SMYTH COUNTY, VA

**Smyth County Planning Commission**
**121 Bagley Circle, Suite 120**
**Marion, Virginia 24354**

**Clerk's Direct Phone: (276) 706-8316**
**Fax: (276) 783-9314**



# AGENDA

Thursday, September 28, 2023
6:30 p.m.

Should additional information become available, we will provide it to you as quickly as possible.

**1.** Call Meeting to Order

**2.** Adopt Agenda

**3.** Adopt Minutes of August 24, 2023, meeting

**4.** Zoning Administrator
   a. BOS decisions from August 24, 2023, joint public hearing
   b. Recommendation to BZA re: front lot setback variance request from Donald Taylor (Cregger & Taylor mini-storage) to construct a 61' x 71' 12-unit vehicle storage aligned with the existing adjacent building facing Hwy 11.

**5.** Citizens Time

**6.** Other Business; if any

**7.** Questions/Comments from Commissioners

**8.** Recess

## JOINT PUBLIC HEARING WITH BOARD OF SUPERVISORS

7:00 p.m.

**9.** Chairman of the Board and Chairman of the Planning Commission call the joint public hearing to order.

**10.** A special use permit application from Laurel Creek Energy Storage LLC to establish a Battery Storage Facility on Maloyed Place behind the AEP Substation at 3456 Saltville Hwy in Saltville, Virginia, further identified as Tax Map No. 18-1-9B and zoned Agricultural/Rural.

**11.** Adjourn joint public hearing.

**12.** Reconvene Planning Commission meeting to deliberate application.

**13.** Adjournment

*Note from Clerk: These minutes are written as the agenda was presented. Some votes may appear out of order.*

# SMYTH COUNTY PLANNING COMMISSION
## Thursday, August 24, 2023

The Smyth County Planning Commission met in their regular meeting on Thursday, August 24, 2023, at 6:30 P.M. in the Smyth County Office Building.

**Commissioners Present:** Hazel Wagoner, Chairperson, Atkins District; Graham Davidson Jr., Vice-Chairman, Chilhowie District; Robert Campbell, North Fork District, Lea Meadows, Park District; Tony Dean, Royal Oak District; and Paul Shepherd, Rye Valley District

**Commissioners Absent:** David Spence, Saltville District

**Staff Present:** Becca Creasy

At approximately 6:30 p.m. Mrs. Wagoner called the meeting to order.

**Adoption of Agenda:** Mrs. Wagoner opened the floor for motions to approve the agenda as presented. Mr. Dean made a motion to approve the agenda which was seconded by Ms. Meadows, with the following vote recorded.

| | | |
|---|---|---|
| Vote: | 6 yeas | Campbell, Davidson, Dean, Meadows, Shepherd, and Wagoner |
| | 1 absent | Spence |

**Minutes:** Mr. Shepherd made a motion to approve the minutes of the Thursday, July 27, 2023, meeting. Mr. Campbell seconded the motion, and the following vote was recorded.

| | | |
|---|---|---|
| Vote: | 6 yeas | Campbell, Davidson, Dean, Meadows, Shepherd, and Wagoner |
| | 1 absent | Spence |

**Citizen's Time:** None present.

**Other Business:** Ms. Creasy updated the Commission on the Board's approval of Hobert Widener's SUP to expand his Automotive Sales and Service business and the text amendments to add *Battery Storage Facility/Energy Storage Facility* and *Wind Energy Facility* to the County's Zoning Ordinance. She further informed the Commission of the Board's decision to table, until their regular meeting in October, the PC's recommendation to approve Clean Footprint's request for a Special Use Permit to construct a *Solar Energy Facility* on the Spence property located on Cedar Branch Road in Saltville and their decision to table the text amendment to add Games, Arcade "Skill" Gaming awaiting information on taxes, etc.

**Recess:** At approximately 6:40 p.m. with no other comments or questions from the Commissioners, Mrs. Wagoner recessed the Planning Commission's meeting until their 7:00 p.m. joint public hearing with the Board of Supervisors.

## JOINT PUBLIC HEARING WITH BOARD OF SUPERVISORS

**Board Members Present:** Charles Atkins, Chairman, Atkins District; Roscoe Call, Saltville District; Mike Sturgill, Chilhowie District; Kris Ratliff, Park District and Courtney Widener, Royal Oak District

**Board Members Absent:** Phil Stevenson, North Fork District; and Lori Deel, Vice-Chairperson, Rye-Valley District

**Commissioners Present:** Hazel Wagoner, Chairperson, Atkins District; Graham Davidson Jr., Vice-Chairman, Chilhowie District; Robert Campbell, North Fork District, Lea Meadows, Park District; Tony Dean, Royal Oak District; and Paul Shepherd, Rye Valley District

**Commissioners Absent:** David Spence, Saltville District

**Staff Present:** Shawn Utt, County Administrator; Clegg Williams, Assistant County Administrator - Development; Lisa Richardson, Assistant County Administrator – Operations-HR; Scot Farthing, County Attorney; Becca Creasy and Auna Louthian, Administrative Assistants

**Others:** Stephanie Porter-Nichols of Smyth County News, representative from Smyth County Sheriff's Office and approximately three citizens were present

**8/24/2023 7:04 PM** Charles Atkins, Chairman of the Board of Supervisors, and Hazel Wagoner, Chair of the Planning Commission, called the joint public hearing to order.

**8/24/2023 7:05 PM** Roscoe Call made a motion to forgo reading the rules of procedure for public hearings which was seconded by Mike Sturgill and unanimously carried.

**8/24/2023 7:06 PM** Clegg Williams read the legal ad.

**BEFORE THE SMYTH COUNTY BOARD OF SUPERVISORS AND SMYTH COUNTY PLANNING COMMISSION**

The Smyth County Board of Supervisors and the Smyth County Planning Commission will conduct a joint public hearing on Thursday, August 24, 2023, at 7:00 P.M. or as soon after 7:00 P.M. as the following application(s) may be heard, in the Smyth County Office Building, 121 Bagley Circle, Marion, Virginia, to consider the following application(s) to the Zoning Ordinance of Smyth County, Virginia:

*A special use permit application from Robert de Camara and Sharon Hayden to expand an airport by constructing an airplane hangar at 592 South Fork Road in Marion, Virginia, further identified as Tax Map No. 67-A-45 and zoned Agricultural/Rural.*

At this public hearing, subject to the rules of procedure of the Board of Supervisors and Planning Commission of Smyth County, Virginia, any person may appear and state his/her views thereon.

Copies of the application along with their maps/drawings are on file in the Office of the County Administrator of Smyth County and may be seen upon request. Copies are also maintained by the County Zoning Administrator at the address given above and may be viewed upon request during regular business hours Monday through Friday.

In compliance with the Americans with Disabilities Act, persons requiring special assistance to attend, and participate in this hearing should contact Clegg Williams, ADA Coordinator, at (276) 706-8315 at least 48 hours prior to the hearing.

Smyth County fully complies with Title VI of the Civil Rights Act of 1964 and related statutes and regulations in all programs and activities. For more information, or to obtain a Title VI Discrimination Complaint Form, contact (276) 783-3298 or at https://www.smythcounty.org.

Done by order of the Board of Supervisors and the Planning Commission.

Shawn M. Utt, County Administrator
Hazel Wagoner, Chairperson of the Planning Commission

**8/24/2023 7:05 PM** Mr. Williams presented an application from Robert de Camara and Sharon Hayden to expand their airport by constructing an airplane hangar. He stated it would be located on a tract of land formerly addressed as 592 South Fork Road; it is zoned agricultural/rural and is further identified as tax map number 67-A-45. He stated, in accordance with State Code 15.2-2204, notice of this hearing was advertised in the Smyth County News on August 12 and 19. In addition, notification was sent to each of the adjoining property owners by first class mail. He indicated he did not receive any comments or questions regarding the application. He pointed out Section 3-2.2 (fff) which allows *airports* in the Agricultural/Rural district by issuance of a special use permit and Article 6 which contains the provisions for Special Use Permits. He directed particular attention to Section 6-2.3 which contains provisions that must be met prior to any SUP being approved. He also noted the 2013 Comprehensive Plan identifies this property as Rural Residential on the Future Land Use Map.

**8/24/2023 7:07 PM** Both Robert de Camara and Sharon Hayden were present to address comments or questions. Mr. de Camara said they would like to build the hangar so the airplane would be closer to their home and protected. He explained he moved the building site from its originally proposed location since they are limited to where they can build due to the conservation easement and to move it further away from neighboring properties.

**8/24/2023 7:10 PM** Several Commissioners asked questions about the plans and future use of the hangar: Mr. de Camara stated they will not store a large amount of fuel in the hangar, this is only a hobby and they do not intend to start a business of flying individuals to the property to stay overnight in the hangar.

**8/24/2023 7:13 PM** Discussion between the applicants, Board members and Commissioners ensued about the location and building plans. Mr. de Camara explained the opening of the hangar would be facing south, location of the utilities, and septic system of the demolished house. Ms. Hayden spoke up to further explain the location of the driveway to the demolished house and to state that they have not hired anyone to build or grade the site.

**8/24/2023 7:20 PM** Mr. Willimas discussed the setback requirements that would be required if the application is approved.

**8/24/2023 7:22 PM** Lea Meadows inquired as to whether the applicants plan to use the residential section of the building as an Air B&B and if other pilots will be able to come there to stay. Mr. de Camara said there are no plans for it to be used as an Air B&B and thought it would be nice to have a restroom and area to rest while on the property.

**8/24/2023 7:23 PM** Because the residential and agriculture portions of the building are allowed “by-right”, Ms. Hayden stated the hangar should be the only thing being considered during the public hearing. She restated The Virginia Outdoor Foundation has restrictions on this property due to the conservation easement and they are limited to locations.

**8/24/2023 7:25 PM** Mike Sturgill asked why they chose this location. Mr. de Camara stated they wanted the view of its location and explained moving it West would be towards the runway and moving it North would be closer to Ms. Odle’s property line.

**8/24/2023 7:30 PM** Ms. Hayden stated the VDOF could approve any site between Ms. Odle's boundary and the site of the recently demolished dwelling.

**8/24/2023 7:32 PM** Veda Odle signed up to speak. After reiterating Mr. de Camara's comments on his desire to locate the hangar on the site of his property with the best view, she asked how that would affect her view of the area. She continued by asking why she should have to give up her view. She reminded the attendees of statements and information from the original public hearing for the Airport. She asked that the Board require the applicants move the hangar closer to the utilities if they are inclined to approve their request. She pointed out the Comprehensive Plan discusses the Rye Valley District as prime agricultural land, and they should protect it from conflicting and high intensity land uses. She feels the applicants have deteriorated the farmland, she does not think it is safe for her and she read into record Va. Code Section 15.2-4301 (Declaration of policy findings and purpose).

**8/24/2023 7:44 PM** Sharon Hayden approached the podium, responding to Ms. Odle's comments stating Ms. Odle is not looking at the hangar. She restated that this hearing is not to relitigate the SUP for the airport. The hangar will be approximately 150' from Ms. Odle's fence for her pasture, not her house.

**8/24/2023 7:46 PM** Tony Dean asked what type of construction they are proposing. Ms. Hayden said the building will be a nice metal barn.

**8/24/2023 7:47 PM** Lea Meadows asked for clarification on the distance from the old home site to the proposed hangar location. The applicants stated about 130-170 feet.

**8/24/2023 7:52 PM** Kris Ratliff asked for clarification about the buildings shown on the (2019) aerial maps. The applicants indicated the buildings have been demolished and removed.

**8/24/2023 7:56 PM** With no additional comments or questions, Mr. Atkins and Mrs. Wagoner closed the joint public hearing. Mr. Atkins adjourned the Board's meeting.

**8/24/2023 7:56 PM** Hazel Wagoner reconvened the Planning Commission meeting by opening the floor for comments from the Commissioners. Hearing none she asked for a motion.

**8/24/2023 7:58 PM** Lea Meadows asked if there is a height limit. Mr. Williams explained that the building code regulates heights but doubts that it will be an issue. Mr. de Camara said the hangar will have about a 14' ceiling. Discussion continued with Mr. Williams explaining the building code will only apply to the residential and hangar portions of the building. The agricultural use of the building is exempt from the building code. Ms. Meadows said it sounds like the building will not be any taller than a two-story barn.

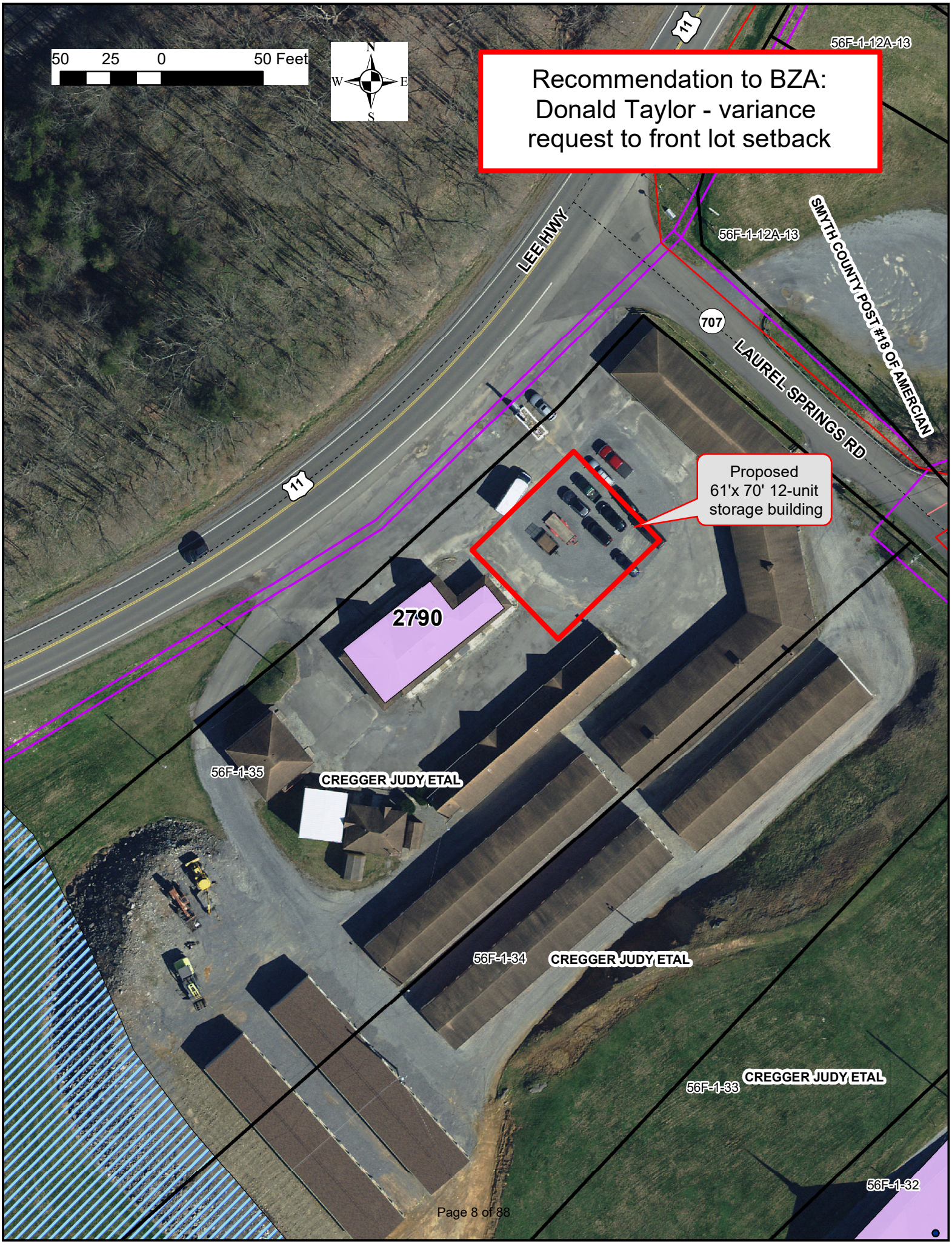
**8/24/2023 8:00 PM** **Robert de Camara and Sharon Hayden - recommendation on Special Use Permit for an Expansion to an existing SUP for an Airport (South Fork Road, Marion, Tax Map No. 67-A-45)** After reviewing the request and taking into consideration all comments, Mr. Dean felt the application met the standards set out in Article 6-2.3 and made a motion to recommend approval of the special use permit to expand the applicants' Airport which was seconded by Ms. Meadows and the following vote was recorded.

| | | |
|---|---|---|
| Vote: | 5 yeas | Davidson, Dean, Meadows, Shepherd, and Wagoner |
| | 1 absent | Spence |
| | 1 abstain | Campbell |

8/24/2023 8:01 PM Graham Davidson made a motion to adjourn which was seconded by Paul Shepherd and unanimously passed.

_____

Tony Dean, Secretary


50 25 0 50 Feet
N
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Recommendation to BZA:
Donald Taylor - variance
request to front lot setback
11
56F-1-12A-13
LEE HWY
56F-1-12A-13
SMYTH COUNTY POST #18 OF AMERICAN
707
LAUREL SPRINGS RD
11
Proposed
61'x 70' 12-unit
storage building
2790
56F-1-35
CREGGER JUDY ETAL
56F-1-34
CREGGER JUDY ETAL
56F-1-33
CREGGER JUDY ETAL
56F-1-32

# APPLICATION FOR SPECIAL USE PERMIT
## Battery Storage Facility

**Applicant:** **Laurel Creek Energy Storage LLC**
**Site:** **Maloyed Place, Saltville, Virginia (behind AEP substation)**
**Tax Map No.:** **18-1-9B**

## Background Information

Laurel Creek Energy Storage LLC is applying for a special use permit to construct a *Battery Storage Facility* on a tract of land presently owned by Jerry and Dorothy Bise on Maloyed Place in Saltville. The property is Tax Map No. 18-1-9B, consists of approximately 49 acres, and is located behind the AEP Broadford substation where they will tie in to the power grid. The property is zoned Agricultural/Rural and is identified as Institutional/Public Service.

## Relevant Zoning Ordinance Sections

| | |
|---|---|
| Section 3-2 | Agricultural/Rural District |
| Article X | Definitions |
| Article VI | Special Use Permit |

## Adjoining Property Owners

Jerry W. Bise and Dorothy M. Bise
106 Morehead Lane
Tazewell, Virginia 24651

James N. and Vicki Holmes
3459 Maloyed Place
Saltville, Virginia 24370

Eunice T. Burgess, et al
397 Burgess Hollow Road
Saltville, Virginia 24370

Appalachian Power
Attn: Robert Mann
Real Estate Asset Management
40 Franklin Road SW
Roanoke, Virginia 24011

# SMYTH COUNTY BUILDING AND ZONING DEPARTMENT

**121 BAGLEY CIRCLE, SUITE 120, MARION, VA 24354**
**Telephone (276) 706-8316**
**Facsimile (276) 783-9314**

## APPLICATION FOR SPECIAL USE PERMIT

**Article VI of Zoning Ordinance**

**Date: 8/29/2023** **Application Fee: $250.00**

| | |
|---|---|
| Name of Applicant: | Laurel Creek Energy Storage LLC |
| Mailing Address: | 1780 Hughes Landing Blvd, Suite 675 |
| | City: The Woodlands State: TX Zip: 77380 |
| Phone: | (Home): (832) 585-1238 |
| Email: | jstrickland@pluspower.com |

Property Owner's Name (if not Applicant) Jerry Bise

| | |
|---|---|
| Mailing Address: | 106 MOREHEAD LANE |
| | City: TAZEWELL State: VA Zip: 24651 |
| Phone: | (Home): (276 ) 988 - 4080 (Cell) (_____) _____ - _____ |
| Email: | bissejerry@gmail.com |

Preferred Method of Contact (circle one): ☐ Home ☐ Cell ☐ E-mail

911 Site Address or Adjoining 911 Address: MALOYED PLACE

City: Saltville State: VA Zip: 24370

Tax Map No. **18-1-9B (ASSOCIATED TIE-LINE ON 18-A-34)**

Existing Use of Property: Agricultural/Rural (A/R)

Proposed Use as defined in the Zoning Ordinance: BATTERY STORAGE FACILITY/ENERGY STORAGE FACILITY

Uses of immediately adjoining properties: Agricultural/Rural (A/R)

Source of Water: NA Means of Sewage Disposal: NA

Attach a Site Plan showing the following information:

a. Shape and dimensions of lot
b. Existing structures with distances to lot lines.
c. Dimensions and locations of all proposed buildings or structures (including additions or alterations) with distances to lot lines.
d. Existing and intended uses of the land and of each building or part of a building
e. Significant natural features, such as woods, streams, etc.
f. Existing and proposed roads and driveways
g. Existing public water and sewer lines
h. Off-street parking spaces

Zoning District: North Folk

AFFIDAVIT:

I swear that: (check one)

__X___ No member of the Smyth County Planning Commission or Smyth County Board of Supervisors or no member of the immediate household of any member of the Planning Commission or the Board of Supervisors has any interest in the property for which this Special Use Permit is requested, either individually, by ownership of stock in a corporation owning such land, partnership, as the beneficiary of a trust, or the settlor of a revocable trust;

**or**

_____ Members of the Smyth County Planning Commission or Smyth County Board of Supervisors or members of the immediate household of members of the Planning Commission or the Board of Supervisors who have an interest in the property for which this Special use permit is requested, either individually, by ownership of stock in a corporation owning such land, partnership, as the beneficiary of a trust, or the settlor of a revocable trust are listed below.

**Disclosure of Ownership of Property for which this Special Use Permit is requested:**
Names of all owners of the property, including in the case of corporate ownership, the name of stockholders, officers and directors, and in any case the names and addresses of all of the real parties of interest. (Requirement of listing names of stockholders, officers and directors shall not apply to a corporation whose stock is traded on a national or local stock exchange and having more than 500 shareholders.)

Jerry W Bise, & Dorothy M Bise

8/30/23
Date

Oscar Dalton Vice President
Signature of Applicant

**NOTARY PUBLIC**

STATE/COMMONWEALTH OF Texas
City/County of Montgomery

The foregoing signature(s) were subscribed and sworn before me this 30 day of August, 2023 by Oscar Dalton and N/A.

Notary Public

My Commission Expires March 23, 2027 My Registration No. 134268488

HANNAH GALLO
Notary ID #134268488
My Commission Expires
March 23, 2027

# OWNER'S CONSENT FORM

I/we hereby grant permission for Laurel Creek Energy Storage LLC
to seek a:

- ☒ Special Use Permit
- ☐ Map Amendment (Rezoning)
- ☐ Variance to the Subdivision Ordinance
- ☐ Variance to the Zoning Ordinance
- ☐ Other: _____

for property I/we own at Maloyed Place, Saltville, Virginia. 24370
Tax Map No. 18-1-9B

8-25-2023
Date

Jerry W. Bise
Owner's Signature

Jerry W. Bise
Print Name

276-988-4080
Phone

8-25-2023
Date

Dorothy M. Bise
Owner's Signature

Dorothy M. Bise
Print Name

276-988-4080
Phone

## NOTARY PUBLIC

STATE/COMMONWEALTH OF Virginia
City/County of Tazewell

The foregoing signature(s) were subscribed and sworn before me this 25 day of August, 2023 by Jerry W Bise and Dorothy M Bise.

