



**TOWN OF KILLINGLY, CT
PLANNING AND ZONING COMMISSION**

TOWN OF KILLINGLY, CT
2024 MAR 15 AM 8:07

Elizabeth M. Wilson

MONDAY – MARCH 18, 2024

**WORKSHOP MEETING - IN PERSON
6:00 PM**

TOWN MEETING ROOM – 2ND FLOOR

Killingly Town Hall

172 Main Street

Killingly, CT

WORKSHOP AGENDA

I. CALL TO ORDER/ROLL CALL

*PLANNING ZONING COMMISSION

II. WORKSHOP DISCUSSION

* Review / Discussion / Action

* Planned Residential Development Open Space, etc.

* Continue this Workshop / Discussion (if needed, and if time allows) during tonight's Regularly Scheduled Meeting of **March 18, 2024**.

* Schedule Next Workshop Meeting on Zoning Regulation changes for **Monday, April 15, 2024**.

III. MOTION TO ADJOURN

NOTE: Must end the workshop before 7:00 pm – so Planning Zoning Commission can start their regular meeting.



TOWN OF KILLINGLY, CT
PLANNING AND ZONING COMMISSION

2024 MAR 15 AM 8:07

MONDAY – MARCH 18, 2024

Regular Meeting – HYBRID MEETING

7:00 PM

TOWN MEETING ROOM – 2ND FLOOR

Killingly Town Hall

172 Main Street

Killingly, CT

THE PUBLIC IS ALLOWED TO ATTEND THE MEETING IN PERSON
OR THE PUBLIC MAY VIEW THIS MEETING AS DESCRIBED BELOW

AGENDA

THE PUBLIC CAN VIEW THIS MEETING ON FACEBOOK LIVE.

GO TO WWW.KILLINGLY.ORG AND CLICK ON FACEBOOK LIVE AT THE BOTTOM OF THE PAGE.

- I. CALL TO ORDER/ROLL CALL
- II. SEATING OF ALTERNATES
- III. AGENDA ADDENDUM
- IV. CITIZENS' COMMENTS ON ITEMS NOT SUBJECT TO PUBLIC HEARING (Individual presentations not to exceed 3 minutes; limited to an aggregate of 21 minutes unless otherwise indicated by a majority vote of the Commission)

NOTE: Public comments can be emailed to publiccomment@killinglyct.gov or mailed to the Town of Killingly, 172 Main Street, Killingly, CT 06239. All public comment must be received prior to 2:00 PM, the day of the meeting. Public comment received will be posted on the Town's website www.killingly.org.

NOTE: To participate in the CITIZENS' COMMENTS– the public may join the meeting via telephone while viewing the meeting on Facebook live.

To join by phone please dial 1-415-655-0001; and use the access code 2634-265-4058 when prompted.

- V. COMMISSION/STAFF RESPONSES TO CITIZENS' COMMENTS

- VI. PUBLIC HEARINGS – (review / discussion / action)

NOTE: PUBLIC HEARING comments can be emailed to publiccomment@killinglyct.gov or mailed to the Town of Killingly, 172 Main Street, Killingly, CT 06239. All public comment must be received prior to 2:00 PM, the day of the meeting. Public Hearing comments received will be posted on the Town's website www.killingly.org

NOTE: To participate in THE PUBLIC HEARINGS – the public may join the meeting via telephone while viewing the meeting on Facebook live.

To join by phone please dial 1-415-655-0001; and use the access code 2634-265-4058 prompted.

(Continued on next page)

PUBLIC HEARINGS CONT:

- 1) **Zone TEXT Change Appl: 24-1329**; Lake Apartments, LLC; Zone TEXT Change – revision to multi-family zoning requirements for clarification purposes for density. **WITHDRAWN BY APPLICANT.**

Hearings' segment closes.

Meeting Business will continue.

VII. UNFINISHED BUSINESS – (review / discussion / action)

- 1) **Zone TEXT Change Appl: 24-1329**; Lake Apartments, LLC; Zone TEXT Change – revision to multi-family zoning requirements for clarification purposes for density. **WITHDRAWN BY APPLICANT.**

VIII. NEW BUSINESS – (review/discussion/action)

- 1) **§8-24 Review Appl. # 24-1331** – Town of Killingly; Capital Improvement Budget for 2024-2025 – presentation by the Town's Engineer, David Capacchione.

(*) Applications submitted prior to 5:00 PM on MONDAY, MARCH 11, 2024 - will be on the agenda as New Business, with a "date of receipt" of MONDAY, MARCH 18, 2024, and may be scheduled for action during the next regularly scheduled meeting of **MONDAY, APRIL 15, 2024.**

(*) Applications submitted by 11:30 AM on FRIDAY, MARCH 15, 2024 - will be received by the Commission ("date of receipt") on MONDAY, MARCH 18, 2024. However, these applications may not be scheduled for action on **MONDAY, APRIL 15, 2024,** as they were submitted after the Commission's deadline. This is in accordance with Commission policy to administer Public Act 03-177, effective October 1, 2003.

IX. ADOPTION OF MINUTES – (review/discussion/action)

- 1) Regular Meeting Minutes – FEBRUARY 20, 2024.

X. OTHER / MISCELLANEOUS – (review / discussion / action)

- 1) Continuation of Workshop re: Planned Residential Development, Open Space, etc.

- 2) Workshop Schedule – Schedule another workshop for MONDAY, APRIL 15, 2024 @ 6:00 pm to continue the discussion of the proposed revisions to the zoning regulations.

XI. CORRESPONDENCE

- 1) Zoning Practice – March 2024 Edition
2) Technical Report from VITIS Energy, RE: Battery Energy Storage System (BESS), 189 Lake Road

XII. DEPARTMENTAL REPORTS – (review/discussion/action)

- A. Zoning Enforcement Officer's & Zoning Board of Appeal's Report(s)
B. Inland Wetlands and Watercourses Agent's Report

XIII. ECONOMIC DEVELOPMENT DIRECTOR REPORT

XIV. TOWN COUNCIL LIAISON REPORT

XV. ADJOURNMENT

VI. PUBLIC HEARINGS – (review / discussion / action)

3) **Zone TEXT Change Appl: 24-1329**; Lake Apartments, LLC; Zone TEXT Change – revision to multi-family zoning requirements for clarification purposes for density.

APPLICANT HAS WITHDRAWN THEIR APPLICATION – MARCH 11, 2024.

APPLICANT(S):	Lake Apartments, LLC
LANDOWNERS:	D/N/A
SUBJECT PROPERTY:	D/N/A
TAX ASSESSOR INFO:	D/N/A
ACREAGE:	D/N/A
ZONING DISTRICT:	Low Density, Medium Density, and Residential High (Borough)
REQUEST:	Update of Multi-Family Regulations re: clarification purposes for density
REGULATIONS:	TOK Zoning Regulations Section 555 – Mult-Family Development

APPLICANT HAS WITHDRAWN THEIR APPLICATION – MARCH 11, 2024.

Ann-Marie Aubrey

~~24~~ 24-1329 PZC

From: bruce@archersurveying.com
Sent: Wednesday, March 13, 2024 2:45 PM
To: Ann-Marie Aubrey; Jonathan Blake
Subject: Text amendment application for Lake Apartments LLC

Caution: External (bruce@archersurveying.com)

First-Time Sender [Details](#)

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On behalf of the applicant Lake Apartments LLC, I like to respectfully request that the application be withdrawn for consideration by the Killingly Planning and Zoning Commission.

Thank you for your time and careful consideration in this matter.

Respectfully,
Bruce
Bruce D. Woodis LLS
Archer Surveying/KWP Associates
18 Providence Rd
Brooklyn, Ct. 06234
860-928-1921
860-779-2240

RECEIVED

MAR 13 2024

PLANNING & ZONING DEPT.
TOWN OF KILLINGLY

VIII. NEW BUSINESS – (review / discussion / action)

- 1) **§8-24 Review Appl #24-1331** – Town of Killingly; Capital Improvement Budget for 2024-2025 – presentation by the Town’s Engineer – David Capacchione
-

MISCELLANEOUS

CAPITAL BUDGET

CIP PROGRAM

DESCRIPTION

The Capital Budget is a listing of all recommended Capital Projects proposed for the next fiscal year. By definition, a Capital Project is a project that helps maintain or improve a Town asset, often called infrastructure. To be included in the Capital Budget, a project must meet ONE of the following requirements (criteria):

- It is a new construction, expansion, renovation, or replacement project for an existing facility or facilities. The project must have a total cost of at least \$10,000 over the life of the project. Project costs can include the cost of land, engineering, architectural planning, and contract services needed to complete the project.
- It is a purchase of major equipment (assets) costing \$50,000 or more with a useful life of at least 10 years.
- It is a major maintenance or rehabilitation project for existing facilities with a cost of \$10,000 or more and an economic life of at least 10 years.

The Capital Outlay amount listed in the Town's expenditures and in the Capital Budget is the Town's General Fund Contribution for that fiscal year. The itemized list of funding sources, when approved on adoption of the General Government Budget, authorizes the acceptance of the non-general government contribution funds. The list of projects is matched to funding sources in the Capital Improvement Program. When any non-general fund contribution funding is approved, the project funds as contained in the Capital Budget are appropriated.

APPROVED BUDGET DETAIL

Below is a summary of financing for FY24-25.

EXPENDITURE CATEGORY	FY 24-25
Road Construction	\$3,527,625
Highway	\$380,000
Bridges	\$0
Public Buildings	\$185,000
Parks & Recreation	\$155,000
Economic & Community Development	\$0
Planning & Development	\$0
Schools	\$2,071,000
Water Pollution Control Authority	\$970,000
	\$7,288,625

FUNDING LEGEND		FY 24-25
Unimproved Town Aid	6	\$50,000
Improved Town Aid	6	\$307,625
LOCIP	3	\$185,000
Bond Funds	2	\$621,300
Grants Funds	4	\$155,000
General Fund	1	\$3,550,000
Sewer Fund	210	\$970,000
State Education Grants	5	\$1,449,700
Reallocation of Capital Funds	7	\$0
		\$7,288,625

TOWN OF KILLINGLY CAPITAL IMPROVEMENT PROGRAM 2025

GENERAL GOVERNMENT PROJECTS			FUNDING SOURCE		
ROAD CONSTRUCTION					
Road Renewal - Unimproved Roads	50,000	100%	(6)		
Road Renewal	3,477,625	93%	(1)	7%	(6)
HIGHWAYS					
Storm Drainage Improvements	20,000	100%	(6)		
Guide Rail Replacement	50,000	100%	(6)		
Sidewalks	10,000	100%	(6)		
Downtown Area - Drainage Improvements	300,000	100%	(1)		
PUBLIC BUILDINGS					
Town Hall Building Improvements	150,000	100%	(3)		
Salt Storage Facility	35,000	100%	(3)		
PARKS AND RECREATION					
Westfield Ave Athletic Courts	155,000	100%	(4)		
FUNDING SOURCE					
General Government Projects	4,247,625				
BOARD OF EDUCATION PROJECTS					
Killingly Westfield Ave Facility	-	30%	(2)	70%	(5)
Killingly Memorial School	-	30%	(2)	70%	(5)
Killingly Central School	175,000	30%	(2)	70%	(5)
Killingly Intermediate School	1,500,000	30%	(2)	70%	(5)
Killingly High School	346,000	30%	(2)	70%	(5)
Goodyear Early Childhood Learning Center	50,000	30%	(2)	70%	(5)
FUNDING SOURCE					
Board of Education Projects	2,071,000				
WATER POLLUTION CONTROL AUTHORITY PROJECTS					
Plant Capital Projects/Equipment	210	870,000	100%	(210)	
Sewer Line Replacement	210	100,000	100%	(210)	
FUNDING SOURCE					
Water Pollution Control Authority Projects	970,000				
CAPITAL IMPROVEMENT PROGRAM SUMMARY					
General Government Projects	4,247,625				
Board of Education Projects	2,071,000				
Water Pollution Control Authority Projects	970,000				
TOTAL PROJECTS					
General Government Revenue	4,247,625				
Water Pollution Control Authority Revenue	970,000				
FUNDING SOURCE					
General Fund Contribution	3,550,000				
Bond Funds	-				
LOCIP	185,000				
Grants Funds	155,000				
State Aid - Unimproved Road (TAR)	50,000				
State Aid - Improved Road (TAR)	307,625				
Reallocated Capital Funds	-				
Capital Reserve	-				
General Government Revenue					
4,247,625					

TOWN OF KILLINGLY CAPITAL BUDGET

ROAD CONSTRUCTION

Funding Summary

Funding Source	FY 2024 - 2025					Total
	FY25	FY26	FY27	FY28	FY29	
Road Renewal - Unimproved Roads	(6)	50,000	50,000	50,000	50,000	250,000
Road Renewal	(1) & (6)	3,477,625	227,625	227,625	227,625	4,388,125
Maple Street and Upper Maple Street Phase III-IX	(4)	-	-	2,100,000	1,300,000	2,100,000
Dyer Street	(4)	-	1,100,000	-	-	1,100,000
Louisa Viens Road	(4)	-	-	-	1,000,000	1,000,000
Total		3,527,625	1,377,625	2,377,625	2,577,625	13,238,125

Project Comments

- * Road Renewal Unimproved Roads - The purpose of the Unimproved Roads program is to pave unimproved (dirt) roads which either cause severe maintenance problems or are experiencing increased traffic due to development.
- * Road Renewal - The Road Renewal Program provides for an on-going pavement resurfacing schedule for the Town's 128 miles of paved roads. This program helps the Town avoid costly reconstruction due to deferred maintenance. In recent years, the Town has been very committed to this program, which is funded through a variety of sources. Town aid funds will be used for resurfacing various streets that are in need. The Engineering Department and the Highway Department have implemented a road evaluation project that established a road resurfacing/rebuilding program.
- * Maple Street & Upper Maple Street Phase III - IX - The section of Maple and Upper Maple Street that connects Rt 6 and Rt 101 is heavily traveled and in need of upgrades. This project is intended to be implemented over a period of several years and would include pavement restoration and pedestrian improvements. Sources of funding are anticipated to be LOTCIP (Local Transportation Capital Improvement Program) or BUILD (Better Utilizing Investments to Leverage Developments).
- * Dyer Street - This project would include payment restoration and pedestrian improvements that would include ADA improvements and sidewalk connections to Water and Franklin Streets. The anticipated source of funding is a the Community Connectivity Grant Program.
- * Louisa Viens Road - This road is in the industrial park and connects to Lake Road with Alexander Parkway. As a result of the heavier traffic for this roadway the road is in need of complete rebuilding. The catch basins have been replaced in this section. However the roadway has not been addressed. Further Evaluation of road base needed.

