BEFORE THE
ENERGY FACILITY SITING COUNCIL
OF THE STATE OF OREGON

In the Matter of Request for Amendment 2 for the Wheatridge Wind Energy Facility	))))	~~DRAFT~~ PROPOSED ORDER ON REQUEST FOR AMENDMENT 2 TO THE SITE CERTIFICATE

~~September 21~~November 1, 2018

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I. INTRODUCTION

The Oregon Department of Energy (Department or ODOE) issues this ~~draft~~ proposed order, in accordance with Oregon Revised Statute (ORS) 469.405(1) and OAR 345-027-~~0065~~0071, based on its review of Request for Amendment 2 (amendment request or RFA2) to the Wheatridge Wind Energy Facility site certificate, as well as comments and recommendations received by specific state agencies and local governments. The certificate holder is Wheatridge Wind Energy, LLC, (hereinafter referred to as "Wheatridge" or certificate holder) which is a wholly owned subsidiary of NextEra Energy Resources, LLC (NextEra or NEER).

The certificate holder requests that the Energy Facility Siting Council (EFSC or Council) approve changes to the site certificate to allow construction and operation of two proposed battery storage systems and interconnection facilities as related or supporting facilities to the previously approved wind energy facility, including the following:

- Series of modular containers or a building per system (approximately 80 feet long, 100 feet wide and 15-20 feet tall for the 20 MW system~~)~~; approximately 190 feet long, 100 feet wide and 15-20 feet tall for the 30 MW system)
    - Each system would contain lithium-ion batteries within battery modules placed in anchored racks within containers or building~~.~~
    - Approximately eighteen 2.7 mega-voltampere (MVA) inverters with associated step up transformers with a combined footprint approximately 8 ~~feet~~ by 4 feet~~.~~
    - Each system would be equipped with a gas pressured deluge fire suppression system, independent smoke detection system, and external fire water tank
    - Each system would include a cooling system comprised of a bank of four power conditioning system fan units with motor
- Control house, approximately 16 by 11 feet, with an external heating, ventilation and air conditioning unit (HVAC)
- Protective device; skid-mounted power transformer; and bi-directional inverter

Based upon review of this amendment request, in conjunction with comments received by members of the public and recommendations received by state agencies and local government entities during the draft proposed order comment period, the Department recommends that the Council approve and grant an amendment to the Wheatridge Wind Energy Facility site certificate subject to the existing, new, and recommended amended conditions set forth in this ~~draft~~ proposed order.

I.A. Name and Address of Certificate Holder

Wheatridge Wind Energy, LLC
700 Universe Boulevard
Juno Beach, Florida 33408

Parent Company of the Certificate Holder
NextEra Energy Resources, LLC
FEW/JB
700 Universe Boulevard
Juno Beach, Florida 33408

Certificate Holder Contact
Jesse Marshall
Wheatridge Wind Energy, LLC
700 Universe Boulevard
Juno Beach, Florida 33408

I.B. Description of the Approved Facility

The Wheatridge Wind Energy Facility (facility) site certificate, effective May 24, 2017, authorizes construction and operation of a 500 megawatt (MW) wind energy generation facility, to be located within both Morrow and Umatilla counties. The facility has not yet been constructed but is approved for up to 292 wind turbines and up to 32 miles of up to two parallel overhead 230-kilovolt (kV) intraconnection transmission lines that would traverse one of four approved routing options, described below. Additional previously approved related or supporting facilities to the energy facility include an electrical collection system, up to three collector substations, up to 12 meteorological towers, communication and supervisory control systems and data acquisition systems (SCADA), up to two operations and maintenance (O&M) buildings, up to 72 miles of new or improved access roads, and temporary construction areas.

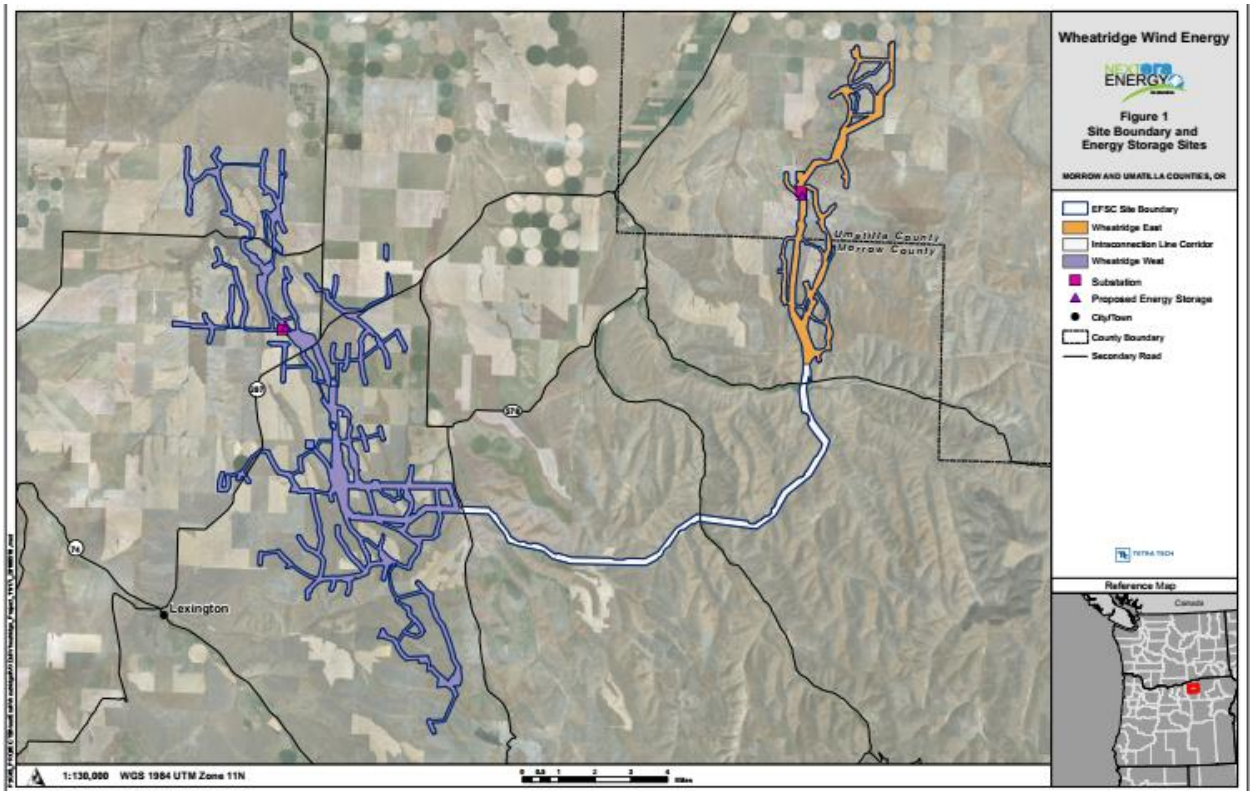
I.C. Description of Approved Facility Site Location

Site Boundary

The facility site boundary includes approximately 13,097 acres of private land, within Morrow and Umatilla counties, and includes the perimeter of the energy facility site, all temporary laydown, staging areas and intraconnection transmission corridors.

The energy facility site is divided into two groups, Wheatridge West and Wheatridge East. Wheatridge West is located entirely within Morrow County, bisected by Oregon Highway 207, approximately 5 miles northeast of Lexington and approximately 7 miles northwest of Heppner. Wheatridge East is located approximately 16 miles northeast of Heppner and includes land in both Morrow and Umatilla counties. Wheatridge West and Wheatridge East will be connected via a 230 kV transmission line or “intraconnection” transmission line (see Figure 1, *Facility Location* below).

Figure 1: Facility Location



Micrositing Corridor

For this facility, the site boundary represents the micrositing corridor, and is a minimum of approximately 660 feet in width around turbines. The site boundary width around site access roads and electrical collection lines (collector lines) is narrower, between 200 ~~feet~~ and 500 feet in width. The micrositing corridor is wider for the area surrounding the substations, meteorological towers (met towers), O&M buildings, and construction yards.

Intraconnection Transmission Line Corridors

The certificate holder previously obtained approval of four routing options for the 230 kV intraconnection transmission line that interconnects Wheatridge West and Wheatridge East for the transmission of generated power. The intraconnection transmission line corridor is approximately 1,000-feet in width and ranges in length from 24.5 to 31.5 miles, based upon the four approved transmission line route options.

The approved 230 kV intraconnection transmission line route options, as presented in ASC Exhibit C (Figures C-4a through C-4d), are summarized below:

- Option 1: 31.5-mile 230 kV intraconnection transmission line extending from Wheatridge East Substation 3 to Wheatridge West Substation 1.

- Option 2: 31.3-mile 230 kV intraconnection transmission line extending from Wheatridge East Substation 3 to Wheatridge West Substation 2b, and then to Wheatridge West Substation 2a (alternate).

- Option 3: 24.5-mile 230 kV intraconnection transmission line extending from Wheatridge West Substation 1 to Wheatridge East Substation 3.

- Option 4: 27.8 mile 230 kV intraconnection transmission line extending from Wheatridge West Substation 2a to Wheatridge West Substation 2b, and then to Wheatridge East Substation 3.

I.D. Procedural History

The Council issued the *Final Order on the Application for Site Certificate* for the Wheatridge Wind Energy Facility (Final Order on ASC) on April 28, 2017. The site certificate became effective on May 24, 2017. On June 14, 2017, the certificate holder submitted Request for Amendment 1 (RFA1) of the site certificate, requesting to transfer certificate holder ownership from Swaggart Wind Power, LLC to a new parent company, NextEra Energy Resources, LLC. The Council issued the final order and first amended site certificate on July 27, 2017. The first amended site certificate became effective on August 17, 2017.

II. AMENDMENT PROCESS

II.A. Requested Amendment

Proposed Related or Supporting Facilities

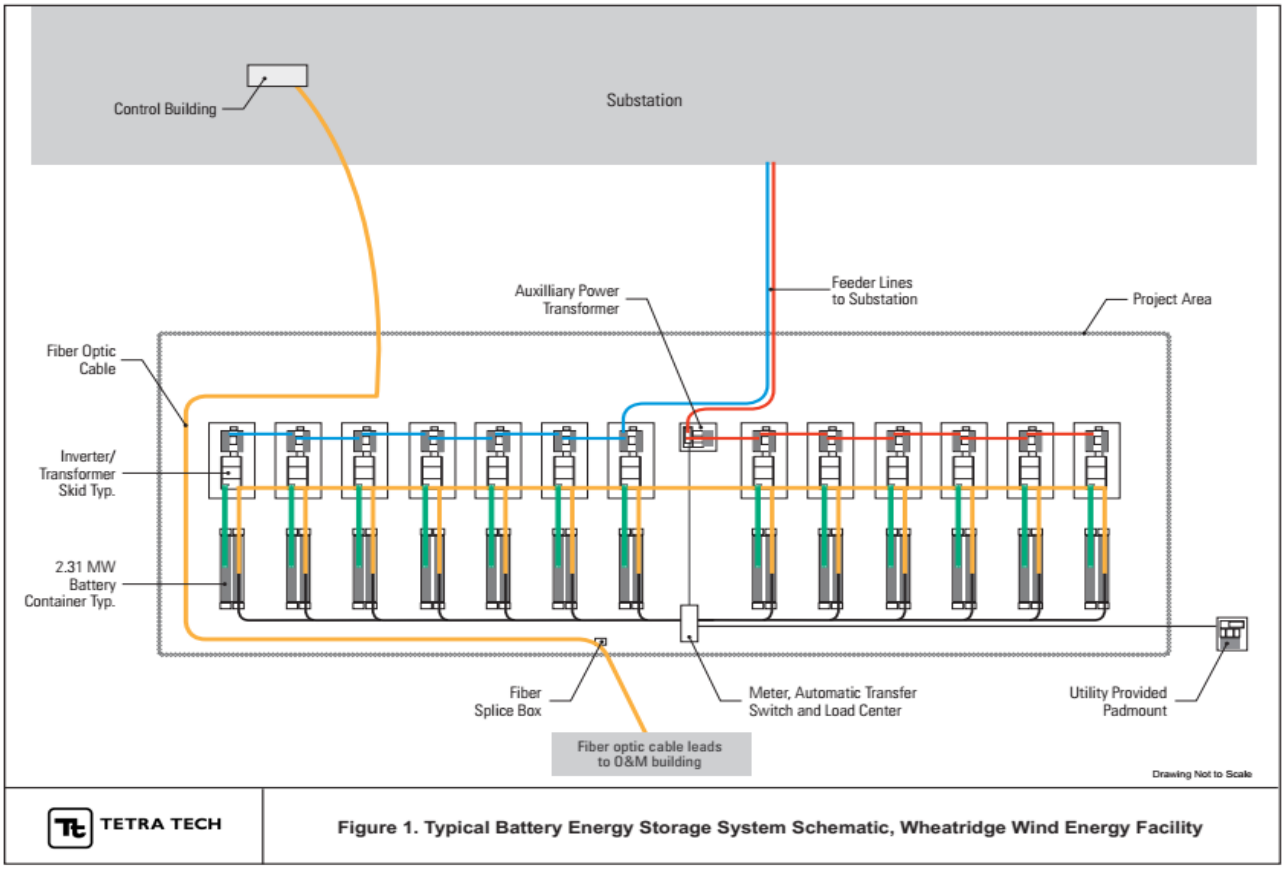
The certificate holder requests Council approval to amend the site certificate to allow construction and operation of additional related or supporting facilities, including two proposed battery storage systems and interconnection facilities (e.g. control house, protective device and power transformer) (see Figure 2, *Battery Storage System Layout* below).

The proposed battery storage systems would be 20 and 30 MW, each located on up to 5 acres adjacent to previously approved but not yet constructed fenced substation and O&M building sites in previously approved site boundary and micrositing area within Morrow and Umatilla counties (see Figure 1, *Facility Location* above).

The certificate holder describes that the proposed battery storage systems would allow energy generated from the wind facility to be stored and distributed to the grid, as needed.[1]

[1] WRWAMD2Doc11. Complete Request for Amendment 2. 2018-09-17. The certificate holder describes that the proposed battery storage systems "would not be built but for the construction and operation of the energy facility" and therefore meet the OAR 345-001-0010(51) definition of a related or supporting facility.

Figure 2: Battery Storage System Layout



Components of the proposed battery storage systems and its interconnection facilities are described below.

Proposed Battery Storage Systems and Interconnection Facilities

The preliminary design of the proposed battery storage systems, as described in RFA2, would include the following components:

- Series of modular containers or a building per system (approximately 80 feet long, 100 feet wide and 15-20 feet tall for the 20 MW system~~)~~; approximately 190 feet long, 100 feet wide and 15-20 feet tall for the 30 MW system)
    - Each system would contain lithium-ion batteries within battery modules placed in anchored racks within containers or building.
    - Approximately eighteen 2.7 mega-voltampere (MVA) inverters with associated step up transformers with a combined footprint approximately 8 feet by 4 feet.
    - Each system would be equipped with a gas pressured deluge fire suppression system, independent smoke detection system, and external fire water tank
    - Each system would include a cooling system comprised of a bank of four power conditioning system fan units with motor

- Control house, approximately 16 feet by 11 feet, with an external heating, ventilation and air conditioning unit (HVAC)
- Protective device; skid-mounted power transformer; and bi-directional inverter

As described in RFA2, battery and inverter equipment would be electrically connected via a combination of aboveground cable trays, underground conduit, and covered cable trenches. Site surfacing would remain primarily gravel. The proposed battery storage systems would interconnect with facility substations via feeder lines.

In RFA2, the certificate holder explains that only two of the four previously approved 230 kV intraconnection transmission line routing options, Options 1 and 3, would apply if the battery storage systems are included in the final facility design (*see Section I.C. Description of Approved Facility Site Location*).

The certificate holder has not specifically requested amendments to site certificate conditions, though as described in this DPO, the Department recommends new and amended conditions.

II.B. Amendment Review Process

Council rules describe the processes for transfers, Type A, Type B, and Type C review of a request for amendment at OAR 345-027-0051. The Type A review is the standard or "default" site certificate amendment process for changes that require an amendment. Type C review process is associated with construction-related changes. The key procedural difference between the Type A and Type B review is that the Type A review includes a public hearing on the draft proposed order and an opportunity to request a contested case proceeding. The primary timing differences between Type A and Type B review are in the maximum allowed timelines for the Department's determination of completeness of the preliminary request for amendment, as well as the issuance of the draft proposed order, and proposed order. It is important to note that Council rules authorize the Department to adjust the timelines for these specific procedural requirements, if necessary.

On April 9, 2018, the certificate holder submitted a Type B review amendment determination request (Type B Review ADR) for Request for Amendment 2 (RFA2), requesting the Department's review and determination of whether, based on evaluation of the OAR 345-027-0057(8) factors, the amendment request could be reviewed under the Type B review process. At the time of the Type B Review ADR submittal, RFA2 had not been submitted to the Department. That Type B Review ADR included two requested amendment components: the battery storage systems, as well as the option to use a proposed differing wind turbine model than was previously considered by Council. Pursuant to OAR 345-027-0057(6), on April 25, 2018, the Department issued a written determination to the certificate holder stating that Type A review be maintained for the modifications ~~proposed,~~ to be included in the RFA~~, be processed under the Type A review process~~. On May 18, 2018, the certificate holder re-submitted a Type B Review ADR for that RFA, and also submitted a preliminary request for amendment (pRFA). Within the Type B Review ADR, the certificate holder requested that the Department

reconsider its previous determination that Type A review be maintained. In addition, the certificate holder requested that the Department provide separate amendment review determinations for the modifications to the wind turbines and for the battery storage ~~additions~~systems. In a letter issued on June 14, 2018, the Department concluded that Type A review be maintained for the proposed changes in wind turbine model and battery storage systems, even if separated into two separate and distinct amendment requests.

OAR 345-027-0057(7) allows that, at the request of the certificate holder, the Department's determination must be referred to the Council for concurrence, modification, or rejection. The certificate holder requested to refer the Department's Type A review determination to Council for its consideration. Additionally, the certificate holder requested that the Council provide separate decisions on amendment review pathways for the proposed wind turbine changes and battery storage systems.

At its June 29, 2018 meeting, the Council evaluated the Department's separate determinations for the turbine modifications and the battery storage systems. The Council concurred that Type A review be maintained for the proposed battery storage systems, but determined that the proposed option to use a differing wind turbine model could be processed under Type B review. In response, the certificate holder separated the amendment components and submitted two separate amendment requests. The proposed battery storage systems are presented in RFA2 and the proposed wind turbine model option are presented in RFA3.[2]

The certificate holder submitted a complete RFA2 on September 17, 2018. On September 21, 2018 the Department posted the complete RFA2 on its website and posted an announcement on the project website informing the public that the complete RFA2 had been received and is available for viewing.

Reviewing Agency Comments on Preliminary Request for Amendment 2

The Department received comments on pRFA2 from the reviewing agencies and Special Advisory Groups listed below:

- Oregon Department of Aviation
- Oregon Department of Fish and Wildlife
- Morrow County Board of Commissioners (Special Advisory Group)
- Umatilla County Board of Commissioners (Special Advisory Group)

Comments from these agencies are incorporated into the Department's analysis of Council standards below, as applicable, and provided in Attachment B of this order.

[2] WRWAMD3Doc11. Request for Amendment 3. 2018-09-18. NextEra also submitted a complete Request for Amendment 3 (RFA3) on September 18~~7~~, 2018 requesting Council approval to use a differing wind turbine model option. As discussed, RFA3 is being reviewed under the Type B review process.

II.C. Council Review Process

On September 21, 2018, the Department issued the draft proposed order, and a notice of public hearing and 34-day comment period on RFA2 and the draft proposed order (notice), extending from September 21 through October 25, 2018. The notice was distributed to all persons on the Council's general mailing list, to the special mailing list established for the facility, to an updated list of property owners supplied by the certificate holder, and to a list of reviewing agencies as defined in OAR 345-001-0010(52).

~~The comment period extends through the close of the public hearing scheduled to occur on October 25, 2018 at 5:30 p.m. at Boardman City Hall in Boardman, Oregon. In addition to accepting written comments during the comment period, the Council will also accept oral testimony at the public hearing. The record of the draft proposed order will close at the conclusion of the public hearing on October 25, 2018, as described in the public notice issued concurrently with the DPO.~~
On October 25, 2018, Council Chair Beyeler conducted a public hearing on the draft proposed order in Boardman, Oregon.[3] The record of the public hearing closed on October 25, 2018 at the conclusion of the public hearing, as provided in the public notice of the draft proposed order. The Council reviewed the draft proposed order and comments received on the record of the public hearing at its regularly scheduled Council meeting on October 26, 2018.

The Department received 9 comments on the record of the public hearing, including oral testimony received at the October 25, 2018 public hearing, from Oregon Department of Fish and Wildlife (written comments); the certificate holder (written comments and oral testimony); Umatilla County Planning Department (written comments); Morrow County Board of Commissioners (written comments and oral testimony); Ms. Irene Gilbert, as an individual and on behalf of Friends of the Grande Ronde Valley (written comments and oral testimony); and Chris Rauch (oral testimony).[4] Attachment C of this proposed order includes copies of the comments submitted on the record of the draft proposed order and an index presenting date comment received, commenter name and organization, location within the proposed order

[3] Chair Beyeler and Council members Jenkins, Grail, Roppe and Howe attended the hearing in person; Council member Gravatt attended via conference line.
[4] WRWAMD2. October 25-26, 2018 Council Meeting Audio File. 2018-10-25. During the October 25, 2018 draft proposed order public hearing, but prior to the conclusion of the hearing and close of the record, Ms. Gilbert requested Council extend the comment period by one week based on a belief that all rules and supporting evidence that she may wish to include in a request for a contested case and/or introduce in a contested case proceeding must be included in comments provided on the record of the draft proposed order. Council denied the extension request because: a) the Sept. 21, 2018 Public Notice of RFA2 explicitly stated that to be eligible to participate in a contested case on RFA2, a person must raise an issue either in person at the public hearing or in a written comment received by ODOE before the record closes on October 25, 2018 at the conclusion of the public hearing, and b) granting an extension for public comment, even if only for one week, would have a cascading effect on other process deadlines and timeframes (e.g., issuance of Proposed Order, opportunity to request a contested case) resulting in an unreasonable delay to the Council's reaching a final decision on RFA2.

where the comment is addressed, and a description of whether material changes were made in the proposed order in response to comments. Issues raised that are within the Council's jurisdiction and related to the proposed amendment are addressed under the applicable standards section below.

~~Following the close of the record of the public hearing and Council's review of the draft proposed order,~~ T~~t~~he Department ~~will issue~~prepared this ~~a~~ proposed order, taking into consideration Council comments, ~~any~~ and comments received "on the record of the public hearing" (i.e., oral testimony provided at the public hearing and written comments received by the Department after the date of the notice of the public hearing and before the close of the public hearing comment period), including any comments from reviewing agencies, special advisory groups, and Tribal Governments. Concurrent with the issuance of this~~e~~ proposed order, the Department ~~will~~ issued a ~~notice~~ Notice of Opportunity to Request a C~~c~~ontested C~~c~~ase and ~~a public~~ N~~n~~otice of ~~the~~ P~~p~~roposed O~~o~~rder.[5] The Notice of Proposed Order was distributed to all persons on the Council's general mailing list, to the special mailing list established for the facility, to an updated list of property owners supplied by the certificate holder, and to a list of reviewing agencies as defined in OAR 345-001-0010(52). The Notice of Opportunity to Request a Contested Case was distributed electronically, where email addresses were received, and via certified mail to the individuals that commented in person or in writing on the record of the draft proposed order public hearing.

Only those persons who commented in person or in writing on the record of the public hearing may request a contested case proceeding on their issues raised, unless the Department did not follow the follow the requirements of OAR 345-027-0067, or unless the action recommended in the proposed order differs materially from the draft proposed order, including any recommended conditions of approval, in which case the person may raise only new issues within the jurisdiction of the Council that are related to such differences. All rules and supporting evidence that a person may wish to cite or include in a request for a contested case proceeding must be included in comments provided on the record of the draft proposed order public hearing. See OAR 345-027-067(3)(G) "The Council will not accept or consider any further public comment on the request for amendment or on the draft proposed order after the close of the public hearing." Additionally, to raise an issue in a contested case proceeding, the issue must be within Council jurisdiction, and the person must have raised the issue on the record of the public hearing with "sufficient specificity to afford the Council, the Department, and the certificate holder an adequate opportunity to respond to the issue."[6]

If the Council finds that a request for contested case identifies one or more properly raised issues that justify a contested case proceeding, the Council shall conduct a contested case proceeding on the proposed order. A person may seek to introduce in the contested case proceeding rules or evidence that were not included in comments on the draft proposed order (the admissibility of such evidence would be subject to the regulations governing contested

[5] See OAR 345-027-0071.
[6] OAR 345-027-0071(5~~7~~).

case proceedings – e.g., OAR 345-105-0001 et seq.). Following a contested case proceeding, if requested and granted; or if no contested case is requested or if requested but not granted, the Council shall adopt, modify or reject the proposed order and will issue a final order approving or denying the site certificate amendment request based upon ~~In making a decision to grant or deny issuance of an amended site certificate, the Council shall apply~~ the applicable laws and Council standards required under OAR 345-027-0075(2) and in effect on the dates described in OAR 345-027-0075(3). The Council's final order is subject to judicial review by the Oregon Supreme Court. Only a party to the contested case proceeding may request judicial review and the issues on appeal are limited to those raised by the parties to the contested case proceeding. A petition for judicial review of the Council's approval or rejection of an application for a site certificate (ASC) or amended site certificate must be filed with the Supreme Court within 60 days after the date of service of the Council's final order or within 30 days after the date of a petition for rehearing is denied or deemed denied.[7]

II.D. Applicable Division 27 Rule Requirements

A site certificate amendment is necessary under OAR 345-027-0050(4) because the certificate holder requests to design, construct, and operate the facility in a manner different from the description in the site certificate, and the proposed changes: (1) could result in a significant adverse impact to a resource or interest protected by a Council standard that the Council has not addressed in an earlier order; (2) could impair the certificate holder's ability to comply with a site certificate condition; or (3) could require new conditions or modification to existing conditions in the site certificate, or could meet more than one of these criteria.

The Type A amendment review process (consisting of OARs 345-027-0059, -0060, -0063, -0065, -0067, -0071 and -0075) is the default amendment review process and shall apply to the Council's review of a request for amendment proposing a change described in OAR 345-027-0050(2), (3), and (4).[8]

III. REVIEW OF THE REQUESTED AMENDMENT

Under ORS 469.310, the Council is charged with ensuring that the "siting, construction and operation of energy facilities shall be accomplished in a manner consistent with protection of the public health and safety." ORS 469.401(2) further provides that the Council must include in the amended site certificate "conditions for the protection of the public health and safety, for the time for completion of construction, and to ensure compliance with the standards, statutes and rules described in ORS 469.501 and ORS 469.503."[9] The Council implements this statutory framework by adopting findings of fact, conclusions of law, and conditions of approval concerning the ability of the ~~amended~~ facility, with proposed changes, to maintain~~'s~~

[7] ORS 469.403 and OAR 345-027-0071(12).
[8] OAR 345-027-0051(2).
[9] ORS 469.401(2).

compliance with the Council's Standards for Siting Facilities at OAR 345, Divisions 22, 24, 26, and 27.

~~This draft proposed order includes the Department's initial analysis of whether the proposed changes meet each applicable Council Standard (with mitigation and subject to compliance with existing and recommended new and amended conditions, as applicable), based on the information in the record. Following the written comment period and hearing on the draft proposed order, the Department will issue its proposed order, which will include the Department's consideration of the comments and any additional evidence received on the record of the draft proposed order.~~

III.A. General Standard of Review: OAR 345-022-0000

(1) To issue a site certificate for a proposed facility or to amend a site certificate, the Council shall determine that the preponderance of evidence on the record supports the following conclusions:

(a) The facility complies with the requirements of the Oregon Energy Facility Siting statutes, ORS 469.300 to ORS 469.570 and 469.590 to 469.619, and the standards adopted by the Council pursuant to ORS 469.501 or the overall public benefits of the facility outweigh the damage to the resources protected by the standards the facility does not meet as described in section (2);

(b) Except as provided in OAR 345-022-0030 for land use compliance and except for those statutes and rules for which the decision on compliance has been delegated by the federal government to a state agency other than the Council, the facility complies with all other Oregon statutes and administrative rules identified in the project order, as amended, as applicable to the issuance of a site certificate for the proposed facility. If the Council finds that applicable Oregon statutes and rules, other than those involving federally delegated programs, would impose conflicting requirements, the Council shall resolve the conflict consistent with the public interest. In resolving the conflict, the Council cannot waive any applicable state statute.

*****

(4) In making determinations regarding compliance with statutes, rules and ordinances normally administered by other agencies or compliance with requirement of the Council statutes if other agencies have special expertise, the Department of Energy shall consult such other agencies during the notice of intent, site certificate application and site certificate amendment processes. Nothing in these rules is intended to interfere with the state's implementation of programs delegated to it by the federal government.

Findings of Fact

OAR 345-022-0000 provides the Council's General Standard of Review and requires the Council to find that a preponderance of evidence on the record supports the conclusion that the facility, with proposed changes, would comply with the requirements of EFSC statutes and the siting standards adopted by the Council and that the facility, with proposed changes, would comply with all other Oregon statutes and administrative rules applicable to the issuance of an amended site certificate for the facility.[10]

The requirements of OAR 345-022-0000 are discussed in the sections that follow. The Department consulted with other state agencies, Morrow County Board of Commissioners and Umatilla County Board of Commissioners during review of pRFA2 to aid in the evaluation of whether the facility, with proposed changes, would maintain compliance with statutes, rules and ordinances otherwise administered by other agencies. Additionally, in many circumstances the Department relies upon these reviewing agencies' special expertise in evaluating compliance with the requirements of Council standards.

Certificate Expiration (OAR 345-025-0006)

Under OAR 345-025-0060(4), the certificate holder must begin construction of the facility, with proposed changes, no later than the construction beginning date specified by Council in the site certificate, unless an amendment is requested and granted. The certificate holder has not requested to extend the previously imposed construction commencement or construction deadlines, as previously imposed in General Standard Conditions 1 and 2 (GEN-GS-01 and GEN-GS-02). The previously imposed conditions establish commencement and construction deadlines based on three and six years, respectively, from the effective date of the site certificate, but did not include specific dates. Because this is the second amendment request, and to avoid unnecessary ambiguity in established deadlines, the Department recommended in the draft proposed order that~~s~~ Council amend General Standard Conditions 1 and 2 (GEN-GS-01 and GEN-GS-02), as presented below, to reference specific dates and require that the certificate holder provide the Department written notification of construction commencement and completion. The site certificate became effective on May 24, 2017.

> **Recommended Amended General Standard Condition 1 (GEN-GS-01):** The certificate holder shall begin construction of the facility by May 24, 2020~~within three years after the effective date of the site certificate. Under OAR 345-015-0085(9), the site certificate is effective upon execution by the Council chair and the applicant~~. On or before May 24,

[10] OAR 345-022-0000(2) and (3) apply to RFAs where a certificate holder has shown that the proposed amendments cannot meet Council standards or has shown that there is no reasonable way to meet the Council standards through mitigation or avoidance of adverse effects to protected resources; and, for those instances, establish criteria for the Council to evaluate in making a balancing determination. The certificate holder does not assert that the proposed amendments cannot meet an applicable Council standard. Therefore, OAR 345-022-0000(2) and (3) do not apply to this review.

2020, the certificate holder shall provide written notification to the Department that it has met the construction commencement deadline. Construction is defined in OAR 345-001-0010.
[Final Order on ASC, Mandatory Condition OAR 345-025-0006(4); Amended in Final Order on AMD2]

Recommended Amended General Standard Condition 2 (GEN-GS-02): The certificate holder shall complete construction of the facility by May 24, 2023.~~within six years after the effective date of the site certificate.~~ The certificate holder shall promptly notify the Department of the date of completion of construction.
[Final Order on ASC, Mandatory Condition OAR 345-025-0006(4); Amended in Final Order on AMD2]

Mandatory and Site-Specific Conditions in Site Certificates [OAR 345-025-0006 and OAR 345-025-0010]

OAR 345-025-0006 lists certain mandatory conditions that the Council must adopt in every site certificate. The Council's October 2017 rule changes moved the mandatory conditions from Division 27 to Division 25. As such, the Department recommends Council administratively amend the rule citations included in the following mandatory and site-specific conditions: GEN-GS-03, GEN-GS-04, GEN-GS-05, GEN-GS-06, GEN-GS-07, GEN-GS-08, GEN-GS-09, GEN-GS-10, GEN-GS-11, GEN-RF-01, PRE-RF-01, OPR-GS-01, RET-RF-01, RET-RF-02, and GEN-GS-12.[11]

Conclusions of Law

Based on the foregoing findings of fact and conclusions of law, and subject to compliance with the existing and recommended new and amended site certificate conditions presented in this order, the Department recommends that the Council find that the facility, with proposed changes, would continue to satisfy the requirements of OAR 345-022-0000.

III.B. Organizational Expertise: OAR 345-022-0010

(1) To issue a site certificate, the Council must find that the applicant has the organizational expertise to construct, operate and retire the proposed facility in compliance with Council standards and conditions of the site certificate. To conclude that the applicant has this expertise, the Council must find that the applicant has demonstrated the ability to design, construct and operate the proposed facility in compliance with site certificate conditions and in a manner that protects public

[11] At the October 19, 2017 meeting, the Council approved a rulemaking project to reorganize Division 27 and rewrite its rules governing requests for amendments to site certificates. A component of this rulemaking was the renumbering of OAR 345-027-0006 (previous reference for mandatory conditions), to OAR 345-025-0006 (new reference for mandatory conditions) as well as the renumbering of site-specific condition from OAR 345-025-0023 to OAR 345-025-0010. The effective date of this rule change was October 24, 2017.

health and safety and has demonstrated the ability to restore the site to a useful, non-hazardous condition. The Council may consider the applicant's experience, the applicant's access to technical expertise and the applicant's past performance in constructing, operating and retiring other facilities, including, but not limited to, the number and severity of regulatory citations issued to the applicant.

(2) The Council may base its findings under section (1) on a rebuttable presumption that an applicant has organizational, managerial and technical expertise, if the applicant has an ISO 9000 or ISO 14000 certified program and proposes to design, construct and operate the facility according to that program.

(3) If the applicant does not itself obtain a state or local government permit or approval for which the Council would ordinarily determine compliance but instead relies on a permit or approval issued to a third party, the Council, to issue a site certificate, must find that the third party has, or has a reasonable likelihood of obtaining, the necessary permit or approval, and that the applicant has, or has a reasonable likelihood of entering into, a contractual or other arrangement with the third party for access to the resource or service secured by that permit or approval.

(4) If the applicant relies on a permit or approval issued to a third party and the third party does not have the necessary permit or approval at the time the Council issues the site certificate, the Council may issue the site certificate subject to the condition that the applicant shall not commence construction or operation as appropriate until the third party has obtained the necessary permit or approval and the applicant has a contract or other arrangement for access to the resource or service secured by that permit or approval.

Findings of Fact

Subsections (1) and (2) of the Council's Organizational Expertise standard require that the certificate holder demonstrate its ability to design, construct and operate the facility, with proposed changes, in compliance with Council standards and all site certificate conditions, and in a manner that protects public health and safety, as well as its ability to restore the site to a useful, non-hazardous condition. The Council may consider the certificate holder's experience and past performance in constructing, operating and retiring other facilities in determining compliance with the Council's Organizational Expertise standard. Subsections (3) and (4) address third party permits.

Compliance with Council Standards and Site Certificate Conditions

The Council may consider a certificate holder's past performance, including but not limited to the quantity or severity of any regulatory citations in the construction or operation a facility, type of equipment, or process similar to the facility, in evaluating whether a proposed change may impact the certificate holder's ability to design, construct and operate a facility in

compliance with Council standards and site certificate conditions.[12] To evaluate whether the proposed battery storage systems would impact the certificate holder's ability to comply with Council standards and site certificate conditions, the Department evaluates the certificate holder's relevant experience constructing and operating similar systems and whether any regulatory citations have been received for its facilities.

Wheatridge Wind Energy, LLC, is a project-specific LLC and therefore relies upon the organizational expertise and experience of its parent company, NextEra.[13] The certificate holder states that NextEra has not received any regulatory citations, nor has it received any North American Energy Reliability Corporation (NERC) violations, for the operation of an EFSC-jurisdictional wind facility (Stateline Wind Project) or its operational battery storage system in Arizona, discussed further below.

In RFA2, the certificate holder describes that its parent company has experience constructing and operating battery storage systems, including a 100 MW system~~s~~ currently under construction and a 106 MW system~~s~~ currently in operation. The certificate holder also represents that it has executed Power Purchase Agreements ~~(PPAs)~~ for combined solar and battery storage projects in operation in Arizona and to be constructed in both Arizona and Nevada. The certificate holder, however, represents that qualified contractors, engineers, and manufacturers would be selected to construct the facility, with proposed changes; and, that these contractors, engineers, and manufacturers would comply with site certificate conditions. Council previously imposed Organizational Expertise Conditions 1 and 3 (PRE-OE-01 and PRE-OE-03) requiring the certificate holder to, prior to construction, provide the Department the major design, engineering, and construction contractor qualifications demonstrating substantial experience in such work for similar facilities; and, contractually require contractors to comply with all applicable laws and regulations, and the terms of the site certificate.

The Department recommends that the Council find that the certificate holder has demonstrated an ability to design, construct, and operate the facility, with proposed changes, in compliance with Council standards and site certificate conditions for the following reasons: the certificate holder demonstrates experience constructing and operating battery storage systems; the certificate holder has not received regulatory citations for its battery storage facilities nor its EFSC jurisdictional facility; and, existing site certificate conditions require the certificate holder to select qualified contractors and contractually require compliance with site certificate conditions during facility design, construction and engineering.

[12] OAR 345-021-0010(1)(d)(D)

[13] As noted in the Council's *Final Order on Amendment 1*, the certificate holder's parent company, NextEra, maintains approximately 66 billion dollars in capital and produces approximately 19,882 MW of energy from 175 facilities located throughout the United States and Canada. NextEra maintains a workforce of approximately 5,000 professionals that are employed in fields such as operations and maintenance, development, environmental services, construction, engineering, and legal services.

Public Health and Safety

Construction and operation of the proposed battery storage systems could result in public health and safety risks during battery and battery waste transport; and, onsite handling and storage of battery-related materials and waste. This is further discussed in Sections III.M, *Public Services* and Section III.N, *Waste Minimization* of this order.

In RFA2, the certificate holder describes that battery and battery waste transport would be provided by a licensed third party battery supplier whom, through their licensure, would be required to handle and transport batteries and battery waste in accordance with applicable regulations including 49 Code of Federal Regulations (CFR) 173.185 Department of Transportation Pipeline and Hazardous Material Administration handling guidelines.[14] 49 CFR 173.185 includes requirements for prevention of dangerous evolution of heat; prevention of short circuits; prevention of damage to terminals; and, prevention of contact with other batteries or conductive materials. In the draft proposed order, the Department recommended Council impose Organizational Expertise Condition 10 (GEN-OE-04) b~~B~~ecause the certificate holder relies upon the expertise of a licensed third-party to handle and transport batteries and battery waste and to minimize impacts of the proposed battery storage systems to the certificate holder's ability to construct and operate the facility, with proposed changes, in a manner that protects public health and safety~~, the Department recommends Council impose the following condition~~:

> **Recommended Organizational Expertise Condition 10** (GEN-OE-04): The certificate holder shall:
>
> a. Prior to and during construction, as applicable, provide evidence to the Department that a contractual agreement has been obtained for transport and disposal of battery and battery waste by a licensed hauler and requires the third-party to comply with all applicable laws and regulations, including applicable provisions of 49 CFR 173.185.
>
> b. Prior to transporting and disposing of battery and battery waste during facility operations, provide evidence to the Department that a contractual agreement has been obtained for transport and disposal of battery and battery waste by a licensed hauler and requires the third-party to comply with all applicable laws and regulations, including applicable provisions of 49 CFR 173.185.
>
> [Final Order on AMD2, Organizational Expertise Condition 10]

The certificate holder also describes that potential safety hazards from onsite handling, management and transport of batteries and battery waste would be minimized through proper personnel training, safe interim storage, segregation from other potential waste streams, and adherence to 49 CFR 173.185 Department of Transportation Pipeline and Hazardous Material Administration handling guidelines. Based on the certificate holder's representation and to minimize potential public health and safety risks during onsite handling of battery and battery

[14] WRWAMD2Doc11 Complete Request for Amendment 2, Section 4.4. 2018-09-17.

waste, the Department recommends Council amend Public Services Condition 4 (OPR-PS-03), Operational Waste Management Plan. The recommended amended condition, as presented in Section III.M, *Public Services,* would require the plan to include an onsite handling procedure, in accordance with 49 CFR 173.185 packaging requirements, for replacement, damaged, defective or recalled lithium-ion batteries and to provide the Department review and approval authority of the plan. The Department also refers Council to previously imposed Public Services Condition 13 and 20 (PRE-PS-05 and PRE-PS-06) which require the certificate holder to, prior to construction, develop and implement an Emergency Management Plan and Health and Safety Plan, respectively. In RFA2, the certificate holder describes implementation of an Emergency Action Plan that would include at a minimum, based on the example provided, emergency response procedures in severe weather events, fire prevention and environmental events.

As described in the certificate holder's example Emergency Action Plan, provided in RFA2 Attachment 6, potential fire hazards from over charging, over current or over temperature operation of the batteries would be minimized by autonomous monitoring from a "Battery Management System." The "Battery Management System" includes autonomous monitoring by bidirectional inverters and a site controller. Bidirectional inverters are equipped with controls to detect out of specification conditions and would autonomously stop operation in the event of overcurrent or out of specification voltage. A site controller continuously monitors all critical parameters and would autonomously disconnect the system in the event of an out of specification condition. The site would also be continuously monitored by an offsite 24-hour Control Room Operator. In the event of an out of specification condition, the Control Room Operator has the ability to remotely control the facility. Additionally, each battery module and battery rack would be individually protected by overcurrent fuses.[15]

Council previously imposed Public Services Condition 13 (PRE-PS-05) requiring that, prior to construction, the certificate holder submit for Department review and approval, in consultation with the applicable fire districts, an Emergency Management Plan. The existing condition requires that the plan include procedures and actions described in "this order" and in ASC Exhibit U. Therefore, the Department considers that the existing condition incorporates

[15] WRWAMD2Doc18 DPO Comment Public Gilbert. 2018-10-25. On the record of the draft proposed order, Ms. Gilbert provided written comments. In these written comments, Comments 1 and 3 suggest that specific hazards of the proposed battery storage systems such as risk from fire, explosion, release of toxic compounds, and thermal runaway need to be addressed and specific conditions, including temperature and gas monitoring, need to be imposed in response to such hazards. As presented in the draft proposed order, the Department recommended several new and amended conditions to minimize potential risks from dangerous evolution of heat and short-circuiting during transport and onsite storage of replacement, and damaged or defective lithium-ion batteries (Recommended Organizational Expertise Condition 10; recommended amended Public Services Condition 4). In the draft proposed order, the Department recommended Land Use Condition 3 be amended to require that the certificate holder, as part of its building permit application, submit for county review of its design and fire suppression system, a third-party technical report. Moreover, Council previously imposed Public Services Condition 13 requiring that the certificate holder submit for Department review and approval, in consultation with local fire districts, an Operational Emergency Management Plan that addresses hazards, emergency response and notification procedures, and training requirements.

procedures and actions presented in Final Orders for Council proceedings for this facility, and thereby applies to the actions and procedures outlined in the Emergency Action Plan.

~~Based on the certificate holder's representation, the Department recommends Council amend Public Services Condition 13 (PRE-PS-05), Emergency Management Plan, to include battery storage system emergency response procedures for severe weather events, fire, and environmental events. This is further described in Section III.M, *Public Services* of this order.~~

Based upon the evidence provided, and compliance with existing, recommended new and amended conditions, the Department recommends that Council find that the certificate holder has provided reasonable assurance that it can successfully construct, operate and retire the facility, with proposed changes, in a manner that protects public health and safety in accordance with the Organizational Expertise standard.

Ability to Restore the Site to a Useful, Non-Hazardous Condition

The certificate holder's ability to restore the facility site to a useful, non-hazardous condition is evaluated in Section III.G, *Retirement and Financial Assurance* of this order, in which the Department recommends that Council find that the certificate holder would continue to be able to comply with the Retirement and Financial Assurance standard.

ISO 900 or ISO 14000 Certified Program

OAR 345-022-0010(2) is not applicable because the certificate holder has not proposed to design, construct or operate the facility, with proposed changes, according to an ISO 9000 or ISO 14000 certified program.

Third-Party Permits

OAR 345-022-0010(3) addresses the requirements for potential third party contractors. In RFA2, the certificate holder describes that the proposed changes would not require any additional state or local government permits or approvals for which the Council would ordinarily determine compliance but that would instead be issued to a third-party not previously considered.

Conclusions of Law

Based on the evidence in the record, and subject to compliance with the existing, recommended new and amended conditions, the Department recommends that the Council find that the certificate holder would continue to satisfy the requirements of the Council's Organizational Expertise standard.

III.C. Structural Standard: OAR 345-022-0020

(1) Except for facilities described in sections (2) and (3), to issue a site certificate, the Council must find that:

(1) The applicant, through appropriate site-specific study, has adequately characterized the seismic hazard risk of the site;

(2) The applicant can design, engineer, and construct the facility to avoid dangers to human safety and the environment presented by seismic hazards affecting the site, as identified in subsection (1)(a);

(3) The applicant, through appropriate site-specific study, has adequately characterized the potential geological and soils hazards of the site and its vicinity that could, in the absence of a seismic event, adversely affect, or be aggravated by, the construction and operation of the proposed facility; and

(4) The applicant can design, engineer and construct the facility to avoid dangers to human safety and the environment presented by the hazards identified in subsection (c).

(2) The Council may not impose the Structural Standard in section (1) to approve or deny an application for an energy facility that would produce power from wind, solar or geothermal energy. However, the Council may, to the extent it determines appropriate, apply the requirements of section (1) to impose conditions on a site certificate issued for such a facility.

(3) The Council may not impose the Structural Standard in section (1) to deny an application for a special criteria facility under OAR 345-015-0310. However, the Council may, to the extent it determines appropriate, apply the requirements of section (1) to impose conditions on a site certificate issued for such a facility.

Findings of Fact

As provided in section (1) above, the Structural Standard generally requires the Council to evaluate whether the applicant (certificate holder) has adequately characterized the potential seismic, geological and soil hazards of the site, and whether the applicant (certificate holder) can design, engineer and construct the facility to avoid dangers to human safety and the environment from these hazards.[16] Pursuant to OAR 345-022-0020(2), the Council may issue a site certificate for a wind energy facility without making findings regarding compliance with the

[16] OAR 345-022-0020(3) does not apply to this facility because the facility, with proposed changes, is a not a special criteria facility under OAR 345-015-0310.

Structural Standard; however, the Council may apply the requirements of the standard to impose site certificate conditions.

The analysis area for the Structural Standard is the area within the site boundary.

Potential Seismic, Geological and Soil Hazards

In RFA2, the certificate holder asserts that, because the proposed battery storage systems would be located in previously approved micrositing corridors and site boundary area, the assessment of potential seismic, geological and soil hazards completed in 2014 during the ASC phase remains valid. To address rule changes in effect as of October 2017 modifying the Division 21, Exhibit H requirements for geologic and soil stability, the certificate holder discusses future climate condition impacts on the facility, with proposed changes. The certificate holder provides that likely temperature or rainfall increases would not impact the underlying geology of the facility and thus there is minimal risk to the environment and human safety by non-seismic geologic hazards associated with climate conditions.[17] Based on the certificate holder's representations, and DOGAMI's confirmation of compliance with applicable requirements during the 2012-2017 ASC phase, the Department recommends Council rely on the previous characterization of potential seismic, geological and soil hazards as presented in the *Final Order on the ASC.* To aid the Council in its review and understanding of its previous evaluation, the Department presents a summary of the seismic and non-seismic hazards as evaluated in the *2017 Final Order on the ASC*.

As described in the *Final Order on the ASC*, the geologic setting of the site boundary generally consists of loess and weak sedimentary rock overlying basalt bedrock. The region of the facility site is affected by four potential types of earthquakes: crustal, intraplate, volcanic, and deep subduction zone. Of these, the deep subduction zone earthquake along the Cascadia Subduction Zone (CSZ) has the potential to produce the largest magnitude earthquake. The certificate holder provided an assessment of the design parameters for ground motion that may affect the facility and to determine the maximum credible earthquake (MCE). The MCE has a peak ground acceleration (PGA) of 0.167g at the bedrock surface. This value of PGA on rock is an average representation of the acceleration most likely to occur within the site boundary for all seismic events (crustal, intraplate, or subduction).[18] The probabilistic seismic hazard analysis (a two-percent probability of exceedance in 50 years or a 2,500 year nominal recurrence period), as conducted by the certificate holder during the ASC phase, resulted in an expected 6.0 magnitude earthquake with a 16 mile epicentral distance from the site boundary, and a PGA of 0.167g.

The Council previously found that the certificate holder adequately characterized the facility site as to the maximum credible earthquake and maximum probable ground motion, taking into account ground failure and amplification for the site specific soil profile under the maximum

[17] WRWAMD2Doc11 Complete Request for Amendment 2, Section 6.1.1. 2018-09-17.

credible and maximum probable seismic event. Council previously imposed Mandatory Condition 7 (GEN-GS-08), pursuant to OAR 345-025-0006(12), requiring that the certificate holder design, engineer and construct the facility to avoid dangers to human safety and the environment presented by seismic hazards affecting the site that are expected to result from all maximum probable seismic events.

As previously evaluated, non-seismic hazards in the facility vicinity include landslides, volcanic activity, erosion and the collapse of potential loess. The evaluation of landslides found no active landslides within the site boundary; during the ASC phase the certificate holder stated that evidence of landslides was found in close proximity to the southern portion of Wheatridge West but this area is not near the proposed locations of the battery storage systems.[19] In RFA2, the certificate holder reiterates that the risk of landslides is low and that the basalt bedrock present within the site boundary is structurally competent and free of existing landslides. The certificate holder stated in the ASC that the probability of volcanic activity impacting the facility is extremely unlikely. To further assess geotechnical considerations at the facility site, Council previously imposed Structural Standard Condition 1 (PRE-SS-01), presented below, requiring that the certificate holder review and assess potential seismic, geologic, and soil hazards of the facility site, in consultation with the Department and DOGAMI, through a pre-construction, site-specific geotechnical investigation.

Design, Engineer and Construct Facility to Avoid Dangers to Human Safety from Seismic and Non-Seismic Hazards

In RFA2, the certificate holder maintains that because the proposed battery storage systems would be located adjacent to the previously evaluated O&M building and substation sites, that the pre-construction site specific geotechnical work required per Structural Standard Condition 1 (PRE-SS-01) would ensure that the proposed battery storage systems are designed, engineered and constructed to avoid dangers to human safety from seismic and non-seismic hazards. The certificate holder commits to modifying facility layout and construction requirements as needed, based on the results of the pre-construction site-specific geotechnical investigation. In the draft proposed order, the Department recommended Council amend Structural Standard Condition 1 (PRE-SS-01) t~~T~~o ensure that design criteria are provided for the proposed battery storage systems within the pre-construction site-specific geotechnical report, and ensure that the methodology and approach of the investigation considers DOGAMI recommendations, ~~the Department recommends Council amend Structural Standard Condition 1 (PRE-SS-01)~~ as follows:

> **Recommended Amended Structural Standard Condition 1 (PRE-SS-01):** Before beginning construction, the certificate holder must:
>
> (a) Submit a protocol to the Department and Oregon Department of Geology & Mineral Industries (DOGAMI), for review, with the applicable codes, standards, and

[19] WRWAPPDoc139-7 ASC Exhibit H, p. 19. 2015-07-01.

guidelines to be used, and proposed geotechnical work to be conducted for the site-specific geotechnical investigation report.

(b) Following receipt and review of Department and DOGAMI comments on the protocol per (a), the certificate holder shall conduct a site-specific geological and geotechnical investigation, and shall report its findings to DOGAMI and the department. The report shall be used by the certificate holder in final facility layout and design. The department shall review, in consultation with DOGAMI, and confirm that the investigation report includes an adequate assessment of the following information:

- Subsurface soil and geologic conditions of the site boundary
- Define and delineate geological and geotechnical hazards, and means to mitigate these hazards
- Geotechnical design criteria and data for the turbine foundations, foundations of substations, O&M buildings, battery storage systems, roads, and other related and supporting facilities
- Design data for installation of underground and overhead collector lines, and overhead transmission lines
- Investigation of specific areas with potential for slope instability and landslide hazards. Landslide hazard evaluation shall be conducted by LIDAR and field work, as recommended by DOGAMI
- Investigations of the swell and collapse potential of loess soils within the site boundary.

[Final Order on ASC, Structural Standard Condition 1; Amended in Final Order on AMD2]

Existing Structural Standard Condition 2 (GEN-SS-01) requires the design, engineering and construction of the facility to comply with current structural and buildings codes. Existing Structural Standard Conditions 3, 4, and 5 (PRE-SS-02, PRE-SS-03, PRE-SS-04, respectively) require that the pre-construction site-specific geotechnical investigation report, required per Structural Standard Condition 1 (PRE-SS-01), include an investigation of potentially active faults, slope instability and landslide hazards, swell and collapse potential. These conditions ensure that the pre-construction site-specific geotechnical investigation evaluate the potential seismic and non-seismic risks to the facility and identify any additional mitigation that would be undertaken to safely design, construct, and operate the facility. Additionally, existing Soil Protection Condition 1 (CON-SP-01) requires that the certificate holder conduct all construction activities in compliance with best management practices of an Erosion and Sediment Control Plan to reduce and mitigate erosion and sedimentation, as discussed further in Section III.D *Soil Protection* of this order.

Based upon the analysis presented above and subject to compliance with existing and recommended amended conditions, the Department recommends that Council find that the certificate holder has adequately characterized the potential seismic, geologic and soil hazards within the site boundary and its vicinity, and that the certificate holder maintains the ability to

design, engineer, and construct the facility, with proposed changes, to avoid dangers to human safety presented by the identified hazards.

Conclusions of Law

Based on the foregoing analysis, and subject to existing and recommended amended conditions, the Department recommends the Council find that the facility, with proposed changes, would continue to comply with the Structural Standard.

III.D. Soil Protection: OAR 345-022-0022

> *To issue a site certificate, the Council must find that the design, construction and operation of the facility, taking into account mitigation, are not likely to result in a significant adverse impact to soils including, but not limited to, erosion and chemical factors such as salt deposition from cooling towers, land application of liquid effluent, and chemical spills.*

Findings of Fact

The Soil Protection standard requires the Council to find that, taking into account mitigation, the design, construction and operation of a facility, with proposed changes, are not likely to result in a significant adverse impact to soils.

The analysis area for potential impacts to soils, as defined in the project order, is the area within the site boundary. The proposed battery storage systems described in RFA2 would be located adjacent to previously approved substations and O&M buildings, within Morrow and Umatilla counties (see Figure 1*, Facility Location*).

Potential Significant Adverse Impacts to Soils

Potential impacts to soils within the analysis area (site boundary) could occur during construction and operation of the proposed battery storage systems from erosion; and during transport, use or disposal of batteries, if not properly handled. The facility site boundary would not be modified as a result of the proposed battery storage systems.~~; therefore, the Department recommends Council rely upon previously evaluated soil classifications described in the *Final Order on the ASC*. To aid the Council in its review and understanding of the evaluation of existing soil types and potential soil impacts, the Department presents a summary of the evaluation of potential impacts to soils represented in the *Final Order on the ASC*, as well as an evaluation of potential adverse impacts resulting from the proposed amendment.~~

As described in RFA2, the proposed battery storage systems would be installed adjacent to the previously-approved facility substation and O&M building sites, within the existing site boundary. The certificate holder explains that the proposed battery storage systems would add, at maximum, 5 acres of permanent disturbance each (10 acres total), but that temporary

impacts would be contained within the previously evaluated temporary disturbance areas (10 to 25 acres).[20] The certificate holder describes that erosion control measures would be implemented during construction in accordance with previously imposed Soil Protection Conditions 1 and 2 (CON-SP-01 and CON-SP-02). Soil Protection Conditions 1 and 2 require the certificate holder to, during construction, implement erosion and sediment control measures and best management practices in accordance with the DEQ-approved National Pollutant Discharge Elimination System Construction Stormwater ~~Stormwater~~ Discharge General Permit (NPDES) 1200-C. Measures and best management practices to be implemented during facility construction, as required under the NPDES 1200-C permit, are provided in the draft Erosion and Sediment Control Plan provided in Attachment G of this order. Council previously imposed Soil Protection Condition 6 (OPR-SP-01) requiring the certificate holder to, during operations, implement and maintain erosion and sediment control measures and restrict vehicular use and maintenance activities to constructed access roads in order to avoid unnecessary erosion or spill risk. The Department recommends Council find that based upon compliance with existing conditions, potential soil erosion impacts during construction and operation would not likely be significant or adverse.

Potential adverse impacts to soils could occur during proposed battery storage system operation from leakage or spills of battery cell electrolyte fluid during potential equipment malfunction or improper handling. In RFA2, the certificate holder describes that the proposed battery storage systems would include battery cells contained within modules within containers or a building, where the modules and container or building would provide secondary and tertiary spill containment, respectively. Furthermore, the proposed battery storage systems would be constructed on concrete foundations and placed on top of 6-inches of gravel. The certificate holder describes that battery function would be electronically monitored and physically inspected by O&M personnel. Additionally, any reduction in battery function, such as from a battery malfunction, would be detected prior to a leak occurring, and even in a scenario where a leak occurs it would be unlikely to escape from the module and the container or building containment. Based on this assessment, the Department recommends Council find, based on the proposed design of the battery storage systems, potential adverse impacts to soil from potential battery leakage would not be likely.

The proposed battery storage systems would include oil and coolant containing equipment (power transformers, distribution/auxiliary transformers, cooling systems), which could result in adverse impacts to soils during a spill. The cooling units would be placed either on top or alongside the battery storage containers. The Council previously imposed Soil Protection Condition 5 (PRO-SP-01) requiring the certificate holder to, during operations, develop and

[20] WRWAMD2Doc11~~2~~. Complete Request for Amendment 2. 2018-09-17. In RFA2 Section 3.3 Location of the Proposed Change, the certificate holder describes that temporary construction impacts from the proposed battery storage system sites would occur within the 5-acre disturbance area already analysis and asserts that there would be no additional temporary impacts. Based on the Department's review of ASC Exhibit C Table C-2, temporary disturbance of the substation and O&M building sites assumed 10 to 25 acres would be temporarily disturbed. Therefore, the Department refers to the temporary disturbance for the substation sites of 10 to 25 acres, total, as referenced in ASC Exhibit C.

implement a DEQ-approved Spill Prevention Control and Countermeasures (SPCC) Plan, if determined to be required by DEQ, or otherwise an operational Spill Prevention and Management Plan. While the Department recommends administrative amendments to this condition, as described below, the Department recommends Council find that development and implementation of an operational SPCC Plan or Spill Prevention and Management Plan, as required through existing site certificate conditions, would continue to minimize potential adverse impacts to soils during a spill event.

The Department understands, based on conversations with DEQ, that it is the certificate holder's obligation to determine if an SPCC Plan is required under DEQ's federally-delegated Hazardous Waste Program, and the certificate holder's obligation to develop and implement the SPCC Plan in accordance with applicable requirements, but that DEQ does not review or approve the plans unless during an inspection or review of spill event and response.[21] In the draft proposed order, t~~T~~he Department~~, therefore,~~ recommended~~s~~ Council administratively amend Soil Protection Condition 5 (PRO-SP-01) based on DEQ's programmatic function and process and to provide clarification that the materials inventory apply to all facility components, including proposed battery storage systems, that would use or store hazardous and non-hazardous materials:

> **Recommended Amended Soil Protection Condition 5 (PRO-SP-01):** Prior to beginning facility operation, the certificate holder shall provide the D~~d~~epartment a copy of an ~~DEQ-approved~~ operational SPCC plan, if required per DEQ's Hazardous Waste Program ~~determined to be required by DEQ~~. If an SPCC plan is not required~~ by DEQ~~, the certificate holder shall prepare and submit to the D~~d~~epartment for review and approval an operational Spill Prevention and Management plan. The Spill Prevention and Management Plan shall include at a minimum the following procedures and BMPs:
>
> - Procedures for oil and hazardous material emergency response consistent with OAR 340, Division 100-122 and 142
> - Procedures demonstrating compliance with all applicable local, state, and federal environmental laws and regulations for handling hazardous materials used onsite in a manner that protects public health, safety, and the environment
> - Current inventory (type and quantity) of all hazardous materials stored onsite, specifying the amounts at each O&M building, substation and battery storage system components
> - Restriction limiting onsite storage of diesel fuel or gasoline
> - Requirement to store lubricating and dielectric oils in quantities equal to or greater than 55-gallons in qualified oil-filled equipment
> - Preventative measures and procedures to avoid spills
> - Procedures for chemical storage
> - Procedures for chemical transfer

[21] DEQ's federally-delegated Hazardous Waste Program and SPCC Plan requirement applies to facilities that store, transfer, use or consume oil or oil products, in quantities greater than 1,320 gallons; and, in the event of a spill or discharge, could reasonably be expected to discharge oil to navigable waters of the U.S. or adjoining shoreline.

    - Procedures for chemical transportation
    - Procedures for fueling and maintenance of equipment and vehicles
- Employee training and education
- Clean-up and response procedures, in case of an accidental spill or release
- Proper storage procedures
- Reporting procedures in case of an accidental spill or release

  [Final Order on ASC, Soil Protection Condition 5; Amended in Final Order on AMD2]

Based on the certificate holder's representation, and to minimize potential adverse impacts to soils during battery handling, the Department recommends Council amend Public Services Condition 4 (OPR-PS-03), Operational Waste Management Plan. The recommended amended condition, as presented in Section III.M *Public Services,* would require the plan to include an onsite handling procedure, in accordance with 49 CFR 173.185 packaging requirements, for replacement, damaged, defective or recalled lithium-ion batteries and to provide the Department review and approval authority of the plan.

In RFA2, the certificate holder describes that a licensed third-party would handle and transport batteries and battery waste in accordance with applicable regulations. As described in Section III.B *Organizational Expertise*, the Department recommends Council impose Organizational Expertise Condition 10 (GEN-OE-04): to require the certificate holder to provide evidence to the Department that a contractual agreement has been secured with a licensed third-party contractor to provide battery and battery waste transport services in compliance with applicable regulations.

Based on the foregoing analysis, the Department recommends that Council find that compliance with existing, recommended new and recommended amended conditions would minimize the potential for accidental chemical spills or leaks and soil erosion to cause a significant adverse impact to soils during construction and operation of the facility, with proposed changes.

Conclusions of Law

Based on the foregoing recommended findings of fact and conclusions of law, and subject to compliance with existing, recommended new and amended site certificate conditions, the Department recommends that the Council find that the facility, with proposed changes, would continue to comply with the Council's Soil Protection standard.

III.E. Land Use: OAR 345-022-0030

1) *To issue a site certificate, the Council must find that the proposed facility complies with the statewide planning goals adopted by the Land Conservation and Development Commission.*

2) The Council shall find that a proposed facility complies with section (1) if:

(a) The applicant elects to obtain local land use approvals under ORS 469.504(1)(a) and the Council finds that the facility has received local land use approval under the acknowledged comprehensive plan and land use regulations of the affected local government; or

(b) The applicant elects to obtain a Council determination under ORS 469.504(1)(b) and the Council determines that:

(A) The proposed facility complies with applicable substantive criteria as described in section (3) and the facility complies with any Land Conservation and Development Commission administrative rules and goals and any land use statutes directly applicable to the facility under ORS 197.646(3);

(B) For a proposed facility that does not comply with one or more of the applicable substantive criteria as described in section (3), the facility otherwise complies with the statewide planning goals or an exception to any applicable statewide planning goal is justified under section (4); or

(C) For a proposed facility that the Council decides, under sections (3) or (6), to evaluate against the statewide planning goals, the proposed facility complies with the applicable statewide planning goals or that an exception to any applicable statewide planning goal is justified under section (4).
*****

Findings of Fact

The Land Use standard requires the Council to find that the facility, with proposed changes, would continue to comply with local applicable substantive criteria, as well as the statewide planning goals adopted by the Land Conservation and Development Commission (LCDC).[22]

The analysis area for potential land use impacts, as defined in the project order, is the area within and extending ½-mile from the site boundary.

Local Applicable Substantive Criteria

On November 2, 2012, during the review of the ASC, the Council appointed the Umatilla County Board of Commissioners and Morrow County Board of Commissioners as the Special Advisory Group (SAG) for the facility. On behalf of and as authorized by the SAG, Morrow and Umatilla County Planning Directors identified applicable substantive criteria to be considered during the ASC phase and through subsequent amendment requests has identified changes in local code to be considered applicable substantive criteria. In a comment provided on pRFA2, on behalf of

[22] The Council must apply the Land Use standard in conformance with the requirements of ORS 469.504.

the SAG, Morrow County Planning Department confirmed that Morrow County Zoning Ordinance (MCZO) Section 3.010 had been updated since Council's previous evaluation, but that the updates aligned local code requirements with state statute and would not affect Council's previous findings of compliance with the Land Use standard.[23] In a comment provided on pRFA2, Umatilla County Planning Department confirmed that there have been no changes in local code provisions that would affect Council's previous findings of compliance with the Land Use standard.[24]

IV.E.1 Morrow County

Table 1, *Applicable Substantive Criteria – Morrow County*, below, summarizes the applicable substantive criteria Council previously evaluated and determined the certificate holder could satisfy.

Table 1: Applicable Substantive Criteria – Morrow County

Morrow County Zoning Ordinance (MCZO)	
Article 3 – Use Zones	
Section 3.010	Exclusive Farm Use, EFU Zone
Section A	Purpose
Section C	Uses Permitted Outright
Section D	Conditional Uses Permitted
Section G	Dimensional Standards
Article 4 – Supplementary Provisions	
Section 4.165	Site Plan Review
Article 6 – Conditional Uses	
Section 6.015	Requirements Under a State Energy Facility Site Certificate
Section 6.020	General Criteria
Section 6.025	Resource Zone Standards for Approval
Section 6.030	General Conditions
Section 6.050	Standards Governing Conditional Uses
Morrow County Comprehensive Plan	
Agricultural Policy 1 Energy Policies 2 and 3 Fish and Wildlife Protection Plan (Attachment to MCCP)	

The facility, with proposed changes, could impact the certificate holder's ability to satisfy the requirements of MCZO Section 3.010(K)(2)(c)-(e), Section 4.165 and Section 6.025. Therefore, the Department provides its evaluation of the certificate holder's compliance with these applicable substantive criteria below.

[23] WRWAMD2Doc6 pRFA2 Special Advisory Group Comment Morrow County. 2018-07-02.
[24] WRWAMD2Doc7 pRFA2 Reviewing Agency Comment Umatilla County. 2018-07-03.

MCZO Article 3 Use Zones

MCZO Section 3.010(K)(2)(c) Wind Power Generation Facility Minimum Standards, Additional Criteria

c. For wind power generation facility proposals on arable lands, meaning lands that are cultivated or suitable for cultivation, including high-value farmland soils described at ORS 195.300(10), the governing body or its designate must find that:

(1) The proposed wind power facility will not create unnecessary negative impacts on agricultural operations conducted on the subject property. Negative impacts could include, but are not limited to, the unnecessary construction of roads, dividing a field or multiple fields in such a way that creates small or isolated pieces of property that are more difficult to farm, and placing wind farm components such as meteorological towers on lands in a manner that could disrupt common and accepted farming practices;

(2) The presence of a proposed wind power facility will not result in unnecessary soil erosion or loss that could limit agricultural productivity on the subject property. This provision may be satisfied by the submittal and county approval of a soil and erosion control plan prepared by an adequately qualified individual, showing how unnecessary soil erosion will be avoided or remedied and how topsoil will be stripped, stockpiled and clearly marked. The approved plan shall be attached to the decision as a condition of approval;

(3) Construction or maintenance activities will not result in unnecessary soil compaction that reduces the productivity of soil for crop production. This provision may be satisfied by the submittal and county approval of a plan prepared by an adequately qualified individual, showing how unnecessary soil compaction will be avoided or remedied in a timely manner through deep soil decompaction or other appropriate practices. The approved plan shall be attached to the decision as a condition of approval; and

(4) Construction or maintenance activities will not result in the unabated introduction or spread of noxious weeds and other undesirable weeds species. This provision may be satisfied by the submittal and county approval of a weed control plan prepared by an adequately qualified individual that includes a long-term maintenance agreement. The approved plan shall be attached to the decision as a condition of approval.

MCZO 3.010(K)(2)(c)(1) Impacts on Agricultural Operations

MCZO Section 3.010(K)(2)(c)(1) requires that the certificate holder demonstrate the facility, with proposed changes, would not "create unnecessary negative impacts on agricultural operations conducted on the subject property." The proposed battery storage systems would result in temporary and permanent impacts within EFU zoned land primarily used for cultivation of dryland wheat. The certificate holder describes that the previously evaluated temporary disturbance area for the facility, as approved, specifically the substation and O&M building sites (10 to 25 acres total), includes the footprint that would be disturbed during construction of the proposed battery storage systems.[25] In other words, temporary disturbance of the proposed battery storage systems would not result in new or greater impacts than previously evaluated. The proposed battery storage systems, however, would result in up to 10 acres total of new permanent disturbance to agricultural lands.

Council previously imposed the following conditions to minimize potential negative impacts on agricultural operations:

- **Land Use Condition 11 (GEN-LU-04)** requiring that the certificate holder design and construct the facility using the minimum land area necessary for safe construction and operation.
- **Land Use Condition 12 (PRE-LU-05)** requiring that, prior to construction, the certificate holder consult with surrounding landowners and lessees to consider proposed measures to reduce or avoid adverse impacts to farm practices and minimizing potential increases to farm costs. This condition requires that the certificate holder provide evidence of the landowner consultation to the Department and Morrow and Umatilla counties.
- **Land Use Condition 8 (CON-LU-01)** requiring that, during construction, construction vehicles use existing roadways and tracks; and, construction yards and laydown areas would be sited within future footprint of permanent structures, as practicable.
- **Land Use Condition 2 (OPR-LU-02)** requiring that, during operations, the certificate holder restore temporary disturbance areas impacted during facility maintenance or repair activities in accordance with the methods and procedures outlined in the final Revegetation Plan

While the proposed battery storage systems would result in impacts to agricultural lands, the Department recommends Council find, based on compliance with the above-referenced

[25] WRWAMD2Doc2. Complete Request for Amendment 2. 2018-09-17. In RFA2 Section 3.3 Location of the Proposed Change, the certificate holder describes that construction impacts from the proposed battery storage system sites would occur within the 5-acre disturbance area already analyzed and asserts that there would be no additional temporary impacts. Based on the Department's review of ASC Exhibit C Table C-2, temporary disturbance of the substation and O&M building sites assumed 10 to 25 acres would be temporary disturbed. Therefore, the Department refers to the temporary disturbance for the substation sites of 10 to 25 acres, total, as referenced in ASC Exhibit C.

conditions, unnecessary negative impacts on agricultural operations within the surrounding area (i.e. "subject property") would be minimized.

MCZO Section 3.010(K)(2)(c)(2) Soil Erosion or Loss

MCZO Section 3.010(K)(2)(c)(2) provides that "the presence of a proposed wind power facility" must not result in unnecessary soil erosion or loss that could limit agricultural productivity.

Potential impacts to soils within the site boundary could occur during construction and operation of the proposed battery storage systems from erosion and loss. As described above, the previously evaluated temporary disturbance area for the facility, as approved, specifically the substation and O&M building sites (10 to 25 acres total) included area that would be disturbed during construction of the proposed battery storage systems. In other words, temporary disturbance of the proposed battery storage systems would not result in new or greater soil erosion impacts than previously evaluated. The proposed battery storage systems, however, would result in up to 10 acres total of new permanent disturbance to agricultural lands and could result in erosion and soil loss impacts.

Council previously imposed Soil Protection Conditions 1 and 2 (CON-SP-01 and CON-SP-02) requiring that, during construction, the certificate holder implement erosion and sediment control measures and best management practices in accordance with the DEQ-approved National Pollutant Discharge Elimination System Construction Stormwater Discharge General Permit (NPDES) 1200-C. Council previously imposed Soil Protection Condition 6 (OPR-SP-01) requiring that, during operations, the certificate holder implement and maintain erosion and sediment control measures. To minimize potential soil loss impacts, Council previously imposed Soil Protection Condition 4 (PRE-SP-02) requiring that, prior to construction, the certificate holder develop a plan for implementation during construction to ensure that agricultural soils are properly excavated, stored and replaced by soil horizon. Based upon compliance with previously imposed conditions, the Department recommends Council find that proposed battery storage system operations would not result in unnecessary soil erosion or loss that could limit the productivity of soil for crop production.

MCZO Section 3.010(K)(2)(c)(3) Soil Compaction

MCZO Section 3.010(K)(2)(c)(3) requires that the certificate holder demonstrate that facility construction or maintenance activities would not result in unnecessary soil compaction that reduces the productivity of soil for crop production.

Construction and operation of the proposed battery storage systems could result in soil compaction. As described above, the previously evaluated temporary disturbance area for the facility, as approved, specifically the substation and O&M building sites (10 to 25 acres total) included area that would be disturbed during construction of the proposed battery storage systems. In other words, temporary disturbance of the proposed battery storage systems would not result in new or greater compaction impacts than previously evaluated. The proposed

battery storage systems, however, would result in up to 10 acres total of new permanent disturbance to agricultural lands and could result in soil compaction.

Council previously imposed Soil Protection Condition 6 (OPR-SP-01) requiring that, during operations, the certificate holder restrict vehicular use and maintenance activities to constructed access roads in order to avoid unnecessary compaction. The Department recommends Council find that based upon compliance with the existing condition, operation of the proposed battery storage systems would not result in unnecessary soil compaction that would reduce the productivity of soil for crop production.

MCZO Section 3.010(K)(2)(c)(4) Weed Control

MCZO Section 3.010(K)(2)(c)(4) requires that the certificate holder demonstrate that facility construction or maintenance activities would not result in the "unabated introduction or spread of noxious weeds and other undesirable weed species."

Construction and operation of the proposed battery storage systems would result in temporary and permanent disturbance, which could result in the introduction or spread of noxious weeds and other undesirable weed species. Council previously imposed Land Use Condition 6 (PRE-LU-03) requiring that, during construction and operation, the certificate holder implement the requirements of a Weed Control Plan, as approved by the Department in consultation with Morrow and Umatilla counties and ODFW. The Department recommends Council find that based upon compliance with the existing condition, construction and operation of the proposed battery storage systems would not result in unabated introduction or spread of noxious weeds and other undesirable weed species.

MCZO Article 3 Use Zones

MCZO Section 3.010(K)(2)(c), (d) and (e) Wind Power Generation Facility Minimum Standards, Additional Criteria

c. For wind power generation facility proposals on nonarable lands, meaning lands that are not suitable for cultivation, the requirements of Subsection K.2.c(4) are satisfied.

d. In the event that a wind power generation facility is proposed on a combination of arable and nonarable lands as described in Subsections c and d, the approval criteria of Subsection c shall apply to the entire project.

Subsections (d) and (e) of MCZO Section 3.010(K)(2) provide additional criteria for wind power generation facilities located on "arable" or "nonarable" land. MCZO Section 3.010(K)(2)(c) defines "arable land" as "lands that are cultivated or suitable for cultivation, including high-value farmland soils" and provides criteria for locating a facility on arable land. MCZO Section 3.010(K)(2)(d) defines "nonarable land" as land "not suitable for cultivation" and provides that the criteria in subsection (2)(d) apply to nonarable land. The facility is approved to be located

on a combination of arable and nonarable lands. Accordingly, subsection (e) applies to the facility, which requires analysis under the criteria provided in subsection (c). The evaluation of subsection (c) is presented above.

Based on the above analysis, the Department recommends the Council continue to find that the facility, with proposed changes, would continue to satisfy the requirements of MCZO 3.010(K)(2).[26]

Article 4. Supplementary Provisions

Section 4.165 Site Plan Review

Site Plan Review is a non-discretionary or "ministerial" review conducted without a public hearing by the County Planning Director or designee. Site Plan Review is for less complex developments and land uses that do not require site development or conditional use review and approval through a public hearing.

A. Purpose. The purpose of Site Plan Review (ministerial review) is based on clear and objective standards and ensures compliance with the basic development standards of the land use district, such as building setbacks, lot coverage, maximum building height, and similar provisions. Site Plan review also addresses conformity to floodplain regulations, consistency with the Transportation System Plan, and other standards identified below.

C. Applicability. Site Plan Review shall be required for all land use actions requiring a Zoning Permit as defined in Section 1.050 of this Ordinance. The approval shall lapse, and a new application shall be required, if a building permit has not been issued within one year of Site Review approval, or if development of the site is in violation of the approved plan or other applicable codes.

The Site Plan Review is the county's ministerial review conducted prior to the issuance of a zoning permit, defined under MCZO 1.050 as "an authorization issued prior to a building permit, or commencement of a use subject to administrative review, stating that the proposed use is in accordance with the requirements of the corresponding land use zone." The certificate holder would be required to obtain a zoning permit, building permit, and conditional use permit from Morrow County, prior to construction. The Council previously imposed Land Use Condition 3 (PRE-LU-01) requiring that, prior to construction, the certificate holder provide evidence to the Department that local permits have been obtained.