Linda M Adkins
Notary Public

My Commission Expires Dec 31, 2026 My Registration No. 8007746

**SMYTH COUNTY BUILDING AND ZONING DEPARTMENT**
121 BAGLEY CIRCLE, SUITE 120, MARION, VA 24354
Telephone (276) 706-8316 or (276) 706-8317
Facsimile (276) 783-9314
buildingandzoning@smythcounty.org

Attach a list of names and addresses of all abutting property owners and property owners directly across the street.

| Tax Map Number | Name | Address | |
|---|---|---|---|
| 18-1-8 & 18-1-9 | HOLMES JAMES N & VICKIE DARLENE | 3459 MALOYED PLACE | SALTVILLE, VA 24370 |
| 18-A-34 | APP POWER CO | No address on tax map | non taxable |
| 30-1-11A | BURGESS EUNICE T ETAL | 397 BURGESS HOLLOW RD | SALTVILLE, VA 24370 |

COMMONWEALTH OF VIRGINIA
HEWLETT W. HUTTON
CERTIFICATE No.
320
CERTIFIED LAND SURVEYOR

S 22° 45E 30.10'
S 8° 15E 292.4'
S 6° 30' W 931'
RIVER
S 8° 40E 385'
S 38° 30W 160.7'
S 16° 30E 105.0'
STA STK
N 50° 25W 120.7'
N 27° 00W 133.8'
STA. STKS
S 85° 15W 45.6'
S 49° 00W 143.9'
N 1° 25E 1056'
S 3° 35W 365.5'
N 78° 30W 135.4'
N 5° 30W 292.6'
N 20° 15W 78.5'
U.S. HWY 58
N 1° 27W 554'
N 00° 22W 1008.0'
S 35° 30E 687.3'
NORTH FORK HOLSTON
S 37° 30E 228.4'
S 27° 00E 388.2'
S 78° 00E 1387.4'
S 78° 00E 603'
N 22° 00W 1074.4'
N 21° 35W 168.0'
N 21° 10W 497.2'
N 9° 05E 608.8'
N 87° 00E 961.9'
N 1° 10W 993'
TR. NO. 2 49.0 A±
TR. NO. 1 32.7 A±
N 87° 35E 205.7'
N 87° 35E 165.4'
N 4° 00E 694'
12' R/W FOR T.F. 2
N 87° 35E 38.4'
S 0° 20E 58.5'
34
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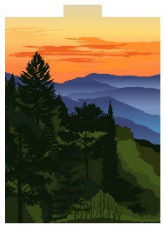
MAP OF THE GEORGE W. HOLMES LAND LOCATED IN THE NORTH FORK DISTRICT OF SMYTH COUNTY VIRGINIA; TRACT NO. 1 TO BE DEEDED TO NEWMAN N HOLMES; TRACT NO. 2 TO BE DEEDED TO ERNEST H. HOLMES; ALL LAND NORTH OF DASHED LINE FROM COR. NO. 38 TO COR. NO. 31 CALLED FOR IN DEED RECORDED IN DEED BOOK 90 PAGE 184, REMAINDER CALLED FOR IN DEED RECORDED IN DEED BOOK 63, PAGE 284; AS SURVEYED SEP. 18, 1967 BY HEWLETT W. HUTTON, CERTIFIED LAND SURVEYOR

COMMONWEALTH OF VIRGINIA
HEWLETT W. HUTTON
CERTIFICATE No.
320
CERTIFIED LAND SURVEYOR

See deed from George W. Holmes et ux to Ernest Howard Holmes dated 28 Sept 1967 recorded in DB 222, page 551.

Teste: Marlin R. Perry
Deputy Clerk



LAUREL CREEK ENERGY STORAGE

# Application for Special Use Permit

Laurel Creek Energy Storage LLC
Maloyed Place, Saltville,
VA 24370

August 30th, 2023

# Introduction to Laurel Creek Energy Storage

*Laurel Creek Energy Storage LLC's Application for a Special Use Permit to construct and operate a Battery Storage Facility/Energy Storage Facility to be located at Tax ID: 18-1-9B along Maloyed Place, Saltville, Virginia 24370 (the "Property") (and Tax ID: 18-A-34 associated electrical infrastructure including 138 kV electric lines and poles to be constructed between the Project substation and the Broadford Substation only) .*

Laurel Creek Energy Storage LLC ("Laurel Creek" or "Applicant") hereby submits a Special Use Permit Application for its proposed Laurel Creek Battery Energy Storage System Project (the "Project") including associated electric lines and poles. This Special Use Permit Application is submitted in accordance with the Smyth County Code of Ordinances Appendix A – Zoning Ordinance ("Zoning Ordinance"), Article III. - District Regulations, Article IV. - General Provisions and Supplementary Regulations, and Article VI. - Special Use Permits, and includes the following materials:

1. Statement of Compliance;
2. Owners Consent Form;
3. Site Plan;
4. Decommissioning Plan;
5. Emergency Response Plan;
6. Vegetation Buffer/Landscaping Plan;
7. Site Photos and Visual Renderings;
8. Sound Study; *and*
9. Filing fee of $250.

These application materials, including this Introduction, address all applicable Supplementary Regulations and Special Use Regulations contained in the Smyth County Zoning Ordinance.

**Project Description**

Laurel Creek Energy Storage will include a new 250MW/1000MWh Battery Energy Storage System (BESS) with associated electrical infrastructure including 138 kV electric lines and poles to be constructed between the Project substation and the Broadford Substation to connect the Project into the transmission system, access roads, temporary construction areas, operation and maintenance facilities, and other ancillary structures and equipment, as further detailed and depicted on the drawings submitted with the Application. The BESS enclosures will range from 8-12 feet tall and will include lighting poles.

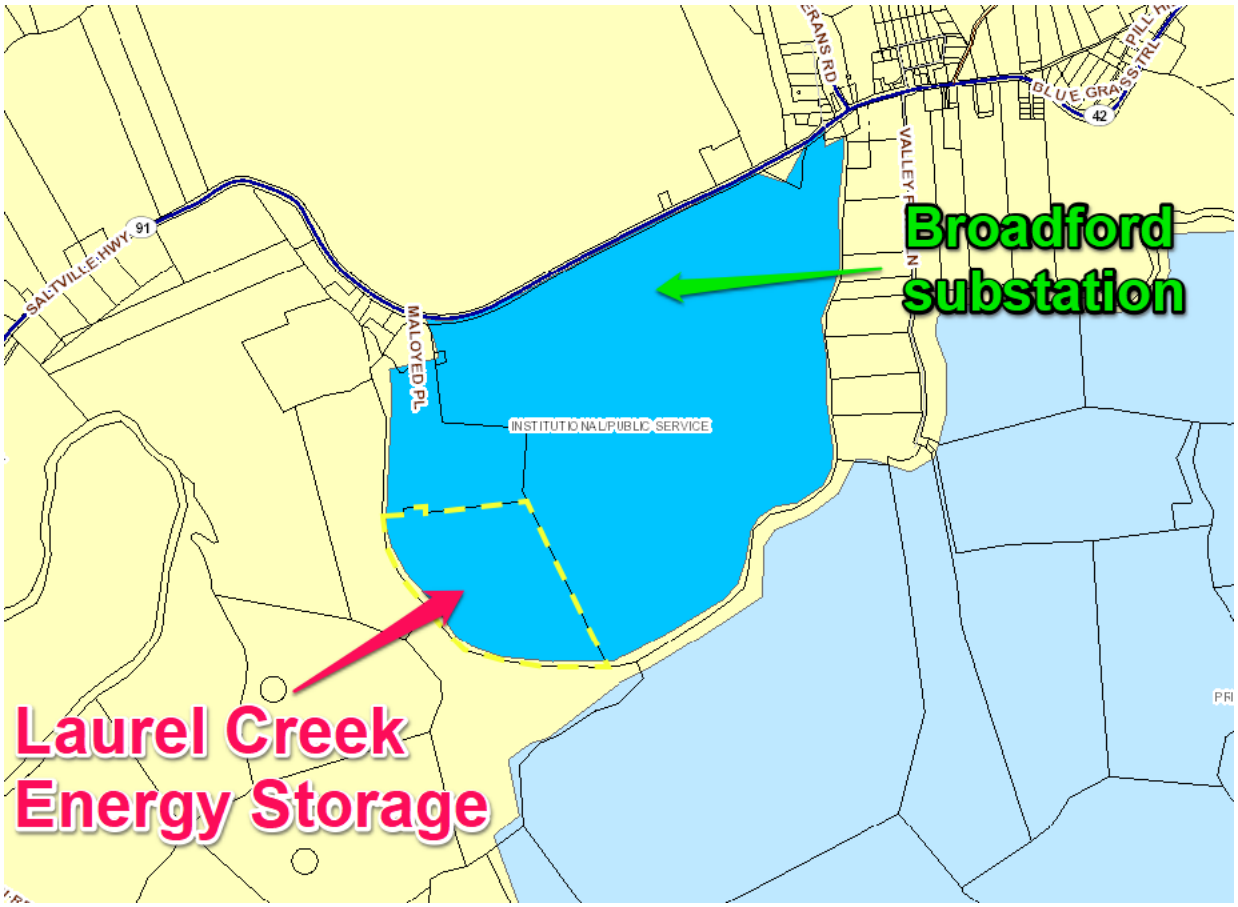
Once operational, Laurel Creek will store and dispatch electricity to support the reliability of the existing electric grid. The facility will function as an emission-less, water-free, low-noise electric

infrastructure resource with no significant impact to known historic or cultural resources and minimal use of farmland. The site is not forested.

*1 - Laurel Creek Energy Storage, photo simulation looking north towards Saltville Highway*

**Project Location**

The proposed Project will be constructed on an approximately 20-acre portion of the above-referenced Property, adjacent to the existing Appalachian Power-owned Broadford electric substation located on Saltville Hwy. This Property is located in the Agricultural/Rural ("A/R") district and designated for Institutional/Public Service by the "Comprehensive Plan 2019 Update", making it an ideal BESS location under Smyth's County future land use plans. Please see image below obtained from the Comprehensive Plan 2019 Update.




**Proposed Conditions of Approval**

Under Section 6-2.2(b) of the Smyth County Zoning Ordinance, "The Commission may recommend and the Board of Supervisors may establish expiration dates for any special use permit as a condition of approval." Due to the delays in the interconnection process managed by PJM, the electric grid operator, and to give sufficient time to design, engineer, finance, and construct the Project, the Applicant respectfully requests that any Special Use Approval granted by the Board of Supervisors be valid for a period of five (5) years. In conjunction with the 5-year approval period, the Applicant shall be required to submit written project updates to the Smyth County Zoning Administrator every six months after the initial approval by the Board of Supervisors. Updates provided via email shall be an acceptable form of submission.

## Statement of Compliance with the Smyth County Zoning Ordinance

### Article III. – District Regulations

Section 3-2.2, as recently amended on August 10, 2023, identifies battery energy storage systems as permitted uses in the A/R district with the approval of a special use permit.

### Article IV. – General Provisions and Supplementary Regulations (for BESS per Section 4-18)

**1. Decommissioning**

Laurel Creek agrees it will be responsible for all costs associated with decommissioning. Project decommissioning will include costs associated with removal of facilities and disposal of components not recycled or sold for salvage, including materials which will be disposed of at a licensed facility. As required by the Zoning Ordinance, a decommissioning plan has been enclosed with this application.

**2. Project Description**

Please see the information below also provided in the Introduction on page 2:

Laurel Creek Energy Storage will include a new 250MW/1000MWh Battery Energy Storage System (BESS) with electrical infrastructure, 138 kV electric overhead lines and poles to connect it into the transmission system, access roads, temporary construction areas, operation and maintenance facilities, and other ancillary structures and equipment. The BESS enclosures will range from 8-12 feet tall and will include lighting poles.

Once operational, Laurel Creek will store and dispatch electricity to support the reliability of the existing electric grid. The facility will function as an emission-less, water-free, low-noise electric infrastructure resource with no significant impact to known historic or cultural resources and minimal use of farmland. The site is not forested.

**3. Site Plan**

Please find the site plan drawings submitted with this application. These drawings comply with all applicable provisions of the Smyth County Zoning Ordinance.

To comply with those provisions, the site plan includes the locations of proposed access, perimeter fencing, setbacks, the vegetative buffer, battery enclosures, and future capacity maintenance units. To maintain output capacity as battery performance declines, future capacity maintenance units (as labeled on the site plan) will be installed over time

throughout the life of the project. The Applicant will monitor battery performance to determine when installation of these units is necessary.

**4. Special Requirements**

**Emergency Action Plan (Emergency Response Plan)**

As part of our commitment to a successful operation, Laurel Creek will provide Smyth County's emergency personnel with an emergency response plan to include:

a. A detailed site overview;
b. Emergency contacts;
c. Site map;
d. System-specific fire protection and safety controls (including plans to install thermal radian energy cameras connected to a NFPA 72 Fire Alarm Control Panel monitored by a 24/7 network operations center);
e. Potential hazards;
f. Required personal protective equipment; *and*
g. Emergency response recommendations, procedures, and commitment to initial and ongoing training of fire department personnel.

An emergency response plan is enclosed with this Special Use Permit Application but will be amended in coordination with County fire department personnel following construction completion and a post-construction site walk.

**Vegetative Buffer**

As part of our commitment to adhere to the requirements for a battery storage facility under Section 4-18 of the Smyth County Zoning Ordinance, Laurel Creek will plant a vegetative buffer at least 15 feet wide around the perimeter of the Project. This vegetative buffer will contain multiple rows of staggered trees and other vegetation to minimize visibility to surrounding neighbors. To the extent practicable, Laurel Creek will utilize local nurseries in the greater Smyth County area but will rely on availability of plants, shrubs, and other vegetation to meet the Special Requirements for a Vegetative Buffer under Section 4-18(b)(7). A landscaping plan consistent with these requirements is enclosed with this Special Use Application.

**Factors Relating to Approval**

Section 4-18(c) identifies three factors for Smyth County to consider in its approval. These criteria and the Applicant's compliance are listed below.

(1) The visual impact of the project, in conjunction with landscaping and screening plans;

The Applicant has included a landscaping plan consistent with the Vegetative Buffer screening requirements contained in 4-18(b)(7). The Applicant will also provide computer generated photo-simulations demonstrating that the visual impact of the Project will be minimal.

(2) Impacts to protected environmental features; and

The Project will not have any impact on protected environmental features. In February 2022, the Project sent the U.S. Army Corps of Engineers a request to review and provide a jurisdictional determination of the wetlands present onsite. During the site walk for the wetland delineation in 2021, a license consultant discovered a few water ways that would be protected under State and Federal laws. With help from the consultant, the Project has identified where these potential wetlands are located onsite and has taken the precautionary measure of increasing the setback from these water features. In late February 2022, the U.S Army Corps of Engineers sent the owners of the property (tax map parcel #18-1-9B) a notification of approved jurisdictional determination that the Project area contains 1.93 acres of jurisdictional wetlands and 7,798 linear feet of jurisdictional stream channel.

(3) An onsite fire monitoring system or fire watch prevention plan as required by the authority having jurisdiction of the County of Smyth

The Tesla Megapack 2XL or equivalent upgraded model is designed with active and passive measures that enable constant monitoring of the Project on a single cell level every second of the day. The Battery Management System (BMS) monitors key datapoints such as voltage, current, and temperature of battery cells, in addition to providing control of corrective and protective actions in response to any abnormal conditions. The Project will also be equipped with 24 infrared flame detectors directed at the Megapacks that will send both operation centers with an alarm for further investigation in the unlikely event of an issue.

More details of the Projects fire monitoring system can be found within the Emergency Response Plan.

**5. Additional Project Information**

**Economic Impact**

Once completed, the Laurel Creek Energy Storage system will will provide the county and region with reliable power. The need for reliable power ranks amongst one of the most important factors when siting and selecting a location for a new industrial plant (factory, manufacturing plant, or a production plant). Hence, we believe the Project will foster additional investments in Smyth County due to enhanced power reliability. The initial investment of the Project will be in the hundreds of millions of dollars, bringing valuable taxable dollars to Smyth County. The Project will work with the County Property Assessor and the Virginia State Corporation Commission (VASCC) to determine the total property taxes or other tax revenue generated once the final Site Plan is approved.

**Noise Impact**

Laurel Creek has completed a Noise Study as part of our Special Use Permit Application with the full report attached as an exhibit below. The Noise Study was conducted to confirm the use and operation of the Project would not add any noise above the current ambient noise for the area. After studying the ambient Noise Levels in the area, the consultant (Dudek) determined that the predicted hourly average operational noise level of the Project would remain **below** the recorded ambient noise level range at the closest residences.

**Article VI. – Special Use Permits (per Section 6-2.3)**

**(a) It is designed, located and operated so as the public health, safety and welfare will be protected**;

The proposed use is similar in character to the existing electric substation which directly abuts the parcel to the north. The overall appearance of battery enclosures is low profile and minimally visible, especially given the vegetative screening requirements applicable to this Project. The Project will require an interconnection to the Broadford electric substation at a voltage of 138kV. Additionally, the Project will also be connected to the distribution voltage electric service to power auxiliary equipment in the facility like sensors, lighting, etc. However, no additional utilities (including water or sewer) are expected. As stated above, the facility will function as an emission-less, water-free, low-noise electric infrastructure resource with no significant impact to known historic or cultural resources and minimal use of farmland. The site is not forested.

The proposed site will generate minimal traffic when construction is complete. Similar facilities generate fewer than two dozen trips per year, typically in the form of light trucks performing routine maintenance. In summary, there will be no significant impact on the abutting properties and surrounding neighborhood's enjoyment of their land.

**(b) It will not adversely affect other property in the area which it is located**;

Please refer to the previous response. Because the enclosed site plan and landscaping plans conform to Smyth County's screening requirements, the low-profile battery enclosures will be minimally visible from surrounding residents. There will be minimal traffic after construction with no need for additional utilities (including water or sewer). As a result, there will be no strain on public resources associated with the construction of this facility.

**(c) It is within the listing of items requiring a special use permit as set forth in this Ordinance**;

Section 3-2.2, as recently amended on August 10, 2023, identifies battery energy storage systems as permitted uses in the A/R district with the approval of a special use permit.

**(d) It conforms to all applicable provisions of this Ordinance for the district in which it is to be located**;

Laurel Creek Energy Storage LLC is located in the A/R district. Sections 3-2.3 and 3-2.4 provide district regulations for the A/R district. As shown on the enclosed site plan, the Project as proposed meets and exceeds these minimum lot size and setback requirements for the A/R district.

**(e) It must have direct access on a public road which can safely and adequately handle the automobile and truck traffic generated**;

As shown on the enclosed site plan, Laurel Creek Energy Storage LLC will have access off Saltville Highway, similar to the Broadford substation also located off Saltville Highway/Hwy 91.

**(f) There must be adequate safeguards to prevent soil erosion on the site and erosion and sedimentation on neighboring downhill and downstream properties during and after development**;

An erosion control plan and stormwater management system will be designed for approval by Smyth County Planning Department to prevent soil erosion and sedimentation on neighboring properties both during and after development. The stormwater management system will be designed in compliance with all applicable codes pertaining to the volume, flow rate, and water quality of all stormwater runoff applying suitable Best Management Practices for erosion control and stormwater. At this time, the specifics of the design are in development, but examples of techniques that may be employed are silt fences, matting, ditches with check dams, sediment basins, and seeding to prevent soil erosion and sedimentation during construction, as well as ditches and detention basins to manage stormwater post-construction.

**(g) There is a satisfactory plan and methods for sewage disposal as approved by state regulatory agencies**;

This facility will be unmanned with no permanent inhabitable structures or dwellings. Therefore, sewage disposal will not be required.

**(h) There is a suitable provision for the protection of privacy on adjoining property which is now in residential use or which may develop in residential use under the provisions of this Ordinance. In this section protection of privacy shall mean effective screening against visual intrusion**;

This site will include a vegetative buffer around the perimeter of the Project planted in accordance with Smyth County's requirements for battery energy storage systems. A visual rendering of the proposed buffer is enclosed with the application. To the extent practicable and pending market available at the time of planting, the Applicant intends to use native trees from a local nursery. As previously noted, a landscaping plan is included with this application.

*Section 6-2.3(i)-(k) pertains to uses not proposed by the Applicant.*


# SITE PLAN
# FOR
# LAUREL CREEK ENERGY STORAGE

MALOYED PL
SALTVILLE, VA 24370
SMYTH COUNTY

PLUS POWER


**DEVELOPER**
LAUREL CREEK ENERGY STORAGE, LLC
ADDRESS: 1780 HUGHES LANDING BLVD. STE. 675
THE WOODLANDS, TX 77380
PHONE: (832) 585-1238
CONTACT: JEFF STRICKLAND
EMAIL: JSTRICKLAND@PLUSPOWER.COM

**SITE DATA**
ZONING: AGRICULTURE/RURAL (A/R)
ACREAGE: 49 AC
PROJECT ADDRESS: MALOYED PL
SALTVILLE, VA 24370
PROJECT JURISDICTION: SMYTH COUNTY
PARCEL NUMBER (APN): 18-1-9B
(ASSOCIATED TIE-LINE ON 18-A-34)

**PROJECT DESCRIPTION**
THE PROJECT IS A CONTAINER BASED UTILITY SCALE ENERGY STORAGE FACILITY COMPRISED OF A BATTERY ENERGY STORAGE SYSTEM LOCATED ADJACENT TO BROADFORD SUBSTATION. THE PROJECT IS COMPRISED OF BATTERY CONTAINERS WITH MEDIUM VOLTAGE TRANSFORMERS AND WILL BE CONNECTED TO THE BROADFORD SUBSTATION (WITH ELECTRIC LINES AND POLES CONSTRUCTED ON ADJOINING LOT).

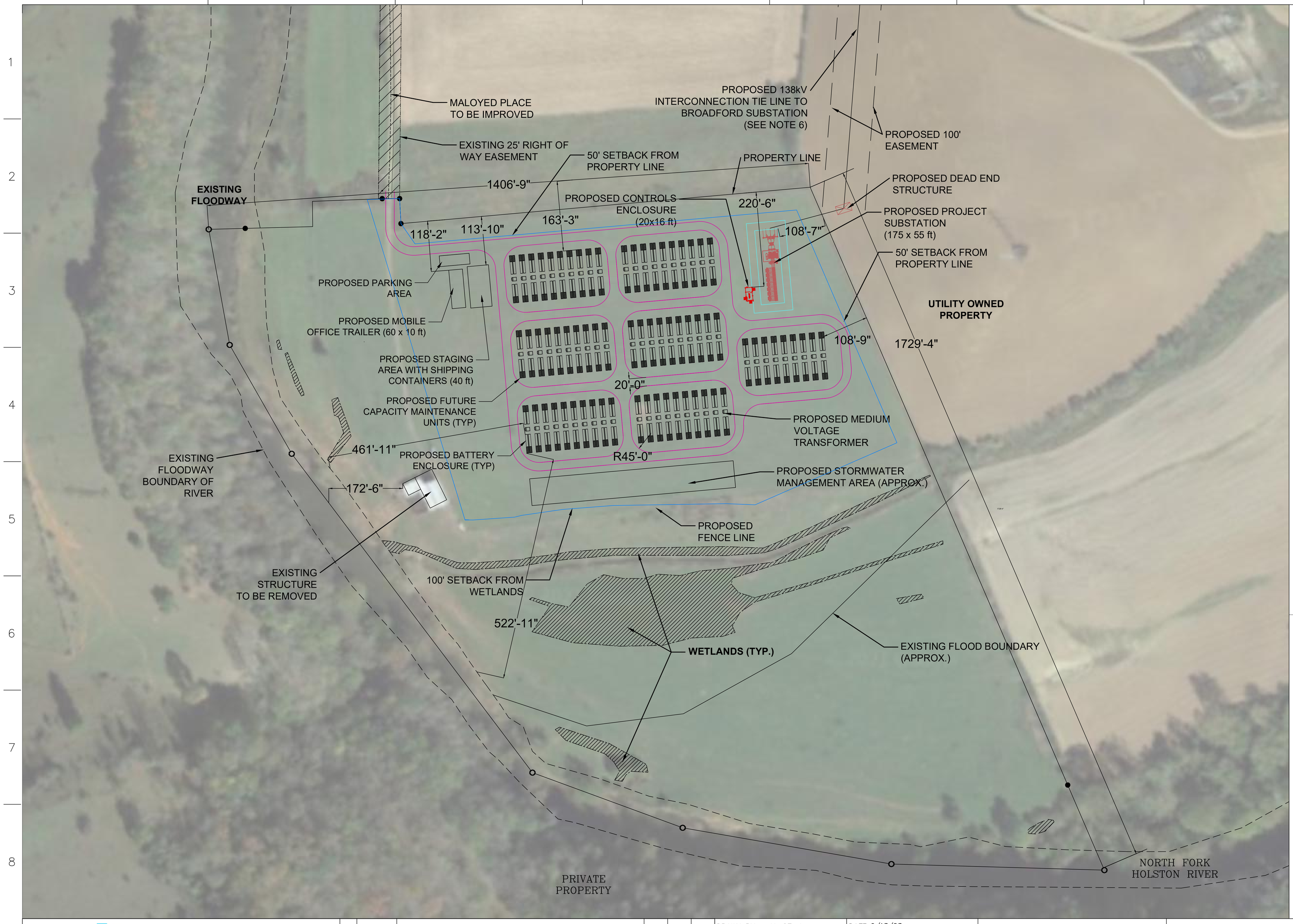
**CODES AND STANDARDS**
PROPOSED BATTERY STORAGE PRODUCT IS COMPLIANT WITH UL9540 AND TESTED TO UL9540A. SITE WILL COMPLY WITH NFPA 855. OTHER NFPA 855 PROJECT REQUIREMENTS TO BE ADDRESSED AT BUILDING PERMIT.

