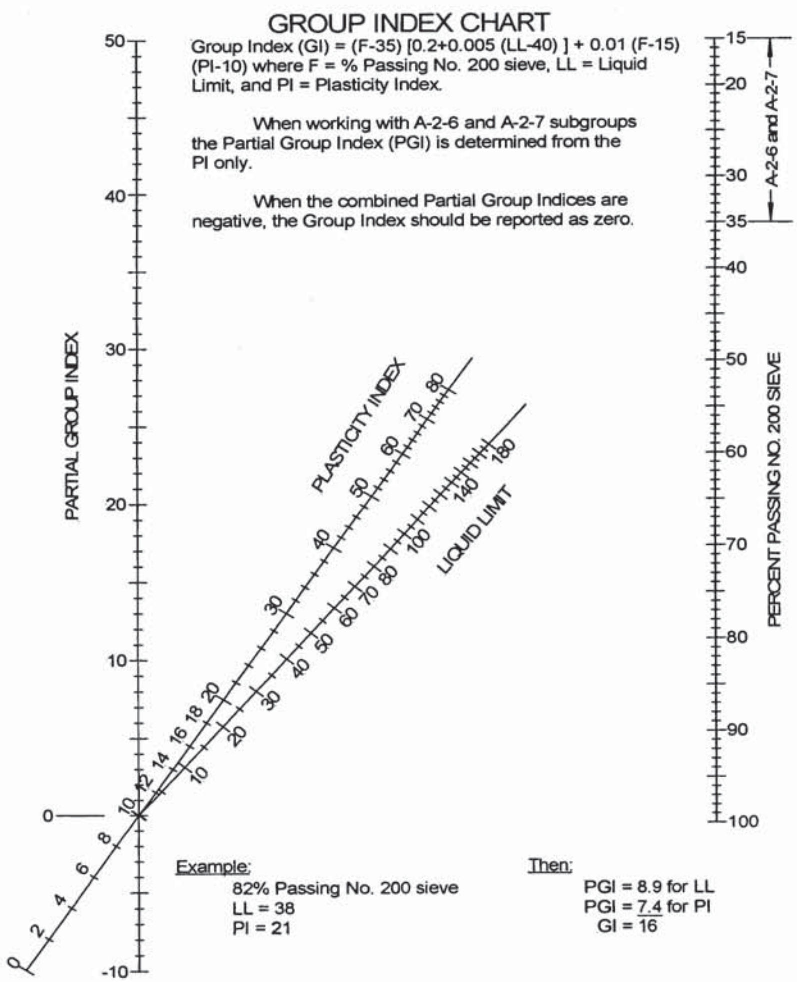
General Classification	Granular Materials (35% or less passing No. 200 sieve)							Silt-Clay Materials (More than 35% passing No. 200 sieve)			
Group Classification	A-1			A-2							A-7
	A-1-a	A-1-b	A-3	A-2-4	A-2-5	A-2-6	A-2-7	A-4	A-5	A-6	A-7-5 A-7-6
Sieve Analysis, Percent passing:											
No. 10 (2.00 mm)	50 max.	....	....	....	....	....	....	....	....	....	....
No. 40 (0.425 mm)	30 max.	50 max.	51 min.	....	....	....	....	....	....	....	....
No. 200 (0.075 mm)	15 max.	25 max.	10 max.	35 max.	35 max.	35 max.	35 max.	36 min.	36 min.	36 min.	36 min.
Characteristics of Fraction Passing No. 40 (0.425 mm)											
Liquid limit	....		....	40 max.	41 min.	40 max.	41 min.	40 max.	41 min.	40 max.	41 min.
Plasticity index	6 max.		N.P.	10 max.	10 max.	11 min.	11 min.	10 max.	10 max.	11 min.	11 min.
Usual Types of Significant Constituent Materials	Stone Fragments, Gravel and Sand		Fine Sand	Silty or Clayey Gravel and Sand				Silty Soils		Clayey Soils	
General Ratings as Subgrade	Excellent to Good							Fair to Poor			

The placing of A-3 before A-2 is necessary in the "left to right elimination process" and does not indicate superiority of A-3 over A-2.

Plasticity index of A-7-5 subgroup is equal to or less than LL minus 30. Plasticity index of A-7-6 subgroup is greater than LL minus 30.



Liquid Limit and Plasticity Index Ranges for the A-4, A-5, A-6 and A-7 Subgroups



Definitions of Gravel, Sand and Silt-Clay

The terms "gravel", "coarse sand", "fine sand" and "silt-clay", as determinable from the minimum test data required in this classification arrangement and as used in subsequent word descriptions are defined as follows:

GRAVEL - Material passing sieve with 3-in. square openings and retained on the No. 10 sieve.

COARSE SAND - Material passing the No. 10 sieve and retained on the No. 40 sieve.

FINE SAND - Material passing the No. 40 sieve and retained on the No. 200 sieve.

COMBINED SILT AND CLAY - Material passing the No. 200 sieve

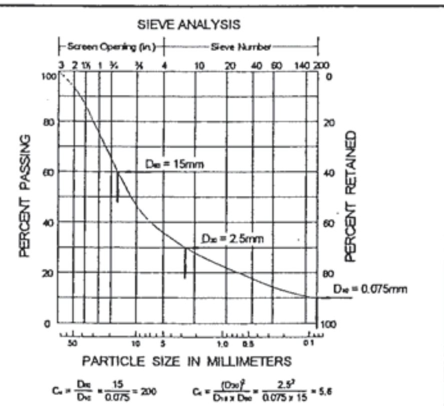
BOULDERS (retained on 3-in. sieve) should be excluded from the portion of the sample to which the classificaiton is applied, but the percentage of such material, if any, in the sample should be recorded.

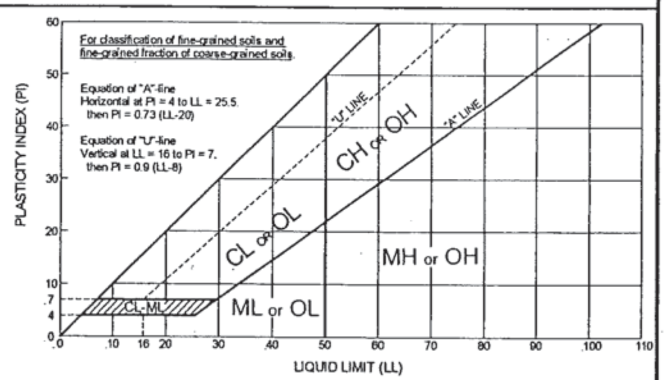
The term "silty" is applied to fine material having plasticity index of 10 or less and the term "clayey" is applied to fine material having plasticity index of 11 or greater.

UNIFIED SOIL CLASSIFICATION SYSTEM
ASTM Designations: D 2487, D2488

AMERICAN ENGINEERING TESTING, INC.

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests[A]				Soil Classification: Group Symbol	Soil Classification: Group Name[B]
Coarse-Grained Soils More than 50% retained on No. 200 sieve	Gravels More than 50% coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines[C]	$Cu \geq 4$ and $1 \leq Cc \leq 3$[E]	GW	Well graded gravel[F]
			$Cu < 4$ and/or $1 > Cc > 3$[E]	GP	Poorly graded gravel[F]
		Gravels with Fines more than 12% fines[C]	Fines classify as ML or MH	GM	Silty gravel[F,G,H]
			Fines classify as CL or CH	GC	Clayey gravel[F,G,H]
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines[D]	$Cu \geq 6$ and $1 \leq Cc \leq 3$[E]	SW	Well-graded sand[I]
			$Cu < 6$ and/or $1 > Cc > 3$[E]	SP	Poorly-graded sand[I]
		Sands with Fines more than 12% fines[D]	Fines classify as ML or MH	SM	Silty sand[G,H,I]
			Fines classify as CL or CH	SC	Clayey sand[G,H,I]
Fine-Grained Soils 50% or more passes the No. 200 sieve (see Plasticity Chart below)	Silts and Clays Liquid limit less than 50	inorganic	PI>7 and plots on or above "A" line[J]	CL	Lean clay[K,L,M]
			PI<4 or plots below "A" line[J]	ML	Silt[K,L,M]
		organic	Liquid limit–oven dried / Liquid limit – not dried <0.75	OL	Organic clay[K,L,M,N] Organic silt[K,L,M,O]
	Silts and Clays Liquid limit 50 or more	inorganic	PI plots on or above "A" line	CH	Fat clay[K,L,M]
			PI plots below "A" line	MH	Elastic silt[K,L,M]
		organic	Liquid limit–oven dried / Liquid limit – not dried <0.75	OH	Organic clay[K,L,M,P] Organic silt[K,L,M,Q]
Highly organic soil			Primarily organic matter, dark in color, and organic in odor	PT	Peat[R]





Plasticity Chart

Notes

[A]Based on the material passing the 3-in (75-mm) sieve.

[B]If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C]Gravels with 5 to 12% fines require dual symbols:
- GW-GM well-graded gravel with silt
- GW-GC well-graded gravel with clay
- GP-GM poorly graded gravel with silt
- GP-GC poorly graded gravel with clay

[D]Sands with 5 to 12% fines require dual symbols:
- SW-SM well-graded sand with silt
- SW-SC well-graded sand with clay
- SP-SM poorly graded sand with silt
- SP-SC poorly graded sand with clay

[E]$Cu = D_{60}/D_{10}$, $Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

[F]If soil contains ≥15% sand, add "with sand" to group name.

[G]If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H]If fines are organic, add "with organic fines" to group name.

[I]If soil contains ≥15% gravel, add "with gravel" to group name.

[J]If Atterberg limits plot is hatched area, soils is a CL-ML silty clay.

[K]If soil contains 15 to 29% plus No. 200 add "with sand" or "with gravel", whichever is predominant.

[L]If soil contains ≥30% plus No. 200, predominantly sand, add "sandy" to group name.

[M]If soil contains ≥30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N]PI≥4 and plots on or above "A" line.

[O]PI<4 or plots below "A" line.

[P]PI plots on or above "A" line.

[Q]PI plots below "A" line.

[R]Fiber Content description shown below.

ADDITIONAL TERMINOLOGY NOTES USED BY AET FOR SOIL IDENTIFICATION AND DESCRIPTION

Grain Size

Term	Particle Size
Boulders	Over 12"
Cobbles	3" to 12"
Gravel	#4 sieve to 3"
Sand	#200 to #4 sieve
Fines (silt & clay)	Pass #200 sieve

Gravel Percentages

Term	Percent
A Little Gravel	3% - 14%
With Gravel	15% - 29%
Gravelly	30% - 50%

Consistency of Plastic Soils

Term	N-Value, BPF
Very Soft	less than 2
Soft	2 - 4
Firm	5 - 8
Stiff	9 - 15
Very Stiff	16 - 30
Hard	Greater than 30

Relative Density of Non-Plastic Soils

Term	N-Value, BPF
Very Loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	Greater than 50

Moisture/Frost Condition
(MC Column)

D (Dry):	Absense of moisture, dusty, dry to touch.
M (Moist):	Damp, although free water not visible. Soil may still have a high water content (over "optimum").
W (Wet/ Waterbearing):	Free water visible intended to describe non-plastic soils. Waterbearing usually relates to sands and sand with silt.
F (Frozen):	Soil frozen

Layering Notes

Laminations:	Layers less than ½" thick of differing material or color.
Lenses:	Pockets or layers greater than ½" thick of differing material or color.

Peat Description

Term	Fiber Content (Visual Estimate)
Fibric Peat:	Greater than 67%
Hemic Peat:	33 – 67%
Sapric Peat:	Less than 33%

Organic Description (if no lab tests)

Soils are described as *organic*, if soil is not peat and is judged to have sufficient organic fines content to influence the Liquid Limit properties. *Slightly organic* used for borderline cases.

Root Inclusions

With roots:	Judged to have sufficient quantity of roots to influence the soil properties.
Trace roots:	Small roots present, but not judged to be in sufficient quantity to significantly affect soil properties.

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: **P-0001619** LOG OF BORING NO. **B-01 (p. 1 of 1)**

PROJECT: **Grover Hill Wind Project; Grover Hill, OH**

SURFACE ELEVATION: ______ LATITUDE: **41.036789** LONGITUDE: **-84.5151**

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	DEN	LL	PL	%-#200
	3" Bituminous pavement	FILL									
	6" FILL, mostly gravelly silty sand, brown (A-1-b)										
	3" FILL, mostly gravelly silty sand with bituminous, dark brown (A-1-b)										
1	FILL, mixture of gravelly silty sand and clayey sand, brown (A-2-4)										
	LEAN CLAY, gray to brown (CL) (A-6)	FINE ALLUVIUM									
2					DP	42					
3											
4	**END OF BORING**										

DEPTH:	DRILLING METHOD	WATER LEVEL MEASUREMENTS DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
0-4'	**Direct Push**							

BORING COMPLETED: **5/4/21**

DR: **SB** LG: **JM** Rig: **441**

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

AET_CORP W-LAT-LONG P-0001619.GPJ AET+CPT+WELL_20181012_JG.GDT 5/21/21

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: **P-0001619** LOG OF BORING NO. **B-02 (p. 1 of 1)**

PROJECT: **Grover Hill Wind Project; Grover Hill, OH**

SURFACE ELEVATION: ________ LATITUDE: **41.03068** LONGITUDE: **-84.5151**

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	WC	DEN	LL	PL	%-#200
	.5' Bituminous pavement	FILL									
	3.5" FILL, mostly gravelly silty sand, brown (A-1-b)										
	2" FILL, mostly gravelly silty sand with bituminous pieces, dark brown (A-1-b)										
1	7" FILL, mostly gravelly silty sand, brown (A-1-b)										
	LEAN CLAY, gray (CL) (A-6)	FINE ALLUVIUM									
2					DP	42					
3											
4	**END OF BORING**										

DEPTH:	DRILLING METHOD	DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
0-4'	**Direct Push**							
BORING COMPLETED: **5/4/21**								
DR: **SB** LG: **JM**	Rig: **441**							

WATER LEVEL MEASUREMENTS

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: **P-0001619** LOG OF BORING NO. **B-03 (p. 1 of 1)**

PROJECT: **Grover Hill Wind Project; Grover Hill, OH**

SURFACE ELEVATION: ________ LATITUDE: **41.0222** LONGITUDE: **-84.515**

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	WC	DEN	LL	PL	%-#200
	1" Bituminous pavement	FILL					4		NP	NP	10
	12" FILL, mostly gravelly silty sand, a little clayey sand, brown (A-1-a)				DP	18					
1											
	END OF BORING										

DEPTH:	DRILLING METHOD	WATER LEVEL MEASUREMENTS							NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG
0-1.5'	**Direct Push**	DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL	
BORING COMPLETED: **5/4/21**									
DR: **SB** LG: **JM** Rig: **441**									

AET_CORP W-LAT-LONG P-0001619.GPJ AET+CPT+WELL_20181012_JG.GDT 5/21/21

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: **P-0001619** LOG OF BORING NO. **B-04 (p. 1 of 1)**

PROJECT: **Grover Hill Wind Project; Grover Hill, OH**

SURFACE ELEVATION: ________ LATITUDE: **41.01506** LONGITUDE: **-84.515**

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	WC	DEN	LL	PL	%-#200
	1" Bituminous pavement	FILL									
	13" FILL, mostly gravelly silty sand, brown (A-1-b)										
1											
	LEAN CLAY, gray to brown (CL) (A-6)	FINE ALLUVIUM			DP	30					
2											
	END OF BORING										

DEPTH:	DRILLING METHOD	DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
0-4'	**Direct Push**							

WATER LEVEL MEASUREMENTS

BORING COMPLETED: **5/4/21**

DR: **SB** LG: **JM** Rig: **441**

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

AET_CORP W-LAT-LONG P-0001619.GPJ AET+CPT+WELL_20181012_JG.GDT 5/21/21

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: **P-0001619** LOG OF BORING NO. **B-05 (p. 1 of 1)**

PROJECT: **Grover Hill Wind Project; Grover Hill, OH**

SURFACE ELEVATION: ______ LATITUDE: **41.00714** LONGITUDE: **-84.5149**

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	WC	DEN	LL	PL	%-#200
	1" Bituminous pavement	FILL									
	4" FILL, mostly gravelly silty sand, light brown (A-1-b)										
	4" FILL, mostly gravelly silty sand with bituminous pieces, dark brown (A-1-b)										
1	5" FILL, mostly gravelly silty sand, light brown (A-1-b)										
	CLAYEY SAND, a little gravel, gray to brown (SC) (A-6)	TILL									
2					DP	42					
3											
4	**END OF BORING**										

DEPTH:	DRILLING METHOD
0-4'	**Direct Push**

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL

BORING COMPLETED: **5/4/21**

DR: **SB** LG: **JM** Rig: **441**

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

AET_CORP W-LAT-LONG P-0001619.GPJ AET+CPT+WELL_20181012_JG.GDT 5/21/21

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: **P-0001619**

LOG OF BORING NO. **B-06 (p. 1 of 1)**

PROJECT: **Grover Hill Wind Project; Grover Hill, OH**

SURFACE ELEVATION: ________ LATITUDE: **41.00455** LONGITUDE: **-84.499**

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	WC	DEN	LL	PL	%-#200
	7" Bituminous pavement	FILL									
	5" FILL, mostly gravelly silty sand, light brown (A-1-b)										
1	LEAN CLAY, gray to brown (CL) (A-6)	FINE ALLUVIUM									
2					DP	42					
3											
4	**END OF BORING**										

DEPTH:	DRILLING METHOD	DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
0-4'	**Direct Push**							

WATER LEVEL MEASUREMENTS

BORING COMPLETED: **5/4/21**

DR: **SB** LG: **JM** Rig: **441**

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

AET_CORP W-LAT-LONG P-0001619.GPJ AET+CPT+WELL_20181012_JG.GDT 5/21/21

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: **P-0001619** LOG OF BORING NO. **B-07 (p. 1 of 1)**

PROJECT: **Grover Hill Wind Project; Grover Hill, OH**

SURFACE ELEVATION: ______ LATITUDE: **41.000459** LONGITUDE: **-84.4889**

DEPTH IN FEET	MATERIAL DESCRIPTION		GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS				
								WC	DEN	LL	PL	%-#200
	6" Bituminous pavement		FILL									
1	8" FILL, mostly gravelly silty sand, light brown (A-1-b)											
2	LEAN CLAY WITH SAND, gray to brown (CL) (A-7-6)		FINE ALLUVIUM			DP	42					
3								24		48	19	81
4	**END OF BORING**											

DEPTH:	DRILLING METHOD	WATER LEVEL MEASUREMENTS							NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG
		DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL	
0-4'	**Direct Push**								

BORING COMPLETED: **5/4/21**

DR: **SB** LG: **JM** Rig: **441**

AET_CORP W-LAT-LONG P-0001619.GPJ AET+CPT+WELL_20181012_JG.GDT 5/21/21

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: P-0001619 LOG OF BORING NO. B-08 (p. 1 of 1)

PROJECT: Grover Hill Wind Project; Grover Hill, OH

SURFACE ELEVATION: ______ LATITUDE: 41.00461 LONGITUDE: -84.4784

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	WC	DEN	LL	PL	%-#200
	6" Bituminous pavement	FILL			CORE						
1	8" FILL, mostly gravelly silty sand, light brown (A-1-b)										
2	LEAN CLAY, gray to brown (CL) (A-6)	FINE ALLUVIUM			DP	42					
3											
4	**END OF BORING**										

DEPTH:	DRILLING METHOD
0-4'	Direct Push

BORING COMPLETED: 5/4/21

DR: SB LG: JM Rig: 441

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

AET_CORP W-LAT-LONG P-0001619.GPJ AET+CPT+WELL_20181012_JG.GDT 5/21/21

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: **P-0001619** LOG OF BORING NO. **B-09 (p. 1 of 1)**

PROJECT: **Grover Hill Wind Project; Grover Hill, OH**

SURFACE ELEVATION: ________ LATITUDE: **41.00464** LONGITUDE: **-84.4684**

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	WC	DEN	LL	PL	%-#200
	5" Bituminous pavement	FILL									
	3" FILL, mostly gravelly clayey sand, gray (A-6)										
1	LEAN CLAY, brown to gray (CL) (A-6)	FINE ALLUVIUM									
2					DP	42					
3											
4	**END OF BORING**										

DEPTH:	DRILLING METHOD	DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
0-4'	**Direct Push**							
BORING COMPLETED:	**5/4/21**							
DR: **SB** LG: **JM**	Rig: **441**							

WATER LEVEL MEASUREMENTS

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

AET_CORP W-LAT-LONG P-0001619.GPJ AET+CPT+WELL_20181012_JG.GDT 5/21/21

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: **P-0001619** LOG OF BORING NO. **B-10 (p. 1 of 1)**

PROJECT: **Grover Hill Wind Project; Grover Hill, OH**

SURFACE ELEVATION: ________ LATITUDE: **40.99736** LONGITUDE: **-84.4776**

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	DEN	LL	PL	%-#200
	6" Crushed limestone (A-1-b)	FILL									
	GEO FABRIC										
	6" FILL, mostly gravelly silty sand, brown (A-1-b)										
1	LEAN CLAY, brown (CL) (A-6)	FINE ALLUVIUM									
2					DP	42					
3											
4	**END OF BORING**										

DEPTH:	DRILLING METHOD	WATER LEVEL MEASUREMENTS DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
0-4'	**Direct Push**							

BORING COMPLETED: **5/4/21**

DR: **SB** LG: **JM** Rig: **441**

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

AET_CORP W-LAT-LONG P-0001619.GPJ AET+CPT+WELL_20181012_JG.GDT 5/21/21

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: **P-0001619** LOG OF BORING NO. **B-11 (p. 1 of 1)**

PROJECT: **Grover Hill Wind Project; Grover Hill, OH**

SURFACE ELEVATION: ________ LATITUDE: **40.99728** LONGITUDE: **-84.5123**

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS				
							WC	DEN	LL	PL	%-#200
	4" Bituminous pavement	FILL									
	8" FILL, mostly gravelly silty sand, light brown (A-1-b)										
1	LEAN CLAY, gray to brown (CL) (A-6)	FINE ALLUVIUM									
2					DP	42					
3											
4	**END OF BORING**										

DEPTH:	DRILLING METHOD	WATER LEVEL MEASUREMENTS							NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG
		DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL	
0-4'	**Direct Push**								
BORING COMPLETED: **5/4/21**									
DR: **SB** LG: **JM** Rig: **441**									

AET_CORP W-LAT-LONG P-0001619.GPJ AET+CPT+WELL_20181012_JG.GDT 5/21/21

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: **P-0001619** LOG OF BORING NO. **B-12 (p. 1 of 1)**

PROJECT: **Grover Hill Wind Project; Grover Hill, OH**

SURFACE ELEVATION: ______ LATITUDE: **40.99728** LONGITUDE: **-84.4999**

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	WC	DEN	LL	PL	%-#200
	6" FILL, mostly gravelly silty sand (A-1-b)	FILL									
	LEAN CLAY, brown (CL) (A-6)	FINE ALLUVIUM									
1											
2					DP	42					
3											
4	**END OF BORING**										

FIELD & LABORATORY TESTS: WC, DEN, LL, PL, %-#200

DEPTH:	DRILLING METHOD	DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
0-4'	**Direct Push**							

WATER LEVEL MEASUREMENTS

BORING COMPLETED: **5/4/21**

DR: **SB** LG: **JM** Rig: **441**

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

AET_CORP W-LAT-LONG P-0001619.GPJ AET+CPT+WELL_20181012_JG.GDT 5/21/21

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: P-0001619 LOG OF BORING NO. B-13 (p. 1 of 1)

PROJECT: Grover Hill Wind Project; Grover Hill, OH

SURFACE ELEVATION: LATITUDE: 41.00038 LONGITUDE: -84.4957

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	WC	DEN	LL	PL	%-#200
	1" Bituminous pavement	FILL									
	8" FILL, mostly gravelly silty sand, a little bituminous, light brown (A-1-b)										
1	LEAN CLAY, gray to brown (CL) (A-6)	FINE ALLUVIUM									
2					DP	42					
3											
4	**END OF BORING**										

DEPTH:	DRILLING METHOD	WATER LEVEL MEASUREMENTS							NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG
		DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL	
0-4'	Direct Push								
BORING COMPLETED: 5/4/21									
DR: SB LG: JM Rig: 441									

AET_CORP W-LAT-LONG P-0001619.GPJ AET+CPT+WELL_20181012_JG.GDT 5/21/21

03/2011 01-DHR-060

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: **P-0001619**   LOG OF BORING NO. **B-14 (p. 1 of 1)**

PROJECT: **Grover Hill Wind Project; Grover Hill, OH**

SURFACE ELEVATION: ________   LATITUDE: **41.00763**   LONGITUDE: **-84.4957**

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	DEN	LL	PL	%-#200
	1" Bituminous pavement	FILL									
	6" FILL, mostly gravelly silty sand, light brown (A-1-b)										
	2" FILL, mostly gravelly silty sand with bituminous, dark brown (A-1-b)										
1	6" FILL, mostly gravelly silty sand, light brown (A-1-b)										
	LEAN CLAY, gray to brown (CL) (A-6)	FINE ALLUVIUM									
2					DP	42					
3											
4	**END OF BORING**										

DEPTH:	DRILLING METHOD	WATER LEVEL MEASUREMENTS DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
0-4'	**Direct Push**							

BORING COMPLETED: **5/4/21**

DR: **SB** LG: **JM** Rig: **441**

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

AET_CORP W-LAT-LONG P-0001619.GPJ AET+CPT+WELL_20181012_JG.GDT 5/21/21

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: **P-0001619** LOG OF BORING NO. **B-15 (p. 1 of 1)**

PROJECT: **Grover Hill Wind Project; Grover Hill, OH**

SURFACE ELEVATION: ______ LATITUDE: **41.01564** LONGITUDE: **-84.4958**

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS				
							WC	DEN	LL	PL	%-#200
	1" Bituminous pavement	FILL									
	15" FILL, mostly gravelly silty sand, brown (A-1-b)										
1											
	LEAN CLAY, gray to brown (CL) (A-6)	FINE ALLUVIUM									
2					DP	42					
3											
4	**END OF BORING**										

DEPTH:	DRILLING METHOD	WATER LEVEL MEASUREMENTS							NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG
		DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL	
0-4'	**Direct Push**								
BORING COMPLETED: **5/4/21**									
DR: **SB** LG: **JM** Rig: **441**									

AET_CORP W-LAT-LONG P-0001619.GPJ AET+CPT+WELL_20181012_JG.GDT 5/21/21

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: **P-0001619** LOG OF BORING NO. **B-16 (p. 1 of 1)**

PROJECT: **Grover Hill Wind Project; Grover Hill, OH**

SURFACE ELEVATION: ______ LATITUDE: **41.02311** LONGITUDE: **-84.4958**

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	WC	DEN	LL	PL	%-#200
	1" Bituminous pavement 7" FILL, mostly gravelly silty sand, brown (A-1-b)	FILL									
	LEAN CLAY, gray (CL) (A-6)	FINE ALLUVIUM									
1											
2					DP	42					
3											
4	**END OF BORING**										

DEPTH:	DRILLING METHOD
0-4'	**Direct Push**

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL

BORING COMPLETED: **5/4/21**

DR: **SB** LG: **JM** Rig: **441**

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

AET_CORP W-LAT-LONG P-0001619.GPJ AET+CPT+WELL_20181012_JG.GDT 5/21/21

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: **P-0001619** LOG OF BORING NO. **B-17 (p. 1 of 1)**

PROJECT: **Grover Hill Wind Project; Grover Hill, OH**

SURFACE ELEVATION: ________ LATITUDE: **41.03036** LONGITUDE: **-84.4958**

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS: WC	DEN	LL	PL	%-#200
	1" Bituminous pavement	FILL			CORE						
	8" FILL, mostly gravelly silty sand, brown (A-1-b)										
1	LEAN CLAY, gray to brown (CL) (A-6)	FINE ALLUVIUM									
2					DP	42					
3											
4	**END OF BORING**										

DEPTH:	DRILLING METHOD	WATER LEVEL MEASUREMENTS: DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
0-4'	**Direct Push**							

BORING COMPLETED: **5/4/21**

DR: **SB** LG: **JM** Rig: **441**

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

AET_CORP W-LAT-LONG P-0001619.GPJ AET+CPT+WELL_20181012_JG.GDT 5/21/21

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: **P-0001619** LOG OF BORING NO. **B-18 (p. 1 of 1)**

PROJECT: **Grover Hill Wind Project; Grover Hill, OH**

SURFACE ELEVATION: ______ LATITUDE: **41.03671** LONGITUDE: **-84.4958**

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	WC	DEN	LL	PL	%-#200
	1" Bituminous pavement	FILL									
	13" FILL, mostly gravelly silty sand, brown (A-1-b)										
1											
	LEAN CLAY, gray to brown (CL) (A-6)	FINE ALLUVIUM									
2					DP	42					
3											
4	**END OF BORING**										

DEPTH:	DRILLING METHOD	DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
0-4'	**Direct Push**							
BORING COMPLETED: **5/4/21**								
DR: **SB** LG: **JM** Rig: **441**								

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

AET_CORP W-LAT-LONG P-0001619.GPJ AET+CPT+WELL_20181012_JG.GDT 5/21/21

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: P-0001619 LOG OF BORING NO. B-19 (p. 1 of 1)

PROJECT: Grover Hill Wind Project; Grover Hill, OH

SURFACE ELEVATION: LATITUDE: 41.03369 LONGITUDE: -84.4916

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS				
							WC	DEN	LL	PL	%-#200
	2" Bituminous pavement	FILL									
	5" FILL, mostly gravelly silty sand, light brown (A-1-b)										
	1" FILL, mostly gravelly silty sand with bituminous pieces, dark brown (A-1-b)										
1	6" FILL, mostly gravelly silty sand, light brown (A-1-b)										
	LEAN CLAY, gray to brown (CL) (A-6)	FINE ALLUVIUM									
2					DP	42					
3											
4	**END OF BORING**										

DEPTH:	DRILLING METHOD	WATER LEVEL MEASUREMENTS							NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG
		DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL	
0-4'	**Direct Push**								

BORING COMPLETED: **5/4/21**

DR: **SB** LG: **JM** Rig: **441**

AET_CORP W-LAT-LONG P-0001619.GPJ AET+CPT+WELL_20181012_JG.GDT 5/21/21

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: P-0001619 LOG OF BORING NO. B-20 (p. 1 of 1)

PROJECT: Grover Hill Wind Project; Grover Hill, OH

SURFACE ELEVATION: ________ LATITUDE: 41.03374 LONGITUDE: -84.4804

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS				
							WC	DEN	LL	PL	%-#200
	2" Bituminous pavement	FILL									
	10" FILL, mostly gravelly silty sand, brown (A-1-b)										
1	LEAN CLAY, gray to brown (CL) (A-6)	FINE ALLUVIUM									
2					DP	42					
3											
4	**END OF BORING**										

DEPTH:	DRILLING METHOD	WATER LEVEL MEASUREMENTS							NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG
		DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL	
0-4'	Direct Push								

BORING COMPLETED: 5/4/21

DR: SB LG: JM Rig: 441

Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	Class-ification	Water Content (%)	Dry Density (pcf)	Satur-ation (%)	Void Ratio
B-03	0.1	NP	NP	NP	25	10	SP-SM	4.0			
B-07	2.6	48	19	29	0.075	81	CL	24.5			

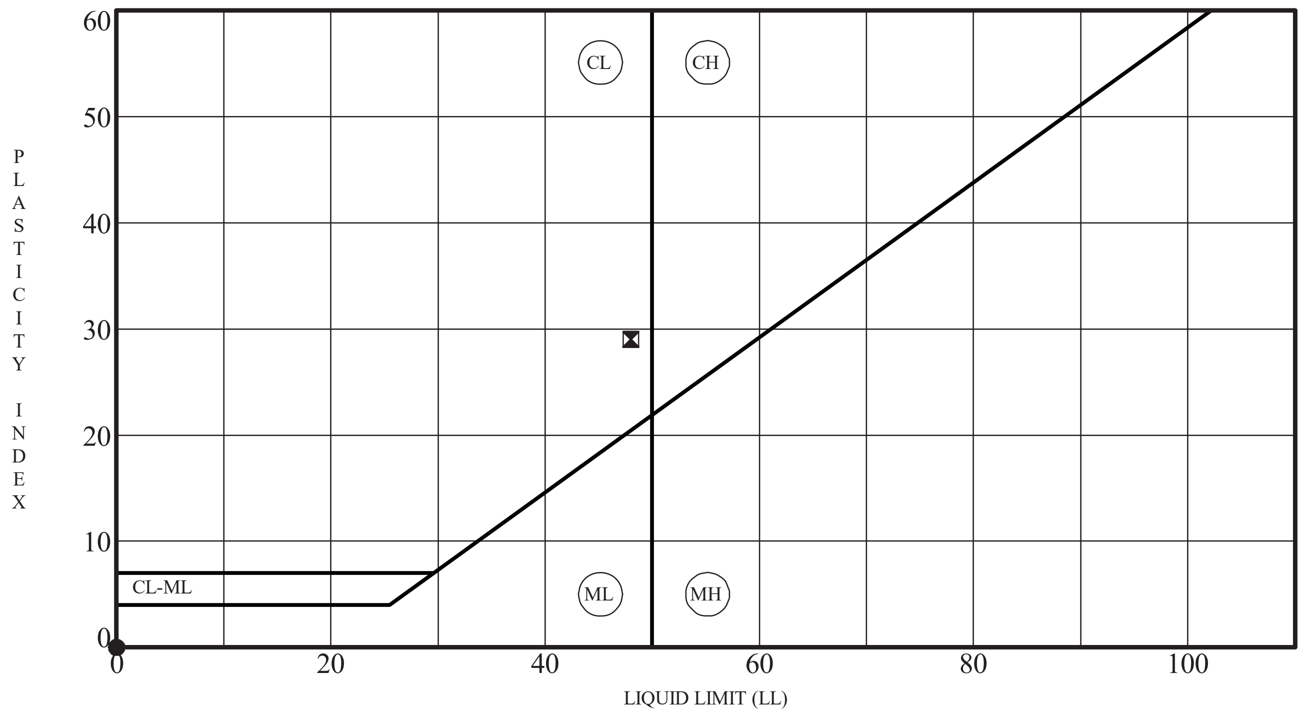
AMERICAN ENGINEERING TESTING, INC.

Summary of Laboratory Results

Project: Grover Hill Wind Project

Location: Grover Hill, OH

Number: P-0001619



	Specimen Identification		LL	PL	PI	Fines	Classification
●	**B-03**	**0.1'**	**NP**	**NP**	**NP**	**9.8**	**POORLY GRADED SAND with SILT and GRAVEL**
⧗	**B-07**	**2.6'**	**48**	**19**	**29**	**81.0**	**LEAN CLAY with SAND**

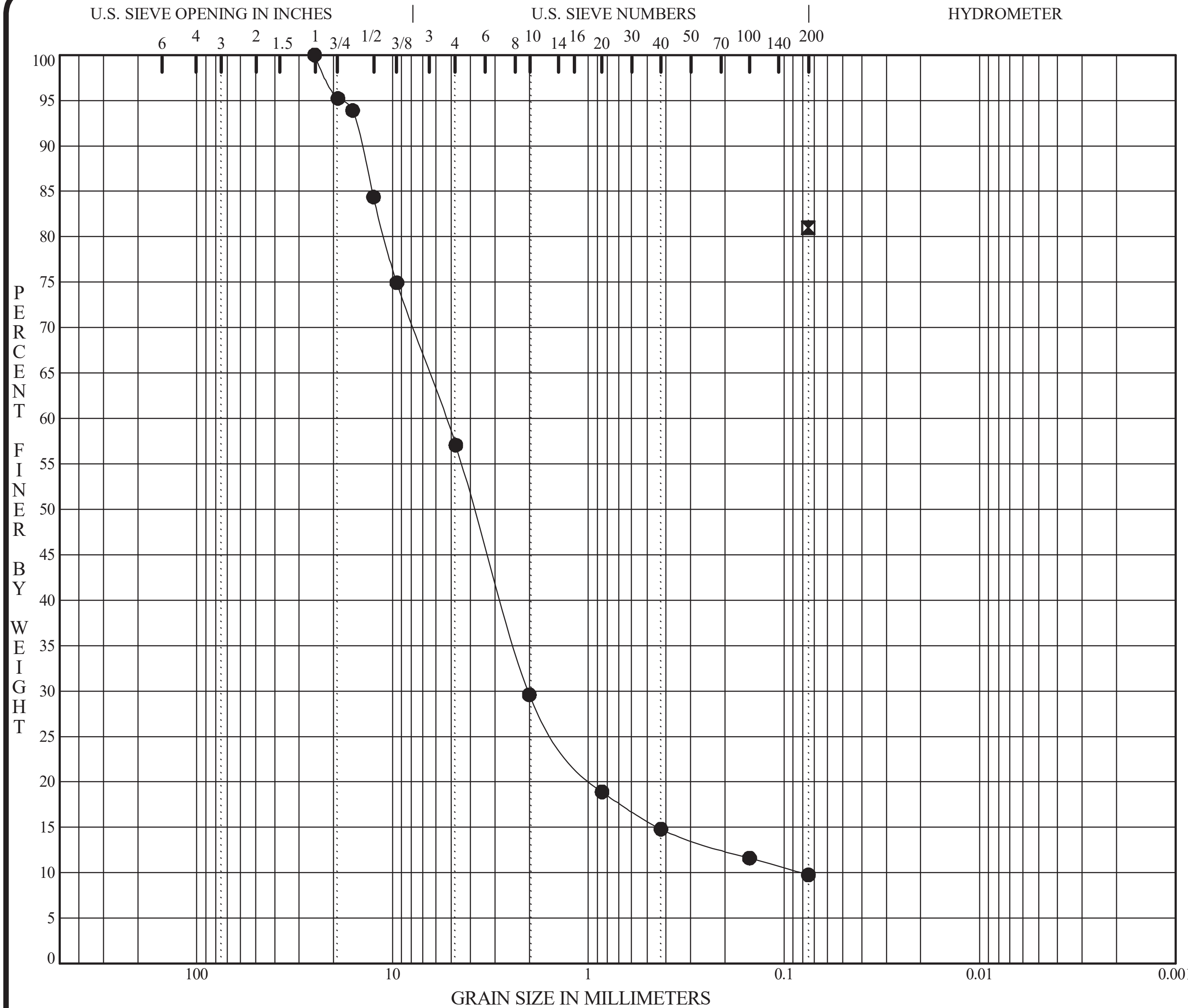
PROJECT **Grover Hill Wind Project; Grover Hill, OH**

AET JOB NO. **P-0001619**

DATE **5/4/21**

AMERICAN ENGINEERING TESTING, INC.

ATTERBERG LIMITS RESULTS



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Cc	Cu
●	**B-03**	**0.1**	**POORLY GRADED SAND with SILT and GRAVEL**	**4**	**NP**	**NP**	**NP**	**9.40**	**64.8**
⊠	**B-07**	**2.6**	**LEAN CLAY with SAND**	**24**	**48**	**19**	**29**		

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**B-03**	**0.1**	**25.00**	**5.32**	**2.027**	**0.0821**	**70.4**	**19.8**	**9.8**	
⊠	**B-07**	**2.6**	**0.08**				**0.0**	**0.0**	**81.0**	

PROJECT **Grover Hill Wind Project; Grover Hill, OH**

AET JOB NO. **P-0001619**
DATE **5/4/21**

AMERICAN ENGINEERING TESTING, INC.

AASHTO GRADATION CURVES

AMERICAN ENGINEERING TESTING, INC.

APPENDIX B

Ground Penetrating Radar Field Exploration and Testing

Grover Hill Wind Project

Paulding County, Ohio

AET Report No. P-0001619A

Appendix B
Ground Penetrating Radar Field Exploration and Testing
AET Project No. P-0001619A

B.1 FIELD EXPLORATION

The pavement structural conditions at the site were evaluated nondestructively using Ground Penetrating Radar (GPR). The description of the equipment precedes the GPR Data and Analysis Results in this appendix.

B.2 EQUIPMENT DESCRIPTION

B.2.1 GSSI GPR Test System

The GPR test system owned by AET is a bumper-mounted, 2 GHz air-coupled antenna; dual-channel controller/data acquisition system; wheel-mounted DMI (Distance Measuring Instrument); and laptop with the GSSI controller software. AET uses GPR systems for testing and analysis that meets the ASTM D4748-10 Determining the Thickness of Bound Pavement Layers Using Short-Pulse Radar and D6087 Evaluating Asphalt-Covered Concrete Bridge Decks Using Ground Penetrating Radar test standards. Figure A1 provides an example of a vehicle outfitted with the air-coupled antenna and the raw GPR data prior to processing.

(a) (b)

Figure B1. (a) GSSI 2 GHz Air-coupled GPR Test System mounted to the rear of an AET survey vehicle and (b) example of raw data collected using the GPR test system

The GPR antenna emits a high-frequency electromagnetic wave into the material under investigation. The reflected energy caused by changes in the electromagnetic properties within the material is detected by a receiver antenna and recorded for subsequent analysis. The 2 GHz air-coupled GPR can collect radar waveforms at more than 100 signals per second, which allows for data to be collected at driving speeds along the longitudinal dimension of a road with the antennas fixed at the rear or in front of the vehicle.

AET prefers the 2 GHz antenna for road surveys as it combines excellent resolution with reasonable depth penetration (18-24 inches in pavement materials). As data collection is performed at normal driving speeds (45-55 mph), no lane closures are required. At this speed the 2 GHz antenna can collect data at 6-inch interval (2 scans/foot), however data collection varies by project. Specific data collection rates (in scans per foot) will be described in project reports. Vertical scans consist of 512 samples and the recorded length in time of each scan is 12 nanoseconds. Data acquisition uses 300 MHz high pass and 5,000 MHz low pass filters.

In a GPR test, the antenna is moved continuously across the test surface and the control unit collects data at a specified distance increment. In this way, the data collection rate is independent of the scan rate. Alternatively, scanning can be performed at a constant rate of time, regardless of the scan distance. Single point scans can be performed as well. Data is reviewed in the controller software in real-time during field testing to identify reflections and ensure proper data collection parameters.

B.2.2 System Calibrations

Prior to each use, the GPR test system is calibrated using metal plate and air calibration methods suggested by the GPR manufacturer. In addition, the DMI is calibrated to within +/- 1 foot/mile.

- Metal plate calibration is obtained with the antenna placed over a metal plate at the same elevation as a scan obtained over pavement. Time-based collection (as opposed to distance) is performed to provide the velocity of the radar energy in terms of reflection strengths (amplitudes) from a pavement layer interface relative to a perfect reflector (a metal plate).

- Air calibrations are also performed in time-based collection mode to account for the vertical travel of the antenna during vehicle-mounted testing. To approximate the range of travel encountered during testing, data is collected for fifteen seconds while an operator moves the vehicle vertically (by jumping up and down on the mounting point at the bumper) to record data. This information is used in later GPR analysis.
- The DMI is calibrated by laying out a long distance (typically 100 feet) with a tape measure, marking the termini, and traversing the known distance. Recorded distance in the controller software is confirmed against actual distance, and adjustments in the controller software are made to ensure that DMI information that is paired with GPR data is accurate.

B.2.3 Linear Distance and Spatial Reference System

The distance measuring instrument (DMI) is a trailer mounted two phase encoder system. When DMI is connected to the GPR controller it provides for automatic display and recording distance information in both English and metric units within a 1-foot (0.3 meters) resolution when calibrated using provided procedure in the controller software.

The spatial reference system is provided using either Trimble or EOS Arrow Global Positioning System (GPS) systems that consist of a fully integrated receiver, antenna, and battery unit to provide subfoot (30 cm) post processed accuracy. All GPS information is coupled with raw GPR data within the GPR controller software.

B.2.4 Camera Monitoring System

A truck-mounted, battery-operated independent 4K waterproof multi-functional digital camera with an SD card is used to capture digital video of the pavement surface during GPR data collection.

B.3 SAMPLING METHODS

Sampling methods using the GPR test system comply with the test standard (ASTM D4748-10). Sampling rates (i.e. scans per foot), sampling location (e.g. right wheel path, middle lane, both wheel paths), and the use of alternative equipment for GPR collection, if applicable (e.g. ground-coupled antennas), are described in the body of the project report.

B.4 QUALITY CONTROL (QC) AND QUALITY ASSURANCE (QA)

Beside the daily metal plate calibration, the DMI is also calibrated at regular intervals by driving the vehicle over a known distance to calculate the distance scale factor. The GPR will be monitored in real time in the data collection vehicle to minimize data errors. The GPR units will be identified with a unique number and that number will accompany all data reported from that unit as required in the QC/QA plan.

Scheduled preventive maintenance ensures proper equipment operation and helps identify potential problems that can be corrected to avoid poor quality or missing data that results if the equipment malfunctions while on site. The routine and major maintenance procedures established by the Federal Highway Administration's Long-Term Pavement Performance research program are adopted and any maintenance has been done at the end of the day after the testing is complete and become part of the routine performed at the end of each test/travel day and on days when no other work is scheduled.

As noted in the applicable test standard (ASTM D4748-10), quality assurance of GPR data is compromised when suboptimal test conditions exist. Such conditions may include wet surfaces (including standing water), ambient electromagnetic interference, or pavement distresses that can significantly scatter the GPR signal.

B.5 DATA ANALYSIS METHODS

B.5.1 Data Editing

Field acquisition is seldom so routine that no errors, omissions, or data redundancy occur. Data editing encompasses issues such as data re-organization, data file merging, data header or background information updates, repositioning, and inclusion of elevation information with the data.

B.5.2 Basic Processing

Basic data processing addresses some of the fundamental manipulations applied to data to make a more acceptable product for initial interpretation and data evaluation. In most instances this type of processing is already applied in real-time to generate the real-time display. The advantage of post survey processing is that the basic processing can be done more systematically and non-causal operators to remove or enhance certain features can be applied.

The Reflection Picking procedure is used to eliminate unwanted noise, detects significant reflections, and records the corresponding time and depth. It uses antenna calibration file data to calculate the radar signal velocity within the pavement.

B.5.3 Advanced Processing

Advanced data processing addresses the types of processing which require a certain amount of operator bias to be applied and which will result in data which are significantly different from the raw information which were input to the processing. This stage of analysis relies on supplementary resources (e.g. boring/coring logs, design plans, as-built records, historical records, conversations with road engineers/supervisors).

B.5.4 Data Interpretation

In some cases, automated layer interpretation modules within the analysis software can be used from preliminary analysis to map structural layers and calculate the corresponding velocities and depths. When used, the results from these modules require engineering review and approval.

B.6 TEST LIMITATIONS

B.6.1 Test Methods

The testing we performed identified pavement conditions only at those points where we measured pavement thicknesses and observed pavement surface conditions. Depending on the sampling methods and sampling frequency, every location may not be tested. Test conditions may limit the quality of the data collected, and some anomalies may be present in the pavement that compromise data and/or data collection at a given location.

Furthermore, because analysis procedures involve matters of engineering judgement, the final analysis developed represents our professional opinions about the subsurface conditions. More specifically, as relates to pavement systems, assessing layer thicknesses using GPR is a matter of engineering judgement. To enrich the analysis, we rely on supporting test methods and project information. However, even with supporting information, the distinction between layers in the road is not always explicit. Factors influencing definition of radar scans include ambient electromagnetic interference, the presence of moisture, the presence of voids, and the similarity of material layer type between layers.

Other factors external to related to methods and analysis data may require that we alter our conclusions and recommendations accordingly.

B.6.2 Test Standards

Pavement testing is performed in general conformance with the described procedures. Compliance with any other standards referenced within the specified standard is neither inferred nor implied.

B.7 SUPPORTING TEST METHODS

B.7.1 Soil Boring/Coring Field Exploration

If both pavement thicknesses and subgrade soil types and conditions are desired, pavement cores and soil borings are obtained. The limited number of cores and borings are necessary to verify the GPR layer thickness data.

B.7.2 Pavement Surface Condition

Certain pavement distresses may affect the electromagnetic signal to an extent that complicates the analysis of GPR data. The results of a pavement condition survey are useful to identify near-surface features (e.g. stripped asphalt) or sub-surface features (e.g. local saturated layers due to ingress of water at the surface) when reviewing GPR data.

When we do not perform a standard pavement condition survey alongside GPR data, we rely on GPR operators to note possible distresses as they traverse the pavement from about 1 ft (0.3 m) in front of vehicle to about 30 ft (9 m) ahead. These test notes are consulted during GPR analysis, however they are not a substitute for a conventional rigorous pavement condition survey.

American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

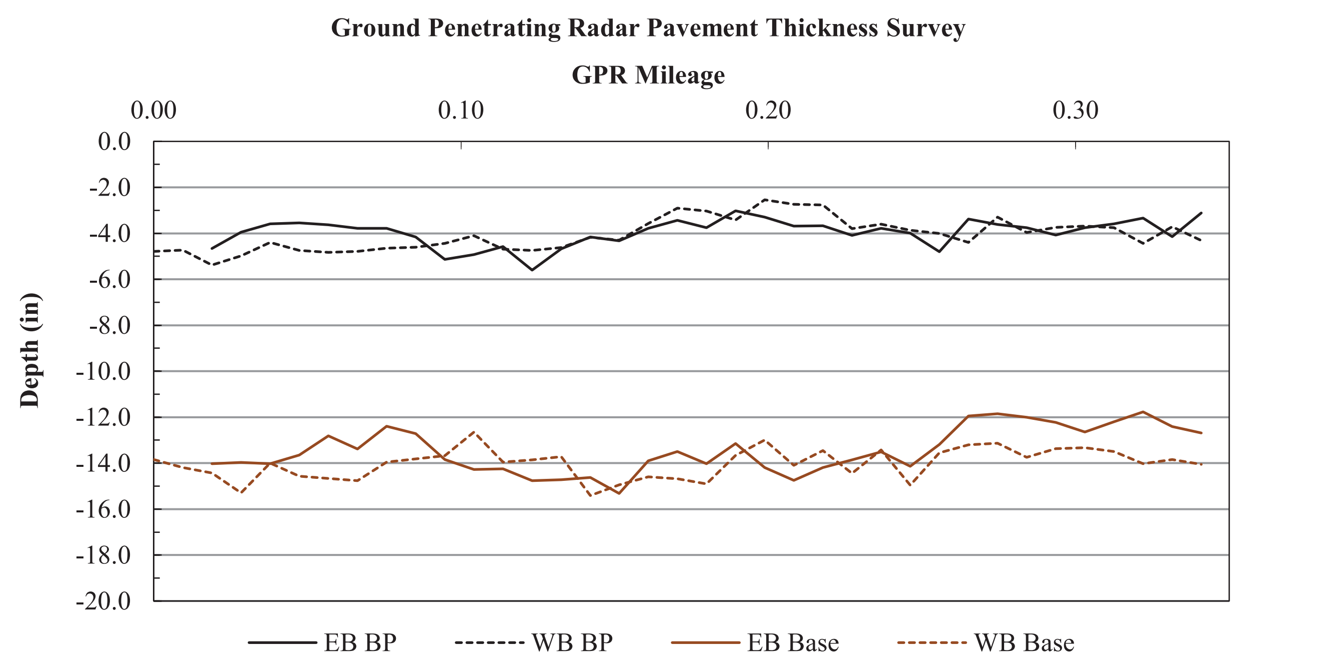
GENERAL INFORMATION: GROUND PENETRATING RADAR

Project: Grover Hill Wind Project
AET Job No.: P-0001619
Road: C-24
From: 0.5 MI W
Date: 4/30/21
Test Date: 4/26/21
Section/Grid: S01
To: T-137

SUMMARY STATISTICS

Units: inches

Layer	EB				WB			
	Average	CV	15th	Min.	Average	CV	15th	Min.
BP	4.0	15%	3.4	3.0	4.1	17%	3.3	2.5
Base	9.5	9%	8.4	8.2	10.0	8%	9.2	8.6



American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

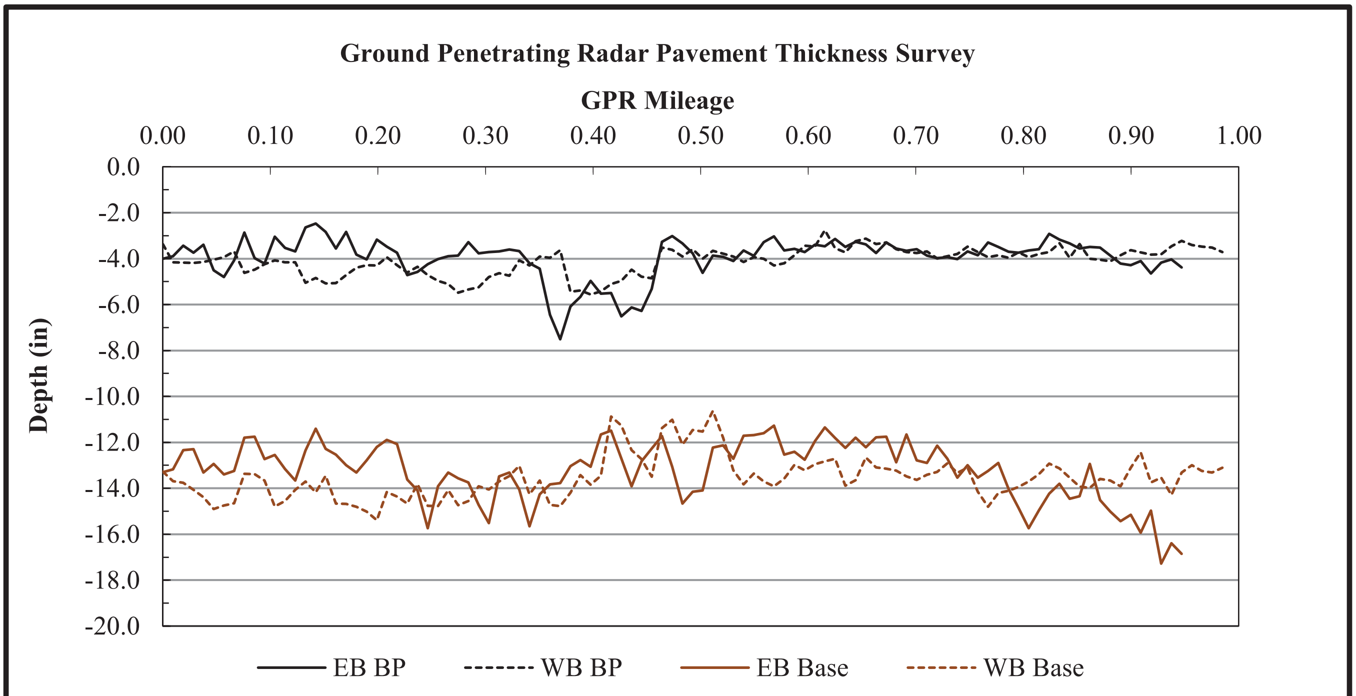
GENERAL INFORMATION: GROUND PENETRATING RADAR

Project: Grover Hill Wind Project
Date: 4/30/21
AET Job No.: P-0001619
Test Date: 4/26/21
Road: C-24
Section/Grid: S02
From: T-137
To: SH-637

SUMMARY STATISTICS

Units: inches

	EB				WB			
Layer	**Average**	**CV**	**15th**	**Min.**	**Average**	**CV**	**15th**	**Min.**
BP	4.0	22%	3.3	2.5	4.1	15%	3.5	2.8
Base	9.3	16%	8.1	6.0	9.5	10%	8.6	5.8



American Engineering Testing, Inc.