In the draft proposed order, ~~Based on communication with the State Fire Marshal,~~ the Department recommended~~s~~ that Land Use Condition 3 (PRE-LU-01) be amended, based on

[26] As noted above, the MCZO 3.010(K)(2) was adopted by Morrow County to reflect the language found in OAR 660-033-0130(37)(b)

communication with the State Fire Marshal~~l~~, to require the certificate holder to submit a third-party technical report for the building code review and fire system evaluation, which identifies potential hazards and mitigation measures for the proposed battery storage systems.[27] Recommended Amended Land Use Condition 3 (PRE-LU-01), as presented in the draft proposed order, would ensure that the certificate holder design and install appropriate fire suppression measures to address any risks posed by battery storage system operation.[28]

> **Amended Land Use Condition 3 (PRE-LU-01):** Before beginning construction, the certificate holder shall complete the following:
>
> a. Pay the requisite fee and obtain a Zoning Permit from Morrow County for all facility components sited in Morrow County; and
> b. Obtain all other necessary local permits, including building permits.
> c. Provide the Department and county with a building permit application that includes a third party technical report which:
> 1. Evaluates fire hazards, and
> 2. Presents mitigation and recommendations for a fire suppression system designed for the battery storage systems.
> d. The certificate holder shall provide copies of the third-party technical report and issued permits to the Department.
>
> [Final Order on ASC, Land Use Condition 3; Amended in Final Order on AMD2]

Section 6.025 Resource Zone Standards for Approval

(a) In the Exclusive Farm Use zone a conditional use may be approved only when the County finds that the use will not:

1. Force a significant change in accepted farm or forest practices on surrounding lands devoted to farm or forest use; or

2. Significantly increase the cost of accepted farm or forest practices on surrounding lands devoted to farm or forest use.

MCZO Section 6.025(A)(1) and (2) establish approval standards for all conditional uses within EFU zoned land. There is no forest lands within the analysis area.

Construction and operation of the proposed battery storage systems could result in impacts to agricultural soils. As described above, the previously evaluated temporary disturbance area for the facility, as approved, specifically the substation and O&M building sites (10 to 25 acres total) included area that would be disturbed during construction of the proposed battery

[27] During its review of pRFA2, ODOE conferred with the Oregon State Fire Marshal's office, Jason Cain, on recommended amended Land Use Condition 3 (PRE-LU-01). 2018-07-13. No written comments received.
[28] WRWAMD2Doc17. DPO Comment SAG Morrow County 2018-10-25. On the record of the draft proposed order, on behalf of the Morrow County Board of Commissioners, the Morrow County Planning Department expressed support of this recommended amended condition, as presented in the draft proposed order.

storage systems. In other words, temporary disturbance of the proposed battery storage systems would not result in new or greater compaction impacts than previously evaluated. The proposed battery storage systems, however, would result in up to 10 acres total of new permanent disturbance to agricultural lands.

Disruption to farming practices and operations would be minimized by following Land Use Conditions 6 through 12,[29] and through coordination of construction and operations with landowners. The conditions listed above require, generally; a Weed Control plan, the recordation of Covenants Not to Sue landowners in causes of action related to accepted farming practices on adjacent land; the minimization of impacts from temporary construction yards and construction vehicles; the painting of metrological towers to adhere to FAA requirements; the restoration of temporarily impacted areas according to the Revegetation Plan; the design of access roads to minimize impacts to farming practices and; consultation with landowners avoid impacts to farming practices. In addition, and as described within ~~the~~ Section III.D. *Soil Protection* ~~section~~ of this ~~draft proposed~~ order, Soil Protection Conditions 1 (CON-SP-01) and 2 (CON-SP-02) require the development of protocols to minimize risks associated with soil compaction and erosion.

Based upon compliance with existing conditions described above, the Department recommends Council find that the facility, with proposed changes, would not force a significant change in accepted farming practices, or otherwise increase costs to farming within Morrow County.

IV.E.2 Umatilla County

Table 2*, Applicable Substantive Criteria – Umatilla County*, below, summarizes the applicable substantive criteria that the Council previously evaluated and determined the certificate holder could satisfy.[30]

Table 2: Applicable Substantive Criteria – Umatilla County

Umatilla County Development Ordinance (UCDO)	
Section 152.060	Conditional Uses allowed on lands zoned for EFU
Section 152.061	Standards for all Conditional Uses on EFU Lands
Section 152.615	Additional Conditional Use Permit Restrictions
Section 152.616	Conditional Uses Permitted
Umatilla County Comprehensive Plan (UCCP)	
Citizen Involvement: Policy 1 and Policy 5	

[29] PRE-LU-03, PRE-LU-04, PRE-LU-05, CON-LU-01, GEN-LU-03, OPR-LU-02, GEN-LU-04

[30] WRWAMD2Doc16. DPO Comment Reviewing Agency Umatilla County. 2018-10-25. On the record of the draft proposed order, Umatilla County Planning Department commented confirming that the amendment request and draft proposed order were reviewed for consistency with applicable substantive criteria and that the county had no comments.

Table 2: Applicable Substantive Criteria – Umatilla County

Agriculture: Policies 1, 8 and 17 Open Space, Scenic & Historic Areas, and Natural Areas: Policies 1(a), 5 (a & b), 6(a), 8(a), 9(a), 10 (c, d & e), 20(a), 20(b) (1-8), 22, 23(a), 24(a), 26, 37 & 38(a-c), 39(a) & 42(a) Air, Land, Water Quality: Policies 1, 7 & 8 Natural Hazards: Policies 1 & 4 Recreational Needs: Policy 1 Economy of the County: Policies 1, 4 & 8(a-f) Public Facilities & Services: Policies 1(a-d), 2, 9 & 19 Transportation: Policy 18 and 20 Energy Conservation: Policy 1

UCDO Section 152.060 establishes the county's conditional use review conducted prior to the issuance of a zoning permit.

> *152.060 CONDITIONAL USES PERMITTED.*
>
> *In an EFU zone the following uses may be permitted conditionally via administrative review (§152.769), subject to the requirements of this section, the applicable criteria in § 152.061, §§ 152.610 through 152.615, 152.617 and §§ 152.545 through 152.562. A zoning permit is required following the approval of a conditional use pursuant to § 152.025. Existing uses classified as conditional uses and listed in this section may be expanded subject to administrative review and subject to the requirements listed in OAR 660, Division 033.*
>
> *(F) Commercial utility facilities for the purpose of generating power for public use by sale as provided in § 152.617 (I)(C). (For specific criteria for Wind Power Generation see §152.617 (I)(W)4).*

The certificate holder would be required to obtain a zoning permit, building permit, and conditional use permit from Umatilla County, prior to construction. Council previously imposed Land Use Condition 15 (PRE-LU-07) requiring that the certificate holder, prior to construction, provide evidence to the Department that local permits from Umatilla County have been obtained. This condition mirrors the requirements of Land Use Condition 3 (PRE-LU-01), but applies to local permits required within Umatilla County. As described in the draft proposed order, the Department recommended Council amend Land Use Condition 3 (PRE-LU-01) to require that the certificate holder, prior to construction, submit a third-party technical report for the building code review and fire system evaluation to identify potential hazards and mitigation measures for the proposed battery storage systems.[31] Because the recommended condition amendment, as described in the draft proposed order, was not intended to be county

[31] During its review of pRFA2, ODOE conferred with the Oregon State Fire Marshal's office, Jason Cain, on recommended amended Land Use Condition 15 (PRE-LU-07). 2018-07-13. No written comments received.

specific, and was intended to apply to the proposed battery storage systems to be located within both Morrow and Umatilla counties, as directed by Council following its review of the draft proposed order at the October 25, 2018 Council meeting, Land Use Condition 15 is amended in the proposed order as follows (changes presented in hi-lite and underline/strikeout):

> **Recommended Amended Land Use Condition 15 (PRE-LU-07):** Before beginning construction, the certificate holder must:
>
> a. -Ppay the requisite fee(s) and obtain a Zoning Permit(s) from Umatilla County for facility components sited within Umatilla County, including, but not limited to, turbines, substation, O&M building, and the intraconnection line.
>
> b. Provide the Department and county with a building permit application that includes a third party technical report which:
>
> 1. Evaluates fire hazards, and
> 2. Presents mitigation and recommendations for a fire suppression system designed for the battery storage systems.
>
> c. The certificate holder shall provide copies of the third-party technical report and issued permits to the Department.
>
> [Final Order on ASC, Land Use Condition 15; Amended in Final Order on AMD2]

The facility, with proposed changes, could impact the certificate holder's ability to satisfy the requirements of UCDC Section 152.061. Therefore, the Department provides its evaluation of the certificate holder's compliance with these applicable substantive criteria below.

UCDC 152.061 Standards for Conditional Uses on EFU lands.

> *The following limitations shall apply to all conditional uses in an EFU zone. Uses may be approved only where such uses:*
>
> *(A) Will not force a significant change in accepted farm or forest practices on surrounding lands devoted to farm or forest use; and*
>
> *(B) Will not significantly increase the cost of accepted farm or forest practices on lands devoted to farm or forest use.*

UCDO Section 152.061(A) and (B) establish approval standards for all conditional uses within EFU zoned land, which mirror MCZO Section 6.025(A)(1) and (2), as evaluated above. Construction and operation of the proposed battery storage system sites would not differ within Morrow or Umatilla counties. Therefore, the Department incorporates by reference the evaluation of MCZO Section 6.025(A)(1) and (2) to address UCDO Section 152.061(A) and (B).

Based upon compliance with existing conditions requiring that the certificate holder consult with landowners to minimize impacts to farming operations, and implement measures to minimize risks to soil quality and vegetation, the Department recommends Council find that the

facility, with proposed changes, would not force a significant change in accepted farming practices, or otherwise increase costs to farming within Umatilla County.

Conclusions of Law

Based on the foregoing findings and the evidence in the record, and subject to compliance with the existing and recommended amended site certificate conditions, the Department recommends the Council find that the facility, with proposed changes, would continue to comply with the Council's Land Use standard.

III.F. Protected Areas: OAR 345-022-0040

(1) Except as provided in sections (2) and (3), the Council shall not issue a site certificate for a proposed facility located in the areas listed below. To issue a site certificate for a proposed facility located outside the areas listed below, the Council must find that, taking into account mitigation, the design, construction and operation of the facility are not likely to result in significant adverse impact to the areas listed below. References in this rule to protected areas designated under federal or state statutes or regulations are to the designations in effect as of May 11, 2007:

i. National parks, including but not limited to Crater Lake National Park and Fort Clatsop National Memorial;

ii. National monuments, including but not limited to John Day Fossil Bed National Monument, Newberry National Volcanic Monument and Oregon Caves National Monument;

iii. Wilderness areas established pursuant to The Wilderness Act, 16 U.S.C. 1131 et seq. and areas recommended for designation as wilderness areas pursuant to 43 U.S.C. 1782;

iv. National and state wildlife refuges, including but not limited to Ankeny, Bandon Marsh, Baskett Slough, Bear Valley, Cape Meares, Cold Springs, Deer Flat, Hart Mountain, Julia Butler Hansen, Klamath Forest, Lewis and Clark, Lower Klamath, Malheur, McKay Creek, Oregon Islands, Sheldon, Three Arch Rocks, Umatilla, Upper Klamath, and William L. Finley;

v. National coordination areas, including but not limited to Government Island, Ochoco and Summer Lake;

vi. National and state fish hatcheries, including but not limited to Eagle Creek and Warm Springs;

vii. National recreation and scenic areas, including but not limited to Oregon Dunes National Recreation Area, Hell's Canyon National Recreation Area, and the Oregon Cascades Recreation Area, and Columbia River Gorge National Scenic Area;

viii. State parks and waysides as listed by the Oregon Department of Parks and Recreation and the Willamette River Greenway;

ix. State natural heritage areas listed in the Oregon Register of Natural Heritage Areas pursuant to ORS 273.581;

x. State estuarine sanctuaries, including but not limited to South Slough Estuarine Sanctuary, OAR Chapter 142;

xi. Scenic waterways designated pursuant to ORS 390.826, wild or scenic rivers designated pursuant to 16 U.S.C. 1271 et seq., and those waterways and rivers listed as potentials for designation;

xii. Experimental areas established by the Rangeland Resources Program, College of Agriculture, Oregon State University: the Prineville site, the Burns (Squaw Butte) site, the Starkey site and the Union site;

xiii. Agricultural experimental stations established by the College of Agriculture, Oregon State University, including but not limited to: Coastal Oregon Marine Experiment Station, Astoria Mid-Columbia Agriculture Research and Extension Center, Hood River Agriculture Research and Extension Center, Hermiston Columbia Basin Agriculture Research Center, Pendleton Columbia Basin Agriculture Research Center, Moro North Willamette Research and Extension Center, Aurora East Oregon Agriculture Research Center, Union Malheur Experiment Station, Ontario Eastern Oregon Agriculture Research Center, Burns Eastern Oregon Agriculture Research Center, Squaw Butte Central Oregon Experiment Station, Madras Central Oregon Experiment Station, Powell Butte Central Oregon Experiment Station, Redmond Central Station, Corvallis Coastal Oregon Marine Experiment Station, Newport Southern Oregon Experiment Station, Medford Klamath Experiment Station, Klamath Falls;

xiv. Research forests established by the College of Forestry, Oregon State University, including but not limited to McDonald Forest, Paul M. Dunn Forest, the Blodgett Tract in Columbia County, the Spaulding Tract in the Mary's Peak area and the Marchel Tract;

xv. Bureau of Land Management areas of critical environmental concern, outstanding natural areas and research natural areas;

xvi. State wildlife areas and management areas identified in OAR chapter 635, Division 8.

*****

(3) The provisions of section (1) do not apply to transmission lines or natural gas pipelines routed within 500 feet of an existing utility right-of-way containing at least one transmission line with a voltage rating of 115 kilovolts or higher or containing at least one natural gas pipeline of 8 inches or greater diameter that is operated at a pressure of 125 psig.

Findings of Fact

The Protected Areas standard requires the Council to find that, taking into account mitigation, the design, construction, and operation of a proposed facility, or facility with proposed changes, are not likely to result in significant adverse impacts to any protected area as defined by OAR 345-022-0040. Impacts to protected areas are evaluated based on identification of protected areas, pursuant to OAR 345-022-0040, within the analysis area and an evaluation of the following potential impacts during facility construction and operation: excessive noise, increased traffic, water use, wastewater disposal, visual impacts of facility structures or plumes, and visual impacts from air emissions.

In accordance with OAR 345-001-0010(59)(e) and consistent with the study area boundary, the analysis area for protected areas is the area within and extending 20 miles from the site boundary.

In RFA2, the certificate holder references 16 protected areas within the analysis area that were previously evaluated by Council in the 2016 *Final Order on ASC*. These protected areas are presented in Table 3, *Protected Areas within Facility Analysis Area and Distance from Site Boundary* below.

Table 3: Protected Areas within Facility Analysis Area and Distance from Site Boundary

Protected Area (OAR Reference)	Distance from Site Boundary (in miles)
Lindsay Prairie Preserve (345-022-0040(1)(i))	0
Boardman RNA (Research Natural Area) (345-022-0040(1)(o))	2.3
Oregon Trail ACEC (Area of Critical Environmental Concern) (345-022-0040(1)(o))	2.7

Table 3: Protected Areas within Facility Analysis Area and Distance from Site Boundary

Protected Area (OAR Reference)	Distance from Site Boundary (in miles)
Oregon State University Agriculture Research and Extension Center, Hermiston (345-022-0040(1)(m))	9
Cold Springs National Wildlife Refuge (345-022-0040(1)(d))	13
Three Mile Adult Hold Fish Hatchery (345-022-0040(1)(f))	13.5
Coyote Springs Wildlife Management Area (345-022-0040(1)(p))	14
Umatilla National Wildlife Refuge (345-022-0040(1)(d))	14
Power City Wildlife Management Area (345-022-0040(1)(p))	14.5
Horn Butte Curlew ACEC (345-022-0040(1)(o))	15
Hat Rock State Park (345-022-0040(1)(h))	16.5
Irrigon Wildlife Management Area (345-022-0040(1)(p))	16.5
Irrigon Hatchery (345-022-0040(1)(f))	17.5
McNary National Wildlife Refuge (345-022-0040(1)(d))	18
Willow Creek Wildlife Management Area (345-022-0040(1)(p))	18
Umatilla Hatchery (345-022-0040(1)(f))	20
Source: WRWAPPDoc139-20. ASC Exhibit T. 2015-07-01.	

As presented in Table 3, *Protected Areas within Facility Analysis Area and Distance from Site Boundary,* the majority of the listed protected areas are located at least 15 miles from the facility site boundary, and would be located at greater distances from the proposed battery storage system sites. As previously identified in the *Final Order on ASC*, the protected areas closest to the site boundary include the Lindsay Prairie Preserve (<0 mile), Boardman Research Natural Area (2.3 miles), and Oregon Trail Area of Critical Environmental Concern (2.7 miles). Potential adverse impacts to protected areas during construction and operation of the facility, with proposed changes, from noise, traffic, water use and wastewater disposal, and visual are discussed below.

Potential Noise Impacts

The significance of potential noise impacts to identified protected areas is based on the magnitude and likelihood of the impact on the affected human population or natural resource that uses the protected area.[32] The nearest protected area, Lindsay Prairie Preserve is a site managed to protect native grassland and wildlife habitat. Based on this function and purpose, the Lindsay Prairie Preserve could be affected if adverse noise levels from the facility, with proposed changes, were audible. Potential noise impacts at the Lindsay Prairie Preserve from construction and operation of the facility, with proposed changes, are evaluated below.

Construction

The proposed battery storage systems would generate construction-related noise. The certificate holder describes that construction related noise would be short-term and intermittent. Site preparation and construction activities for the proposed battery storage systems would include gravel delivery and placement; underground utility work; concrete pad and foundation installation; container and battery delivery and installation.[33] These activities are similar to activities described in the ASC for wind facility construction; therefore, the Department refers to construction equipment noise levels presented in ASC Exhibit X, which range from 42 (crane) to 56 (loader/dozer) dBA, at 2,000 feet.

While not specifically addressed in RFA2 Section 6.1.4~~10~~ ~~*Recreation*~~*Protected Areas*, the Department relies upon information provided in ASC Exhibit X and RFA2 Section 6.3.1 *Noise Control Regulation* to evaluate potential construction-related noise impacts at the nearest protected area, Lindsay Prairie Preserve, which is adjacent to segments of the site boundary in the northern portion of Wheatridge West, but located at further distances from the proposed battery storage systems. The Department acknowledges that the analysis area extends 20-miles from the site boundary, but presents an evaluation of impacts at the nearest protected areas as a proxy for potential impacts at further distances from the site boundary.

The certificate holder previously described that peak construction noise at the Lindsay Prairie Preserve would be 55 dBA. Council previously determined that this level of short-term, intermittent noise would not interfere with the primary purpose of the protected area (i.e. habitat preservation). Because the proposed battery storage systems would be located at greater distances from the Lindsay Prairie Preserve than previously evaluated construction-

[32] The Protected Areas standard requires the Council to find that, taking into account mitigation, the design, construction and operation of a facility are not likely to result in significant adverse impacts to any protected area as defined by OAR 345-022-0040. OAR 345-001-0010(53) defines "significant" as: "having an important consequence, either alone or in combination with other factors, based upon the magnitude and likelihood of the impact on the affected human population or natural resources, or on the importance of the natural resources affected, considering the context of the action or impact, its intensity and the degree to which possible impacts are caused by the proposed action. Nothing in this definition is intended to require a statistical analysis of the magnitude or likelihood of a particular impact."

[33] WRWAMD2Doc11. Complete Request for Amendment 2, Section 4.4 Materials Analysis. 2018-09-17.

related noise sources, the Department agrees with the certificate holder's representation that the construction-related noise from the proposed battery storage systems would not be expected to increase short-term, temporary noise impacts at the protected area.

Existing Noise Control Condition 1 (CON-NC-01) would reduce noise impacts during construction by requiring the use of exhaust mufflers on combustion engine-powered equipment, use of air-inlet silencers, shrouds and shields, as appropriate; and requires that the certificate holder establish a noise complaint response system, including a system for the certificate holder to receive and resolve noise complaints.

Based on the low dBA level expected at the nearest protected area and compliance with the above-referenced condition, and because construction related noise would be temporary and short-term in duration, the Department recommends that Council find that construction of the facility, with proposed changes, would not be likely to result in significant adverse noise impacts at the Lindsay Prairie Preserve. Because the other protected areas within the analysis area are located at greater distances from the facility site boundary than the Lindsay Prairie Preserve, the Department recommends that Council conclude that potential construction-related impacts from the facility, with proposed changes, at these protected areas would also not likely be potentially significant or adverse.

Operation

The proposed battery storage systems would generate operational noise from the following sources

- Up to 56 heating, ventilation and air conditioning (HVAC) modules
- Up to 28 power inverters
- Up to 28 distribution transformers

The HVAC modules, power inverters, and distribution transformers would generate maximum noise levels of 103, 92, and 72 dBA, respectively.[34] In RFA2, the certificate holder provides a noise modeling analysis for operational noise, which demonstrates ~~asserts~~ that operational noise from the facility, with proposed changes, would be similar to or less than evaluated in ASC Exhibit L and Council's *Final Order on ASC*. Based on noise modeling conducted during the ASC phase, the Council previously found that facility-related operational noise would be inaudible at all protected areas other than the Lindsay Prairie Preserve where potential operational sound levels between 36 to 54 dBA are anticipated.[35]

Council previously concluded that audible noise levels between 36 to 54 dBA would not interfere with the primary purpose of the protected area (i.e. habitat preservation). Therefore, based on the Council's previous findings and the certificate holder's assertion that operational

[34] WRWAMD2Doc11 Complete Request for Amendment 2, Attachment 3. 2018-09-17.
[35] WRWAPPDoc196. Final Order on ASC, p. 211. 2017-05-24.

noise would be similar to or less than 54 dBA, the Department recommends Council find that operation of the facility, with proposed changes, would not be likely to result in significant adverse noise impacts to any protected areas within the analysis area.

Potential Traffic Impacts

Construction

The facility, with proposed changes, would generate construction-related traffic;~~,~~ however, in RFA2, the certificate holder explains that the potential traffic impacts from ~~the~~ construction of ~~and operation of~~ the proposed battery storage system additions would not vary significantly from the impacts evaluated by Council in the *Final Order on the ASC*. The certificate holder previously described that construction-related trucks would utilize I-84, OR-207 and local county roads ~~during construction~~; and, confirmed that facility construction traffic would not occur north of I-84. All but five of the protected areas are located north of I-84 and therefore, those areas would be largely unaffected by temporary traffic impacts generated during facility construction.

Of the five protected areas south of I-84, only the Boardman Research Natural Area (RNA) and Lindsay Prairie Preserve are likely to experience impacts from construction-related traffic of the facility, but as noted, the proposed battery storage systems would not contribute substantially to the construction vehicle traffic compared to other components of the facility. Council previously imposed Public Services Condition 6 (PRE-PS-01) requiring that the certificate holder implement a Traffic Management Plan, as approved by the Department, that would include best management practices (BMP's) such as traffic control BMP's and reduction practices to minimize potential construction-related traffic impacts.~~[36]~~

Because construction of the battery storage system is not expected to increase traffic impacts compared to those considered in Council's *Final Order on ~~the~~ ASC*, where construction-related traffic impacts at protected areas were not expected to be significant or adverse, and based upon compliance with Public Services Condition 6 (PRE-PS-01), the Department recommends Council find that construction-related traffic impacts would not be likely to result in a significant adverse traffic impact to protected areas within the analysis area.

~~[36] WRWAPPDoc196. Final Order on ASC. 2017-05-24. Council previously imposed Land Use Condition 13 (PRE-LU-06), which also requires that the certificate holder develop and implement a Traffic Management Plan during construction. Specifically, the condition states, "Before beginning construction, the certificate holder shall work with the Morrow County Road Department to identify specific construction traffic related concerns, and develop a traffic management plan that specific necessary traffic control measures to mitigate the effects of the temporary increase in traffic. The certificate holder must provide a copy of the traffic management plan to the department and Morrow County, and must implement the traffic management plan during construction." Because the requirement of this condition are redundant with Public Services Condition 6 (PRE-PS-01), the Department recommends in Section III.M *Public Services* of this order that Council remove the condition and amend Public Service Condition 6 (PRE-PS-01) to include any substantive requirements of the removed condition.~~

Operation

The facility, with proposed changes, would generate operational-related traffic. However, the certificate holder asserts that the proposed battery storage systems would not result in changes to previously evaluated operational traffic impacts of 10 to 20 vehicle trips per day, which were previously determined not likely to have a significant adverse impact to protected area access roads.[37] Because RFA2 would not result in changes to the expected number of permanent employees, the Department recommends Council find that operational-traffic impacts would not be likely to result in a significant adverse impact to protected areas within the analysis area.

Potential Water Use and Wastewater Disposal Impacts

Construction and Operation

Construction and operation of the proposed battery storage systems would result in water use. Approximately 12,500 gallons of water would be used for ~~road construction,~~ concrete mixing, dust suppression and other construction-related activities, similar to the water-use activities associated with the facility, as approved. Water used for construction would be procured from licensed sources in the vicinity of the facility.[38] Water used during operation of the proposed battery storage systems would result from filling and use of fire water tanks associated with the gas pressured deluge fire suppression systems. The fire suppression system fire water tanks would obtain water from previously evaluated permit-exempt wells to be located at the O&M buildings. None of these water sources are anticipated to impact protected areas in the analysis area. Based on this water use and sources, the Department recommends Council find that construction and operation of the facility, with proposed changes, would continue not to be likely to result in significant adverse impacts to protected areas within the analysis area.

The proposed battery storage systems would not result in new wastewater disposal impacts during construction or operation; therefore, the Department recommends that Council find that construction and operational wastewater generation from the facility, with proposed changes, would continue not to be likely to result in significant adverse impacts to protected areas within the analysis area.

Visual Impacts of Facility Structures

The proposed battery storage systems would result in up to 5 acres, each, of permanent disturbance and would be approximately 20-feet in height. Based on the low height, intervening geographic and development features, and distance from the nearest protected area (> 2 miles) to proposed battery storage system sites, the Department recommends Council

[37] WRWAPPDoc196. Final Order on ASC. 2017-04-28.
[38] WRWAMD2Doc11. Complete Request for Amendment 2, Section 4.4. 2018-09-17.

find that visibility and associated visual impacts would not be expected at any of the protected areas within the analysis area.

Visual Impacts from Air Emissions

There would be no air emissions from the proposed battery storage systems and therefore no related visual impacts.

Conclusions of Law

Based on the foregoing recommended findings, the Department recommends that Council find that the design, construction and operation of the facility, with proposed changes, would not be likely to result in significant adverse impacts to any protected areas, in compliance with the Council's Protected Area standard.

III.G. Retirement and Financial Assurance: OAR 345-022-0050

To issue a site certificate, the Council must find that:

(1) The site, taking into account mitigation, can be restored adequately to a useful, non-hazardous condition following permanent cessation of construction or operation of the facility.

(2) The applicant has a reasonable likelihood of obtaining a bond or letter of credit in a form and amount satisfactory to the Council to restore the site to a useful, non-hazardous condition.

Findings of Fact

The Retirement and Financial Assurance standard requires a finding that the facility site can be restored to a useful, non-hazardous condition at the end of the facility's useful life, should either the certificate holder stop construction or should the facility cease to operate.[39] In addition, it requires a demonstration that the certificate holder can obtain a bond or letter of credit in a form and amount satisfactory to the Council to restore the site to a useful, non-hazardous condition.

Restoration of the Site Following Cessation of Construction or Operation

OAR 345-022-0050(1) requires the Council to find that the site of the facility, with proposed changes, can be restored to a useful non-hazardous condition at the end of the facility's useful life.

[39] OAR 345-022-0050(1).

In RFA2, the certificate holder describes the tasks and actions necessary to restore the battery storage system site to a useful, nonhazardous condition. The tasks and actions would include removal and disposal of: storage containers, battery cell modules, inverters, and concrete pads. Batteries would be removed, packaged, and transported to an offsite recycling or disposal facility. Other system components would be dismantled using standard industry methods and would be disposed offsite. Concrete foundations and underground utilities would be excavated and removed to three feet below the soil surface. Topsoil would be imported and replaced, restoring the soil to pre-construction grade, and the soil would be re-seeded with native vegetation.

The certificate holder describes that, based on the design, site contamination from the proposed battery storage systems would be unlikely. If a module, which provides secondary spill containment, were to leak, any spill would be contained inside the storage container (tertiary spill containment) and would be cleaned up as soon as it was discovered.

The certificate holder represents that the proposed battery storage systems would be kept in a temperature-controlled facility and would be continuously electronically monitored by a "Battery Management System" for function and operability and inspected monthly by O&M personnel. The Department recommends Council consider the certificate holder's representation of monthly battery storage system inspections to be a binding representation, and necessary to minimize the potential for site contamination from equipment malfunction. Further, the Department recommends Council impose a requirement that the certificate holder provide evidence, on an annual basis, of active property coverage under its commercial business insurance policy from high loss catastrophic events including but not limited to an onsite explosion or fire. To ensure that the certificate holder has the ability to restore the site to a useful, non-hazardous condition, the Department recommends Council impose the following condition:

> **Recommended Retirement and Financial Assurance Condition 6 (OPR-RF-01):**
> During facility operation, the certificate holder shall:
> a. Conduct monthly inspections of the battery storage systems, in accordance with manufacturer specifications. The certificate holder shall maintain documentation of inspections, including any corrective actions, and shall submit copies of inspection documentation in its annual report to the Department.
> b. Provide evidence in its annual report to the Department of active property coverage under its commercial business insurance from high loss-catastrophic events, including but not limited to, onsite fire or explosion.
> [Final Order on AMD2, Retirement and Financial Assurance Condition 6]

Subject to compliance with ~~the~~ existing and recommended conditions identified above, the Department recommends the Council find that the site of the facility, with proposed changes, could be restored adequately to a useful, non-hazardous condition following permanent cessation of facility construction or operation.

Estimated Cost of Site Restoration

OAR 345-022-0050(2) requires the Council to find that the certificate holder continues to have a reasonable likelihood of obtaining a bond or letter of credit in a form and amount necessary to restore the site of the facility, with proposed changes, to a useful non-hazardous condition.

In RFA2, the certificate holder provides a site restoration cost estimate for the proposed battery storage systems of approximately $279,000. The site restoration cost estimate was prepared by TetraTech, the certificate holder's consultant. The TetraTech employee responsible for developing the restoration cost estimate has 24 years of relevant experience as an estimator and as an electrical contractor.

The scope of work and individual tasks were established using professional experience, in collaboration with Tetra Tech's engineering staff. The certificate holder evaluated labor requirements, equipment needs and duration for each of the tasks and actions identified for site restoration. Production rates were based on professional knowledge and published standards, including review of "RS Means," a construction cost estimating software. Labor and equipment rates were obtained based on US Department of Labor wage determinations. Typical industry standards were applied for contingency, overhead and fee.

Based on this information, the Department recommends Council conclude that the certificate holder's consultant, TetraTech, has the experience necessary to adequately and accurately prepare a cost estimate for decommissioning and restoration of battery storage system sites, as presented in Table 4, *Proposed Battery Storage System Site Restoration Cost Estimate*.

Table 4: Proposed Battery Storage System Site Restoration Cost Estimate

Restoration Activity	30 MW Battery Storage System	20 MW Battery Storage System
Proposed Battery Storage Systems		
Field Management	$20,115	$13,410
Battery Removal and Disposal	$55,883	$37,256
Removal and Disposal of Structures and Components	$27,783	$18,522
Concrete Breaking and Excavation	$12,023	$8,015
Concrete Transport Offsite	$16,487	$10,991
Underground Utility Removal	$3,304	$2,203
Restoration	$9,982	$6,655
15% Subcontractor Markup (Overhead + Fees)	$21,837	$14,558
Subtotal, per Battery Storage System	$167,414	$111,610
Subtotal (Q3 2018 Dollars) =	$279,024	
*Applied Contingencies**		
1% Performance Bond[1]	$2,790	
10% Administration and Project Management[2]	$27,902	

Table 4: Proposed Battery Storage System Site Restoration Cost Estimate

Restoration Activity	30 MW Battery Storage System	20 MW Battery Storage System
10% Future Development Contingency[3]	$27,902	
Proposed Changes, Total (Q3 2018 Dollars) =	$337,618	
Proposed Changes, Total (Q3 2018 Dollars)[~~5~~] =	$338,000	
Facility, as approved (Q3 2018 Dollars)[5] =	$19,200,000	
Facility, with Proposed Changes =	$19,538,000	

*Notes: The Department recommends Council apply additional contingencies, consistent with those applied to the approved facility, as follows:

1. 1% to account for the cost of a performance bond that would be posted by the contractor as assurance that the work will be completed as agreed.
2. 10% for the Department's administrative and management expenses.
3. 10% for future uncertainties such as changes in environmental standards or other legal requirements, availability of disposal sites, and the cost of labor and equipment.
4. Rounded to nearest 1,000
5. Retirement cost estimate, as approved in Final Order on ASC, equaled $18.1 million in Q1 2015 dollars. The Department provides an amount adjusted for inflation based on Q1 2018 dollars.

In the draft proposed order, the Department recommended Council amend Retirement and Financial Assurance Condition 5 (PRE-RF-02) b~~B~~ased on the increase in estimated site restoration cost for the facility, with proposed changes, ~~the Department recommends the Council amend Retirement and Financial Assurance Condition 5 (PRE-RF-02)~~ as follows:

Recommended Amended Retirement and Financial Assurance Condition 5 (PRE-RF-02): Before beginning construction of the facility, the certificate holder shall submit to the State of Oregon, through the Council, a bond or letter of credit naming the State of Oregon, acting by and through the Council, as beneficiary or payee. The initial bond or letter of credit amount for the facility is $19.5 ~~$18.1~~ million dollars (Q~~1~~3 201~~5~~8 dollars) to be adjusted to the date of issuance, and adjusted on an annual basis thereafter, as described in sub-paragraph (b) of this condition:

- The certificate holder may adjust the amount of the initial bond or letter of credit based on the final design configuration of the facility. Any revision to the restoration costs should be adjusted to the date of issuance as described in (b) and subject to review and approval by the Council.
- The certificate holder shall adjust the amount of the bond or letter of credit using the following calculation:
    1) Adjust the amount of the bond or letter of credit (expressed in ~~Q1 2015 dollars~~ Q3 2018 dollars) to present value, using the U.S. Gross Domestic Product Implicit Price Deflator, ChainWeight, as published in the Oregon Department of Administrative Services' "Oregon Economic and Revenue Forecast" or by any successor agency and using the ~~first quarter 2015~~ third quarter 2018 index value and the quarterly index value for the date of issuance of the new bond or letter of credit. If at any time the index is no longer published, the Council shall

select a comparable calculation to adjust ~~first quarter 2015~~ third quarter 2018 dollars to present value.

2) Round the result total to the nearest $1,000 to determine the financial assurance amount.

- The certificate holder shall use an issuer of the bond or letter of credit approved by the Council.
- The certificate holder shall use a form of bond or letter of credit approved by the Council. The certificate holder shall describe the status of the bond or letter of credit in the annual report submitted to the Council under OAR 345-026-0080. The bond or letter of credit shall not be subject to revocation or reduction before retirement of the facility site.

  [Final Order on ASC, Retirement and Financial Assurance Condition 5; Amended in Final Order on AMD2]

Based on compliance with recommended amended Retirement and Financial Assurance Condition 5 (PRE-RF-02), the Department recommends that the Council find that retirement cost estimate, with applied contingencies, is a reasonable estimate of an amount satisfactory to restore the proposed battery storage system sites to a useful, non-hazardous condition.

Ability of the Applicant (Certificate Holder) to Obtain a Bond or Letter of Credit

OAR 345-022-0050(2) requires the Council to find that the applicant (certificate holder) has a reasonable likelihood of obtaining a bond or letter of credit in a *form* and amount necessary to restore the facility site, with proposed changes, to a useful non-hazardous condition [Emphasis added]. A bond or letter of credit provides a site restoration remedy to protect the state of Oregon and its citizens if the certificate holder fails to perform its obligation to restore the site. The bond or letter of credit must remain in force until the certificate holder has fully restored the site. OAR 345-025-0010(8) establishes a mandatory condition, Retirement and Financial Assurance Condition 4 (PRE-RF-01), which ensures compliance with this requirement.

Based on the estimate shown in Table 4, *Proposed Battery Storage System Site Restoration Cost Estimate* the value of the financial assurance bond or letter of credit for restoring the site of the facility, with proposed changes, would be approximately $19.5 million (Q3 2018 dollars), adjusted annually as described in the recommended amended condition above. To demonstrate its ability to receive an adequate bond or letter of credit, the certificate holder refers to a June 8, 2017 letter from Wells Fargo Bank included as part of the record for Request for Amendment 1. The letter states that "[Wells Fargo] has an ongoing relationship with NEER and there is a reasonable likelihood that we will provide a letter of credit for this project should it be required... understanding that the potential liability of the letter of credit could total an amount of up to eighteen million one hundred thousand dollars (18,100,000)." [40] The Department acknowledges that the 2017 bank letter is less than the retirement cost estimate

[40] WRWAMD2Doc11 Complete Request for Amendment 2, Section 6.1.5. 2018-09-17 and WRWAMD1Doc20 Final Order on Amendment 1, p. 15, 2017-08-25.

presented in Table 4, *Proposed Battery Storage System Site Restoration Cost Estimate* above (i.e. $18.1 million versus $19.5 million). However, the bank letter is intended solely to demonstrate that, prior to construction, the certificate holder has a reasonable likelihood of obtaining a bond or letter of credit in the amount necessary for site restoration. The amount necessary for site restoration must be based on the methodology, as approved by Council in *Final Order on ASC*. Adjustments to the final site restoration bond or letter of credit amount may be made but are limited to final facility design adjustments (e.g. based on final number of wind turbines, which may be less than 292; final number of substations, which may be less than 3; etc.)

Because the restoration cost of the proposed battery storage systems represent less than 1 percent of the total restoration cost, and the increase is primarily due to inflation, the Department recommends Council consider the previously provided bank letter sufficient for representing a reasonable likelihood of obtaining a bond or letter of credit in the amount necessary for site restoration. Additionally, as described above and in accordance with Retirement and Financial Assurance Condition 5, construction cannot begin on the facility until the Department receives a satisfactory bond or letter of credit.

Subject to compliance with existing and recommended amended conditions, the Department recommends the Council find that the facility, with proposed changes, can be restored adequately to a useful, non-hazardous condition following permanent cessation of construction or operation~~ of the proposed facility~~. Additionally, the Department recommends that the Council find that the certificate holder has a reasonable likelihood of obtaining a bond or letter of credit in a form and amount satisfactory to the Council to restore the site to a useful, non-hazardous condition.

Conclusions of Law

Based on the foregoing findings of fact, and subject to compliance with the Retirement and Financial Assurance conditions, the Department recommends that the Council find that the facility, with proposed changes, would continue to comply with the Council's Retirement and Financial Assurance standard.

III.H. Fish and Wildlife Habitat: OAR 345-022-0060

> *To issue a site certificate, the Council must find that the design, construction and operation of the facility, taking into account mitigation, are consistent with:*

*(1) The general fish and wildlife habitat mitigation goals and standards of OAR 635-415-0025(1) through (6) in effect as of February 24, 2017****

Findings of Fact

The EFSC Fish and Wildlife Habitat standard requires the Council to find that the design, construction and operation of a facility is consistent with the Oregon Department of Fish and Wildlife's (ODFW) habitat mitigation goals and standards, as set forth in OAR 635-415-0025. This rule creates requirements to mitigate impacts to fish and wildlife habitat, based on the quantity and quality of the habitat as well as the nature, extent, and duration of the potential impacts to the habitat. The rule also establishes a habitat classification system based on value the habitat would provide to a species or group of species. There are six habitat categories; Category 1 being the most valuable and Category 6 the least valuable.

The analysis area for potential impacts to fish and wildlife habitat, as defined in the project order, is the area within the site boundary and extending ½-mile from all ground-disturbing activities. Because the amendment request does not include changes to the previously approved site boundary, the evaluation under the Fish and Wildlife Habitat standard focuses on potential impacts within and extending ½-mile from the proposed battery storage system sites.

Habitat Types and Categories in the Analysis Area

Based on review of ASC Exhibit P, previously identified habitat category, type and subtypes within and extending ½-mile from the proposed battery storage system sites include:

- Grassland: Exotic Annual and Native Perennial (habitat categories 2, 3 and 4)
- Developed: Irrigated Agriculture, Dryland Wheat, and Other (habitat category 6)

Potential Impacts to Fish and Wildlife Habitat

The proposed battery storage system sites would be located within previously approved micrositing corridors and would permanently impact up to 5 acres, each, entirely within Category 6 habitat (dryland wheat). Temporary impacts would also occur within Category 6 habitat (dryland wheat), but would occur within the disturbance footprint evaluated in the *Final Order on ASC* for the substation and O&M building sites, and therefore is assumed not to result in new temporary disturbance.

The habitat assessment of the proposed battery storage system sites, Category 6 habitat, is based upon the assessment approved in Council's 2016 *Final Order on ~~the~~ ASC*. Based upon review of aerial imagery, the Department confirms that the underlying land use is agricultural and agrees that the potential temporary and permanent impacts from the proposed battery

storage system sites would occur within Category 6 habitat.[41] Impacts to Category 6 habitat do not require compensatory mitigation under the Council's Fish and Wildlife Habitat standard.

Potential Impacts to State Sensitive Species

Construction and operation of the proposed battery storage systems could impact previously identified State sensitive species within Category 2, 3 and 4 habitat present within ½-mile of the proposed battery storage system sites. It was concluded during the review of the ASC that potential facility impacts could include vehicle and equipment collision, as well as noise-related disturbances during critical life stages (breeding and nesting); these same impacts could occur during construction of the battery storage systems.[42] Based on review of State sensitive species surveys conducted by the certificate holder in 2010-2013, Grasshopper sparrow nests were identified within ½-mile of the proposed battery storage system sites.

Council previously imposed conditions to mitigate potential construction and operational impacts as described above, including potential vehicle and equipment collision and noise-related disturbances during critical life stages for nesting birds. Previously imposed conditions that would minimize potential impacts to State sensitive species identified within ½-mile of the proposed battery storage system sites are summarized below:

- **Fish and Wildlife Habitat Condition 1 (PRE-FW-01)** requires that, prior to construction, the certificate holder conduct a field-based habitat survey of all areas to be affected by facility components, and locations of any identified active raptor and other bird nests, to confirm the habitat categories of impacted areas. The pre-construction habitat assessment must be based upon a protocol approved by the Department in consultation with ODFW. The pre-construction habitat assessment is used to confirm the compensatory mitigation requirement and identify presence of State sensitive species.
- **Fish and Wildlife Habitat Condition 2 (GEN-FW-01)** requires that, during construction and operation, the certificate holder impose a 20 mile per hour speed limit on new or improved private access roads.
- **Fish and Wildlife Habitat Condition 7 (CON-FW-03)** requires that, during construction, the certificate holder employ a qualified professional to provide environmental training to all personnel related to sensitive species, avoidance measures, exclusion areas, and reporting requirements.
- **Fish and Wildlife Habitat Condition 8 (PRE-FW-03)** requires that, during construction, the certificate holder flag all sensitive areas as restricted work areas, including active state sensitive species bird nests.

In addition, Council previously imposed Fish and Wildlife Habitat Condition 4 (PRE-FW-02) requiring that the certificate holder, prior to construction, receive concurrence from the Department in consultation with ODFW, of its draft Wildlife Monitoring and Mitigation Plan

[41] Google Earth 2015
[42] WRWAPPDoc139-16 ASC Exhibit P. p. 29-30. 2015-07-01.

(WMMP) (Attachment D of this order). The draft WMMP includes initial concepts for short- and long-term monitoring and mitigation of wildlife impacts.[43]

Conclusions of Law

Based on the foregoing findings of fact and conclusions, and subject to compliance with existing site certificate conditions, the Department recommends the Council find that facility, with proposed changes, would continue to comply with the Council's Fish and Wildlife Habitat standard.

III.I. Threatened and Endangered Species: OAR 345-022-0070

> *To issue a site certificate, the Council, after consultation with appropriate state agencies, must find that:*
>
> > *(1) For plant species that the Oregon Department of Agriculture has listed as threatened or endangered under ORS 564.105(2), the design, construction and operation of the proposed facility, taking into account mitigation:*
> >
> > > *(a) Are consistent with the protection and conservation program, if any, that the Oregon Department of Agriculture has adopted under ORS 564.105(3); or*
> > >
> > > *(b) If the Oregon Department of Agriculture has not adopted a protection and conservation program, are not likely to cause a significant reduction in the likelihood of survival or recovery of the species; and*
> >
> > *(2) For wildlife species that the Oregon Fish and Wildlife Commission has listed as threatened or endangered under ORS 496.172(2), the design, construction and operation of the proposed facility, taking into account mitigation, are not likely to cause a significant reduction in the likelihood of survival or recovery of the species.*

Findings of Fact

The Threatened and Endangered Species standard requires the Council to find that the design, construction, and operation of a proposed facility, or facility with proposed changes, are not likely to cause a significant reduction in the likelihood of survival or recovery of a fish, wildlife, or plant species listed as threatened or endangered by Oregon Department of Fish and Wildlife (ODFW) or Oregon Department of Agriculture (ODA). For threatened and endangered plant

[43] WRWAMD2Doc14. DPO Comment Reviewing Agency ODFW. 2018-10-08. On the record of the draft proposed order, ODFW requested that the requirements of previously imposed conditions related to wildlife and habitat surveys, revegetation and habitat mitigation, apply to the proposed battery storage systems. As described in Section III.H Fish and Wildlife Habitat of this order, requirements of all previously imposed conditions, and any new or recommended amended conditions apply to the proposed battery storage systems, if approved.

species, the Council must also find that a proposed facility, or facility with proposed changes, is consistent with an adopted protection and conservation program from ODA. Threatened and endangered species are those listed under ORS 564.105(2) for plant species and ORS 496.172(2) for fish and wildlife species. For the purposes of this standard, threatened and endangered species are those identified as such by either the Oregon Department of Agriculture or the Oregon Fish and Wildlife Commission.[44]

The analysis area for threatened or endangered plant and wildlife species is the area within and extending 5-miles from the site boundary.

Potential Impacts to Identified Threatened and Endangered Species

In order to identify endangered and threatened species that might occur within the analysis area, the certificate holder, from 2011 through 2013, conducted literature review and field surveys. Two state listed threatened or endangered species were identified and observed within the site boundary, Laurent's milkvetch - a State-listed threatened plant species; and Washington ground squirrel - a State-listed threatened wildlife species. As described in Section III.H *Fish and Wildlife Habitat* of this order, temporary and permanent disturbance associated with the proposed battery storage system sites would occur within Category 6 habitat (dryland wheat) and would not be expected to result in direct impacts to suitable habitat for the two previously observed state listed species. However, as described in the ASC, direct mortality of these species could occur from equipment and vehicle collision during access and egress to the facility; this impact also applies to the proposed battery storage system sites.[45]

Council previously imposed Threatened and Endangered Species Condition 3 (PRE-TE-03) requiring that the certificate holder conduct a pre-construction survey for Laurent's milkvetch and flag and avoid areas where the species is located. However, the condition did not specify the sensitive plant survey area. In the draft proposed order, t~~T~~he Department recommended~~s~~ Council amend the condition to specify the survey area, consistent with the survey distances and methodologies the certificate holder conducted in preparation of the ASC.[46]

On the record of the draft proposed order, the certificate holder requested removal of the recommended amended condition language and argued that the initial survey areas, used as the basis for the recommended amended condition, used a wider survey area than is necessary to provide information for the avoidance of Laurent's milkvetch, if identified during pre-construction surveys.[47] The Department considers the survey area, as defined in the recommended amended condition, necessary based on the extent of the previously approved 1,000-foot intraconnection transmission line corridor, and uncertainty and changes that occur

[44] Although the Council's standard does not address federally-listed threatened or endangered species, certificate holders must comply with all applicable federal laws, including laws protecting those species, independent of the site certificate.

[45] WRWAPPDoc139-16 ASC Exhibit Q. p. 7. 2015-07-01.

[46] WRWAPPDoc139-16 Wheatridge ASC Exhibit P Fish and Wildlife Habitat, Attachment P-1, p. 14. 2015-07-01.

[47] WRWAMD2Doc15 DPO Comments Certificate Holder. 2018-10-16.

in facility design between pre-construction surveys and final facility component siting. The Department, however, considers the certificate holder's request reasonable and recommends that Council maintain the previously recommended amended language specifying the survey area, but allow for review of the appropriate survey area, prior to construction, by the Department in consultation with Oregon Department of Agriculture. The Department recommends edits to this condition from the draft proposed order to the proposed order, presented in hi-lite, underline/strikeout; recommended edits included in the draft proposed order are presented in underline/strikeout, only.

Amended Threatened and Endangered Species Condition 3 (PRE-TE-03): To avoid potential impacts to Laurent's milkvetch, the certificate holder must:

i. Conduct preconstruction plant surveys in suitable habitat for Laurent's milkvetch within 1,000-feet of temporary and permanent disturbance from the 230 kV intraconnection transmission line; and, within 500-feet of temporary and permanent disturbance from all other facility components, unless extent of survey area within suitable habitat from temporary and permanent disturbances is otherwise agreed upon by the Department in consultation with Oregon Department of Agriculture. If the species is found to occur, the certificate holder must install protection flagging around the plant population and avoid any ground disturbance within this zone.

ii. Ensure that any plant protection zone established under (a) above is included on construction plans showing the final design locations.

iii. If herbicides are used to control weeds, the certificate holder shall follow the manufacturer's guidelines in establishing a buffer area around confirmed populations of Laurent's milkvetch. Herbicides must not be used within the established buffers.

[Final Order on ASC, Threatened and Endangered Species Condition 3; Amended in Final Order on AMD2]

Council previously imposed Threatened and Endangered Species Condition 1 (PRE-TE-01) requiring that, prior to construction, the certificate holder conduct a protocol-level survey in all areas of suitable habitat within 1,000 feet of any ground disturbing activity for Washington ground squirrel, to ensure avoidance of any temporary or permanent impacts to Washington ground squirrel habitat.[48]

Based upon compliance with previously imposed and recommended amended conditions and because the proposed battery storage systems would be located within Category 6 habitat and would not provide suitable habitat for the two state-listed species previously observed, the Department recommends Council find that the facility with proposed changes would not be

[48] Threatened and Endangered Species Condition 2 (PRE-TE-02) incorrectly references Fish and Wildlife Habitat Condition 3 for the finalization and implementation of the Wildlife Monitoring and Mitigation Plan (WMMP). The condition should reference Fish and Wildlife Habitat Condition 4. The Department recommends the Council administratively amend Threatened and Endangered Species Condition 3 to reference Fish and Wildlife Habitat Condition 4.

likely to cause a significant reduction in the likelihood or survival of any species listed as threatened or endangered.

Conclusions of Law

Based on the foregoing findings of fact and conclusions, and subject to compliance with existing and recommended amended site certificate conditions, the Department recommends that the Council find that the facility, with proposed changes, would continue to comply with the Council's Threatened and Endangered Species standard.

III.J. Scenic Resources: OAR 345-022-0080

> *(1) Except for facilities described in section (2), to issue a site certificate, the Council must find that the design, construction and operation of the facility, taking into account mitigation, are not likely to result in significant adverse impact to scenic resources and values identified as significant or important in local land use plans, tribal land management plans and federal land management plans for any lands located within the analysis area described in the project order.*
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> *****

Findings of Fact

OAR 345-022-0080 requires the Council to determine that the design, construction and operation of the proposed facility are not likely to have a "significant adverse impact" to any significant or important scenic resources and values within the analysis area. In applying the standard set forth in OAR 345-022-0080(1), the Council assesses visual impacts of facility structures on significant or important scenic resources described in "local land use plans, tribal land management plans and federal land management plans for any lands located within the analysis area described in the project order." For purposes of this rule, "local land use plans" includes applicable state land use and management plans.

The analysis area for the evaluation of scenic resources, as defined in the project order, is the area within and extending 10-miles from the site boundary.

In RFA2, the certificate holder states that there are no significant or important scenic resources in the analysis area. This is the same conclusion as was reached during the Council's review on the ASC. The certificate holder states in RFA2 that it reviewed the applicable management plans to verify that there have not been any changes in scenic resources since Council's decision on the ASC. Furthermore, as represented by the certificate holder in RFA2, the proposed battery storage ~~facilities~~ systems would be approximately 20 feet high, co-located with ~~the~~ previously approved substations, and finished with neutral colors to blend with the surrounding landscape.[49] Based on ~~the findings presented here~~this evidence, the Department recommends

[49] WRWAMD2 Request for Amendment 2. Section 6.1.8. 2018-09-17.

that the Council find that the facility, with proposed changes, ~~will~~ would not result in significant adverse impact to any identified scenic resources and values.

Council previously imposed Scenic Resources Condition 1 (GEN-SR-01) to minimize visual impacts from substation and O&M building lighting; and Scenic Resources Condition 2 (GEN-SR-02) to minimize visual impacts from facility component finish, vegetative clearing and facility signage. In RFA2, the certificate holder represents that it would implement the same measures for the proposed battery storage systems. In the draft proposed order, ~~Based on the certificate holder's representation,~~ the Department recommended~~s~~ the Council amend Scenic Resources Condition 1 and 2 based on the certificate holder's representations, as follows:

Recommended Amended Scenic Resources Conditions 1 (GEN-SR-01)

To reduce visual impacts associated with lighting facility structures, other than lighting on structures subject to the requirements of the Federal Aviation Administration or the Oregon Department of Aviation, the certificate holder shall implement the following measures:

a. Outdoor night lighting at the collector substations, ~~and~~ Operations and Maintenance Buildings, and battery storage systems, must be
   i. The minimum number and intensity required for safety and security;
   ii. Directed downward and inward within the facility to minimize backscatter and offsite light trespass; and
   Have motion sensors and switches to keep lights turned off when not needed.

[Final Order on ASC, Scenic Resources Condition 1, Amended in Final Order on AMD2]

Recommended Amended Scenic Resources Conditions 2 (GEN-SR-02)

The certificate holder shall:

1. Design and construct the O&M buildings and battery storage system facilities to be generally consistent with the character of agricultural buildings used by farmers or ranchers in the area, and the buildings shall be finished in a neutral color to blend with the surrounding landscape;
2. Paint or otherwise finish turbine structures in a grey, white, or off-white, low reflectivity coating to minimize reflection and contrast with the sky, unless required otherwise by the local code applicable to the structure location.
3. Design and construct support towers for the intraconnection transmission lines using either wood or steel structures and utilize finish with a low reflectivity coating;
4. Finish substation structures and battery storage systems utilizing neutral colors to blend with the surrounding landscape;
5. Minimize use of lighting and design lighting to prevent offsite glare;
6. Not display advertising or commercial signage on any part of the proposed facility;
7. Limit vegetation clearing and ground disturbance to the minimum area necessary to safely and efficiently install the facility equipment;
8. Water access roads and other areas of ground disturbance during construction, as needed, to avoid the generation of airborne dust; and

9. Restore and revegetate temporary impact areas as soon as practicable following completion of construction

[Final Order on ASC Scenic Resources Condition 2; Amended in Final Order on AMD2]

Conclusion of Law

Based on the foregoing findings of fact and conclusions, the Department recommends that the Council find that the facility, with proposed changes, would continue to complyies with the Council's Scenic Resources standard.

III.K. Historic, Cultural, and Archaeological Resources: OAR 345-022-0090

(1) Except for facilities described in sections (2) and (3), to issue a site certificate, the Council must find that the construction and operation of the facility, taking into account mitigation, are not likely to result in significant adverse impacts to:

(a) Historic, cultural or archaeological resources that have been listed on, or would likely be listed on the National Register of Historic Places;

(b) For a facility on private land, archaeological objects, as defined in ORS 358.905(1)(a), or archaeological sites, as defined in ORS 358.905(1)(c); and

(c) For a facility on public land, archaeological sites, as defined in ORS 358.905(1)(c).

(2) The Council may issue a site certificate for a facility that would produce power from wind, solar or geothermal energy without making the findings described in section (1). However, the Council may apply the requirements of section (1) to impose conditions on a site certificate issued for such a facility.

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Findings of Fact

Subsection (1) of the Historic, Cultural and Archaeological Resources standard, OAR 345-022-0090, generally requires the Council to find that the proposed amended facilityfacility, with proposed changes, is not likely to result in significant adverse impacts to identified historic, cultural, or archaeological resources. -Subsection (2) of OAR 345-022-0090 provides that the findings described in subsection (1) may be waived for wind facilities. However, the Council may impose site certificate conditions based on the requirements of this standard.

The analysis area for the evaluation of potential impacts to identified historic, cultural or archeological resources, as defined in the project order, is the area within the site boundary.

In RFA2, the certificate holder provides a summary of the field and desktop archaeological surveys conducted for the entire 13,097 acres within the site boundary during the ASC review phase. Previous pedestrian field surveys recorded 21 archaeological sites and isolated finds

within the site boundary, 7 of which were recommended for inclusion on the National Register of Historic Places and as such, would be protected by the Council's Historic, Cultural, and Archaeological Resources standard. On the record of the ASC, SHPO agreed with the eligibility evaluation. However, the certificate holder asserts that the proposed battery storage system sites have been designed to avoid impacts to all known archeological, historic, and cultural resources deemed eligible or potentially eligible for NRHP listing.

Council previously imposed Historic, Cultural and Archaeological Resources Conditions 1 through 5 (PRE-HC-01, PRE-HC-02, CON-HC-01, PRE-HC-03, and CON-HC-02) to avoid and reduce the potential for adverse impacts to historic, cultural, and archaeological resources. Specific to the proposed battery storage systems, Historic, Cultural, and Archeological Resources Condition 3 requires that onsite construction personnel are trained to identify cultural and archaeological resources, and understand the requirements if such resources are discovered during construction, and Historic, Cultural, and Archeological Resources Condition 5 (CON-HC-02) outlines protocols to be followed if archeological or cultural resources are inadvertently discovered during construction.

Based upon the analysis presented above and subject to compliance with existing conditions, the Department recommends that Council find that the facility, with proposed changes, would not be likely to result in significant adverse impacts to resources protected by the Council's Historic, Cultural and Archaeological Resources standard.

Conclusions of Law

Based on the foregoing analysis, and subject to compliance with existing conditions, the Department recommends the Council find that the facility, with proposed changes, would continue to comply with the Council's Historic, Cultural, and Archaeological Resources Standard.

III.L. Recreation: OAR 345-022-0100

> *(1) Except for facilities described in section (2), to issue a site certificate, the Council must find that the design, construction and operation of a facility, taking into account mitigation, are not likely to result in a significant adverse impact to important recreational opportunities in the analysis area as described in the project order. The Council shall consider the following factors in judging the importance of a recreational opportunity:*

(a) Any special designation or management of the location;
(b) The degree of demand;
(c) Outstanding or unusual qualities;
(d) Availability or rareness;
(e) Irreplaceability or irretrievability of the opportunity.
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Findings of Fact

The Recreation standard requires the Council to find that the design, construction, and operation of a facility would not likely result in significant adverse impacts to "important" recreational opportunities. Therefore, the Council's Recreation standard applies only to those recreation areas that the Council finds to be "important," utilizing the factors listed in the sub-paragraphs of section (1) of the standard. The importance of recreational opportunities is assessed based on five factors outlined in the standard: special designation or management, degree of demand, outstanding or unusual qualities, availability or rareness, and irreplaceability or irretrievability of the recreational opportunity. The certificate holder evaluates impacts to important recreational opportunities based on the potential of construction or operation of the facility, with proposed changes, to result in any of the following: direct or indirect loss of an important recreational opportunity, excessive noise, increased traffic, and visual impacts of facility structures or plumes.

In accordance with OAR 345-001-0010(59)(d) and consistent with the study area boundary, the analysis area for recreational opportunities is the area within and extending 5 miles from the site boundary.

Recreational Opportunities within the Analysis Area

Important recreational opportunities within the 5-mile analysis area include:[50]

- Oregon National Historic Trail High-Potential Segment (1.2 miles from site boundary)
- Oregon Trail Well Spring Interpretive Site (1.2 miles from site boundary)
- Echo Meadows Site/Oregon Trail Area of Critical Environmental Concern (2.5 miles from site boundary)
- Blue Mountain State Scenic Byway (OR-74) (2.6 miles from site boundary)
- Morrow County Fairgrounds (3.0 miles from site boundary)
- Willow Creek Water Park (3.0 miles from site boundary)[51]

[50] WRWAPPDoc139-20 ASC Exhibit T. 2015-07-01.
[51] WRWAPPDoc196. Final Order on ASC. 2016-05-24. In the Final Order on ASC, the Council disagreed with the certificate holder's representation that Willow Creek Water Park met the criteria for an "important" recreational opportunity. However, the Council included an evaluation of potential impacts to this recreational opportunity.

Evaluation of Potential Impacts to Important Recreation Opportunities

Under the Council's Recreation standard, the Council must find that, taking into account mitigation, the facility, with proposed changes, is not likely to result in a significant adverse impact to those identified important recreational opportunities. The Department presents its evaluation of potential impacts below.

As presented above, the six identified important recreational opportunities within the 5-mile analysis area are located between 1.2 to 3 miles from the site boundary, and would be located at greater distances from the proposed battery storage system sites based on its location within the site boundary.

Potential Direct or Indirect Loss of Recreational Opportunity

The proposed battery storage systems would be located within previously approved site boundary area, entirely within private property, and would not be located on or within any of the identified important recreational opportunities. Therefore, the facility, with proposed changes, would not physically disturb, or result in ground disturbance, to the important recreational opportunities identified within the analysis area. The facility, with proposed changes, would also not require any temporary or permanent closure or removal of the important recreation opportunities to public use. Therefore, the Department recommends the Council find that the facility, with proposed changes, would not be expected to result in direct or indirect loss to important recreational opportunities within the analysis area.

Potential Noise Impacts

Construction

The proposed battery storage systems would generate construction-related noise. The certificate holder describes that construction related noise would be short-term and intermittent. Site preparation and construction activities for the proposed battery storage systems would include gravel delivery and placement; underground utility work; concrete pad and foundation installation; container and battery delivery and installation.[52] These activities are similar to activities described in the ASC for wind facility construction; therefore, the Department refers to construction equipment noise levels presented in ASC Exhibit X, which range from 42 (crane) to 56 (loader/dozer) dBA, at 2,000 feet.

While not specifically addressed in RFA2 Section 6.1.10 *Recreation*, the Department relies upon information provided in ASC Exhibit X and RFA2 Section 6.3.1 *Noise Control Regulation* to evaluate potential construction-related noise impacts at the nearest recreational opportunity from the site boundary, Oregon Trail Well Spring Interpretive Site (which is also the closest point of the Oregon Trail High-Potential Segment) located approximately 1.2 miles from the site

[52] WRWAMD2 Request for Amendment 2. Section 4.4 Materials Analysis. 2018-09-17.

boundary. The Department acknowledges that the analysis area extends 5-miles from the site boundary, but presents an evaluation of impacts at the nearest important recreational opportunity as a proxy for potential impacts at further distances from the site boundary.

Existing Noise Control Condition 1 (CON-NC-01) would reduce noise impacts during construction by requiring the use of exhaust mufflers on combustion engine-powered equipment, use of air-inlet silencers, shrouds and shields, as appropriate; and requires that the certificate holder establish a noise complaint response system, including a system for the certificate holder to receive and resolve noise complaints.

Based on the low dBA level expected at the nearest important recreational opportunity and compliance with the above-reference condition, and because construction related noise would be temporary and short-term in duration, the Department recommends that Council find that construction of the facility, with proposed changes, would not be likely to result in significant adverse noise impacts at the Oregon Trail Well Spring Interpretive Site. Because the other important recreational opportunities within the analysis area are located at greater distances from the facility site boundary than the Oregon Trail Well Spring Interpretive Site, the Department recommends that Council conclude that potential construction-related impacts from the facility, with proposed changes, at these important recreational opportunities would also not likely be potentially significant or adverse.

Operation

The proposed battery storage systems would generate operational noise from the following sources

- Up to 56 heating, ventilation and air conditioning (HVAC) modules
- Up to 28 power inverters
- Up to 28 distribution transformers

The HVAC modules, power inverters, and distribution transformers would generate maximum noise levels of 103, 92, and 72 dBA, respectively.[53] In RFA2, the certificate holder ~~asserts~~ provides an updated noise modeling analysis of ~~that~~ operational noise from the facility, with proposed changes, and describes that noise would be similar to or less than evaluated in ASC Exhibit T and Council's *Final Order on ASC*. Based on noise modeling conducted during the ASC phase, the Council previously found that facility-related operational noise would be inaudible at all important recreational opportunities other than the Oregon Trail Well Spring Interpretive Site where potential operational sound levels of 31 dBA, comparable to a whisper or wind blowing, would be audible.[54]

[53] WRWAMD2Doc11. Request for Amendment 2. Attachment 3. 2018-09-17.
[54] WRWAPPDoc196. Final Order on ASC, p. 211. 2017-05-24

Council previously concluded that audible noise levels of 31 dBA would not interfere with the recreational opportunities of the Oregon Trail Well Spring Interpretive Site. Therefore, based on the Council's previous findings and because the certificate holder asserts that operational noise would be similar to or less than 31 dBA, the Department recommends Council find that operation of the facility, with proposed changes, would not be likely to result in significant adverse noise impacts to any important recreational opportunities within the analysis area.

Potential Traffic Impacts

Construction

The proposed battery storage systems would generate construction-related traffic. The certificate holder did not identify any new roads or routes to be used during construction; therefore, the Department assumes that the roads and routes previously identified for use during construction would continue to be utilized. Roads that provide access to important recreational opportunities, specifically Oregon Trail Well Spring Interpretive Site and Echo Meadows/Oregon Trail ACEC, which could be impacted by construction-related traffic include OR-207 and/or Bombing Range Road and Little Juniper Canyon Road. The certificate holder asserts that the potential construction-related traffic impacts would not result in greater impacts than evaluated in Council's 2016 *Final Order on ASC*.

Council previously considered potential construction-related traffic impacts to the roads identified above not likely to be significant or adverse because impacts would occur during the morning peak hours, when visitors are unlikely to arrive at the recreational opportunities. In addition, Council imposed Public Services Condition 6 (PRE-PS-01) requiring that the certificate holder implement a Traffic Management Plan, as approved by the Department, that would include best management practices (BMP's) such as traffic control BMP's and reduction practices to minimize potential construction-related traffic impacts.[55]

Because construction of the facility, with proposed changes, is not expected to increase traffic impacts compared to those considered in Council's *Final Order on the ASC*, where construction-related traffic impacts at important recreational opportunities were not expected to be significant or adverse, and based upon compliance with Public Services Condition 6 (PRE-PS-01), the Department recommends Council find that construction-related traffic impacts would not

[55] ~~WRWAPPDoc196. Final Order on ASC. 2017-05-24. Council previously imposed Land Use Condition 13 (PRE-LU-06), which also requires that the certificate holder develop and implement a Traffic Management Plan during construction. Specifically, the condition states, "Before beginning construction, the certificate holder shall work with the Morrow County Road Department to identify specific construction traffic related concerns, and develop a traffic management plan that specific necessary traffic control measures to mitigate the effects of the temporary increase in traffic. The certificate holder must provide a copy of the traffic management plan to the department and Morrow County, and must implement the traffic management plan during construction." Because the requirement of this condition are redundant with Public Services Condition 6 (PRE-PS-01), the Department recommends in Section III.M *Public Services* of this order that Council remove the condition and amend Public Service Condition 6 (PRE-PS-01 to include any substantive requirements of the removed condition.~~

be likely to result in a significant adverse traffic impact to important recreational opportunities within the analysis area.

Operation

The facility, with proposed changes, would generate operational-related traffic. However, the certificate holder asserts that the proposed battery storage systems would not result in changes to previously evaluated operational traffic impacts of 10 to 20 vehicle trips per day, which were previously determined not likely to have a significant adverse impact to recreational opportunity access roads.[56] Because RFA2 would not result in changes to the expected number of permanent employees, the Department recommends Council find that operational-traffic impacts would not be likely to result in a significant adverse impact to important recreational opportunities within the analysis area.

Visual Impacts

The proposed battery storage systems would result in up to 5 acres, each, of permanent disturbance and would be approximately 20-feet in height. Based on the low height, intervening geographic and development features, and distance from important recreational opportunities to site boundary ranging from 1.2 to 3 miles, and would be at greater distances to proposed battery storage system sites, visibility and associated visual impacts would not be expected at any of the important recreational opportunities within the analysis area.

Because of the distance between the important recreational opportunities and the proposed battery storage systems, as well as the existing intervening geographic and development features, the Department recommends Council find that the changes proposed in the amendment request would not alter that visibility impacts previously evaluated and determined by Council not likely to be significant or adverse at any of the important recreational opportunities within the analysis area.

Conclusions of Law

Based on the foregoing recommended findings of fact, and subject to compliance with existing site certificate conditions, the Department recommends that the Council find that the facility, proposed changes, would continue to comply with the Council's Recreation standard.

III.M. Public Services: OAR 345-022-0110

> *(1) Except for facilities described in sections (2) and (3), to issue a site certificate, the Council must find that the construction and operation of the facility, taking into account mitigation, are not likely to result in significant adverse impact to the ability of public and private providers within the analysis area described in the project order to provide:*

[56] WRWAPPDoc196. Final Order on ASC. 2017-04-28.

sewers and sewage treatment, water, storm water drainage, solid waste management, housing, traffic safety, police and fire protection, health care and schools.

(2) The Council may issue a site certificate for a facility that would produce power from wind, solar or geothermal energy without making the findings described in section (1). However, the Council may apply the requirements of section (1) to impose conditions on a site certificate issued for such a facility.
*****

Findings of Fact

The Council's Public Services standard requires the Council to find that the facility, with proposed changes, is not likely to result in significant adverse impacts on the ability of public and private service providers to supply sewer and sewage treatment, water, stormwater drainage, solid waste management, housing, traffic safety, police and fire protection, health care, and schools. Pursuant to OAR 345-022-0110(2), the Council may issue a site certificate for a facility that would produce power from wind energy without making findings regarding the Public Services standard; however, the Council may impose site certificate conditions based upon the requirements of the standard.

In accordance with OAR 345-001-0010(59)(b) and consistent with the study area boundary, the analysis area for potential impacts to public services from construction and operation of the facility, with proposed changes, is defined as the area within and extending 10-miles from the site boundary.

Sewer and Sewage Treatment; Stormwater Drainage

The proposed battery storage systems would not generate sewage or require sewage treatment, nor require construction or expansion of public stormwater drainage facilities. Therefore, construction and operation of the proposed battery storage systems would not impact public and private providers of sewer, sewage treatment or stormwater drainage.

Water

Construction and operation of the proposed battery storage systems would result in water use. Approximately 12,500 gallons of water would be used for ~~road construction,~~ concrete mixing, dust suppression and other construction-related activities, similar to the water-use activities associated with the facility, as approved. Water used for construction would be procured from licensed sources in the vicinity of the facility, such as the Port of Morrow.[57] The certificate holder relies upon correspondence submitted in ASC Exhibit U from four municipal water suppliers, including the Port of Morrow, which confirmed adequate supply and capacity to meet the facility's water use needs during construction. Based on confirmation from public water providers obtained in 2014 during the ASC phase, and the minimal increase in

[57] WRWAMD2 Request for Amendment 2. 2018-09-17. Section 4.4

construction-related water use from the proposed battery storage systems, the Department recommends Council find that construction of the facility, with proposed changes, would continue not to be likely to result in significant adverse impacts on the ability of public or private providers of water to deliver services.

Water used during proposed battery storage system operations would result from filling and use of fire water tanks associated with the gas pressured deluge fire suppression systems. The fire suppression system fire water tanks would obtain water from previously evaluated permit-exempt wells to be located at the O&M buildings. Operational water withdrawn from facility-specific wells would not result in impacts on the ability of public or private providers of water to deliver services.

Solid Waste Management

Construction

Construction of the proposed battery storage systems would generate solid waste. Construction related solid waste would include concrete waste from container and inverter pads, erosion control materials, and packaging materials, similar to the types of solid waste generated during construction of the facility, as approved. Council previously imposed Waste Minimization Condition 2 (PRE-WM-01) and Public Service Condition 3 (CON-PS-01) requiring that the certificate holder, prior to construction, develop a waste management plan, to be implemented during construction. The conditions require that the plan include measures for recycling and segregating waste, and discharging concrete wash water onsite, when possible. Based on the low level of construction-related waste anticipated during proposed battery storage system construction, and compliance with previously imposed conditions, the Department recommends Council find that the facility, with proposed changes, would not likely result in a significant adverse impact on the ability of public and private providers of solid waste management to deliver services.

Operations

Operation of the proposed battery storage systems would generate waste during equipment (i.e. batteries) replacement activities, anticipated every 10 to 15 years. The certificate holder describes that battery cells contain lithium-ion electrolyte gel or liquid, which is potentially hazardous. Spent battery cells would be disposed at the Chemical Waste Management facility in Arlington, Oregon ("Arlington Landfill"). The Arlington Landfill is regulated by EPA and the Oregon DEQ; and, maintains permits under the Resource Conservation and Recovery Act as well as under the Toxic Substances Control Act. Additionally it is licensed to handle hazardous materials, including transportation and disposal of hazardous wastes. The certificate holder provides evidence that the Arlington Landfill's operating capacity is greater than 100 years, with 3.7 million cubic yards in available capacity remaining.[58]

[58] WRWAMD2Doc11. Request for Amendment 2. 2018-09-17.

Council previously imposed Public Services Condition 4 (OPR-PS-03) requiring that, during operation, the certificate holder implement a waste management plan. The condition requires that the certificate holder train employees to minimize and recycle solid waste; segregate hazardous and non-hazardous waste; and utilize a licensed waste hauler for offsite removal and transport to a licensed waste management facility. The Department recommends Council amend Public Services Condition 4 (OPR-PS-03) to clarify that the requirements apply to waste generated from proposed battery storage system operations. The Department also recommends Council incorporate the certificate holder's representation that handling and replacement of batteries would follow guidelines in 49 CFR 173.185 Department of Transportation Pipeline and Hazardous Material Administration. 49 CFR 173.185 includes requirements for prevention of dangerous evolution of heat; prevention of short circuits; prevention of damage to terminals; and, prevention of contact with other batteries or conductive materials.

On the record of the draft proposed order, Morrow County Planning Department, on behalf of the Morrow County Board of Commissioners – one of the Special Advisory Groups for the facility – requested that Public Services Condition 4 be amended in the proposed order to reference Morrow County Solid Waste Management Ordinance Section 5.010 Transportation of Solid Waste.[59] In these comments, Morrow County Planning Department clarified that this ordinance section establishes that legal standards be followed for disposal of hazardous solid waste generated or accumulated by the facility. The Department reviewed Section 5.010 of Morrow County's Solid Waste Management Ordinance and recommends Council agree to the requested amendment, as presented in hi-lite, underline/strikeout below; recommended edits included in the draft proposed order are presented in underline/strikeout, only.

Recommended amended Public Services Condition 4 (OPR-PS-03) is as follows:

Recommended Amended Public Services Condition 4 (OPR-PS-03):[60]

(a) Prior to operation, ~~During operation,~~ the certificate holder shall submit to the Department for approval its ~~implement a~~ Operational W~~w~~aste M~~m~~anagement P~~p~~lan that includes but is not limited to the following ~~measures~~:

1. Onsite handling procedure for operational replacement of damaged, defective or recalled lithium-ion batteries. The procedure shall identify applicable 49 CFR

[59] WRWAMD2Doc17. DPO Comment SAG Morrow County 2018-10-25.

[60] WRWAMD2Doc6. pRFA2 Special Advisory Group Comment Morrow County. In a comment on pRFA2, on behalf of the Special Advisory Group, Morrow County Planning Department commented that Section 5.000 (Public Responsibilities) and 5.050 (Responsibility for Proper Disposal of Hazardous Waste) of the Morrow County Solid Waste Management Plan and Ordinance would apply to the proposed battery storage systems. Because this ordinance was previously included in Public Services Condition 4 (OPR-PS-03), but not the specific sections, the Department considers the inclusion of the ordinance section reference administrative, and recommends Council include in the amended condition.

173.185 provisions and address, at a minimum, onsite handling, packaging, interim storage, and segregation requirements.

2. Training employees to handle, replace, and store damaged, defective or recalled lithium-ion batteries; minimize and recycle solid waste.
3. Recycling paper products, metals, glass, and plastics.
4. Recycling used oil and hydraulic fluid.
5. Collecting non-recyclable waste for transport to a local landfill by a licensed waste hauler or by using facility equipment and personnel to haul the waste. Waste hauling by facility personnel within Morrow County shall be performed in compliance with the Morrow County Solid Waste Management Ordinance, Section 5.000 Public Responsibilities, 5.010 Transportation of Solid Waste and 5.030 Responsibility for Propose Disposal of Hazardous Waste which requires that all loads be covered and secured and that operators be responsible for hazardous waste disposal in accordance with applicable regulatory requirements.
6. Segregating all hazardous and universal, non-recyclable wastes such as used oil, oily rags and oil-absorbent materials, mercury-containing lights, lithium-ion batteries, ~~and~~ lead-acid and nickel-cadmium batteries, and replaced, damaged, defective or recalled lithium-ion batteries for disposal by a licensed firm specializing in the proper recycling or disposal of hazardous and universal wastes.

(b) During operation, the certificate holder shall implement the approved Operational Waste Management Plan.

[Final Order on ASC, Public Services Condition 4; Amended in Final Order on AMD2]

Based on the available capacity and ability of Arlington Landfill to receive the potential quantity and types of waste generated during proposed battery storage system operations, and compliance with the recommended amended site certificate condition, the Department recommends the Council find that operation of the facility, with proposed changes, would not likely result in a significant adverse impact on the ability of public and private providers of solid waste management to deliver services.

Traffic Safety – Trip Generation

Construction

The proposed battery storage systems would generate construction-related ~~and operational~~ traffic; however, in RFA2, the certificate holder explains that potential traffic impacts (i.e. vehicle trip generation) from construction of the proposed battery storage systems would not vary significantly from the impacts evaluated by Council in the *Final Order on the ASC*.

The certificate holder previously identified that construction-related traffic would generate an additional 192 round trips per day (384 one-way trips), with that number increasing to 288 round trips per day (576 one-way trips) during peak construction. Council previously imposed

Public Services Condition 6 (PRE-PS-01) requiring that, prior to construction, the certificate holder coordinate with ODOT and county road officials to develop and implement a Traffic Management Plan, as approved by the Department, that would include best management practices (BMP's) to minimize potential construction-related traffic impacts. BMP's include maintaining emergency vehicle access to private property, using chase vehicles if required by ODOT, and notifying nearby landowners prior to the start of construction.[~~61~~] As the proposed battery storage system construction would not add significant numbers of construction vehicles, would not alter the impacts previously evaluated, and based on the traffic impact minimization measures to be implemented in accordance with Public Services Condition 6 (PRE-PS-01), the Department recommends Council find that construction related traffic impacts (i.e. vehicle trip generation) from the facility, with proposed changes, would not be likely to result in a significant adverse impact to the ability of public or private providers of traffic safety.