**EXISTING LAND USE**
NORTHERN HALF OF THE PROPERTY IS CURRENTLY PRODUCING HAY. EXISTING STRUCTURE USED FOR STORAGE OF ASSOCIATED EQUIPMENT.

**INTENDED LAND USE**
BATTERY ENCLOSURE (TYP): ENERGY STORAGE SYSTEM
MEDIUM VOLTAGE (MV) TRANSFOMERS: STEP UP VOLTAGE FROM 480 V TO 34.5 kV
PROJECT SUBSTATION: COLLECTS ALL MV ENERGY AND STEPS IT UP TO 138 kV FOR INTERCONNECTION INTO BROADFORD SUBSTATION
MOBILE OFFICE TRAILER: USED DURING CONSTRUCTION AND OCCASIONALLY FOR O&M SERVICES
SHIPPING CONTAINERS: USED TO STORE SPARE PARTS AND O&M EQUIPMENT
CONTROLS ENCLOSURE: USED TO MONITOR SAFE OPERATION OF EQUIPMENT
TIE-LINE: CONNECTION BETWEEN PROJECT SUBSTATION AND UTILITY SUBSTATION TO BE DETERMINED AT THE TIME OF CONSTRUCTION.

**FLOODPLAIN ZONE**
THE CURRENT FEMA FLOOD INSURANCE RATE MAP (FIRM) FOR THIS AREA, MAP NUMBER 51173C0095D (EFFECTIVE REVISED DATE AUGUST 2, 2012), DESIGNATES THE SOUTHEAST PORTION OF THE PROPERTY WITHIN FLOOD HAZARD ZONE AE. THE ZONE AE AREA BOUNDARY IS LOCATED APPROXIMATELY 500 FT AWAY FROM THE NEAREST BATTERY ENCLOSURE.

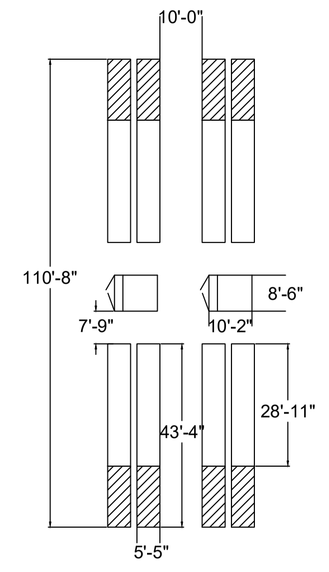
ZONE: AE IS DEFINED AS AREAS OF 1% ANNUAL CHANCE FLOOD.




## NOTES

1. ALL SPECIFIED DIMENSIONS ARE FOR REFERENCE ONLY AND SUBJECT TO +/- 25 FT OF ERROR AT THIS DESIGN STAGE.
2. THIS IS A PRELIMINARY DESIGN NOT FOR CONSTRUCTION.
3. TIE-LINE CONNECTION BETWEEN PROJECT SUBSTATION AND UTILITY SUBSTATION TO BE DETERMINED AT THE TIME OF CONSTRUCTION.
4. SITE ACCESS FOR FIRE VEHICLES TO FOLLOW REQUIREMENTS WITHIN NFPA 1 SECTION 18.2.3.
5. LAYOUT INCLUDES BATTERY ENCLOSURES AND MVTS AT BEGINNING OF LIFE WITH ALLOWANCE FOR FUTURE CAPACITY MAINTENANCE UNITS FOR 20 YEARS
6. EXACT LOCATION OF PROPOSED 138 kV INTECONNECTION TIE-LINE TO BROADFORD SUBSTATION TO BE FINALIZED WITH AEP. PLEASE SEE AERIAL PHOTO ON TITLE PAGE FOR COMPLETE TIE-LINE PATH.
7. PLEASE SEE ATTACHED LANDSCAPING PLAN

## BATTERY SYSTEM LAYOUT




PLUS POWER

LAUREL CREEK BESS
250MW / 1000MWH

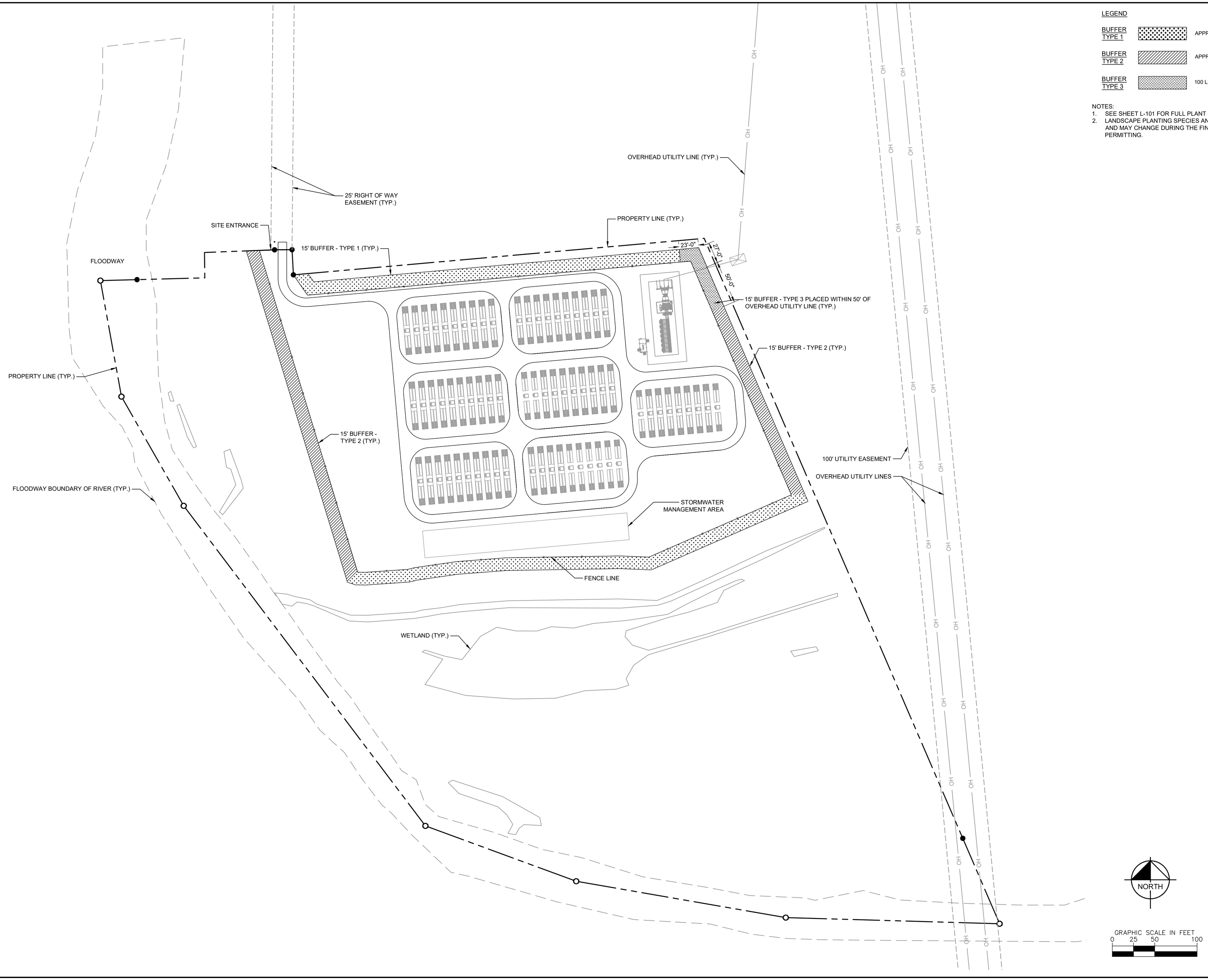
| NO. | DATE | REVISION | DR | BY |
|---|---|---|---|---|
| 3 | 7/31/23 | UPDATED SETBACKS | | MO |
| 2 | 3/30/23 | UPDATED TO LATEST STANDARDS | | AY |
| 1 | 8/32/21 | INITIAL LAYOUT | | PK |

DRAWN BY: M. OToole
DATE: 9/13/23
DRAWING NO.:
PROJECT NO.:
REVISION NO.: 3

NOT FOR CONSTRUCTION
DRAWING NOT TO SCALE

PROJECT SITE PLAN

SHEET NO.
S.1




LEGEND

| | |
|---|---|
| BUFFER TYPE 1 | APPROX. 1,240 LF |
| BUFFER TYPE 2 | APPROX. 640 LF |
| BUFFER TYPE 3 | 100 LF TOTAL |

NOTES:
1. SEE SHEET L-101 FOR FULL PLANT SCHEDULE AND BUFFER DETAILS.
2. LANDSCAPE PLANTING SPECIES AND QUANTITIES ARE CONCEPTUAL AND MAY CHANGE DURING THE FINAL SITE PLAN DESIGN AND PERMITTING.

| No. | REVISIONS | DATE | BY |
|---|---|---|---|

Kimley»Horn
11400 COMMERCE PARK DR., SUITE 400, RESTON, VA 20191
PHONE: 703-674-1300 FAX: 703-674-1350
WWW.KIMLEY-HORN.COM

LICENSED PROFESSIONAL

KHA PROJECT:
DATE 08/23/2023
SCALE AS SHOWN
DESIGNED BY BRB
DRAWN BY BRB
CHECKED BY JSH
DATE:

# LANDSCAPE BUFFER PLAN

# LAUREL CREEK BESS

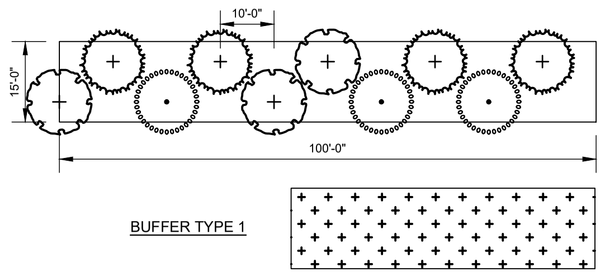
SHEET NUMBER
L-100

# PLANT SCHEDULE

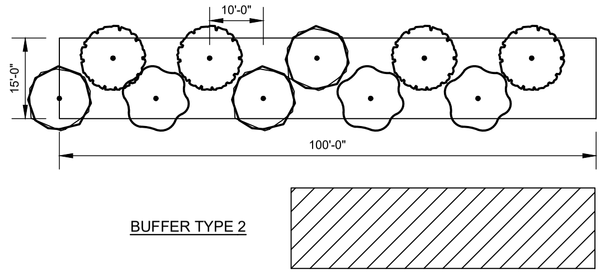
| EVERGREEN TREES | QTY | BOTANICAL NAME | COMMON NAME | CONT | CAL / HT |
|---|---|---|---|---|---|
| +/- | 38 | Cupressus x leylandii | Leyland Cypress | B & B | 3` HT MIN |
| +/- | 20 | Ilex opaca | American Holly | B & B | 3` HT MIN |
| +/- | 50 | Juniperus virginiana | Eastern Red Cedar | B & B | 3` HT MIN |
| +/- | 38 | Picea abies | Norway Spruce | B & B | 3` HT MIN |
| +/- | 26 | Pseudotsuga menziesii | Douglas Fir | B & B | 3` HT MIN |
| +/- | 20 | Tsuga canadensis | Eastern Hemlock | B & B | 3` HT MIN |

| SHRUBS | QTY | BOTANICAL NAME | COMMON NAME | CONT | HEIGHT |
|---|---|---|---|---|---|
| +/- | 10 | Ilex cornuta 'Rotunda' | Chinese Holly | B & B | 24"-30" HT. MIN. |
| +/- | 20 | Ilex x 'Nellie R. Stevens' | Nellie R. Stevens Holly | B & B | 24"-30" HT. MIN. |
| +/- | 10 | Rhododendron x 'Delaware Valley White' | Delaware Valley White Azalea | B & B | 24"-30" HT. MIN. |

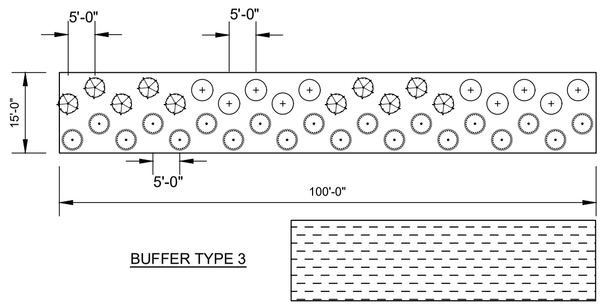
NOTES:
1. SEE SHEET L-100 FOR BUFFER TYPE LOCATION.
2. LANDSCAPE PLANTING SPECIES AND QUANTITIES ARE CONCEPTUAL AND MAY CHANGE DURING THE FINAL SITE PLAN DESIGN AND PERMITTING.




BUFFER TYPE 1




BUFFER TYPE 2




BUFFER TYPE 3

## BUFFER TYPE 1

LEYLAND CYPRESS
*CUPRESSUS X LEYLANDII*

EASTERN RED CEDAR
*JUNIPERUS VIRGINIANA*

NORWAY SPRUCE
*PICEA ABIES*

## BUFFER TYPE 2

AMERICAN HOLLY
*ILEX OPACA*

DOUGLAS FIR
*PSEUDOTSUGA MENZIESII*

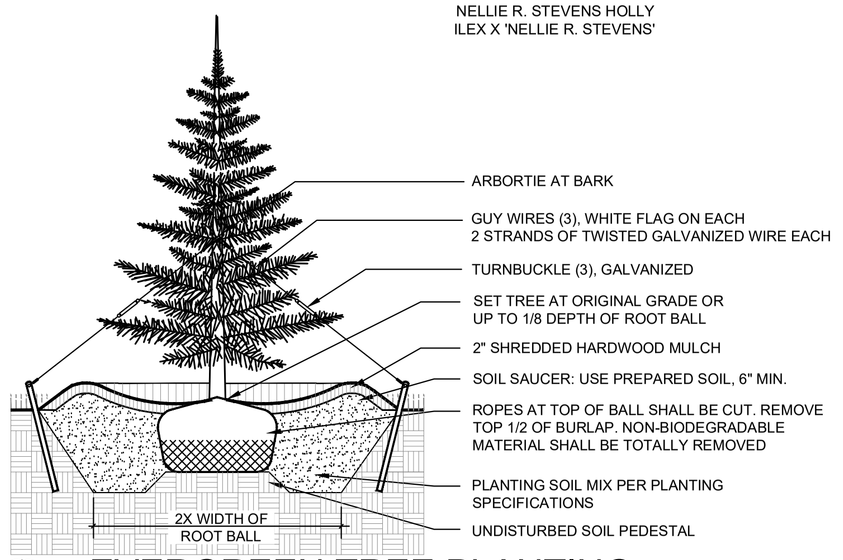
EASTERN HEMLOCK
*TSUGA CANADENSIS*

## BUFFER TYPE 3

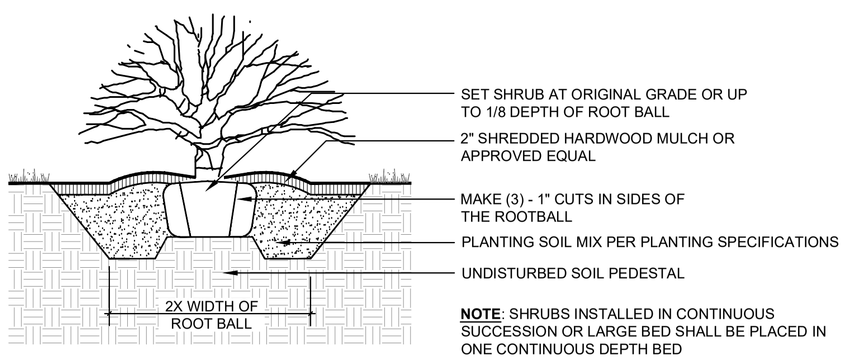
NELLIE R. STEVENS HOLLY
ILEX X 'NELLIE R. STEVENS'

CHINESE HOLLY
ILEX CORNUTA 'ROTUNDA'

DELAWARE VALLEY WHITE AZALEA
RHODODENDRON X 'DELAWARE VALLEY WHITE'




A EVERGREEN TREE PLANTING
NOT TO SCALE




**NOTE**: SHRUBS INSTALLED IN CONTINUOUS SUCCESSION OR LARGE BED SHALL BE PLACED IN ONE CONTINUOUS DEPTH BED

B SHRUB PLANTING
NOT TO SCALE

| No. | REVISIONS | DATE | BY |
|---|---|---|---|

Kimley»Horn
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PHONE: 703-674-1300 FAX: 703-674-1350
WWW.KIMLEY-HORN.COM

LICENSED PROFESSIONAL

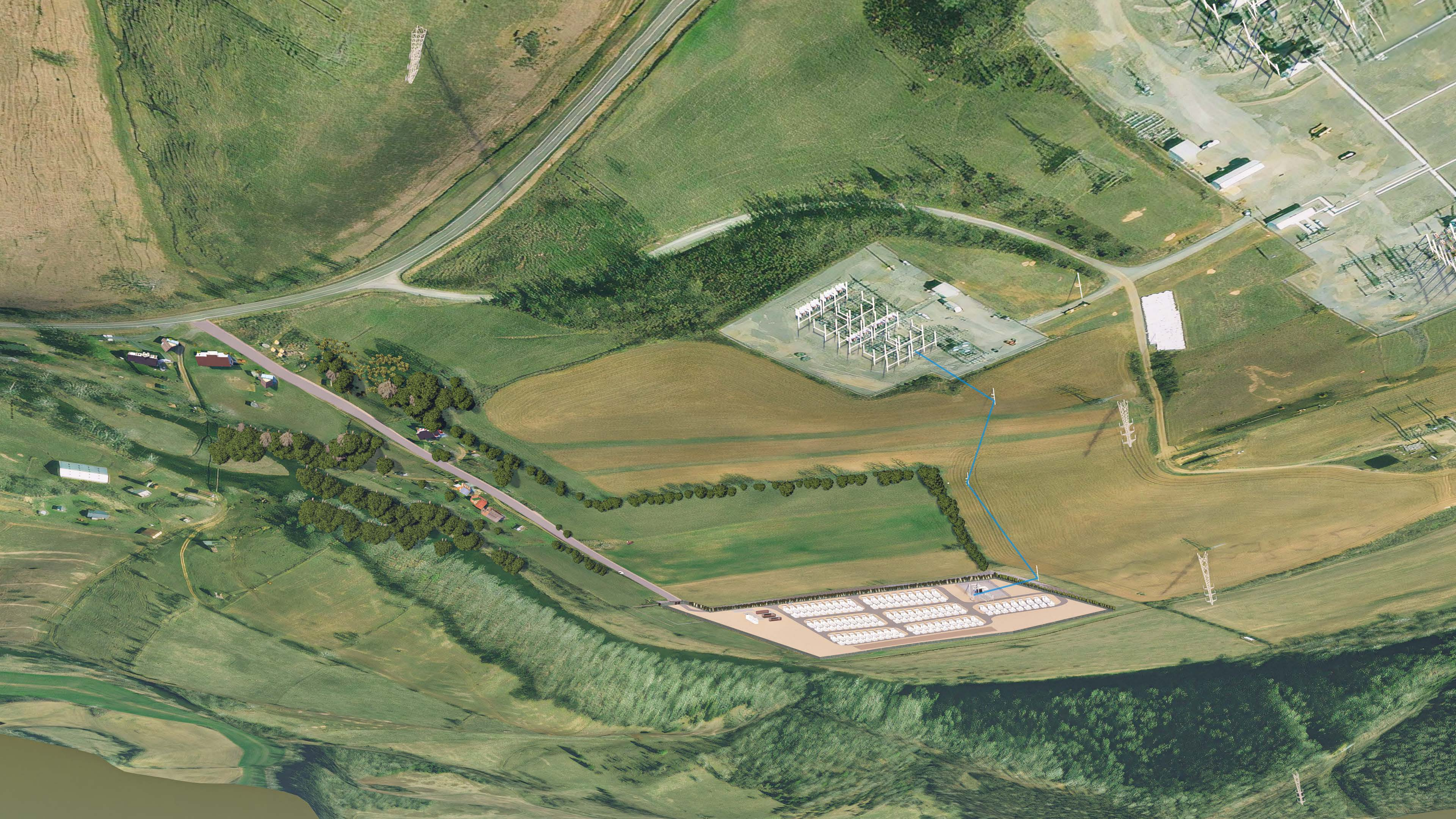
DATE:

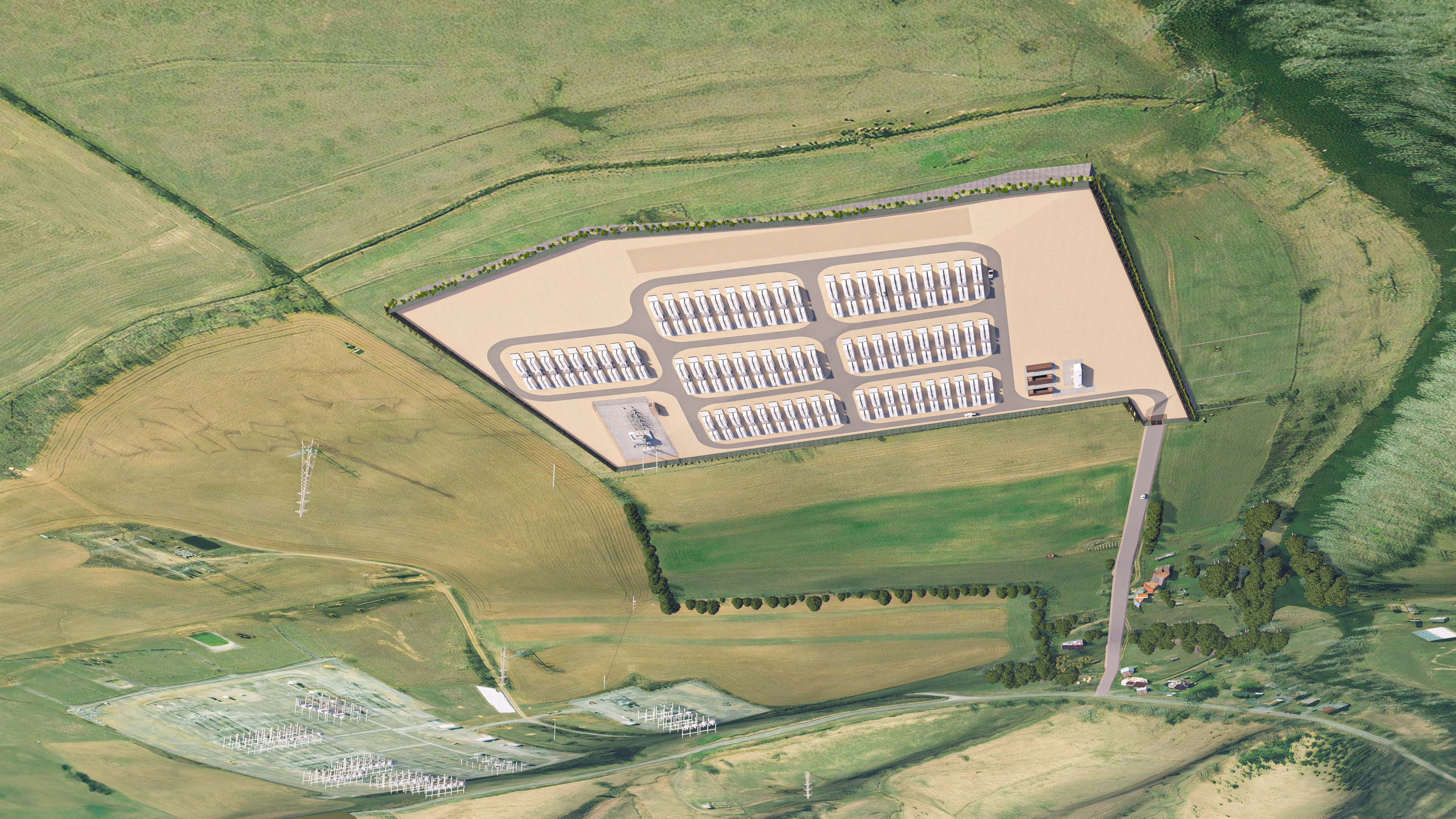
| KHA PROJECT | DATE | SCALE | DESIGNED BY | DRAWN BY | CHECKED BY |
|---|---|---|---|---|---|
| | 08/23/2023 | AS SHOWN | BRB | BRB | JSH |

# LANDSCAPE BUFFER DETAILS

# LAUREL CREEK BESS

SHEET NUMBER
L-101





# Decommissioning Plan
# Laurel Creek Energy Storage Project
# Smyth County, Virginia

Prepared for:
Laurel Creek Energy Storage LLC
c/o Energy Storage Resources, LLC
1780 Hughes Landing Blvd, Ste 675
The Woodlands, TX 77381

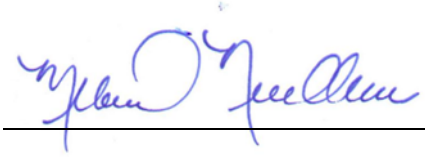
Prepared by:
Stantec Consulting Services Inc.
1165 Scheuring Road
De Pere, Wisconsin 54115

August 23, 2023

This document entitled Decommissioning Plan – Laurel Creek Energy Storage Project, Smyth County, Virginia was prepared by Stantec Consulting Services Inc. (“Stantec”) for the use of Laurel Creek Energy Storage LLC (owned by Energy Storage Resources, LLC) and Plus Power (the “Client”). The material in this document reflects Stantec’s professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in this document are based on conditions and information existing at the time this document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others.

