SECTION 20.
BLASTING

It is anticipated that during construction, blasting will be required in some areas of the Number Nine Wind Farm (Project) to break up intact bedrock for development of roadways as well as turbine clearings and foundations. Blasted bedrock, as feasible, will be broken into a well-graded mixture according to specifications from Maine Department of Transportation and used on-site as surface aggregate for crane path and access roads, riprap, and potentially for deeper embankment fills. Proposed site grades have been designed to balance cuts and fills to minimize the net import or export of material.

Preliminary geotechnical investigation conducted by Terracon indicated that subsurface conditions along ridges generally consist of forest mat underlain by a thin veneer of glacial till over bedrock. Based on the rock cores recovered from the geotechnical investigation, and on Terracon's review of bedrock geologic mapping, the bedrock underlying the site is not considered susceptible to producing acid rock drainage, due to the absence of pyritic (sulfuric) minerals in the rock.

Exhibit 20-A includes the blasting plan for the Project.

EXHIBIT 20-A NUMBER NINE WIND PROJECT BLASTING PLAN

SECTION 20: BLASTING PLAN

Number Nine Mountain Wind

Prepared by:

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20.0 BLASTING

20.1 INTRODUCTION

It is anticipated during construction, blasting will be required in some areas of the project site to break up intact bedrock for development of roadways, wind turbine generator (WTG) clearings, and WTG foundations. Blasted bedrock, as feasible, will be broken into a well-graded mixture according to MDOT specifications and used on-site as surface aggregate for crane path and access roads, riprap, and potentially for deeper embankment fills. Proposed site grades have been designed to balance cuts and fills to minimize the net import or export of material.

20.2 SOIL AND BEDROCK CONDITIONS

Based on our preliminary geotechnical investigation subsurface conditions along ridges generally consist of forest mat underlain by a thin veneer of glacial till over bedrock. Bedrock was typically encountered within 2 to 6 feet below the ground surface at the WTG locations, except WTG structures A5 and B21 where bedrock was encountered at 22 and 20 feet deep, respectively. Bedrock generally consisted of very poor to fair quality rock consisting of mudstone, mafic volcanic rocks, sandstone, and conglomerate. Bedrock geologic maps indicate the project site to be underlain primarily by unmetamorphosed to slightly metamorphosed meta-sedimentary rocks, with localized areas of mafic volcanic rocks.

The turbine foundations have not been finalized. The foundation type will likely be a reinforced concrete mat with or without rock anchors.

20.3 CONTROLLED BLASTING PROCEDURES

General

Controlled blasting methods will be specified to excavate rock efficiently and safely. Controlled blasting methods will be implemented in order to limit the charge weight per blast delay, avoid potential damage from fly rock, and reduce blast vibration levels at structures on adjacent properties. Vibrations will be measured as an aid in selecting charge weights such that property damage is avoided. Blasting mats will be required on all blast rounds. Blasting operations shall follow all local, state, and federal regulations related to transportation and use of explosives, including Title 38 Maine *Revised Statues Annotated* Section 490-Z(14).

Pre-Blast Surveys/Notifications

The contractor will offer to perform a pre-blast survey of structures on adjacent properties within a distance from blasting of 2,000 feet from the blast site, in order to establish a baseline, not only for existing house conditions, but also for domestic water supply wells. Due to the remote

location for most turbine sites, the majority of blasting activities will be more than 2,000 feet from residential or commercial properties.

Appropriate notices will be given and appointments arranged for those who desire a survey. Results of pre-blast surveys will be documented in photographs or video, and in narrative form in written reports.

Property owners within 2,000 feet of the blast area will be provided a blasting schedule. The blasting schedule shall contain, at a minimum: (1) name, address, and telephone number of the operator; (2) identification of the specific areas in which blasting will take place; (3) dates and time periods when explosives are to be detonated; (4) methods to be used to control access to the blasting areas; and (5) type and patterns of audible warning and all-clear signals to be used before and after blasting.

When blasting is finished, a final survey of conditions will be made to evaluate whether blasting may have caused reported damage. Water well claims such as an increase in turbidity, a decrease in yield, a change in color, or a change in chemical composition are often asserted, but often are either temporary conditions caused by blasting or produced by other causes.