Funding Schedule

Funding Sources	FY25	FY26	FY27	FY28	FY29	TOTAL
General Fund Contribution (1)	3,250,000	-	-	-	-	3,250,000
State Aid - Unimproved Roads (TAR) (6)	50,000	50,000	50,000	50,000	50,000	250,000
State Aid - Improved Roads (TAR) (6)	227,625	227,625	227,625	227,625	227,625	1,138,125
Grant Funds (4)	-	1,100,000	2,100,000	2,300,000	3,100,000	8,600,000
TOTAL	3,527,625	1,377,625	2,377,625	2,577,625	3,377,625	13,238,125

TOWN OF KILLINGLY CAPITAL BUDGET

HIGHWAYS

Funding Summary

Funding Source	FY 2024 - 2025					Total
	FY25	FY26	FY27	FY28	FY29	
Storm Drainage Improvements	(6)	20,000	20,000	20,000	20,000	100,000
Guide Rail Replacement	(6)	50,000	50,000	50,000	50,000	250,000
Sidewalks	(6)	10,000	10,000	10,000	10,000	50,000
Downtown Area - Drainage Improvements	(1)	300,000	100,000	150,000	-	550,000
Route 12 Sidewalk Connection	(4)	-	-	750,000	-	750,000
Industrial Park Sidewalks	(4)	-	-	1,400,000	-	1,400,000
Total		380,000	180,000	2,380,000	80,000	80,000
						3,100,000

Project Comments

- * Storm Drainage Improvements- The Storm Drainage Improvement Program was started in 1991. It is designed to address miscellaneous spot drainage problems throughout the Town. Funding is applied on an as-needed basis.
- * Guide Rail Replacement - The Guide Rail Replacement program allows for the replacement of seriously deteriorated guide rail with metal beam type guide rail and at selected locations where conditions dictate, new guide rail.
- * Sidewalks - The purpose of the Sidewalk program is to provide an ongoing improvement and maintenance schedule for sidewalks in the Town.
- * Downtown Area - Drainage Study Improvements -The downtown area drains through a series of very old stone box culverts. This Town performed a Phase I and Phase II study to evaluate the condition and capacity of the existing drainage system and provide recommendations for improvements. The study began at its outlet to the Five Mile River on Water Street to the municipal parking on School Street and continued to Reynolds Street. This funding will begin to address necessary improvements identified in the drainage study. In 2025 the culvert that bisects the Brickyard would be replaced.
- * Route 12 Sidewalk Connection - Lower Route 12 near the Big Y Plaza and the WPCA facility is being evaluated by the State of Connecticut Department of Transportation for a signaled crosswalk. Sidewalks would be constructed to connect the existing sidewalks near Big Y to the River Trail walk.
- * Industrial Park Sidewalks - This project will improve sidewalk access at the Industrial Park to implement recommendations outlined in a feasibility study performed under a Connectivity Grant. The project would install sidewalks through the Industrial Park and focus on connection to Route 12. Connections to Upper Maple Street need additional evaluation.

Funding Schedule

Funding Sources	FY25	FY26	FY27	FY28	FY29	TOTAL
General Fund Contribution (1)	300,000	100,000	150,000	-	-	550,000
State Aid - Improved Roads (TAR) (6)	80,000	80,000	80,000	80,000	80,000	400,000
Grant Funds (4)	-	-	2,150,000	-	-	2,150,000
TOTAL	380,000	180,000	2,380,000	80,000	80,000	3,100,000

TOWN OF KILLINGLY CAPITAL BUDGET

BRIDGES

Funding Summary

	Funding Source	FY 2024 - 2025					Total
		FY25	FY26	FY27	FY28	FY29	
Cotton Bridge Road Bridge	(2) & (4)	-	-	-	-	12,500,000	12,500,000
Peeproad Stone Arch Bridge	(2) & (4)	-	-	-	-	1,600,000	1,600,000
Wright Road Bridge	(2) & (4)	-	2,000,000	-	-	-	2,000,000
North Road	(2) & (4)	-	2,350,000	-	-	-	2,350,000
North Street Bridge	(2) & (4)	-	-	5,000,000	-	-	5,000,000
Total		-	4,350,000	5,000,000	-	14,100,000	23,450,000

Project Comments

- Cotton Bridge Road Bridge - This bridge crosses the Quinebaug River connecting the Towns of Killingly and Pomfret. The Connecticut Department of Transportation (CDOT) has identified areas of concern with the bridge. The replacement of this bridge will require an inter-municipal agreement. Therefore, planning work should begin early. Addressing some of the areas identified in the CDOT inspection report may prolong the life of the bridge and reduce overall costs. Funding is expected to be awarded from the Federal Infrastructure Investment and Jobs Act (IIJA) Grants.
- Peeproad Road Stone Arch Bridge - This is a historical Stone Double Arch Bridge on Peeproad Road in Dayville. The Bridge was built in or about 1850. This bridge was rated as poor in the inspection performed by CDOT in 2012. Funding is expected to be awarded from the Federal IIJA Grants.
- Wright Road Bridge - This project will address the areas CDOT has identified as areas of concern with the bridge. Funding is expected to include design and rebuild of the bridge through an award from the Federal IIJA Grants.
- North Road Bridge - This project will address the areas CDOT has identified as areas of concern with the bridge. Funding is expected to include design and rebuild of the bridge through an award from the Federal IIJA Grants.
- North Street Bridge - The decking structure dates to the 1970's while the stone abutments are much older. CDOT has documented several deficiencies mostly relating to the stone abutments. Repairs have been made in advance of a larger grant funded project in future years.

Funding Schedule

Funding Sources	FY25	FY26	FY27	FY28	FY29	TOTAL
Bond Funds (2)	-	870,000	2,500,000	-	7,050,000	10,420,000
Grant Funds (4)	-	3,480,000	2,500,000	-	7,050,000	13,030,000
TOTAL	-	4,350,000	5,000,000	-	14,100,000	23,450,000

TOWN OF KILLINGLY CAPITAL BUDGET

PUBLIC BUILDINGS

Funding Summary

Funding Source	FY 2024 - 2025					Total
	FY25	FY26	FY27	FY28	FY29	
Town Hall 3rd & 4th Floor Renovation/Expansion	(2)	-	-	-	1,000,000	4,000,000
Police Training Facility	(1)	-	25,000	-	-	25,000
Town Hall Building Improvements	(3)	150,000	150,000	-	-	300,000
Vehicle Wash Bay at Highway Garage	(1)	-	-	2,000,000	-	2,000,000
Salt Storage Facility	(3)	35,000	-	-	-	35,000
Parks and Recreation Storage Facility - Westfield Avenue	(4)	-	1,000,000	-	-	1,000,000
Library Parking Lot	(1)	-	-	-	-	150,000
Totals		185,000	1,175,000	2,000,000	1,000,000	7,510,000

Project Comments

- Town 3rd & 4th Floor Renovation/Expansion - The space on the 3rd and 4th floors of the Town Hall would provide much needed office space for several departments. This project would include the design, renovation and reconfiguration of office space to allow for a more functional layout among Town Hall departments as well as improvements to the elevator. The elevator portion of the project would replace the existing elevator and extend service to the 3rd and 4th floors of the Town Hall. The existing elevator was installed in the mid-1980's and requires modifications to meet current code and ADA compliance.
- * Police Training Facility - An area is needed for the Constables to conduct required training exercises. Space at Brickhouse Road is being explored as a potential location for this facility. The project would include the cost of materials to install the required safety barriers.
- * Town Hall Building Improvements - This project would include brick repointing to the exterior of the building as well as make improvements to various second floor office spaces in need of renovations.
- * Vehicle Wash Bay at Highway Garage - The installation of a vehicle wash bay at the Public Works garage would serve the Town and Board of Education vehicle fleet. The project would include a water reclamation system to conserve and reuse water services.
- * Salt Storage Facility - The roof at the Salt Storage Facility is nearing the end of its useful life. This project would include the installation of a new roof.
- * Parks and Recreation Storage Facility - Westfield Avenue- This project includes the construction of a storage building to provide a place to store related equipment to maintain the facility.
- * Library Parking Lot- The parking lot at the Library is nearing the end of its useful life. This project would include renovation and improvements to the existing parking lot.

Funding Schedule

Funding Sources	FY25	FY26	FY27	FY28	FY29	TOTAL
General Fund Contribution (1)	-	25,000	2,000,000	-	150,000	2,175,000
Bonds (2)	-	-	-	1,000,000	3,000,000	4,000,000
LOCIP (3)	185,000	150,000	-	-	-	335,000
Grants Funds (4)	-	1,000,000	-	-	-	1,000,000
TOTAL	185,000	1,175,000	2,000,000	1,000,000	3,150,000	7,510,000

TOWN OF KILLINGLY CAPITAL BUDGET

PARKS AND RECREATION

Funding Summary

Funding Source	FY 2024 - 2025					Total
	FY25	FY26	FY27	FY28	FY29	
Westfield Ave Athletic Courts	(4)	155,000	-	-	-	155,000
Owen Bell Access Stairs to KCS	(1)	-	200,000	-	-	200,000
Owen Bell Tennis Courts Repainting	(1)	-	-	30,000	-	30,000
Owen Bell - Resurfacing of Skate Park	(1)	-	-	-	51,000	51,000
Owen Bell - Softball field lights	(1)	-	-	-	-	200,000
Lions Park Renovation	(4)	-	200,000	40,000	-	240,000
Davis Park Gazebo	(1)	-	-	-	-	30,000
River Trail Phase - V & VI	(4)	-	3,450,000	3,450,000	-	6,900,000
Parks at Davis Property	(8)	-	-	-	250,000	250,000
Totals		155,000	3,850,000	3,520,000	301,000	7,901,000

Project Comments

- * Westfield Ave Athletic Courts- This project would improve the condition of the existing tennis and basketball courts to repair and resurface the back courts and make additional modifications to the front court to allow for use as a pickleball court.
- * Owen Bell Access Stairs to KCS- This project would update and make necessary repairs to the pavilion space at the park.
- * Owen Bell Sidewalks- This project would repair existing sidewalks and add sidewalks to connect concession stand to the splash pad.
- * Owen Bell Tennis Courts Repainting- This project would include minor repairs to the existing courts, including repainting.
- * Owen Bell - Resurfacing of Skate Park- The Skate Park is in need of resurfacing due to its continued use. This project would include resurfacing of the existing structures including any minor repairs that may be needed.
- * Owen Bell - Softball Field Lights- The softball field lights are nearing the end of their useful life. This project would include the replacement of existing lighting.
- * Lions Park Renovation- This project would make necessary repairs to the park including the upgrade of playground equipment and installation of new fencing.
- * Davis Park Gazebo- The Gazebo is in need of various repairs. This project would include a new roof, lighting and any necessary repairs and repainting.
- * River Trail - Phase V & VI - Design and construction to continue the expansion of River Trail walk to include a pedestrian bridge to cross the existing stream and would extend to the Killingly/Plainfield town line.
- * Parks at Davis Property- Currently, the property is being utilized as a gravel yard. Once the gravel operation has completed the property would be reconstructed to allow for recreational use. The Town would propose to install several playing fields in this location.

Funding Schedule

<u>Funding Sources</u>	FY25	FY26	FY27	FY28	FY29	TOTAL
General Fund Contribution (1)	-	200,000	30,000	51,000	230,000	511,000
Grant Funds (4)	155,000	3,650,000	3,490,000	-	-	7,295,000
Reserve Funds (8)	-	-	-	250,000	-	250,000
TOTAL	155,000	3,850,000	3,520,000	301,000	230,000	8,056,000

TOWN OF KILLINGLY CAPITAL BUDGET

KILLINGLY SCHOOLS

Funding Summary

	Funding Source	FY 2024 - 2025					Total
		FY25	FY26	FY27	FY28	FY29	
Killingly Westfield Ave Facility	(2) & (5)	-	250,000	560,000	-	-	810,000
Killingly Memorial School	(2) & (5)	-	-	-	-	-	-
Killingly Central School	(2) & (5)	175,000	50,000	2,000,000	-	-	2,225,000
Killingly Intermediate School	(2) & (5)	1,500,000	4,000,000	-	-	-	5,500,000
Killingly High School	(2) & (5)	346,000	-	600,000	-	-	946,000
Goodyear Early Childhood Learning Center	(2) & (5)	50,000	146,315	-	-	-	196,315
Total		2,071,000	4,446,315	3,160,000	-	-	9,677,315

Project Comments

See Capital Improvement Plan as outlined in the Board of Education Budget.