550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

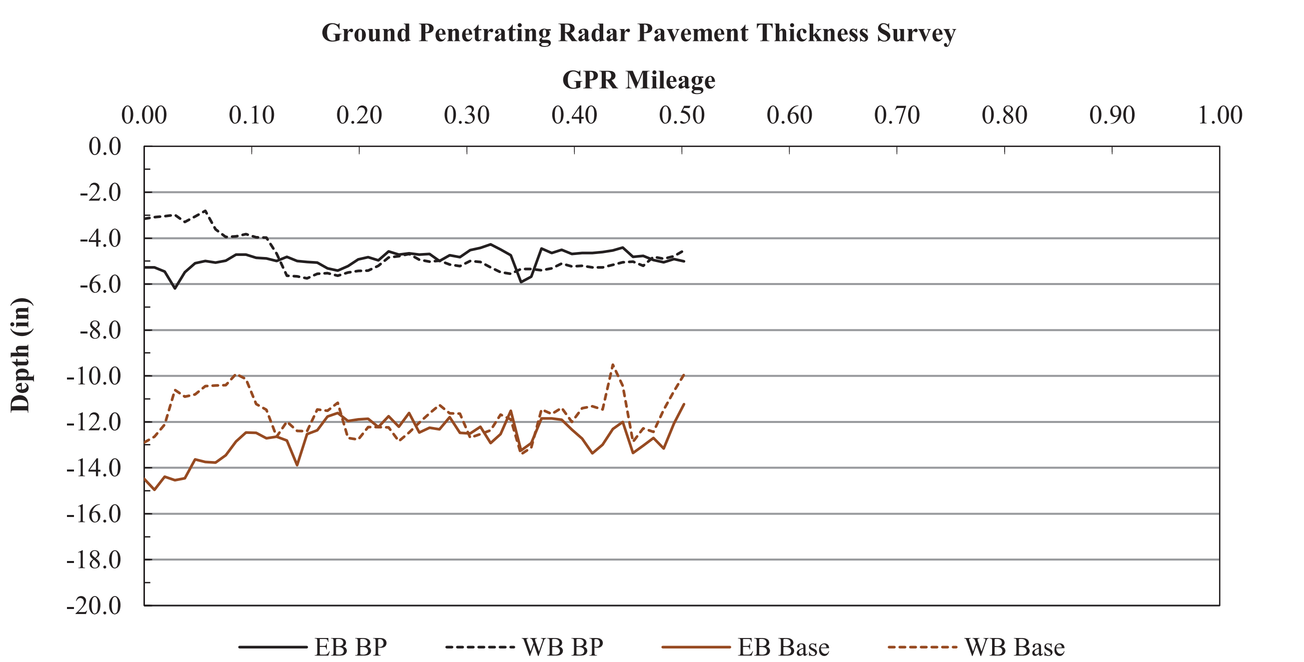
GENERAL INFORMATION: GROUND PENETRATING RADAR

Project: Grover Hill Wind Project
Date: 4/30/21
AET Job No.: P-0001619
Test Date: 4/26/21
Road: C-24
Section/Grid: S03
From: SH-637
To: 0.5 MI E

SUMMARY STATISTICS

Units: inches

Layer	EB				WB			
	Average	CV	15th	Min.	Average	CV	15th	Min.
BP	4.9	8%	4.6	4.3	4.8	17%	3.8	2.8
Base	7.8	10%	7.0	6.2	6.9	15%	6.0	4.4



American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

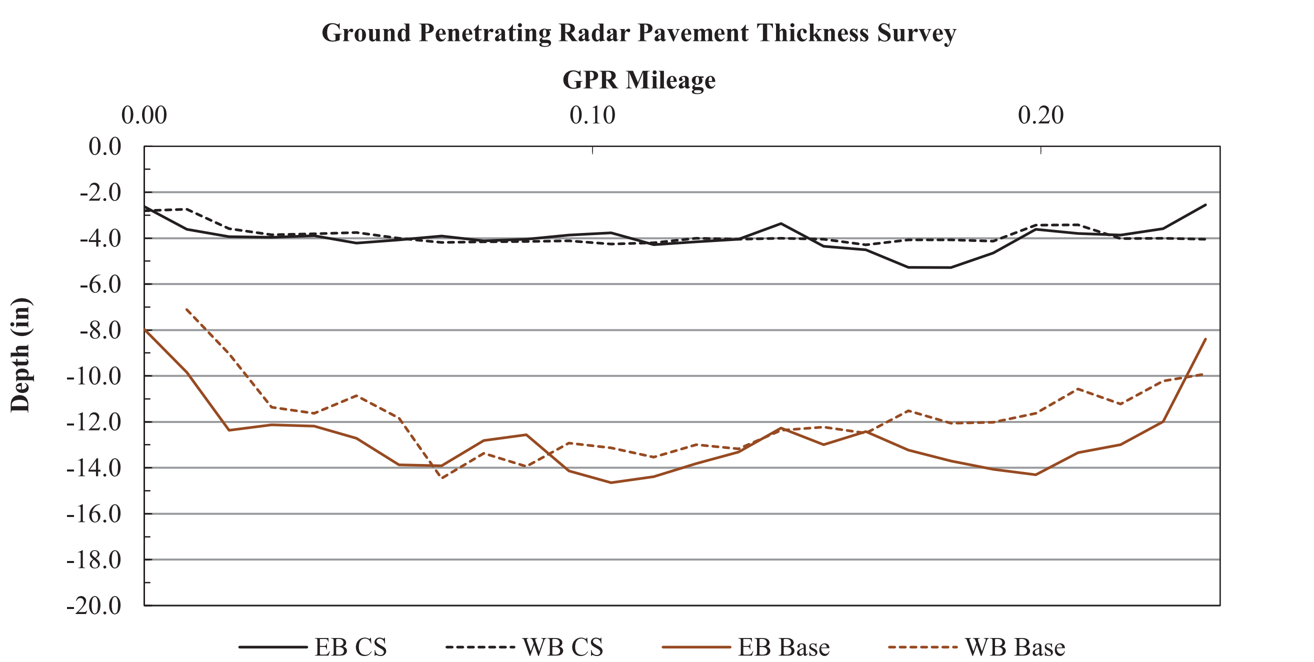
GENERAL INFORMATION: GROUND PENETRATING RADAR

Project: Grover Hill Wind Project
Date: 4/30/21
AET Job No.: P-0001619
Test Date: 4/26/21
Road: T-18
Section/Grid: S04
From: T-131
To: 0.25 MI E

SUMMARY STATISTICS

Units: inches

Layer	EB				WB			
	Average	CV	15th	Min.	Average	CV	15th	Min.
CS	4.0	15%	3.6	2.6	3.9	10%	3.6	2.7
Base	8.7	16%	8.0	5.4	7.9	17%	6.7	4.4



American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

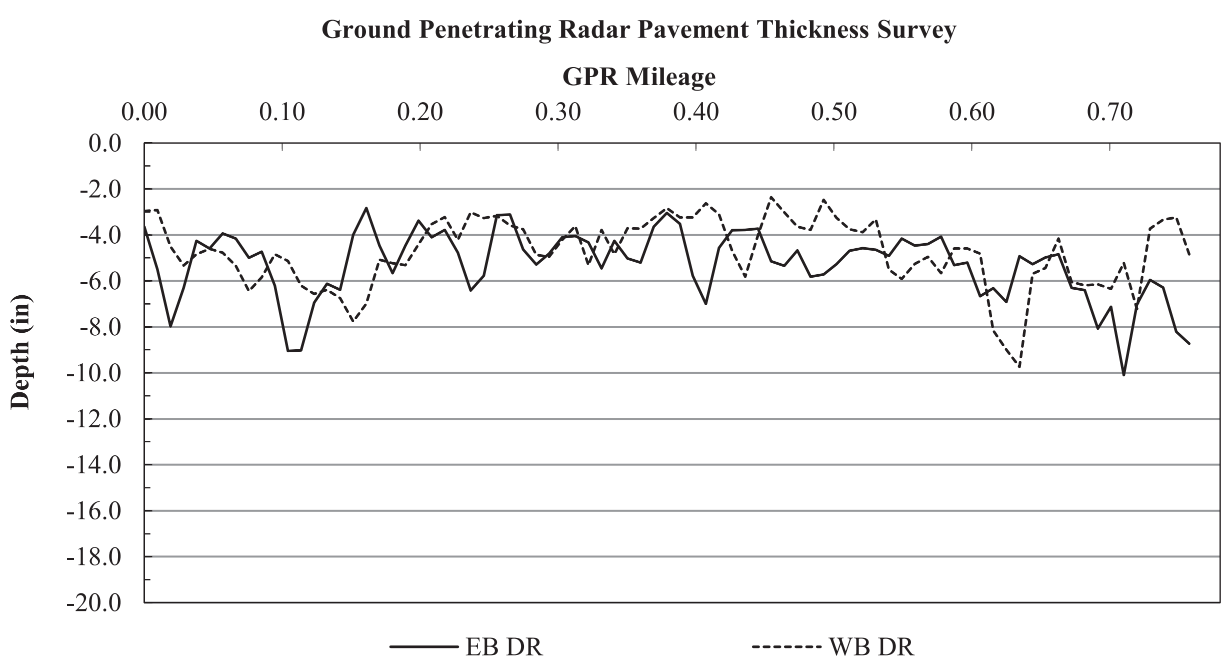
GENERAL INFORMATION: GROUND PENETRATING RADAR

Project:	Grover Hill Wind Project	**Date:**	4/30/21
AET Job No.:	P-0001619	**Test Date:**	4/26/21
Road:	T-18	**Section/Grid:**	S05
From:	0.75 MI W	**To:**	T-137

SUMMARY STATISTICS

Units: inches

	EB				WB			
Layer	**Average**	**CV**	**15th**	**Min.**	**Average**	**CV**	**15th**	**Min.**
DR	5.3	28%	3.9	2.8	4.7	32%	3.2	2.4



American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

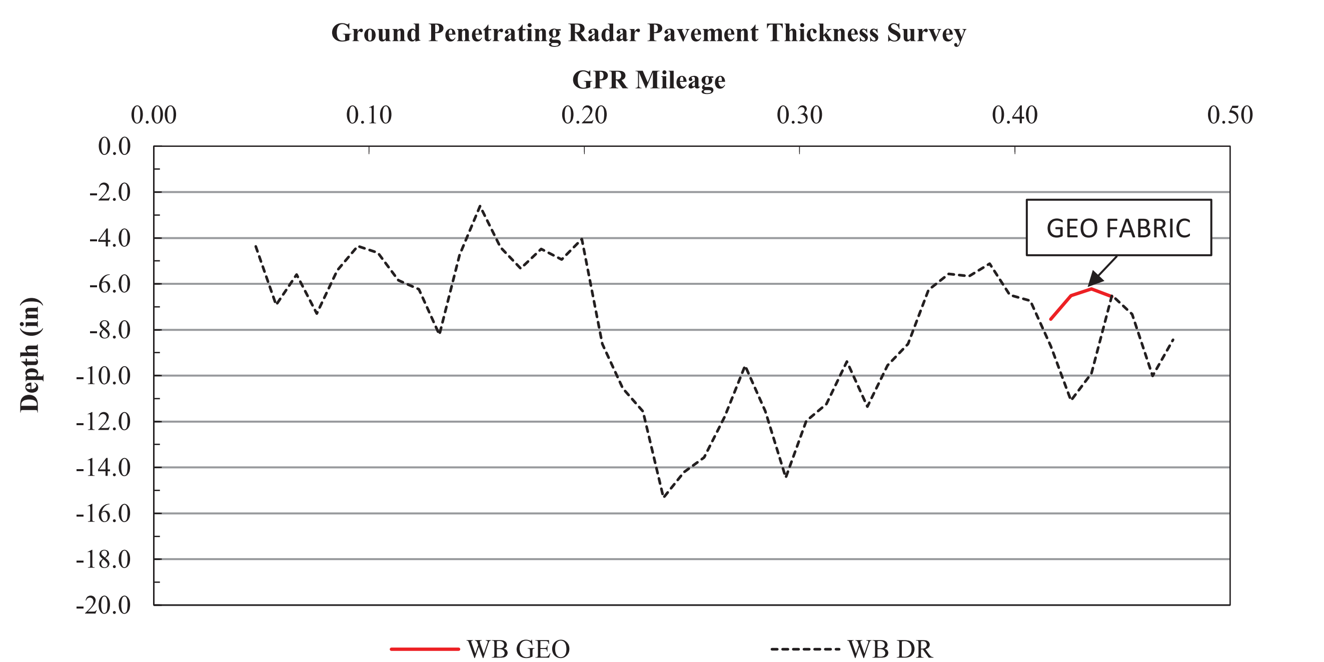
GENERAL INFORMATION: GROUND PENETRATING RADAR

Project:	Grover Hill Wind Project	**Date:**	4/30/21
AET Job No.:	P-0001619	**Test Date:**	4/26/21
Road:	T-18	**Section/Grid:**	S06
From:	0.5 MI W	**To:**	SH-637

SUMMARY STATISTICS

Units: inches

Layer	EB				WB			
	Average	CV	15th	Min.	Average	CV	15th	Min.
DR	N/A	N/A	N/A	N/A	8.0	39%	4.7	2.6



American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

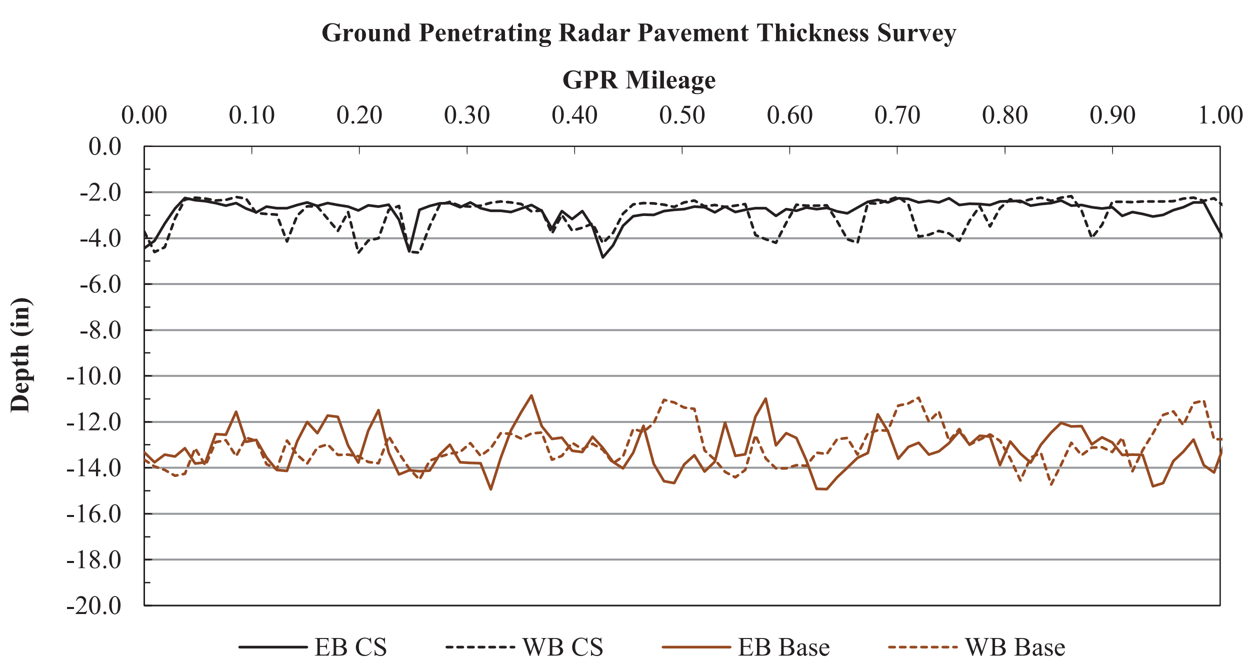
GENERAL INFORMATION: GROUND PENETRATING RADAR

Project: Grover Hill Wind Project
AET Job No.: P-0001619
Road: T-48
From: T-137
Date: 4/30/21
Test Date: 4/26/21
Section/Grid: S07
To: SH-637

SUMMARY STATISTICS

Units: inches

	EB				WB			
Layer	**Average**	**CV**	**15th**	**Min.**	**Average**	**CV**	**15th**	**Min.**
CS	2.8	17%	2.5	2.3	3.0	24%	2.4	2.2
Base	10.4	9%	9.4	8.3	10.1	10%	9.1	7.0



American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

GENERAL INFORMATION: GROUND PENETRATING RADAR

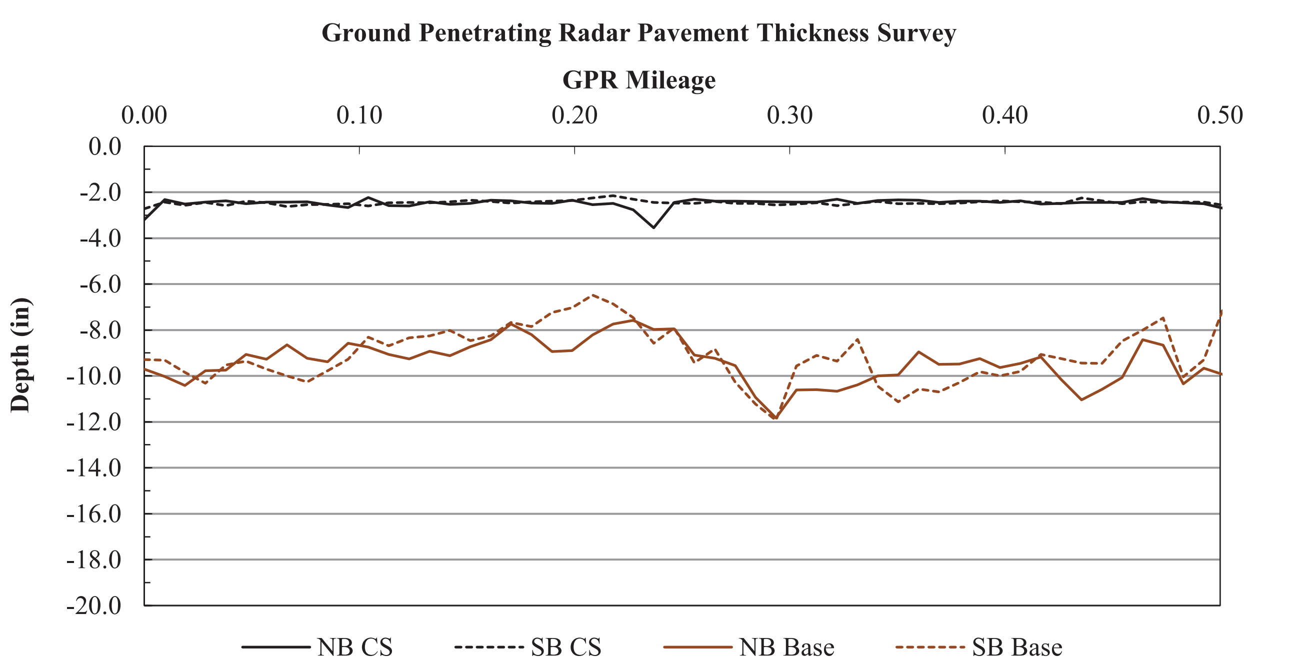
Project: Grover Hill Wind Project
Date: 4/30/21
AET Job No.: P-0001619
Test Date: 4/26/21
Road: T-131
Section/Grid: S08A
From: T-18
To: C-24

S

SUMMARY STATISTICS

Units: **inches**

Layer	NB				SB			
	Average	CV	15th	Min.	Average	CV	15th	Min.
CS	2.5	8%	2.3	2.2	2.5	4%	2.4	2.2
Base	6.9	14%	6.1	4.4	6.6	18%	5.4	4.2



American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

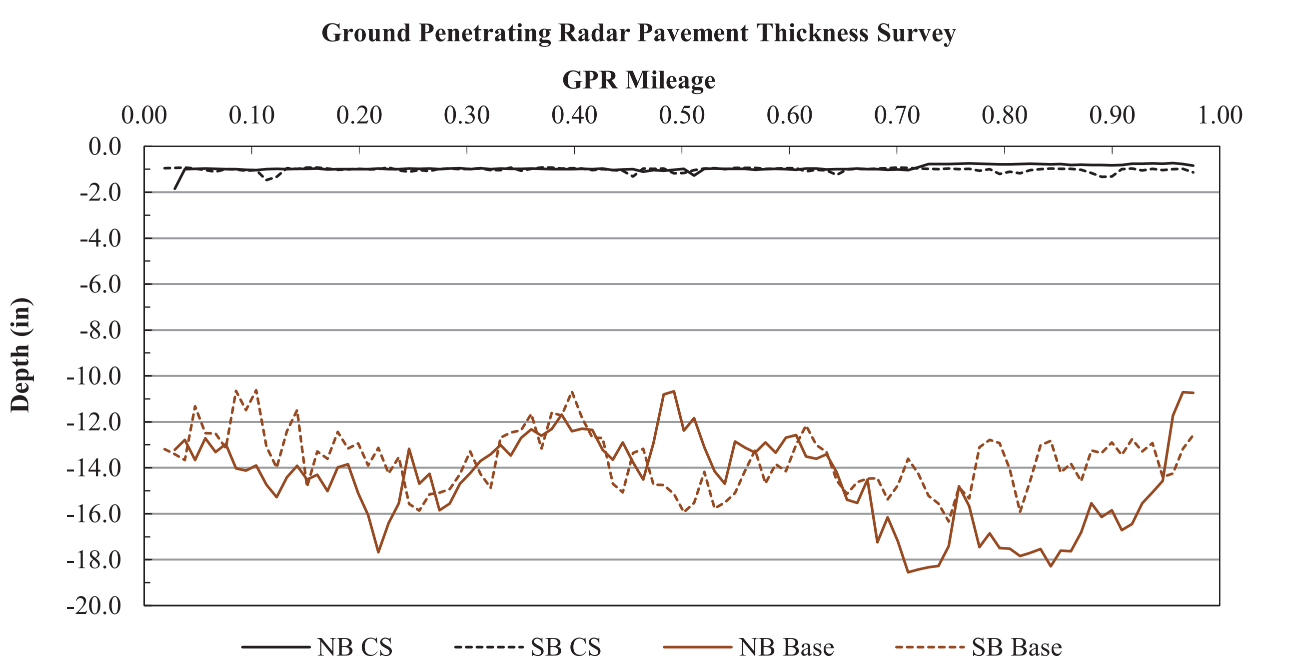
GENERAL INFORMATION: GROUND PENETRATING RADAR

Project:	Grover Hill Wind Project	**Date:**	4/30/21
AET Job No.:	P-0001619	**Test Date:**	4/26/21
Road:	T-131	**Section/Grid:**	S08B
From:	C-24	**To:**	SH-114

SUMMARY STATISTICS

Units: **inches**

	NB				SB			
Layer	**Average**	**CV**	**15th**	**Min.**	**Average**	**CV**	**15th**	**Min.**
CS	0.9	15%	0.8	0.7	1.0	10%	1.0	0.9
Base	13.6	15%	11.6	9.7	12.7	10%	11.5	9.6



American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

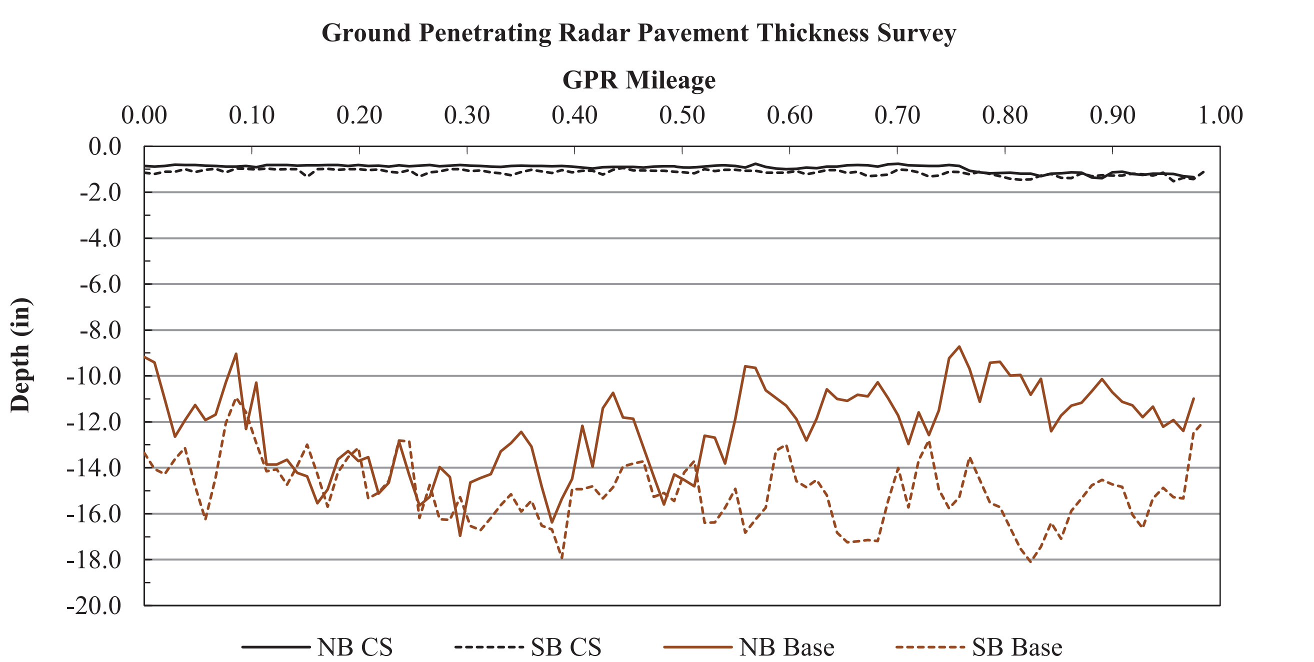
GENERAL INFORMATION: GROUND PENETRATING RADAR

Project: Grover Hill Wind Project
Date: 4/30/21
AET Job No.: P-0001619
Test Date: 4/26/21
Road: T-131
Section/Grid: S09
From: SH-114
To: T-48

SUMMARY STATISTICS

Units: **inches**

Layer	NB				SB			
	Average	CV	15th	Min.	Average	CV	15th	Min.
CS	0.9	16%	0.8	0.8	1.1	11%	1.0	0.9
Base	11.4	17%	9.4	7.9	13.9	10%	12.4	10.0



American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

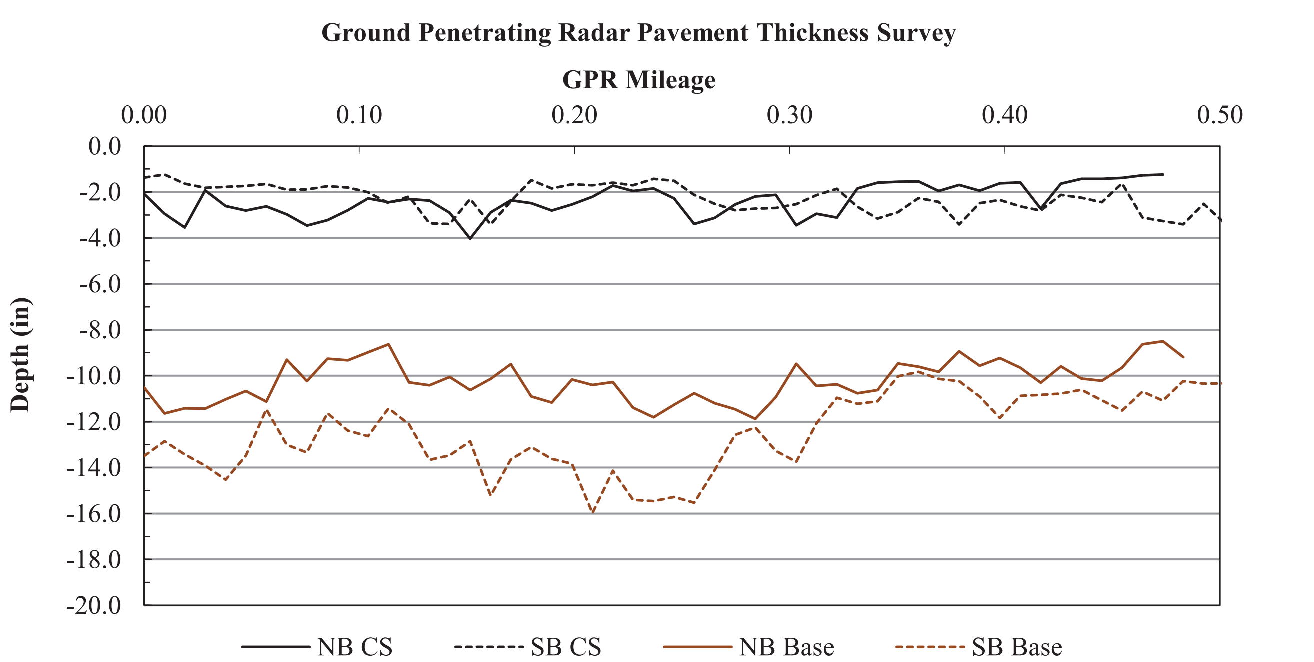
GENERAL INFORMATION: GROUND PENETRATING RADAR

Project:	Grover Hill Wind Project	**Date:**	4/30/21
AET Job No.:	P-0001619	**Test Date:**	4/26/21
Road:	T-131	**Section/Grid:**	S10
From:	T-48	**To:**	T-54

SUMMARY STATISTICS

Units: **inches**

	NB				SB			
Layer	**Average**	**CV**	**15th**	**Min.**	**Average**	**CV**	**15th**	**Min.**
CS	2.3	29%	1.6	1.2	2.3	27%	1.6	1.2
Base	7.9	12%	7.0	6.0	10.2	20%	7.8	6.8



American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

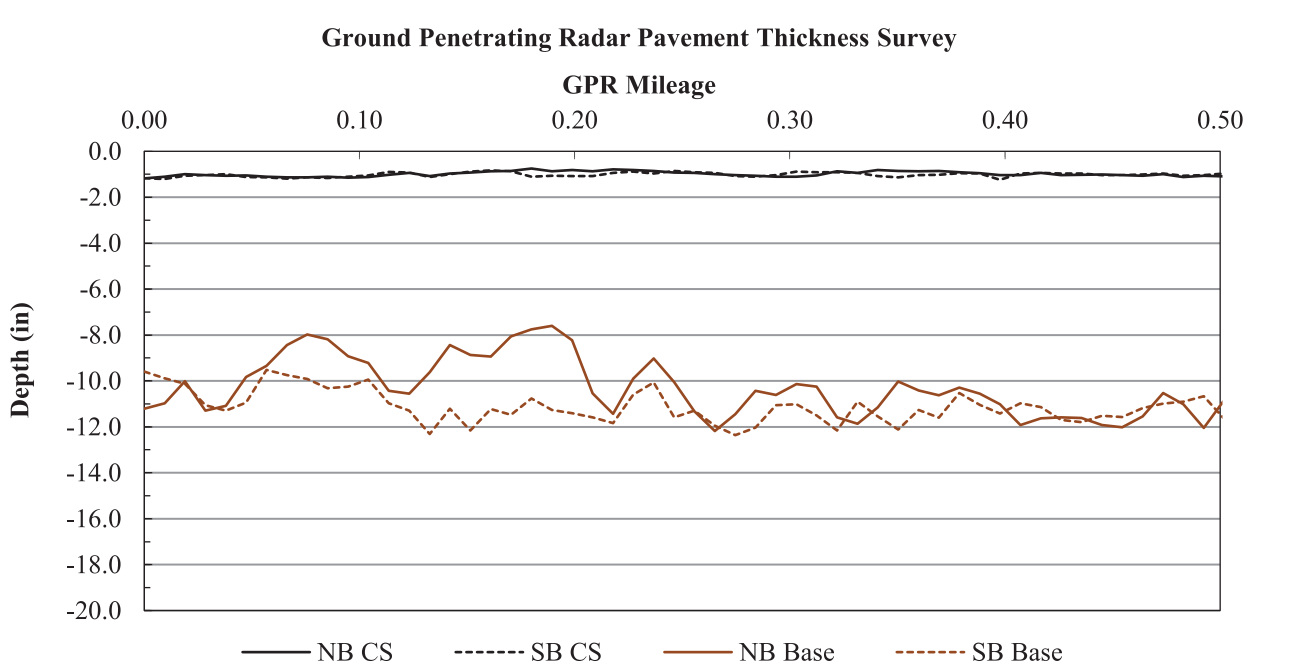
GENERAL INFORMATION: GROUND PENETRATING RADAR

Project:	Grover Hill Wind Project	**Date:**	4/30/21
AET Job No.:	P-0001619	**Test Date:**	4/26/21
Road:	T-137	**Section/Grid:**	S11
From:	T-18	**To:**	C-24

SUMMARY STATISTICS

Units: **inches**

	NB				SB			
Layer	**Average**	**CV**	**15th**	**Min.**	**Average**	**CV**	**15th**	**Min.**
CS	1.0	11%	0.9	0.8	1.0	10%	0.9	0.8
Base	9.3	13%	7.8	6.7	10.1	7%	9.1	8.4



American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

GENERAL INFORMATION: GROUND PENETRATING RADAR

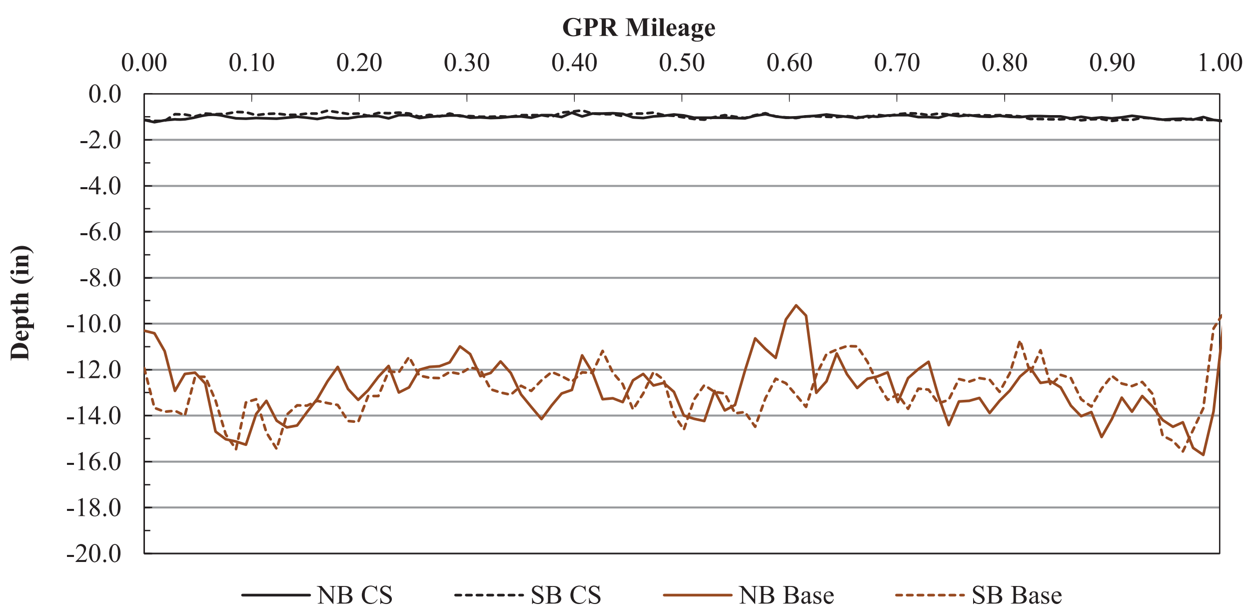
Project: Grover Hill Wind Project
AET Job No.: P-0001619
Road: T-137
From: C-24
Date: 4/30/21
Test Date: 4/26/21
Section/Grid: S12
To: SH-114

SUMMARY STATISTICS

Units: **inches**

	NB				SB			
Layer	**Average**	**CV**	**15th**	**Min.**	**Average**	**CV**	**15th**	**Min.**
CS	1.0	7%	0.9	0.8	1.0	12%	0.9	0.7
Base	11.8	11%	10.7	8.2	11.9	9%	11.1	8.3

Ground Penetrating Radar Pavement Thickness Survey



American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

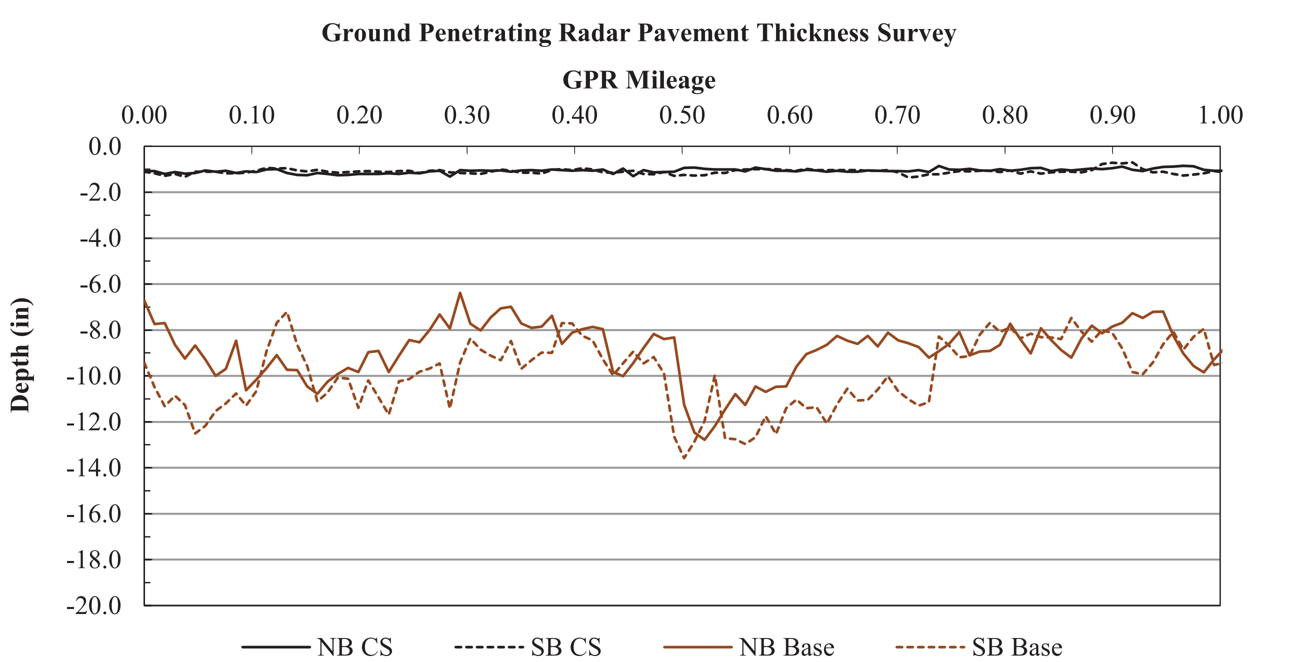
GENERAL INFORMATION: GROUND PENETRATING RADAR

Project: Grover Hill Wind Project
Date: 4/30/21
AET Job No.: P-0001619
Test Date: 4/26/21
Road: T-137
Section/Grid: S13
From: SH-114
To: T-48

SUMMARY STATISTICS

Units: inches

Layer	NB				SB			
	Average	CV	15th	Min.	Average	CV	15th	Min.
CS	1.1	9%	1.0	0.9	1.1	10%	1.0	0.7
Base	7.8	16%	6.7	5.3	8.8	17%	7.2	6.3



American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

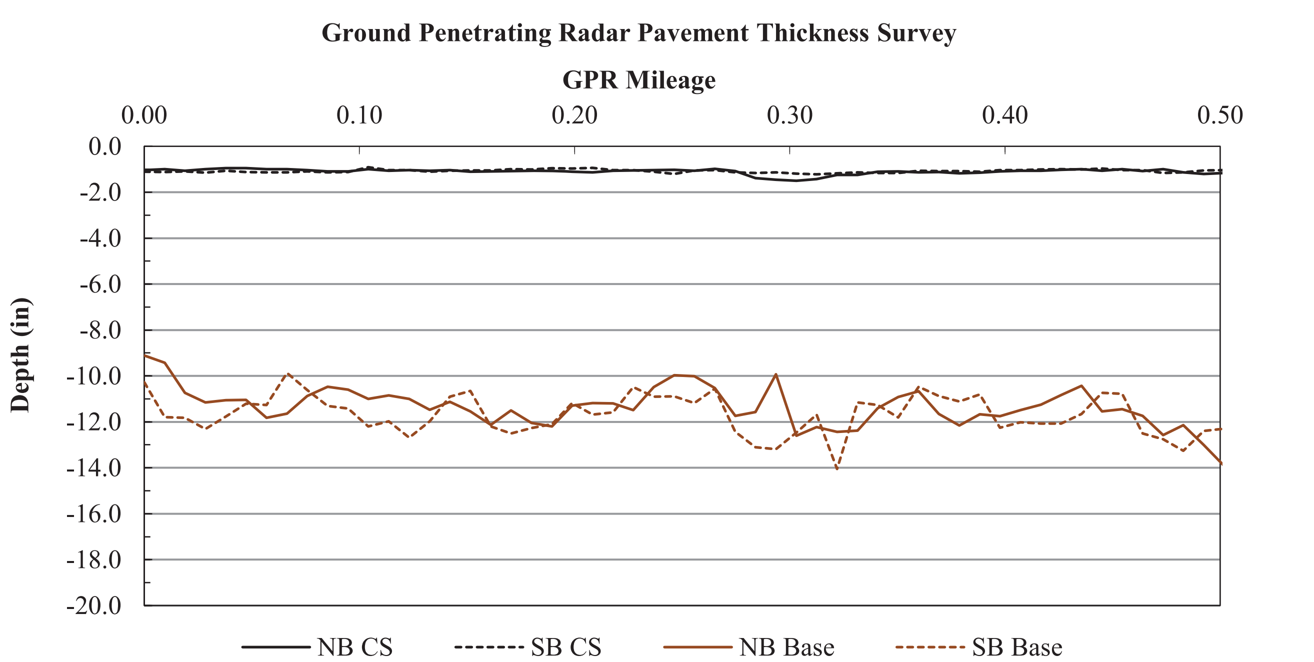
GENERAL INFORMATION: GROUND PENETRATING RADAR

Project:	Grover Hill Wind Project	**Date:**	4/30/21
AET Job No.:	P-0001619	**Test Date:**	4/26/21
Road:	T-137	**Section/Grid:**	S14
From:	T-48	**To:**	0.5 MI N

SUMMARY STATISTICS

Units: **inches**

	NB				SB			
Layer	**Average**	**CV**	**15th**	**Min.**	**Average**	**CV**	**15th**	**Min.**
CS	1.1	11%	1.0	1.0	1.1	7%	1.0	0.9
Base	10.2	8%	9.5	8.1	10.6	8%	9.7	8.7



APPENDIX C

Falling Weight Deflectometer Field Exploration and Testing

Grover Hill Wind Project
Paulding County, Ohio

AET Report No. P-0001619A

Appendix C
Falling Weight Deflectometer Field Exploration and Testing
Report No. P-0001619A

C.1 PAVEMENT TESTING

The pavement structural conditions at the site were evaluated nondestructively using Falling Weight Deflectometer (FWD). The testing locations appear in Figure 1, preceding Appendix A in this report.

C.2 EQUIPMENT DESCRIPTION

C.2.1 Dynatest 8000 FWD Test System

The FWD owned by AET is a Dynatest 8000 FWD Test System that consists of a Dynatest 8002 trailer and a third generation control and data acquisition unit developed in 2003, called the Dynatest Compact15, featuring fifteen (15) deflection channels. The new generation FWD, including a Compact15 System and a standard PC with the FwdWin field Program constitutes the newest, most sophisticated Dynatest FWD Test System, which fulfills or exceeds all requirements to meet ASTM-4694, ASTM D-4695 Standards. Figure C1 provides a view of this equipment.

Figure C1 Dynatest 8002 FWD Test System

The FWD imposes a dynamic impulse load onto the pavement surface through a load plate. Total pulse is an approximately half sine shape with a total duration typically between 25 to 30 ms. The FWD is capable of applying a variety of loads to the pavement ranging from 1,500 lbf (7 kN) to 27,000 ibf (120 kN) by dropping a variable weight mass from different heights to a standard, 11.8-inch (300-mm) diameter rigid plate.

The drop weights and the buffers are constructed so that the falling weight buffer subassembly may be quickly and conveniently changed between falling masses of 440 lbm (200 kg) for highways and 770 lbm (350 kg) for airports. With the 440 lbm (200 kg) package for highways three drop heights are used with the target load of 6,000 lbf (27 kN) at drop height 1, 9,000 lbf (40 kN) at drop height 2, and 12,000 lbf at drop height 3 (53 kN). The drop sequence consists of two seating drops from drop height 3 and 2 repeat measurements at drop height 1 and 1 measurement at drop height 2 for flexible pavements and 2 repeat measurements at drop height 2 and 1 measurement at drop height 3 for rigid pavements. The data from the seating drops is not stored.

The FWD is equipped with a load cell to measure the applied forces and nine geophones or deflectors to measure deflections up to 100 mils (2.5 mm). The load cell is capable of accurately measuring the force that is applied perpendicular to the loading plate with a resolution of 0.15 psi (1 kPa) or better. The force is expressed in terms of pressure, as a function of loading plate size.

Nine deflectors at the offsets listed in the following table in the Long Term Performance Program (LTPP) configuration are capable of measuring electronically discrete deflections per test, together with nine (9) separate deflection measuring channels for recording of the data. One (1) of the deflectors measures the deflection of the pavement surface through the center of the loading plate, while seven (7) deflectors are capable of being positioned behind the loading plate along the housing bar, up to a distance of 5 ft (2.5 m) from the center of the loading plate and one (1) being positioned in front of the loading plate along the bar.

Deflector	D1	D2	D3	D4	D5	D6	D7	D8	D9
Offset (in.)	0	8	12	18	24	36	48	60	72

Field testing is performed in accordance with the standard ASTM procedures as described in ASTM D 4695-96, “Standard Guide for General Pavement Deflection Measurements” and the calibration of our equipment is verified each year at the Long Term Pavement Performance Calibration Center in Maplewood, MN.

C.2.2 Linear Distance and Spatial Reference System

Distance measuring instrument (DMI) is a trailer mounted two phase encoder system. When DMI is connected to the Compact15 it provides for automatic display and recording distance information in both English and metric units with a 1 foot (0.3 meters) resolution and four percent accuracy when calibrated using provided procedure in the Field Program.

Spatial reference system is a Trimble ProXH Global Positioning System (GPS) that consists of fully integrated receiver, antenna and battery unit with Trimble's new H-Star™ technology to provide subfoot (30 cm) post-processed accuracy. The External Patch antenna is added to the ProXH receiver for the position of the loading plate. The External Patch antenna can be conveniently elevated with the optional baseball cap to prevent any signal blockage.

C.2.3 Air and Pavement Temperature Measuring System

A temperature monitoring probe, for automatic recording of air temperature, is an electronic (integrated circuit) sensing element in a stainless steel probe. The probe mounts on the FWD unit in a special holder with air circulation and connects to the Compact15. A non-contact Infra-Red (IR) Temperature Transmitter, for automatic recording of pavement surface temperature only, features an integrated IR-detector and digital electronics in a weather proof enclosure. The IR transmitter mounts on the FWD unit in a special holder with air circulation and connects to the Compact15. Both probe and IR transmitter have a resolution of 0.9 ºF (0.5 ºC) and accuracy within ± 1.8ºF (1 ºC) in the 0 to 158 ºF (-18 to +70ºC) range when calibrated using provided procedure.

C.2.4 Camera Monitoring System

A battery operated independent DC-1908E multi-functional digital camera with a SD card is used for easy positioning of the loading plate or of the pavement surface condition at the testing locations.

C.3 SAMPLING METHODS

At the project level, the testing interval is set at 0.1 mi. (maximum) or 10 locations per uniform section in the Outside Wheel Path (OWP) = 2.5 ft ± 0.25 ft (0.76 m ± 0.08 m) for nominal 12 ft (3.7 m) wide lanes. Where a divided roadbed exists, surveys will be taken in both directions if the project will include improvements in both directions. If there is more than one lane in one direction the surveys will be taken in the outer driving lane (truck lane) versus the passing lane of the highway. FWD tests are performed at a constant lateral offset down the test section.

At the network level, FWD tests on 20% mileage or three tests per mile are set with two deflection basins collected at only one load level, without statistically compromising the quality of the data collected. If FWD tests are for the in situ characterization of material stress sensitivity FWD data will be collected at multiple load levels.

C.4 QUALITY CONTROL (QC) AND QUALITY ASSURANCE (QA)

Beside the annual reference calibration the relative calibration of the FWD deflection sensors is conducted monthly but not to exceed 6 weeks during the months in which the FWD unit is continually testing. The DMI is also calibrated monthly by driving the vehicle over a known distance to calculate the distance scale factor. The accuracy of the FWD air temperature and infra-red (IR) sensors are checked on a monthly basis or more frequently if the FWD operator observes "suspicious" temperature readings.

Some care in the placement of the load plate and sensors is taken by the survey crew, especially where the highway surface is rutted or cracked to ensure that the load plate lays on a flat surface and that the load plate and all geophones lie on the same side of any visible cracks. Liberal use of comments placed in the FWD data file at the time of data collection is required. Comments pertaining to proximity to reference markers, bridge abutments, patches, cracks, etc., are all important documentation for the individual evaluating the data.

Scheduled preventive maintenance ensures proper equipment operation and helps identify potential problems that can be corrected to avoid poor quality or missing data that results if the equipment malfunctions while on site. The routine and major maintenance procedures established by the LTPP are adopted and any maintenance has been done at the end of the day after the testing is complete and become part of the routine performed at the end of each test/travel day and on days when no other work is scheduled.

C.5 DATA ANALYSIS METHODS

C.5.1 Inputs

The two-way AADT and HCADT are required to calculate the ESALs. The state average truck percent and truck type distribution are used when HCADT is not provided. The as-built pavement information (layer type, thickness, and construction year) are required and if not provided, GPR and/or coring and boring is needed.

C.5.2 Adjustments
Temperature adjustment to the deflections measured on bituminous pavements is determined from the temperature predicted at the middle depth of the pavement using the LTPP BELLS3 model that uses the pavement surface temperature and previous day mean air temperature. The predicted middle depth temperature and the standard temperature of 80 degrees Fahrenheit are used to calculate the temperature adjustment factor for deflection data analysis. Seasonal adjustment developed by Mn/DOT is also used.

C.5.3 Methods
For bituminous pavements, the deflection data were analyzed using the he American Association of State Highway and Transportation Officials' (AASHTO) method for determining the in-place (effective) subgrade and pavement strength and the Asphalt Institute method for determining allowable axle loads for a roadway. The Asphalt Institute method also uses the allowable deflection method for estimating Seasonal Load Capacity and Required Overlay, as described in the Asphalt Institute publication "Manual Series No. 17 Asphalt Overlays and Pavement Rehabilitation".

For gravel roads, the deflection data were analyzed using the American Association of State Highway and Transportation Officials' (AASHTO) method for determining the in-place (effective) subgrade and pavement strength, as well as allowable axle loads for a roadway as in the AASHTO Guide for Design of Pavement Structures, 1993.

For concrete pavements, the deflection data were analyzed using the FAA methods for determining the modulus of subgrade reaction (k-value), effective elastic modulus of concrete slabs, load transfer efficiency (LTE) on approach and leave slabs of a joint, slab support conditions (void analysis) and impulse stiffness modulus ratio (durability analysis) as in the FAA AC 150/5370-11A, Use of Nondestructive Testing Devices in the Evaluation of Airport Pavement, 2004.

C.6 TEST LIMITATIONS
C.6.1 Test Methods
The data derived through the testing program have been used to develop our opinions about the pavement conditions at your site. However, because no testing program can reveal totally what is in the subsurface, conditions between test locations and at other times, may differ from conditions described in this report. The testing we conducted identified pavement conditions only at those points where we measured pavement surface temperature, deflections, and observed pavement surface conditions. Depending on the sampling methods and sampling frequency, every location may not be tested, and some anomalies which are present in the pavement may not be noted on the testing results. If conditions encountered during construction differ from those indicated by our testing, it may be necessary to alter our conclusions and recommendations, or to modify construction procedures, and the cost of construction may be affected.

C.6.2 Test Standards
Pavement testing is done in general conformance with the described procedures. Compliance with any other standards referenced within the specified standard is neither inferred nor implied.

C.7 SUPPORTING TEST METHODS
C.7.1 GSSI Ground Penetrating Radar (GPR)
If the as-built pavement layer thicknesses are not available the thickness data are collected using a bumper-mounted, air-coupled 2-GHz radar unit from GSSI (RoadScan system) that consists of a SIR-20 dual channel data acquisition system, wheel-mounted DMI, ProXH GPS, air-launched (horn) antenna, horn antenna vehicle mounting kit, RADAN software with the Road Structure Module, and system accessories. The system provides continuous data at 1-ft spacing while traveling at highway speed.

C.7.2 Soil Boring/Coring Field Exploration
If both pavement thicknesses and subgrade soil types and conditions are desired the shallow coring/boring and sampling is used. The limited number of coring/boring is necessary to verify the GPR layer thickness data.

C.7.3 Pavement Surface Condition Survey
The type and severity of pavement distress influence the deflection response for a pavement. Therefore, FWD operators record any distress located from about 1 ft (0.3 m) in front of deflector D8 to about 3 ft (0.9 m) behind the load plate. This information is recorded in the FWD file using the comment line in the field program immediately following the test.

American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

AET Project No. P-0001619
County: Paulding
Test Date: Apr 27, 2021
Section: 1
Roadway: C-24
From: 0.5 MI W
To: T-137

Prev. Day's Avg. Air Temp.: 54 °F
Total AC: 4.1 in.
Daily ESALs: 9.7
PASER: 68
Haul ESALs: 0
Soil Type: P
Draught Adjustment Factor: 1.00
Seasonal Correction Factor: 1.14

Design Period: 10 Years
Projection Factor: 1.1
Growth Factor: 10.46
10-year Design ESALs: 37,117
Design Period: 20 Years
Projection Factor: 1.2
Growth Factor: 22.02
20-year Design ESALs: 78,113

Station	Drop	Time	Air °F	Bit °F	Load	D1	D2	D3	D4	D4	D6	D7	D8	D9	Effective Values Mr ksi	SN inches	Overlay Thickness inches	Spring Capacity tons/axle	Comments
1.5																			RD24,IC,RD137,WB"
1.5																			41.004597,-84.495694"
1.5	1	13:05	86.0	88.1	5468	39.0	27.6	21.3	13.7	8.0	3.1	1.8	1.3	1.0	5.3	1.6	1.3	6.9	
1.5	2	13:05	86.0	88.1	5512	38.7	27.3	21.0	13.5	7.9	3.1	1.8	1.3	1.1	5.4	1.7	1.2	7.1	
1.5	3	13:05	86.0	88.1	8289	58.1	42.5	33.4	21.8	13.1	5.0	2.8	2.2	1.8	5.0	1.7	1.3	7.1	
1.5	4	13:05	86.0	88.1	8289	58.7	43.1	33.9	22.2	13.2	5.0	2.9	2.2	1.8	5.0	1.7	1.3	7.0	
1.5																			41.0045797,-84.4965523"
1.6	1	13:07	86.0	87.7	5490	36.3	24.8	17.9	11.1	6.2	2.0	1.1	1.0	0.8	8.4	1.6	0.6	7.4	
1.6	2	13:07	86.0	87.7	5512	35.7	24.5	17.6	11.0	6.2	2.0	1.1	1.0	0.8	8.3	1.6	0.6	7.6	
1.6	3	13:07	86.0	87.7	8322	54.6	38.6	28.5	18.2	10.4	3.2	1.7	1.6	1.4	7.9	1.6	0.7	7.5	
1.6	4	13:07	86.0	87.7	8311	55.3	38.9	28.9	18.4	10.5	3.2	1.7	1.6	1.4	7.9	1.6	0.7	7.4	
1.7	1	13:08	86.0	89.0	5446	40.9	29.3	22.8	15.1	9.0	3.4	1.7	1.3	1.1	4.9	1.6	1.5	6.7	
1.7	2	13:08	86.0	89.0	5490	40.2	29.0	22.6	15.1	9.0	3.4	1.7	1.3	1.1	4.9	1.7	1.4	6.8	
1.7	3	13:08	86.0	89.0	8257	60.6	44.7	35.5	23.9	14.7	5.5	2.7	2.2	1.9	4.6	1.7	1.5	6.8	
1.7	4	13:08	86.0	89.0	8235	60.8	45.0	35.8	24.1	14.8	5.5	2.8	2.2	1.9	4.5	1.7	1.5	6.8	
1.8	1	13:09	86.0	89.4	5545	31.2	22.3	17.4	11.8	7.3	3.0	1.5	1.0	0.8	5.6	1.9	0.7	8.7	
1.8	2	13:09	86.0	89.4	5566	31.0	22.1	17.3	11.8	7.3	3.0	1.5	1.0	0.8	5.6	1.9	0.6	8.8	
1.8	3	13:09	86.0	89.4	8377	47.2	34.6	27.4	18.9	11.8	4.9	2.5	1.8	1.4	5.2	1.9	0.7	8.7	
1.8	4	13:09	86.0	89.4	8344	47.1	34.7	27.5	19.0	11.8	4.8	2.5	1.8	1.4	5.2	1.9	0.7	8.7	
1.8																			END"

American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

AET Project No. P-0001619
County: Paulding
Test Date: Apr 27, 2021
Section: 2
Roadway: C-24
From: T-137
To: SH-637

Prev. Day's Avg. Air Temp.: 54 °F
Total AC: 4.1 in.
Daily ESALs: 9.7
PASER: 53
Haul ESALs: 0
Soil Type: P
Draught Adjustment Factor: 1.00
Seasonal Correction Factor: 1.14

Design Period: 10 Years
Projection Factor: 1.1
Growth Factor: 10.46
10-year Design ESALs: 37,117
Design Period: 20 Years
Projection Factor: 1.2
Growth Factor: 22.02
20-year Design ESALs: 78,113

Station	Drop	Time	Air °F	Bit °F	Load	0 D1	8 D2	12 D3	18 D4	24 D4	36 D6	48 D7	60 D8	72 D9	Effective Values Mr ksi	Effective Values SN inches	Overlay Thickness inches	Spring Capacity tons/axle	Comments
0.5																			RD24,IC,StateRoute637,WB"
0.5																			41.004608,-84.476268"
0.5	1	12:48	84.2	86.0	5632	27.8	19.0	14.7	10.0	6.3	3.1	1.9	1.4	1.1	5.6	1.9	0.5	9.7	
0.5	2	12:48	84.2	86.0	5665	27.2	18.8	14.6	9.9	6.2	3.0	1.9	1.4	1.1	5.6	2.0	0.4	9.9	
0.5	3	12:48	84.2	86.0	8530	41.1	29.4	23.2	15.7	10.0	5	3	2	2	5	2	0	10	
0.5	4	12:48	84.2	86.0	8552	40.7	29.6	23.4	15.9	10.1	4.8	3.0	2.3	1.8	5.4	2.0	0.4	10.0	
0.5																			41.004623,-84.476742"
0.6	1	12:49	84.2	87.3	5566	28.9	20.6	16.2	10.9	6.8	2.8	1.6	1.2	0.9	6.0	1.9	0.5	9.3	
0.6	2	12:49	84.2	87.3	5577	28.8	20.4	16.0	10.9	6.7	2.8	1.6	1.2	1.0	6.0	1.9	0.5	9.3	
0.6	3	12:49	84.2	87.3	8410	44.3	32.7	25.9	17.8	11.1	4.5	2.5	2.0	1.6	5.7	1.9	0.6	9.1	
0.6	4	12:49	84.2	87.3	8432	45.0	33.0	26.2	18.0	11.3	4.6	2.5	2.0	1.6	5.6	1.9	0.7	9.0	
0.6																			41.004618,-84.478695"
0.7	1	12:51	84.2	87.6	5512	36.7	25.2	19.3	12.4	7.4	2.9	1.7	1.3	1.1	5.8	1.6	1.2	7.4	
0.7	2	12:51	84.2	87.6	5523	36.9	25.1	19.3	12.4	7.4	2.9	1.7	1.3	1.1	5.7	1.6	1.2	7.4	
0.7	3	12:51	84.2	87.6	8344	55.5	39.9	31.2	20.5	12.4	4.7	2.7	2.2	1.9	5.4	1.7	1.2	7.4	
0.7	4	12:51	84.2	87.6	8311	55.9	40.2	31.4	20.6	12.4	4.7	2.7	2.2	1.9	5.4	1.6	1.2	7.3	
0.7																			41.004662,-84.480672"
0.8	1	12:53	84.2	87.9	5566	36.5	25.5	17.4	11.2	6.4	2.4	1.5	1.1	0.9	7.0	1.6	0.9	7.5	
0.8	2	12:53	84.2	87.9	5577	36.2	25.2	17.2	11.1	6.3	2.4	1.5	1.1	0.9	7.0	1.6	0.9	7.5	
0.8	3	12:53	84.2	87.9	8432	54.9	39.7	28.2	18.3	10.6	3.8	2.3	1.9	1.6	6.7	1.6	0.9	7.5	
0.8	4	12:53	84.2	87.9	8388	54.8	39.8	28.3	18.5	10.6	3.8	2.3	1.9	1.6	6.6	1.6	1.0	7.5	
0.8																			41.004670,-84.482597"
0.9	1	12:54	84.2	89.6	5621	24.1	16.1	12.3	7.9	4.7	2.0	1.1	0.7	0.7	8.6	1.9	0.0	11.1	
0.9	2	12:54	84.2	89.6	5577	23.7	15.8	12.0	7.8	4.7	1.9	1.1	0.7	0.7	8.7	1.9	0.0	11.1	
0.9	3	12:54	84.2	89.6	8552	36.9	25.4	19.7	12.8	7.8	3.1	1.9	1.5	1.3	8.3	1.9	0.0	11.0	
0.9	4	12:54	84.2	89.6	8497	36.4	25.4	19.7	12.8	7.8	3.2	1.9	1.5	1.2	8.1	1.9	0.0	11.1	
0.9																			41.004598,-84.484679"
1.0	1	12:56	84.2	87.9	5720	14.6	11.0	9.4	7.3	5.4	3.1	2.0	1.4	1.1	5.5	3.1	0.0	17.2	
1.0	2	12:56	84.2	87.9	5709	14.3	10.9	9.4	7.3	5.4	3.1	2.0	1.4	1.1	5.5	3.2	0.0	17.5	
1.0	3	12:56	84.2	87.9	8661	21.8	17.1	14.8	11.6	8.6	5.0	3.1	2.3	1.8	5.3	3.2	0.0	17.4	
1.0	4	12:56	84.2	87.9	8672	22.1	17.2	14.9	11.6	8.7	5.0	3.2	2.3	1.8	5.3	3.2	0.0	17.2	
1.0																			41.004600,-84.486897"
1.1	1	12:57	84.2	88.3	5632	24.7	16.0	12.0	7.7	4.6	2.0	1.1	0.8	0.6	8.6	1.9	0.0	10.8	
1.1	2	12:57	84.2	88.3	5610	24.0	15.8	11.9	7.7	4.6	2.0	1.1	0.8	0.6	8.6	1.9	0.0	11.0	
1.1	3	12:57	84.2	88.3	8519	37.3	25.2	19.1	12.5	7.5	3.1	1.8	1.4	1.2	8.2	1.9	0.0	10.8	
1.1	4	12:57	84.2	88.3	8519	37.5	25.3	19.3	12.6	7.6	3.2	1.8	1.3	1.1	8.1	1.9	0.0	10.7	
1.1																			41.004613,-84.488626"
1.2	1	12:59	84.2	87.8	5523	32.6	22.7	17.7	11.8	6.9	2.5	1.3	1.0	0.8	6.8	1.7	0.7	8.2	
1.2	2	12:59	84.2	87.8	5555	32.4	22.5	17.6	11.7	6.9	2.5	1.3	1.1	0.9	6.6	1.7	0.7	8.3	
1.2	3	12:59	84.2	87.8	8377	49.7	36.0	28.5	19.3	11.5	4.0	2.0	1.7	1.4	6.3	1.7	0.8	8.2	
1.2	4	12:59	84.2	87.8	8388	49.8	36.3	28.7	19.5	11.6	4.1	2.0	1.7	1.5	6.3	1.7	0.8	8.2	
1.2																			41.004740,-84.490223"
1.3	1	13:00	84.2	88.0	5534	29.3	20.2	15.6	10.5	6.5	2.7	1.5	1.1	0.9	6.3	1.8	0.6	9.1	
1.3	2	13:00	84.2	88.0	5621	29.8	20.3	15.7	10.5	6.5	2.7	1.5	1.1	0.9	6.3	1.8	0.6	9.1	
1.3	3	13:00	84.2	88.0	8410	44.9	32.0	25.1	17.0	10.7	4.4	2.4	1.9	1.6	5.8	1.8	0.6	9.0	
1.3	4	13:00	84.2	88.0	8399	45.0	32.1	25.2	17.1	10.7	4.3	2.4	1.9	1.6	5.9	1.8	0.6	9.0	
1.3																			41.004600,-84.492655"
1.4	1	13:02	84.2	88.1	5490	33.9	23.6	18.2	12.3	7.4	3.0	1.8	1.3	1.1	5.5	1.7	1.0	7.9	
1.4	2	13:02	84.2	88.1	5501	33.5	23.4	18.1	12.2	7.4	3.0	1.8	1.4	1.1	5.5	1.7	1.0	8.0	
1.4	3	13:02	84.2	88.1	8355	51.1	37.2	29.2	19.9	12.2	5.0	2.9	2.2	1.8	5.1	1.8	1.1	8.0	
1.4	4	13:02	84.2	88.1	8322	50.9	37.4	29.4	19.9	12.2	5.0	2.9	2.2	1.8	5.1	1.8	1.1	8.0	
1.4																			41.004573,-84.494641"
1.5																			RD24,IC,RD137,WB"
1.5																			41.004597,-84.495694"

American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

AET Project No. P-0001619
County: Paulding
Test Date: Apr 27, 2021
Section: 3
Roadway: C-24
From: SH-637
To: 0.5 MI E

Prev. Day's Avg. Air Temp.: 54 °F
Total AC: 4.8 in.
Daily ESALs: 9.7
PASER: 74
Haul ESALs: 0
Soil Type: P
Draught Adjustment Factor: 1.00
Seasonal Correction Factor: 1.14

Design Period: 10 Years
Projection Factor: 1.1
Growth Factor: 10.46
10-year Design ESALs: 37,117
Design Period: 20 Years
Projection Factor: 1.2
Growth Factor: 22.02
20-year Design ESALs: 78,113

Station	Drop	Time	Air °F	Bit °F	Load	D1	D2	D3	D4	D4	D6	D7	D8	D9	Effective Values Mr ksi	Effective Values SN inches	Overlay Thickness inches	Spring Capacity tons/axle	Comments
0.0																			Start"
0.0	1	12:39	84.2	88.3	5512	38.6	25.9	19.7	12.8	7.8	3.4	1.8	1.3	1.0	5.0	1.5	1.8	7.0	
0.0	2	12:39	84.2	88.3	5512	37.9	25.6	19.5	12.7	7.8	3.3	1.8	1.3	1.0	5.0	1.5	1.8	7.1	
0.0	3	12:39	84.2	88.3	8322	59.3	41.1	31.9	21.1	13.1	5.5	2.9	2.2	1.8	4.6	1.5	2.0	6.9	
0.0	4	12:39	84.2	88.3	8311	59.3	41.3	32.1	21.2	13.2	5.5	3.0	2.2	1.8	4.5	1.5	2.0	6.9	
0.0																			41.004661,-84.467187"
0.1	1	12:40	84.2	88.3	5479	35.8	24.2	18.5	12.4	7.7	3.5	2.0	1.5	1.2	4.7	1.5	1.7	7.5	
0.1	2	12:40	84.2	88.3	5501	35.6	24.1	18.5	12.4	7.7	3.5	2.1	1.5	1.2	4.7	1.6	1.7	7.6	
0.1	3	12:40	84.2	88.3	8344	55.3	39.1	30.4	20.6	12.9	5.7	3.3	2.4	1.9	4.4	1.6	1.8	7.4	
0.1	4	12:40	84.2	88.3	8322	55.8	39.2	30.5	20.5	13.0	5.8	3.3	2.4	2.0	4.4	1.6	1.9	7.3	
0.1																			41.004696,-84.468747"
0.2	1	12:42	84.2	87.9	5402	52.0	34.6	25.7	16.0	8.7	2.8	1.4	1.1	1.0	5.7	1.2	2.2	5.2	
0.2	2	12:42	84.2	87.9	5435	51.2	34.2	25.5	15.9	8.7	2.9	1.4	1.1	1.0	5.7	1.2	2.2	5.3	
0.2	3	12:42	84.2	87.9	8147	76.0	53.7	40.8	25.9	14.5	4.6	2.3	1.9	1.8	5.3	1.2	2.3	5.3	
0.2	4	12:42	84.2	87.9	8125	75.1	53.7	40.9	26.0	14.5	4.7	2.3	1.9	1.8	5.3	1.2	2.3	5.4	
0.2																			41.004659,-84.470767"
0.3	1	12:44	84.2	88.0	5457	39.4	25.8	20.0	13.7	8.6	3.8	1.9	1.3	1.0	4.4	1.5	2.0	6.8	
0.3	2	12:44	84.2	88.0	5457	38.3	25.5	19.8	13.5	8.6	3.8	1.9	1.3	1.0	4.4	1.5	2.0	7.0	
0.3	3	12:44	84.2	88.0	8224	58.7	40.5	32.0	22.0	14.1	6.1	3.1	2.1	1.7	4.1	1.5	2.1	6.9	
0.3	4	12:44	84.2	88.0	8246	58.5	40.8	32.3	22.2	14.3	6.2	3.1	2.2	1.8	4.0	1.5	2.1	6.9	
0.3																			41.004642,-84.472764"
0.4	1	12:45	84.2	87.2	5370	53.6	37.3	28.4	18.5	10.9	3.9	1.8	1.5	1.3	4.1	1.2	2.7	5.0	
0.4	2	12:45	84.2	87.2	5348	52.8	36.7	28.1	18.3	10.8	3.9	1.9	1.5	1.4	4.1	1.2	2.7	5.1	
0.4	3	12:45	84.2	87.2	8082	78.4	57.3	44.6	29.6	17.8	6.3	2.9	2.5	2.3	3.9	1.3	2.8	5.2	
0.4	4	12:45	84.2	87.2	8049	78.1	57.2	44.7	29.6	17.8	6.3	2.9	2.5	2.3	3.9	1.3	2.8	5.2	
0.4																			41.004653,-84.474934"
0.5																			RD24,IC,StateRoute637,WB"
0.5																			41.004608,-84.476268"