**Molly Cyr, EIT**
**Civil Engineer**

**Matthew A. Clementi, PE**
**Senior Civil Engineer**



**Melanie Needham, PE**
**Associate, Project Manager**

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**LIST OF FIGURES**

# 1.0 INTRODUCTION

Laurel Creek Energy Storage LLC (Laurel Creek) is proposing to construct the Laurel Creek Energy Storage Project (the Project) located east of the Town of Saltville, in Smyth County, Virginia. The Project encompasses approximately 15.1 acres within the proposed perimeter fencing. The rated power capacity of the Project will be 250 megawatts (MW) alternating current [AC], with a 1000-MW-Hour (MWh) energy storage capacity. Major components of the Project include battery energy storage systems, inverter/transformer power conversion systems and associated structures and foundations.

Construction of the Project is anticipated to start in mid-2028, with a projected Commercial Operation Date in 2029. This Decommissioning Plan (Plan) provides a description of the decommissioning and site restoration phase of the Project. The decommissioning phase is assumed to include the removal of Project facilities as listed in Section 1.1 and shown in Figure 1.

This Plan provides an overview of the primary decommissioning activities, including the dismantling and removal of facilities, and subsequent restoration of land. A summary of estimated costs associated with decommissioning the Project is provided in Section 4.0. Summary statistics and estimated costs are provided assuming a 250-$MW_{[AC]}$, 1000-MWh Project design.

## 1.1 BATTERY STORAGE FACILITY COMPONENTS

The main components of the Project include:

- Battery energy storage system (BESS) with integrated inverters
- Transformer stations
- Steel pile foundations for equipment
- Electrical cabling and conduits
- Perimeter fencing
- Gravel yard and access drive
- Substation and transmission tie-in line
- Permanent stormwater drainage swales and basin

## 1.2 TRIGGERING EVENTS AND EXPECTED LIFETIME OF PROJECT

Project decommissioning will start after the abandonment or cessation of the use and may be triggered by an event such as the end of a contract or power purchase agreement. If properly maintained, the expected lifetime of a utility-scale BESS project is 25 years or greater with an opportunity for additional years of operation with necessary equipment replacement or augmentation.

When decommissioned, the battery units will be shipped to a recycling facility, as described further in Section 2.2. Other components of the BESS facility with resale value may be sold in the wholesale market. Components with no wholesale value will be salvaged and sold as scrap for recycling outside Smyth County or disposed of at an approved off site licensed solid waste disposal facility (landfill) outside Smyth County.

Decommissioning activities will include removal of the BESS and associated components as described in Section 2.

## 1.3 DECOMMISSIONING SEQUENCE

Project Decommissioning activities will be initiated within six months of non-operation and completed within six to eight months of decommissioning commencement. Laurel Creek or the facility owner at the time of decommissioning will be the responsible party for Project decommissioning. The anticipated sequence of decommissioning and removal is described below; however, overlap of activities is expected and will be determined by the chosen decommissioning contractor.

- Reinforce access and internal areas, if needed, and prepare site for component removal
- Install temporary fencing and erosion control best management practices (BMPs) to protect sensitive resources, if present, and control erosion during decommissioning activities
- De-energize BESS and associated electrical equipment
- Remove integrated battery storage units
- Remove BESS steel pile foundations
- Remove transformers and steel pile foundations
- Remove electrical cables and conduits
- Remove substation, if decommissioned
- Remove transmission tie-in line, if decommissioned
- Remove aggregate (if not retained for future use), import topsoil (if necessary), and grade site
- Restore site to allow for pre-project land use

# 2.0 PROJECT COMPONENTS AND DECOMMISSIONING ACTIVITIES

The BESS facility components and decommissioning activities necessary to restore the Project area, as near as practicable, to pre-construction conditions are described within this section. The above and below-ground facilities will be removed and re-used, recycled, or disposed of in accordance with state and federal law at a licensed solid waste facility.

## 2.1 OVERVIEW OF BATTERY ENERGY STORAGE FACILITY SYSTEM

Laurel Creek anticipates utilizing approximately 276 self-contained battery storage units with a total energy storage capacity of approximately 1,000 MWh. The Project area encompasses approximately 15.1 acres within the proposed perimeter fencing. Prior to construction, land use within the BESS area is predominantly agricultural. Statistics and estimates provided in this Plan are based on the Megapack 2 XL battery storage units manufactured by Tesla, Inc.

Low and medium voltage collection cabling will be installed below the surface at an approximate depth of 36 inches (three feet). Foundations, electric cabling, and conduit above and below the soil surface will be removed, unless an agreement to allow improvements to remain has been reached with the landowner and approved by the County. Public roads damaged or modified during the removal and reclamation process will be repaired and restored upon completion of the decommissioning phase.

Estimated quantities of materials to be removed and salvaged or disposed of are included in this section. Some of the materials described will have salvage value; although there are also some components that will likely have none at the time of decommissioning. All removed materials will be salvaged or recycled to the extent possible. All other waste materials will be disposed of in accordance with state and federal law at a licensed solid waste facility. If decommissioned prior to the end of their useful life, the battery packs may have value in a resale market, depending on their condition.

Table 1 presents a summary of the primary components of the Project included in this decommissioning plan.

**Table 1 Primary Components of BESS Facility**

| Component | Quantity | Unit of Measure |
|---|---|---|
| Battery Energy Storage Units with Integrated Inverters | 276 | Each |
| Transformers | 69 | Each |
| Steel piles/piers (BESS units) | 4,416 | Each |
| Electrical Cables and Conduits | 8,120 | Lineal Foot (estimated) |
| Gravel yard (aggregate base-fill within fence line) | 15.1 | Acres |
| Access Roads | 1,760 | Lineal Foot (estimated) |
| Perimeter Fencing | 3,500 | Lineal Foot (estimated) |
| Substation | 1 | Each |
| Overhead Transmission Tie-in Line | 2,000 | Lineal Foot (estimated) |
| Permanent Stormwater Management Area (approximate) | 0.7 | Acres |

## 2.2 BESS UNITS AND SUPPORT STRUCTURES

The Project includes 276 battery energy storage units, each with integrated ventilation. The system will provide 250 $MW_{[AC]}$ of rated power capacity and 1,000 MWh of energy storage capacity. Statistics and estimates provided in this Plan are based on the Tesla Megapack 2 XL battery energy storage units. Each battery unit will be supported by sixteen wide-flange steel I-beams (piles). The units are mainly comprised of materials such as Lithium-ion (Li-ion) batteries, steel, copper, plastic, and epoxies. If decommissioned prior to the end of their useful life, the battery packs will likely have value in a resale market, depending on their condition.

At the time of decommissioning, the BESS and container units will be completely removed from the Project site. Laurel Creek is considering a Tesla battery storage system. Tesla is an example of a manufacturer that offers a program accepting responsibility for the recycling of their battery system at end of life. Although not all manufacturers offer this type of return program, it is assumed, based on manufacturer information and projected market conditions, that the battery units will have resale value for the first 10 to 15 years. Therefore, no battery recycling costs have been included in this cost estimate.

The BESS pile foundations will be removed and recycled or properly disposed of in accordance with state and federal law at a licensed solid waste facility. Above ground facilities and subsurface materials will be removed and salvaged or disposed of in accordance with state and federal law at a licensed solid waste facility.

## 2.3 TRANSFORMER STATIONS AND ELECTRICAL CABLING

Sixty-nine (69) medium voltage transformers (MVTs) will be located adjacent to the BESS container units on skid assemblies mounted on four (4) wide-flange steel I-beams (piles). The transformers and associated

equipment will be deactivated, disassembled, and removed at decommissioning. Depending on condition, the transformers may be sold for refurbishment and re-use. If not re-used, they will be salvaged or disposed of at an approved solid waste management facility. All oils and lubricants will be collected and disposed of at a licensed facility.

The Project's underground electrical collection system will be placed at a depth of 36 inches. The Plan assumes that electrical cabling located below the ground surface will be removed and salvaged or disposed of in accordance with state and federal law at a licensed solid waste facility.

## 2.4 BESS YARD, PERIMETER FENCING, AND ACCESS ROADS

The BESS site is surrounded by an approximately 4,000-foot-long chain-link security fence. The area within the fence contains an aggregate surface approximately eight inches in depth. An external access drive will provide direct access to the BESS from a public road. Internal gravel access roads within the facility fence line will provide access to the internal equipment. Access roads will be comprised of an 8-inch-thick gravel layer placed on geogrid materials and an 18-inch compacted subgrade.

Aggregate and underlying geogrid material will be removed during the decommissioning process. Geogrid material that is easily separated from the aggregate during excavation will be disposed of in an approved solid waste disposal facility. Geogrid material that remains with the aggregate will be sorted out at the processing site and properly disposed of. Following removal of aggregate and geogrid material, and fencing, the yard and access road areas will be graded, de-compacted, back-filled with native subsoil and topsoil, as needed, and land restored to a condition suitable for the preconstruction land use.

## 2.5 PERMANENT STORMWATER BASINS

The current design includes one permanent stormwater detention basin within the footprint of the BESS facility that will remain in place for the life of the Project. The detention basin is approximately 0.7 acre in size and although it may be retained at the end of the Project operational period, this report has conservatively assumed it will be removed. The basin will be filled with clean fill, finished with topsoil, and graded to restore as near as practical to pre-construction drainage patterns.

## 2.6 PROJECT SUBSTATION AND ABOVE GROUND GENERATION TRANSMISSION TIE-IN LINE

The Laurel Creek site will include a Project substation and an overhead transmission tie-in line. The substation will be located within the site footprint and include a gravel pad, power transformer and footings, electrical control house and concrete foundations, as needed. The Project will utilize an approximately 2,000-foot-long above ground transmission line and 4 steel monopoles to interconnect to a larger regional substation.

The substation transformer may be sold for re-use or salvage. Components of the substation that cannot be salvaged will be transported off-site for disposal at an approved waste management facility. Foundations and footings will be demolished and removed. The transmission tie-in line and associated structures will be

removed. Although the substation and transmission line may be retained at the end of the Project life, an estimated decommissioning cost has been included in this Plan.

# 3.0 LAND USE AND ENVIRONMENT

## 3.1 SOILS AND PREVIOUS LAND USE

The proposed BESS facility is located on Agricultural/Rural (A/R) land. Land disturbed by Project facilities will be restored in such a way as to allow a land use similar to its original use as it existed prior to Project construction.

## 3.2 RESTORATION AND REVEGETATION

Project areas that have been excavated and backfilled will be graded as previously described to restore land to a condition allowing a land use similar to the pre-construction use. Restoration will be completed as required by landowner and regulatory commitments. Soils outside the aggregate pad that were compacted during de-commissioning activities will be de-compacted, as necessary, to restore the land to a condition suitable for the preconstruction land use. If required, topsoil will be placed on disturbed areas, as needed, and seeded with appropriate vegetation or in coordination with current landowner(s).

## 3.3 SURFACE WATER DRAINAGE AND CONTROL

Surface water conditions at the Project site will be reassessed prior to the decommissioning phase. Laurel Creek will obtain the required water quality permits, if needed, before decommissioning of the Project. Construction stormwater permits will also be obtained, and an Erosion Control and Stormwater Management Plan will be prepared describing the protection needed to reflect conditions present at that time. BMPs may include: construction entrances, temporary seeding, permanent seeding, mulching (in non-agricultural areas), erosion control matting, silt fence, filter berms, and filter socks.

## 3.4 MAJOR EQUIPMENT REQUIRED FOR DECOMMISSIONING

The activities involved in decommissioning the Project include removal of the above and below-ground Project equipment and restoration as described in Sections 2 and 3.2.

Equipment required for the decommissioning activities is similar to what is needed to construct the BESS facility and may include, but is not limited to: small cranes, low ground pressure (LGP) track-mounted excavators, backhoes, LGP tracked bulldozers and dump trucks, front-end loaders, water trucks, disc plows and/or tractors, and ancillary equipment. Standard dump trucks may be used to transport material removed from the site to disposal facilities.

# 4.0 DECOMMISSIONING COST ESTIMATE SUMMARY

Expenses associated with decommissioning the Project will be dependent on labor costs at the time of decommissioning. For the purposes of this report, approximate 2023 average market values were used to estimate labor expenses. Fluctuation and inflation of labor costs were not factored into the estimate table.

## 4.1 DECOMMISSIONING EXPENSES

Project decommissioning will incur costs associated with removal of facilities and disposal of components not recycled or sold for salvage, including materials which will be disposed of at a licensed facility, as required. Decommissioning costs also include backfilling, grading and restoration of the proposed Project site as described in Sections 2 and 3. Table 2 summarizes the estimated costs for activities associated with decommissioning the Project.

**Table 2 Estimated Decommissioning Expenses**

| Activity | Unit | Quantity | Cost per Unit | Total |
|---|---|---|---|---|
| Overhead and management | Lump Sum | 1 | $348,000 | $348,000 |
| Battery pack and container removal | Each | 276 | $4,720 | $1,302,720 |
| Battery pack pile removal | Each | 4,416 | $150 | $662,400 |
| Transformer removal | Each | 69 | $800 | $55,200 |
| Transformer foundation removal (piles) | Each | 276 | $150 | $41,400 |
| Perimeter fence removal | Lineal Foot | 3,500 | $4.60 | $16,100 |
| Stormwater basin removal | Lump Sum | 1 | $27,111 | $27,111 |
| Buried cable | Linear Foot | 8,120 | $0.50 | $4,060 |
| Substation | Lump Sum | 1 | $300,000 | $300,000 |
| Overhead generation tie-in transmission line | Linear Mile | 0.38 | $250,000 | $95,000 |
| Access road and internal yard removal | Lump Sum | 1 | $300,800 | $300,800 |
| Site restoration (topsoil, grading, and revegetation, as needed) | Lump Sum | 1 | $679,400 | $679,400 |
| **Total estimated cost for removal of BESS facilities and site restoration** | | | | $3,832,191 |

## 4.2 DECOMMISSIONING REVENUES

Battery energy storage systems will retain a significant resale value during the early phases of their life cycle. During the first 10 years of the Project, BESS units, or the individual battery cells, could be sold for re-use or returned to the manufacturer for recycling. It is estimated that the battery units' value during the first ten years of the Project life would offset (or exceed) the cost of preparation and shipping. Although

additional revenue due to resale may be generated during this stage of the Project, these revenues are not reflected in Table 2. During later stages of the Project, the value of the battery components, such as lithium, copper, aluminum, and steel, would be extracted during recycling to provide an offset to the disposal costs. Tesla, the proposed BESS manufacturer for the Project, currently provides a recycling program at end of life as described in Section 2.2.

Laurel Creek is committed to re-assessing the decommissioning costs every five years beginning on the fifth anniversary of Project commissioning. Additionally, due to the recycling program currently offered by Tesla, no cost for recycling or disposal of the BESS is included at this time.

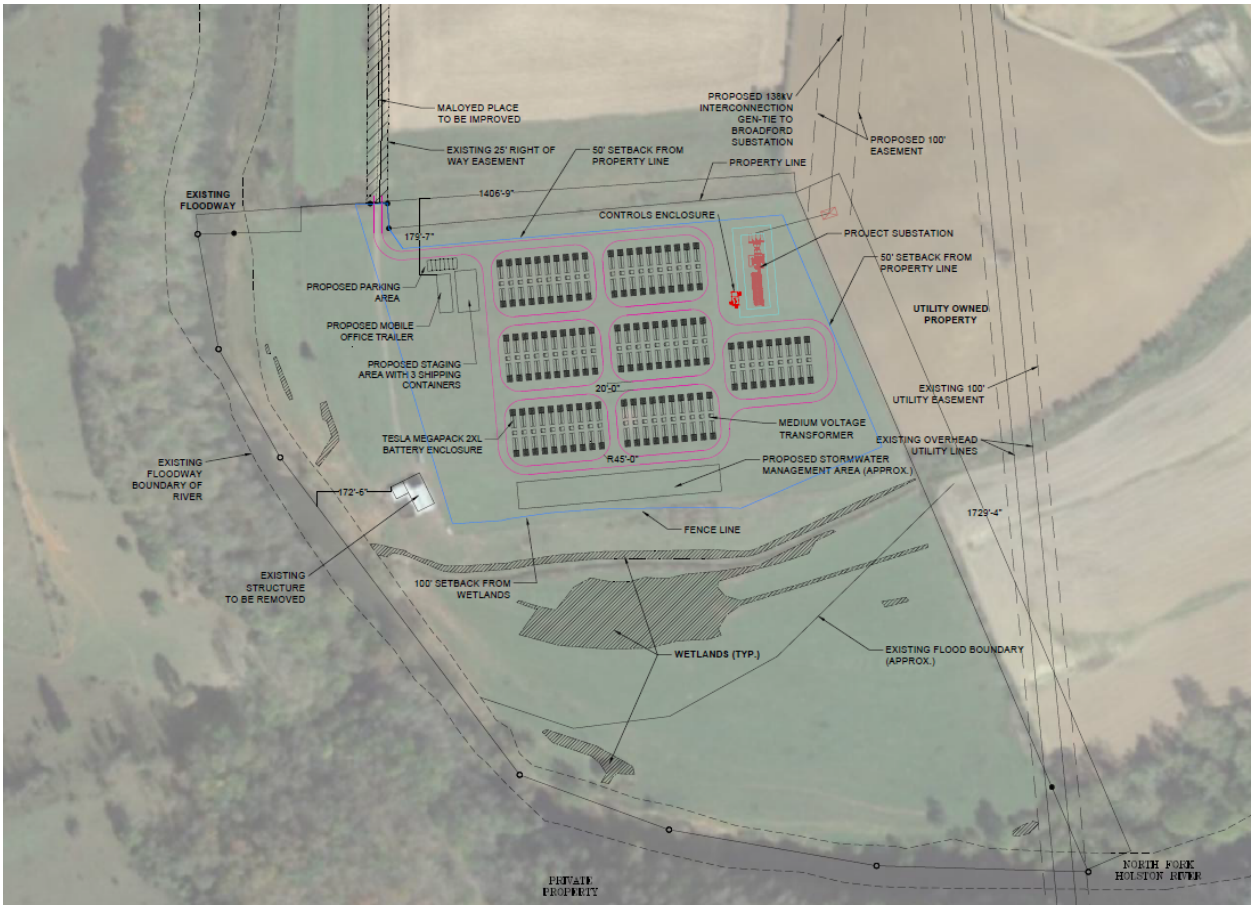
## 4.3 DECOMMISSIONING COST SUMMARY

Table 3 provides a summary of the estimated cost to decommission the Project, using the information detailed in Section 4.1. Estimates are based on 2023 prices, with no resale or salvage revenue, market fluctuations or inflation considered.

### Table 3 Decommissioning Cost Summary

| Description | Cost |
|---|---|
| Decommissioning Expenses for Facility Removal and Restoration | $3,832,191 |
| Estimated Transportation Cost of Battery Components to Recycling Facility | $5,449,316 |
| **Total Decommissioning Cost Including Estimated Transportation to Facility for Resale or Recycling** | **$9,281,507** |

## Figure 1 Proposed Project Layout



August 25, 2023

Mr. Jeff Strickland
Project Development Manager
Plus Power
1780 Hughes Landing Blvd, Suite 675
The Woodlands, TX 77380

Subject: Laurel Creek Energy Storage Facility, Smyth County Virginia
Operational Noise Study

Dear Mr. Young:

Consistent with the approved scope of work, this concise draft letter report prepared for the Laurel Creek Energy Storage Systems Facility (Project) in Smyth County Virginia includes as follows:

- Summarized measurement results from an outdoor ambient sound pressure level (SPL) survey in the vicinity of the Project.
- A presentation of predicted aggregate noise levels at nearby existing residential receptors attributed to operation of the proposed facility, as compared to ambient noise levels and exterior noise exposure guidelines of the US Department of Housing and Urban Development (HUD).

In summary, and based on Project design information to date, Dudek has determined that operational noise from the proposed facility would be no greater than "ambient" levels at the closest offsite residences and would comply with residential exterior noise exposure recommendations adopted by HUD.

# 1 Introduction

## 1.1 Project Setting

The Laurel Creek Electrical Storage System (ESS) facility is proposed to be developed in an unincorporated portion of Smyth County Virginia, approximately 1 mile southwest of the town of Broadford. The proposed project site is located along the eastern side of Maloyed Place (which extends southward from Saltville Highway), within approximately 1,250 feet southwest of the AEP Broadford electrical distribution system sub-station. Figure 1 at the end of the report illustrates the regional vicinity of the proposed project location.

The project site is located on a parcel zoned Agriculture/Rural, and currently used as an agricultural pasture that is developed with a single barn structure. Agriculture/Rural zoned parcels are immediately adjacent to each side of the subject parcel. The closest residence to the project site is to the north, on the east side of Maloyed Place, at approximately 1,200 feet from the subject parcel northern parcel boundary. An additional three residences are located to the north/northwest of the subject parcel, along Saltville Highway or Maloyed Place, at distances between 1,700 and 2,000 feet from the northern subject parcel boundary. Figure 2 at the end of the report illustrates the project site and location of nearby residential land uses.

## 1.2 Acoustical Fundamentals

Although the terms may be used interchangeably in the right context, "sound" is defined as any gas or fluid pressure variation detected by the human ear, and "noise" is unwanted sound. The preferred unit for measuring sound is the decibel (dB), which by way of expressing the ratio of sound pressures to a reference value logarithmically enables a wide range of audible sound to be evaluated and discussed conveniently. On the low end of this range, zero dB is not the absence of sound energy, but instead corresponds approximately to the threshold of average healthy human hearing; and, on the upper end, 120–140 dB corresponds to an average person's threshold of pain.

The human ear is not equally responsive to all frequencies of the audible sound spectrum. An electronic filter is normally used when taking noise measurements that de-emphasizes certain frequencies in a manner that mimics the human ear's response to sound; this method is referred to as A-weighting. Sound levels expressed under the A-weighted system are sometimes designated dBA. All sound levels discussed in this report are A-weighted.

The equivalent continuous sound level ($L_{eq}$) is a single dB value which, if held constant during the specified time period, would represent the same total acoustical energy of a fluctuating noise level over that same time period. $L_{eq}$ values are commonly expressed for periods of one hour, but longer or shorter time periods may be specified. Another descriptor is maximum sound level ($L_{max}$), which is the greatest sound level measured during a designated time interval or event. The minimum sound level ($L_{min}$) is the lowest measured level and often called the floor of a measurement period.