Operations

The proposed battery storage system would generate operational-related traffic. However, the certificate holder asserts that the proposed battery storage systems would not result in changes to previously evaluated operational traffic impacts of 10 to 20 vehicle trips per day, which were previously determined not likely to have a significant adverse impact to providers of traffic safety services.[62] Because RFA2 would not result in changes to the expected number of permanent employees, the Department recommends Council find that operational-traffic impacts (i.e. vehicle trip generation) from the facility, with proposed changes, would continue not to be likely to result in a significant adverse impact to the ability of public or private providers of traffic safety.

Traffic Safety – Hazards

The proposed battery storage systems could result in impacts to traffic safety during transport of batteries to and from the site. In RFA2, the certificate holder describes that transportation of lithium-ion batteries is subject to 49 CFR 173.185 – Department of Transportation Pipeline and Hazardous Material Administration. The regulations include requirements for prevention of a dangerous evolution of heat, prevention of short circuits, prevention of damage to the terminals, and requires that no battery come in contact with other batteries or conductive materials. As described in Section III.B *Organizational Expertise* and above, in the evaluation of

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[~~61~~] ~~WRWAPPDoc196. Final Order on ASC. 2017-05-24. Council previously imposed Land Use Condition 13 (PRE-LU-06), which also requires that the certificate holder develop and implement a Traffic Management Plan during construction. Specifically, the condition states, "Before beginning construction, the certificate holder shall work with the Morrow County Road Department to identify specific construction traffic related concerns, and develop a traffic management plan that specific necessary traffic control measures to mitigate the effects of the temporary increase in traffic. The certificate holder must provide a copy of the traffic management plan to the department and Morrow County, and must implement the traffic management plan during construction." Because the requirements of this condition are redundant with Public Services Condition 6 (PRE-PS-01), the Department recommends in Section III.M *Public Services* of this order that Council remove the condition and amend Public Service Condition 6 (PRE-PS-01 to include any substantive requirements of the removed condition.~~

[62] WRWAPPDoc196. Final Order on ASC. 2017-04-28.

potential impacts to public and private providers of solid waste management, the Department recommends Council impose Recommended Organizational Expertise Condition 10 (GEN-OE-04) and amend Public Services Condition 4 (OPR-PS-03) to ensure the certificate holder utilizes a licensed hauler for battery transport and that onsite handling, storage and transport of batteries satisfies the requirements of 49 CFR 173.185. Based on compliance with the recommended new and amended conditions, the Department recommends Council find that construction and operational-traffic impacts related to safety risks during battery transport to and from the site would not be likely to result in a significant adverse impact to the ability of public or private providers of traffic safety.

Police Protection

Construction and operation of the proposed battery storage systems is not expected to change the previously estimated temporary or permanent number of workers previously evaluated in the Council's *Final Order on ASC*.[63] In RFA2, the certificate holder states that the proposed battery storage system sites would be secured and restricted from the public via fencing. In the *Final Order on ~~the~~ ASC* it was estimated that the facility would employ an average of 240 workers during construction and a maximum of 360 individuals during peak construction; and approximately 10 to 20 permanent employees during operations.[64] Council previously imposed Public Service Conditions 10 (CON-PS-02) and 12 (OPR-PS-04) requiring that, during construction and operations, the certificate holder provide 24 hour private security, and ensure that law enforcement agencies have up-to-date contact information of relevant facility staff, respectively. Additionally, Council previously imposed Public Health and Safety Standards for Wind Facilities Condition 2 (OPR-WF-01) requiring that facility substation be fenced with locked gates. In RFA2, the certificate holder represents that the proposed battery storage system sites would also be fenced with locked gates. Based on this representation, and to minimize potential impacts to public and private providers of police services, the Department recommends Council amend Public Health and Safety Standards for Wind Facilities Condition 2 (OPR-WF-01), as described in Section III.P.1 *Public Health and Safety Standards for Wind Energy Facilities*, to ensure the proposed battery storage system sites are fenced with locked gates.

The Department recommends Council find that construction and operation of the facility, with proposed changes, in compliance with the existing and recommended amended condition, would not likely result in a significant adverse impact on the ability of public and private police providers to provide services.

Fire Protection

The proposed battery storage systems could, during an unanticipated fire-related emergency, result in impacts to the ability of public and private providers of fire protection to provide services.

[63] WRWAMD3Doc2 Preliminary Request for Amendment 2, Section 6.1.10, 2018-05-18.
[64] WRWAPPDoc196 Final Order on ASC, p. 215, 2017-05-24.

While not specifically addressed in RFA2, the Department assumes, based on the requirements of 49 CFR 173.185 as referenced by the certificate holder, that potential fire risk would result from dangerous evolution of heat or short circuiting from malfunctioning or defective batteries either as installed or if improperly handled and stored onsite. As described above, the Department recommends Council impose Recommended Organizational Expertise Condition 10 (GEN-OE-04) and amend Public Services Condition 4 (OPR-PS-03) to ensure that onsite handling, storage and transport of batteries satisfies the requirements of 49 CFR 173.185, which minimizes potential of dangerous evolution of heat and short-circuiting.

If a heat or smoke detector is triggered within the proposed battery storage system, a gas pressured deluge fire suppression system would be activated and would simultaneously discharge water from all sprinkler heads. The certificate holder explains further that water is considered to be the most effective fire suppressant for lithium ion batteries due to its ability to both extinguish the fire and remove excess heat.[65] The proposed on-site fire protection measures are consistent with battery manufacturer recommendations and are consistent with fire codes.

The certificate holder contacted the Ione Rural Fire Department and the Echo Rural Fire Department to identify concerns regarding potential impacts of the proposed battery storage systems on their ability to provide fire protection services. In a comment provided in RFA2, Ione Rural Fire Department confirmed that they would be able to provide service to the facility including the proposed battery storage systems, and that the presence of the proposed battery storage systems would not impact their ability to provide fire protection services. The certificate holder also provides correspondence with the Echo Rural Fire Department, where the Fire Department requests a 100 foot vegetation free zone be maintained around the proposed battery storage system sites in the event of a wildland fire.[66] In the draft proposed order, the Department recommended Council adopt the following site certificate condition b~~B~~ased on the certificate holder's representation that a 100 foot vegetation free zone would be maintained, and to minimize potential fire-risk related impacts~~, the Department recommends the Council adopt the following site certificate condition~~:

> **Recommended Public Services Condition 23 (GEN-PS-04):** The certificate holder shall maintain a 100-foot setback from the battery storage system sites to vegetation. [Final Order on AMD2, Public Services Condition 23]

Additionally, the Council previously imposed three conditions that would continue to apply to the facility, with proposed change, that would further reduce potential impacts from the proposed battery storage systems to fire protection service providers:

[65] WRWAMD2. Request for Amendment 2. 2018-09-17.
[66] *Id.*

- **Public Services Condition 13 (PRE-PS-05)** requiring that, prior to construction, the certificate submit to the Department for review and approval, in consultation with the appropriate local fire protection districts (including the City of Heppner Volunteer Fire Department, Ione Rural Fire Protection District, and Echo Rural Fire Protection District), an Emergency Management Plan
- **Public Services Condition 18 (GEN-PS-03)** requiring that, prior to construction and operation, the certificate holder provide worker fire prevention and response training for personnel
- **Public Services Condition 19 (PRO-PS-02)** requiring that, prior to operation, the certificate holder provide a final site plan to local fire protection districts and first-responders identifying the number assigned to each turbine and the actual location of all facility structures

As described in Section III.E *Land Use* of this order, the Department recommends that Land Use Condition 3 (PRE-LU-01) be amended to require the certificate holder to submit a third-party technical report for the building code review and fire system evaluation, to identify potential hazards and mitigation measures for the proposed battery storage systems.[67] Recommended Amended Land Use Condition 3 (PRE-LU-01) would ensure that the certificate holder design and install appropriate fire suppression measures to address fire and safety risks posed by battery storage system operation.

Based on compliance with existing and recommended amended conditions, and representations obtained from local fire districts, the Department recommends Council find that construction and operation of the facility, would not likely result in a significant adverse impact on the ability of public and private fire protection providers to provide services.

Housing, Schools, and Healthcare

Construction and operation of the proposed battery storage systems would not contribute substantial numbers of additional workers, compared to what was considered and approved by Council in the *Final Order on ~~the~~ ASC*. As described in the *Final Order on ASC,* Council found that there was sufficient supply of hotel rooms and other housing options in the communities within commuting distance to the facility site for the temporary influx of construction workers. Additionally, the Council found that the estimated current and anticipated housing vacancies within surrounding communities would provide adequate housing for the permanent operational workforce would not have a substantial adverse impact on housing in the analysis area. No significant adverse impacts to schools or the healthcare system are anticipated during construction of the facility, with proposed changes, as the battery storage system would not requires substantial additional workers during either construction or operation.

[67] During its review of pRFA2, ODOE conferred with the Oregon State Fire Marshal's office, Jason Cain, on recommended amended Land Use Condition 3 (PRE-LU-01). 2018-07-13. No written comments received.

Based on the Council's previous reasoning and because the facility, with proposed changes, would not increase the expected number of temporary or permanent workers, the Department recommends the Council find that the facility, with proposed changes, would not likely result in a significant adverse impact on the ability of public and private providers of housing, schools, and health care to deliver services.

Conclusions of Law

Based on the foregoing analysis, and subject to the existing, and recommended ~~new and~~amended conditions, the Department recommends that the Council find that the facility, with proposed changes, would continue to comply with the Council's Public Services standard.

III.N. Waste Minimization: OAR 345-022-0120

> *(1) Except for facilities described in sections (2) and (3), to issue a site certificate, the Council must find that, to the extent reasonably practicable:*
>
> > *(a) The applicant's solid waste and wastewater plans are likely to minimize generation of solid waste and wastewater in the construction and operation of the facility, and when solid waste or wastewater is generated, to result in recycling and reuse of such wastes;*
> >
> > *(b) The applicant's plans to manage the accumulation, storage, disposal and transportation of waste generated by the construction and operation of the facility are likely to result in minimal adverse impact on surrounding and adjacent areas.*
>
> *(2) The Council may issue a site certificate for a facility that would produce power from wind, solar or geothermal energy without making the findings described in section (1). However, the Council may apply the requirements of section (1) to impose conditions on a site certificate issued for such a facility.*
> *****

Findings of Fact

The Waste Minimization standard requires the Council to find that the certificate holder will minimize the generation of solid waste and wastewater, and that the waste generated would be managed to minimally impact surrounding and adjacent areas. Pursuant to OAR 345-022-0020(2), the Council may issue a site certificate for a wind facility without making findings regarding the Waste Minimization standard; however, the Council may impose site certificate conditions based upon the requirements of the standard.

Solid Waste and Wastewater

Construction

Construction of the proposed battery storage systems would generate solid waste, but would not be expected to generate wastewater other than concrete wash water. While the certificate holder does not specify potential quantities of solid waste, the potential types of solid waste are described as concrete waste from container and inverter pads, erosion control materials, and packaging materials, similar to the types of solid waste to be generated by the facility, as approved. Based on the quantity of materials needed during construction of the proposed battery storage systems (i.e. 500 cubic yards of concrete; 5,200 tons of gravel and size of the sites (5 acres, each)), the Department considers that the quantities of solid waste would be relatively low.

Council previously imposed Waste Minimization Condition 2 (PRE-WM-01) and Public Service Condition 3 (CON-PS-01) requiring that the certificate holder, prior to construction, develop a waste management plan, to be implemented during construction. The conditions require that the plan include measures for recycling and segregating waste, and discharging concrete wash water onsite, when possible. Based on the low level of construction-related waste and waste water anticipated during proposed battery storage system construction, and compliance with previously imposed conditions, the Department recommends Council find that the facility, with proposed changes, would continue to minimize and manage solid waste and waste water, resulting in minimal adverse impacts on surrounding and adjacent areas from construction of the facility, with proposed changes.

Operations

Operation of the proposed battery storage system may generate incidental waste during repair or replacement of electrical equipment, and periodic replacement of the batteries, expected every 10 to 15 years.[68] Lithium-ion electrolyte gel or liquids within the self-contained battery cells are potentially hazardous, but would not be extracted or handled onsite. The certificate holder describes that battery components (modules) would be removed and disposed of or recycled by a qualified vendor as needed to keep the facility operational. Battery modules, when removed from the site, would be transported intact to their final destination either for recycling or disposal to a licensed recycling or disposal facility. Routine storage of spent batteries is not anticipated.

Council previously imposed Public Services Condition 3 (CON-PS-01), Waste Minimization Condition 2 (PRE-WM-01) and Public Service Condition 4 (OPR-PS-03) requiring that, during construction and operation, the certificate holder develop and implement waste management plans, which include minimization measures such as recycling and segregating waste, and using a licensed waste hauler for disposal of hazardous and universal wastes. In addition, as described

[68] WRWAMD2Doc11 Complete Request for Amendment 2, Section 6.1.12. 2018-09-17.

in Section III.B *Organizational Expertise* of this order, the Department recommends Council impose Recommended Organizational Expertise Condition 10 (GEN-OE-04) to ensure the certificate holder utilizes a licensed hauler for battery transport.

Based on the foregoing analysis, the likelihood of potential adverse impacts on surrounding and adjacent areas from solid waste generated during operation of the facility, with proposed changes, is low based on the limited quantity of waste that could be generated. Moreover, compliance with previously imposed and recommended amended conditions would minimize potential construction and operational solid waste and would require that the certificate holder demonstrate use of licensed haulers for lithium-ion battery transport and disposal. For these reasons, the Department recommends that the Council find that the facility, with proposed changes, would continue to satisfy the requirements of the Waste Minimization standard.

Conclusions of Law

Based on the foregoing analysis, and subject to existing condition, the Department recommends that the Council find that that facility, with proposed changes, would continue to comply with the Council's Waste Minimization standard.

III.O. Division 23 Standards

The Division 23 standards apply only to "nongenerating facilities" as defined in ORS 469.503(2)(e)(K), except nongenerating facilities that are related or supporting facilities. The facility, with proposed changes, would not be a nongenerating facility as defined in statute and therefore Division 23 is not applicable to the facility, with proposed changes.

III.P. Division 24 Standards

The Council's Division 24 standards include specific standards for the siting of energy facilities, including wind projects, underground gas storage reservoirs, transmission lines, and facilities that emit carbon dioxide.

III.P.1. Public Health and Safety Standards for Wind Energy Facilities: OAR 345-024-0010

To issue a site certificate for a proposed wind energy facility, the Council must find that the applicant:

(1) Can design, construct and operate the facility to exclude members of the public from close proximity to the turbine blades and electrical equipment.
(2) Can design, construct and operate the facility to preclude structural failure of the tower or blades that could endanger the public safety and to have adequate safety devices and testing procedures designed to warn of impending failure and to minimize the consequences of such failure.

Findings of Fact

OAR 345-024-0010 requires the Council to consider specific public health and safety standards related to wind energy facilities. For a proposed facility, or facility with proposed changes, the Council must evaluate a certificate holder's proposed measures to exclude members of the public from proximity to the turbine blades and electrical equipment, and the certificate holder's ability to design, construct and operate the proposed facility, or facility with proposed changes, to prevent structural failure of the tower or blades and to provide sufficient safety devices to warn of failure.

Based on the components of the amendment request, the Department considers that (2) is not applicable and evaluates (1) related to the electrical equipment associated with the proposed battery storage systems.

Potential Public Health and Safety Impacts from Proximity to Turbine Blades and Electrical Equipment

The proposed battery storage systems would include electrical equipment. The certificate holder describes that the proposed battery storage system sites would be fenced and would include locked gates, similar to the previously approved substation and O&M building sites. In the draft proposed order, the Department recommended Council amend Public Health and Safety Standards for Wind Facilities Condition 2 (OPR-WR-01) to also apply the requirement of fencing and locked gates to the proposed battery storage system sites b~~B~~ased on the certificate holder's representation, and to ensure unauthorized access by members of the public and proximity to electrical equipment is minimized~~, the Department recommends Council amend Public Health and Safety Standards for Wind Facilities Condition 2 (OPR-WR-01) to also apply the requirement of fencing and locked gates to the proposed battery storage system sites~~, as follows:[69]

> **Recommended Amended Public Health and Safety Standards for Wind Facilities Condition 2 (OPR-WF-01):** During operation, the certificate holder shall ensure each facility substation and battery storage system site is enclosed with appropriate fencing and locked gates to protect the public from electrical hazards.
> [Final Order on ASC, Public Health and Safety Standards for Wind Facilities Condition; Amended in Final Order on AMD2]

Subject to compliance with the recommended amended condition, the Department recommends the Council find that the certificate holder can design, construct and operate the facility, with proposed changes, to exclude members of the public from the close proximity to the electrical equipment.

[69] WRWAMD2. Request for Amendment 2. Section 6.1.11. 2018-09-17.

Conclusions of Law

Based on the foregoing findings of fact and conclusions, and subject to compliance with the recommended amended condition, the Department recommends that the Council find that the facility, with proposed changes, would continue to satisfy the requirements of the Public Health and Safety Standards for Wind Facilities.

III.P.2. Cumulative Effects Standard for Wind Energy Facilities [OAR 345-024-0015]

> *To issue a site certificate for a proposed wind energy facility, the Council must find that the applicant can design and construct the facility to reduce cumulative adverse environmental effects in the vicinity by practicable measures including, but not limited to, the following:*
>
> *(1) Using existing roads to provide access to the facility site, or if new roads are needed, minimizing the amount of land used for new roads and locating them to reduce adverse environmental impacts.*
> *(2) Using underground transmission lines and combining transmission routes.*
> *(3) Connecting the facility to existing substations, or if new substations are needed, minimizing the number of new substations.*
> *(4) Designing the facility to reduce the risk of injury to raptors or other vulnerable wildlife in areas near turbines or electrical equipment.*
> *(5) Designing the components of the facility to minimize adverse visual features.*
> *(6) Using the minimum lighting necessary for safety and security purposes and using techniques to prevent casting glare from the site, except as otherwise required by the Federal Aviation Administration or the Oregon Department of Aviation.*

Findings of Fact

This standard requires the use of practicable measures to reduce the cumulative adverse environmental effects by practicable measures.

Access Roads

OAR 345-024-0015(1) encourages the use of existing roads for facility site access, minimizing the amount of land used for new roads, and locating new roads in such a manner that reduces adverse environmental impacts. The proposed battery storage systems would not result in new permanent or temporary access roads. Previously-approved access roads that would be constructed to serve the overall facility, including the proposed battery storage systems, would be sited along farm field edges to limit overall impacts to soils, habitat and agricultural practices.

Soil Protection Conditions 1 (CON-SP-01) and 2 (CON-SP-02) require that, during construction, the certificate holder implement erosion and sediment control measures outlined in the NPDES 1200-C permit and ESCP to reduce adverse environmental impacts from facility roads. Because

the proposed battery storage systems would not result in new permanent or temporary access roads, the Department recommends the Council continue to find that the certificate holder demonstrates that it would use existing roads where practicable to provide access to the site of the facility, with proposed changes, and where previously approved new roads would be utilized, they would be located to reduce adverse environmental impacts and constructed in a manner that minimizes the amount of land used.

Transmission Lines and Substations

As described in RFA2, interconnection facilities for the proposed battery storage systems would include a control house, protective devices, and power transformers, all of which would be located within previously approved micrositing area. The proposed battery storage systems would not require any new transmission lines or substations. Therefore, the Department recommends Council continue to find, based on the fact that no new transmission lines or substations are proposed in the amendment request, that the design of the facility, with proposed changes, would minimize cumulative adverse environmental effects.

Wildlife Protection

The proposed battery storage systems would be located adjacent to previously approved facility substation and O&M building sites, within Category 6 (developed – dryland wheat) habitat. Additionally, the certificate holder explains that the proposed battery storage systems would be located toward the center of the site boundary and enclosed in storage containers, so the electrical equipment would not be likely to pose a risk on raptors and sensitive wildlife.

The Department recommends the Council find that the certificate holder has demonstrated that it can reduce cumulative adverse environmental effects in the vicinity by designing the facility, with proposed changes, to reduce the risk of injury to raptors or other vulnerable wildlife in areas near turbines or electrical equipment

Visual Features

RFA2 describes the proposed battery storage building enclosure footprint as approximately 80 feet in length by 100 feet in width (20 MW) and 190 feet in length and 100 in width (30 MW) and approximately 20 feet in height, located in the center of the site boundary. The cumulative visual impacts from the proposed battery storage system sites would be minimal. Recommended Amended Scenic Resources Conditions 2 (GEN-SR-02) addresses finishing facility components, including the battery storage containers, in neutral colors consistent with the surrounding landscape as well as limiting vegetative clearing and facility signage, and would further reduce visual impacts of the proposed battery storage systems.

The Department recommends the Council find that the certificate holder has demonstrated that it can reduce cumulative adverse environmental effects in the vicinity by designing the components of the facility, with proposed changes, to minimize adverse visual features

Lighting

Other than lighting on structures subject to the requirements of the Federal Aviation Administration or the Oregon Department of Aviation site certificate, the recommended amended Scenic Resources Condition 1 (GEN-SR-01) would reduce the visual impacts associated with lighting facility structures, which would include the proposed battery storage systems.

Conclusions of Law

Based on the foregoing findings of fact and conclusions, and subject to compliance with the site certificate conditions, the Department recommends Council find that the facility, with proposed changes, would continue to comply with the Council's Cumulative Effects Standards for Wind Energy Facilities.

III.P.3. Siting Standards for Transmission Lines: OAR 345-024-0090

To issue a site certificate for a facility that includes any transmission line under Council jurisdiction, the Council must find that the applicant:

(1) Can design, construct and operate the proposed transmission line so that alternating current electric fields do not exceed 9 kV per meter at one meter above the ground surface in areas accessible to the public;
(2) Can design, construct and operate the proposed transmission line so that induced currents resulting from the transmission line and related or supporting facilities will be as low as reasonably achievable

Findings of Fact

This standard addresses safety hazards associated with electric fields around transmission lines. Section (1) of OAR 345-024-0090 sets a limit for electric fields from transmission lines of not more than 9 kV per meter at one meter above the ground surface in areas that are accessible to the public. Section (2) requires implementation of measures to reduce the risk of induced current.

RFA2 does not propose changes to the previously approved 230 kV intraconnection transmission line or its location, and therefore does not apply to the proposed changes included in the amendment request. However, for the record, the Department recommends Council find that RFA2 would not result in a significant adverse impact under OAR 345-024-0090(1) and (2) that was not addressed in a previous Council order and incorporates reasoning and analysis presented in its previous final orders for the facility.

The Council addressed the Siting Standards for Transmission Lines in section IV.Q of the *Final Order on the ASC* and found the facility to be in compliance with the standard. In the *Final Order on the ASC,* the Council found that the certificate holder could construct and operate the transmission lines so that alternating current electric fields do not exceed 9 kV per meter at one

meter above the ground surface in areas accessible to the public. The Council further found that the certificate holder could design, construct and operate the transmission lines so that induced currents resulting from the transmission lines would be as low as reasonably achievable.

Subsection (2) of the standard requires the Council to find that a certificate holder can design, construct, and operate transmission lines so that induced currents will be as low as reasonably achievable. The Council previously found that the facility would comply with this standard, as the certificate holder would provide appropriate grounding of fences and metal-roofed buildings in order to reduce the risk of induced current. The Council previously imposed Siting Standard Condition 1 (CON-TL-01) requiring that the certificate holder design, construct and operate the transmission line in accordance with the 2012 Edition National Electric Safety Code standards to reduce risk of induced current; and implement reasonable measures to reduce and manage potential human exposure to electromagnetic fields.

Conclusion of Law

For the reasons discussed above, and subject to compliance with the existing site certificate conditions, the Department recommends that the Council find that the facility, with proposed changes, would not result in a significant adverse impact under OAR 345-024-0090 that was not addressed in a previous Council order and would continue to comply with the Council's Siting Standards for Transmission Lines.

III.Q. Other Applicable Regulatory Requirements Under Council Jurisdiction

Under ORS 469.503(3) and under the Council's General Standard of Review (OAR 345-022-0000), the Council must determine whether the facility, with proposed changes, complies with "all other Oregon statutes and administrative rules…as applicable to the issuance of a site certificate for the proposed facility." This section addresses the applicable Oregon statutes and administrative rules that are not otherwise addressed in Council standards, including noise control regulations, regulations for removal or fill of material affecting waters of the state, and regulations for appropriating ground water.

III.Q.1. Noise Control Regulations: OAR 340-035-0035

(1) Standards and Regulations:
*****
(b) New Noise Sources:

(B) New Sources Located on Previously Unused Site:

(i) No person owning or controlling a new industrial or commercial noise source located on a previously unused industrial or commercial site shall cause or permit the operation of that noise source if the noise levels generated or indirectly caused by

that noise source increase the ambient statistical noise levels, L10 or L50, by more than 10 dBA in any one hour, or exceed the levels specified in Table 8, as measured at an appropriate measurement point, as specified in subsection (3)(b) of this rule, except as specified in subparagraph (1)(b)(B)(iii).

(ii) The ambient statistical noise level of a new industrial or commercial noise source on a previously unused industrial or commercial site shall include all noises generated or indirectly caused by or attributable to that source including all of its related activities. Sources exempted from the requirements of section (1) of this rule, which are identified in subsections (5)(b) - (f), (j), and (k) of this rule, shall not be excluded from this ambient measurement.

(iii) For noise levels generated or caused by a wind energy facility:

(I) The increase in ambient statistical noise levels is based on an assumed background L50 ambient noise level of 26 dBA or the actual ambient background level. The person owning the wind energy facility may conduct measurements to determine the actual ambient L10 and L50 background level.

(II) The "actual ambient background level" is the measured noise level at the appropriate measurement point as specified in subsection (3)(b) of this rule using generally accepted noise engineering measurement practices. Background noise measurements shall be obtained at the appropriate measurement point, synchronized with windspeed measurements of hub height conditions at the nearest wind turbine location. "Actual ambient background level" does not include noise generated or caused by the wind energy facility. The noise levels from a wind energy facility may increase the ambient statistical noise levels L10 and L50 by more than 10 dBA (but not above the limits specified in Table 8), if the person who owns the noise sensitive property executes a legally effective easement or real covenant that benefits the property on which the wind energy facility is located. The easement or covenant must authorize the wind energy facility to increase the ambient statistical noise levels, L10 or L50 on the sensitive property by more than 10 dBA at the appropriate measurement point.

(III) The noise levels from a wind energy facility may increase the ambient statistical noise levels L10 and L50 by more than 10 dBA (but not above the limits specified in Table 8), if the person who owns the noise sensitive property executes a legally effective easement or real covenant that benefits the property on which the wind energy facility is located. The easement or covenant must authorize the wind energy facility to increase the ambient statistical noise levels, L10 or L50 on the sensitive property by more than 10 dBA at the appropriate measurement point.

(IV) For purposes of determining whether a proposed wind energy facility would satisfy the ambient noise standard where a landowner has not waived the standard, noise levels at the appropriate measurement point are predicted

assuming that all of the proposed wind facility's turbines are operating between cut-in speed and the wind speed corresponding to the maximum sound power level established by IEC 61400-11 (version 2002-12). These predictions must be compared to the highest of either the assumed ambient noise level of 26 dBA or to the actual ambient background L10 and L50 noise level, if measured. The facility complies with the noise ambient background standard if this comparison shows that the increase in noise is not more than 10 dBA over this entire range of wind speeds.

(V) For purposes of determining whether an operating wind energy facility complies with the ambient noise standard where a landowner has not waived the standard, noise levels at the appropriate measurement point are measured when the facility's nearest wind turbine is operating over the entire range of wind speeds between cut-in speed and the windspeed corresponding to the maximum sound power level and no turbine that could contribute to the noise level is disabled. The facility complies with the noise ambient background standard if the increase in noise over either the assumed ambient noise level of 26 dBA or to the actual ambient background L10 and L50 noise level, if measured, is not more than 10 dBA over this entire range of wind speeds.

(VI) For purposes of determining whether a proposed wind energy facility would satisfy the Table 8 standards, noise levels at the appropriate measurement point are predicted by using the turbine's maximum sound power level following procedures established by IEC 61400-11 (version 2002-12), and assuming that all of the proposed wind facility's turbines are operating at the maximum sound power level.

(VII) For purposes of determining whether an operating wind energy facility satisfies the Table 8 standards, noise generated by the energy facility is measured at the appropriate measurement point when the facility's nearest wind turbine is operating at the windspeed corresponding to the maximum sound power level and no turbine that could contribute to the noise level is disabled.[70]

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Findings of Fact

The Department of Environmental Quality (DEQ) noise control regulations at OAR 340-035-0035

[70] WRWAMD2Doc18 DPO Public Comment Gilbert 2018-10-25. On the record of the draft proposed order, Ms. Gilbert provided written comments. In comment 4, Ms. Gilbert describes that DEQ noise rules include procedures for determining noise impacts. In the proposed order, in response to these comments, the Department includes reference to the regulatory language of OAR 345-035-0035(iii) which applies to wind energy generation facilities, and outlines the applicable procedures (IEC 61400-11 version 2002-12) that apply to the evaluation of wind turbine noise. The Department confirms that based on review of the wind turbine manufacturer specifications provided in support of the noise analysis for RFA2 and RFA3, IEC 61400-11 version 2002-12 was utilized for the manufacturer's noise specification.

have been adopted by Council as the compliance requirements for EFSC-jurisdiction energy facilities.

The analysis area for the Noise Control Regulation is the area within and extending 1-mile from the site boundary.
The proposed battery storage systems would generate operational noise from the following sources:

- Up to 56 heating, ventilation and air conditioning (HVAC) modules
- Up to 28 power inverters
- Up to 28 distribution transformers

The HVAC modules, power inverters, and distribution transformers would generate maximum noise levels of 103, 93~~2~~, and 72 dBA, respectively.[71] Based upon maximum noise levels of equipment associated with the proposed battery storage systems, the certificate holder conducted an updated acoustic modeling assessment using the Computer Aided Noise Abatement (CadnaA), version 2018 MR1 software program to make predictions of peak noise levels at noise-sensitive properties within the analysis area (RFA2 Attachment 3). The noise modeling assessment included wind turbines, as proposed in RF3, substation transformers, and noise sources associated with the proposed battery storage systems.[72]

The noise modeling results show that the facility, with proposed changes, would not exceed the maximum allowable decibel threshold of 50 dBA at any noise sensitive receptor included in the analysis, as presented in Attachment H (Noise Contour Map) of this order.[73] The results also show that there are 19 noise sensitive receptors that would exceed the 10 dBA threshold above ambient or assumed ambient noise (assumed ambient baseline is 26 dBA, per OAR 340-035-

[71] WRWAMD2Doc11. Complete Request for Amendment 2, Attachment 3. 2018-09-17.
[72] The wind turbine model, as proposed in RFA3, were utilized in the assessment and included noise reducing technology, "Low Noise Trailing Edge" blades, based on a facility layout of 165 turbines; this is fewer turbines than considered in the ASC. Finally, the noise modeling assessment also uses different noise levels for the previously approved substation transformers, based on changes in potential technology and associated sound emission levels.
[73] WRWAMD2Doc18 DPO Public Comment Gilbert 2018-10-25. On the record of the draft proposed order, Ms. Gilbert provided written comments. In comment 4 of these written comments, Ms. Gilbert argues that 1) noise modeling information was not provided for public review; 2) lower noise thresholds are recommended by the World Health Organization; and, 3) requests Council impose a condition requiring that the certificate holder conduct testing and develop mitigation for properties where the threshold is not exceeded but residents are negatively impacted. Related to sub 1) of this comment, the Department acknowledges RFA2 Attachment 4 "Noise Analysis Results and Information" was provided under separate cover and marked as "confidential." The components in Attachment 4 included wind turbine specifications and a noise contour map. The Department agrees that the noise contour map should not be treated as confidential, and provides as Attachment G of this order for public review. However, RFA2 Attachment 3 Facility Noise Analysis Memo presented the methodology including number of sources, individual noise levels of sources, and modeling tool utilized in the battery system noise analysis. The Department recommends Council not make changes to findings or conditions in response to sub 2) and 3) of this comment.

0035(1)(b)(B)(iii)(I)); however, as described in RFA2, these 19 noise sensitive receptors are all "participating property owners," meaning those landowners that have signed a lease with Wheatridge and have indicated that they are willing to sign a noise waiver, if necessary.[74] In accordance with existing site certificate condition Noise Control Condition 2 (PRE-NC-01(d)), those noise waivers must be secured and provided to the Department as a pre-construction requirement to demonstrate compliance with the noise regulation.

Based on this assessment, the Department recommends Council finds that operational noise levels from the proposed battery storage systems would not alter the certificate holders' ability to comply with OAR 340-035-0035 and preexisting conditions relating to noise control regulations. The Department recommends that the Council find that the operation of the facility, with proposed changes, subject to the existing site certificate conditions, would continue to comply with the Noise Control Regulations in OAR 340-0035(1)(b)(B).

Conclusions of Law

Based on the foregoing findings, the Department recommends that the Council find that the facility, with proposed changes, would continue to comply with the Noise Control Regulations in OAR 340-035-0035(1)(b)(B).

III.Q.2. Removal-Fill

The Oregon Removal-Fill Law (ORS 196.795 through 196.990) and Department of State Lands (DSL) regulations (OAR 141-085-0500 through 141-085-0785) require a removal-fill permit if 50 cubic yards or more of material is removed, filled, or altered within any "waters of the state."[75] The Council, in consultation with DSL, must determine whether a removal-fill permit is needed and if so, whether a removal-fill permit should be issued.

The analysis area for potential impacts to wetlands and other waters of the state, as defined in the project order, is the area within the site boundary.

Findings of Fact

The proposed battery storage systems would be built adjacent to the previously-approved facility substations, on EFU-zoned land utilized for dryland wheat cultivation. In RFA2, the certificate holder describes that the proposed battery storage systems would not result in temporary or permanent impacts to waters of the state, and confirms that a removal-fill permit would not be needed.

During the review of the ASC, DSL reviewed the wetland delineation report and provided a concurrence letter, in which DSL agreed with the wetland delineation and classifications. RFA2

[74] WRWAMD2Doc11 Complete Request for Amendment 2, Attachment 3. 2018-09-17.

[75] ORS 196.800(15) defines "Waters of this state." The term includes wetlands and certain other waterbodies.

does not request any change to the facility site boundary. Therefore, the Department recommends the Council find that the facility, with proposed changes, would continue to satisfy the requirements of the removal-fill law and that the certificate holder is not required to obtain a removal-fill permit.

Conclusions of Law

Based on the foregoing findings of fact and conclusions, the Department recommends that the Council find that a removal-fill permit is not needed for the facility, with proposed changes.

III.Q.3. Water Rights

Under ORS Chapters 537 and 540 and OAR Chapter 690, the Oregon Water Resources Department (OWRD) administers water rights for appropriation and use of the water resources of the state. Under OAR 345-022-0000(1)(b), the Council must determine whether the facility would comply with these statutes and administrative rules. OAR 345-021-0010(1)(o)(F) requires that if a facility needs a groundwater permit, surface water permit, or water right transfer, that a decision on authorizing such a permit rests with the Council.

Findings of Fact

OAR 690 establishes the procedures and standards which shall be applied by the OWRD in the evaluation of applications for a permit to appropriate surface water, ground water, to construct a reservoir and store water, to use reserved water, or to use water stored in a reservoir.

In RFA2, the certificate holder is not requesting a groundwater permit, a surface water permit, or a water rights transfer during the construction and operation of the battery storage system components. The certificate holder confirms that construction-related water, as described in ASC Exhibit O, would be obtained from municipal sources near the facility, including Hermiston Public Works, Stanfield Public Works, Boardman Public Works, or Port of Morrow. In RFA2, the certificate holder states that the Port of Morrow alone has stated that it can provide up to 6.5 million gallons of water per month, more than the certificate holder anticipates needing during a “worst case” facility demand for water. Based on the source of construction water, as described by the certificate holder, the facility, with proposed changes, would not need a groundwater permit, surface water permit, or water right transfer.

Water used during proposed battery storage system operations would result from filling and use of fire water tanks associated with the gas pressured deluge fire suppression systems. The fire suppression system fire water tanks would obtain water from previously evaluated permit-exempt wells to be located at the O&M buildings. Council previously imposed Public Services Condition 2 (OPR-PS-02) requiring that, pursuant to ORS 537.765, the certificate holder demonstrate that water withdrawal would not exceed 5,000-gallons per day. Water used for emergency fire-fighting is exempt from the 5,000-gallon limit pursuant to ORS 537.141(a). Therefore, use of water during emergency operation of the fire suppression system would not

be limited to 5,000-gallons per day. Therefore, the Department recommends Council find that the facility, with proposed changes, would continue to satisfy the requirements of the Ground Water Act of 1955 or Water Resources Department rules.

Conclusions of Law

Based on the foregoing findings of fact, the Department recommends that the Council conclude that the facility, with proposed changes, does not need a groundwater permit, surface water permit, or water right transfer.

IV. PROPOSED CONCLUSIONS AND ORDER

Based on the recommended findings and conclusions included in this order, the Department recommends that Council make the following findings:

1. The proposed facility modifications included in Request for Amendment 2 of the Wheatridge Wind Energy Facility site certificate complies with the requirements of the Oregon Energy Facility Siting Statutes, ORS 469.300 to 469.520.

2. The proposed facility modifications included in Request for Amendment 2 of the Wheatridge Wind Energy Facility site certificate complies with the standards adopted by the Council pursuant to ORS 469.501.

3. The proposed facility modifications included in Request for Amendment 2 of the Wheatridge Wind Energy Facility site certificate complies with all other Oregon statutes and administrative rules identified in the project order as applicable to the issuance of an amended site certificate for the facility.

Accordingly, the Department recommends that the Council find that the proposed facility modifications included in Request for Amendment 2 of the Wheatridge Wind Energy Facility site certificate complies with the General Standard of Review (OAR 345-022-0000). The Department recommends that the Council find, based on a preponderance of the evidence on the record, that the site certificate may be amended as requested.

Proposed Order

The Department recommends that the Council approve Amendment 2 of the Wheatridge Wind Energy Facility site certificate.~~,~~

Issued this ~~21th~~ 1st day of ~~September~~November, 2018

The OREGON DEPARTMENT OF ENERGY

By: _____

Todd R. Cornett, Assistant Director
Oregon Department of Energy, Energy Facility Siting Division

Attachments:
Attachment A: Draft Amended Site Certificate (Red-line version)
Attachment B: Reviewing Agency Comments on preliminary Request for Amendment 2
Attachment C: ~~[Reserved for~~ Draft Proposed Order Comments/Index~~]~~
Attachment D: Draft Habitat Mitigation Plan
Attachment E: Draft Revegetation Plan
Attachment F: Wildlife Monitoring and ~~Management~~ Mitigation Plan
Attachment G: Draft Erosion and Sediment Control Plan
Attachment H: Certificate Holder's Noise Contour Map

Notice of the Right to Appeal

[Text to be added to Final Order]

Attachment A: Draft Amended Site Certificate (Red-line version)

NOTE: Changes to conditions that occurred between the draft proposed order and proposed order are presented in both hi-lite and underline/strikeout.

ENERGY FACILITY SITING COUNCIL

OF THE

STATE OF OREGON

~~First~~ Second Amended
Site Certificate for the

Wheatridge Wind Energy Facility

ISSUE DATE

~~July 2017~~

TBD

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Attachments

Attachment A	Facility Site Boundary Map

Acronyms and Abbreviations

ASC	Application for Site Certificate
Council	Oregon Energy Facility Siting Council
Department	Oregon Department of Energy
DOGAMI	Oregon Department of Geology and Mineral Industries
ESCP	Erosion and Sediment Control Plan
NPDES	National Pollutant Discharge Elimination System
O&M	Operations and Maintenance
OAR	Oregon Administrative Rule
ODFW	Oregon Department of Fish and Wildlife
ORS	Oregon Revised Statute
NRHP	National Register of Historic Places
WGS	Washington Ground Squirrel

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1.0 Introduction and Site Certification

This site certificate is a binding agreement between the State of Oregon (State), acting through the Energy Facility Siting Council (Council), and Wheatridge Wind Energy, LLC (certificate holder), which is a wholly-owned subsidiary of NextEra Energy Resources, LLC (NextEra or parent company). As authorized under Oregon Revised Statue (ORS) Chapter 469, the Council issues this site certificate authorizing certificate holder to construct, operate and retire the Wheatridge Wind Energy Facility (facility) at the below described site within Morrow and Umatilla counties, subject to the conditions set forth herein.

Both the State and certificate holder must abide by local ordinances, state law and the rules of the Council in effect on the date this site certificate is executed. However, upon a clear showing of a significant threat to public health, safety, or the environment that requires application of later-adopted laws or rules, the Council may require compliance with such later-adopted laws or rules (ORS 469.401(2)).

The findings of fact, reasoning and conclusions of law underlying the terms and conditions of this site certificate are set forth in the following documents incorporated herein by this reference: (a) the Final Order on the Application for Site Certificate for the Wheatridge Wind Energy Facility issued on April 28, 2017 (hereafter, Final Order on the Application); ~~and~~ (b) ~~the~~ Final Order on Request for Transfer issued on July 27, 2017; and Final Order on Request for Amendment 2 issued on TBD. In interpreting this site certificate, any ambiguity will be clarified by reference to the following, in order of priority: (1) Final Order on Request for Amendment 2; (2~~1~~) ~~this First Amended Site Certificate~~Final Order on Request for Amendment 1;~~,~~ (3~~2~~) the Final Order on the Application, and (4~~3~~) the record of the proceedings that led ~~to the Final Order on the Application~~to the above referenced orders. This site certificate binds the State and all counties, cities and political subdivisions in Oregon as to the approval of the site and the construction, operation, and retirement of the facility as to matters that are addressed in and governed by this site certificate (ORS 469.401(3)). This site certificate does not address, and is not binding with respect to, matters that are not included in and governed by this site certificate, and such matters include, but are not limited to: employee health and safety; building code compliance; wage and hour or other labor regulations; local government fees and charges; other design or operational issues that do not relate to siting the facility (ORS 469.401(4)); and permits issued under statutes and rules for which the decision on compliance has been delegated by the federal government to a state agency other than the Council (ORS 469.503(3)).

The definitions in ORS 469.300 and OAR 345-001-0010 apply to the terms used in this site certificate, except where otherwise stated, or where the context clearly indicates otherwise.

Each affected state agency, county, city, and political subdivision in Oregon with authority to issue a permit, license, or other approval addressed in or governed by this site certificate, shall upon submission of the proper application and payment of the proper fees, but without hearings or other proceedings, issue such permit, license or other approval subject only to conditions set forth in this site certificate. In addition, each state agency or local government agency that issues a permit, license or other approval for this facility shall continue to exercise enforcement authority over such permit, license or other approval (ORS 469.401(3)). For those permits, licenses, or other approvals addressed in and governed by this site certificate, the certificate

holder shall comply with applicable state and federal laws adopted in the future to the extent that such compliance is required under the respective state agency statutes and rules (ORS 469.401(2)).

The certificate holder must construct, operate and retire the facility in accordance with all applicable rules as provided for in Oregon Administrative Rule (OAR) Chapter 345, Division 26. After issuance of this site certificate, the Council shall have continuing authority over the site and may inspect, or direct the Oregon Department of Energy (Department) to inspect, or request another state agency or local government to inspect, the site at any time in order to ensure that the facility is being operated consistently with the terms and conditions of this site certificate (ORS 469.430).

The obligation of the certificate holder to report information to the Department or the Council under the conditions listed in this site certificate is subject to the provisions of ORS 192.502 *et seq.* and ORS 469.560. To the extent permitted by law, the Department and the Council will not publicly disclose information that may be exempt from public disclosure if the certificate holder has clearly labeled such information and stated the basis for the exemption at the time of submitting the information to the Department or the Council. If the Council or the Department receives a request for the disclosure of the information, the Council or the Department, as appropriate, will make a reasonable attempt to notify the certificate holder and will refer the matter to the Attorney General for a determination of whether the exemption is applicable, pursuant to ORS 192.450.

The Council recognizes that many specific tasks related to the design, construction, operation and retirement of the facility will be undertaken by the certificate holder's agents or contractors. Nevertheless, the certificate holder is responsible for ensuring compliance with all provisions of the site certificate.

The duration of this site certificate shall be the life of the facility, subject to termination pursuant to OAR 345-027-0010 or the rules in effect on the date that termination is sought, or revocation under ORS 469.440 and OAR 345-029-0100 or the statutes and rules in effect on the date that revocation is ordered. The Council shall not change the conditions of this site certificate except as provided for in OAR Chapter 345, Division 27.

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2.0 Facility Location

The energy facility and its related and supporting facilities are located within Morrow and Umatilla counties. The site boundary, as defined in OAR 345-001-0010, encompasses approximately 13,097 acres of private land and includes the perimeter of the energy facility site, its related and supporting facilities, all temporary laydown and staging areas and all transmission corridors and micrositing corridors proposed by the certificate holder, as approved by the Council.

The energy facility is divided into two groups, Wheatridge West and Wheatridge East. Wheatridge West is located entirely within Morrow County, bisected by Oregon Highway 207, approximately 5 miles northeast of Lexington and approximately 7 miles northwest of Heppner. Wheatridge East is located approximately 16 miles northeast of Heppner and includes land in both Morrow and Umatilla counties. Wheatridge West and Wheatridge East are connected via a 230 kV transmission line or "intraconnection" transmission line (see facility site boundary map provided in Attachment A).

2.1 Site Boundary

The site boundary encompasses a total of 13,097 acres of privately owned land: 2,956 acres in Wheatridge East, 8,515 acres in Wheatridge West, and 1,626 acres in the intraconnection transmission line corridor. Table 1 identifies the Public Land Survey System sections in which the site boundary is located.

Table 1. Location of Site Boundary by Township, Range and Section

Township	Range	Section(s)
Wheatridge East		
1N	28E	4, 5, 8, 9, 16, 17, 21
2N	28E	2, 3, 9, 10, 11, 14, 15, 16, 21, 22, 27, 28, 29, 32, 33
Wheatridge West		
2N	25E	25, 26, 27, 34, 35, 36
1N	25E	1, 2, 11, 12, 13, 14, 15, 22, 23, 24
1N	26E	4, 6, 7, 8, 9, 15, 16, 17, 18, 19, 20, 21, 22, 28, 29, 30, 32, 33
1S	25E	1, 12
1S	26E	2, 3, 4, 5, 6, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 25, 26, 27, 28, 29, 34, 35, 36
2S	26E	1, 12
Intraconnection Corridor		
1S	27E	7, 12, 13, 14, 15, 16, 17, 18, 21, 22, 23, 24
1S	28E	3, 4, 7, 8, 9, 16, 17, 18
1N	28E	28, 33

For this facility, the certificate holder requested that the site boundary represent the "micrositing corridor" for the placement of facility components to allow some flexibility in specific component locations and design in response to site-specific conditions and engineering requirements to be determined prior to construction. The Council permits final siting flexibility within a micrositing corridor when the certificate holder demonstrates that requirements of all applicable standards have been satisfied by adequately evaluating the entire corridor and location of facility components

anywhere within the corridor.

2.2 Micrositing Corridor

The certificate holder requested flexibility to locate components of the energy facility and its related and supporting facilities within a micrositing corridor to allow adjustment of the specific location of components, while establishing outer boundaries of potential construction for purposes of evaluating potential impacts. As described above, for this facility, the site boundary represents the micrositing corridor, and is a minimum of approximately 660 feet in width around turbines, and wider in some locations. The site boundary width around site access roads and electrical collection lines (collector lines) is narrower, between 200 feet and 500 feet in width. The micrositing corridor is wider for the area surrounding the substations, meteorological towers (met towers), the operation and maintenance (O&M) buildings, and construction yards.

2.3 Intraconnection Transmission Line Corridor

The certificate holder obtained approval of four routing options for the 230 kV intraconnection transmission line that interconnects Wheatridge West and Wheatridge East for the transmission of generated power. The intraconnection transmission line corridor is approximately 1,000-feet in width and ranges in length from 24.5 to 31.5 miles, based upon the four approved transmission line route options.

The four approved transmission line route options range in length from 24.5 to 31.5 miles and would follow the same alignment for approximately 18 miles from the Wheatridge East substation to the crossing at Sand Hollow Road. For the remainder of the route, Options 1 and 3 traverse the same alignment, with Option 1 extending 7 miles longer than Option 3; Option 2 and 4 traverse the same alignment, with Option 2 extending 3.5 miles longer than Option 4. Option 1 and 2 differ for an approximately 4 mile segment located between Sand Hollow Road and the Wheatridge West substation (primary), with Option 2 traversing from Sand Hollow Road through the alternative (2b) Wheatridge West substation to the primary (1) Wheatridge West substation. The four approved routing options and associated transmission line corridors are presented in Attachment A of the site certificate (and are clearly delineated in figures provided in ASC Exhibit C).

3.0 Facility Description

3.1 Energy Facility

The energy facility includes individual wind turbines, each consisting of a nacelle, a three-bladed rotor, turbine tower and foundation. The nacelle houses the equipment such as the gearbox, generator, brakes, and control systems for the turbine. The total height of the turbine tower and blades (tip-height) ranges between 431 and 476 feet, depending on the turbine model selected. The total generating capacity of the facility will not exceed 500 MW, and the total number of turbines will not exceed 292.

The base of each tower foundation requires a cleared area (typically a gravel pad) up to 80 feet in diameter. The turbines are grouped in linear "strings" within the micrositing corridor and interconnect with a 34.5 kV electrical collection system (described below). Most turbine types include a generator step-up (GSU) transformer installed at the base of the tower that would be used to increase the voltage of the turbine to that of the electrical collection system. Table 2 shows the range of turbine specifications approved for use at the facility site.

Table 2: Turbine Specifications used for Impact Evaluations

Specification	Maximum
Turbine Generating Capacity (Individual)	2.5 MW
Blade Length	197 ft.
Hub Height	278 ft.
Rotor Diameter (Rotor Swept Height)	393 ft.
Total Height (tower height plus blade length)	476 ft.

3.2 Related or Supporting Facilities

The facility includes the following related or supporting facilities described below:~~ and in greater detail in the *Final Order on the Application*, and *Final Order on Request for Transfer*:~~

- Electrical collection system (includes up to 88 miles of mostly underground 34.5 kV collector lines)
- Up to three collector substations
- Up to 32 miles of up to two overhead, parallel 230 kV transmission lines
- Up to 12 permanent meteorological (met) towers
- Communication and Supervisory Control and Data Acquisition (SCADA) System
- Up to two operations and maintenance (O&M) buildings
- Up to 73 miles of new or improved access roads
- Additional temporary construction areas (including staging areas and one or more temporary concrete batch plant areas)
- Battery Storage Systems and Interconnection Facilities

Electrical Collection System

The electrical collection system includes up to 88 miles of mostly underground 34.5 kV collector lines. Electrical connections are located underground or in enclosed junction boxes between the turbine and the pad-mounted GSU transformer. From the GSU transformer to the collector lines the connections are installed along and between the turbine strings to collect power generated by each wind turbine and to route the power to one of three collector substations, which step up the power from 34.5 kV to 230 kV.

The collector lines are underground, to the extent practicable, in trenches approximately three-feet wide and not less than two- to three-feet deep, generally alongside access roads, to minimize ground disturbance. Where land use and soil conditions make a buried depth of three-feet infeasible, collector lines may be buried at a depth of less than three feet, while still adhering to National Electrical Safety Code (NESC) standards.

Collector lines may be run overhead in situations where a buried cable would be infeasible or would create unnecessary impacts, such as at stream or canyon crossings. Overhead collector lines are supported by a wooden or steel pole structure. Each support pole has been buried approximately 6 feet in the ground and extends to a height of approximately 60 feet above ground, spaced 100 to 200 feet apart. Overhead collector lines are only anticipated in Wheatridge West. The facility includes up to 10.8 miles of overhead collector lines; however, the specific locations of overhead collector lines will not be known until site geotechnical work has been completed during pre-construction activities.

No more than 88 miles of collector lines would be needed for the facility.

Collector Substations

The facility includes up to two substations within Wheatridge West and one substation within Wheatridge East. The proposed substation locations are presented in ASC Exhibit C. However, Wheatridge has requested, and Council grants, the ability to microsite the final location and number (up to three) of substations within the micrositing corridor.

Prior to construction, substation sites will be cleared and graded, with a bed of crushed rock applied for a durable surface. Each collector substation is located on a two- to five-acre site, enclosed by a locked eight-foot tall wire mesh fence. Each substation consists of transformers, transmission line termination structures, a bus bar, circuit breakers and fuses, control systems, meters, and other equipment.

230 kV Intraconnection Transmission Line

The facility includes one or two parallel overhead 230 kV intraconnection transmission lines supported by H-frame or monopole structures constructed of either wood or steel that extends 24.5 to 31.5 miles in length, depending on the route option selected. The 230 kV overhead transmission line structures are approximately 60 to 150 feet tall and spaced approximately 400 to 800 feet apart depending on the terrain. Each transmission line route requires acquisition of an approximately 150-

foot wide right-of-way from private landowners.

The four approved transmission line routing options and associated corridors for the intraconnection transmission line are described below (see Attachment A figure and figures contained in ASC Exhibit C):

- Option 1: Two Project Substations to Longhorn
    - This option runs from Substation 3 in Wheatridge East to Substation 1 in Wheatridge West and then to the proposed UEC/CB Strawberry substation, just to the west of Wheatridge West, for interconnection to a UEC or UEC/CB operated Gen-tie Line to the proposed BPA Longhorn substation. The intraconnection line route is 31.5 miles (50.5 kilometers) in length.
- Option 2: Three Project Substations to Longhorn (Final facility design with battery storage system would not include this routing option)
    - This option runs from Substation 3 in Wheatridge East to Substation 2b in Wheatridge West, then on to Substation 2a in Wheatridge West, and then to the proposed UEC/CB Strawberry substation, just west of Wheatridge West, for interconnection to a UEC or UEC/CB operated Gen-tie Line to the proposed BPA Longhorn substation. The intraconnection line route is 31.3 miles (50.3 kilometers) in length.
- Option 3: Two Project Substations to Stanfield
    - This option runs from Substation 1 in Wheatridge West to Substation 3 in Wheatridge East for interconnection to a UEC operated Gen-tie Line to the proposed BPA Stanfield substation. The intraconnection line route is 24.5 miles (39.4 kilometers) in length.
- Option 4: Three Project Substations to Stanfield (Final facility design with battery storage system would not include this routing option)
    - This option runs from Substation 2a in Wheatridge West to Substation 2b in Wheatridge West, and then to Substation 3 in Wheatridge East for interconnection to a UEC operated Gen-tie Line to the proposed BPA Stanfield substation. The intraconnection line route is 27.8 miles (44.7 kilometers) in length.

Meteorological Towers

The facility includes up to 12 permanent met towers. Up to five met towers are sited in Wheatridge East and up to seven met towers are sited in Wheatridge West for the collection of wind speed and direction data. Each met tower has a free-standing, non-guyed design and is approximately 328 feet (100 meters) in height. Installation of permanent met towers results in approximately 98-feet (30-meters) in diameter of temporary land disturbance per tower and approximately 32-feet (10-meter) in diameter of permanent land disturbance per tower. Permanent met towers are fitted with safety lighting and paint as required by the Federal Aviation Administration (FAA).

Communication and SCADA System

The facility includes a communication system, consisting of fiber optic and copper communication lines that connect the turbines, met towers, and substations to the O&M buildings. A SCADA system is installed in the O&M buildings to enable remote operation to collect operating data for each wind turbine, and to archive wind and performance data. SCADA system wires are collocated with the collector lines both in the underground trenches and overhead, if necessary.

O&M Buildings

The facility includes up to two O&M buildings, each located on up to 1.1 acres, one within Wheatridge East and one within Wheatridge West. Each O&M building consists of a single-story, prefabricated structure approximately 6,000 to 9,000 square feet in size, and includes an office, break room, kitchen, lavatory with shower, utility room, covered vehicle parking, storage for maintenance supplies and equipment, and SCADA system. A permanent, fenced, graveled parking and storage area for employees, visitors, and equipment is located adjacent to each O&M building. Each building is served by an on-site well and septic system and power supplied by a local service provider using overhead and/or underground lines.

Access Roads

Primary access to the facility site is from Interstate 84 (I-84) via Bombing Range Road or Oregon Route 207 (OR-207). The certificate holder completed improvements to existing public roads to accommodate construction activities, including flattening crests or filling dips, widening sharp corners, or adding road base material; the certificate holder is required to consult with the appropriate county road master on specific improvements prior to construction. The certificate holder committed to completing upgrade to existing roads according to applicable state and county road standards and after consultation with Morrow and Umatilla County staff. The certificate holder is required to implement a road use agreement with each county to specify requirements, including that all existing public roads used to access the site would be left in as good or better condition than that which existed prior to the start of construction.

Access to the turbines, construction yards, substations, and O&M buildings is from a network of private access roads constructed or improved by the certificate holder. The certificate holder will grade and gravel all newly constructed and improved site access roads to meet load requirements for heavy construction equipment, as necessary. Following turbine construction, the certificate holder will narrow the site access roads for use during operations and maintenance. The additional disturbed width required during construction will be restored following the completion of construction by removing gravel surfacing, restoring appropriate contours with erosion and stormwater control best management practices (BMPs), decompacting as needed, and revegetating the area appropriately.

In the maximum impact scenario, the facility will require up to 73 miles of access roads.

Temporary access roads were needed for the construction of the intraconnection transmission line(s). The intraconnection transmission line(s) can be constructed and maintained using only large trucks

rather than heavy construction cranes, and construction will occur during the dry time of year when the ground surface is hard enough to support those vehicles. Therefore, the interconnection transmission lines do not include permanent access roads. The total mileage of the temporary access roads needed for constructing the intraconnection transmission line(s) depends on the intraconnection line route option chosen. The shortest route would require approximately 22.8 miles of access roads, while the longest would require approximately 25.5 miles.

Additional Construction Yards

The facility includes up to four temporary construction yards located within the site boundary to facilitate the delivery and assembly of material and equipment. The construction yards are used for temporary storage of diesel and gasoline fuels, which are located in an above-ground 1,000-gallon diesel and 500-gallon gasoline tank, within designated secondary containments areas.

Each construction yard occupies between 15 and 20 acres, and was graded and gravel surfaced. The certificate holder is required to restore all construction yards to pre-construction conditions unless an agreement with the landowner leads to some or all of the construction yard being retained after construction.

In addition, the certificate holder may utilize one or more temporary concrete batch plant areas, located within the construction yard area. The temporary concrete batch plants are permitted and operated by the selected contractor.

Battery Storage Systems and Interconnection Facilities

The battery storage systems include the following components:

- Series of modular containers or a building per system (approximately 80 feet long, 100 feet wide and 15-20 feet tall for the 20 MW system); approximately 190 feet long, 100 feet wide and 15-20 feet tall for the 30 MW system)
    - Each system would contain lithium-ion batteries within battery modules placed in anchored racks within containers or building.
    - Approximately eighteen 2.7 mega-voltampere (MVA) inverters with associated step up transformers with a combined footprint approximately 8 feet by 4 feet.
    - Each system would be equipped with a gas pressured deluge fire suppression system, independent smoke detection system, and external fire water tank
    - Each system would include a cooling system comprised of a bank of four power conditioning system fan units with motor
- Control house, approximately 16 feet by 11 feet, with an external heating, ventilation and air conditioning unit (HVAC)
- Protective device; skid-mounted power transformer; and bi-directional inverter

Battery and inverter equipment would be electrically connected via a combination of aboveground cable trays, underground conduit, and covered cable trenches. Site surfacing would remain primarily gravel. The battery storage systems would interconnect with facility substations via feeder lines.

4.0 Site Certificate Conditions

4.1 Condition Format

The conditions in Sections 4.2 through 4.7 of this Site Certificate are organized and coded to indicate the phase of implementation, the standard the condition is required to satisfy, and an identification number (1, 2, 3, etc.)[1]. The table below presents a "key" for phase of implementation:

Key	Type of Conditions/Phase of Implementation
GEN	General Conditions: Design, Construction and Operation
PRE	Pre-Construction Conditions
CON	Construction Conditions
PRO	Pre-Operational Conditions
OPR	Operational Conditions
RET	Retirement Conditions

The standards are presented using an acronym; for example, the General Standard of Review is represented in the condition numbering as "GS"; the Soil Protection standard is represented in the condition numbering as "SP" and so forth.

For example, the coding of Condition GEN-GS-01 represents that the condition is a general condition (GEN) to be implemented during design, construction and operation of the facility, is required to satisfy the Council's General Standard of Review, and is condition number 1.

[1] The identification number is not representative of an order that conditions must be implemented; it is intended only to represent a numerical value for identifying the condition.

NOTE: Changes to conditions that occurred between the draft proposed order and proposed order are presented in both hi-lite and underline/strikeout.

4.2 General Conditions (GEN): Design, Construction and Operations

Condition Number	General (GEN) Conditions
STANDARD: GENERAL STANDARD OF REVIEW (GS) [OAR 345-022-0000]	
GEN-GS-01	The certificate holder shall begin construction of the facility by May 24, 2020~~within three years after the effective date of the site certificate. Under OAR 345-015-0085(9), the site certificate is effective upon execution by the Council chair and the applicant~~. On or before May 24, 2020, the certificate holder shall provide written notification to the Department that it has met the construction commencement deadline. Construction is defined in OAR 345-001-0010. [Final Order on ASC, General Standard Condition 1; Amended in Final Order on AMD2~~General Standard Condition 1~~] [Mandatory Condition OAR 345-025-0006(4)]
GEN-GS-02	The certificate holder shall complete construction of the facility by May 24, 2023~~within six years after the effective date of the site certificate~~. The certificate holder shall promptly notify the Department of the date of completion of construction. [Final Order on ASC, General Standard Condition 2; Amended in Final Order on AMD2] [Mandatory Condition OAR 345-025-0006(4)]
GEN-GS-03	The certificate holder shall design, construct, operate, and retire the facility: a. Substantially as described in the site certificate; b. In compliance with the requirements of ORS Chapter 469, applicable Council rules, and applicable state and local laws, rules and ordinances in effect at the time the site certificate is issued; and c. In compliance with all applicable permit requirements of other state agencies. [Final Order on ASC, Mandatory Condition 2] [OAR 345-~~027-0020~~-025-0006(3)]
GEN-GS-04	Except as necessary for the initial survey or as otherwise allowed for wind energy facilities, transmission lines or pipelines under this section, the certificate holder shall not begin construction, as defined in OAR 345-001-0010, or create a clearing on any part of the site until the certificate holder has construction rights on all parts of the site. For the purpose of this rule, "construction rights" means the legal right to engage in construction activities. For wind energy facilities, transmission lines or pipelines, if the certificate holder does not have construction rights on all parts of the site, the certificate holder may nevertheless begin construction, as defined in OAR 345-001-0010, or create a clearing on a part of the site if the certificate holder has construction rights on that part of the site and: a. ~~the~~ The certificate holder would construct and operate part of the facility on that part of the site even if a change in the planned route of a transmission line or pipeline occurs during the certificate holder's negotiations to acquire construction rights on another part of the site; or ~~a.~~b. The certificate holder would construct and operate part of a wind energy facility on that part of the site even if other parts of the facility were modified by amendment of the site certificate or were not built. [Final Order on ASC, Mandatory Condition 3] [OAR 345-025-0006 ~~-027-0020~~(5)]

GEN-GS-05	If the certificate holder becomes aware of a significant environmental change or impact attributable to the facility, the certificate holder shall, as soon as possible, submit a written report to the department describing the impact on the facility and any affected site certificate conditions. [Final Order on ASC, Mandatory Condition 4] [OAR 345-027-0020(6)]
GEN-GS-06	The Council shall include as conditions in the site certificate all representations in the site certificate application and supporting record the Council deems to be binding commitments made by the applicant. [Final Order on ASC, Mandatory Condition 5] [OAR 345-025-0006 ~~-027-0020~~(10)]

GEN-GS-07	Upon completion of construction, the certificate holder shall restore vegetation to the extent practicable and shall landscape all areas disturbed by construction in a manner compatible with the surroundings and proposed use. Upon completion of construction, the certificate holder shall remove all temporary structures not required for facility operation and dispose of all timber, brush, refuse and flammable or combustible material resulting from clearing of land and construction of the facility. [Final Order on ASC, Mandatory Condition 6] [OAR 345-~~-~~025-0006 ~~027-0020~~(11)]
GEN-GS-08	The certificate holder shall design, engineer and construct the facility to avoid dangers to human safety presented by seismic hazards affecting the site that are expected to result from all maximum probable seismic events. As used in this rule "seismic hazard" includes ground shaking, ground failure, landslide, liquefaction triggering and consequences (including flow failure, settlement buoyancy, and ~~,~~ lateral spreading), cyclic softening of clays and silts, fault rupture, directivity effects and soil-structure interaction. For coastal sites, this also includes tsunami hazards and seismically-induced coastal ~~inundation, fault displacement and~~ subsidence. [Final Order on ASC, Mandatory Condition 7] [OAR 345-02~~7~~5-00~~2~~06(12)]
GEN-GS-09	The certificate holder shall notify the ~~department~~Department, the State Building Codes Division and the Department of Geology and Mineral Industries promptly if site investigations or trenching reveal that conditions in the foundation rocks differ significantly from those described in the application for a site certificate. After the Department receives the notice, the Council may require the certificate holder to consult with the Department of Geology and Mineral Industries and the Building Codes Division and to propose mitigation actions. [Final Order on ASC, Mandatory Condition 8] [OAR 345-025-0006 ~~-027-0020~~(13)]
GEN-GS-10	The certificate holder shall notify the department, the State Building Codes Division and the Department of Geology and Mineral Industries promptly if shear zones, artesian aquifers, deformations or clastic dikes are found at or in the vicinity of the site. After the Department receives notice, the Council may require the certificate holder to consult with the Department of Geology and Mineral Industries and the Building Codes Division to propose and implement corrective or mitigation actions. [Final Order on ASC, Mandatory Condition 9] [OAR 345-025-0006 ~~-027-0020~~(14)]
GEN-GS-11	Before any transfer of ownership of the facility or ownership of the site certificate holder, the certificate holder shall inform the department of the proposed new owners. The requirements of OAR 345-027-0100 apply to any transfer of ownership that requires a transfer of the site certificate. [Final Order on ASC, Mandatory Condition 10] [OAR 345-~~-~~025-0006 ~~027-0020~~(15)]
GEN-GS-12	The Council shall specify an approved corridor in the site certificate and shall allow the certificate holder to construct the pipeline or transmission line anywhere within the corridor, subject to the conditions of the site certificate. If the applicant has analyzed more than one corridor in its application for a site certificate, the Council may, subject to the Council's standards, approve more than one corridor. [*The transmission line corridors approved by EFSC pursuant to this condition is described in Section 2.3 of the site certificate, and presented in the facility site map (see Attachment A of the site certificate).*

	[Final Order on ASC, Site Specific Condition 1] [OAR 345-027-0023(5)]]
STANDARD: ORGANIZATIONAL EXPERTISE (OE) [OAR 345-022-0010]	
GEN-OE-01	Any matter of non-compliance under the site certificate is the responsibility of the certificate holder. Any notice of violation issued under the site certificate will be issued to the certificate holder. Any civil penalties under the site certificate will be levied on the certificate holder. [Final Order on ASC, Organizational Expertise Condition 5]
GEN-OE-02	In addition to the requirements of OAR 345-026-0170, within 72 hours after discovery of incidents or circumstances that violate the terms or conditions of the site certificate, the certificate holder must report the conditions or circumstances to the department. [Final Order on ASC, Organizational Expertise Condition 6]
GEN-OE-03	During facility construction and operation, the certificate holder shall report to the Department, within 7 days, any change in the corporate structure of the parent company, NextEra Energy Resources, LLC. The certificate holder shall report promptly to the Department any change in its access to the resources, expertise, and personnel of NextEra Energy Resources, LLC. [Amendment #1 , Organizational Expertise Condition 9]
GEN-OE-04	The certificate holder shall: a. Prior to and during construction, as applicable, provide evidence to the Department that a contractual agreement has been obtained for transport and disposal of battery and battery waste by a licensed hauler and requires the third-party to comply with all applicable laws and regulations, including applicable provisions of 49 CFR 173.185. b. Prior to transporting and disposing of battery and battery waste during facility operations, provide evidence to the Department that a contractual agreement has been obtained for transport and disposal of battery and battery waste by a licensed hauler and requires the third-party to comply with all applicable laws and regulations, including applicable provisions of 49 CFR 173.185. [Final Order on AMD2, Organizational Expertise Condition 10]
STANDARD: STRUCTURAL (SS) [OAR 345-022-0020]	
GEN-SS-01	The certificate holder shall design, engineer, and construct the facility in accordance with the current versions of the latest International Building Code, Oregon Structural Specialty Code, and building codes as adopted by the State of Oregon at the time of construction. [Final Order on ASC, Structural Standard Condition 2]

STANDARD: LAND USE (LU) [OAR 345-022-0030]	
GEN-LU-01	The certificate holder shall design the facility to comply with the following wind turbine setback distances in Morrow County: a. Wind turbines shall be setback from the property line of any abutting property of any non-participant property owners a minimum of 110 percent of maximum blade tip height of the wind turbine tower. b. Wind turbines shall be setback 100 feet from all property boundaries, including participant property boundaries within the site boundary, if practicable. c. Wind turbine foundations shall not be located on any property boundary, including participant property boundaries within the site boundary. [Final Order on ASC, Land Use Condition 1]
GEN-LU-02	During design and construction of the facility, the certificate holder shall: a. Obtain an access permit for changes in access on Morrow County roads; and b. Improve or develop private access roads impacting intersections with Morrow County roads in compliance with Morrow County access standards. [Final Order on ASC, Land Use Condition 4]
GEN-LU-03	During design and construction, the certificate holder shall implement the following actions on all meteorological towers approved through the site certificate: a. Paint the towers in alternating bands of white and red or aviation orange; and b. Install aviation lighting as recommended by the Federal Aviation Administration. [Final Order on ASC, Land Use Condition 9]
GEN-LU-04	The certificate holder shall design and construct the facility using the minimum land area necessary for safe construction and operation. The certificate holder shall locate access roads and temporary construction laydown and staging areas to minimize disturbance of farming practices and, wherever feasible, shall place turbines and transmission interconnection lines along the margins of cultivated areas to reduce the potential for conflict with farm operations. Where possible, underground communication and electrical lines shall be buried within the area disturbed by temporary road widening. [Final Order on ASC, Land Use Condition 11]
GEN-LU-05	During design and construction of the facility, the certificate holder shall ensure that fencing and landscaping selected and used for the O&M building and similar facility components sited within Morrow County blend with the nature of the surrounding area. [Final Order on ASC, Land Use Condition 14]
GEN-LU-06	During micrositing of the facility, the certificate holder shall ensure that wind turbines are sited based on a minimum setback of 110% of the overall tower-to-blade tip height from the boundary right-of-way of county roads and state and interstate highways in Umatilla County. [Final Order on ASC, Land Use Condition 16]
GEN-LU-07	During design and construction, the certificate holder must ensure that the O&M building in Umatilla County is consistent with the character of similar agricultural buildings used by commercial farmers or ranchers in Umatilla County. [Final Order on ASC, Land Use Condition 20]

GEN-LU-08	During facility design and construction of new access roads and road improvements, the certificate holder shall implement best management practices after consultation with the Umatilla County Soil Water Conservation district. The new and improved road designs must be reviewed and certified by a civil engineer. [Final Order on ASC, Land Use Condition 22]
GEN-LU-09	Before beginning electrical production, the certificate hold shall provide the location of each turbine tower, electrical collecting lines, the O&M building, the substation, project access roads, and portion of the intraconnection transmission line located in Umatilla County to the department and Umatilla County in a format suitable for GPS mapping. [Final Order on ASC, Land Use Condition 24]
GEN-LU-10	During construction and operation of the facility, the certificate holder shall deliver a copy of the annual report required under OAR 345-026-0080 to the Umatilla County Planning Commission on an annual basis. [Final Order on ASC, Land Use Condition 28]
STANDARD: RETIREMENT AND FINANCIAL ASSURANCE (RT) [OAR 345-022-0050]	
GEN-RF-01	The certificate holder shall prevent the development of any conditions on the site that would preclude restoration of the site to a useful, non-hazardous condition to the extent that prevention of such site conditions is within the control of the certificate holder. [Final Order on ASC, Retirement and Financial Assurance Condition 1] [Mandatory Condition OAR 345-~~027~~025-00~~2~~06(7)]
STANDARD: FISH AND WILDLIFE HABITAT (FW) [OAR 345-022-0060]	
GEN-FW-01	During construction and operation, the certificate holder shall impose a 20 mile per hour speed limit on new and improved private access roads, which have been approved as a related and supporting facility to the energy facility. [Final Order on ASC, Fish and Wildlife Habitat Condition 2]
GEN-FW-02	The certificate holder shall construct all overhead collector and transmission intraconnection lines in accordance with the latest Avian Power Line Interaction Committee design standards, and shall only install permanent meteorological towers that are unguyed. [Final Order on ASC, Fish and Wildlife Habitat Condition 6]
STANDARD: SCENIC RESOURCES (SR) [OAR 345-022-0080]	
GEN-SR-01	To reduce visual impacts associated with lighting facility structures, other than lighting on structures subject to the requirements of the Federal Aviation Administration or the Oregon Department of Aviation, the certificate holder shall implement the following measures: a. Outdoor night lighting at the collector substations, ~~and~~ Operations and Maintenance Buildings, and battery storage systems, must be i. The minimum number and intensity required for safety and security; ii. Directed downward and inward within the facility to minimize backscatter and offsite light trespass; and iii. Have motion sensors and switches to keep lights turned off when not needed. [Final Order on ASC, Scenic Resources Condition 1, Amended in Final Order on AMD2]

GEN-SR-02	The certificate holder shall: a. Design and construct the O&M buildings and battery storage systems to be generally consistent with the character of agricultural buildings used by farmers or ranchers in the area, and the buildings shall be finished in a neutral color to blend with the surrounding landscape; b. Paint or otherwise finish turbine structures in a grey, white, or off-white, low reflectivity coating to minimize reflection and contrast with the sky, unless required otherwise by the local code applicable to the structure location. c. Design and construct support towers for the intraconnection transmission lines using either wood or steel structures and utilize finish with a low reflectivity coating; d. Finish substation structures and battery storage systems utilizing neutral colors to blend with the surrounding landscape; e. Minimize use of lighting and design lighting to prevent offsite glare; f. Not display advertising or commercial signage on any part of the proposed facility; g. Limit vegetation clearing and ground disturbance to the minimum area necessary to safely and efficiently install the facility equipment; h. Water access roads and other areas of ground disturbance during construction, as needed, to avoid the generation of airborne dust; and i. Restore and revegetate temporary impact areas as soon as practicable following completion of construction. [Final Order on ASC, Scenic Resources Condition 2, Amended in Final Order on AMD2]
STANDARD: PUBLIC SERVICES (PS) [OAR 345-022-0110]	
GEN-PS-01	During construction and operation, the certificate holder shall coordinate with its solid waste handler to provide the information solicited through the Oregon Department of Environmental Quality's Recycling Collector Survey to the Morrow County waste shed representative on an annual basis. [Final Order on ASC, Public Services Condition 5]
GEN-PS-02	The certificate holder shall construct turbine towers with no exterior ladders or access to the turbine blades and shall install locked tower access doors. The O&M buildings shall be fenced. The certificate holder shall keep tower access doors and O&M buildings locked at all times, except when authorized personnel are present. [Final Order on ASC, Public Services Condition 11]

GEN-PS-03	Prior to construction and operation of the facility, the certificate holder must provide employee fire prevention and response training that includes instruction on facility fire hazards, fire safety, emergency notification procedures, use of fire safety equipment, and fire safety rules and regulations. The certificate holder shall notify the department and the first-response agencies listed in the Emergency Management Plan developed to comply with Public Services Condition 13 at least 30 days prior to the annual training to provide an opportunity to participate in the training. Equivalent training shall be provided to new employees or subcontractors working on site that are hired during the fire season. The certificate holder must retain records of the training and provide them to the department upon request. [Final Order on ASC, Public Services Condition 18]
GEN-PS-04	The certificate holder shall design, construct and maintain the battery storage systems ~~facilities~~ within a 100 foot vegetation free zone. [Final Order on AMD~~3~~2, Public Services Condition 23]
STANDARD: PUBLIC HEALTH AND SAFETY FOR WIND FACILITIES (WF) [OAR 345-024-0010]	
GEN-WF-01	During construction and operation, the certificate holder shall follow manufacturers' recommended handling instructions and procedures to prevent damage to turbine or turbine tower components. [Final Order on ASC, Public Health and Safety Standards for Wind Facilities Condition 3]
GEN-WF-02	The certificate holder shall notify the department, the Morrow County Planning Department and the Umatilla County Planning Department within 72 hours of any accidents including mechanical failures on the site associated with construction or operation of the facility that may result in public health or safety concerns. [Final Order on ASC, Public Health and Safety Standards for Wind Facilities Condition 5]

4.3 Pre-Construction (PRE) Conditions

Condition Number	Pre-Construction (PRE) Conditions
STANDARD: ORGANIZATIONAL EXPERTISE (OE) [OAR 345-022-0010]	
PRE-OE-01	Before beginning construction, the certificate holder shall notify the department of the identity and qualifications of the major design, engineering and construction contractor(s) for the facility. The certificate holder shall select contractors that have substantial experience in the design, engineering and construction of similar facilities. The certificate holder shall report to the department any changes of major contractors. [Final Order on ASC, Organizational Expertise Condition 1]
PRE-OE-02	Before beginning construction, the certificate holder shall notify the department of the identity and qualifications of the construction manager to demonstrate that the construction manager is qualified in environmental compliance and has the capability to ensure compliance with all site certificate conditions. [Final Order on ASC, Organizational Expertise Condition 2]
PRE-OE-03	Prior to construction, the certificate holder shall contractually require all construction contractors and subcontractors involved in the construction of the facility to comply with all applicable laws and regulations and with the terms and conditions of the site certificate. Such contractual provisions shall not operate to relieve the certificate holder of responsibility under the site certificate. [Final Order on ASC, Organizational Expertise Condition 3]
PRE-OE-04	Before beginning construction, the certificate holder shall notify the department before conducting any work on the site that does not qualify as surveying, exploration, or other activities to define or characterize the site. The notice must include a description of the work and evidence that its value is less than $250,000 or evidence that the certificate holder has satisfied all conditions that are required prior to beginning construction. [Final Order on ASC, Organizational Expertise Condition 4]
PRE-OE-05	Prior to construction, the certificate holder must provide the department and Umatilla and Morrow Counties with the name(s) and location(s) of the aggregate source and evidence of the source's county permit(s). [Final Order on ASC, Organizational Expertise Condition 7]
PRE-OE-06	Before beginning construction on any phase of the facility, the certificate holder must provide evidence to the department and Morrow and Umatilla counties that the third party that will construct, own and operate the interconnection transmission line has obtained all necessary approvals and permits for that interconnection transmission line and that the certificate holder has a contract with the third party for use of the transmission line. [Final Order on ASC, Organizational Expertise Condition 8]