American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

AET Project No. P-0001619
County: Latty
Test Date: Apr 27, 2021
Section: 4
Roadway: T-18
From: T-131
To: 0.25 MI E

Prev. Day's Avg. Air Temp.: 54 °F
Total AC: 3.9 in.
Daily ESALs: 3.9
PASER: 70
Haul ESALs: 0
Soil Type: P
Draught Adjustment Factor: 1.00
Seasonal Correction Factor: 1.14

Design Period: 10 Years
Projection Factor: 1.1
Growth Factor: 10.46
10-year Design ESALs: 14,847
Design Period: 20 Years
Projection Factor: 1.2
Growth Factor: 22.02
20-year Design ESALs: 31,245

															Effective Values		Overlay	Spring	
															Mr	SN	Thickness	Capacity	
Station	Drop	Time	Air °F	Bit °F	Load	D1	D2	D3	D4	D4	D6	D7	D8	D9	ksi	inches	inches	tons/axle	Comments
0.7																			End of gravel"
0.8																			Chip seal, one lane road"
0.8	1	11:30	80.6	83.1	5632	34.0	23.3	17.8	11.2	6.4	2.5	1.5	1.2	1.0	6.9	1.4	0.6	7.9	
0.8	2	11:30	80.6	83.1	5621	33.9	23.0	17.6	11.1	6.3	2.5	1.5	1.2	0.9	6.8	1.5	0.6	7.9	
0.8	3	11:30	80.6	83.1	8530	52.3	36.1	28.1	18.0	10.4	3.9	2.4	2.0	1.6	6.7	1.4	0.6	7.8	
0.8	4	11:30	80.6	83.1	8497	53.6	36.4	28.3	18.2	10.5	3.9	2.4	2.0	1.6	6.7	1.4	0.7	7.6	
0.8																			40.997294,-84.511777"
0.9	1	11:32	80.6	83.4	5599	31.5	21.2	16.3	11.0	6.9	3.3	2.0	1.4	1.2	5.1	1.7	0.6	8.5	
0.9	2	11:32	80.6	83.4	5643	31.0	21.0	16.3	11.0	7.0	3.3	2.0	1.4	1.2	5.2	1.7	0.5	8.7	
0.9	3	11:32	80.6	83.4	8443	47.5	33.3	25.9	17.5	11.1	5.2	3.2	2.3	1.8	4.9	1.7	0.6	8.5	
0.9	4	11:32	80.6	83.4	8464	48.7	33.6	26.2	17.8	11.3	5.3	3.2	2.3	1.9	4.8	1.7	0.7	8.3	
0.9																			40.997259,-84.513877"
0.9	1	11:33	80.6	83.0	5523	36.8	25.1	18.7	11.8	6.7	2.8	1.7	1.3	1.0	5.9	1.4	0.9	7.2	
0.9	2	11:33	80.6	83.0	5610	36.1	25.0	18.7	11.8	6.8	2.8	1.8	1.3	1.0	6.0	1.4	0.8	7.4	
0.9	3	11:33	80.6	83.0	8388	55.8	39.1	29.7	19.0	11.1	4.5	2.8	2.2	1.8	5.6	1.4	0.9	7.2	
0.9	4	11:33	80.6	83.0	8399	56.5	39.3	30.0	19.2	11.1	4.5	2.8	2.2	1.8	5.6	1.4	0.9	7.2	
0.9																			40.997291,-84.514657"
0.9																			END"

American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

AET Project No. P-0001619
County: Latty
Test Date: Apr 27, 2021
Section: 5
Roadway: T-18
From: 0.75 MI W
To: T-137

Allowable Rut: 2 inches
Allowable Serviceability Loss: 2.5
Daily ESALs: 4.0
Haul ESALs: 0
Annual Growth: 2.0%
Surface Condition Rating: 23.0
Soil Type: P
Seasonal Correction Factor: 1.00

Design Period: 5 Years
Projection Factor: 1.1
Growth Factor: 5.20
5-year Design ESALs: 7,599
Design Period: 10 Years
Projection Factor: 1.2
Growth Factor: 10.95
10-year Design ESALs: 15,993

Station	Drop	Time	Air °F	Surf °F	Load	D1	D2	D3	D4	D5	D6	D7	D8	D9	Effective Values Mr ksi	Effective Values GE inches	Overlay Thickness inches	Load Capacity tons/axle	Comments
0.0	1	11:12	78.8	79.4	5687	66.8	32.9	24.6	13.2	7.6	3.7	2.5	1.7	1.5	7.4	1.0	6.0	5.8	
0.0	2	11:12	78.8	79.4	5763	55.5	33.2	24.2	13.3	7.7	3.7	2.5	1.8	1.6	7.3	2.5	4.5	7.0	
0.0	3	11:12	78.8	79.4	8235	78.2	53.7	40.5	22.0	12.3	5.6	3.7	2.7	2.4	7.0	2.8	4.2	7.1	
0.0	4	11:12	78.8	79.4	8235	80.5	53.3	40.0	22.4	12.4	5.6	3.7	2.7	2.3	7.0	2.7	4.4	6.9	
0.0																			Start"
0.0																			LOTS of VEGETATION"
0.0																			40.997303,-84.495840"
0.1	1	11:15	78.8	80.1	4440	129.0	63.3	23.2	6.2	3.9	3.2	2.4	1.8	1.3	6.6	0.4	6.7	2.4	
0.1	2	11:15	78.8	80.1	4495	123.0	64.7	24.1	6.7	4.1	3.3	2.5	2.0	1.3	6.4	0.4	6.7	2.6	
0.1	3	11:15	78.8	80.1	6540	129.0	96.2	46.1	11.9	6.3	4.9	3.6	2.8	1.9	6.3	0.5	6.6	3.5	
0.1	4	11:15	78.8	80.1	6562	129.0	115.4	47.9	12.5	6.8	5.0	3.6	2.5	1.9	6.2	0.6	6.6	3.5	
0.1																			40.997268,-84.497917"
0.2	1	11:17	80.6	78.8	4571	112.8	60.0	30.9	8.1	3.2	2.7	2.1	1.7	1.3	7.9	0.4	6.5	2.8	
0.2	2	11:17	80.6	78.8	4593	113.8	60.4	31.7	8.4	3.3	2.7	2.1	1.5	0.9	8.1	0.4	6.5	2.8	
0.2	3	11:17	80.6	78.8	6627	129.0	95.7	56.0	13.7	4.3	3.9	3.3	2.7	2.2	8.0	0.5	6.4	3.6	
0.2	4	11:17	80.6	78.8	6616	129.0	98.0	57.9	14.7	4.8	4.2	3.4	2.6	2.1	7.5	0.5	6.5	3.6	
0.2																			40.997215,-84.499891"
0.3	1	11:20	80.6	79.1	4571	120.5	74.7	32.9	8.1	3.2	3.1	3.2	2.3	1.9	7.0	0.4	6.6	2.7	
0.3	2	11:20	80.6	79.1	4626	118.3	73.7	32.5	22.1	3.1	3.2	4.6	1.9	1.6	7.0	0.4	6.7	2.7	
0.3	3	11:20	80.6	79.1	6682	129.0	94.3	53.8	10.8	4.8	4.3	3.5	2.7	2.6	7.4	0.5	6.5	3.6	
0.3	4	11:20	80.6	79.1	6715	129.0	95.1	54.9	32.5	4.4	4.6	4.2	3.0	2.4	6.9	0.5	6.6	3.6	
0.3																			40.997584,-84.501645"
0.4	1	11:22	80.6	79.9	4626	116.1	69.4	33.0	6.1	2.3	2.9	2.2	1.6	1.1	7.6	0.4	6.6	2.8	
0.4	2	11:22	80.6	79.9	4735	115.2	70.0	33.5	6.5	2.6	3.0	2.4	1.7	1.2	7.4	0.4	6.6	2.9	
0.4	3	11:22	80.6	79.9	6868	129.0	97.6	55.7	10.8	3.5	4.0	2.9	2.0	1.5	8.2	0.5	6.4	3.7	
0.4	4	11:22	80.6	79.9	6912	129.0	99.5	55.8	11.1	3.8	4.2	2.9	2.0	1.4	7.8	0.5	6.5	3.7	
0.4																			40.997301,-84.502991"
0.5	1	11:24	80.6	80.6	4385	118.4	68.7	27.8	5.6	2.2	3.1	2.1	1.4	1.0	6.8	0.4	6.7	2.6	
0.5	2	11:24	80.6	80.6	4451	115.8	70.0	28.6	6.1	2.6	3.2	2.2	1.5	1.0	6.7	0.4	6.7	2.7	
0.5	3	11:24	80.6	80.6	6463	129.0	96.8	49.5	12.3	3.5	4.5	3.3	2.3	1.6	6.8	0.5	6.6	3.5	
0.5	4	11:24	80.6	80.6	6507	129.0	93.7	50.6	11.6	4.2	4.8	3.4	2.4	1.6	6.4	0.5	6.6	3.5	
0.5																			40.997467,-84.505377"
0.6	1	11:26	80.6	79.8	0:00	94.3	49	29.1	10.3	4.7	3.3	2.3	1.9	1.5	7.4	0.5	6.5	3.7	
0.6	2	11:26	80.6	79.8	5096	90.9	48.9	29.1	10.4	4.8	3.3	2.3	2.0	1.5	7.2	0.6	6.4	3.9	
0.6	3	11:26	80.6	79.8	7240	122.4	79.2	48.5	17.1	7.2	4.7	3.3	3.0	2.2	7.2	0.6	6.4	4.1	
0.6	4	11:26	80.6	79.8	7218	121.6	82.3	48.9	17.2	7.2	4.7	3.3	3.0	2.0	7.3	0.6	6.4	4.1	
0.6																			40.997353,-84.507941"
0.7	1	11:28	80.6	80.5	5435	75.6	44.0	27.8	13.8	5.6	2.8	2.2	1.7	1.3	9.1	0.6	6.2	4.9	
0.7	2	11:28	80.6	80.5	5523	73.3	44.1	28.1	14.8	5.8	2.9	2.3	1.8	1.4	9.0	0.6	6.2	5.2	
0.7	3	11:28	80.6	80.5	8082	110.5	68.1	46.8	23.8	8.6	3.8	3.2	2.6	2.0	10.0	0.6	6.2	5.0	
0.7	4	11:28	80.6	80.5	8005	113.6	68.2	47.4	23.8	8.5	3.9	3.4	2.6	2.0	9.8	0.6	6.2	4.9	
0.7																			40.997322,-84.509764"
0.7																			End of gravel"

American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

AET Project No. P-0001619
County: Latty
Test Date: Apr 27, 2021
Section: 6
Roadway: T-18
From: 0.5 MI W
To: SH-637

Allowable Rut: 2 inches
Allowable Serviceability Loss: 2.5
Daily ESALs: 4.0
Haul ESALs: 0
Annual Growth: 2.0%
Surface Condition Rating: 23.0
Soil Type: P
Seasonal Correction Factor: 1.00

Design Period: 5 Years
Projection Factor: 1.1
Growth Factor: 5.20
5-year Design ESALs: 7,599
Design Period: 10 Years
Projection Factor: 1.2
Growth Factor: 10.95
10-year Design ESALs: 15,993

Station	Drop	Time	Air °F	Surf °F	Load	D1	D2	D3	D4	D5	D6	D7	D8	D9	Effective Values Mr ksi	Effective Values GE inches	Overlay Thickness inches	Load Capacity tons/axle	Comments
0.0	1	13:30	89.6	87.7	5370	94.8	37.9	22.5	9.2	5.7	3.9	2.8	2.1	1.6	6.6	0.6	6.5	3.9	
0.0	2	13:30	89.6	87.7	5424	73.3	38.1	22.5	9.5	6.5	3.8	2.8	2.1	1.6	6.7	0.9	6.2	5.1	
0.0	3	13:30	89.6	87.7	7907	120.7	64.5	35.8	15.9	10.6	5.6	4.3	3.2	2.6	6.6	0.7	6.4	4.5	
0.0	4	13:30	89.6	87.7	7907	129.0	59.0	36.6	15.9	9.3	6.0	4.3	3.2	2.6	6.3	0.7	6.4	4.2	
0.0																			Start"
0.1	1	13:31	89.6	87.5	4965	87.8	43	22.8	6.2	2.6	2.2	1.8	1.4	1.1	10.5	0.5	6.2	3.9	
0.1	2	13:31	89.6	87.5	5009	88.6	44	23.0	6.4	2.7	2.3	1.9	1.5	1.3	10.4	0.5	6.3	3.9	
0.1	3	13:31	89.6	87.5	7338	118.3	68	38.0	9.7	3.1	2.9	2.7	2.2	1.6	11.9	0.5	6.2	4.3	
0.1	4	13:31	89.6	87.5	7338	119.5	69	39.0	9.7	3.0	3.0	2.7	2.1	1.6	11.4	0.5	6.2	4.2	
0.2	1	13:32	89.6	86.2	6365	41.0	20	14.7	8.6	5.7	3.1	2.0	1.3	1.1	9.6	4.8	2.0	10.2	
0.2	2	13:32	89.6	86.2	6441	44.8	20.2	14.7	8.6	5.7	3.2	2.0	1.3	1.2	9.6	3.8	3.0	9.5	
0.2	3	13:32	89.6	86.2	9339	68.3	33.0	23.6	13.5	8.6	4.6	2.9	1.9	1.8	9.7	3.6	3.2	9.1	
0.2	4	13:32	89.6	86.2	9339	69.8	34.2	24.3	13.8	8.6	4.6	2.9	1.9	1.9	9.6	3.0	3.8	8.9	
0.3	1	13:34	87.8	86.4	4987	91.1	52.5	28.4	10.2	4.7	2.9	2.3	1.7	1.2	8.2	0.5	6.4	3.8	
0.3	2	13:34	87.8	86.4	5009	91.2	52.8	28.6	10.4	4.8	2.9	2.3	1.7	1.2	8.1	0.5	6.4	3.8	
0.3	3	13:34	87.8	86.4	7152	119.5	88.4	47.3	17.2	7.1	4.1	3.2	2.4	1.8	8.2	0.5	6.4	4.1	
0.3	4	13:34	87.8	86.4	7163	122.4	88.6	48.3	17.6	7.3	4.2	3.3	2.5	1.8	8.1	0.5	6.4	4.1	
0.4	1	13:36	87.8	87.1	4265	107.9	42.3	21.0	6.8	4.2	3.2	2.3	1.6	1.2	6.3	0.5	6.6	2.8	
0.4	2	13:36	87.8	87.1	4396	104.3	43.8	20.7	7.2	4.4	3.3	2.3	1.6	1.3	6.4	0.5	6.6	2.9	
0.4	3	13:36	87.8	87.1	6441	129.0	63.0	36.0	10.9	5.7	4.7	3.3	2.1	1.5	6.6	0.5	6.6	3.5	
0.4	4	13:36	87.8	87.1	6419	129.0	63.6	36.7	11.5	6.3	4.9	3.5	2.4	1.2	6.2	0.5	6.7	3.5	
0.5	1	13:37	87.8	86.7	4462	114.5	70.0	28.8	7.9	5.0	3.3	2.2	1.4	1.0	6.5	0.4	6.7	2.7	
0.5	2	13:37	87.8	86.7	4528	117.6	71.1	28.5	8.4	5.0	3.3	2.2	1.4	1.1	6.5	0.4	6.7	2.7	
0.5	3	13:37	87.8	86.7	6507	129.0	93.5	49.9	13.3	7.3	5.0	3.4	2.4	1.7	6.2	0.5	6.7	3.5	
0.5	4	13:37	87.8	86.7	6496	129.0	92.3	50.7	13.9	7.3	5.1	3.5	2.3	1.7	6.0	0.6	6.6	3.5	
0.5																			End"

American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

AET Project No. P-0001619
County: Latty
Test Date: Apr 27, 2021
Section: 7
Roadway: T-48
From: T-137
To: SH-637

Prev. Day's Avg. Air Temp.: 54 °F
Total AC: 3.0 in.
Daily ESALs: 3.9
PASER: 79
Haul ESALs: 0
Soil Type: P
Draught Adjustment Factor: 1.00
Seasonal Correction Factor: 1.14

Design Period: 10 Years
Projection Factor: 1.1
Growth Factor: 10.46
10-year Design ESALs: 14,847
Design Period: 20 Years
Projection Factor: 1.2
Growth Factor: 22.02
20-year Design ESALs: 31,245

Station	Drop	Time	Air °F	Bit °F	Load	D1	D2	D3	D4	D4	D6	D7	D8	D9	Effective Values Mr ksi	Effective Values SN inches	Overlay Thickness inches	Spring Capacity tons/axle	Comments
0.0																			Start"
0.0	1	9:38	73.4	73.1	5895	32.3	22.2	17.4	11.9	7.6	3.5	2.2	1.5	1.2	5.1	1.8	0.3	8.5	
0.0	2	9:38	73.4	73.1	5873	32.1	22.0	17.1	11.8	7.5	3.5	2.2	1.5	1.2	5.1	1.8	0.3	8.6	
0.0	3	9:38	73.4	73.1	8760	46.2	33.2	26.3	18.4	11.9	5.5	3.3	2.3	2.0	4.8	1.8	0.2	8.9	
0.0	4	9:38	73.4	73.1	8793	46.6	33.8	26.9	18.8	12.1	5.6	3.4	2.4	2.1	4.8	1.8	0.3	8.8	
0.0																			41.033785, -84.477144"
0.1	1	9:42	73.4	73.9	5829	34.6	24.9	19.5	13.2	8.1	3.6	2.1	1.6	1.2	5.0	1.7	0.5	8.0	
0.1	2	9:42	73.4	73.9	5862	34.4	24.8	19.5	13.3	8.2	3.6	2.2	1.6	1.3	4.9	1.7	0.5	8.1	
0.1	3	9:42	73.4	73.9	8738	50.7	37.7	30.1	20.9	13.2	5.7	3.3	2.5	2.0	4.6	1.8	0.5	8.2	
0.1	4	9:42	73.4	73.9	8716	50.7	38.0	30.5	21.2	13.3	5.7	3.3	2.5	2.0	4.6	1.8	0.5	8.1	
0.1																			41.033757,-84.478841"
0.2	1	9:46	73.4	74.2	5818	36.6	26.0	20.1	13.3	8.1	3.5	2.2	1.6	1.4	5.1	1.6	0.6	7.6	
0.2	2	9:46	73.4	74.2	5818	36.1	25.7	20.0	13.2	8.0	3.5	2.2	1.6	1.4	5.1	1.6	0.6	7.6	
0.2	3	9:46	73.4	74.2	8738	53.0	38.8	30.5	20.6	12.8	5.4	3.4	2.6	2.2	4.9	1.7	0.6	7.8	
0.2	4	9:46	73.4	74.2	8683	53.0	39.1	30.8	20.8	12.9	5.4	3.4	2.6	2.2	4.8	1.7	0.6	7.8	
0.2																			41.033773,-84.480706"
0.3	1	9:48	73.4	73.5	5807	30.4	22.2	17.7	12.4	8.0	3.9	2.4	1.8	1.4	4.6	1.9	0.2	9.0	
0.3	2	9:48	73.4	73.5	5829	30.1	22.1	17.6	12.4	8.0	3.8	2.4	1.7	1.4	4.6	1.9	0.2	9.1	
0.3	3	9:48	73.4	73.5	8782	44.3	33.5	27.1	19.3	12.7	6.1	3.8	2.8	2.2	4.4	2.0	0.1	9.3	
0.3	4	9:48	73.4	73.5	8672	44.3	33.7	27.2	19.4	12.7	6.1	3.7	2.7	2.2	4.3	2.0	0.2	9.2	
0.3																			41.033781,-84.482789"
0.4	1	9:50	73.4	74.8	5840	23.1	17.5	14.6	10.9	7.6	4.0	2.3	1.5	1.2	4.4	2.3	0.0	11.5	
0.4	2	9:50	73.4	74.8	5884	23.1	17.4	14.5	10.9	7.6	4.0	2.3	1.5	1.2	4.5	2.3	0.0	11.6	
0.4	3	9:50	73.4	74.8	8771	35.2	27.1	22.6	17.0	12.0	6.3	3.6	2.5	1.9	4.3	2.3	0.0	11.4	
0.4	4	9:50	73.4	74.8	8760	35.3	27.1	22.7	17.0	12.1	6.3	3.6	2.5	1.9	4.2	2.3	0.0	11.4	
0.4																			41.033778,-84.484750"
0.5	1	9:51	73.4	75.2	5916	19.0	13.8	10.8	7.7	5.2	2.8	1.9	1.4	1.0	6.3	2.4	0.0	13.6	
0.5	2	9:51	73.4	75.2	5873	18.6	13.6	10.7	7.6	5.2	2.8	1.8	1.3	1.0	6.4	2.4	0.0	13.8	
0.5	3	9:51	73.4	75.2	8902	27.9	20.6	16.4	11.8	8.1	4.4	2.9	2.1	1.6	6.1	2.4	0.0	13.9	
0.5	4	9:51	73.4	75.2	8880	27.9	20.8	16.5	11.9	8.2	4.4	2.9	2.1	1.7	6.0	2.4	0.0	13.9	
0.5																			41.033699,-84.486720"
0.6	1	9:53	73.4	75.2	5873	20.9	14.9	11.7	8.1	5.2	2.5	1.6	1.2	0.9	7.2	2.1	0.0	12.4	
0.6	2	9:53	73.4	75.2	5884	20.5	14.8	11.6	8.1	5.1	2.5	1.6	1.1	0.9	7.2	2.1	0.0	12.6	
0.6	3	9:53	73.4	75.2	8891	31.3	23.0	18.3	12.8	8.3	3.9	2.4	1.8	1.5	6.9	2.2	0.0	12.5	
0.6	4	9:53	73.4	75.2	8858	31.2	23.0	18.3	12.8	8.3	3.9	2.5	1.9	1.5	6.8	2.2	0.0	12.5	
0.6																			41.033691,-84.488764"
0.7	1	9:55	73.4	75.4	5774	28.0	19.9	15.3	10.2	6.2	2.7	1.8	1.4	1.1	6.5	1.8	0.0	9.5	
0.7	2	9:55	73.4	75.4	5763	28.0	19.8	15.3	10.2	6.2	2.7	1.8	1.4	1.1	6.4	1.8	0.0	9.5	
0.7	3	9:55	73.4	75.4	8705	42.1	30.6	23.9	16.2	10.1	4.2	2.8	2.2	1.8	6.2	1.8	0.0	9.5	
0.7	4	9:55	73.4	75.4	8683	42.2	30.9	24.2	16.4	10.2	4.3	2.8	2.2	1.8	6.2	1.8	0.0	9.5	
0.7																			41.033733,-84.490795"
0.8	1	9:56	75.2	75.6	5840	22.0	16.3	13.4	10.0	7.1	3.8	2.1	1.5	1.2	4.7	2.4	0.0	12.0	
0.8	2	9:56	75.2	75.6	5895	21.9	16.3	13.4	10.1	7.1	3.8	2.1	1.5	1.2	4.7	2.4	0.0	12.2	
0.8	3	9:56	75.2	75.6	8793	33.7	25.3	21.0	15.9	11.3	5.9	3.1	2.3	2.0	4.5	2.4	0.0	11.9	
0.8	4	9:56	75.2	75.6	8771	33.8	25.4	21.2	15.9	11.4	5.9	3.2	2.4	2.0	4.5	2.4	0.0	11.8	
0.8																			41.033751,-84.492836"
0.9	1	9:58	75.2	75.8	5796	22.4	18.3	15.3	11.7	8.2	4.3	2.5	1.8	1.4	4.1	2.5	0.0	11.9	
0.9	2	9:58	75.2	75.8	5774	22.1	18.1	15.2	11.6	8.2	4.3	2.5	1.8	1.4	4.1	2.5	0.0	11.9	
0.9	3	9:58	75.2	75.8	8705	33.9	27.9	23.5	18.0	12.9	6.7	3.9	2.7	2.2	3.9	2.5	0.0	11.8	
0.9	4	9:58	75.2	75.8	0:00	34.0	28.1	23.8	18.2	13.0	6.8	3.9	2.8	2.3	3.9	2.5	0.0	11.8	
0.9																			41.033878,-84.494672"
0.9	1	10:00	75.2	76.0	0:00	18.4	15.0	13.0	10.3	7.6	4.3	2.5	1.6	1.2	4.1	2.9	0.0	14.2	
0.9	2	10:00	75.2	76.0	5807	18.0	14.8	12.9	10.2	7.5	4.3	2.5	1.6	1.2	4.1	2.9	0.0	14.4	
0.9	3	10:00	75.2	76.0	8782	28.0	23.1	20.3	16.1	11.9	6.8	3.9	2.6	1.9	3.9	2.9	0.0	14.0	
0.9	4	10:00	75.2	76.0	8749	28.0	23.2	20.4	16.2	12.0	6.8	3.9	2.6	2.0	3.9	2.9	0.0	14.0	
0.9																			41.033668,-84.495677"
0.9																			End"

American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

AET Project No. P-0001619
County: Latty
Test Date: May 18, 2021
Section: 8A
Roadway: T-131
From: T-18
To: C-24

Prev. Day's Avg. Air Temp.: 62 °F
Total AC: 2.5 in.
Daily ESALs: 3.9
PASER: 68
Haul ESALs: 0
Soil Type: P
Draught Adjustment Factor: 1.00
Seasonal Correction Factor: 1.14

Design Period: 10 Years
Projection Factor: 1.1
Growth Factor: 10.46
10-year Design ESALs: 14,847
Design Period: 20 Years
Projection Factor: 1.2
Growth Factor: 22.02
20-year Design ESALs: 31,245

Station	Drop	Time	Air °F	Bit °F	Load	D1	D2	D3	D4	D4	D6	D7	D8	D9	Effective Values Mr ksi	SN inches	Overlay Thickness inches	Spring Capacity tons/axle	Comments
0.0																			HWY 131,IC,ROAD 18,NB"
0.0	1	7:33	66.2	63.1	5654	67.1	45.3	32.9	18.9	9.6	3.5	2.3	1.7	1.5	4.9	0.8	2.5	4.8	
0.0	2	7:33	66.2	63.1	5643	65.6	44.4	32.4	18.7	9.6	3.5	2.3	1.7	1.5	4.8	0.9	2.5	4.9	
0.0	3	7:33	66.2	63.1	8421	97.3	67.2	50.2	29.8	15.7	5.4	3.5	2.8	2.3	4.7	0.9	2.5	4.9	
0.0	4	7:33	66.2	63.1	8399	97.5	67.4	50.4	29.9	15.7	5.4	3.5	2.8	2.3	4.7	0.9	2.5	4.9	
0.1	1	7:34	66.2	63.5	5424	71.9	48.4	36.4	21.4	11.0	3.9	2.7	2.0	1.5	4.2	0.8	2.8	4.3	
0.1	2	7:34	66.2	63.5	5468	70.8	47.9	36.2	21.5	11.0	4.0	2.7	2.0	1.6	4.1	0.8	2.8	4.4	
0.1	3	7:34	66.2	63.5	8169	103.9	72.2	55.8	34.1	17.9	6.0	4.1	3.2	2.5	4.1	0.9	2.8	4.5	
0.1	4	7:34	66.2	63.5	8125	104.3	72.5	56.1	34.0	17.9	6.0	4.1	3.1	2.4	4.1	0.9	2.8	4.5	
0.2	1	7:36	64.4	63.2	5501	69.8	46.6	33.2	18.5	9.2	2.8	2.2	1.9	1.5	5.9	0.8	2.3	4.4	
0.2	2	7:36	64.4	63.2	5490	68.0	45.9	32.8	18.3	9.3	2.9	2.2	1.9	1.5	5.8	0.8	2.4	4.5	
0.2	3	7:36	64.4	63.2	8213	100.8	70.1	51.0	29.2	14.9	4.1	3.4	3.0	2.5	6.0	0.8	2.3	4.5	
0.2	4	7:36	64.4	63.2	8213	101.5	70.1	51.6	29.6	15.1	4.2	3.4	3.0	2.5	5.9	0.8	2.3	4.5	
0.3	1	7:37	64.4	63.3	5566	49.0	35.3	27.2	17.5	10.1	3.9	2.3	1.7	1.5	4.4	1.1	2.2	6.4	
0.3	2	7:37	64.4	63.3	5643	48.7	35.2	27.1	17.5	10.1	3.9	2.4	1.7	1.5	4.4	1.1	2.2	6.5	
0.3	3	7:37	64.4	63.3	8552	72.5	53.2	41.9	27.7	16.4	6.1	3.7	2.8	2.4	4.2	1.1	2.2	6.6	
0.3	4	7:37	64.4	63.3	8497	72.9	53.6	42.2	27.7	16.3	6.1	3.7	2.8	2.4	4.2	1.1	2.2	6.6	
0.4	1	7:39	64.4	64.1	5227	94.5	66	49.8	29.1	13.7	2.8	1.7	2.0	2.2	5.6	0.6	2.7	3.2	
0.4	2	7:39	64.4	64.1	5238	92.5	64.9	49.1	28.8	13.6	2.9	1.8	2.0	2.2	5.5	0.7	2.7	3.2	
0.4	3	7:39	64.4	64.1	7852	129.0	95.4	74.4	45.2	22.3	4.4	2.5	3.1	3.4	5.4	0.7	2.7	3.5	
0.4	4	7:39	64.4	64.1	7830	129.0	96.3	75.0	45.5	22.2	4.4	2.5	3.1	3.4	5.4	0.7	2.7	3.5	
0.5	1	7:41	66.2	63.9	5676	51.3	36.2	27.4	17.2	9.4	3.5	2.2	1.6	1.3	4.9	1.0	2.1	6.2	
0.5	2	7:41	66.2	63.9	5698	50.6	35.8	27.1	17.1	9.3	3.5	2.2	1.6	1.3	4.9	1.0	2.1	6.3	
0.5	3	7:41	66.2	63.9	8486	75.3	54.1	42.2	27.2	15.2	5.5	3.4	2.5	2.1	4.7	1.0	2.1	6.3	
0.5	4	7:41	66.2	63.9	8497	75.9	54.7	42.7	27.5	15.4	5.4	3.4	2.5	2.1	4.7	1.0	2.1	6.3	
0.5																			HWY 131,IC,ROAD 24,NB"

American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

AET Project No. P-0001619
County: Latty
Test Date: Apr 27, 2021
Section: 8B
Roadway: T-131
From: C-24
To: SH-114

Prev. Day's Avg. Air Temp.: 54 °F
Total AC: 0.9 in.
Daily ESALs: 3.9
PASER: 76
Haul ESALs: 0
Soil Type: P
Draught Adjustment Factor: 1.00
Seasonal Correction Factor: 1.14

Design Period: 10 Years
Projection Factor: 1.1
Growth Factor: 10.46
10-year Design ESALs: 14,847
Design Period: 20 Years
Projection Factor: 1.2
Growth Factor: 22.02
20-year Design ESALs: 31,245

															Effective Values		Overlay	Spring	
															Mr	SN	Thickness	Capacity	
Station	**Drop**	**Time**	**Air °F**	**Bit °F**	**Load**	**D1**	**D2**	**D3**	**D4**	**D4**	**D6**	**D7**	**D8**	**D9**	**ksi**	**inches**	**inches**	**tons/axle**	**Comments**
0.0	1	11:38	84.2	84.9	5468	50.3	35.2	26.8	15.7	8.2	2.8	1.7	1.4	1.1	6.0	1.4	0.9	6.4	
0.0	2	11:38	84.2	84.9	5490	49.8	34.6	26.4	15.6	8.2	2.8	1.8	1.4	1.1	5.9	1.4	0.9	6.5	
0.0	3	11:38	84.2	84.9	8268	68.4	52.6	41.4	25.4	13.8	4.5	2.8	2.2	1.8	5.6	1.5	0.8	7.1	
0.0	4	11:38	84.2	84.9	8268	70.2	52.8	41.7	25.6	13.8	4.5	2.8	2.3	1.8	5.6	1.5	0.9	6.9	
0.0																			START"
0.0																			41.004749,-84514880"
0.1	1	11:40	84.2	84.3	0:00	39.6	27	21.4	14.1	8.0	3.5	1.9	1.2	1.2	4.8	1.6	0.7	8.1	
0.1	2	11:40	84.2	84.3	5523	38.9	26.8	21.0	13.9	8.0	3.5	1.9	1.3	1.2	4.8	1.7	0.7	8.2	
0.1	3	11:40	84.2	84.3	8344	56.5	41.1	33.1	22.5	13.1	5.5	3.0	2.1	2.0	4.6	1.7	0.7	8.5	
0.1	4	11:40	84.2	84.3	8333	56.5	41.3	33.4	22.7	13.2	5.5	3.0	2.1	2.0	4.6	1.7	0.7	8.5	
0.1																			41.005961,-84.514861"
0.2	1	11:41	86.0	84.1	5457	50.2	33.4	24.3	13.8	6.7	2.0	1.2	1.0	0.8	8.3	1.3	0.5	6.4	
0.2	2	11:41	86.0	84.1	5457	49.2	32.8	23.9	13.7	6.7	2.0	1.2	1.0	0.8	8.1	1.4	0.5	6.5	
0.2	3	11:41	86.0	84.1	8169	68.2	49.6	37.7	22.5	11.4	3.1	1.9	1.6	1.4	8.0	1.4	0.4	7.0	
0.2	4	11:41	86.0	84.1	8235	68.9	50.5	38.5	22.8	11.5	3.1	1.9	1.6	1.4	8.2	1.4	0.4	7.0	
0.2																			41.007418,-84.514873"
0.3	1	11:43	86.0	84.6	5523	33.3	23.5	17.4	11.1	6.6	3.1	2.0	1.4	1.1	5.4	1.8	0.2	9.5	
0.3	2	11:43	86.0	84.6	5545	32.8	23.0	17.2	11.0	6.6	3.1	2.0	1.4	1.1	5.4	1.8	0.2	9.6	
0.3	3	11:43	86.0	84.6	8344	49.4	35.5	27.5	18.0	11.0	4.9	3.1	2.3	1.9	5.1	1.8	0.3	9.7	
0.3	4	11:43	86.0	84.6	0:00	49.7	36	27.8	18.3	11.1	5.0	3.1	2.3	1.9	5.1	1.8	0.3	9.6	
0.3																			41.008998,-84.514941"
0.4	1	11:45	87.8	85.5	5326	64.4	44.4	32.0	17.4	8.3	2.9	2.4	2.0	1.7	5.5	1.2	1.4	4.9	
0.4	2	11:45	87.8	85.5	5304	63.2	43.5	31.3	17.1	8.3	2.9	2.4	2.0	1.7	5.5	1.2	1.4	5.0	
0.4	3	11:45	87.8	85.5	8027	90.1	65.8	49.3	28.4	14.2	4.4	3.6	3.2	2.6	5.5	1.3	1.3	5.3	
0.4	4	11:45	87.8	85.5	8038	92.1	66.6	49.9	28.6	14.3	4.4	3.6	3.2	2.6	5.5	1.3	1.3	5.2	
0.4																			41.010292,-84.514846"
0.5	1	11:46	87.8	85.3	5020	87.9	57.7	38.6	17.6	5.2	0.3	1.6	1.6	1.5	43.4	1.0	0.0	3.5	
0.5	2	11:46	87.8	85.3	5052	88.0	57.2	38.5	17.8	5.3	0.5	1.6	1.6	1.5	32.6	1.0	0.0	3.5	
0.5	3	11:46	87.8	85.3	7590	115.4	85.9	60.8	29.7	9.8	0.4	2.5	2.7	2.3	57.5	1.0	0.0	4.1	
0.5	4	11:46	87.8	85.3	7622	114.0	86.8	61.7	30.3	9.9	0.4	2.6	2.7	2.4	51.3	1.0	0.0	4.1	
0.5																			41.011127,-84.514436"
0.6	1	11:48	87.8	83.8	5238	51.6	35.5	26.8	16.4	8.4	3.1	2.3	1.9	1.5	5.1	1.4	1.2	6.0	
0.6	2	11:48	87.8	83.8	5282	51.1	35.3	26.6	16.2	8.4	3.1	2.3	1.8	1.5	5.1	1.4	1.2	6.1	
0.6	3	11:48	87.8	83.8	7994	78.5	54.3	42.0	26.4	14.2	4.7	3.4	2.8	2.5	5.1	1.4	1.2	6.0	
0.6	4	11:48	87.8	83.8	7994	79.2	54.7	42.4	26.6	14.2	4.7	3.4	2.8	2.5	5.2	1.4	1.2	6.0	
0.6																			41.012808,-84.515158"
0.7	1	11:50	89.6	83.9	5555	35.1	26.7	20.9	13.5	7.4	3.0	1.8	1.4	1.3	5.6	1.7	0.3	9.1	
0.7	2	11:50	89.6	83.9	5555	35.0	26.5	20.8	13.5	7.4	3.0	1.8	1.4	1.3	5.5	1.7	0.3	9.1	
0.7	3	11:50	89.6	83.9	8377	51.3	40.4	32.7	22.0	12.5	4.8	2.8	2.3	2.2	5.3	1.8	0.3	9.4	
0.7	4	11:50	89.6	83.9	8399	51.5	40.8	33.0	22.2	12.6	4.8	2.8	2.4	2.1	5.3	1.8	0.3	9.4	
0.7																			41.014840,-84.514947"
0.8	1	11:51	89.6	84.2	5588	35.6	25.4	19.7	12.3	7.0	3.0	1.9	1.5	1.3	5.6	1.7	0.3	9.0	
0.8	2	11:51	89.6	84.2	5599	35.1	25.0	19.5	12.2	7.0	3.0	1.9	1.5	1.3	5.6	1.7	0.3	9.2	
0.8	3	11:51	89.6	84.2	8410	50.9	38.2	30.6	19.9	11.8	4.8	3.0	2.3	2.0	5.3	1.8	0.3	9.5	
0.8	4	11:51	89.6	84.2	8377	51.4	38.5	30.9	20.1	11.9	4.8	3.0	2.3	2.1	5.3	1.8	0.3	9.3	
0.8																			41.016317,-84.514774"
0.9	1	11:53	89.6	84.4	5260	74.0	49.3	34.1	16.3	6.0	1.5	1.9	1.6	1.4	10.7	1.1	0.7	4.3	
0.9	2	11:53	89.6	84.4	5238	72.6	48.5	33.6	16.2	6.0	1.5	1.9	1.6	1.4	10.3	1.1	0.7	4.4	
0.9	3	11:53	89.6	84.4	7896	102.8	73.2	53.1	27.1	10.6	2.0	2.8	2.6	2.2	11.7	1.1	0.5	4.6	
0.9	4	11:53	89.6	84.4	7907	103.5	73.9	53.7	27.3	10.6	2.1	2.9	2.7	2.2	11.6	1.1	0.5	4.6	
0.9																			41.018029,-84.514940"
1.0																			RD131,IC,StateRoute114,SB"
1.0																			41.018990,-84514948"

American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

AET Project No. P-0001619
County: Latty
Test Date: Apr 27, 2021
Section: 9
Roadway: T-131
From: SH-114
To: T-48

Prev. Day's Avg. Air Temp.: 54 °F
Total AC: 0.9 in.
Daily ESALs: 3.9
PASER: 78
Haul ESALs: 0
Soil Type: P
Draught Adjustment Factor: 1.00
Seasonal Correction Factor: 1.14

Design Period: 10 Years
Projection Factor: 1.1
Growth Factor: 10.46
10-year Design ESALs: 14,847
Design Period: 20 Years
Projection Factor: 1.2
Growth Factor: 22.02
20-year Design ESALs: 31,245

Station	Drop	Time	Air °F	Bit °F	Load	D1	D2	D3	D4	D4	D6	D7	D8	D9	Effective Values Mr ksi	Effective Values SN inches	Overlay Thickness inches	Spring Capacity tons/axle	Comments
1.0																			RD131,IC,StateRoute114,SB"
1.0																			41.018990,-84514948"
1.0	1	11:56	89.6	84.3	5381	44.2	29.6	21.8	13.0	7.4	3.2	2.1	1.7	1.4	5.1	1.3	1.4	7.1	
1.0	2	11:56	89.6	84.3	5402	43.7	29.3	21.6	12.9	7.4	3.2	2.1	1.7	1.4	5.1	1.3	1.4	7.2	
1.0	3	11:56	89.6	84.3	8180	62.7	45.2	34.3	21.2	12.2	5.0	3.3	2.7	2.2	4.9	1.4	1.3	7.6	
1.0	4	11:56	89.6	84.3	8202	63.2	45.8	34.8	21.5	12.4	5.1	3.3	2.7	2.2	4.9	1.4	1.3	7.6	
1.0																			41.019496,-84.514872"
1.1	1	11:57	89.6	84.0	5413	49.2	34.0	24.6	14.3	7.2	2.7	2.0	1.7	1.4	6.1	1.2	1.3	6.5	
1.1	2	11:57	89.6	84.0	5424	49.1	33.6	24.4	14.2	7.2	2.7	1.9	1.6	1.4	6.0	1.2	1.3	6.5	
1.1	3	11:57	89.6	84.0	8180	70.1	51.0	38.3	23.2	11.9	4.2	2.8	2.6	2.2	5.9	1.2	1.3	6.9	
1.1	4	11:57	89.6	84.0	8136	69.9	51.5	38.8	23.4	12.0	4.2	2.8	2.5	2.2	5.9	1.2	1.3	6.8	
1.1																			41.021001,-84.514909"
1.2	1	11:59	89.6	85.3	5413	47.6	31.9	23.5	13.2	6.9	2.8	2.0	1.7	1.3	5.8	1.2	1.4	6.7	
1.2	2	11:59	89.6	85.3	5468	47.0	31.6	23.3	13.1	6.9	2.9	2.0	1.7	1.3	5.8	1.2	1.3	6.8	
1.2	3	11:59	89.6	85.3	8180	66.8	48.4	37.0	21.7	11.6	4.4	3.2	2.8	2.2	5.6	1.3	1.3	7.2	
1.2	4	11:59	89.6	85.3	8180	67.8	49.2	37.6	22.0	11.7	4.4	3.3	2.8	2.2	5.6	1.3	1.3	7.1	
1.2																			41.022352,-84.514871"
1.3	1	12:00	89.6	84.4	5391	48.3	32.3	23.1	13.3	6.6	2.8	2.0	1.7	1.5	5.9	1.2	1.3	6.6	
1.3	2	12:00	89.6	84.4	5370	48.0	31.9	22.8	13.1	6.6	2.8	2.0	1.7	1.5	5.9	1.2	1.4	6.6	
1.3	3	12:00	89.6	84.4	8136	68.0	48.7	35.9	21.2	10.9	4.1	3.1	2.7	2.4	6.0	1.3	1.2	7.0	
1.3	4	12:00	89.6	84.4	8147	68.6	49.3	36.4	21.4	10.9	4.1	3.1	2.7	2.4	6.0	1.3	1.2	7.0	
1.3																			41.024050,-84.514945"
1.4	1	12:02	89.6	85.0	5271	58.9	37.6	26.4	14.5	6.6	1.8	1.5	1.4	1.2	9.0	1.0	1.1	5.3	
1.4	2	12:02	89.6	85.0	5271	58.2	37.2	26.1	14.4	6.6	1.8	1.5	1.4	1.2	8.9	1.0	1.1	5.4	
1.4	3	12:02	89.6	85.0	7972	83.3	57.9	42.1	24.1	11.3	2.6	2.4	2.4	2.0	9.2	1.1	1.0	5.7	
1.4	4	12:02	89.6	85.0	7994	84.9	58.6	42.7	24.5	11.4	2.6	2.4	2.4	2.0	9.2	1.1	1.0	5.6	
1.4																			41.025580,-84.514953"
1.5	1	12:04	89.6	85.9	5413	49.0	31.5	21.9	12.8	6.6	2.5	1.9	1.6	1.4	6.4	1.2	1.3	6.5	
1.5	2	12:04	89.6	85.9	5435	48.1	31.1	21.7	12.6	6.6	2.5	1.9	1.6	1.4	6.5	1.2	1.2	6.6	
1.5	3	12:04	89.6	85.9	8191	69.7	47.5	34.5	21.0	11.2	4.1	3.0	2.6	2.2	6.1	1.2	1.2	6.9	
1.5	4	12:04	89.6	85.9	8202	69.1	48.1	34.9	21.2	11.3	4.1	3.0	2.7	2.3	6.1	1.2	1.2	6.9	
1.5																			41.027105,-84.514988"
1.6	1	12:05	89.6	84.9	5282	58.9	38.8	27.9	15.7	6.7	1.7	1.7	1.5	1.4	9.4	1.0	1.1	5.4	
1.6	2	12:05	89.6	84.9	5293	57.9	38.4	27.7	15.6	6.8	1.8	1.7	1.6	1.5	9.0	1.0	1.1	5.5	
1.6	3	12:05	89.6	84.9	7961	81.4	57.9	42.9	25.0	11.3	2.6	2.6	2.6	2.2	9.4	1.1	1.0	5.8	
1.6	4	12:05	89.6	84.9	7972	82.1	58.9	43.7	25.4	11.4	2.6	2.6	2.6	2.2	9.4	1.1	1.0	5.8	
1.6																			41.028530,-84.515092"
1.7	1	12:07	89.6	85.1	5534	36.5	24.4	18.0	11.0	6.2	2.6	1.7	1.3	1.2	6.5	1.4	0.7	8.8	
1.7	2	12:07	89.6	85.1	5534	35.8	23.9	17.7	10.9	6.2	2.6	1.7	1.3	1.2	6.5	1.4	0.7	8.9	
1.7	3	12:07	89.6	85.1	8344	54.1	38.3	29.1	18.4	10.6	4.1	2.7	2.2	1.9	6.2	1.4	0.8	8.9	
1.7	4	12:07	89.6	85.1	8279	54.6	38.2	29.2	18.5	10.6	4.1	2.8	2.3	2.0	6.1	1.4	0.8	8.7	
1.7																			41.030122,-84.515043"
1.8	1	12:10	87.8	84.5	5501	42.3	28.1	20.8	12.4	6.5	2.3	1.4	1.1	0.9	7.3	1.3	0.9	7.6	
1.8	2	12:10	87.8	84.5	5523	41.8	27.8	20.6	12.3	6.5	2.3	1.4	1.1	0.9	7.3	1.3	0.9	7.7	
1.8	3	12:10	87.8	84.5	8322	61.1	43.0	32.9	20.4	11.0	3.5	2.2	1.8	1.6	7.1	1.3	0.8	7.9	
1.8	4	12:10	87.8	84.5	8300	61.8	43.4	33.3	20.6	11.0	3.5	2.2	1.8	1.6	7.1	1.3	0.9	7.8	
1.8																			41.031406,-84.515067"
1.9	1	12:11	87.8	84.7	5545	35.9	25.4	19.8	13.1	7.8	3.1	1.8	1.3	1.2	5.4	1.5	0.9	8.9	
1.9	2	12:11	87.8	84.7	5512	35.6	24.9	19.5	12.9	7.6	3.1	1.8	1.3	1.2	5.4	1.5	0.9	8.9	
1.9	3	12:11	87.8	84.7	8289	53.6	39.0	31.0	20.9	12.6	4.9	2.8	2.2	2.1	5.1	1.5	0.9	8.9	
1.9	4	12:11	87.8	84.7	8300	54.4	39.4	31.4	21.1	12.7	4.9	2.8	2.2	2.1	5.1	1.5	1.0	8.8	
1.9																			41.032974,-84.514933"
1.9																			RD131,IC,RD48,NB"
1.9																			41.033467,-84.515075"

American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

AET Project No. P-0001619
County: Latty
Test Date: Apr 27, 2021
Section: 10
Roadway: T-131
From: T-48
To: T-54

Prev. Day's Avg. Air Temp.: 54 °F
Total AC: 2.3 in.
Daily ESALs: 3.9
PASER: 76
Haul ESALs: 0
Soil Type: P
Draught Adjustment Factor: 1.00
Seasonal Correction Factor: 1.14

Design Period: 10 Years
Projection Factor: 1.1
Growth Factor: 10.46
10-year Design ESALs: 14,847
Design Period: 20 Years
Projection Factor: 1.2
Growth Factor: 22.02
20-year Design ESALs: 31,245

															Effective Values		Overlay	Spring	
															Mr	SN	Thickness	Capacity	
Station	Drop	Time	Air °F	Bit °F	Load	D1	D2	D3	D4	D4	D6	D7	D8	D9	ksi	inches	inches	tons/axle	Comments
1.9																			RD131,IC,RD48,NB"
1.9																			41.033467,-84.515075"
2.0	1	12:14	87.8	85.7	5534	34.4	24.2	19.5	13.3	8.5	4.0	2.3	1.6	1.4	4.2	1.5	1.3	9.2	
2.0	2	12:14	87.8	85.7	5501	33.7	23.8	19.2	13.1	8.4	4.0	2.3	1.6	1.5	4.2	1.5	1.2	9.4	
2.0	3	12:14	87.8	85.7	8410	50.1	37.1	30.5	21.2	13.9	6.3	3.6	2.6	2.3	4.0	1.6	1.1	9.6	
2.0	4	12:14	87.8	85.7	8410	50.3	37.2	30.7	21.3	13.9	6.3	3.6	2.6	2.3	4.1	1.6	1.2	9.6	
2.0																			41.034647,-84.514807"
2.1	1	12:16	87.8	85.0	5610	27.9	20.3	16.1	11.2	7.1	3.4	2.2	1.6	1.4	5.0	1.7	0.6	11.3	
2.1	2	12:16	87.8	85.0	5610	27.5	20.0	15.9	11.1	7.1	3.4	2.2	1.6	1.4	5.0	1.7	0.5	11.4	
2.1	3	12:16	87.8	85.0	8486	41.9	31.5	25.4	18.0	11.6	5.4	3.5	2.6	2.1	4.8	1.7	0.6	11.3	
2.1	4	12:16	87.8	85.0	8464	41.7	31.9	25.8	18.2	11.7	5.4	3.5	2.6	2.2	4.7	1.7	0.6	11.4	
2.1																			41.036168,-84.515083"
2.2	1	12:17	87.8	85.8	5588	27.7	19.3	14.5	9.6	6.0	2.7	1.6	1.1	0.9	6.3	1.5	0.5	11.3	
2.2	2	12:17	87.8	85.8	5599	27.7	19.0	14.4	9.6	6.0	2.7	1.6	1.1	0.9	6.3	1.5	0.5	11.3	
2.2	3	12:17	87.8	85.8	8421	41.1	29.7	22.9	15.6	9.9	4.3	2.5	1.8	1.5	6.0	1.6	0.5	11.5	
2.2	4	12:17	87.8	85.8	8410	41.5	29.8	23.1	15.7	9.9	4.3	2.5	1.8	1.5	6.0	1.6	0.5	11.3	
2.2																			41.037578,-84.515077"
2.3	1	12:19	87.8	85.2	5490	35.7	24.4	18.3	11.4	6.3	2.7	1.7	1.3	1.1	6.2	1.3	1.1	8.8	
2.3	2	12:19	87.8	85.2	5523	35.6	24.3	18.1	11.3	6.2	2.7	1.7	1.3	1.1	6.2	1.3	1.1	8.9	
2.3	3	12:19	87.8	85.2	8311	52.6	38.0	29.2	18.8	10.6	4.3	2.7	2.1	1.7	5.9	1.3	1.1	9.0	
2.3	4	12:19	87.8	85.2	8322	52.7	38.5	29.8	19.1	10.7	4.3	2.7	2.1	1.7	5.9	1.3	1.1	9.0	
2.3																			41.039148,-84.515032"
2.4	1	12:21	87.8	85.4	5523	39.4	26.9	19.8	11.4	6.2	2.2	1.3	1.0	1.1	7.6	1.1	1.1	8.1	
2.4	2	12:21	87.8	85.4	5512	39.1	26.5	19.6	11.4	6.2	2.2	1.3	1.0	1.1	7.5	1.1	1.1	8.1	
2.4	3	12:21	87.8	85.4	8355	57.6	41.1	31.3	18.9	10.4	3.5	2.2	1.8	1.7	7.2	1.2	1.1	8.3	
2.4	4	12:21	87.8	85.4	8355	57.9	41.4	31.6	19.0	10.5	3.5	2.2	1.8	1.8	7.2	1.2	1.1	8.3	
2.4																			41.040639,-84.515052"
2.4																			END"

American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

AET Project No. P-0001619
County: Latty
Test Date: Apr 27, 2021
Section: 11
Roadway: T-137
From: T-18
To: C-24

Prev. Day's Avg. Air Temp.: 54 °F
Total AC: 1.0 in.
Daily ESALs: 3.9
PASER: 73
Haul ESALs: 0
Soil Type: P
Draught Adjustment Factor: 1.00
Seasonal Correction Factor: 1.14

Design Period: 10 Years
Projection Factor: 1.1
Growth Factor: 10.46
10-year Design ESALs: 14,847
Design Period: 20 Years
Projection Factor: 1.2
Growth Factor: 22.02
20-year Design ESALs: 31,245

															Effective Values		Overlay	Spring	
															Mr	SN	Thickness	Capacity	
Station	Drop	Time	Air °F	Bit °F	Load	D1	D2	D3	D4	D4	D6	D7	D8	D9	ksi	inches	inches	tons/axle	Comments
2.4																			RD137,IC,RD24,SB"
2.4																			41.004678,-84.495688"
2.5	1	11:02	78.8	79.7	5523	37.2	26.9	20.8	13.8	7.9	3.2	1.9	1.2	1.1	5.2	1.4	1.2	8.7	
2.5	2	11:02	78.8	79.7	5512	36.8	26.4	20.4	13.6	7.9	3.2	1.9	1.2	1.1	5.2	1.4	1.2	8.7	
2.5	3	11:02	78.8	79.7	8322	55.1	40.5	32.1	21.9	13.1	5.1	2.9	2.0	1.8	4.9	1.4	1.2	8.8	
2.5	4	11:02	78.8	79.7	8355	55.6	41.0	32.5	22.1	13.2	5.1	2.9	2.1	1.8	5.0	1.4	1.2	8.8	
2.5																			41.003879,-84.495685"
2.6	1	11:04	78.8	80.4	5512	40.0	29.2	22.6	14.4	8.1	2.9	1.8	1.5	1.3	5.7	1.3	1.3	8.1	
2.6	2	11:04	78.8	80.4	5512	39.6	28.7	22.3	14.2	8.1	3.0	1.9	1.5	1.3	5.6	1.3	1.3	8.1	
2.6	3	11:04	78.8	80.4	8311	59.1	43.6	34.6	22.7	13.2	4.6	2.9	2.4	2.1	5.4	1.3	1.3	8.2	
2.6	4	11:04	78.8	80.4	8300	59.7	44.1	35.1	22.9	13.3	4.6	2.9	2.5	2.1	5.4	1.3	1.3	8.1	
2.6																			41.002422,-84.495740"
2.7	1	11:05	78.8	80.1	5391	52.2	33.8	25.3	14.9	7.7	2.9	1.9	1.4	1.2	5.7	1.1	1.7	6.2	
2.7	2	11:05	78.8	80.1	5413	51.5	33.3	25.0	14.7	7.7	2.9	1.9	1.5	1.2	5.6	1.1	1.7	6.3	
2.7	3	11:05	78.8	80.1	8136	75.6	50.5	39.0	24.0	13.0	4.6	3.1	2.4	2.0	5.4	1.1	1.7	6.4	
2.7	4	11:05	78.8	80.1	8104	76.0	51.0	39.4	24.2	13.1	4.7	3.1	2.4	2.1	5.3	1.1	1.8	6.3	
2.7																			41.000919,-84.495746"
2.8	1	11:07	78.8	80.6	5391	50.4	34.8	25.7	15.1	7.9	2.8	1.9	1.5	1.3	5.8	1.1	1.7	6.3	
2.8	2	11:07	78.8	80.6	5391	49.8	34.2	25.2	14.9	7.9	2.9	1.9	1.5	1.3	5.7	1.1	1.7	6.4	
2.8	3	11:07	78.8	80.6	8125	72.2	51.6	39.4	24.3	13.2	4.4	2.9	2.5	2.1	5.6	1.1	1.6	6.7	
2.8	4	11:07	78.8	80.6	8147	73.9	52.2	40.1	24.6	13.4	4.4	3.0	2.5	2.1	5.6	1.1	1.7	6.5	
2.8																			41.999387,-84.495656"
2.9	1	11:09	78.8	80.2	5566	36.6	26.1	19.8	12.3	7.1	2.8	1.5	1.1	0.9	6.1	1.3	1.0	8.8	
2.9	2	11:09	78.8	80.2	5566	36.4	25.8	19.5	12.2	7.1	2.8	1.5	1.1	0.9	6.0	1.3	1.0	8.9	
2.9	3	11:09	78.8	80.2	8377	53.6	39.0	30.4	19.6	11.7	4.4	2.5	1.9	1.5	5.7	1.4	1.0	9.1	
2.9	4	11:09	78.8	80.2	8377	53.3	39.3	30.7	19.7	11.8	4.4	2.5	1.9	1.5	5.7	1.4	1.0	9.1	
2.9																			41.997738,-84.495668"
2.9																			END"

American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

AET Project No. P-0001619
County: Latty
Test Date: Apr 27, 2021
Section: 12
Roadway: T-137
From: C-24
To: SH-114

Prev. Day's Avg. Air Temp.: 54 °F
Total AC: 1.0 in.
Daily ESALs: 3.9
PASER: 75
Haul ESALs: 0
Soil Type: P
Draught Adjustment Factor: 1.00
Seasonal Correction Factor: 1.14

Design Period: 10 Years
Projection Factor: 1.1
Growth Factor: 10.46
10-year Design ESALs: 14,847
Design Period: 20 Years
Projection Factor: 1.2
Growth Factor: 22.02
20-year Design ESALs: 31,245

Station	Drop	Time	Air °F	Bit °F	Load	D1	D2	D3	D4	D4	D6	D7	D8	D9	Effective Values Mr ksi	Effective Values SN inches	Overlay Thickness inches	Spring Capacity tons/axle	Comments
1.5																			RD137,IC,STATERD114,SB"
1.5																			41.019268,-84.495854"
1.5	1	10:44	77.0	78.3	5457	46.7	32.4	24.5	14.7	7.6	2.8	1.8	1.4	1.1	5.9	1.3	1.1	6.9	
1.5	2	10:44	77.0	78.3	5523	46.2	32.3	24.4	14.7	7.7	2.8	1.8	1.4	1.1	6.0	1.3	1.1	7.1	
1.5	3	10:44	77.0	78.3	8257	68.5	48.9	37.9	23.7	12.9	4.4	2.8	2.2	1.8	5.7	1.3	1.1	7.1	
1.5	4	10:44	77.0	78.3	8224	69.9	49.7	38.6	24.1	13.0	4.4	2.8	2.2	1.8	5.7	1.3	1.2	7.0	
1.5																			41.018922,-84.495768"
1.6	1	10:46	77.0	78.0	5785	23.6	17.6	13.6	9.7	6.4	3.3	2.1	1.3	1.1	5.3	2.1	0.0	13.6	
1.6	2	10:46	77.0	78.0	5829	23.6	17.5	13.5	9.7	6.5	3.4	2.1	1.3	1.1	5.2	2.1	0.0	13.8	
1.6	3	10:46	77.0	78.0	8683	34.8	26.5	21.0	15.3	10.4	5.4	3.3	2.2	1.8	4.9	2.2	0.0	13.9	
1.6	4	10:46	77.0	78.0	8639	34.4	26.5	21.0	15.3	10.4	5.3	3.3	2.2	1.8	4.9	2.2	0.0	14.0	
1.6																			41.017379,-84.495776"
1.7	1	10:48	77.0	77.9	5687	31.0	22.4	17.8	11.6	7.1	3.4	2.0	1.6	1.1	5.1	1.8	0.4	10.5	
1.7	2	10:48	77.0	77.9	5676	30.6	22.2	17.6	11.4	7.1	3.4	2.1	1.6	1.1	5.1	1.8	0.3	10.7	
1.7	3	10:48	77.0	77.9	8519	44.8	34.1	27.7	18.3	11.6	5.4	3.1	2.6	1.7	4.8	1.8	0.3	10.9	
1.7	4	10:48	77.0	77.9	8486	45.4	34.6	28.1	18.5	11.7	5.4	3.1	2.6	1.7	4.8	1.8	0.4	10.7	
1.7																			41.016063,-84.495876"
1.8	1	10:49	77.0	77.7	5654	29.3	21.3	16.6	10.8	6.5	3.0	1.8	1.3	1.1	5.8	1.7	0.2	11.0	
1.8	2	10:49	77.0	77.7	5654	29.2	21.1	16.4	10.7	6.5	3.0	1.8	1.3	1.1	5.8	1.8	0.2	11.0	
1.8	3	10:49	77.0	77.7	8541	43.0	31.8	25.4	17.0	10.5	4.7	2.8	2.1	1.8	5.5	1.8	0.1	11.3	
1.8	4	10:49	77.0	77.7	8519	43.3	32.2	25.6	17.1	10.5	4.7	2.8	2.1	1.8	5.5	1.8	0.1	11.2	
1.8																			41.014424,-84.495774"
1.9	1	10:51	77.0	78.5	5730	24.8	17.1	12.6	7.8	4.6	2.2	1.4	1.0	0.8	7.8	1.8	0.0	12.8	
1.9	2	10:51	77.0	78.5	5741	24.5	17.0	12.4	7.8	4.6	2.2	1.4	1.0	0.8	7.8	1.8	0.0	13.0	
1.9	3	10:51	77.0	78.5	8650	37.2	26.6	20.2	12.9	7.7	3.5	2.3	1.7	1.3	7.4	1.8	0.0	12.9	
1.9	4	10:51	77.0	78.5	8607	37.3	26.7	20.2	12.9	7.7	3.5	2.3	1.7	1.4	7.4	1.8	0.0	12.9	
1.9																			41.012070,-84.495831"
2.0	1	10:53	77.0	78.6	5621	31.7	21.8	16.3	9.9	5.7	2.2	1.4	1.0	0.8	7.8	1.6	0.1	10.1	
2.0	2	10:53	77.0	78.6	5632	31.8	21.6	16.2	9.8	5.7	2.2	1.4	1.0	0.8	7.7	1.6	0.1	10.1	
2.0	3	10:53	77.0	78.6	8486	47.4	33.3	25.6	16.0	9.3	3.4	2.1	1.6	1.3	7.5	1.6	0.1	10.2	
2.0	4	10:53	77.0	78.6	8475	47.4	33.6	25.8	16.2	9.4	3.5	2.2	1.6	1.3	7.4	1.6	0.2	10.2	
2.0																			41.011142,-84.495793"
2.1	1	10:54	77.0	78.3	5698	22.8	16.0	12.2	8.5	5.6	2.5	1.4	0.9	0.8	7.0	2.0	0.0	13.8	
2.1	2	10:54	77.0	78.3	5730	22.6	15.8	12.1	8.5	5.6	2.5	1.4	0.9	0.8	6.9	2.0	0.0	14.0	
2.1	3	10:54	77.0	78.3	8629	34.0	24.0	18.9	13.4	8.9	4.0	2.2	1.5	1.2	6.6	2.0	0.0	14.0	
2.1	4	10:54	77.0	78.3	8650	33.9	24.1	19.1	13.6	8.9	4.0	2.2	1.5	1.3	6.6	2.0	0.0	14.1	
2.1																			41.009882,-84.495765"
2.2	1	10:56	77.0	78.5	5610	34.7	24.3	18.1	11.3	6.5	2.7	1.7	1.2	1.0	6.2	1.5	0.5	9.3	
2.2	2	10:56	77.0	78.5	5610	34.1	24.0	18.0	11.3	6.6	2.8	1.7	1.2	1.0	6.1	1.6	0.5	9.5	
2.2	3	10:56	77.0	78.5	8454	51.0	36.4	28.2	18.2	10.9	4.4	2.7	2.0	1.9	5.8	1.6	0.5	9.6	
2.2	4	10:56	77.0	78.5	8432	51.0	36.8	28.6	18.4	10.9	4.4	2.8	2.0	1.8	5.8	1.6	0.5	9.5	
2.2																			41.008378,-84.495710"
2.3	1	10:58	77.0	78.5	5566	32.6	23.5	17.3	11.1	6.6	3.2	1.9	1.2	0.9	5.3	1.7	0.5	9.9	
2.3	2	10:58	77.0	78.5	5588	32.5	23.3	17.1	11.0	6.6	3.3	1.9	1.2	0.9	5.2	1.7	0.5	9.9	
2.3	3	10:58	77.0	78.5	8443	48.3	35.3	26.8	17.8	10.8	5.1	3.0	2.1	1.6	5.0	1.7	0.5	10.1	
2.3	4	10:58	77.0	78.5	8432	48.4	35.6	27.1	17.9	10.8	5.1	3.0	2.1	1.6	5.0	1.7	0.5	10.1	
2.3																			41.006930,-84.495736"
2.4	1	10:59	78.8	78.8	5534	38.9	27.6	21.3	13.7	8.0	3.5	2.1	1.5	1.1	4.8	1.5	1.0	8.3	
2.4	2	10:59	78.8	78.8	5534	38.5	27.4	21.0	13.6	7.9	3.5	2.1	1.5	1.2	4.8	1.5	1.0	8.4	
2.4	3	10:59	78.8	78.8	8344	55.7	41.2	32.7	21.8	13.0	5.4	3.3	2.3	1.8	4.6	1.6	0.9	8.8	
2.4	4	10:59	78.8	78.8	8311	56.0	41.5	33.0	22.0	13.0	5.4	3.3	2.3	1.9	4.6	1.6	0.9	8.7	
2.4																			41.005386,-84.495776"
2.4																			RD137,IC,RD24,SB"
2.4																			41.004678,-84.495688"