Blast Monitoring

All blasts will be monitored by a representative who has been properly trained in the setup and use of seismic monitoring equipment. At least one seismograph will be in use at all times. Placement of monitoring equipment will be at the nearest structure to the blast site.

Sequence of Blasting

All blasting operations will be strictly coordinated with all appropriate parties including the Maine Forest Service, Forest Protection Division. Emphasis will be on safe and efficient removal of rock existing on this project without impact to surrounding structures. Blasts will be developed to create adequate relief, minimizing ground vibrations and offering the greatest protection possible to surrounding structures.

Based on grading, perimeter controls will be implemented, such as line drilling or presplitting to reduce overbreak along permanent rock cut slopes, where applicable. Initial production test blasts should be performed near the center of the site. The test shot should be sized on standard-scaled distance relationships and monitored for vibrations at the nearest property line. Vibration results will provide data to help the contractor establish charge weight loadings for subsequent blasting.

After each blast, shot rock should be removed as necessary from the face of the subsequent blast area to reduce confinement. An open matted rock face allows the rock mass to move during the shot, thereby reducing blast vibrations. The size of each production round will

depend on the depth of bedrock, measured and anticipated vibrations, and the proximity to adjacent property.

Blasting Procedures

1. Blasting operations shall commence after 6:00 AM and cease before 6:00 PM, Monday through Friday.
2. Blasting operations shall commence after 9:00 AM and cease before 2:00 PM on Saturdays. No blasting shall be performed on Sundays.
3. No Saturday blasting shall be performed within 2,000 feet of residential or commercial structures.
4. Blasting cannot be conducted at times different from those announced in the blasting schedule except in emergency situations such as electrical storms or public safety required unscheduled detonation.
5. Warning and all-clear signals of different character that are audible within a range of on-half mile from the point of the blast shall be given. All persons within the permit area shall be notified of the meaning of the signals through appropriate instructions and signs posted.
6. Access to blasting area shall be regulated to protect the public from the effects of blasting. Access to the blasting area shall be controlled to prevent unauthorized entry before each blast and until the permittee's authorized representative has determined that no unusual circumstances exist after the blast. Access to and travel in or through the area can then safely resume.
7. Areas in which charged holes are awaiting firing shall be guarded, barricaded, and posted or flagged against unauthorized entry.
8. All blasts shall be made in the direction of the stress relieved face.
9. All stemming shall be minimum as specified using clean, dry, 3/8-inch crushed stone.
10. Blasting mats shall be used as necessary to cover blasts.

Blasting Mats

Blasting mats and backfill will be used to control excess amounts of rock movement and flyrock when blasting in close proximity to structures. Mats will be placed so as to protect people and structures, prevent flyrock from entering protected natural resource areas on, or surrounding the blast site and property.

Blast Security and Warning Whistles

Each blast will be preceded by a security check of the affected area and then a series of warning whistles. Communications will be made with job site supervisors and local officials as required to ensure the safest possible operation. All personnel in the vicinity closest to the blast area will be warned. The warning whistles will be in the following sequence:

3 Whistles – 5 Minutes to Blast
2 Whistles – 1 Minute to Blast
1 Whistle – All Clear

The blast site will be examined by the blaster prior to the all-clear signal to determine that it is safe to resume work. No blast will be fired until the area has been secured and determined safe.

Explosives

All explosives will be stored in approved magazines when not in use. The federal explosives regulations at 27 CFR, Part 555, Subpart K, provide specific construction requirements for explosives magazines. Explosives that are attended at all times may be stored in Type 3 “day box” magazines. Unattended explosives will be stored in Type 2 portable magazines when not in use. Long-term storage of explosives will be stored in a Type 1 permanent magazine at a designated location. The Contractor will be required to include additional security to prevent unauthorized entry to unattended blast sites during non-working hours.