Unlike the $L_{eq}$, $L_{max}$, and $L_{min}$ metrics, the, $L_{dn}$ descriptor always represents a 24-hour period and differs from a 24-hour $L_{eq}$ value because it applies a time-weighted factor designed to emphasize noise events that occur during the non-daytime hours (when speech and sleep disturbance is of more concern). Time weighted refers to the fact that $L_{dn}$ penalizes noise that occurs during certain sensitive periods. Noise during the nighttime period (10:00 PM to 7:00 AM) is penalized by adding 10 dB to the hourly $L_{eq}$ for each hour. $L_{dn}$ is the predominant criteria used to measure community noise affecting residential receptors. Regarding increases or decreases to the outdoor ambient noise environment, changes in a community noise level of less than 3 dBA $L_{dn}$ are not typically noticed by the human ear, while changes from 3 to 5 dBA $L_{dn}$ may be noticed by some individuals who are extremely sensitive to changes in noise; greater than a 5 dBA $L_{dn}$ increase is readily noticeable (FHWA 2006).

Sound that is produced during operation of mechanical equipment may be reported using sound pressure level ($L_p$ or simply L), which can be directly measured with a sound level meter. Sound pressure level varies with distance from the source, and therefore sound pressure data for mechanical equipment noise must include the distance from the equipment for the reported sound level. Equipment sound generation can also be reported as sound power levels ($L_W$ – which stands for level in watts). $L_W$ is a rating of the total sound energy produced and does rely on distance from the source. Additional common acoustical descriptors and terms that may assist the reader in framing the evaluation and discussion of noise in this report are provided in Attachment 1.

## 1.3 Noise Regulation in Smyth County

The Smyth County Board of Supervisors repealed a previous Noise Ordinance at their March 24, 2022 hearing. A replacement Noise Ordinance was introduced at the January 12, 2023 Board of Supervisor's Hearing; that replacement ordinance has evidently yet to be adopted. However, it should be noted the proposed language in the

replacement ordinance would not establish noise limits applicable to the operation of commercial, municipal, or industrial facilities, nor would the proposed language identify a recommended exterior noise exposure level limit for residences.

Nonetheless, certain land uses are recognized as noise-sensitive by federal agencies, including residences. The United States Department of Housing and Urban Development (HUD) noise program is established in the noise regulation, 24 CFR 51B. Under this HUD regulation, the maximum normally acceptable exterior noise exposure level is 65 dBA $L_{dn}$ for residences. HUD regulations are not applicable to the project, but the maximum recommended exterior noise exposure level for residences is a useful reference point when evaluating the predicted operational noise level of the proposed project at existing vicinity residences.

# 2 Baseline Sound Level Survey

Between August 9 and 10, 2023, Dudek conducted three continuous 24-hour sound level measurements in the project vicinity (designated LT#) to characterize the existing ambient noise environment affecting residences in the project site vicinity. The three measurement locations are depicted in Figure 2 (at the end of this report). Measurement Location LT1 is located along to the south side of Saltville Highway, adjacent to a residence along the south side of Saltville Highway and west side of Maloyed Place; traffic along Saltville Highway is the primary contributor to the noise environment at this location. Measurement Location LT2 is along the east side of Maloyed Place, adjacent to the closest residence to the project site; this location is distant from Saltville Highway, but the existing electrical sub-station evidently contributes to the noise environment at this location. Measurement Location LT3 is located along the northern project site boundary, due southwest of the existing electrical sub-station; the sub-station contributes to the noise environment at this location.

Measurements were conducted using three SoftdB brand Piccolo II Type 2 Sound Level Meters. Type 2 sound-level meters have precision accuracy that is suitable for all types of environmental noise evaluation. The sound-level meter was calibrated before and after use in the field for these measurements. Each sound level meter was configured to record data for one-hour intervals. Sound level metrics including $L_{eq}$. $L_{max}$, $L_{min}$, were recorded for each one-hour period. Measurement data was collected over a 24-hour period at each of the three long-term measurement locations (LT1 – LT3). Data logs for each of the three measurement locations are included in Attachment 2. Table 1 presents a summary of the results of the baseline sound level survey.

## Table 1 Ambient Sound Level Measurement Results

| Site | Daytime Noise Level Range dBA [1] 7 AM to 10 PM ($L_{eq\ hour}$) | Nighttime Noise Level Range dBA [1] 10 PM to 7 AM ($L_{eq\ hour}$) | $L_{dn}$ |
|---|---|---|---|
| Measure Location LT1 | 59 - 71 | 53 - 68 | 69 |
| Measure Location LT2 | 48 - 60 | 53 - 63 | 64 |
| Measure Location LT3 | 52 - 65 | 57 - 65 | 68 |

**Notes:** [1] Hourly $L_{eq}$ range over the measurement period; dBA= A-weighted decibel; $L_{dn}$= Weighted 24-hour average noise.

The sound level monitoring program documents ambient noise levels at the three representative receiver locations ranging from 48 -71 dBA $L_{eq}$ which are influenced by traffic along adjacent roadways and/or the operation of the existing electrical sub-station. With respect to the HUD recommended exterior noise exposure limit for residences of 65 dBA $L_{dn}$ the ambient noise levels in the vicinity of existing residences may in some cases marginally exceed the recommended HUD limits.

# 3. Project Description

The Laurel Creek energy storage facility will connect to the existing AEP Broadford electrical transmission system sub-station, allowing electricity to be drawn from the transmission lines feeding the substation during off-peak hours, stored in on-site battery systems, and fed back into the transmission lines during high demand (peak) periods. Major project components include Tesla Megapacks (a complete energy storage solution including direct current [DC] batteries, bidirectional inverter, thermal management system, and a Tesla Site Controller), low-to-medium voltage transformers, and a step-up transformer (or GSU: generator step up unit).

The facility will include 138 pairs of Megapacks (276 total megapacks). The outer dimensions of the Megapack containers are 28'10.5" width, 5'5" depth, and 9'2" height. A pad-mounted low-to-medium voltage transformer will generally be installed at the end of each four pairs of parallel Megapacks. The pad-mounted transformers adjacent to the Megapacks would comply with National Electrical Manufacturers Association (NEMA) standards for a medium voltage transformer, not to exceed a sound level generation of 72 dBA $L_W$ (sound power level). The facility is proposed to be equipped with a high voltage main power GSU transformer, which will be 110 mega volt ampere (MVA) with a connection voltage of 220kV; the NEMA standards for this capacity transformer dictate a sound level generation not to exceed 97 dBA $L_W$. Refer to Figure 3 (at the end of this report) for the Site Plan which indicates the facility boundaries and the configuration of major components described above.

# 4 Operation Noise Prediction

## 4.1 Methodology

Prediction of operation noise attributed to the Project involved creation of a sound propagation model using a Dudek proprietary Excel-based software tool. Dudek NoisePro is used for calculation, presentation, assessment, and prediction of environmental noise. Estimated sound emission from the Megapacks (i.e., the top-mounted cooling fan units), medium-voltage transformers, and GSU were entered into the Dudek NoisePro model. The outdoor noise propagation formulas in NoisePro follow the International Organization of Standardization (ISO) Standard 9613-2, "Attenuation of Sound During Propagation Outdoors, Part 2: General Method of Calculation" (ISO 1996).

For the Tesla Megapacks, the primary noise generation comes from the operation of the cooling fans. The cooling fans do not run continuously, but instead are activated only if needed to exhaust excess heat when outside air temperatures are elevated. For a proposed Megapack installation outside Houston Texas, Tesla conducted a careful evaluation of climatic conditions in January and July and correlated this to the operation of fans throughout a 24-hour representative day in January and July. Refer to Attachment 3 for a summary of the fan usage study, and comparison to Saltville Virginia climatic conditions. Because the 40% fan level is the most common throughout a day (with rare instances of higher fan use), the 40% fan level is used for the modeling.

Project features are input as sound sources in the NoisePro model space and defined with the following assumptions and available Project design information (component locations indicated on Figure 3):

- Megapack cooling systems – The Tesla team provided one-third octave band center frequency (1/3-OBCF) sound power levels for each of six sound intensity measurement facings (based upon a 40% operating capacity) of a Megapack unit. These sound power levels from each of the six facings were logarithmically added together to calculate the total sound power for fan operation for a single Megapack. The sound generation level from the Megapack is actually dependent upon the operating speed of the cooling fan units; at 40% fan operating speed Tesla reports a sound power level of **86.9 dBA $L_w$** for the Megapack 2XL 4hr (the model proposed for Laurel Creek ESS). The sound power level was depicted in the model as a horizontal area source no more than a few inches above the upper surface of a solid "building" block representing a Megapack container. Based on the use histogram (described above), 40% fan capacity is used for the Megapacks in the NoisePro modeling.

- Medium-voltage transformers – Situated near each four pairs of Megapacks is a ground-mounted transformer with anticipated capacity of 4 MVA. The sound level produced by this capacity transformer is identified as **64 dBA** (sound pressure level at one meter) from a NEMA TR-1 table. These transformer sound pressure levels were input as horizontal area sources (roughly consistent with the footprint of the equipment on the available site plan) at approximately 3 feet above grade.
- GSU transformer – The facility would include a GSU transformer with anticipated capacity of 110 MVA. The sound level produced by this capacity transformer is identified as **89 dBA** (sound pressure level at one meter) from a NEMA TR-1 table. The GSU transformer sound pressure level was input to the model space as a horizontal area source (roughly consistent with the footprint of the equipment on the available site plan) at approximately 12 feet above grade.

Calculation parameters that establish how the NoisePro model predicts combined noise level from these above-listed Project sources include as follows:

- Sound propagation per International Organization of Standardization (ISO) 9613-2 (ISO 1996);
- Default ground acoustical absorption coefficient = 0.5 (on a scale of 0 = reflective, 1 = absorptive); and.
- Zero order of reflection.

## 4.2 Results

Figure 4 indicates the facility layout, including the major components identified above (Section 4.1). Figure 4 also depicts the locations for the modeled receiver locations (R1 – R4) in the NoisePro model space. These modeled receptor positions are intended to represent project operational sound levels at the closest residences to the project site.

Table 2 compares the modeled operational noise levels (as hourly $L_{eq}$) against recorded ambient sound level (based upon the range of average ambient sound levels measured near that receptor). NoisePro modeling data is presented in Attachment 4.

## Table 2 Modeled Operational Noise Levels Compared to Ambient Levels

| Model Receiver | Ambient Monitor Site | Land Use | Operations Noise Level dBA $L_{eq}$ | Range of Measured Ambient Noise Levels [1] dBA $L_{eq}$ | Greater Than Ambient Range? |
|---|---|---|---|---|---|
| R1 | LT2 | Agriculture/ Rural | **42** | **48 - 63** | **NO** |
| R2 | LT1 | Agriculture/ Rural | **40** | **53 - 71** | **NO** |
| R3 | LT1 | Agriculture/ Rural | **39** | **53 - 71** | **NO** |
| R4 | LT1 | Agriculture/ Rural | **38** | **53 - 71** | **NO** |

**Table Notes:** [1] Hourly $L_{eq}$ range over the measurement period; dBA= A-weighted decibel.

As illustrated in Table 2, predicted hourly average operational noise from the Laurel Creek ESS would remain below the range of recorded ambient noise levels at all receivers that represent the closest residences to the project site. As such, operation of the proposed Laurel Creek ESS facility would not result in a noticeable change to the ambient noise environment at these residences.

With regard to the HUD maximum exterior noise exposure level recommended for residences, Table 3 compares the project operational noise levels at modeled receivers with the HUD recommended limit of 65 dBA $L_{dn}$. The $L_{dn}$ operations levels in Table 3 assume continuous operation of all facility equipment around the clock, these levels are therefore a very conservative analysis (with actual operations noise levels expected to be lower).

## Table 3 Modeled Operational Noise Levels Compared to HUD Recommended Limits

| Model Receiver | Ambient Monitor Site | Land Use | Operations Noise Level dBA $L_{dn}$ | Ambient Noise Level dBA $L_{dn}$ | HUD Recommended Limit dBA $L_{dn}$ |
|---|---|---|---|---|---|
| R1 | LT2 | Agriculture/ Rural | **49** | 64 | **65** |
| R2 | LT1 | Agriculture/ Rural | **47** | 69 | |
| R3 | LT1 | Agriculture/ Rural | **46** | 69 | |
| R4 | LT1 | Agriculture/ Rural | **45** | 69 | |

**Table Notes:** dBA= A-weighted decibel; $L_{dn}$= Weighted 24-hour average noise level.

As illustrated in Table 3, project operational noise levels at each modeled receiver would remain well below the HUD recommended exterior noise exposure level for residences of 65 dBA $L_{dn}$ even with all equipment operating continuously over the 24-hour period. Operational noise levels (using the $L_{dn}$ metric which is typically applied to noise environments affecting residences) would also remain at least 21 dBA $L_{dn}$ below the calculated ambient noise levels at each of the receiver locations.

As described in the Megapack discussion (precedent to Table 2), NoisePro was run with reported sound power levels for fan operating speed of 40%, since this is the most frequent use level that has been shown to occur at several Tesla Megapack installation sites. This model run yielded average sound levels (dBA $L_{eq}$) at each of the four modeled receiver locations. Figure 4 not only identifies the modeled sound level at the four selected receiver points, but also provides noise contours extending outward from the proposed ESS to illustrate the hourly noise level from operation of the project (i.e., the most common 40% fan utilization from all the included Megapacks).

## 4.3 Conclusions

This noise study includes an analysis of noise emission from operation of the total suite of equipment at the facility at Megapack 40 percentage fan operational levels corresponding to usage histograms developed by Tesla. As described in Section 4.1, Dudek modeled operation noise levels at each studied receiver from an operational level of 40%. In addition, the NoisePro software enables a user to graphically present the predicted sound pressure levels over a defined horizontal plane, such as illustrated in Figure 4. The legend in the upper right corner of Figure 4 defines a 5-dB range of comparable sound levels for each depicted color. The superposition of the aggregate Project predicted noise emission over the Project site and its surroundings provides the reader a visual understanding of how loud the Project may be at a geographic location (in addition to the selected 7 modeled receivers) from project operations.

In each case, the predicted hourly average operational noise level would remain below the recorded ambient noise level range at the closest residences. Using the $L_{dn}$ metric that is typcally applied to residential land uses, the project oeprational noise levels would remain below the HUD recommended limit of 65 dBA $L_{dn}$ as well as below the calculated ambient $L_{dn}$ levels at residences in the vicinity of the proejct site. As such, the noise from the ESS facility would not be noticeable over the existing background noise levels at the rural residences in the vicinity of the project.

## 4.4 Extreme Heat Days Operational Noise Levels

The use histogram profile compiled by Tesla indicates that 40% fan use for the Megapacks would be the highest expected for the climatic conditions present at the Laurel Creek ESS site in Smyth County (Saltville Virginia), which was used in modeling operational noise levels of the facility. The potential does exist for extreme heat days to occur, that were possibly not captured in the existing climate data. Tesla operations manuals indicate that at fan speeds greater than 65%, inverter operations are reduced in order to minimize generation of heat within the Megapacks and avoid the need for greater fan speeds.

To address potential episodes of extreme heat, Dudek also modeled operational noise levels with 70% fan use for the Megapacks (which is slightly greater than the level at which inverter use is curtailed). At **70%** fan operating speed Tesla reports a sound power level of **96 dBA $L_w$** for the Megapack 2XL 4hr.

Figure 5 indicates the facility layout, including the major components identified above (Section 4.1). Figure 5 also depicts the locations for the modeled receiver locations (R1 – R4) in the NoisePro model space. These modeled receptor positions are intended to represent project operational sound levels at the closest residences to the project site.

Table 4 compares modeled "extreme heat days" hourly average operational noise against recorded ambient sound level (based upon the range of hourly average ambient sound levels measured at that receptor). As illustrated in Table 4, predicted "extreme heat days" hourly average operational noise from the Laurel Creek ESS would also remain below or within the range of recorded ambient noise levels at receivers that represent the closest residences to the project site. As such, even during extreme heat day conditions, operational noise from the project would not be anticipated to result in a noticeable increase in the ambient noise levels at residential receivers in the project vicinity.

## Table 4
## Modeled Extreme Heat Days Operational Noise Levels Compared to Ambient Levels

| Model Receiver | Ambient Monitor Site | Land Use | Operations Noise Level dBA $L_{eq}$ | Range of Measured Ambient Noise Levels [1] dBA $L_{eq}$ | Greater Than Ambient Range? |
|---|---|---|---|---|---|
| R1 | LT2 | Agriculture/ Rural | **51** | **48 - 63** | **NO** |
| R2 | LT1 | Agriculture/ Rural | **48** | **53 - 71** | **NO** |
| R3 | LT1 | Agriculture/ Rural | **48** | **53 - 71** | **NO** |
| R4 | LT1 | Agriculture/ Rural | **47** | **53 - 71** | **NO** |

**Table Notes:** [1] Hourly $L_{eq}$ range over the measurement period; dBA= A-weighted decibel.

For the extreme heat day analysis, NoisePro was run with reported sound power levels for fan operating speed of 70%. This model run yielded average hourly sound levels (dBA $L_{eq}$) at each of the four modeled receiver locations. Figure 5 not only identifies the modeled sound level at the four selected receiver points, but also provides noise contours extending outward from the proposed ESS to illustrate the hourly noise level from operation of the project during extreme heat day occurrences (i.e., 70% fan utilization from all the included Megapacks).

With regard to the HUD maximum exterior noise exposure level recommended for residences, Table 5 compares the project operational noise levels at modeled receivers with the HUD recommended limit of 65 dBA $L_{dn}$. The $L_{dn}$ operations levels in Table 5 assume continuous operation of all facility equipment around the clock, these levels are therefore a very conservative analysis (with actual operations noise levels expected to be lower).

As illustrated in Table 5, project extreme heat days operational noise levels at each modeled receiver would remain below the HUD recommended exterior noise exposure level for residences of 65 dBA $L_{dn}$. Operational noise levels (using the $L_{dn}$ metric which is typically applied to noise environments affecting residences) would also remain below the calculated existing ambient noise levels at each of the receiver locations. Consequently, even during extreme heat day conditions, noise from continuous operation of all equipment at the Laurel Creek ESS, including Megapack fan operating speeds of 70%, would continue to remain below the recommended HUD exterior noise exposure limits for the residences in the project vicinity.

### Table 5 Modeled Extreme Heat Days Operational Noise Levels Compared to HUD Recommended Limits

| Model Receiver | Ambient Monitor Site | Land Use | Operations Noise Level dBA $L_{dn}$ | Ambient Noise Level dBA $L_{dn}$ | HUD Recommended Limit dBA $L_{dn}$ |
|---|---|---|---|---|---|
| R1 | LT2 | Agriculture/ Rural | **58** | 64 | **65** |
| R2 | LT1 | Agriculture/ Rural | **55** | 69 | |
| R3 | LT1 | Agriculture/ Rural | **55** | 69 | |
| R4 | LT1 | Agriculture/ Rural | **54** | 69 | |

**Table Notes:** dBA= A-weighted decibel; $L_{dn}$= Weighted 24-hour average noise level.

# 5 Recommendations

Modeling of facility equipment operations noise levels on the basis of capacity characteristics represented by expected climatic conditions and corresponding Megapack fan utilization and transformer loadings, concludes that the facility operational noise levels would fall below existing outdoor ambient noise levels at the closest residences to the project site. Therefore, the project as proposed and acoustically studied herein would not be expected to result in an increase in ambient noise levels at residences in the project vicinity.

Given the project as designed would not increase ambient noise levels at nearby residences, nor result in exterior noise exposure levels that exceed HUD guidelines, no recommendations are necessary regarding noise control for the proposed facility.

# 6 References


Edison Electric Institute. 1984. *Electric Power Plant Environmental Noise Guide*. 2nd edition. Volume I.

International Organization of Standardization (ISO). 1996. 9613-2: “Attenuation of Sound During Propagation Outdoors, Part 2: General Method of Calculation”. December. Accessible at *https://www.iso.org/standard/20649.html*

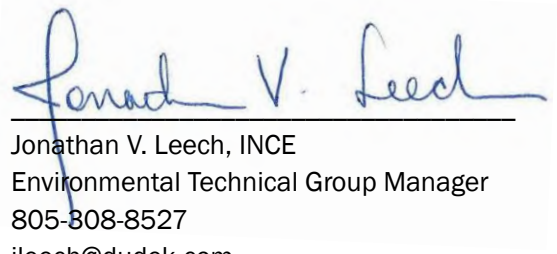
Smyth County Virginia. Board of Supervisors Meeting Minutes, March 28, 2022 Hearing.

United State Department of Housing and Urban Development (HUD). Residential Noise Regulation. 24 CFR 51B

# 7 Closing

Dudek trusts that the results and findings presented in this letter report meet your needs for the proposed Laurel Creek ESS at this time and represents appropriate completion of the approved scope of work.