STANDARD: STRUCTURAL (SS) [OAR 345-022-0020]	
PRE-SS-01	Before beginning construction, the certificate holder must: a) Submit a protocol to the Department and Oregon Department of Geology & Mineral Industries (DOGAMI), for review, with the applicable codes, standards, and guidelines to be used, and proposed geotechnical work to be conducted for the site-specific geotechnical investigation report. ~~a)~~b) Following receipt and review of Department and DOGAMI comments on the protocol per (a), the certificate holder shall conduct a site-specific geological and geotechnical investigation, and shall report its findings to DOGAMI and the department. The report shall be used by the certificate holder in final facility layout and design. The department shall review, in consultation with DOGAMI, and confirm that the investigation report includes an adequate assessment of the following information: • Subsurface soil and geologic conditions of the site boundary • Define and delineate geological and geotechnical hazards, and means to mitigate these hazards • Geotechnical design criteria and data for the turbine foundations, foundations of substations, O&M buildings, battery storage systems, roads, and other related and supporting facilities • Design data for installation of underground and overhead collector lines, and overhead transmission lines • Investigation of specific areas with potential for slope instability and landslide hazards. Landslide hazard evaluation shall be conducted by LIDAR and field work, as recommended by DOGAMI • Investigations of the swell and collapse potential of loess soils within the site boundary. [Final Order on ASC, Structural Standard Condition 1; Amended in Final Order on AMD2]
PRE-SS-02	Prior to construction, the certificate holder shall include as part of the geotechnical investigation required per Structural Standard Condition 1, an investigation of all potentially active faults within the site boundary, including the fault labeled as 2438 on Figures H-1 and H-2 of ASC Exhibit H. The investigation shall include a description of the potentially active faults, their potential risk to the facility, and any additional mitigation that will be undertaken by the certificate holder to ensure safe design, construction, and operation of the facility. [Final Order on ASC, Structural Standard Condition 3]
PRE-SS-03	Prior to construction, the certificate holder shall include as part of the geotechnical investigation required per Structural Standard Condition 1 an investigation of specific areas with potential for slope instability and shall site turbine strings appropriate to avoid potential hazards. The landslide hazards shall be investigated and mapped before final facility layout and design. The landslide hazard evaluation shall be conducted by a combination of LIDAR and field work. [Final Order on ASC, Structural Standard Condition 4]
PRE-SS-04	Prior to construction, the certificate holder shall include as part of the geotechnical investigation required per Structural Standard Condition 1, an investigation of the swell and collapse potential of loess soil in the site boundary. Based on the results of the investigation, the certificate holder shall include mitigation measures including, as necessary, over-excavating and replacing loess soil with structural fill, wetting and compacting, deep foundations, or avoidance of specific areas. [Final Order on ASC, Structural Standard Condition 5]
STANDARD: SOIL PROTECTION (SP) [OAR 345-022-0022]	
PRE-SP-01	Prior to beginning construction, the certificate holder shall provide a copy of a DEQ-approved construction Spill Prevention Control and Countermeasures (SPCC) plan, to be implemented during

	facility construction. The SPCC plan shall include the measures described in Exhibit I of ASC and in the final order approving the site certificate. [Final Order on ASC, Soil Protection Condition 3]

PRE-SP-02	Prior to construction, the certificate holder shall ensure that the final Revegetation Plan includes a program to protect and restore agricultural soils temporarily disturbed during facility construction. As described in the final order, agriculture soils shall be properly excavated, stored, and replaced by soil horizon. Topsoil shall be preserved and replaced. The Revegetation Plan shall be finalized pursuant to Fish and Wildlife Habitat Condition 11. [Final Order on ASC, Soil Protection Condition 4]
PRE-SP-03	Prior to beginning construction of the O&M buildings, the certificate holder shall secure any necessary septic system permits from DEQ. Copies of the necessary permits must be provided to the department prior to beginning construction of the O&M buildings. [Final Order on ASC, Soil Protection Condition 7]
STANDARD: LAND USE (LU) [OAR 345-022-0030]	
PRE-LU-01	Before beginning construction, the certificate holder shall complete the following: a. Pay the requisite fee and obtain a Zoning Permit from Morrow County for all facility components sited in Morrow County; and b. Obtain all other necessary local permits, including building permits. c. Provide the county with a building permit application, a third party technical report which includes: 1. Evaluates fire hazards and; 2. Presents mitigation and recommendations for a fire suppression system designed for the battery storage systems. ~~b.~~d. The certificate holder shall provide copies of the third-party technical report and issued permits to the Department. [Final Order on ASC, Land Use Condition 3; Amended in Final Order on AMD2~~2~~]
PRE-LU-02	Before beginning construction, the certificate holder shall pay the requisite fee and obtain a Conditional Use Permit as required under Morrow County Zoning Ordinance Article 6 Section 6.015. [Final Order on ASC, Land Use Condition 5]
PRE-LU-03	Before beginning construction, the certificate holder shall prepare a Weed Control Plan that is consistent with Morrow and Umatilla County weed control requirements to be approved by the department. The department shall consult with Morrow and Umatilla counties and ODFW. The final plan must be submitted to the department no less than 30 days prior to the beginning of construction. The certificate holder shall implement the requirements of the approved plan during all phases of construction and operation of the facility. [Final Order on ASC, Land Use Condition 6]
PRE-LU-04	Before beginning construction, the certificate holder shall record in the real property records of Morrow County a Covenant Not to Sue with regard to generally accepted farming practices on adjacent farmland. [Final Order on ASC, Land Use Condition 7]
PRE-LU-05	Prior to beginning construction, the certificate holder shall consult with surrounding landowners and lessees and shall consider proposed measures to reduce or avoid any adverse impacts to farm practices on surrounding lands and to avoid any increase in farming costs during construction and operation of the facility. Prior to beginning construction, the certificate holder shall provide evidence of this consultation to the department, Morrow County, and Umatilla County. [Final Order on ASC, Land Use Condition 12]

PRE-LU-06	Before beginning construction, the certificate holder shall work with the Morrow County Road Department to identify specific construction traffic related concerns, and develop a traffic management plan that specifies necessary traffic control measures to mitigate the effects of the temporary increase in traffic. The certificate holder must provide a copy of the traffic management plan to the department and Morrow County, and must implement the traffic management plan during construction. [Final Order on ASC, Land Use Condition 13]
PRE-LU-07	Before beginning construction, the certificate holder must: a. P~~p~~ay the requisite fee(s) and obtain a Zoning Permit(s) from Umatilla County for facility components sited within Umatilla County, including, but not limited to, turbines, substation, O&M building, and the intraconnection line. b. Provide the Department and county with a building permit application that includes a third party technical report which: 1. Evaluates fire hazards, and 2. Presents mitigation and recommendations for a fire suppression system designed for the battery storage systems. ~~a.~~c. The certificate holder shall provide copies of the third-party technical report and issued permits to the Department. [Final Order on ASC, Land Use Condition 15; AMD2]
PRE-LU-08	Prior to facility construction, the certificate holder shall install gates and no trespassing signs at all private access roads established or improved for the purpose of facility construction and operation. [Final Order on ASC, Land Use Condition 18]
PRE-LU-09	Before beginning construction, the certificate holder shall record in the real property records of Umatilla County a Covenant Not to Sue with regard to generally accepted farming practices on adjacent farmland. [Final Order on ASC, Land Use Condition 21]
STANDARD: RETIREMENT AND FINANCIAL ASSURANCE (RT) [OAR 345-022-0050]	
PRE-RF-01	Before beginning construction of the facility, the certificate holder shall submit to the State of Oregon, through the Council, a bond or letter of credit in a form and amount satisfactory to the Council to restore the site to a useful, non-hazardous condition. The certificate holder shall maintain a bond or letter of credit in effect at all times until the facility has been retired. The Council may specify different amounts for the bond or letter of credit during construction and during operation of the facility. [Final Order on ASC, Retirement and Financial Assurance Condition 4] [Mandatory Condition OAR 345-~~027~~025-~~0020~~0006(8)]

PRE-RF-02	Before beginning construction of the facility, the certificate holder shall submit to the State of Oregon, through the Council, a bond or letter of credit naming the State of Oregon, acting by and through the Council, as beneficiary or payee. The initial bond or letter of credit amount for the facility is $19.5 ~~$18.1~~ million dollars (~~Q1~~ Q3 ~~2015~~ 2018 dollars), to be adjusted to the date of issuance, and adjusted on an annual basis thereafter, as described in sub-paragraph (b) of this condition: (a) The certificate holder may adjust the amount of the initial bond or letter of credit based on the final design configuration of the facility. Any revision to the restoration costs should be adjusted to the date of issuance as described in (b) and subject to review and approval by the Council. (b) The certificate holder shall adjust the amount of the bond or letter of credit using the following calculation: (1) Adjust the amount of the bond or letter of credit (expressed in Q3 2018 dollars~~Q1 2015 dollars~~) to present value, using the U.S. Gross Domestic Product Implicit Price Deflator, Chain-Weight, as published in the Oregon Department of Administrative Services' "Oregon Economic and Revenue Forecast" or by any successor agency and using the ~~first quarter 2015~~third quarter 2018 index value and the quarterly index value for the date of issuance of the new bond or letter of credit. If at any time the index is no longer published, the Council shall select a comparable calculation to adjust third quarter 2018~~first quarter 2015~~ dollars to present value. (2) Round the result total to the nearest $1,000 to determine the financial assurance amount. (c) The certificate holder shall use an issuer of the bond or letter of credit approved by the Council. (d) The certificate holder shall use a form of bond or letter of credit approved by the Council. The certificate holder shall describe the status of the bond or letter of credit in the annual report submitted to the Council under OAR 345-026-0080. The bond or letter of credit shall not be subject to revocation or reduction before retirement of the facility site. [Final Order on ASC, Retirement and Financial Assurance Condition 5; Amended in Final Order on AMD2]

STANDARD: FISH AND WILDLIFE HABITAT (FW) [OAR 345-022-0060]	
PRE-FW-01	Prior to final site design and facility layout, the certificate holder shall conduct a field-based habitat survey to confirm the habitat categories of all areas that will be affected by facility components, as well as the locations of any sensitive resources such as active raptor and other bird nests. The survey shall be planned in consultation with the department and ODFW, and survey protocols shall be confirmed with the department and ODFW. Following completion of the field survey, and final layout design and engineering, the certificate holder shall provide the department and ODFW a report containing the results of the survey, showing expected final location of all facility components, the habitat categories of all areas that will be affected by facility components, and the locations of any sensitive resources. The report shall also include an updated version of Table FW-1 Potential Temporary and Permanent Impacts by Habitat Category and Type of the final order, showing the acres of expected temporary and permanent impacts to each habitat category, type, and sub-type. The pre-construction survey shall be used to complete final design, facility layout, and micrositing of facility components. As part of the report, the certificate holder shall include its impact assessment methodology and calculations, including assumed temporary and permanent impact acreage for each transmission structure, wind turbine, access road, and all other facility components. If construction laydown yards are to be retained post construction, due to a landowner request or otherwise, the construction laydown yards must be calculated as permanent impacts, not temporary. In classifying the affected habitat into habitat categories, the certificate holder shall consult with the department and ODFW. The certificate holder shall not begin construction of the facility until the habitat assessment, categorization, and impact assessment has been approved by the department, in consultation with ODFW. The certificate holder shall not construct any facility components within areas of Category 1 habitat and shall avoid temporary disturbance of Category 1 habitat. [Final Order on ASC, Fish and Wildlife Habitat Condition 1]
PRE-FW-02	Prior to construction, the certificate holder shall finalize and implement the Wildlife Monitoring and Mitigation Plan (WMMP) provided in Attachment D of this order, based on the final facility design, as approved by the department in consultation with ODFW. a. The final WMMP must be submitted and ODOE's concurrence received prior to the beginning of construction. ODOE shall consult with ODFW on the final WMMP. The certificate holder shall implement the requirements of the approved WMMP during all phases of construction and operation of the facility. b. The WMMP may be amended from time to time by agreement of the certificate holder and the Oregon Energy Facility Siting Council ("Council"). Such amendments may be made without amendment of the site certificate. The Council authorizes the Department to agree to amendments to this plan. The Department shall notify the Council of all amendments, and the Council retains the authority to approve, reject, or modify any amendment of the WMMP agreed to by the Department. [Final Order on ASC, Fish and Wildlife Habitat Condition 4]
PRE-FW-03	Prior to construction, the certificate holder shall flag all environmentally sensitive areas as restricted work zones. Restricted work zones shall include but not be limited to areas with sensitive or protected plant species, including candidate species, wetlands and waterways that are not authorized for construction impacts, areas with seasonal restrictions, and active state sensitive species bird nests. [Final Order on ASC, Fish and Wildlife Habitat Condition 8]

PRE-FW-04	Before beginning construction the certificate holder shall prepare and receive approval from the department of a final Habitat Mitigation Plan. The final Habitat Mitigation Plan shall be based on the final facility design and shall be approved by the department in consultation with ODFW. The Council retains the authority to approve, reject or modify the final HMP. a. The final Habitat Mitigation Plan and the department's approval must be received prior to beginning construction. The department shall consult with ODFW on the final plan. The certificate holder shall implement the requirements of the approved plan during all phases of construction and operation of the facility. b. The certificate holder shall calculate the size of the habitat mitigation area according to the final design configuration of the facility and the estimated areas of habitat affected in each habitat category, in consultation with the department, as per the pre-construction survey results and impact assessment calculations called for in Fish and Wildlife Habitat Condition 1. c. The certificate holder shall acquire the legal right to create, enhance, maintain, and protect the habitat mitigation area, as long as the site certificate is in effect, by means of an outright purchase, conservation easement or similar conveyance and shall provide a copy of the documentation to the department prior to the start of construction. Within the habitat mitigation area, the certificate holder shall improve the habitat quality as described in the final Habitat Mitigation Plan. d. The final HMP shall include an implementation schedule for all mitigation actions, including securing the conservation easement, conducting the ecological uplift actions at the habitat mitigation area, revegetation and restoration of temporarily impacted areas, and monitoring. The mitigation actions shall be implemented according to the following schedule, as included in the HMP: i. Restoration and revegetation of temporary construction-related impact area shall be conducted as soon as possible following construction. ii. The certificate holder shall obtain legal authority to conduct the required mitigation work at the compensatory habitat mitigation site before commencing construction. The habitat enhancement actions at the compensatory habitat mitigation site shall be implemented concurrent with construction. e. The final HMP shall include a monitoring and reporting program for evaluating the effectiveness of all mitigation actions, including restoration of temporarily impacted areas and ecological uplift actions at the habitat mitigation area. f. The final HMP shall include mitigation in compliance with the Council's Fish and Wildlife Habitat standard, including mitigation for temporary impacts to Category 4 habitat (shrub-steppe habitat); and, mitigation for all Category 2 habitat impacts that meet the mitigation goal of no net loss of habitat quality or quantity, plus a net benefit of habitat quality or quantity. g. The final HMP may be amended from time to time by agreement of the certificate holder and the Oregon Energy Facility Siting Council ("Council"). Such amendments may be made without amendment of the site certificate. The Council authorizes the Department to agree to amendments to this plan. The Department shall notify the Council of all amendments, and the Council retains the authority to approve, reject, or modify any amendment of this plan agreed to by the Department. [Final Order on ASC, Fish and Wildlife Habitat Condition 10]
PRE-FW-05	Before beginning construction, the certificate holder shall prepare and receive approval of a final Revegetation Plan, provided as Attachment C to this order, from the department, in consultation with Umatilla and Morrow counties and ODFW. The certificate holder shall implement the requirements of the approved plan during all phases of construction and operation of the facility. [Final Order on ASC, Fish and Wildlife Habitat Condition 11]

STANDARD: THREATENED AND ENDANGERED SPECIES (TE) [OAR 345-022-0070]	
PRE-TE-01	Prior to construction, the certificate holder shall determine the boundaries of Category 1 Washington ground squirrel habitat. The certificate holder shall hire a qualified professional biologist who has experience in detection of Washington ground squirrel to conduct pre-construction surveys using a survey protocol approved by the department in consultation with ODFW. The biologist shall survey all areas of suitable habitat within 1,000 feet of any ground disturbing activity. Ground disturbing activity refers to any potential impact, whether permanent or temporary. The protocol surveys shall be conducted in the active squirrel season (March 1 to May 31) prior to construction commencement. The protocol survey is valid for three years. If construction begins within three years of conducting the protocol survey, but not within one year of the protocol survey, the certificate holder shall conduct a pre-construction survey only within areas of suitable Washington ground squirrel habitat where ground disturbing activity would occur. The certificate holder shall provide written reports of the surveys to the department and to ODFW and shall identify the boundaries of Category 1 Washington ground squirrel (WGS) habitat. The certificate holder shall not begin construction within suitable habitat until the identified boundaries of Category 1 WGS habitat have been approved by the department, in consultation with ODFW. The certificate holder shall avoid any permanent or temporary disturbance in all Category 1 WGS habitat. The certificate holder shall ensure that these sensitive areas are correctly marked with exclusion flagging and avoided during construction. [Final Order on ASC, Threatened and Endangered Species Condition 1]
PRE-TE-02	In accordance with Fish and Wildlife Habitat Condition 4~~3~~, prior to construction, the certificate holder shall finalize and implement the Wildlife Monitoring and Mitigation Plan (WMMP) provided in Attachment D of this order, based on the final facility design, as approved by the department in consultation with ODFW. The final WMMP shall include a program to monitor potential impacts from facility operation on Washington ground squirrel. Monitoring shall be of any known colonies and shall be completed on the same schedule as the raptor nest monitoring for the facility. The monitoring surveys shall include returning to the known colonies to determine occupancy and the extent of the colony as well as a general explanation of the amount of use at the colony. If the colony is not found within the known boundary of the historic location a survey 500 feet out from the known colony will be conducted to determine if the colony has shifted over time. Any new colonies that are located during other monitoring activities, such as raptor nest monitoring surveys, shall be documented and the extent of those colonies should be delineated as well. These newly discovered colonies shall also be included in any future WGS monitoring activities. [Final Order on ASC, Threatened and Endangered Species Condition 2]
PRE-TE-03	To avoid potential impacts to Laurent's milkvetch, the certificate holder must: i. Conduct preconstruction plant surveys for Laurent's milkvetch within 1,000-feet of temporary and permanent disturbance from the 230 kV intraconnection transmission line; and, within 500-feet of temporary and permanent disturbance from all other facility components, unless extent of survey area within suitable habitat from temporary and permanent disturbance is otherwise agreed upon by the Department on consultation with Oregon Department of Agriculture. If the species is found to occur, the certificate holder must install protection flagging around the plant population and avoid any ground disturbance within this zone. ii. Ensure that any plant protection zone established under (a) above is included on construction plans showing the final design locations.

	iii. If herbicides are used to control weeds, the certificate holder shall follow the manufacturer's guidelines in establishing a buffer area around confirmed populations of Laurent's milkvetch. Herbicides must not be used within the established buffers. [Final Order on ASC, Threatened and Endangered Species Condition 3; Amended in Final Order on AMD2]
STANDARD: HISTORIC, CULTURAL, AND ARCHAEOLOGICAL RESOURCES (HC) [OAR 345-022-0090]	
PRE-HC-01	Before beginning construction, the certificate holder shall provide to the department a map showing the final design locations of all components of the facility, the areas that will be temporarily disturbed during construction and the areas that were surveyed in 2013-14 for historic, cultural, and archaeological resources. [Final Order on ASC, Historic, Cultural, and Archeological Resources Condition 1]
PRE-HC-02	Before beginning construction, the certificate holder shall mark the buffer areas established under Historic, Cultural, and Archeological Resources Condition 3 for all identified historic, cultural, or archaeological resource sites (including those of unknown age) on construction maps and drawings as "no entry" areas. A copy of current maps and drawings must be maintained onsite during construction and made available to the department upon request. [Final Order on ASC, Historic, Cultural, and Archeological Resources Condition 2]
PRE-HC-03	Before beginning construction, the certificate holder shall ensure that a qualified archeologist, as defined in OAR 736-051-0070, trains construction contractors on how to identify sensitive historic, cultural, and archaeological resources present onsite and on measures to avoid accidental damage to identified resource sites. Records of such training must be maintained onsite during construction, and made available to the department upon request. [Final Order on ASC, Historic, Cultural, and Archeological Resources Condition 4]
STANDARD: PUBLIC SERVICES (PS) [OAR 345-022-0110]	
PRE-PS-01	Prior to construction, the certificate holder shall prepare a Traffic Management Plan that includes the procedures and actions described in this order and the mitigation measures identified in ASC Exhibit U, Section 3.5.4. The plan shall be approved by the department in consultation with the appropriate transportation service providers. The plan shall be maintained onsite and implemented throughout construction of the facility. In addition, the certificate holder shall include the following information in the plan: a. Procedures to provide advance notice to all affected local jurisdictions and adjacent landowners of construction deliveries and the potential for heavy traffic on local roads; b. A policy of including traffic control procedures in contract specifications for construction of the facility; c. Procedures to maintain at least one travel lane at all times to the extent reasonably possible so that roads will not be closed to traffic because of construction vehicles; d. A policy of ensuring that no equipment or machinery is parked or stored on any county road whether inside or outside the site boundary. The certificate holder may temporarily park equipment off the road but within county rights-of-way with the approval of the Morrow County and Umatilla County Public Works Departments; e. A policy to encourage and promote carpooling for the construction workforce; and f. Procedures to keep state highways and county roads free of gravel that may be tracked out on intersecting roads at facility access points. [Final Order on ASC, Public Services Condition 6]

PRE-PS-02	Before beginning construction, the certificate holder must enter into Road Use Agreements with the Morrow County and Umatilla County Public Works Departments. The Agreements must include, at a minimum, a pre-construction assessment of road surfaces under Morrow County and Umatilla County jurisdiction, construction monitoring, and post-construction inspection and repair. A copy of the Road Use Agreements with Morrow County and Umatilla County must be submitted to the department before beginning construction. If required by Morrow County or Umatilla County, the certificate holder shall post bonds to ensure funds are available to repair and maintain roads affected by the facility. [Final Order on ASC, Public Services Condition 7]
PRE-PS-03	The certificate holder shall design and construct new access roads and private road improvements to standards approved by Umatilla County or Morrow County. Where modifications of county roads are necessary, the certificate holder shall construct the modifications entirely within the county road rights-of-way and in conformance with county road design standards subject to the approval of the Umatilla County and Morrow County Public Works Departments. [Final Order on ASC, Public Services Condition 8]
PRE-PS-04	Before beginning construction, the certificate holder shall submit to the Federal Aviation Administration (FAA) and the Oregon Department of Aviation an FAA Form 7460-1 Notice of Proposed Construction or Alteration for each turbine. Before beginning construction, the certificate holder shall submit to the department the results of the Oregon Department of Aviation aeronautical study and determination. If the department, in consultation with the Oregon Department of Aviation, determines that any turbine would adversely impact an airport's ability to provide service by obstructing the airport's primary or horizontal surface, the department, in consultation with the Oregon Department of Aviation and the certificate holder, shall determine appropriate mitigation, if any, prior to construction. [Final Order on ASC, Public Services Condition 9]

PRE-PS-05	Prior to construction, the certificate holder shall prepare an Emergency Management Plan that includes the procedures and actions described in this order and in ASC Exhibit U. The certificate holder shall submit the plan to ODOE for review and approval in consultation with the appropriate local fire protection districts (including the City of Heppner Volunteer Fire Department, Ione Rural Fire Protection District, and Echo Rural Fire Protection District) prior to construction. The plan shall be maintained onsite and implemented throughout construction and operation of the facility. Any updates to the plan shall be provided to the department within 30 days. All onsite workers shall be trained on the fire prevention and safety procedures contained in the plan prior to working on the facility. Additional information that shall be included in the plan: a. Current contact information of at least two facility personnel available to respond on a 24-hour basis in case of an emergency on the facility site. The contact information must include name, telephone number(s), physical location, and email address for the listed contact(s). An updated list must be provided to the fire protection agencies immediately upon any change of contact information. A copy of the contact list, and any updates as they occur, must also be provided to the Department, along with a list of the agencies that received the contact information. b. Identification of agencies that participated in developing the plan; c. Identification of agencies that are designated as first response agencies or are included in any mutual aid agreements with the facility; d. A list of any other mutual aid agreements or fire protection associations in the vicinity of the facility; e. Contact information for each agency listed above; f. Communication protocols for both routine and emergency events and the incident command system to be used in the event a fire response by multiple agencies is needed at the facility; g. Access and fire response at the facility site during construction and operations. Fire response plans during construction should address regular and frequent communication amongst the agencies regarding the number and location of construction sites within the site boundary, access roads that are completed and those still under construction, and a temporary signage system until permanent addresses and signs are in place;the h. The designated meeting location in case of evacuation; i. Staff training requirements; and Copies of mutual aid, fire protection association, or other agreements entered into concerning fire protection at the facility site. [Final Order on ASC, Public Services Condition 13]
PRE-PS-06	Before beginning construction, the certificate holder shall develop and implement, or require its contractors to develop and implement, a site health and safety plan that informs workers and others onsite about first aid techniques and what to do in case of an emergency. The health and safety plan will include preventative measures, important telephone numbers, the locations of onsite fire extinguishers, and the names, locations and contact information of nearby hospitals. All onsite workers shall be trained in safety and emergency response, as per the site health and safety plan. The site health and safety plan must be updated on an annual basis, maintained throughout the construction and operations and maintenance phases of the facility, and available upon request by the department. [Final Order on ASC, Public Services Condition 20]

PRE-PS-07	Before beginning construction, the certificate holder shall ensure that all construction workers are certified in first aid, cardio pulmonary resuscitation (CPR), and the use of an automated external defibrillator (AED). The certificate holder must retain records of the certifications and provide them to the department upon request. The certificate holder shall also ensure that an AED is available onsite at all times that construction activities are occurring. [Final Order on ASC, Public Services Condition 21]
STANDARD: WASTE MINIMIZATION (WM,) [OAR 345-022-0120]	
PRE-WM-01	Prior to construction, the certificate holder shall develop a construction waste management plan, to be implemented during all phases of facility construction, which includes at a minimum the following details: a. Specification of the number and types of waste containers to be maintained at construction sites and construction yards b. Description of waste segregation methods for recycling or disposal. c. Names and locations of appropriate recycling and waste disposal facilities, collection requirements, and hauling requirements to be used during construction. The certificate holder shall maintain a copy of the construction waste management plan onsite and shall provide to the department a report on plan implementation in the 6-month construction report required pursuant to OAR 345-026-0080(1)(a). [Final Order on ASC, Waste Minimization Condition 2]
PRE-WM-02	Prior to construction, the certificate holder shall investigate and confirm that no surfaces waters, shallow groundwater, or drinking water sources will be adversely impacted by the usage of concrete washout water in the foundations of facility components, and shall submit an investigation report to the department. Prior to construction, the department, in consultation with DEQ, shall review the results of the investigation report and shall verify that the plan to dispose of concrete washout water in the foundations of facility components is unlikely to adversely impact surface waters, shallow groundwater, or drinking water sources. The applicant's investigation shall be based on the anticipated final facility layout and design. If the results of the investigation show that the proposed concrete washout water disposal method would cause adverse impacts to surface water, shallow groundwater, or drinking water sources, the applicant shall propose mitigation measures to reduce potential impacts, for review and approval by the department in consultation with DEQ, prior to construction. [Final Order on ASC, Waste Minimization Condition 3]
STANDARD: SITING STANDARDS FOR TRANSMISSION LINES (TL) [OAR 345-024-0090]	
PRE-TL-01	Prior to construction, the certificate holder shall schedule a time to brief the OPUC Safety, Reliability, and Security Division (Safety) Staff as to how it will comply with OAR Chapter 860, Division 024 during design, construction, operations, and maintenance of the facilities. [Final Order on ASC, Siting Standard Condition 2]

STANDARD: NOISE CONTROL REGULATION (NC) [OAR 345-035-0035]	
PRE-NC-01	Prior to construction, the certificate holder shall provide to the department: a. Information that identifies the final design locations of all facility components to be built at the facility; b. The maximum sound power level for the facility components and the maximum sound power level and octave band data for the turbine type(s) and transformers selected for the facility based on manufacturers' warranties or confirmed by other means acceptable to the department; c. The results of the noise analysis of the final facility design performed in a manner consistent with the requirements of OAR 340-035-0035(1)(b)(B) (iii)(IV) and (VI). The analysis must demonstrate to the satisfaction of the department that the total noise generated by the facility (including turbines and transformers) would meet the ambient noise degradation test and maximum allowable test at the appropriate measurement point for all potentially-affected noise sensitive properties, or that the certificate holder has obtained the legally effective easement or real covenant for expected exceedances of the ambient noise degradation test described (d) below. The analysis must also identify the noise reduction operation (NRO) mode approach that will be used during facility operation and include a figure that depicts the turbines that will be operating in NRO mode and the associated dBA reduction level; and, d. For each noise-sensitive property where the certificate holder relies on a noise waiver to demonstrate compliance in accordance with OAR 340-035-0035(1)(b)(B)(iii)(III), a copy of the legally effective easement or real covenant pursuant to which the owner of the property authorizes the certificate holder's operation of the facility to increase ambient statistical noise levels L_{10} and L_{50} by more than 10 dBA at the appropriate measurement point. The legally effective easement or real covenant must: include a legal description of the burdened property (the noise sensitive property); be recorded in the real property records of the county; expressly benefit the property on which the wind energy facility is located; expressly run with the land and bind all future owners, lessees or holders of any interest in the burdened property; and not be subject to revocation without the certificate holder's written approval. [Final Order on ASC, Noise Control Condition 2]

4.4 Construction (CON) Conditions

Condition Number	Construction (CON) Conditions
STANDARD: SOIL PROTECTION (SP) [OAR 345-022-0022]	
CON-SP-01	During construction, the certificate holder shall conduct all work in compliance with a final Erosion and Sediment Control Plan (ESCP) that is satisfactory to the Oregon Department of Environmental Quality as required under the National Pollutant Discharge Elimination System Construction Stormwater Discharge General Permit 1200-C. [Final Order on ASC, Soil Protection Condition 1]
CON-SP-02	During construction, the erosion and sediment control best management practices and measures as described in ASC Exhibit I, Section 5.2 and listed in the final order approving the site certificate shall be included and implemented as part of the final ESCP. [Final Order on ASC, Soil Protection Condition 2]
STANDARD: LAND USE (LU) [OAR 345-022-0030]	
CON-LU-01	During construction, the certificate holder shall comply with the following requirements: a. Construction vehicles shall use previously disturbed areas including existing roadways and tracks. b. Temporary construction yards and laydown areas shall be located within the future footprint of permanent structures to the extent practicable. c. New, permanent roadways will be the minimum width allowed while still being consistent with safe use and satisfying county road and safety standards. d. Underground communication and electrical lines will be buried within the area disturbed by temporary road widening to the extent practicable. [Final Order on ASC, Land Use Condition 8]
CON-LU-02	During construction, the certificate holder shall install smooth turbine tower structures and turbine nacelles that lack perching or nesting opportunities for birds. [Final Order on ASC, Land Use Condition 17]
CON-LU-03	During construction, the certificate holder shall install the electrical cable collector system underground, where practicable. In agricultural areas, the collector system lines must be installed at a depth of 3 feet or deeper as necessary to prevent adverse impacts on agriculture operations. In all other areas, the collector system lines must be installed a minimum of 3 feet where practicable. [Final Order on ASC, Land Use Condition 19]
STANDARD: FISH AND WILDLIFE HABITAT (FW) [OAR 345-022-0060]	
CON-FW-01	No construction shall occur in mule deer winter range during winter, defined as December 1 to March 31. Mule deer winter range is based on data to be provided by ODFW at the time of construction. [Final Order on ASC, Fish and Wildlife Habitat Condition 3]

CON-FW-02	During construction within the time periods listed below, the certificate holder shall implement buffer zones around nest sites of the species listed below. No ground-disturbing activities within the buffer zone shall occur during the seasonal restrictions. The construction workforce and facility employees must be provided maps with the locations of the buffer zones and be instructed to avoid ground-disturbing activity within the buffer zone during construction activities. [Final Order on ASC, Fish and Wildlife Habitat Condition 5]
CON-FW-03	During construction, the certificate holder shall employ a qualified environmental professional to provide environmental training to all personnel prior to working onsite, related to sensitive species present onsite, precautions to avoid injuring or destroying wildlife or sensitive wildlife habitat, exclusion areas, permit requirements and other environmental issues. All personnel shall be given clear maps showing areas that are off-limits for construction, and shall be prohibited from working outside of the areas in the site boundary that have been surveyed and approved for construction. The certificate holder shall instruct construction personnel to report any injured or dead wildlife detected while on the site to the appropriate onsite environmental manager. Records of completed training shall be maintained onsite and made available to the department upon request. [Final Order on ASC, Fish and Wildlife Habitat Condition 7]
CON-FW-04	During construction, the certificate holder shall employ at a minimum one environmental inspector to be onsite daily. The environmental inspector shall oversee permit compliance and construction, and ensure that known sensitive environmental resources are protected. The environmental inspector shall prepare a weekly report during construction, documenting permit compliance and documenting any corrective actions taken. Reports shall be kept on file and available for inspection by the department upon request. [Final Order on ASC, Fish and Wildlife Habitat Condition 9]
STANDARD: HISTORIC, CULTURAL, AND ARCHAEOLOGICAL RESOURCES (HC) [OAR 345-022-0090]	
CON-HC-01	Immediately prior to construction activities, the certificate holder must flag or otherwise mark a 200-foot avoidance buffer around historic archaeological sites, as identified by the maps and drawings prepared in accordance with Historic, Cultural, and Archeological Resources Conditions 1 and 2. No disturbance is allowed within the buffer zones. For historic archaeological sites, an archeological monitor must be present if construction activities are required within 200-feet of sites identified as potentially eligible for listing on the National Register of Historic Places (NRHP). The certificate holder may use existing private roads within the buffer areas but may not widen or improve private roads within the buffer areas. The no-entry restriction does not apply to public road rights-of-way within buffer areas. Flagging or marking should be removed immediately upon cessation of activities in the area that pose a threat of disturbance to the site being protected. [Final Order on ASC, Historic, Cultural, and Archeological Resources Condition 3]

CON-HC-02	During construction, the certificate holder shall ensure that construction personnel cease all ground-disturbing activities in the immediate area if any archeological or cultural resources are found during construction of the facility until a qualified archeologist can evaluate the significance of the find. The certificate holder shall notify the department and the Oregon State Historic Preservation Office (SHPO) of the find. If ODOE, in consultation with SHPO, determines that the resource meets the definition of an archaeological object, archaeological site, or is eligible or likely to be eligible for listing on the (NRHP), the certificate holder shall, in consultation with the department, SHPO, interested Tribes and other appropriate parties, make recommendations to the Council for mitigation, including avoidance, field documentation and data recovery. The certificate holder shall not restart work in the affected area until the department, in consultation with SHPO, agree that the certificate holder has demonstrated that it has complied with archeological resources protection regulations. [Final Order on ASC, Historic, Cultural, and Archeological Resources Condition 5]
STANDARD: PUBLIC SERVICES (PS) [OAR 345-022-0110]	
CON-PS-01	During construction, the certificate holder shall include the following additional measures in the construction waste management plan required by Waste Minimization Condition 2: a. Recycling steel and other metal scrap. b. Recycling wood waste. c. Recycling packaging wastes such as paper and cardboard. d. Collecting non-recyclable waste for transport to a local landfill by a licensed waste hauler or by using facility equipment and personnel to haul the waste. Waste hauling by facility personnel within Morrow County shall be performed in compliance with the Morrow County Solid Waste Management Ordinance, which requires that all loads be covered and secured. e. Segregating all hazardous and universal wastes such as used oil, oily rags and oil-absorbent materials, mercury-containing lights and lead-acid and nickel-cadmium batteries for disposal by a licensed firm specializing in the proper recycling or disposal of hazardous and universal wastes. f. Discharging concrete truck rinse-out within foundation holes, completing truck wash-down off-site, and burying other concrete waste as fill on-site whenever possible. [Final Order on ASC, Public Services Condition 3]
CON-PS-02	During construction of the facility, the certificate holder shall provide for 24-hour on-site security, and shall establish effective communications between on-site security personnel and the Morrow County Sheriff's Office and Umatilla County Sheriff's Office. [Final Order on ASC, Public Services Condition 10]
CON-PS-03	During construction of the facility, the certificate holder shall ensure that turbine construction personnel are trained and equipped for fall protection, high angle, and confined space rescue. The certificate holder must retain records of the training and provide them to the department upon request. [Final Order on ASC, Public Services Condition 14]
CON-PS-04	During construction, the certificate holder shall design turbines to be constructed on concrete pads with a minimum of 10 feet of nonflammable and non-erosive ground cover on all sides. The certificate holder shall cover turbine pad areas with nonflammable, non-erosive material immediately following exposure during construction and shall maintain the pad area covering during facility operation. [Final Order on ASC, Public Services Condition 16]

CON-PS-05	During construction the certificate holder must maintain an area clear of vegetation for fire prevention around construction sites, including turbines and towers and any areas where work includes welding, cutting, grinding, or other flame- or spark-producing operations. [Final Order on ASC, Public Services Condition 17]
STANDARD: WASTE MINIMIZATION (WM) [OAR 345-022-0120]	
CON-WM-01	During construction, the certificate holder shall require construction contractors to complete the following for any off-site disposal of excess soil during construction activities: a. Obtain and provide the certificate holder with a signed consent agreement between contractor and the party receiving the earth materials authorizing the acceptance and disposal of the excess soil; and, b. Confirm that all disposal sites have been inspected and approved by the certificate holder's environmental personnel to ensure that sensitive environmental resources, such as wetlands or high quality habitats, would not be impacted. The certificate holder shall maintain copies of all signed consent agreements and disposal site inspection and approvals onsite and shall provide to the department in the 6-month construction report required pursuant to OAR 345-026-0080(1)(a). [Final Order on ASC, Waste Minimization Condition 1]
STANDARD: PUBLIC HEALTH AND SAFETY FOR WIND FACILITIES (WF) [OAR 345-024-0010]	
CON-WF-01	During construction, the certificate holder shall install pad-mounted step-up transformers at the base of each tower in steel boxes designed to protect the public from electrical hazards. [Final Order on ASC, Public Health and Safety Standards for Wind Facilities Condition 1]
CON-WF-02	During construction, the certificate holder shall install and maintain self-monitoring devices on each turbine, linked to sensors at the operations and maintenance building, connected to a fault annunciation panel or supervisory control and data acquisition (SCADA) system to alert operators to potentially dangerous conditions. The certificate holder shall maintain automatic equipment protection features in each turbine that would shut down the turbine and reduce the chance of a mechanical problem causing a fire. The certificate holder shall immediately remedy any dangerous conditions. [Final Order on ASC, Public Health and Safety Standards for Wind Facilities Condition 4]

STANDARD: SITING STANDARDS FOR TRANSMISSION LINES (TL) [OAR 345-024-0090]	
CON-TL-01	During construction, the certificate holder shall take reasonable steps to reduce or manage human exposure to electromagnetic fields, including: a. Constructing all aboveground collector and transmission lines at least 200 feet from any residence or other occupied structure, measured from the centerline of the transmission line. b. Constructing all aboveground 34.5-kV transmission lines with a minimum clearance of 25 feet from the ground. c. Constructing all aboveground 230-kV transmission lines with a minimum clearance of 30 feet from the ground. d. Developing and implementing a program that provides reasonable assurance that all fences, gates, cattle guards, trailers, irrigation systems, or other objects or structures of a permanent nature that could become inadvertently charged with electricity are grounded or bonded throughout the life of the line (OAR 345-027-0023(4)). e. Providing to landowners a map of underground and overhead transmission lines on their property and advising landowners of possible health and safety risks from induced currents caused by electric and magnetic fields. f. Designing and maintaining all transmission lines so that alternating current electric fields do not exceed 9 kV per meter at one meter above the ground surface in areas accessible to the public. g. Increasing the intraconnection transmission line height, shielding the electric field, or installing access barriers, if needed, to prevent induced current and nuisance shock of mobile vehicles. h. Designing and maintaining all transmission lines so that induced voltages during operation are as low as reasonably achievable. i. Designing, constructing and operating the transmission line in accordance with the requirements of the 2012 Edition of the National Electrical Safety Code approved on June 3, 2011 by the American National Standards Institute (OAR 345-027-0023(4)). j. Implement a safety protocol to ensure adherence to NESC grounding requirements [Final Order on ASC, Siting Standard Condition 1]

STANDARD: NOISE CONTROL REGULATION (NC) [OAR 345-035-0035]	
CON-NC-01	During construction, to reduce construction noise impacts at nearby residences, the certificate holder shall: a. Establish and enforce construction site and access road speed limits; b. Utilize electrically-powered equipment instead of pneumatic or internal combustion powered equipment, where feasible; c. Locate material stockpiles and mobile equipment staging, parking, and maintenance areas as far as practicable away from noise sensitive properties; d. Utilize noise-producing signals, including horns, whistles, alarms, and bells for safety warning purposes only; e. Equip all noise-producing construction equipment and vehicles using internal combustion engines with mufflers, air-inlet silencers where appropriate, and any other shrouds, shields, or other noise-reducing features in good operating condition that meet or exceed original factory specification. Mobile or fixed "package" equipment (e.g., arc-welders, air compressors) shall be equipped with shrouds and noise control features that are readily available for that type of equipment; and, f. Establish a noise complaint response system. All construction noise complaints will be logged within 48 hours of issuance. The construction supervisor shall have the responsibility and authority to receive and resolve noise complaints. A clear appeal process to the owner shall be established prior to the start of construction that will allow for resolution of noise problems that cannot be resolved by the site supervisor in a reasonable period of time. Records of noise complaints during construction must be made available to authorized representatives of the department upon request. [Final Order on ASC, Noise Control Condition 1]

4.5 Pre-Operational (PRO) Conditions

Condition Number	Pre-Operational (PRO) Conditions
STANDARD: SOIL PROTECTION (SP) [OAR 345-022-0022]	

PRO-SP-01	Prior to beginning facility operation, the certificate holder shall provide the D~~d~~epartment a copy of a ~~DEQ-approved~~ operational SPCC plan, if required per DEQ's Hazardous Waste Program~~-determined to be required by DEQ~~. If an SPCC plan is not required~~ by DEQ~~, the certificate holder shall prepare and submit to the D~~d~~epartment for review and approval an operational Spill Prevention and Management plan. The Spill Prevention and Management Plan shall include at a minimum the following procedures and BMPs:
	• Procedures for oil and hazardous material emergency response consistent with OAR 340, Division 100-122 and 142
	• Procedures demonstrating compliance with all applicable local, state, and federal environmental laws and regulations for handling hazardous materials used onsite in a manner that protects public health, safety, and the environment
	• Current inventory (type and quantity) of all hazardous materials stored onsite, specifying the amounts at each O&M building, substation and battery storage system components
	• Restriction limiting onsite storage of diesel fuel or gasoline
	• Requirement to store lubricating and dielectric oils in quantities equal to or greater than 55-gallons in qualified oil-filled equipment
	• Preventative measures and procedures to avoid spills
	  ○ Procedures for chemical storage
	  ○ Procedures for chemical transfer
	  ○ Procedures for chemical transportation
	  ○ Procedures for fueling and maintenance of equipment and vehicles
	  ○ Employee training and education
	• Clean-up and response procedures, in case of an accidental spill or release
	• Proper storage procedures
	• Reporting procedures in case of an accidental spill or release
	
	[Final Order on ASC, Soil Protection Condition 5; Amended in Final Order on AMD2]

STANDARD: PUBLIC SERVICES (PS) [OAR 345-022-0110]	
PRO-PS-01	Prior to operation of the facility, the certificate holder shall ensure that operations personnel are trained and equipped for fall protection and tower rescue, including high angle and confined space rescue. Refresher training in high angle and confined space rescue must be provided to operations personnel on an annual basis throughout the operational life of the facility. The certificate holder must retain records of the training and provide them to the department upon request. [Final Order on ASC, Public Services Condition 15]
PRO-PS-02	Before beginning operation of the facility, the certificate holder must provide a final site plan to the identified fire protection districts and first-responders included in the Emergency Management Plan. The certificate holder must indicate on the site plan the identification number assigned to each turbine and the actual location of all facility structures. The certificate

	holder shall provide an updated site plan if additional turbines or other structures are later added to the facility. [Final Order on ASC, Public Services Condition 19]
PRO-PS-03	Prior to operation, the certificate holder must ensure that operations personnel remain current in their first aid/CPR/AED certifications throughout the operational life of the facility. The certificate holder must retain records of the certifications and provide them to the department upon request. The certificate holder shall also ensure that an AED is available onsite at all times that operations and maintenance personnel are at the facility. [Final Order on ASC, Public Services Condition 22

4.6 Operational (OPR) Conditions

Condition Number	Operational (OPR) Conditions
STANDARD: GENERAL STANDARD OF REVIEW (GS) [OAR 345-022-0000]	
OPR-GS-01	The certificate holder shall submit a legal description of the site to the Oregon Department of Energy within 90 days after beginning operation of the facility. The legal description required by this rule means a description of metes and bounds or a description of the site by reference to a map and geographic data that clearly and specifically identify the outer boundaries that contain all parts of the facility. [Final Order on ASC, Mandatory Condition 1] [OAR 345-~~027~~025-00~~2~~60(2)]]
STANDARD: SOIL PROTECTION (SP) [OAR 345-022-0022]	
OPR-SP-01	During facility operation, the certificate holder shall: a. Routinely inspect and maintain all facility components including roads, pads, and other facility components and, as necessary, maintain or repair erosion and sediment control measures and reduce potential facility contribution to erosion. b. Restrict vehicles to constructed access roads, and ensure material laydown or other maintenance activities occur within graveled areas or within the maintenance area of the O&M buildings to avoid unnecessary compaction, erosion, or spill risk to the area surrounding the facility. c. If in order to serve the operational needs of the energy facility, or related and supporting facilities, the certificate holder intends to substantially modify an existing road or construct a new road, the certificate holder must submit and receive Council approval of an amendment to the site certificate prior to the modification or construction. [Final Order on ASC, Soil Protection Condition 6]
STANDARD: LAND USE (LU) [OAR 345-022-0030]	
OPR-LU-01	Within one month of commencement of commercial operation, the certificate holder shall submit an as-built survey for each construction phase that demonstrates compliance with the setback requirements in Land Use Condition 1 to the department and Morrow County. [Final Order on ASC, Land Use Condition 2]
OPR-LU-02	During operation of the facility, the certificate holder shall restore areas that are temporarily disturbed during facility maintenance or repair activities using the same methods and monitoring procedures described in the final Revegetation Plan referenced in Fish and Wildlife Habitat Condition 11. [Final Order on ASC, Land Use Condition 10]
OPR-LU-03	Before beginning decommissioning activities, the certificate holder must provide a copy of the final retirement plan to Morrow County and Umatilla County. [Final Order on ASC, Land Use Condition 23]
OPR-LU-04	Before beginning electrical production, the certificate holder shall prepare an Operating and Facility Maintenance Plan (Plan) and submit the Plan to the department for approval in consultation with Umatilla and Morrow Counties. [Final Order on ASC, Land Use Condition 25]

OPR-LU-05	Within 90 days of the commencement of electrical service from Wheatridge East, the certificate holder shall provide a summary of as-built changes to the department and Umatilla County. [Final Order on ASC, Land Use Condition 26]
OPR-LU-06	Prior to facility retirement, the certificate holder must include the following minimum restoration activities in the proposed final retirement plan it submits to the Council pursuant to OAR 345-027-0110 or its equivalent: 1. Dismantle turbines, towers, pad mounted transformers, meteorological towers and related aboveground equipment, and remove concrete pads to a depth of at least three feet below the surface grade. 2. Remove underground collection and communication cables that are buried less than three feet in depth and are deemed by Council to be a hazard or a source of interference with surface resource uses. 3. Remove gravel from areas surrounding turbine pads. 4. Remove and restore private access roads unless the landowners directs otherwise. 5. Following removal of facility components, grade disturbed areas as close as reasonably possible to the original contours and restore soils to a condition compatible with farm uses or other resources uses. 6. Revegetate disturbed areas in consultation with the land owner and in a manner consistent with the final Revegetation Plan referenced in Fish and Wildlife Habitat Condition 11. 7. If the landowner wishes to retain certain facilities, provide a letter from the land owner that identifies the roads, cleared pads, fences, gates and other improvements to be retained and a commitment from the land owner to maintain the identified facilities for farm or other purposes permitted under the applicable zone. [Final Order on ASC, Land Use Condition 27]
STANDARD: RETIREMENT AND FINANCIAL ASSURANCE (RT) [OAR 345-022-0050]	
OPR-RF-01	During facility operation, the certificate holder shall: (a) Conduct monthly inspections of the battery storage systems, in accordance with manufacturer specifications. The certificate holder shall maintain documentation of inspections, including any corrective actions, and shall submit copies of inspection documentation in its annual report to the Department. (b) Provide evidence in its annual report to the Department of active property coverage under its commercial business insurance from high loss-catastrophic events, including but not limited to, onsite fire or explosion. [Final Order on AMD2, Retirement and Financial Assurance Condition 6]
STANDARD: PUBLIC SERVICES (PS) [OAR 345-022-0110]	
OPR-PS-01	During operation of the facility, the certificate holder shall discharge sanitary wastewater generated at the O&M buildings to licensed on-site septic systems in compliance with State permit requirements. The certificate holder shall design each septic system for a discharge capacity of less than 2,500 gallons per day. [Final Order on ASC, Public Services Condition 1]
OPR-PS-02	Except as provided in this condition, during facility operation, the certificate holder shall obtain water for on-site uses from on-site wells located near the O&M buildings. The certificate holder shall construct on-site wells subject to compliance with the provisions of ORS 537.765 relating to keeping a well log. The certificate holder shall not use more than 5,000 gallons of water per day from each of the two on-site wells. The certificate holder may obtain water from other sources for on-site uses subject to prior approval by the Department.

	[Final Order on ASC, Public Services Condition 2]
~~GEN~~OPR-PS-0~~5~~3	(a) Prior to operation, ~~During operation,~~ the certificate holder shall submit to the Department for approval its ~~implement a~~ Operational W~~w~~aste M~~m~~anagement P~~p~~lan that includes but is not limited to the following ~~measures~~: 1. Onsite handling procedure for operational replacement of damaged, defective or recalled lithium-ion batteries. The procedure shall identify applicable 49 CFR 173.185 provisions and address, at a minimum, onsite handling, packaging, interim storage, and segregation requirements. ~~1.~~2. Training employees to handle, replace, and store damaged, defective or recalled lithium-ion batteries; minimize and recycle solid waste. ~~2.~~3. Recycling paper products, metals, glass, and plastics. ~~3.~~4. Recycling used oil and hydraulic fluid. ~~4.~~5. Collecting non-recyclable waste for transport to a local landfill by a licensed waste hauler or by using facility equipment and personnel to haul the waste. Waste hauling by facility personnel within Morrow County shall be performed in compliance with the Morrow County Solid Waste Management Ordinance, Section 5.000 Public Responsibilities, 5.010 Transportation of Solid Waste and 5.030 Responsibility for Propose Disposal of Hazardous Waste which requires that all loads be covered and secured and that operators be responsible for hazardous waste disposal in accordance with applicable regulatory requirements. ~~5.~~6. Segregating all hazardous and universal, non-recyclable wastes such as used oil, oily rags and oil-absorbent materials, mercury-containing lights, lithium-ion batteries, ~~and~~lead-acid and nickel-cadmium batteries, and replaced, damaged, defective or recalled lithium-ion batteries for disposal by a licensed firm specializing in the proper recycling or disposal of hazardous and universal wastes. (b) During operation, the certificate holder shall implement the approved Operational Waste Management Plan. [Final Order on ASC, Public Services Condition 4; Amended in Final Order on AMD2]
OPR-PS-04	During operation, the certificate holder shall ensure that appropriate law enforcement agency personnel have an up-to-date list of the names and telephone numbers of facility personnel available to respond on a 24-hour basis in case of an emergency at the facility site. [Final Order on ASC, Public Services Condition 12]
STANDARD: PUBLIC HEALTH AND SAFETY FOR WIND FACILITIES (WF) [OAR 345-024-0010]	
OPR-WF-01	During operation, the certificate holder shall ensure each facility substation and battery storage systems are ~~is~~ enclosed with appropriate fencing and locked gates to protect the public from electrical hazards. [Final Order on ASC, Public Health and Safety Standards for Wind Facilities Condition 2; Amended in Final Order on AMD2]

STANDARD: SITING STANDARDS FOR TRANSMISSION LINES (TL) [OAR 345-024-0090]	
OPR-TL-01	During operation, the certificate holder shall: (1) Update the OPUC Safety Staff as to how the operator will comply with OAR Chapter 860, Division 024 on an ongoing basis considering future operations, maintenance, emergency response, and alterations until facility retirement. (2) File the following required information with the Commission: a. 758.013 Operator of electric power line to provide Public Utility Commission with safety information; availability of information to public utilities. (1) Each person who is subject to the Public Utility Commission's authority under ORS 757.035 and who engages in the operation of an electric power line as described in ORS 757.035 must provide the commission with the following information before January 2 of each even-numbered year: i. The name and contact information of the person that is responsible for the operation and maintenance of the electric power line, and for ensuring that the electric power line is safe, on an ongoing basis; and ii. The name and contact information of the person who is responsible for responding to conditions that present an imminent threat to the safety of employees, customers and the public. iii. In the event that the contact information described in subsection (1) of this section changes or that ownership of the electric power line changes, the person who engages in the operation of the electric power line must notify the commission of the change as soon as practicable, but no later than within 90 days. iv. If the person described in subsection (1) of this section is not the public utility, as defined in ORS 757.005, in whose service territory the electric power line is located, the commission shall make the information provided to the commission under subsection (1) of this section available to the public utility in whose service territory the electric power line is located. [2013 c.235 §3] (3) Provide OPUC Safety Staff with: a. Maps and Drawings of routes and installation of electrical supply lines showing: • Transmission lines and structures (over 50,000 Volts) • Distribution lines and structures - differentiating underground and overhead lines (over 600 Volts to 50,000 Volts) • Substations, roads and highways • Plan and profile drawings of the transmission lines (and name and contact information of responsible professional engineer). [Final Order on ASC, Siting Standard Condition 3]
STANDARD: NOISE CONTROL REGULATION (NC) [OAR 345-035-0035]	
OPR-NC-01	During operation of the facility, the certificate holder shall only operate the facility in the NRO mode that is identified prior to construction pursuant to Noise Control Condition 2. After beginning operation of the facility, the certificate holder shall include a certification in its annual Compliance Report that the NRO mode turbines identified in the preconstruction analysis required by Noise Control Condition 2 are operating at or below the identified dBA reduction level. [Final Order on ASC, Noise Control Condition 3]

OPR-NC-02	During operation, the certificate holder shall maintain a complaint response system to address noise complaints. The certificate holder shall notify the department within two working days of receiving a noise complaint related to the facility. The notification should include, but is not limited to, the date the certificate holder received the complaint, the nature of the complaint, the complainant's contact information, the location of the affected property, and any actions taken, or planned to be taken, by the certificate holder to address the complaint. [Final Order on ASC, Noise Control Condition 4]
OPR-NC-03	During operation, in response to a complaint from the owner of a noise sensitive property regarding noise levels from the facility, the Council may require the certificate holder to monitor and record the statistical noise levels to verify that the certificate holder is operating in compliance with the noise control regulations. The monitoring plan must be reviewed and approved by the department prior to implementation. The cost of such monitoring, if required, shall be borne by the certificate holder. [Final Order Noise Control Condition 5]

4.7 Retirement Conditions (RET)

Condition Number	Retirement (RET) Conditions
STANDARD: RETIREMENT AND FINANCIAL ASSURANCE (RT) [OAR 345-022-0050]	
RET-RF-01	The certificate holder must retire the facility in accordance with a retirement plan approved by the Council if the certificate holder permanently ceases construction or operation of the facility. The retirement plan must describe the activities necessary to restore the site to a useful, nonhazardous condition, as described in OAR 345-027-0110(5). After Council approval of the plan, the certificate holder must obtain the necessary authorization from the appropriate regulatory agencies to proceed with restoration of the site. [Final Order Retirement and Financial Assurance Condition 2] [Mandatory Condition OAR 345-027-0020(9)]
RET-RF-02	~~The certificate holder is obligated to retire the facility upon permanent cessation of construction or operation.~~ If the Council finds that the certificate holder has permanently ceased construction or operation of the facility without retiring the facility according to a final retirement plan approved by the Council, as described in OAR 345-027-0110, the Council must notify the certificate holder and request that the certificate holder submit a proposed final retirement plan to the department within a reasonable time not to exceed 90 days. If the certificate holder does not submit a proposed final retirement plan by the specified date, the Council may direct the department to prepare a proposed final retirement plan for the Council's approval. Upon the Council's approval of the final retirement plan, the Council may draw on the bond or letter of credit described in ~~OAR 345-027-0020(8)~~section (8) to restore the site to a useful, nonhazardous condition according to the final retirement plan, in addition to any penalties the Council may impose under OAR Chapter 345, Division 29. If the amount of the bond or letter of credit is insufficient to pay the actual cost of retirement, the certificate holder must pay any additional cost necessary to restore the site to a useful, nonhazardous condition. After completion of site restoration, the Council must issue an order to terminate the site certificate if the Council finds that the facility has been retired according to the approved final retirement plan. [Final Order Retirement and Financial Assurance Condition 3] [Mandatory Condition OAR 345~~-027-0020~~-025-0006(16)]

5.0 Successors and Assigns

To transfer this site certificate or any portion thereof or to assign or dispose of it in any other manner, directly or indirectly, the certificate holder shall comply with OAR 345-027-0100.

6.0 Severability and Construction

If any provision of this agreement and certificate is declared by a court to be illegal or in conflict with any law, the validity of the remaining terms and conditions shall not be affected, and the rights and obligations of the parties shall be construed and enforced as if the agreement and certificate did not contain the particular provision held to be invalid.

7.0 Execution

This site certificate may be executed in counterparts and will become effective upon signature by the Chair of the Energy Facility Siting Council and the authorized representative of the certificate holder

IN WITNESS THEREOF, this site certificate has been executed by the State of Oregon, acting by and through the Energy Facility Siting Council, and by Wheatridge Wind Energy, LLC.

ENERGY FACILITY SITING COUNCIL	**WHEATRIDGE WIND ENERGY, LLC**
By: _____	By: _____
Barry Beyeler, Chair	John DiDonato, Vice President Development, NextEra Energy Resources, LLC on behalf of Wheatridge Wind Energy, LLC
Oregon Energy Facility Siting Council	
Date: _____	Date:_____

Attachment A
Facility Site Boundary Map

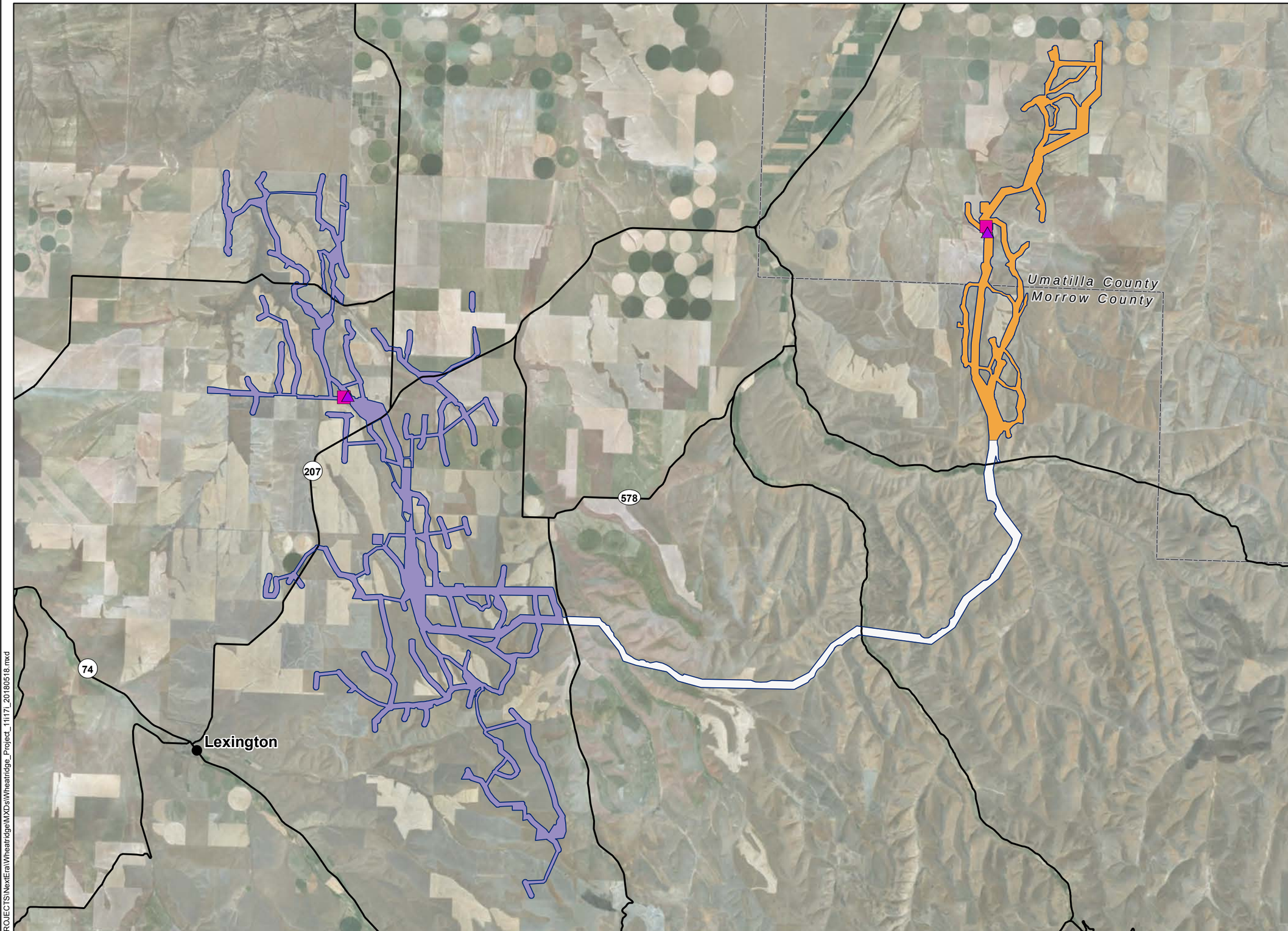
(Figure 1)

Wheatridge Wind Energy

NEXTera ENERGY RESOURCES

Figure 1
Site Boundary and Energy Storage Sites

MORROW AND UMATILLA COUNTIES, OR

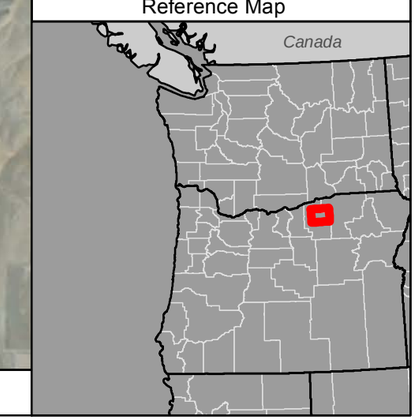


- EFSC Site Boundary
- Wheatridge East
- Intraconnection Line Corridor
- Wheatridge West
- Substation
- Proposed Energy Storage
- City/Town
- County Boundary
- Secondary Road

WHEATRIDGE WIND ENERGY, LLC

TETRA TECH

Reference Map



1:130,000 WGS 1984 UTM Zone 11N

0 0.5 1 2 3 4 Miles

P:\GIS_PROJECTS\NextEra\Wheatridge\MXDs\Wheatridge_Project_11i17i_20180518.mxd

Attachment B: Reviewing Agency Comments on preliminary Request for Amendment 2

ESTERSON Sarah * ODOE

From: CAINES Jeff <Jeff.CAINES@aviation.state.or.us>
Sent: Wednesday, June 20, 2018 4:40 PM
To: ESTERSON Sarah * ODOE
Cc: WOODS Maxwell * ODOE; Sandra Pointer (Lexington Airport)
Subject: RE: Wheatridge Wind Energy Facility - Preliminary Request for Amendment 2 of Site Certificate - Proposed Larger Turbines - Request for ODA Review/Comment

Sarah:

Thank you for allowing ODA to comment on the proposed changes to the Wheatridge Wind Energy Facility.

It is my understanding that the Wheatridge project removed approximately 4-5 proposed turbines that could have an effect on the Lexington airport. I have contacted the airport sponsor and did confirm that turbines were removed and that there would be no adverse impacts to the Lexington airport.

ODA does not regulate private use airports, i.e., West Buttercreek airport, in the same manner as Lexington. However, I understand that the West Buttercreek airport is approximately 4 miles away from the proposed energy site, therefore this project should not pose an impact to the operational use of the airport.

Any planes flying in the area for agricultural use (i.e., crop dusting) should be aware that turbines are in the area and needs to work with the land owner(s) to identify the location of the proposed structures.

ODA would request that the applicant submit updated FAA forms 7460-1 if the determinations are older than 18 months, as specified by 14 CFR Part 77. ODA will defer to the FAA for their determination since the structures are over 200 feet in height, knowing that no impact to the Lexington airport will take place.

Thank you again for allowing ODA to comment. Please feel free to contact me if you or the applicant have any questions.

Jeff

JEFF CAINES, AICP
OREGON DEPARTMENT OF AVIATION
AVIATION PLANNER / SCIP COORDINATOR

OFFICE 503-378-2529
CELL/TEXT **503**-507-6965

EMAIL jeff.caines@aviation.state.or.us
WEBSITE www.oregon.gov/aviation

3040 25th Street SE, Salem, OR 97302

From: ESTERSON Sarah * ODOE [mailto:Sarah.Esterson@oregon.gov]
Sent: Friday, June 15, 2018 12:17 PM
To: CAINES Jeff
Cc: WOODS Maxwell * ODOE
Subject: Wheatridge Wind Energy Facility - Preliminary Request for Amendment 2 of Site Certificate - Proposed Larger Turbines - Request for ODA Review/Comment

Jeff,

This email is to inform the Oregon Department of Aviation of the Oregon Department of Energy's receipt of the preliminary Request for Amendment 2 (pAMD2) for the Wheatridge Wind Energy Facility Site Certificate. The Wheatridge Wind Energy Facility is an approved but not yet constructed wind energy facility, to be located in Morrow and Umatilla counties, with up to 292 wind turbines and a maximum capacity of 500 megawatts..

The pAMD2 requests Council approval to construct and operate larger wind turbines and two battery storage systems.

The proposed larger wind turbines would change the previously approved turbine dimensions including: increase turbine hub height (278 to 291.3 feet), increase maximum blade tip height (476 to 499.7 feet), increase maximum blade length (197 to 204.1 feet), lower the minimum ground clearance (83 to 70.5 feet), and increase rotor diameter (393 to 416.7 feet).

The proposed battery storage systems would consist of lithium-ion batteries contained in a building or series of modular containers and would include approximately 18 inverters and associated step-up transformers, as well as interconnecting facilities (control house, protective device and power transformer). The proposed battery storage systems may include ground-level cooling equipment, power conditioning systems, distribution and auxiliary transformers. The proposed battery storage systems would be located adjacent to the previously approved substation and operation and maintenance building sites and would each result in up to 5 acres of new permanent disturbance. One of these sites would be located within Umatilla County.

The Department has already requested additional information from the certificate holder, and the certificate has provided responses specific to the proposed larger turbines. Specifically, please see the information request and response below:

A. Response to RAI-25.

Public Health and Safety Standards for Wind Energy Facilities does not address whether or how the increase in total maximum blade tip length from 476 to 499.7-ft could impact the certificate holder's ability to design, construct and operate the turbines to exclude members of the public, specifically users of airspace associated with Lexington and West Buttercreek airports and private airstrips from close proximity to turbine blades. Describe the potential impacts and identify how those impacts would not impact the certificate holders' ability to operate the facility in a manner that would exclude members of the public from close proximity to turbine blades.

<u>Response</u>: Because the turbines are greater than 200 feet in height, the certificate holder is required to submit a Notice of Proposed Construction or Alteration form (known as FAA Form 7460-1) to both the Federal Aviation Administration (FAA) and the Oregon Department of Aviation (ODA), in order for the FAA and ODA to asses potential hazards to air safety and air navigation. In 2016, the FAA determined that the turbines proposed at that time, at a height of 499 feet about ground level, were in compliance with federal aviation safety standards and subsequently issued favorable Determinations of No Hazard to Air Navigation. Subsequent to that determination, Wheatridge micro-sited 63 turbines, resulting in the need for new aeronautical studies. Per Public Services Condition No. 9, the certificate holder will secure new aeronautical studies for these new locations. Although the certificate holder does not anticipate any issues, should the FAA find that the impact of one or more of these turbines exceeds an acceptable threshold of impact, mitigation options are available and will be implemented.

My questions are:

- Should we request that the certificate holder describe both the acceptable threshold of impact and potential mitigation options?
- The certificate holder references Determinations of No Hazard for 499' turbines.
    - Does ODA have these on file?

- Would a new 7460 evaluation be needed for a 499.7' turbine, or just those that represent a new location?

Let me know if you have availability next week to discuss.

Thanks,
Sarah

Sarah T. Esterson
Energy Facility Siting Analyst
Oregon Department of Energy
550 Capitol St NE, 1st Floor
Salem, OR 97301
P:(503) 373-7945
C: (503) 385-6128

Oregon.gov/energy

From: Marshall, Jesse [mailto:JESSE.MARSHALL@nexteraenergy.com]
Sent: Monday, June 11, 2018 4:02 PM
To: ESTERSON Sarah * ODOE <Sarah.Esterson@oregon.gov>
Cc: Castro, Scott <Scott.Castro@nexteraenergy.com>; Carrie Konkol (carrie.konkol@tetratech.com) <carrie.konkol@tetratech.com>; Curtiss, Sarah Stauffer (sarah.curtiss@stoel.com) <sarah.curtiss@stoel.com>; Filippi, David (david.filippi@stoel.com) <david.filippi@stoel.com>; Solsby, Anneke (Anneke.Solsby@tetratech.com) <Anneke.Solsby@tetratech.com>; WOODS Maxwell * ODOE <Maxwell.Woods@oregon.gov>; RATCLIFFE Jesse D <Jesse.D.RATCLIFFE@state.or.us>; CORNETT Todd * ODOE <Todd.Cornett@oregon.gov>; ROWE Patrick G <Patrick.G.ROWE@state.or.us>; Pappalardo, Mike <MIKE.PAPPALARDO@nexteraenergy.com>
Subject: RE: Department Response to Wheatridge Wind Energy, LLC's Amendment Determination Request and pRFA2 Determination and RAIs

Ms. Esterson:

Thank you for forwarding along the Oregon Department of Energy's ("Department") Determination on Wheatridge Wind Energy, LLC's ("Wheatridge") Amendment Determination Request, as well as the Department's requests for additional information ("RAIs") on Request for Amendment 2 ("RFA2"). This is to confirm receipt of those materials. As requested, the Wheatridge team will assemble the information requested in the RAIs and submit to the Department by June 29, 2018.

In addition, in light of the RAIs and given that the Department is still re-evaluating whether Type B review is the appropriate procedural process for RFA2, we wanted to provide clarification on several issues that may inform the Department's determination on the appropriate review path. Specifically, given that there are only a few RAIs related to modified range of turbine specifications, we are providing advance responses on those RAIs. (Note that we will include these in the full RAI response table later this month).

Although we continue to believe that the Type B review process is appropriate for both the modified range of turbine specifications and the addition of battery storage for the reasons outlined in our May 18, 2018 submittal, we request that you make separate review path determinations on each proposed change. That way, Wheatridge may evaluate whether it would be advantageous to separate the proposed modifications into two separate requests for amendment.

A. Responses to RAI-5.

Confirm whether larger cranes would be needed during wind turbine installation. If larger cranes would be needed, confirm whether a wider crane path would be needed than was previously evaluated (at 39 feet).

Response: Larger cranes will not be needed during wind turbine installation. Cranes will operate within the crane path that was previously evaluated.

Confirm whether larger cranes would be needed during routine operations and maintenance activities, such as blade repair and blade replacement, and whether the previously evaluated permanent turbine pad impact area (65-ft diameter circle) would continue to provide adequate space for the necessary equipment.

Response: Larger cranes will not be needed during routine operations and maintenance activities. The previously evaluated permanent turbine pad impact area will continue to provide adequate space for the necessary equipment.

Describe frequency of anticipated routine operations and maintenance (O&M) activities, such as blade repair or replacement, and whether this differs from the frequency of O&M activities associated with the previously evaluated turbines.

Response: The frequency of anticipated routine operations and maintenance activities, such as blade repair or replacement, will remain the same as those associated with the previously evaluated turbines.

Evaluate whether the previously provided construction schedule (ASC Exhibit B: 18-month duration, phased) continues to represent the construction schedule for the proposed larger turbines and battery storage systems.

Response: The previously provided construction schedule continues to represent the construction schedule for the proposed larger turbines and battery storage systems.

Describe whether the previously evaluated peak number of workers needed during construction would continue to represent a worst-case scenario related to impacts to public services.

Response: The previously evaluated peak number of workers needed during construction will continue to represent a worst-case scenario related to impacts to public services.

B. Response to RAI-24.

Public Health and Safety Standards for Wind Energy Facilities does not address whether or how the lowering of the wind turbine minimum blade tip clearance could impact the certificate holder's ability to design, construct and operate the turbines to exclude members of the public from close proximity to the turbine blades. Describe the potential impacts to public health and safety from lowering of the minimum blade tip clearance; describe how the certificate holder would continue to be able to operate the facility to exclude members of the public from close proximity to blades; and, identify whether any new or amended conditions are necessary to satisfy the standard.

Response: The lowering of the wind turbine minimum blade tip clearance will not impact the certificate holder's ability to design, construct and operate the turbines to exclude members of the public from close proximity to the turbine blades. As outlined in the Final Order, (1) the facility is located entirely on private property which will restrict public access to turbine and other facility component locations; (2) access roads improved or developed for proposed facility construction and operation will be gated or locked, when not actively in use, to limit accessibility; and (3) pad-mounted step-up transformers will be enclosed in steel boxes. In addition, substations and the proposed battery storage area will be within fenced and locked areas, and all turbine towers will be located within the minimum safety setbacks of 110 percent of the maximum blade tip height from public roads, and 100 percent from non-participating landowners. With these measures in place, no new or amended conditions are necessary to ensure that the certificate holder can design,

construct and operate the facility to exclude members of the public from close proximity to the turbine blades and electrical equipment

C. Response to RAI-25.

Public Health and Safety Standards for Wind Energy Facilities does not address whether or how the increase in total maximum blade tip length from 476 to 499.7-ft could impact the certificate holder's ability to design, construct and operate the turbines to exclude members of the public, specifically users of airspace associated with Lexington and West Buttercreek airports and private airstrips from close proximity to turbine blades. Describe the potential impacts and identify how those impacts would not impact the certificate holders' ability to operate the facility in a manner that would exclude members of the public from close proximity to turbine blades.

Response: Because the turbines are greater than 200 feet in height, the certificate holder is required to submit a Notice of Proposed Construction or Alteration form (known as FAA Form 7460-1) to both the Federal Aviation Administration (FAA) and the Oregon Department of Aviation (ODA), in order for the FAA and ODA to asses potential hazards to air safety and air navigation. In 2016, the FAA determined that the turbines proposed at that time, at a height of 499 feet about ground level, were in compliance with federal aviation safety standards and subsequently issued favorable Determinations of No Hazard to Air Navigation. Subsequent to that determination, Wheatridge micro-sited 63 turbines, resulting in the need for new aeronautical studies. Per Public Services Condition No. 9, the certificate holder will secure new aeronautical studies for these new locations. Although the certificate holder does not anticipate any issues, should the FAA find that the impact of one or more of these turbines exceeds an acceptable threshold of impact, mitigation options are available and will be implemented.

Thank you for your review of these advance responses.

Sincerely,
Jesse Marshall

Jesse Marshall
NextEra Energy Resources
Project Director
(760) 846-4421
jesse.marshall@nee.com

From: ESTERSON Sarah * ODOE [mailto:Sarah.Esterson@oregon.gov]
Sent: Friday, June 08, 2018 1:50 PM
To: Pappalardo, Mike
Cc: Marshall, Jesse; Castro, Scott; Carrie Konkol (carrie.konkol@tetratech.com); Curtiss, Sarah Stauffer (sarah.curtiss@stoel.com); Filippi, David (david.filippi@stoel.com); Solsby, Anneke (Anneke.Solsby@tetratech.com); WOODS Maxwell * ODOE; RATCLIFFE Jesse D; CORNETT Todd * ODOE; ROWE Patrick G
Subject: Department Response to Wheatridge Wind Energy, LLC's Amendment Determination Request and pRFA2 Determination and RAIs

CAUTION - EXTERNAL EMAIL

Mike,

Per our discussion, please find the attached two Department determinations:

- ODOE ADR Determination: Department determines site certificate amendment is required for the proposed facility modifications based on evaluation of OAR 345-027-0050(4) criteria.
- Determination Letter and RAIs: Department determines preliminary Request for Amendment 2 (pRFA2) incomplete and requests additional information (RAI) to support the evaluation of compliance with Council

standards and evaluation of new or amended conditions. (Note: Word Version of RAI table provided for ease of review/response).

If requested, NextEra may refer the Department's amendment determination to Council for concurrence, modification or rejection. In order to be included on the June 29, 2018 Council agenda, please let us know by June 12, 2018 if NextEra chooses to refer the Department amendment determination to Council.

In addition, please provide responses to the pRFA2 request for additional information by June 29, 2018. Please let us know if additional time is needed to respond.