Funding Schedule

	FY25	FY26	FY27	FY28	FY29	TOTAL
Funding Sources						
Bond Funds (2)	621,300	1,333,895	948,000	-	-	2,903,195
State Education Grants (5)	1,449,700	3,112,421	2,212,000	-	-	6,774,121
TOTAL	2,071,000	4,446,315	3,160,000	-	-	9,677,315



TOWN OF KILLINGLY, CT
PLANNING AND ZONING COMMISSION

TUESDAY – FEBRUARY 20, 2024

Regular Meeting – HYBRID MEETING

7:00 PM

TOWN MEETING ROOM – 2ND FLOOR

Killingly Town Hall

172 Main Street

Killingly, CT

THE PUBLIC IS ALLOWED TO ATTEND THE MEETING IN PERSON
OR THE PUBLIC MAY VIEW THIS MEETING AS DESCRIBED BELOW

MINUTES

THE PUBLIC CAN VIEW THIS MEETING ON FACEBOOK LIVE.

GO TO WWW.KILLINGLY.ORG AND CLICK ON FACEBOOK LIVE AT THE BOTTOM OF THE PAGE.

- I. **CALL TO ORDER** – Chair, Keith Thurlow, called the meeting to order at 7:04 p.m.

ROLL CALL – Brian Card, Michael Hewko, Virge Lorents, John Sarantopoulos, Keith Thurlow.
Matthew Wendorf was absent with notice.

Staff Present – Ann-Marie Aubrey, Director of Planning & Development; Jonathan Blake, Planner I/ZEO;
Jill St. Clair, Director of Economic Development.

Also Present – Peter Thurlow, JPF Rentals LLC; Paul Terwilleger, PC Survey Associates; Ulla Tiik-Barclay, Town
Council Liaison; J.S. Perreault, Recording Secretary.
There were approximately ten additional people present in the audience.

Present via Online – Bruce Woodis, Archer Surveying and KWP Associates.
- II. **SEATING OF ALTERNATES** – Michael Hewko was seated as a voting Member for this meeting in the absence of
Matthew Wendorf.
- III. **AGENDA ADDENDUM** – None.
- IV. **CITIZENS' COMMENTS ON ITEMS NOT SUBJECT TO PUBLIC HEARING** (Individual presentations not to exceed 3
minutes; limited to an aggregate of 21 minutes unless otherwise indicated by a majority vote of the
Commission)

NOTE: Public comments can be emailed to publiccomment@killinglyct.gov or mailed to the Town of Killingly,
172 Main Street, Killingly, CT 06239. All public comment must be received prior to 2:00 PM, the day of the
meeting. Public comment received will be posted on the Town's website www.killingly.org.

NOTE: To participate in the CITIZENS' COMMENTS– the public may join the meeting via telephone while
viewing the meeting on Facebook live.

To join by phone please dial 1-415-655-0001; and use the access code 2630-925-0424 when prompted.

Engelstein, Susan

2024 FEB 26 AM 8:10

- **Ed Grandelski**, Upper Maple Street, commented that final decisions of the Commission should include consideration regarding alternate access/egress to Town infrastructure and roadways. He also commented that snow shelves should be identified when looking at designs.

V. COMMISSION/STAFF RESPONSES TO CITIZENS' COMMENTS

- Ann-Marie Aubrey stated that Mr. Grandelski had previously made his comments to Staff and that she had made note of them.

VI. PUBLIC HEARINGS – (review / discussion / action)

NOTE: PUBLIC HEARING comments can be emailed to publiccomment@killinglyct.gov or mailed to the Town of Killingly, 172 Main Street, Killingly, CT 06239. All public comment must be received prior to 2:00 PM, the day of the meeting. Public Hearing comments received will be posted on the Town's website www.killingly.org

NOTE: To participate in THE PUBLIC HEARINGS – the public may join the meeting via telephone while viewing the meeting on Facebook live.

To join by phone please dial 1-415-655-0001; and use the access code 2630-925-0424 prompted.

The above information was read aloud.

PUBLIC HEARINGS CONT:

Keith Thurlow recused himself, and left the room. Vice-Chair, Brian Card, assumed the position of Chair for this Application.

1) **Special Permit Appl #23-1322** – JPF Rentals LLC (JPF Rentals, LLC & C. Chenette/ Landowners); 18 Ware Road (GIS MAP 40, LOT 27) and 21 Pineville Road (GIS MAP 40, LOT 33); Medium Density; approximately 4 acres; to construct 14 new residential rental units, w/community bldg., parking, drainage and appurtenant utility services; under TOK Zoning Regulations; Medium Density, Section 410.3.2(j) Special Permitted Uses, (j) Multi-family Development; Section 555, Multi-Family Development; Article VII, Special Permits; Section 470 Site Plan Review. **CONT FROM 11/20/2023 & 12/18/2023 & 01/16/2024**

Peter Thurlow, JPF Rentals, LLC and owner of 18 Ware Road, explained about changes that they have made to the proposed plans, based on comments made at the previous meeting:

- Switched the main entrance and the emergency entrance. Now, they are proposing the main entrance will come off of Ware Road where the current driveway is for the house and apartments that are there. The emergency exit will go down Pineville Road.
- Mr. Thurlow explained that they feel that this will address some of the concerns from the public and the Commission:
- It will eliminate a lot of traffic at the intersection.
 - No headlights will shine into the property across Pineville Road.
 - Regarding run-off onto Pineville Road, the emergency access won't be paved, they are proposing processed gravel. Added a riprap swale and a catch basin, so everything will be directed into the swale and, then, into the catch basin.
 - The approach coming onto Ware Road is much more level, so there should not be a run-off issue there.
 - They will be removing the existing mobile home due to the width of the driveway. As part of this, Mr. Thurlow explained that they are within the 200 feet of wetlands across the street on Ware Road and they received IWWC approval for the changes.
 - They are adding a privacy fence on the south side of the entrance and are extending the existing fence on the north side of the entrance. He said it would provide better buffering for the neighbors.

- Regarding architectural plans for the units being built, Mr. Thurlow explained that they modified the plans adding specifications and more details to make them more appealing. He said that they definitely match the area (ranch-style units in a residential area).

Paul Terwilliger, Licensed Land Surveyor with PC Associates, gave an overview (plans were displayed as discussed):

- The Ware Road entrance is a flatter approach to the site (1.5 percent grade coming off the road).
- They can stack some parking spaces in between the existing unit and the proposed new unit – 90 degrees (removing the existing trailer).
- Community building (with laundry facility) at the rear of the property. The road will fork off to the left to three units heading toward the Pineville Road emergency access which will have “No Parking/No Access” signs on either side. It will be gated at the Pineville Road end and there will be a Knox box. Mr. Terwilliger explained that the gravel driveway will have a riprap swale on the north side which will be pitched so that the run-off will be directed into the swale and down into a new catch basin which will feed into another new catch basin on the south corner which will tie-in to the existing drainage on Pineville Road. The gravel will make it more pervious regarding run-off and will also not contribute to lot coverage.

Virge Lorents asked about the maintenance of the gravel road.

Mr. Terwilliger explained that it is only going to be used for emergency access. The gravel will make it more pervious regarding run-off and will also not contribute to lot coverage. There will be 7.5-8 percent slope on that driveway and it will transition down to about 1-1.5 percent as it meets Pineville Road. Mr. Thurlow explained that he would be responsible, as the owner, to maintain it (including plowing).

- Mr. Terwilliger explained about parking calculations. Due to concerns, they added some parking spaces. The requirement is 24 parking spaces for the development and they are proposing a total of 47 parking spaces (2.75 per unit).
- Regarding garbage concerns, Mr. Terwilliger explained that the Town Ordinance requires a 40-gallon minimum per unit, per collection time period (weekly). A 3.4 cubic-yard dumpster is required. They are proposing two, 4-yard dumpsters (one to be located in the area of Units 4, 5 & 6 and the other one to be located at the center turn-around).
- Regarding utilities: Water and sewer will tie-in to Pineville Road; Electricity will come in off of Ware Road.
- Mr. Terwilliger explained that drainage calculations have not changed much. Run-off from the site is still less than existing conditions.
- Regarding turning radius, Mr. Terwilliger explained that a sheet has been added to the plans that demonstrates that they can accommodate a turning radius for the largest 65-foot fire truck (ladder truck) and school buses.
- Regarding snow storage/removal, Mr. Terwilliger explained that they can handle a 14-snowfall without having to transport it. It could be removed with payloaders, if needed, and it could be dumped over the edge where the pond is. Five-foot peak on piles.
- Regarding erosion control, Mr. Terwilliger explained that when the trees are cleared, they are proposing to pile the wood chips to make a berm along the low sides of the property to contain/filter run-off (he indicated the areas). This is in addition to silt fencing and other erosion control previously proposed.
- They are proposing additional plantings (Green Giant Arborvitaes) between the buildings and adjacent properties to buffer the view from neighboring properties.
- All proposed lighting to be dark-sky compliant (downcast with motion sensors and photocells so they will only be on when needed).
- Regarding the fire cistern, Mr. Terwilliger explained that it will be owned by the owner of the property. It will be his responsibility. The Fire Department will have access to it with a key. Mr. Terwilliger stated

that the Fire Marshal reviewed the plans and has issued a letter stating that everything is in compliance with what he would require for the cistern and turning radii.

- Mr. Terwilliger indicated the location for the bus-stop shelter which has been added at the intersection of Ware Road. The sidewalks run from there all the way up through the site to the houses around the cul de sac. All of the units are connected to sidewalks that lead past the Community Building and down to Ware Road.

QUESTIONS/COMMENTS FROM THE COMMISSION:

- Michael Hewko suggested that sidewalks be added to go around the parking areas for safety. He also suggested that, in the "Y" of the road, a pedestrian crossing be added to each side. Mr. Hewko also asked about an area on the plans where the trees stop.
Mr. Terwilliger and Mr. Thurlow expressed agreement that they could do pervious walkways along there and also add the pedestrian crossings. Regarding the trees, Mr. Terwilliger explained about the stockade and privacy fencing that is to be installed in those areas.
- John Sarantopoulos noted that there is only one door for the Community Center and that there should be another door in the case of an emergency. He asked if it is 2x6 framing throughout and he asked about 2x8 floor joists. He suggested adding a cornice in the rear to separate floors as he feels it would make the buildings more attractive. He asked about the heat.
Mr. Terwilliger and Mr. Thurlow expressed agreement that they will add another door (the windows are egress windows).
Mr. Thurlow stated that it is 2x6 framing throughout and he explained that the 2x8's meet the building code.
Regarding what type of heat, Mr. Thurlow stated that it would be electric mini-splits (wall units).
- For the Record, Brian Card asked that the Applicant go through the Memo from Town Engineer, David Capacchione (dated January 11, 2024) and to explain the changes made to the plans.
Mr. Terwilliger reviewed the following:
 - Comment #1 – Mr. Terwilliger explained that the copy of the executed grading easement cannot be provided until both existing properties are owned by the Applicant.
Mr. Card asked if a note has been added to the plan stating that the grading easement will be provided.
Mr. Terwilliger stated and indicated that it is called out as a five-foot grading easement on the plan and he stated that, at the time that it is needed, an instrument will be recorded on the land records.
Mr. Terwilliger stated that he can put a note to that effect on the plan.
 - Comment #2 - H-20 walk detail is shown on the plan.
 - Comment #3 - Privacy fence detail is shown on the plan.
 - Comment #4 – Perforated infiltration pipe in the bottom of the detention basin shown on the plan.
 - Comment #5 - Mr. Terwilliger indicated the location of an 18-inch pipe on Ware Road that they do not know where it goes. He explained that there is a buried structure and during construction, they will uncover it and determine what they need to do (catch basin top or manhole cover or something else). Town Engineer and the Wetlands Agent will be contacted.
 - Comment #6 – They provided the sanitary sewer connection for each unit.
 - Comment #7 – They added stationing to the utility plan.
Mr. Terwilliger stated that they have addressed all of the comments to Mr. Capacchione's satisfaction. Mr. Terwilliger stated that Mr. Capacchione has reviewed the latest plans regarding the driveway base and will change that detail (per Mr. Capacchione's e-mail dated January 16, 2024). Mr. Terwilliger suggested that this be a condition of approval as it has not been done yet.
Mr. Terwilliger also stated that Mr. Capacchione called him at 5:10 this evening with one more comment regarding anti-tracking pad on the Pineville Road entrance, so they will be adding that to the plan also.
- Mr. Card asked about recycling and he asked about the distance from the gate to the public roadway.
Mr. Terwilliger stated that they will add recycling in the same area as the dumpsters.

Mr. Terwilliger stated that the distance between the gate and the public roadway is 20 feet. Mr. Thurlow explained that they will move it back so that a fire truck can pull all the way in.

QUESTIONS/COMMENTS FROM STAFF:

- Ann-Marie Aubrey asked if there is a reason why there are evergreens shown around every unit, but Unit 16.

Mr. Terwilliger explained that it is due to the house location on the abutting property, but he said that they can add six more trees in that location.

QUESTIONS/COMMENTS FROM THE PUBLIC:

- John LaBelle, 57 Island Road, spoke of how he feels that there should be an architectural review process, gravel sidewalks are not good for people with wheelchairs, the sidewalk by Unit 4 does not traverse around the unit, why are developments allowed to drain off-site, how would this development be affected if Text Change Application #24-1329 is approved.

Regarding Application #24-1329, Mr. Card explained that it is not applicable at this point in time and if it does get reviewed and approved, the Commission would deal with applications that come before them at that point in time.

- Ed Grandelski, Upper Maple Street, spoke of concern regarding the drainage easement because the Applicant can't guarantee the Town the easement if he doesn't own the property (he made reference to Briarwood). Mr. Grandelski also expressed concern regarding off-site run-off and how it would affect MS4 and sampling requirements. He said that on-site retention basins are supposed to pick up everything except the 1,000-year flood.
- Jennifer Sullivan, 39 Pineville Road, commented that the water and sewer pipes that service that area were built in 1896 and she voiced concern for how they will be able to handle double the population in that area.
- John Sullivan, 39 Pineville Road, asked if the gravel emergency access will be open or blocked off, he expressed concern about the current run-off and what it will be like with the development, he also asked if anything was added to the lot to the north.