Sincerely,



Jonathan V. Leech, INCE
Environmental Technical Group Manager
805-308-8527
jleech@dudek.com


FIGURE 1

Project Regional Setting

Laurel Creek ESS Noise Assessment


LEGEND

LT# Ambient Noise Measurement (Long Term, 24-hour)

R# Existing Receiver

FIGURE 2

Project Site, Existing Noise Sensitive Receivers, Noise Measurement Locations

Laurel Creek ESS Noise Assessment

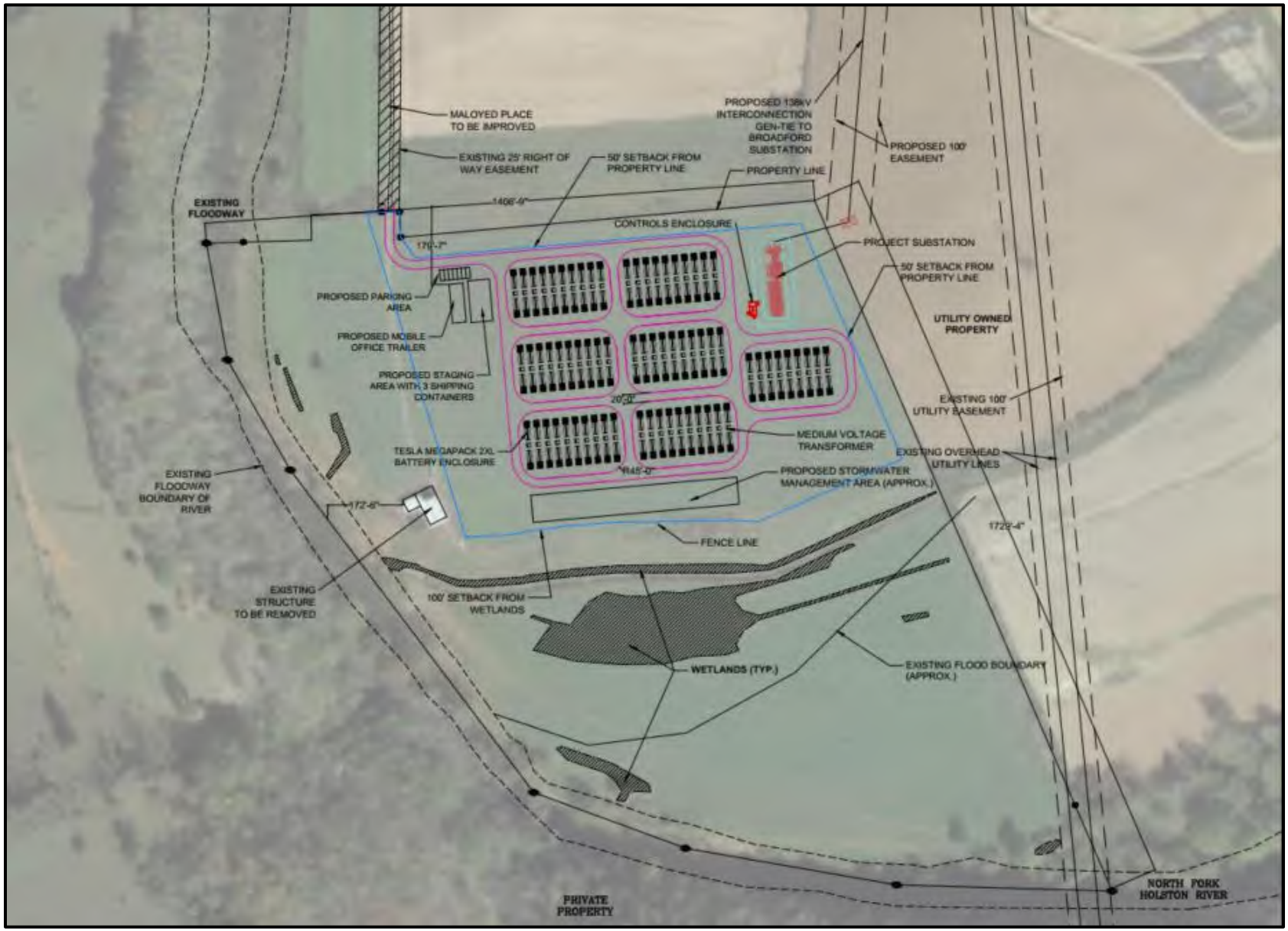
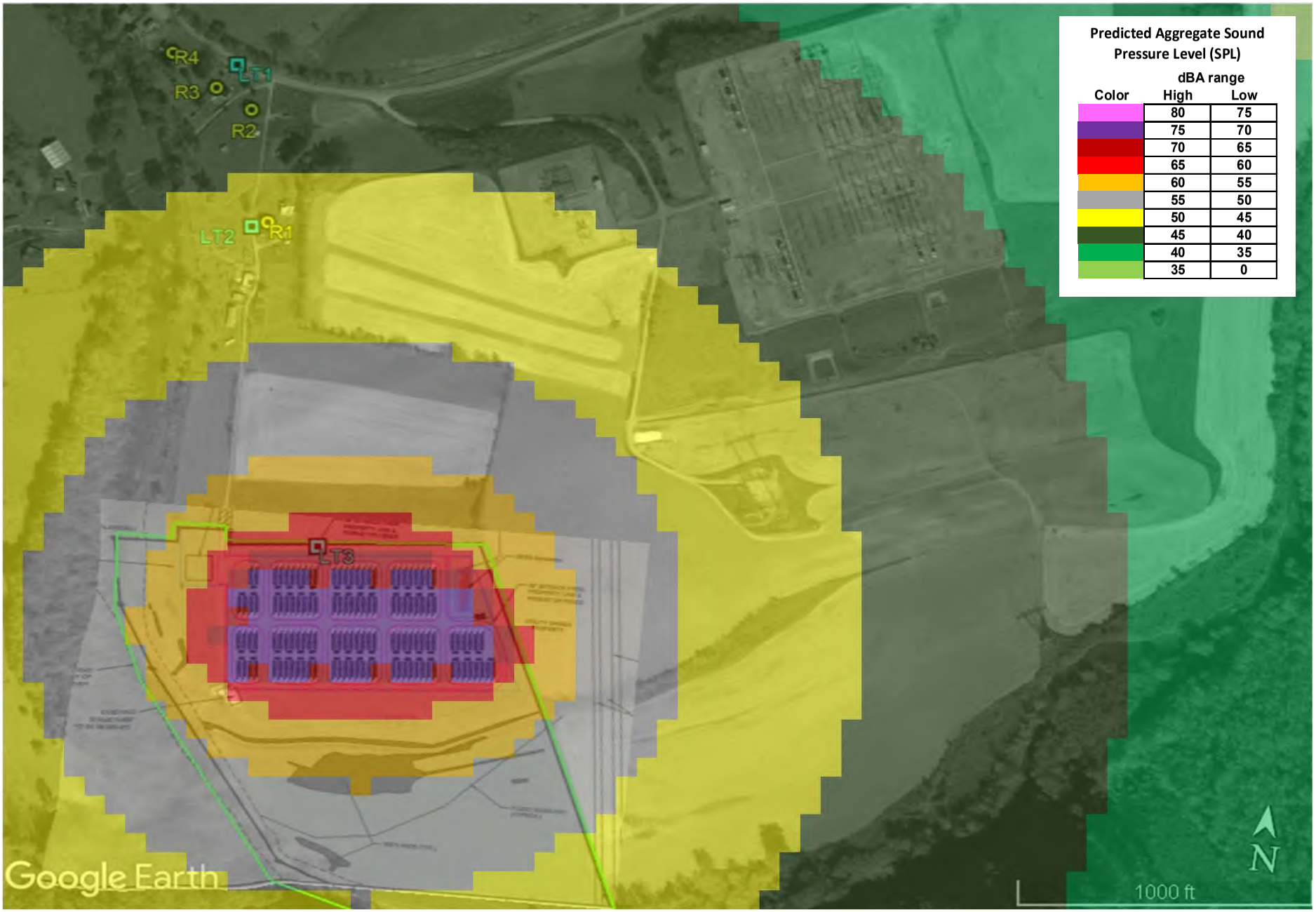



FIGURE 3

Project Site Plan

Laurel Creek ESS Noise Assessment




SOURCE: Dudek 2023

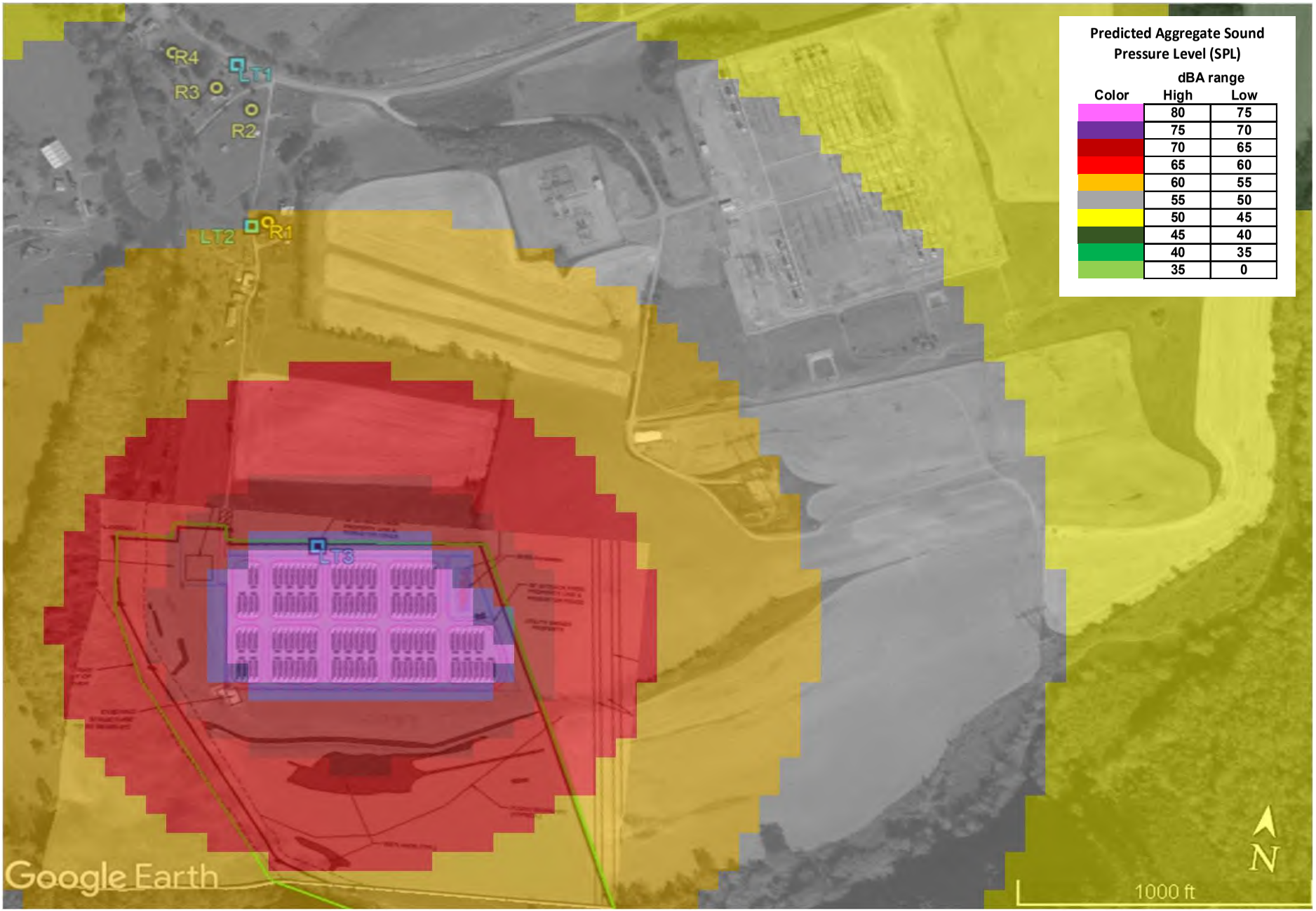
DUDEK

0 280 560 Feet

**FIGURE 4**

**Predicted Battery Storage Facility Operation Noise at 40% Fan Speed**

**Laurel Creek BESS Project**




SOURCE: Dudek 2023

DUDEK

0 280 560 Feet

**FIGURE 5**

**Predicted Battery Storage Facility Operation Noise at 70% Fan Speed**

**Laurel Creek BESS Project**

# ATTACHMENT 1

## ACOUSTIC TERMINOLOGY

| | |
|---|---|
| Ambient Noise Level | The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location. |
| A-Weighted Sound Level (dBA) | The sound pressure level (SPL) in decibels as measured on a sound level meter (SLM) using the A-weighted filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the measured sound in a manner similar to the frequency response of the average healthy human ear, and thus correlates well with assessment of environmental noise in a community setting where noise-sensitive receptors may be present. |
| Decibel (dB) | The unit for expressing SPL and is equal to 10 times the logarithm (to the base 10) of the ratio of the measured sound pressure squared to a reference pressure, which is 20 micropascals. |
| Equivalent Sound Level ($L_{eq}$) | The value corresponding to a steady-state sound level containing the same total energy as a time-varying signal over a given sample period. $L_{eq}$ is designed to average all of the loud and quiet sound levels occurring over a time period. |
| Octave Band Center Frequency (OBCF) | Commonly discussed octave frequency bands are: 31.5 Hz, 63 Hz, 125 Hz, 250 Hz, 500 Hz, 1 kHz, 2 kHz, 4 kHz, 8 kHz and 16 kHz. Each of these "center frequencies" represents an octave band defined by a lower band limit equal to 0.707 times the center frequency, and an upper band limit equal to 1.414 times the center frequency. |

In addition to the above key terms, the following paragraphs provide a primer on relevant noise terminology and fundamental acoustical concepts that should help frame the discussion of measured outdoor ambient noise levels and corresponding metrics and statistical values used in this technical memorandum.

### Sound, Noise, Acoustics

Sound is oscillation that travels through the air or another medium, entailing a process that consists of three components: the source, the path, and the receiver. All three components must be present for sound to exist and be perceived. Without a source to produce sound, there is no sound. Likewise, without a medium to transmit sound pressure waves, there is no sound. Finally, sound must be received; a hearing organ, sensor, or object must be present to perceive, register, or be affected by sound or noise. In most situations, there are many different sound sources, paths, and receptors rather than just one of each. Acoustics is the field of science that deals with the production, propagation, reception, effects, and control of sound. Noise is defined as sound that is loud, unpleasant, unexpected, or undesired.

### Sound Pressure Levels and Decibels

The amplitude of a sound determines its loudness. Loudness of sound increases with increasing amplitude. Sound pressure amplitude is measured in units of micro-Newton per square meter, also called micro-Pascal. One micro-

Pascal is approximately one-hundred billionths (0.00000000001) of normal atmospheric pressure. The pressure of a very loud sound may be 200 million micro-Pascals, or 10 million times the pressure of the weakest audible sound. Because expressing sound levels in terms of micro-Pascal would be very cumbersome, sound pressure level in logarithmic units is used instead to describe the ratio of actual sound pressures to a reference pressure squared. These units are called Bels. To provide a finer resolution, a Bel is subdivided into 10 decibels, abbreviated dB.

Sound pressure level alone is not a reliable indicator of loudness. The frequency, or pitch, of a sound also has a substantial effect on how humans will respond. Although the intensity (energy per unit area) of the sound is a purely physical quantity, the loudness or human response is determined by the characteristics of the human ear.

Human hearing is limited not only in the range of audible frequencies but also in the way it perceives the sound in that range. In general, the healthy human ear is most sensitive to sounds between 1,000 Hertz (Hz) and 5,000 Hz, and it perceives a sound within that range as more intense than a sound of higher or lower frequency with the same magnitude. To approximate the frequency response of the human ear, a series of sound level adjustments is usually applied to the sound measured by a sound level meter. The adjustments (referred to as a weighting network) are frequency-dependent.

### A-weighted Sound Level

The A-scale weighting network approximates the frequency response of the average healthy ear when listening to most ordinary sounds. When people make judgments of the relative loudness or annoyance of a sound, their judgments correlate well with the A-scale sound levels of those sounds. All sound levels discussed herein are A-weighted (dBA) unless otherwise noted.

Under controlled conditions in an acoustics laboratory, the trained, healthy human ear is able to discern changes in sound levels of 1 dB when exposed to steady, single-frequency signals in the mid-frequency range. Outside such controlled conditions, the trained ear can detect changes of 2 dB in normal environmental noise. It is widely accepted that the average healthy ear, however, can barely perceive noise level changes of 3 dB in outdoor environments. A change of 5 dB is readily perceptible, and a change of 10 dB is perceived as twice or half as loud. As discussed above, a doubling of sound energy results in a 3 dB increase in sound, which means that a doubling of sound energy (e.g., doubling the volume of traffic on a road) would result in a barely perceptible change in sound level.

### Noise Level Descriptors

Additional units of measure have also been developed to evaluate the long-term characteristics of sound. The equivalent sound level (Leq), is also referred to as the time-average sound level. It is the equivalent steady state sound level which in a stated period of time would contain the same acoustical energy as the time-varying sound level during the same time period. The 1-hour A-weighted equivalent sound level, Leq1h, is the energy average of the A-weighted sound levels occurring during a 1-hour period and is commonly the basis for community noise ordinance criteria.

People are generally more sensitive and annoyed by noise occurring during the evening and nighttime hours. Thus, another noise descriptor used in community noise assessments, the Community Noise Equivalent Level (CNEL), was introduced. The CNEL scale represents a time-weighted 24-hour average noise level based on the A-weighted sound level. The CNEL accounts for the increased noise sensitivity during the evening hours (7:00 p.m. to 10:00

p.m.) and nighttime hours (10:00 p.m. to 7:00 a.m.) by adding 5 dB and 10 dB, respectively, to the average hourly sound levels during these periods.

### Sound Propagation

Sound propagation (i.e., the passage of sound through a gaseous or fluid medium from a noise source to a receiver) is influenced by several factors. These factors include geometric spreading, ground absorption, and atmospheric effects, as well as shielding by natural and/or man-made features. Sound levels are attenuated at a rate of approximately 6 dB per doubling of distance from an outdoor point source due to the geometric spreading of the sound waves. Additional sound attenuation can result from man-made features such as intervening walls and buildings, as well as natural features such as hills and dense woods. Atmospheric conditions such as humidity, temperature, and wind gradients can temporarily either increase or decrease sound levels. In general, the greater the distance the receiver is from the source, the greater the potential for variation in sound levels due to atmospheric effects.

# ATTACHMENT 2

## AMBIENT NOISE MEASUREMENT DATA

# FIELD NOISE MEASUREMENT DATA

DUDEK

PROJECT: LAUREL CREEK ESS — PROJECT #: 14684.15
SITE ID: LT1
SITE ADDRESS: HIGHWAY 91 — OBSERVER(S): JVL
START DATE: 8/9/23 — END DATE: 8/10/23
START TIME: NOON — END TIME: NOON

**METEOROLOGICAL CONDITIONS**

TEMP: 64-78 F — HUMIDITY: 88-95% R.H. — WIND: CALM (LIGHT) MODERATE
WINDSPD: Lo MPH — DIR. N NE S SE S (SW) W NW — (VARIABLE) STEADY GUSTY
SKY: SUNNY CLEAR OVRCAST (PRTLY CLDY) FOG RAIN

**ACOUSTIC MEASUREMENTS**

MEAS. INSTRUMENT: SoftdB Piccolo II — TYPE 1 (2) — SERIAL # 3105
CALIBRATOR: Reed R8090 — SERIAL # 2621
CALIBRATION CHECK — PRE-MEASUREMENT: 94.0 dBA SPL — POST-MEASUREMENT: 94.0 dBA SPL — WINDSCRN: X

SETTINGS: (A-WTD) (SLOW) FAST (FRONTAL) RANDOM ANSI OTHER:

| REC. # | BEGIN | END | Leq | Lmax | Lmin | L90 | L50 | L10 | OTHER (SPECIFY METRIC |
|---|---|---|---|---|---|---|---|---|---|
| 1 | NOON | | | | | | | | |
| 24 | NOON | | | | | | | | |

**COMMENTS**

LT1 WAS APPROXIMATELY 4 FEET FROM HIGHWAY SHOULDER. REFER TO PICC #3105 LOGS FOR SOUND LEVEL DATA.

**SOURCE INFO AND TRAFFIC COUNTS**

PRIMARY NOISE SOURCE: (TRAFFIC) AIRCRAFT RAIL INDUSTRIAL OTHER:
ROADWAY TYPE: 2 LANE HIGHWAY — DIST. TO RDWY C/L OR EOP:
TRAFFIC COUNT DURATION: ___ MIN — SPEED 55 — ___ MIN — SPEED

| COUNT 1 (OR RDWY 1) DIRECTION | NB/EB | SB/WB | NB/EB | SB/WB |
|---|---|---|---|---|
| AUTOS | | | | |
| MED TRKS | | | | |
| HVY TRKS | | | | |
| BUSES | | | | |
| MOTRCLS | | | | |

IF COUNTING BOTH DIRECTIONS AS ONE, CHECK HERE ___

| COUNT 2 (OR RDWY 2) | NB/EB | SB/WB | NB/EB | SB/WB |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

SPEEDS ESTIMATED BY: RADAR / DRIVING THE PACE
POSTED SPEED LIMIT SIGNS SAY:

OTHER NOISE SOURCES (BACKGROUND): DIST. AIRCRAFT RUSTLING LEAVES DIST. BARKING DOGS BIRDS DIST. INDUSTRIAL
DIST. KIDS PLAYING DIST. CONVRSTNS / YELLING DIST. TRAFFIC (LIST RDWYS BELOW) DISTD GARDENERS/LANDSCAPING NOISE
OTHER:

**DESCRIPTION / SKETCH**

TERRAIN (HARD) SOFT MIXED FLAT OTHER:
PHOTOS LT1.1 – LT1.3
OTHER COMMENTS / SKETCH

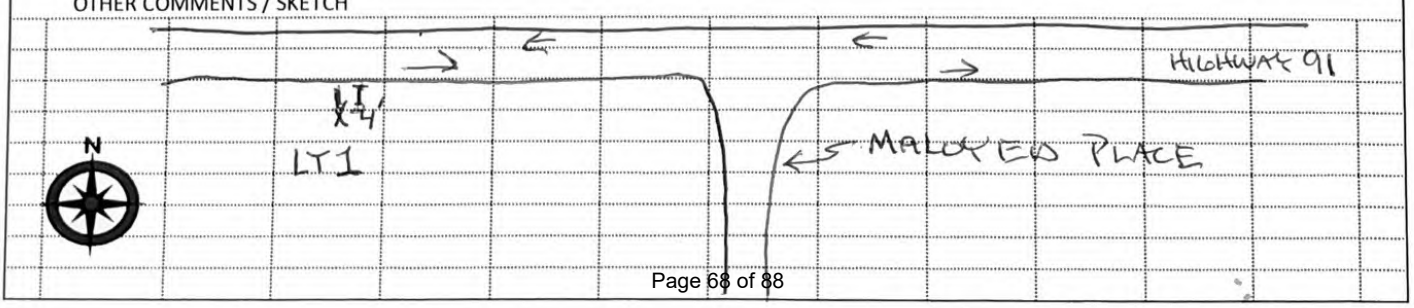



Photo 01

Photo 02

**Field Photos**

Location LT1

Photo 03

**Field Photos**
Location LT1

DUDEK

# FIELD NOISE MEASUREMENT DATA

PROJECT: LAUREL CREEK ESS — PROJECT #: 14684.15
SITE ID: LT2
SITE ADDRESS: MALOYED PLACE — OBSERVER(S): JVL
START DATE: 8/9/23 — END DATE: 8/10/23
START TIME: NOON — END TIME: NOON

**METEOROLOGICAL CONDITIONS**

TEMP: 64-78 F — HUMIDITY: 88-95 % R.H. — WIND: CALM (LIGHT) MODERATE
WINDSPD: 6 MPH — DIR. N NE S SE S (SW) W NW — (VARIABLE) STEADY GUSTY
SKY: SUNNY CLEAR OVRCAST (PRTLY CLDY) FOG — RAIN

**ACOUSTIC MEASUREMENTS**

MEAS. INSTRUMENT: SoftdB Piccolo II — TYPE 1 (2) — SERIAL # 0204
CALIBRATOR: Reed R8090 — SERIAL # 2621
CALIBRATION CHECK — PRE-MEASUREMENT: 94.0 dBA SPL — POST-MEASUREMENT: 94.0 dBA SPL — WINDSCRN:

SETTINGS: (A-WTD) (SLOW) FAST FRONTAL (RANDOM) ANSI OTHER:

| REC. # | BEGIN | END | Leq | Lmax | Lmin | L90 | L50 | L10 | OTHER (SPECIFY METRIC |
|---|---|---|---|---|---|---|---|---|---|
| 1 | NOON | | | | | | | | |
| 24 | NOON | | | | | | | | |

**COMMENTS**

LT2 WAS POSITIONED APPROXIMATELY 8 FEET WEST OF MALOYED PLACE, OPPOSITE THE CLOSEST RESIDENCE TO THE PROPOSED ESS SITE. REFER TO PICC #0204 LOGS FOR SOUND LEVEL DATA.

**SOURCE INFO AND TRAFFIC COUNTS**

PRIMARY NOISE SOURCE: (TRAFFIC) AIRCRAFT RAIL (INDUSTRIAL) (OTHER: DISTANT SUB-STATION)
ROADWAY TYPE: 2 LANE COLLECTOR — DIST. TO RDWY C/L OR EOP:
TRAFFIC COUNT DURATION: ___ MIN — SPEED 15

| COUNT 1 (OR RDWY 1) DIRECTION | NB/EB | SB/WB | NB/EB SPEED | SB/WB SPEED |
|---|---|---|---|---|
| AUTOS | | | | |
| MED TRKS | | | | |
| HVY TRKS | | | | |
| BUSES | | | | |
| MOTRCLS | | | | |

IF COUNTING BOTH DIRECTIONS AS ONE, CHECK HERE ___

| COUNT 2 (OR RDWY 2) | ___ MIN NB/EB | SB/WB | SPEED NB/EB | SB/WB |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

SPEEDS ESTIMATED BY: RADAR / DRIVING THE PACE
POSTED SPEED LIMIT SIGNS SAY:

OTHER NOISE SOURCES (BACKGROUND): DIST. AIRCRAFT RUSTLING LEAVES DIST. BARKING DOGS BIRDS DIST. INDUSTRIAL
DIST. KIDS PLAYING DIST. CONVRSTNS / YELLING DIST. TRAFFIC (LIST RDWYS BELOW) DISTD GARDENERS/LANDSCAPING NOISE
OTHER: THE EAST BRANCH OF MALOYED IS UNPAVED AND SERVES APPROXIMATELY 4 PARCELS INCLUDING SUBJECT PARCEL.