The Department intends to provide its determination on the re-evaluation of the Type B review ADR next week.

Please do not hesitate to contact myself, Todd or Max with questions or comments.

Thanks,
Sarah

Sarah T. Esterson
Energy Facility Siting Analyst
Oregon Department of Energy
550 Capitol St NE, 1st Floor
Salem, OR 97301
P:(503) 373-7945
C: (503) 385-6128

Oregon.gov/energy

From: Pappalardo, Mike [mailto:MIKE.PAPPALARDO@nexteraenergy.com]
Sent: Friday, May 18, 2018 3:30 PM
To: ESTERSON Sarah * ODOE <Sarah.Esterson@oregon.gov>
Cc: Marshall, Jesse <JESSE.MARSHALL@nexteraenergy.com>; Castro, Scott <Scott.Castro@nexteraenergy.com>; Carrie Konkol (carrie.konkol@tetratech.com) <carrie.konkol@tetratech.com>; Curtiss, Sarah Stauffer (sarah.curtiss@stoel.com) <sarah.curtiss@stoel.com>; Filippi, David (david.filippi@stoel.com) <david.filippi@stoel.com>; Solsby, Anneke (Anneke.Solsby@tetratech.com) <Anneke.Solsby@tetratech.com>; WOODS Maxwell * ODOE <Maxwell.Woods@oregon.gov>; RATCLIFFE Jesse D <Jesse.D.RATCLIFFE@state.or.us>; CORNETT Todd * ODOE <Todd.Cornett@oregon.gov>
Subject: Submittal of RFA 2 for Wheatridge Wind Energy Facility, and Request for Reconsideration for the Wheatridge Wind Energy, LLC's Amendment Determination Request

Dear Ms. Esterson:

Attached please find a second Request for Amendment ("RFA 2") for the Wheatridge Wind Energy, LLC ("Wheatridge"), Wheatridge Wind Energy Facility ("Project"). In RFA 2, Wheatridge seeks concurrence on a modified range of turbine specifications for use at the Project. In addition, Wheatridge seeks to add energy storage as a related and supporting facility. With this submittal, we are also formally requesting that the Oregon Department of Energy ("Department") reevaluate its April 25, 2018 determination ("Department Response") that RFA 2 should be subject to the Department's Type A amendment review process.

Please feel free to contact me at any time if you have any questions or concerns regarding this submittal.

Sincerely,

Mike Pappalardo|Environmental Manager
NextEra Energy Resources|3256 Wintercreek Drive|Eugene, OR 97405
office: 541.302.1345|cell: 541.206.1005|email: mike.pappalardo@nexteraenergy.com

ESTERSON Sarah * ODOE

From: Steve Cherry <Steve.P.Cherry@state.or.us>
Sent: Friday, June 22, 2018 9:25 AM
To: ESTERSON Sarah * ODOE; REIF Sarah J; CHERRY Steve P
Cc: WOODS Maxwell * ODOE
Subject: RE: Wheatridge Wind Energy Facility - Preliminary Request for Amendment 2 of Site Certificate - ODFW Review Request

Sarah,
ODFW does not have any concerns about the current monitoring plan's effectiveness to determine mortality for this project with the proposed change in turbine size. The only comment I would make is that the mitigation and reveg plans need to be updated to include the permanent and temporary impacts from the change in the layout (i.e. battery storage systems, and potential for change in turbine layout due to turbine size). Please let me know if you have any more questions.

Steve

From: ESTERSON Sarah * ODOE [mailto:Sarah.Esterson@oregon.gov]
Sent: Friday, June 15, 2018 11:24 AM
To: REIF Sarah J; CHERRY Steve P
Cc: WOODS Maxwell * ODOE
Subject: Wheatridge Wind Energy Facility - Preliminary Request for Amendment 2 of Site Certificate - ODFW Review Request

Sarah and Steve,

On May 18, 2018, the Oregon Department of Energy received preliminary Request for Amendment 2 (pAMD5) for the Wheatridge Wind Energy Facility Site Certificate (link provided below). The Wheatridge Wind Energy Facility is an approved but not yet constructed wind energy facility, to be located in Morrow and Umatilla counties, with up to 292 wind turbines and a maximum capacity of 500 megawatts..

The pAMD2 requests Council approval to construct and operate larger wind turbines and two battery storage systems.

The proposed larger wind turbines would change the previously approved turbine dimensions including: increase turbine hub height (278 to 291.3 feet), increase maximum blade tip height (476 to 499.7 feet), increase maximum blade length (197 to 204.1 feet), lower the minimum ground clearance (83 to 70.5 feet), and increase rotor diameter (393 to 416.7 feet).

The proposed battery storage systems would consist of lithium-ion batteries contained in a building or series of modular containers and would include approximately 18 inverters and associated step-up transformers, as well as interconnecting facilities (control house, protective device and power transformer). The proposed battery storage systems may include ground-level cooling equipment, power conditioning systems, distribution and auxiliary transformers. The proposed battery storage systems would be located adjacent to the previously approved substation and operation and maintenance building sites and would each result in up to 5 acres of new permanent disturbance.

We would like to request ODFW review and comment on the amendment request by **June 29, 2018.** In particular, we have the following question:

- Does ODFW consider the fatality monitoring program sufficient (i.e. sample size of 50 turbines) to monitor/mitigate for potential bird/bat species during operation of the proposed larger turbines?

The amendment request is attached for reference, along with the WMMP as reviewed/approved in draft format during the application process.

Let me know if you have questions and whether the June 29, 2019 review timeline is feasible.

Thanks,
Sarah

Sarah T. Esterson
Energy Facility Siting Analyst
Oregon Department of Energy
550 Capitol St NE, 1st Floor
Salem, OR 97301
P:(503) 373-7945
C: (503) 385-6128

Oregon.gov/energy

ESTERSON Sarah * ODOE

From: Carla McLane <cmclane@co.morrow.or.us>
Sent: Monday, July 2, 2018 10:45 AM
To: ESTERSON Sarah * ODOE
Cc: RUSSELL Don; Jim Doherty; Melissa Lindsay; WOODS Maxwell * ODOE; Darrell Green; 'Marshall, Jesse'; Sandra Pointer
Subject: RE: Wheatridge Wind Energy Facility - Preliminary Request for Amendment 2 of Site Certificate - Special Advisory Group Review Request by July 6, 2018
Attachments: RFA2 Comment letter 07022018 signed.pdf

Sarah,
Attached please find our comment letter for the WRW pAMD2.
Let me know if you have any questions or follow up.

Have a great 4th of July!
Carla

From: ESTERSON Sarah * ODOE [mailto:Sarah.Esterson@oregon.gov]
Sent: Friday, June 15, 2018 11:44 AM
To: Carla McLane <cmclane@co.morrow.or.us>
Cc: Don Russell <drussell@co.morrow.or.us>; Jim Doherty <jdoherty@co.morrow.or.us>; Melissa Lindsay <mlindsay@co.morrow.or.us>; WOODS Maxwell * ODOE <Maxwell.Woods@oregon.gov>
Subject: Wheatridge Wind Energy Facility - Preliminary Request for Amendment 2 of Site Certificate - Special Advisory Group Review Request by July 6, 2018

Carla and Morrow County Board of Commissioners,

This email is to inform the Morrow County Planning Department and Morrow County Board of Commissioners of the Oregon Department of Energy's receipt of the preliminary Request for Amendment 2 (pAMD2) for the Wheatridge Wind Energy Facility Site Certificate. The Wheatridge Wind Energy Facility is an approved but not yet constructed wind energy facility, to be located in Morrow and Umatilla counties, with up to 292 wind turbines and a maximum capacity of 500 megawatts..

The pAMD2 requests Council approval to construct and operate larger wind turbines and two battery storage systems.

The proposed larger wind turbines would change the previously approved turbine dimensions including: increase turbine hub height (278 to 291.3 feet), increase maximum blade tip height (476 to 499.7 feet), increase maximum blade length (197 to 204.1 feet), lower the minimum ground clearance (83 to 70.5 feet), and increase rotor diameter (393 to 416.7 feet).

The proposed battery storage systems would consist of lithium-ion batteries contained in a building or series of modular containers and would include approximately 18 inverters and associated step-up transformers, as well as interconnecting facilities (control house, protective device and power transformer). The proposed battery storage systems may include ground-level cooling equipment, power conditioning systems, distribution and auxiliary transformers. The proposed battery storage systems would be located adjacent to the previously approved substation and operation and maintenance building sites and would each result in up to 5 acres of new permanent disturbance. One of these sites would be located within Morrow County.

We would like to request your review and comment on the amendment request by **July 6, 2018.** In particular, we have the following questions:

- Has the county adopted any changes to county code provisions (e.g. setback requirements, etc) that could apply to the proposed larger turbines?
- The Department has already completed initial consultation with Carla regarding applicability of the County's Solid Waste Management Ordinance and Solid Waste Management Program for solid waste management during operation of the proposed battery storage systems. Please confirm whether the above-provided description, as obtained from the amendment request, would trigger applicability of any other county code provisions that necessarily should be evaluated through the site certificate amendment process.

The amendment request is attached for reference.

Let me know if you have questions and whether the July 6, 2019 review timeline is feasible.

Thanks,
Sarah

Sarah T. Esterson
Energy Facility Siting Analyst
Oregon Department of Energy
550 Capitol St NE, 1st Floor
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P:(503) 373-7945
C: (503) 385-6128

Oregon.gov/energy

MORROW COUNTY

PLANNING DEPARTMENT

P. O. Box 40 • Irrigon, Oregon 97844
(541) 922-4624 or (541) 676-9061 x 5503
FAX: (541) 922-3472

July 2, 2018

Sarah Esterson, Energy Facility Siting Analyst
Oregon Department of Energy
550 Capitol Street NE, 1st Floor
Salem, OR 97301

RE: Wheatridge Wind Energy Facility - Request for Amendment 2

Dear Ms. Esterson:

The following comments are on behalf of the Morrow County Board of Commissioners serving as a Special Advisory Group for this project. The purpose of this letter is to address the preliminary Request for Amendment 2 (pAMD2) and more specifically to address the questions posed in your June 15, 2018, email to myself.

Since the original application by the developers of the Wheatridge Wind Energy Facility was submitted, Morrow County has updated portions of our Zoning Ordinance. The portion applicable to this action is the Exclusive Farm Use (EFU) zone. The Morrow County update brought the EFU zone into compliance with both Oregon Revised Statute and Oregon Administrative Rule, incorporating the required standards for development of wind energy facilities. There is nothing in the Morrow County update of our EFU zone that should affect or impact the Energy Facility Siting Council decision or be applicable to the pAMD2.

As to the discussion we previously had concerning the applicability of the Morrow County Solid Waste Management Plan and Ordinance I would find it to still be applicable, but would not find that it should unduly hold up the amendment process. Our previously submitted and included Solid Waste Management Ordinance provisions are still applicable, including Section 5.000 Public Responsibilities 5.030 Responsibility for Proper Disposal of Hazardous Waste. Those are analyzed in Exhibit V Solid Waste and Waste Water, specifically on page 6. There is also discussion of hazardous waste in Exhibit G Materials Analysis. Within the pAMD2 the applicant has placed the discussion concerning the battery storage relative to waste within the Waste Minimization standard, which Morrow County would agree is appropriate. In reviewing those portions of the original application and the pAMD2 Morrow County would find that the Oregon Department of Energy (ODOE) review and Energy Facility Siting Council (EFSC) imposed Conditions found in the Final Order under Waste Minimization address solid and hazardous wastes appropriately. As part of the Waste Minimization discussion within the Final Order ODOE staff state the following, "The applicant stated that any hazardous waste generated during construction *or operation* of the facility would be removed, transported, and disposed by a qualified and licensed contractor. No hazardous solid wastes shall be dumped, deposited, buried, or otherwise disposed on or under the ground at the facility." Morrow County would find this statement satisfactory when coupled with the statements and assertions found within both the original application and the pAMD2.

Thanks again for the opportunity to comment to the Wheatridge Wind Energy Facility Request for Amendment 2. It has been a pleasure working with you and other Department staff to date, and I anticipate that will continue. Should you have any questions about this comment letter, previous comment letters, or need additional information, please do not hesitate to contact me.

Cordially,

Carla McLane
Planning Director

cc: Jesse Marshall
Morrow County Board of Commissioners
Sandra Pointer, Morrow County Public Works

ESTERSON Sarah * ODOE

From: Robert Waldher <robert.waldher@umatillacounty.net>
Sent: Tuesday, July 3, 2018 4:32 PM
To: ESTERSON Sarah * ODOE
Cc: GIVENS Larry; George Murdock; ELFERING Bill; WOODS Maxwell * ODOE
Subject: Re: Wheatridge Wind Energy Facility - Preliminary Request for Amendment 2 of Site Certificate - Special Advisory Group Review Request by July 6, 2018
Attachments: image001.jpg

Hello Sarah - Thank you for the inquiry regarding the Wheatridge amendment.

Here is a response to your questions...

1. Our Development Code provisions have not changed beyond what was considered in the original Wheatridge application. We would process a battery storage system similar to how we would permit a substation on EFU...Utility Facility Necessary for Public Service.

2. I have reviewed other County ordinances and I am not aware of additional ordinances that would apply.

Thank you for explaining to me a little more about the battery storage facilities. I am guessing we will see more of these as more renewable projects come online. Please let me know if you have additional questions or comments. Thank you!

Bob

On Fri, Jun 15, 2018 at 11:50 AM ESTERSON Sarah * ODOE <Sarah.Esterson@oregon.gov> wrote:

> Bob and Umatilla County Board of Commissioners,
>
> This email is to inform the Umatilla County Planning Department and Umatilla County Board of Commissioners of the Oregon Department of Energy's receipt of the preliminary Request for Amendment 2 (pAMD2) for the Wheatridge Wind Energy Facility Site Certificate. The Wheatridge Wind Energy Facility is an approved but not yet constructed wind energy facility, to be located in Morrow and Umatilla counties, with up to 292 wind turbines and a maximum capacity of 500 megawatts..
>
> The pAMD2 requests Council approval to construct and operate larger wind turbines and two battery storage systems.
>
> The proposed larger wind turbines would change the previously approved turbine dimensions including: increase turbine hub height (278 to 291.3 feet), increase maximum blade tip height (476 to 499.7 feet), increase maximum blade length (197 to 204.1 feet), lower the minimum ground clearance (83 to 70.5 feet), and increase rotor diameter (393 to 416.7 feet).

The proposed battery storage systems would consist of lithium-ion batteries contained in a building or series of modular containers and would include approximately 18 inverters and associated step-up transformers, as well as interconnecting facilities (control house, protective device and power transformer). The proposed battery storage systems may include ground-level cooling equipment, power conditioning systems, distribution and auxiliary transformers. The proposed battery storage systems would be located adjacent to the previously approved substation and operation and maintenance building sites and would each result in up to 5 acres of new permanent disturbance. One of these sites would be located within Umatilla County.

We would like to request your review and comment on the amendment request by **July 6, 2018.** In particular, we have the following questions:

- Has the county adopted any changes to county code provisions (e.g. setback requirements, etc) that could apply to the proposed larger turbines?
- Please confirm whether the above-provided description of the proposed battery storage systems, as obtained from the amendment request, would trigger applicability of any county code provisions (e.g. hazardous waste/materials management, fire safety, etc) that necessarily should be evaluated through the site certificate amendment process.

The amendment request is attached for reference.

Let me know if you have questions and whether the July 6, 2019 review timeline is feasible.

Thanks,

Sarah

Sarah T. Esterson
Energy Facility Siting Analyst
Oregon Department of Energy
550 Capitol St NE, 1st Floor
Salem, OR 97301
P:(503) 373-7945
C: (503) 385-6128

Oregon.gov/energy

--

Bob Waldher, RLA

Director

Umatilla County Department of Land Use Planning

216 SE 4th ST | Pendleton, OR 97801

Phone: 541-278-6251 | Fax: 541-278-5480

http://www.umatillacounty.net/planning - Visit our website for copies of planning documents, permit applications and other helpful information.

Please Be Aware - Documents such as emails, letters, maps, reports, etc. sent from or received by the Umatilla County Department of Land Use Planning are subject to Oregon Public Records law and are NOT CONFIDENTIAL. All such documents are available to the public upon request; costs for copies may be collected. This includes materials that may contain sensitive data or other information, and Umatilla County will not be held liable for its distribution.

Attachment C: Draft Proposed Order Comments/Index

Wheatridge Wind Energy Facility:
Draft Proposed Order on Request for Amendment 2 – Comment Index

***If you provided comments on the record of the draft proposed order, this table is intended to support review of changes made in the proposed order in response to issues raised with sufficient specificity. Changes included in the proposed order, resulting from comments received during the draft proposed order comment period (Sept 21 – Oct 25, 2018) and during the Council's review of the draft proposed order on October 26, 2018, are presented in both hi-lite and track changes.**

Date Comment Received	Unique Record ID	Commenter Identification			Analysis of Comments	Changes in Proposed Order*
		Last Name	First Name	Organization		
10/08/2018	WRWAMD2Doc14	Cherry	Steve	Oregon Department of Fish and Wildlife	Section III.H. Fish and Wildlife Habitat section of proposed order addresses comments	No recommended changes to findings or conditions in proposed order
10/25/2018	WRWAMD2Doc15	Marshall	Jesse	NextEra Energy Resources, LLC Certificate Holder	Section III.J. Threatened and Endangered Species of proposed order addresses comment	Material change recommended in Condition PRE-TE-03.
10/25/2018	WRWAMD2Doc16	Waldher	Robert	Umatilla County Planning Department	Section III.E. Land Use section of the proposed order addressed comment	No recommended changes to findings or conditions in proposed order
10/25/2018	WRWAMD2Doc17	McLane	Carla	Morrow County Board of Commissioners	Section III.E. Land Use and Section III.M Public Services of proposed order address comments	Material change recommended in Condition OPR-PS-03
10/25/2018	WRWAMD2Doc18	Gilbert	Irene	Individual and on behalf of Friends of the Grande Ronde Valley	Introductory Comments – lack of sufficient specificity	No recommended changes in proposed order
					Comment 1: Sections III.B. Organizational Expertise and III.G. Retirement and Financial Assurance of proposed order address comment	Recommended material change to findings in proposed order
					Comment 2: Addressed in Section II.B. Amendment Review Process	No recommended changes to findings or conditions in proposed order
					Comment 3: Sections III.B. Organizational Expertise and III.G. Retirement and Financial Assurance of proposed order address comment	Recommended material change to findings in proposed order
					Comment 4: Section III.Q.1 Noise Control Regulation of proposed order addresses comment	Recommended change in proposed order (administrative change) – reference OAR 340-035-0035(iii) language and provide new attachment provided in proposed order – presenting certificate holder's Noise Contour Map
					Comment 5: Section III.H Fish and Wildlife Habitat section of proposed order addresses comments	No recommended changes to findings or conditions in proposed order
10/25/2018	WRWAMD2Doc19	Rauch	Chris	Individual	Comments provided in support of amendment request; not addressed in proposed order	No recommended changes to findings or conditions in proposed order

ESTERSON Sarah * ODOE

Subject: FW: Wheatridge Wind Energy Facility: Notice of Complete Request for Amendment 2 of the Site Certificate, Draft Proposed Order and Public Hearing - October 25, 2018 Comment Deadline
Attachments: Wheatridge Ammendment 2 comments 10-8-18.doc

From: Steve Cherry [mailto:Steve.P.Cherry@state.or.us]
Sent: Monday, October 8, 2018 10:43 AM
To: ESTERSON Sarah * ODOE <Sarah.Esterson@oregon.gov>
Cc: REIF Sarah J <Sarah.J.Reif@state.or.us>
Subject: RE: Wheatridge Wind Energy Facility: Notice of Complete Request for Amendment 2 of the Site Certificate, Draft Proposed Order and Public Hearing - October 25, 2018 Comment Deadline

Sarah,
Here are ODFW's comments on Amendment 2 for the Wheatridge project. Please let me know if you have any questions. Thanks

Sarah R.
If I missed anything please let me know.

Steve

MEMORANDUM

Department of Fish and Wildlife
Wildlife Division
Intra Departmental

Date: October 8, 2018

To: Sarah Esterson- Oregon Department of Energy

From: Steve Cherry –District Biologist, Sarah Reif –ODFW Energy Coordinator

Subject: ODFW Comments for Amendment 2 for the Wheatridge Wind Energy Facility

---

Oregon Department of Energy (ODOE) has requested comments from the Oregon Department of Fish and Wildlife (ODFW) on the Request Amendment 2 for the Wheatridge Wind Energy Facility. This Letter contains: (1) ODFW contact information for the project; and (2) ODFW's comments on the Application.

Contacts

I will be the main contact person for ODFW for the Energy Facility Siting Council (EFSC) permitting process and my contact information is: Steve Cherry, PO Box 363, Heppner, OR 97836. My phone number is (541) 676-5230. I will also be coordinating with Sarah Reif, 3406 Cherry Ave. NE Salem, OR 97303 I would appreciate if you would ask the Applicant to send myself and Sarah Reif hard copies of the future EFSC process documents.

General Comments

Please find below a listing of the most applicable statutes, administrative rules and policies administered by ODFW that would pertain to the siting of this proposed facility. ODFW will review and make recommendations for the proposed project based on the following applicable statutes and rules.

ODFW Management Authorities

Some of the Oregon Department of Fish and Wildlife's (ODFW) goals, objectives, and management authorities for the fish and wildlife populations affected by the Project are found in the following Oregon Revised Statutes (ORS), Oregon Administrative Rules (OAR) and associated plans, and are summarized below.

- Energy Facility Siting Council Siting Standards – Fish and Wildlife Habitat (OAR 345-022-0060)
  This standard requires that the design, construction, and operation of a proposed facility (including mitigation) be consistent with the habitat mitigation goals and standards in OAR chapter 635, division 415. Oregon's Energy Facility Siting Council (EFSC) must determine whether the applicant has done appropriate site-specific studies to characterize the fish and wildlife habitat at the site and nearby. If impacts cannot be avoided, the applicant must provide a habitat mitigation plan. The plan must provide for appropriate mitigation measures, depending on the habitat categories affected by the proposed facility. The plan may require setting aside and improving other land for fish and wildlife habitat to make up for the habitat removed by the facility.

- Energy Facility Siting Council Siting Standards – Threatened and Endangered Species (OAR 345-022-0070)
  To issue a site certificate, EFSC must (after consultation with ODFW) determine that the design, construction and operation of the proposed facility, taking into account mitigation, are not likely to cause a significant reduction in the likelihood of survival or recovery of a species listed under the Oregon Endangered Species Act. This standard seeks to avoid harmful impacts to plant and animal species identified as threatened or endangered under state law. In practice, this means that the applicant must provide appropriate studies of the site to identify threatened or endangered species that the proposed facility could affect. ODFW determines the state-listed threatened or endangered wildlife species. If a potential risk to the survival or recovery of a threatened or endangered species exists, the applicant must redesign or relocate the facility to avoid that risk or propose appropriate mitigation measures.

- Wildlife Policy (ORS 496.012)
  Establishes wildlife management policy to prevent serious depletion of any indigenous species and maintain all species of fish and wildlife at optimum levels for future generations.

- State Endangered Species Act (ORS 496.171-182)
  Requires conservation and recovery of wildlife species that are classified as endangered or threatened. Authorizes ODFW to develop conservation and recovery plans for listed wildlife species. At ORS 498.026(1), prohibits "taking" of any listed species. Illegal take is a violation of the wildlife laws, subject to criminal prosecution as a Class A misdemeanor or violation pursuant to ORS 496.992.

- Prohibition of harassment, etc. of wildlife (ORS 498.006)
  Prohibits chasing, harassment, molestation, worrying or disturbing any wildlife, except as the Fish and Wildlife Commission may allow by rule.

- Criminal penalties for wildlife violations (ORS 496.992)
  Makes violation of any wildlife statute or Fish and Wildlife Commission rule subject to prosecution as a Class A misdemeanor or violation.

- Fish and Wildlife Habitat Mitigation Rule (OAR 635-415-0000-0025)

Governs ODFW's provision of biological advice and recommendations concerning mitigation for losses of fish and wildlife habitat caused by development actions. Based on standards in the rule, ODFW determines the appropriate category to apply to land where a development action is proposed. If ODFW determines that such land is Category 1, ODFW must recommend that impacts to the habitat be avoided. If impacts cannot be avoided, ODFW must recommend against the development action. If ODFW determines that such land is Category 2, ODFW must recommend that impacts to the habitat be avoided. If impacts cannot be avoided, ODFW must recommend a high level of mitigation (as specified in more detail in the rule). If such mitigation is not required, ODFW must recommend against the development action.

- Wildlife Diversity Plan (OAR 635-100-0001 through 0030)
  Establishes a plan to maintain Oregon's wildlife diversity by protecting and enhancing populations and habitats of native wildlife at self-sustaining levels throughout natural geographic ranges.

- Oregon Conservation Strategy Plan (Adopted by Commission)
  A blueprint for conservation of the state's native fish and wildlife and their habitats, the Strategy provides information on at-risk species and habitats, identifies key issues affecting them, and recommends actions. The Conservation Strategy emphasizes proactively conserving declining species and habitats to reduce the possibility of future federal or state listings.

- Oregon Plan for Salmon and Watersheds (ORS 541.405)
  Establishes plan to restore native fish populations and the aquatic systems that support them to productive and sustainable levels that will provide environmental, cultural, and economic benefits.

- ODFW's Fish Passage Law (ORS 509.580 - 509.645)
  Requires upstream and downstream passage at all artificial obstructions in those Oregon waters in which migratory native fish are currently or have historically been present.

- General Fish Management Goals (OAR 635-007-0510)
  Establishes the goals that fish be managed to take full advantage of the productive capacity of natural habitats, and that ODFW address losses in fish productivity due to habitat degradation through habitat restoration.

- Native Fish Conservation Policy (OAR 635-007-0502-0535)
  Protects and promotes natural production of indigenous fishes.

- Trout Management (OAR 635-500-0100-0120)
  Requires maintenance of genetic diversity and integrity of wild trout stocks, and the protection, restoration, and enhancement of trout habitat.

- Oregon's Mule Deer Management Plan (OAR 635-190-0000-0030)

Establishes a plan to protect and enhance mule deer populations in Oregon to provide optimum balance among recreational uses, habitat availability, primary land uses, and other wildlife species.

- Oregon's Elk Management Plan (OAR 635-160-0000-0030)
  Establishes a plan to protect and enhance elk populations in Oregon, to provide optimum recreational benefits to the public, and be compatible with habitat capability and primary land uses.

- Oregon's Wolf Conservation and Management Plan (OAR 635-110-0000-0040)
  Establishes measures ODFW will take to conserve and manage the species. This includes actions that could be taken to protect livestock from wolf depredation and address human safety concerns.

- Recommendations for Greater Sage-Grouse Habitat Classification Under Oregon Department of Fish and Wildlife's Fish and Wildlife Habitat Mitigation Policy (OAR 635-140-0000)
  This document provides policy direction, consistent recommendations, and supporting rationale to guide ODFW habitat mitigation recommendations associated with impacts to greater sage-grouse habitat from energy development, its associated infrastructure, or other industrial/commercial development.

Specific Comments

Comment 1
ODFW does not have any specific comments on this proposed amendment providing that the Applicant follow all of the site certificate conditions for the two proposed battery storage facilities that are already adopted for the Wheatridge project. This includes but is not limited to any additional survey requirements, as well as revegetation and habitat mitigation requirements outlined in the certificate.

ODFW appreciates the opportunity to comment on this Amendment and is looking forward to working with ODOE and the Applicant on this project.

ESTERSON Sarah * ODOE

From: Konkol, Carrie <Carrie.Konkol@tetratech.com>
Sent: Tuesday, October 16, 2018 5:06 PM
To: ESTERSON Sarah * ODOE
Cc: WOODS Maxwell * ODOE; CORNETT Todd * ODOE; ROWE Patrick G; Solsby, Anneke; Curtiss, Sarah Stauffer (sarah.curtiss@stoel.com); Pappalardo, Mike; Marshall, Jesse; Castro, Scott
Subject: WRWAMD 2 and 3 - Comments on DPO's
Attachments: WRWAMD2_3_DPOComments_2018.10.16.pdf

Hello Sarah,

Attached please find NextEra's comments with respect to the Draft Proposed Orders for Request for Amendments 2 and 3.
Please contact me with any questions.

Thank you,
Carrie

Carrie Konkol | **Senior Project Manager**
Carrie.Konkol@tetratech.com

Tetra Tech | **Portland**
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Direct: 503.721.7225 | Fax: 503.227.1287 | Cell: 503.830.8587

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Think Green - Not every email needs to be printed.

October 16, 2018

Ms. Sarah Esterson
Siting Analyst
Oregon Department of Energy
550 Capitol St. NE, 1st Floor
Salem, OR 97301

Subject: WRWAMD2 and 3 – Comments on Draft Proposed Orders

Dear Ms. Esterson:

NextEra Energy Resources, LLC (NextEra), on behalf of Wheatridge Wind Energy, LLC (certificate holder), has the following comments with respect to the Draft Proposed Orders for Request for Amendments 2 and 3. The comments are followed by the proposed changes in red to the applicable Site Certificate location or condition.

1. The certificate holder requests that Table 1. reflect the proposed turbine maximum blade to tip height of 499.7 feet. Additionally, the certificate holder requests that the stipulation to require turbines types with the maximum dimensions be equipped with Low Noise Trailing Edge blades be removed. As discussed below, there are a variety of technologies, modes and measures to ensure that (1) the turbines and the Facility meet the DEQ noise standard and (2) the noise impacts are ~~be~~ in the range of noise impacts previously analyzed and reviewed by the Oregon Department of Energy for the Facility.

Table 1: Proposed Wind Turbine Specification Range

Specification	Maximum
~~Turbine Generating Capacity (Individual)~~	~~2.5 MW~~
Blade Length	~~197~~ 204.1 ft.
Hub Height	~~278~~ 291.3 ft.
Rotor Diameter	~~393~~ 416.7 ft.
~~Total Height~~ Blade Tip Height (tower height plus blade length)	~~476~~ ~~525~~ 499.7 ft.
Aboveground Blade Tip Clearance	70.5 ft.
~~Wind turbine types with the maximum dimension specifications shall be equipped with Low Noise Trailing Edge blades.~~	

2. The certificate holder requests that the proposed change to Condition PRE-TE-03 to provide pre construction survey areas for Laurent's milkvetch be revised to include a purposeful survey area consisting of the temporary and permanent disturbance areas. Direct impacts (i.e., removing the plant) are the primary concern for this species, and a survey of the impact area

itself would likely yield all the information needed to avoid direct impacts to these plants. Although initial surveys used a wider buffer, this was likely in consideration of micrositing corridor refinement.

Amended Threatened and Endangered Species Condition 3 (PRE-TE-03): To avoid potential impacts to Laurent's milkvetch, the certificate holder must:

i. Conduct preconstruction plant surveys in suitable habitat for Laurent's milkvetch within ~~1,000 feet of~~ areas of temporary and permanent disturbance, and within the project boundary, ~~from the 230 kV intraconnection transmission line; and, within 500 feet of temporary and permanent disturbance from~~ for all ~~other~~ facility components. If the species is found to occur, the certificate holder must install protection flagging around the plant population and avoid any ground disturbance within this zone.

ii. Ensure that any plant protection zone established under (a) above is included on construction plans showing the final design locations.

iii. If herbicides are used to control weeds, the certificate holder shall follow the manufacturer's guidelines in establishing a buffer area around confirmed populations of Laurent's milkvetch. Herbicides must not be used within the established buffers.

[Final Order on ASC, Threatened and Endangered Species Condition 3; Amended in Final Order on AMD2]

3. As noted above, there are various turbine designs, operational modes, and measures that can be employed to comply with DEQ noise requirements including the maximum 50dBA allowable threshold at noise sensitive receivers. The Site Certificate conditions were developed in consideration of micrositing which allows for flexibility in turbine selection and turbine placement. With that in mind, the certificate holder requests the below changes to Site Certificate Conditions PRE-NC-01 and OPR-NC-01.

Recommended Amended Noise Control Condition 2 (PRE-NC-01): Prior to construction, the certificate holder shall provide to the department:

A. Information that identifies the final design locations of all facility components to be built at the facility;

B. The maximum sound power level for the facility components and the maximum sound power level and octave band data for the turbine type(s) and transformers selected for the facility based on manufacturers' warranties or confirmed by other means acceptable to the department;

C. The results of the noise analysis of the final facility design performed in a manner consistent with the requirements of OAR 340-035-0035(1)(b)(B) (iii)(IV) and (VI). The analysis must demonstrate to the satisfaction of the department that the total noise generated by the facility (including turbines and transformers) would meet the ambient noise degradation test and maximum allowable test at the appropriate measurement point for all potentially-affected noise sensitive properties, or that the certificate holder has obtained the legally effective easement or real covenant for expected exceedances of the ambient noise degradation test described (d) below. The analysis must also identify ~~the~~ any noise reduction ~~operation (NRO) mode approach~~ measure that will be used during facility operation and include a figure that depicts the turbines that will ~~be operating in NRO mode~~ use a noise reduction measure and the associated dBA reduction level, if required to meet the maximum allowable decibel threshold of 50 dBA; and,

D. For each noise-sensitive property where the certificate holder relies on a noise waiver to demonstrate compliance in accordance with OAR 340-035-0035(1)(b)(B)(iii)(III), a copy of the legally effective easement or real covenant pursuant to which the owner of the property authorizes the certificate holder's operation of the facility to increase ambient statistical noise levels L_{10} and L_{50} by more than 10 dBA at the appropriate measurement point. The legally effective easement or real covenant must: include a legal description of the burdened property (the noise sensitive property); be recorded in the real property records of the county; expressly benefit the property on which the wind energy facility is located; expressly run with the land and bind all future owners, lessees or holders of any interest in the burdened property; and not be subject to revocation without the certificate holder's written approval.
[Final Order on ASC; AMD3]

Certificate Holder Proposed Amended Noise Control Condition 3 (OPR-NC-01):-During operation of the facility, if required to meet the maximum allowable decibel threshold of 50 dBA, the certificate holder shall only operate the facility in the ~~NRO mode~~ noise reduction manner that is identified prior to construction pursuant to Noise Control Condition 2. After beginning operation of the facility, the certificate holder shall include a certification in its annual Compliance Report that the ~~NRO mode~~ turbines requiring noise reduction measures identified in the preconstruction analysis required by Noise Control Condition 2 are operating at or below the identified dBA reduction level.
[Final Order on ASC; AMD3]

Thank you for your consideration.

Best regards,

Jesse Marshall
Project Director
NextEra Energy Resources
(760) 846-4421
jesse.marshall@nee.com

ESTERSON Sarah * ODOE

From: Robert Waldher <robert.waldher@umatillacounty.net>
Sent: Thursday, October 25, 2018 1:17 PM
To: ESTERSON Sarah * ODOE
Subject: Wheatridge RFA2 and RFA 3

Hello Sarah -

I have reviewed both Wheatridge amendments for consistency with Umatilla County's land use standards. I do not have any comments on RFA2.

I do have one comment on RFA3...
Page 15, Line 10 includes requirements for setbacks from "City of Umatilla's Urban Growth Boundary." I believe this would apply to any UGB in Umatilla County, not just the City of Umatilla. In fact, there are other UGB's located closer to the project than City of Umatilla's. I would like to see this corrected on page 15 and also reflected in Condition **Gen-LU-06**.

Unfortunately I will not be able to attend the hearing tonight because we have a Planning Commission Work Session. Please let me know if you have any questions after the meeting. Thank you!

Kind Regards -

Bob
--

Bob Waldher, RLA

Director

Umatilla County Department of Land Use Planning

216 SE 4th ST | Pendleton, OR 97801

Phone: 541-278-6251 | Fax: 541-278-5480

http://www.umatillacounty.net/planning - Visit our website for copies of planning documents, permit applications and other helpful information.

Please Be Aware - Documents such as emails, letters, maps, reports, etc. sent from or received by the Umatilla County Department of Land Use Planning are subject to Oregon Public Records law and are NOT CONFIDENTIAL. All such documents are available to the public upon request; costs for copies may be collected. This includes materials that may contain sensitive data or other information, and Umatilla County will not be held liable for its distribution.

ESTERSON Sarah * ODOE

From: Carla McLane <cmclane@co.morrow.or.us>
Sent: Thursday, October 25, 2018 2:24 PM
To: ESTERSON Sarah * ODOE
Cc: 'Marshall, Jesse'; Pappalardo, Mike; Matt Scrivner; Sandra Pointer; RUSSELL Don; Jim Doherty; Melissa Lindsay; Darrell Green; Roberta Lutcher
Subject: Wheatridge AMD2 - Battery Storage - Morrow County Comment
Attachments: RFA2 Comment letter 10252018 signed w attach.pdf

Sarah,
Please find attached the Morrow County comment to this first of two actions amending the Wheatridge Site Certificate. I'll be providing the original at this evenings meeting.

Have a great day!!
Carla

Carla McLane, MBA
Morrow County Planning Director
205 Third Street NE
Post Office Box 40
Irrigon, Oregon 97844
541-922-4624
cmclane@co.morrow.or.us

PLANNING DEPARTMENT

PO Box 40 • 205 Third Street NE
Irrigon, Oregon 97844
(541) 922-4624

October 25, 2018

Sarah Esterson, Senior Siting Analyst
Oregon Department of Energy
550 Capitol Street NE, 1st Floor
Salem, OR 97301

RE: Wheatridge Wind Energy Facility - Request for Amendment 2

Dear Ms. Esterson:

The following comments are on behalf of the Morrow County Board of Commissioners serving as a Special Advisory Group for this project. The purpose of this letter is to address the Request for Amendment 2 (AMD2) which is a request to construct and operate two battery storage systems with the related components as outlined in the applicant submitted Request for Amendment.

Morrow County would treat battery storage as a component of the primary use, a wind energy facility, allowed conditionally on land zoned Exclusive Farm Use. Earlier this summer I did discuss this request with you and shared that the Morrow County Zoning Ordinance would not have any new or different provisions that would be applicable, but that the Morrow County Solid Waste Management Plan and Ordinance would be applicable. Those provisions have been previously submitted and Morrow County would specifically apply the Solid Waste Management Ordinance provision Section 5.000 Public Responsibilities 5.030 Responsibility for Proper Disposal of Hazardous Waste.

In reviewing both the applicant submittal and the Oregon Department of Energy (ODOE) staff generated findings and Amended Site Certificate Morrow County would have the following comments:

- There is support for the requested third party technical report which would evaluate fire hazards, and presents mitigation and recommendations for a fire suppression system designed for the battery storage systems.
- The recommended amended Public Services Condition 4 is acceptable with the following change to be incorporated into item 5: "Waste hauling by facility personnel within Morrow County shall be performed in compliance with the Morrow County Solid Waste Management Ordinance Section 5.000 Public Responsibilities 5.010 Transportation of Solid Waste and 5.030 Responsibility for Proper Disposal of Hazardous Waste. Together these two sections require generally that loads be contained within an enclosed vehicle or container and covered and that operators be responsible for the satisfactory and legal disposal

of all hazardous solid waste generated or accumulated by them on the property, and further to be disposed of at an appropriate solid waste disposal site licenced to receive such waste."

- There is support for the new proposed Condition under Organizational Expertise concerning the battery storage.

Morrow County also wants to state that should the Energy Facility Siting Council (EFSC) approve this amendment the applicant needs to make application to amend the Morrow County issued Conditional Use Permit (CUP) specifically addressing the battery storage components. Without an amendment to the local CUP there will be inconsistencies between the EFSC Site Certificate and the local CUP.

The opportunity to comment is much appreciated. It has been a pleasure working with you and other Department staff to date, and I anticipate that will continue. Should you have any questions about this comment letter, previous comment letters, or need additional information, please do not hesitate to contact me.

Cordially,

Carla McLane
Planning Director

attachments: Select portions of the Morrow County Solid Waste Management Ordinance

cc: Jesse Marshall, NextERA
Mike Pappalardo, NextERA
Morrow County Board of Commissioners
Matt Scrivner, Morrow County Public Works
Sandra Pointer, Morrow County Public Works

MORROW COUNTY
SOLID WASTE MANAGEMENT ORDINANCE

SECTION 1.000. TITLE

This ordinance shall be known as the "Solid Waste Management Ordinance" (Ordinance) and shall be so cited and pleaded.

SECTION 2.000. DEFINITIONS

The definitions to be applied to this Ordinance are found in the Morrow County Solid Waste Management Plan and shall be used as such. The definitions are provided as an addendum to this Ordinance.

SECTION 3.000. PURPOSE AND POLICY

To protect the health, safety and welfare of the people of Morrow County, hereafter referred to as the County, and to meet the goals of the Solid Waste Management Plan, it is declared to be the policy of the County to regulate solid waste management by:

1. Following the priorities on managing solid waste provided in Oregon Revised Statute (ORS) 459.015(2);

2. Providing for the safe and sanitary accumulation, storage, collection, transportation and disposal of solid waste;

3. Providing the opportunity to recycle as part of the overall solid waste plan;

4. Providing for public input in solid waste management and recycling through the Solid Waste Advisory Committee; and

5. Prohibiting accumulation of waste or solid waste on private property in such manner as to create a public nuisance, a hazard to health or a condition of unsightliness, and to provide for the abatement of such conditions where found.

SECTION 4.000. COUNTY RESPONSIBILITIES

The Administrator, (Administrator means the Planning Director, or other person(s) designated by resolution of the County Court to administer the Solid Waste Management Plan and this Ordinance, and the duly authorized deputy or assistant of such person) under the supervision of the County Court, shall be responsible for the administration and enforcement of the Morrow County Solid Waste Management Ordinance. In order to carry out the goals and duties imposed by the Morrow County Solid Waste Management Plan and Ordinance the Solid Waste Advisory Committee through the Administrator or the Administrator's authorized designee shall have the discretion to expend funds for any and all solid waste management activities within an approved budget.

SECTION 5.000. PUBLIC RESPONSIBILITIES

Public responsibility requires the citizens of Morrow County comply with items two and five of Section 3.000 Purpose and Policy of this Ordinance.

5.010. Transportation of Solid Waste

No person shall transport or self-haul, as defined in the Solid Waste Management Plan, solid waste on a public road unless such waste or solid waste is covered and secured. "Covered and Secured" includes:

1. Loads which are totally contained within an enclosed vehicle or container;
2. Loads of solid waste contained in garbage cans with tightly fitting lids, tied plastic solid waste disposal bags or similar totally enclosed individual containers that are completely contained within the walls of a vehicle or container, such that no solid waste can reasonably be expected to escape during hauling;
3. Loads of brush, building materials and similar bulky materials which are secured in or on the hauling vehicle or completely contained within the walls of a vehicle or container, such that none can reasonably be expected to escape during hauling; or
4. Loads consisting entirely of rock, concrete, asphalt paving, stumps and similar materials that are completely contained within the walls of a vehicle or container, such that none can reasonably be expected to escape during hauling.

5.020. Accumulation, Littering and Disturbance of Solid Waste Prohibited
No person shall accumulate or store wastes in violation of the Morrow County Nuisance Ordinance or in violation of regulations of the Oregon Littering Provisions (ORS 164.775 - 805).

No unauthorized person shall remove the lid from any solid waste container or collect, disturb or scatter solid waste stored in the container or deposit solid waste into the container.

5.030. Responsibility for Proper Disposal of Hazardous Waste
The owner, operator, or occupant of any premise, business, establishment, or industry shall be responsible for the satisfactory and legal disposal of all hazardous solid waste generated or accumulated by them on the property. All hazardous solid wastes shall be disposed of at an appropriate solid waste disposal site licensed to receive such waste, or in a manner consistent with Department of Environmental Quality regulations. It shall be unlawful for any person to dump, deposit, bury, or allow the dumping, depositing or burying of any hazardous solid waste onto or under the surface of the ground or into the waters of the state, except at a State permitted solid or hazardous waste disposal site.

5.040. Open Burning
Woody debris, brush, leaves, grass, tumbleweeds, wood and cuttings from trees, lawns, shrubs and gardens (excepting paper, cardboard, or wood containers in commercial quantities) may be burned on private property only if the method of burning is approved by the local fire department and is done in accordance with the rules and regulations of the Oregon Department of Environmental Quality. Agricultural open burning is allowed pursuant to Oregon air pollution laws (ORS 468A.020) and the requirements and prohibitions of local jurisdictions and the State Fire Marshal.

Open burning of any waste materials, including on agricultural lands, that normally emit dense smoke, noxious odors, or that create a public nuisance is prohibited. These materials include, but are not limited to, household garbage, plastics, wire, insulation, auto bodies, asphalt, waste petroleum products, rubber products, animal remains, and animal or vegetable wastes resulting from the handling, preparation, cooking, or service of food.

SECTION 6.000. SOLID WASTE ADVISORY COMMITTEE (SWAC), ESTABLISHMENT, MEMBERSHIP AND RESPONSIBILITIES

There shall be a Solid Waste Advisory Committee (SWAC). The purpose of the SWAC shall be to help discharge and manage Morrow County's solid waste management agenda duties.

6.010. Duties.
The duties of the Solid Waste Advisory Committee shall be to:
1. Provide a forum for citizen comments, questions and concerns about solid waste topics as deemed appropriate and necessary by the County Court

Sarah Esteron, Senpr Siting Analyst
Oregon Department of Energy
550 Capitol Street NE, 1st Floor
Salem, Oregon 97301
email: sarah.esterson@oregon.gov

October 23, 2018

Regarding: Comments onWheatridge, Amendment 2

I am including state statutes which relate to the amendment request. Since the Oregon Department of Energy and Energy Facility Siting Council have placed illegal limits on the Administrative Rules that can be referenced. Whenever they can be applied, I am using the state statutes since they cannot be ignored by the Oregon Department of Energy, nor can they be overruled by Administrative Rules of the department.

Comment Number One: The developer claims, and the Oregon Department of Energy acts as if the addition of battery storage does not require the same level of review specific to it as is required of all other facility components and that the generic conditions applied to other hazards are adequate to address the unique hazards associated with these large batteries. The draft proposed order treats the addition of battery storage as just another component that requires no special conditions. Contrary to the current site certificate conditions, there need to be site certificate conditions specifically addressing the unique hazards of battery storage components. ORS 469.401(2) "The site certificate or amended site certificate shall contain conditions for the protection of the public health and safety for the time for completion of construction, and to ensure compliance with the standards, statutes and rules described in ORS 469.501 and ORS 469.505. The hazards associated with these battery storage developments are unique and require more than a general statement regarding the incorporation of requirements to address them. Some of the hazards are discussed in "Further study of the intrinsic safety of internally shorted lithium and lithium-ion cells within methane-air." by Dubaniewicz and Duban of the National Institue for Occupational Safety and Health. This study talks to thermal rinaway susceptability and the inadequacy of crash speed as a method of addressing it. The study by Jhu, Wang, Shu, Chang and Wu entitled "Thermal Explosion Hazards on 18650 lithium ion batteries with a VSP2 adiabatic calorimeter" documents the explosion hazard. "Lithium-ion batteries: runaway risk of forming toxic compounds" by Hammami, Raymond and Armand documents the potential for the creation of toxic compounds. All these hazards and others created by the introduction of battery storage at the development need to be specifically addressed

Comment Number Two: The Oregon Department of Energy failed to obtain input from reviewing agencies regarding Land Use conditions they would include to address the hazards specific to battery storage. This has resulted in issues regarding fire hazards not being documented or addressed appropriately as well as a potential failure to be in compliance with local land use laws. The applicant only documents contact with two of the five fire departments that would be relied upon to respond to fires at the proposed developments. Given the remote

locations of the two sections of this development and the fact that there are being proposed battery storage at both of these locations, the availability of fire fighting resources for both areas need to be documented. Division 1 rules according to OAR 345-001-0030 apply to all matters under Council jurisdiction, except rules in effect before the date of adoption of this rule apply to site certificate proceedings pending before the Council as of this date. OAR 345-027-0020(10) requires the site certificate to contain all representations from the site certificate application and suporting record the Council considers as binding commitments made by the applicant. The statutes require the agency to contact those with expertise who normally implement the Land Use Rules which are being interpreted in a vacuum. Contact with the reviewing agencies regarding the inital site certificate did not include requesting an assessment of how local Land Use Laws would apply to battery storage or what special conditions would be required in order to allow this type construction. ORS 469.405 Amendment of site certificate, judicial review, examption, rules section 2) states: "Notwithstanding ORS 34.020 or 197.825, or any other provision of law, the land use approval by an affected local gcvernment of a proposed amendment to a facility and the recommendation of the special advisory group of applicable substantive criteria shall be subject to judicial-------" This statute makes it clear that special advisory groups are intended to be participants in amendment actions as well as initial site certificate actions The multiple documents and references from reputable sources support the need for conditions specific to the hazards these batteries pose. No site certificate should be issued absent input from the advisory groups and making decisions regarding the implementation of their suggestions. The public servies OAR 345-022-0110 rules require impacts of the development on the ability of the local governments to be included in the site certificate. You have received a comment from the Ione fire department stating that there needs to be a 100 foot area around battery storage components that is free of flamables. I am not able to determine if that is in the draft proposed order. If not, it should be.

Comment Number Three:
The site certificate needs to include specific requirements related to minimizing the potential for fire or explosion of the batteries including specific site certificate conditions mandating ongoing temperature monitoring to address high heat as well as cold conditions which could precipitate battery failure. In addition, gas monitors should be required to provide a warning system to identify thermal runaway. Attachment entitled, "Li-Ion Battery Fire Hazards and Safety Strategies", by Lingxi Kong Chuan Li, Jiuchun Jiang and Michael G Pecht published August 22, 2018 discusses these hazards and methods to reduce the risk. OAR 345-024-0010 needs to specifically require the developer to address the battery storage component in GEN-WF-01

Comment Number Four:
I find no basis for hiding the noise modeling information from the public. It is obvious that these battery storage developments will generate a significant amount of noise. This source of noise will be significantly different from that coming from wind turbines or power lines. The combination of noise sources and differing noise characteristics should be made available for public review and comment. In addition, the DEQ rules regarding noise identify the procedure for determining noise impacts and the procedures used need to be available to determine if the modeling has any potential of being accurate. The rule addressing this is OAR 345-035-0035. There is no justification for considering this information confidential and it is required in order to determine if the noise modeling completed by the applicant has any potential for being

accurate and in compliance with the rule.

While the "legal threshold" for noise may not be exceeded for some NSP's, the Oregon standards are higher than those recommended by noise experts as reflected in the World Health Organization recommendations. For this reason, the site certificate should include requirements for the developer to complete testing and develop mitigation for properties which may not exceed the standard, but which are negatively impacting the residents.

Comment Number Five:
PRE-FW-02 This site condition should include a requirement for monitoring of wildlife impacts in the vicinity of the battery developments. These developments will be creating noise, and may be impacting wildlife in ways different than wind turbines. Since this is a new type development, and in particular since the developer has not indicated with specificity what models of batteries they will be installing, the monitoring component is critical to assure the development is not having unidentified adverse wildlife impacts.

Thank you,

Irene Gilbert, Legal Research Analyst
Friends of the Grande Ronde Valley
2310 Adams Ave.
La Grande, Oregon 97850
email: ott.irene@frontier.com
Phone:541-963-8160

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J Loss Prev Process Ind. 2014 Nov;32:165-173.

Further study of the intrinsic safety of internally shorted lithium and lithium-ion cells within methane-air.

Dubaniewicz TH Jr[1], DuCarme JP[1].

Author information

Abstract

National Institute for Occupational Safety and Health (NIOSH) researchers continue to study the potential for lithium and lithium-ion battery thermal runaway from an internal short circuit in equipment for use in underground coal mines. Researchers conducted cell crush tests using a plastic wedge within a 20-L explosion-containment chamber filled with 6.5% CH_4-air to simulate the mining hazard. The present work extends earlier findings to include a study of $LiFePO_4$ cells crushed while under charge, prismatic form factor $LiCoO_2$ cells, primary spiral-wound constructed $LiMnO_2$ cells, and crush speed influence on thermal runaway susceptibility. The plastic wedge crush was a more severe test than the flat plate crush with a prismatic format cell. Test results indicate that prismatic Saft MP 174565 $LiCoO_2$ and primary spiral-wound Saft FRIWO M52EX $LiMnO_2$ cells pose a CH_4-air ignition hazard from internal short circuit. Under specified test conditions, A123 systems ANR26650M1A $LiFePO_4$ cylindrical cells produced no chamber ignitions while under a charge of up to 5 A. Common spiral-wound cell separators are too thin to meet intrinsic safety standards provisions for distance through solid insulation, suggesting that a hard internal short circuit within these cells should be considered for intrinsic safety evaluation purposes, even as a non-countable fault. Observed flames from a $LiMnO_2$ spiral-wound cell after a chamber ignition within an inert atmosphere indicate a sustained exothermic reaction within the cell. The influence of crush speed on ignitions under specified test conditions was not statistically significant.

KEYWORDS: Batteries; Explosion protection; Fires; Hazardous areas; Intrinsic safety; Lithium-ion; Mining industry; Standardization

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J Hazard Mater. 2011 Aug 15;192(1):99-107. doi: 10.1016/j.jhazmat.2011.04.097. Epub 2011 May 4.

Thermal explosion hazards on 18650 lithium ion batteries with a VSP2 adiabatic calorimeter.

Jhu CY[1], Wang YW, Shu CM, Chang JC, Wu HC.

Author information

Abstract

Thermal abuse behaviors relating to adiabatic runaway reactions in commercial 18650 lithium ion batteries (LiCoO(2)) are being studied in an adiabatic calorimeter, vent sizing package 2 (VSP2). We select four worldwide battery producers, Sony, Sanyo, Samsung and LG, and tested their Li-ion batteries, which have LiCoO(2) cathodes, to determine their thermal instabilities and adiabatic runaway features. The charged (4.2V) and uncharged (3.7 V) 18650 Li-ion batteries are tested using a VSP2 with a customized stainless steel test can to evaluate their thermal hazard characteristics, such as the initial exothermic temperature (T(0)), the self-heating rate (dT/dt), the pressure rise rate (dP/dt), the pressure-temperature profiles and the maximum temperature (T(max)) and pressure (P(max)). The T(max) and P(max) of the charged Li-ion battery during the runaway reaction reach 903.0°C and 1565.9 psig (pound-force per square inch gauge), respectively. This result leads to a thermal explosion, and the heat of reaction is 26.2 kJ. The thermokinetic parameters of the reaction of LiCoO(2) batteries are also determined using the Arrhenius model. The thermal reaction mechanism of the Li-ion battery (pack) proved to be an important safety concern for energy storage. Additionally, use of the VSP2 to classify the self-reactive ratings of the various Li-ion batteries demonstrates a new application of the adiabatic calorimetric methodology.

PMID: 21612866 DOI: 10.1016/j.jhazmat.2011.04.097

[Indexed for MEDLINE]

Publication type, MeSH terms, Substance

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Format: Abstract

Full text links

nature

Nature. 2003 Aug 7;424(6949):635-6.

Lithium-ion batteries: runaway risk of forming toxic compounds.

Hammami A[1], Raymond N, Armand M.

Author information

Abstract

Lithium-ion batteries are stabilized by an ultrathin protective film that is 10-50 nanometers thick and coats both electrodes. Here we artificially simulate the 'thermal-runaway' conditions that would arise should this coating be destroyed, which could happen in a battery large enough to overheat beyond 80 degrees C. We find that under these conditions the reaction of the battery electrolyte with the material of the unprotected positive electrode results in the formation of toxic fluoro-organic compounds. Although not a concern for the small units used in today's portable devices, this unexpected chemical hazard should be taken into account as larger and larger lithium-ion batteries are developed, for example for incorporation into electric-powered vehicles.

PMID: 12904779 DOI: 10.1038/424635b

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energies

MDPI

Review

Li-Ion Battery Fire Hazards and Safety Strategies

Lingxi Kong [1], Chuan Li [2], Jiuchun Jiang [3] and Michael G. Pecht [1,*]

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Abstract: In the past five years, there have been numerous cases of Li-ion battery fires and explosions, resulting in property damage and bodily injuries. This paper discusses the thermal runaway mechanism and presents various thermal runaway mitigation approaches, including separators, flame retardants, and safety vents. The paper then overviews measures for extinguishing fires, and concludes with a set of recommendations for future research and development.

Keywords: Li-ion battery; energy conversion and storage; fire incidents; safety issues; separator shutdown; flame retardants; venting

1. Introduction

Li-ion batteries have become the first choice for applications that require rechargeable batteries. Compared with previous rechargeable batteries such as lead–acid batteries [1], Li-ion batteries have higher specific capacity, energy density, and power density. These advantages allow Li-ion batteries to support long-term operation and high-current usage, which are required by many of today's portable electronic devices, including cell phones, computers, and electric vehicles. However, Li-ion batteries present safety concerns. If the Li-ion battery is short-circuited or exposed to high temperature, exothermic reactions can be triggered, resulting in a self-enhanced increasing temperature loop known as "thermal runaway" that can lead to battery fires and explosions.

There have been numerous incidents of Li-ion batteries catching fire and exploding. For example, the United States (U.S.) Federal Aviation Administration (FAA) reported 206 air/airport Li-ion battery fire/explosion incidents from March 1991 to January 2018 [2]. In May 2011, a Chevrolet Volt caught fire three weeks after a crash test [3]. In 2013, several Tesla Model S sedans caught fire after they were damaged by road debris. Although Tesla strengthened the battery shield on its new and existing cars, in August 2016, a Tesla electric car caught fire in France during a promotional tour. In 2016, 92 Samsung Note 7 smartphones caught fire and caused a mass product recall [4]. Other Li-ion battery-powered devices have also been mentioned in fire-type incidents, such as notebook computers [4,5], hoverboards [4], and electronic cigarettes [6,7]. The corresponding causes for the Li-ion battery incidents vary. Short circuits, mechanical abuse, battery overcharging, and design and manufacturing flaws can all result in a battery fire/explosion. Saxena et al. [8] investigated e-cigarette incidents and found that the e-cigarette market is not regulated. Low-quality or even defective batteries are entering the market, which increases the risk of Li-ion battery explosions.

In conventional Li-ion batteries with liquid electrolytes, there are five key components: anode, cathode, separator, current collectors, and electrolyte. Among these components, the separator and the electrolyte are less tolerant to increasing temperature than the electrodes and current collectors,

which are made of metal oxide/graphite or metal. A Li-ion battery uses a polymer separator and a flammable electrolyte, which are both constrained to certain temperature limits for safe performance.

When a Li-ion battery's temperature increases to approximately 130–150 °C, the high-energy materials and the organic components are not stable and are prone to generate more heat [9]. If the generated heat does not dissipate, the battery temperature will further increase and accelerate the heat-releasing process. Thermal runaway may be triggered if a battery has certain defects that can lead to short-circuiting, is overheated, is subject to high pulse power usage, or is punctured. Generally, the passivation layer (solid electrolyte interphase, SEI) on the electrode decomposes at around 69 °C [10]. After the breakdown of the SEI layer, the electrolyte reacts with the electrode and releases flammable hydrocarbon gases [11]. The polymer separator melts when the temperature is around 130 °C [9]. At higher temperatures, the positive electrode decomposes and releases oxygen.

Thermal runaway can be mitigated by methods that take effect at different stages of the thermal runaway process. These measures can be classified into three categories based on their effects on the process. In general, the potential for thermal runaway is influenced by the state of charge, operation conditions, battery electrode materials, electrolyte, and separator. The first category is preventive measures, wherein flame retardants are added for battery thermal stability. The second category is fail-safe measures that stop or decrease the damage caused by thermal runaway; these include separator shutdown and cell venting. The third category involves measures for extinguishing Li-ion battery fires once the thermal runaway has occurred.

This paper is organized as follows: Section 2 summarizes battery behavior during the thermal runaway process. Section 3 discusses measures for preventing thermal runaway. Section 4 overviews the use of flame retardants. Section 5 presents current methods and regulations for cell venting. Strategies and standards for putting out Li-ion battery fires are summarized in Section 6. The conclusions and recommendations are presented in Section 7.

2. The Thermal Runaway Process

This section discusses how thermal runaway influences battery behavior. The thermal runaway process affects the battery voltage, temperature, and pressure. The battery voltage drops sharply before thermal runaway due to the delamination of the battery electrodes. The battery temperature increases because the heat generation rate overwhelms the heat dissipation rate. In addition, due to the reactions among battery active materials, organic electrolyte evaporation and gas generation lead to an accumulation of gases in the battery.

Under normal operation conditions, the battery open circuit voltage (OCV) does not drop sharply, whereas a sharp voltage drop indicates the loss of battery integrity and internal short circuit [12,13]. Al Hallaj et al. [12] conducted thermal runaway tests on Sony 18650 cells and found that the sharp voltage drop occurred around the separator melting point. However, Feng et al. [13] found the sharp voltage drop occurred only 15–40 s ahead of the uncontrolled temperature increase. This voltage drop phenomenon is not suitable as a warning signal that immediate action is required to prevent thermal runaway. In addition, before the voltage drop, the voltage remains almost unchanged and does not reveal the thermal runaway process in the initial stage. In order to characterize battery behavior during the entire thermal runaway process, it is necessary to track the battery temperature change.

The thermal runaway process can be triggered by high temperature, and there is a thermal runaway onset temperature above which the battery temperature will uncontrollably increase. Temperature values that indicate the onset of thermal runaway have been reported. Al Hallaj et al. [12] measured the onset of thermal runaway at 104 °C, 109 °C, and 144 °C, where the differences were related to various battery OCVs. The thermal runaway onset temperature is influenced by not only the battery OCV, but also the type of battery cathode material. For commercially available cathode materials, their oxidation ability follows the order of $LiCoO_2 > LiMn_2O_4 > LiFePO_4$ [14]. Their thermal stability follows the reverse order, and the order of the theoretical onset of thermal runaway is $LiCoO_2 < LiMn_2O_4 < LiFePO_4$. The reported thermal runaway onset temperature for $LiFePO_4$ is 246 °C [15].

A 3D model was built to verify the experimental results [15]. The model prediction agrees well with the oven test data.

The temperature distribution in a battery can be nonuniform, especially during the thermal runaway process. Feng et al. [13] measured the battery case temperature and the core temperature, and found that the temperature difference can be as high as 520 °C. The modeling result [16] also indicated the existence of temperature difference. Nonuniform temperature distribution indicates where the thermal runaway process is triggered. Thermal runaway can initiate at some spots and propagate to the entire battery; for example, the localized temperature of the initial spot for battery thermal runaway can be as high as 800 °C.

Gas generation can occur during both normal operation and thermal runaway, but the gas composition is different in each process. During normal operation, the generated gases are CO_2, CO, CH_4, and O_2 [17]. During thermal runaway, the generated gases are H_2, CO_2, CO, CH_4, C_2H_6, and C_2H_4 [18,19]. The flammable hydrocarbons are usually related to the electrolyte involved in the battery system. The H_2 generation is related to the thermal runaway process. During thermal runaway, toxic fluoroorganics can also be generated [20]. Battery aging can also influence the gas composition. Roth et al. [21] compared the change of gas composition from punctured cells before and after the aging process. The volume percentage of CO composition increased from 4.2% to 11.3%, CO_2 increased from 12.6% to 26.3%, and oxygen increased from 0.1% to 1.7%.

Thermal runaway propagation among a battery pack that includes several individual cells is also worth notice. Thermal runaway may initiate in a single cell and propagate to the other cells in the battery pack. In this case, two thermal runaway scenarios present. For the initial cell, the thermal runaway is internally induced, whereas the other cells are at risk of thermal runaway by heating from the outside. Feng et al. [22] conducted a thermal runaway test on a battery pack containing six pouch-shaped batteries stacked together. They induced thermal runaway by penetrating one of the batteries on the end with a nail, and found that the thermal runaway cell can heat the other cells from the side. In their work, the thermal runaway onset time is defined as the moment that the temperature increased at least 10 °C in a second, and it was found that the thermal runaway in the other cells started at a temperature only around 100 °C. Enlarging the space between cells in a battery pack can decrease the probability of thermal runaway propagation [23]. Lamb et al. [24] found that the electrical connection on a battery pack can work as the thermal conducting pathway, and a battery pack with different electrical configurations presented different behaviors during the thermal runaway event. A battery pack in which six 18650 batteries were fully connected in series remained intact after the thermal runaway, but the other battery pack, which was fully connected in parallel, was destroyed.

Some of the above-mentioned features could be incorporated into the battery management system (BMS) to limit the battery operation condition within a safety range. For example, Guo et al. [15] built a battery thermal model with a finite element approach. Forgez et al. [16] built a thermal model for the cylindrical battery to predict the battery internal temperature with an accuracy within 1.5 °C. This model is not complex, which makes it promising to be used in the BMS. The other methods that can improve the intrinsic thermal stability of batteries will be discussed in the following sections.

3. Preventing Thermal Runaway Using Separators

The separator is one of the basic components of a Li-ion battery. The separator can be made of paper, gel, or polymer. Among these materials, the polymer separator is the most widely used in commercial Li-ion batteries. As mentioned, the separator is placed in the middle of the positive and negative electrodes inside a battery. From the battery operation perspective, a separator serves two functions: it prevents direct contact between the two electrodes, and it provides a pathway for the lithium ions. The separator is always made of insulation materials that will not cause an internal short circuit in the battery, and it has a porous structure that can absorb liquid electrolyte. Battery electrochemical reactions rely on this ionic pathway provided by the separator. The implementation of a polymer separator also improves Li-ion battery safety. Since a polymer separator has a porous

structure, if the battery temperature increases to near the separator melting point, the separator pores will close. This pore closure process is referred to as "separator shutdown".

The separator shutdown blocks the pathway between the positive and negative electrodes, and stops the electrochemical reactions. The battery impedance will also usually increase during this process. In the shutdown process, the polymer separator will not collapse at once, which means that the separator shutdown will not fully stop all of the reactions immediately. As a direct result, the battery will not start to cool down immediately during the separator shutdown or even after the separator shutdown [25]. The temperature at which the separator shutdown will be activated depends on the separator melting point. For example, the polypropylene (PP) and polyethylene (PE) separators will melt around 160 °C and 140 °C, respectively [25].

The separator needs to retain its integrity during the shutdown process. Otherwise, if the separator shrinks during the shutdown process, the blocked positive and negative electrodes will directly connect with each other and lead to internal short circuit [26]. At this stage, the advantage of the separator shutdown no longer exists. In a single-layer polymer separator using only one type of material, the shutdown temperature is close to the separator melting temperature, which only allows a narrow margin for the separator shutdown to function. Even if the separator shutdown works, the separator will also still melt and shrink, which makes it difficult for a single-layer polymer separator to maintain integrity. There are designs for triple-layered polymer separators where the PE single layer is sandwiched between two PP layers. This design provides a certain safety margin due to the difference in the melting points. Another approach to improve the separator safety is to use ceramic materials in the polymer separator. The ceramic/polymer composite separator has a higher melting temperature and is more thermally stable than the polymer separator [27].

4. Fire Prevention Using Flame Retardants

In the thermal runaway process, the heat-releasing reaction will lead to the battery temperature increase, and the gases accumulated inside the battery will cause the internal pressure to increase. In order to improve the battery safety and prevent an explosion, multiple safety mechanisms have been implemented. The electrolyte used in a Li-ion battery is a solution of solvent, inorganic lithium salt, and some additives. Since the operating voltage of a Li-ion battery is usually higher than 3 V, the solvent in the cell is a nonaqueous organic liquid, which is typically a mixture of cyclic and acyclic carbonate solvents. Although cyclic solvents usually have a higher flash point than non-cyclic solvents, the latter are combustible due to their low flash point. For example, the flash points of diethyl carbonate (DEC), dimethyl carbonate (DMC), and methyl ethyl carbonate (EMC) are 33 °C, 15 °C, and 22 °C, respectively [28]. The flammable organic electrolyte has the lowest thermal stability among all of the components. During the thermal runaway process, the electrolyte can release flammable gases and the cathode material can generate oxygen. Under this condition, the increasing Li-ion battery temperature makes the battery prone to catching fire.

Several methods to improve the thermal stability of the electrolyte have been proposed. One approach is to add flame retardants (FRs) to the electrolyte. The first requirement of the FR is that its flash points should be higher than the corresponding values of the above-mentioned acyclic solvents. Moreover, the implemented FRs should be inert and should not hinder the battery's performance and the electrochemical reactions inside it. Xu et al. [29] found that triethyl phosphate (TEP) and trimethyl phosphate (TMP) were unstable on the graphite electrode. Hexamethylcyclophosphate (HMPN) has a high melting point, but the viscosity is also high. Adding these FRs can undermine the battery's performance. In order to improve these shortcomings, Xu et al. [30] synthesized tris-(2,2,2-trifluoroethyl) phosphate (TFP), bis(2,2,2-trifluoroethyl)-methylphosphate (BMP), and (2,2,2-trifluoroethyl) diethyl phosphate (TDP). They investigated the flame-retarding ability and electrochemical properties of the three additives. It was found that all three additives maintain the electrolyte conductivity and have excellent electrochemical properties. Xu et al. found that TFP has the best overall performance compared to BMP and TDP. As an additive to the electrolyte,

in order to improve the thermal stability of the electrolyte without hindering the cycling performance, the weight percentage of the flame retardant content is usually less than 20% [31]. Some optimum values of the flame retardant content are reported as follows: 10 wt % 1-butyl-1-methylpyrrolidinium hexafluorophosphate (BMP-PF_6) [32], 10 wt % cresyl diphenyl phosphate (CDP) [33,34], and 5–10 wt % 4-isopropyl phenyl diphenyl phosphate (IPPP) [35]. Table 1 lists some FRs found in the literature.

Instead of adding FRs to the electrolyte directly, another strategy is to incorporate the FRs into the battery by confining them to the separator. The FRs in the separator are designed to be released at a certain temperature. For example, Liu et al. [36] built a nonwoven electrospun Li-ion battery separator that has thermal-triggered flame-retardant properties. The separator is made of electrospun microfiber that is specially designed with a core–shell structure. The core is made of triphenyl phosphate (TPP), which is an FR. The shell is made of poly(vinylidene fluoride-hexafluoropropylene) (PVDF-HFP), which is insoluble in the electrolyte, and can protect the core. The TPP has a melting point around 160 °C, which corresponds to the early stage of combustion. Meanwhile, the PVDF-HFP will not influence the battery electrochemical reactions. Liu et al. [36] claimed that this design provides flame-retarding ability without hindering the battery's performance. When the battery temperature increases to the melting point of PVDF-HFP (160 °C), the encapsulated TPP FR will be released into the electrolyte. At room temperature (around 25 °C), 4% TPP is in the electrolyte.

Several manufacturers offer TPP, TEP, and TMP FR products for batteries: Jiangsu Yoke Technology; Tianjin Shilianrui Zuran Material; Zhejiang Wansheng; Jinan Taixing Fine Chemicals; and Jiangsu Changyu Chemical Industry. The applications and limitations of these FR products are mentioned above.

Beyond adding FR to the electrolyte, another strategy to increase battery safety is to replace the current low flash point solvents with a high flash point electrolyte, which can make the electrolyte intrinsically inert to fire. Arbizzani et al. [37] mixed the hydrophobic ionic liquid *N*-butyl-*N*-methylpyrrolidinium bis(trifluoromethanesulfonyl)imide (Pyr14TFSI) with the conventional EC(ethylene carbonate):DMC (with 1 M $LiPF_6$) electrolyte, and found that the battery thermal resistance can be improved. Some other researchers tried to eliminate the combustible vapor generation sources by implementing a solid-state electrolyte. Wang et al. [38] made a concentrated fire-extinguishing electrolyte with TMP as the solvent and $LiN(SO_2F)_2$ (LiFSA) as the lithium salt. The molar concentration of LiFSA is higher than 3 M. This electrolyte is nonflammable, and has the potential to work as a fire extinguisher to put out the fire on other battery components. However, the high-concentration electrolyte (HCE) has certain disadvantages such as high cost, high viscosity, and poor wettability [39]. Chen et al. [39] developed a localized high-concentration electrolyte (LHCE) by diluting the electrolyte (3.2 M LiFSI in TEP) with bis(2,2,2-trifluoroethyl) ether (BTFE). Their test results on lithium batteries proved that the electrochemical performance of the LHCE is better than the HCE.

Table 1. Some flame retardants from published research work.

Abbrev.	Full Name	Ref.
BMP-PF_6	1-Butyl-1-methylpyrrolidinium hexafluorophosphate	[32]
CDP	Cresyl diphenyl phosphate	[33]
DMMP	Dimethyl methyl phosphonate	[40]
DPOF	Diphenyloctyl phosphate	[41]
HMPN	Hexamethylcyclophosphazene	[29]
IPPP	4-Isopropyl phenyl diphenyl phosphate	[35]
$[NP(OCH_3)_2]_3$	Hexamethoxycyclotriphosphazene	[42]
TEP	Triethyl phosphate	[29]
TMP	Trimethyl phosphate	[29]
TMP(a)	Trimethyl phosphate	[43]
TMP(i)	Trimethyl phosphite	[43]
TPP	Triphenyl phosphate	[44]
TTFMT	2,4,6-Tris(trifluoromethyl)-1,3,5-triazine (TTFMT)	[45]
TTFP	Tris(2,2,2-trifluoroethyl) phosphite	[46]

5. Fire and Explosion Prevention Using Cell Venting

Another strategy for improving battery safety is to add fail-safe mechanisms into the battery. Typically implemented fail-safe mechanisms include safety vents, thermal fuses, and shutdown separators. Safety vents are designed to release extra internal pressure and prevent the continuous increase of internal temperature. Once the temperature is beyond the separator shutdown working temperature range, the thermal runaway can continue. At this time, flammable gases from the battery materials, including organic electrolyte, will accumulate inside the battery. Allowing the gas accumulation may result in the rupture of the battery. A cell-venting mechanism is designed to reduce the battery's internal pressure and release the gases.

When the cell venting is activated, the accumulated gases inside a battery will burst out at once. With the safety vents, the battery internal gases are released in a controlled way rather than in an uncontrolled explosion. After the venting, not only can the gathered flammable gases be released, but a large amount of heat contained in the gases can also be released to the environment. Furthermore, venting can reduce the pressure applied on the battery separator and reduce the risk of battery internal short circuit. The concept of a battery vent aims to decrease the pressure built up in the thermal runaway process and prevent battery rupture. Based on the Institute of Electrical and Electronics Engineers (IEEE) standard for rechargeable batteries for cellular telephones [47], cell vents are suggested for cell phone batteries: "Cells shall be designed to include a consistent vent design or mechanism, for example, foil, edge, seam, or score. The vent mechanism shall be designed to minimize projectiles and maximize [the] retention of cell contents". For an 18650 type Li-ion battery, the thermal runaway can propagate to the entire battery in less than 2 s [26]. The battery internal pressure will build up in this short time frame. The vent design should be able to handle the corresponding gas flux. Mier et al. [48] found that not only gases vented, but also the electrolyte and even solids. They also observed a venting-generated shock wave at approximately Mach 1, which indicated the high rate of gas venting.

Based on patent information, cell venting designs vary among battery types. Usually, an 18650 battery has small vent "windows" in the positive terminal cap for releasing extra internal pressure, whereas a prismatic battery uses a fill hole as the battery vent [49]. For example, one vent design for 18650 batteries is a fragile cap that breaks when the critical pressure is reached [50]. The typical cap structure of an 18650 cylindrical battery is shown in Figure 1. The cap contains a vent disk that has scoring made in prior. If the battery internal pressure increased to a critical point due to the gas accumulation, the vent disk will break at the scoring and form a pathway for the gas venting. Another vent design for a cylindrical-shaped battery (not 18650) for e-cigarette usage simply uses a sealed pinhole as the vent, the original purpose of which is for electrolyte injection [51]. In either design, if the vents are clogged by battery materials during the venting process, the battery pressure will increase and result in an explosion [49]. Additionally, in the 18650 battery, Finegan et al. [52] found that not only the clogged vent, but also insufficient gas venting can lead to battery bursting. Some 18650 battery designs include a central mandrel for ensuring that the gas has an escape route. However, under the gas pressure, even the mandrel can move and puncture the battery cap, thereby becoming a high-speed projectile [52].

The International Electrotechnical Commission (IEC) [53] defines venting as "release of excessive internal pressure from a cell/battery in a manner intended by design to preclude rupture or explosion". However, there is no specific requirement for vent design in the IEC document. Based on the European Council for Automotive Research and Development (EUCAR) hazard levels and descriptions of Li-ion batteries, a Li-ion battery is classified as level 4 (venting) if there is no fire or flame, no rupture, or no explosion, and if weight loss is greater than or equal to the electrolyte weight [54]. Table 2 (modified from Ref. [54]) lists the eight hazard levels. The range of levels changes from zero to seven, with the severer situation at a higher level. The venting process is a critical point, and there is no flame at this level, which means that the flammable gases are released through the cell venting without ignition. In a worse case, the high-temperature flammable gases accumulated inside the battery ignite after venting.

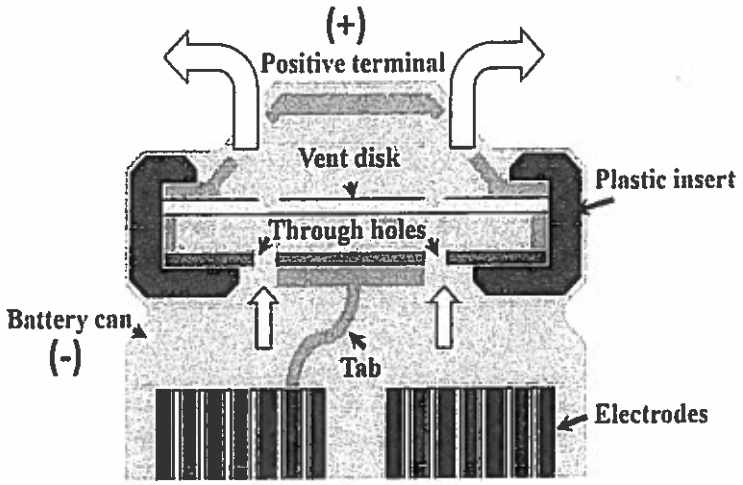

Figure 1. The typical structure of the 18650 battery cap. If the vent function works well during the thermal runaway process, the vent disk will break at the scoring and form a pathway to the internal gases.

Table 2. European Council for Automotive Research and Development (EUCAR) hazard levels and descriptions [54].