Mr. Thurlow stated that the emergency access will be blocked off.

The drainage plan was displayed and Mr. Thurlow, Mr. Card and Mr. Terwilliger explained about the swale and the flow of the drainage which ties-in to the existing drainage system in the road.

Mr. Card explained that the drainage calculations submitted for the plan demonstrate that the stormwater run-off is less than what is currently occurring today, from a flow standpoint. Stormwater will be retained in the pond, discharging at a much slower rate than exists today. It drains to the Town of Killingly Stormwater System which has been reviewed by the Town Engineer who has stated that the system is adequate for this development. If the system fails, if it is on the private development, the private development has to repair that system that ends up tying-in to the Town of Killingly system. Regarding if anything was being added to the north, Mr. Terwilliger explained that it is getting smaller due to the driveway and he stated that there is no proposed development for that lot other than that the garage will be removed.

Regarding Mr. Grandelski's comment about the easement, Mr. Terwilliger clarified that they are not proposing an easement to the Town, it is a grading easement that would be between the two private property owners along that driveway. The Applicant will purchase the other property and will own both properties.

Mr. Card explained that in order for the Applicant to do the grading to put the swale in for the drainage, the easement to cross that property line will be needed, so it will be a condition of approval.

- Ulla Tiik-Barclay commented that both of the properties need to be purchased in order to have the acreage allowable for that development.

Mr. Thurlow explained that he had submitted a Purchase and Sale Agreement contingent on PZC approval.

Motion was made by John Sarantopoulos to close the public hearing for **Special Permit Appl #23-1322** – JPF Rentals LLC (JPF Rentals, LLC & C. Chenette/ Landowners); 18 Ware Road (GIS MAP 40, LOT 27) and 21 Pineville Road (GIS MAP 40, LOT 33); Medium Density; approximately 4 acres; to construct 14 new residential rental units, w/community bldg., parking, drainage and appurtenant utility services; under TOK Zoning Regulations; Medium Density, Section 410.3.2(j) Special Permitted Uses, (j) Multi-family Development; Section 555, Multi-Family Development; Article VII, Special Permits; Section 470 Site Plan Review. **CONT FROM 11/20/2023 & 12/18/2023 & 01/16/2024**
Second by Virge Lorents. No discussion.
Motion carried by voice vote (4-0-0). Keith Thurlow had recused himself.

Keith Thurlow returned to the room and resumed the position of Chair.

2) **Special Permit Appl: 24-1328**; Austin Noel (Fred Schramm/Landowner); 427 Chestnut Hill Rd, GIS MAP 66, LOT 14, Rural Development; (home occupation) welding and fabrication business out of the garage, RD Sect. 410.1.2(l), (Spec Perm, Home Occupation) and Sect 595 (Home Occupation).

Austin Noel represented himself and reviewed the applicable Sections of the Regulations:

- His business will be primarily mobile.
- Any welding on the property will take place inside the garage, no welding outdoors on the property. Ann-Marie Aubrey explained that Staff visited the site earlier in the day and that Mr. Noel will only be using one bay of the garage (approximately 600 s.f.). The other bay is used by the homeowner.
- It is secondary to the residential use. Someone is living in the house.
- No employees.
- No plans to install any signage.
- Will not be creating any noise, smoke, odors, toxins that would be a nuisance to neighbors.
- No interference with radio signals.
- No additional traffic to the neighborhood,
- No customers coming and going from the property. He usually goes to them.
- Regarding toxic materials, Mr. Noel explained that the metals are solid and they have to be made to a gas to be toxic and he also explained that he doesn't work in a confined space.
- Not selling any products at the property.
- Will comply with all State and federal regulations.

Mr. Thurlow stated that any alterations to the dwelling would need to be inspected by the Building Official.

QUESTIONS/COMMENTS FROM COMMISSION MEMBERS:

- Michael Hewko asked what welding equipment is currently in the part of the garage that will be used and he asked what the garage is made of.

Mr. Noel stated two welders, a plasma cutter and a tool box with all of his hand tools. The garage is a steel building.

Ann-Marie Aubrey explained that during the site inspection, she explained to Mr. Noel that the Fire Marshal should also visit the site to make sure that everything is in compliance. She said that Mr. Noel agreed and had no problem with the Fire Marshal or the Building Official visiting the site.

- Regarding exhaust gases, Brian Card asked if Mr. Noel has a self-contained hood or if he will be venting through wall vents. He asked if there would be any specialty metal welding.

Mr. Noel stated wall vents with both bay doors open and also the man door. He said he also usually has a fan.

Mr. Noel explained he would, but rarely.

- Virge Lorents asked if specialty welding would be toxic.
Mr. Noel explained that he doesn't consider it to be particularly toxic and he explained that it requires a different machine than stainless steel.
- John Sarantopoulos asked about the type of welding that would be done. He also asked about the type of machinery that would be used.
Mr. Noel explained that he does all types of welding and about the types of machinery that he would eventually like to use.
- Keith Thurlow asked, for the Record, if Mr. Noel lives at the property. He also asked if Mr. Noel had fire equipment there.
Mr. Noel stated that he does live at the property and that he does have fire equipment.
- Mr. Card referred to the two items noted by Staff: He asked if Staff was provided with a signed application; and he also asked about site cleanup.
Ms. Aubrey stated that Mr. Noel will be providing the documentation to Staff and she noted that he has answered the questions from the Commission on the public Record and that she will have him sign the application.
Ms. Aubrey explained that was part of the site visit and that part of the property is a farm so some of the equipment is for the farm. It is not a junkyard.

QUESTIONS/COMMENTS FROM THE PUBLIC:

- John LaBelle, 57 Island Road, asked about what he has for a fire suppression system.
Mr. Noel explained that he has a hose and multiple fire extinguishers (A, B & C). He explained that, as far as he understands, you only need to have a fire extinguisher capable of putting out the fire that you are involved with and no combustibles within 35 feet.
Mr. Thurlow stated that it would be for the Fire Marshal/Building Official to determine.
Mr. Sarantopoulos asked if it is regulated by the State or they do inspections.
Mr. Noel explained not at his scale. A shop with employees would have OSHA.
- Jason Anderson, 125 Lake Road, asked if Mr. Noel would be doing any welding or work with galvanized metal. He also asked if there would be any magnesium metal anywhere on the site.
Mr. Noel stated that he has.
Mr. Anderson recommended that he have a ventilation system because of the risk of galvanic poisoning. He voiced concern regarding toxicity levels due to that gas being released into the neighborhood and if it could affect neighbors.
Mr. Noel stated that there would not be any magnesium metal on the site.
Mr. Thurlow, again, stated that it would be for the Fire Marshal/Building Official to determine.

QUESTIONS/COMMENTS FROM THE COMMISSION MEMBERS:

- Brian Card asked, for clarification on the map, if the garage is the first building on the left, coming up the driveway.
Ms. Aubrey stated that it is.

Motion was made by Virge Lorents to close the public hearing for **Special Permit Appl: 24-1328**; Austin Noel (Fred Schramm/Landowner); 427 Chestnut Hill Rd, GIS MAP 66, LOT 14, Rural Development; (home occupation) welding and fabrication business out of the garage, RD Sect. 410.1.2(I), (Spec Perm, Home Occupation) and Sect 595 (Home Occupation).

Second by Michael Hewko. No discussion.

Motion carried unanimously by voice vote (5-0-0).

3) **Zone TEXT Change Appl: 24-1329**; Lake Apartments, LLC; Zone TEXT Change – revision to multi-family zoning requirements for clarification purposes for density.

(NOTE: Edits, if any, may be suggested, and made, to the proposed text up to the close of the hearing. There will be no further advertisement of those edits until the decision of the PZC is published.)

Bruce Woodis, Archer Surveying and KWP Associates (via online), represented the Applicant and gave an overview:

Mr. Woodis explained that some of the regulations are a little confusing and they are trying to, by the proposed changes, clarify and identify certain parts of the regulations primarily related to coverage and density requirements.

Mr. Woodis reviewed the proposed changes to Section 555 – MULTI-FAMILY DEVELOPMENT (copies were included in packets to Commission Members):

- Item #3 – “Multi-family development shall comply with the underlying zone lot coverage and height requirement” would be deleted and the following would be added, to be specific:

Lot coverage in a multi-family development shall not exceed the following:

- 30% in Low Density Zone
- 35% in Medium Density Zone
- 40% in Residential High (Borough) Zone

Maximum building heights shall comply with the requirements of the underlying zone.

Mr. Woodis said that these percentages are based on what is currently contained in the PRD Regulations for lot coverage.

- Item #4 – Second sentence would be deleted and the following would be added:
The minimum distance between principal buildings shall be based on minimum fire code requirements.

Mr. Woodis explained that in the PRD, the minimum separating distance is 30 feet, but may be reduced with the use of fire-rated materials and the approval of the Building Official and Fire Marshal. Mr. Woodis feels that it is more appropriate to be based on safety requirements.

- Item #10 – “requirements of the underlying zone. (LD, MD, RH B)” would be deleted and the following would be added:
“maximum coverage requirements contained herein.”

Mr. Woodis explained that this would be more appropriate for multi-family as minimum density requirements in low and medium density zones are, primarily, based on single-family or two-family dwellings, so he does not feel it is correct to limit your multi-family density to that.

QUESTIONS/COMMENTS FROM THE COMMISSION MEMBERS:

- Keith Thurlow commented that they are rewriting those regulations, but also proposing to add ten percent in the Low-Density Zone, add five percent in the Medium-Density Zone and add ten percent in the Borough Residential Zone. Mr. Thurlow would like to know the difference it would make in terms of development, but it is difficult without a specific lot in mind (acreage/building square footage). Mr. Woodis explained that it is appropriate to have greater lot coverage for multi-family so you can have all of the necessary parking, drainage, building sizes, etc.
- Brian Card noted that in PRD there is a significant amount of open space that is required which is not required in multi-family, which is one of the reasons you get some additional coverage and some additional densities. He asked how they would account for that.

Mr. Woodis, again, explained that he feels that it is appropriate to have greater lot coverage for multi-family for all of the necessary requirements (parking, driveway, storm drainage, setback requirements,

landscaping, etc.) and not be required to have passive or active open space. He noted that multi-family development is by special permit.

- John Sarantopoulos commented that lessening the standards would inflame the antagonistic confrontation between those that want to develop and those that want it to remain strictly residential, primarily single-family or duplex.
- Mr. Thurlow commented that this is something that the Commission would need to look at more thoroughly because it doesn't address as much as it should.
- Brian Card asked Mr. Woodis how he would differentiate between multi-family from PRD.

Mr. Woodis stated that multi-family is primarily larger buildings, more units and they would be placed in appropriate locations as opposed to the PRD which is primarily setup for more of a broad-based development with smaller units. Multi-family is more like the traditional multi-unit condominium/apartment building where the PRD is more of a country-type setting where the buildings are spread out and a smaller number of units.

Mr. Card explained that PRD does not limit the type of units to be built, so you can build multi-unit buildings in PRD. He explained that one of the differentiators is that multi-family is typically a little bit more on the lessor of the development side, so if changing lot coverage and densities to be consistent with PRD, he asked what would be the differentiator between the two? Mr. Card stated that they would, essentially, become similar regulations and the only difference would be that PRD requires significant additional work related to open space and other activities in the PRD, whereas, the multi-family would not require that. He asked Mr. Woodis if that is a fair statement.

Mr. Wood stated that currently, according to the Regulations, that would be a fair statement.

Ann-Marie Aubrey stated that public comment had been received from Norm Thibeault of Killingly Engineering Associates (dated February 20, 2024), in which, he also suggests changes to Section 555 – MULTI-FAMILY DEVELOPMENT, for consideration (copies were provided to Commission Members at this meeting). Ms. Aubrey read aloud, from the letter, Mr. Thibeault's suggestions and questions.

Jonathan Blake explained that he had spoken with Mr. Thibeault:

- Regarding pre-existing multi-family developments in the RD Zone, Mr. Thibeault references two that he knows of that predate the adoption of the 1989 Multi-Family Regulations. Mr. Blake explained that if those two wanted to expand now, they would have to get a variance.
Mr. Thibeault's thought behind particularly identifying the two was similar to the MMUD (they had been re-zoned). He feels that these two could, potentially, be developed in the future under the proposed regulations without including the use in RD.
Mr. Blake noted that, if the Commission is looking to consider this change, the Town Attorney should review the language.
- Regarding Mr. Thibeault's question regarding increasing lot acreage to greater than five acres, Mr. Blake explained that this was based off of the two that are already developed in the RD Zone (both are greater than five acres). Mr. Blake noted that the current definition for multi-family development in Section 300 caps a multi-family development proposal for lots no greater than five acres. So, it can be anything below, but nothing above.
- Mr. Blake explained Mr. Thibeault's suggestion regarding the public water system and sewer.

QUESTIONS/COMMENTS FROM THE COMMISSION MEMBERS:

- Michael Hewko commented about Item #4 "The minimum distance between principal structures shall be based on minimum fire code requirements." He explained that CT State Fire Code Requirements (174 pages) is not easily found. He feels the Fire Marshal should be involved in determining the distance required for applications.
Mr. Thurlow also stated concern. There was discussion. Mr. Card stated that we have that allowance already in PRD.