American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

AET Project No. P-0001619
County: Latty
Test Date: Apr 27, 2021
Section: 13
Roadway: T-137
From: SH-114
To: T-48

Prev. Day's Avg. Air Temp.: 54 °F
Total AC: 1.1 in.
Daily ESALs: 3.9
PASER: 56
Haul ESALs: 0
Soil Type: P
Draught Adjustment Factor: 1.00
Seasonal Correction Factor: 1.14

Design Period: 10 Years
Projection Factor: 1.1
Growth Factor: 10.46
10-year Design ESALs: 14,847
Design Period: 20 Years
Projection Factor: 1.2
Growth Factor: 22.02
20-year Design ESALs: 31,245

Station	Drop	Time	Air °F	Bit °F	Load	D1	D2	D3	D4	D4	D6	D7	D8	D9	Effective Values Mr ksi	Effective Values SN inches	Overlay Thickness inches	Spring Capacity tons/axle	Comments
0.5																			RD137,IC,RD48,SB"
0.5																			41.033643,-84.495840"
0.6	1	10:27	77.0	76.9	5446	49.2	31.4	21.9	12.6	6.2	2.5	1.9	1.6	1.4	6.7	1.0	1.7	6.5	
0.6	2	10:27	77.0	76.9	5490	48.6	31.2	21.8	12.6	6.3	2.5	1.9	1.6	1.4	6.7	1.0	1.7	6.7	
0.6	3	10:27	77.0	76.9	8268	71.4	48.8	34.8	20.5	10.3	3.6	2.8	2.5	2.2	6.9	1.0	1.6	6.8	
0.6	4	10:27	77.0	76.9	8257	72.3	49.6	35.4	20.8	10.4	3.6	2.8	2.5	2.2	7.0	1.0	1.6	6.7	
0.6																			41.032596,-84.495807"
0.7	1	10:29	77.0	76.7	5271	61.5	40.6	28.6	15.7	7.8	2.9	2.2	1.8	1.6	5.6	0.9	2.2	5.2	
0.7	2	10:29	77.0	76.7	5271	62.1	40.3	28.4	15.6	7.8	2.9	2.2	1.8	1.5	5.5	0.9	2.2	5.1	
0.7	3	10:29	77.0	76.7	7929	88.9	62.2	45.3	25.8	13.0	4.3	3.3	2.8	2.4	5.6	0.9	2.2	5.4	
0.7	4	10:29	77.0	76.7	7961	89.8	63.4	46.3	26.4	13.3	4.3	3.4	2.9	2.5	5.5	0.9	2.2	5.3	
0.7																			41.031067,-84.495887"
0.8	1	10:31	77.0	77.4	5523	52.1	33.0	23.5	12.9	6.6	2.6	1.9	1.5	1.2	6.4	1.0	1.8	6.3	
0.8	2	10:31	77.0	77.4	5501	52.4	32.7	23.2	12.8	6.6	2.6	1.9	1.5	1.2	6.3	1.0	1.8	6.2	
0.8	3	10:31	77.0	77.4	8300	77.8	50.8	37.3	21.3	11.1	3.9	2.8	2.3	1.9	6.4	1.0	1.8	6.3	
0.8	4	10:31	77.0	77.4	8289	79.2	51.8	38.0	21.8	11.2	3.9	2.9	2.4	2.0	6.4	1.0	1.8	6.2	
0.8																			41.029611,-84.495844"
0.9	1	10:32	77.0	77.4	5566	39.0	26.5	19.5	11.8	6.7	2.8	1.8	1.4	1.2	6.0	1.2	1.4	8.3	
0.9	2	10:32	77.0	77.4	5555	38.8	26.3	19.3	11.7	6.7	2.8	1.8	1.4	1.2	5.9	1.2	1.4	8.3	
0.9	3	10:32	77.0	77.4	8432	59.6	41.1	31.0	19.3	11.1	4.5	3.0	2.4	2.1	5.7	1.2	1.5	8.3	
0.9	4	10:32	77.0	77.4	8399	59.9	41.5	31.4	19.4	11.2	4.4	2.9	2.4	2.0	5.7	1.2	1.5	8.2	
0.9																			41.027972,-84.495798"
1.0	1	10:34	77.0	77.5	5665	24.8	17.5	13.7	9.5	6.2	3.1	1.9	1.3	1.0	5.5	1.7	0.3	12.8	
1.0	2	10:34	77.0	77.5	5720	24.7	17.4	13.6	9.5	6.2	3.1	1.9	1.3	1.0	5.5	1.7	0.3	12.9	
1.0	3	10:34	77.0	77.5	8607	37.2	27.0	21.6	15.2	10.1	5.0	3.0	2.1	1.7	5.2	1.8	0.3	13.0	
1.0	4	10:34	77.0	77.5	8563	37.1	27.2	21.7	15.3	10.1	5.0	3.0	2.1	1.7	5.2	1.8	0.3	12.9	
1.0																			41.026637,-84.495793"
1.1	1	10:36	77.0	78.1	5337	70.7	46.6	34.7	19.0	8.0	1.9	1.9	1.7	1.5	8.5	0.8	1.8	4.5	
1.1	2	10:36	77.0	78.1	5337	69.6	46.0	34.3	18.8	8.1	2.0	1.9	1.7	1.6	8.3	0.8	1.8	4.6	
1.1	3	10:36	77.0	78.1	8005	95.3	69.2	53.0	30.3	13.4	2.9	2.9	2.8	2.5	8.5	0.8	1.7	5.0	
1.1	4	10:36	77.0	78.1	7994	100.1	70.1	53.6	30.6	13.3	2.8	2.9	2.8	2.5	8.6	0.8	1.7	4.8	
1.1																			41.024985,-84.495835"
1.2	1	10:37	77.0	78.4	5424	52.0	37.5	28.9	18.4	10.6	3.7	2.1	1.7	1.5	4.4	1.0	2.2	6.2	
1.2	2	10:37	77.0	78.4	5435	50.5	37.0	28.6	18.3	10.6	3.7	2.1	1.8	1.6	4.4	1.1	2.2	6.4	
1.2	3	10:37	77.0	78.4	8191	77.4	56.7	44.8	29.3	17.3	6.0	3.3	2.9	2.6	4.1	1.1	2.3	6.3	
1.2	4	10:37	77.0	78.4	8202	78.7	57.3	45.4	29.7	17.5	6.0	3.3	2.9	2.6	4.1	1.1	2.3	6.2	
1.2																			41.023354,-84.495817"
1.3	1	10:39	77.0	78.3	5501	51.5	37.7	27.8	16.9	9.5	3.7	2.2	1.7	1.5	4.5	1.1	2.2	6.4	
1.3	2	10:39	77.0	78.3	5468	49.9	36.9	27.2	16.6	9.4	3.7	2.2	1.7	1.5	4.5	1.1	2.1	6.5	
1.3	3	10:39	77.0	78.3	8257	76.1	56.8	43.6	27.6	15.8	5.7	3.4	2.8	2.4	4.4	1.1	2.2	6.5	
1.3	4	10:39	77.0	78.3	8289	77.6	57.9	44.6	28.2	16.1	5.8	3.4	2.8	2.4	4.4	1.1	2.2	6.4	
1.3																			41.021934,-84.495841"
1.4	1	10:41	77.0	78.5	5337	73.4	46.6	34.5	19.5	9.1	2.1	1.8	1.7	2.3	7.6	0.8	2.0	4.4	
1.4	2	10:41	77.0	78.5	5337	71.2	45.9	33.9	19.3	9.1	2.2	1.9	1.8	2.3	7.3	0.8	2.0	4.5	
1.4	3	10:41	77.0	78.5	8038	103.5	69.2	52.3	30.6	14.8	3.2	2.8	2.8	3.7	7.6	0.8	1.9	4.7	
1.4	4	10:41	77.0	78.5	8005	103.8	69.8	52.8	30.9	14.8	3.1	2.8	2.8	3.7	7.9	0.8	1.9	4.6	
1.4																			41.020541,-84.495811"
1.5																			RD137,IC,STATERD114,SB"
1.5																			41.019268,-84.495854"

American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

AET Project No. P-0001619
County: Latty
Test Date: Apr 27, 2021
Section: 14
Roadway: T-137
From: T-48
To: 0.5 MI N

Prev. Day's Avg. Air Temp.: 54 °F
Total AC: 1.1 in.
Daily ESALs: 3.9
PASER: 48
Haul ESALs: 0
Soil Type: P
Draught Adjustment Factor: 1.00
Seasonal Correction Factor: 1.14

Design Period: 10 Years
Projection Factor: 1.1
Growth Factor: 10.46
10-year Design ESALs: 14,847
Design Period: 20 Years
Projection Factor: 1.2
Growth Factor: 22.02
20-year Design ESALs: 31,245

															Effective Values		Overlay	Spring	
															Mr	SN	Thickness	Capacity	
Station	**Drop**	**Time**	**Air °F**	**Bit °F**	**Load**	**D1**	**D2**	**D3**	**D4**	**D4**	**D6**	**D7**	**D8**	**D9**	**ksi**	**inches**	**inches**	**tons/axle**	**Comments**
0.0																			Start"
0.0	1	10:11	77.0	76.7	5730	29.4	20.8	16.0	10.3	6.1	2.2	1.2	0.9	0.8	7.8	1.5	0.2	11.0	
0.0	2	10:11	77.0	76.7	5741	29.1	20.7	15.9	10.3	6.1	2.2	1.2	0.9	0.8	7.8	1.5	0.2	11.1	
0.0	3	10:11	77.0	76.7	8607	43.8	31.8	24.8	16.3	9.8	3.3	1.8	1.5	1.4	7.9	1.5	0.2	11.1	
0.0	4	10:11	77.0	76.7	8607	44.0	32.1	25.1	16.5	9.9	3.3	1.9	1.5	1.4	7.9	1.5	0.2	11.0	
0.0																			41.041290,-84.495878"
0.1	1	10:12	77.0	76.2	5588	40.5	26.9	19.0	10.1	5.1	1.6	0.9	0.5	0.6	10.5	1.2	0.6	7.9	
0.1	2	10:12	77.0	76.2	5566	39.5	26.5	21.4	10.0	5.1	1.6	0.9	0.5	0.6	10.5	1.2	0.5	8.1	
0.1	3	10:12	77.0	76.2	8432	59.2	40.9	30.4	16.9	8.8	2.7	1.4	1.0	1.1	9.5	1.2	0.6	8.2	
0.1	4	10:12	77.0	76.2	8410	59.3	41.3	30.8	17.3	8.9	2.8	1.3	1.0	1.1	9.2	1.2	0.6	8.2	
0.1																			41.040084,-84.495854"
0.2	1	10:14	77.0	76.0	5599	42.7	27.7	20.0	11.3	6.3	2.4	1.6	1.2	1.0	7.1	1.2	1.0	7.7	
0.2	2	10:14	77.0	76.0	5588	42.2	27.5	19.9	11.3	6.3	2.4	1.6	1.2	1.0	7.0	1.2	1.0	7.7	
0.2	3	10:14	77.0	76.0	8377	64.5	42.5	31.6	18.5	10.3	3.5	2.4	1.9	1.6	7.2	1.2	1.0	7.6	
0.2	4	10:14	77.0	76.0	8355	65.2	43	31.8	18.6	10.3	3.5	2.4	1.9	1.6	7.3	1.2	1.0	7.5	
0.2																			41.038561,-84.495852"
0.3	1	10:16	77.0	76.2	5402	65.3	41.5	28.6	15.0	6.7	2.2	2.2	2.0	2.0	7.3	1.0	1.6	5.0	
0.3	2	10:16	77.0	76.2	5424	64.5	41.3	28.4	14.9	6.6	2.2	2.3	1.9	1.9	7.4	1.0	1.5	5.0	
0.3	3	10:16	77.0	76.2	8115	93.2	63.2	44.9	24.6	11.1	3.0	3.4	3.0	3.0	8.1	1.0	1.4	5.2	
0.3	4	10:16	77.0	76.2	8125	94.0	64.6	45.9	25.0	11.3	3.0	3.4	3.0	3.0	8.2	1.0	1.4	5.1	
0.3																			41.037110,-84.495814"
0.4	1	10:19	77.0	76.6	5435	58.2	39.5	27.9	14.1	6.3	2.3	1.9	1.6	1.3	7.3	1.0	1.4	5.6	
0.4	2	10:19	77.0	76.6	5479	57.3	38.9	27.6	14.1	6.3	2.3	1.9	1.6	1.3	7.3	1.0	1.4	5.7	
0.4	3	10:19	77.0	76.6	8257	84.0	58.9	43.3	23.0	10.5	3.4	3.0	2.6	2.1	7.4	1.1	1.4	5.8	
0.4	4	10:19	77.0	76.6	8224	84.1	58.9	43.5	23.1	10.5	3.3	3.0	2.6	2.1	7.5	1.0	1.4	5.8	
0.4																			41.035564,-84.495881"
0.5	1	10:21	77.0	77.4	5566	45.3	30.7	21.6	12.7	7.2	3.0	2.0	1.5	1.5	5.6	1.3	1.4	7.2	
0.5	2	10:21	77.0	77.4	5599	44.8	30	21.5	12.6	7.2	3.0	2.0	1.5	1.5	5.6	1.3	1.3	7.4	
0.5	3	10:21	77.0	77.4	8421	66.1	46.8	34.2	20.8	11.8	4.7	3.0	2.4	2.2	5.5	1.3	1.3	7.5	
0.5	4	10:21	77.0	77.4	8432	65.8	47.2	34.6	20.9	11.8	4.7	3.1	2.4	2.1	5.5	1.3	1.3	7.5	
0.5																			41.034098,-84.495823"
0.5																			RD137,IC,RD48,SB"
0.5																			41.033643,-84.495840"

APPENDIX D

Pavement Condition Index Field Exploration and Testing

Grover Hill Wind Project

Paulding County, Ohio

AET Project No. P-0001619A

Appendix D
Pavement Condition Survey
Report No. P-0001619A

D.1 FIELD WORK

The pavement surface conditions at the site were evaluated nondestructively using Digital Video Log (DVL) and Pavement Condition Index (PCI). The description of the equipment precedes the photos of Structures in this appendix.

D.2 EQUIPMENT DESCRIPTION

D.2.1 MicroPAVER™ PMS System

MicroPAVER™ -- The Pavement Maintenance Management (PMS) System -- originally was developed in the late 1970s to help the Department of Defense (DOD) manage M&R for its vast inventory of pavements. It uses inspection data and a pavement condition index (PCI™) rating from zero (failed) to 100 (excellent) for consistently describing a pavement's condition and for predicting its M&R needs many years into the future. The PCI™ for airports became an ASTM standard in 1993 (D5340-10). The PCI™ for roads and parking lots became an ASTM standard in 1999 (D6433-09). Figure A1 provides a view of this equipment.

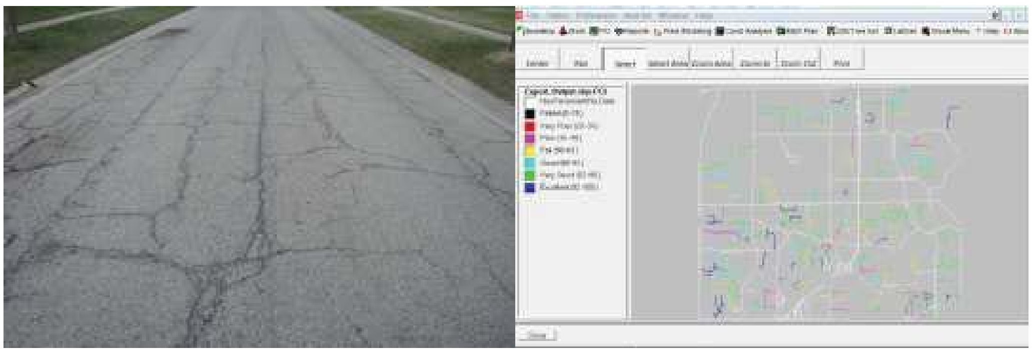


Figure D1 MicroPAVER™ PMS System

External indicators of pavement deterioration caused by loading, environmental factors, construction deficiencies, or a combination thereof. Typical distresses are cracks, rutting, and weathering of the pavement surface. Distress types and severity levels detailed in Inspection Manual must be used to obtain an accurate PCI value.

- A battery operated independent DC-1908E multi-functional digital camera with a SD card is used for easy positioning of the loading plate or of the pavement surface condition at the testing locations.
- Hand Odometer Wheel that reads to the nearest 0.1 ft. (30 mm).
- Straightedge or String Line, (AC only), 10 ft. (3 m).
  Scale, 12 in. (300 mm) that reads to 1⁄8 in. (3 mm) or better. Additional 12-in. (300 mm) ruler or straightedge is needed to measure faulting in PCC pavements.
- Layout Plan, for network to be inspected.

D.2.2 PCI Calibrations

Since the collection of the pavement distress data is such a critical component of any PMS implementation or update, AET has in place the PCI calibration as a quality control.

The PCI raters undergo internal calibrations every two months. This calibration exercise is conducted by our chief inspector and/or quality control engineer and is performed to ensure that the ratings of pavement distresses are consistent among the crews and in accordance with the ASTM D6344-07.

Survey wheel is calibrated by laying out a long distance (> 50 feet) with tape measure.

D.2.3 Linear Distance and Spatial Reference System

Distance measuring instrument (DMI) is a trailer mounted two phase encoder system. When DMI is connected to the HD Camera it provides for automatic display and recording distance information in both English and metric units with a 1 foot (0.3 meters) resolution and four percent accuracy when calibrated using provided procedure in the Field Program.

Spatial reference system is a Trimble ProXRT Global Positioning System (GPS) that consists of fully integrated receiver, antenna and battery unit with Trimble's new H-Star™ technology to provide sub foot (30 cm) post processed accuracy. The External Patch antenna is added to the ProXH receiver for the position of the loading plate. The External Patch antenna can be conveniently elevated with the optional baseball cap to prevent any signal blockage.

D.3 TRAFFIC CONTROL
Traffic control during the PCI data collection operation will be maintained in compliance with Manual on Uniform Traffic Control Devices (MUTCD) and part VI, "Field Manual for Temporary Traffic Control Zone Layouts," as shown in Appendix D. The PCI operation will be mobile in nature and will be moderately disruptive to traffic.

D.4 QUALITY CONTROL (QC) AND QUALITY ASSURANCE (QA)
Beside the daily metal plate calibration, the DMI is also calibrated monthly by driving the vehicle over a known distance to calculate the distance scale factor. The HD video camera will be monitored in real time in the data collection vehicle to minimize data errors. The HD video cameras will be identified with a unique number and that number will accompany all data reported from that unit as required in the QC/QA plan.

Scheduled preventive maintenance ensures proper equipment operation and helps identify potential problems that can be corrected to avoid poor quality or missing data that results if the equipment malfunctions while on site. The routine and major maintenance procedures established by AET are adopted and any maintenance has been done at the end of the day after the testing is complete and become part of the routine performed at the end of each test/travel day and on days when no other work is scheduled.

To insure quality data, the PCI assessments only took place in day light, and data was collected in one lane.

D.5 DATA ANALYSIS METHODS

D.5.1 Data Editing
Field acquisition is seldom so routine that no errors, omissions or data redundancy occur. Data editing encompasses issues such as video editing, video file merging, video log header or background information updates, repositioning and inclusion of elevation information with the video.

D.5.2 Sampling Methods
The sampling rate is set at 10 percent in on lane (OWP) = 500 ft. ± 50 ft. (23.6 m ± 2.4 m) for nominal 12 ft. (3.7 m) wide lanes at a survey speed of approximately 30 mph. Where a divided roadbed exists, surveys will be taken in both directions if the project will include improvements in both directions. If there is more than one lane in one direction the surveys will be taken in the outer driving lane (truck lane) versus the passing lane of the highway.

Basic data processing addresses some of the fundamental manipulations applied to data to make a more acceptable product for initial interpretation and data evaluation. In most instances this type of processing is already applied in real-time to generate the real-time display. The advantage of post survey processing is that the basic processing can be done more systematically and non-causal operators to remove or enhance certain features can be applied.

D.5.3 Advance Processing
Advanced data processing addresses the types of processing which require a certain amount of operator bias to be applied and which will result in data which are significantly different from the raw information which were input to the processing.

D.6 TEST LIMITATIONS

D.6.1 Test Methods
The data derived through the testing program have been used to develop our opinions about the pavement conditions at your site. However, because no testing program can reveal totally what is in the subsurface, conditions between test locations and at other times, may differ from conditions described in this report. The testing we conducted identified pavement conditions only at those areas where we observed pavement surface conditions. Depending on the sampling methods and sampling frequency, every location may not be rated, and some anomalies which are present in the pavement may not be noted on the testing results. If conditions encountered during construction differ from those indicated by our testing, it may be necessary to alter our conclusions and recommendations, or to modify construction procedures, and the cost of construction may be affected.

D.6.2 Test Standards
Pavement testing is done in general conformance with the described procedures. Compliance with any other standards referenced within the specified standard is neither inferred nor implied.

D.7 SUPPORTING TEST METHODS

D.7.1 Falling Weight Deflectometer (FWD)
If the pavement layer moduli and subgrade soil strength are desired the deflection data are collected using a Dynatest 8000 FWD Test System that consists of a Dynatest 8002 trailer and a third-generation control and data acquisition unit developed in 2003, called the Dynatest Compact15, featuring fifteen (15) deflection channels. The new generation FWD, including a Compact15 System and a standard PC with the FwdWin field Program constitutes the newest, most sophisticated Dynatest FWD Test System, which fulfills or exceeds all requirements to meet ASTM-4694 and ASTM D-4695 Standards. The system provides continuous data at pre-set spacing.

D.7.2 Ground Penetrating Radar
If the pavement layer thicknesses are desired the thickness data are collected using a GSSI air-coupled 2 GHz Test System that consists of a bumper-mounted, 2 GHz air-coupled antenna and a SIR-20 control and data acquisition processor, featuring dual channels. The GPR processor, including a SIR-20 data acquisition system, wheel-mounted DMI (Distance Measuring Instrument), and a tough book with the SIR-20 Field Program constitutes the newest, most sophisticated GSSI Test System, which fulfills or exceeds all requirements to meet ASTM-4748 and ASTM D-6087 Standards. The antenna used for Roadscan is the Horn Antenna Model 4105 (2 GHz). The 2 GHz antenna is the current antenna of choice for road survey because it combines excellent resolution with reasonable depth penetration (18-24 inches in pavement materials). The data collection is performed at normal driving speeds (45-55 mph), requiring no lane closures nor causing traffic congestion. At this peed the 2 GHz antenna can collect data at 1-foot interval (1 scan/foot).

D.7.2 Soil Boring/Coring Field Exploration
If both pavement thicknesses and subgrade soil types and conditions are desired the shallow coring/boring and sampling is used. The limited number of coring/boring is necessary to verify the GPR layer thickness data.

American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

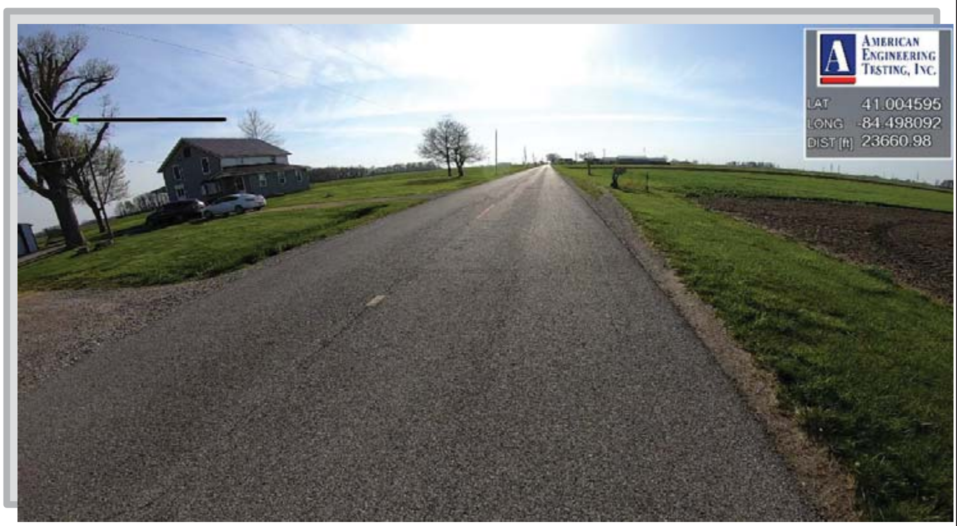
GENERAL INFORMATION: PAVEMENT CONDITION INDEX

Project:	Grover Hill Wind Project	**Date:**	4/30/21
AET Job No.:	P-0001619	**Test Date:**	4/26/21
Road:	C-24	**Section/Grid:**	S01
From:	T-137	**To:**	0.5 MI W

SUMMARY DISTRESSES

Total Samples	**9**
Sample #	**2**
Sample Size	**6000**
Sample Length	**600**

PCI	**68**



American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

GENERAL INFORMATION: PAVEMENT CONDITION INDEX

Project:	Grover Hill Wind Project	**Date:**	4/30/21
AET Job No.:	P-0001619	**Test Date:**	4/26/21
Road:	C-24	**Section/Grid:**	S01
From:	T-137	**To:**	0.5 MI W

SUMMARY DISTRESSES

Total Samples	**9**
Sample #	**2**
Sample Size	**6000**
Sample Length	**600**

PCI	**68**

Distresses			Distresses		
(1) Alligator	Low		**(11) Patch/Ut Cut**	Low	
	Med			Med	
	High			High	
(2) Bleeding	Low		**(12) Polished Aggregate**	N/A	
	Med				
	High				
(3) Block Cracking	Low		**(13) Pothole**	Low	
	Med			Med	
	High			High	
(4) Bumps/Sags	Low		**(14) RR Crossing**	Low	
	Med			Med	
	High			High	
(5) Corrugations	Low		**(15) Rutting**	Low	
	Med			Med	
	High			High	
(6) Depression	Low		**(16) Shoving**	Low	
	Med			Med	
	High			High	
(7) Edge Cracking	Low	1%	**(17) Slippages Cracking**	Low	
	Med			Med	
	High			High	
(8) Joint Reflection Cracking	Low		**(18) Swell**	Low	
	Med			Med	
	High			High	
(9) Lane Shoulder Drop	Low		**(19) Raveling**	Med	
	Med				
	High			High	
(10) L & T Cracking	Low	7%	**(20) Weathering**	Low	
	Med	3%		Med	100%
	High			High	

American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

GENERAL INFORMATION: PAVEMENT CONDITION INDEX

Project:	Grover Hill Wind Project	**Date:**	4/30/21
AET Job No.:	P-0001619	**Test Date:**	4/26/21
Road:	C-24	**Section/Grid:**	S02
From:	SH-637	**To:**	T-137

SUMMARY DISTRESSES

Total Samples	**18**
Sample #	**2**
Sample Size	**6000**
Sample Length	**600**

PCI	**53**

American Engineering Testing, Inc.

550 Cleveland Avenue North

St. Paul, Minnesota 55114

Phone: (651) 659-9001

Fax: (651) 659-1379

GENERAL INFORMATION: PAVEMENT CONDITION INDEX

Project:	Grover Hill Wind Project	**Date:**	4/30/21
AET Job No.:	P-0001619	**Test Date:**	4/26/21
Road:	C-24	**Section/Grid:**	S02
From:	SH-637	**To:**	T-137

SUMMARY DISTRESSES

Total Samples	**18**
Sample #	**2**
Sample Size	**6000**
Sample Length	**600**

PCI	**53**

Distresses	Severity	Value	Distresses	Severity	Value
(1) Alligator	Low		**(11) Patch/Ut Cut**	Low	
	Med	4%		Med	
	High			High	
(2) Bleeding	Low		**(12) Polished Aggregate**	N/A	
	Med				
	High				
(3) Block Cracking	Low		**(13) Pothole**	Low	
	Med			Med	
	High			High	
(4) Bumps/Sags	Low		**(14) RR Crossing**	Low	
	Med			Med	
	High			High	
(5) Corrugations	Low		**(15) Rutting**	Low	
	Med			Med	
	High			High	
(6) Depression	Low		**(16) Shoving**	Low	
	Med			Med	
	High			High	
(7) Edge Cracking	Low	4%	**(17) Slippages Cracking**	Low	
	Med	1%		Med	
	High			High	
(8) Joint Reflection Cracking	Low		**(18) Swell**	Low	
	Med			Med	
	High			High	
(9) Lane Shoulder Drop	Low		**(19) Raveling**	Med	
	Med				
	High			High	
(10) L & T Cracking	Low	9%	**(20) Weathering**	Low	
	Med	1%		Med	100%
	High			High	

American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

GENERAL INFORMATION: PAVEMENT CONDITION INDEX

Project:	Grover Hill Wind Project	**Date:**	4/30/21
AET Job No.:	P-0001619	**Test Date:**	4/26/21
Road:	C-24	**Section/Grid:**	S03
From:	0.5 MI E	**To:**	SH-637

SUMMARY DISTRESSES

Total Samples	**9**
Sample #	**2**
Sample Size	**6000**
Sample Length	**600**

PCI	**74**

American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

GENERAL INFORMATION: PAVEMENT CONDITION INDEX

Project:	Grover Hill Wind Project	**Date:**	4/30/21
AET Job No.:	P-0001619	**Test Date:**	4/26/21
Road:	C-24	**Section/Grid:**	S03
From:	0.5 MI E	**To:**	SH-637

SUMMARY DISTRESSES

Total Samples	**9**
Sample #	**2**
Sample Size	**6000**
Sample Length	**600**

PCI	**74**

Distresses	Severity	Value	Distresses	Severity	Value
(1) Alligator	Low		(11) Patch/Ut Cut	Low	
	Med			Med	
	High			High	
(2) Bleeding	Low		(12) Polished Aggregate	N/A	
	Med				
	High				
(3) Block Cracking	Low		(13) Pothole	Low	
	Med			Med	
	High			High	
(4) Bumps/Sags	Low		(14) RR Crossing	Low	
	Med			Med	
	High			High	
(5) Corrugations	Low		(15) Rutting	Low	
	Med			Med	
	High			High	
(6) Depression	Low		(16) Shoving	Low	
	Med			Med	
	High			High	
(7) Edge Cracking	Low	3%	(17) Slippages Cracking	Low	
	Med	3%		Med	
	High			High	
(8) Joint Reflection Cracking	Low		(18) Swell	Low	
	Med			Med	
	High			High	
(9) Lane Shoulder Drop	Low		(19) Raveling	Med	1%
	Med				
	High			High	
(10) L & T Cracking	Low		(20) Weathering	Low	
	Med			Med	100%
	High			High	

American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

GENERAL INFORMATION: PAVEMENT CONDITION INDEX

Project:	Grover Hill Wind Project	**Date:**	4/30/21
AET Job No.:	P-0001619	**Test Date:**	4/26/21
Road:	T-18	**Section/Grid:**	S04
From:	0.25 MI E	**To:**	T-131

SUMMARY DISTRESSES

Total Samples	**3**
Sample #	**1**
Sample Size	**6000**
Sample Length	**857**

PCI	**70**

American Engineering Testing, Inc.

550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

GENERAL INFORMATION: PAVEMENT CONDITION INDEX

Project:	Grover Hill Wind Project	**Date:**	4/30/21
AET Job No.:	P-0001619	**Test Date:**	4/26/21
Road:	T-18	**Section/Grid:**	S04
From:	0.25 MI E	**To:**	T-131

SUMMARY DISTRESSES

Total Samples	**3**
Sample #	**1**
Sample Size	**6000**
Sample Length	**857**

PCI	**70**

Distresses	Severity	Value	Distresses	Severity	Value
(1) Alligator	Low		**(11) Patch/Ut Cut**	Low	
	Med	1%		Med	
	High			High	
(2) Bleeding	Low		**(12) Polished Aggregate**	N/A	
	Med				
	High				
(3) Block Cracking	Low		**(13) Pothole**	Low	
	Med			Med	
	High			High	
(4) Bumps/Sags	Low		**(14) RR Crossing**	Low	
	Med			Med	
	High			High	
(5) Corrugations	Low		**(15) Rutting**	Low	
	Med			Med	
	High			High	
(6) Depression	Low		**(16) Shoving**	Low	
	Med			Med	
	High			High	
(7) Edge Cracking	Low	2%	**(17) Slippages Cracking**	Low	
	Med	2%		Med	
	High			High	
(8) Joint Reflection Cracking	Low		**(18) Swell**	Low	
	Med			Med	
	High			High	
(9) Lane Shoulder Drop	Low		**(19) Raveling**	Med	
	Med				
	High			High	
(10) L & T Cracking	Low		**(20) Weathering**	Low	
	Med			Med	100%
	High			High	

American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

GENERAL INFORMATION: PAVEMENT CONDITION INDEX

Project:	Grover Hill Wind Project	**Date:**	4/30/21
AET Job No.:	P-0001619	**Test Date:**	4/26/21
Road:	T-18	**Section/Grid:**	S05
From:	0.75 MI W	**To:**	T-137

SUMMARY DISTRESSES

Total Samples	8
Sample #	2
Sample Size	6000
Sample Length	500

URCI	23

American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

GENERAL INFORMATION: PAVEMENT CONDITION INDEX

Project:	Grover Hill Wind Project	**Date:**	4/30/21
AET Job No.:	P-0001619	**Test Date:**	4/26/21
Road:	T-18	**Section/Grid:**	S06
From:	0.5 MI W	**To:**	SH-637

SUMMARY DISTRESSES

Total Samples	6
Sample #	2
Sample Size	6000
Sample Length	500

URCI	**23**

American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

GENERAL INFORMATION: PAVEMENT CONDITION INDEX

Project:	Grover Hill Wind Project	**Date:**	4/30/21
AET Job No.:	P-0001619	**Test Date:**	4/26/21
Road:	T-48	**Section/Grid:**	S07
From:	SH-637	**To:**	T-137

SUMMARY DISTRESSES

Total Samples	**14**
Sample #	**2**
Sample Size	**6000**
Sample Length	**750**

PCI	**79**

American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

GENERAL INFORMATION: PAVEMENT CONDITION INDEX

Project:	Grover Hill Wind Project	**Date:**	4/30/21
AET Job No.:	P-0001619	**Test Date:**	4/26/21
Road:	T-48	**Section/Grid:**	S07
From:	SH-637	**To:**	T-137

SUMMARY DISTRESSES

Total Samples	**14**
Sample #	**2**
Sample Size	**6000**
Sample Length	**750**

PCI	**79**

Distresses	Severity		Distresses	Severity	
(1) Alligator	Low		**(11) Patch/Ut Cut**	Low	
	Med			Med	
	High			High	
(2) Bleeding	Low		**(12) Polished Aggregate**	N/A	
	Med				
	High				
(3) Block Cracking	Low		**(13) Pothole**	Low	
	Med			Med	
	High			High	
(4) Bumps/Sags	Low		**(14) RR Crossing**	Low	
	Med			Med	
	High			High	
(5) Corrugations	Low		**(15) Rutting**	Low	
	Med			Med	
	High			High	
(6) Depression	Low		**(16) Shoving**	Low	
	Med			Med	
	High			High	
(7) Edge Cracking	Low	1%	**(17) Slippages Cracking**	Low	
	Med	1%		Med	
	High			High	
(8) Joint Reflection Cracking	Low		**(18) Swell**	Low	
	Med			Med	
	High			High	
(9) Lane Shoulder Drop	Low		**(19) Raveling**	Med	
	Med				
	High			High	
(10) L & T Cracking	Low	1%	**(20) Weathering**	Low	
	Med			Med	100%
	High			High	

American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

GENERAL INFORMATION: PAVEMENT CONDITION INDEX

Project:	Grover Hill Wind Project	**Date:**	4/30/21
AET Job No.:	P-0001619	**Test Date:**	4/26/21
Road:	T-131	**Section/Grid:**	S08A
From:	T-18	**To:**	C-24

SUMMARY DISTRESSES

Total Samples	**7**
Sample #	**2**
Sample Size	**6000**
Sample Length	**750**

PCI	**68**

American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

GENERAL INFORMATION: PAVEMENT CONDITION INDEX

Project:	Grover Hill Wind Project	**Date:**	4/30/21
AET Job No.:	P-0001619	**Test Date:**	4/26/21
Road:	T-131	**Section/Grid:**	S08A
From:	T-18	**To:**	C-24

SUMMARY DISTRESSES

Total Samples	**7**
Sample #	**2**
Sample Size	**6000**
Sample Length	**750**

PCI	**68**

Distresses			**Distresses**		
(1) Alligator	Low		**(11) Patch/Ut Cut**	Low	
	Med			Med	
	High			High	
(2) Bleeding	Low	5%	**(12) Polished Aggregate**	N/A	
	Med				
	High				
(3) Block Cracking	Low		**(13) Pothole**	Low	
	Med			Med	
	High			High	
(4) Bumps/Sags	Low		**(14) RR Crossing**	Low	
	Med			Med	
	High			High	
(5) Corrugations	Low		**(15) Rutting**	Low	
	Med			Med	
	High			High	
(6) Depression	Low		**(16) Shoving**	Low	
	Med			Med	
	High			High	
(7) Edge Cracking	Low	5%	**(17) Slippages Cracking**	Low	
	Med	4%		Med	
	High			High	
(8) Joint Reflection Cracking	Low		**(18) Swell**	Low	
	Med			Med	
	High			High	
(9) Lane Shoulder Drop	Low		**(19) Raveling**	Med	
	Med				
	High			High	
(10) L & T Cracking	Low	3%	**(20) Weathering**	Low	
	Med	2%		Med	100%
	High			High	

American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

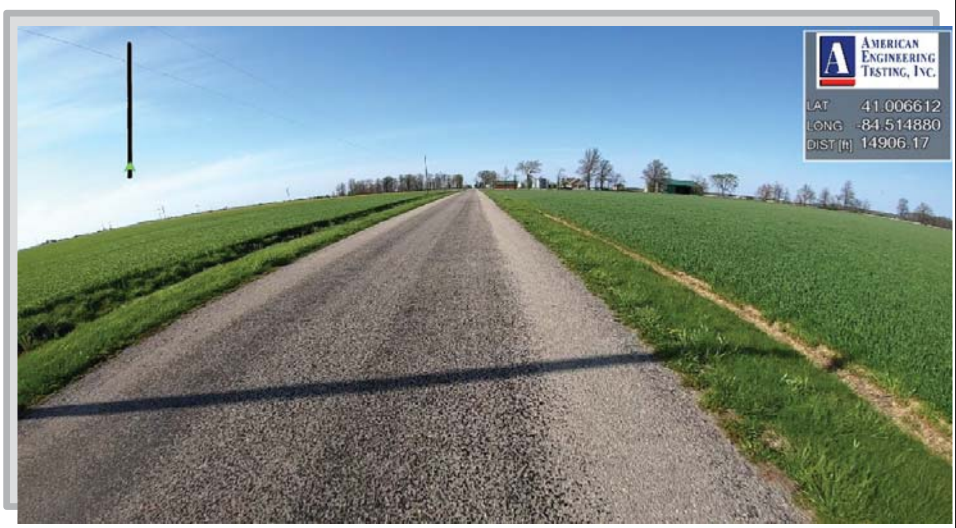
GENERAL INFORMATION: PAVEMENT CONDITION INDEX

Project:	Grover Hill Wind Project	**Date:**	4/30/21
AET Job No.:	P-0001619	**Test Date:**	4/26/21
Road:	T-131	**Section/Grid:**	S08B
From:	C-24	**To:**	SH-114

SUMMARY DISTRESSES

Total Samples	**14**
Sample #	**2**
Sample Size	**6000**
Sample Length	**750**

PCI	**76**



American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

GENERAL INFORMATION: PAVEMENT CONDITION INDEX

Project:	Grover Hill Wind Project	**Date:**	4/30/21
AET Job No.:	P-0001619	**Test Date:**	4/26/21
Road:	T-131	**Section/Grid:**	S08B
From:	C-24	**To:**	SH-114

SUMMARY DISTRESSES

Total Samples	**14**
Sample #	**2**
Sample Size	**6000**
Sample Length	**750**

PCI	**76**

Distresses			Distresses		
(1) Alligator	Low		**(11) Patch/Ut Cut**	Low	
	Med			Med	
	High			High	
(2) Bleeding	Low	60%	**(12) Polished Aggregate**	N/A	
	Med				
	High				
(3) Block Cracking	Low		**(13) Pothole**	Low	
	Med			Med	
	High			High	
(4) Bumps/Sags	Low		**(14) RR Crossing**	Low	
	Med			Med	
	High			High	
(5) Corrugations	Low		**(15) Rutting**	Low	
	Med			Med	
	High			High	
(6) Depression	Low		**(16) Shoving**	Low	
	Med			Med	
	High			High	
(7) Edge Cracking	Low		**(17) Slippages Cracking**	Low	
	Med			Med	
	High			High	
(8) Joint Reflection Cracking	Low		**(18) Swell**	Low	
	Med			Med	
	High			High	
(9) Lane Shoulder Drop	Low		**(19) Raveling**	Med	
	Med				
	High			High	
(10) L & T Cracking	Low		**(20) Weathering**	Low	
	Med			Med	100%
	High			High	

American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

GENERAL INFORMATION: PAVEMENT CONDITION INDEX

Project:	Grover Hill Wind Project	**Date:**	4/30/21
AET Job No.:	P-0001619	**Test Date:**	4/26/21
Road:	T-131	**Section/Grid:**	S09
From:	SH-114	**To:**	T-48

SUMMARY DISTRESSES

Total Samples	**16**
Sample #	**2**
Sample Size	**6000**
Sample Length	**667**

PCI	**78**

American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

GENERAL INFORMATION: PAVEMENT CONDITION INDEX

Project:	Grover Hill Wind Project	**Date:**	4/30/21
AET Job No.:	P-0001619	**Test Date:**	4/26/21
Road:	T-131	**Section/Grid:**	S09
From:	SH-114	**To:**	T-48

SUMMARY DISTRESSES

Total Samples	**16**
Sample #	**2**
Sample Size	**6000**
Sample Length	**667**

PCI	**78**

Distresses	Severity	Value	Distresses	Severity	Value
(1) Alligator	Low		**(11) Patch/Ut Cut**	Low	1%
	Med			Med	
	High			High	
(2) Bleeding	Low	10%	**(12) Polished Aggregate**	N/A	
	Med				
	High				
(3) Block Cracking	Low		**(13) Pothole**	Low	
	Med			Med	
	High			High	
(4) Bumps/Sags	Low		**(14) RR Crossing**	Low	
	Med			Med	
	High			High	
(5) Corrugations	Low		**(15) Rutting**	Low	
	Med			Med	
	High			High	
(6) Depression	Low		**(16) Shoving**	Low	
	Med			Med	
	High			High	
(7) Edge Cracking	Low		**(17) Slippages Cracking**	Low	
	Med			Med	
	High			High	
(8) Joint Reflection Cracking	Low		**(18) Swell**	Low	
	Med			Med	
	High			High	
(9) Lane Shoulder Drop	Low		**(19) Raveling**	Med	
	Med				
	High			High	
(10) L & T Cracking	Low	1%	**(20) Weathering**	Low	
	Med			Med	100%
	High			High	

American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

GENERAL INFORMATION: PAVEMENT CONDITION INDEX

Project:	Grover Hill Wind Project	**Date:**	4/30/21
AET Job No.:	P-0001619	**Test Date:**	4/26/21
Road:	T-131	**Section/Grid:**	S10
From:	T-48	**To:**	T-54

SUMMARY DISTRESSES

Total Samples	**8**
Sample #	**2**
Sample Size	**6000**
Sample Length	**667**

PCI	**76**

American Engineering Testing, Inc.

550 Cleveland Avenue North

St. Paul, Minnesota 55114

Phone: (651) 659-9001

Fax: (651) 659-1379

GENERAL INFORMATION: PAVEMENT CONDITION INDEX

Project:	Grover Hill Wind Project	**Date:**	4/30/21
AET Job No.:	P-0001619	**Test Date:**	4/26/21
Road:	T-131	**Section/Grid:**	S10
From:	T-48	**To:**	T-54

SUMMARY DISTRESSES

Total Samples	**8**
Sample #	**2**
Sample Size	**6000**
Sample Length	**667**

PCI	**76**

Distresses			**Distresses**		
(1) Alligator	Low		**(11) Patch/Ut Cut**	Low	
	Med			Med	
	High			High	
(2) Bleeding	Low	5%	**(12) Polished Aggregate**	N/A	
	Med				
	High				
(3) Block Cracking	Low		**(13) Pothole**	Low	
	Med			Med	
	High			High	
(4) Bumps/Sags	Low		**(14) RR Crossing**	Low	
	Med			Med	
	High			High	
(5) Corrugations	Low		**(15) Rutting**	Low	
	Med			Med	
	High			High	
(6) Depression	Low		**(16) Shoving**	Low	
	Med			Med	
	High			High	
(7) Edge Cracking	Low		**(17) Slippages Cracking**	Low	
	Med			Med	
	High			High	
(8) Joint Reflection Cracking	Low		**(18) Swell**	Low	
	Med			Med	
	High			High	
(9) Lane Shoulder Drop	Low		**(19) Raveling**	Med	3%
	Med				
	High			High	
(10) L & T Cracking	Low		**(20) Weathering**	Low	
	Med			Med	100%
	High			High	

American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

GENERAL INFORMATION: PAVEMENT CONDITION INDEX

Project:	Grover Hill Wind Project	**Date:**	4/30/21
AET Job No.:	P-0001619	**Test Date:**	4/26/21
Road:	T-137	**Section/Grid:**	S11
From:	T-18	**To:**	C-24

SUMMARY DISTRESSES

Total Samples	**7**
Sample #	**2**
Sample Size	**6000**
Sample Length	**750**

PCI	**73**

American Engineering Testing, Inc.

550 Cleveland Avenue North

St. Paul, Minnesota 55114

Phone: (651) 659-9001

Fax: (651) 659-1379

GENERAL INFORMATION: PAVEMENT CONDITION INDEX

Project:	Grover Hill Wind Project	**Date:**	4/30/21
AET Job No.:	P-0001619	**Test Date:**	4/26/21
Road:	T-137	**Section/Grid:**	S11
From:	T-18	**To:**	C-24

SUMMARY DISTRESSES

Total Samples	**7**
Sample #	**2**
Sample Size	**6000**
Sample Length	**750**

PCI	**73**

Distresses	Severity	Value	Distresses	Severity	Value
(1) Alligator	Low		**(11) Patch/Ut Cut**	Low	
	Med			Med	
	High			High	
(2) Bleeding	Low	50%	**(12) Polished Aggregate**	N/A	
	Med				
	High				
(3) Block Cracking	Low		**(13) Pothole**	Low	
	Med			Med	
	High			High	
(4) Bumps/Sags	Low		**(14) RR Crossing**	Low	
	Med			Med	
	High			High	
(5) Corrugations	Low		**(15) Rutting**	Low	
	Med			Med	
	High			High	
(6) Depression	Low		**(16) Shoving**	Low	
	Med			Med	
	High			High	
(7) Edge Cracking	Low	1%	**(17) Slippages Cracking**	Low	
	Med	1%		Med	
	High	1%		High	
(8) Joint Reflection Cracking	Low		**(18) Swell**	Low	
	Med			Med	
	High			High	
(9) Lane Shoulder Drop	Low		**(19) Raveling**	Med	
	Med				
	High			High	
(10) L & T Cracking	Low	1%	**(20) Weathering**	Low	
	Med			Med	100%
	High			High	

American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

GENERAL INFORMATION: PAVEMENT CONDITION INDEX

Project:	Grover Hill Wind Project	**Date:**	4/30/21
AET Job No.:	P-0001619	**Test Date:**	4/26/21
Road:	T-137	**Section/Grid:**	S12
From:	C-24	**To:**	SH-114

SUMMARY DISTRESSES

Total Samples	**14**
Sample #	**2**
Sample Size	**6000**
Sample Length	**750**

PCI	**75**

American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

GENERAL INFORMATION: PAVEMENT CONDITION INDEX

Project:	Grover Hill Wind Project	**Date:**	4/30/21
AET Job No.:	P-0001619	**Test Date:**	4/26/21
Road:	T-137	**Section/Grid:**	S12
From:	C-24	**To:**	SH-114

SUMMARY DISTRESSES

Total Samples	**14**
Sample #	**2**
Sample Size	**6000**
Sample Length	**750**

PCI	**75**

Distresses			**Distresses**		
(1) Alligator	Low		**(11) Patch/Ut Cut**	Low	
	Med			Med	
	High			High	
(2) Bleeding	Low		**(12) Polished Aggregate**	N/A	
	Med				
	High				
(3) Block Cracking	Low		**(13) Pothole**	Low	
	Med			Med	
	High			High	
(4) Bumps/Sags	Low		**(14) RR Crossing**	Low	
	Med			Med	
	High			High	
(5) Corrugations	Low		**(15) Rutting**	Low	
	Med			Med	
	High			High	
(6) Depression	Low		**(16) Shoving**	Low	
	Med			Med	
	High			High	
(7) Edge Cracking	Low	3%	**(17) Slippages Cracking**	Low	
	Med	2%		Med	
	High	1%		High	
(8) Joint Reflection Cracking	Low		**(18) Swell**	Low	
	Med			Med	
	High			High	
(9) Lane Shoulder Drop	Low		**(19) Raveling**	Med	
	Med				
	High			High	
(10) L & T Cracking	Low		**(20) Weathering**	Low	
	Med			Med	100%
	High			High	

American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

GENERAL INFORMATION: PAVEMENT CONDITION INDEX

Project:	Grover Hill Wind Project	**Date:**	4/30/21
AET Job No.:	P-0001619	**Test Date:**	4/26/21
Road:	T-137	**Section/Grid:**	S13
From:	SH-114	**To:**	T-48

SUMMARY DISTRESSES

Total Samples	**14**
Sample #	**2**
Sample Size	**6000**
Sample Length	**750**

PCI	**56**

American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

GENERAL INFORMATION: PAVEMENT CONDITION INDEX

Project:	Grover Hill Wind Project	**Date:**	4/30/21
AET Job No.:	P-0001619	**Test Date:**	4/26/21
Road:	T-137	**Section/Grid:**	S13
From:	SH-114	**To:**	T-48

SUMMARY DISTRESSES

Total Samples	**14**
Sample #	**2**
Sample Size	**6000**
Sample Length	**750**

PCI	**56**

Distresses	Severity		Distresses	Severity	
(1) Alligator	Low		**(11) Patch/Ut Cut**	Low	
	Med			Med	
	High			High	
(2) Bleeding	Low		**(12) Polished Aggregate**	N/A	
	Med	55%			
	High				
(3) Block Cracking	Low		**(13) Pothole**	Low	
	Med			Med	
	High			High	
(4) Bumps/Sags	Low		**(14) RR Crossing**	Low	
	Med			Med	
	High			High	
(5) Corrugations	Low		**(15) Rutting**	Low	
	Med			Med	
	High			High	
(6) Depression	Low		**(16) Shoving**	Low	
	Med			Med	
	High			High	
(7) Edge Cracking	Low	1%	**(17) Slippages Cracking**	Low	
	Med			Med	
	High	1%		High	
(8) Joint Reflection Cracking	Low		**(18) Swell**	Low	
	Med			Med	
	High			High	
(9) Lane Shoulder Drop	Low		**(19) Raveling**	Med	5%
	Med				
	High			High	
(10) L & T Cracking	Low	1%	**(20) Weathering**	Low	
	Med			Med	100%
	High			High	

American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

GENERAL INFORMATION: PAVEMENT CONDITION INDEX

Project:	Grover Hill Wind Project	**Date:**	4/30/21
AET Job No.:	P-0001619	**Test Date:**	4/26/21
Road:	T-137	**Section/Grid:**	S14
From:	T-48	**To:**	0.5 MI N

SUMMARY DISTRESSES

Total Samples	**7**
Sample #	**2**
Sample Size	**6000**
Sample Length	**750**

PCI	**48**

American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
Phone: (651) 659-9001
Fax: (651) 659-1379

GENERAL INFORMATION: PAVEMENT CONDITION INDEX

Project:	Grover Hill Wind Project	**Date:**	4/30/21
AET Job No.:	P-0001619	**Test Date:**	4/26/21
Road:	T-137	**Section/Grid:**	S14
From:	T-48	**To:**	0.5 MI N

SUMMARY DISTRESSES

Total Samples	**7**
Sample #	**2**
Sample Size	**6000**
Sample Length	**750**

PCI	**48**

Distresses			**Distresses**		
(1) Alligator	Low		**(11) Patch/Ut Cut**	Low	
	Med			Med	
	High			High	
(2) Bleeding	Low	20%	**(12) Polished Aggregate**	N/A	
	Med				
	High				
(3) Block Cracking	Low		**(13) Pothole**	Low	
	Med			Med	
	High			High	
(4) Bumps/Sags	Low		**(14) RR Crossing**	Low	
	Med			Med	
	High			High	
(5) Corrugations	Low		**(15) Rutting**	Low	
	Med			Med	
	High			High	
(6) Depression	Low		**(16) Shoving**	Low	
	Med			Med	
	High			High	
(7) Edge Cracking	Low	2%	**(17) Slippages Cracking**	Low	
	Med	5%		Med	
	High			High	
(8) Joint Reflection Cracking	Low		**(18) Swell**	Low	
	Med			Med	
	High			High	
(9) Lane Shoulder Drop	Low		**(19) Raveling**	Med	
	Med				
	High			High	
(10) L & T Cracking	Low	2%	**(20) Weathering**	Low	
	Med	5%		Med	100%
	High	2%		High	

AMERICAN ENGINEERING TESTING, INC.

APPENDIX E

Geotechnical Report Limitations and Guidelines for Use

Grover Hill Wind Project

Paulding County, Ohio

AET Report No. P-0001619A

Appendix E
Geotechnical Report Limitations and Guidelines for Use
Report No. P-0001619A

E.1 REFERENCE

This appendix provides information to help you manage your risks relating to subsurface problems which are caused by construction delays, cost overruns, claims, and disputes. This information was developed and provided by GBA[1], of which, we are a member firm.

E.2 RISK MANAGEMENT INFORMATION

E.2.1 Geotechnical Services are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared solely for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. And no one, not even you, should apply the report for any purpose or project except the one originally contemplated.

E.2.2 Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

E.2.3 A Geotechnical Engineering Report is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a few unique, project-specific factors when establishing the scope of a study. Typically, factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a rule, always inform your geotechnical engineer of project changes, even minor ones, and request an assessment of their impact. Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.

E.2.4 Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. Do not rely on a geotechnical engineering report whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. Always contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

1 Geoprofessional Business Association, 15800 Crabbs Branch Way, Suite 300, Rockville, MD 20855
Telephone: 301/565-2733: www.geoprofessional.org

E.2.5 Most Geotechnical Findings Are Professional Opinions
Site exploration identified subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ, sometimes significantly, from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

E.2.6 A Geotechnical Engineering Report Is Subject to Misinterpretation
Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

E.2.7 Do Not Redraw the Engineer's Logs
Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should never be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, but recognizes that separating logs from the report can elevate risk.

E.2.8 Give Contractors a Complete Report and Guidance
Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, but preface it with a clearly written letter of transmittal. In the letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. Be sure contractors having sufficient time to perform additional study. Only then might you be able to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

E.2.9 Read Responsibility Provisions Closely
Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their report. Sometimes labeled "limitations" many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. Read these provisions closely. Ask questions. Your geotechnical engineer should respond fully and frankly.

E.2.10 Geoenvironmental Concerns Are Not Covered
The equipment, techniques, and personnel used to perform a geoenvironmental study differ significantly from those used to perform a geotechnical study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Unanticipated environmental problems have led to numerous project failures. If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. Do not rely on an environmental report prepared for someone else.

Attachment 4

Supplement to Exhibit Y
Airport Coordination
Federal Aviation Administration
Preliminary Finding and Notification
June 2, 2021

DICKINSON WRIGHT PLLC

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2021-WTE-132-OE

Issued Date: 06/02/2021

Matthias Weigel
Starwood Energy Group, LLC.
5 Greenwich Office Park
2nd Floor
Greenwich, CT 06831

**** NOTICE OF PRELIMINARY FINDINGS ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine 20210129-11
Location:	Grover Hill, OH
Latitude:	41-02-39.16N NAD 83
Longitude:	84-30-35.30W
Heights:	725 feet site elevation (SE) 656 feet above ground level (AGL) 1381 feet above mean sea level (AMSL)

Initial findings of this study indicate that the structure as described exceeds obstruction standards and/or would have an adverse physical or electromagnetic interference effect upon navigable airspace or air navigation facilities. Pending resolution of the issues described below, the structure is presumed to be a hazard to air navigation.

To pursue a favorable determination at the originally submitted height, further study would be necessary. Further study entails distribution to the public for comment, and may extend the study period up to 120 days. The outcome cannot be predicted prior to public circularization.

If you would like the FAA to conduct further study, you must make the request within 60 days from the date of issuance of this letter.

See Attachment for Additional information.

NOTE: PENDING RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE, THE STRUCTURE IS PRESUMED TO BE A HAZARD TO AIR NAVIGATION. THIS LETTER DOES NOT AUTHORIZE CONSTRUCTION OF THE STRUCTURE EVEN AT A REDUCED HEIGHT. ANY RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE MUST BE COMMUNICATED TO THE FAA SO THAT A FAVORABLE DETERMINATION CAN SUBSEQUENTLY BE ISSUED.

IF MORE THAN 60 DAYS FROM THE DATE OF THIS LETTER HAS ELAPSED WITHOUT ATTEMPTED RESOLUTION, IT WILL BE NECESSARY FOR YOU TO REACTIVATE THE STUDY BY FILING A NEW FAA FORM 7460-1, NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION.

If we can be of further assistance, please contact Bill Ratts, at (816) 329-2544, or William.M.Ratts@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-WTE-132-OE.

Signature Control No: 466829371-483476927 (NPF -WT)
Steve Phillips
Manager, Obstruction Evaluation Group

Attachment(s)
Additional Information

Additional information for ASN 2021-WTE-132-OE

Abbreviations
AGL - above ground level
AMSL - above mean sea level
RWY - runway
VFR - visual flight rules
IFR - instrument flight rules
NM - nautical mile
ASN- Aeronautical Study Number
CAT - category aircraft
RNAV- area navigation
MDA - minimum descent altitude
Part 77 - Title 14 Code of Federal Regulations (CFR) Part 77, Safe, Efficient Use and Preservation of the Navigable Airspace

The proposed Grover Hill wind turbine project near Grover Hill, OH consists of 27 wind turbines and has been reviewed by the FAA under ASNs 2021-WTE-132-OE sequentially through 2021-WTE-158-OE.

The proposed wind turbine project lies approximately between 2.2 NM north northwest to 2.1 NM southwest from the town of Grover Hill, OH.

For the sake of efficiency, the 27 proposed wind turbines in this project that have similar impacts to 14 CFR Part 77 standards are included in this narrative.