Hazard Level	Description	Classification Criteria and Effect
0	No effect	No effect. No loss of functionality.
1	Passive protection activated	No defect; no leakage; no venting, fire, or flame; no rupture; no explosion; no exothermic reaction or thermal runaway. Cell reversibly damaged. Repair of protection device needed.
2	Defect/damage	No leakage; no venting, fire, or flame; no rupture; no explosion; no exothermic reaction or thermal runaway. Cell irreversibly damaged. Repair needed.
3	Leakage Δmass < 50%	No venting, fire, or flame* no rupture; no explosion. Weight loss <50% of electrolyte weight (electrolyte = solvent + salt).
4	Venting Δmass ≥ 50%	No fire or flame*; no rupture; no explosion. Weight loss ≥50% of electrolyte weight (electrolyte = solvent + salt).
5	Fire or flame	No rupture; no explosion (i.e., no flying parts).
6	Rupture	No explosion, but flying parts of the active mass.
7	Explosion	Explosion (i.e., disintegration of the cell).

* The presence of flame requires the presence of an ignition source in combination with fuel and oxidizer in concentrations that will support combustion. Thus, if a spark source were added to the test configuration and the gas or liquid expelled from the cell was flammable, the test article would quickly progress from level 3 or level 4 to level 5 [54].

6. Extinguishing Li-ion Battery Fires

According to the National Fire Protection Association (NFPA), fires are classified into five different kinds (classes A, B, C, D, and K) (see Table 3 for the definitions) [55].

Table 3. Classification of fires [55].

Class	Description
A	Fires in ordinary combustible materials, such as wood, cloth, paper, rubber, and many plastics.
B	Fires in flammable liquids, combustible liquids, petroleum greases, tars, oils, oil-based paints, solvents, lacquers, alcohols, and flammable gases.
C	Fires that involve energized electrical equipment.
D	Fires in combustible metals, such as magnesium, titanium, zirconium, sodium, lithium, and potassium.
K	Fires in cooking appliances that involve combustible cooking media (vegetable or animal oils and fats).

The classification of a Li-ion battery fire can vary, but generally fits into classes A, B, or C. In some cases, a Li-ion battery is used as the power source, and the fire involves electrical devices. In other cases, a fire caused by a Li-ion battery can spread and ignite nearby materials. Fire extinguishers for Li-ion batteries vary based on the extinguishing agent, such as dry chemicals, carbon dioxide, foam, water, halons, and dry powders. Carbon dioxide can be used to suppress the fire, but it does not cool the battery down [56].

Putting out a Li-ion battery fire refers to both extinguishing the open flame and decreasing the battery temperature. If the battery temperature is high enough after the open flame is extinguished, there is still a possibility that the battery will reignite. In 2013, the Fire Protection Research Foundation conducted Li-ion battery fire testing on full-scale-model vehicles. In one of the tests, the battery reignited 22 h after the open flame was extinguished [57]. In 2017, there was a Li-ion battery fire incident in California involving an electric vehicle. The potential electrical hazard for the firefighters convinced them to use carbon dioxide fire extinguishers. Although the carbon dioxide extinguishers were successful, Andrew Klock, senior project manager at the NFPA, claimed that water would have worked to cool down the car and prevent reignition [58].

Current standards do not have specific requirements for extinguishing Li-ion battery fires. Standards for Li-ion batteries are published by the Institute of Electrical and Electronics Engineers (IEEE), Underwriters Laboratories (UL), and the United Nations (UN), but they focus only on battery abuse testing to ensure that Li-ion batteries are safe during transportation. The tests are designed to be conducted under abusive conditions, such as crack, drop, shock, heating, and abnormal charging. This research gap forced the NFPA to conduct an assessment of Li-ion battery hazards [56]. The identified issues related to extinguishing Li-ion battery fires are: limited understanding of battery flammability, lack of fire protection specifications for battery packs, and unclear effectiveness of potential fire-extinguishing suppressants.

7. Conclusions and Recommendations

Numerous Li-ion battery fire and explosion incidents have attracted more and more attention to the issue of battery safety. This paper discussed three strategies for reducing the number of battery fire incidents: separator shutdown, flame retardants, and cell venting. Although the most widely used polymer separator has a shutdown function, once the separator shrinks and loses its integrity, the shutdown function is useless. As for flame retardants, the major issue is whether they hinder the battery's performance. Recent research showed the possibility of replacing the carbonate-based electrolyte with another organic electrolyte that has better thermal stability. The implementation of cell venting cannot guarantee that the heated battery content will be blocked inside the battery case during the thermal runaway. The battery venting design should consider blocking the heated battery content while releasing the accumulated gases. Lowering the gas release threshold or adding a screen on the vent can improve the venting function.

The strategies for extinguishing Li-ion battery fires were also discussed. Current available standards provide battery safety testing under abusive conditions, including electrical/mechanical/thermal abuse, but do not provide guidance for battery fire protection or

extinguishing Li-ion battery fires. When extinguishing battery fires, cooling the battery is as important as suppressing the flame.

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References

1. Armand, M.; Tarascon, J.M. Building better batteries. *Nature* 2008, *451*, 652. [CrossRef] [PubMed]
2. FAA Office of Security and Hazardous Materials Safety. Available online: https://www.faa.gov/about/office_org/headquarters_offices/ash/ash_programs/hazmat/aircarrier_info/media/battery_incident_chart.pdf (accessed on 9 July 2018).
3. Could Chevy Volt Lithium-Ion Battery Fires Burn out Interest in EVs and Hybrids? Available online: https://blogs.scientificamerican.com/observations/could-chevy-volt-lithium-ion-battery-fires-burn-out-interest-in-evs-and-hybrids/ (accessed on 31 July 2018).
4. Can You Trust the Lithium-Ion Battery in Your Pocket? Available online: https://www.washingtonpost.com/news/the-switch/wp/2016/09/16/can-you-trust-the-lithium-ion-battery-in-your-pocket/?utm_term=.f7ae4130ed74 (accessed on 6 August 2017).
5. Why Lithium-Ion Smartphone Batteries Keep Exploding. Available online: http://globalnews.ca/news/1714748/why-lithium-ion-smartphone-batteries-keep-exploding/ (accessed on 6 August 2017).
6. Dramatic CCTV Footage Shows e-Cigarette Battery Exploding in Man's Pocket-Prompting Storage Warning from Fire Services. Available online: https://www.telegraph.co.uk/news/2016/12/22/dramatic-cctv-footage-shows-e-cigarette-battery-exploding-mans/ (accessed on 31 July 2018).
7. Man Says e-Cigarette Battery Exploded in His Pocket. Available online: https://www.cnn.com/2016/02/25/health/e-cigarette-explodes-in-mans-pocket/index.html (accessed on 6 August 2017).
8. Saxena, S.; Kong, L.; Pecht, M.G. Exploding E-cigarettes: A battery safety issue. *IEEE Access* 2018, *6*, 21442–21466. [CrossRef]
9. Balakrishnan, P.; Ramesh, R.; Kumar, T. Safety mechanisms in lithium-ion batteries. *J. Power Sources* 2006, *155*, 401–414. [CrossRef]
10. Wang, Q.; Sun, J.; Yao, X.; Chen, C. Thermal Behavior of Lithiated Graphite with Electrolyte in Lithium-Ion Batteries. *J. Electrochem. Soc.* 2006, *153*, A329–A333. [CrossRef]
11. Spotnitz, R.; Franklin, J. Abuse behavior of high-power, lithium-ion cells. *J. Power Sources* 2003, *113*, 81–100. [CrossRef]
12. Al Hallaj, S.; Maleki, H.; Hong, J.; Selman, J. Thermal modeling and design considerations of lithium-ion batteries. *J. Power Sources* 1999, *83*, 1–8. [CrossRef]
13. Feng, X.; Fang, M.; He, X.; Ouyang, M.; Lu, L.; Wang, H.; Zhang, M. Thermal runaway features of large format prismatic lithium ion battery using extended volume accelerating rate calorimetry. *J. Power Sources* 2014, *255*, 294–301. [CrossRef]
14. Kong, W.; Li, H.; Huang, X.; Chen, L. Gas evolution behaviors for several cathode materials in lithium-ion batteries. *J. Power Sources* 2005, *142*, 285–291. [CrossRef]
15. Guo, G.; Long, B.; Cheng, B.; Zhou, S.; Xu, P.; Cao, B. Three-dimensional thermal finite element modeling of lithium-ion battery in thermal abuse application. *J. Power Sources* 2010, *195*, 2393–2398. [CrossRef]
16. Forgez, C.; Do, D.V.; Friedrich, G.; Morcrette, M.; Delacourt, C. Thermal modeling of a cylindrical $LiFePO_4$/graphite lithium-ion battery. *J. Power Sources* 2010, *195*, 2961–2968. [CrossRef]
17. Shin, J.S.; Han, C.H.; Jung, U.H.; Lee, S.I.; Kim, H.J.; Kim, K. Effect of Li_2CO_3 additive on gas generation in lithium-ion batteries. *J. Power Sources* 2002, *109*, 47–52. [CrossRef]

18. Golubkov, A.W.; Fuchs, D.; Wagner, J.; Wiltsche, H.; Stangl, C.; Fauler, G.; Voitic, G.; Thaler, A.; Hacker, V. Thermal-runaway experiments on consumer Li-ion batteries with metal-oxide and olivin-type cathodes. *RSC Adv.* 2014, *4*, 3633–3642. [CrossRef]
19. Spinner, N.S.; Field, C.R.; Hammond, M.H.; Williams, B.A.; Myers, K.M.; Lubrano, A.L.; Rose-Pehrsson, S.L.; Tuttle, S.G. Physical and chemical analysis of lithium-ion battery cell-to-cell failure events inside custom fire chamber. *J. Power Sources* 2015, *279*, 713–721. [CrossRef]
20. Hammami, A.; Raymond, N.; Armand, M. Lithium-ion batteries: Runaway risk of forming toxic compounds. *Nature* 2003, *424*, 635–636. [CrossRef] [PubMed]
21. Roth, E.P.; Crafts, C.C.; Doughty, D.H.; McBreen, J. *Advanced Technology Development Program for Lithium-Ion Batteries: Thermal Abuse Performance of 18650 Li-Ion Cells*; Sandia Report; Sandia National Laboratories: Albuquerque, NM, USA, 2004.
22. Feng, X.; Sun, J.; Ouyang, M.; Wang, F.; He, X.; Lu, L.; Peng, H. Characterization of penetration induced thermal runaway propagation process within a large format lithium ion battery module. *J. Power Sources* 2015, *275*, 261–273. [CrossRef]
23. Lopez, C.F.; Jeevarajan, J.A.; Mukherjee, P.P. Experimental analysis of thermal runaway and propagation in lithium-ion battery modules. *J. Electrochem. Soc.* 2015, *162*, A1905–A1915. [CrossRef]
24. Lamb, J.; Orendorff, C.J.; Steele, L.A.M.; Spangler, S.W. Failure propagation in multi-cell lithium ion battereis. *J. Power Sources* 2015, *283*, 517–523. [CrossRef]
25. Venugopal, G.; Moore, J.; Howard, J.; Pendalwar, S. Characterization of microporous separators for lithium-ion batteries. *J. Power Sources* 1999, *77*, 34–41. [CrossRef]
26. Finegan, D.P.; Scheel, M.; Robinson, J.B.; Tjaden, B.; Hunt, I.; Mason, T.J.; Millichamp, J.; Michiel, M.D.; Offer, G.J.; Hinds, G.; et al. In-operando high-speed tomography of lithium-ion batteries during thermal runaway. *Nat. Commun.* 2015, *6*, 6924. [CrossRef] [PubMed]
27. Orendorff, C.J. The role of separators in lithium-ion cell safety. *Electrochem. Soc. Interf.* 2012, *21*, 61–65. [CrossRef]
28. Yuan, X.; Liu, H.; Zhang, J. *Lithium-Ion Batteries: Advanced Materials and Technologies*; CRC Press: Boca Raton, FL, USA, 2011; ISBN 9781439841280.
29. Xu, K.; Zhang, S.; Allen, J.L.; Jow, T.R. Nonflammable electrolytes for Li-ion batteries based on a fluorinated phosphate. *J. Electrochem. Soc.* 2002, *149*, A1079–A1082. [CrossRef]
30. Xu, K.; Ding, M.S.; Zhang, S.; Allen, J.L.; Jow, T.R. Evaluation of fluorinated alkyl phosphates as flame retardants in electrolytes for Li-ion batteries: I. Physical and electrochemical properties. *J. Electrochem. Soc.* 2003, *150*, A161–A169. [CrossRef]
31. Zhang, S.S. A review on electrolyte additives for lithium-ion batteries. *J. Power Sources* 2006, *162*, 1379–1394. [CrossRef]
32. Choi, J.A.; Sun, Y.K.; Shim, E.G.; Scrosati, B.; Kim, D.W. Effect of 1-butyl-1-methylpyrrolidinium hexafluorophosphate as a flame-retarding additive on the cycling performance and thermal properties of lithium-ion batteries. *Electrochim. Acta* 2011, *56*, 10179–10184. [CrossRef]
33. Wang, Q.; Ping, P.; Sun, J.; Chen, C. Improved thermal stability of lithium ion battery by using cresyl diphenyl phosphate as an electrolyte additive. *J. Power Sources* 2010, *195*, 7457–7461. [CrossRef]
34. Wang, Q.; Ping, P.; Sun, J.; Chen, C. Cresyl diphenyl phosphate effect on the thermal stabilities and electrochemical performances of electrodes in lithium ion battery. *J. Power Sources* 2011, *196*, 5960–5965. [CrossRef]
35. Wang, Q.; Sun, J.; Yao, X.; Chen, C. 4-Isopropyl phenyl diphenyl phosphate as flame-retardant additive for lithium-ion battery electrolyte. *Electrochem. Solid-State Letters* 2005, *8*, A467–A470. [CrossRef]
36. Liu, K.; Liu, W.; Qiu, Y.; Kong, B.; Sun, Y.; Chen, Z.; Zhuo, D.; Lin, D.; Cui, Y. Electrospun core-shell microfiber separator with thermal-triggered flame-retardant properties for lithium-ion batteries. *Sci. Adv.* 2017, *3*, e1601978. [CrossRef] [PubMed]
37. Arbizzani, C.; Gabrielli, G.; Mastragostino, M. Thermal stability and flammability of electrolytes for lithium-ion batteries. *J. Power Sources* 2011, *196*, 4801–4805. [CrossRef]
38. Wang, J.; Yamada, Y.; Sodeyama, K.; Watanabe, E.; Takada, K.; Tateyama, Y.; Yamada, A. Fire-extinguishing organic electrolytes for safe batteries. *Nat. Energy* 2018, *3*, 22–29. [CrossRef]
39. Chen, S.; Zheng, J.; Yu, L.; Ren, X.; Engelhard, M.H.; Niu, C.; Lee, H.; Xu, W.; Xiao, J.; Liu, J.; Zhang, J.G. High-efficiency lithium metal batteries with fire-retardant electrolytes. *Joule* 2018, *2*, 1–11. [CrossRef]

40. Xiang, H.; Xu, H.; Wang, Z.; Chen, C. Dimethyl methylphosphonate (DMMP) as an efficient flame retardant additive for the lithium-ion battery electrolytes. *J. Power Sources* 2007, *173*, 562–564. [CrossRef]
41. Shim, E.G.; Nam, T.H.; Kim, J.G.; Kim, H.S.; Moon, S.I. Diphenyloctyl phosphate as a flame-retardant additive in electrolyte for Li-ion batteries. *J. Power Sources* 2008, *175*, 533–539. [CrossRef]
42. Lee, C.W.; Venkatachalapathy, R.; Prakash, J.A. novel flame-retardant additive for lithium batteries. *Electrochem. Solid-State Lett.* 2000, *3*, 63–65. [CrossRef]
43. Yao, X.; Xie, S.; Chen, C.; Wang, Q.; Sun, J.; Li, Y.; Lu, S. Comparative study of trimethyl phosphite and trimethyl phosphate as electrolyte additives in lithium ion batteries. *J. Power Sources* 2005, *144*, 170–175. [CrossRef]
44. Shim, E.G.; Nam, T.H.; Kim, J.G.; Kim, H.S.; Moon, S.I. Electrochemical performance of lithium-ion batteries with triphenylphosphate as a flame-retardant additive. *J. Power Sources* 2007, *172*, 919–924. [CrossRef]
45. Kim, K.; Ahn, S.; Kim, H.S.; Liu, H.K. Electrochemical and thermal properties of 2, 4, 6-tris (trifluoromethyl)-1, 3, 5-triazine as a flame retardant additive in Li-ion batteries. *Electrochim. Acta* 2009, *54*, 2259–2265. [CrossRef]
46. Nam, T.H.; Shim, E.G.; Kim, J.G.; Kim, H.S.; Moon, S.I. Diphenyloctyl phosphate and tris (2,2,2-trifluoroethyl) phosphite as flame-retardant additives for Li-ion cell electrolytes at elevated temperature. *J. Power Sources* 2008, *180*, 561–567. [CrossRef]
47. *Rechargeable Batteries for Cellular Telephones*; IEEE Standard 1725; IEEE Power Engineering Society Press: New York, NY, USA, 2011.
48. Mier, F.A.; Morales, R.; Coultas-McKenney, C.A.; Hargather, M.J.; Ostanek, J. Overcharge and thermal destructive testing of lithium metal oxide and lithium metal phosphate batteries incorporating optical diagnostics. *J. Energy Storage* 2017, *13*, 378–386. [CrossRef]
49. Chu, A.C.; Gozdz, A.S.; Riley, G.N., Jr.; Hoff, C.M. Battery Tab Location Design and Method of Construction. U.S. Patent US8084158B2, 27 December 2011.
50. Kaschmitter, J.L.; Martucci, F.L.; Mayer, S.T.; Souh, J.H.; Thompson, S. Cell Cap Assembly Having Frangible Tab Disconnect Mechanism. U.S. Patent 5,609,972, 11 March 1997.
51. Hua, J.; Yang, J. Mesoporous Lithium-Ion Battery Vented at Both Ends, and Method for Manufacturing Same. W.O. Patent 2,016,008,137, 21 January 2016.
52. Finegan, D.P.; Darcy, E.; Keyser, M.; Tjaden, B.; Heenan, T.M.M.; Jervis, R.; Bailey, J.J.; Vo, N.T.; Magdysyuk, O.V.; Drakopoulos, M.; et al. Identifying the cause of rupture of Li-ion batteries during thermal runaway. *Adv. Sci.* 2018, *5*, 1700369. [CrossRef] [PubMed]
53. IEC Standard 62133. *Secondary Cells and Batteries Containing Alkaline or Other Non-acid Electrolytes—Safety Requirements for Portable Sealed Secondary Cells, and for Batteries Made from Them, for Use in Portable Applications*; IEC Standard 62133: Geneva, Switzerland, 2012.
54. Josefowitz, W.; Kranz, H.; Macerata, D.; Soczka-Guth, T.; Mettlach, H.; Porcellato, D.; Orsini, F.; Hansson, J. Assessment and Testing of Advanced Energy Storage Systems for Propulsion–European Testing Report. In Proceedings of the 21st Worldwide Battery, Hybrid and Fuel Cell Electric Vehicle Symposium & Exhibition, Monte Carlo, Monaco, 2–6 April 2005.
55. National Fire Protection Association. *Portable Fire Extinguishers*; National Fire Protection Association: Quincy, MA, USA, 2013.
56. Mikolajczak, C.; Kahn, M.; White, K.; Long, R.T. *Lithium-ion Batteries Hazard and Use Assessment*; Springer Science & Business Media Press: New York, NY, USA, 2012, ISBN 978-1-4614-3485-6.
57. Long, R.T.; Blum, A.F.; Bress, T.J.; Cotts, B.R. *Best Practices for Emergency Response to Incidents Involving Electric Vehicles Battery Hazards: A Report on Full-Scale Testing Results*; National Fire Protection Research Foundation: Quincy, MA, USA, 2013.
58. Lithium-Ion Battery Car Fires Pose A New Challenge for Firefighters. Available online: http://www.rightinginjustice.com/news/2017/02/06/lithium-ion-battery-car-fires-pose-a-new-challenge-for-firefighters/ (accessed on 6 August 2017).

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Li-ion Lithium Ion Battery Technology

- details about Li-ion, lithium ion battery technology giving an overview of what they are, and how they work.

IN THIS SECTION

Li-ion technology (li-ion-lithium-ion.php)

Li-ion types (lithium-ion-battery-types.php)

Li-ion charging (lithium-ion-battery-charging.php)

Advantages / disadvantages (lithium-ion-battery-advantages-disadvantages.php)

Lithium ion, or Li-ion batteries are now being widely used for applications such as powering laptop computers, mobile phones cameras and many more devices. The high energy density that Li-ion batteries provide, enables the electronic devices they power to be recharged less frequently. Also Li-ion batteries are comparatively light when compared to other forms of rechargeable cells and batteries.

In view of their convenience, Li-ion, lithium ion batteries are widely used and there are a number of different manufacturers for these batteries. Accordingly costs have fallen from their original high levels, although Li-ion batteries are still expensive.

Growth & development of Li-Ion batteries

Lithium battery technology has taken many years to develop. It offers distinct advantages over other older rechargeable battery technologies such as Nickel cadmium and Nickel Metal Hydride. Despite the advantages of Lithium Ion it has taken years to perfect and enable it to reach a maturity level where it could be widely used. Now it is used in many areas and its use has enabled may technologies such as mobile phones, laptops and other items of everyday use to move forwards.

The idea for lithium ion battery technology was first proposed in the 1970s by M Whittingham who used titanium sulphide and lithium metal as the electrodes for his cell.

Work was undertaken at the University of Pennsylvania to enable a graphite electode to be used with lithium ions in the electrode. This was a major advance, although it was not take up immediately by

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other advances in lithium ion technology.

However other techniques associated with charging needed to be solved before a viable cell could be made. In 1979 J Goodenough demonstrated a rechargeable lithium ion cell using Lithium Cobalt Oxide for the positive electrode and lithium as the negative one.

The next stages in producing a workable production cell were to be able to enable recharging action with lithium in graphite. This was achieved by Rachid Yazami in 1979. It then took until 1985 before a rechargeable lithium ion cell was developed that could be manufactured in large scale production quantities. Akira Yoshino used carbonaceous material into which would accept lithium ions as one electrode, and lithium cobalt oxide, LiCoO2 as the other. The use of Lithium Cobalt Oxide was important because it is stable in air unlike lithium itself, and this made this cell structure more stable chemically and far less dangerous.

Lithium ion, Li-ion battery basics

Although there are various different forms of lithium ion battery technology, there are several common elements in common.

A lithium ion battery, or cell of whatever form has three main constituents:

1. Cathode
2. Anode
3. Electrolyte

The main charge carrier is lithium ions - hence the name for the battery technology. Both the anode and cathode are made from materials into which and from which the lithium ions can flow.

During the overall cycle there are two processes associated with movement of the lithium ions:

- ***Intercalation :*** The process where the lithium ions in the lithium ion battery are inserted into the electrode is called intercalation.
- ***Deintercalation :*** This is the reverse process and occurs when lithium ions are extracted from the electrode, i.e. they move back out.

Lithium ion battery variants

Although lithium ion batteries are generally referred to by their generic name, there are actually several different types of lithium ion battery. Even though they have many similar characteristics, each has its own and is optimum for different applications.

LITHIUM ION BATTERY TECHNOLOGIES SUMMARY				
NAME	CONSTITUENTS	ABBREVIATION	MAJOR CHARACTERISTICS	APPLICATIONS
Lithium Cobalt	LiCoO2	LCO	High capacity	Cellphones, laptops,cameras
Lithium Manganese Oxide	LiMn2O4	LMO	Safety, but lower capacity	Power tools, medical, hobbyist
Lithium Iron Phosphate	LiFePO4	LFP	Safety, but lower capacity	Power tools, medical, hobbyist
Lithium Nickel Manganese Cobalt Oxide	LiNiMnCoO2	NMC	Safety, but lower capacity	Power tools, medical, hobbyist
Lithium Nickel Cobalt Aluminium Oxide	LiNiCoAlO2	NCA		Electric vehicles and grid storage
Lithium Titanate	Li4Ti5O12	LTO		Electric vehicles and grid storage

More details of the various variants of lithium ion battery can be found later in this tutorial.

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Guidelines for using Li-ion batteries

Lithium ion batteries or Li-ion batteries can be relatively expensive. It therefore pays to follow simple guidelines that can help ensure the maximum life is obtained from them.

1. Lithium-ion batteries should be charged before the battery is completely discharged.

2. Lithium-ion batteries should not be frequently fully discharged and recharged ("deep-cycled") like Ni-Cd batteries. However this may be needed occasionally to recalibrate any associated "fuel gauge" circuitry used to monitor the state of charge, control charging, etc.

3. Li-ion batteries should never be depleted to below their minimum voltage, 2.4 V to 3.0 V per cell.

4. If a Li-ion battery is not to be used for an extended period of time it should ideally be brought to a charge level of between about 40% and 60% of full charge.

5. Li-ion batteries should be kept cool. By keeping them cool, possibly in a refrigerator, the ageing process becomes slower. As a result, Li-ion batteries should not be kept in cars on sunny days as the temperatures rise significantly.

6. Li-ion batteries should not be exposed to very low temperatures - most lithium-ion battery electrolytes freeze at approximately 40°C. This may preclude them from some applications where equipment needs powering in extremes of temperature.

7. Li-ion batteries should be bought only when needed, because the aging process begins as soon as the battery is manufactured

Li-ion summary

Li-ion batteries and cells or li-ion batteries and cells are now in widespread use. They have taken a position of dominance in the rechargeable battery market and as a result many mobile phones, laptop computers and cameras, etc use them. Although there are many new battery developments taking place, lithium ion batteries, li-ion batteries will remain one of the main types of battery for many years to come.

By Ian Poole (https://plus.google.com/104687638164370436625?rel=author)

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Gladys West - Pioneer of GPS (/industry-currents/posts/gladys-west-pioneer-of-gps)

GPS and GNSS positioning technology is such an integral part of our lives today that we rarely stop to think about where it all came from. When we do, we usually picture men in white shirts and dark glasses hunched over calculators and slide rules. In fact, one of the early pioneers behind GPS and GNSS technology was Gladys West - a black woman.

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LITHIUM-ION BATTERY HAZARDS

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FIRE PROTECTION Engineering

Lithium-Ion Battery Hazards

By R. Thomas Long, P.E., Michael Kahn, Ph. D., and Celina Mikolajczak, P.E. | Fire Protection Engineering

Lithium-ion (Li-ion) has become the dominant rechargeable battery chemistry for consumer electronics devices (e.g., smart phones and notebook computers) and is poised to become commonplace for industrial, transportation, and power-storage applications. Li-ion battery chemistry is different from previously popular rechargeable battery chemistries (e.g., nickel metal hydride [NiMH], nickel cadmium [NiCad], and lead acid) in a number of ways. From a technological standpoint, because of high energy density, Li-ion technology has enabled entire families of portable devices, such as smart phones. From a safety and fire protection standpoint, a high energy density coupled with a flammable organic, rather than traditional aqueous electrolyte, has created a number of new fire protection challenges. Specific challenges include the design of batteries containing Li-ion cells, the storage and handling of these batteries, and challenges in determining the best response to suppress and control fires involving Li-ion batteries.

The Fire Protection Research Foundation (FPRF) completed an assessment of the hazards associated with Li-ion batteries related to storage of Li-ion batteries and fire protection; this article provides a brief overview of this work to-date.[1] Before the global fire safety challenges associated with Li-ion batteries can be addressed, an understanding of Li-ion technology is useful and follows.

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Li-ion Cells and Batteries

The term Li-ion battery refers to an entire family of battery chemistries. It is beyond the scope of this article to describe all of the chemistries used in commercial Li-ion batteries. Li-

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ion battery chemistry is an active area of research, and new materials are constantly being developed. Li-ion cells are distinct from lithium (or lithium primary cells). The term "Li-ion cell" most accurately refers to non-rechargeable battery chemistry, where lithium metal is used as one of the cell electrodes. Lithium metal is not used as an anode in Li-ion cells. However, the similarity in these two names has routinely led to confusion with regards to appropriate fire protection techniques. The following is a commentary on rechargeable Li-ion technology and focuses on the characteristics of Li-ion cells.

In the most basic sense, the term Li-ion battery refers to a battery where the negative electrode (anode) and positive electrode (cathode) materials serve as a host for the lithium ion (Li+). Lithium ions move from the anode to the cathode during discharge and are intercalated into (inserted into voids in the crystallographic structure of) the cathode. The ions reverse direction during charging (see Figure 1). Since lithium ions are intercalated into host materials during charge or discharge, there is no free lithium metal within a Li-ion cell; thus, if a cell ignites due to external flame impingement or an internal fault, metal fire suppression techniques are not appropriate for controlling a Li-ion battery fire. Under certain abuse conditions, lithium metal in very small quantities can plate onto anode surfaces. However, this should not have any appreciable effect on the fire behavior of the cell.

Cells can be constructed by stacking alternating layers of electrodes (such as in prismatic cells or by winding long strips of electrodes into a "jellyroll" configuration typical for cylindrical cells. Generally, cell form factors are classified as prismatic, cylindrical, and pouch cells (also known as polymer, soft-pack polymer, or lithium polymer).

In a Li-ion cell, alternating layers of anode and cathode are separated by a porous film (separator). An electrolyte composed of an organic solvent and dissolved lithium salt provides the media for lithium ion transport. A variety of safety mechanisms might also be included in a cell mechanical design, such as current interrupt devices (CID) and positive temperature coefficient switches.

An individual Li-ion cell will have a safe voltage range over which it can be cycled that will be determined by the specific cell chemistry. A safe voltage range will be a range in which the cell electrodes will not rapidly degrade due to lithium plating, copper dissolution, or other undesirable reactions. For most cells, charging significantly above 100% state of charge (SOC) can lead to rapid, exothermic degradation of the electrodes. Charging above the manufacturer's high voltage specification is referred to as overcharge. Since overcharging can lead to violent thermal runaway reactions,[2] a number of overcharge protection devices are either designed into the cells or included in the electronics protection packages for Li-ion battery packs.

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A Li-ion battery (or battery pack) is made from one or more individual cells packaged together with their associated protection electronics. By connecting cells in parallel, one can increase pack capacity. By connecting cells in series, pack voltage is increased.

For large format battery packs, cells may be connected together (in series or in parallel) into modules. The modules may then be connected in series or in parallel to form full battery packs. Thus, large format battery pack architecture can be significantly more complex than small consumer electronics battery packs, which typically contain series connected elements consisting of two or more parallel-connected cells.

The four primary functional components of a practical Li-ion cell are the anode, cathode, separator, and electrolyte. Additional components of Li-ion cells, such as the current collectors, case or pouch, internal insulators, headers, and vent ports also affect cell reliability, safety, and behavior in a fire.

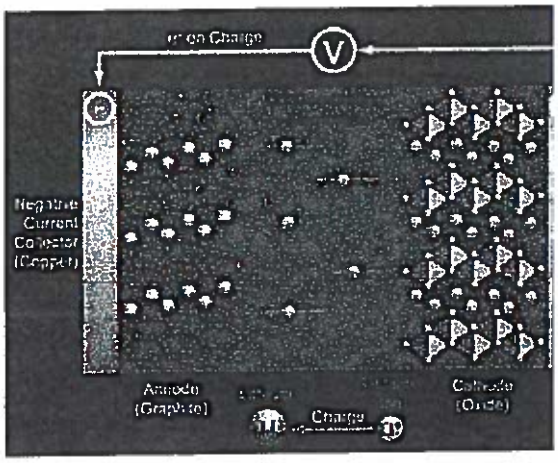

Figure 1. Li-ion cell operation: during charging, Lithium ions intercalate into the anode; the reverse occurs during discharge

The chemistry and design of these components can vary widely across multiple parameters. Cell components, chemistry, electrode materials, particle sizes, particle size distributions, coatings on individual particles, binder materials, cell construction styles, etc., generally will be selected by a cell designer to optimize a family of cell properties and performance criteria. As a result, no "standard" Li-ion cell exists, and even cells that nominally appear to be the same (e.g., lithium cobalt oxide/graphite electrodes) can exhibit significantly different performance and safety behavior. In addition, since Li-ion cell chemistry is an area of active research, one can expect cell manufacturers to continue to change cell designs for the foreseeable future.

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Li-Ion Technology Applications

Li-ion cells have gained a dominant position in the rechargeable battery market for consumer electronic devices. primary reason for Li-ion battery dominance is the

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chemistry's high specific energy (Wh/kg) and volumetric energy density (Wh/L); or more simply, the fact that a Li-ion cell of a specific size and weight will provide substantially more energy than competing technologies of the same size or weight. Li-ion cells have enabled smaller, more slender, and more feature-rich portable electronics. The smallest Li-ion cells are found in devices such as hearing aids and Bluetooth headsets. Larger, single cell applications include batteries for digital cameras, MP3 players, and wireless cellular phones. The most common single-cell Li-ion battery applications are cell phones and

For larger electronic devices, such as notebook computers, power tools, portable DVD players, and portable test instruments, multi-cell battery packs are used. Multi-cell devices, such as notebook computer battery packs, utilize complex protection electronics.

Notebook computers represent the largest population of relatively complex Li-ion batteries in the commercial market. Many of these packs contain between six and 12 cylindrical, 18, 650-size cells connected in series and parallel, though smaller cylindrical cells and flat soft pouch Li-ion polymer cells are becoming more common (see Figure 2).

The demand for Hybrid Electric Vehicles (HEVs), plug-in hybrid electric vehicles (PHEVs), and purely electric vehicles (EVs) is expected to increase. At present, many hybrid vehicles implement NiMH batteries. A few vehicles that implement Li-ion battery technology have recently entered the U.S. market.

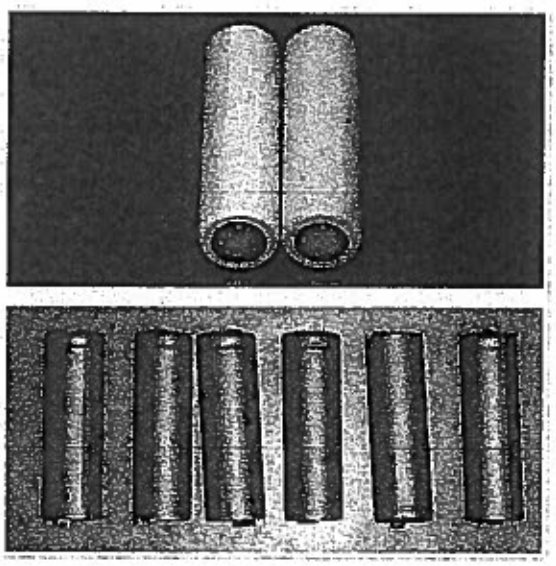

Figure 2. Examples of 18, 650 cylindrical cells (these are the most common consumer electronics Li-ion cell form factor).

With penetration of electric vehicles comes the addition of charging stations in public areas, as well as in private residences. Automotive battery packs will also be serviced and thus, stored at service and battery switching locations. This

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new type of infrastructure will pose high voltage and fire safety challenges in addition to those associated with Li-ion batteries themselves.

Considerable interest has been generated in the last two to three years for applying Li-ion batteries for a variety of energy storage and grid stabilization (stationary) applications.[3]

Prototype systems have been installed.[4] Megawatt-scale systems typically include thousands of cells housed in shipping container-sized structures that can be situated on power utility locations. These systems usually include integrated fire suppression in their installations. Smaller systems have also been planned and are being delivered for evaluation purposes, particularly for use with renewable energy sources.

Li-ion Battery Failures

The fact that batteries can fail in an uncontrolled manner on rare occasions has brought an increased public awareness for battery safety, in particular as a result of some very large product recalls of portable notebook computer and cell phone batteries. Both energetic and non-energetic failures of Li-ion cells and batteries can occur for a number of reasons, including poor cell design (electrochemical or mechanical), cell manufacturing flaws, external abuse of cells (thermal, mechanical, or electrical), poor battery pack design or manufacture, poor protection electronics design or manufacture, and poor charger or system design or manufacture. Thus, Li-ion battery reliability and safety is generally considered a function of the entirety of the cell, pack, system design, and manufacture.[5,6]

Performance standards are designed to test cell and battery pack designs. Failures that occur in the field are seldom related to cell design; rather, they are predominantly the result of manufacturing defects or subtle abuse scenarios that result in the development of latent cell internal faults.

Cell and Battery Failure Modes

Li-ion batteries can fail in both non-energetic and energetic modes. Typical non-energetic failure modes (usually considered benign failures) include loss of capacity, internal impedance increase (loss of rate capability), activation of a permanent disabling mechanism such as a CID, shut down separator, fuse, or battery pack permanent disable, electrolyte leakage with subsequent cell dry-out, and cell swelling.

Often, energetic failures lead to thermal runaway. Cell thermal runaway refers to rapid self-heating of a cell derived from the exothermic chemical reaction of the highly oxidizing positive electrode and the highly reducing negative electrode; it can occur with batteries of almost any chemistry.

In a thermal runaway reaction, a cell rapidly releases its stored energy. The more energy a cell has stored, the more energetic a thermal runaway reaction will be. One of the reasons Li-ion thermal runaway reactions can be very energetic is these cells have very high-energy densities compared to other cell

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chemistries. The other reason that Li-ion cell thermal runaway reactions can be very energetic is because these cells contain flammable electrolyte. As a result, not only do they store electrical energy in the form of electrochemical potential energy, they store appreciable chemical energy (especially compared to cells with water-based electrolytes) in the form of combustible materials.

The severity of a cell thermal runaway event will depend upon a number of factors, including the SOC of a cell (how much electrical energy is stored in the form of chemical potential energy), the ambient environmental temperature, the electrochemical design of the cell (cell chemistry), and the mechanical design of the cell (cell size, electrolyte volume, etc.).

For any given cell, the most severe thermal runaway reaction will be achieved when that cell is at 100% (or greater, if overcharged) SOC, because the cell will contain maximum electrical energy. If a typical fully charged (or overcharged) Li-ion cell undergoes a thermal runaway reaction, a number of things occur, including:

- Cell internal temperature increases;
- Cell internal pressure increases;
- Cell undergoes venting;
- Cell vent gases may ignite;
- Cell contents may be ejected; and
- Cell thermal runaway may propagate to adjacent cells.

Root Causes of Energetic Cell and Battery Failures

There are a number of ways to exceed the thermal stability limits of a Li-ion cell and cause an energetic failure. Energetic Li-ion battery failures may be induced by external forces, such as exposure to fire or mechanical damage, or they may be the result of problems involving charge, discharge, and/or battery protection circuitry design and implementation, or they may be caused by internal cell faults that result from rare or subtle manufacturing problems. Generally, the root causes of energetic cell and battery failures can be classified as:

- Thermal abuse (e.g., external heating);
- Mechanical abuse (e.g., denting, dropping);
- Electrical abuse (e.g., overcharge, external short circuit, over discharge);

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- Poor cell electrochemical design (e.g., imbalance between positive and negative electrodes); and
- Internal cell faults associated with cell manufacturing defects (e.g., foreign metallic particles, poor electrode alignment).

Factors That Influence the Effect of Failure

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The severity of a Li-ion cell failure will be strongly affected by the total energy stored in that cell: a combination of chemical energy and electrical energy. Thus, the severity of a potential thermal runaway event can be mitigated by reducing stored chemical energy (i.e., by reducing the volume of electrolyte within a cell), or by changing the electrolyte to a noncombustible material (i.e., the cell chemistry).

The most flammable component of a Li-ion cell is the hydrocarbon-based electrolyte. The hydrocarbon-based electrolyte in Li-ion cells means that under fire conditions, these cells will behave in a fundamentally different way than lead acid, NiMH or NiCad cells, which contain water-based electrolytes.

Although all charged cells contain stored electrical energy, even fully discharged Li-ion cells contain appreciable chemical energy that can be released through combustion of the electrolyte. Water-based battery chemistries, under some charging conditions, can produce hydrogen gas through electrolysis of the water; however, this hazard is seldom a concern during storage where no charging occurs.

If cells with water-based electrolyte are punctured or damaged, leakage of the electrolyte can pose a corrosive hazard; however, it does not pose a flammability hazard. In comparison, leakage or venting of Li-ion cells will release flammable vapors. Fire impingement on Li-ion cells will cause release of flammable electrolyte, increasing the total heat release of the fire (assuming there are well-ventilated conditions).

Other combustible components in a Li-ion cell include a polymeric separator, various binders used in the electrodes, and the graphite of the anode.

When a cell vents, the released gases mix with the surrounding atmosphere. Depending upon a number of factors, including fuel concentration, oxygen concentration, and temperature, the resulting mixture may or may not be flammable.

Fire Behavior of Cells and Battery Packs

Currently, there is no publicly available data from large-scale Li-ion cell or battery pack fire tests. There are a number of reasons for the lack of large-scale test data. The Li-ion cell industry has been evolving rapidly, so there has been an inherent difficulty in obtaining an "average" cell, battery pack, or device. Thus, if testing were to be conducted and idered reasonably comprehensive, it would require testing

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of multiple models of cells, packs, or devices from multiple suppliers, and even so might quickly become obsolete, as cell chemistries and mechanical designs evolve.

In 2010, testing was conducted involving a consumer electronic device package that contained a Li-ion battery pack and a cell within a consumer electronics device package undergoing a thermal runaway reaction (no external heating).[7]

The observations from this testing may have significant implications on firefighting procedures, specifically fire protection and fighting strategies, fire scene overhaul procedures, and fire scene monitoring for rekindles. Specifically, if a fire occurs adjacent to stored Li-ion cells and battery packs, those cells and battery packs must be protected from relatively modest (compared to flashover) overheating, or cells may begin to vent and ignite, spreading the fire more rapidly than would be expected for normal combustibles.

On fire scenes where large quantities of Li-ion cells have been involved, decisions regarding overhaul procedures must be made with an understanding that as cells are uncovered, moved, or damaged by overhaul procedures, they may undergo thermal runaway reactions and vent, they may ignite, and they may generate (or may themselves become) hot projectiles. Similarly, the potential for rekindles will be high at such fire scenes, and these scenes will require extended monitoring.

As these products saturate the marketplace, distribution, storage, warehousing and retail locations will store Li-ion batteries, as well as the products that contain them. With new battery technologies come new hazards and new challenges for determining the best way to suppress and control fires, including determination of the most effective suppression agents.

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Fire Protection Standards

Li-ion batteries and battery packs have a higher energy density other, more common battery types, which is appealing to the end user, but provides distinct fire protection challenges

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given the current body of knowledge available regarding Li-ion battery fires.

standards specific to Li-ion cells. None of the widely accepted standards applicable to Li-ion battery packs includes water application tests. The publicly available information from testing conducted to date does not allow a comprehensive assessment of whether traditional water-based automatic sprinkler systems, water mist systems, or some other water-based suppression system would be most effective in the protection of stored Li-ion cells or batteries.

Water-based automatic sprinklers are the most widely used fire suppression system and have proven their efficiency and reliability over the years. Many locations are currently provided with the infrastructure necessary to facilitate suppression strategies using water-based suppression systems. Therefore, based on current knowledge and infrastructure, a water-based fire suppression system is the strongest candidate for the protection of stored Li-ion cells and batteries. As warehouse and retail spaces see an increase in the volume of these products, the current codes and standards do not provide adequate guidance on how to best protect Li-ion batteries or classification of their commodity type.

Commodity classifications for water-based suppression strategies are described in NFPA 13,[8] which addresses sprinkler system applications and proposes requirements for storage protection. Commodity classifications relate directly to the fire protection system design requirements.

Classification of actual commodities is primarily based on comparing the commodity to be protected to the definitions for the various commodity classes. NFPA 13 provides a list of commodity classes for various commodities.8 Once the commodity classification is known along with the geometry and configuration of the stored product, sprinkler design densities can be selected. Different types of batteries and the recommended commodity classification for those batteries are mentioned:

- Dry cells (non-lithium or similar exotic metals) packaged in cartons: Class I (i.e., alkaline cells);
- Dry cells (non-lithium or similar exotic metals) blister packed in cartons: Class II (i.e., alkaline cells);
- Automobile batteries - filled:Class I (i.e., lead acid batteries with water-based electrolyte); and
- Truck or larger batteries, empty or filled Group A Plastics (i.e., lead acid batteries with water-based electrolyte).

Currently, NFPA 13 does not provide a specific recommendation of a commodity classification for Li-ion cells, or complete batteries containing several cells. A number of features specific to Li-ion batteries could make any of the existing battery classifications inaccurate and the recommended fire suppression strategy may not be appropriate:

- Flammable versus aqueous electrolyte;

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- The potential to elect electrodes/case material (projectiles) upon thermal runaway;
- Latency of thermal runaway reactions (cell venting can occur sequentially and after a significant delay resulting in re-ignition of materials);
- Large format battery packs may exhibit voltages much higher than typical truck batteries; and
- Individual cells generally have metal versus plastic outer shells.

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The venting and projectile potential of Li-ion cells has some similarities with aerosol products, which typically utilize a flammable propellant, such as propane, butane, dimethyl ether, and methyl ethyl ether. However, these products generally have no associated electrical energy and are not as susceptible to re-ignition events. As they contain flammable electrolyte, Li-ion cells might also be compared to commodities such as ammunition or butane lighters in blister packed cartons (high-energy density).

For commodities not specifically covered by NFPA 13, full-scale fire suppression tests are typically used to determine the commodity classification. Most current sprinkler system design criteria are based on classifications of occupancies or commodities that have been developed from the results of full-scale fire suppression test data and the application of experimental results that have been shown to provide a minimum level of protection. According to the *Automatic Sprinkler System Handbook:*[9]

> *Where commodities are not currently defined, commodity classification testing can provide an accurate comparison between the proposed commodity and known commodity classifications. This testing is essential when determining acceptable sprinkler design criteria for new or unknown commodities where a meaningful comparison cannot be made between the given commodity and other known commodity classifications. Bench-scale testing is not useful for making precise commodity classifications.*

One of the main reasons that specific test data are required when determining the commodity classification of a new or unknown commodity is that the current ability of an engineering analysis is insufficient to define sprinkler suppression characteristics.[9]

At present, there is no publicly available large-scale fire test data for Li-ion cells that can be used to fully assess the storage hazards of Li-ion cells or batteries or to determine an appropriate commodity classification that could be used to provide an overall fire protection suppression strategy.

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The FPRF is currently preparing for Phase II of the Li-ion Hazard and Use Assessment, which will likely involve fire tests aimed at determining the fire behavior characteristics of bulk

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packaged Li-ion batteries with the end goal of determining appropriate NFPA commodity classifications, as appropriate, for various Li-ion battery products. This data will likely prove useful to the NFPA technical committees responsible for the development of provisions related to the suppression of Li-ion battery fires in various occupancies.

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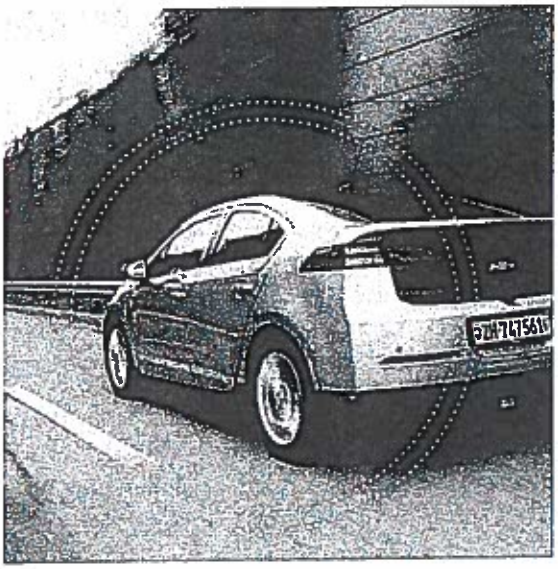

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References:

1. Adapted from Mikolajczak C., Kahn M., White K., Long R.T., Lithium-ion batteries hazard and use assessment, Fire Protection Research Foundation, July 2011.
2. Reddy T.B. (ed), *Linden's Handbook of Batteries*, 4th Edition, McGraw Hill, NY: 2011.
3. Kamath H., "Integrating Batteries with the Grid," *28th International Battery Seminar and Exhibit 2011*, Curran Associates, Inc., Red Hook, NY, 2011, pp. 921-940.
4. Gengo T., Kobayashi Y., Hashimoto T., Minami M., Shigemizu T., Kobayashi K., "Development of Grid-Stabilization Power-Storage System with Lithium-Ion Secondary Battery," *Mitsubishi Heavy Industries Technical Review* 46(2) June 2009.
5. IEEE 1625, "IEEE Standard for Rechargeable Batteries for Multi-Cell Mobile Computing Devices," IEEE, New York, NY, 2008.
6. IEEE 1725, "IEEE Standard for Rechargeable Batteries for Cellular Telephones," IEEE, New York, NY, 2011.
7. Harmon J., Gopalakrishnan P., Mikolajczak C., "US FAA-style flammability assessment of lithium-ion batteries packed with and contained in equipment (UN3481)," Exponent Report 1000025.000 A0F0 0310 FREP, The

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ACCEPT DENY

Rechargeable Battery Association, Washington, DC, March 2010.
8. NFPA 13, *Standard for the Installation of Sprinkler Systems*, National Fire Protection Association, Quincy, MA, 2010.
9. Dubay C. (ed), *Automatic Sprinkler System Handbook*; National Fire Protection Association, Quincy, MA, 2010.

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ACCEPT DENY

From:	Delbert Gehrke
To:	Solsby, Anneke
Subject:	RE: Wheatridge Wind Energy Facility
Date:	Friday, July 06, 2018 6:23:49 AM

Anneke, the only change we would request would be that a 100 foot vegetation free zone be maintained around the battery storage area in the event of a wildland fire.

Sincerely,
Chief Delbert Gehrke
Echo Rural Fire Protection District.

From: Solsby, Anneke [mailto:Anneke.Solsby@tetratech.com]
Sent: Monday, July 02, 2018 12:56 PM
To: dgehrke000@centurytel.net
Subject: Wheatridge Wind Energy Facility

Hello Delbert,

As discussed on the phone, we are proposing to add energy (battery) storage to the Wheatridge Wind Energy Facility. Wheatridge Wind Energy Facility is an approved wind energy generation facility consisting of up to 292 turbines with a peak generating capacity of up to 500 megawatts, to be located on approximately 13,097 acres both in Morrow and Umatilla counties – see attached map. Previously, Merle Gehrke had provided a letter stating that the Echo Rural Fire District did not have any reservations regarding the project – see attached. We need a similar confirmation stating that the potential fire and hazard risk from the proposed addition of energy (battery) storage systems would not impact Echo Rural Fire District's ability to provide fire protection services to the Facility. An email response to this email will suffice.

Although siting and design isn't final, the proposed energy storage systems (20 MW system in Umatilla County) would consist of lithium-ion batteries contained in a building or series of modular containers and would include approximately 18 inverters and associated step-up transformers, as well as interconnecting facilities (control house, protective device and power transformer). The proposed battery storage systems may include ground-level cooling equipment, power conditioning systems, distribution and auxiliary transformers. The proposed battery storage systems would be located adjacent to the previously approved substation and operation and maintenance building sites and would each result in up to 5 acres of new permanent disturbance.

Please let me know if you need additional information. Thank you in advance for your assistance.

Attachment D: Draft Habitat Mitigation Plan

Wheatridge Wind Energy Project

Habitat Mitigation Plan
(Draft Concepts)

Prepared for:

Wheatridge Wind Energy, LLC
245 W. Main Street, Suite 200
Ione, Oregon 97843

Prepared by:

Rick Gerhardt

Northwest Wildlife Consultants, Inc.
815 NW 4th St.
Pendleton, Oregon 97801

April 2015

I. Introduction

This document has been prepared for the Wheatridge Wind Energy Project (Project) Site Certificate Application (SCA) submitted to the Oregon Department of Energy (ODOE). It provides primary concepts for meeting Project development habitat mitigation needs and will be finalized into a formal Habitat Mitigation Plan (HMP). The proposed concepts were discussed with personnel from the Oregon Department of Fish and Wildlife (ODFW) on August 20, 2012 and on July 11, 2014.

The Wheatridge Wind Energy Project is located in Morrow and Umatilla Counties, Oregon. As part of the SCA (Exhibits P and Q), Northwest Wildlife Consultants, Inc. (NWC) completed habitat mapping and quality assessment of the Project area, and conducted site-specific biological studies that included rare plant surveys, avian use surveys, special status vertebrate wildlife species surveys, golden eagle and other raptor nest surveys, an inventory of bat species, and big game observations, as well as reviews for potential occurrence of or records of special status species. No wetlands, perennial streams or other aquatic habitats are addressed in this document because at the time of preparation (August 2014) no facilities are planned for these habitat types. Project impact estimates were provided by Wheatridge Wind Energy, LLC and their SCA contractor, Tetra Tech. Based on a combination of the results of the multi-year biological studies, experience with such mitigation, and knowledge of the wildlife and habitats impacted by wind and natural gas energy development in the Columbia Plateau since 1992, NWC offers the concepts in this document as recommendations for inclusion in the Project's final Habitat Mitigation Plan. Details on habitat types, subtypes, and Categories 1–6 can be found in the SCA, Exhibit P and in the Wheatridge ecological investigations report (Gerhardt and Anderson, 2014). The Applicant is reducing and eliminating the impact of the proposed Project over time by preserving and maintaining in-kind habitat in the Columbia Basin ecoregion to achieve a net benefit to Category 2 habitat and no net loss of Category 3, and 4, Details are discussed in this document.

II. Description of Project Impacts Addressed by the Plan

As presently designed (as of November 13, 2014), the Wheatridge Wind Energy Facility (Project) will be constructed within a landscape of approximately 13,100 acres of privately-owned land and will have a generating capacity of up to 500 megawatts and use an array of up to 292 wind turbines. The Project consists of two groups of wind turbines, 'Wheatridge West' and 'Wheatridge East,' and a connecting 230-kilovolt overhead transmission line (the 'Intraconnection Line'); each of these involve other supporting facilities such as roads and underground electrical lines.

Oregon Administrative Rule (OAR) 635-415-0025, the Wildlife Habitat Mitigation Policy, defines habitats based on type, quality, availability, and usefulness/importance to wildlife, and establishes mitigation goals and implementation standards for each. As further described in the SCA Exhibit P, Category 1 habitat, which is defined as irreplaceable, essential, and limited, includes habitat within 785 feet of documented Washington ground squirrels. The Project was designed and microsited to avoid all mapped Category 1 upland

habitat, and based on that information, no Project facilities or activities will impact such habitat.

Category 2 habitat is defined by OAR 635-415-0025 as essential and limited, and NWC identified small amounts of such habitat within the Project area based on these criteria and the value of such lands to wildlife generally and, in particular, to species of special state or federal status. The OAR specifies net benefit be achieved for Category 2 impacts and defines this as "an increase in overall in-proximity habitat quality or quantity after a development action and any subsequent mitigation measures have been completed and monitored."

In 2013, ODFW began to consider all land (except developed and agriculture such as cropland) that lies within designated big game winter range as Category 2. This leads to the inclusion of additional Category 2 habitat in the Project impacts. For habitat impacts (permanent and temporary) associated with this (big game) Category 2, the mitigation described in this plan will be coupled with minimization best practices during construction to attain the goal of no net loss and a net benefit.

Most of the Project's footprint (area to be covered by permanent facilities) will occupy dryland agriculture, which is Category 6 habitat. The rest of the footprint will occupy Category 2, Category 3 (Revegetated Grassland, Native Perennial Grassland, Basin Big Sagebrush Shrub-steppe, or Rabbitbrush/Buckwheat Shrub-steppe) or Category 4 (Exotic Annual Grassland) habitats.

In addition to the permanent impacts mentioned above, construction of the Project will entail temporary impacts to the same types and categories of habitat. Temporary impacts are summarized as follows: no Category 1 impacts, a small amount of impact to Category 2 habitat (based on ground assessment and definitions in OAR 635-415-0025), additional impacts to Category 2 (based on location within big game winter range), some Category 3 and Category 4 impacts, and mostly Category 6 impacts. Grassland habitats (Category 3 and 4) are expected to require three to five years after disturbance from construction activities to recover to a mature state of grassland cover. Native forbs in perennial grasslands (as well as in shrub-steppe) may not recover to pre-construction diversity or will take longer to recolonize the restored areas. Shrub-steppe habitats (Category 2 and 3) may take much longer to achieve the shrub species maturity and height that existed prior to construction (ten to fifty years).

III. Calculation of the Size of the Mitigation Area

The Habitat Mitigation Area (HMA) must be large enough and have the characteristics to meet the standards set in OAR 635-415-0025. These standards include "no net loss" and a "net benefit" in habitat quality and quantity for Category 2 habitats, and "no net loss" of habitat for Categories 3 and 4. Mitigation standards for Category 6 involve minimizing direct habitat loss and avoiding impacts to off-site habitat.

For the purposes of this discussion, the acreages of impact are the current estimate of the maximum affected area (the permanent and temporary impacts). The actual areas of

disturbance will be determined based on the final design layout of the Project. It is anticipated that ODOE and ODFW will require that they be provided with the final design layout and the associated impact acreages prior to the beginning of Project construction.

The following tables delineate current maximum habitat impact acreage estimates of each of the three components of the Wheatridge Wind Energy Project.

Wheatridge West

Habitat Category	Permanent Impacts	Temporary Impacts
Category 2	3.6	19.7
Category 2 (big game)	21.3	135.8
Category 3	13.5	91.5
Category 4	1.8	11.6
Category 6*	88.6	534.3
Total Impacted Acres	128.9	792.9

* no mitigation required

Wheatridge East

Habitat Category	Permanent Impacts	Temporary Impacts
Category 2	5.6	33.6
Category 2 (big game)	0.4	3.1
Category 3	3.8	26.4
Category 4	1.8	11.7
Category 6*	29.9	185.7
Total Impacted Acres	41.5	260.5

* no mitigation required

Transmission Intraconnection Line

Habitat Category	Permanent Impacts	Temporary Impacts
Category 2	0.0	4.1
Category 2 (big game)	0.4	62.6
Category 3	0.1	16.8
Category 4	0.0	2.5
Category 6*	0.4	58.0
Total Impacted Acres	0.9	144.0

* no mitigation required

Based on these impact estimates, calculation of the mitigation area required (under the maximum layout) are as follows:

Wheatridge West

Category 2
Footprint: 3.6 acres (2:1 ratio)
Temporary impacts: 19.7 acres (>1:1 ratio)
Mitigation area required: (3.6 x 2) + (>19.7) = >26.9

Category 2 (Big Game)
Footprint: 21.3 acres (>1:1 ratio)
Temporary impacts:* revegetated grassland 91.5 (1:1); exotic annual grassland 12.5 (1:1); native perennial grassland 31.8 (1:1)
Mitigation area required: > 21.3 + (91.5 + 12.5 + 31.8) = >157.2 acres

Category 3
Footprint: 13.5 acres (1:1 ratio)
Temporary impacts: revegetated grassland 60.7 (0:1); native perennial grassland 28.7 (0.5:1 ratio); shrub-steppe 2.1 (0.5:1)
Mitigation area required: 13.5 acres + (0.0 + 14.4 + 1.0) = 28.9 acres

Category 4
Footprint: 1.8 acres (1:1 ratio)
Mitigation area required: 1.8 acres

Total mitigation area required (Wheatridge West, to nearest whole acre): >215

* For temporary habitat loss within designated deer winter range, mitigation will be coupled with impact minimization and revegetation efforts to attain the goal of no net loss and a net benefit.

Wheatridge East

Category 2
Footprint: 5.6 acres (2:1 ratio)
Temporary impacts: 33.6 acres (>1:1 ratio)
Mitigation area required: (5.6 x 2) + (>33.6 x 1) = >44.8 acres

Category 2 (Big Game)
Footprint: 0.4 acres (>1:1 ratio)
Temporary impacts: exotic annual grassland 0.8 (1:1); native perennial grassland 2.3 (1:1)
Mitigation area required: >(0.4 + (0.8 + 2.3) = >3.5 acres

Category 3
Footprint: 3.8 acres (1:1 ratio)
Temporary impacts: revegetated grassland 0.0 (0:1); native perennial grassland and shrub-steppe 26.4 (0.5:1 ratio)
Mitigation area required: 3.8 acres + (0.0 + 13.2) = 17.0 acres

Category 4
Footprint: 1.8 acres (1:1 ratio)
Mitigation area required: 1.8 acres

Total mitigation area required (Wheatridge East, to nearest whole acre): >67

Transmission Intraconnection Line

Category 2
Footprint: 0.0 acres (2:1 ratio)
Temporary impacts: 4.1 acres (>1:1 ratio)
Mitigation area required: (0.0 x 2) + (>4.1 x 1) = >4.1 acres

Category 2 (Big Game)
Footprint: 0.4 acres (>1:1 ratio)
Temporary impacts:* revegetated grassland 11.5 (1:1); exotic annual grassland 1.4 (1:1); native perennial grassland 35.5 (1:1); shrub-steppe 14.2 (1:1)
Mitigation area required: > 0.4 + (11.5 + 1.4 + 35.5 + 14.2) = > 63.0 acres

Category 3
Footprint: 0.1 acres (1:1 ratio)
Temporary impacts: revegetated grassland 7.2 (0:1); native perennial grassland and shrub-steppe 9.6 (0.5:1 ratio)
Mitigation area required: 0.1 acres + (0.0 + 4.8) = 4.9 acres

Category 4
Footprint: 0.0 acres (1:1 ratio)
Mitigation area required: 0.0 acres

Total mitigation area required (Transmission Intraconnection, to nearest whole acre): >72

* For temporary habitat loss within designated deer winter range, mitigation will be coupled with impact minimization and revegetation efforts to attain the goal of no net loss and a net benefit.

Total mitigation area required (all three Project components): >354 acres

IV. Description of the Habitat Mitigation Area (HMA)

According to ODFW standards, areas appropriate for mitigation of Category 2 and Category 3 habitat impacts must be “in proximity” to the Project and have potential for habitat enhancement. The applicant has identified more than 360 acres of suitable habitat for consideration by ODFW and ODOE (map submitted separately). These include Native Perennial Grassland, Revegetated Grassland, Basin Big Sagebrush Shrub-steppe, Rabbitbrush/Buckwheat Shrub-steppe, and Exotic Annual Grassland habitats of varying quality. There are opportunities for implementing habitat enhancement actions, as needed for the final habitat mitigation compliance. NWC has confirmed that the parcels under current consideration have adequate potential for mitigating the habitat loss expected to occur and for providing benefit for the wildlife species that use the habitats impacted by habitat loss associated with the Project, including big game. All of the habitat proposed for use as mitigation lies within designated deer winter range. The referenced acreages for mitigation will be discussed with ODFW.

V. Habitat Enhancement Actions

Habitat designated for mitigation will be conserved and protected from alteration for the life of the Project. Besides such legal protection to insure no development, actions that are proposed for enhancement of the mitigation area include

- Livestock grazing will be restricted from the HMA to ensure that habitat is maximally useful to wildlife;
- The holder of the Site Certificate will work with the landowner to control or eradicate noxious weeds.
- Revegetation with native plants—sagebrush and bunch grasses—will occur in proportion to the acres of sagebrush and native grassland habitats lost through Project construction.
- A plan for fire response and control will be in place and applied to the HMA.
- Where old barbed wire fence on the HMA presents potential problems for wildlife, the holder of the Site Certificate will work with the landowner to remove such fencing.
- Habitat protection will involve restricting any uses of the mitigation area that would be inconsistent with the goals of no net loss of habitats in Categories 2, 3, and 4 and a net benefit to Category 2 habitat quantity or quality.

Enhancement activities are expected to apply specifically to the approximately 80 acres of the HMA required as compensation for those habitat impacts outside of deer winter range. The other 226 acres are deemed sufficient compensation for the big game Category 2 habitat impacts. The habitat within the HMA is currently of superior quality to most of the habitat to be impacted within deer winter range. Moreover, the majority of those impacted acres (those with temporary impacts) will be restored within three to five years to better condition than they were prior to construction, as required as part of the Revegetation Plan.

VI. Monitoring

1. Procedures

The holder of the Site Certificate will hire a qualified, independent investigator (wildlife biologist, botanist, or revegetation specialist) to conduct a comprehensive program of monitoring the HMA and the success of its protection and (within applicable acres) enhancements. Annual monitoring will include assessments of:

- Amount and quality of vegetation
- Success of weed control measures
- Degree of recovery of native grasses and forbs
- Success of revegetation measures (where applicable)
- Special status species present

Methods and results of all monitoring will be reported to ODOE and ODFW on an annual basis, along with a report of the mitigation/enhancement measures undertaken that year.

2. Success Criteria

The goal of the habitat mitigation described herein is to protect and enhance a sufficient quantity of habitat to meet ODFW standards of no net loss of habitat Category 3 and Category 4 and a net gain in habitat quantity and quality of Category 2. Habitat protection alone—apart from enhancement—will not be deemed to meet the net-benefit criterion for Category 2 habitat. The minimum amount of habitat protection and enhancement required will be calculated as in Section 3 above using the impact acreages associated with the final Project design. If sufficient high-quality habitat is not available for protection, habitat mitigation goals can be achieved by enhancing the required amount of habitat to bring it up to the higher category. Criteria for assessing such a category improvement will include density and quality of native vegetation of the appropriate types (desirable forbs and bunchgrasses, e.g.) success of weed control, and increased use of the area by native bird or mammal species with special status. If the holder of the Site Certificate desires to base habitat improvement on increased avian or other wildlife use, then baseline studies will need to be conducted on the habitat mitigation area in the spring of Year 1 or Year 2.

Habitat protection and enhancement must endure for the life of the Project. That is, even after habitat protection and enhancement has been achieved, periodic monitoring must take place to assess whether protection and enhancement persists at levels commensurate with mitigation goals. Should habitat quality fall below that prescribed by the Habitat Management Plan, the holder of the Site Certificate will, in consultation with ODFW and ODOE, propose remedial actions for compensating for such a failure to meet mitigation goals.

VII. Amendment of the Plan

This Habitat Mitigation Plan may be amended by agreement of the holder of the Site Certificate and the Oregon Energy Facility Siting Council. Amendments to this Plan will not require an amendment of the Site Certificate.

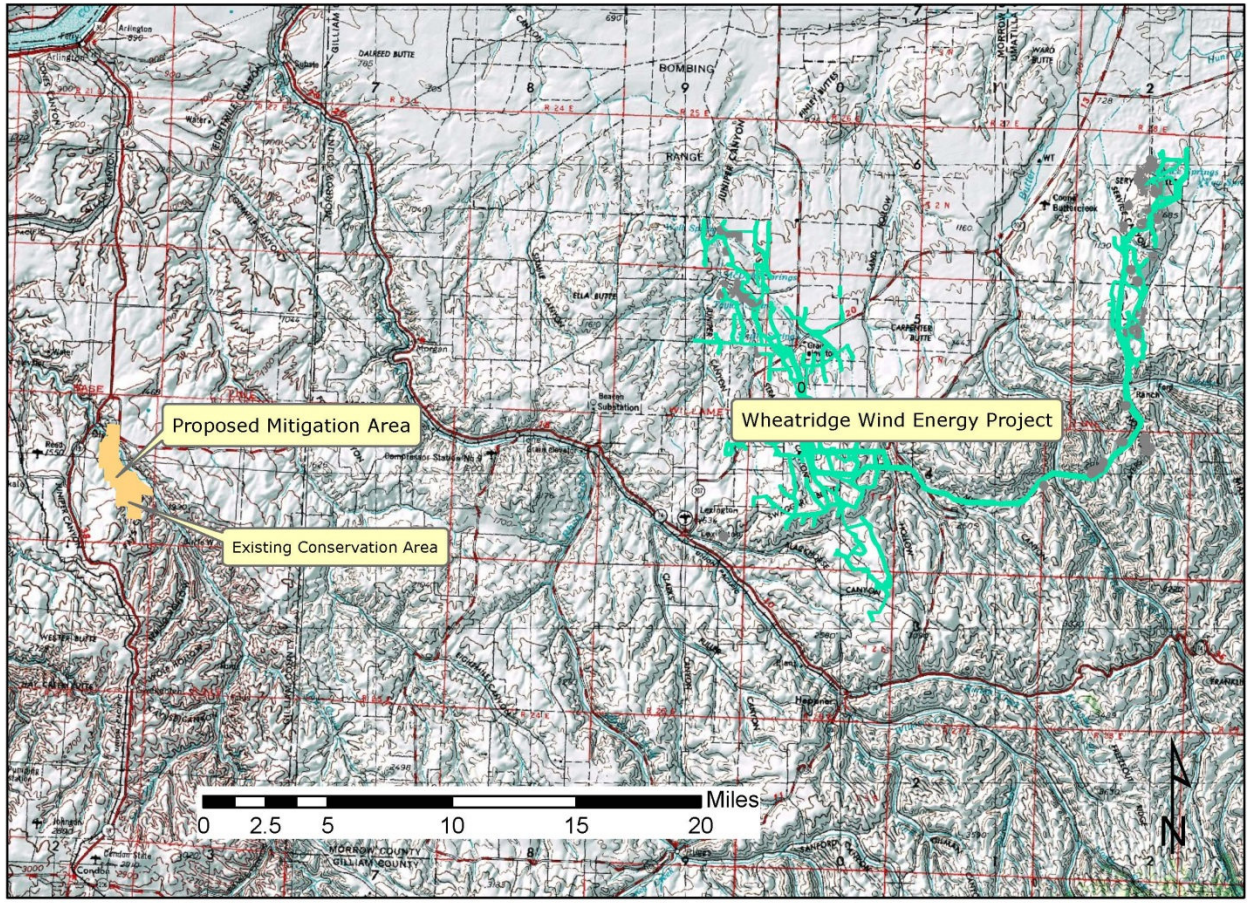

Figure 1. Overview Map: Habitat Mitigation Area for the Wheatridge Wind Energy Project.

Attachment E: Draft Revegetation Plan

Wheatridge Wind Energy Facility

Revegetation Plan
(Draft Concepts)

Prepared for:

Wheatridge Wind Energy, LLC
245 W. Main Street, Suite 200
Ione, Oregon 97843

Prepared by:

Rick Gerhardt

Northwest Wildlife Consultants, Inc.
815 NW 4th Street
Pendleton, Oregon 97801

April 2015

I. Introduction

This document has been prepared for the Wheatridge Wind Energy Facility (Wheatridge, WWEF, or Project) Site Certificate Application (SCA) submitted to the Oregon Department of Energy (ODOE). It provides primary concepts for meeting the needs for revegetation following Project construction and will be finalized (by ODOE) into a formal Revegetation Plan, authored by the ODOE before issuance of the Site Certificate. The concepts provided here are consistent with approved plans in place for other Oregon wind projects in similar habitats, in particular those that are permitted through the State process and the Oregon Energy Facility Siting Council (OEFSC or the Council). The Leaning Juniper II, Stateline, and Montague Revegetation Plans, and available revegetation monitoring reports for wind and natural gas energy projects served as models for the Wheatridge concepts.

The WWEF Revegetation Plan, which has been developed in consultation with personnel from the Oregon Department of Fish and Wildlife, delineates practices and standards for restoring to preconstruction conditions or better those areas temporarily disturbed during construction of the Project; it does not apply to areas permanently occupied by Project facilities. Such restoration is a requirement of the Site Certificate.

The amounts and types of habitats expected to be disturbed during Project construction are described in Exhibit P of the Site Certificate Application; they are also described in Attachment P-3, the Draft Habitat Mitigation Plan. These will include agricultural and other developed lands (collectively referred to as cropland) and grassland, shrub-steppe, and other habitats (collectively referred to as wildlife habitat). This plan addresses both restoration of croplands and restoration of wildlife habitat. For wildlife habitat in particular, it describes planting methods, monitoring requirements, success criteria, and remedial actions (in case success criteria are not met).

Throughout Project construction and revegetation activities, the Developer will take appropriate actions to prevent the spread of noxious weeds (as identified in Morrow County Ordinance No. MC-C-3-90 and No. MC-C-2-99 Appendices A and B). Where appropriate, and pursuant to consultation with the county weed control managers, monitoring of the establishment of noxious weeds and of the effectiveness of weed control or eradication may be performed in concert with the revegetation monitoring described in this document.

II. Project Site Description

The Project is located primarily in Morrow County, with a small portion in Umatilla County, Oregon. It lies within the Columbia Plateau Ecoregion, entirely on public land and primarily in agricultural land used for growing dryland wheat. Native vegetation has been modified by historical and current livestock grazing, by changes in fire regimes, and by the presence of exotic grasses and other vegetation.

Primary soil types include Mikkalo, Willis, Ritzville, and Warden, and land cover types are Developed (Dryland Wheat, Revegetated Grassland, and Other Developed), Grassland (Exotic Annual and Native Perennial), and Shrub-steppe (Basin Big Sagebrush and Snakeweed/Rabbitbrush).

III. Revegetation Methods

Revegetation will begin as soon as feasible after completion of construction, and seeding and planting will be done in a timely manner and in the appropriate season. Agricultural land restoration methods will likely be designed in consultation with the landowner. Soil preparation will involve standard, commonly-used methods, and will take into account all relevant site-specific factors, including slope, size of area, and erosion potential. Topsoil will be restored to the preconstruction condition or better. Mulching and other erosion control measures will be used throughout construction and during revegetation efforts. Preconstruction land use, soil, and vegetation type will dictate the seed mix used for each area to be restored; the wildlife habitat seed mixes used will be finalized in consultation with ODFW and will comply with the Oregon Seed Law.

1. Seed Planting Methods

Methods and timing of planting will be appropriate to the seed mix, weather conditions, and site conditions (including area size, slope, and erosion potential). Preparation of disturbed ground may include replacing lost topsoil and/or chemical or mechanical weed control. Two common application methods for non-cropland are described below.

a) Broadcasting

In this method, the seed mix will be broadcast at specified application rates. Broadcasting should not be utilized when winds exceed five miles per hour. If feasible, half of the seed mix will be broadcast in one direction, with the other half broadcast perpendicular to the first half. A tracking dye may be added to facilitate uniform application. Certified weed-free straw will be applied at a rate of two tons per acre immediately after seeding; straw may either be crimped into the ground or applied with a tackifier.

b) Drilling

In this method, seed will be planted using an agricultural or range seed drill according to application rates recommended by the seed supplier.

IV. Restoration of Cropland

It is expected that croplands will be reseeded with the appropriate crop or maintained as fallow in consultation with the landowner or farm operator. The holder of the Site Certificate will also consult with the landowner or farm operator to determine seed mix and application methods and rates for seed and fertilizer. Success of cropland revegetation will have been achieved when production of the revegetated area is comparable to that of adjacent non-disturbed croplands. Success determination will involve consultation with the landowner or farm operator, and the holder of the Site Certificate will report to ODOE on the success of cropland restoration efforts.

V. Restoration of Wildlife Habitat

All disturbed grassland, shrub-steppe, and other wildlife habitat will be reseeded with a mix of native or native-like grasses, forbs, and shrubs characteristic of the area prior to construction disturbance. Seed mix and application rates will be determined in consultation

with the landowner and ODFW, and will take into consideration soil types, erosion potential, and growing conditions. The seed mix will be approved by ODOE, and seeds will be obtained from a reputable supplier in compliance with the Oregon Seed Law.

VI. Monitoring

1. Revegetation Record

Records will be kept of revegetation efforts, both for croplands and for wildlife habitat; records will include:

- Date construction was completed
- Description of the affected area
- Date revegetation was initiated
- Description of the revegetation effort

The holder of the Site Certificate will update these records periodically as revegetation work occurs, and will provide ODOE with copies of these records with submission of the annual report required by the Site Certificate.

2. Monitoring Procedures

Monitoring of the revegetation effort will be conducted by an independent botanist or revegetation specialist; this monitoring will be done during the first growing season after planting (Year 1), and again in Years 3 and 5. Nearby reference sites (approximating pre-construction conditions) will be selected as targets toward which revegetation will aim. Monitoring will not be required for areas that have been converted by the landowner to land uses that preclude meeting revegetation success criteria.

Weed Control

A qualified investigator will be employed to annually assess weed growth during the first five years of revegetation work and to make recommendations on weed control measures. Reports will be submitted to the holder of the Site Certificate, to ODOE, and to ODFW following each annual inspection. These reports will identify areas and describe extent of weed growth and describe the success of control measures. At the time of the year-5 report, the investigator will consult with ODOE, ODFW, and the holder of the Site Certificate to design an appropriate plan for subsequent weed control.

Wildlife Habitat Recovery

In the first growing season after planting of areas to be revegetated, a qualified independent investigator (botanist or revegetation specialist) will inspect each wildlife habitat revegetation area to assess the success of revegetation measures. These assessments will be repeated in Year 3 and Year 5. Annual reports will be submitted to the holder of the Site Certificate, to ODOE, and to ODFW. Assessments will address whether each wildlife habitat revegetation area is trending toward meeting the success criteria described below.

In consultation with ODFW, reference sites—areas of habitat and quality similar to those found prior to disturbance at the areas to be revegetated—will be established to represent target conditions for revegetation areas. During each assessment, revegetated areas will be compared to reference sites with regard to:

- Presence and density of weeds
- Degree of erosion
- Vegetative density
- Proportion of desirable vegetation
- Species diversity and structural stage of desirable vegetation

Reference sites will be chosen with consideration to land use patterns, soil types, terrain, and presence of noxious weeds. It is expected that a variety of reference sites will be required to represent the range of disturbed areas for which revegetation is required. New reference sites may be chosen if land use changes, wildfire, or other disturbance makes a chosen reference site no longer representative of target conditions.

Based on the Year 5 assessment, the holder of the Site Certificate will consult with ODOE and ODFW to design an action plan for subsequent years. The holder of the Site Certificate may propose remedial actions and/or additional monitoring for areas that have not met the success criteria. Alternatively, revegetation efforts may in some cases be deemed to have failed, and mitigation may be proposed in such cases to compensate for habitat loss.

3. Success Criteria

Each annual report will involve an assessment of the progress toward revegetation objectives of each area of wildlife habitat disturbed during Project construction. The overarching metric for success is when the habitat quality is equal to or better than the quality at the relevant reference site according to the conditions described above. Final determination of whether the holder of the Site Certificate has met the revegetation obligations will be made by ODOE.

4. Remedial Action

Remedial action options will be identified in cases where success criteria are not met, whether due to wildfire subsequent to Project construction or because of lower than expected rates of germination or survival. Remedial actions may include reseeding or other measures. The investigator will make recommendations for remedial actions after each monitoring visit, and the holder of the Site Certificate will take appropriate measures to meet the restoration objectives. The holder of the Site Certificate will annually report the investigator's recommendations for remedial actions and the measures taken. ODOE may require reseeding or other remedial actions in cases where revegetation objectives have not been met.