**DESCRIPTION / SKETCH**

TERRAIN: HARD (SOFT) MIXED FLAT OTHER:
PHOTOS: LT2.1 - LT2.2
OTHER COMMENTS / SKETCH

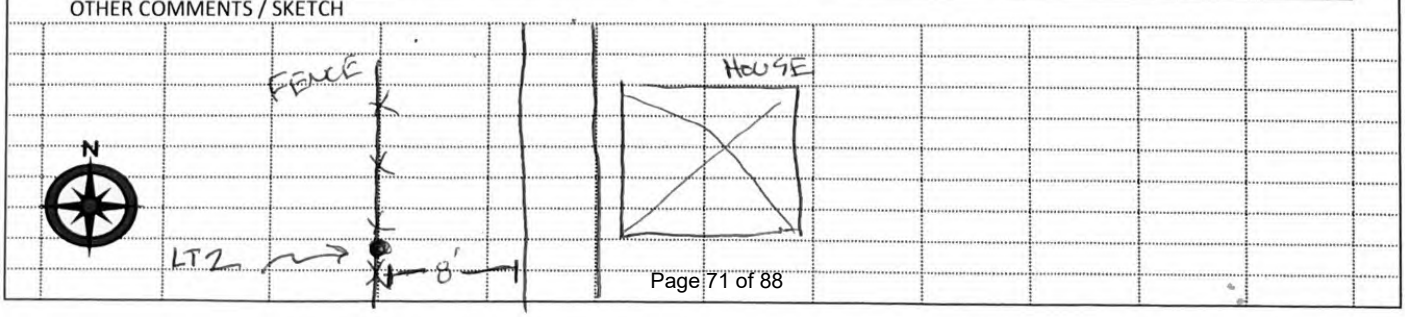



Photo 01

Photo 02

**Field Photos**

Location LT2

Photo 03

**Field Photos**
Location LT2

DUDEK

# FIELD NOISE MEASUREMENT DATA

PROJECT: LAUREL CREEK ESS — PROJECT #: 14684.15
SITE ID: LT3
SITE ADDRESS: NORTH PROPERTY LINE — OBSERVER(S): JVL
START DATE: 8/9/23 — END DATE: 8/10/23
START TIME: NOON — END TIME: NOON

**METEOROLOGICAL CONDITIONS**

TEMP: 64-78 F — HUMIDITY: 88-95 % R.H. — WIND: CALM (LIGHT) MODERATE
WINDSPD: 6 MPH — DIR. N NE S SE S (SW) W NW — (VARIABLE) STEADY GUSTY
SKY: SUNNY CLEAR OVRCAST (PRTLY CLDY) FOG — RAIN

**ACOUSTIC MEASUREMENTS**

MEAS. INSTRUMENT: SoftdB Piccolo II — TYPE 1 (2) — SERIAL # 3104
CALIBRATOR: Reed R8090 — SERIAL # 2621
CALIBRATION CHECK — PRE-MEASUREMENT: 94.0 dBA SPL — POST-MEASUREMENT: 94.0 dBA SPL — WINDSCRN:

SETTINGS: (A-WTD) (SLOW) FAST FRONTAL (RANDOM) ANSI OTHER:

| REC. # | BEGIN | END | Leq | Lmax | Lmin | L90 | L50 | L10 | OTHER (SPECIFY METRIC |
|---|---|---|---|---|---|---|---|---|---|
| 1 | NOON | | | | | | | | |
| ↓ | ↓ | | | | | | | | |
| 24 | NOON | | | | | | | | |

**COMMENTS**

LT3 WAS LOCATED ALONG THE NORTHERN PROPERTY LINE OF THE PROJECT PARCEL. NO TRAFFIC NOISE WAS AUDIBLE AT THIS LOCATION. LT3 WAS PLACED TO ESTABLISH CURRENT NOISE LEVELS FROM SUB-STATION.

**SOURCE INFO AND TRAFFIC COUNTS**

PRIMARY NOISE SOURCE: TRAFFIC AIRCRAFT RAIL (INDUSTRIAL) OTHER: SUB-STATION
ROADWAY TYPE: — DIST. TO RDWY C/L OR EOP:
TRAFFIC COUNT DURATION: ___ MIN — SPEED

| COUNT 1 (OR RDWY 1) DIRECTION | NB/EB | SB/WB | NB/EB | SB/WB |
|---|---|---|---|---|
| AUTOS | | | | |
| MED TRKS | | | | |
| HVY TRKS | | | | |
| BUSES | | | | |
| MOTRCLS | | | | |

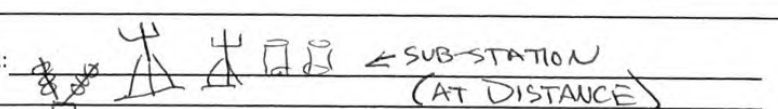
IF COUNTING BOTH DIRECTIONS AS ONE, CHECK HERE ___

| COUNT 2 (OR RDWY 2) ___ MIN | NB/EB | SB/WB | NB/EB | SB/WB |
|---|---|---|---|---|
| SPEED | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

SPEEDS ESTIMATED BY: RADAR / DRIVING THE PACE
POSTED SPEED LIMIT SIGNS SAY:

OTHER NOISE SOURCES (BACKGROUND): DIST. AIRCRAFT RUSTLING LEAVES DIST. BARKING DOGS BIRDS DIST. INDUSTRIAL
DIST. KIDS PLAYING DIST. CONVRSTNS / YELLING DIST. TRAFFIC (LIST RDWYS BELOW) DISTD GARDENERS/LANDSCAPING NOISE
OTHER:

**DESCRIPTION / SKETCH**

TERRAIN: HARD (SOFT) MIXED FLAT OTHER:  ← SUB-STATION (AT DISTANCE)
PHOTOS:
OTHER COMMENTS / SKETCH

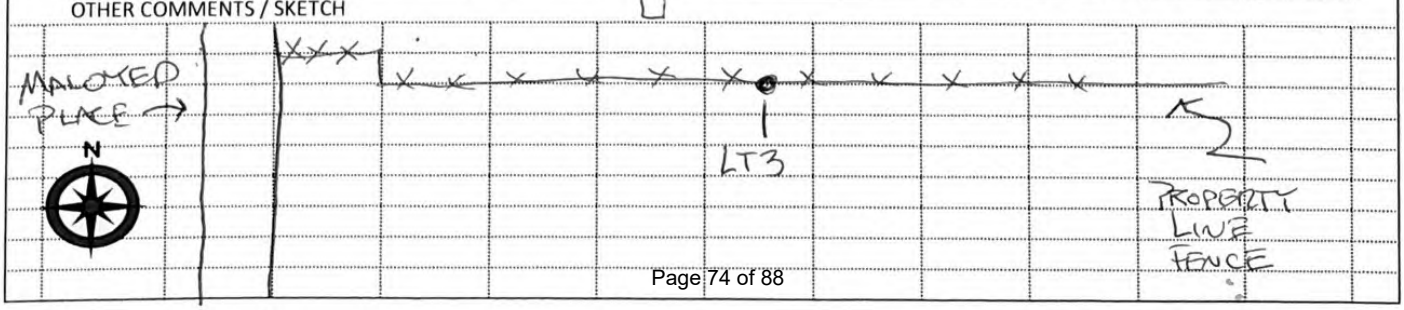



Photo 01

Photo 02

**Field Photos**

Location LT3

Photo 03

**Field Photos**
Location LT3

| Start Date | Start Time | End Time | SPL Time Weight | Freq Weight | Leq | Lmax | Lmin | L10 | L50 | L90 |
|---|---|---|---|---|---|---|---|---|---|---|
| 8/9/2023 | 1:00:02 PM | 2:00:00 PM | Slow | dBA | 62.5 | 86.4 | 36.5 | 61.6 | 48.9 | 38.7 |
| 8/9/2023 | 2:00:02 PM | 3:00:00 PM | Slow | dBA | 64.3 | 89.6 | 36.5 | 63.1 | 42.3 | 38.7 |
| 8/9/2023 | 3:00:02 PM | 4:00:00 PM | Slow | dBA | 65.0 | 90.8 | 35.7 | 64.9 | 41.7 | 37.3 |
| 8/9/2023 | 4:00:02 PM | 5:00:00 PM | Slow | dBA | 63.0 | 86.9 | 38.2 | 63.1 | 43.9 | 40.4 |
| 8/9/2023 | 5:00:02 PM | 6:00:00 PM | Slow | dBA | 64.3 | 90.3 | 38.2 | 63.1 | 42.6 | 39.9 |
| 8/9/2023 | 6:00:02 PM | 7:00:00 PM | Slow | dBA | 62.4 | 83.6 | 39.6 | 63.0 | 44.7 | 41.3 |
| 8/9/2023 | 7:00:02 PM | 8:00:00 PM | Slow | dBA | 63.1 | 90.0 | 40.0 | 59.6 | 43.6 | 42.3 |
| 8/9/2023 | 8:00:02 PM | 9:00:00 PM | Slow | dBA | 60.7 | 83.2 | 41.6 | 55.3 | 45.2 | 42.6 |
| 8/9/2023 | 9:00:02 PM | 10:00:00 PM | Slow | dBA | 59.3 | 83.0 | 48.0 | 52.9 | 51.2 | 49.8 |
| 8/9/2023 | 10:00:02 PM | 11:00:00 PM | Slow | dBA | 60.1 | 87.0 | 48.7 | 54.5 | 51.4 | 50.1 |
| 8/9/2023 | 11:00:02 PM | 12:00:00 AM | Slow | dBA | 60.3 | 89.0 | 48.4 | 51.9 | 50.1 | 49.4 |
| 8/10/2023 | 12:00:02 AM | 1:00:00 AM | Slow | dBA | 53.8 | 78.8 | 47.8 | 53.0 | 50.3 | 49.1 |
| 8/10/2023 | 1:00:02 AM | 2:00:00 AM | Slow | dBA | 54.9 | 81.7 | 47.3 | 51.7 | 50.3 | 49.1 |
| 8/10/2023 | 2:00:02 AM | 3:00:00 AM | Slow | dBA | 53.5 | 80.5 | 46.9 | 50.7 | 49.8 | 48.5 |
| 8/10/2023 | 3:00:02 AM | 4:00:00 AM | Slow | dBA | 55.3 | 84.0 | 46.1 | 50.7 | 48.7 | 47.2 |
| 8/10/2023 | 4:00:02 AM | 5:00:00 AM | Slow | dBA | 54.3 | 79.1 | 44.9 | 49.3 | 47.6 | 46.7 |
| 8/10/2023 | 5:00:02 AM | 6:00:00 AM | Slow | dBA | 67.9 | 86.4 | 46.3 | 70.1 | 63.7 | 47.5 |
| 8/10/2023 | 6:00:02 AM | 7:00:00 AM | Slow | dBA | 67.7 | 88.8 | 53.3 | 67.1 | 58.6 | 55.6 |
| 8/10/2023 | 7:00:02 AM | 8:00:00 AM | Slow | dBA | 71.4 | 90.4 | 54.7 | 72.9 | 61.0 | 58.5 |
| 8/10/2023 | 8:00:02 AM | 9:00:00 AM | Slow | dBA | 71.4 | 91.0 | 51.1 | 72.5 | 56.3 | 52.7 |
| 8/10/2023 | 9:00:02 AM | 10:00:00 AM | Slow | dBA | 66.6 | 90.0 | 42.8 | 63.6 | 48.6 | 45.7 |
| 8/10/2023 | 10:00:02 AM | 11:00:00 AM | Slow | dBA | 64.7 | 83.6 | 42.3 | 63.8 | 46.4 | 43.9 |
| 8/10/2023 | 11:00:02 AM | 12:00:00 PM | Slow | dBA | 65.6 | 88.5 | 40.8 | 64.6 | 45.7 | 42.5 |
| 8/10/2023 | 12:00:02 PM | 1:00:00 PM | Slow | dBA | 65.8 | 86.7 | 41.5 | 66.6 | 46.1 | 43.0 |
| | | | | | | | | | | |
| | | | | | | | | | | |
| Daytime Hourly $L_{eq}$ Range (7 AM - 10 PM): | | | | | 59 - 71 | dBA | | | | |
| | | | | | | | | | | |
| Nighttime Hourly $L_{eq}$ Range (10 PM - 7 AM): | | | | | 53 - 68 | dBA | | | | |
| | | | | | | | | | | |
| $L_{dn}$ | | | | | 69 | dBA | | | | |

| Start Date | Start Time | End Time | SPL Time Weight | Freq Weight | Leq | Lmax | Lmin | L10 | L50 | L90 |
|---|---|---|---|---|---|---|---|---|---|---|
| 8/9/2023 | 1:00:02 PM | 2:00:00 PM | Slow | dBA | 54.1 | 80.4 | 40.5 | 52.0 | 45.6 | 43.5 |
| 8/9/2023 | 2:00:02 PM | 3:00:00 PM | Slow | dBA | 51.8 | 66.6 | 40.5 | 54.4 | 50.3 | 45.3 |
| 8/9/2023 | 3:00:02 PM | 4:00:00 PM | Slow | dBA | 51.8 | 63.4 | 39.9 | 54.9 | 49.7 | 46.8 |
| 8/9/2023 | 4:00:02 PM | 5:00:00 PM | Slow | dBA | 51.6 | 63.3 | 42.2 | 54.7 | 49.8 | 47.0 |
| 8/9/2023 | 5:00:02 PM | 6:00:00 PM | Slow | dBA | 55.7 | 77.0 | 44.5 | 58.3 | 54.4 | 46.7 |
| 8/9/2023 | 6:00:02 PM | 7:00:00 PM | Slow | dBA | 54.6 | 70.7 | 44.0 | 57.3 | 52.6 | 50.0 |
| 8/9/2023 | 7:00:02 PM | 8:00:00 PM | Slow | dBA | 48.4 | 76.5 | 39.6 | 48.4 | 44.2 | 42.0 |
| 8/9/2023 | 8:00:02 PM | 9:00:00 PM | Slow | dBA | 57.5 | 74.2 | 39.2 | 57.7 | 53.1 | 42.1 |
| 8/9/2023 | 9:00:02 PM | 10:00:00 PM | Slow | dBA | 56.3 | 62.4 | 48.8 | 58.4 | 55.1 | 52.3 |
| 8/9/2023 | 10:00:02 PM | 11:00:00 PM | Slow | dBA | 54.5 | 56.9 | 50.2 | 55.7 | 54.4 | 53.0 |
| 8/9/2023 | 11:00:02 PM | 12:00:00 AM | Slow | dBA | 57.6 | 68.5 | 48.9 | 56.2 | 54.5 | 52.1 |
| 8/10/2023 | 12:00:02 AM | 1:00:00 AM | Slow | dBA | 57.0 | 63.5 | 48.6 | 59.3 | 57.4 | 51.2 |
| 8/10/2023 | 1:00:02 AM | 2:00:00 AM | Slow | dBA | 54.4 | 61.3 | 49.1 | 59.0 | 52.0 | 50.7 |
| 8/10/2023 | 2:00:02 AM | 3:00:00 AM | Slow | dBA | 55.6 | 59.3 | 49.4 | 57.7 | 55.4 | 52.2 |
| 8/10/2023 | 3:00:02 AM | 4:00:00 AM | Slow | dBA | 53.1 | 56.9 | 47.1 | 55.3 | 52.6 | 50.3 |
| 8/10/2023 | 4:00:02 AM | 5:00:00 AM | Slow | dBA | 55.4 | 65.1 | 43.9 | 57.0 | 54.7 | 52.5 |
| 8/10/2023 | 5:00:02 AM | 6:00:00 AM | Slow | dBA | 62.4 | 74.8 | 43.0 | 66.7 | 59.9 | 45.4 |
| 8/10/2023 | 6:00:02 AM | 7:00:00 AM | Slow | dBA | 62.8 | 85.8 | 50.2 | 63.5 | 56.5 | 53.0 |
| 8/10/2023 | 7:00:02 AM | 8:00:00 AM | Slow | dBA | 59.7 | 80.7 | 51.7 | 61.8 | 58.2 | 55.9 |
| 8/10/2023 | 8:00:02 AM | 9:00:00 AM | Slow | dBA | 55.9 | 77.0 | 47.2 | 58.7 | 53.6 | 50.0 |
| 8/10/2023 | 9:00:02 AM | 10:00:00 AM | Slow | dBA | 50.6 | 61.8 | 44.1 | 53.2 | 48.6 | 46.7 |
| 8/10/2023 | 10:00:02 AM | 11:00:00 AM | Slow | dBA | 53.7 | 73.6 | 41.5 | 54.5 | 49.4 | 45.3 |
| 8/10/2023 | 11:00:02 AM | 12:00:00 PM | Slow | dBA | 50.6 | 70.3 | 43.6 | 52.5 | 48.7 | 46.4 |
| 8/10/2023 | 12:00:02 PM | 1:00:00 PM | Slow | dBA | 60.3 | 81.0 | 44.4 | 63.5 | 47.8 | 46.2 |
| | | | | | | | | | | |
| | | | | | | | | | | |
| Daytime Hourly $L_{eq}$ Range (7 AM - 10 PM): | | | | | 48 -60 dBA | | | | | |
| | | | | | | | | | | |
| Nighttime Hourly $L_{eq}$ Range (10 PM - 7 AM): | | | | | 53 - 63 dBA | | | | | |
| | | | | | | | | | | |
| $L_{dn}$ | | | | | 64 dBA | | | | | |

| Start Date | Start Time | End Time | SPL Time Weight | Freq Weight | Leq | Lmax | Lmin | L10 | L50 | L90 |
|---|---|---|---|---|---|---|---|---|---|---|
| 8/9/2023 | 12:00:02 PM | 1:00:00 PM | Slow | dBA | 64.6 | 87.1 | 42.4 | 65.5 | 49.3 | 45.5 |
| 8/9/2023 | 1:00:02 PM | 2:00:00 PM | Slow | dBA | 54.6 | 59.6 | 43.4 | 57.9 | 53.5 | 46.6 |
| 8/9/2023 | 2:00:02 PM | 3:00:00 PM | Slow | dBA | 52.0 | 59.8 | 44.0 | 53.7 | 51.4 | 47.5 |
| 8/9/2023 | 3:00:02 PM | 4:00:00 PM | Slow | dBA | 55.1 | 62.2 | 41.2 | 59.0 | 52.4 | 47.5 |
| 8/9/2023 | 4:00:02 PM | 5:00:00 PM | Slow | dBA | 56.8 | 64.6 | 46.4 | 58.4 | 56.8 | 53.6 |
| 8/9/2023 | 5:00:02 PM | 6:00:00 PM | Slow | dBA | 57.7 | 63.0 | 48.3 | 60.0 | 57.1 | 55.6 |
| 8/9/2023 | 6:00:02 PM | 7:00:00 PM | Slow | dBA | 57.8 | 73.7 | 50.7 | 59.4 | 57.7 | 54.4 |
| 8/9/2023 | 7:00:02 PM | 8:00:00 PM | Slow | dBA | 57.6 | 67.8 | 49.4 | 59.8 | 57.3 | 53.2 |
| 8/9/2023 | 8:00:02 PM | 9:00:00 PM | Slow | dBA | 57.5 | 62.8 | 51.3 | 59.4 | 57.2 | 54.7 |
| 8/9/2023 | 9:00:02 PM | 10:00:00 PM | Slow | dBA | 59.5 | 62.9 | 52.2 | 61.0 | 59.4 | 57.3 |
| 8/9/2023 | 10:00:02 PM | 11:00:00 PM | Slow | dBA | 59.1 | 64.2 | 53.2 | 60.8 | 58.7 | 56.8 |
| 8/9/2023 | 11:00:02 PM | 12:00:00 AM | Slow | dBA | 62.1 | 65.7 | 51.8 | 63.2 | 62.2 | 60.0 |
| 8/10/2023 | 12:00:02 AM | 1:00:00 AM | Slow | dBA | 64.6 | 70.7 | 59.6 | 65.8 | 64.6 | 62.7 |
| 8/10/2023 | 1:00:02 AM | 2:00:00 AM | Slow | dBA | 63.9 | 67.1 | 58.6 | 64.8 | 63.9 | 62.8 |
| 8/10/2023 | 2:00:02 AM | 3:00:00 AM | Slow | dBA | 62.8 | 64.5 | 56.1 | 63.7 | 63.0 | 61.3 |
| 8/10/2023 | 3:00:02 AM | 4:00:00 AM | Slow | dBA | 63.1 | 65.7 | 60.4 | 63.8 | 63.1 | 62.0 |
| 8/10/2023 | 4:00:02 AM | 5:00:00 AM | Slow | dBA | 61.9 | 64.3 | 52.3 | 63.0 | 62.1 | 60.1 |
| 8/10/2023 | 5:00:02 AM | 6:00:00 AM | Slow | dBA | 60.9 | 80.4 | 47.0 | 64.5 | 58.2 | 52.1 |
| 8/10/2023 | 6:00:02 AM | 7:00:00 AM | Slow | dBA | 57.3 | 67.0 | 49.4 | 61.0 | 55.5 | 52.1 |
| 8/10/2023 | 7:00:02 AM | 8:00:00 AM | Slow | dBA | 57.6 | 65.0 | 52.3 | 60.2 | 56.6 | 54.0 |
| 8/10/2023 | 8:00:02 AM | 9:00:00 AM | Slow | dBA | 54.2 | 62.6 | 47.3 | 56.7 | 53.2 | 51.6 |
| 8/10/2023 | 9:00:00 AM | 10:00:00 AM | Slow | dBA | 59.8 | 64.7 | 52.3 | 62.5 | 59.1 | 55.2 |
| 8/10/2023 | 10:00:02 AM | 11:00:00 AM | Slow | dBA | 60.4 | 65.2 | 51.2 | 62.5 | 60.3 | 56.2 |
| 8/10/2023 | 11:00:02 AM | 12:00:00 PM | Slow | dBA | 59.5 | 65.3 | 45.5 | 62.7 | 57.8 | 52.0 |
| | | | | | | | | | | |
| | | | | | | | | | | |
| Daytime Hourly $L_{eq}$ Range (7 AM - 10 PM): | | | | | 52 - 65 dBA | | | | | |
| | | | | | | | | | | |
| Nighttime Hourly $L_{eq}$ Range (10 PM - 7 AM): | | | | | 57 - 65 dBA | | | | | |
| | | | | | | | | | | |
| $L_{dn}$ | | | | | 68 dBA | | | | | |

# ATTACHMENT 3

## TESLA HISTOGRAM DATA

## HOUSTON TEXAS SITE

## Cooling Fan Use Pattern (Histogram)

The use of the cooling fans for the megapacks is a function of climatic conditions. In warmer temperatures, the fans run in order to circulate air through the cabinet and remove excess heat from the inverters. The manufacturer of the megapacks performed a careful study of climate patterns for a proposed site outside Houston Texas to establish the fan usage (expressed in speed or percentage of fan capacity) throughout the day. The information below compares climatic conditions in Saltville Virginia with Houston Texas.