1. LOCATION OF PROPOSED CONSTRUCTION

The Aeronautical Study Number (ASNs), Structure Names, Above Ground Level (AGL) heights, Above Mean Sea Level (AMSL) heights and coordinates for each proposed structure are listed as follows:

ASN Structure Name AGL/AMSL LAT/LONG

2021-WTE-132-OE / 20210129-11 / 656 / 1381 / 41-02-39.16N / 84-30-35.30W
2021-WTE-133-OE / 20210129-12 / 656 / 1380 / 41-02-34.48N / 84-30-15.14W
2021-WTE-134-OE / 20210129-13 / 656 / 1376 / 41-02-24.96N / 84-30-07.54W
2021-WTE-135-OE / 20210129-14 / 656 / 1377 / 41-02-12.42N / 84-30-01.05W
2021-WTE-136-OE / 20210129-15 / 656 / 1380 / 41-02-12.09N / 84-29-25.08W
2021-WTE-137-OE / 20210129-16 / 656 / 1379 / 41-02-09.99N / 84-28-57.10W
2021-WTE-138-OE / 20210129-17 / 656 / 1383 / 41-01-47.59N / 84-30-28.07W
2021-WTE-139-OE / 20210129-22 / 656 / 1381 / 41-01-47.39N / 84-29-10.01W
2021-WTE-140-OE / 20210129-25 / 656 / 1381 / 41-01-35.08N / 84-29-00.37W
2021-WTE-141-OE / 20210129-26 / 656 / 1381 / 41-01-50.39N / 84-28-56.14W

2021-WTE-142-OE / 20210129-27 / 656 / 1386 / 41-00-53.14N / 84-30-34.67W
2021-WTE-143-OE / 20210129-28 / 656 / 1384 / 41-00-53.49N / 84-30-06.23W
2021-WTE-144-OE / 20210129-29 / 656 / 1386 / 41-00-35.59N / 84-30-30.57W
2021-WTE-145-OE / 20210129-30 / 656 / 1384 / 41-00-34.70N / 84-30-06.47W
2021-WTE-146-OE / 20210129-31 / 656 / 1386 / 41-00-35.52N / 84-29-22.91W
2021-WTE-147-OE / 20210129-32 / 656 / 1383 / 41-00-37.96N / 84-28-54.19W

2021-WTE-148-OE / 20210129-33 / 656 / 1382 / 41-00-54.25N / 84-28-07.10W
2021-WTE-149-OE / 20210129-34 / 656 / 1381 / 41-00-44.49N / 84-28-08.43W
2021-WTE-150-OE / 20210129-35 / 656 / 1383 / 41-00-32.56N / 84-28-12.16W
2021-WTE-151-OE / 20210129-36 / 656 / 1382 / 41-00-30.53N / 84-27-51.17W

2021-WTE-152-OE / 20210129-37 / 656 / 1389 / 40-59-38.09N / 84-30-28.20W
2021-WTE-153-OE / 20210129-38 / 656 / 1384 / 40-59-57.53N / 84-29-11.57W
2021-WTE-154-OE / 20210129-39 / 656 / 1384 / 41-02-39.83N / 84-30-05.48W
2021-WTE-155-OE / 20210129-40 / 656 / 1382 / 41-02-28.32N / 84-30-35.47W
2021-WTE-156-OE / 20210129-41 / 656 / 1380 / 41-01-48.86N / 84-29-26.86W
2021-WTE-157-OE / 20210129-42 / 656 / 1384 / 41-00-44.10N / 84-30-05.63W
2021-WTE-158-OE / 20210129-43 / 656 / 1387 / 40-59-57.76N / 84-28-53.84W

2. OBSTRUCTION STANDARDS EXCEEDED

The following proposed turbines would exceed Part 77 standards as described below.

a. Section 77.17(a)(1): Section 77.17(a)(1): Exceeds a height of 499 feet AGL at the site of the object. All proposed structures would exceed this surface by 157 feet.

b. Section 77.17(a)(4) -- A height within an en route obstacle clearance area, including turn and termination areas, of a Federal Airway or approved off-airway route, that would increase the IFR en route minimum obstacle clearance altitude

The following proposed structures would have the following effect: HUUVR ONE ARRIVAL (RNAV) Increase Minimum Obstruction Clearance Altitude (MOCA) from MSKTS to JJUST from 2300 feet to 2400 feet AMSL. (Procedure serves KAKR KCAK 1G3). The height at which there is no effect is at or below 1300 feet AMSL

2021-WTE-140-OE
2021-WTE-142-OE
2021-WTE-143-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

3. VFR ROUTE

VFR en route is evaluated in accordance with Part 77 Section 77.29 (a)(1): the impact on arrival, departure, and en route procedures for aircraft operating under visual flight rules.

At 656 feet AGL, the following structures would extend into airspace normally utilized for VFR en route flight by 157 feet. The structures would be located within 2 statute miles of a VFR Route as defined by JO 7400.2M, Section 6-3-8 and would have an adverse effect upon VFR air navigation.

2021-WTE-142-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

4. RADAR IMPACTS

The FAA found that all 27 proposed wind turbines would have a Radar Line of Sight (RLOS) impact to the Airport Surveillance Radar (ASR) -9 at Fort Wayne, IN (FWA). Since they are visible to the ASR, they could cause unwanted primary-only returns (clutter) and primary-only target drops, all in the immediate area of the turbines. Also, tracked primary-only targets could diverge from the aircraft path and follow wind turbines, when the aircraft is over or near the turbines.
No effect will occur on the Secondary (Beacon) Radar System.

5. SPONSOR ACTIONS

To pursue the possibility of receiving a favorable determination at the originally requested height, further study would be necessary. Further study entails coordination with the affected air traffic control facilities in order to evaluate effects fully and potential mitigations for possible approval of your project. Further study will also involve a public notice circularization and 37-day comment period. The outcome cannot be predicted.

If you have questions regarding this Notice of Presumed Findings, you may contact Bill Ratts via email at (William.M.Ratts@faa.gov)

FURTHER STUDY HAS ALREADY BEEN REQUESTED.

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2021-WTE-133-OE

Issued Date: 06/02/2021

Matthias Weigel
Starwood Energy Group, LLC.
5 Greenwich Office Park
2nd Floor
Greenwich, CT 06831

**** NOTICE OF PRELIMINARY FINDINGS ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine 20210129-12
Location:	Grover Hill, OH
Latitude:	41-02-34.48N NAD 83
Longitude:	84-30-15.14W
Heights:	724 feet site elevation (SE)
	656 feet above ground level (AGL)
	1380 feet above mean sea level (AMSL)

Initial findings of this study indicate that the structure as described exceeds obstruction standards and/or would have an adverse physical or electromagnetic interference effect upon navigable airspace or air navigation facilities. Pending resolution of the issues described below, the structure is presumed to be a hazard to air navigation.

To pursue a favorable determination at the originally submitted height, further study would be necessary. Further study entails distribution to the public for comment, and may extend the study period up to 120 days. The outcome cannot be predicted prior to public circularization.

If you would like the FAA to conduct further study, you must make the request within 60 days from the date of issuance of this letter.

See Attachment for Additional information.

NOTE: PENDING RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE, THE STRUCTURE IS PRESUMED TO BE A HAZARD TO AIR NAVIGATION. THIS LETTER DOES NOT AUTHORIZE CONSTRUCTION OF THE STRUCTURE EVEN AT A REDUCED HEIGHT. ANY RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE MUST BE COMMUNICATED TO THE FAA SO THAT A FAVORABLE DETERMINATION CAN SUBSEQUENTLY BE ISSUED.

IF MORE THAN 60 DAYS FROM THE DATE OF THIS LETTER HAS ELAPSED WITHOUT ATTEMPTED RESOLUTION, IT WILL BE NECESSARY FOR YOU TO REACTIVATE THE STUDY BY FILING A NEW FAA FORM 7460-1, NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION.

If we can be of further assistance, please contact Bill Ratts, at (816) 329-2544, or William.M.Ratts@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-WTE-133-OE.

Signature Control No: 466829372-483476935 (NPF -WT)
Steve Phillips
Manager, Obstruction Evaluation Group

Attachment(s)
Additional Information

Additional information for ASN 2021-WTE-133-OE

Abbreviations
AGL - above ground level
AMSL - above mean sea level
RWY - runway
VFR - visual flight rules
IFR - instrument flight rules
NM - nautical mile
ASN- Aeronautical Study Number
CAT - category aircraft
RNAV- area navigation
MDA - minimum descent altitude
Part 77 - Title 14 Code of Federal Regulations (CFR) Part 77, Safe, Efficient Use and Preservation of the Navigable Airspace

The proposed Grover Hill wind turbine project near Grover Hill, OH consists of 27 wind turbines and has been reviewed by the FAA under ASNs 2021-WTE-132-OE sequentially through 2021-WTE-158-OE.

The proposed wind turbine project lies approximately between 2.2 NM north northwest to 2.1 NM southwest from the town of Grover Hill, OH.

For the sake of efficiency, the 27 proposed wind turbines in this project that have similar impacts to 14 CFR Part 77 standards are included in this narrative.

1. LOCATION OF PROPOSED CONSTRUCTION

The Aeronautical Study Number (ASNs), Structure Names, Above Ground Level (AGL) heights, Above Mean Sea Level (AMSL) heights and coordinates for each proposed structure are listed as follows:

ASN Structure Name AGL/AMSL LAT/LONG

2021-WTE-132-OE / 20210129-11 / 656 / 1381 / 41-02-39.16N / 84-30-35.30W
2021-WTE-133-OE / 20210129-12 / 656 / 1380 / 41-02-34.48N / 84-30-15.14W
2021-WTE-134-OE / 20210129-13 / 656 / 1376 / 41-02-24.96N / 84-30-07.54W
2021-WTE-135-OE / 20210129-14 / 656 / 1377 / 41-02-12.42N / 84-30-01.05W
2021-WTE-136-OE / 20210129-15 / 656 / 1380 / 41-02-12.09N / 84-29-25.08W
2021-WTE-137-OE / 20210129-16 / 656 / 1379 / 41-02-09.99N / 84-28-57.10W
2021-WTE-138-OE / 20210129-17 / 656 / 1383 / 41-01-47.59N / 84-30-28.07W
2021-WTE-139-OE / 20210129-22 / 656 / 1381 / 41-01-47.39N / 84-29-10.01W
2021-WTE-140-OE / 20210129-25 / 656 / 1381 / 41-01-35.08N / 84-29-00.37W
2021-WTE-141-OE / 20210129-26 / 656 / 1381 / 41-01-50.39N / 84-28-56.14W

2021-WTE-142-OE / 20210129-27 / 656 / 1386 / 41-00-53.14N / 84-30-34.67W
2021-WTE-143-OE / 20210129-28 / 656 / 1384 / 41-00-53.49N / 84-30-06.23W
2021-WTE-144-OE / 20210129-29 / 656 / 1386 / 41-00-35.59N / 84-30-30.57W
2021-WTE-145-OE / 20210129-30 / 656 / 1384 / 41-00-34.70N / 84-30-06.47W
2021-WTE-146-OE / 20210129-31 / 656 / 1386 / 41-00-35.52N / 84-29-22.91W
2021-WTE-147-OE / 20210129-32 / 656 / 1383 / 41-00-37.96N / 84-28-54.19W

2021-WTE-148-OE	20210129-33	656	1382	41-00-54.25N	84-28-07.10W
2021-WTE-149-OE	20210129-34	656	1381	41-00-44.49N	84-28-08.43W
2021-WTE-150-OE	20210129-35	656	1383	41-00-32.56N	84-28-12.16W
2021-WTE-151-OE	20210129-36	656	1382	41-00-30.53N	84-27-51.17W
2021-WTE-152-OE	20210129-37	656	1389	40-59-38.09N	84-30-28.20W
2021-WTE-153-OE	20210129-38	656	1384	40-59-57.53N	84-29-11.57W
2021-WTE-154-OE	20210129-39	656	1384	41-02-39.83N	84-30-05.48W
2021-WTE-155-OE	20210129-40	656	1382	41-02-28.32N	84-30-35.47W
2021-WTE-156-OE	20210129-41	656	1380	41-01-48.86N	84-29-26.86W
2021-WTE-157-OE	20210129-42	656	1384	41-00-44.10N	84-30-05.63W
2021-WTE-158-OE	20210129-43	656	1387	40-59-57.76N	84-28-53.84W

2. OBSTRUCTION STANDARDS EXCEEDED

The following proposed turbines would exceed Part 77 standards as described below.

a. Section 77.17(a)(1): Section 77.17(a)(1): Exceeds a height of 499 feet AGL at the site of the object. All proposed structures would exceed this surface by 157 feet.

b. Section 77.17(a)(4) -- A height within an en route obstacle clearance area, including turn and termination areas, of a Federal Airway or approved off-airway route, that would increase the IFR en route minimum obstacle clearance altitude

The following proposed structures would have the following effect: HUUVR ONE ARRIVAL (RNAV) Increase Minimum Obstruction Clearance Altitude (MOCA) from MSKTS to JJUST from 2300 feet to 2400 feet AMSL. (Procedure serves KAKR KCAK 1G3). The height at which there is no effect is at or below 1300 feet AMSL

2021-WTE-140-OE
2021-WTE-142-OE
2021-WTE-143-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

3. VFR ROUTE

VFR en route is evaluated in accordance with Part 77 Section 77.29 (a)(1): the impact on arrival, departure, and en route procedures for aircraft operating under visual flight rules.

At 656 feet AGL, the following structures would extend into airspace normally utilized for VFR en route flight by 157 feet. The structures would be located within 2 statute miles of a VFR Route as defined by JO 7400.2M, Section 6-3-8 and would have an adverse effect upon VFR air navigation.

2021-WTE-142-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

4. RADAR IMPACTS

The FAA found that all 27 proposed wind turbines would have a Radar Line of Sight (RLOS) impact to the Airport Surveillance Radar (ASR) -9 at Fort Wayne, IN (FWA). Since they are visible to the ASR, they could cause unwanted primary-only returns (clutter) and primary-only target drops, all in the immediate area of the turbines. Also, tracked primary-only targets could diverge from the aircraft path and follow wind turbines, when the aircraft is over or near the turbines.
No effect will occur on the Secondary (Beacon) Radar System.

5. SPONSOR ACTIONS

To pursue the possibility of receiving a favorable determination at the originally requested height, further study would be necessary. Further study entails coordination with the affected air traffic control facilities in order to evaluate effects fully and potential mitigations for possible approval of your project. Further study will also involve a public notice circularization and 37-day comment period. The outcome cannot be predicted.

If you have questions regarding this Notice of Presumed Findings, you may contact Bill Ratts via email at (William.M.Ratts@faa.gov)

FURTHER STUDY HAS ALREADY BEEN REQUESTED.

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2021-WTE-134-OE

Issued Date: 06/02/2021

Matthias Weigel
Starwood Energy Group, LLC.
5 Greenwich Office Park
2nd Floor
Greenwich, CT 06831

**** NOTICE OF PRELIMINARY FINDINGS ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine 20210129-13
Location:	Grover Hill, OH
Latitude:	41-02-24.96N NAD 83
Longitude:	84-30-07.54W
Heights:	720 feet site elevation (SE)
	656 feet above ground level (AGL)
	1376 feet above mean sea level (AMSL)

Initial findings of this study indicate that the structure as described exceeds obstruction standards and/or would have an adverse physical or electromagnetic interference effect upon navigable airspace or air navigation facilities. Pending resolution of the issues described below, the structure is presumed to be a hazard to air navigation.

To pursue a favorable determination at the originally submitted height, further study would be necessary. Further study entails distribution to the public for comment, and may extend the study period up to 120 days. The outcome cannot be predicted prior to public circularization.

If you would like the FAA to conduct further study, you must make the request within 60 days from the date of issuance of this letter.

See Attachment for Additional information.

NOTE: PENDING RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE, THE STRUCTURE IS PRESUMED TO BE A HAZARD TO AIR NAVIGATION. THIS LETTER DOES NOT AUTHORIZE CONSTRUCTION OF THE STRUCTURE EVEN AT A REDUCED HEIGHT. ANY RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE MUST BE COMMUNICATED TO THE FAA SO THAT A FAVORABLE DETERMINATION CAN SUBSEQUENTLY BE ISSUED.

IF MORE THAN 60 DAYS FROM THE DATE OF THIS LETTER HAS ELAPSED WITHOUT ATTEMPTED RESOLUTION, IT WILL BE NECESSARY FOR YOU TO REACTIVATE THE STUDY BY FILING A NEW FAA FORM 7460-1, NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION.

If we can be of further assistance, please contact Bill Ratts, at (816) 329-2544, or William.M.Ratts@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-WTE-134-OE.

Signature Control No: 466829373-483476928 (NPF -WT)

Steve Phillips
Manager, Obstruction Evaluation Group

Attachment(s)
Additional Information

Additional information for ASN 2021-WTE-134-OE

Abbreviations
AGL - above ground level
AMSL - above mean sea level
RWY - runway
VFR - visual flight rules
IFR - instrument flight rules
NM - nautical mile
ASN- Aeronautical Study Number
CAT - category aircraft
RNAV- area navigation
MDA - minimum descent altitude
Part 77 - Title 14 Code of Federal Regulations (CFR) Part 77, Safe, Efficient Use and Preservation of the Navigable Airspace

The proposed Grover Hill wind turbine project near Grover Hill, OH consists of 27 wind turbines and has been reviewed by the FAA under ASNs 2021-WTE-132-OE sequentially through 2021-WTE-158-OE.

The proposed wind turbine project lies approximately between 2.2 NM north northwest to 2.1 NM southwest from the town of Grover Hill, OH.

For the sake of efficiency, the 27 proposed wind turbines in this project that have similar impacts to 14 CFR Part 77 standards are included in this narrative.

1. LOCATION OF PROPOSED CONSTRUCTION

The Aeronautical Study Number (ASNs), Structure Names, Above Ground Level (AGL) heights, Above Mean Sea Level (AMSL) heights and coordinates for each proposed structure are listed as follows:

ASN	Structure Name	AGL/AMSL		LAT/LONG	
2021-WTE-132-OE	20210129-11	656	1381	41-02-39.16N	84-30-35.30W
2021-WTE-133-OE	20210129-12	656	1380	41-02-34.48N	84-30-15.14W
2021-WTE-134-OE	20210129-13	656	1376	41-02-24.96N	84-30-07.54W
2021-WTE-135-OE	20210129-14	656	1377	41-02-12.42N	84-30-01.05W
2021-WTE-136-OE	20210129-15	656	1380	41-02-12.09N	84-29-25.08W
2021-WTE-137-OE	20210129-16	656	1379	41-02-09.99N	84-28-57.10W
2021-WTE-138-OE	20210129-17	656	1383	41-01-47.59N	84-30-28.07W
2021-WTE-139-OE	20210129-22	656	1381	41-01-47.39N	84-29-10.01W
2021-WTE-140-OE	20210129-25	656	1381	41-01-35.08N	84-29-00.37W
2021-WTE-141-OE	20210129-26	656	1381	41-01-50.39N	84-28-56.14W
2021-WTE-142-OE	20210129-27	656	1386	41-00-53.14N	84-30-34.67W
2021-WTE-143-OE	20210129-28	656	1384	41-00-53.49N	84-30-06.23W
2021-WTE-144-OE	20210129-29	656	1386	41-00-35.59N	84-30-30.57W
2021-WTE-145-OE	20210129-30	656	1384	41-00-34.70N	84-30-06.47W
2021-WTE-146-OE	20210129-31	656	1386	41-00-35.52N	84-29-22.91W
2021-WTE-147-OE	20210129-32	656	1383	41-00-37.96N	84-28-54.19W

2021-WTE-148-OE	20210129-33	656	1382	41-00-54.25N	84-28-07.10W
2021-WTE-149-OE	20210129-34	656	1381	41-00-44.49N	84-28-08.43W
2021-WTE-150-OE	20210129-35	656	1383	41-00-32.56N	84-28-12.16W
2021-WTE-151-OE	20210129-36	656	1382	41-00-30.53N	84-27-51.17W
2021-WTE-152-OE	20210129-37	656	1389	40-59-38.09N	84-30-28.20W
2021-WTE-153-OE	20210129-38	656	1384	40-59-57.53N	84-29-11.57W
2021-WTE-154-OE	20210129-39	656	1384	41-02-39.83N	84-30-05.48W
2021-WTE-155-OE	20210129-40	656	1382	41-02-28.32N	84-30-35.47W
2021-WTE-156-OE	20210129-41	656	1380	41-01-48.86N	84-29-26.86W
2021-WTE-157-OE	20210129-42	656	1384	41-00-44.10N	84-30-05.63W
2021-WTE-158-OE	20210129-43	656	1387	40-59-57.76N	84-28-53.84W

2. OBSTRUCTION STANDARDS EXCEEDED

The following proposed turbines would exceed Part 77 standards as described below.

a. Section 77.17(a)(1): Section 77.17(a)(1): Exceeds a height of 499 feet AGL at the site of the object. All proposed structures would exceed this surface by 157 feet.

b. Section 77.17(a)(4) -- A height within an en route obstacle clearance area, including turn and termination areas, of a Federal Airway or approved off-airway route, that would increase the IFR en route minimum obstacle clearance altitude

The following proposed structures would have the following effect: HUUVR ONE ARRIVAL (RNAV) Increase Minimum Obstruction Clearance Altitude (MOCA) from MSKTS to JJUST from 2300 feet to 2400 feet AMSL. (Procedure serves KAKR KCAK 1G3). The height at which there is no effect is at or below 1300 feet AMSL

2021-WTE-140-OE
2021-WTE-142-OE
2021-WTE-143-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

3. VFR ROUTE

VFR en route is evaluated in accordance with Part 77 Section 77.29 (a)(1): the impact on arrival, departure, and en route procedures for aircraft operating under visual flight rules.

At 656 feet AGL, the following structures would extend into airspace normally utilized for VFR en route flight by 157 feet. The structures would be located within 2 statute miles of a VFR Route as defined by JO 7400.2M, Section 6-3-8 and would have an adverse effect upon VFR air navigation.

2021-WTE-142-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

4. RADAR IMPACTS

The FAA found that all 27 proposed wind turbines would have a Radar Line of Sight (RLOS) impact to the Airport Surveillance Radar (ASR) -9 at Fort Wayne, IN (FWA). Since they are visible to the ASR, they could cause unwanted primary-only returns (clutter) and primary-only target drops, all in the immediate area of the turbines. Also, tracked primary-only targets could diverge from the aircraft path and follow wind turbines, when the aircraft is over or near the turbines.
No effect will occur on the Secondary (Beacon) Radar System.

5. SPONSOR ACTIONS

To pursue the possibility of receiving a favorable determination at the originally requested height, further study would be necessary. Further study entails coordination with the affected air traffic control facilities in order to evaluate effects fully and potential mitigations for possible approval of your project. Further study will also involve a public notice circularization and 37-day comment period. The outcome cannot be predicted.

If you have questions regarding this Notice of Presumed Findings, you may contact Bill Ratts via email at (William.M.Ratts@faa.gov)

FURTHER STUDY HAS ALREADY BEEN REQUESTED.

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2021-WTE-135-OE

Issued Date: 06/02/2021

Matthias Weigel
Starwood Energy Group, LLC.
5 Greenwich Office Park
2nd Floor
Greenwich, CT 06831

**** NOTICE OF PRELIMINARY FINDINGS ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine 20210129-14
Location:	Grover Hill, OH
Latitude:	41-02-12.42N NAD 83
Longitude:	84-30-01.05W
Heights:	721 feet site elevation (SE)
	656 feet above ground level (AGL)
	1377 feet above mean sea level (AMSL)

Initial findings of this study indicate that the structure as described exceeds obstruction standards and/or would have an adverse physical or electromagnetic interference effect upon navigable airspace or air navigation facilities. Pending resolution of the issues described below, the structure is presumed to be a hazard to air navigation.

To pursue a favorable determination at the originally submitted height, further study would be necessary. Further study entails distribution to the public for comment, and may extend the study period up to 120 days. The outcome cannot be predicted prior to public circularization.

If you would like the FAA to conduct further study, you must make the request within 60 days from the date of issuance of this letter.

See Attachment for Additional information.

NOTE: PENDING RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE, THE STRUCTURE IS PRESUMED TO BE A HAZARD TO AIR NAVIGATION. THIS LETTER DOES NOT AUTHORIZE CONSTRUCTION OF THE STRUCTURE EVEN AT A REDUCED HEIGHT. ANY RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE MUST BE COMMUNICATED TO THE FAA SO THAT A FAVORABLE DETERMINATION CAN SUBSEQUENTLY BE ISSUED.

IF MORE THAN 60 DAYS FROM THE DATE OF THIS LETTER HAS ELAPSED WITHOUT ATTEMPTED RESOLUTION, IT WILL BE NECESSARY FOR YOU TO REACTIVATE THE STUDY BY FILING A NEW FAA FORM 7460-1, NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION.

If we can be of further assistance, please contact Bill Ratts, at (816) 329-2544, or William.M.Ratts@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-WTE-135-OE.

Signature Control No: 466829374-483476941 (NPF -WT)

Steve Phillips
Manager, Obstruction Evaluation Group

Attachment(s)
Additional Information

Additional information for ASN 2021-WTE-135-OE

Abbreviations
AGL - above ground level
AMSL - above mean sea level
RWY - runway
VFR - visual flight rules
IFR - instrument flight rules
NM - nautical mile
ASN- Aeronautical Study Number
CAT - category aircraft
RNAV- area navigation
MDA - minimum descent altitude
Part 77 - Title 14 Code of Federal Regulations (CFR) Part 77, Safe, Efficient Use and Preservation of the Navigable Airspace

The proposed Grover Hill wind turbine project near Grover Hill, OH consists of 27 wind turbines and has been reviewed by the FAA under ASNs 2021-WTE-132-OE sequentially through 2021-WTE-158-OE.

The proposed wind turbine project lies approximately between 2.2 NM north northwest to 2.1 NM southwest from the town of Grover Hill, OH.

For the sake of efficiency, the 27 proposed wind turbines in this project that have similar impacts to 14 CFR Part 77 standards are included in this narrative.

1. LOCATION OF PROPOSED CONSTRUCTION

The Aeronautical Study Number (ASNs), Structure Names, Above Ground Level (AGL) heights, Above Mean Sea Level (AMSL) heights and coordinates for each proposed structure are listed as follows:

ASN Structure Name AGL/AMSL LAT/LONG

2021-WTE-132-OE / 20210129-11 / 656 / 1381 / 41-02-39.16N / 84-30-35.30W
2021-WTE-133-OE / 20210129-12 / 656 / 1380 / 41-02-34.48N / 84-30-15.14W
2021-WTE-134-OE / 20210129-13 / 656 / 1376 / 41-02-24.96N / 84-30-07.54W
2021-WTE-135-OE / 20210129-14 / 656 / 1377 / 41-02-12.42N / 84-30-01.05W
2021-WTE-136-OE / 20210129-15 / 656 / 1380 / 41-02-12.09N / 84-29-25.08W
2021-WTE-137-OE / 20210129-16 / 656 / 1379 / 41-02-09.99N / 84-28-57.10W
2021-WTE-138-OE / 20210129-17 / 656 / 1383 / 41-01-47.59N / 84-30-28.07W
2021-WTE-139-OE / 20210129-22 / 656 / 1381 / 41-01-47.39N / 84-29-10.01W
2021-WTE-140-OE / 20210129-25 / 656 / 1381 / 41-01-35.08N / 84-29-00.37W
2021-WTE-141-OE / 20210129-26 / 656 / 1381 / 41-01-50.39N / 84-28-56.14W

2021-WTE-142-OE / 20210129-27 / 656 / 1386 / 41-00-53.14N / 84-30-34.67W
2021-WTE-143-OE / 20210129-28 / 656 / 1384 / 41-00-53.49N / 84-30-06.23W
2021-WTE-144-OE / 20210129-29 / 656 / 1386 / 41-00-35.59N / 84-30-30.57W
2021-WTE-145-OE / 20210129-30 / 656 / 1384 / 41-00-34.70N / 84-30-06.47W
2021-WTE-146-OE / 20210129-31 / 656 / 1386 / 41-00-35.52N / 84-29-22.91W
2021-WTE-147-OE / 20210129-32 / 656 / 1383 / 41-00-37.96N / 84-28-54.19W

2021-WTE-148-OE / 20210129-33 / 656 / 1382 / 41-00-54.25N / 84-28-07.10W
2021-WTE-149-OE / 20210129-34 / 656 / 1381 / 41-00-44.49N / 84-28-08.43W
2021-WTE-150-OE / 20210129-35 / 656 / 1383 / 41-00-32.56N / 84-28-12.16W
2021-WTE-151-OE / 20210129-36 / 656 / 1382 / 41-00-30.53N / 84-27-51.17W

2021-WTE-152-OE / 20210129-37 / 656 / 1389 / 40-59-38.09N / 84-30-28.20W
2021-WTE-153-OE / 20210129-38 / 656 / 1384 / 40-59-57.53N / 84-29-11.57W
2021-WTE-154-OE / 20210129-39 / 656 / 1384 / 41-02-39.83N / 84-30-05.48W
2021-WTE-155-OE / 20210129-40 / 656 / 1382 / 41-02-28.32N / 84-30-35.47W
2021-WTE-156-OE / 20210129-41 / 656 / 1380 / 41-01-48.86N / 84-29-26.86W
2021-WTE-157-OE / 20210129-42 / 656 / 1384 / 41-00-44.10N / 84-30-05.63W
2021-WTE-158-OE / 20210129-43 / 656 / 1387 / 40-59-57.76N / 84-28-53.84W

2. OBSTRUCTION STANDARDS EXCEEDED

The following proposed turbines would exceed Part 77 standards as described below.

a. Section 77.17(a)(1): Section 77.17(a)(1): Exceeds a height of 499 feet AGL at the site of the object. All proposed structures would exceed this surface by 157 feet.

b. Section 77.17(a)(4) -- A height within an en route obstacle clearance area, including turn and termination areas, of a Federal Airway or approved off-airway route, that would increase the IFR en route minimum obstacle clearance altitude

The following proposed structures would have the following effect: HUUVR ONE ARRIVAL (RNAV) Increase Minimum Obstruction Clearance Altitude (MOCA) from MSKTS to JJUST from 2300 feet to 2400 feet AMSL. (Procedure serves KAKR KCAK 1G3). The height at which there is no effect is at or below 1300 feet AMSL

2021-WTE-140-OE
2021-WTE-142-OE
2021-WTE-143-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

3. VFR ROUTE

VFR en route is evaluated in accordance with Part 77 Section 77.29 (a)(1): the impact on arrival, departure, and en route procedures for aircraft operating under visual flight rules.

At 656 feet AGL, the following structures would extend into airspace normally utilized for VFR en route flight by 157 feet. The structures would be located within 2 statute miles of a VFR Route as defined by JO 7400.2M, Section 6-3-8 and would have an adverse effect upon VFR air navigation.

2021-WTE-142-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

4. RADAR IMPACTS

The FAA found that all 27 proposed wind turbines would have a Radar Line of Sight (RLOS) impact to the Airport Surveillance Radar (ASR) -9 at Fort Wayne, IN (FWA). Since they are visible to the ASR, they could cause unwanted primary-only returns (clutter) and primary-only target drops, all in the immediate area of the turbines. Also, tracked primary-only targets could diverge from the aircraft path and follow wind turbines, when the aircraft is over or near the turbines.
No effect will occur on the Secondary (Beacon) Radar System.

5. SPONSOR ACTIONS

To pursue the possibility of receiving a favorable determination at the originally requested height, further study would be necessary. Further study entails coordination with the affected air traffic control facilities in order to evaluate effects fully and potential mitigations for possible approval of your project. Further study will also involve a public notice circularization and 37-day comment period. The outcome cannot be predicted.

If you have questions regarding this Notice of Presumed Findings, you may contact Bill Ratts via email at (William.M.Ratts@faa.gov)

FURTHER STUDY HAS ALREADY BEEN REQUESTED.

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2021-WTE-136-OE

Issued Date: 06/02/2021

Matthias Weigel
Starwood Energy Group, LLC.
5 Greenwich Office Park
2nd Floor
Greenwich, CT 06831

**** NOTICE OF PRELIMINARY FINDINGS ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine 20210129-15
Location:	Grover Hill, OH
Latitude:	41-02-12.09N NAD 83
Longitude:	84-29-25.08W
Heights:	724 feet site elevation (SE)
	656 feet above ground level (AGL)
	1380 feet above mean sea level (AMSL)

Initial findings of this study indicate that the structure as described exceeds obstruction standards and/or would have an adverse physical or electromagnetic interference effect upon navigable airspace or air navigation facilities. Pending resolution of the issues described below, the structure is presumed to be a hazard to air navigation.

To pursue a favorable determination at the originally submitted height, further study would be necessary. Further study entails distribution to the public for comment, and may extend the study period up to 120 days. The outcome cannot be predicted prior to public circularization.

If you would like the FAA to conduct further study, you must make the request within 60 days from the date of issuance of this letter.

See Attachment for Additional information.

NOTE: PENDING RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE, THE STRUCTURE IS PRESUMED TO BE A HAZARD TO AIR NAVIGATION. THIS LETTER DOES NOT AUTHORIZE CONSTRUCTION OF THE STRUCTURE EVEN AT A REDUCED HEIGHT. ANY RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE MUST BE COMMUNICATED TO THE FAA SO THAT A FAVORABLE DETERMINATION CAN SUBSEQUENTLY BE ISSUED.

IF MORE THAN 60 DAYS FROM THE DATE OF THIS LETTER HAS ELAPSED WITHOUT ATTEMPTED RESOLUTION, IT WILL BE NECESSARY FOR YOU TO REACTIVATE THE STUDY BY FILING A NEW FAA FORM 7460-1, NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION.

If we can be of further assistance, please contact Bill Ratts, at (816) 329-2544, or William.M.Ratts@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-WTE-136-OE.

Signature Control No: 466829375-483476930 (NPF -WT)

Steve Phillips
Manager, Obstruction Evaluation Group

Attachment(s)
Additional Information

Abbreviations
AGL - above ground level
AMSL - above mean sea level
RWY - runway
VFR - visual flight rules
IFR - instrument flight rules
NM - nautical mile
ASN- Aeronautical Study Number
CAT - category aircraft
RNAV- area navigation
MDA - minimum descent altitude
Part 77 - Title 14 Code of Federal Regulations (CFR) Part 77, Safe, Efficient Use and Preservation of the Navigable Airspace

The proposed Grover Hill wind turbine project near Grover Hill, OH consists of 27 wind turbines and has been reviewed by the FAA under ASNs 2021-WTE-132-OE sequentially through 2021-WTE-158-OE.

The proposed wind turbine project lies approximately between 2.2 NM north northwest to 2.1 NM southwest from the town of Grover Hill, OH.

For the sake of efficiency, the 27 proposed wind turbines in this project that have similar impacts to 14 CFR Part 77 standards are included in this narrative.

1. LOCATION OF PROPOSED CONSTRUCTION

The Aeronautical Study Number (ASNs), Structure Names, Above Ground Level (AGL) heights, Above Mean Sea Level (AMSL) heights and coordinates for each proposed structure are listed as follows:

ASN	Structure Name	AGL/AMSL		LAT/LONG	
2021-WTE-132-OE	20210129-11	656	1381	41-02-39.16N	84-30-35.30W
2021-WTE-133-OE	20210129-12	656	1380	41-02-34.48N	84-30-15.14W
2021-WTE-134-OE	20210129-13	656	1376	41-02-24.96N	84-30-07.54W
2021-WTE-135-OE	20210129-14	656	1377	41-02-12.42N	84-30-01.05W
2021-WTE-136-OE	20210129-15	656	1380	41-02-12.09N	84-29-25.08W
2021-WTE-137-OE	20210129-16	656	1379	41-02-09.99N	84-28-57.10W
2021-WTE-138-OE	20210129-17	656	1383	41-01-47.59N	84-30-28.07W
2021-WTE-139-OE	20210129-22	656	1381	41-01-47.39N	84-29-10.01W
2021-WTE-140-OE	20210129-25	656	1381	41-01-35.08N	84-29-00.37W
2021-WTE-141-OE	20210129-26	656	1381	41-01-50.39N	84-28-56.14W
2021-WTE-142-OE	20210129-27	656	1386	41-00-53.14N	84-30-34.67W
2021-WTE-143-OE	20210129-28	656	1384	41-00-53.49N	84-30-06.23W
2021-WTE-144-OE	20210129-29	656	1386	41-00-35.59N	84-30-30.57W
2021-WTE-145-OE	20210129-30	656	1384	41-00-34.70N	84-30-06.47W
2021-WTE-146-OE	20210129-31	656	1386	41-00-35.52N	84-29-22.91W
2021-WTE-147-OE	20210129-32	656	1383	41-00-37.96N	84-28-54.19W

2021-WTE-148-OE / 20210129-33 / 656 / 1382 / 41-00-54.25N / 84-28-07.10W
2021-WTE-149-OE / 20210129-34 / 656 / 1381 / 41-00-44.49N / 84-28-08.43W
2021-WTE-150-OE / 20210129-35 / 656 / 1383 / 41-00-32.56N / 84-28-12.16W
2021-WTE-151-OE / 20210129-36 / 656 / 1382 / 41-00-30.53N / 84-27-51.17W

2021-WTE-152-OE / 20210129-37 / 656 / 1389 / 40-59-38.09N / 84-30-28.20W
2021-WTE-153-OE / 20210129-38 / 656 / 1384 / 40-59-57.53N / 84-29-11.57W
2021-WTE-154-OE / 20210129-39 / 656 / 1384 / 41-02-39.83N / 84-30-05.48W
2021-WTE-155-OE / 20210129-40 / 656 / 1382 / 41-02-28.32N / 84-30-35.47W
2021-WTE-156-OE / 20210129-41 / 656 / 1380 / 41-01-48.86N / 84-29-26.86W
2021-WTE-157-OE / 20210129-42 / 656 / 1384 / 41-00-44.10N / 84-30-05.63W
2021-WTE-158-OE / 20210129-43 / 656 / 1387 / 40-59-57.76N / 84-28-53.84W

2. OBSTRUCTION STANDARDS EXCEEDED

The following proposed turbines would exceed Part 77 standards as described below.

a. Section 77.17(a)(1): Section 77.17(a)(1): Exceeds a height of 499 feet AGL at the site of the object. All proposed structures would exceed this surface by 157 feet.

b. Section 77.17(a)(4) -- A height within an en route obstacle clearance area, including turn and termination areas, of a Federal Airway or approved off-airway route, that would increase the IFR en route minimum obstacle clearance altitude

The following proposed structures would have the following effect: HUUVR ONE ARRIVAL (RNAV) Increase Minimum Obstruction Clearance Altitude (MOCA) from MSKTS to JJUST from 2300 feet to 2400 feet AMSL. (Procedure serves KAKR KCAK 1G3). The height at which there is no effect is at or below 1300 feet AMSL

2021-WTE-140-OE
2021-WTE-142-OE
2021-WTE-143-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

3. VFR ROUTE

VFR en route is evaluated in accordance with Part 77 Section 77.29 (a)(1): the impact on arrival, departure, and en route procedures for aircraft operating under visual flight rules.

At 656 feet AGL, the following structures would extend into airspace normally utilized for VFR en route flight by 157 feet. The structures would be located within 2 statute miles of a VFR Route as defined by JO 7400.2M, Section 6-3-8 and would have an adverse effect upon VFR air navigation.

2021-WTE-142-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

4. RADAR IMPACTS

The FAA found that all 27 proposed wind turbines would have a Radar Line of Sight (RLOS) impact to the Airport Surveillance Radar (ASR) -9 at Fort Wayne, IN (FWA). Since they are visible to the ASR, they could cause unwanted primary-only returns (clutter) and primary-only target drops, all in the immediate area of the turbines. Also, tracked primary-only targets could diverge from the aircraft path and follow wind turbines, when the aircraft is over or near the turbines.
No effect will occur on the Secondary (Beacon) Radar System.

5. SPONSOR ACTIONS

To pursue the possibility of receiving a favorable determination at the originally requested height, further study would be necessary. Further study entails coordination with the affected air traffic control facilities in order to evaluate effects fully and potential mitigations for possible approval of your project. Further study will also involve a public notice circularization and 37-day comment period. The outcome cannot be predicted.

If you have questions regarding this Notice of Presumed Findings, you may contact Bill Ratts via email at (William.M.Ratts@faa.gov)

FURTHER STUDY HAS ALREADY BEEN REQUESTED.

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2021-WTE-137-OE

Issued Date: 06/02/2021

Matthias Weigel
Starwood Energy Group, LLC.
5 Greenwich Office Park
2nd Floor
Greenwich, CT 06831

**** NOTICE OF PRELIMINARY FINDINGS ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine 20210129-16
Location:	Grover Hill, OH
Latitude:	41-02-09.99N NAD 83
Longitude:	84-28-57.10W
Heights:	723 feet site elevation (SE) 656 feet above ground level (AGL) 1379 feet above mean sea level (AMSL)

Initial findings of this study indicate that the structure as described exceeds obstruction standards and/or would have an adverse physical or electromagnetic interference effect upon navigable airspace or air navigation facilities. Pending resolution of the issues described below, the structure is presumed to be a hazard to air navigation.

To pursue a favorable determination at the originally submitted height, further study would be necessary. Further study entails distribution to the public for comment, and may extend the study period up to 120 days. The outcome cannot be predicted prior to public circularization.

If you would like the FAA to conduct further study, you must make the request within 60 days from the date of issuance of this letter.

See Attachment for Additional information.

NOTE: PENDING RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE, THE STRUCTURE IS PRESUMED TO BE A HAZARD TO AIR NAVIGATION. THIS LETTER DOES NOT AUTHORIZE CONSTRUCTION OF THE STRUCTURE EVEN AT A REDUCED HEIGHT. ANY RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE MUST BE COMMUNICATED TO THE FAA SO THAT A FAVORABLE DETERMINATION CAN SUBSEQUENTLY BE ISSUED.

IF MORE THAN 60 DAYS FROM THE DATE OF THIS LETTER HAS ELAPSED WITHOUT ATTEMPTED RESOLUTION, IT WILL BE NECESSARY FOR YOU TO REACTIVATE THE STUDY BY FILING A NEW FAA FORM 7460-1, NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION.

If we can be of further assistance, please contact Bill Ratts, at (816) 329-2544, or William.M.Ratts@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-WTE-137-OE.

Signature Control No: 466829376-483476939 (NPF -WT)

Steve Phillips
Manager, Obstruction Evaluation Group

Attachment(s)
Additional Information

Abbreviations
AGL - above ground level
AMSL - above mean sea level
RWY - runway
VFR - visual flight rules
IFR - instrument flight rules
NM - nautical mile
ASN- Aeronautical Study Number
CAT - category aircraft
RNAV- area navigation
MDA - minimum descent altitude
Part 77 - Title 14 Code of Federal Regulations (CFR) Part 77, Safe, Efficient Use and Preservation of the Navigable Airspace

The proposed Grover Hill wind turbine project near Grover Hill, OH consists of 27 wind turbines and has been reviewed by the FAA under ASNs 2021-WTE-132-OE sequentially through 2021-WTE-158-OE.

The proposed wind turbine project lies approximately between 2.2 NM north northwest to 2.1 NM southwest from the town of Grover Hill, OH.

For the sake of efficiency, the 27 proposed wind turbines in this project that have similar impacts to 14 CFR Part 77 standards are included in this narrative.

1. LOCATION OF PROPOSED CONSTRUCTION

The Aeronautical Study Number (ASNs), Structure Names, Above Ground Level (AGL) heights, Above Mean Sea Level (AMSL) heights and coordinates for each proposed structure are listed as follows:

ASN Structure Name AGL/AMSL LAT/LONG

2021-WTE-132-OE / 20210129-11 / 656 / 1381 / 41-02-39.16N / 84-30-35.30W
2021-WTE-133-OE / 20210129-12 / 656 / 1380 / 41-02-34.48N / 84-30-15.14W
2021-WTE-134-OE / 20210129-13 / 656 / 1376 / 41-02-24.96N / 84-30-07.54W
2021-WTE-135-OE / 20210129-14 / 656 / 1377 / 41-02-12.42N / 84-30-01.05W
2021-WTE-136-OE / 20210129-15 / 656 / 1380 / 41-02-12.09N / 84-29-25.08W
2021-WTE-137-OE / 20210129-16 / 656 / 1379 / 41-02-09.99N / 84-28-57.10W
2021-WTE-138-OE / 20210129-17 / 656 / 1383 / 41-01-47.59N / 84-30-28.07W
2021-WTE-139-OE / 20210129-22 / 656 / 1381 / 41-01-47.39N / 84-29-10.01W
2021-WTE-140-OE / 20210129-25 / 656 / 1381 / 41-01-35.08N / 84-29-00.37W
2021-WTE-141-OE / 20210129-26 / 656 / 1381 / 41-01-50.39N / 84-28-56.14W

2021-WTE-142-OE / 20210129-27 / 656 / 1386 / 41-00-53.14N / 84-30-34.67W
2021-WTE-143-OE / 20210129-28 / 656 / 1384 / 41-00-53.49N / 84-30-06.23W
2021-WTE-144-OE / 20210129-29 / 656 / 1386 / 41-00-35.59N / 84-30-30.57W
2021-WTE-145-OE / 20210129-30 / 656 / 1384 / 41-00-34.70N / 84-30-06.47W
2021-WTE-146-OE / 20210129-31 / 656 / 1386 / 41-00-35.52N / 84-29-22.91W
2021-WTE-147-OE / 20210129-32 / 656 / 1383 / 41-00-37.96N / 84-28-54.19W

2021-WTE-148-OE / 20210129-33 / 656 / 1382 / 41-00-54.25N / 84-28-07.10W
2021-WTE-149-OE / 20210129-34 / 656 / 1381 / 41-00-44.49N / 84-28-08.43W
2021-WTE-150-OE / 20210129-35 / 656 / 1383 / 41-00-32.56N / 84-28-12.16W
2021-WTE-151-OE / 20210129-36 / 656 / 1382 / 41-00-30.53N / 84-27-51.17W

2021-WTE-152-OE / 20210129-37 / 656 / 1389 / 40-59-38.09N / 84-30-28.20W
2021-WTE-153-OE / 20210129-38 / 656 / 1384 / 40-59-57.53N / 84-29-11.57W
2021-WTE-154-OE / 20210129-39 / 656 / 1384 / 41-02-39.83N / 84-30-05.48W
2021-WTE-155-OE / 20210129-40 / 656 / 1382 / 41-02-28.32N / 84-30-35.47W
2021-WTE-156-OE / 20210129-41 / 656 / 1380 / 41-01-48.86N / 84-29-26.86W
2021-WTE-157-OE / 20210129-42 / 656 / 1384 / 41-00-44.10N / 84-30-05.63W
2021-WTE-158-OE / 20210129-43 / 656 / 1387 / 40-59-57.76N / 84-28-53.84W

2. OBSTRUCTION STANDARDS EXCEEDED

The following proposed turbines would exceed Part 77 standards as described below.

a. Section 77.17(a)(1): Section 77.17(a)(1): Exceeds a height of 499 feet AGL at the site of the object. All proposed structures would exceed this surface by 157 feet.

b. Section 77.17(a)(4) -- A height within an en route obstacle clearance area, including turn and termination areas, of a Federal Airway or approved off-airway route, that would increase the IFR en route minimum obstacle clearance altitude

The following proposed structures would have the following effect: HUUVR ONE ARRIVAL (RNAV) Increase Minimum Obstruction Clearance Altitude (MOCA) from MSKTS to JJUST from 2300 feet to 2400 feet AMSL. (Procedure serves KAKR KCAK 1G3). The height at which there is no effect is at or below 1300 feet AMSL

2021-WTE-140-OE
2021-WTE-142-OE
2021-WTE-143-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

3. VFR ROUTE

VFR en route is evaluated in accordance with Part 77 Section 77.29 (a)(1): the impact on arrival, departure, and en route procedures for aircraft operating under visual flight rules.

At 656 feet AGL, the following structures would extend into airspace normally utilized for VFR en route flight by 157 feet. The structures would be located within 2 statute miles of a VFR Route as defined by JO 7400.2M, Section 6-3-8 and would have an adverse effect upon VFR air navigation.

2021-WTE-142-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

4. RADAR IMPACTS

The FAA found that all 27 proposed wind turbines would have a Radar Line of Sight (RLOS) impact to the Airport Surveillance Radar (ASR) -9 at Fort Wayne, IN (FWA). Since they are visible to the ASR, they could cause unwanted primary-only returns (clutter) and primary-only target drops, all in the immediate area of the turbines. Also, tracked primary-only targets could diverge from the aircraft path and follow wind turbines, when the aircraft is over or near the turbines.
No effect will occur on the Secondary (Beacon) Radar System.

5. SPONSOR ACTIONS

To pursue the possibility of receiving a favorable determination at the originally requested height, further study would be necessary. Further study entails coordination with the affected air traffic control facilities in order to evaluate effects fully and potential mitigations for possible approval of your project. Further study will also involve a public notice circularization and 37-day comment period. The outcome cannot be predicted.

If you have questions regarding this Notice of Presumed Findings, you may contact Bill Ratts via email at (William.M.Ratts@faa.gov)

FURTHER STUDY HAS ALREADY BEEN REQUESTED.

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2021-WTE-138-OE

Issued Date: 06/02/2021

Matthias Weigel
Starwood Energy Group, LLC.
5 Greenwich Office Park
2nd Floor
Greenwich, CT 06831

**** NOTICE OF PRELIMINARY FINDINGS ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine 20210129-17
Location:	Grover Hill, OH
Latitude:	41-01-47.59N NAD 83
Longitude:	84-30-28.07W
Heights:	727 feet site elevation (SE)
	656 feet above ground level (AGL)
	1383 feet above mean sea level (AMSL)

Initial findings of this study indicate that the structure as described exceeds obstruction standards and/or would have an adverse physical or electromagnetic interference effect upon navigable airspace or air navigation facilities. Pending resolution of the issues described below, the structure is presumed to be a hazard to air navigation.

To pursue a favorable determination at the originally submitted height, further study would be necessary. Further study entails distribution to the public for comment, and may extend the study period up to 120 days. The outcome cannot be predicted prior to public circularization.

If you would like the FAA to conduct further study, you must make the request within 60 days from the date of issuance of this letter.

See Attachment for Additional information.

NOTE: PENDING RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE, THE STRUCTURE IS PRESUMED TO BE A HAZARD TO AIR NAVIGATION. THIS LETTER DOES NOT AUTHORIZE CONSTRUCTION OF THE STRUCTURE EVEN AT A REDUCED HEIGHT. ANY RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE MUST BE COMMUNICATED TO THE FAA SO THAT A FAVORABLE DETERMINATION CAN SUBSEQUENTLY BE ISSUED.

IF MORE THAN 60 DAYS FROM THE DATE OF THIS LETTER HAS ELAPSED WITHOUT ATTEMPTED RESOLUTION, IT WILL BE NECESSARY FOR YOU TO REACTIVATE THE STUDY BY FILING A NEW FAA FORM 7460-1, NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION.

If we can be of further assistance, please contact Bill Ratts, at (816) 329-2544, or William.M.Ratts@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-WTE-138-OE.

Signature Control No: 466829377-483476940 (NPF -WT)

Steve Phillips
Manager, Obstruction Evaluation Group

Attachment(s)
Additional Information

Additional information for ASN 2021-WTE-138-OE

Abbreviations
AGL - above ground level
AMSL - above mean sea level
RWY - runway
VFR - visual flight rules
IFR - instrument flight rules
NM - nautical mile
ASN- Aeronautical Study Number
CAT - category aircraft
RNAV- area navigation
MDA - minimum descent altitude
Part 77 - Title 14 Code of Federal Regulations (CFR) Part 77, Safe, Efficient Use and Preservation of the Navigable Airspace

The proposed Grover Hill wind turbine project near Grover Hill, OH consists of 27 wind turbines and has been reviewed by the FAA under ASNs 2021-WTE-132-OE sequentially through 2021-WTE-158-OE.

The proposed wind turbine project lies approximately between 2.2 NM north northwest to 2.1 NM southwest from the town of Grover Hill, OH.

For the sake of efficiency, the 27 proposed wind turbines in this project that have similar impacts to 14 CFR Part 77 standards are included in this narrative.

1. LOCATION OF PROPOSED CONSTRUCTION

The Aeronautical Study Number (ASNs), Structure Names, Above Ground Level (AGL) heights, Above Mean Sea Level (AMSL) heights and coordinates for each proposed structure are listed as follows:

ASN	Structure Name	AGL/AMSL		LAT/LONG	
2021-WTE-132-OE	20210129-11	656	1381	41-02-39.16N	84-30-35.30W
2021-WTE-133-OE	20210129-12	656	1380	41-02-34.48N	84-30-15.14W
2021-WTE-134-OE	20210129-13	656	1376	41-02-24.96N	84-30-07.54W
2021-WTE-135-OE	20210129-14	656	1377	41-02-12.42N	84-30-01.05W
2021-WTE-136-OE	20210129-15	656	1380	41-02-12.09N	84-29-25.08W
2021-WTE-137-OE	20210129-16	656	1379	41-02-09.99N	84-28-57.10W
2021-WTE-138-OE	20210129-17	656	1383	41-01-47.59N	84-30-28.07W
2021-WTE-139-OE	20210129-22	656	1381	41-01-47.39N	84-29-10.01W
2021-WTE-140-OE	20210129-25	656	1381	41-01-35.08N	84-29-00.37W
2021-WTE-141-OE	20210129-26	656	1381	41-01-50.39N	84-28-56.14W
2021-WTE-142-OE	20210129-27	656	1386	41-00-53.14N	84-30-34.67W
2021-WTE-143-OE	20210129-28	656	1384	41-00-53.49N	84-30-06.23W
2021-WTE-144-OE	20210129-29	656	1386	41-00-35.59N	84-30-30.57W
2021-WTE-145-OE	20210129-30	656	1384	41-00-34.70N	84-30-06.47W
2021-WTE-146-OE	20210129-31	656	1386	41-00-35.52N	84-29-22.91W
2021-WTE-147-OE	20210129-32	656	1383	41-00-37.96N	84-28-54.19W

2021-WTE-148-OE / 20210129-33 / 656 / 1382 / 41-00-54.25N / 84-28-07.10W
2021-WTE-149-OE / 20210129-34 / 656 / 1381 / 41-00-44.49N / 84-28-08.43W
2021-WTE-150-OE / 20210129-35 / 656 / 1383 / 41-00-32.56N / 84-28-12.16W
2021-WTE-151-OE / 20210129-36 / 656 / 1382 / 41-00-30.53N / 84-27-51.17W

2021-WTE-152-OE / 20210129-37 / 656 / 1389 / 40-59-38.09N / 84-30-28.20W
2021-WTE-153-OE / 20210129-38 / 656 / 1384 / 40-59-57.53N / 84-29-11.57W
2021-WTE-154-OE / 20210129-39 / 656 / 1384 / 41-02-39.83N / 84-30-05.48W
2021-WTE-155-OE / 20210129-40 / 656 / 1382 / 41-02-28.32N / 84-30-35.47W
2021-WTE-156-OE / 20210129-41 / 656 / 1380 / 41-01-48.86N / 84-29-26.86W
2021-WTE-157-OE / 20210129-42 / 656 / 1384 / 41-00-44.10N / 84-30-05.63W
2021-WTE-158-OE / 20210129-43 / 656 / 1387 / 40-59-57.76N / 84-28-53.84W

2. OBSTRUCTION STANDARDS EXCEEDED

The following proposed turbines would exceed Part 77 standards as described below.

a. Section 77.17(a)(1): Section 77.17(a)(1): Exceeds a height of 499 feet AGL at the site of the object. All proposed structures would exceed this surface by 157 feet.

b. Section 77.17(a)(4) -- A height within an en route obstacle clearance area, including turn and termination areas, of a Federal Airway or approved off-airway route, that would increase the IFR en route minimum obstacle clearance altitude

The following proposed structures would have the following effect: HUUVR ONE ARRIVAL (RNAV) Increase Minimum Obstruction Clearance Altitude (MOCA) from MSKTS to JJUST from 2300 feet to 2400 feet AMSL. (Procedure serves KAKR KCAK 1G3). The height at which there is no effect is at or below 1300 feet AMSL

2021-WTE-140-OE
2021-WTE-142-OE
2021-WTE-143-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

3. VFR ROUTE

VFR en route is evaluated in accordance with Part 77 Section 77.29 (a)(1): the impact on arrival, departure, and en route procedures for aircraft operating under visual flight rules.

At 656 feet AGL, the following structures would extend into airspace normally utilized for VFR en route flight by 157 feet. The structures would be located within 2 statute miles of a VFR Route as defined by JO 7400.2M, Section 6-3-8 and would have an adverse effect upon VFR air navigation.

2021-WTE-142-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

4. RADAR IMPACTS

The FAA found that all 27 proposed wind turbines would have a Radar Line of Sight (RLOS) impact to the Airport Surveillance Radar (ASR) -9 at Fort Wayne, IN (FWA). Since they are visible to the ASR, they could cause unwanted primary-only returns (clutter) and primary-only target drops, all in the immediate area of the turbines. Also, tracked primary-only targets could diverge from the aircraft path and follow wind turbines, when the aircraft is over or near the turbines.
No effect will occur on the Secondary (Beacon) Radar System.

5. SPONSOR ACTIONS

To pursue the possibility of receiving a favorable determination at the originally requested height, further study would be necessary. Further study entails coordination with the affected air traffic control facilities in order to evaluate effects fully and potential mitigations for possible approval of your project. Further study will also involve a public notice circularization and 37-day comment period. The outcome cannot be predicted.

If you have questions regarding this Notice of Presumed Findings, you may contact Bill Ratts via email at (William.M.Ratts@faa.gov)

FURTHER STUDY HAS ALREADY BEEN REQUESTED.

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2021-WTE-139-OE

Issued Date: 06/02/2021

Matthias Weigel
Starwood Energy Group, LLC.
5 Greenwich Office Park
2nd Floor
Greenwich, CT 06831

**** NOTICE OF PRELIMINARY FINDINGS ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine 20210129-22
Location:	Grover Hill, OH
Latitude:	41-01-47.39N NAD 83
Longitude:	84-29-10.01W
Heights:	725 feet site elevation (SE) 656 feet above ground level (AGL) 1381 feet above mean sea level (AMSL)

Initial findings of this study indicate that the structure as described exceeds obstruction standards and/or would have an adverse physical or electromagnetic interference effect upon navigable airspace or air navigation facilities. Pending resolution of the issues described below, the structure is presumed to be a hazard to air navigation.

To pursue a favorable determination at the originally submitted height, further study would be necessary. Further study entails distribution to the public for comment, and may extend the study period up to 120 days. The outcome cannot be predicted prior to public circularization.

If you would like the FAA to conduct further study, you must make the request within 60 days from the date of issuance of this letter.

See Attachment for Additional information.

NOTE: PENDING RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE, THE STRUCTURE IS PRESUMED TO BE A HAZARD TO AIR NAVIGATION. THIS LETTER DOES NOT AUTHORIZE CONSTRUCTION OF THE STRUCTURE EVEN AT A REDUCED HEIGHT. ANY RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE MUST BE COMMUNICATED TO THE FAA SO THAT A FAVORABLE DETERMINATION CAN SUBSEQUENTLY BE ISSUED.

IF MORE THAN 60 DAYS FROM THE DATE OF THIS LETTER HAS ELAPSED WITHOUT ATTEMPTED RESOLUTION, IT WILL BE NECESSARY FOR YOU TO REACTIVATE THE STUDY BY FILING A NEW FAA FORM 7460-1, NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION.

If we can be of further assistance, please contact Bill Ratts, at (816) 329-2544, or William.M.Ratts@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-WTE-139-OE.

Signature Control No: 466829378-483476932 (NPF -WT)

Steve Phillips
Manager, Obstruction Evaluation Group

Attachment(s)
Additional Information

Additional information for ASN 2021-WTE-139-OE

Abbreviations
AGL - above ground level
AMSL - above mean sea level
RWY - runway
VFR - visual flight rules
IFR - instrument flight rules
NM - nautical mile
ASN- Aeronautical Study Number
CAT - category aircraft
RNAV- area navigation
MDA - minimum descent altitude
Part 77 - Title 14 Code of Federal Regulations (CFR) Part 77, Safe, Efficient Use and Preservation of the Navigable Airspace

The proposed Grover Hill wind turbine project near Grover Hill, OH consists of 27 wind turbines and has been reviewed by the FAA under ASNs 2021-WTE-132-OE sequentially through 2021-WTE-158-OE.

The proposed wind turbine project lies approximately between 2.2 NM north northwest to 2.1 NM southwest from the town of Grover Hill, OH.

For the sake of efficiency, the 27 proposed wind turbines in this project that have similar impacts to 14 CFR Part 77 standards are included in this narrative.

1. LOCATION OF PROPOSED CONSTRUCTION

The Aeronautical Study Number (ASNs), Structure Names, Above Ground Level (AGL) heights, Above Mean Sea Level (AMSL) heights and coordinates for each proposed structure are listed as follows:

ASN Structure Name AGL/AMSL LAT/LONG

2021-WTE-132-OE / 20210129-11 / 656 / 1381 / 41-02-39.16N / 84-30-35.30W
2021-WTE-133-OE / 20210129-12 / 656 / 1380 / 41-02-34.48N / 84-30-15.14W
2021-WTE-134-OE / 20210129-13 / 656 / 1376 / 41-02-24.96N / 84-30-07.54W
2021-WTE-135-OE / 20210129-14 / 656 / 1377 / 41-02-12.42N / 84-30-01.05W
2021-WTE-136-OE / 20210129-15 / 656 / 1380 / 41-02-12.09N / 84-29-25.08W
2021-WTE-137-OE / 20210129-16 / 656 / 1379 / 41-02-09.99N / 84-28-57.10W
2021-WTE-138-OE / 20210129-17 / 656 / 1383 / 41-01-47.59N / 84-30-28.07W
2021-WTE-139-OE / 20210129-22 / 656 / 1381 / 41-01-47.39N / 84-29-10.01W
2021-WTE-140-OE / 20210129-25 / 656 / 1381 / 41-01-35.08N / 84-29-00.37W
2021-WTE-141-OE / 20210129-26 / 656 / 1381 / 41-01-50.39N / 84-28-56.14W

2021-WTE-142-OE / 20210129-27 / 656 / 1386 / 41-00-53.14N / 84-30-34.67W
2021-WTE-143-OE / 20210129-28 / 656 / 1384 / 41-00-53.49N / 84-30-06.23W
2021-WTE-144-OE / 20210129-29 / 656 / 1386 / 41-00-35.59N / 84-30-30.57W
2021-WTE-145-OE / 20210129-30 / 656 / 1384 / 41-00-34.70N / 84-30-06.47W
2021-WTE-146-OE / 20210129-31 / 656 / 1386 / 41-00-35.52N / 84-29-22.91W
2021-WTE-147-OE / 20210129-32 / 656 / 1383 / 41-00-37.96N / 84-28-54.19W

2021-WTE-148-OE / 20210129-33 / 656 / 1382 / 41-00-54.25N / 84-28-07.10W
2021-WTE-149-OE / 20210129-34 / 656 / 1381 / 41-00-44.49N / 84-28-08.43W
2021-WTE-150-OE / 20210129-35 / 656 / 1383 / 41-00-32.56N / 84-28-12.16W
2021-WTE-151-OE / 20210129-36 / 656 / 1382 / 41-00-30.53N / 84-27-51.17W

2021-WTE-152-OE / 20210129-37 / 656 / 1389 / 40-59-38.09N / 84-30-28.20W
2021-WTE-153-OE / 20210129-38 / 656 / 1384 / 40-59-57.53N / 84-29-11.57W
2021-WTE-154-OE / 20210129-39 / 656 / 1384 / 41-02-39.83N / 84-30-05.48W
2021-WTE-155-OE / 20210129-40 / 656 / 1382 / 41-02-28.32N / 84-30-35.47W
2021-WTE-156-OE / 20210129-41 / 656 / 1380 / 41-01-48.86N / 84-29-26.86W
2021-WTE-157-OE / 20210129-42 / 656 / 1384 / 41-00-44.10N / 84-30-05.63W
2021-WTE-158-OE / 20210129-43 / 656 / 1387 / 40-59-57.76N / 84-28-53.84W

2. OBSTRUCTION STANDARDS EXCEEDED

The following proposed turbines would exceed Part 77 standards as described below.

a. Section 77.17(a)(1): Section 77.17(a)(1): Exceeds a height of 499 feet AGL at the site of the object. All proposed structures would exceed this surface by 157 feet.

b. Section 77.17(a)(4) -- A height within an en route obstacle clearance area, including turn and termination areas, of a Federal Airway or approved off-airway route, that would increase the IFR en route minimum obstacle clearance altitude

The following proposed structures would have the following effect: HUUVR ONE ARRIVAL (RNAV) Increase Minimum Obstruction Clearance Altitude (MOCA) from MSKTS to JJUST from 2300 feet to 2400 feet AMSL. (Procedure serves KAKR KCAK 1G3). The height at which there is no effect is at or below 1300 feet AMSL

2021-WTE-140-OE
2021-WTE-142-OE
2021-WTE-143-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

3. VFR ROUTE

VFR en route is evaluated in accordance with Part 77 Section 77.29 (a)(1): the impact on arrival, departure, and en route procedures for aircraft operating under visual flight rules.