Blasting Personnel

All blasting operations shall be conducted by experienced, trained, and competent persons who understand the hazards involved. Persons working with explosive materials shall:

1. Have demonstrated a knowledge of, and willingness to comply with, safety and security requirements;
2. Be capable of using mature judgment in all situations;
3. Be of good physical condition and not addicted to intoxicants, narcotics, prescription drugs, or similar controlled substances;
4. The person(s) responsible for the explosives possess current knowledge of the local, state, and federal laws and regulations applicable to this work; and
5. The person(s) responsible for the explosives shall have obtained a Certificate of Competency or a license as required by State law.

Licenses and Permits

Blasting operations shall be performed by a blaster who is fully licensed and insured for the transportation, use, and handling of explosives. Blasting permits will be applied for as required from local authorities.

Blast Vibration

Blast vibrations, which are the primary specified controlling criteria, will be measured using at least one engineering seismograph. The seismograph should be located at the nearest property line to the closest structure. Additional monitoring can be provided if other property owners file complaints. Vibration monitoring results will be used to provide information to the blaster to modify blast rounds, as necessary. Finally, airblast overpressure will also be measured using the seismographs and comparison to criteria listed in the State Regulations. Typically, airblast overpressure is not a controlling factor for a well-matted blast.

At this time, it is recommended the peak particle velocity (PPV) at residential structures be limited to 0.5 inch per second due to the relatively long distances between blasting and residential structures. The airblast overpressure should be limited to 0.014 pound per square inch at nearest adjacent residences.

Sound from blasting will comply with Title 38 *Maine Revised Statutes Annotated (MRSA)*, Section 490-Z (14)(H).

Record Keeping
Records of individual blasts will comply with Title 38 MRSA Section 490-Z (14)(L).

20.4 EFFECTS OF GROUNDWATER MIGRATION

Based on our experience with projects involving blasting near occupied structures with private water supply, there are usually concerns regarding the potential for blasting activities to impact the migration of groundwater and affect water wells. We understand that the potential change in bedrock joint conditions due to blasting, resulting in either increasing or decreasing the volume of groundwater flow, or altering the direction of groundwater flow on adjacent properties, is a primary concern.

We anticipate that blasting will have minimal effect, if any, on the bedrock structure outside the project limits and, therefore, will not result in noticeable effects on water well recharge. The potential radius of nonelastic (permanent) bedrock deformation that occurs during a blast is approximately equivalent to the depth of the blast hole. The anticipated maximum blast hole depth will be less than approximately 10 feet, therefore, the lateral distance in which bedrock joints may be affected by blasting is assumed to be approximately 10 feet.

Permanent deformation is more likely to occur if a blast is confined. Proper blasting sequence will significantly reduce lateral confinement by blasting from the center of the site toward the perimeter in order to provide a free face for rock to move. This will likely involve excavating blast rock prior to detonating the next adjacent round. In addition, the depth below the bottom of the blast hole in which bedrock is broken will generally be limited to a few feet due to the high confining stresses at the toe of the blast round.

20.5 ACID ROCK MITIGATION

Based on the rock cores recovered from the geotechnical investigation, and on our review of bedrock geologic mapping, the bedrock underlying the site is not considered susceptible to producing acid rock drainage (ARD), due to the absence of pyritic (sulfuric) minerals in the rock.

In the event further investigations indicate the potential for ARD, the following mitigation measures will be implemented, including:

- Avoiding or minimizing disturbance/excavation of acid producing rock;
- Disposal of the material above the water table;
- Surface and groundwater management to divert water away from acid producing rock and management areas;
- Blending or alkaline addition to maintain pH at or near neutral levels;
- Identifying potential borrow sites for cover material, or for the isolation or temporary storage of potential acid producing material;
- Using low permeability and impermeable barriers to limit infiltration into the potentially acid producing rock from rainwater or groundwater;
- Preparation of a logistics plan including sources for alkaline material and locations for the stockpiling of such material;
- Identification of monitoring methods and locations to evaluate the effectiveness of the mitigation; and
- Contingency plans should initial mitigation require modification.

The construction plan will be reviewed and adapted to allow initial construction activities to begin while further ARD evaluation of any specific locations of concern is in progress. This is expected to include initial clearing and grubbing not requiring cut and fill operations into acid bedrock.