QUESTIONS/COMMENTS FROM THE PUBLIC:

- Ulla Tiik-Barclay, 26 Dark Lantern Hill Road, stated that she is speaking as a resident, a tax payer and as a Town Council Member representing District 3 and the residents of Killingly. She referred to previous applications for which residents voiced opposition. She said that we don't want increased density. People move here because they want to live in a rural area. She said that she has heard comments that Killingly is easy for developers. She said that multi-family development is clearly defined in the Borough Zoning Regulations and she read aloud from Article IV Classification of Districts, Section 470, Table A Dimensional Requirements which stated medium density maximum lot coverage 25 percent. She said that the developer is not here just for clarifications, he is here to increase the density which. That is not what we want. She said that the 40-foot distance between buildings is quite clear. She said that she tried to look up the fire codes and it says that the municipalities have more stringent codes. She said that the proposed text change is for the benefit of a developer, not for the benefit of the Town or its residents.
- Michell Murphy, 325 Breakneck Hill Road, spoke in opposition. She urged that Staff and the PZC remain on the side of less lot coverage and less density. In speaking with people and listening to PZC meetings, she finds that there is a majority of people that wish to keep Killingly more rural, and speaking as a citizen, she feels the same. She stated agreement with Ulla Tiik-Barclay.
- John LaBelle, 57 Island Road, read aloud the following statement (he did not know the source): "The absence of a proposed locations contemplated by applicant in the public notice renders such notice insufficient." He submitted it to the Recording Secretary who gave it to Chairman Thurlow at the end of the meeting. Mr. LaBelle then read aloud from Article I, Section 120 – Intent. Mr. LaBelle voiced concern regarding congestion, minimum fire separation distance and fire walls (he referred to Table 705.5 of the Building Code). Mr. LaBelle displayed Killingly and Borough Zoning Maps indicating the areas that would be impacted by the proposed changes to the Regulations. He referred to Proposed Item #4 and he said that the codes established in the United States in 1955 are minimum.
Although there was no change proposed to Item #9, Mr. LaBelle regarding accessibility, he suggested that the last sentence should state what it is in accordance with (federal and State codes).
Item #10 – Mr. LaBelle stated it should not be changed.
Item #11 – Although no change is proposed, Mr. LaBelle commented about the need for more detail..
Item #16 – Mr. LaBelle suggests removing "where practical."
Item #17 – Mr. LaBelle stated that it is the hook to establishing an architectural review.
Mr. LaBelle suggested that the Commission look up a stadium fire in May 1985.
- Jason Alexander, 125 Lake Road, spoke of how he hears from people that they like the rural nature of Killingly and don't want to see it developed. He asked if the developer is familiar with the Section 3.4.A of the POCD – Housing Goals Policies and Actions and Section 3.5.A – Land Use Goals Policies and Actions. He asked how these text changes fall within the POCD.
- Ed Grandelski, Upper Maple Street, commented that this is rural Killingly, not urban Bridgeport and that these change belong in a heavily-developed, urban community, not here. He explained about how the actual increase for low density going from 20% to 30% is 50 percent from what the standard is, for medium density from 30% to 35% is actually an increase of 16%, and Borough high density from 30% to 40% is actually an increase of 33%. He said that this is unacceptable.
Regarding separation between buildings, Mr. Grandelski commented that we have volunteer fire departments, not paid 24/7, at-the-fire-station, ready personnel. He said that the 40 feet should stand alone, there is no question.
Mr. Grandelski stated that these changes were supposed to clarify existing language and he said that 40 feet is very clear, but there is no clarity in building code requirements.
Mr. Grandelski stated agreement with Mr. LaBelle regarding removing "where practical" from Item #16 and all utilities should be underground.
Mr. Grandelski commented that there are no changes proposed for fire suppression. He spoke of the need for sufficient water for fires, of the need for increased density on driveways, roadways, sidewalks, and designed on-site retention basins.

Mr. Grandelski stated that he is not in favor of any of the proposed changes.

- Michelle Murphy commented that the way she understands PRD is that there are two types: Independent Residential Living and Residential Life Care Community (which already have provisions for more density).

Ann-Marie Aubrey explained that the way the Commission has looked at Independent Residential Living has been single-family units (not disabled) and Residential Life Care Communities are things like the 75-unit Westview complex.

- John Sarantopoulos spoke about the cluster development requirement to be located near public water and sewer because of the volume. He said that there is also a fire issue.

Mr. Sarantopoulos referred to, and read aloud from, Article I, Section 120. He said that we would be going against the PZC's intent with a proposal such as this for a select group (who are not part of this Community) to get what they want.

Bruce Woodis stated that he heard the comments and he requested that the public hearing be kept open to give him an opportunity to take a look at the proposal and try to get it more in keeping with the current Regulations and get the coverage requirements and separating distances where they belong. He said that they would analyze and modify to make it more palatable.

QUESTIONS/COMMENTS FROM THE PUBLIC continued:

- Michelle Murphy commented that she does not feel that there is a need for a continuance.
- Tom Egan, 108 Stone Road, stated that there should be no need for a continuance and it should be closed and keep it the way that it is.

Ann-Marie Aubrey explained that whether to close or continue is the Commission's decision.

Motion was made by Brian Card to continue the public hearing for the public hearing for **Zone TEXT Change Appl: 24-1329**; Lake Apartments, LLC; Zone TEXT Change – revision to multi-family zoning requirements for clarification purposes for density, to the next regularly scheduled meeting of the Planning and Zoning Commission to be held on Monday, March 18, 2024, Town Meeting Room, 2nd Floor, 172 Main Street, at 7:00 p.m.

Second by Virge Lorents.

Discussion:

Mr. Card explained that it is consistent for the PZC to continue the public hearing to give the Applicant the opportunity to address the comments that were made and re-present to the Commission.

Mr. Sarantopoulos commented that the PZC should be taking a look at this, not to have someone come in to say what to do. Mr. Card explained that it was presented to the PZC which had the opportunity during the public hearing to make changes to the proposed amendment.

ROLL CALL VOTE: John Sarantopoulos – no; Brian Card – yes; Michael Hewko – yes; Virge Lorents – yes; Keith Thurlow – yes.

Motion carried (4-1-0). John Sarantopoulos was opposed.

VII. UNFINISHED BUSINESS – (review / discussion / action)

1) **Special Permit Appl #23-1322** – JPF Rentals LLC (JPF Rentals, LLC & C. Chenette/ Landowners); 18 Ware Road (GIS MAP 40, LOT 27) and 21 Pineville Road (GIS MAP 40, LOT 33); Medium Density; approximately 4 acres; to construct 14 new residential rental units, w/community bldg., parking, drainage and appurtenant utility services; under TOK Zoning Regulations; Medium Density, Section 410.3.2(j) Special Permitted Uses, (j) Multi-family Development; Section 555, Multi-Family Development; Article VII, Special Permits; Section 470 Site Plan Review.
CONT FROM 11/20/2023 & 12/18/2023 & 01/16/2024

Keith Thurlow recused himself, and left the room. Vice-Chair, Brian Card, assumed the position of Chair for this Application.

Motion was made by John Sarantopoulos to approve **Special Permit Appl #23-1322** – JPF Rentals LLC (JPF Rentals, LLC & C. Chenette/ Landowners); 18 Ware Road (GIS MAP 40, LOT 27) and 21 Pineville Road (GIS MAP 40, LOT 33); Medium Density; approximately 4 acres; to construct 14 new residential rental units, w/community bldg., parking, drainage and appurtenant utility services; under TOK Zoning Regulations; Medium Density, Section 410.3.2(j) Special Permitted Uses, (j) Multi-family Development; Section 555, Multi-Family Development; Article VII, Special Permits; Section 470 Site Plan Review. **CONT FROM 11/20/2023 & 12/18/2023 & 01/16/2024, with the following conditions:**

- Sidewalks installed around the parking lot previous to make sure that we don't exceed the requirements.
- Pedestrian crossings at the intersections.
- Community center to have a second door added to the back (or somewhere to the building) for emergency egress.
- The five-foot grading easement be executed and provided for the Record.
- If 18-inch CMP is encountered, the Applicant will contact the Town of Killingly Engineer. Notes to be added to the plans.
- Paving details to be modified consistent with the Town Engineer's specifications.
- Anti-tracking pad along Pineville Road will be needed.
- Recycling receptacles be added to the solid waste locations.

Discussion: Mr. Hewko asked about the Fire Marshal's comments. Ann-Marie Aubrey confirmed that she had spoken with the Fire Marshal and that the Town Engineer's comment about paving was included.

Second by Virge Lorents. No discussion.

ROLL CALL VOTE #1: Michael Hewko – yes; Virge Lorents – yes; John Sarantopoulos – yes; Brian Card – yes.

Motion carried (4-0-0). Keith Thurlow had recused himself.

Keith Thurlow returned to the room and resumed the position of Chair.

2) **Special Permit Appl: 24-1328**; Austin Noel (Fred Schramm/Landowner); 427 Chestnut Hill Rd, GIS MAP 66, LOT 14, Rural Development; (home occupation) welding and fabrication business out of the garage, RD Sect. 410.1.2(I), (Spec Perm, Home Occupation) and Sect 595 (Home Occupation).

Motion was made by Brian Card to approve **Special Permit Appl: 24-1328**; Austin Noel (Fred Schramm/Landowner); 427 Chestnut Hill Rd, GIS MAP 66, LOT 14, Rural Development; (home occupation) welding and fabrication business out of the garage, RD Sect. 410.1.2(I), (Spec Perm, Home Occupation) and Sect 595 (Home Occupation).

Second by Virge Lorents. No discussion.

ROLL CALL VOTE #2: Virge Lorents – yes; John Sarantopoulos – yes; Brian Card – yes; Michael Hewko – yes; Keith Thurlow – yes.

Motion carried unanimously (5-0-0).

3) **Zone TEXT Change Appl: 24-1329**; Lake Apartments, LLC; Zone TEXT Change – revision to multi-family zoning requirements for clarification purposes for density.

(NOTE: Edits, if any, may be suggested, and made, to the proposed text up to the close of the hearing. There will be no further advertisement of those edits until the decision of the PZC is published.

Continued to Monday, March 18, 2024, Town Meeting Room, 2nd Floor, 172 Main Street, at 7:00 p.m.

VIII. NEW BUSINESS – (review/discussion/action)

1) **Site Plan Review Appl #24-1330** – Samantha & William Menghi (Samantha Menghi / Landowner); 476 Bailey Hill Road; GIS MAP 170; LOT 12.2; ~2.8 acres; Rural Development; construction of a one-bedroom accessory dwelling w/garage.

Receive, and consider allowing staff to conduct the site plan review.

Keith Thurlow commented that he would be in favor of site plan review by Staff.

Motion was made by Virge Lorents to receive and allow Staff to conduct the Site Plan Review for **Site Plan Review Appl #24-1330** – Samantha & William Menghi (Samantha Menghi / Landowner); 476 Bailey Hill Road; GIS MAP 170; LOT 12.2; ~2.8 acres; Rural Development; construction of a one-bedroom accessory dwelling w/garage.

Second by John Sarantopoulos. No discussion.

ROLL CALL VOTE #3: Brian Card – yes; Michael Hewko – yes; Virge Lorents – yes; John Sarantopoulos – yes; Keith Thurlow – yes.

Motion carried unanimously (5-0-0).

IX. ADOPTION OF MINUTES – (review/discussion/action)

1) Regular Meeting Minutes – JANUARY 16, 2024

Motion was made by Virge Lorents to adopt the Regular Meeting Minutes – JANUARY 16, 2024.

Second by Brian Card. No discussion.

Motion carried by voice vote (3-0-2). Brian Card and Michael Hewko abstained.

X. OTHER / MISCELLANEOUS – (review / discussion / action)

1) Workshop Schedule – Schedule another workshop for Monday, March 18, 2024 @ 6:00 pm to start/continue the discussion of the proposed revisions to the Planned Residential Development Regulations and proposed (General) Design Standards.

Workshop Monday, March 18, 2024 @ 6:00 p.m.

XI. CORRESPONDENCE

1) Zoning Practice – February 2024 Edition

2) Letter from Crown Castle, dated January 11, 2024 – Notice of Exempt Modification for 280 Ross Road Complete application in Planning and Development Office for Review.

Ms. Aubrey explained that some towers will be removed and new ones will be installed.

XII. DEPARTMENTAL REPORTS – (review/discussion/action)

A. Zoning Enforcement Officer's & Zoning Board of Appeal's Report(s) – No Report.

B. Inland Wetlands and Watercourses Agent's Report – No Report.

XIII. ECONOMIC DEVELOPMENT DIRECTOR REPORT

Jill St. Clair reported on the recent actions of the Economic Development Commission regarding remediating Brownfields, Actions in the POCD pertaining to Economic Development and an environmental program at the Library.

XIV. TOWN COUNCIL LIAISON REPORT

Ulla Tiik-Barclay reported that there will be a special meeting of the Town Council on February 21st.

XV. ADJOURNMENT

Motion was made by Brian Card to adjourn at 9:26 p.m.
Second by Michael Hewko. No discussion.
Motion carried unanimously by voice vote (5-0-0).

Respectfully submitted,

J.S. Perreault
Recording Secretary

XI. CORRESPONDENCE

- 1) Zoning Practice – March 2024 Edition (RE: Battery Energy Storage Systems)
 - 2) Technical Report from VITIS Energy, RE: Battery Energy Storage System (BESS) 189 Lake Road
-

- On Tuesday, March 12, 2024, the enclosed Technical Report from VITIS Energy was presented to the Killingly Town Council.
- The Town Council now has 60 days to respond to VITIS with their comments.
- Once VITIS receives those comments, they will prepare their application to the Connecticut Siting Council.
- Once VITIS' application is submitted to the Connecticut Siting Council (hereinafter CSC) the Planning Zoning Commission (PZC) and the Inland Wetlands and Watercourses Commission (IWWC) will have 65 days to complete the following.
 - Hold a joint public hearing regarding the above application.
 - Then each commission will adjourn to hold their own public meeting (on a different date) to create/write their individual "orders to regulate and restrict" regarding the application.
 - Those Orders must be recorded in the land evidence records, and mailed by certified mail to the applicant, etc. within a 65-day time period.

This (draft) technical report is being given to commission members for **their private review only**. No action is required of commission members until the application to CSC is submitted.