At 656 feet AGL, the following structures would extend into airspace normally utilized for VFR en route flight by 157 feet. The structures would be located within 2 statute miles of a VFR Route as defined by JO 7400.2M, Section 6-3-8 and would have an adverse effect upon VFR air navigation.

2021-WTE-142-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

4. RADAR IMPACTS

The FAA found that all 27 proposed wind turbines would have a Radar Line of Sight (RLOS) impact to the Airport Surveillance Radar (ASR) -9 at Fort Wayne, IN (FWA). Since they are visible to the ASR, they could cause unwanted primary-only returns (clutter) and primary-only target drops, all in the immediate area of the turbines. Also, tracked primary-only targets could diverge from the aircraft path and follow wind turbines, when the aircraft is over or near the turbines.
No effect will occur on the Secondary (Beacon) Radar System.

5. SPONSOR ACTIONS

To pursue the possibility of receiving a favorable determination at the originally requested height, further study would be necessary. Further study entails coordination with the affected air traffic control facilities in order to evaluate effects fully and potential mitigations for possible approval of your project. Further study will also involve a public notice circularization and 37-day comment period. The outcome cannot be predicted.

If you have questions regarding this Notice of Presumed Findings, you may contact Bill Ratts via email at (William.M.Ratts@faa.gov)

FURTHER STUDY HAS ALREADY BEEN REQUESTED.

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2021-WTE-140-OE

Issued Date: 06/02/2021

Matthias Weigel
Starwood Energy Group, LLC.
5 Greenwich Office Park
2nd Floor
Greenwich, CT 06831

**** NOTICE OF PRELIMINARY FINDINGS ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine 20210129-25
Location:	Grover Hill, OH
Latitude:	41-01-35.08N NAD 83
Longitude:	84-29-00.37W
Heights:	725 feet site elevation (SE) 656 feet above ground level (AGL) 1381 feet above mean sea level (AMSL)

Initial findings of this study indicate that the structure as described exceeds obstruction standards and/or would have an adverse physical or electromagnetic interference effect upon navigable airspace or air navigation facilities. Pending resolution of the issues described below, the structure is presumed to be a hazard to air navigation.

To pursue a favorable determination at the originally submitted height, further study would be necessary. Further study entails distribution to the public for comment, and may extend the study period up to 120 days. The outcome cannot be predicted prior to public circularization.

If you would like the FAA to conduct further study, you must make the request within 60 days from the date of issuance of this letter.

See Attachment for Additional information.

NOTE: PENDING RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE, THE STRUCTURE IS PRESUMED TO BE A HAZARD TO AIR NAVIGATION. THIS LETTER DOES NOT AUTHORIZE CONSTRUCTION OF THE STRUCTURE EVEN AT A REDUCED HEIGHT. ANY RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE MUST BE COMMUNICATED TO THE FAA SO THAT A FAVORABLE DETERMINATION CAN SUBSEQUENTLY BE ISSUED.

IF MORE THAN 60 DAYS FROM THE DATE OF THIS LETTER HAS ELAPSED WITHOUT ATTEMPTED RESOLUTION, IT WILL BE NECESSARY FOR YOU TO REACTIVATE THE STUDY BY FILING A NEW FAA FORM 7460-1, NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION.

If we can be of further assistance, please contact Bill Ratts, at (816) 329-2544, or William.M.Ratts@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-WTE-140-OE.

Signature Control No: 466829379-483476926 (NPF -WT)
Steve Phillips
Manager, Obstruction Evaluation Group

Attachment(s)
Additional Information

Abbreviations
AGL - above ground level
AMSL - above mean sea level
RWY - runway
VFR - visual flight rules
IFR - instrument flight rules
NM - nautical mile
ASN- Aeronautical Study Number
CAT - category aircraft
RNAV- area navigation
MDA - minimum descent altitude
Part 77 - Title 14 Code of Federal Regulations (CFR) Part 77, Safe, Efficient Use and Preservation of the Navigable Airspace

The proposed Grover Hill wind turbine project near Grover Hill, OH consists of 27 wind turbines and has been reviewed by the FAA under ASNs 2021-WTE-132-OE sequentially through 2021-WTE-158-OE.

The proposed wind turbine project lies approximately between 2.2 NM north northwest to 2.1 NM southwest from the town of Grover Hill, OH.

For the sake of efficiency, the 27 proposed wind turbines in this project that have similar impacts to 14 CFR Part 77 standards are included in this narrative.

1. LOCATION OF PROPOSED CONSTRUCTION

The Aeronautical Study Number (ASNs), Structure Names, Above Ground Level (AGL) heights, Above Mean Sea Level (AMSL) heights and coordinates for each proposed structure are listed as follows:

ASN Structure Name AGL/AMSL LAT/LONG

2021-WTE-132-OE / 20210129-11 / 656 / 1381 / 41-02-39.16N / 84-30-35.30W
2021-WTE-133-OE / 20210129-12 / 656 / 1380 / 41-02-34.48N / 84-30-15.14W
2021-WTE-134-OE / 20210129-13 / 656 / 1376 / 41-02-24.96N / 84-30-07.54W
2021-WTE-135-OE / 20210129-14 / 656 / 1377 / 41-02-12.42N / 84-30-01.05W
2021-WTE-136-OE / 20210129-15 / 656 / 1380 / 41-02-12.09N / 84-29-25.08W
2021-WTE-137-OE / 20210129-16 / 656 / 1379 / 41-02-09.99N / 84-28-57.10W
2021-WTE-138-OE / 20210129-17 / 656 / 1383 / 41-01-47.59N / 84-30-28.07W
2021-WTE-139-OE / 20210129-22 / 656 / 1381 / 41-01-47.39N / 84-29-10.01W
2021-WTE-140-OE / 20210129-25 / 656 / 1381 / 41-01-35.08N / 84-29-00.37W
2021-WTE-141-OE / 20210129-26 / 656 / 1381 / 41-01-50.39N / 84-28-56.14W

2021-WTE-142-OE / 20210129-27 / 656 / 1386 / 41-00-53.14N / 84-30-34.67W
2021-WTE-143-OE / 20210129-28 / 656 / 1384 / 41-00-53.49N / 84-30-06.23W
2021-WTE-144-OE / 20210129-29 / 656 / 1386 / 41-00-35.59N / 84-30-30.57W
2021-WTE-145-OE / 20210129-30 / 656 / 1384 / 41-00-34.70N / 84-30-06.47W
2021-WTE-146-OE / 20210129-31 / 656 / 1386 / 41-00-35.52N / 84-29-22.91W
2021-WTE-147-OE / 20210129-32 / 656 / 1383 / 41-00-37.96N / 84-28-54.19W

2021-WTE-148-OE / 20210129-33 / 656 / 1382 / 41-00-54.25N / 84-28-07.10W
2021-WTE-149-OE / 20210129-34 / 656 / 1381 / 41-00-44.49N / 84-28-08.43W
2021-WTE-150-OE / 20210129-35 / 656 / 1383 / 41-00-32.56N / 84-28-12.16W
2021-WTE-151-OE / 20210129-36 / 656 / 1382 / 41-00-30.53N / 84-27-51.17W

2021-WTE-152-OE / 20210129-37 / 656 / 1389 / 40-59-38.09N / 84-30-28.20W
2021-WTE-153-OE / 20210129-38 / 656 / 1384 / 40-59-57.53N / 84-29-11.57W
2021-WTE-154-OE / 20210129-39 / 656 / 1384 / 41-02-39.83N / 84-30-05.48W
2021-WTE-155-OE / 20210129-40 / 656 / 1382 / 41-02-28.32N / 84-30-35.47W
2021-WTE-156-OE / 20210129-41 / 656 / 1380 / 41-01-48.86N / 84-29-26.86W
2021-WTE-157-OE / 20210129-42 / 656 / 1384 / 41-00-44.10N / 84-30-05.63W
2021-WTE-158-OE / 20210129-43 / 656 / 1387 / 40-59-57.76N / 84-28-53.84W

2. OBSTRUCTION STANDARDS EXCEEDED

The following proposed turbines would exceed Part 77 standards as described below.

a. Section 77.17(a)(1): Section 77.17(a)(1): Exceeds a height of 499 feet AGL at the site of the object. All proposed structures would exceed this surface by 157 feet.

b. Section 77.17(a)(4) -- A height within an en route obstacle clearance area, including turn and termination areas, of a Federal Airway or approved off-airway route, that would increase the IFR en route minimum obstacle clearance altitude

The following proposed structures would have the following effect: HUUVR ONE ARRIVAL (RNAV) Increase Minimum Obstruction Clearance Altitude (MOCA) from MSKTS to JJUST from 2300 feet to 2400 feet AMSL. (Procedure serves KAKR KCAK 1G3). The height at which there is no effect is at or below 1300 feet AMSL

2021-WTE-140-OE
2021-WTE-142-OE
2021-WTE-143-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

3. VFR ROUTE

VFR en route is evaluated in accordance with Part 77 Section 77.29 (a)(1): the impact on arrival, departure, and en route procedures for aircraft operating under visual flight rules.

At 656 feet AGL, the following structures would extend into airspace normally utilized for VFR en route flight by 157 feet. The structures would be located within 2 statute miles of a VFR Route as defined by JO 7400.2M, Section 6-3-8 and would have an adverse effect upon VFR air navigation.

2021-WTE-142-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

4. RADAR IMPACTS

The FAA found that all 27 proposed wind turbines would have a Radar Line of Sight (RLOS) impact to the Airport Surveillance Radar (ASR) -9 at Fort Wayne, IN (FWA). Since they are visible to the ASR, they could cause unwanted primary-only returns (clutter) and primary-only target drops, all in the immediate area of the turbines. Also, tracked primary-only targets could diverge from the aircraft path and follow wind turbines, when the aircraft is over or near the turbines.
No effect will occur on the Secondary (Beacon) Radar System.

5. SPONSOR ACTIONS

To pursue the possibility of receiving a favorable determination at the originally requested height, further study would be necessary. Further study entails coordination with the affected air traffic control facilities in order to evaluate effects fully and potential mitigations for possible approval of your project. Further study will also involve a public notice circularization and 37-day comment period. The outcome cannot be predicted.

If you have questions regarding this Notice of Presumed Findings, you may contact Bill Ratts via email at (William.M.Ratts@faa.gov)

FURTHER STUDY HAS ALREADY BEEN REQUESTED.

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2021-WTE-141-OE

Issued Date: 06/02/2021

Matthias Weigel
Starwood Energy Group, LLC.
5 Greenwich Office Park
2nd Floor
Greenwich, CT 06831

**** NOTICE OF PRELIMINARY FINDINGS ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine 20210129-26
Location:	Grover Hill, OH
Latitude:	41-01-50.39N NAD 83
Longitude:	84-28-56.14W
Heights:	725 feet site elevation (SE)
	656 feet above ground level (AGL)
	1381 feet above mean sea level (AMSL)

Initial findings of this study indicate that the structure as described exceeds obstruction standards and/or would have an adverse physical or electromagnetic interference effect upon navigable airspace or air navigation facilities. Pending resolution of the issues described below, the structure is presumed to be a hazard to air navigation.

To pursue a favorable determination at the originally submitted height, further study would be necessary. Further study entails distribution to the public for comment, and may extend the study period up to 120 days. The outcome cannot be predicted prior to public circularization.

If you would like the FAA to conduct further study, you must make the request within 60 days from the date of issuance of this letter.

See Attachment for Additional information.

NOTE: PENDING RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE, THE STRUCTURE IS PRESUMED TO BE A HAZARD TO AIR NAVIGATION. THIS LETTER DOES NOT AUTHORIZE CONSTRUCTION OF THE STRUCTURE EVEN AT A REDUCED HEIGHT. ANY RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE MUST BE COMMUNICATED TO THE FAA SO THAT A FAVORABLE DETERMINATION CAN SUBSEQUENTLY BE ISSUED.

IF MORE THAN 60 DAYS FROM THE DATE OF THIS LETTER HAS ELAPSED WITHOUT ATTEMPTED RESOLUTION, IT WILL BE NECESSARY FOR YOU TO REACTIVATE THE STUDY BY FILING A NEW FAA FORM 7460-1, NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION.

If we can be of further assistance, please contact Bill Ratts, at (816) 329-2544, or William.M.Ratts@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-WTE-141-OE.

Signature Control No: 466829380-483476934 (NPF -WT)

Steve Phillips
Manager, Obstruction Evaluation Group

Attachment(s)
Additional Information

Additional information for ASN 2021-WTE-141-OE

Abbreviations
AGL - above ground level
AMSL - above mean sea level
RWY - runway
VFR - visual flight rules
IFR - instrument flight rules
NM - nautical mile
ASN- Aeronautical Study Number
CAT - category aircraft
RNAV- area navigation
MDA - minimum descent altitude
Part 77 - Title 14 Code of Federal Regulations (CFR) Part 77, Safe, Efficient Use and Preservation of the Navigable Airspace

The proposed Grover Hill wind turbine project near Grover Hill, OH consists of 27 wind turbines and has been reviewed by the FAA under ASNs 2021-WTE-132-OE sequentially through 2021-WTE-158-OE.

The proposed wind turbine project lies approximately between 2.2 NM north northwest to 2.1 NM southwest from the town of Grover Hill, OH.

For the sake of efficiency, the 27 proposed wind turbines in this project that have similar impacts to 14 CFR Part 77 standards are included in this narrative.

1. LOCATION OF PROPOSED CONSTRUCTION

The Aeronautical Study Number (ASNs), Structure Names, Above Ground Level (AGL) heights, Above Mean Sea Level (AMSL) heights and coordinates for each proposed structure are listed as follows:

ASN Structure Name AGL/AMSL LAT/LONG

2021-WTE-132-OE / 20210129-11 / 656 / 1381 / 41-02-39.16N / 84-30-35.30W
2021-WTE-133-OE / 20210129-12 / 656 / 1380 / 41-02-34.48N / 84-30-15.14W
2021-WTE-134-OE / 20210129-13 / 656 / 1376 / 41-02-24.96N / 84-30-07.54W
2021-WTE-135-OE / 20210129-14 / 656 / 1377 / 41-02-12.42N / 84-30-01.05W
2021-WTE-136-OE / 20210129-15 / 656 / 1380 / 41-02-12.09N / 84-29-25.08W
2021-WTE-137-OE / 20210129-16 / 656 / 1379 / 41-02-09.99N / 84-28-57.10W
2021-WTE-138-OE / 20210129-17 / 656 / 1383 / 41-01-47.59N / 84-30-28.07W
2021-WTE-139-OE / 20210129-22 / 656 / 1381 / 41-01-47.39N / 84-29-10.01W
2021-WTE-140-OE / 20210129-25 / 656 / 1381 / 41-01-35.08N / 84-29-00.37W
2021-WTE-141-OE / 20210129-26 / 656 / 1381 / 41-01-50.39N / 84-28-56.14W

2021-WTE-142-OE / 20210129-27 / 656 / 1386 / 41-00-53.14N / 84-30-34.67W
2021-WTE-143-OE / 20210129-28 / 656 / 1384 / 41-00-53.49N / 84-30-06.23W
2021-WTE-144-OE / 20210129-29 / 656 / 1386 / 41-00-35.59N / 84-30-30.57W
2021-WTE-145-OE / 20210129-30 / 656 / 1384 / 41-00-34.70N / 84-30-06.47W
2021-WTE-146-OE / 20210129-31 / 656 / 1386 / 41-00-35.52N / 84-29-22.91W
2021-WTE-147-OE / 20210129-32 / 656 / 1383 / 41-00-37.96N / 84-28-54.19W

2021-WTE-148-OE	20210129-33	656	1382	41-00-54.25N	84-28-07.10W
2021-WTE-149-OE	20210129-34	656	1381	41-00-44.49N	84-28-08.43W
2021-WTE-150-OE	20210129-35	656	1383	41-00-32.56N	84-28-12.16W
2021-WTE-151-OE	20210129-36	656	1382	41-00-30.53N	84-27-51.17W
2021-WTE-152-OE	20210129-37	656	1389	40-59-38.09N	84-30-28.20W
2021-WTE-153-OE	20210129-38	656	1384	40-59-57.53N	84-29-11.57W
2021-WTE-154-OE	20210129-39	656	1384	41-02-39.83N	84-30-05.48W
2021-WTE-155-OE	20210129-40	656	1382	41-02-28.32N	84-30-35.47W
2021-WTE-156-OE	20210129-41	656	1380	41-01-48.86N	84-29-26.86W
2021-WTE-157-OE	20210129-42	656	1384	41-00-44.10N	84-30-05.63W
2021-WTE-158-OE	20210129-43	656	1387	40-59-57.76N	84-28-53.84W

2. OBSTRUCTION STANDARDS EXCEEDED

The following proposed turbines would exceed Part 77 standards as described below.

a. Section 77.17(a)(1): Section 77.17(a)(1): Exceeds a height of 499 feet AGL at the site of the object. All proposed structures would exceed this surface by 157 feet.

b. Section 77.17(a)(4) -- A height within an en route obstacle clearance area, including turn and termination areas, of a Federal Airway or approved off-airway route, that would increase the IFR en route minimum obstacle clearance altitude

The following proposed structures would have the following effect: HUUVR ONE ARRIVAL (RNAV) Increase Minimum Obstruction Clearance Altitude (MOCA) from MSKTS to JJUST from 2300 feet to 2400 feet AMSL. (Procedure serves KAKR KCAK 1G3). The height at which there is no effect is at or below 1300 feet AMSL

2021-WTE-140-OE
2021-WTE-142-OE
2021-WTE-143-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

3. VFR ROUTE

VFR en route is evaluated in accordance with Part 77 Section 77.29 (a)(1): the impact on arrival, departure, and en route procedures for aircraft operating under visual flight rules.

At 656 feet AGL, the following structures would extend into airspace normally utilized for VFR en route flight by 157 feet. The structures would be located within 2 statute miles of a VFR Route as defined by JO 7400.2M, Section 6-3-8 and would have an adverse effect upon VFR air navigation.

2021-WTE-142-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

4. RADAR IMPACTS

The FAA found that all 27 proposed wind turbines would have a Radar Line of Sight (RLOS) impact to the Airport Surveillance Radar (ASR) -9 at Fort Wayne, IN (FWA). Since they are visible to the ASR, they could cause unwanted primary-only returns (clutter) and primary-only target drops, all in the immediate area of the turbines. Also, tracked primary-only targets could diverge from the aircraft path and follow wind turbines, when the aircraft is over or near the turbines.
No effect will occur on the Secondary (Beacon) Radar System.

5. SPONSOR ACTIONS

To pursue the possibility of receiving a favorable determination at the originally requested height, further study would be necessary. Further study entails coordination with the affected air traffic control facilities in order to evaluate effects fully and potential mitigations for possible approval of your project. Further study will also involve a public notice circularization and 37-day comment period. The outcome cannot be predicted.

If you have questions regarding this Notice of Presumed Findings, you may contact Bill Ratts via email at (William.M.Ratts@faa.gov)

FURTHER STUDY HAS ALREADY BEEN REQUESTED.

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2021-WTE-142-OE

Issued Date: 06/02/2021

Matthias Weigel
Starwood Energy Group, LLC.
5 Greenwich Office Park
2nd Floor
Greenwich, CT 06831

**** NOTICE OF PRELIMINARY FINDINGS ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine 20210129-27
Location:	Grover Hill, OH
Latitude:	41-00-53.14N NAD 83
Longitude:	84-30-34.67W
Heights:	730 feet site elevation (SE) 656 feet above ground level (AGL) 1386 feet above mean sea level (AMSL)

Initial findings of this study indicate that the structure as described exceeds obstruction standards and/or would have an adverse physical or electromagnetic interference effect upon navigable airspace or air navigation facilities. Pending resolution of the issues described below, the structure is presumed to be a hazard to air navigation.

To pursue a favorable determination at the originally submitted height, further study would be necessary. Further study entails distribution to the public for comment, and may extend the study period up to 120 days. The outcome cannot be predicted prior to public circularization.

If you would like the FAA to conduct further study, you must make the request within 60 days from the date of issuance of this letter.

See Attachment for Additional information.

NOTE: PENDING RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE, THE STRUCTURE IS PRESUMED TO BE A HAZARD TO AIR NAVIGATION. THIS LETTER DOES NOT AUTHORIZE CONSTRUCTION OF THE STRUCTURE EVEN AT A REDUCED HEIGHT. ANY RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE MUST BE COMMUNICATED TO THE FAA SO THAT A FAVORABLE DETERMINATION CAN SUBSEQUENTLY BE ISSUED.

IF MORE THAN 60 DAYS FROM THE DATE OF THIS LETTER HAS ELAPSED WITHOUT ATTEMPTED RESOLUTION, IT WILL BE NECESSARY FOR YOU TO REACTIVATE THE STUDY BY FILING A NEW FAA FORM 7460-1, NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION.

If we can be of further assistance, please contact Bill Ratts, at (816) 329-2544, or William.M.Ratts@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-WTE-142-OE.

Signature Control No: 466829381-483476942 (NPF -WT)

Steve Phillips
Manager, Obstruction Evaluation Group

Attachment(s)
Additional Information

Additional information for ASN 2021-WTE-142-OE

Abbreviations
AGL - above ground level
AMSL - above mean sea level
RWY - runway
VFR - visual flight rules
IFR - instrument flight rules
NM - nautical mile
ASN- Aeronautical Study Number
CAT - category aircraft
RNAV- area navigation
MDA - minimum descent altitude
Part 77 - Title 14 Code of Federal Regulations (CFR) Part 77, Safe, Efficient Use and Preservation of the Navigable Airspace

The proposed Grover Hill wind turbine project near Grover Hill, OH consists of 27 wind turbines and has been reviewed by the FAA under ASNs 2021-WTE-132-OE sequentially through 2021-WTE-158-OE.

The proposed wind turbine project lies approximately between 2.2 NM north northwest to 2.1 NM southwest from the town of Grover Hill, OH.

For the sake of efficiency, the 27 proposed wind turbines in this project that have similar impacts to 14 CFR Part 77 standards are included in this narrative.

1. LOCATION OF PROPOSED CONSTRUCTION

The Aeronautical Study Number (ASNs), Structure Names, Above Ground Level (AGL) heights, Above Mean Sea Level (AMSL) heights and coordinates for each proposed structure are listed as follows:

ASN Structure Name AGL/AMSL LAT/LONG

2021-WTE-132-OE / 20210129-11 / 656 / 1381 / 41-02-39.16N / 84-30-35.30W
2021-WTE-133-OE / 20210129-12 / 656 / 1380 / 41-02-34.48N / 84-30-15.14W
2021-WTE-134-OE / 20210129-13 / 656 / 1376 / 41-02-24.96N / 84-30-07.54W
2021-WTE-135-OE / 20210129-14 / 656 / 1377 / 41-02-12.42N / 84-30-01.05W
2021-WTE-136-OE / 20210129-15 / 656 / 1380 / 41-02-12.09N / 84-29-25.08W
2021-WTE-137-OE / 20210129-16 / 656 / 1379 / 41-02-09.99N / 84-28-57.10W
2021-WTE-138-OE / 20210129-17 / 656 / 1383 / 41-01-47.59N / 84-30-28.07W
2021-WTE-139-OE / 20210129-22 / 656 / 1381 / 41-01-47.39N / 84-29-10.01W
2021-WTE-140-OE / 20210129-25 / 656 / 1381 / 41-01-35.08N / 84-29-00.37W
2021-WTE-141-OE / 20210129-26 / 656 / 1381 / 41-01-50.39N / 84-28-56.14W

2021-WTE-142-OE / 20210129-27 / 656 / 1386 / 41-00-53.14N / 84-30-34.67W
2021-WTE-143-OE / 20210129-28 / 656 / 1384 / 41-00-53.49N / 84-30-06.23W
2021-WTE-144-OE / 20210129-29 / 656 / 1386 / 41-00-35.59N / 84-30-30.57W
2021-WTE-145-OE / 20210129-30 / 656 / 1384 / 41-00-34.70N / 84-30-06.47W
2021-WTE-146-OE / 20210129-31 / 656 / 1386 / 41-00-35.52N / 84-29-22.91W
2021-WTE-147-OE / 20210129-32 / 656 / 1383 / 41-00-37.96N / 84-28-54.19W

2021-WTE-148-OE / 20210129-33 / 656 / 1382 / 41-00-54.25N / 84-28-07.10W
2021-WTE-149-OE / 20210129-34 / 656 / 1381 / 41-00-44.49N / 84-28-08.43W
2021-WTE-150-OE / 20210129-35 / 656 / 1383 / 41-00-32.56N / 84-28-12.16W
2021-WTE-151-OE / 20210129-36 / 656 / 1382 / 41-00-30.53N / 84-27-51.17W

2021-WTE-152-OE / 20210129-37 / 656 / 1389 / 40-59-38.09N / 84-30-28.20W
2021-WTE-153-OE / 20210129-38 / 656 / 1384 / 40-59-57.53N / 84-29-11.57W
2021-WTE-154-OE / 20210129-39 / 656 / 1384 / 41-02-39.83N / 84-30-05.48W
2021-WTE-155-OE / 20210129-40 / 656 / 1382 / 41-02-28.32N / 84-30-35.47W
2021-WTE-156-OE / 20210129-41 / 656 / 1380 / 41-01-48.86N / 84-29-26.86W
2021-WTE-157-OE / 20210129-42 / 656 / 1384 / 41-00-44.10N / 84-30-05.63W
2021-WTE-158-OE / 20210129-43 / 656 / 1387 / 40-59-57.76N / 84-28-53.84W

2. OBSTRUCTION STANDARDS EXCEEDED

The following proposed turbines would exceed Part 77 standards as described below.

a. Section 77.17(a)(1): Section 77.17(a)(1): Exceeds a height of 499 feet AGL at the site of the object. All proposed structures would exceed this surface by 157 feet.

b. Section 77.17(a)(4) -- A height within an en route obstacle clearance area, including turn and termination areas, of a Federal Airway or approved off-airway route, that would increase the IFR en route minimum obstacle clearance altitude

The following proposed structures would have the following effect: HUUVR ONE ARRIVAL (RNAV) Increase Minimum Obstruction Clearance Altitude (MOCA) from MSKTS to JJUST from 2300 feet to 2400 feet AMSL. (Procedure serves KAKR KCAK 1G3). The height at which there is no effect is at or below 1300 feet AMSL

2021-WTE-140-OE
2021-WTE-142-OE
2021-WTE-143-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

3. VFR ROUTE

VFR en route is evaluated in accordance with Part 77 Section 77.29 (a)(1): the impact on arrival, departure, and en route procedures for aircraft operating under visual flight rules.

At 656 feet AGL, the following structures would extend into airspace normally utilized for VFR en route flight by 157 feet. The structures would be located within 2 statute miles of a VFR Route as defined by JO 7400.2M, Section 6-3-8 and would have an adverse effect upon VFR air navigation.

2021-WTE-142-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

4. RADAR IMPACTS

The FAA found that all 27 proposed wind turbines would have a Radar Line of Sight (RLOS) impact to the Airport Surveillance Radar (ASR) -9 at Fort Wayne, IN (FWA). Since they are visible to the ASR, they could cause unwanted primary-only returns (clutter) and primary-only target drops, all in the immediate area of the turbines. Also, tracked primary-only targets could diverge from the aircraft path and follow wind turbines, when the aircraft is over or near the turbines.
No effect will occur on the Secondary (Beacon) Radar System.

5. SPONSOR ACTIONS

To pursue the possibility of receiving a favorable determination at the originally requested height, further study would be necessary. Further study entails coordination with the affected air traffic control facilities in order to evaluate effects fully and potential mitigations for possible approval of your project. Further study will also involve a public notice circularization and 37-day comment period. The outcome cannot be predicted.

If you have questions regarding this Notice of Presumed Findings, you may contact Bill Ratts via email at (William.M.Ratts@faa.gov)

FURTHER STUDY HAS ALREADY BEEN REQUESTED.

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2021-WTE-143-OE

Issued Date: 06/02/2021

Matthias Weigel
Starwood Energy Group, LLC.
5 Greenwich Office Park
2nd Floor
Greenwich, CT 06831

**** NOTICE OF PRELIMINARY FINDINGS ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine 20210129-28
Location:	Grover Hill, OH
Latitude:	41-00-53.49N NAD 83
Longitude:	84-30-06.23W
Heights:	728 feet site elevation (SE)
	656 feet above ground level (AGL)
	1384 feet above mean sea level (AMSL)

Initial findings of this study indicate that the structure as described exceeds obstruction standards and/or would have an adverse physical or electromagnetic interference effect upon navigable airspace or air navigation facilities. Pending resolution of the issues described below, the structure is presumed to be a hazard to air navigation.

To pursue a favorable determination at the originally submitted height, further study would be necessary. Further study entails distribution to the public for comment, and may extend the study period up to 120 days. The outcome cannot be predicted prior to public circularization.

If you would like the FAA to conduct further study, you must make the request within 60 days from the date of issuance of this letter.

See Attachment for Additional information.

NOTE: PENDING RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE, THE STRUCTURE IS PRESUMED TO BE A HAZARD TO AIR NAVIGATION. THIS LETTER DOES NOT AUTHORIZE CONSTRUCTION OF THE STRUCTURE EVEN AT A REDUCED HEIGHT. ANY RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE MUST BE COMMUNICATED TO THE FAA SO THAT A FAVORABLE DETERMINATION CAN SUBSEQUENTLY BE ISSUED.

IF MORE THAN 60 DAYS FROM THE DATE OF THIS LETTER HAS ELAPSED WITHOUT ATTEMPTED RESOLUTION, IT WILL BE NECESSARY FOR YOU TO REACTIVATE THE STUDY BY FILING A NEW FAA FORM 7460-1, NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION.

If we can be of further assistance, please contact Bill Ratts, at (816) 329-2544, or William.M.Ratts@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-WTE-143-OE.

Signature Control No: 466829382-483476936 (NPF -WT)

Steve Phillips
Manager, Obstruction Evaluation Group

Attachment(s)
Additional Information

Additional information for ASN 2021-WTE-143-OE

Abbreviations
AGL - above ground level
AMSL - above mean sea level
RWY - runway
VFR - visual flight rules
IFR - instrument flight rules
NM - nautical mile
ASN- Aeronautical Study Number
CAT - category aircraft
RNAV- area navigation
MDA - minimum descent altitude
Part 77 - Title 14 Code of Federal Regulations (CFR) Part 77, Safe, Efficient Use and Preservation of the Navigable Airspace

The proposed Grover Hill wind turbine project near Grover Hill, OH consists of 27 wind turbines and has been reviewed by the FAA under ASNs 2021-WTE-132-OE sequentially through 2021-WTE-158-OE.

The proposed wind turbine project lies approximately between 2.2 NM north northwest to 2.1 NM southwest from the town of Grover Hill, OH.

For the sake of efficiency, the 27 proposed wind turbines in this project that have similar impacts to 14 CFR Part 77 standards are included in this narrative.

1. LOCATION OF PROPOSED CONSTRUCTION

The Aeronautical Study Number (ASNs), Structure Names, Above Ground Level (AGL) heights, Above Mean Sea Level (AMSL) heights and coordinates for each proposed structure are listed as follows:

ASN	Structure Name	AGL	AMSL	LAT	LONG
2021-WTE-132-OE	20210129-11	656	1381	41-02-39.16N	84-30-35.30W
2021-WTE-133-OE	20210129-12	656	1380	41-02-34.48N	84-30-15.14W
2021-WTE-134-OE	20210129-13	656	1376	41-02-24.96N	84-30-07.54W
2021-WTE-135-OE	20210129-14	656	1377	41-02-12.42N	84-30-01.05W
2021-WTE-136-OE	20210129-15	656	1380	41-02-12.09N	84-29-25.08W
2021-WTE-137-OE	20210129-16	656	1379	41-02-09.99N	84-28-57.10W
2021-WTE-138-OE	20210129-17	656	1383	41-01-47.59N	84-30-28.07W
2021-WTE-139-OE	20210129-22	656	1381	41-01-47.39N	84-29-10.01W
2021-WTE-140-OE	20210129-25	656	1381	41-01-35.08N	84-29-00.37W
2021-WTE-141-OE	20210129-26	656	1381	41-01-50.39N	84-28-56.14W
2021-WTE-142-OE	20210129-27	656	1386	41-00-53.14N	84-30-34.67W
2021-WTE-143-OE	20210129-28	656	1384	41-00-53.49N	84-30-06.23W
2021-WTE-144-OE	20210129-29	656	1386	41-00-35.59N	84-30-30.57W
2021-WTE-145-OE	20210129-30	656	1384	41-00-34.70N	84-30-06.47W
2021-WTE-146-OE	20210129-31	656	1386	41-00-35.52N	84-29-22.91W
2021-WTE-147-OE	20210129-32	656	1383	41-00-37.96N	84-28-54.19W

2021-WTE-148-OE / 20210129-33 / 656 / 1382 / 41-00-54.25N / 84-28-07.10W
2021-WTE-149-OE / 20210129-34 / 656 / 1381 / 41-00-44.49N / 84-28-08.43W
2021-WTE-150-OE / 20210129-35 / 656 / 1383 / 41-00-32.56N / 84-28-12.16W
2021-WTE-151-OE / 20210129-36 / 656 / 1382 / 41-00-30.53N / 84-27-51.17W

2021-WTE-152-OE / 20210129-37 / 656 / 1389 / 40-59-38.09N / 84-30-28.20W
2021-WTE-153-OE / 20210129-38 / 656 / 1384 / 40-59-57.53N / 84-29-11.57W
2021-WTE-154-OE / 20210129-39 / 656 / 1384 / 41-02-39.83N / 84-30-05.48W
2021-WTE-155-OE / 20210129-40 / 656 / 1382 / 41-02-28.32N / 84-30-35.47W
2021-WTE-156-OE / 20210129-41 / 656 / 1380 / 41-01-48.86N / 84-29-26.86W
2021-WTE-157-OE / 20210129-42 / 656 / 1384 / 41-00-44.10N / 84-30-05.63W
2021-WTE-158-OE / 20210129-43 / 656 / 1387 / 40-59-57.76N / 84-28-53.84W

2. OBSTRUCTION STANDARDS EXCEEDED

The following proposed turbines would exceed Part 77 standards as described below.

a. Section 77.17(a)(1): Section 77.17(a)(1): Exceeds a height of 499 feet AGL at the site of the object. All proposed structures would exceed this surface by 157 feet.

b. Section 77.17(a)(4) -- A height within an en route obstacle clearance area, including turn and termination areas, of a Federal Airway or approved off-airway route, that would increase the IFR en route minimum obstacle clearance altitude

The following proposed structures would have the following effect: HUUVR ONE ARRIVAL (RNAV) Increase Minimum Obstruction Clearance Altitude (MOCA) from MSKTS to JJUST from 2300 feet to 2400 feet AMSL. (Procedure serves KAKR KCAK 1G3). The height at which there is no effect is at or below 1300 feet AMSL

2021-WTE-140-OE
2021-WTE-142-OE
2021-WTE-143-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

3. VFR ROUTE

VFR en route is evaluated in accordance with Part 77 Section 77.29 (a)(1): the impact on arrival, departure, and en route procedures for aircraft operating under visual flight rules.

At 656 feet AGL, the following structures would extend into airspace normally utilized for VFR en route flight by 157 feet. The structures would be located within 2 statute miles of a VFR Route as defined by JO 7400.2M, Section 6-3-8 and would have an adverse effect upon VFR air navigation.

2021-WTE-142-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

4. RADAR IMPACTS

The FAA found that all 27 proposed wind turbines would have a Radar Line of Sight (RLOS) impact to the Airport Surveillance Radar (ASR) -9 at Fort Wayne, IN (FWA). Since they are visible to the ASR, they could cause unwanted primary-only returns (clutter) and primary-only target drops, all in the immediate area of the turbines. Also, tracked primary-only targets could diverge from the aircraft path and follow wind turbines, when the aircraft is over or near the turbines.
No effect will occur on the Secondary (Beacon) Radar System.

5. SPONSOR ACTIONS

To pursue the possibility of receiving a favorable determination at the originally requested height, further study would be necessary. Further study entails coordination with the affected air traffic control facilities in order to evaluate effects fully and potential mitigations for possible approval of your project. Further study will also involve a public notice circularization and 37-day comment period. The outcome cannot be predicted.

If you have questions regarding this Notice of Presumed Findings, you may contact Bill Ratts via email at (William.M.Ratts@faa.gov)

FURTHER STUDY HAS ALREADY BEEN REQUESTED.

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2021-WTE-144-OE

Issued Date: 06/02/2021

Matthias Weigel
Starwood Energy Group, LLC.
5 Greenwich Office Park
2nd Floor
Greenwich, CT 06831

**** NOTICE OF PRELIMINARY FINDINGS ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine 20210129-29
Location:	Grover Hill, OH
Latitude:	41-00-35.59N NAD 83
Longitude:	84-30-30.57W
Heights:	730 feet site elevation (SE)
	656 feet above ground level (AGL)
	1386 feet above mean sea level (AMSL)

Initial findings of this study indicate that the structure as described exceeds obstruction standards and/or would have an adverse physical or electromagnetic interference effect upon navigable airspace or air navigation facilities. Pending resolution of the issues described below, the structure is presumed to be a hazard to air navigation.

To pursue a favorable determination at the originally submitted height, further study would be necessary. Further study entails distribution to the public for comment, and may extend the study period up to 120 days. The outcome cannot be predicted prior to public circularization.

If you would like the FAA to conduct further study, you must make the request within 60 days from the date of issuance of this letter.

See Attachment for Additional information.

NOTE: PENDING RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE, THE STRUCTURE IS PRESUMED TO BE A HAZARD TO AIR NAVIGATION. THIS LETTER DOES NOT AUTHORIZE CONSTRUCTION OF THE STRUCTURE EVEN AT A REDUCED HEIGHT. ANY RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE MUST BE COMMUNICATED TO THE FAA SO THAT A FAVORABLE DETERMINATION CAN SUBSEQUENTLY BE ISSUED.

IF MORE THAN 60 DAYS FROM THE DATE OF THIS LETTER HAS ELAPSED WITHOUT ATTEMPTED RESOLUTION, IT WILL BE NECESSARY FOR YOU TO REACTIVATE THE STUDY BY FILING A NEW FAA FORM 7460-1, NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION.

If we can be of further assistance, please contact Bill Ratts, at (816) 329-2544, or William.M.Ratts@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-WTE-144-OE.

Signature Control No: 466829383-483476925 (NPF -WT)
Steve Phillips
Manager, Obstruction Evaluation Group

Attachment(s)
Additional Information

Abbreviations
AGL - above ground level
AMSL - above mean sea level
RWY - runway
VFR - visual flight rules
IFR - instrument flight rules
NM - nautical mile
ASN- Aeronautical Study Number
CAT - category aircraft
RNAV- area navigation
MDA - minimum descent altitude
Part 77 - Title 14 Code of Federal Regulations (CFR) Part 77, Safe, Efficient Use and Preservation of the Navigable Airspace

The proposed Grover Hill wind turbine project near Grover Hill, OH consists of 27 wind turbines and has been reviewed by the FAA under ASNs 2021-WTE-132-OE sequentially through 2021-WTE-158-OE.

The proposed wind turbine project lies approximately between 2.2 NM north northwest to 2.1 NM southwest from the town of Grover Hill, OH.

For the sake of efficiency, the 27 proposed wind turbines in this project that have similar impacts to 14 CFR Part 77 standards are included in this narrative.

1. LOCATION OF PROPOSED CONSTRUCTION

The Aeronautical Study Number (ASNs), Structure Names, Above Ground Level (AGL) heights, Above Mean Sea Level (AMSL) heights and coordinates for each proposed structure are listed as follows:

ASN Structure Name AGL/AMSL LAT/LONG

2021-WTE-132-OE / 20210129-11 / 656 / 1381 / 41-02-39.16N / 84-30-35.30W
2021-WTE-133-OE / 20210129-12 / 656 / 1380 / 41-02-34.48N / 84-30-15.14W
2021-WTE-134-OE / 20210129-13 / 656 / 1376 / 41-02-24.96N / 84-30-07.54W
2021-WTE-135-OE / 20210129-14 / 656 / 1377 / 41-02-12.42N / 84-30-01.05W
2021-WTE-136-OE / 20210129-15 / 656 / 1380 / 41-02-12.09N / 84-29-25.08W
2021-WTE-137-OE / 20210129-16 / 656 / 1379 / 41-02-09.99N / 84-28-57.10W
2021-WTE-138-OE / 20210129-17 / 656 / 1383 / 41-01-47.59N / 84-30-28.07W
2021-WTE-139-OE / 20210129-22 / 656 / 1381 / 41-01-47.39N / 84-29-10.01W
2021-WTE-140-OE / 20210129-25 / 656 / 1381 / 41-01-35.08N / 84-29-00.37W
2021-WTE-141-OE / 20210129-26 / 656 / 1381 / 41-01-50.39N / 84-28-56.14W

2021-WTE-142-OE / 20210129-27 / 656 / 1386 / 41-00-53.14N / 84-30-34.67W
2021-WTE-143-OE / 20210129-28 / 656 / 1384 / 41-00-53.49N / 84-30-06.23W
2021-WTE-144-OE / 20210129-29 / 656 / 1386 / 41-00-35.59N / 84-30-30.57W
2021-WTE-145-OE / 20210129-30 / 656 / 1384 / 41-00-34.70N / 84-30-06.47W
2021-WTE-146-OE / 20210129-31 / 656 / 1386 / 41-00-35.52N / 84-29-22.91W
2021-WTE-147-OE / 20210129-32 / 656 / 1383 / 41-00-37.96N / 84-28-54.19W

2021-WTE-148-OE / 20210129-33 / 656 / 1382 / 41-00-54.25N / 84-28-07.10W
2021-WTE-149-OE / 20210129-34 / 656 / 1381 / 41-00-44.49N / 84-28-08.43W
2021-WTE-150-OE / 20210129-35 / 656 / 1383 / 41-00-32.56N / 84-28-12.16W
2021-WTE-151-OE / 20210129-36 / 656 / 1382 / 41-00-30.53N / 84-27-51.17W

2021-WTE-152-OE / 20210129-37 / 656 / 1389 / 40-59-38.09N / 84-30-28.20W
2021-WTE-153-OE / 20210129-38 / 656 / 1384 / 40-59-57.53N / 84-29-11.57W
2021-WTE-154-OE / 20210129-39 / 656 / 1384 / 41-02-39.83N / 84-30-05.48W
2021-WTE-155-OE / 20210129-40 / 656 / 1382 / 41-02-28.32N / 84-30-35.47W
2021-WTE-156-OE / 20210129-41 / 656 / 1380 / 41-01-48.86N / 84-29-26.86W
2021-WTE-157-OE / 20210129-42 / 656 / 1384 / 41-00-44.10N / 84-30-05.63W
2021-WTE-158-OE / 20210129-43 / 656 / 1387 / 40-59-57.76N / 84-28-53.84W

2. OBSTRUCTION STANDARDS EXCEEDED

The following proposed turbines would exceed Part 77 standards as described below.

a. Section 77.17(a)(1): Section 77.17(a)(1): Exceeds a height of 499 feet AGL at the site of the object. All proposed structures would exceed this surface by 157 feet.

b. Section 77.17(a)(4) -- A height within an en route obstacle clearance area, including turn and termination areas, of a Federal Airway or approved off-airway route, that would increase the IFR en route minimum obstacle clearance altitude

The following proposed structures would have the following effect: HUUVR ONE ARRIVAL (RNAV) Increase Minimum Obstruction Clearance Altitude (MOCA) from MSKTS to JJUST from 2300 feet to 2400 feet AMSL. (Procedure serves KAKR KCAK 1G3). The height at which there is no effect is at or below 1300 feet AMSL

2021-WTE-140-OE
2021-WTE-142-OE
2021-WTE-143-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

3. VFR ROUTE

VFR en route is evaluated in accordance with Part 77 Section 77.29 (a)(1): the impact on arrival, departure, and en route procedures for aircraft operating under visual flight rules.

At 656 feet AGL, the following structures would extend into airspace normally utilized for VFR en route flight by 157 feet. The structures would be located within 2 statute miles of a VFR Route as defined by JO 7400.2M, Section 6-3-8 and would have an adverse effect upon VFR air navigation.

2021-WTE-142-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

4. RADAR IMPACTS

The FAA found that all 27 proposed wind turbines would have a Radar Line of Sight (RLOS) impact to the Airport Surveillance Radar (ASR) -9 at Fort Wayne, IN (FWA). Since they are visible to the ASR, they could cause unwanted primary-only returns (clutter) and primary-only target drops, all in the immediate area of the turbines. Also, tracked primary-only targets could diverge from the aircraft path and follow wind turbines, when the aircraft is over or near the turbines.
No effect will occur on the Secondary (Beacon) Radar System.

5. SPONSOR ACTIONS

To pursue the possibility of receiving a favorable determination at the originally requested height, further study would be necessary. Further study entails coordination with the affected air traffic control facilities in order to evaluate effects fully and potential mitigations for possible approval of your project. Further study will also involve a public notice circularization and 37-day comment period. The outcome cannot be predicted.

If you have questions regarding this Notice of Presumed Findings, you may contact Bill Ratts via email at (William.M.Ratts@faa.gov)

FURTHER STUDY HAS ALREADY BEEN REQUESTED.

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2021-WTE-145-OE

Issued Date: 06/02/2021

Matthias Weigel
Starwood Energy Group, LLC.
5 Greenwich Office Park
2nd Floor
Greenwich, CT 06831

**** NOTICE OF PRELIMINARY FINDINGS ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine 20210129-30
Location:	Grover Hill, OH
Latitude:	41-00-34.70N NAD 83
Longitude:	84-30-06.47W
Heights:	728 feet site elevation (SE) 656 feet above ground level (AGL) 1384 feet above mean sea level (AMSL)

Initial findings of this study indicate that the structure as described exceeds obstruction standards and/or would have an adverse physical or electromagnetic interference effect upon navigable airspace or air navigation facilities. Pending resolution of the issues described below, the structure is presumed to be a hazard to air navigation.

To pursue a favorable determination at the originally submitted height, further study would be necessary. Further study entails distribution to the public for comment, and may extend the study period up to 120 days. The outcome cannot be predicted prior to public circularization.

If you would like the FAA to conduct further study, you must make the request within 60 days from the date of issuance of this letter.

See Attachment for Additional information.

NOTE: PENDING RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE, THE STRUCTURE IS PRESUMED TO BE A HAZARD TO AIR NAVIGATION. THIS LETTER DOES NOT AUTHORIZE CONSTRUCTION OF THE STRUCTURE EVEN AT A REDUCED HEIGHT. ANY RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE MUST BE COMMUNICATED TO THE FAA SO THAT A FAVORABLE DETERMINATION CAN SUBSEQUENTLY BE ISSUED.

IF MORE THAN 60 DAYS FROM THE DATE OF THIS LETTER HAS ELAPSED WITHOUT ATTEMPTED RESOLUTION, IT WILL BE NECESSARY FOR YOU TO REACTIVATE THE STUDY BY FILING A NEW FAA FORM 7460-1, NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION.

If we can be of further assistance, please contact Bill Ratts, at (816) 329-2544, or William.M.Ratts@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-WTE-145-OE.

Signature Control No: 466829384-483476933 (NPF -WT)
Steve Phillips
Manager, Obstruction Evaluation Group

Attachment(s)
Additional Information

Abbreviations
AGL - above ground level
AMSL - above mean sea level
RWY - runway
VFR - visual flight rules
IFR - instrument flight rules
NM - nautical mile
ASN- Aeronautical Study Number
CAT - category aircraft
RNAV- area navigation
MDA - minimum descent altitude
Part 77 - Title 14 Code of Federal Regulations (CFR) Part 77, Safe, Efficient Use and Preservation of the Navigable Airspace

The proposed Grover Hill wind turbine project near Grover Hill, OH consists of 27 wind turbines and has been reviewed by the FAA under ASNs 2021-WTE-132-OE sequentially through 2021-WTE-158-OE.

The proposed wind turbine project lies approximately between 2.2 NM north northwest to 2.1 NM southwest from the town of Grover Hill, OH.

For the sake of efficiency, the 27 proposed wind turbines in this project that have similar impacts to 14 CFR Part 77 standards are included in this narrative.

1. LOCATION OF PROPOSED CONSTRUCTION

The Aeronautical Study Number (ASNs), Structure Names, Above Ground Level (AGL) heights, Above Mean Sea Level (AMSL) heights and coordinates for each proposed structure are listed as follows:

ASN	Structure Name	AGL	AMSL	LAT	LONG
2021-WTE-132-OE	20210129-11	656	1381	41-02-39.16N	84-30-35.30W
2021-WTE-133-OE	20210129-12	656	1380	41-02-34.48N	84-30-15.14W
2021-WTE-134-OE	20210129-13	656	1376	41-02-24.96N	84-30-07.54W
2021-WTE-135-OE	20210129-14	656	1377	41-02-12.42N	84-30-01.05W
2021-WTE-136-OE	20210129-15	656	1380	41-02-12.09N	84-29-25.08W
2021-WTE-137-OE	20210129-16	656	1379	41-02-09.99N	84-28-57.10W
2021-WTE-138-OE	20210129-17	656	1383	41-01-47.59N	84-30-28.07W
2021-WTE-139-OE	20210129-22	656	1381	41-01-47.39N	84-29-10.01W
2021-WTE-140-OE	20210129-25	656	1381	41-01-35.08N	84-29-00.37W
2021-WTE-141-OE	20210129-26	656	1381	41-01-50.39N	84-28-56.14W
2021-WTE-142-OE	20210129-27	656	1386	41-00-53.14N	84-30-34.67W
2021-WTE-143-OE	20210129-28	656	1384	41-00-53.49N	84-30-06.23W
2021-WTE-144-OE	20210129-29	656	1386	41-00-35.59N	84-30-30.57W
2021-WTE-145-OE	20210129-30	656	1384	41-00-34.70N	84-30-06.47W
2021-WTE-146-OE	20210129-31	656	1386	41-00-35.52N	84-29-22.91W
2021-WTE-147-OE	20210129-32	656	1383	41-00-37.96N	84-28-54.19W

2021-WTE-148-OE	20210129-33	656	1382	41-00-54.25N	84-28-07.10W
2021-WTE-149-OE	20210129-34	656	1381	41-00-44.49N	84-28-08.43W
2021-WTE-150-OE	20210129-35	656	1383	41-00-32.56N	84-28-12.16W
2021-WTE-151-OE	20210129-36	656	1382	41-00-30.53N	84-27-51.17W
2021-WTE-152-OE	20210129-37	656	1389	40-59-38.09N	84-30-28.20W
2021-WTE-153-OE	20210129-38	656	1384	40-59-57.53N	84-29-11.57W
2021-WTE-154-OE	20210129-39	656	1384	41-02-39.83N	84-30-05.48W
2021-WTE-155-OE	20210129-40	656	1382	41-02-28.32N	84-30-35.47W
2021-WTE-156-OE	20210129-41	656	1380	41-01-48.86N	84-29-26.86W
2021-WTE-157-OE	20210129-42	656	1384	41-00-44.10N	84-30-05.63W
2021-WTE-158-OE	20210129-43	656	1387	40-59-57.76N	84-28-53.84W

2. OBSTRUCTION STANDARDS EXCEEDED

The following proposed turbines would exceed Part 77 standards as described below.

a. Section 77.17(a)(1): Section 77.17(a)(1): Exceeds a height of 499 feet AGL at the site of the object. All proposed structures would exceed this surface by 157 feet.

b. Section 77.17(a)(4) -- A height within an en route obstacle clearance area, including turn and termination areas, of a Federal Airway or approved off-airway route, that would increase the IFR en route minimum obstacle clearance altitude

The following proposed structures would have the following effect: HUUVR ONE ARRIVAL (RNAV) Increase Minimum Obstruction Clearance Altitude (MOCA) from MSKTS to JJUST from 2300 feet to 2400 feet AMSL. (Procedure serves KAKR KCAK 1G3). The height at which there is no effect is at or below 1300 feet AMSL

2021-WTE-140-OE
2021-WTE-142-OE
2021-WTE-143-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

3. VFR ROUTE

VFR en route is evaluated in accordance with Part 77 Section 77.29 (a)(1): the impact on arrival, departure, and en route procedures for aircraft operating under visual flight rules.

At 656 feet AGL, the following structures would extend into airspace normally utilized for VFR en route flight by 157 feet. The structures would be located within 2 statute miles of a VFR Route as defined by JO 7400.2M, Section 6-3-8 and would have an adverse effect upon VFR air navigation.

2021-WTE-142-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

4. RADAR IMPACTS

The FAA found that all 27 proposed wind turbines would have a Radar Line of Sight (RLOS) impact to the Airport Surveillance Radar (ASR) -9 at Fort Wayne, IN (FWA). Since they are visible to the ASR, they could cause unwanted primary-only returns (clutter) and primary-only target drops, all in the immediate area of the turbines. Also, tracked primary-only targets could diverge from the aircraft path and follow wind turbines, when the aircraft is over or near the turbines.
No effect will occur on the Secondary (Beacon) Radar System.

5. SPONSOR ACTIONS

To pursue the possibility of receiving a favorable determination at the originally requested height, further study would be necessary. Further study entails coordination with the affected air traffic control facilities in order to evaluate effects fully and potential mitigations for possible approval of your project. Further study will also involve a public notice circularization and 37-day comment period. The outcome cannot be predicted.

If you have questions regarding this Notice of Presumed Findings, you may contact Bill Ratts via email at (William.M.Ratts@faa.gov)

FURTHER STUDY HAS ALREADY BEEN REQUESTED.

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2021-WTE-146-OE

Issued Date: 06/02/2021

Matthias Weigel
Starwood Energy Group, LLC.
5 Greenwich Office Park
2nd Floor
Greenwich, CT 06831

**** NOTICE OF PRELIMINARY FINDINGS ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine 20210129-31
Location:	Grover Hill, OH
Latitude:	41-00-35.52N NAD 83
Longitude:	84-29-22.91W
Heights:	730 feet site elevation (SE)
	656 feet above ground level (AGL)
	1386 feet above mean sea level (AMSL)

Initial findings of this study indicate that the structure as described exceeds obstruction standards and/or would have an adverse physical or electromagnetic interference effect upon navigable airspace or air navigation facilities. Pending resolution of the issues described below, the structure is presumed to be a hazard to air navigation.

To pursue a favorable determination at the originally submitted height, further study would be necessary. Further study entails distribution to the public for comment, and may extend the study period up to 120 days. The outcome cannot be predicted prior to public circularization.

If you would like the FAA to conduct further study, you must make the request within 60 days from the date of issuance of this letter.

See Attachment for Additional information.

NOTE: PENDING RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE, THE STRUCTURE IS PRESUMED TO BE A HAZARD TO AIR NAVIGATION. THIS LETTER DOES NOT AUTHORIZE CONSTRUCTION OF THE STRUCTURE EVEN AT A REDUCED HEIGHT. ANY RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE MUST BE COMMUNICATED TO THE FAA SO THAT A FAVORABLE DETERMINATION CAN SUBSEQUENTLY BE ISSUED.

IF MORE THAN 60 DAYS FROM THE DATE OF THIS LETTER HAS ELAPSED WITHOUT ATTEMPTED RESOLUTION, IT WILL BE NECESSARY FOR YOU TO REACTIVATE THE STUDY BY FILING A NEW FAA FORM 7460-1, NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION.

If we can be of further assistance, please contact Bill Ratts, at (816) 329-2544, or William.M.Ratts@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-WTE-146-OE.

Signature Control No: 466829385-483476929 (NPF -WT)
Steve Phillips
Manager, Obstruction Evaluation Group

Attachment(s)
Additional Information

Abbreviations
AGL - above ground level
AMSL - above mean sea level
RWY - runway
VFR - visual flight rules
IFR - instrument flight rules
NM - nautical mile
ASN- Aeronautical Study Number
CAT - category aircraft
RNAV- area navigation
MDA - minimum descent altitude
Part 77 - Title 14 Code of Federal Regulations (CFR) Part 77, Safe, Efficient Use and Preservation of the Navigable Airspace

The proposed Grover Hill wind turbine project near Grover Hill, OH consists of 27 wind turbines and has been reviewed by the FAA under ASNs 2021-WTE-132-OE sequentially through 2021-WTE-158-OE.

The proposed wind turbine project lies approximately between 2.2 NM north northwest to 2.1 NM southwest from the town of Grover Hill, OH.

For the sake of efficiency, the 27 proposed wind turbines in this project that have similar impacts to 14 CFR Part 77 standards are included in this narrative.

1. LOCATION OF PROPOSED CONSTRUCTION

The Aeronautical Study Number (ASNs), Structure Names, Above Ground Level (AGL) heights, Above Mean Sea Level (AMSL) heights and coordinates for each proposed structure are listed as follows:

ASN Structure Name AGL/AMSL LAT/LONG

2021-WTE-132-OE / 20210129-11 / 656 / 1381 / 41-02-39.16N / 84-30-35.30W
2021-WTE-133-OE / 20210129-12 / 656 / 1380 / 41-02-34.48N / 84-30-15.14W
2021-WTE-134-OE / 20210129-13 / 656 / 1376 / 41-02-24.96N / 84-30-07.54W
2021-WTE-135-OE / 20210129-14 / 656 / 1377 / 41-02-12.42N / 84-30-01.05W
2021-WTE-136-OE / 20210129-15 / 656 / 1380 / 41-02-12.09N / 84-29-25.08W
2021-WTE-137-OE / 20210129-16 / 656 / 1379 / 41-02-09.99N / 84-28-57.10W
2021-WTE-138-OE / 20210129-17 / 656 / 1383 / 41-01-47.59N / 84-30-28.07W
2021-WTE-139-OE / 20210129-22 / 656 / 1381 / 41-01-47.39N / 84-29-10.01W
2021-WTE-140-OE / 20210129-25 / 656 / 1381 / 41-01-35.08N / 84-29-00.37W
2021-WTE-141-OE / 20210129-26 / 656 / 1381 / 41-01-50.39N / 84-28-56.14W

2021-WTE-142-OE / 20210129-27 / 656 / 1386 / 41-00-53.14N / 84-30-34.67W
2021-WTE-143-OE / 20210129-28 / 656 / 1384 / 41-00-53.49N / 84-30-06.23W
2021-WTE-144-OE / 20210129-29 / 656 / 1386 / 41-00-35.59N / 84-30-30.57W
2021-WTE-145-OE / 20210129-30 / 656 / 1384 / 41-00-34.70N / 84-30-06.47W
2021-WTE-146-OE / 20210129-31 / 656 / 1386 / 41-00-35.52N / 84-29-22.91W
2021-WTE-147-OE / 20210129-32 / 656 / 1383 / 41-00-37.96N / 84-28-54.19W

2021-WTE-148-OE	20210129-33	656	1382	41-00-54.25N	84-28-07.10W
2021-WTE-149-OE	20210129-34	656	1381	41-00-44.49N	84-28-08.43W
2021-WTE-150-OE	20210129-35	656	1383	41-00-32.56N	84-28-12.16W
2021-WTE-151-OE	20210129-36	656	1382	41-00-30.53N	84-27-51.17W
2021-WTE-152-OE	20210129-37	656	1389	40-59-38.09N	84-30-28.20W
2021-WTE-153-OE	20210129-38	656	1384	40-59-57.53N	84-29-11.57W
2021-WTE-154-OE	20210129-39	656	1384	41-02-39.83N	84-30-05.48W
2021-WTE-155-OE	20210129-40	656	1382	41-02-28.32N	84-30-35.47W
2021-WTE-156-OE	20210129-41	656	1380	41-01-48.86N	84-29-26.86W
2021-WTE-157-OE	20210129-42	656	1384	41-00-44.10N	84-30-05.63W
2021-WTE-158-OE	20210129-43	656	1387	40-59-57.76N	84-28-53.84W

2. OBSTRUCTION STANDARDS EXCEEDED

The following proposed turbines would exceed Part 77 standards as described below.

a. Section 77.17(a)(1): Section 77.17(a)(1): Exceeds a height of 499 feet AGL at the site of the object. All proposed structures would exceed this surface by 157 feet.

b. Section 77.17(a)(4) -- A height within an en route obstacle clearance area, including turn and termination areas, of a Federal Airway or approved off-airway route, that would increase the IFR en route minimum obstacle clearance altitude

The following proposed structures would have the following effect: HUUVR ONE ARRIVAL (RNAV) Increase Minimum Obstruction Clearance Altitude (MOCA) from MSKTS to JJUST from 2300 feet to 2400 feet AMSL. (Procedure serves KAKR KCAK 1G3). The height at which there is no effect is at or below 1300 feet AMSL

2021-WTE-140-OE
2021-WTE-142-OE
2021-WTE-143-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

3. VFR ROUTE

VFR en route is evaluated in accordance with Part 77 Section 77.29 (a)(1): the impact on arrival, departure, and en route procedures for aircraft operating under visual flight rules.

At 656 feet AGL, the following structures would extend into airspace normally utilized for VFR en route flight by 157 feet. The structures would be located within 2 statute miles of a VFR Route as defined by JO 7400.2M, Section 6-3-8 and would have an adverse effect upon VFR air navigation.

2021-WTE-142-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

4. RADAR IMPACTS

The FAA found that all 27 proposed wind turbines would have a Radar Line of Sight (RLOS) impact to the Airport Surveillance Radar (ASR) -9 at Fort Wayne, IN (FWA). Since they are visible to the ASR, they could cause unwanted primary-only returns (clutter) and primary-only target drops, all in the immediate area of the turbines. Also, tracked primary-only targets could diverge from the aircraft path and follow wind turbines, when the aircraft is over or near the turbines.
No effect will occur on the Secondary (Beacon) Radar System.

5. SPONSOR ACTIONS

To pursue the possibility of receiving a favorable determination at the originally requested height, further study would be necessary. Further study entails coordination with the affected air traffic control facilities in order to evaluate effects fully and potential mitigations for possible approval of your project. Further study will also involve a public notice circularization and 37-day comment period. The outcome cannot be predicted.

If you have questions regarding this Notice of Presumed Findings, you may contact Bill Ratts via email at (William.M.Ratts@faa.gov)

FURTHER STUDY HAS ALREADY BEEN REQUESTED.