VII. Plan Amendment

It is expected that the completed Revegetation Plan will make provision for an amendment process that would depend upon the agreement of all concerned parties. In particular, this Plan may be amended—without requiring an amendment to the Site Certificate—by agreement between the Oregon Energy Facility Siting Council (OEFSC) and the holder of the Site Certificate.

Attachment F: Wildlife Monitoring and Mitigation Plan

Wheatridge Wind Energy Project

Proposed Concepts for Wildlife Monitoring and Mitigation Plan

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December 14, 2014

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Introduction

This document has been prepared for the Wheatridge Wind Energy Facility (WWEF or Project) Site Certificate Application (SCA) submitted to the Oregon Department of Energy (ODOE). It provides primary concepts for meeting the operations phase wildlife monitoring and mitigation needs and will be finalized (by ODOE) into a formal Wildlife Monitoring and Mitigation Plan (WMMP), taking into account the objectives for such monitoring of the Oregon Department of Fish and Wildlife (ODFW) and the United States Fish and Wildlife Service (USFWS).

The concepts provided herein are consistent with approved plans in place for other Oregon wind projects, in particular those that are permitted through the State process and the Energy Facility Siting Council. For most such plans in the Oregon Columbia Plateau, the objective has been to provide information useful for determining the impacts of construction and operation of wind energy facilities on wildlife in general—and on birds and bats in particular. As a result of such studies, a wealth of information is available, and the species and relative proportions of birds and bats impacted by wind development in the Oregon Columbia Plateau is now well established.

For this reason, and because multiple-species monitoring has often led to a suboptimal understanding of impacts to particular species of special conservation concern, the USFWS has established guidelines (USFWS, 2012) to facilitate the identifying and addressing such species and the potential impacts to them. For the Wheatridge Wind Energy Facility, pre-construction information reviews and field investigations (Gerhardt et al., 2014) followed those guidelines, as did subsequent siting and micrositing of facilities (Exhibits P and Q of the Wheatridge Site Certificate Application). The conclusion of this process led to discussions with USFWS centering on the potential risk of the Project to golden eagle, discussions that likely will lead to an Eagle Conservation Plan and an Eagle Take Permit. In that case, the methods described in this Plan (especially fatality monitoring and mitigation) may—prior to the beginning of construction of the Project—be tailored specifically to golden eagles and other large raptors.

Wheatridge Wind Energy, LLC (Wheatridge) proposes to construct the Wheatridge Wind Energy Facility on portions of approximately 13,100 acres of privately-owned land in Morrow and Umatilla Counties, Oregon. The Project will have a generating capacity of up to 500 megawatts (MW), using an array of up to 292 wind turbines. The Project consists of two groups of wind turbines, called 'Wheatridge West' and 'Wheatridge East,' and an intraconnection corridor connecting the Wheatridge West and Wheatridge East wind turbine groups with one or two 230 kilovolt (kV) overhead transmission lines. A detailed Project description can be found in Exhibit B of the Wheatridge Site Certificate Application, and detailed maps of the Project site boundary and Project facilities can be found in Exhibit C.

This plan describes wildlife monitoring that the certificate holder shall conduct during operation of the Project. Monitoring objectives of the formal study are to determine whether the facility causes significant fatalities of birds and bats and to determine whether the facility results in a loss of habitat quality. Objectives of continued recording, handling and

reporting of incidentally discovered injured or dead wildlife are to meet the standards specified in any other requirement (federal, state, county) for understanding and documenting species found over time.

For the formal study, the certificate holder shall use experienced and properly trained personnel (the "investigators") to conduct the monitoring required under this plan. The professional qualifications of the investigators are subject to approval by the Oregon Department of Energy. For all components of this plan except the life-of-project Wildlife Reporting and Handling System, the certificate holder shall hire independent third party investigators (not employees of the certificate holder) to perform monitoring tasks.

The *Wildlife Monitoring and Mitigation Plan* for the WWEF has the following components:

1) Fatality monitoring program including:
    a) Removal trials
    b) Searcher efficiency trials
    c) Fatality search protocol
    d) Statistical analysis
2) Raptor nesting surveys
3) Wildlife Reporting and Handling System

Component #1 is of shorter duration whereas #2 is periodic for a longer period and #3 if for the life of the project. Based on the results of the monitoring program, mitigation of significant impacts may be required. The selection of the mitigation actions should allow for flexibility in creating appropriate responses to monitoring results that cannot be known in advance. If the Department determines that mitigation is needed, the certificate holder shall propose appropriate mitigation actions to ODOE and shall carry out mitigation actions approved by ODOE, subject to review by the Oregon Energy Facility Council (Council).

1. Fatality Monitoring

(a) Definitions and Methods

Seasons

This plan uses the following dates for defining seasons:

Season	Dates
Spring Migration	March 16 to May 15
Summer/Breeding	May 16 to August 15
Fall Migration	August 16 to October 31
Winter	November 1 to March 15

Search Plots

The investigators shall conduct fatality monitoring within search plots. The certificate holder, in consultation with the Oregon Department of Fish and Wildlife, shall select search plots based on a systematic sampling design that ensures that the selected search plots are representative of the habitat conditions in different parts of the site. Each search plot will

contain one turbine. Search plots will be square or circular. Circular search plots will be centered on the turbine location; radius will be determined with regard to maximum blade tip height and species of concern. Square search plots will be of sufficient size to contain a circular search plot as described above. The certificate holder shall provide maps of the search plots to ODOE before beginning fatality monitoring at the facility. The certificate holder shall use the same search plots for each search conducted during a monitoring year.

Scheduling

Fatality monitoring will begin one month after commencement of commercial operation of the facility. Subsequent monitoring years will follow the same schedule (beginning in the same calendar month in the subsequent monitoring year).

In each monitoring year, the investigators shall conduct fatality monitoring searches at the rates of frequency shown below. Over the course of one monitoring year, the investigators will conduct 16 searches, as follows:

Season	**Frequency**
Spring Migration	2 searches per month (4 searches)
Summer/Breeding	1 search per month (3 searches)
Fall Migration	2 searches per month (5 searches)
Winter	1 search per month (4 searches)

Sample Size

The sample size for fatality monitoring is the number of turbines searched per monitoring year. The investigators shall conduct fatality monitoring during each monitoring year in search plots at one-third of the turbines that are built or 50 turbines, whichever is greater. If fewer than 50 turbines are built, the certificate holder shall search all turbines.

Duration of Fatality Monitoring

The investigators shall perform one complete monitoring cycle during the first full year of facility operation (Year 1). At the end of the first year of monitoring, the certificate holder will report the results for joint evaluation by ODOE, the certificate holder, and ODFW. In the evaluation, the certificate holder shall compare the results for the WWEF with the thresholds of concern described in Section 1(g) of this plan and with comparable data from other wind power facilities in the Columbia Basin, as available. If the fatality rates for the first year of monitoring at the WWEF do not exceed any of the thresholds of concern and are within the range of the fatality rates found at other wind power facilities in the region, then the investigators will perform a second year of monitoring in Year 5 of operations.

If fatality rates for the first year of monitoring at the WWEF materially exceed any of the thresholds of concern or the range of fatality rates found at other wind power facilities in the region, the certificate holder shall propose additional mitigation for ODOE and ODFW review within 6 months after reporting the fatality rates to the ODOE. Alternatively, the certificate holder may opt to conduct a second year of fatality monitoring immediately if the certificate

holder believes that the results of Year 1 monitoring were anomalous. If the certificate holder takes this option, the investigators still must perform the monitoring in Year 5 of operations as described above.

(b) Removal Trials

The objective of the removal trials is to estimate the length of time avian and bat carcasses remain in the search area. Estimates of carcass removal rates will be used to adjust carcass counts for removal bias. “Carcass removal” is the disappearance of a carcass from the search area due to predation, scavenging, or other means, such as farming activity.

The investigators shall conduct carcass removal trials within each of the seasons defined above during the first year of fatality monitoring. For each trial, the investigators shall use 10 to 15 carcasses of small- and large-bodied species. Trial carcasses shall be distributed within habitat categories and subtypes in proportion to their amounts within search plots.

After the first year of fatality monitoring, the investigators may reduce the number of removal trials and the number of removal trial carcasses during any subsequent year of fatality monitoring, subject to the approval of the Department. The investigators must show that the reduction is justified based on a comparison of the first year removal data with published removal data from nearby wind energy facilities.

The investigators shall use game birds or other legal sources of avian species as test carcasses for the removal trials, and the investigators may use carcasses found in fatality monitoring searches. The investigators shall select species with the same coloration and size attributes as species found within the site boundary. If suitable trial carcasses are available, trials during the fall season will include several small brown birds to simulate bat carcasses. Legally obtained bat carcasses will be used if available.

Trial carcasses will be marked discreetly for recognition by searchers and other personnel. Carcasses will be placed in a variety of postures to simulate a range of conditions. For example, birds will be: (1) placed in an exposed posture (e.g., thrown over the shoulder), (2) hidden to simulate a crippled bird (e.g., placed beneath a shrub or tuft of grass) or (3) partially hidden. The trial carcasses will be placed randomly within the carcass removal trial plots. Trial carcasses will be left in place until the end of the carcass removal trial.

An approximate schedule for assessing removal status is once daily for the first 4 days, and on days 7, 10, 14, 21, 28 and 35. This schedule may be adjusted depending on actual carcass removal rates, weather conditions and coordination with the other survey work. The condition of scavenged carcasses will be documented during each assessment, and at the end of the trial all traces of the carcasses will be removed from the site. Scavenger or other activity could result in complete removal of all traces of a carcass in a location or distribution of feathers and carcass parts to several locations. This distribution will not constitute removal if evidence of the carcass remains within an area similar in size to a search plot and if the evidence would be discernable to a searcher during a normal survey.

Before beginning removal trials for any subsequent year of fatality monitoring, the certificate holder shall report the results of the first year removal trials to ODOE and ODFW. In the report, the certificate holder shall analyze whether four removal trials per year, as

described above, provide sufficient data to accurately estimate adjustment factors for carcass removal. The number of removal trials may be adjusted up or down, subject to the approval of ODOE.

(c) Searcher Efficiency Trials

The objective of searcher efficiency trials is to estimate the percentage of bird and bat fatalities that searchers are able to find. The investigators shall conduct searcher efficiency trials on the fatality monitoring search plots in both grassland/shrub-steppe and cultivated agriculture habitat types. A pooled estimate of searcher efficiency may be used—if sample sizes are too small for some habitat types—to adjust carcass counts for detection bias.

The investigators shall conduct searcher efficiency trials within each of the seasons defined above during the years in which the fatality monitoring occurs. Each trial will involve approximately 4 to 15 carcasses. The searchers will not be notified of carcass placement or test dates. The investigators shall vary the number of trials per season and the number of carcasses per trial so that the searchers will not know the total number of trial carcasses being used in any trial. In total, approximately 80 carcasses will be used per year, or approximately 15 to 25 per season.

For each trial, the investigators shall use small- and large-bodied species. The investigators shall use game birds or other legal sources of avian species as test carcasses for the efficiency trials, and the investigators may use carcasses found in fatality monitoring searches. The investigators shall select species with the same coloration and size attributes as species found within the site boundary. If suitable test carcasses are available, trials during the fall season will include several small brown birds to simulate bat carcasses. Legally obtained bat carcasses will be used if available. The investigators shall mark the test carcasses to differentiate them from other carcasses that might be found within the search plot and shall use methods similar to those used to mark removal test carcasses as long as the procedure is sufficiently discreet and does not increase carcass visibility.

The certificate holder shall distribute trial carcasses in varied habitat in rough proportion to the habitat types within the facility site. On the day of a standardized fatality monitoring search (described below) but before the beginning of the search, investigators will place efficiency trial carcasses randomly within search plots (one to three trial carcasses per search plot) within areas to be searched. If scavengers appear attracted by placement of carcasses, the carcasses will be distributed before dawn.

Efficiency trials will be spread over the entire season to incorporate effects of varying weather and vegetation growth. Carcasses will be placed in a variety of postures to simulate a range of conditions. For example, birds will be: (1) placed in an exposed posture (thrown over the shoulder), (2) hidden to simulate a crippled bird or (3) partially hidden.

The number and location of the efficiency trial carcasses found during the carcass search will be recorded. The number of efficiency trial carcasses available for detection during each trial will be determined immediately after the trial by the person responsible for distributing the carcasses. Following plot searches, all traces of test carcasses will be removed from the site.

If new searchers are brought into the search team, additional searcher efficiency trials will be conducted to ensure that detection rates incorporate searcher differences. The certificate holder shall include a discussion of any changes in search personnel and any additional detection trials in the reporting required under Section 4 of this plan.

Before beginning searcher efficiency trials for any subsequent year of fatality monitoring, the certificate holder shall report the results of the first year efficiency trials to ODOE and ODFW. In the report, the certificate holder shall analyze whether the efficiency trials as described above provide sufficient data to accurately estimate adjustment factors for searcher efficiency. The number of searcher efficiency trials for any subsequent year of fatality monitoring may be adjusted up or down, subject to the approval of ODOE.

(d) Fatality Monitoring Search Protocol

The objective fatality monitoring is to estimate the number of bird and bat fatalities that are attributable to facility operation as an indicator of the impact of the facility on habitat quality. The goal of bird and bat fatality monitoring is to estimate fatality rates and associated variances. The investigators shall perform fatality monitoring using standardized carcass searches according to the schedule described above.

Personnel trained in proper search techniques ("the searchers") will conduct the carcass searches by walking concentric or parallel transects (with transect width determined by the species of concern) within search plots. Search area and speed may be adjusted by habitat type after evaluation of the first searcher efficiency trial.

Searchers shall flag all avian or bat carcasses discovered. Carcasses are defined as a complete carcass or body part, 10 or more feathers or three or more primary feathers in one location. When parts of carcasses and feathers from the same species are found within a search plot, searchers shall make note of the relative positions and assess whether or not these are from the same fatality.

All carcasses (avian and bat) found during the standardized carcass searches will be photographed, recorded and labeled with a unique number. Searchers shall make note of the nearest two or three structures (turbine, power pole, fence, building or overhead line) and the approximate distance from the carcass to these structures. The species and age of the carcass will be determined when possible. Searchers shall note the extent to which the carcass is intact and estimate time since death. Searchers shall describe all evidence that might assist in determination of cause of death, such as evidence of electrocution, vehicular strike, wire strike, predation or disease. When assessment of the carcass is complete, all traces of it will be removed from the site.

Each carcass will be bagged and frozen for future reference and possible necropsy or (if the carcass is fresh and whole) for use in trials. A copy of the data sheet for each carcass will be kept with the carcass at all times. For each carcass found, searchers will record species, sex and age when possible, date and time collected, location, condition (e.g., intact, scavenged, feather spot) and any comments that may indicate cause of death. Searchers will photograph each carcass as found and will map the find on a detailed map of the search area showing the location of the wind turbines and associated facilities. The certificate

holder shall coordinate collection of state endangered, threatened, sensitive or other state protected species with ODFW. The certificate holder shall coordinate collection of federally listed endangered or threatened species and Migratory Bird Treaty Act protected avian species with the U.S. Fish and Wildlife Service. The certificate holder shall obtain appropriate collection permits from ODFW and USFWS.

The investigators shall calculate fatality rates using the statistical methods described in Section (f), except that the investigators may use different notation or methods that are mathematically equivalent with prior approval of ODOE. In making these calculations, the investigators may exclude carcass data from the first search of each turbine plot (to eliminate possible counting of carcasses that were present before the turbine was operating).

The investigators shall estimate the number of avian and bat fatalities attributable to operation of the facility based on the number of avian and bat fatalities found at the facility site. All carcasses located within areas surveyed, regardless of species, will be recorded and, if possible, a cause of death determined based on blind necropsy results. If a different cause of death is not apparent, the fatality will be attributed to facility operation. The total number of avian and bat fatalities will be estimated by adjusting for removal and searcher efficiency bias.

On an annual basis, the certificate holder shall report an estimate of fatalities in eight categories: (1) all birds, (2) small birds, (3) large birds, (4) raptors, (5) grassland birds, (6) nocturnal migrants, (7) state and federally listed threatened and endangered species and State Sensitive Species listed under OAR 635-100-0040 and (8) bats. The certificate holder shall report annual fatality rates on both a per-MW and per-turbine basis.

(e) Incidental Finds and Injured Birds

The searchers might discover carcasses incidental to formal carcass searches (e.g., while driving within the project area). For each incidentally discovered carcass, the searcher shall identify, photograph, record data and collect the carcass as would be done for carcasses within the formal search sample during scheduled searches. If the incidentally discovered carcass is found within a formal search plot, the fatality data will be included in the calculation of fatality rates. If the incidentally discovered carcass is found outside a formal search plot, the data will be reported separately. The certificate holder shall coordinate collection of incidentally discovered state endangered, threatened, sensitive or other state protected species with ODFW. The certificate holder shall coordinate collection of incidentally discovered federally-listed endangered or threatened species and Migratory Bird Treaty Act protected avian species with the USFWS.

The certificate holder shall develop and follow a protocol for handling injured birds. Any injured native birds found on the facility site will be carefully captured by a trained project biologist or technician and transported to a qualified rehabilitation specialist approved by ODOE.[1] The certificate holder shall pay costs, if any, charged for time and expenses related

[1] Approved specialists include Lynn Tompkins (wildlife rehabilitator) of Blue Mountain Wildlife, a wildlife rehabilitation center in Pendleton, and the Audubon Bird Care Center in Portland. The certificate holder must obtain

to care and rehabilitation of injured native birds found on the site, unless the cause of injury is clearly demonstrated to be unrelated to the facility operations.

(f) Statistical Methods for Fatality Estimates (Shoenfeld Estimator)

The estimate of the total number of wind facility-related fatalities is based on:

(1) The observed number of carcasses found during standardized searches during the two monitoring years for which the cause of death is attributed to the facility.[2]
(2) Searcher efficiency expressed as the proportion of planted carcasses found by searchers.
(3) Removal rates expressed as the estimated average probability a carcass is expected to remain in the study area and be available for detection by the searchers during the entire survey period.

Definition of Variables

The following variables are used in the equations below:

c_i the number of carcasses detected at plot *i* for the study period of interest (e.g., one year) for which the cause of death is either unknown or is attributed to the facility

n the number of search plots

k the number of turbines searched (includes the turbines centered within each search plot and a proportion of the number of turbines adjacent to search plots to account for the effect of adjacent turbines on the search plot buffer area)

$\bar{c}$ the average number of carcasses observed per turbine per year

s the number of carcasses used in removal trials

s_c the number of carcasses in removal trials that remain in the study area after 35 days

se standard error (square of the sample variance of the mean)

t_i the time (days) a carcass remains in the study area before it is removed

$\bar{t}$ the average time (days) a carcass remains in the study area before it is removed

d the total number of carcasses placed in searcher efficiency trials

p the estimated proportion of detectable carcasses found by searchers

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ODOE approval before using other specialists.
[2] If a different cause of death is not apparent, the fatality will be attributed to facility operation.

I the average interval between searches in days

$\hat{\pi}$ the estimated probability that a carcass is both available to be found during a search and is found

m_t the estimated annual average number of fatalities per turbine per year, adjusted for removal and observer detection bias

C nameplate energy output of turbine in megawatts (MW)

Observed Number of Carcasses

The estimated average number of carcasses ($\bar{c}$) observed per turbine per year is:

$$\bar{c} = \frac{\sum_{i=1}^{n} c_i}{k}. \qquad (1)$$

Estimation of Carcass Removal

Estimates of carcass removal are used to adjust carcass counts for removal bias. Mean carcass removal time ($\bar{t}$) is the average length of time a carcass remains at the site before it is removed:

$$\bar{t} = \frac{\sum_{i=1}^{s} t_i}{s - s_c}. \qquad (2)$$

This estimator is the maximum likelihood estimator assuming the removal times follow an exponential distribution and there is right-censoring of data. Any trial carcasses still remaining at 35 days are collected, yielding censored observations at 35 days. If all trial carcasses are removed before the end of the trial, then s_c is 0, and $\bar{t}$ is just the arithmetic average of the removal times. Removal rates will be estimated by carcass size (small and large), habitat type and season.

Estimation of Observer Detection Rates

Observer detection rates (i.e., searcher efficiency rates) are expressed as *p,* the proportion of trial carcasses that are detected by searchers. Observer detection rates will be estimated by carcass size, habitat type and season.

Estimation of Facility-Related Fatality Rates

The estimated per turbine annual fatality rate (m_t) is calculated by:

$$m_t = \frac{\bar{c}}{\hat{\pi}}, \qquad (3)$$

where $\hat{\pi}$ includes adjustments for both carcass removal (from scavenging and other means) and observer detection bias assuming that the carcass removal times t_i follow an exponential distribution. Under these assumptions, this detection probability is estimated by:

$$\hat{\pi} = \frac{\bar{t} \cdot p}{I} \cdot \left[\frac{\exp\left(I / \bar{t} \right) - 1}{\exp\left(I / \bar{t} \right) - 1 + p} \right]. \tag{4}$$

The estimated per MW annual fatality rate (m) is calculated by:

$$m = \frac{m_t}{C}. \tag{5}$$

The final reported estimates of *m*, associated standard errors and 90% confidence intervals will be calculated using bootstrapping (Manly 1997). Bootstrapping is a computer simulation technique that is useful for calculating point estimates, variances and confidence intervals for complicated test statistics. For each iteration of the bootstrap, the plots will be sampled with replacement, trial carcasses will be sampled with replacement, and $\bar{c}$, $\bar{t}$, p, $\hat{\pi}$ and m will be calculated. A total of 5,000 bootstrap iterations will be used. The reported estimates will be the means of the 5,000 bootstrap estimates. The standard deviation of the bootstrap estimates is the estimated standard error. The lower 5th and upper 95th percentiles of the 5000 bootstrap estimates are estimates of the lower limit and upper limit of 90% confidence intervals.

Nocturnal Migrant and Bat Fatalities

Differences in observed nocturnal migrant and bat fatality rates for lit turbines, unlit turbines that are adjacent to lit turbines and unlit turbines that are not adjacent to lit turbines will be compared graphically and statistically.

(g) Mitigation

The certificate holder shall use a worst-case analysis to resolve any uncertainty in the results and to determine whether the data indicate that additional mitigation should be considered. ODOE may require additional, targeted monitoring if the data indicate the potential for significant impacts that cannot be addressed by worst-case analysis and appropriate mitigation.

Mitigation may be appropriate if fatality rates exceed a "threshold of concern." [3] For the purpose of determining whether a threshold has been exceeded, the certificate holder shall calculate the average annual fatality rates for species groups after each year of monitoring. Based on current knowledge of the species that are likely to use the habitat in the area of the facility, the following thresholds apply to the WWEF:

Species Group	**Threshold of Concern** (fatalities per MW)
Raptors (All eagles, hawks, falcons and owls, including burrowing owls.)	0.09
Raptor species of special concern (Swainson's hawk, ferruginous hawk, peregrine falcon, golden eagle, bald eagle, burrowing owl.)	0.06
Grassland species (All native bird species that rely on grassland habitat and are either resident species occurring year round or species that nest in the area, excluding horned lark, burrowing owl and northern harrier.)	0.59
State sensitive avian species listed under OAR 635-100-0040 (Excluding raptors listed above.)	0.2
Bat species as a group	2.5

If the data show that a threshold of concern for an avian species group has been exceeded, the certificate holder shall implement mitigation if ODOE determines that mitigation is appropriate based on analysis of the data, consultation with ODFW, and consideration of any other significant information available at the time. In addition, ODOE may determine that mitigation is appropriate if fatality rates for individual avian or bat species (especially State Sensitive Species) are higher than expected and at a level of biological concern. If ODOE determines that mitigation is appropriate, the certificate holder, in consultation with ODOE and ODFW, shall propose mitigation measures designed to benefit the affected species. This may take into consideration whether the mitigation required or provided in conjunction with raptor nest monitoring, habitat mitigation, or other components of the *Wildlife Monitoring and Mitigation Plan* or *Habitat Mitigation Plan*, would also benefit the affected species.

The certificate holder shall implement mitigation as approved by ODOE, subject to review by the Council. ODOE may recommend additional, targeted data collection if the need for

[3] The Council adopted "thresholds of concern" for raptors, grassland species, and state sensitive avian species in the Final Order on the Application for the Klondike III Wind Project (June 30, 2006) and for bats in the Final Order on the Application for the Biglow Canyon Wind Farm (June 30, 2006). As explained in the Klondike III order: "Although the threshold numbers provide a rough measure for deciding whether the Council should be concerned about observed fatality rates, the thresholds have a very limited scientific basis. The exceeding of a threshold, by itself, would not be a scientific indicator that operation of the facility would result in range-wide population level declines of any of the species affected. The thresholds are provided in the Wildlife Monitoring and Mitigation Plan to guide consideration of additional mitigation based on two years of monitoring data."

mitigation is unclear based on the information available at the time. The certificate holder shall implement such data collection as approved by the Council.

The certificate holder shall design mitigation to benefit the affected species group. Mitigation may include, but is not limited to, protection of nesting habitat for the affected group of native species through a conservation easement or similar agreement. Tracts of land that are intact and functional for wildlife are preferable to degraded habitat areas. Preference should be given to protection of land that would otherwise be subject to development or use that would diminish the wildlife value of the land. In addition, mitigation measures might include: enhancement of the protected tract by weed removal and control; increasing the diversity of native grasses and forbs; planting sagebrush or other shrubs; constructing and maintaining artificial nest structures for raptors; improving wildfire response; and conducting or making a contribution to research that will aid in understanding more about the affected species and its conservation needs in the region.

If the data show that the threshold of concern for bat species as a group has been exceeded, the certificate holder shall implement mitigation if ODOE determines that mitigation is appropriate based on analysis of the data, consultation with ODFW, and consideration of any other significant information available at the time. For example, if the threshold for bat species as a group is exceeded, the certificate holder may contribute to Bat Conservation International or to a Pacific Northwest bat conservation group to fund new or ongoing research in the Pacific Northwest to better understand wind facility impacts to bat species and to develop possible ways to reduce impacts to the affected species.

2. Raptor Nest Surveys

The objectives of raptor nest surveys are: (1) to estimate the size of the local breeding populations of raptor species that nest on the ground or aboveground in trees or other aboveground nest locations in the vicinity of the facility; and (2) to determine whether there are noticeable changes in nesting activity or nesting success in the local populations of the following raptor species: Swainson's hawk, golden eagle, ferruginous hawk and burrowing owl.

The certificate holder shall conduct short-term and long-term monitoring. The investigators will use aerial and ground surveys to evaluate nest success by gathering data on active nests, on nests with young, and on young fledged.

(a) Short-Term Monitoring

Short-term monitoring will be done in two monitoring seasons. The first monitoring season will be in the first raptor nesting season after completion of construction of the facility. The second monitoring season will be in the fourth year after construction is completed. The certificate holder shall provide a summary of the first-year results in the monitoring report described in Section 4. After the second monitoring season, the investigators will analyze two years of data compared to the baseline data.

During each monitoring season, the investigators will conduct a minimum of one aerial and one ground survey for raptor nests in late May or early June and additional surveys as described in this section. The survey area is the area within the facility site and a 2-mile

buffer zone around the site. For the ground surveys while checking for nesting *success* (conducted within the facility site and up to a maximum of ½ mile from the facility site), nests outside the leased project boundary will be checked from an appropriate distance where feasible, depending on permission from the landowner for access.

All nests discovered during pre-construction surveys and any nests discovered during post-construction surveys, whether active or inactive, will be given identification numbers. Global positioning system (GPS) coordinates will be recorded for each nest. Locations of inactive nests will be recorded because they could become occupied during future years.

Determining nest *occupancy* may require one or two visits to each nest. Aerial surveys for nest occupancy will be conducted within the facility site and a 2-mile buffer. For occupied nests, the certificate holder will determine nesting *success* by a minimum of one ground visit to determine the species, number of young and young fledged within the facility site and up to ½ mile from the facility site. "Nesting success" means that the young have successfully fledged (the young are independent of the core nest site).

(b) Long-Term Monitoring

In addition to the two years of post-construction raptor nest surveys described in Section 2(a), the investigators shall conduct long-term raptor nest surveys at 5-year intervals for the life of the facility.[4] Investigators will conduct the first long-term raptor nest survey in the raptor nesting season of the ninth year after construction is completed and will repeat the survey at 5-year intervals thereafter. In conducting long-term surveys, the investigators will follow the same survey protocols as described above in Section 2(a) unless the investigators propose alternative protocols that are approved by ODOE. In developing an alternative protocol, the investigators will consult with ODFW and will take into consideration other raptor nest monitoring conducted in adjacent areas. The investigators will analyze the data—as a way of determining trends in the number of raptor breeding attempts the facility supports and the success of those attempts—and will submit a report after each year of long-term raptor nest surveys.

3. Wildlife Reporting and Handling System

The Wildlife Reporting and Handling System (WRHS) is a monitoring program to search for and handle avian and bat casualties found by maintenance personnel during operation of the facility. Maintenance personnel will be trained in the methods needed to carry out this program. This monitoring program includes the initial response, handling and reporting of bird and bat carcasses discovered incidental to maintenance operations ("incidental finds").

All avian and bat carcasses discovered by maintenance personnel will be photographed and data will be recorded as would be done for carcasses within the formal search sample during scheduled searches. If maintenance personnel discover incidental finds, the maintenance personnel will notify a project biologist. The Project biologist (or the Project biologist's experienced wildlife technician) will collect the carcass or will instruct maintenance

[4] As used in this plan, "life of the facility" means continuously until the facility site is restored and the site certificate is terminated in accordance with OAR 345-027-0110.

personnel to have an on-site carcass handling permittee collect the carcass. The certificate holder's on-site carcass handling permittee must be a person who is listed on state and federal scientific or salvage collection permits and who is available to process (collect) the find on the day it is discovered. The find must be processed on the same day as it is discovered.

During the years in which fatality monitoring occurs, if maintenance personnel discover incidental finds outside the search plots for the fatality monitoring searches, the data will be reported separately from fatality monitoring data. If maintenance personnel discover carcasses within search plots, the data will be included in the calculation of fatality rates. The maintenance personnel will notify a project biologist. The Project biologist will collect the carcass or will instruct maintenance personnel to have an on-site carcass handling permittee collect the carcass. As stated above, the on-site permittee must be available to process the find on the day it is discovered. The certificate holder shall coordinate collection of state endangered, threatened, sensitive or other state protected species with ODFW. The certificate holder shall coordinate collection of federally-listed endangered or threatened species and Migratory Bird Treaty Act protected avian species with the USFWS.

4. Data Reporting

The certificate holder will report wildlife monitoring data and analysis to the ODOE for each calendar year in which wildlife monitoring occurs. Monitoring data include fatality monitoring program data, raptor nest survey data, and WRHS data. The certificate holder may include the reporting of wildlife monitoring data and analysis in the annual report required under OAR 345-026-0080 or submit this information as a separate document at the same time the annual report is submitted. In addition, the certificate holder shall provide to ODOE any data or record generated in carrying out this monitoring plan upon request by ODOE.

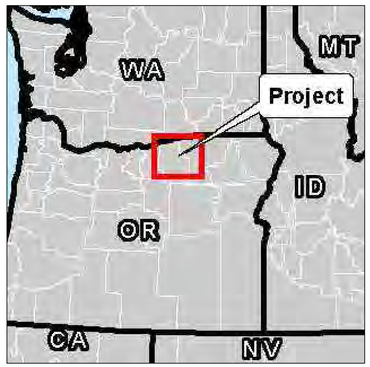
The certificate holder shall notify USFWS and ODFW immediately if any federal or state endangered or threatened species are killed or injured on the facility site.

5. Amendment of the Plan

This *Wildlife Monitoring and Mitigation Plan* may be amended from time to time by agreement of the certificate holder and the Council. Such amendments may be made without amendment of the site certificate. The Council authorizes ODOE to agree to amendments to this plan and to mitigation actions that may be required under this plan. ODOE shall notify the Council of all amendments and mitigation actions, and the Council retains the authority to approve, reject or modify any amendment of this plan or mitigation action agreed to by ODOE.

Attachment G: Draft Erosion and Sediment Control Plan

WHEATRIDGE WIND ENERGY FACILITY
LEXINGTON, OREGON
EROSION AND SEDIMENT CONTROL PLAN
DECEMBER 2014



FACILITY LOCATION

THE DISTANCE FROM THE CITY OF LEXINGTON TO THE PRIMARY SUBSTATION OF THE WEST PORTION OF THE FACILITY SITE BOUNDARY IS APPROXIMATELY 7 MILES. THE DISTANCE FROM THE CITY OF LEXINGTON TO THE SITE BOUNDARY WITH THE NEAREST FACILITY TURBINE IS APPROXIMATELY 2.5 MILES.

LAT 45°29'55.0"
LONG –119°33'57.9"

DEVELOPER

WHEATRIDGE WIND ENERGY
CONTACT: ANDREW O'CONNELL
245 W. MAIN STREET, SUITE 200
IONE, OREGON, 97843
TELEPHONE: 541–422–7552
EMAIL: ANDREW@DIVERSIFIEDWINDS.COM

DESIGNER

TETRA TECH, INC.
CONTACT: ROBERT FRIEDEL
1750 SW HARBOR WAY, SUITE 400
PORTLAND, OREGON 97201
TELEPHONE: 503–221–8636
EMAIL: ROBERT.FRIEDEL@TETRATECH.COM

NARRATIVE DESCRIPTION – EXISTING SITE CONDITIONS

WHEATRIDGE WIND ENERGY, LLC PROPOSES TO CONSTRUCT THE WHEATRIDGE WIND ENERGY FACILITY IN MORROW AND UMATILLA COUNTIES, WITH GENERATING CAPACITY OF UP TO 500 MEGAWATTS. THE FACILITY WILL CONSIST OF NO MORE THAN 292 TURBINES LOCATED AT THE SITE (DEPENDING ON THE FINAL TURBINE SIZE AND VENDOR), NEWLY CONSTRUCTED ROADS, TWO OPERATIONS AND MAINTENANCE FACILITIES, A 34.5–KILOVOLT COLLECTION SYSTEM, UP TO TWO, OVERHEAD, 230–KILOVOLT TRANSMISSION LINES, AND UP TO THREE NEW SUBSTATIONS.

TOTAL AREA DISTURBED

1,115 ACRES TEMPORARILY (EST., MAX.)
165 ACRES PERMANENTLY (EST., MAX.)

RECEIVING WATERBODIES

RUNOFF FROM THE SITE IS OVERLAND FLOW TO NUMEROUS EPHEMERAL STREAMS, BUTTER CREEK, AND ULTIMATELY TO THE COLUMBIA RIVER.

PERMITTEE'S SITE INSPECTOR

TBD

LOCAL AGENCY–SPECIFIC EROSION CONTROL REQUIREMENTS:

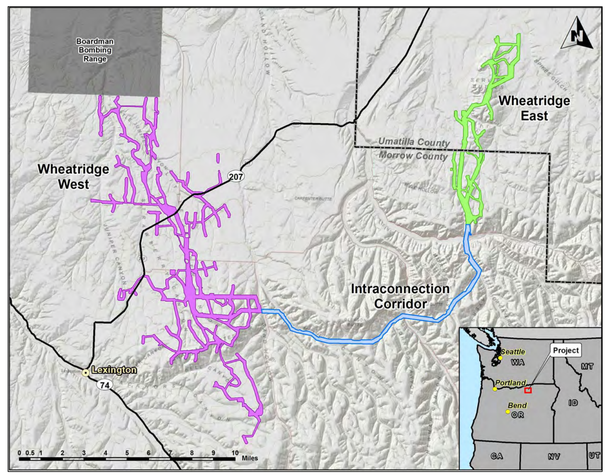
(HHH) COMMERCIAL WIND POWER GENERATION FACILITY

THE FOLLOWING INFORMATION SHALL BE PROVIDED AS PART OF THE APPLICATION, OR SUBJECT TO THE COUNTY'S DISCRETIONARY AUTHORITY, BE REQUIRED PRIOR TO THE CONSTRUCTION OR OPERATION OF THE WIND POWER GENERATION FACILITY THROUGH A CONDITION OF APPROVAL:

A RE–VEGETATION AND EROSION CONTROL PLAN, DEVELOPED IN CONSULTATION WITH THE UMATILLA COUNTY PUBLIC WORKS DEPARTMENT, SOIL AND WATER CONSERVATION DISTRICT, AND APPROPRIATE WATERSHED COUNCIL. AT A MINIMUM, THE PLAN SHALL INCLUDE THE SEEDING OF ALL ROAD CUTS OR RELATED BARE ROAD AREAS AS A RESULT OF ALL CONSTRUCTION, DEMOLITION AND RESTORATION WITH AN APPROPRIATE MIX OF NATIVE VEGETATION OR VEGETATION SUITED TO THE AREA. THE PLAN SHALL ALSO ADDRESS MONITORING DURING AND POST CONSTRUCTION.

DRAWING INDEX

ESC–1 EROSION CONTROL – COVER SHEET AND DRAWING INDEX
ESC–2 EROSION CONTROL – GENERAL NOTES
ESC–3 EROSION CONTROL – NOTES
ESC–4 EROSION CONTROL – OVERALL SITE PLAN
ESC–5 EROSION CONTROL – MAXIMUM PROJECT IMPACT, GE 1.7–103 PROJECT FACILITIES AND 230 KV INTRACONNECTION LINES OPTION 1 SITE PLAN (SHEET 1 OF 5)
ESC–6 EROSION CONTROL – MAXIMUM PROJECT IMPACT, GE 1.7–103 PROJECT FACILITIES AND 230 KV INTRACONNECTION LINES OPTION 1 SITE PLAN (SHEET 2 OF 5)
ESC–7 EROSION CONTROL – MAXIMUM PROJECT IMPACT, GE 1.7–103 PROJECT FACILITIES AND 230 KV INTRACONNECTION LINES OPTION 1 SITE PLAN (SHEET 3 OF 5)
ESC–8 EROSION CONTROL – MAXIMUM PROJECT IMPACT, GE 1.7–103 PROJECT FACILITIES AND 230 KV INTRACONNECTION LINES OPTION 1 SITE PLAN (SHEET 4 OF 5)
ESC–9 EROSION CONTROL – MAXIMUM PROJECT IMPACT, GE 1.7–103 PROJECT FACILITIES AND 230 KV INTRACONNECTION LINES OPTION 1 SITE PLAN (SHEET 5 OF 5)
ESC–10 EROSION CONTROL – MINIMUM PROJECT IMPACT, GE 2.5–120 PROJECT FACILITIES AND 230 KV INTRACONNECTION LINES OPTION 3 SITE PLAN (SHEET 1 OF 5)
ESC–11 EROSION CONTROL – MINIMUM PROJECT IMPACT, GE 2.5–120 PROJECT FACILITIES AND 230 KV INTRACONNECTION LINES OPTION 3 SITE PLAN (SHEET 2 OF 5)
ESC–12 EROSION CONTROL – MINIMUM PROJECT IMPACT, GE 2.5–120 PROJECT FACILITIES AND 230 KV INTRACONNECTION LINES OPTION 3 SITE PLAN (SHEET 3 OF 5)
ESC–13 EROSION CONTROL – MINIMUM PROJECT IMPACT, GE 2.5–120 PROJECT FACILITIES AND 230 KV INTRACONNECTION LINES OPTION 3 SITE PLAN (SHEET 4 OF 5)
ESC–14 EROSION CONTROL – MINIMUM PROJECT IMPACT, GE 2.5–120 PROJECT FACILITIES AND 230 KV INTRACONNECTION LINES OPTION 3 SITE PLAN (SHEET 5 OF 5)
ESC–15 EROSION AND SEDIMENT CONTROL CONSTRUCTION DETAILS (SHEET 1 OF 3)
ESC–16 EROSION AND SEDIMENT CONTROL CONSTRUCTION DETAILS (SHEET 2 OF 3)
ESC–17 EROSION AND SEDIMENT CONTROL CONSTRUCTION DETAILS (SHEET 3 OF 3)



LOCATION MAP

REV	REVISION DESCRIPTION	DSG BY/DATE	DWN BY/DATE	CHK BY/DATE	APPVD/DATE
0	FINAL	JPP/11–21–14	AML/11–21–14	REV/11–21–14	SO/11–21–14

REGISTERED PROFESSIONAL ENGINEER
76918PE
OREGON
SEPTEMBER 13, 2005
SENDA OZKAN

EXPIRES: 12/31/2014

WHEATRIDGE WIND ENERGY FACILITY
EROSION AND SEDIMENT CONTROL PLAN

WHEATRIDGE WIND ENERGY FACILITY
LEXINGTON, OREGON

EROSION AND SEDIMENT CONTROL
COVER SHEET AND DRAWING INDEX

THE ORIGINAL DRAWING AND SUBSEQUENT REVISIONS THEREOF WITH APPROVAL NAMES, INITIALS AND PE SEAL, IF APPLICABLE, ARE MAINTAINED IN THE FILES OF TETRA TECH, INC.

SIZE	CONTRACT NO.	DRAWING NO.	REV
DI		ESC–1	0

SCALE:

FILE NAME: P:\WHEATRIDGE WIND\ENGINEERING\DRAWINGS\20141120 WHEATRIDGE WIND ESCP.DWG

NATURE OF CONSTRUCTION ACTIVITY AND ESTIMATED TIME TABLE

SEE ESCP PART II NARRATIVE FORM.

INSPECTION FREQUENCY

SITE CONDITION	MINIMUM FREQUENCY
ACTIVE PERIOD.	DAILY WHEN STORMWATER RUNOFF, INCLUDING RUNOFF FROM SNOWMELT, IS OCCURRING. AT LEAST ONCE EVERY TWO (2) WEEKS, REGARDLESS OF WHETHER STORMWATER RUNOFF IS OCCURRING.
PRIOR TO THE SITE BECOMING INACTIVE OR IN ANTICIPATION OF INACTIVITY.	ONCE TO ENSURE THAT EROSION AND SEDIMENT CONTROL MEASURES ARE IN WORKING ORDER. ANY NECESSARY MAINTENANCE AND REPAIR MUST BE MADE PRIOR TO LEAVING THE SITE.
INACTIVE PERIODS GREATER THAN SEVEN (7) CONSECUTIVE CALENDAR DAYS.	ONCE EVERY TWO (2) WEEKS.
PERIODS DURING WHICH THE SITE IS INACCESSIBLE DUE TO INCLEMENT WEATHER.	IF PRACTICAL, INSPECTIONS MUST OCCUR DAILY AT A RELEVANT AND ACCESSIBLE DISCHARGE POINT OR DOWNSTREAM LOCATION.

HOLD A PRECONSTRUCTION MEETING WITH PROJECT CONSTRUCTION PERSONNEL THAT INCLUDES THE ESC INSPECTOR. ALL INSPECTIONS MUST BE MADE IN ACCORDANCE WITH DEQ 1200-C PERMIT REQUIREMENTS.

SOIL TYPES

THE FACILITY WILL OCCUPY AN AREA IN MORROW AND UMATILLA COUNTIES THAT CONTAINS 18 MAJOR SOIL UNITS. BURKE SILT LOAM, RITZVILLE SILT LOAM, VALBY SILT LOAM, WARDEN SILT LOAM AND THE WILLIS SILT LOAM ARE THE MOST WIDESPREAD SOIL TYPES AND WOULD UNDERLIE THE MAJORITY OF THE FACILITY ON THE WESTERN AND EASTERN PORTIONS.

BURKE SILT LOAM - THIS SOIL UNIT CONSISTS OF MODERATELY DEEP SILT LOAM TO DURIPAN, WELL DRAINED SOILS FORMED IN LOESS AND GLACIOLACUSTRINE DEPOSITS OVER A DURIPAN ON UPLANDS. THE SURFACE LAYER IS A LIGHT BROWNISH GRAY SILT LOAM ABOUT 4 INCHES THICK. THE SUBSOIL IS A PALE TO DARK BROWN SILT LOAM ABOUT 18 INCHES THICK AND LIKE THE SURFACE SOIL IS SOFT, VERY FRIABLE, SLIGHTLY STICKY AND SLIGHTLY PLASTIC. BELOW A DEPTH OF ABOUT 30 INCHES IS INDURATED LIME-SILICA DURIPAN. THE DURIPAN IS 6 INCHES TO SEVERAL FEET THICK AND OVERLIES WEAKLY CONSOLIDATED ALLUVIUM, LAKE SEDIMENTS, LOESS, GRAVELLY ALLUVIAL DEPOSITS, OR BASALT. PERMEABILITY OF THE BURKE SOIL IS MODERATE ABOVE THE DURIPAN. AVAILABLE WATER CAPACITY IS ABOUT 5.2 INCHES. EFFECTIVE ROOTING DEPTH IS TO THE DURIPAN. NO PREPONDERANCE FOR FLOODING OR PONDING. RUNOFF IS VERY SLOW FOR SLOPES LESS THAN 7 PERCENT AND MEDIUM FOR SLOPES 7 TO 20 PERCENT. THE HAZARD OF WATER EROSION IS HIGH. THE HAZARD OF WIND EROSION IS LOW TO MODERATE. SLOPES ARE PRIMARILY 1 TO 12 PERCENT IN THE FACILITY AREA.

VALBY SILT LOAM - THIS SOIL UNIT CONSISTS OF MODERATELY DEEP, WELL DRAINED SOILS THAT FORMED IN LOESS MIXED WITH SOME ASH, OVERLYING BASALT AND ARE LOCATED ON UPLAND SLOPES. THE SURFACE LAYER IS VERY DARK GRAYISH BROWN SILT LOAM ABOUT 14 INCHES THICK. THE SUBSOIL IS A DARK BROWN HEAVY SILT LOAM ABOUT 16 INCHES THICK. AT DEPTH THIS SUBSOIL LAYER IS HARD, FRIABLE, SLIGHTLY STICKY AND SLIGHTLY PLASTIC. AT AN APPROXIMATE DEPTH OF 30 INCHES OR MORE THERE IS A TRANSITION TO FRACTURED BASALT. PERMEABILITY OF THE VALBY SOIL IS MODERATE. AVAILABLE WATER CAPACITY IS ABOUT 6 INCHES. NO PREPONDERANCE FOR FLOODING OR PONDING. RUNOFF IS SLOW FOR SLOPES LESS THAN 7 PERCENT, MEDIUM FOR SLOPES 7 TO 20 PERCENT, AND RAPID FOR SLOPES GREATER THAN 20 PERCENT. THE HAZARD OF WATER EROSION IS MODERATE TO HIGH. THE HAZARD OF WIND EROSION IS LOW TO MODERATE. SLOPES ARE PRIMARILY 1 TO 20 PERCENT IN THE FACILITY AREA.

RITZVILLE SILT LOAM - THIS SOIL UNIT CONSISTS OF DEEP, WELL-DRAINED SOILS FORMED IN LOESS, ON SUMMIT PLATEAUS WITHIN THE FACILITY AREA. TYPICALLY, THE SURFACE LAYER AND SUBSOIL ARE EACH BROWN VERY FINE SANDY LOAM, ABOUT 13 INCHES THICK, RESPECTIVELY. THE SUBSTRATUM IS A BROWN SILT LOAM TO A DEPTH OF 70 INCHES OR MORE. PERMEABILITY OF THE RITZVILLE SOIL IS MODERATE. AVAILABLE WATER CAPACITY IS ABOUT 11.6 INCHES. EFFECTIVE ROOTING DEPTH IS 60 INCHES OR MORE. NO PREPONDERANCE FOR FLOODING OR PONDING. RUNOFF IS SLOW FOR SLOPES LESS THAN 7 PERCENT, MEDIUM FOR SLOPES 7 TO 20 PERCENT, AND RAPID FOR SLOPES GREATER THAN 20 PERCENT. THE HAZARD OF WATER EROSION IS MODERATE TO HIGH. THE HAZARD OF WIND EROSION IS MODERATE. SLOPES ARE PRIMARILY 2 TO 12 PERCENT IN THE FACILITY AREA.

WARDEN SILT LOAM - THIS SOIL UNIT IS LOCATED ON UPLAND TERRACES WITHIN THE FACILITY AREA, AND CONSISTS OF VERY DEEP, WELL DRAINED SOILS FORMED IN LOESS AND THE UNDERLYING CALCAREOUS, LACUSTRINE SILTS. THE SURFACE LAYER IS DARK BROWN SILT LOAM ABOUT 5 INCHES THICK. THE SUBSOIL IS DARK BROWN TO BROWN VERY FINE SANDY LOAM ABOUT 15 INCHES THICK. THE SUBSTRATUM IS A BROWN TO GRAYISH BROWN, PARTIALLY CALCAREOUS SILT LOAM AND STRATIFIED VERY FINE SANDY LOAM TO A DEPTH OF 60 INCHES OR MORE. PERMEABILITY OF THE WARDEN SOIL IS MODERATE. AVAILABLE WATER CAPACITY IS ABOUT 11.5 INCHES. EFFECTIVE ROOTING DEPTH IS 60 INCHES OR MORE. NO PREPONDERANCE FOR FLOODING OR PONDING. RUNOFF IS MEDIUM FOR SLOPES LESS THAN 20 PERCENT, AND RAPID FOR SLOPES GREATER THAN 20 PERCENT. THE HAZARD OF WATER EROSION IS HIGH. THE HAZARD OF WIND EROSION IS MODERATE. SLOPES ARE PRIMARILY 0 TO 5 PERCENT IN THE FACILITY AREA.

WILLIS SILT LOAM - THIS SOIL UNIT CONSISTS OF WELL-DRAINED SOILS FORMED IN LOESS, ON SUMMIT PLATEAUS WITHIN THE FACILITY AREA. THE SURFACE LAYER IS DARK BROWN SILT LOAM ABOUT 12 INCHES THICK. THE SUBSOIL IS DARK BROWN SILT LOAM ABOUT 15 INCHES THICK. THE SUBSTRATUM IS A DARK BROWN SILT LOAM TO A DEPTH OF APPROXIMATELY 35 INCHES, AND THE SOIL IS UNDERLAIN BY CEMENTED ALLUVIUM. PERMEABILITY OF THE WARDEN SOIL IS MODERATE. AVAILABLE WATER CAPACITY IS ABOUT 6.8 INCHES. EFFECTIVE ROOTING DEPTH IS 20 TO 40 INCHES. NO PREPONDERANCE FOR FLOODING OR PONDING. RUNOFF IS MEDIUM. THE HAZARD OF WATER EROSION IS HIGH. THE HAZARD OF WIND EROSION IS LOW TO MODERATE. SLOPES ARE PRIMARILY 2 TO 12 PERCENT IN THE FACILITY AREA.

STANDARD EROSION AND SEDIMENT CONTROL PLAN DRAWING NOTES

1. HOLD A PRE-CONSTRUCTION MEETING OF PROJECT CONSTRUCTION PERSONNEL THAT INCLUDES THE INSPECTOR TO DISCUSS EROSION AND SEDIMENT CONTROL MEASURES AND CONSTRUCTION LIMITS. (SCHEDULE A.8.c.i.(3))
2. ALL PERMIT REGISTRANTS MUST IMPLEMENT THE ESCP. FAILURE TO IMPLEMENT ANY OF THE CONTROL MEASURES OR PRACTICES DESCRIBED IN THE ESCP IS A VIOLATION OF THE PERMIT. (SCHEDULE A 8.a)
3. RETAIN A COPY OF THE ESCP AND ALL REVISIONS ON SITE AND MAKE IT AVAILABLE ON REQUEST TO DEQ, AGENT, OR THE LOCAL MUNICIPALITY. DURING INACTIVE PERIODS OF GREATER THAN SEVEN (7) CONSECUTIVE CALENDAR DAYS, RETAIN THE ESCP AT THE CONSTRUCTION SITE OR AT ANOTHER LOCATION. (SCHEDULE B.2.a)
4. THE ESCP MEASURES SHOWN ON THIS PLAN ARE MINIMUM REQUIREMENTS FOR ANTICIPATED SITE CONDITIONS. DURING THE CONSTRUCTION PERIOD, UPGRADE THESE MEASURES AS NEEDED TO COMPLY WITH ALL APPLICABLE LOCAL, STATE, AND FEDERAL EROSION AND SEDIMENT CONTROL REGULATIONS. (SCHEDULE A.8.c.ii.(1)(c))
5. SUBMISSION OF ALL ESCP REVISIONS IS NOT REQUIRED. SUBMITTAL OF THE ESCP REVISIONS IS ONLY UNDER SPECIFIC CONDITIONS. (SCHEDULE A.12.c.iii)
6. PHASE CLEARING AND GRADING TO THE MAXIMUM EXTENT PRACTICAL TO PREVENT EXPOSED INACTIVE AREAS FROM BECOMING A SOURCE OF EROSION. (SCHEDULE A 8.c.ii.(1)(d))
7. IDENTIFY, MARK, AND PROTECT (BY FENCING OFF OR OTHER MEANS) CRITICAL RIPARIAN AREAS AND VEGETATION INCLUDING IMPORTANT TREES AND ASSOCIATED ROOTING ZONES, AND VEGETATION AREAS TO BE PRESERVED. IDENTIFY VEGETATIVE BUFFER ZONES BETWEEN THE SITE AND SENSITIVE AREAS (E.G., WETLANDS), AND OTHER AREAS TO BE PRESERVED, ESPECIALLY IN PERIMETER AREAS. (SCHEDULE A.8.c.i.(1) & (2))
8. PRESERVE EXISTING VEGETATION AND RE-VEGETATE OPEN AREAS WHEN PRACTICABLE BEFORE AND AFTER GRADING OR CONSTRUCTION. (SCHEDULE A.7.b.iii.(1))
9. EROSION AND SEDIMENT CONTROL MEASURES INCLUDING PERIMETER SEDIMENT CONTROL MUST BE IN PLACE BEFORE VEGETATION IS DISTURBED AND MUST REMAIN IN PLACE AND BE MAINTAINED, REPAIRED, AND PROMPTLY IMPLEMENTED FOLLOWING PROCEDURES ESTABLISHED FOR THE DURATION OF CONSTRUCTION, INCLUDING PROTECTION FOR ACTIVE STORM DRAIN INLETS AND CATCH BASINS AND APPROPRIATE NON-STORMWATER POLLUTION CONTROLS. (SCHEDULE A.7.d.i and A.8.c)
10. ESTABLISH CONCRETE TRUCK AND OTHER CONCRETE EQUIPMENT WASHOUT AREAS BEFORE BEGINNING CONCRETE WORK. (SCHEDULE A.8.c.i.(6))
11. APPLY TEMPORARY AND/OR PERMANENT SOIL STABILIZATION MEASURES IMMEDIATELY ON ALL DISTURBED AREAS AS GRADING PROGRESSES AND FOR ALL ROADWAYS INCLUDING GRAVEL ROADWAYS. (SCHEDULE A.8.c.ii.(2))
12. ESTABLISH MATERIAL AND WASTE STORAGE AREAS, AND OTHER NON-STORMWATER CONTROLS. (SCHEDULE A.8.c.i.(7))
13. PREVENT TRACKING OF SEDIMENT ONTO PUBLIC OR PRIVATE ROADS USING BMPS SUCH AS: GRAVELED (OR PAVED) EXITS AND PARKING AREAS, GRAVEL ALL UNPAVED ROADS LOCATED ONSITE, OR USE AN EXIT TIRE WASH. THESE BMPS MUST BE IN PLACE PRIOR TO LAND-DISTURBING ACTIVITIES. (SCHEDULE A 7.d.ii.(1) and A.8.c.i(4))
14. WHEN TRUCKING SATURATED SOILS FROM THE SITE, EITHER USE WATER-TIGHT TRUCKS OR DRAIN LOADS ON SITE. (SCHEDULE A.7.d.ii. (3))
15. USE BMPS TO PREVENT OR MINIMIZE STORMWATER EXPOSURE TO POLLUTANTS FROM SPILLS; VEHICLE AND EQUIPMENT FUELING, MAINTENANCE, AND STORAGE; OTHER CLEANING AND MAINTENANCE ACTIVITIES; AND WASTE HANDLING ACTIVITIES. THESE POLLUTANTS INCLUDE FUEL, HYDRAULIC FLUID, AND OTHER OILS FROM VEHICLES AND MACHINERY, AS WELL AS DEBRIS, LEFTOVER PAINTS, SOLVENTS, AND GLUES FROM CONSTRUCTION OPERATIONS. (SCHEDULE A.7.e.i.(2))
16. WATER OR USE A SOIL-BINDING AGENT OR OTHER DUST CONTROL TECHNIQUE AS NEEDED TO AVOID WIND-BLOWN SOIL. (SCHEDULE A 7.b.iii)
17. THE APPLICATION RATE OF FERTILIZERS USED TO REESTABLISH VEGETATION MUST FOLLOW MANUFACTURER□S RECOMMENDATIONS TO MINIMIZE NUTRIENT RELEASES TO SURFACE WATERS. EXERCISE CAUTION WHEN USING TIME-RELEASE FERTILIZERS WITHIN ANY WATERWAY RIPARIAN ZONE. (SCHEDULE A.9.b.iii)
18. IF A STORMWATER TREATMENT SYSTEM (FOR EXAMPLE, ELECTRO-COAGULATION, FLOCCULATION, FILTRATION, ETC.) FOR SEDIMENT OR OTHER POLLUTANT REMOVAL IS EMPLOYED, SUBMIT AN OPERATION AND MAINTENANCE PLAN (INCLUDING SYSTEM SCHEMATIC, LOCATION OF SYSTEM, LOCATION OF INLET, LOCATION OF DISCHARGE, DISCHARGE DISPERSION DEVICE DESIGN, AND A SAMPLING PLAN AND FREQUENCY) BEFORE OPERATING THE TREATMENT SYSTEM. OBTAIN PLAN APPROVAL BEFORE OPERATING THE TREATMENT SYSTEM. OPERATE AND MAINTAIN THE TREATMENT SYSTEM ACCORDING TO MANUFACTURER□S SPECIFICATIONS. (SCHEDULE A.9.d)
19. TEMPORARILY STABILIZE SOILS AT THE END OF THE SHIFT BEFORE HOLIDAYS AND WEEKENDS, IF NEEDED. THE REGISTRANT IS RESPONSIBLE FOR ENSURING THAT SOILS ARE STABLE DURING RAIN EVENTS AT ALL TIMES OF THE YEAR. (SCHEDULE A 7.b)
20. CONSTRUCTION ACTIVITIES MUST AVOID OR MINIMIZE EXCAVATION AND CREATION OF BARE GROUND DURING WET WEATHER. (SCHEDULE A.7.a.i)
21. SEDIMENT FENCE: REMOVE TRAPPED SEDIMENT BEFORE IT REACHES ONE THIRD OF THE ABOVE GROUND FENCE HEIGHT AND BEFORE FENCE REMOVAL. (SCHEDULE A.9.c.i)
22. OTHER SEDIMENT BARRIERS (SUCH AS BIOBAGS): REMOVE SEDIMENT BEFORE IT REACHES TWO INCHES DEPTH ABOVE GROUND HEIGHT. AND BEFORE BMP REMOVAL. (SCHEDULE A.9.c.ii)
23. SEDIMENT BASINS AND SEDIMENT TRAPS: REMOVE TRAPPED SEDIMENTS BEFORE DESIGN CAPACITY HAS BEEN REDUCED BY FIFTY PERCENT AND AT COMPLETION OF PROJECT. (SCHEDULE A.9.c.iii & iv)
24. WITHIN 24 HOURS, SIGNIFICANT SEDIMENT THAT HAS LEFT THE CONSTRUCTION SITE, MUST BE REMEDIATED. INVESTIGATE THE CAUSE OF THE SEDIMENT RELEASE AND IMPLEMENT STEPS TO PREVENT A RECURRENCE OF THE DISCHARGE WITHIN THE SAME 24 HOURS. ANY IN-STREAM CLEAN UP OF SEDIMENT SHALL BE PERFORMED ACCORDING TO THE OREGON DIVISION OF STATE LANDS REQUIRED TIMEFRAME. (SCHEDULE A.9.b.i)
25. THE INTENTIONAL WASHING OF SEDIMENT INTO STORM SEWERS OR DRAINAGE WAYS MUST NOT OCCUR. VACUUMING OR DRY SWEEPING AND MATERIAL PICKUP MUST BE USED TO CLEANUP RELEASED SEDIMENTS. (SCHEDULE A.9.b.ii)
26. THE ENTIRE SITE MUST BE TEMPORARILY STABILIZED USING VEGETATION OR A HEAVY MULCH LAYER, TEMPORARY SEEDING, OR OTHER METHOD SHOULD ALL CONSTRUCTION ACTIVITIES CEASE FOR 30 DAYS OR MORE. (SCHEDULE A.7.f.i)
27. PROVIDE TEMPORARY STABILIZATION FOR THAT PORTION OF THE SITE WHERE CONSTRUCTION ACTIVITIES CEASE FOR 14 DAYS OR MORE WITH A COVERING OF BLOWN STRAW AND A TACKIFIER, LOOSE STRAW, OR AN ADEQUATE COVERING OF COMPOST MULCH UNTIL WORK RESUMES ON THAT PORTION OF THE SITE. (SCHEDULE A.7.f.ii)
28. THE DESIGNATED EROSION AND SEDIMENT CONTROL INSPECTOR MUST PERFORM DAILY INSPECTIONS OF THE BMPS AND DISCHARGE OUTFALLS WHEN RAINFALL AND RUNOFF OCCUR. RECORD THE INSPECTIONS AND OBSERVATIONS IN A LOG THAT IS ON SITE. (SCHEDULE B.1.b(1))
29. ALL ESCP CONTROLS AND PRACTICES MUST BE INSPECTED VISUALLY ONCE TO ENSURE THAT BMPS ARE IN WORKING ORDER PRIOR TO THE SITE BECOMING INACTIVE OR IN ANTICIPATION OF SITE INACCESSIBILITY AND MUST BE INSPECTED VISUALLY ONCE EVERY TWO (2) WEEKS DURING INACTIVE PERIODS GREATER THAN SEVEN (7) CONSECUTIVE CALENDAR DAYS. (SCHEDULE B.1.b.(2) & (3))
30. IF PRACTICAL, INSPECTIONS MUST OCCUR DAILY AT A RELEVANT AND ACCESSIBLE DISCHARGE POINT OR DOWNSTREAM LOCATION DURING PERIODS IN WHICH THE SITE IS INACCESSIBLE DUE TO INCLEMENT WEATHER. (SCHEDULE B.1.b.(4))
31. DO NOT REMOVE TEMPORARY SEDIMENT CONTROL PRACTICES UNTIL PERMANENT VEGETATION OR OTHER COVER OF EXPOSED AREAS IS ESTABLISHED. IDENTIFY THE TYPE OF VEGETATIVE SEED MIX USED. (SCHEDULE A 7.b.iii)
32. PROVIDE PERMANENT EROSION CONTROL MEASURES ON ALL EXPOSED AREAS. REMOVE ALL TEMPORARY EROSION CONTROL MEASURES AS EXPOSED AREAS BECOME STABILIZED, UNLESS DOING SO CONFLICTS WITH LOCAL REQUIREMENTS. PROPERLY DISPOSE OF CONSTRUCTION MATERIALS AND WASTE, INCLUDING SEDIMENT RETAINED BY TEMPORARY BMPS. (SCHEDULE A.8.c.iii)

RATIONALE STATEMENT

A COMPREHENSIVE LIST OF AVAILABLE BEST MANAGEMENT PRACTICES (BMP) OPTIONS BASED ON DEQ's GUIDANCE MANUAL HAS BEEN REVIEWED TO COMPLETE THIS EROSION AND SEDIMENT CONTROL PLAN. SOME OF THE ABOVE LISTED BMP's WERE NOT CHOSEN BECAUSE THEY WERE DETERMINED TO NOT EFFECTIVELY MANAGE EROSION PREVENTION AND SEDIMENT CONTROL FOR THIS PROJECT BASED ON SPECIFIC SITE CONDITIONS, INCLUDING SOIL CONDITIONS TOPOGRAPHIC CONSTRAINTS, ACCESSIBILITY TO THE SITE, AND OTHER RELATED CONDITIONS, AS THE PROJECT PROGRESSES AND THERE IS A NEED TO REVISE THE ESC PLAN, AN ACTION PLAN WILL BE SUBMITTED.

THE SITE SPECIFIC EROSION NOTES ARE THE BMPS THAT WERE CHOSEN FOR THE SITE, AND REPRESENT THE BMPS THAT SHOULD BE FOLLOWED

_____ INITIAL

LOCAL AGENCY-SPECIFIC EROSION CONTROL NOTES

MORROW AND UMATILLA COUNTIES HAVE NO SPECIFIC EROSION CONTROL REQUIREMENTS BEYOND THOSE ALREADY LISTED.

ATTENTION EXCAVATORS

OREGON LAW REQUIRES YOU TO FOLLOW RULES ADOPTED BY THE OREGON UTILITY NOTIFICATION CENTER. THOSE RULES ARE SET FORTH IN OAR 952-001-0010 THROUGH OAR 962-001-0090. YOU MAY OBTAIN COPIES OF THESE RULES FROM THE CENTER BY CALLING 503-232-1987. IF YOU HAVE ANY QUESTIONS ABOUT THESE RULES, YOU MAY CONTACT THE CENTER. YOU MUST NOTIFY THE CENTER AT LEAST TWO BUSINESS DAYS BEFORE COMMENDING AN EXCAVATION. CALL 503-246-6699.

REV	REVISION DESCRIPTION	DSG BY/DATE	DWN BY/DATE	CHK BY/DATE	APPVD/DATE
0	FINAL	JPP/11-21-14	AML/11-21-14	REV/11-21-14	SO/11-21-14

REGISTERED PROFESSIONAL ENGINEER
76918PE
OREGON
SEPTEMBER 13, 2005
SENDA OZKAN
EXPIRES: 12/31/2014

WHEATRIDGE WIND ENERGY FACILITY
EROSION AND SEDIMENT CONTROL PLAN

WHEATRIDGE WIND ENERGY FACILITY
LEXINGTON, OREGON

EROSION AND SEDIMENT CONTROL
GENERAL NOTES

THE ORIGINAL DRAWING AND SUBSEQUENT REVISIONS THEREOF WITH APPROVAL NAMES, INITIALS AND PE SEAL, IF APPLICABLE, ARE MAINTAINED IN THE FILES OF TETRA TECH, INC.

SIZE	CONTRACT NO.	DRAWING NO.	REV
DI		ESC-2	0

SCALE:

FILE NAME: P:\WHEATRIDGE WIND\ENGINEERING\DRAWINGS\20141120 WHEATRIDGE WIND ESCP.DWG

EROSION CONTROL NOTES

GENERAL NOTES

1. THE PREDOMINANT SOIL TYPES IN THIS AREA ARE PRONE TO BOTH WIND AND WATER EROSION. THEREFORE, THE IMPLEMENTATION OF EROSION CONTROL PRACTICES MUST BE AN INTEGRAL PART OF ALL PHASES OF CONSTRUCTION.

2. THE IMPLEMENTATION OF THESE EROSION CONTROL PLANS AND THE CONSTRUCTION, MAINTENANCE, REPLACEMENT, AND UPGRADING OF THESE FACILITIES IS THE RESPONSIBILITY OF THE CONTRACTOR UNTIL ALL CONSTRUCTION IS COMPLETED, APPROVED AND VEGEATION/LANDSCAPING IS ESTABLISHED.

3. THE EROSION CONTROL FACILITIES SHOWN ON THESE PLANS MUST BE CONSTRUCTED IN CONJUNCTION WITH ALL CLEARING AND GRADING ACTIVITIES AND IN SUCH A MANNER AS TO INSURE THAT SEDIMENT AND SEDIMENT LADEN WATER DO NOT ENTER THE DRAINAGE SYSTEM OR ROADWAYS OUTSIDE OF PROJECT LIMITS, AND VIOLATE APPLICABLE WATER STANDARDS.

4. THE EROSION CONTROL FACILITIES SHOWN ON THIS PLAN ARE THE MINIMUM REQUIREMENTS FOR ANTICIPATED SITE CONDITIONS. DURING THE CONSTRUCTION PERIOD, THESE FACILITIES SHALL BE MAINTAINED AND UPGRADED AS NEEDED FOR UNEXPECTED STORM EVENTS AND TO INSURE THAT SEDIMENT AND SEDIMENT LADEN WATER DO NOT LEAVE THE SITE.

5. TEMPORARILY STABILIZE EXISTING BARE SOIL AREAS BY SPREADING STRAW MULCH AND CRIMPING IT IN TO THE GROUND WITH A DISC OR WITH A HYDROSEEDER. THE APPLICATION RATE FOR STRAW MULCH IS 2500 LBS/ACRE AS NEEDED. A SOIL BINDER OR TACKIFIER MAY BE INCORPORATED INTO STRAW OR MULCH. IN THE FALL, WHEN SOIL MOISTURE IS ADEQUATE, SEED ALL IMPACTED AREAS WITH THE FOLLOWING SEED MIXES.

SPECIFIC SEED MIX		MINIMUM LBS/AC PURE LIVE SEED (PLS)
COMMON NAME	SCIENTIFIC NAME	
SEAR BLUE BUNCH WHEAT GRASS		5
SHERMAN BIG BLUEGRASS		2
CRITANA THICKSPIKE WHEATGRASS		2.5
WHITMAR BEARDLESS WHEATGRASS		5
ALFALFA		0.5

6. THE CONSTRUCTION MANAGER IS RESPONSIBLE FOR LOCATING ANY NECESSARY DISPOSAL SITES. TO CONTROL THE RELEASE OF SEDIMENT FROM THE SITES, SEDIMENT FENCE SHALL BE INSTALLED ON THE DOWNSLOPE SIDE OF ALL DISPOSAL AREAS ON CONTOUR. SEE DETAIL ON DRAWING ESC-16. IF ADDITIONAL SEDIMENT OR EROSION CONTROL MEASURES ARE DETERMINED TO BE NECESSARY TO CONTROL THE RELEASE OF SEDIMENT FROM THE DISPOSAL SITES, THE CONSTRUCTION MANAGER SHALL BE RESPONSIBLE FOR IMPLEMENTING ADDITIONAL MEASURES.

7. PRIOR TO ANY LAND DISTURBING ACTIVITIES EACH SITE MUST HAVE GRAVELED, PAVED, OR CONSTRUCTED ENTRANCES, EXITS AND PARKING AREAS TO REDUCE THE TRACKING OF SEDIMENT ONTO PUBLIC OR PRIVATE ROADS.

8. TEMPORARY STABILIZATION MEASURES WILL BE TAKEN TO ENSURE THAT SEDIMENT-LADEN STORMWATER DOES NOT IMPACT WATER QUALITY STANDARDS OF RECEIVING WATER BODIES. TEMPORARY STABILIZATION WILL INCLUDE MULCHING AND SEEDING OF DISTURBED AREAS, APPLICATION OF SOIL BINDERS AND TACKIFIERS, PERIMETER CONTROL OF STOCKPILE AREAS, AND COVERING TEMPORARY STOCKPILES WITH PLASTIC OR STABILIZING TEMPORARY STOCKPILES WITH STRAW MULCH.

KEYED NOTES

1. TOWER ACCESS ROADS TO TURBINES TO BE GRADED AND CONSTRUCTED APPROXIMATELY LEVEL WITH EXISTING GROUND SO RUNOFF FROM UPSLOPE SHEET FLOW, FLOWS ACROSS ROAD. FOR IMPACTED AREAS ADJACENT TO THE ROADWAY, SURFACE ROUGHENING TECHNIQUES WILL BE EMPLOYED PRIOR TO APPLICATION OF MULCH AND SEEDING PER GENERAL NOTES. SEE DETAIL ON DRAWING ESC-15.

2. TOWER AREAS: FOR IMPACTED AREAS ADJACENT TO THE PADS, SPREAD MULCH AND SEED ACCORDING TO GENERAL NOTE 5. EXCAVATION MATERIALS TO BE STORED ADJACENT TO PADS FOR 14-28 DAYS WHILE CONCRETE CURES, PRIOR TO BACKFILL. INSTALL SEDIMENT FENCE ON DOWNSLOPE SIDE OF SOIL STOCKPILES. PROMPTLY DISPOSE OF EXCESS EXCAVATION SPOILS IN DESIGNATED LOCATIONS. SEE DETAIL ON DRAWING ESC-15.

3. INSTALL SEDIMENT FENCE ON CONTOUR ON THE DOWNSLOPE SIDE OF THE STAGING AREA. SEE DETAIL ON DRAWING ESC-16 FOR TYPICAL INSTALLATION.

4. INSTALL SEDIMENT FENCE ON CONTOUR ON THE DOWNSLOPE SIDE OF AREA CLEARED FOR CONSTRUCTION OF O&M BUILDING AND PROJECT SUBSTATION. REMOVE WASTE MATERIAL PROMPTLY AFTER CONSTRUCTION. SPREAD EXCESS SOIL ON SITE. SPREAD MULCH AND SEED ACCORDING TO GENERAL NOTE 5.

5. INSTALL SILT FENCE BETWEEN REGRADED ROAD AND INTERMITTENT STREAM WHERE ROAD IS ADJACENT TO STREAM CHANNEL.

6. TRENCHES WILL BE 3 TO 5 FEET DEEP. AFTER CABLES ARE INSTALLED, TRENCHES WILL BE BACK FILLED WITH EXCAVATED MATERIAL, AND TOP SOIL WILL BE PLACED ON TOP. SPREAD MULCH AND SEED ACCORDING TO GENERAL NOTE 5.

7. FINAL CLEANUP AND RESTORATION TO OCCUR IMMEDIATELY FOLLOWING CONSTRUCTION OF OVERHEAD TRANSMISSION LINES AND UNDERGROUND COLLECTOR SYSTEM. WASTE MATERIALS (BRUSH, ROCK, CONSTRUCTION MATERIALS) TO BE REMOVED FROM AREA AND EITHER RECYCLED OR DISPOSED AT APPROVED FACILITIES. EXCESS TOPSOIL WILL BE COMPACTED AROUND POLES OR SPREAD ON RIGHT OF WAY. SPREAD MULCH AND SEED ACCORDING TO GENERAL NOTE 5.

8. INSTALL STABILIZED CONSTRUCTION ENTRANCE AT ACCESS POINT TO PAVED ROADS. ADDITIONAL BMPs MAY BE NEEDED IF TRACKING IS OBSERVED. THESE BMPs WOULD INCLUDE SWEEPING, WASHING, OR VACUUMING.

9. PROTECT WETLANDS WITHIN CONSTRUCTION AREA WITH HIGHLY VISIBLE FENCE PRIOR TO CONSTRUCTION.

10. WASH CONCRETE OUT OF THE CONCRETE TRUCK CHUTES INTO THE DEDICATED CONCRETE WASHOUT AREA LOCATED AT EACH COMPLETE TURBINE FOUNDATION. THE CONCRETE WASHOUT AREA WILL BE CONSTRUCTED WITHIN A CORNER OF THE FOUNDATION EXCAVATION. THE BOTTOM WILL CONSIST OF THE COMPACTED FOUNDATION SUBGRADE AND THE SIDES WILL CONSIST OF THE EXCAVATION SIDE CUT, HARDENED CONCRETE FOUNDATION, AND SOIL BERMS AT EACH END TO CONSTRUCT A CONFINED AREA. THE SOIL USED TO CONSTRUCT THE WASHOUT AREA BERMS (ALONG WITH ANY CONCRETE SOLIDS) WILL BE BURIED AS PART OF THE TURBINE FOUNDATION BACKFILL. SEE DETAIL ON DRAWING ESC-16. CONCRETE WASHOUTS ARE DESIGNED TO PROMOTE EVAPORATION - VACUUM AND DISPOSE OF LIQUIDS IN AN APPROVED MANNER AS NEEDED.

11. INSTALL CHECK DAM AND ROAD FORD OR CULVERT CROSSINGS AS SHOWN ON ESC-15 AND ESC-17. THE CHECK DAM WILL BE INSTALLED IN CONJUNCTION WITH LOW IMPACT FORD ROAD CROSSINGS OR CULVERTS TO MINIMIZE SEDIMENTATION IN EPHEMERAL OR SEASONAL STREAMS OR WETLANDS. INSTALL CHECK DAM DOWNSTREAM OF ELECTRICAL TRENCH CROSSINGS. INSTALL OUTLET PROTECTION/RIPRAP BASINS AT THE END OF CULVERTS WHERE APPROPRIATE. SEE DETAIL ON DRAWING ESC-15.

BMP MATRIX FOR CONSTRUCTION PHASES

	CLEARING	MASS GRADING	UTILITY INSTALLATION	ROAD CONSTRUCTION	FINAL STABILIZATION	WET WEATHER (NOV. - APRIL)
EROSION PREVENTION						
PRESERVE NATURAL VEGETATION	** X	X	X	X	X	X
PLASTIC SHEETING	X	X	X	X		X
DUST CONTROL	X	X	X	X		X
TEMPORARY/ PERMANENT SEEDING	X	X	X	X	X	X
MULCH	X	X	X	X	X	X
OTHER:						
SEDIMENT CONTROL						
SEDIMENT FENCE (PERIMETER)	** X	X	X	X	X	X
SEDIMENT FENCE (INTERIOR)			X	X	X	X
STRAW WATTLES			X	X	X	X
FILTER BERM	X	X	X	X		
SEDIMENT TRAP	X	X	X	X		
OTHER: SOIL BINDER AND TACKIFIER					X	X
RUN OFF CONTROL						
CONSTRUCTION ENTRANCE	** X	X	X	X	X	
OUTLET PROTECTION	X	X	X	X	X	
SURFACE ROUGHENING					X	
CHECK DAMS	** X	X	X	X	X	
OTHER:						
POLLUTION PREVENTION						
PROPER SIGNAGE	X	X	X	X	X	X
HAZ WASTE MGMT	X	X	X	X	X	X
SPILL KIT ON-SITE	X	X	X	X	X	X
CONCRETE WASHOUT AREA	X	X	X	X	X	X
OTHER:						

** - SIGNIFIES BMP WILL BE INSTALLED PRIOR TO ANY GROUND DISTURBING ACTIVITY.

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76918PE
OREGON
SEPTEMBER 13, 2005
SENDA OZKAN

EXPIRES: 12/31/2014

WHEATRIDGE WIND ENERGY FACILITY
EROSION AND SEDIMENT CONTROL PLAN

WHEATRIDGE WIND ENERGY FACILITY
LEXINGTON, OREGON

EROSION AND SEDIMENT CONTROL
EROSION CONTROL NOTES

THE ORIGINAL DRAWING AND SUBSEQUENT REVISIONS THEREOF WITH APPROVAL NAMES, INITIALS AND PE SEAL, IF APPLICABLE, ARE MAINTAINED IN THE FILES OF TETRA TECH, INC.