HOWEVER –

Since this will be coming before the commission at a later date for a public hearing, commission members must be careful. Even though the commission cannot make a final decision on this application (the jurisdiction for this application rests solely with the CT Siting Council), you need to treat this as if it were a regular application.

Therefore, just like all other applications coming before you, you should refrain from public comments. You cannot show prejudice either for or against the application, and no ex parte communications, etc.

As was done for a prior CSC application, the commission will be looking to see how the application meets the current zoning regulations, and if it does not, what can be done to make it more conforming.

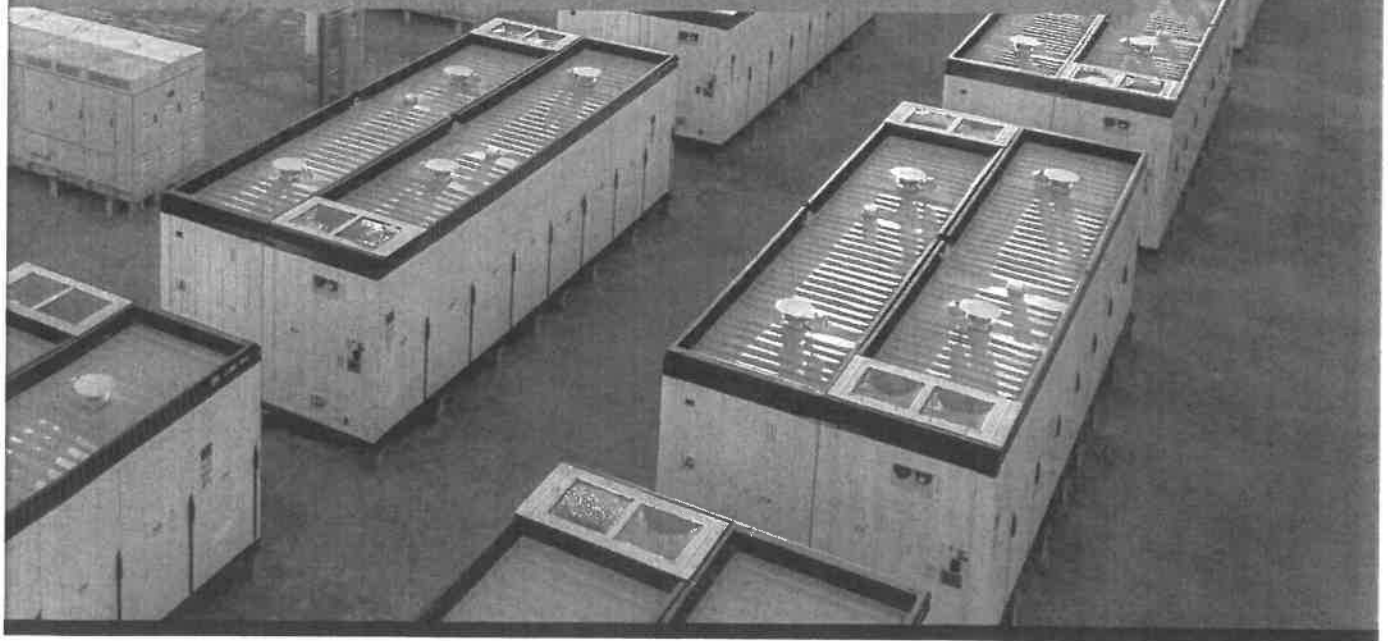
The APA Zoning Practice Publication is timely since it deals with Battery Energy Storage Systems.

Please review both documents and if you have any questions, contact the Planning & Development Staff directly.

ZONING PRACTICE

Unique Insights | Innovative Approaches | Practical Solutions

Battery Energy Storage Systems



In this Issue: Battery Energy Storage Basics | BESS Market Forces | Energy Storage as a Land Use | Examples of Battery Storage Ordinances | Recommended Practices | Conclusions

Battery Energy Storage Systems

By Brian Ross, AICP, and Monika Vadali, PhD

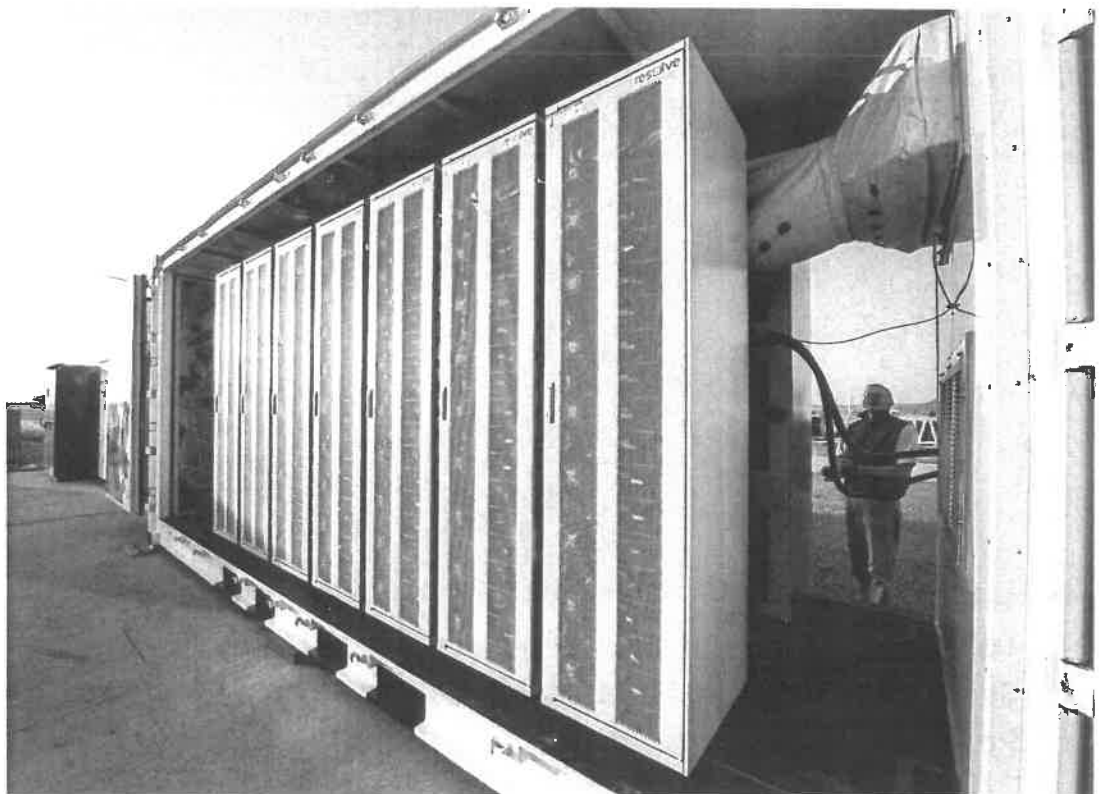
The electric energy system in our country is undergoing dramatic changes, with new technologies and infrastructural investment occurring at a speed and scale unprecedented in our nation's history. One manifestation of those changes is the introduction of new land uses into our communities, land uses whose risks, conflicts, and synergies with existing land uses are uncertain or unknown by the host communities.

One such example is the rapid increase in use of battery energy storage systems (BESS) and related technologies. Grid-connected BESS regularly take the form of one or more shipping containers with ventilation equipment on the outside and row upon row of batteries and control systems secured inside. These systems are being deployed as part of utility

substations and transmission systems and as part of solar and wind electric generation projects. Depending on state enabling legislation, some BESS will be exempt from local zoning, such as when BESS is part of renewable energy or transmission projects that are exempt. However, BESS have potential applications across the rural-to-urban transect, and most communities will need to address BESS in some form.

This issue of *Zoning Practice* explores how stationary battery storage fits into local land-use plans and zoning regulations. It briefly summarizes the market forces and land-use issues associated with BESS development, analyzes existing regulations for these systems, and offers guidance for new regulations rooted in sound planning principles.

A one megawatt
hour lithium-
ion BESS at the
National Renewable
Energy Laboratory's
National Wind
Technology Center
(Photo by Dennis
Schroeder, NREL
47215)



Battery Energy Storage Basics

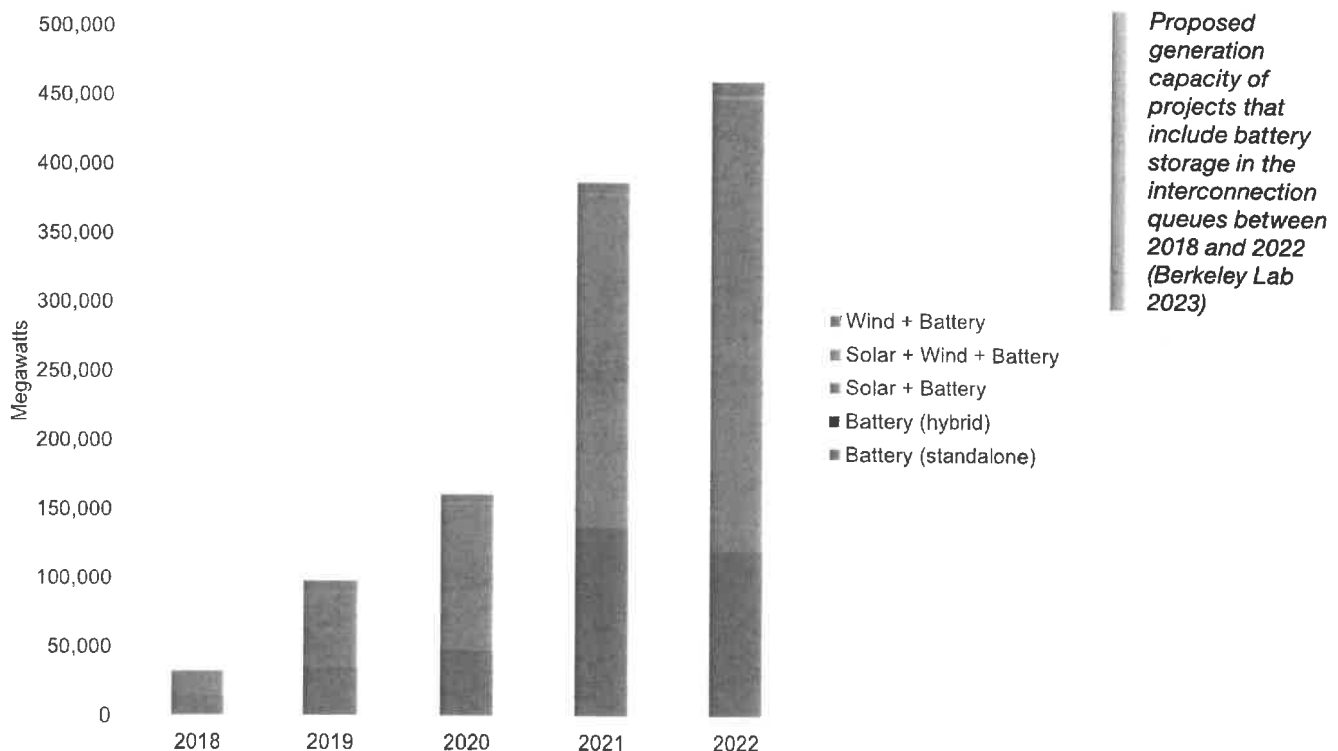
Energy can be stored using mechanical, chemical, and thermal technologies. Batteries are chemical storage of energy. Several types of batteries are currently used, and new battery chemistries are coming to market. The most used chemistry is the lithium-ion battery. These batteries are used in a variety of devices, from cell phones to electric vehicles to large-scale BESS.

To complicate matters, not all lithium batteries use the same chemistry and present different risks and benefits; there are actually six distinct chemistries with different benefits and use cases, and different risk profiles. The type of lithium battery used depends on the device or use case where energy storage is needed. Lithium iron phosphate (LFP) batteries are the preferred choice for grid-scale storage. LFP batteries are less energy dense than lithium nickel cobalt aluminum (NCA) and lithium nickel manganese cobalt (NMC) batteries—which are preferred in electric vehicles where weight matters— but more stable and have greater thermal stability (lower thermal runaway risk) than other lithium chemistries.

Emerging battery chemistries that are not lithium based also present different risk/benefit profiles, including promising characteristics for stationary uses. These include iron-air batteries, zinc-air batteries, flow batteries, and solid-state batteries. Several of these technologies promise to be a good choice for stationary storage and grid integration as they have a longer performance period, showing no degradation for up to 30 years (IEA 2023).

Solid-state batteries are typically used in medical devices like pacemakers and other wearable devices, but over the last decade there has been significant research in this field to expand applicability to automotive, transportation, and other industrial uses (Weppner 2003). These batteries use a solid electrolyte instead of a liquid/polymer gel and could potentially prove to be safer, less flammable, and provide better cycling performance and strength (Ping et al. 2019).

Zinc-air batteries are another emerging technology that could be useful for utility-scale energy storage. Although they have not yet been tested for grid energy storage, these batteries may be safer and more environmentally friendly than



lithium-ion batteries since they use water as a component and zinc is less destructive to mine (Proctor 2021).