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2021-WTE-147-OE

Issued Date: 06/02/2021

Matthias Weigel
Starwood Energy Group, LLC.
5 Greenwich Office Park
2nd Floor
Greenwich, CT 06831

**** NOTICE OF PRELIMINARY FINDINGS ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine 20210129-32
Location:	Grover Hill, OH
Latitude:	41-00-37.96N NAD 83
Longitude:	84-28-54.19W
Heights:	727 feet site elevation (SE)
	656 feet above ground level (AGL)
	1383 feet above mean sea level (AMSL)

Initial findings of this study indicate that the structure as described exceeds obstruction standards and/or would have an adverse physical or electromagnetic interference effect upon navigable airspace or air navigation facilities. Pending resolution of the issues described below, the structure is presumed to be a hazard to air navigation.

To pursue a favorable determination at the originally submitted height, further study would be necessary. Further study entails distribution to the public for comment, and may extend the study period up to 120 days. The outcome cannot be predicted prior to public circularization.

If you would like the FAA to conduct further study, you must make the request within 60 days from the date of issuance of this letter.

See Attachment for Additional information.

NOTE: PENDING RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE, THE STRUCTURE IS PRESUMED TO BE A HAZARD TO AIR NAVIGATION. THIS LETTER DOES NOT AUTHORIZE CONSTRUCTION OF THE STRUCTURE EVEN AT A REDUCED HEIGHT. ANY RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE MUST BE COMMUNICATED TO THE FAA SO THAT A FAVORABLE DETERMINATION CAN SUBSEQUENTLY BE ISSUED.

IF MORE THAN 60 DAYS FROM THE DATE OF THIS LETTER HAS ELAPSED WITHOUT ATTEMPTED RESOLUTION, IT WILL BE NECESSARY FOR YOU TO REACTIVATE THE STUDY BY FILING A NEW FAA FORM 7460-1, NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION.

If we can be of further assistance, please contact Bill Ratts, at (816) 329-2544, or William.M.Ratts@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-WTE-147-OE.

Signature Control No: 466829386-483476937 (NPF -WT)

Steve Phillips
Manager, Obstruction Evaluation Group

Attachment(s)
Additional Information

Abbreviations
AGL - above ground level
AMSL - above mean sea level
RWY - runway
VFR - visual flight rules
IFR - instrument flight rules
NM - nautical mile
ASN- Aeronautical Study Number
CAT - category aircraft
RNAV- area navigation
MDA - minimum descent altitude
Part 77 - Title 14 Code of Federal Regulations (CFR) Part 77, Safe, Efficient Use and Preservation of the Navigable Airspace

The proposed Grover Hill wind turbine project near Grover Hill, OH consists of 27 wind turbines and has been reviewed by the FAA under ASNs 2021-WTE-132-OE sequentially through 2021-WTE-158-OE.

The proposed wind turbine project lies approximately between 2.2 NM north northwest to 2.1 NM southwest from the town of Grover Hill, OH.

For the sake of efficiency, the 27 proposed wind turbines in this project that have similar impacts to 14 CFR Part 77 standards are included in this narrative.

1. LOCATION OF PROPOSED CONSTRUCTION

The Aeronautical Study Number (ASNs), Structure Names, Above Ground Level (AGL) heights, Above Mean Sea Level (AMSL) heights and coordinates for each proposed structure are listed as follows:

ASN Structure Name AGL/AMSL LAT/LONG

2021-WTE-132-OE / 20210129-11 / 656 / 1381 / 41-02-39.16N / 84-30-35.30W
2021-WTE-133-OE / 20210129-12 / 656 / 1380 / 41-02-34.48N / 84-30-15.14W
2021-WTE-134-OE / 20210129-13 / 656 / 1376 / 41-02-24.96N / 84-30-07.54W
2021-WTE-135-OE / 20210129-14 / 656 / 1377 / 41-02-12.42N / 84-30-01.05W
2021-WTE-136-OE / 20210129-15 / 656 / 1380 / 41-02-12.09N / 84-29-25.08W
2021-WTE-137-OE / 20210129-16 / 656 / 1379 / 41-02-09.99N / 84-28-57.10W
2021-WTE-138-OE / 20210129-17 / 656 / 1383 / 41-01-47.59N / 84-30-28.07W
2021-WTE-139-OE / 20210129-22 / 656 / 1381 / 41-01-47.39N / 84-29-10.01W
2021-WTE-140-OE / 20210129-25 / 656 / 1381 / 41-01-35.08N / 84-29-00.37W
2021-WTE-141-OE / 20210129-26 / 656 / 1381 / 41-01-50.39N / 84-28-56.14W

2021-WTE-142-OE / 20210129-27 / 656 / 1386 / 41-00-53.14N / 84-30-34.67W
2021-WTE-143-OE / 20210129-28 / 656 / 1384 / 41-00-53.49N / 84-30-06.23W
2021-WTE-144-OE / 20210129-29 / 656 / 1386 / 41-00-35.59N / 84-30-30.57W
2021-WTE-145-OE / 20210129-30 / 656 / 1384 / 41-00-34.70N / 84-30-06.47W
2021-WTE-146-OE / 20210129-31 / 656 / 1386 / 41-00-35.52N / 84-29-22.91W
2021-WTE-147-OE / 20210129-32 / 656 / 1383 / 41-00-37.96N / 84-28-54.19W

2021-WTE-148-OE / 20210129-33 / 656 / 1382 / 41-00-54.25N / 84-28-07.10W
2021-WTE-149-OE / 20210129-34 / 656 / 1381 / 41-00-44.49N / 84-28-08.43W
2021-WTE-150-OE / 20210129-35 / 656 / 1383 / 41-00-32.56N / 84-28-12.16W
2021-WTE-151-OE / 20210129-36 / 656 / 1382 / 41-00-30.53N / 84-27-51.17W

2021-WTE-152-OE / 20210129-37 / 656 / 1389 / 40-59-38.09N / 84-30-28.20W
2021-WTE-153-OE / 20210129-38 / 656 / 1384 / 40-59-57.53N / 84-29-11.57W
2021-WTE-154-OE / 20210129-39 / 656 / 1384 / 41-02-39.83N / 84-30-05.48W
2021-WTE-155-OE / 20210129-40 / 656 / 1382 / 41-02-28.32N / 84-30-35.47W
2021-WTE-156-OE / 20210129-41 / 656 / 1380 / 41-01-48.86N / 84-29-26.86W
2021-WTE-157-OE / 20210129-42 / 656 / 1384 / 41-00-44.10N / 84-30-05.63W
2021-WTE-158-OE / 20210129-43 / 656 / 1387 / 40-59-57.76N / 84-28-53.84W

2. OBSTRUCTION STANDARDS EXCEEDED

The following proposed turbines would exceed Part 77 standards as described below.

a. Section 77.17(a)(1): Section 77.17(a)(1): Exceeds a height of 499 feet AGL at the site of the object. All proposed structures would exceed this surface by 157 feet.

b. Section 77.17(a)(4) -- A height within an en route obstacle clearance area, including turn and termination areas, of a Federal Airway or approved off-airway route, that would increase the IFR en route minimum obstacle clearance altitude

The following proposed structures would have the following effect: HUUVR ONE ARRIVAL (RNAV) Increase Minimum Obstruction Clearance Altitude (MOCA) from MSKTS to JJUST from 2300 feet to 2400 feet AMSL. (Procedure serves KAKR KCAK 1G3). The height at which there is no effect is at or below 1300 feet AMSL

2021-WTE-140-OE
2021-WTE-142-OE
2021-WTE-143-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

3. VFR ROUTE

VFR en route is evaluated in accordance with Part 77 Section 77.29 (a)(1): the impact on arrival, departure, and en route procedures for aircraft operating under visual flight rules.

At 656 feet AGL, the following structures would extend into airspace normally utilized for VFR en route flight by 157 feet. The structures would be located within 2 statute miles of a VFR Route as defined by JO 7400.2M, Section 6-3-8 and would have an adverse effect upon VFR air navigation.

2021-WTE-142-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

4. RADAR IMPACTS

The FAA found that all 27 proposed wind turbines would have a Radar Line of Sight (RLOS) impact to the Airport Surveillance Radar (ASR) -9 at Fort Wayne, IN (FWA). Since they are visible to the ASR, they could cause unwanted primary-only returns (clutter) and primary-only target drops, all in the immediate area of the turbines. Also, tracked primary-only targets could diverge from the aircraft path and follow wind turbines, when the aircraft is over or near the turbines.
No effect will occur on the Secondary (Beacon) Radar System.

5. SPONSOR ACTIONS

To pursue the possibility of receiving a favorable determination at the originally requested height, further study would be necessary. Further study entails coordination with the affected air traffic control facilities in order to evaluate effects fully and potential mitigations for possible approval of your project. Further study will also involve a public notice circularization and 37-day comment period. The outcome cannot be predicted.

If you have questions regarding this Notice of Presumed Findings, you may contact Bill Ratts via email at (William.M.Ratts@faa.gov)

FURTHER STUDY HAS ALREADY BEEN REQUESTED.

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2021-WTE-148-OE

Issued Date: 06/02/2021

Matthias Weigel
Starwood Energy Group, LLC.
5 Greenwich Office Park
2nd Floor
Greenwich, CT 06831

**** NOTICE OF PRELIMINARY FINDINGS ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine 20210129-33
Location:	Grover Hill, OH
Latitude:	41-00-54.25N NAD 83
Longitude:	84-28-07.10W
Heights:	726 feet site elevation (SE)
	656 feet above ground level (AGL)
	1382 feet above mean sea level (AMSL)

Initial findings of this study indicate that the structure as described exceeds obstruction standards and/or would have an adverse physical or electromagnetic interference effect upon navigable airspace or air navigation facilities. Pending resolution of the issues described below, the structure is presumed to be a hazard to air navigation.

To pursue a favorable determination at the originally submitted height, further study would be necessary. Further study entails distribution to the public for comment, and may extend the study period up to 120 days. The outcome cannot be predicted prior to public circularization.

If you would like the FAA to conduct further study, you must make the request within 60 days from the date of issuance of this letter.

See Attachment for Additional information.

NOTE: PENDING RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE, THE STRUCTURE IS PRESUMED TO BE A HAZARD TO AIR NAVIGATION. THIS LETTER DOES NOT AUTHORIZE CONSTRUCTION OF THE STRUCTURE EVEN AT A REDUCED HEIGHT. ANY RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE MUST BE COMMUNICATED TO THE FAA SO THAT A FAVORABLE DETERMINATION CAN SUBSEQUENTLY BE ISSUED.

IF MORE THAN 60 DAYS FROM THE DATE OF THIS LETTER HAS ELAPSED WITHOUT ATTEMPTED RESOLUTION, IT WILL BE NECESSARY FOR YOU TO REACTIVATE THE STUDY BY FILING A NEW FAA FORM 7460-1, NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION.

If we can be of further assistance, please contact Bill Ratts, at (816) 329-2544, or William.M.Ratts@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-WTE-148-OE.

Signature Control No: 466829387-483476943 (NPF -WT)

Steve Phillips
Manager, Obstruction Evaluation Group

Attachment(s)
Additional Information

Abbreviations
AGL - above ground level
AMSL - above mean sea level
RWY - runway
VFR - visual flight rules
IFR - instrument flight rules
NM - nautical mile
ASN- Aeronautical Study Number
CAT - category aircraft
RNAV- area navigation
MDA - minimum descent altitude
Part 77 - Title 14 Code of Federal Regulations (CFR) Part 77, Safe, Efficient Use and Preservation of the Navigable Airspace

The proposed Grover Hill wind turbine project near Grover Hill, OH consists of 27 wind turbines and has been reviewed by the FAA under ASNs 2021-WTE-132-OE sequentially through 2021-WTE-158-OE.

The proposed wind turbine project lies approximately between 2.2 NM north northwest to 2.1 NM southwest from the town of Grover Hill, OH.

For the sake of efficiency, the 27 proposed wind turbines in this project that have similar impacts to 14 CFR Part 77 standards are included in this narrative.

1. LOCATION OF PROPOSED CONSTRUCTION

The Aeronautical Study Number (ASNs), Structure Names, Above Ground Level (AGL) heights, Above Mean Sea Level (AMSL) heights and coordinates for each proposed structure are listed as follows:

ASN Structure Name AGL/AMSL LAT/LONG

2021-WTE-132-OE / 20210129-11 / 656 / 1381 / 41-02-39.16N / 84-30-35.30W
2021-WTE-133-OE / 20210129-12 / 656 / 1380 / 41-02-34.48N / 84-30-15.14W
2021-WTE-134-OE / 20210129-13 / 656 / 1376 / 41-02-24.96N / 84-30-07.54W
2021-WTE-135-OE / 20210129-14 / 656 / 1377 / 41-02-12.42N / 84-30-01.05W
2021-WTE-136-OE / 20210129-15 / 656 / 1380 / 41-02-12.09N / 84-29-25.08W
2021-WTE-137-OE / 20210129-16 / 656 / 1379 / 41-02-09.99N / 84-28-57.10W
2021-WTE-138-OE / 20210129-17 / 656 / 1383 / 41-01-47.59N / 84-30-28.07W
2021-WTE-139-OE / 20210129-22 / 656 / 1381 / 41-01-47.39N / 84-29-10.01W
2021-WTE-140-OE / 20210129-25 / 656 / 1381 / 41-01-35.08N / 84-29-00.37W
2021-WTE-141-OE / 20210129-26 / 656 / 1381 / 41-01-50.39N / 84-28-56.14W

2021-WTE-142-OE / 20210129-27 / 656 / 1386 / 41-00-53.14N / 84-30-34.67W
2021-WTE-143-OE / 20210129-28 / 656 / 1384 / 41-00-53.49N / 84-30-06.23W
2021-WTE-144-OE / 20210129-29 / 656 / 1386 / 41-00-35.59N / 84-30-30.57W
2021-WTE-145-OE / 20210129-30 / 656 / 1384 / 41-00-34.70N / 84-30-06.47W
2021-WTE-146-OE / 20210129-31 / 656 / 1386 / 41-00-35.52N / 84-29-22.91W
2021-WTE-147-OE / 20210129-32 / 656 / 1383 / 41-00-37.96N / 84-28-54.19W

2021-WTE-148-OE / 20210129-33 / 656 / 1382 / 41-00-54.25N / 84-28-07.10W
2021-WTE-149-OE / 20210129-34 / 656 / 1381 / 41-00-44.49N / 84-28-08.43W
2021-WTE-150-OE / 20210129-35 / 656 / 1383 / 41-00-32.56N / 84-28-12.16W
2021-WTE-151-OE / 20210129-36 / 656 / 1382 / 41-00-30.53N / 84-27-51.17W

2021-WTE-152-OE / 20210129-37 / 656 / 1389 / 40-59-38.09N / 84-30-28.20W
2021-WTE-153-OE / 20210129-38 / 656 / 1384 / 40-59-57.53N / 84-29-11.57W
2021-WTE-154-OE / 20210129-39 / 656 / 1384 / 41-02-39.83N / 84-30-05.48W
2021-WTE-155-OE / 20210129-40 / 656 / 1382 / 41-02-28.32N / 84-30-35.47W
2021-WTE-156-OE / 20210129-41 / 656 / 1380 / 41-01-48.86N / 84-29-26.86W
2021-WTE-157-OE / 20210129-42 / 656 / 1384 / 41-00-44.10N / 84-30-05.63W
2021-WTE-158-OE / 20210129-43 / 656 / 1387 / 40-59-57.76N / 84-28-53.84W

2. OBSTRUCTION STANDARDS EXCEEDED

The following proposed turbines would exceed Part 77 standards as described below.

a. Section 77.17(a)(1): Section 77.17(a)(1): Exceeds a height of 499 feet AGL at the site of the object. All proposed structures would exceed this surface by 157 feet.

b. Section 77.17(a)(4) -- A height within an en route obstacle clearance area, including turn and termination areas, of a Federal Airway or approved off-airway route, that would increase the IFR en route minimum obstacle clearance altitude

The following proposed structures would have the following effect: HUUVR ONE ARRIVAL (RNAV) Increase Minimum Obstruction Clearance Altitude (MOCA) from MSKTS to JJUST from 2300 feet to 2400 feet AMSL. (Procedure serves KAKR KCAK 1G3). The height at which there is no effect is at or below 1300 feet AMSL

2021-WTE-140-OE
2021-WTE-142-OE
2021-WTE-143-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

3. VFR ROUTE

VFR en route is evaluated in accordance with Part 77 Section 77.29 (a)(1): the impact on arrival, departure, and en route procedures for aircraft operating under visual flight rules.

At 656 feet AGL, the following structures would extend into airspace normally utilized for VFR en route flight by 157 feet. The structures would be located within 2 statute miles of a VFR Route as defined by JO 7400.2M, Section 6-3-8 and would have an adverse effect upon VFR air navigation.

2021-WTE-142-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

4. RADAR IMPACTS

The FAA found that all 27 proposed wind turbines would have a Radar Line of Sight (RLOS) impact to the Airport Surveillance Radar (ASR) -9 at Fort Wayne, IN (FWA). Since they are visible to the ASR, they could cause unwanted primary-only returns (clutter) and primary-only target drops, all in the immediate area of the turbines. Also, tracked primary-only targets could diverge from the aircraft path and follow wind turbines, when the aircraft is over or near the turbines.
No effect will occur on the Secondary (Beacon) Radar System.

5. SPONSOR ACTIONS

To pursue the possibility of receiving a favorable determination at the originally requested height, further study would be necessary. Further study entails coordination with the affected air traffic control facilities in order to evaluate effects fully and potential mitigations for possible approval of your project. Further study will also involve a public notice circularization and 37-day comment period. The outcome cannot be predicted.

If you have questions regarding this Notice of Presumed Findings, you may contact Bill Ratts via email at (William.M.Ratts@faa.gov)

FURTHER STUDY HAS ALREADY BEEN REQUESTED.

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2021-WTE-149-OE

Issued Date: 06/02/2021

Matthias Weigel
Starwood Energy Group, LLC.
5 Greenwich Office Park
2nd Floor
Greenwich, CT 06831

**** NOTICE OF PRELIMINARY FINDINGS ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine 20210129-34
Location:	Grover Hill, OH
Latitude:	41-00-44.49N NAD 83
Longitude:	84-28-08.43W
Heights:	725 feet site elevation (SE)
	656 feet above ground level (AGL)
	1381 feet above mean sea level (AMSL)

Initial findings of this study indicate that the structure as described exceeds obstruction standards and/or would have an adverse physical or electromagnetic interference effect upon navigable airspace or air navigation facilities. Pending resolution of the issues described below, the structure is presumed to be a hazard to air navigation.

To pursue a favorable determination at the originally submitted height, further study would be necessary. Further study entails distribution to the public for comment, and may extend the study period up to 120 days. The outcome cannot be predicted prior to public circularization.

If you would like the FAA to conduct further study, you must make the request within 60 days from the date of issuance of this letter.

See Attachment for Additional information.

NOTE: PENDING RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE, THE STRUCTURE IS PRESUMED TO BE A HAZARD TO AIR NAVIGATION. THIS LETTER DOES NOT AUTHORIZE CONSTRUCTION OF THE STRUCTURE EVEN AT A REDUCED HEIGHT. ANY RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE MUST BE COMMUNICATED TO THE FAA SO THAT A FAVORABLE DETERMINATION CAN SUBSEQUENTLY BE ISSUED.

IF MORE THAN 60 DAYS FROM THE DATE OF THIS LETTER HAS ELAPSED WITHOUT ATTEMPTED RESOLUTION, IT WILL BE NECESSARY FOR YOU TO REACTIVATE THE STUDY BY FILING A NEW FAA FORM 7460-1, NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION.

If we can be of further assistance, please contact Bill Ratts, at (816) 329-2544, or William.M.Ratts@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-WTE-149-OE.

Signature Control No: 466829388-483476944 (NPF -WT)
Steve Phillips
Manager, Obstruction Evaluation Group

Attachment(s)
Additional Information

Abbreviations
AGL - above ground level
AMSL - above mean sea level
RWY - runway
VFR - visual flight rules
IFR - instrument flight rules
NM - nautical mile
ASN- Aeronautical Study Number
CAT - category aircraft
RNAV- area navigation
MDA - minimum descent altitude
Part 77 - Title 14 Code of Federal Regulations (CFR) Part 77, Safe, Efficient Use and Preservation of the Navigable Airspace

The proposed Grover Hill wind turbine project near Grover Hill, OH consists of 27 wind turbines and has been reviewed by the FAA under ASNs 2021-WTE-132-OE sequentially through 2021-WTE-158-OE.

The proposed wind turbine project lies approximately between 2.2 NM north northwest to 2.1 NM southwest from the town of Grover Hill, OH.

For the sake of efficiency, the 27 proposed wind turbines in this project that have similar impacts to 14 CFR Part 77 standards are included in this narrative.

1. LOCATION OF PROPOSED CONSTRUCTION

The Aeronautical Study Number (ASNs), Structure Names, Above Ground Level (AGL) heights, Above Mean Sea Level (AMSL) heights and coordinates for each proposed structure are listed as follows:

ASN	Structure Name	AGL	AMSL	LAT	LONG
2021-WTE-132-OE	20210129-11	656	1381	41-02-39.16N	84-30-35.30W
2021-WTE-133-OE	20210129-12	656	1380	41-02-34.48N	84-30-15.14W
2021-WTE-134-OE	20210129-13	656	1376	41-02-24.96N	84-30-07.54W
2021-WTE-135-OE	20210129-14	656	1377	41-02-12.42N	84-30-01.05W
2021-WTE-136-OE	20210129-15	656	1380	41-02-12.09N	84-29-25.08W
2021-WTE-137-OE	20210129-16	656	1379	41-02-09.99N	84-28-57.10W
2021-WTE-138-OE	20210129-17	656	1383	41-01-47.59N	84-30-28.07W
2021-WTE-139-OE	20210129-22	656	1381	41-01-47.39N	84-29-10.01W
2021-WTE-140-OE	20210129-25	656	1381	41-01-35.08N	84-29-00.37W
2021-WTE-141-OE	20210129-26	656	1381	41-01-50.39N	84-28-56.14W
2021-WTE-142-OE	20210129-27	656	1386	41-00-53.14N	84-30-34.67W
2021-WTE-143-OE	20210129-28	656	1384	41-00-53.49N	84-30-06.23W
2021-WTE-144-OE	20210129-29	656	1386	41-00-35.59N	84-30-30.57W
2021-WTE-145-OE	20210129-30	656	1384	41-00-34.70N	84-30-06.47W
2021-WTE-146-OE	20210129-31	656	1386	41-00-35.52N	84-29-22.91W
2021-WTE-147-OE	20210129-32	656	1383	41-00-37.96N	84-28-54.19W

2021-WTE-148-OE / 20210129-33 / 656 / 1382 / 41-00-54.25N / 84-28-07.10W
2021-WTE-149-OE / 20210129-34 / 656 / 1381 / 41-00-44.49N / 84-28-08.43W
2021-WTE-150-OE / 20210129-35 / 656 / 1383 / 41-00-32.56N / 84-28-12.16W
2021-WTE-151-OE / 20210129-36 / 656 / 1382 / 41-00-30.53N / 84-27-51.17W

2021-WTE-152-OE / 20210129-37 / 656 / 1389 / 40-59-38.09N / 84-30-28.20W
2021-WTE-153-OE / 20210129-38 / 656 / 1384 / 40-59-57.53N / 84-29-11.57W
2021-WTE-154-OE / 20210129-39 / 656 / 1384 / 41-02-39.83N / 84-30-05.48W
2021-WTE-155-OE / 20210129-40 / 656 / 1382 / 41-02-28.32N / 84-30-35.47W
2021-WTE-156-OE / 20210129-41 / 656 / 1380 / 41-01-48.86N / 84-29-26.86W
2021-WTE-157-OE / 20210129-42 / 656 / 1384 / 41-00-44.10N / 84-30-05.63W
2021-WTE-158-OE / 20210129-43 / 656 / 1387 / 40-59-57.76N / 84-28-53.84W

2. OBSTRUCTION STANDARDS EXCEEDED

The following proposed turbines would exceed Part 77 standards as described below.

a. Section 77.17(a)(1): Section 77.17(a)(1): Exceeds a height of 499 feet AGL at the site of the object. All proposed structures would exceed this surface by 157 feet.

b. Section 77.17(a)(4) -- A height within an en route obstacle clearance area, including turn and termination areas, of a Federal Airway or approved off-airway route, that would increase the IFR en route minimum obstacle clearance altitude

The following proposed structures would have the following effect: HUUVR ONE ARRIVAL (RNAV) Increase Minimum Obstruction Clearance Altitude (MOCA) from MSKTS to JJUST from 2300 feet to 2400 feet AMSL. (Procedure serves KAKR KCAK 1G3). The height at which there is no effect is at or below 1300 feet AMSL

2021-WTE-140-OE
2021-WTE-142-OE
2021-WTE-143-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

3. VFR ROUTE

VFR en route is evaluated in accordance with Part 77 Section 77.29 (a)(1): the impact on arrival, departure, and en route procedures for aircraft operating under visual flight rules.

At 656 feet AGL, the following structures would extend into airspace normally utilized for VFR en route flight by 157 feet. The structures would be located within 2 statute miles of a VFR Route as defined by JO 7400.2M, Section 6-3-8 and would have an adverse effect upon VFR air navigation.

2021-WTE-142-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

4. RADAR IMPACTS

The FAA found that all 27 proposed wind turbines would have a Radar Line of Sight (RLOS) impact to the Airport Surveillance Radar (ASR) -9 at Fort Wayne, IN (FWA). Since they are visible to the ASR, they could cause unwanted primary-only returns (clutter) and primary-only target drops, all in the immediate area of the turbines. Also, tracked primary-only targets could diverge from the aircraft path and follow wind turbines, when the aircraft is over or near the turbines.
No effect will occur on the Secondary (Beacon) Radar System.

5. SPONSOR ACTIONS

To pursue the possibility of receiving a favorable determination at the originally requested height, further study would be necessary. Further study entails coordination with the affected air traffic control facilities in order to evaluate effects fully and potential mitigations for possible approval of your project. Further study will also involve a public notice circularization and 37-day comment period. The outcome cannot be predicted.

If you have questions regarding this Notice of Presumed Findings, you may contact Bill Ratts via email at (William.M.Ratts@faa.gov)

FURTHER STUDY HAS ALREADY BEEN REQUESTED.

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2021-WTE-150-OE

Issued Date: 06/02/2021

Matthias Weigel
Starwood Energy Group, LLC.
5 Greenwich Office Park
2nd Floor
Greenwich, CT 06831

**** NOTICE OF PRELIMINARY FINDINGS ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine 20210129-35
Location:	Grover Hill, OH
Latitude:	41-00-32.56N NAD 83
Longitude:	84-28-12.16W
Heights:	727 feet site elevation (SE)
	656 feet above ground level (AGL)
	1383 feet above mean sea level (AMSL)

Initial findings of this study indicate that the structure as described exceeds obstruction standards and/or would have an adverse physical or electromagnetic interference effect upon navigable airspace or air navigation facilities. Pending resolution of the issues described below, the structure is presumed to be a hazard to air navigation.

To pursue a favorable determination at the originally submitted height, further study would be necessary. Further study entails distribution to the public for comment, and may extend the study period up to 120 days. The outcome cannot be predicted prior to public circularization.

If you would like the FAA to conduct further study, you must make the request within 60 days from the date of issuance of this letter.

See Attachment for Additional information.

NOTE: PENDING RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE, THE STRUCTURE IS PRESUMED TO BE A HAZARD TO AIR NAVIGATION. THIS LETTER DOES NOT AUTHORIZE CONSTRUCTION OF THE STRUCTURE EVEN AT A REDUCED HEIGHT. ANY RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE MUST BE COMMUNICATED TO THE FAA SO THAT A FAVORABLE DETERMINATION CAN SUBSEQUENTLY BE ISSUED.

IF MORE THAN 60 DAYS FROM THE DATE OF THIS LETTER HAS ELAPSED WITHOUT ATTEMPTED RESOLUTION, IT WILL BE NECESSARY FOR YOU TO REACTIVATE THE STUDY BY FILING A NEW FAA FORM 7460-1, NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION.

If we can be of further assistance, please contact Bill Ratts, at (816) 329-2544, or William.M.Ratts@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-WTE-150-OE.

Signature Control No: 466829389-483476931 (NPF -WT)
Steve Phillips
Manager, Obstruction Evaluation Group

Attachment(s)
Additional Information

Additional information for ASN 2021-WTE-150-OE

Abbreviations
AGL - above ground level
AMSL - above mean sea level
RWY - runway
VFR - visual flight rules
IFR - instrument flight rules
NM - nautical mile
ASN- Aeronautical Study Number
CAT - category aircraft
RNAV- area navigation
MDA - minimum descent altitude
Part 77 - Title 14 Code of Federal Regulations (CFR) Part 77, Safe, Efficient Use and Preservation of the Navigable Airspace

The proposed Grover Hill wind turbine project near Grover Hill, OH consists of 27 wind turbines and has been reviewed by the FAA under ASNs 2021-WTE-132-OE sequentially through 2021-WTE-158-OE.

The proposed wind turbine project lies approximately between 2.2 NM north northwest to 2.1 NM southwest from the town of Grover Hill, OH.

For the sake of efficiency, the 27 proposed wind turbines in this project that have similar impacts to 14 CFR Part 77 standards are included in this narrative.

1. LOCATION OF PROPOSED CONSTRUCTION

The Aeronautical Study Number (ASNs), Structure Names, Above Ground Level (AGL) heights, Above Mean Sea Level (AMSL) heights and coordinates for each proposed structure are listed as follows:

ASN	Structure Name	AGL	AMSL	LAT	LONG
2021-WTE-132-OE	20210129-11	656	1381	41-02-39.16N	84-30-35.30W
2021-WTE-133-OE	20210129-12	656	1380	41-02-34.48N	84-30-15.14W
2021-WTE-134-OE	20210129-13	656	1376	41-02-24.96N	84-30-07.54W
2021-WTE-135-OE	20210129-14	656	1377	41-02-12.42N	84-30-01.05W
2021-WTE-136-OE	20210129-15	656	1380	41-02-12.09N	84-29-25.08W
2021-WTE-137-OE	20210129-16	656	1379	41-02-09.99N	84-28-57.10W
2021-WTE-138-OE	20210129-17	656	1383	41-01-47.59N	84-30-28.07W
2021-WTE-139-OE	20210129-22	656	1381	41-01-47.39N	84-29-10.01W
2021-WTE-140-OE	20210129-25	656	1381	41-01-35.08N	84-29-00.37W
2021-WTE-141-OE	20210129-26	656	1381	41-01-50.39N	84-28-56.14W
2021-WTE-142-OE	20210129-27	656	1386	41-00-53.14N	84-30-34.67W
2021-WTE-143-OE	20210129-28	656	1384	41-00-53.49N	84-30-06.23W
2021-WTE-144-OE	20210129-29	656	1386	41-00-35.59N	84-30-30.57W
2021-WTE-145-OE	20210129-30	656	1384	41-00-34.70N	84-30-06.47W
2021-WTE-146-OE	20210129-31	656	1386	41-00-35.52N	84-29-22.91W
2021-WTE-147-OE	20210129-32	656	1383	41-00-37.96N	84-28-54.19W

2021-WTE-148-OE / 20210129-33 / 656 / 1382 / 41-00-54.25N / 84-28-07.10W
2021-WTE-149-OE / 20210129-34 / 656 / 1381 / 41-00-44.49N / 84-28-08.43W
2021-WTE-150-OE / 20210129-35 / 656 / 1383 / 41-00-32.56N / 84-28-12.16W
2021-WTE-151-OE / 20210129-36 / 656 / 1382 / 41-00-30.53N / 84-27-51.17W

2021-WTE-152-OE / 20210129-37 / 656 / 1389 / 40-59-38.09N / 84-30-28.20W
2021-WTE-153-OE / 20210129-38 / 656 / 1384 / 40-59-57.53N / 84-29-11.57W
2021-WTE-154-OE / 20210129-39 / 656 / 1384 / 41-02-39.83N / 84-30-05.48W
2021-WTE-155-OE / 20210129-40 / 656 / 1382 / 41-02-28.32N / 84-30-35.47W
2021-WTE-156-OE / 20210129-41 / 656 / 1380 / 41-01-48.86N / 84-29-26.86W
2021-WTE-157-OE / 20210129-42 / 656 / 1384 / 41-00-44.10N / 84-30-05.63W
2021-WTE-158-OE / 20210129-43 / 656 / 1387 / 40-59-57.76N / 84-28-53.84W

2. OBSTRUCTION STANDARDS EXCEEDED

The following proposed turbines would exceed Part 77 standards as described below.

a. Section 77.17(a)(1): Section 77.17(a)(1): Exceeds a height of 499 feet AGL at the site of the object. All proposed structures would exceed this surface by 157 feet.

b. Section 77.17(a)(4) -- A height within an en route obstacle clearance area, including turn and termination areas, of a Federal Airway or approved off-airway route, that would increase the IFR en route minimum obstacle clearance altitude

The following proposed structures would have the following effect: HUUVR ONE ARRIVAL (RNAV) Increase Minimum Obstruction Clearance Altitude (MOCA) from MSKTS to JJUST from 2300 feet to 2400 feet AMSL. (Procedure serves KAKR KCAK 1G3). The height at which there is no effect is at or below 1300 feet AMSL

2021-WTE-140-OE
2021-WTE-142-OE
2021-WTE-143-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

3. VFR ROUTE

VFR en route is evaluated in accordance with Part 77 Section 77.29 (a)(1): the impact on arrival, departure, and en route procedures for aircraft operating under visual flight rules.

At 656 feet AGL, the following structures would extend into airspace normally utilized for VFR en route flight by 157 feet. The structures would be located within 2 statute miles of a VFR Route as defined by JO 7400.2M, Section 6-3-8 and would have an adverse effect upon VFR air navigation.

2021-WTE-142-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

4. RADAR IMPACTS

The FAA found that all 27 proposed wind turbines would have a Radar Line of Sight (RLOS) impact to the Airport Surveillance Radar (ASR) -9 at Fort Wayne, IN (FWA). Since they are visible to the ASR, they could cause unwanted primary-only returns (clutter) and primary-only target drops, all in the immediate area of the turbines. Also, tracked primary-only targets could diverge from the aircraft path and follow wind turbines, when the aircraft is over or near the turbines.
No effect will occur on the Secondary (Beacon) Radar System.

5. SPONSOR ACTIONS

To pursue the possibility of receiving a favorable determination at the originally requested height, further study would be necessary. Further study entails coordination with the affected air traffic control facilities in order to evaluate effects fully and potential mitigations for possible approval of your project. Further study will also involve a public notice circularization and 37-day comment period. The outcome cannot be predicted.

If you have questions regarding this Notice of Presumed Findings, you may contact Bill Ratts via email at (William.M.Ratts@faa.gov)

FURTHER STUDY HAS ALREADY BEEN REQUESTED.

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2021-WTE-151-OE

Issued Date: 06/02/2021

Matthias Weigel
Starwood Energy Group, LLC.
5 Greenwich Office Park
2nd Floor
Greenwich, CT 06831

**** NOTICE OF PRELIMINARY FINDINGS ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine 20210129-36
Location:	Grover Hill, OH
Latitude:	41-00-30.53N NAD 83
Longitude:	84-27-51.17W
Heights:	726 feet site elevation (SE)
	656 feet above ground level (AGL)
	1382 feet above mean sea level (AMSL)

Initial findings of this study indicate that the structure as described exceeds obstruction standards and/or would have an adverse physical or electromagnetic interference effect upon navigable airspace or air navigation facilities. Pending resolution of the issues described below, the structure is presumed to be a hazard to air navigation.

To pursue a favorable determination at the originally submitted height, further study would be necessary. Further study entails distribution to the public for comment, and may extend the study period up to 120 days. The outcome cannot be predicted prior to public circularization.

If you would like the FAA to conduct further study, you must make the request within 60 days from the date of issuance of this letter.

See Attachment for Additional information.

NOTE: PENDING RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE, THE STRUCTURE IS PRESUMED TO BE A HAZARD TO AIR NAVIGATION. THIS LETTER DOES NOT AUTHORIZE CONSTRUCTION OF THE STRUCTURE EVEN AT A REDUCED HEIGHT. ANY RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE MUST BE COMMUNICATED TO THE FAA SO THAT A FAVORABLE DETERMINATION CAN SUBSEQUENTLY BE ISSUED.

IF MORE THAN 60 DAYS FROM THE DATE OF THIS LETTER HAS ELAPSED WITHOUT ATTEMPTED RESOLUTION, IT WILL BE NECESSARY FOR YOU TO REACTIVATE THE STUDY BY FILING A NEW FAA FORM 7460-1, NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION.

If we can be of further assistance, please contact Bill Ratts, at (816) 329-2544, or William.M.Ratts@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-WTE-151-OE.

Signature Control No: 466829390-483476938 (NPF -WT)

Steve Phillips
Manager, Obstruction Evaluation Group

Attachment(s)
Additional Information

Abbreviations
AGL - above ground level
AMSL - above mean sea level
RWY - runway
VFR - visual flight rules
IFR - instrument flight rules
NM - nautical mile
ASN- Aeronautical Study Number
CAT - category aircraft
RNAV- area navigation
MDA - minimum descent altitude
Part 77 - Title 14 Code of Federal Regulations (CFR) Part 77, Safe, Efficient Use and Preservation of the Navigable Airspace

The proposed Grover Hill wind turbine project near Grover Hill, OH consists of 27 wind turbines and has been reviewed by the FAA under ASNs 2021-WTE-132-OE sequentially through 2021-WTE-158-OE.

The proposed wind turbine project lies approximately between 2.2 NM north northwest to 2.1 NM southwest from the town of Grover Hill, OH.

For the sake of efficiency, the 27 proposed wind turbines in this project that have similar impacts to 14 CFR Part 77 standards are included in this narrative.

1. LOCATION OF PROPOSED CONSTRUCTION

The Aeronautical Study Number (ASNs), Structure Names, Above Ground Level (AGL) heights, Above Mean Sea Level (AMSL) heights and coordinates for each proposed structure are listed as follows:

ASN Structure Name AGL/AMSL LAT/LONG

2021-WTE-132-OE / 20210129-11 / 656 / 1381 / 41-02-39.16N / 84-30-35.30W
2021-WTE-133-OE / 20210129-12 / 656 / 1380 / 41-02-34.48N / 84-30-15.14W
2021-WTE-134-OE / 20210129-13 / 656 / 1376 / 41-02-24.96N / 84-30-07.54W
2021-WTE-135-OE / 20210129-14 / 656 / 1377 / 41-02-12.42N / 84-30-01.05W
2021-WTE-136-OE / 20210129-15 / 656 / 1380 / 41-02-12.09N / 84-29-25.08W
2021-WTE-137-OE / 20210129-16 / 656 / 1379 / 41-02-09.99N / 84-28-57.10W
2021-WTE-138-OE / 20210129-17 / 656 / 1383 / 41-01-47.59N / 84-30-28.07W
2021-WTE-139-OE / 20210129-22 / 656 / 1381 / 41-01-47.39N / 84-29-10.01W
2021-WTE-140-OE / 20210129-25 / 656 / 1381 / 41-01-35.08N / 84-29-00.37W
2021-WTE-141-OE / 20210129-26 / 656 / 1381 / 41-01-50.39N / 84-28-56.14W

2021-WTE-142-OE / 20210129-27 / 656 / 1386 / 41-00-53.14N / 84-30-34.67W
2021-WTE-143-OE / 20210129-28 / 656 / 1384 / 41-00-53.49N / 84-30-06.23W
2021-WTE-144-OE / 20210129-29 / 656 / 1386 / 41-00-35.59N / 84-30-30.57W
2021-WTE-145-OE / 20210129-30 / 656 / 1384 / 41-00-34.70N / 84-30-06.47W
2021-WTE-146-OE / 20210129-31 / 656 / 1386 / 41-00-35.52N / 84-29-22.91W
2021-WTE-147-OE / 20210129-32 / 656 / 1383 / 41-00-37.96N / 84-28-54.19W

2021-WTE-148-OE	20210129-33	656	1382	41-00-54.25N	84-28-07.10W
2021-WTE-149-OE	20210129-34	656	1381	41-00-44.49N	84-28-08.43W
2021-WTE-150-OE	20210129-35	656	1383	41-00-32.56N	84-28-12.16W
2021-WTE-151-OE	20210129-36	656	1382	41-00-30.53N	84-27-51.17W
2021-WTE-152-OE	20210129-37	656	1389	40-59-38.09N	84-30-28.20W
2021-WTE-153-OE	20210129-38	656	1384	40-59-57.53N	84-29-11.57W
2021-WTE-154-OE	20210129-39	656	1384	41-02-39.83N	84-30-05.48W
2021-WTE-155-OE	20210129-40	656	1382	41-02-28.32N	84-30-35.47W
2021-WTE-156-OE	20210129-41	656	1380	41-01-48.86N	84-29-26.86W
2021-WTE-157-OE	20210129-42	656	1384	41-00-44.10N	84-30-05.63W
2021-WTE-158-OE	20210129-43	656	1387	40-59-57.76N	84-28-53.84W

2. OBSTRUCTION STANDARDS EXCEEDED

The following proposed turbines would exceed Part 77 standards as described below.

a. Section 77.17(a)(1): Section 77.17(a)(1): Exceeds a height of 499 feet AGL at the site of the object. All proposed structures would exceed this surface by 157 feet.

b. Section 77.17(a)(4) -- A height within an en route obstacle clearance area, including turn and termination areas, of a Federal Airway or approved off-airway route, that would increase the IFR en route minimum obstacle clearance altitude

The following proposed structures would have the following effect: HUUVR ONE ARRIVAL (RNAV) Increase Minimum Obstruction Clearance Altitude (MOCA) from MSKTS to JJUST from 2300 feet to 2400 feet AMSL. (Procedure serves KAKR KCAK 1G3). The height at which there is no effect is at or below 1300 feet AMSL

2021-WTE-140-OE
2021-WTE-142-OE
2021-WTE-143-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

3. VFR ROUTE

VFR en route is evaluated in accordance with Part 77 Section 77.29 (a)(1): the impact on arrival, departure, and en route procedures for aircraft operating under visual flight rules.

At 656 feet AGL, the following structures would extend into airspace normally utilized for VFR en route flight by 157 feet. The structures would be located within 2 statute miles of a VFR Route as defined by JO 7400.2M, Section 6-3-8 and would have an adverse effect upon VFR air navigation.

2021-WTE-142-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

4. RADAR IMPACTS

The FAA found that all 27 proposed wind turbines would have a Radar Line of Sight (RLOS) impact to the Airport Surveillance Radar (ASR) -9 at Fort Wayne, IN (FWA). Since they are visible to the ASR, they could cause unwanted primary-only returns (clutter) and primary-only target drops, all in the immediate area of the turbines. Also, tracked primary-only targets could diverge from the aircraft path and follow wind turbines, when the aircraft is over or near the turbines.
No effect will occur on the Secondary (Beacon) Radar System.

5. SPONSOR ACTIONS

To pursue the possibility of receiving a favorable determination at the originally requested height, further study would be necessary. Further study entails coordination with the affected air traffic control facilities in order to evaluate effects fully and potential mitigations for possible approval of your project. Further study will also involve a public notice circularization and 37-day comment period. The outcome cannot be predicted.

If you have questions regarding this Notice of Presumed Findings, you may contact Bill Ratts via email at (William.M.Ratts@faa.gov)

FURTHER STUDY HAS ALREADY BEEN REQUESTED.

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2021-WTE-152-OE

Issued Date: 06/02/2021

Matthias Weigel
Starwood Energy Group, LLC.
5 Greenwich Office Park
2nd Floor
Greenwich, CT 06831

**** NOTICE OF PRELIMINARY FINDINGS ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine 20210129-37
Location:	Grover Hill, OH
Latitude:	40-59-38.09N NAD 83
Longitude:	84-30-28.20W
Heights:	733 feet site elevation (SE)
	656 feet above ground level (AGL)
	1389 feet above mean sea level (AMSL)

Initial findings of this study indicate that the structure as described exceeds obstruction standards and/or would have an adverse physical or electromagnetic interference effect upon navigable airspace or air navigation facilities. Pending resolution of the issues described below, the structure is presumed to be a hazard to air navigation.

To pursue a favorable determination at the originally submitted height, further study would be necessary. Further study entails distribution to the public for comment, and may extend the study period up to 120 days. The outcome cannot be predicted prior to public circularization.

If you would like the FAA to conduct further study, you must make the request within 60 days from the date of issuance of this letter.

See Attachment for Additional information.

NOTE: PENDING RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE, THE STRUCTURE IS PRESUMED TO BE A HAZARD TO AIR NAVIGATION. THIS LETTER DOES NOT AUTHORIZE CONSTRUCTION OF THE STRUCTURE EVEN AT A REDUCED HEIGHT. ANY RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE MUST BE COMMUNICATED TO THE FAA SO THAT A FAVORABLE DETERMINATION CAN SUBSEQUENTLY BE ISSUED.

IF MORE THAN 60 DAYS FROM THE DATE OF THIS LETTER HAS ELAPSED WITHOUT ATTEMPTED RESOLUTION, IT WILL BE NECESSARY FOR YOU TO REACTIVATE THE STUDY BY FILING A NEW FAA FORM 7460-1, NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION.

If we can be of further assistance, please contact Bill Ratts, at (816) 329-2544, or William.M.Ratts@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-WTE-152-OE.

Signature Control No: 466829391-483476947 (NPF -WT)
Steve Phillips
Manager, Obstruction Evaluation Group

Attachment(s)
Additional Information

Abbreviations
AGL - above ground level
AMSL - above mean sea level
RWY - runway
VFR - visual flight rules
IFR - instrument flight rules
NM - nautical mile
ASN- Aeronautical Study Number
CAT - category aircraft
RNAV- area navigation
MDA - minimum descent altitude
Part 77 - Title 14 Code of Federal Regulations (CFR) Part 77, Safe, Efficient Use and Preservation of the Navigable Airspace

The proposed Grover Hill wind turbine project near Grover Hill, OH consists of 27 wind turbines and has been reviewed by the FAA under ASNs 2021-WTE-132-OE sequentially through 2021-WTE-158-OE.

The proposed wind turbine project lies approximately between 2.2 NM north northwest to 2.1 NM southwest from the town of Grover Hill, OH.

For the sake of efficiency, the 27 proposed wind turbines in this project that have similar impacts to 14 CFR Part 77 standards are included in this narrative.

1. LOCATION OF PROPOSED CONSTRUCTION

The Aeronautical Study Number (ASNs), Structure Names, Above Ground Level (AGL) heights, Above Mean Sea Level (AMSL) heights and coordinates for each proposed structure are listed as follows:

ASN / Structure Name / AGL/AMSL / LAT/LONG

2021-WTE-132-OE / 20210129-11 / 656 / 1381 / 41-02-39.16N / 84-30-35.30W
2021-WTE-133-OE / 20210129-12 / 656 / 1380 / 41-02-34.48N / 84-30-15.14W
2021-WTE-134-OE / 20210129-13 / 656 / 1376 / 41-02-24.96N / 84-30-07.54W
2021-WTE-135-OE / 20210129-14 / 656 / 1377 / 41-02-12.42N / 84-30-01.05W
2021-WTE-136-OE / 20210129-15 / 656 / 1380 / 41-02-12.09N / 84-29-25.08W
2021-WTE-137-OE / 20210129-16 / 656 / 1379 / 41-02-09.99N / 84-28-57.10W
2021-WTE-138-OE / 20210129-17 / 656 / 1383 / 41-01-47.59N / 84-30-28.07W
2021-WTE-139-OE / 20210129-22 / 656 / 1381 / 41-01-47.39N / 84-29-10.01W
2021-WTE-140-OE / 20210129-25 / 656 / 1381 / 41-01-35.08N / 84-29-00.37W
2021-WTE-141-OE / 20210129-26 / 656 / 1381 / 41-01-50.39N / 84-28-56.14W

2021-WTE-142-OE / 20210129-27 / 656 / 1386 / 41-00-53.14N / 84-30-34.67W
2021-WTE-143-OE / 20210129-28 / 656 / 1384 / 41-00-53.49N / 84-30-06.23W
2021-WTE-144-OE / 20210129-29 / 656 / 1386 / 41-00-35.59N / 84-30-30.57W
2021-WTE-145-OE / 20210129-30 / 656 / 1384 / 41-00-34.70N / 84-30-06.47W
2021-WTE-146-OE / 20210129-31 / 656 / 1386 / 41-00-35.52N / 84-29-22.91W
2021-WTE-147-OE / 20210129-32 / 656 / 1383 / 41-00-37.96N / 84-28-54.19W

2021-WTE-148-OE / 20210129-33 / 656 / 1382 / 41-00-54.25N / 84-28-07.10W
2021-WTE-149-OE / 20210129-34 / 656 / 1381 / 41-00-44.49N / 84-28-08.43W
2021-WTE-150-OE / 20210129-35 / 656 / 1383 / 41-00-32.56N / 84-28-12.16W
2021-WTE-151-OE / 20210129-36 / 656 / 1382 / 41-00-30.53N / 84-27-51.17W

2021-WTE-152-OE / 20210129-37 / 656 / 1389 / 40-59-38.09N / 84-30-28.20W
2021-WTE-153-OE / 20210129-38 / 656 / 1384 / 40-59-57.53N / 84-29-11.57W
2021-WTE-154-OE / 20210129-39 / 656 / 1384 / 41-02-39.83N / 84-30-05.48W
2021-WTE-155-OE / 20210129-40 / 656 / 1382 / 41-02-28.32N / 84-30-35.47W
2021-WTE-156-OE / 20210129-41 / 656 / 1380 / 41-01-48.86N / 84-29-26.86W
2021-WTE-157-OE / 20210129-42 / 656 / 1384 / 41-00-44.10N / 84-30-05.63W
2021-WTE-158-OE / 20210129-43 / 656 / 1387 / 40-59-57.76N / 84-28-53.84W

2. OBSTRUCTION STANDARDS EXCEEDED

The following proposed turbines would exceed Part 77 standards as described below.

a. Section 77.17(a)(1): Section 77.17(a)(1): Exceeds a height of 499 feet AGL at the site of the object. All proposed structures would exceed this surface by 157 feet.

b. Section 77.17(a)(4) -- A height within an en route obstacle clearance area, including turn and termination areas, of a Federal Airway or approved off-airway route, that would increase the IFR en route minimum obstacle clearance altitude

The following proposed structures would have the following effect: HUUVR ONE ARRIVAL (RNAV) Increase Minimum Obstruction Clearance Altitude (MOCA) from MSKTS to JJUST from 2300 feet to 2400 feet AMSL. (Procedure serves KAKR KCAK 1G3). The height at which there is no effect is at or below 1300 feet AMSL

2021-WTE-140-OE
2021-WTE-142-OE
2021-WTE-143-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

3. VFR ROUTE

VFR en route is evaluated in accordance with Part 77 Section 77.29 (a)(1): the impact on arrival, departure, and en route procedures for aircraft operating under visual flight rules.

At 656 feet AGL, the following structures would extend into airspace normally utilized for VFR en route flight by 157 feet. The structures would be located within 2 statute miles of a VFR Route as defined by JO 7400.2M, Section 6-3-8 and would have an adverse effect upon VFR air navigation.

2021-WTE-142-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

4. RADAR IMPACTS

The FAA found that all 27 proposed wind turbines would have a Radar Line of Sight (RLOS) impact to the Airport Surveillance Radar (ASR) -9 at Fort Wayne, IN (FWA). Since they are visible to the ASR, they could cause unwanted primary-only returns (clutter) and primary-only target drops, all in the immediate area of the turbines. Also, tracked primary-only targets could diverge from the aircraft path and follow wind turbines, when the aircraft is over or near the turbines.
No effect will occur on the Secondary (Beacon) Radar System.

5. SPONSOR ACTIONS

To pursue the possibility of receiving a favorable determination at the originally requested height, further study would be necessary. Further study entails coordination with the affected air traffic control facilities in order to evaluate effects fully and potential mitigations for possible approval of your project. Further study will also involve a public notice circularization and 37-day comment period. The outcome cannot be predicted.

If you have questions regarding this Notice of Presumed Findings, you may contact Bill Ratts via email at (William.M.Ratts@faa.gov)

FURTHER STUDY HAS ALREADY BEEN REQUESTED.

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2021-WTE-153-OE

Issued Date: 06/02/2021

Matthias Weigel
Starwood Energy Group, LLC.
5 Greenwich Office Park
2nd Floor
Greenwich, CT 06831

**** NOTICE OF PRELIMINARY FINDINGS ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine 20210129-38
Location:	Grover Hill, OH
Latitude:	40-59-57.53N NAD 83
Longitude:	84-29-11.57W
Heights:	728 feet site elevation (SE) 656 feet above ground level (AGL) 1384 feet above mean sea level (AMSL)

Initial findings of this study indicate that the structure as described exceeds obstruction standards and/or would have an adverse physical or electromagnetic interference effect upon navigable airspace or air navigation facilities. Pending resolution of the issues described below, the structure is presumed to be a hazard to air navigation.

To pursue a favorable determination at the originally submitted height, further study would be necessary. Further study entails distribution to the public for comment, and may extend the study period up to 120 days. The outcome cannot be predicted prior to public circularization.

If you would like the FAA to conduct further study, you must make the request within 60 days from the date of issuance of this letter.

See Attachment for Additional information.

NOTE: PENDING RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE, THE STRUCTURE IS PRESUMED TO BE A HAZARD TO AIR NAVIGATION. THIS LETTER DOES NOT AUTHORIZE CONSTRUCTION OF THE STRUCTURE EVEN AT A REDUCED HEIGHT. ANY RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE MUST BE COMMUNICATED TO THE FAA SO THAT A FAVORABLE DETERMINATION CAN SUBSEQUENTLY BE ISSUED.

IF MORE THAN 60 DAYS FROM THE DATE OF THIS LETTER HAS ELAPSED WITHOUT ATTEMPTED RESOLUTION, IT WILL BE NECESSARY FOR YOU TO REACTIVATE THE STUDY BY FILING A NEW FAA FORM 7460-1, NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION.

If we can be of further assistance, please contact Bill Ratts, at (816) 329-2544, or William.M.Ratts@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-WTE-153-OE.

Signature Control No: 466829392-483476948 (NPF -WT)

Steve Phillips
Manager, Obstruction Evaluation Group

Attachment(s)
Additional Information

Additional information for ASN 2021-WTE-153-OE

Abbreviations
AGL - above ground level
AMSL - above mean sea level
RWY - runway
VFR - visual flight rules
IFR - instrument flight rules
NM - nautical mile
ASN- Aeronautical Study Number
CAT - category aircraft
RNAV- area navigation
MDA - minimum descent altitude
Part 77 - Title 14 Code of Federal Regulations (CFR) Part 77, Safe, Efficient Use and Preservation of the Navigable Airspace

The proposed Grover Hill wind turbine project near Grover Hill, OH consists of 27 wind turbines and has been reviewed by the FAA under ASNs 2021-WTE-132-OE sequentially through 2021-WTE-158-OE.

The proposed wind turbine project lies approximately between 2.2 NM north northwest to 2.1 NM southwest from the town of Grover Hill, OH.

For the sake of efficiency, the 27 proposed wind turbines in this project that have similar impacts to 14 CFR Part 77 standards are included in this narrative.

1. LOCATION OF PROPOSED CONSTRUCTION

The Aeronautical Study Number (ASNs), Structure Names, Above Ground Level (AGL) heights, Above Mean Sea Level (AMSL) heights and coordinates for each proposed structure are listed as follows:

ASN Structure Name AGL/AMSL LAT/LONG

2021-WTE-132-OE / 20210129-11 / 656 / 1381 / 41-02-39.16N / 84-30-35.30W
2021-WTE-133-OE / 20210129-12 / 656 / 1380 / 41-02-34.48N / 84-30-15.14W
2021-WTE-134-OE / 20210129-13 / 656 / 1376 / 41-02-24.96N / 84-30-07.54W
2021-WTE-135-OE / 20210129-14 / 656 / 1377 / 41-02-12.42N / 84-30-01.05W
2021-WTE-136-OE / 20210129-15 / 656 / 1380 / 41-02-12.09N / 84-29-25.08W
2021-WTE-137-OE / 20210129-16 / 656 / 1379 / 41-02-09.99N / 84-28-57.10W
2021-WTE-138-OE / 20210129-17 / 656 / 1383 / 41-01-47.59N / 84-30-28.07W
2021-WTE-139-OE / 20210129-22 / 656 / 1381 / 41-01-47.39N / 84-29-10.01W
2021-WTE-140-OE / 20210129-25 / 656 / 1381 / 41-01-35.08N / 84-29-00.37W
2021-WTE-141-OE / 20210129-26 / 656 / 1381 / 41-01-50.39N / 84-28-56.14W

2021-WTE-142-OE / 20210129-27 / 656 / 1386 / 41-00-53.14N / 84-30-34.67W
2021-WTE-143-OE / 20210129-28 / 656 / 1384 / 41-00-53.49N / 84-30-06.23W
2021-WTE-144-OE / 20210129-29 / 656 / 1386 / 41-00-35.59N / 84-30-30.57W
2021-WTE-145-OE / 20210129-30 / 656 / 1384 / 41-00-34.70N / 84-30-06.47W
2021-WTE-146-OE / 20210129-31 / 656 / 1386 / 41-00-35.52N / 84-29-22.91W
2021-WTE-147-OE / 20210129-32 / 656 / 1383 / 41-00-37.96N / 84-28-54.19W

2021-WTE-148-OE / 20210129-33 / 656 / 1382 / 41-00-54.25N / 84-28-07.10W
2021-WTE-149-OE / 20210129-34 / 656 / 1381 / 41-00-44.49N / 84-28-08.43W
2021-WTE-150-OE / 20210129-35 / 656 / 1383 / 41-00-32.56N / 84-28-12.16W
2021-WTE-151-OE / 20210129-36 / 656 / 1382 / 41-00-30.53N / 84-27-51.17W

2021-WTE-152-OE / 20210129-37 / 656 / 1389 / 40-59-38.09N / 84-30-28.20W
2021-WTE-153-OE / 20210129-38 / 656 / 1384 / 40-59-57.53N / 84-29-11.57W
2021-WTE-154-OE / 20210129-39 / 656 / 1384 / 41-02-39.83N / 84-30-05.48W
2021-WTE-155-OE / 20210129-40 / 656 / 1382 / 41-02-28.32N / 84-30-35.47W
2021-WTE-156-OE / 20210129-41 / 656 / 1380 / 41-01-48.86N / 84-29-26.86W
2021-WTE-157-OE / 20210129-42 / 656 / 1384 / 41-00-44.10N / 84-30-05.63W
2021-WTE-158-OE / 20210129-43 / 656 / 1387 / 40-59-57.76N / 84-28-53.84W

2. OBSTRUCTION STANDARDS EXCEEDED

The following proposed turbines would exceed Part 77 standards as described below.

a. Section 77.17(a)(1): Section 77.17(a)(1): Exceeds a height of 499 feet AGL at the site of the object. All proposed structures would exceed this surface by 157 feet.

b. Section 77.17(a)(4) -- A height within an en route obstacle clearance area, including turn and termination areas, of a Federal Airway or approved off-airway route, that would increase the IFR en route minimum obstacle clearance altitude

The following proposed structures would have the following effect: HUUVR ONE ARRIVAL (RNAV) Increase Minimum Obstruction Clearance Altitude (MOCA) from MSKTS to JJUST from 2300 feet to 2400 feet AMSL. (Procedure serves KAKR KCAK 1G3). The height at which there is no effect is at or below 1300 feet AMSL

2021-WTE-140-OE
2021-WTE-142-OE
2021-WTE-143-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

3. VFR ROUTE

VFR en route is evaluated in accordance with Part 77 Section 77.29 (a)(1): the impact on arrival, departure, and en route procedures for aircraft operating under visual flight rules.

At 656 feet AGL, the following structures would extend into airspace normally utilized for VFR en route flight by 157 feet. The structures would be located within 2 statute miles of a VFR Route as defined by JO 7400.2M, Section 6-3-8 and would have an adverse effect upon VFR air navigation.

2021-WTE-142-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

4. RADAR IMPACTS

The FAA found that all 27 proposed wind turbines would have a Radar Line of Sight (RLOS) impact to the Airport Surveillance Radar (ASR) -9 at Fort Wayne, IN (FWA). Since they are visible to the ASR, they could cause unwanted primary-only returns (clutter) and primary-only target drops, all in the immediate area of the turbines. Also, tracked primary-only targets could diverge from the aircraft path and follow wind turbines, when the aircraft is over or near the turbines.
No effect will occur on the Secondary (Beacon) Radar System.

5. SPONSOR ACTIONS

To pursue the possibility of receiving a favorable determination at the originally requested height, further study would be necessary. Further study entails coordination with the affected air traffic control facilities in order to evaluate effects fully and potential mitigations for possible approval of your project. Further study will also involve a public notice circularization and 37-day comment period. The outcome cannot be predicted.

If you have questions regarding this Notice of Presumed Findings, you may contact Bill Ratts via email at (William.M.Ratts@faa.gov)

FURTHER STUDY HAS ALREADY BEEN REQUESTED.

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2021-WTE-154-OE

Issued Date: 06/02/2021

Matthias Weigel
Starwood Energy Group, LLC.
5 Greenwich Office Park
2nd Floor
Greenwich, CT 06831

**** NOTICE OF PRELIMINARY FINDINGS ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine 20210129-39
Location:	Grover Hill, OH
Latitude:	41-02-39.83N NAD 83
Longitude:	84-30-05.48W
Heights:	728 feet site elevation (SE)
	656 feet above ground level (AGL)
	1384 feet above mean sea level (AMSL)

Initial findings of this study indicate that the structure as described exceeds obstruction standards and/or would have an adverse physical or electromagnetic interference effect upon navigable airspace or air navigation facilities. Pending resolution of the issues described below, the structure is presumed to be a hazard to air navigation.

To pursue a favorable determination at the originally submitted height, further study would be necessary. Further study entails distribution to the public for comment, and may extend the study period up to 120 days. The outcome cannot be predicted prior to public circularization.

If you would like the FAA to conduct further study, you must make the request within 60 days from the date of issuance of this letter.

See Attachment for Additional information.

NOTE: PENDING RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE, THE STRUCTURE IS PRESUMED TO BE A HAZARD TO AIR NAVIGATION. THIS LETTER DOES NOT AUTHORIZE CONSTRUCTION OF THE STRUCTURE EVEN AT A REDUCED HEIGHT. ANY RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE MUST BE COMMUNICATED TO THE FAA SO THAT A FAVORABLE DETERMINATION CAN SUBSEQUENTLY BE ISSUED.

IF MORE THAN 60 DAYS FROM THE DATE OF THIS LETTER HAS ELAPSED WITHOUT ATTEMPTED RESOLUTION, IT WILL BE NECESSARY FOR YOU TO REACTIVATE THE STUDY BY FILING A NEW FAA FORM 7460-1, NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION.

If we can be of further assistance, please contact Bill Ratts, at (816) 329-2544, or William.M.Ratts@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-WTE-154-OE.