### Climate Comparison

| | Houston, TX | Saltville, VA |
|---|---|---|
| Rainfall (inches) | 53 | 44 |
| Snowfall (inches) | 0 | 13 |
| Precipitation (days) | 90 | 138 |
| Sunny | 204 | 185 |
| Avg. July High | 93 | 83 |
| Avg. Jan. Low | 43 | 22 |
| Comfort Index (higher=better) | 6.6 | 7.3 |
| UV Index | 6.1 | 4.8 |

Source: NOAA, National Center for Environmental Data, https://www.ncdc.noaa.gov/temp-and-precip/

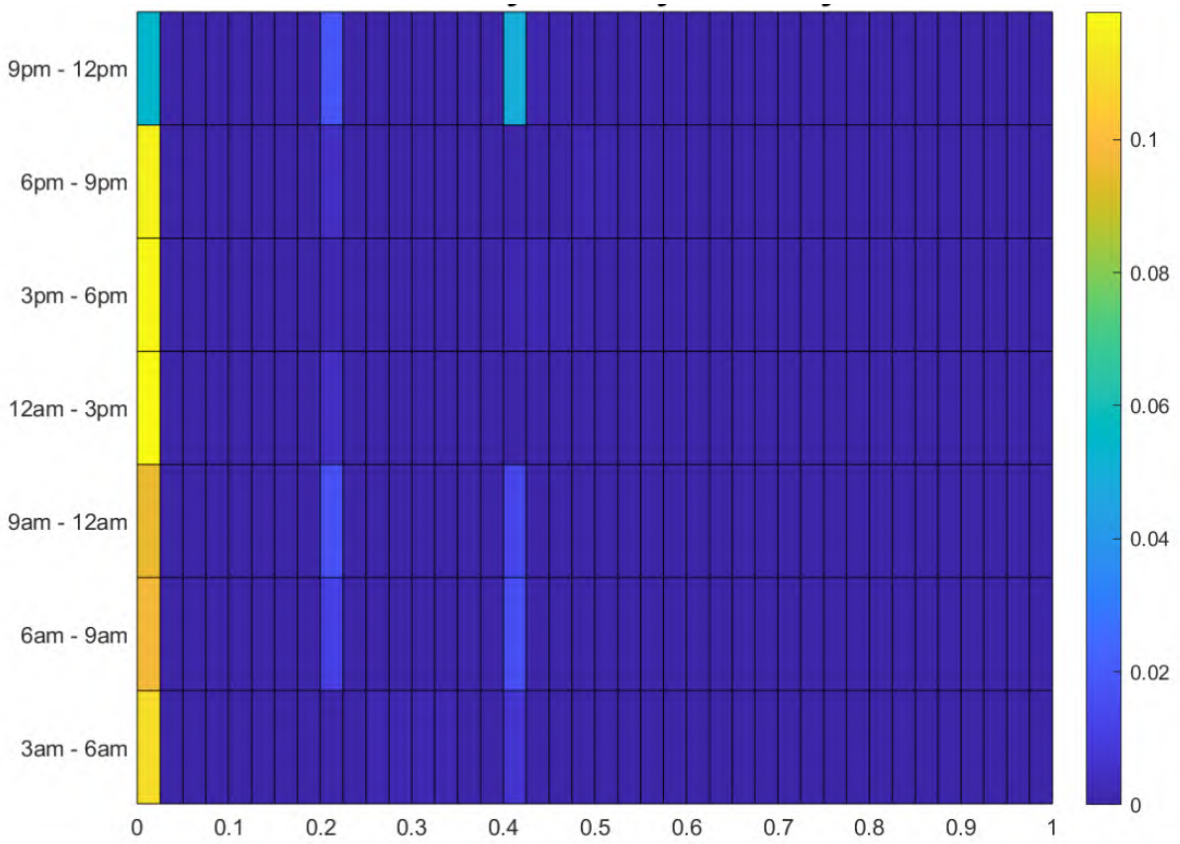
Number of days of sunshine are slightly fewer in Saltville, compared to Houston. The average daily temperature in July is also lower for Saltville as compared to Houston, which means the cooling fans should operate very similarly in the Saltville environment compared to the Houston environment. The comfort index is seven tenths of a point higher for Saltville (which accounts for factors such as humidity; Houston has a higher humidity, which makes the cooling of equipment more difficult). The UV index is also lower (4.8 vs. 6.1) in Saltville.

The number of days with precipitation is 50% greater in Saltville compared to Houston. The January average temperatures in Saltville are 11 degrees less, and Saltville experiences a modest amount of snow on average (whereas Houston does not). The megapacks are not equipped with heaters, as the inverters naturally generate heat during the electricity transfer process.

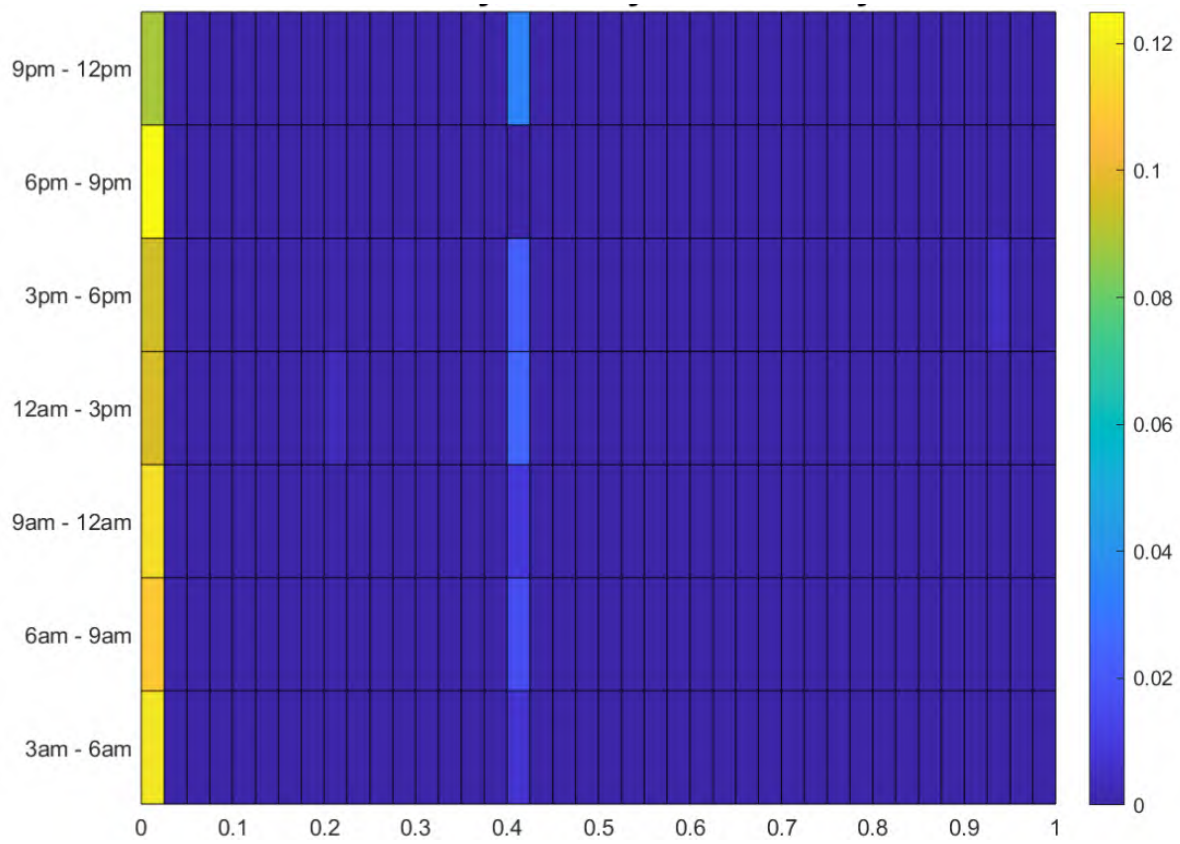
Consequently the provided representative daily use histograms for the cooling fan use in January and July at the Houston Texas site would be very reasonable as a reference for the Saltville Virginia site operations. The use histograms from Houston are provided on the following pages.

From the histograms, it is clear that the 40 percent fan level (0.4) is the most common occurrence throughout the 24-hour period, in both January and July. There are virtually no fan levels higher than 40 percent, with a handful of occurrences with 20 percent fan level use. 40 percent is therefore representative of the most common, and most intensive, fan use that is anticipated for the Aragon Georgia site.

## Total Daily Fan Duty - July




## Total Daily Fan Duty - January




Fan Speed (Percent of Capacity)

# ATTACHMENT 4

## NOISEPRO MODELING DATA

**Technical Basis of Dudek's "NoisePro" Excel-based Outdoor Sound Propagation Prediction Model**

In summary, the Microsoft Excel-based **NoisePro** outdoor sound propagation model developed by Dudek calculates the aggregate sound pressure level (SPL) received by each and every cell within a two-dimensional (2D) array (a product of X columns of cells by Y rows of cells). The quantity of this received SPL, in A-weighted decibels (dBA), is the logarithmic sum of acoustical contribution from each of "n" user-input sound emitting point sources located on the same 2D array, which may be written as follows:

$$SPL_{X,Y} = 10 * \log \sum_{i=1}^{n} 10^{0.1[L_i - A_i]}$$

where each individual source sound level ($L_i$) is attenuated by an algebraic sum of three attenuation factors ($A_i = A_{div} + A_{atm} + A_{gr}$) that are each dependent on the distance between the sound source position on the X by Y array and the receiving $SPL_{X,Y}$ position on a different position in the same 2D array of worksheet cells, where each cell is defined by the user as representing the center of a square area having equal sides of user-defined length in feet. The above expression is based on Equation 5 from the International Organization for Standardization (ISO) 9613-2 "Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation", and the individual attenuation factors used by **NoisePro** emulate those in Equation 4 and may be summarized as follows:

- $\boldsymbol{A_{div}}$ = attenuation due to *geometrical divergence* (i.e., pure distance), equating to 20*LOG($d/d_{ref}$); and where $\boldsymbol{d}$ is the horizontal distance between a source and a receiver position, while $\boldsymbol{d_{ref}}$ is the reference distance at which the sound source $L_i$ is defined.
- $\boldsymbol{A_{atm}}$ = attenuation due to *atmospheric absorption*, which for 1,000 Hz (1 kHz) = 4.16*$\boldsymbol{d}$/3280 and is derived from Equation 5.7 in Noise & Vibration Control Engineering (Beranek and Ver, 1992).
- $\boldsymbol{A_{gr}}$ = attenuation due to *ground effects*, appearing as Equation 10 in ISO 9613-2 and can be expressed with the following Excel formula:

  $$\boldsymbol{A_{gr}} = \text{MAX}(0,4.8-[\boldsymbol{h_s}+\boldsymbol{h_r}]/\boldsymbol{d}*[17+984/\boldsymbol{d}])$$

  where $\boldsymbol{h_s}$ and $\boldsymbol{h_r}$ are the heights (in feet) of the sound source and receiver positions above grade, respectively. This means that for small distances, attenuation from ground effects will be small or essentially zero; and, even at great distances, the attenuation from ground effects is effectively capped at 4.8 dB.

The Excel workbook comprising **NoisePro** calculates $SPL_{X,Y}$ by using a coding loop to evaluate the acoustic contribution from each attenuated sound source ($\boldsymbol{L_i}$ - $\boldsymbol{A_i}$) in sequence, and logarithmically adding the new evaluation to the previous total in a cumulative manner. When all sources have been evaluated, the loop terminates and yields an aggregate or log-summed total $SPL_{X,Y}$ value that is thus unique to a position in the 2D array of cells represented by X and Y, and can thus be "mapped". If the user has defined a particular cell in the X by Y array as a uniquely tagged Receiver, then the corresponding $SPL_{X,Y}$ value can be indexed and displayed accordingly.

The resulting output array of cells, each having an individually calculated $SPL_{X,Y}$ numerical value, is then filled with a color (from a user-defined palette) by application of a Conditional Formatting rules set (an Excel formatting feature) that compares the dB quantity with user-defined "high" and "low" dB ranges for each available color. Each colored cell can thus be likened to a "pixel" within a 2D array that forms a composite image representing—visually—the sound propagation from all modeled sound sources.

## GRID CALCULATION WORKSHEET

**40% Fan Usage**

Example Portion of Concluded Calculations Loop

| | | | |
|---|---|---|---|
| | | Source | 37 |
| grid size (ft) | | Source X-coordinate | 1923 |
| x | 76.9 | Source Y-coordinate | 2461 |
| y | 76.9 | Source Z-coordinate | 8 |
| rcvr plane height (ft) | | Source TYPE (1) | GSU |
| z | 5 | Source Reference SPL (1) | 89 |
| | | Source TYPE (2) | |
| Grid Upper Left (C,R) | | Source Reference SPL (2) | |
| 1 | 1 | Source Ref. Distance (ft.) | 3.28 |
| Grid Lower Right (C,R) | | | |
| 120 | 90 | Receiver Location | |

| Column | Row | X-coord | Y-coord | Z-coord | Cumulative SPL |
|---|---|---|---|---|---|
| 1 | 1 | 70 | 70 | 5 | 36.0 |
| 1 | 2 | 70 | 140 | 5 | 36.3 |
| 1 | 3 | 70 | 210 | 5 | 36.6 |
| 1 | 4 | 70 | 280 | 5 | 36.9 |
| 1 | 5 | 70 | 350 | 5 | 37.2 |
| 1 | 6 | 70 | 420 | 5 | 37.4 |
| 1 | 7 | 70 | 490 | 5 | 37.7 |
| 1 | 8 | 70 | 560 | 5 | 38.0 |
| 1 | 9 | 70 | 630 | 5 | 38.3 |
| 1 | 10 | 70 | 700 | 5 | 38.6 |
| 1 | 11 | 70 | 770 | 5 | 38.9 |
| 1 | 12 | 70 | 840 | 5 | 39.2 |
| 1 | 13 | 70 | 910 | 5 | 39.5 |
| 1 | 14 | 70 | 980 | 5 | 39.8 |
| 1 | 15 | 70 | 1050 | 5 | 40.1 |
| 1 | 16 | 70 | 1120 | 5 | 40.4 |
| 1 | 17 | 70 | 1190 | 5 | 40.6 |
| 1 | 18 | 70 | 1260 | 5 | 40.9 |
| 1 | 19 | 70 | 1330 | 5 | 41.2 |
| 1 | 20 | 70 | 1400 | 5 | 41.5 |
| 1 | 21 | 70 | 1470 | 5 | 41.7 |
| 1 | 22 | 70 | 1540 | 5 | 42.0 |
| 1 | 23 | 70 | 1610 | 5 | 42.2 |
| 1 | 24 | 70 | 1680 | 5 | 42.5 |
| 1 | 25 | 70 | 1750 | 5 | 42.7 |
| 1 | 26 | 70 | 1820 | 5 | 42.9 |
| 1 | 27 | 70 | 1890 | 5 | 43.0 |
| 1 | 28 | 70 | 1960 | 5 | 43.2 |
| 1 | 29 | 70 | 2030 | 5 | 43.3 |
| 1 | 30 | 70 | 2100 | 5 | 43.5 |
| 1 | 31 | 70 | 2170 | 5 | 43.6 |

# Source Inventory With Model Grid Coordinate Locations and Sound Pressure Reference Levels

| Source | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Source Tag | S01 | S02 | S03 | S04 | S05 | S06 | S07 | S08 | S09 | S10 | S11 | S12 | S13 | S14 | S15 |
| Source X-coordinate | 1384 | 1461 | 1538 | 1692 | 1769 | 1384 | 1461 | 1538 | 1692 | 1769 | 1384 | 1461 | 1538 | 1692 | 1769 |
| Source Y-coordinate | 2384 | 2384 | 2384 | 2384 | 2384 | 2461 | 2461 | 2461 | 2461 | 2461 | 2538 | 2538 | 2538 | 2538 | 2538 |
| Source Z-coordinate | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| Source Type 1 (enter abbrev.) | MP8 | MP8 | MP8 | MP8 | MP8 | MP8 | MP8 | MP8 | MP8 | MP8 | MP8 | MP8 | MP8 | MP8 | MP8 |
| Source Type 2 (enter abbrev.) | TR4 | TR4 | TR4 | TR4 | TR4 | | | | | | | | | | |
| Source Reference SPL (1) | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 |
| Source Reference SPL (2) | 70 | 70 | 70 | 70 | 70 | | | | | | | | | | |
| Source Reference Distance (ft.) | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 |

| Source | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Source Tag | S16 | S17 | S18 | S19 | S20 | S21 | S22 | S23 | S24 | S25 | S26 | S27 | S28 | S29 | S30 |
| Source X-coordinate | 1384 | 1461 | 1538 | 1692 | 1769 | 1384 | 1461 | 1538 | 1692 | 1769 | 1384 | 1461 | 1538 | 1692 | 1769 |
| Source Y-coordinate | 2615 | 2615 | 2615 | 2615 | 2615 | 2768 | 2768 | 2768 | 2768 | 2768 | 2845 | 2845 | 2845 | 2845 | 2845 |
| Source Z-coordinate | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| Source Type 1 (enter abbrev.) | MP8 | MP8 | MP8 | MP8 | MP8 | MP8 | MP8 | MP8 | MP8 | MP8 | MP8 | MP8 | MP8 | MP8 | MP8 |
| Source Type 2 (enter abbrev.) | TR4 | TR4 | TR4 | TR4 | TR4 | TR4 | TR4 | TR4 | TR4 | TR4 | | | | | |
| Source Reference SPL (1) | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 |
| Source Reference SPL (2) | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | | | | | |
| Source Reference Distance (ft.) | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 |

| Source | 31 | 32 | 33 | 34 | 35 | 36 | 37 |
|---|---|---|---|---|---|---|---|
| Source Tag | S31 | S32 | S33 | S34 | S35 | S35 | S35 |
| Source X-coordinate | 1846 | 1923 | 1999 | 1846 | 1923 | 1999 | 1923 |
| Source Y-coordinate | 2615 | 2615 | 2615 | 2692 | 2692 | 2692 | 2461 |
| Source Z-coordinate | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| Source Type 1 (enter abbrev.) | MP6 | MP6 | MP6 | MP6 | MP6 | MP6 | GSU |
| Source Type 2 (enter abbrev.) | TR3 | TR3 | TR3 | | | | |
| Source Reference SPL (1) | 86.8 | 86.8 | 86.8 | 86.8 | 86.8 | 86.8 | 89 |
| Source Reference SPL (2) | 68.8 | 68.8 | 68.8 | | | | |
| Source Reference Distance (ft.) | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 |

**Receiver Inventory With Model Grid Coordinate Locations and Predicted Operational Sound Level Exposure**

| Receiver | R1 | R2 | R3 | R4 |
|---|---|---|---|---|
| Tag | R1 | R2 | R3 | R4 |
| X-Coordinate | 320 | 300 | 260 | 220 |
| Y-Coordinate | 240 | 120 | 100 | 60 |
| Modeled SPL | **42** | **40** | **39** | **38** |

## GRID CALCULATION WORKSHEET

**70% Fan Usage**

Example Portion of Concluded Calculations Loop

| | | | |
|---|---|---|---|
| | | Source | 37 |
| grid size (ft) | | Source X-coordinate | 1923 |
| x | 76.9 | Source Y-coordinate | 2461 |
| y | 76.9 | Source Z-coordinate | 8 |
| rcvr plane height (ft) | | Source TYPE (1) | GSU |
| z | 5 | Source Reference SPL (1) | 89 |
| | | Source TYPE (2) | |
| Grid Upper Left (C,R) | | Source Reference SPL (2) | |
| 1 | 1 | Source Ref. Distance (ft.) | 3.28 |
| Grid Lower Right (C,R) | | | |
| 120 | 90 | Receiver Location | |

| Column | Row | X-coord | Y-coord | Z-coord | Cumulative SPL |
|---|---|---|---|---|---|
| 1 | 1 | 70 | 70 | 5 | 44.9 |
| 1 | 2 | 70 | 140 | 5 | 45.1 |
| 1 | 3 | 70 | 210 | 5 | 45.4 |
| 1 | 4 | 70 | 280 | 5 | 45.7 |
| 1 | 5 | 70 | 350 | 5 | 46.0 |
| 1 | 6 | 70 | 420 | 5 | 46.3 |
| 1 | 7 | 70 | 490 | 5 | 46.6 |
| 1 | 8 | 70 | 560 | 5 | 46.9 |
| 1 | 9 | 70 | 630 | 5 | 47.2 |
| 1 | 10 | 70 | 700 | 5 | 47.4 |
| 1 | 11 | 70 | 770 | 5 | 47.7 |
| 1 | 12 | 70 | 840 | 5 | 48.0 |
| 1 | 13 | 70 | 910 | 5 | 48.3 |
| 1 | 14 | 70 | 980 | 5 | 48.6 |
| 1 | 15 | 70 | 1050 | 5 | 48.9 |
| 1 | 16 | 70 | 1120 | 5 | 49.2 |
| 1 | 17 | 70 | 1190 | 5 | 49.5 |
| 1 | 18 | 70 | 1260 | 5 | 49.8 |
| 1 | 19 | 70 | 1330 | 5 | 50.1 |
| 1 | 20 | 70 | 1400 | 5 | 50.3 |
| 1 | 21 | 70 | 1470 | 5 | 50.6 |
| 1 | 22 | 70 | 1540 | 5 | 50.8 |
| 1 | 23 | 70 | 1610 | 5 | 51.1 |
| 1 | 24 | 70 | 1680 | 5 | 51.3 |
| 1 | 25 | 70 | 1750 | 5 | 51.5 |
| 1 | 26 | 70 | 1820 | 5 | 51.7 |
| 1 | 27 | 70 | 1890 | 5 | 51.9 |
| 1 | 28 | 70 | 1960 | 5 | 52.1 |
| 1 | 29 | 70 | 2030 | 5 | 52.2 |
| 1 | 30 | 70 | 2100 | 5 | 52.3 |
| 1 | 31 | 70 | 2170 | 5 | 52.4 |

# Source Inventory With Model Grid Coordinate Locations and Sound Pressure Reference Levels

| Source | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Source Tag | S01 | S02 | S03 | S04 | S05 | S06 | S07 | S08 | S09 | S10 | S11 | S12 | S13 | S14 | S15 |
| Source X-coordinate | 1384 | 1461 | 1538 | 1692 | 1769 | 1384 | 1461 | 1538 | 1692 | 1769 | 1384 | 1461 | 1538 | 1692 | 1769 |
| Source Y-coordinate | 2384 | 2384 | 2384 | 2384 | 2384 | 2461 | 2461 | 2461 | 2461 | 2461 | 2538 | 2538 | 2538 | 2538 | 2538 |
| Source Z-coordinate | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| Source Type 1 (enter abbrev.) | MP8 | MP8 | MP8 | MP8 | MP8 | MP8 | MP8 | MP8 | MP8 | MP8 | MP8 | MP8 | MP8 | MP8 | MP8 |
| Source Type 2 (enter abbrev.) | TR4 | TR4 | TR4 | TR4 | TR4 | | | | | | | | | | |
| Source Reference SPL (1) | 97 | 97 | 97 | 97 | 97 | 97 | 97 | 97 | 97 | 97 | 97 | 97 | 97 | 97 | 97 |
| Source Reference SPL (2) | 70 | 70 | 70 | 70 | 70 | | | | | | | | | | |
| Source Reference Distance (ft.) | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 |

| Source | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Source Tag | S16 | S17 | S18 | S19 | S20 | S21 | S22 | S23 | S24 | S25 | S26 | S27 | S28 | S29 | S30 |
| Source X-coordinate | 1384 | 1461 | 1538 | 1692 | 1769 | 1384 | 1461 | 1538 | 1692 | 1769 | 1384 | 1461 | 1538 | 1692 | 1769 |
| Source Y-coordinate | 2615 | 2615 | 2615 | 2615 | 2615 | 2768 | 2768 | 2768 | 2768 | 2768 | 2845 | 2845 | 2845 | 2845 | 2845 |
| Source Z-coordinate | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| Source Type 1 (enter abbrev.) | MP8 | MP8 | MP8 | MP8 | MP8 | MP8 | MP8 | MP8 | MP8 | MP8 | MP8 | MP8 | MP8 | MP8 | MP8 |
| Source Type 2 (enter abbrev.) | TR4 | TR4 | TR4 | TR4 | TR4 | TR4 | TR4 | TR4 | TR4 | TR4 | | | | | |
| Source Reference SPL (1) | 97 | 97 | 97 | 97 | 97 | 97 | 97 | 97 | 97 | 97 | 97 | 97 | 97 | 97 | 97 |
| Source Reference SPL (2) | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | | | | | |
| Source Reference Distance (ft.) | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 |

| Source | 31 | 32 | 33 | 34 | 35 | 36 | 37 |
|---|---|---|---|---|---|---|---|
| Source Tag | S31 | S32 | S33 | S34 | S35 | S35 | S35 |
| Source X-coordinate | 1846 | 1923 | 1999 | 1846 | 1923 | 1999 | 1923 |
| Source Y-coordinate | 2615 | 2615 | 2615 | 2692 | 2692 | 2692 | 2461 |
| Source Z-coordinate | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| Source Type 1 (enter abbrev.) | MP6 | MP6 | MP6 | MP6 | MP6 | MP6 | GSU |
| Source Type 2 (enter abbrev.) | TR3 | TR3 | TR3 | | | | |
| Source Reference SPL (1) | 95.7 | 95.7 | 95.7 | 95.7 | 95.7 | 95.7 | 89 |
| Source Reference SPL (2) | 68.8 | 68.8 | 68.8 | | | | |
| Source Reference Distance (ft.) | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 |

**Receiver Inventory With Model Grid Coordinate Locations and Predicted Operational Sound Level Exposure**

| Receiver | R1 | R2 | R3 | R4 |
|---|---|---|---|---|
| Tag | R1 | R2 | R3 | R4 |
| X-Coordinate | 320 | 300 | 260 | 220 |
| Y-Coordinate | 240 | 120 | 100 | 60 |
| Modeled SPL | **51** | **48** | **48** | **47** |