BESS Market Forces

While non-battery energy storage technologies (e.g., pumped hydroelectric energy storage) are already in widespread use, and other technologies (e.g., gravity-based mechanical storage) are in development, batteries are and will likely continue to be the primary new electric energy storage technology for the next several decades. There are three reasons for the dramatic increase in deployment of grid-connected BESS:

1. The rapid increase in variable renewable energy development (especially solar and wind) creates a large market for energy storage technologies to control the flow of energy between power generators and end uses on the grid and mitigate energy spikes or power quality issues.
2. Dramatic drops in the cost of batteries combined with improved performance have made batteries a much more useful tool for electric grid resilience and

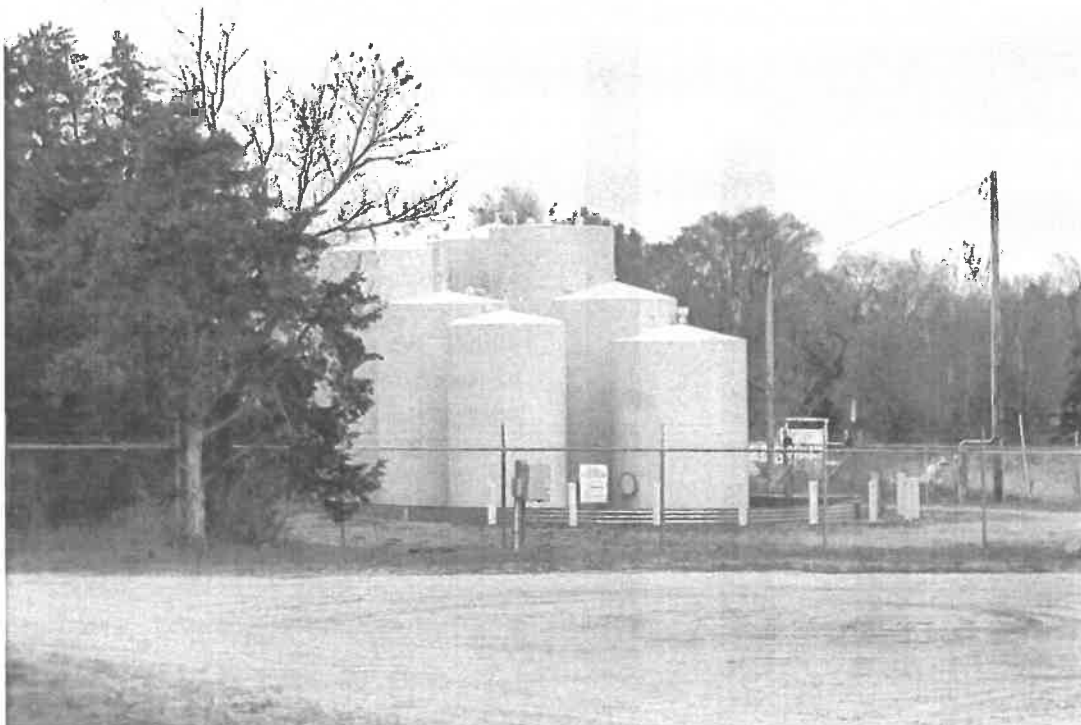
reliability, potentially replacing fossil-fuel-based peaking power plants.

3. The **2022 Inflation Reduction Act** included significant new tax credits for energy storage, providing a substantial incentive that is rapidly pushing battery system investments across the nation.

BESS is a land use that can have value at any point on the electric grid. The grid runs across the rural-to-urban transect and is infrastructure that exists in almost every zoning district. The upshot is that communities will need to consider how stationary battery storage, particularly the larger BESS applications, fits into their land-use plans and should be addressed through zoning regulations.

Energy Storage as a Land Use

While stationary battery storage is a new land use for most communities, all communities already have and likely regulate other forms of energy storage. How communities treat existing energy storage land uses in ordinances can help inform the level of risk and degree of regulation needed to protect the community's health, safety, and general welfare.



*A propane and oil distribution business in an incorporated city
(Credit: Brian Ross)*

Established Energy Storage Uses

While rarely categorized as “energy storage,” many communities already host various energy storage land uses, and many of these uses carry safety risks. Long-established energy storage uses include gas stations (underground tanks store thousands of gallons of highly volatile fuel), propane storage and delivery businesses, ammonia storage and delivery businesses, and even grain elevators, which contain a vast and potentially volatile energy source (Donley 2023).

“As is true with many technological advances or with new and potentially dangerous products, there is a tendency either to view the advance as a fearful monster, and outlaw it from the city, or to assume that the new project differs little from its predecessor... both of these are wrong” (ASPO 1951).

Perhaps the most common energy storage use in communities across the country (Credit: Brian Ross)

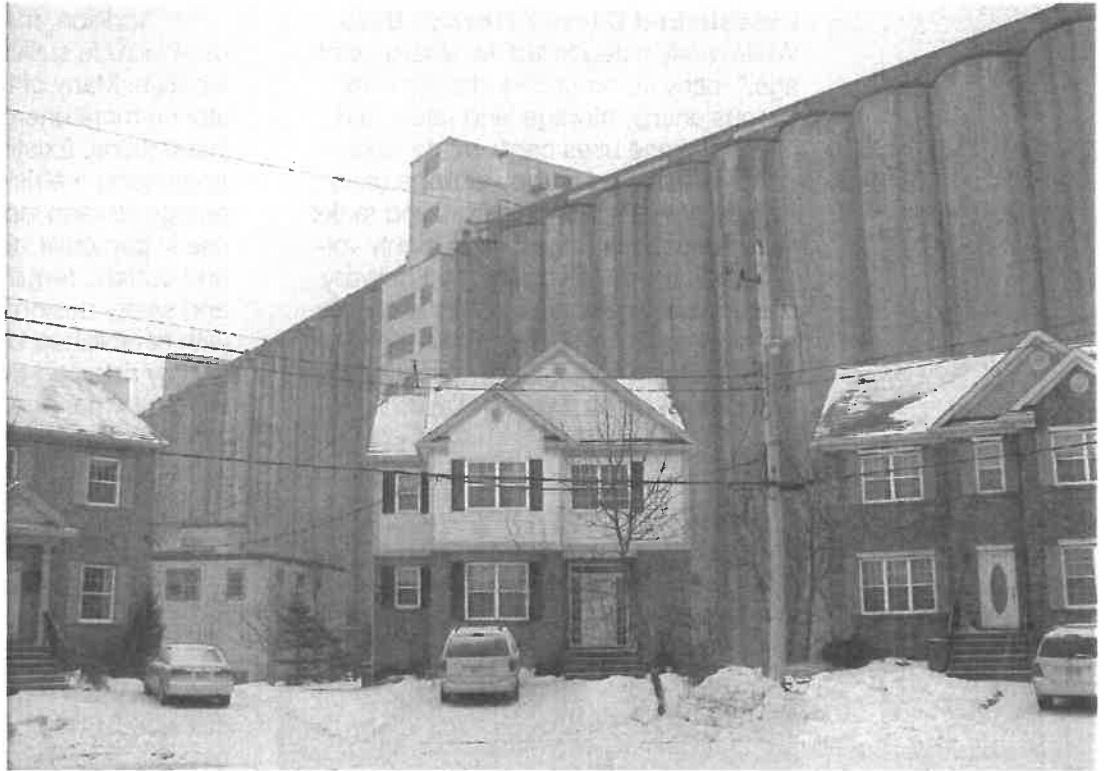


In addition, many industrial land uses include substantial energy storage facilities. Many of these land uses are storing more energy than typical BESS installations. Existing zoning standards addressing the risks associated with energy storage include isolation of the land use in particular districts, use of setbacks and buffers, requiring safety equipment and safety design standards consistent with established best practices for that energy risk, and training of first responders in how to manage the specifics of each type of energy storage. Some of these tools can also make sense for large-scale BESS, although adapted for safety best practices specific to batteries.

Unique Risks of Battery Storage

While examination of how non-electric energy storage facilities are regulated should inform regulation of battery energy storage, BESS do have some unique characteristics relative to other energy storage land uses and some unique considerations in addressing risks and emergency events. The primary safety risk associated with most battery chemistries, including

*Residences near
a grain elevator
complex in Halifax,
Nova Scotia (Credit:
Alexei & Verne
Stakhanov, Flickr)*



the predominant lithium-based batteries, is thermal runaway or thermal stability. As indicated by this term, an incident (i.e., a hazardous electrical, thermal, or mechanical event) causes a cell or cells within the battery bank to overheat and can lead to an escalating thermal event that damages the BESS and can result in fire, or rarely, an explosion (Jeevarajan et al. 2022).

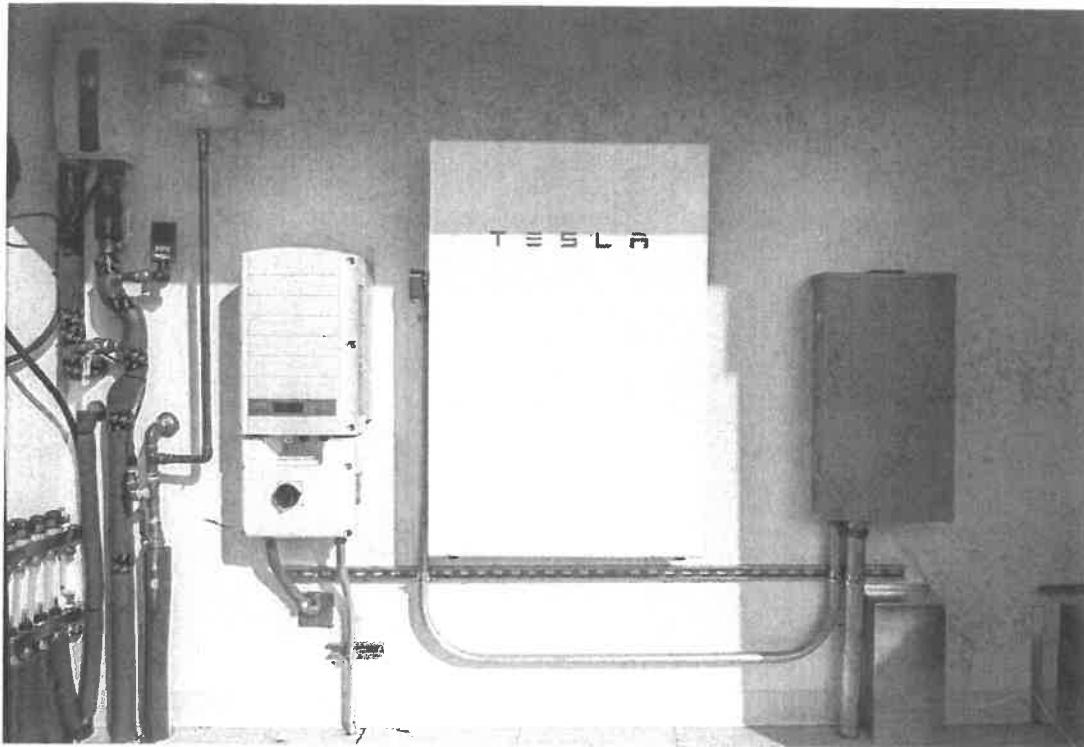
Some battery chemistries are more prone to thermal runaway than others, particularly chemistries with higher energy density (e.g., NMC and NCA). Planners should be aware that different types of lithium batteries carry different risks. In stationary applications, particularly BESS used in electric utility applications, LFP batteries are widely used and are less prone to thermal runaway.

According to the Electric Power Research Institute, there have been 22 BESS fires since 2012 in the U.S (but seven in 2023 alone) (2023). Some of the fires were minor, with the facilities being able to resume operation after the fire was suppressed (Twitchell, Powell, and Paiss 2023). But several higher profile fires or explosions that resulted in first responder injuries have raised awareness of risks and resulted in modified best practices in

containing risks. Public perception was also shaped by high profile events, and lead to the perception that BESS presents risks (or risks greater than other energy storage land uses).

The National Fire Prevention Association (NFPA) standard **855** sets safety code thresholds for batteries. Under this standard, operators of facilities with total energy storage exceeding 600 kWh must complete a hazard mitigation analysis, utilize fire suppression designs and equipment, conduct fire and explosion testing in accordance with **UL 9540A**, develop emergency planning, and conduct annual training of maintenance staff. These requirements are not applicable to residential BESS; the International Fire Code limits residential battery banks to 20 kWh for residential applications (**\$1207**). Multiple banks (up to 80 kWh total) can be installed if each bank is physically separated and protected from fire, but this is still well below the 600 kWh threshold.

Zoning standards can reference **NFPA 1: Fire Code**, **NFPA 70: National Electric Code**, **NFPA 855: Standard for the Installation of Stationary Energy Storage Systems**, and the International Fire Code in order to ensure that battery



A Tesla Powerwall residential battery system (Photo by Dennis Schroeder, NREL 48520)

installations are meeting safety best practices (rather than creating safety standards from whole cloth in an ordinance). States that set mandatory state-wide electric or fire codes will usually preclude a community from requiring additional safety standards or equipment.

American Clean Power (ACP) has developed the **“First Responders Guide to Lithium-Ion Battery Energy Storage System Incidents”** for first responders. Large-scale BESS site owners or managers (such as solar or wind farm operators or utilities installing at substations) should be required to train first responders in battery firefighting techniques and standards. Specific hazards noted by ACP include fire, explosion, arc flash, shock, and toxic chemicals.

Battery Energy Storage Use Cases

As the cost of batteries declines and the efficacy improves, batteries are being used in many new applications where costs were previously prohibitive. People are quite familiar with how this has changed consumer devices and function. Mobility devices using batteries, from electric bicycles and scooters to passenger vehicles and even buses, are also increasingly common in the market.

Stationary battery use cases are less well understood by the general public and are perceived as having land-use impacts that may require planning or zoning consideration. A review of the literature and existing standards applied by state and local jurisdictions shows that stationary battery applications fall into four general use cases, each of which has potential subcategories: residential, commercial, standalone utility asset, and integrated with wholesale energy generation.

Residential battery systems are generally coupled with rooftop or backyard solar arrays designed to supply household energy. These battery applications serve primarily a backup power or resilience function but are increasingly being deployed as an alternative to selling excess production to the utility as “net metering” buy back rates are reduced by state regulators or legislators. These systems all fall well below the 600 kWh NFPA 855 threshold for mandatory fire and thermal protections. Most residential backup systems would also fall below the 20 kWh International Fire Code (IFC) limitation for residential battery units.