Signature Control No: 466829393-483476949 (NPF -WT)

Steve Phillips
Manager, Obstruction Evaluation Group

Attachment(s)
Additional Information

Abbreviations
AGL - above ground level
AMSL - above mean sea level
RWY - runway
VFR - visual flight rules
IFR - instrument flight rules
NM - nautical mile
ASN- Aeronautical Study Number
CAT - category aircraft
RNAV- area navigation
MDA - minimum descent altitude
Part 77 - Title 14 Code of Federal Regulations (CFR) Part 77, Safe, Efficient Use and Preservation of the Navigable Airspace

The proposed Grover Hill wind turbine project near Grover Hill, OH consists of 27 wind turbines and has been reviewed by the FAA under ASNs 2021-WTE-132-OE sequentially through 2021-WTE-158-OE.

The proposed wind turbine project lies approximately between 2.2 NM north northwest to 2.1 NM southwest from the town of Grover Hill, OH.

For the sake of efficiency, the 27 proposed wind turbines in this project that have similar impacts to 14 CFR Part 77 standards are included in this narrative.

1. LOCATION OF PROPOSED CONSTRUCTION

The Aeronautical Study Number (ASNs), Structure Names, Above Ground Level (AGL) heights, Above Mean Sea Level (AMSL) heights and coordinates for each proposed structure are listed as follows:

ASN Structure Name AGL/AMSL LAT/LONG

2021-WTE-132-OE / 20210129-11 / 656 / 1381 / 41-02-39.16N / 84-30-35.30W
2021-WTE-133-OE / 20210129-12 / 656 / 1380 / 41-02-34.48N / 84-30-15.14W
2021-WTE-134-OE / 20210129-13 / 656 / 1376 / 41-02-24.96N / 84-30-07.54W
2021-WTE-135-OE / 20210129-14 / 656 / 1377 / 41-02-12.42N / 84-30-01.05W
2021-WTE-136-OE / 20210129-15 / 656 / 1380 / 41-02-12.09N / 84-29-25.08W
2021-WTE-137-OE / 20210129-16 / 656 / 1379 / 41-02-09.99N / 84-28-57.10W
2021-WTE-138-OE / 20210129-17 / 656 / 1383 / 41-01-47.59N / 84-30-28.07W
2021-WTE-139-OE / 20210129-22 / 656 / 1381 / 41-01-47.39N / 84-29-10.01W
2021-WTE-140-OE / 20210129-25 / 656 / 1381 / 41-01-35.08N / 84-29-00.37W
2021-WTE-141-OE / 20210129-26 / 656 / 1381 / 41-01-50.39N / 84-28-56.14W

2021-WTE-142-OE / 20210129-27 / 656 / 1386 / 41-00-53.14N / 84-30-34.67W
2021-WTE-143-OE / 20210129-28 / 656 / 1384 / 41-00-53.49N / 84-30-06.23W
2021-WTE-144-OE / 20210129-29 / 656 / 1386 / 41-00-35.59N / 84-30-30.57W
2021-WTE-145-OE / 20210129-30 / 656 / 1384 / 41-00-34.70N / 84-30-06.47W
2021-WTE-146-OE / 20210129-31 / 656 / 1386 / 41-00-35.52N / 84-29-22.91W
2021-WTE-147-OE / 20210129-32 / 656 / 1383 / 41-00-37.96N / 84-28-54.19W

2021-WTE-148-OE / 20210129-33 / 656 / 1382 / 41-00-54.25N / 84-28-07.10W
2021-WTE-149-OE / 20210129-34 / 656 / 1381 / 41-00-44.49N / 84-28-08.43W
2021-WTE-150-OE / 20210129-35 / 656 / 1383 / 41-00-32.56N / 84-28-12.16W
2021-WTE-151-OE / 20210129-36 / 656 / 1382 / 41-00-30.53N / 84-27-51.17W

2021-WTE-152-OE / 20210129-37 / 656 / 1389 / 40-59-38.09N / 84-30-28.20W
2021-WTE-153-OE / 20210129-38 / 656 / 1384 / 40-59-57.53N / 84-29-11.57W
2021-WTE-154-OE / 20210129-39 / 656 / 1384 / 41-02-39.83N / 84-30-05.48W
2021-WTE-155-OE / 20210129-40 / 656 / 1382 / 41-02-28.32N / 84-30-35.47W
2021-WTE-156-OE / 20210129-41 / 656 / 1380 / 41-01-48.86N / 84-29-26.86W
2021-WTE-157-OE / 20210129-42 / 656 / 1384 / 41-00-44.10N / 84-30-05.63W
2021-WTE-158-OE / 20210129-43 / 656 / 1387 / 40-59-57.76N / 84-28-53.84W

2. OBSTRUCTION STANDARDS EXCEEDED

The following proposed turbines would exceed Part 77 standards as described below.

a. Section 77.17(a)(1): Section 77.17(a)(1): Exceeds a height of 499 feet AGL at the site of the object. All proposed structures would exceed this surface by 157 feet.

b. Section 77.17(a)(4) -- A height within an en route obstacle clearance area, including turn and termination areas, of a Federal Airway or approved off-airway route, that would increase the IFR en route minimum obstacle clearance altitude

The following proposed structures would have the following effect: HUUVR ONE ARRIVAL (RNAV) Increase Minimum Obstruction Clearance Altitude (MOCA) from MSKTS to JJUST from 2300 feet to 2400 feet AMSL. (Procedure serves KAKR KCAK 1G3). The height at which there is no effect is at or below 1300 feet AMSL

2021-WTE-140-OE
2021-WTE-142-OE
2021-WTE-143-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

3. VFR ROUTE

VFR en route is evaluated in accordance with Part 77 Section 77.29 (a)(1): the impact on arrival, departure, and en route procedures for aircraft operating under visual flight rules.

At 656 feet AGL, the following structures would extend into airspace normally utilized for VFR en route flight by 157 feet. The structures would be located within 2 statute miles of a VFR Route as defined by JO 7400.2M, Section 6-3-8 and would have an adverse effect upon VFR air navigation.

2021-WTE-142-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

4. RADAR IMPACTS

The FAA found that all 27 proposed wind turbines would have a Radar Line of Sight (RLOS) impact to the Airport Surveillance Radar (ASR) -9 at Fort Wayne, IN (FWA). Since they are visible to the ASR, they could cause unwanted primary-only returns (clutter) and primary-only target drops, all in the immediate area of the turbines. Also, tracked primary-only targets could diverge from the aircraft path and follow wind turbines, when the aircraft is over or near the turbines.
No effect will occur on the Secondary (Beacon) Radar System.

5. SPONSOR ACTIONS

To pursue the possibility of receiving a favorable determination at the originally requested height, further study would be necessary. Further study entails coordination with the affected air traffic control facilities in order to evaluate effects fully and potential mitigations for possible approval of your project. Further study will also involve a public notice circularization and 37-day comment period. The outcome cannot be predicted.

If you have questions regarding this Notice of Presumed Findings, you may contact Bill Ratts via email at (William.M.Ratts@faa.gov)

FURTHER STUDY HAS ALREADY BEEN REQUESTED.

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2021-WTE-155-OE

Issued Date: 06/02/2021

Matthias Weigel
Starwood Energy Group, LLC.
5 Greenwich Office Park
2nd Floor
Greenwich, CT 06831

**** NOTICE OF PRELIMINARY FINDINGS ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine 20210129-40
Location:	Grover Hill, OH
Latitude:	41-02-28.32N NAD 83
Longitude:	84-30-35.47W
Heights:	726 feet site elevation (SE)
	656 feet above ground level (AGL)
	1382 feet above mean sea level (AMSL)

Initial findings of this study indicate that the structure as described exceeds obstruction standards and/or would have an adverse physical or electromagnetic interference effect upon navigable airspace or air navigation facilities. Pending resolution of the issues described below, the structure is presumed to be a hazard to air navigation.

To pursue a favorable determination at the originally submitted height, further study would be necessary. Further study entails distribution to the public for comment, and may extend the study period up to 120 days. The outcome cannot be predicted prior to public circularization.

If you would like the FAA to conduct further study, you must make the request within 60 days from the date of issuance of this letter.

See Attachment for Additional information.

NOTE: PENDING RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE, THE STRUCTURE IS PRESUMED TO BE A HAZARD TO AIR NAVIGATION. THIS LETTER DOES NOT AUTHORIZE CONSTRUCTION OF THE STRUCTURE EVEN AT A REDUCED HEIGHT. ANY RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE MUST BE COMMUNICATED TO THE FAA SO THAT A FAVORABLE DETERMINATION CAN SUBSEQUENTLY BE ISSUED.

IF MORE THAN 60 DAYS FROM THE DATE OF THIS LETTER HAS ELAPSED WITHOUT ATTEMPTED RESOLUTION, IT WILL BE NECESSARY FOR YOU TO REACTIVATE THE STUDY BY FILING A NEW FAA FORM 7460-1, NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION.

If we can be of further assistance, please contact Bill Ratts, at (816) 329-2544, or William.M.Ratts@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-WTE-155-OE.

Signature Control No: 466829394-483476950 (NPF -WT)
Steve Phillips
Manager, Obstruction Evaluation Group

Attachment(s)
Additional Information

Abbreviations
AGL - above ground level
AMSL - above mean sea level
RWY - runway
VFR - visual flight rules
IFR - instrument flight rules
NM - nautical mile
ASN- Aeronautical Study Number
CAT - category aircraft
RNAV- area navigation
MDA - minimum descent altitude
Part 77 - Title 14 Code of Federal Regulations (CFR) Part 77, Safe, Efficient Use and Preservation of the Navigable Airspace

The proposed Grover Hill wind turbine project near Grover Hill, OH consists of 27 wind turbines and has been reviewed by the FAA under ASNs 2021-WTE-132-OE sequentially through 2021-WTE-158-OE.

The proposed wind turbine project lies approximately between 2.2 NM north northwest to 2.1 NM southwest from the town of Grover Hill, OH.

For the sake of efficiency, the 27 proposed wind turbines in this project that have similar impacts to 14 CFR Part 77 standards are included in this narrative.

1. LOCATION OF PROPOSED CONSTRUCTION

The Aeronautical Study Number (ASNs), Structure Names, Above Ground Level (AGL) heights, Above Mean Sea Level (AMSL) heights and coordinates for each proposed structure are listed as follows:

ASN Structure Name AGL/AMSL LAT/LONG

2021-WTE-132-OE / 20210129-11 / 656 / 1381 / 41-02-39.16N / 84-30-35.30W
2021-WTE-133-OE / 20210129-12 / 656 / 1380 / 41-02-34.48N / 84-30-15.14W
2021-WTE-134-OE / 20210129-13 / 656 / 1376 / 41-02-24.96N / 84-30-07.54W
2021-WTE-135-OE / 20210129-14 / 656 / 1377 / 41-02-12.42N / 84-30-01.05W
2021-WTE-136-OE / 20210129-15 / 656 / 1380 / 41-02-12.09N / 84-29-25.08W
2021-WTE-137-OE / 20210129-16 / 656 / 1379 / 41-02-09.99N / 84-28-57.10W
2021-WTE-138-OE / 20210129-17 / 656 / 1383 / 41-01-47.59N / 84-30-28.07W
2021-WTE-139-OE / 20210129-22 / 656 / 1381 / 41-01-47.39N / 84-29-10.01W
2021-WTE-140-OE / 20210129-25 / 656 / 1381 / 41-01-35.08N / 84-29-00.37W
2021-WTE-141-OE / 20210129-26 / 656 / 1381 / 41-01-50.39N / 84-28-56.14W

2021-WTE-142-OE / 20210129-27 / 656 / 1386 / 41-00-53.14N / 84-30-34.67W
2021-WTE-143-OE / 20210129-28 / 656 / 1384 / 41-00-53.49N / 84-30-06.23W
2021-WTE-144-OE / 20210129-29 / 656 / 1386 / 41-00-35.59N / 84-30-30.57W
2021-WTE-145-OE / 20210129-30 / 656 / 1384 / 41-00-34.70N / 84-30-06.47W
2021-WTE-146-OE / 20210129-31 / 656 / 1386 / 41-00-35.52N / 84-29-22.91W
2021-WTE-147-OE / 20210129-32 / 656 / 1383 / 41-00-37.96N / 84-28-54.19W

2021-WTE-148-OE / 20210129-33 / 656 / 1382 / 41-00-54.25N / 84-28-07.10W
2021-WTE-149-OE / 20210129-34 / 656 / 1381 / 41-00-44.49N / 84-28-08.43W
2021-WTE-150-OE / 20210129-35 / 656 / 1383 / 41-00-32.56N / 84-28-12.16W
2021-WTE-151-OE / 20210129-36 / 656 / 1382 / 41-00-30.53N / 84-27-51.17W

2021-WTE-152-OE / 20210129-37 / 656 / 1389 / 40-59-38.09N / 84-30-28.20W
2021-WTE-153-OE / 20210129-38 / 656 / 1384 / 40-59-57.53N / 84-29-11.57W
2021-WTE-154-OE / 20210129-39 / 656 / 1384 / 41-02-39.83N / 84-30-05.48W
2021-WTE-155-OE / 20210129-40 / 656 / 1382 / 41-02-28.32N / 84-30-35.47W
2021-WTE-156-OE / 20210129-41 / 656 / 1380 / 41-01-48.86N / 84-29-26.86W
2021-WTE-157-OE / 20210129-42 / 656 / 1384 / 41-00-44.10N / 84-30-05.63W
2021-WTE-158-OE / 20210129-43 / 656 / 1387 / 40-59-57.76N / 84-28-53.84W

2. OBSTRUCTION STANDARDS EXCEEDED

The following proposed turbines would exceed Part 77 standards as described below.

a. Section 77.17(a)(1): Section 77.17(a)(1): Exceeds a height of 499 feet AGL at the site of the object. All proposed structures would exceed this surface by 157 feet.

b. Section 77.17(a)(4) -- A height within an en route obstacle clearance area, including turn and termination areas, of a Federal Airway or approved off-airway route, that would increase the IFR en route minimum obstacle clearance altitude

The following proposed structures would have the following effect: HUUVR ONE ARRIVAL (RNAV) Increase Minimum Obstruction Clearance Altitude (MOCA) from MSKTS to JJUST from 2300 feet to 2400 feet AMSL. (Procedure serves KAKR KCAK 1G3). The height at which there is no effect is at or below 1300 feet AMSL

2021-WTE-140-OE
2021-WTE-142-OE
2021-WTE-143-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

3. VFR ROUTE

VFR en route is evaluated in accordance with Part 77 Section 77.29 (a)(1): the impact on arrival, departure, and en route procedures for aircraft operating under visual flight rules.

At 656 feet AGL, the following structures would extend into airspace normally utilized for VFR en route flight by 157 feet. The structures would be located within 2 statute miles of a VFR Route as defined by JO 7400.2M, Section 6-3-8 and would have an adverse effect upon VFR air navigation.

2021-WTE-142-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

4. RADAR IMPACTS

The FAA found that all 27 proposed wind turbines would have a Radar Line of Sight (RLOS) impact to the Airport Surveillance Radar (ASR) -9 at Fort Wayne, IN (FWA). Since they are visible to the ASR, they could cause unwanted primary-only returns (clutter) and primary-only target drops, all in the immediate area of the turbines. Also, tracked primary-only targets could diverge from the aircraft path and follow wind turbines, when the aircraft is over or near the turbines.
No effect will occur on the Secondary (Beacon) Radar System.

5. SPONSOR ACTIONS

To pursue the possibility of receiving a favorable determination at the originally requested height, further study would be necessary. Further study entails coordination with the affected air traffic control facilities in order to evaluate effects fully and potential mitigations for possible approval of your project. Further study will also involve a public notice circularization and 37-day comment period. The outcome cannot be predicted.

If you have questions regarding this Notice of Presumed Findings, you may contact Bill Ratts via email at (William.M.Ratts@faa.gov)

FURTHER STUDY HAS ALREADY BEEN REQUESTED.

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2021-WTE-156-OE

Issued Date: 06/02/2021

Matthias Weigel
Starwood Energy Group, LLC.
5 Greenwich Office Park
2nd Floor
Greenwich, CT 06831

**** NOTICE OF PRELIMINARY FINDINGS ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine 20210129-41
Location:	Grover Hill, OH
Latitude:	41-01-48.86N NAD 83
Longitude:	84-29-26.86W
Heights:	724 feet site elevation (SE)
	656 feet above ground level (AGL)
	1380 feet above mean sea level (AMSL)

Initial findings of this study indicate that the structure as described exceeds obstruction standards and/or would have an adverse physical or electromagnetic interference effect upon navigable airspace or air navigation facilities. Pending resolution of the issues described below, the structure is presumed to be a hazard to air navigation.

To pursue a favorable determination at the originally submitted height, further study would be necessary. Further study entails distribution to the public for comment, and may extend the study period up to 120 days. The outcome cannot be predicted prior to public circularization.

If you would like the FAA to conduct further study, you must make the request within 60 days from the date of issuance of this letter.

See Attachment for Additional information.

NOTE: PENDING RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE, THE STRUCTURE IS PRESUMED TO BE A HAZARD TO AIR NAVIGATION. THIS LETTER DOES NOT AUTHORIZE CONSTRUCTION OF THE STRUCTURE EVEN AT A REDUCED HEIGHT. ANY RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE MUST BE COMMUNICATED TO THE FAA SO THAT A FAVORABLE DETERMINATION CAN SUBSEQUENTLY BE ISSUED.

IF MORE THAN 60 DAYS FROM THE DATE OF THIS LETTER HAS ELAPSED WITHOUT ATTEMPTED RESOLUTION, IT WILL BE NECESSARY FOR YOU TO REACTIVATE THE STUDY BY FILING A NEW FAA FORM 7460-1, NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION.

If we can be of further assistance, please contact Bill Ratts, at (816) 329-2544, or William.M.Ratts@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-WTE-156-OE.

Signature Control No: 466829395-483476951 (NPF -WT)
Steve Phillips
Manager, Obstruction Evaluation Group

Attachment(s)
Additional Information

Abbreviations
AGL - above ground level
AMSL - above mean sea level
RWY - runway
VFR - visual flight rules
IFR - instrument flight rules
NM - nautical mile
ASN- Aeronautical Study Number
CAT - category aircraft
RNAV- area navigation
MDA - minimum descent altitude
Part 77 - Title 14 Code of Federal Regulations (CFR) Part 77, Safe, Efficient Use and Preservation of the Navigable Airspace

The proposed Grover Hill wind turbine project near Grover Hill, OH consists of 27 wind turbines and has been reviewed by the FAA under ASNs 2021-WTE-132-OE sequentially through 2021-WTE-158-OE.

The proposed wind turbine project lies approximately between 2.2 NM north northwest to 2.1 NM southwest from the town of Grover Hill, OH.

For the sake of efficiency, the 27 proposed wind turbines in this project that have similar impacts to 14 CFR Part 77 standards are included in this narrative.

1. LOCATION OF PROPOSED CONSTRUCTION

The Aeronautical Study Number (ASNs), Structure Names, Above Ground Level (AGL) heights, Above Mean Sea Level (AMSL) heights and coordinates for each proposed structure are listed as follows:

ASN Structure Name AGL/AMSL LAT/LONG

2021-WTE-132-OE / 20210129-11 / 656 / 1381 / 41-02-39.16N / 84-30-35.30W
2021-WTE-133-OE / 20210129-12 / 656 / 1380 / 41-02-34.48N / 84-30-15.14W
2021-WTE-134-OE / 20210129-13 / 656 / 1376 / 41-02-24.96N / 84-30-07.54W
2021-WTE-135-OE / 20210129-14 / 656 / 1377 / 41-02-12.42N / 84-30-01.05W
2021-WTE-136-OE / 20210129-15 / 656 / 1380 / 41-02-12.09N / 84-29-25.08W
2021-WTE-137-OE / 20210129-16 / 656 / 1379 / 41-02-09.99N / 84-28-57.10W
2021-WTE-138-OE / 20210129-17 / 656 / 1383 / 41-01-47.59N / 84-30-28.07W
2021-WTE-139-OE / 20210129-22 / 656 / 1381 / 41-01-47.39N / 84-29-10.01W
2021-WTE-140-OE / 20210129-25 / 656 / 1381 / 41-01-35.08N / 84-29-00.37W
2021-WTE-141-OE / 20210129-26 / 656 / 1381 / 41-01-50.39N / 84-28-56.14W

2021-WTE-142-OE / 20210129-27 / 656 / 1386 / 41-00-53.14N / 84-30-34.67W
2021-WTE-143-OE / 20210129-28 / 656 / 1384 / 41-00-53.49N / 84-30-06.23W
2021-WTE-144-OE / 20210129-29 / 656 / 1386 / 41-00-35.59N / 84-30-30.57W
2021-WTE-145-OE / 20210129-30 / 656 / 1384 / 41-00-34.70N / 84-30-06.47W
2021-WTE-146-OE / 20210129-31 / 656 / 1386 / 41-00-35.52N / 84-29-22.91W
2021-WTE-147-OE / 20210129-32 / 656 / 1383 / 41-00-37.96N / 84-28-54.19W

2021-WTE-148-OE	20210129-33	656	1382	41-00-54.25N	84-28-07.10W
2021-WTE-149-OE	20210129-34	656	1381	41-00-44.49N	84-28-08.43W
2021-WTE-150-OE	20210129-35	656	1383	41-00-32.56N	84-28-12.16W
2021-WTE-151-OE	20210129-36	656	1382	41-00-30.53N	84-27-51.17W
2021-WTE-152-OE	20210129-37	656	1389	40-59-38.09N	84-30-28.20W
2021-WTE-153-OE	20210129-38	656	1384	40-59-57.53N	84-29-11.57W
2021-WTE-154-OE	20210129-39	656	1384	41-02-39.83N	84-30-05.48W
2021-WTE-155-OE	20210129-40	656	1382	41-02-28.32N	84-30-35.47W
2021-WTE-156-OE	20210129-41	656	1380	41-01-48.86N	84-29-26.86W
2021-WTE-157-OE	20210129-42	656	1384	41-00-44.10N	84-30-05.63W
2021-WTE-158-OE	20210129-43	656	1387	40-59-57.76N	84-28-53.84W

2. OBSTRUCTION STANDARDS EXCEEDED

The following proposed turbines would exceed Part 77 standards as described below.

a. Section 77.17(a)(1): Section 77.17(a)(1): Exceeds a height of 499 feet AGL at the site of the object. All proposed structures would exceed this surface by 157 feet.

b. Section 77.17(a)(4) -- A height within an en route obstacle clearance area, including turn and termination areas, of a Federal Airway or approved off-airway route, that would increase the IFR en route minimum obstacle clearance altitude

The following proposed structures would have the following effect: HUUVR ONE ARRIVAL (RNAV) Increase Minimum Obstruction Clearance Altitude (MOCA) from MSKTS to JJUST from 2300 feet to 2400 feet AMSL. (Procedure serves KAKR KCAK 1G3). The height at which there is no effect is at or below 1300 feet AMSL

2021-WTE-140-OE
2021-WTE-142-OE
2021-WTE-143-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

3. VFR ROUTE

VFR en route is evaluated in accordance with Part 77 Section 77.29 (a)(1): the impact on arrival, departure, and en route procedures for aircraft operating under visual flight rules.

At 656 feet AGL, the following structures would extend into airspace normally utilized for VFR en route flight by 157 feet. The structures would be located within 2 statute miles of a VFR Route as defined by JO 7400.2M, Section 6-3-8 and would have an adverse effect upon VFR air navigation.

2021-WTE-142-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

4. RADAR IMPACTS

The FAA found that all 27 proposed wind turbines would have a Radar Line of Sight (RLOS) impact to the Airport Surveillance Radar (ASR) -9 at Fort Wayne, IN (FWA). Since they are visible to the ASR, they could cause unwanted primary-only returns (clutter) and primary-only target drops, all in the immediate area of the turbines. Also, tracked primary-only targets could diverge from the aircraft path and follow wind turbines, when the aircraft is over or near the turbines.
No effect will occur on the Secondary (Beacon) Radar System.

5. SPONSOR ACTIONS

To pursue the possibility of receiving a favorable determination at the originally requested height, further study would be necessary. Further study entails coordination with the affected air traffic control facilities in order to evaluate effects fully and potential mitigations for possible approval of your project. Further study will also involve a public notice circularization and 37-day comment period. The outcome cannot be predicted.

If you have questions regarding this Notice of Presumed Findings, you may contact Bill Ratts via email at (William.M.Ratts@faa.gov)

FURTHER STUDY HAS ALREADY BEEN REQUESTED.

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2021-WTE-157-OE

Issued Date: 06/02/2021

Matthias Weigel
Starwood Energy Group, LLC.
5 Greenwich Office Park
2nd Floor
Greenwich, CT 06831

**** NOTICE OF PRELIMINARY FINDINGS ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine 20210129-42
Location:	Grover Hill, OH
Latitude:	41-00-44.10N NAD 83
Longitude:	84-30-05.63W
Heights:	728 feet site elevation (SE) 656 feet above ground level (AGL) 1384 feet above mean sea level (AMSL)

Initial findings of this study indicate that the structure as described exceeds obstruction standards and/or would have an adverse physical or electromagnetic interference effect upon navigable airspace or air navigation facilities. Pending resolution of the issues described below, the structure is presumed to be a hazard to air navigation.

To pursue a favorable determination at the originally submitted height, further study would be necessary. Further study entails distribution to the public for comment, and may extend the study period up to 120 days. The outcome cannot be predicted prior to public circularization.

If you would like the FAA to conduct further study, you must make the request within 60 days from the date of issuance of this letter.

See Attachment for Additional information.

NOTE: PENDING RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE, THE STRUCTURE IS PRESUMED TO BE A HAZARD TO AIR NAVIGATION. THIS LETTER DOES NOT AUTHORIZE CONSTRUCTION OF THE STRUCTURE EVEN AT A REDUCED HEIGHT. ANY RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE MUST BE COMMUNICATED TO THE FAA SO THAT A FAVORABLE DETERMINATION CAN SUBSEQUENTLY BE ISSUED.

IF MORE THAN 60 DAYS FROM THE DATE OF THIS LETTER HAS ELAPSED WITHOUT ATTEMPTED RESOLUTION, IT WILL BE NECESSARY FOR YOU TO REACTIVATE THE STUDY BY FILING A NEW FAA FORM 7460-1, NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION.

If we can be of further assistance, please contact Bill Ratts, at (816) 329-2544, or William.M.Ratts@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-WTE-157-OE.

Signature Control No: 466829396-483476954 (NPF -WT)

Steve Phillips
Manager, Obstruction Evaluation Group

Attachment(s)
Additional Information

Abbreviations
AGL - above ground level
AMSL - above mean sea level
RWY - runway
VFR - visual flight rules
IFR - instrument flight rules
NM - nautical mile
ASN- Aeronautical Study Number
CAT - category aircraft
RNAV- area navigation
MDA - minimum descent altitude
Part 77 - Title 14 Code of Federal Regulations (CFR) Part 77, Safe, Efficient Use and Preservation of the Navigable Airspace

The proposed Grover Hill wind turbine project near Grover Hill, OH consists of 27 wind turbines and has been reviewed by the FAA under ASNs 2021-WTE-132-OE sequentially through 2021-WTE-158-OE.

The proposed wind turbine project lies approximately between 2.2 NM north northwest to 2.1 NM southwest from the town of Grover Hill, OH.

For the sake of efficiency, the 27 proposed wind turbines in this project that have similar impacts to 14 CFR Part 77 standards are included in this narrative.

1. LOCATION OF PROPOSED CONSTRUCTION

The Aeronautical Study Number (ASNs), Structure Names, Above Ground Level (AGL) heights, Above Mean Sea Level (AMSL) heights and coordinates for each proposed structure are listed as follows:

ASN	Structure Name	AGL/AMSL		LAT/LONG	
2021-WTE-132-OE	20210129-11	656	1381	41-02-39.16N	84-30-35.30W
2021-WTE-133-OE	20210129-12	656	1380	41-02-34.48N	84-30-15.14W
2021-WTE-134-OE	20210129-13	656	1376	41-02-24.96N	84-30-07.54W
2021-WTE-135-OE	20210129-14	656	1377	41-02-12.42N	84-30-01.05W
2021-WTE-136-OE	20210129-15	656	1380	41-02-12.09N	84-29-25.08W
2021-WTE-137-OE	20210129-16	656	1379	41-02-09.99N	84-28-57.10W
2021-WTE-138-OE	20210129-17	656	1383	41-01-47.59N	84-30-28.07W
2021-WTE-139-OE	20210129-22	656	1381	41-01-47.39N	84-29-10.01W
2021-WTE-140-OE	20210129-25	656	1381	41-01-35.08N	84-29-00.37W
2021-WTE-141-OE	20210129-26	656	1381	41-01-50.39N	84-28-56.14W
2021-WTE-142-OE	20210129-27	656	1386	41-00-53.14N	84-30-34.67W
2021-WTE-143-OE	20210129-28	656	1384	41-00-53.49N	84-30-06.23W
2021-WTE-144-OE	20210129-29	656	1386	41-00-35.59N	84-30-30.57W
2021-WTE-145-OE	20210129-30	656	1384	41-00-34.70N	84-30-06.47W
2021-WTE-146-OE	20210129-31	656	1386	41-00-35.52N	84-29-22.91W
2021-WTE-147-OE	20210129-32	656	1383	41-00-37.96N	84-28-54.19W

2021-WTE-148-OE / 20210129-33 / 656 / 1382 / 41-00-54.25N / 84-28-07.10W
2021-WTE-149-OE / 20210129-34 / 656 / 1381 / 41-00-44.49N / 84-28-08.43W
2021-WTE-150-OE / 20210129-35 / 656 / 1383 / 41-00-32.56N / 84-28-12.16W
2021-WTE-151-OE / 20210129-36 / 656 / 1382 / 41-00-30.53N / 84-27-51.17W

2021-WTE-152-OE / 20210129-37 / 656 / 1389 / 40-59-38.09N / 84-30-28.20W
2021-WTE-153-OE / 20210129-38 / 656 / 1384 / 40-59-57.53N / 84-29-11.57W
2021-WTE-154-OE / 20210129-39 / 656 / 1384 / 41-02-39.83N / 84-30-05.48W
2021-WTE-155-OE / 20210129-40 / 656 / 1382 / 41-02-28.32N / 84-30-35.47W
2021-WTE-156-OE / 20210129-41 / 656 / 1380 / 41-01-48.86N / 84-29-26.86W
2021-WTE-157-OE / 20210129-42 / 656 / 1384 / 41-00-44.10N / 84-30-05.63W
2021-WTE-158-OE / 20210129-43 / 656 / 1387 / 40-59-57.76N / 84-28-53.84W

2. OBSTRUCTION STANDARDS EXCEEDED

The following proposed turbines would exceed Part 77 standards as described below.

a. Section 77.17(a)(1): Section 77.17(a)(1): Exceeds a height of 499 feet AGL at the site of the object. All proposed structures would exceed this surface by 157 feet.

b. Section 77.17(a)(4) -- A height within an en route obstacle clearance area, including turn and termination areas, of a Federal Airway or approved off-airway route, that would increase the IFR en route minimum obstacle clearance altitude

The following proposed structures would have the following effect: HUUVR ONE ARRIVAL (RNAV) Increase Minimum Obstruction Clearance Altitude (MOCA) from MSKTS to JJUST from 2300 feet to 2400 feet AMSL. (Procedure serves KAKR KCAK 1G3). The height at which there is no effect is at or below 1300 feet AMSL

2021-WTE-140-OE
2021-WTE-142-OE
2021-WTE-143-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

3. VFR ROUTE

VFR en route is evaluated in accordance with Part 77 Section 77.29 (a)(1): the impact on arrival, departure, and en route procedures for aircraft operating under visual flight rules.

At 656 feet AGL, the following structures would extend into airspace normally utilized for VFR en route flight by 157 feet. The structures would be located within 2 statute miles of a VFR Route as defined by JO 7400.2M, Section 6-3-8 and would have an adverse effect upon VFR air navigation.

2021-WTE-142-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

4. RADAR IMPACTS

The FAA found that all 27 proposed wind turbines would have a Radar Line of Sight (RLOS) impact to the Airport Surveillance Radar (ASR) -9 at Fort Wayne, IN (FWA). Since they are visible to the ASR, they could cause unwanted primary-only returns (clutter) and primary-only target drops, all in the immediate area of the turbines. Also, tracked primary-only targets could diverge from the aircraft path and follow wind turbines, when the aircraft is over or near the turbines.
No effect will occur on the Secondary (Beacon) Radar System.

5. SPONSOR ACTIONS

To pursue the possibility of receiving a favorable determination at the originally requested height, further study would be necessary. Further study entails coordination with the affected air traffic control facilities in order to evaluate effects fully and potential mitigations for possible approval of your project. Further study will also involve a public notice circularization and 37-day comment period. The outcome cannot be predicted.

If you have questions regarding this Notice of Presumed Findings, you may contact Bill Ratts via email at (William.M.Ratts@faa.gov)

FURTHER STUDY HAS ALREADY BEEN REQUESTED.

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2021-WTE-158-OE

Issued Date: 06/02/2021

Matthias Weigel
Starwood Energy Group, LLC.
5 Greenwich Office Park
2nd Floor
Greenwich, CT 06831

**** NOTICE OF PRELIMINARY FINDINGS ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine 20210129-43
Location:	Grover Hill, OH
Latitude:	40-59-57.76N NAD 83
Longitude:	84-28-53.84W
Heights:	731 feet site elevation (SE)
	656 feet above ground level (AGL)
	1387 feet above mean sea level (AMSL)

Initial findings of this study indicate that the structure as described exceeds obstruction standards and/or would have an adverse physical or electromagnetic interference effect upon navigable airspace or air navigation facilities. Pending resolution of the issues described below, the structure is presumed to be a hazard to air navigation.

To pursue a favorable determination at the originally submitted height, further study would be necessary. Further study entails distribution to the public for comment, and may extend the study period up to 120 days. The outcome cannot be predicted prior to public circularization.

If you would like the FAA to conduct further study, you must make the request within 60 days from the date of issuance of this letter.

See Attachment for Additional information.

NOTE: PENDING RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE, THE STRUCTURE IS PRESUMED TO BE A HAZARD TO AIR NAVIGATION. THIS LETTER DOES NOT AUTHORIZE CONSTRUCTION OF THE STRUCTURE EVEN AT A REDUCED HEIGHT. ANY RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE MUST BE COMMUNICATED TO THE FAA SO THAT A FAVORABLE DETERMINATION CAN SUBSEQUENTLY BE ISSUED.

IF MORE THAN 60 DAYS FROM THE DATE OF THIS LETTER HAS ELAPSED WITHOUT ATTEMPTED RESOLUTION, IT WILL BE NECESSARY FOR YOU TO REACTIVATE THE STUDY BY FILING A NEW FAA FORM 7460-1, NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION.

If we can be of further assistance, please contact Bill Ratts, at (816) 329-2544, or William.M.Ratts@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-WTE-158-OE.

Signature Control No: 466829397-483476953 (NPF -WT)

Steve Phillips
Manager, Obstruction Evaluation Group

Attachment(s)
Additional Information

Abbreviations
AGL - above ground level
AMSL - above mean sea level
RWY - runway
VFR - visual flight rules
IFR - instrument flight rules
NM - nautical mile
ASN- Aeronautical Study Number
CAT - category aircraft
RNAV- area navigation
MDA - minimum descent altitude
Part 77 - Title 14 Code of Federal Regulations (CFR) Part 77, Safe, Efficient Use and Preservation of the Navigable Airspace

The proposed Grover Hill wind turbine project near Grover Hill, OH consists of 27 wind turbines and has been reviewed by the FAA under ASNs 2021-WTE-132-OE sequentially through 2021-WTE-158-OE.

The proposed wind turbine project lies approximately between 2.2 NM north northwest to 2.1 NM southwest from the town of Grover Hill, OH.

For the sake of efficiency, the 27 proposed wind turbines in this project that have similar impacts to 14 CFR Part 77 standards are included in this narrative.

1. LOCATION OF PROPOSED CONSTRUCTION

The Aeronautical Study Number (ASNs), Structure Names, Above Ground Level (AGL) heights, Above Mean Sea Level (AMSL) heights and coordinates for each proposed structure are listed as follows:

ASN	Structure Name	AGL/AMSL		LAT/LONG	
2021-WTE-132-OE	20210129-11	656	1381	41-02-39.16N	84-30-35.30W
2021-WTE-133-OE	20210129-12	656	1380	41-02-34.48N	84-30-15.14W
2021-WTE-134-OE	20210129-13	656	1376	41-02-24.96N	84-30-07.54W
2021-WTE-135-OE	20210129-14	656	1377	41-02-12.42N	84-30-01.05W
2021-WTE-136-OE	20210129-15	656	1380	41-02-12.09N	84-29-25.08W
2021-WTE-137-OE	20210129-16	656	1379	41-02-09.99N	84-28-57.10W
2021-WTE-138-OE	20210129-17	656	1383	41-01-47.59N	84-30-28.07W
2021-WTE-139-OE	20210129-22	656	1381	41-01-47.39N	84-29-10.01W
2021-WTE-140-OE	20210129-25	656	1381	41-01-35.08N	84-29-00.37W
2021-WTE-141-OE	20210129-26	656	1381	41-01-50.39N	84-28-56.14W
2021-WTE-142-OE	20210129-27	656	1386	41-00-53.14N	84-30-34.67W
2021-WTE-143-OE	20210129-28	656	1384	41-00-53.49N	84-30-06.23W
2021-WTE-144-OE	20210129-29	656	1386	41-00-35.59N	84-30-30.57W
2021-WTE-145-OE	20210129-30	656	1384	41-00-34.70N	84-30-06.47W
2021-WTE-146-OE	20210129-31	656	1386	41-00-35.52N	84-29-22.91W
2021-WTE-147-OE	20210129-32	656	1383	41-00-37.96N	84-28-54.19W

2021-WTE-148-OE / 20210129-33 / 656 / 1382 / 41-00-54.25N / 84-28-07.10W
2021-WTE-149-OE / 20210129-34 / 656 / 1381 / 41-00-44.49N / 84-28-08.43W
2021-WTE-150-OE / 20210129-35 / 656 / 1383 / 41-00-32.56N / 84-28-12.16W
2021-WTE-151-OE / 20210129-36 / 656 / 1382 / 41-00-30.53N / 84-27-51.17W

2021-WTE-152-OE / 20210129-37 / 656 / 1389 / 40-59-38.09N / 84-30-28.20W
2021-WTE-153-OE / 20210129-38 / 656 / 1384 / 40-59-57.53N / 84-29-11.57W
2021-WTE-154-OE / 20210129-39 / 656 / 1384 / 41-02-39.83N / 84-30-05.48W
2021-WTE-155-OE / 20210129-40 / 656 / 1382 / 41-02-28.32N / 84-30-35.47W
2021-WTE-156-OE / 20210129-41 / 656 / 1380 / 41-01-48.86N / 84-29-26.86W
2021-WTE-157-OE / 20210129-42 / 656 / 1384 / 41-00-44.10N / 84-30-05.63W
2021-WTE-158-OE / 20210129-43 / 656 / 1387 / 40-59-57.76N / 84-28-53.84W

2. OBSTRUCTION STANDARDS EXCEEDED

The following proposed turbines would exceed Part 77 standards as described below.

a. Section 77.17(a)(1): Section 77.17(a)(1): Exceeds a height of 499 feet AGL at the site of the object. All proposed structures would exceed this surface by 157 feet.

b. Section 77.17(a)(4) -- A height within an en route obstacle clearance area, including turn and termination areas, of a Federal Airway or approved off-airway route, that would increase the IFR en route minimum obstacle clearance altitude

The following proposed structures would have the following effect: HUUVR ONE ARRIVAL (RNAV) Increase Minimum Obstruction Clearance Altitude (MOCA) from MSKTS to JJUST from 2300 feet to 2400 feet AMSL. (Procedure serves KAKR KCAK 1G3). The height at which there is no effect is at or below 1300 feet AMSL

2021-WTE-140-OE
2021-WTE-142-OE
2021-WTE-143-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

3. VFR ROUTE

VFR en route is evaluated in accordance with Part 77 Section 77.29 (a)(1): the impact on arrival, departure, and en route procedures for aircraft operating under visual flight rules.

At 656 feet AGL, the following structures would extend into airspace normally utilized for VFR en route flight by 157 feet. The structures would be located within 2 statute miles of a VFR Route as defined by JO 7400.2M, Section 6-3-8 and would have an adverse effect upon VFR air navigation.

2021-WTE-142-OE
2021-WTE-144-OE
2021-WTE-145-OE
2021-WTE-146-OE
2021-WTE-147-OE
2021-WTE-148-OE
2021-WTE-149-OE
2021-WTE-150-OE
2021-WTE-151-OE
2021-WTE-152-OE
2021-WTE-153-OE
2021-WTE-157-OE
2021-WTE-158-OE

4. RADAR IMPACTS

The FAA found that all 27 proposed wind turbines would have a Radar Line of Sight (RLOS) impact to the Airport Surveillance Radar (ASR) -9 at Fort Wayne, IN (FWA). Since they are visible to the ASR, they could cause unwanted primary-only returns (clutter) and primary-only target drops, all in the immediate area of the turbines. Also, tracked primary-only targets could diverge from the aircraft path and follow wind turbines, when the aircraft is over or near the turbines.
No effect will occur on the Secondary (Beacon) Radar System.

5. SPONSOR ACTIONS

To pursue the possibility of receiving a favorable determination at the originally requested height, further study would be necessary. Further study entails coordination with the affected air traffic control facilities in order to evaluate effects fully and potential mitigations for possible approval of your project. Further study will also involve a public notice circularization and 37-day comment period. The outcome cannot be predicted.

If you have questions regarding this Notice of Presumed Findings, you may contact Bill Ratts via email at (William.M.Ratts@faa.gov)

FURTHER STUDY HAS ALREADY BEEN REQUESTED.

Dean Sather

From: noreply@faa.gov
Sent: Wednesday, June 2, 2021 12:15 PM
To: Matthias@mnwindconsultants.com; Dean Sather
Subject: Status of FAA Filing 2021-WTE-140-OE (CIR)

Your filing is assigned Aeronautical Study Number 2021-WTE-140-OE.

Further study has been initiated and the FAA issued a Public Notice for the subject ASN on 06/02/2021. Comments from interested parties must be received by the FAA within 30 days in order to be considered. Please refer to the assigned ASN on all future inquiries regarding this filing. To review your electronic record, go to our website oeaaa.faa.gov and select the Search Archives link to locate your case using the Aeronautical Study Number (ASN). Copies of your letter are available on the website for your convenience.

To ensure e-mail notifications are delivered to your inbox please add noreply@faa.gov to your address book. Notifications sent from this address are system generated FAA e-mails and replies to this address will NOT be read or forwarded for review. Each system generated e-mail will contain specific FAA contact information in the text of the message.

Attachment 5

Supplement to Exhibit Q

Architecture Survey
State Historic Preservation Office Concurrence Letter
May 12, 2021

Archaeological Survey
State Historic Preservation Office Concurrence Letter
June 4, 2021

OHIO HISTORY CONNECTION

May 12, 2021

In reply, please refer to:
2020-PAU-47772

Amy Kramb
Kramb Consulting
7511 Riverside Drive
Dublin, Ohio 43016

RE: History/Architecture Reconnaissance Survey for the Grover Hill Wind Farm
Latty Township, Paulding County, Ohio

Dear Ms. Kramb:

This letter is in response to information received on April 12, 2021. The comments of Ohio's State Historic Preservation Office (SHPO) are submitted in accordance with provisions of Ohio Revised Code 149.53 requesting cooperation among state agencies in the preservation of historic properties, Ohio Administrative Code Chapters 4906-1 to 4906-17, and with provisions of the National Historic Preservation Act of 1966, as amended, and the associated regulations at 36 CFR Part 800.

The project includes the construction of a wind farm consisting of twenty-three (23) wind turbines erected within an area approximately three miles east-west by four miles north-south. The overall total height of each wind turbine will range from approximately 572 feet to 656 feet. A permanent gravel bed approximately fifty feet in diameter will be installed at the base of each wind turbine. No fencing surrounds the turbines. The following review and comments pertain only to the *History/Architecture Reconnaissance Survey for the Grover Hill Wind Farm in Latty Township, Paulding County, Ohio* by Kramb Consulting (Kramb, 2021). The archaeological component has been submitted in a stand-alone report, therefore the review will be under a separate cover.

A literature review and field survey were completed as part of the investigations. A total of sixty-nine (69) architectural resources fifty years of age or older were identified within the Area of Potential Effects. Kramb recommends that twenty-one (21) are considered potentially eligible for listing in the National Register of Historic Places. Our office agrees with Kramb's recommendations of eligibility.

Existing wind turbines are visible from most locations within the APE, which is generally flat and devoid of trees. The existing visibility of wind turbines does not impact the significance and integrity of these properties in a way that would alter their potential National Register eligibility. Therefore, additional visibility of new turbines should not have an adverse effect on historic properties. No further coordination in regards to history/architecture properties are required for this project unless the scope of work changes.

If you have any questions, please do not hesitate to contact me at jwilliams@ohiohistory.org.
Thank you for your cooperation.

Sincerely,

Joy Williams

Joy Williams, Project Reviews Manager
Resource Protection and Review

"Please be advised that this is a Section 106 decision. This review decision may not extend to other SHPO programs."

RPR Serial No: 1088165

In reply, refer to
2020-PAU-47772

June 4, 2021

Ryan Grohnke
Westwood
12701 Whitewater Drive, Suite 300
Minnetonka, MN 55343
Ryan.Grohnke@westwoodps.com

RE: Grover Hill Wind Farm, Latty Township, Paulding County, Ohio

Dear Mr. Grohnke:

This letter is in response to the correspondence received May 12, 2021 regarding the proposed Grover Hill Wind Farm, Latty Township, Paulding County, Ohio. We appreciate the opportunity to comment on this project. The comments of the Ohio State Historic Preservation Office (SHPO) are made pursuant to Section 149.53 of the Ohio Revised Code and the Ohio Power Siting Board rules for siting this project (OAC 4906-4 and 4906-5). The comments of the Ohio SHPO are also submitted in accordance with the provisions of Section 106 of the National Historic Preservation Act of 1966, as amended (54 U.S.C. 306108 [36 CFR 800]).

The following comments pertain to the *Phase I Archaeological Investigations for the 701.4 ha (1,733.2 ac) Grover Hill Wind Farm in Latty Township, Paulding County, Ohio* by Weller & Associates, Inc. (2021).

A literature review, visual inspection, surface collection, shovel probe, and shovel test unit excavation was completed as part of the investigations. Two (2) previously identified archaeological site is located within in the project area. Ohio Archaeological Inventory (OAI) #33PA0291 was originally recorded in 2013 and was not reidentified during this survey. OAI#33PA0051 was originally recorded in 1976 and was reidentified during this survey. Neither site is recommended eligible for listing in the National Register of Historic Places (NRHP). Our office agrees with this recommendation. Nineteen (19) new archaeological sites were identified during survey. OAI#33PA0355-33PA0373 are all recommended not eligible for listing in the NRHP. Our office also agrees with this recommendation and no future archaeological survey work is recommended.

The History/Architecture Reconnaissance Survey was submitted to our office on April 12, 2021 and a coordination letter was issued from our office on May 12, 2021 determining twenty-one (21) NRHP-eligible properties are located within the Area of Potential Effect (APE) and the proposed project would have no adverse effect on those properties.

Based on the information provided, we agree that the project as proposed will have no adverse effect on historic properties. No further coordination with this office is necessary, unless the project changes or unless new or additional historic properties are discovered during implementation of this project. In such a situation, this office should be contacted. If you have any questions, please contact me at (614) 298-2022, or by e-mail at khorrocks@ohiohistory.org. Thank you for your cooperation.

Sincerely,

Krista Horrocks, Project Reviews Manager
Resource Protection and Review

cc: Ryan Weller, Weller & Associates, Inc. (rweller@wellercrm.com)

RPR Serial No: 1088563

Attachment 6

Supplement to Exhibit D
Agency Correspondence
Ohio Department of Natural Resources Correspondence
Regarding Review of Project

Office of Real Estate
John Kessler, Chief
2045 Morse Road – Bldg. E-2
Columbus, OH 43229
Phone: (614) 265-6621
Fax: (614) 267-4764

May 7, 2021

Shelby Kilibarda
Westwood Professional Services
12701 Whitewater Drive, Suite 300
Minnetonka, Minnesota 55343

Re: 21-0254: Grover Hill Wind Project

Project: The proposed project involves installation of 25 wind turbines, depending upon the model(s) selected and the final output of the Project. Additional facilities may include transmission line, access roads, electrical collection lines etc.

Location: The proposed project is located in Grover Hill, Paulding County, Ohio.

The Ohio Department of Natural Resources (ODNR) has completed a review of the above referenced project. These comments were generated by an inter-disciplinary review within the Department. These comments have been prepared under the authority of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), the National Environmental Policy Act, the Coastal Zone Management Act, Ohio Revised Code and other applicable laws and regulations. These comments are also based on ODNR's experience as the state natural resource management agency and do not supersede or replace the regulatory authority of any local, state or federal agency nor relieve the applicant of the obligation to comply with any local, state or federal laws or regulations.

Natural Heritage Database: The Natural Heritage Database has no records at or within a one-mile radius of the project area.

A review of the Ohio Natural Heritage Database indicates there are no other records of state endangered or threatened plants or animals within the project area. There are also no records of state potentially threatened plants, special interest or species of concern animals, or any federally listed species. In addition, we are unaware of any unique ecological sites, geologic features, animal assemblages, scenic rivers, state wildlife areas, state nature preserves, state or national parks, state or national forests, national wildlife refuges, or other protected natural areas within the project area. The review was performed on the project area you specified in your request as well as an additional one-mile radius. Records searched date from 1980.

Please note that Ohio has not been completely surveyed and we rely on receiving information from many sources. Therefore, a lack of records for any particular area is not a statement that rare species or unique features are absent from that area. Although all types of plant communities have been surveyed, we only maintain records on the highest quality areas.

Fish and Wildlife: The Division of Wildlife (DOW) has the following comments.

The DOW recommends that impacts to streams, wetlands and other water resources be avoided and minimized to the fullest extent possible, and that Best Management Practices be utilized to minimize erosion and sedimentation.

State and federally listed species have been documented within the vicinity of the Grover Hill Wind Project area. These species include the Indiana bat (*Myotis sodalis*), a state and federally endangered species, the red bat (*Lasiurus borealis*), a state species of concern, the big brown bat (*Eptesicus fuscus*), a state species of concern, the hoary bat (*Lasiurus cinereus*), a state species of concern, and the silver-haired bat (*Lasionycteris noctivagans*), a state species of concern. These and other species have the potential to be impacted by construction and/or operational activities associated with the project. Because construction and operational activities have the potential to impact species differently, these comments have been separated between construction, and operation of the project.

<u>Recommendations for construction phase</u>

The eastern half of the project is within the vicinity of records for the Indiana bat (*Myotis sodalis*), a state endangered and federally endangered species. Because presence of state endangered bat species has been established in the area, summer tree cutting is not recommended, and additional summer surveys would not constitute presence/absence in the area. However, limited summer tree cutting inside this buffer may be acceptable after further consultation with DOW (contact Sarah Stankavich, sarah.stankavich@dnr.state.oh.us).

In addition, the entire state of Ohio is within the range of the Indiana bat (*Myotis sodalis*), a state endangered and federally endangered species, the northern long-eared bat (*Myotis septentrionalis*), a state endangered and federally threatened species, the little brown bat (*Myotis lucifugus*), a state endangered species, and the tricolored bat (*Perimyotis subflavus*), a state endangered species. During the spring and summer (April 1 through September 30), these bat species predominately roost in trees behind loose, exfoliating bark, in crevices and cavities, or in the leaves. However, these species are also dependent on the forest structure surrounding roost trees. The DOW recommends tree cutting only occur from October 1 through March 31, conserving trees with loose, shaggy bark and/or crevices, holes, or cavities, as well as trees with DBH ≥ 20 if possible.

The DOW also recommends that a desktop habitat assessment, followed by a field assessment if needed, is conducted to determine if there are potential hibernaculum(a) present within the project area. Information about how to conduct habitat assessments can be found in the current USFWS "*Range-wide Indiana Bat Survey Guidelines*." If a habitat assessment finds that potential hibernacula are present within 0.25 miles of the project area, please send this information to Sarah Stankavich, sarah.stankavich@dnr.state.oh.us for project recommendations. If a potential or known hibernaculum is found, the DOW recommends a 0.25-mile tree cutting and subsurface disturbance buffer around the hibernaculum entrance, however, limited summer or winter tree cutting may be acceptable after consultation with DOW. If no tree cutting or subsurface impacts to a hibernaculum are proposed, this project is not likely to impact these species.

The project is within the range of the club shell (*Pleurobema clava*), a state endangered and federally endangered mussel, and the pondhorn (*Uniomerus tetralasmus*), a state threatened mussel. This project must not have an impact on freshwater native mussels at the project site.

This applies to both listed and non-listed species. Per the Ohio Mussel Survey Protocol (2020), all Group 2, 3, and 4 streams (Appendix A) require a mussel survey. Per the Ohio Mussel Survey Protocol, Group 1 streams (Appendix A) and unlisted streams with a watershed of 5 square miles or larger above the point of impact should be assessed using the Reconnaissance Survey for Unionid Mussels (Appendix B) to determine if mussels are present. Mussel surveys may be recommended for these streams as well. This is further explained within the Ohio Mussel Survey Protocol. Therefore, if in-water work is planned in any stream that meets any of the above criteria, the DOW recommends the applicant provide information to indicate no mussel impacts will occur. If this is not possible, the DOW recommends a professional malacologist conduct a mussel survey in the project area. If mussels that cannot be avoided are found in the project area, as a last resort, the DOW recommends a professional malacologist collect and relocate the mussels to suitable and similar habitat upstream of the project site. Mussel surveys and any subsequent mussel relocation should be done in accordance with the Ohio Mussel Survey Protocol. The Ohio Mussel Survey Protocol (2020) can be found at: http://wildlife.ohiodnr.gov/portals/wildlife/pdfs/licenses%20&%20permits/OH%20Mussel%20Survey%20Protocol.pdf

The project is within the range of the greater redhorse (*Moxostoma valenciennesi*), a state threatened fish. The DOW recommends no in-water work in perennial streams from March 15 through June 30 to reduce impacts to indigenous aquatic species and their habitat. If no in-water work is proposed in a perennial stream, this project is not likely to impact this or other aquatic species.

The project is within the range of the Blanding's turtle (*Emydoidea blandingii*), a state threatened species. This species inhabits marshes, ponds, lakes, streams, wet meadows, and swampy forests. Although essentially aquatic, the Blanding's turtle will travel over land as it moves from one wetland to the next. Due to the location, the type of habitat within the project area, and the type of work proposed, this project is not likely to impact this species.

The project is within the range of the Kirtland's snake (*Clonophis kirtlandii*), a state threatened species. This secretive species prefers wet meadows and other wetlands. Due to the location, the type of habitat within the project area, and the type of work proposed, this project is not likely to impact this species.

The project is within the range of the American bittern (*Botaurus lentiginosus*), a state endangered bird. Nesting bitterns prefer large undisturbed wetlands that have scattered small pools amongst dense vegetation. They occasionally occupy bogs, large wet meadows, and dense shrubby swamps. If this type of habitat will be impacted, construction should be avoided in this habitat during the species' nesting period of May 1 through July 31. If this type of habitat will not be impacted, the project is not likely to impact this species.

The project is within the range of the northern harrier (*Circus hudsonis*), a state endangered bird. This is a common migrant and winter species. Nesters are much rarer, although they occasionally breed in large marshes and grasslands. Harriers often nest in loose colonies. The female builds a nest out of sticks on the ground, often on top of a mound. Harriers hunt over grasslands. If this type of habitat will be impacted, construction should be avoided in this habitat during the species' nesting period of April 15 through July 31. If this habitat will not be impacted, this project is not likely to impact this species.

The project is within the range of the upland sandpiper (*Bartramia longicauda*), a state endangered bird. Nesting upland sandpipers utilize dry grasslands including native grasslands, seeded grasslands, grazed and ungrazed pasture, hayfields, and grasslands established through the Conservation Reserve Program (CRP). If this type of habitat will be impacted, construction should be avoided in this habitat during the species' nesting period of April 15 through July 31. If this type of habitat will not be impacted, this project is not likely to impact this species.

Recommendations for operational phase

To reduce impacts to migratory birds and bats, the DOW recommends curtailment at night during migratory seasons at and below wind speeds of 6.9 m/s. Because mortality rates have been shown to increase in Ohio in August and September, even under 6.9m/s curtailment, additional curtailment regimes or other avoidance measures may be recommended post-construction. The DOW also recommends a curtailment regime at night during the summer residency period to reduce risk to the state and federally endangered Indiana bat and the state-endangered tricolored bat which have been documented in project vicinity. The DOW further recommends development of a bird and bat mitigation plan, in conjunction with DOW and OPSB staff.

Please refer to the survey effort letter dated November 2, 2018 for breeding bird habitat survey direction, including the northern harrier.

Due to the potential operational impacts to federally and state listed species, migratory birds, and other protected species, including bald eagles and other raptors, we recommend that this project be coordinated with the US.. Fish & Wildlife Service.

Geological Survey: The Division of Geological Survey has the following comment.

Physiographic Region
The proposed project area is in Latty Township, Paulding County. The project area lies within the Paulding Clay Basin physiographic region. This region is characterized by a nearly flat lacustrine plain. Low gradient, highly meandering streams are common. Soils are easily ponded. Pleistocene-age lacustrine clay covers clay till. Silurian-age dolomite underlies the site. The southern portion of this project area lies with the Maumee Lake Plains subregion. This area is characterized by a flat-lying Ice-Age lake basin. Beach ridges, bars, dunes, deltas and clay flats can all be found in this region. This area was once covered by the Great Black Swamp but is now dissected by modern streams. Pleistocene-age silt, clay and wave-planed clayey till cover Silurian and Devonian-age bedrock (Ohio Department of Natural Resources, Division of Geological Survey, 1998).

Surficial/Glacial Geology
The project area lies within the glaciated margin of the state and includes several Wisconsinan-age glacial features. The northern portion of the project area is covered by lacustrine clay. This clay was deposited in a calm glacial lake environment. It is mostly laminated and covered in places with thin organic deposits. The southern portion of the project area is covered by lake-planed moraine. This area is made up of clayey till. Terrain is very flat and small patches of sand, silt, or clay may be present on the surface. Small patches of thin sand may indicate localized beach deposits (Pavey et al, 1999). Glacial drift throughout most of the study area is between 13 and 49 feet thick. Drift is highest in uplands and thinnest along drainages (Powers and Swinford, 2004).

Bedrock Geology
The uppermost bedrock unit in the project area is the Salina Undifferentiated. This unit is Silurian-age and consists of a gray to brown dolomite which contains argillaceous partings,

brecciated intervals, algal laminations and anhydrite/gypsum zones. This unit underlies the entire project area. Underlying the Salina Undifferentiated is the Silurian-age Tymochtee and Greenfield Formations Undivided. This unit is characterized by olive gray to yellowish brown dolomite with brownish black to gray shale laminae. Underlying the Tymochtee and Greenfield Formations Undivided is the Silurian-age Lockport Dolomite. This unit is characterized by bluish gray to gray dolomite with minor interbedding of limestone, chert and shale. Fossils and planar to irregular bedding are common. These two units are not the uppermost unit anywhere within the project area but may be used as an aquifer in area wells. It should be noted that bedrock is not exposed at the surface within the boundaries of the project area due to glacial drift (Slucher et al, 2006).

Oil, Gas and Mining
ODNR has record of five oil and gas wells within one mile of the proposed project area. Most of these wells are listed as dry holes in final restoration. One well record is an expired permit for a well that was never drilled (Ohio Department of Natural Resources, Division of Oil and Gas, Ohio Oil and Gas Wells Locator).
ODNR does not have record of any mining operations within the project area. The nearest mine to the project area is the Scott Quarry mine operated by Stoneco, Inc. This mine is a limestone quarry and is located approximately 7.1 miles from the site boundary (Ohio Department of Natural Resources, Division of Mineral Resources, Mines of Ohio).

Seismic Activity
Several small earthquakes have historically been recorded in the region. The three events closest to the site are listed in the chart below (Ohio Department of Natural Resources, Division of Geological Survey, Ohio Earthquake Epicenters):

Date	Magnitude	Distance to Site Boundary	County	Township
06/12/2015	2.6	12.5	Van Wert	Tully
03/13/2005	2.2	21.9	Mercer	Dublin
01/30/2004	2.4	22.8	Mercer	Dublin

Karst
Karst features usually form in areas that are covered by thin or no glacial drift and the bedrock is limestone or dolomite. There are no known sinkholes in this area, however it should be noted that the underlying carbonate bedrock units are known for their tendency to include karst features in other areas of the state (Ohio Department of Natural Resources, Division of Geological Survey, Ohio Karst).
Soils
According to the USDA Web Soil Survey, the project area consists primarily of soils derived from glacial till, alluvium and glaciolacustrine deposits. Paulding, Latty and Nappanee are the most common soil series found within the boundaries of the project area. Together these soils make up over 85% of the project area (USDA Web Soil Survey).

There is a moderate to high risk of shrink-swell potential in these soils. Other limiting factors include ponding and seasonal saturation. Slope remains relatively flat, with slope seldom exceeding a 6% grade. (USDA Web Soil Survey).

Groundwater
Groundwater resources are plentiful throughout the project area. Wells developed in bedrock are likely to yield 5 to 100 gallons per minute. Wells developed in the Salina Undifferentiated have an expected yield of 5 to 25 gallons per minute however wells that are developed in deeper

carbonate units such as the Tymochtee and Greenfield Formations Undivided or the Lockport Dolomite have an expected yield of up to 100 gallons per minute or more (Raab, 1986 and Ohio Department of Natural Resources, Division of Water, Bedrock Aquifer Map, 2000). Wells developed in glacial material are likely to yield up to 25 gallons per minute. The majority of the project area overlies the Lake Maumee Lacustrine Aquifer which has a yield of 5 gallons per minute or less. Portions of the project area that intersect the Auglaize River Alluvial Aquifer have an expected yield of 5 to 25 gallons per minute. Higher groundwater yields typically reflect larger diameter, properly developed and screened wells (Ohio Department of Natural Resources, Division of Water, Statewide Unconsolidated Aquifer Map, 2000).

Water Resources: The Division of Water Resources has the following comment.

The local floodplain administrator should be contacted concerning the possible need for any floodplain permits or approvals for this project. Your local floodplain administrator contact information can be found at the website below.

http://water.ohiodnr.gov/portals/soilwater/pdf/floodplain/Floodplain%20Manager%20Community%20Contact%20List_8_16.pdf

ODNR appreciates the opportunity to provide these comments. Please contact Sarah Tebbe, Environmental Specialist, at (614) 265-6397 or Sarah.Tebbe@dnr.state.oh.us if you have questions about these comments or need additional information.

Mike Pettegrew
Environmental Services Administrator (Acting)