SIZE	CONTRACT NO.	DRAWING NO.	REV
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SCALE:

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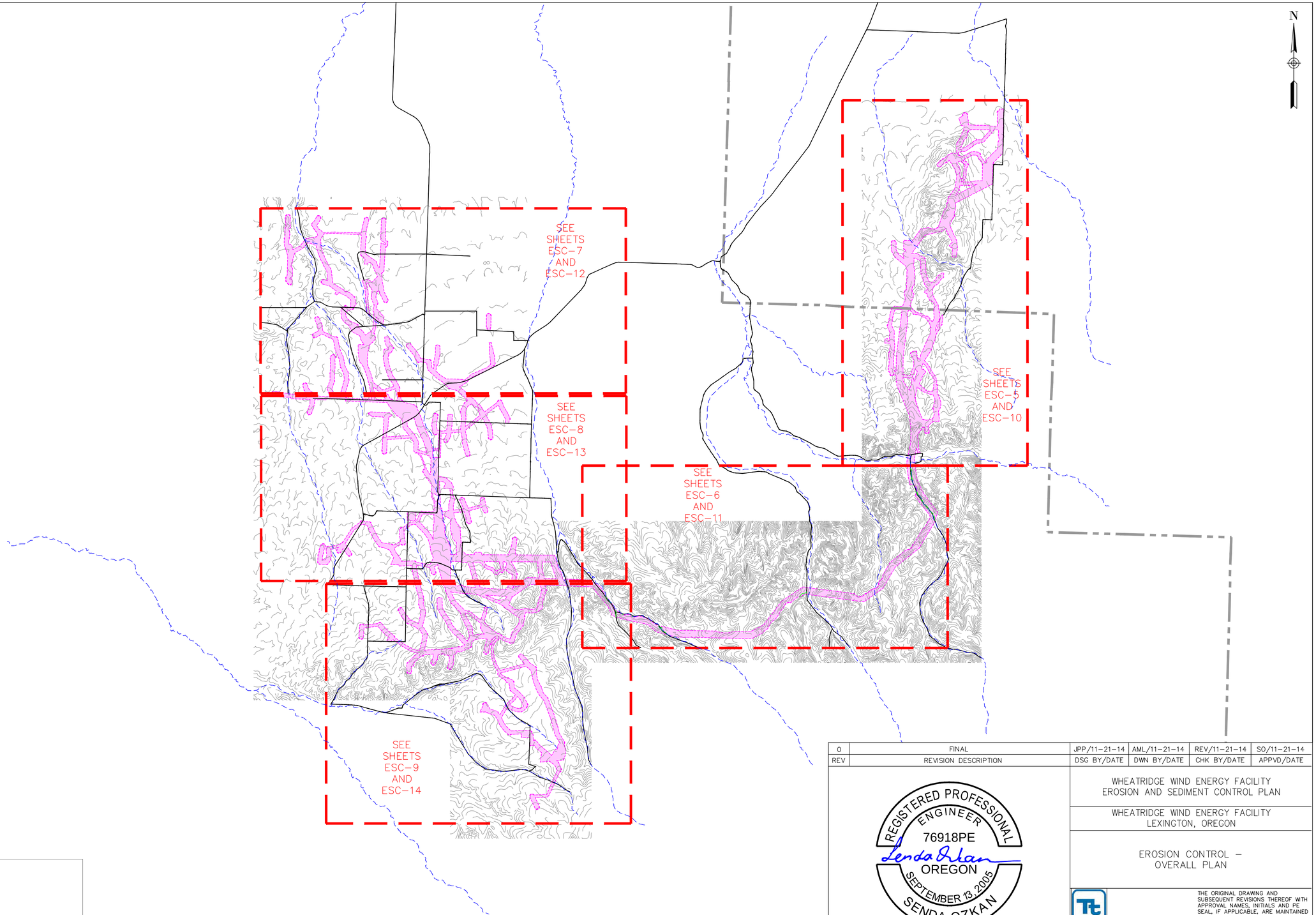

LEGEND:

- SITE BOUNDARY
- EXISTING ROAD
- WETLANDS

REV	REVISION DESCRIPTION	DSG BY/DATE	DWN BY/DATE	CHK BY/DATE	APPVD/DATE
0	FINAL	JPP/11-21-14	AML/11-21-14	REV/11-21-14	SO/11-21-14

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OREGON
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SENDA OZKAN

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WHEATRIDGE WIND ENERGY FACILITY
EROSION AND SEDIMENT CONTROL PLAN

WHEATRIDGE WIND ENERGY FACILITY
LEXINGTON, OREGON

EROSION CONTROL –
OVERALL PLAN

THE ORIGINAL DRAWING AND SUBSEQUENT REVISIONS THEREOF WITH APPROVAL NAMES, INITIALS AND PE SEAL, IF APPLICABLE, ARE MAINTAINED IN THE FILES OF TETRA TECH, INC.

SIZE	CONTRACT NO.	DRAWING NO.	REV
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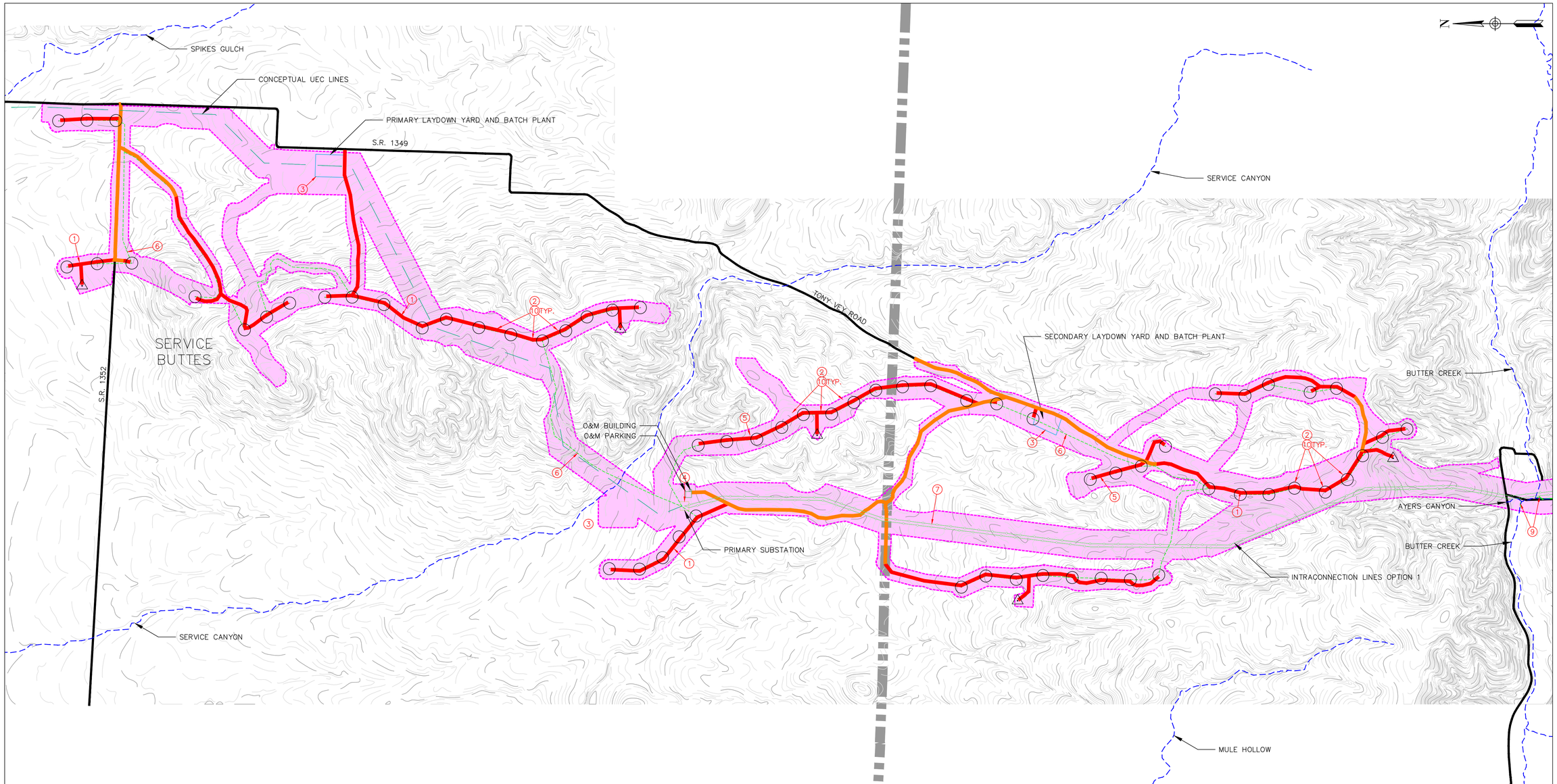

LEGEND:

- SITE BOUNDARY
- TURBINE
- MET TOWER
- EXISTING ROAD
- EXISTING PRIVATE ROAD TO BE IMPROVED
- NEW ROAD TO BE CONSTRUCTED
- OVERHEAD INTRACONNECTION LINES
- ELECTRICAL COLLECTOR LINE
- SUBSTATION
- WETLANDS
- STREAM

NOTES:

1. SEE DRAWING ESC-3 FOR KEYED EROSION CONTROL NOTES.

0 500 1000 FEET

REV	REVISION DESCRIPTION	DSG BY/DATE	DWN BY/DATE	CHK BY/DATE	APPVD/DATE
0	FINAL	JPP/11-21-14	AML/11-21-14	REV/11-21-14	SO/11-21-14

REGISTERED PROFESSIONAL ENGINEER
76918PE
OREGON
SEPTEMBER 13, 2005
SENDA OZKAN

EXPIRES: 12/31/2014

WHEATRIDGE WIND ENERGY FACILITY
EROSION AND SEDIMENT CONTROL PLAN

WHEATRIDGE WIND ENERGY FACILITY
LEXINGTON, OREGON

EROSION CONTROL – MAXIMUM PROJECT IMPACT
GE 1.7-103 PROJECT FACILITIES AND 230 KV
INTRACONNECTION LINES OPTION 1 SITE PLAN
(SHEET 1 OF 5)

THE ORIGINAL DRAWING AND SUBSEQUENT REVISIONS THEREOF WITH APPROVAL NAMES, INITIALS AND PE SEAL, IF APPLICABLE, ARE MAINTAINED IN THE FILES OF TETRA TECH, INC.

SIZE	CONTRACT NO.	DRAWING NO.	REV
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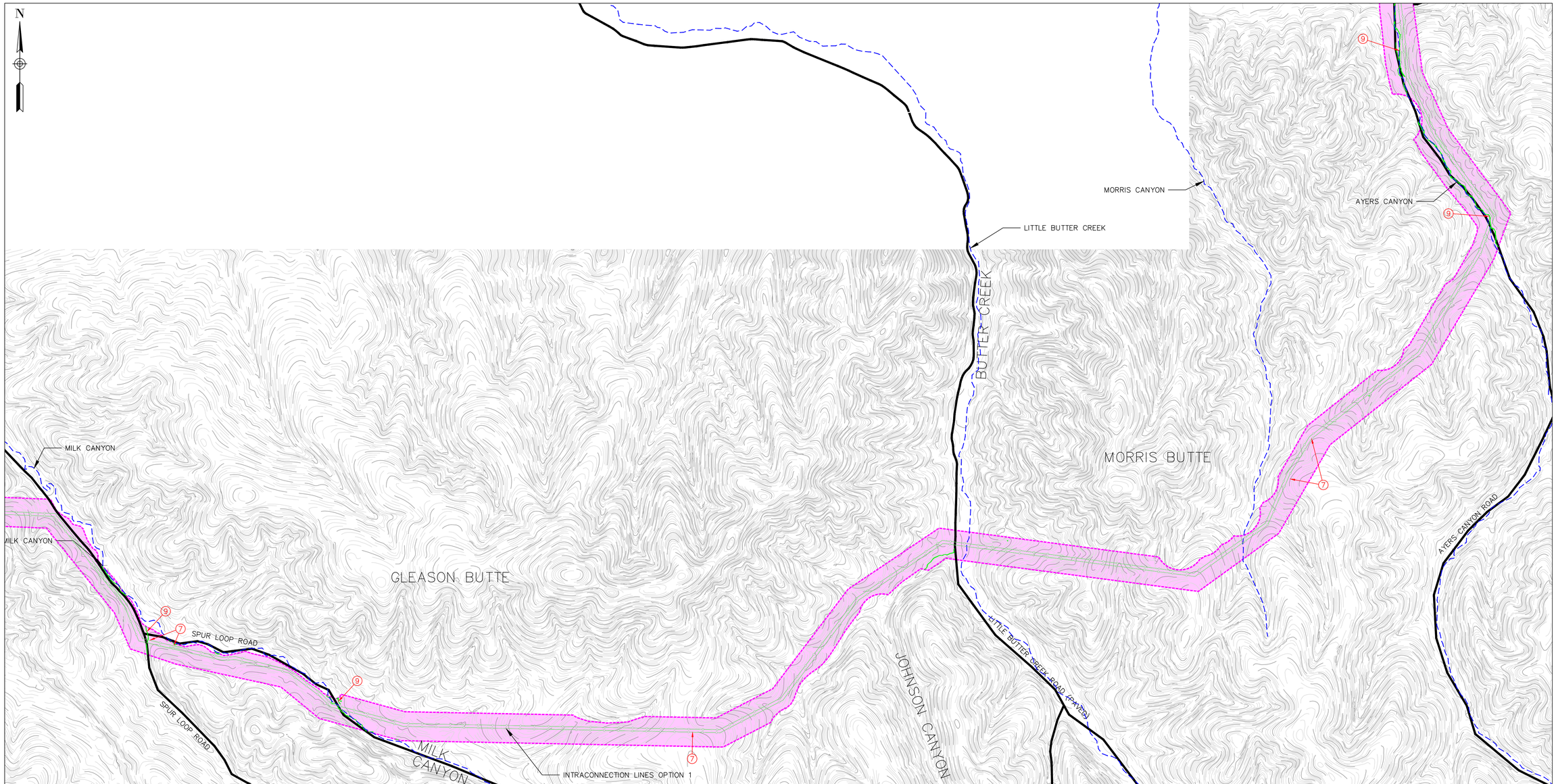

LEGEND:

- SITE BOUNDARY
- TURBINE
- MET TOWER
- EXISTING ROAD
- EXISTING PRIVATE ROAD TO BE IMPROVED
- NEW ROAD TO BE CONSTRUCTED
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- SUBSTATION
- WETLANDS
- STREAM

NOTES:

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0 500 1000 FEET

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76918PE
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WHEATRIDGE WIND ENERGY FACILITY
EROSION AND SEDIMENT CONTROL PLAN

WHEATRIDGE WIND ENERGY FACILITY
LEXINGTON, OREGON

EROSION CONTROL – MAXIMUM PROJECT IMPACT
GE 1.7-103 PROJECT FACILITIES AND 230 KV
INTRACONNECTION LINES OPTION 1 SITE PLAN
(SHEET 2 OF 5)

THE ORIGINAL DRAWING AND SUBSEQUENT REVISIONS THEREOF WITH APPROVAL NAMES, INITIALS AND PE SEAL, IF APPLICABLE, ARE MAINTAINED IN THE FILES OF TETRA TECH, INC.

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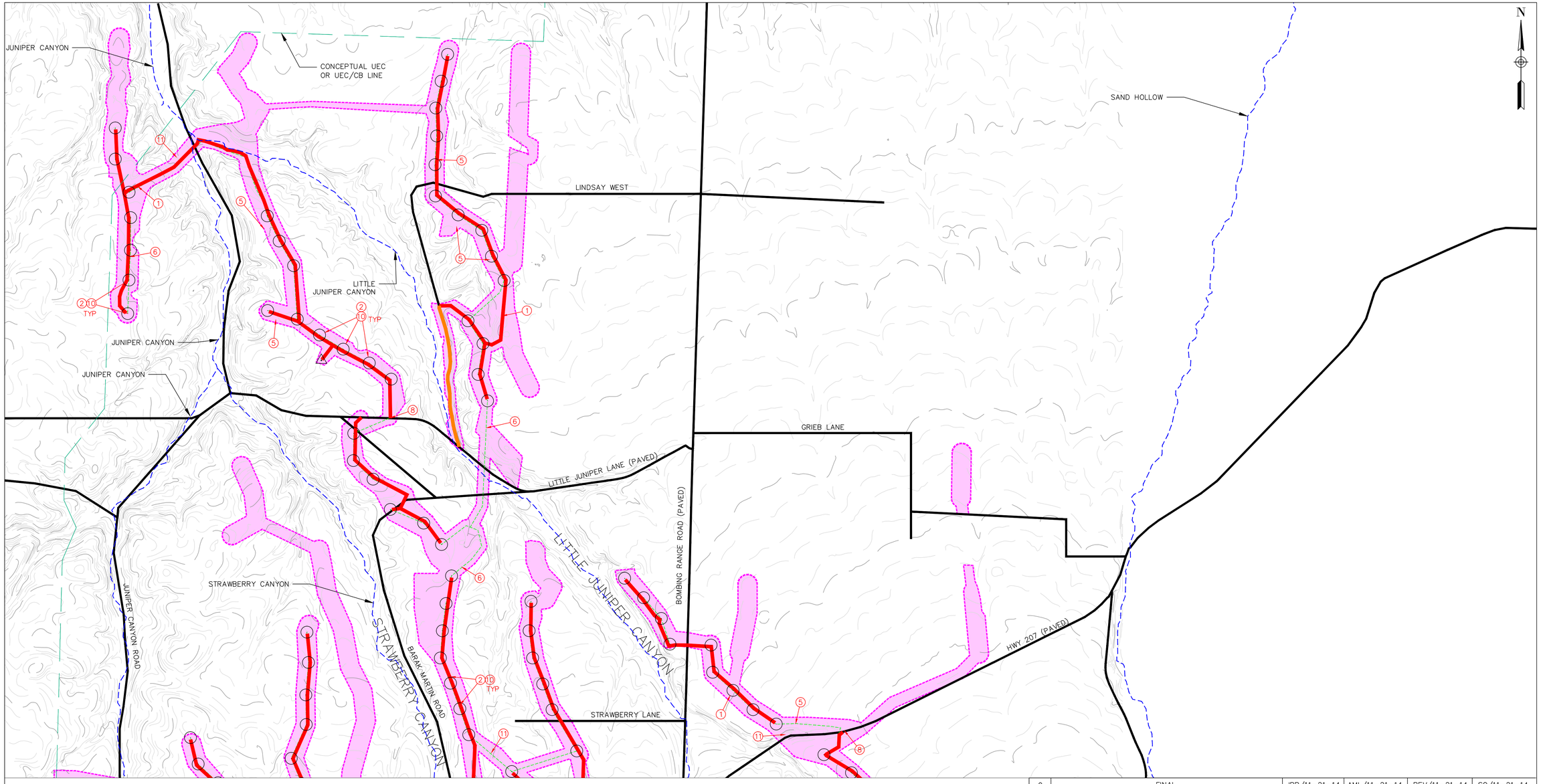

LEGEND:

- SITE BOUNDARY
- TURBINE
- MET TOWER
- EXISTING ROAD
- EXISTING PRIVATE ROAD TO BE IMPROVED
- NEW ROAD TO BE CONSTRUCTED
- OVERHEAD INTRACONNECTION LINES
- ELECTRICAL COLLECTOR LINE
- SUBSTATION
- WETLANDS
- STREAM

NOTES:

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0 500 1000 FEET

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WHEATRIDGE WIND ENERGY FACILITY
EROSION AND SEDIMENT CONTROL PLAN

WHEATRIDGE WIND ENERGY FACILITY
LEXINGTON, OREGON

EROSION CONTROL – MAXIMUM PROJECT IMPACT GE 1.7-103 PROJECT FACILITIES AND 230 KV INTRACONNECTION LINES OPTION 1 SITE PLAN (SHEET 3 OF 5)

THE ORIGINAL DRAWING AND SUBSEQUENT REVISIONS THEREOF WITH APPROVAL NAMES, INITIALS AND PE SEAL, IF APPLICABLE, ARE MAINTAINED IN THE FILES OF TETRA TECH, INC.

SIZE	CONTRACT NO.	DRAWING NO.	REV
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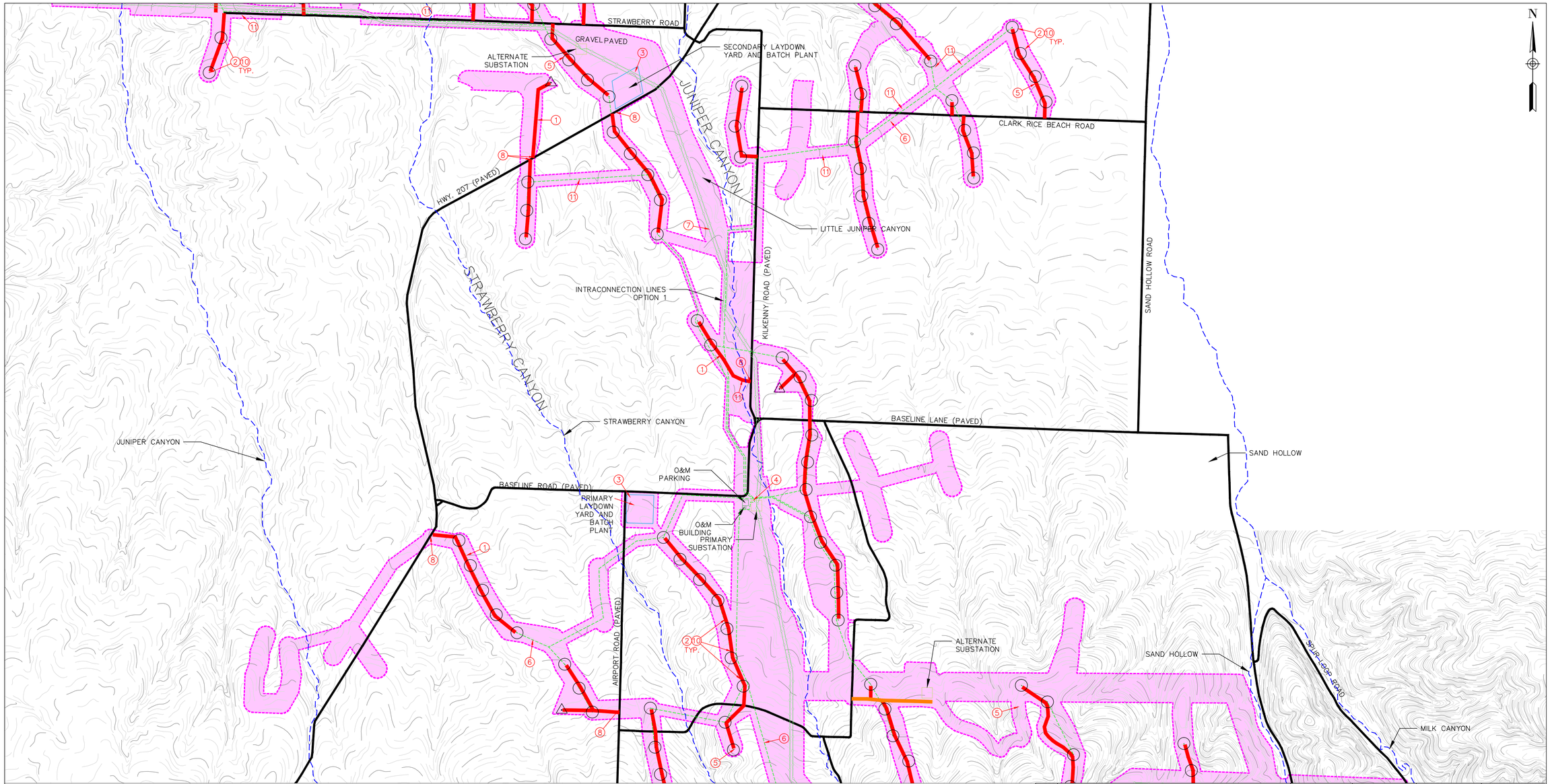

LEGEND:

- SITE BOUNDARY
- TURBINE
- MET TOWER
- EXISTING ROAD
- EXISTING PRIVATE ROAD TO BE IMPROVED
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- ELECTRICAL COLLECTOR LINE
- SUBSTATION
- WETLANDS
- STREAM

NOTES:

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0 500 1000 FEET

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WHEATRIDGE WIND ENERGY FACILITY
EROSION AND SEDIMENT CONTROL PLAN

WHEATRIDGE WIND ENERGY FACILITY
LEXINGTON, OREGON

EROSION CONTROL – MAXIMUM PROJECT IMPACT
GE 1.7-103 PROJECT FACILITIES AND 230 KV
INTRACONNECTION LINES OPTION 1 SITE PLAN
(SHEET 4 OF 5)

THE ORIGINAL DRAWING AND SUBSEQUENT REVISIONS THEREOF WITH APPROVAL NAMES, INITIALS AND PE SEAL, IF APPLICABLE, ARE MAINTAINED IN THE FILES OF TETRA TECH, INC.

SIZE	CONTRACT NO.	DRAWING NO.	REV
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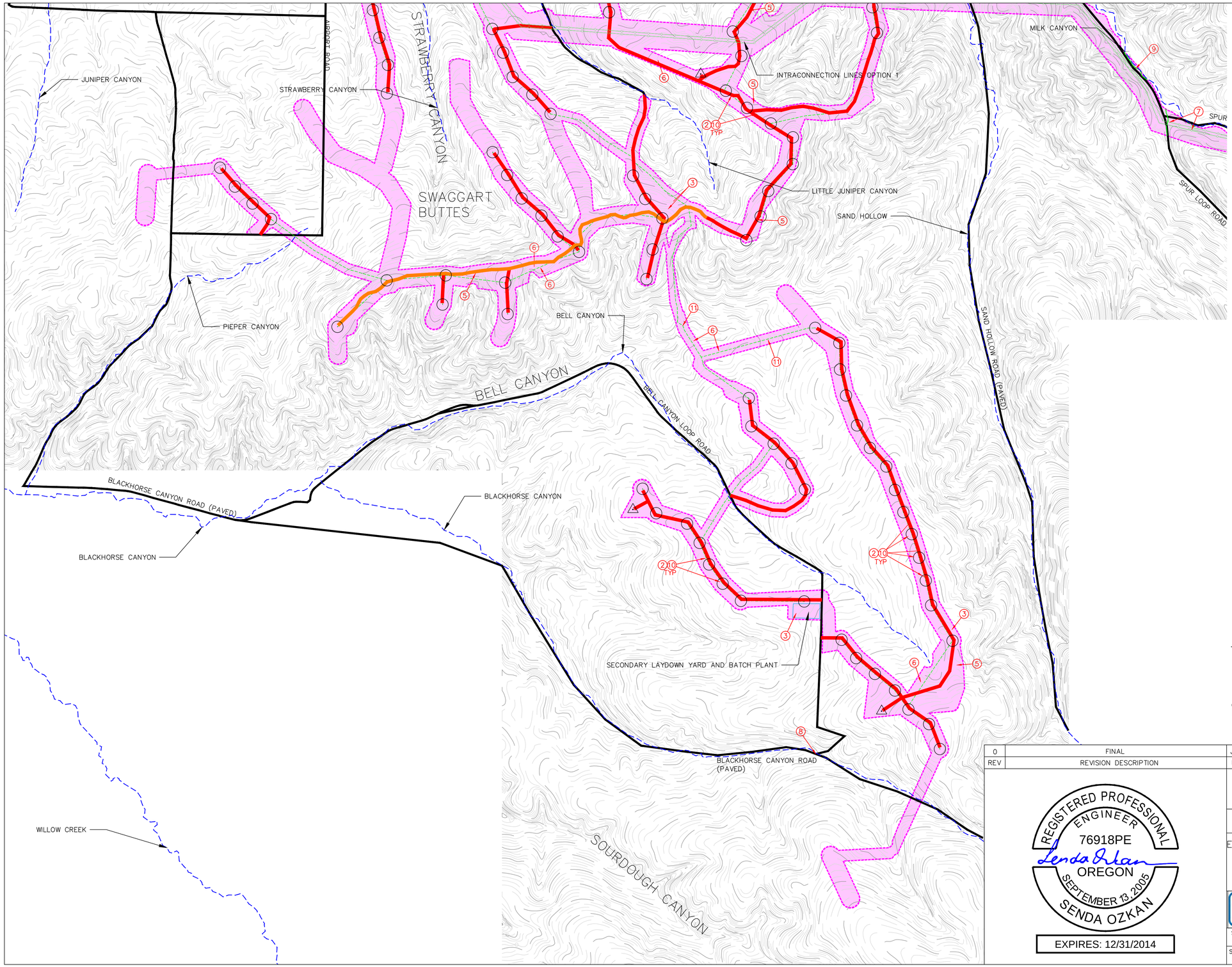

LEGEND:

- SITE BOUNDARY
- TURBINE
- MET TOWER
- EXISTING ROAD
- EXISTING PRIVATE ROAD TO BE IMPROVED
- NEW ROAD TO BE CONSTRUCTED
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- ELECTRICAL COLLECTOR LINE
- SUBSTATION
- WETLANDS
- STREAM

NOTES:

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EROSION AND SEDIMENT CONTROL PLAN

WHEATRIDGE WIND ENERGY FACILITY
LEXINGTON, OREGON

EROSION CONTROL – MAXIMUM PROJECT IMPACT
GE 1.7-103 PROJECT FACILITIES AND 230 KV
INTRACONNECTION LINES OPTION 1 SITE PLAN
(SHEET 5 OF 5)

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SIZE	CONTRACT NO.	DRAWING NO.	REV
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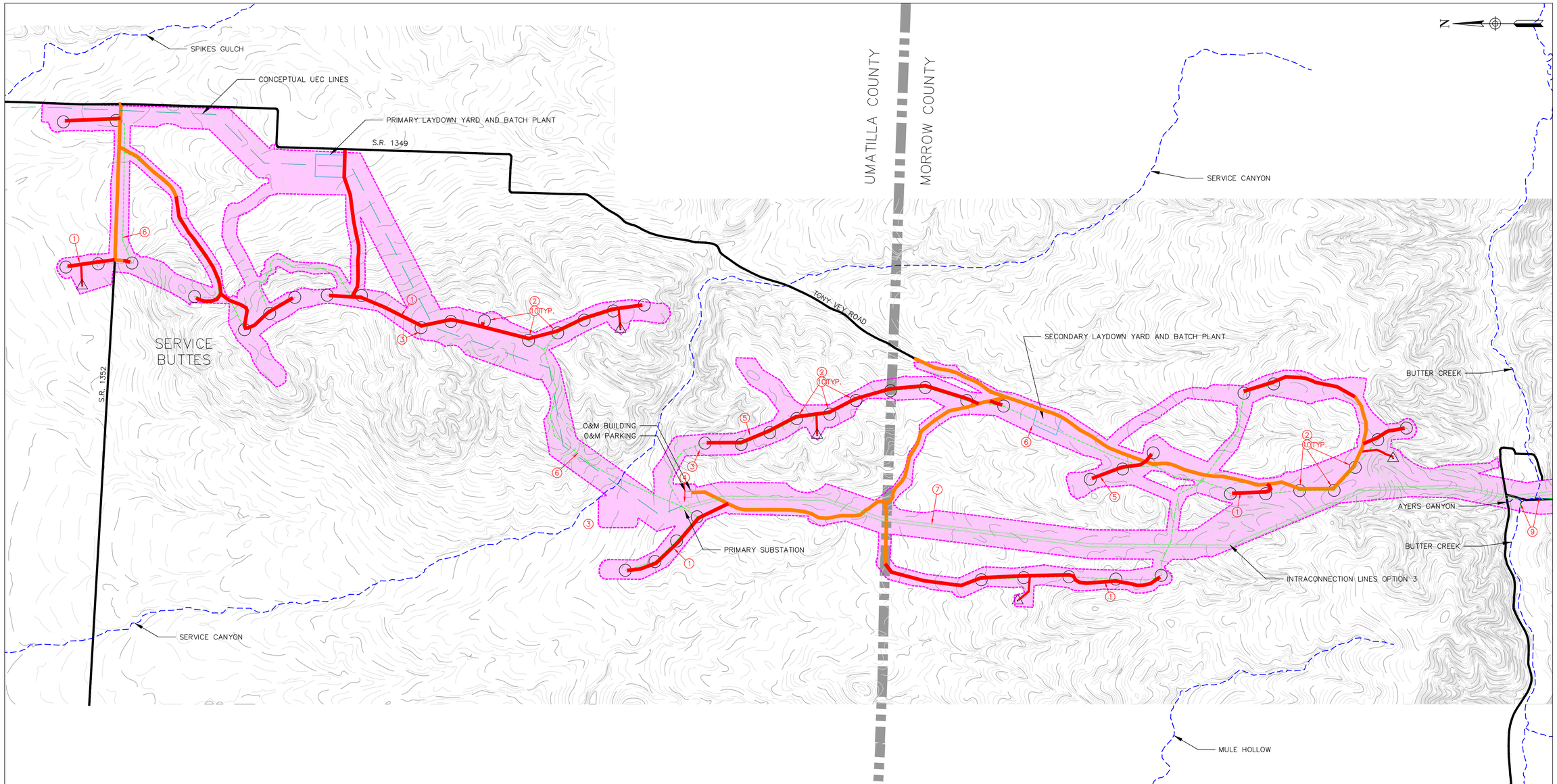

LEGEND:

- SITE BOUNDARY
- TURBINE
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- WETLANDS
- STREAM

NOTES:

1. SEE DRAWING ESC-3 FOR KEYED EROSION CONTROL NOTES.

0 500 1000 FEET

REV	REVISION DESCRIPTION	DSG BY/DATE	DWN BY/DATE	CHK BY/DATE	APPVD/DATE
0	FINAL	JPP/11-21-14	AML/11-21-14	REV/11-21-14	SO/11-21-14

REGISTERED PROFESSIONAL ENGINEER
76918PE
OREGON
SEPTEMBER 13, 2005
SENDA OZKAN

EXPIRES: 12/31/2014

WHEATRIDGE WIND ENERGY FACILITY
EROSION AND SEDIMENT CONTROL PLAN

WHEATRIDGE WIND ENERGY FACILITY
LEXINGTON, OREGON

EROSION CONTROL – MINIMUM PROJECT IMPACT
GE 2.5-120 PROJECT FACILITIES AND 230 KV
INTRACONNECTION LINES OPTION 3 SITE PLAN
(SHEET 1 OF 5)

THE ORIGINAL DRAWING AND SUBSEQUENT REVISIONS THEREOF WITH APPROVAL NAMES, INITIALS AND PE SEAL, IF APPLICABLE, ARE MAINTAINED IN THE FILES OF TETRA TECH, INC.

SIZE	CONTRACT NO.	DRAWING NO.	REV
DI		ESC-10	0

SCALE:

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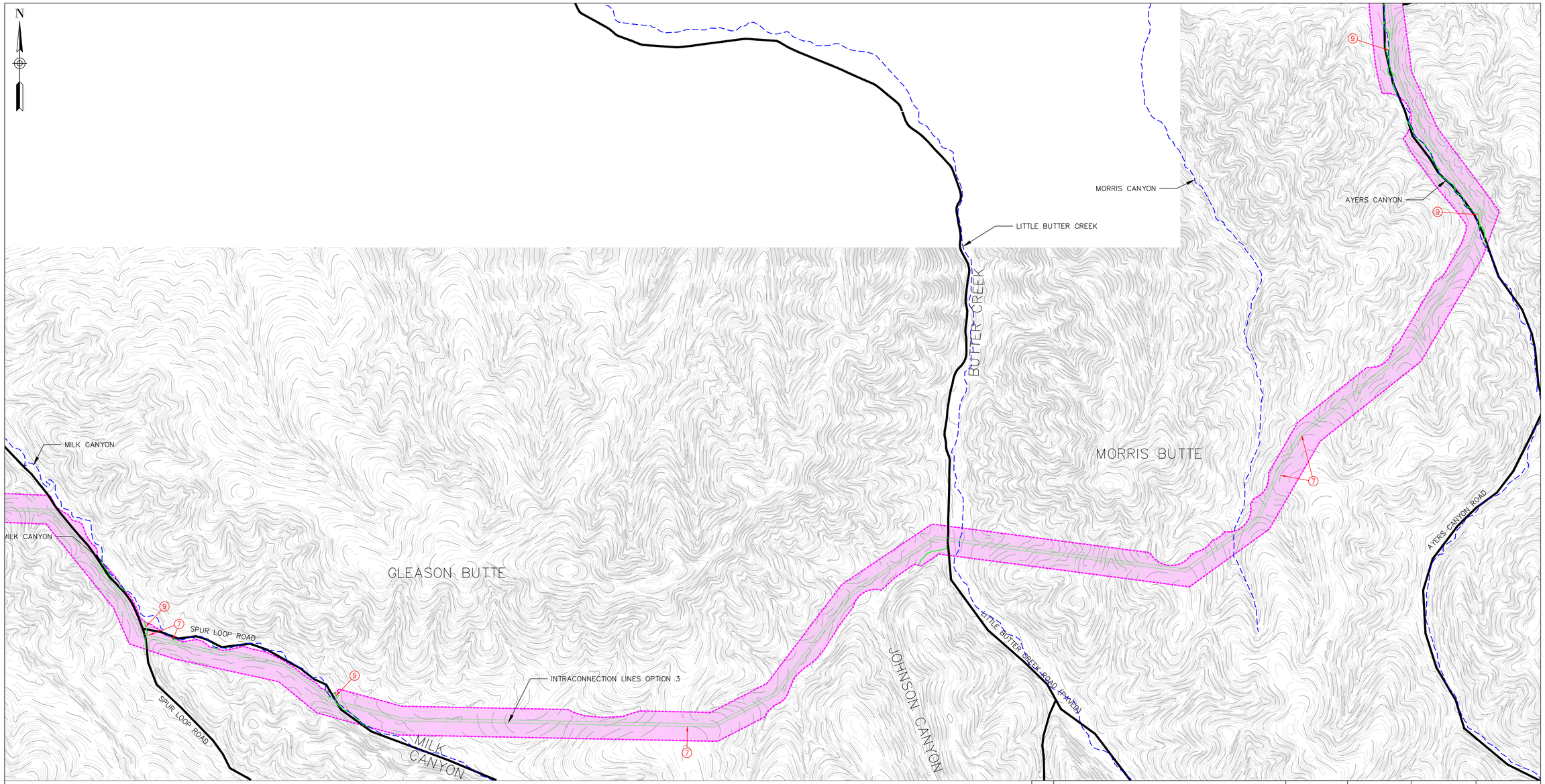

LEGEND:

- SITE BOUNDARY
- TURBINE
- MET TOWER
- EXISTING ROAD
- EXISTING PRIVATE ROAD TO BE IMPROVED
- NEW ROAD TO BE CONSTRUCTED
- OVERHEAD INTRACONNECTION LINES
- ELECTRICAL COLLECTOR LINE
- SUBSTATION
- WETLANDS
- STREAM

NOTES:

1. SEE DRAWING ESC-3 FOR KEYED EROSION CONTROL NOTES.

0 500 1000 FEET

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0	FINAL	JPP/11-21-14	AML/11-21-14	REV/11-21-14	SO/11-21-14

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INTRACONNECTION LINES OPTION 3 SITE PLAN
(SHEET 2 OF 5)

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SIZE	CONTRACT NO.	DRAWING NO.	REV
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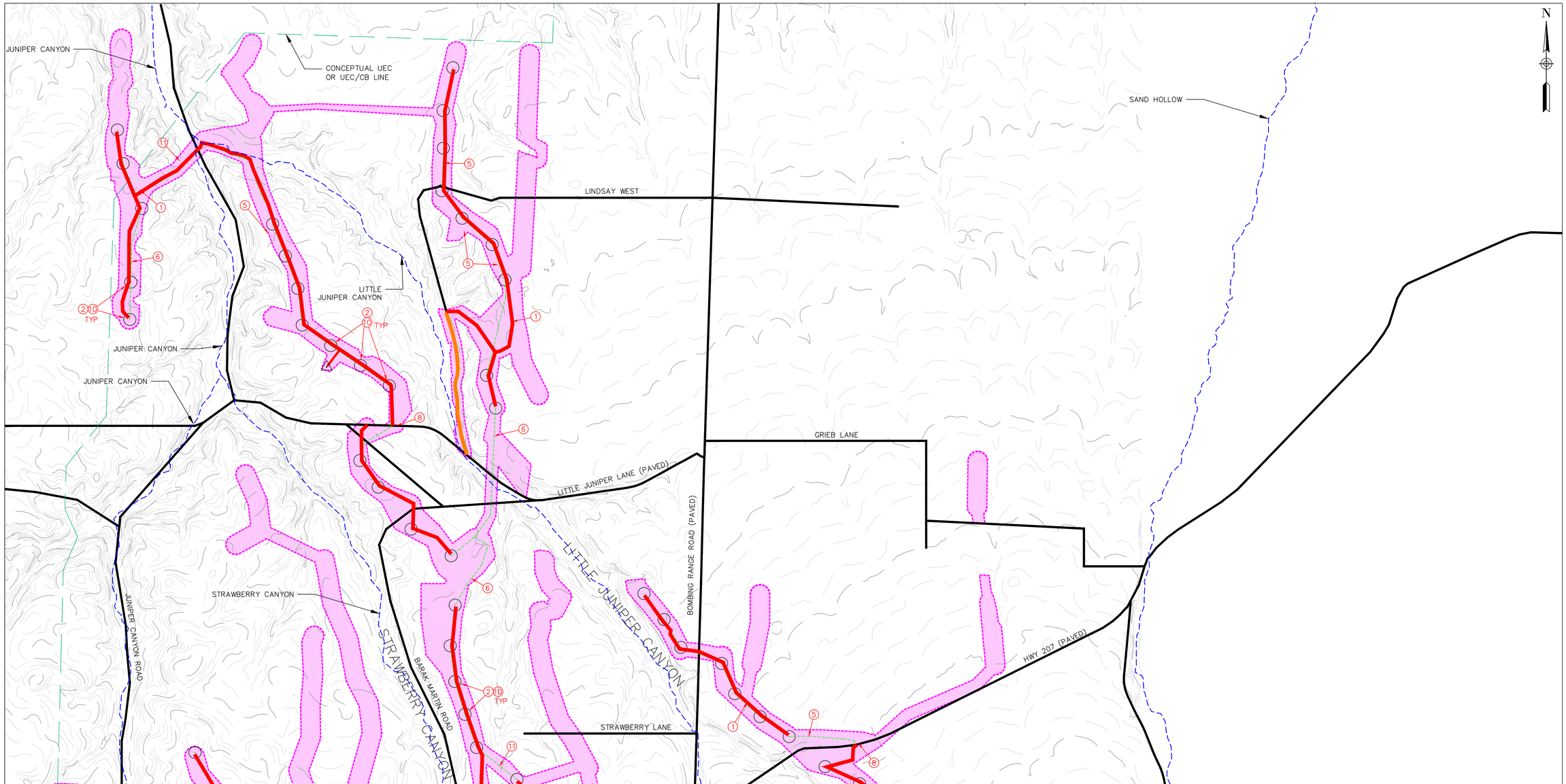

LEGEND:

- SITE BOUNDARY
- TURBINE
- MET TOWER
- EXISTING ROAD
- EXISTING PRIVATE ROAD TO BE IMPROVED
- NEW ROAD TO BE CONSTRUCTED
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NOTES:

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0 500 1000 FEET

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INTRACONNECTION LINES OPTION 3 SITE PLAN
(SHEET 3 OF 5)

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SIZE	CONTRACT NO.	DRAWING NO.	REV
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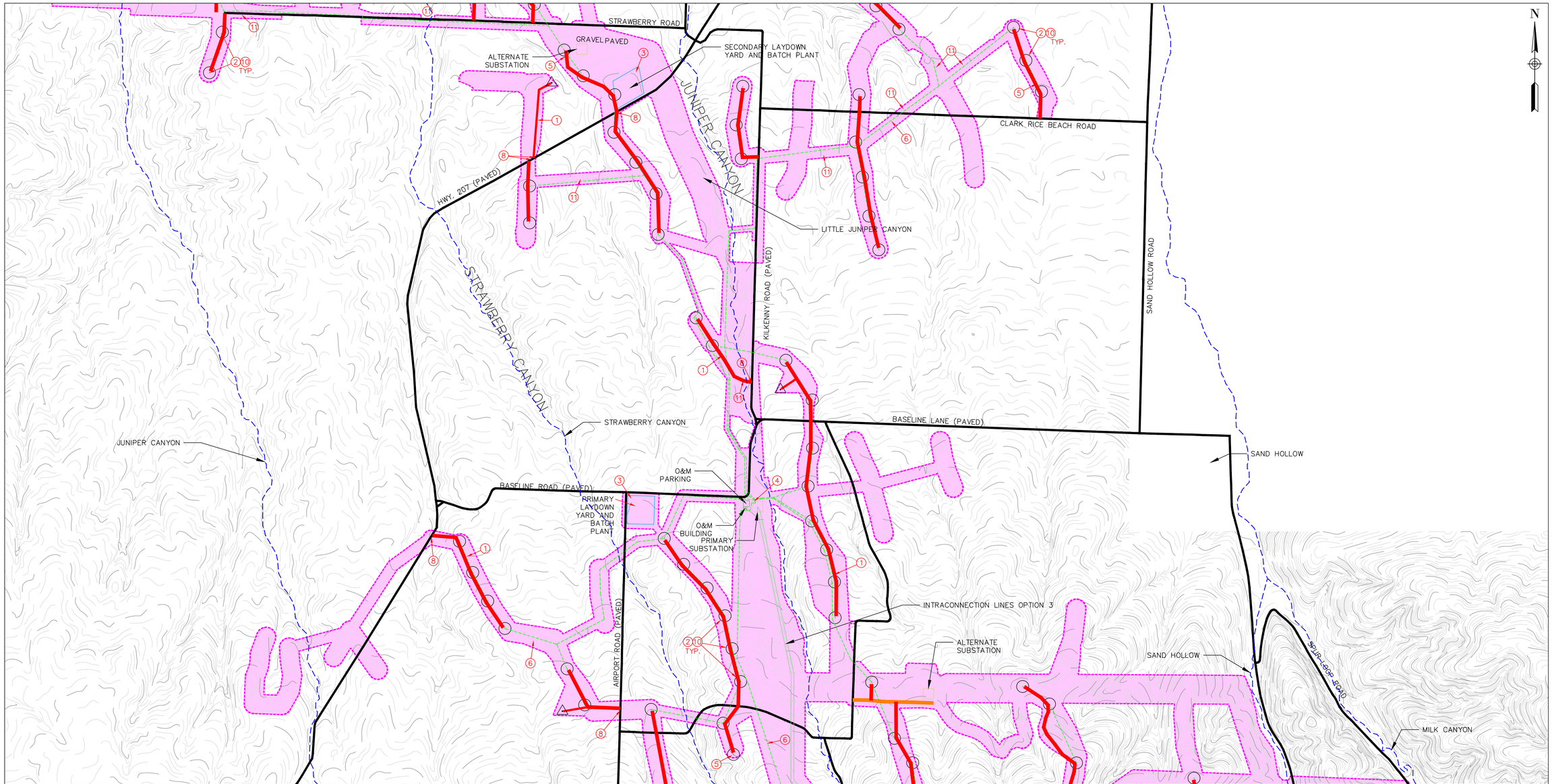

LEGEND:

- SITE BOUNDARY
- TURBINE
- MET TOWER
- EXISTING ROAD
- EXISTING PRIVATE ROAD TO BE IMPROVED
- NEW ROAD TO BE CONSTRUCTED
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NOTES:

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0 500 1000 FEET

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LEXINGTON, OREGON

EROSION CONTROL – MINIMUM PROJECT IMPACT GE 2.5-120 PROJECT FACILITIES AND 230 KV INTRACONNECTION LINES OPTION 3 SITE PLAN (SHEET 4 OF 5)

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SIZE	CONTRACT NO.	DRAWING NO.	REV
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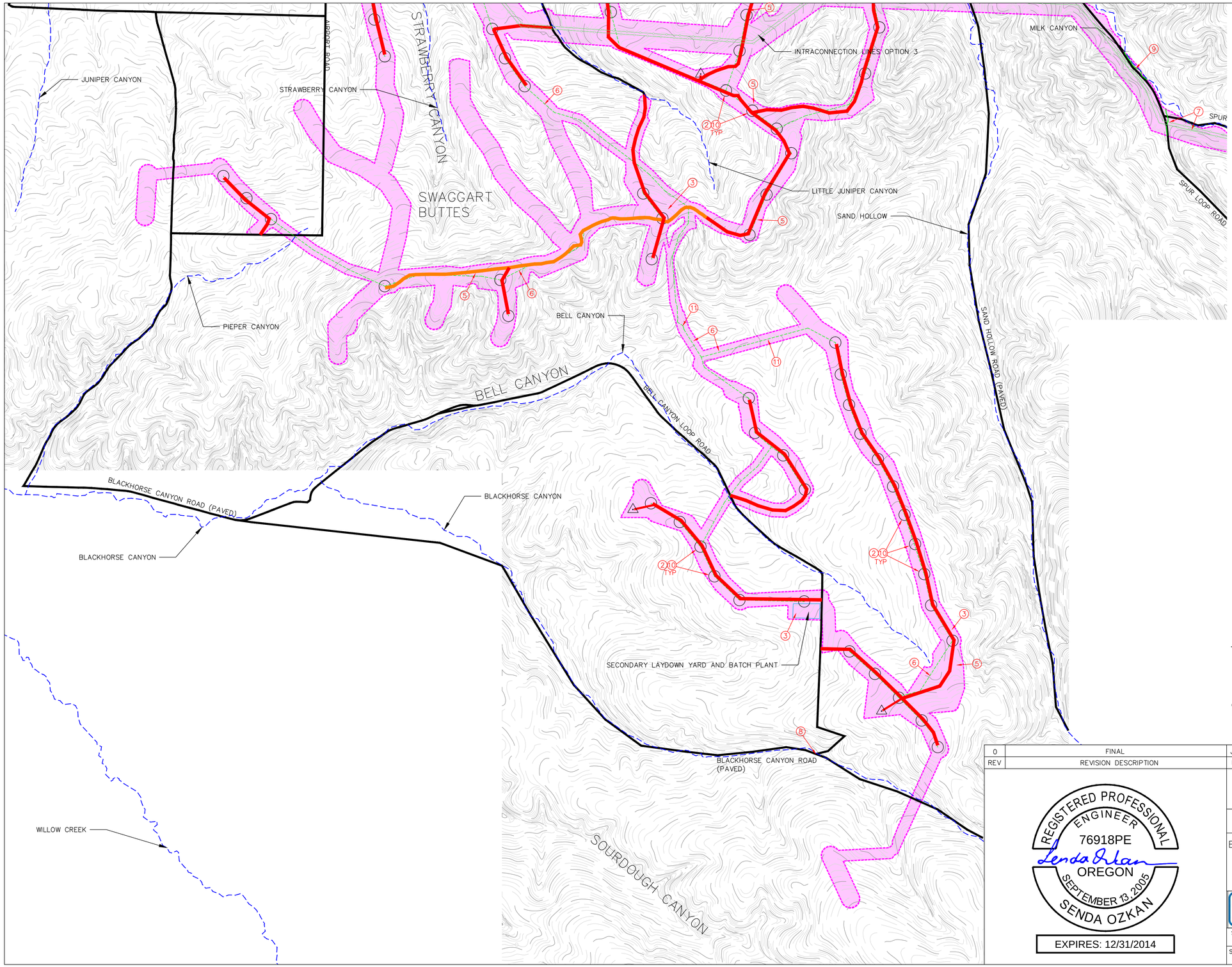

LEGEND:

- SITE BOUNDARY
- TURBINE
- MET TOWER
- EXISTING ROAD
- EXISTING PRIVATE ROAD TO BE IMPROVED
- NEW ROAD TO BE CONSTRUCTED
- OVERHEAD INTRACONNECTION LINES
- ELECTRICAL COLLECTOR LINE
- SUBSTATION
- WETLANDS
- STREAM

NOTES:

1. SEE DRAWING ESC-3 FOR KEYED EROSION CONTROL NOTES.

N

0 500 1000 FEET

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LEXINGTON, OREGON

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DI		ESC-14	0

SCALE:

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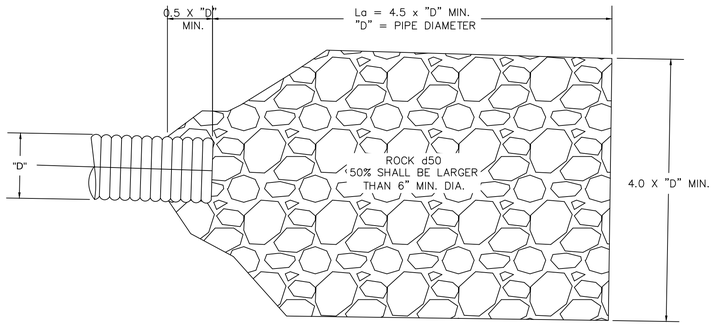
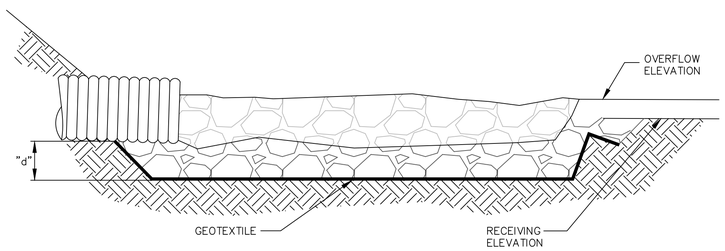


PLAN

NOTES:

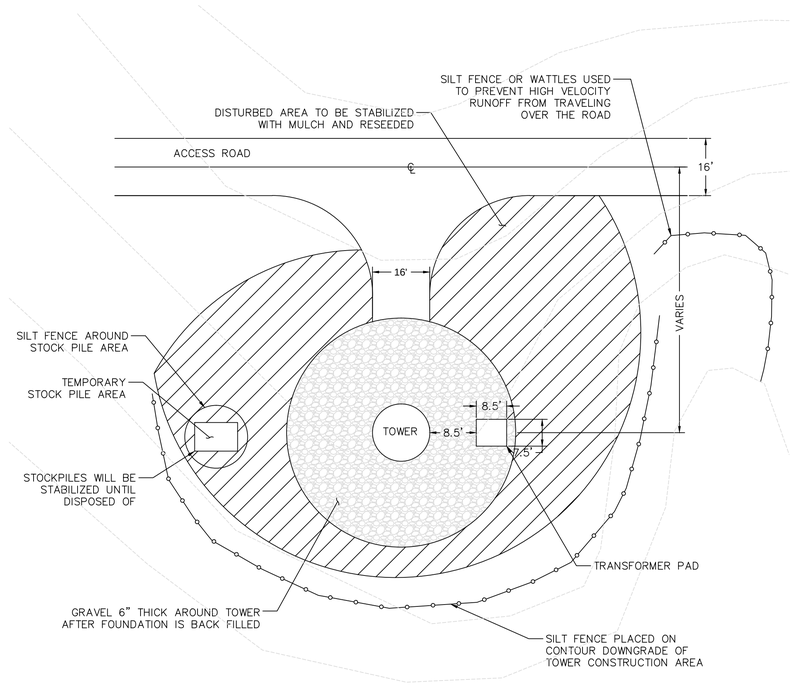
1. " La" = LENGTH OF APRON. DISTANCE " La" SHALL BE OF SUFFICICIENT LENGTH TO DISSIPATE ENERGY.
2. APRON SHALL BE SET HORIZONTALLY AND ALIGNED STRAIGHT
3. FILTER MATERIAL SHALL BE FABRIC OR 6" (150mm) THICK MINIMUM GRADED GRAVEL LAYER.



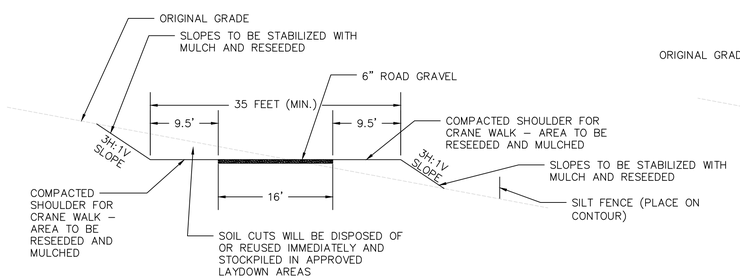
THICKNESS ("d") = 1.5 x MAX. ROCK DIAMETER – 6" (150mm) MIN.

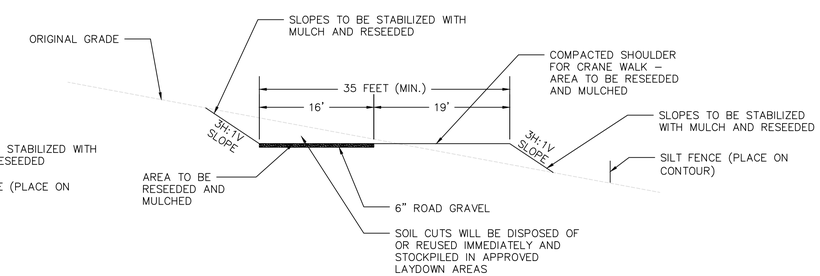
SECTION

OUTLET PROTECTION
RIPRAP BASIN

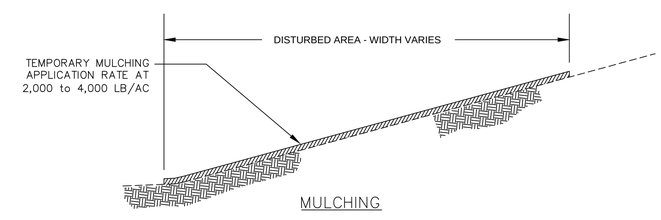


TYPICAL TOWER LAYOUT
N.T.S.





TYPICAL ACCESS ROAD
N.T.S.



MULCHING

REV	REVISION DESCRIPTION	DSG BY/DATE	DWN BY/DATE	CHK BY/DATE	APPVD/DATE
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76918PE
OREGON
SEPTEMBER 13, 2005
SENDA OZKAN

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WHEATRIDGE WIND ENERGY FACILITY
EROSION AND SEDIMENT CONTROL PLAN

WHEATRIDGE WIND ENERGY FACILITY
LEXINGTON, OREGON

EROSION AND SEDIMENT CONTROL
CONSTRUCTION DETAILS (SHEET 1 OF 3)

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SIZE	CONTRACT NO.	DRAWING NO.	REV
DI		ESC–15	0

SCALE:

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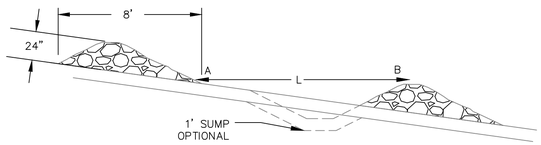
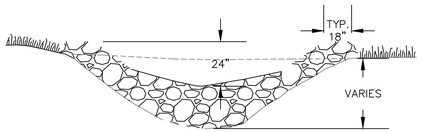


PROFILE

NOTES:

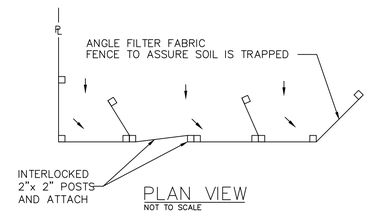
1. KEY STONE INTO THE CHANNEL BANKS AND EXTEND CHECK DAM A MINIMUM OF 18" TO PREVENT FLOW AROUND DAM.
2. L = DISTANCE SUCH THAT POINTS A AND B ARE OF EQUAL ELEVATION. SEE TABLE TO THE RIGHT.



SECTION

SLOPE	SPACING L (FT)
2% OR LESS	80
2.1% – 4%	40
4.1% – 7%	25
7.1% – 10%	15
OVER 10%	USE LINED WATERWAY

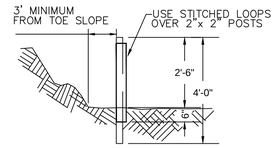
ROCK CHECK DAM



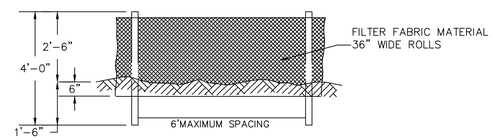
PLAN VIEW
NOT TO SCALE

NOTES:

1. THE PRIMARY PURPOSE OF A SEDIMENT FENCE IS TO REDUCI
2. SEDIMENT FENCE SHALL BE INSTALLED ON A LINE OF EQUAL ELEVATION (CONTOUR) TO THE EXTENT PRACTICABLE.
3. SEDIMENT FENCE SHALL NOT BE USED IN OR ACROSS A FLOWING NATURAL CHANNEL.
4. THE BOTTOM EDGE OF SEDIMENT FENCE SHALL BE BURIED A MINIMUM OF 6" BELOW GROUND.
5. POSTS MAY BE 2" X 2" FIR, PINE OR STEEL FENCE POSTS.
6. POSTS TO BE INSTALLED ON UPHILL SIDE OF SLOPE.
7. COMPACT BOTH SIDES OF FILTER FABRIC TRENCH.
8. SEDIMENT SHALL BE REMOVED WHEN ACCUMULATION REACHE ONE–THIRD OF THE MEASURE HEIGHT. SEDIMENT SHALL BE DISPOSED OF TO AN AREA THAT WILL NOT CONTRIBUTE SEDIMENT OFF–SITE AND CAN BE PERMANENTLY STABILIZED.
9. MAXIMUM DRAINAGE AREA TRIBUTARY TO 100 FEET OF SEDIMENT FENCE SHALL BE 0.25 ACRES.
10. FOR MAXIMUM SPACING ON SLOPE SEE SEDIMENT FENCE SPACING TABLE BELOW.

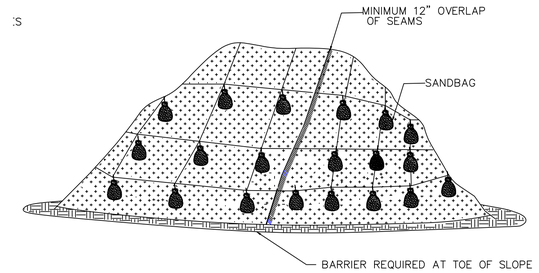


PROFILE
NOT TO SCALE



FRONT VIEW
NOT TO SCALE

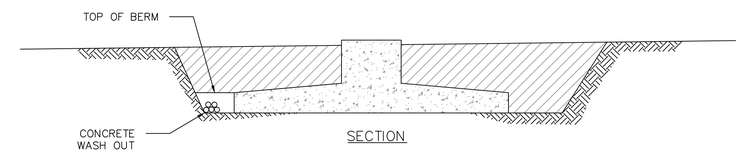
SEDIMENT FENCING



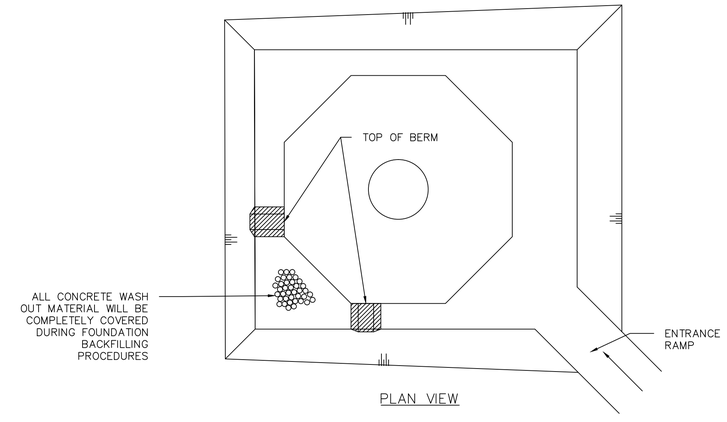
NOTES:

1. MINIMUM 12" OVERLAP OF ALL SEAMS REQUIRED.
2. BARRIER (SEDIMENT FENCE OR FIBER ROLLS/WATTLES) REQUIRED AT TOE OF STOCK PILE.
3. COVERING MAINTAINED TIGHTLY IN PLACE BY USING SANDBAGS OR TIES ON ROPES WITH A MAXIMUM OF 10' GRID SPACING IN ALL DIRECTIONS.
4. IF FEASIBLE, STOCKPILES WILL BE PLACED A MINIMUM OF 50 FEET AWAY FROM DRAINAGE COURSES OR WATER BODIES.

STOCKPILE MANAGEMENT/PLASTIC SHEETING

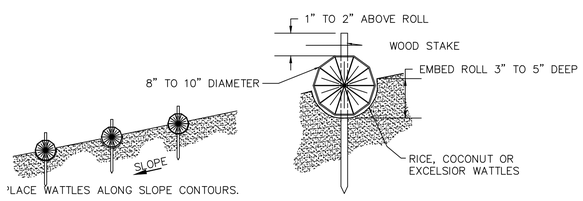


SECTION



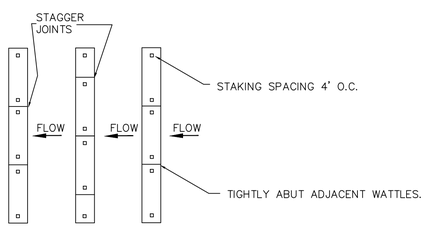
PLAN VIEW

CONCRETE WASHOUT AREA



PLACE WATTLES ALONG SLOPE CONTOURS.

PROFILE SECTION

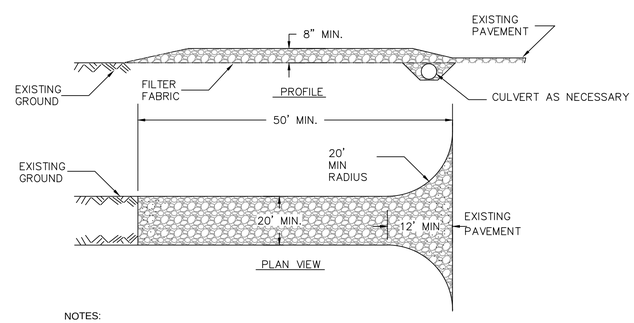


PLAN VIEW

NOTES:

1. STAKES SHALL BE 1"X2" WOODEN STAKES.
2. ADDITIONAL STAKES MAY BE INSTALLED ON DOWNHILL SIDE OF WATTLES, ON STEEP SLOPES OR HIGHLY EROSIVE SOILS
3. FIBER ROLLS OR WATTLES TO BE INSTALLED EVERY 10' TO 25'.

FIBER ROLLS / WATTLES



NOTES:

1. STONE SIZE – USE 3"–6" STONE, OR RECLAIMED OR RECYCLED CONCRETE EQUIVALENT.
2. LENGTH – NOT LESS THAN 50 FT.
3. THICKNESS – NOT LESS THAN 8 INCHES.
4. WIDTH – NOT LESS THAN 20 FT.
5. FILTER FABRIC – WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
6. SURFACE WATER – ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED ACROSS THE ENTRANCE. PIPE HAS TO BE SIZED AS PER DRAINAGE.
7. MAINTENANCE – THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS–OF–WAY, ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS–OF–WAY MUST BE REMOVED IMMEDIATELY.
8. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.
9. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.
10. ENTRANCE/EXIT TRACKING CONTROLS WILL ONLY BE NECESSARY IF DIRT OR MUD IS TRACKED ONTO PUBLIC ROADS, SITE ADJACENT TO WATER BODIES, POOR SOILS ENCOUNTERED ON SITE, DUST IS A PROBLEM DURING DRY WEATHER CONDITIONS, OR IF

CONSTRUCTION ENTRANCE

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SIZE	CONTRACT NO.	DRAWING NO.	REV
DI		ESC–16	0

SCALE:

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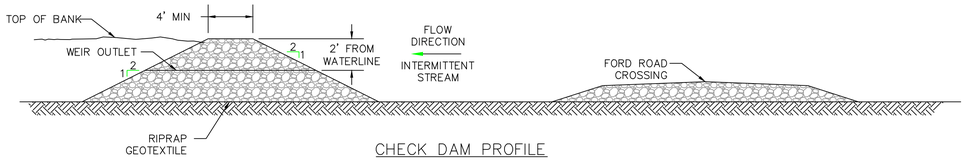
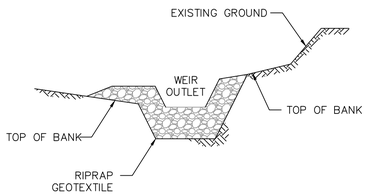
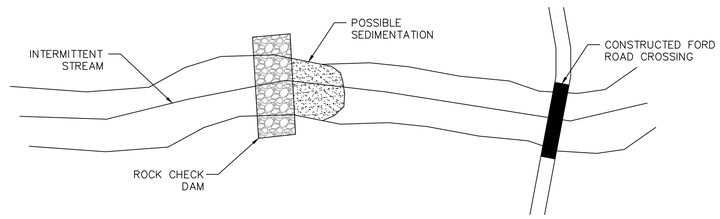


CHECK DAM PROFILE



CHECK DAM SECTION

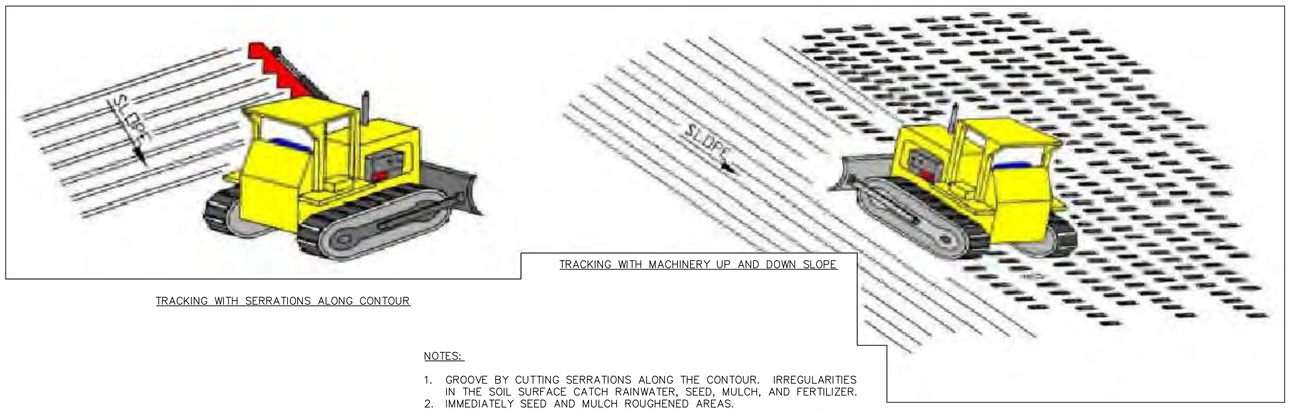


CHECK DAM PLAN VIEW

NOTES:

1. LIMIT GROUND AND VEGETATION DISTURBANCE. TRIM RATHER THAN REMOVE.
2. INSTALL TEMPORARY ROCK CHECK DAM BEFORE UPSTREAM GROUND DISTURBANCE OCCURS.
3. HAND PLACE GEOTEXTILE AND RIPRAP. USE CLASS 100 (METRIC) RIPRAP.
4. FOLLOW MAINTENANCE SPECIFICATIONS STATED IN THE NARRATIVE PORTION OF THE EROSION AND SEDIMENT PLAN IN THE SPECIAL PROVISIONS. PREVENT SEDIMENT RESUSPENSION WHEN PERFORMING MAINTENANCE AND WHEN REMOVING THE TRAP.
5. CLEAN OUT ACCUMULATED SEDIMENT AND REMOVE TRAP AFTER CONSTRUCTION IS COMPLETED.

TEMPORARY SEDIMENT TRAP



TRACKING WITH SERRATIONS ALONG CONTOUR

TRACKING WITH MACHINERY UP AND DOWN SLOPE

NOTES:

1. GROOVE BY CUTTING SERRATIONS ALONG THE CONTOUR. IRREGULARITIES IN THE SOIL SURFACE CATCH RAINWATER, SEED, MULCH, AND FERTILIZER.
2. IMMEDIATELY SEED AND MULCH ROUGHENED AREAS.
3. TRACKING BY DRIVING EQUIPMENT UP AND DOWN SLOPE TO CREATE HORIZONTAL DEPRESSIONS AND GROOVES.

SURFACE ROUGHENING

REV	REVISION DESCRIPTION	DSG BY/DATE	DWN BY/DATE	CHK BY/DATE	APPVD/DATE
0	FINAL	JPP/11-21-14	AML/11-21-14	REV/11-21-14	SO/11-21-14

REGISTERED PROFESSIONAL ENGINEER
76918PE
OREGON
SEPTEMBER 13, 2005
SENDA OZKAN

EXPIRES: 12/31/2014

WHEATRIDGE WIND ENERGY FACILITY
EROSION AND SEDIMENT CONTROL PLAN

WHEATRIDGE WIND ENERGY FACILITY
LEXINGTON, OREGON

EROSION AND SEDIMENT CONTROL
CONSTRUCTION DETAILS (SHEET 3 OF 3)

THE ORIGINAL DRAWING AND SUBSEQUENT REVISIONS THEREOF WITH APPROVAL NAMES, INITIALS AND PE SEAL, IF APPLICABLE, ARE MAINTAINED IN THE FILES OF TETRA TECH, INC.

SIZE	CONTRACT NO.	DRAWING NO.	REV
D1		ESC-17	0

SCALE:

FILE NAME:
P:\WHEATRIDGE WIND\ENGINEERING\DRAWINGS\20141120 WHEATRIDGE WIND ESCP.DWG

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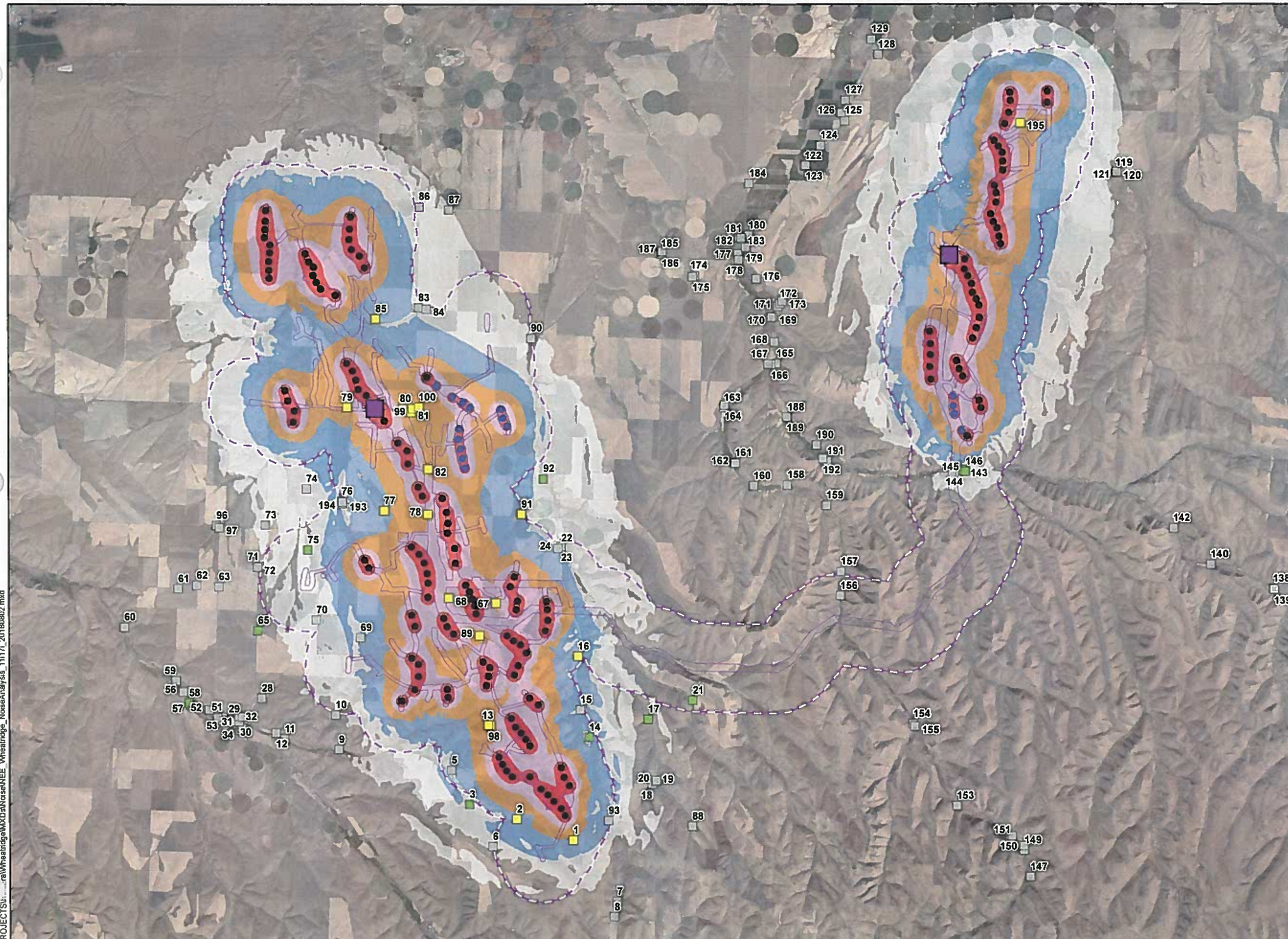
Attachment H: Certificate Holder's Noise Contour Map

Wheatridge Wind Energy

Received Sound Levels Wind Turbine Operation at Maximum Rotational Wind Speed

MORROW AND UMATILLA COUNTIES, OR



- Site Boundary
- 1 mile Buffer of Site Boundary
- Substation and Battery Storage Site
- GE2.3-116, 80 mHH (Project site layout modified May 9, 2018)
- GE2.5-127, 89m HH (Project site layout modified May 9, 2018)

Noise Sensitive Receptor

- Participant - In Exceedance
- Participant - Not In Exceedance
- Non-Participant - Not In Exceedance

Total Sound Pressure Level [(dBA)]

- 31-36
- 36-41
- 41-46
- 46-50
- > 50

NEXTera ENERGY RESOURCES

TETRA TECH

Reference Map

1:145,220 WGS 1984 UTM Zone 11N

0 0.5 1 2 3 4 Miles

P:\GIS_PROJECTS\I:...ra\Wheatridge\MXD\st\kiosk\NEE_Wheatridge_NoiseAnalysis_11i17i_20180802.mxd