Commercial battery systems are increasingly used in conjunction with on-site solar generation, particularly as



A commercial battery system outside of the Energy Systems Integration Facility at the National Renewable Energy Laboratory (Photo by Werner Slocum, NREL 74338)

a means to reduce the demand charge portion of commercial electric bills. Some applications are also designed to provide backup power or resilience benefits. Most systems will fall below the NPFA 855 threshold, but larger commercial or industrial applications will exceed the 600-kWh standard and need to meet structure containment, fire suppression, personnel training, and a variety of other standards.

Standalone utility asset battery systems are high-capacity systems deployed at substations or occasionally as a standalone land use, which serve to enhance performance and resilience of the local electric system. These systems will always be over the 600-kWh threshold and need to meet required safety and fire standards for large-scale energy storage.

Integrated with wholesale energy generation battery systems are high-capacity systems deployed within or as part of large-scale solar or wind facilities. These BESS serve the wholesale electric market at either the transmission or distribution system scale. These systems will always be over the 600-kWh threshold and need to meet required safety and fire standards for large-scale energy storage.

These use cases can be a distinguishing factor in how communities choose to regulate (or not) stationary batteries as a land use. Batteries incorporated into other land uses generally do not need separate

consideration for setbacks or buffers. Smaller scale applications (residential and some commercial) similarly do not rise to the level of risk requiring special treatment through local zoning.

Examples of Battery Storage Ordinances

In October 2023, the Pacific Northwest National Lab (PNNL) published a **summary** of energy storage provisions in local ordinances (Twitchell, Powell, and Paiss). The study identified, through a search of the **Municode** database, 59 jurisdictions with ordinances (zoning but also building, fire, tax, and sustainability ordinances) addressing battery energy storage systems. The extensive search across thousands of jurisdictions shows that very few jurisdictions have clear standards for battery energy storage land uses. Similar experiences with solar and wind energy land uses demonstrated that the lack of definition and standards results in widely varying treatment across jurisdictions, slowing deployment and raising the likelihood of inappropriate standards.

The Great Plains Institute (GPI) also conducted a national scan of jurisdictions for locally developed (i.e., sub-state) battery energy storage zoning standards. GPI queried energy storage or renewable energy developers regarding jurisdictions

that have standards and identified others through news stories on energy storage installations or ordinance changes. Additional sources included the [Solar@Scale guidebook](#), resources from the [SolSmart](#) national designation and technical assistance program, and unpublished work from the University of Michigan Graham Sustainability Institute's [Solar Zoning in the Great Lakes States](#) project (all funded by the U.S. Department of Energy). GPI's scan was to identify regional examples of local approaches to regulation of battery energy storage, not to complete an inventory of standards. GPI's scan looked at the details of 14 adopted or draft ordinances and two model ordinances across nine states.

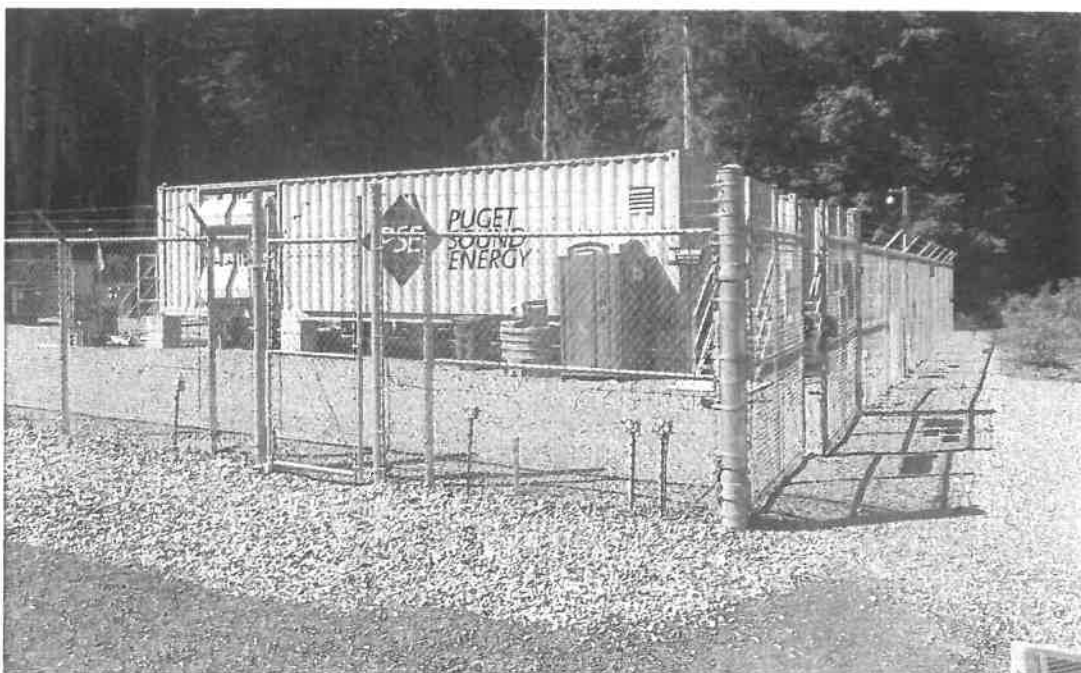
While energy storage regulations are rare overall, some consistent patterns and practices can be identified across existing ordinances. BESS ordinances typically included the following components:

- *Definitions:* Provisions identifying the battery use cases that will be regulated and identifying the distinctions between use cases that fit with the jurisdiction's priorities.
- *Use permissions:* Provisions identifying the districts where BESS are permitted or conditional, and the circumstances where BESS is accessory and where BESS are a primary use.

- *Dimensional standards:* Provisions identifying setbacks, including different setbacks for different use cases; height standards; lot size standards; and density or intensity standards.
- *Performance and design standards:* Provisions addressing noise, visual impact, treatment of power lines, fencing, lighting, and signage.
- *Safety and first responder standards:* Provisions identifying the required emergency plans and hazard information to be submitted and maintained as part of the permit, identifying design requirements for fire or environmental considerations, information or training for local first responders, and codes or safety standards for equipment or management.
- *Decommissioning standards:* Provisions identifying required decommissioning thresholds, decommissioning standards and outcomes, and financial sureties that are recommended or required.

Definitions

BESS definitions show some consistency across jurisdictions, such as the many definitions that distinguish between types of batteries consistent with fire and safety standards. However, the definitions still varied considerably.



A standalone utility asset battery system at a substation in central Whatcom County, Washington (Credit: [Robert Ashworth](#), [Flickr](#))

Some definitions intend to capture all BESS use cases, while others focus on only one application. For instance, Johnson County, Iowa, defines all BESS in two categories that reflect NPFA standards for safety and reporting (a threshold definition used by many jurisdictions that have BESS ordinances) (**Ordinance No. 05-19-22-01**). This definition is used by a number of jurisdictions and likely originated from the New York State Energy Research & Development Agency (NYSERDA) **model ordinance** developed in 2020. Johnson County defines *Battery Energy Storage System, Tier 1* as “one or more devices, assembled together, capable of storing energy in order to supply electrical energy at a future time, not to include a stand-alone 12-volt car battery or an electric motor vehicle; and which have an aggregate energy capacity less than or equal to 600 kWh and, if in a room or enclosed area, consist of only a single energy storage system technology.” *Tier 2* uses the same definition but has a capacity greater than 600 kWh or uses more than one battery technology or chemistry.

Some jurisdictions focus on a specific application or use case. The most frequent such application is BESS as a component of a solar or wind installation. Several jurisdictions addressed only this use case in their ordinance.

Another variation in definitions and uses is the treatment of BESS as a principal/primary use or as an accessory use. Some jurisdictions addressed only one or the other, and some both, but in different ways. For instance, Ellsworth, Maine, distinguishes between *accessory* and *stand alone* (i.e., principal use) *energy storage systems* based on how the energy from the battery is to be used (**§56-14**). To be considered accessory, the system “shall be designed with appropriate storage capacity to serve the principal use only and not the electric power grid.” In contrast, other jurisdictions included BESS installed at substations to be an accessory use to the utility or essential service land use, while Pueblo County, Colorado, defines BESS on solar farms as accessory but as a principal use at a substation (**§17-168.050.C.3**).

Use Permissions

Jurisdictions varied in the breadth of districts where BESS is permitted. Yorktown, New York, permits utility-scale BESS (*Tier 2*) in all zoning districts under a special use permit (**§300-81.5.G**). Will County, Illinois, permits BESS in one agricultural district, a special-purpose open space district, and three industrial districts (**§155-7.30**). Systems occupying 10-acres or less only require a discretionary use permit in the agricultural district, while larger systems require a discretionary use permit in all but the special-purpose open space district. These limits could restrict BESS from being used more broadly on the distribution system at local substations.

Dimensional Standards

Most ordinances required BESS to meet general structure setback standards for the district in which the system was located. Those that set BESS-specific setbacks used distances of 50–150 feet from property lines. For example, Johnson County, Kansas, requires a 150-foot setback from property lines for BESS within large-scale solar facilities (**Resolution No. 038-22**). Amelia County, Virginia, was the most restrictive in GPI’s review, requiring 5,000 feet between battery energy storage facilities and public roads and property lines (**§325-34.2.T(3)**).

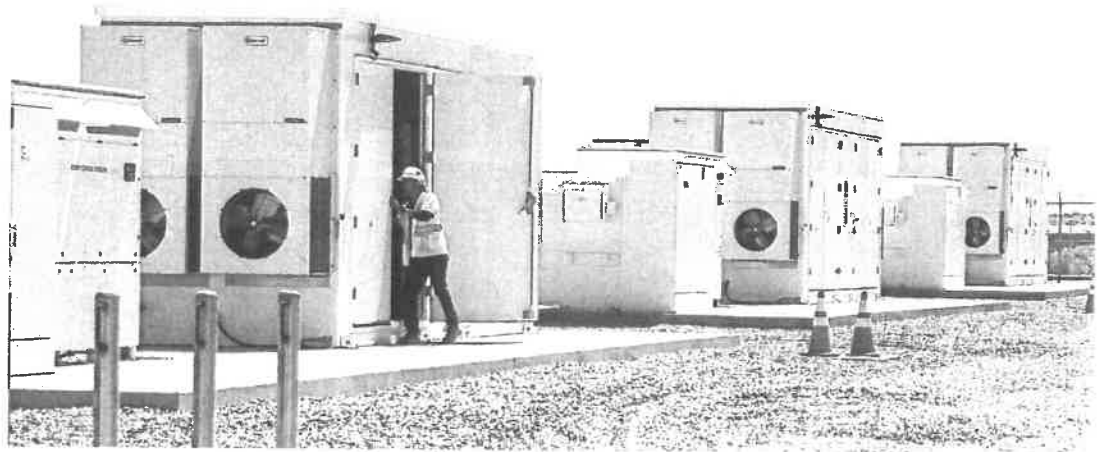
Performance and Design Standards

Most BESS ordinances for large-scale installations included several elements of site design, including mitigating visual impacts through vegetation or other screening, fencing standards, lighting standards, and treatment of power lines. Screening standards varied from simple requirements to screen from some adjacent land uses to requiring vegetation management plans that screened the entire facility or used solid fencing.

Safety and First Responder Standards

Nearly all jurisdictions included submittal requirements (with the permit application or site plan) for an emergency plan, operations plan, or fire safety plan. Some jurisdictions required separate approval

*An integrated with
wholesale energy
battery system at
the Beacon Solar
Plant in eastern
Kern County,
California (Photo by
Dennis Schroeder,
NREL 50688)*



of first responder officials for emergency plans. Utility-scale BESS are subject to many of these requirements through the National Electric Code or the National Fire Code, and to equipment testing and installation standards set in NFPA 885. Some ordinances listed all the requirements, others simply incorporated safety and first responder requirements by reference.

Decommissioning Standards

Most BESS ordinances include decommissioning standards and require financial sureties for the decommissioning process. Ordinances varied significantly in detail about decommissioning standards. Jurisdictions that addressed BESS as a component of solar or wind facilities included BESS decommissioning as a component of the larger project.

Recommended Practices

Several organizations have created guidance documents on how to treat battery energy storage systems within zoning (and sometimes other) ordinances with an eye toward enabling the local grid benefits of battery storage. The PNNL study (described earlier) identified considerations and best practices for several land-use issues. The New York State Energy Research & Development Agency (NYSERDA) created a **battery energy guide** for local governments that included both zoning and building/electric/fire code permitting recommendations, covering both residential and commercial use

cases and BESS. Many ordinances catalogued for this issue used the NYSERDA standards. American Clean Power has developed **guidance for local and state governments** that permit BESS or evaluate site-specific conditions, which includes a set of recommendations to inform local zoning choices.

BESS land-use applications and potential local benefits are also addressed in the **Solar@Scale guidebook** and in guidance from **SolSmart**.

Based on the review of best practices and considering implications of existing practices in jurisdictions who have included BESS in ordinance, here are some basic recommended practices and considerations for planning and zoning.

Exempt Small BESS from Zoning Standards

Small BESS (residential and commercial battery systems) located within existing buildings do not present land use issues, nor health and safety issues that are materially different from other electric devices or appliances. Safety and fire issues for these systems are addressed under the NEC and NFC. Consequently, zoning standards are generally not necessary for these energy storage systems.

Define BESS as a Distinct Use

Define BESS as a land use, separate from electric generation or production but consistent with other energy infrastructure, such as substations. BESS have potential community benefits when sited with other electric grid infrastructure.

The Case for Consistent Standards

Connexus Energy is an independent electric cooperative serving the northern metro area of the Minneapolis/St. Paul metropolitan region and is the largest co-op by number of members served in the Midwest. Connexus Energy's mission is to power its members and communities toward a smarter energy future with a passionate focus on affordability, innovation, safety, and grid reliability. Connexus is a leader in integrating community-scale solar and battery storage into its generation portfolio and positioning the non-profit utility and its member consumers to take advantage of new technological innovation and market transformations.

In coordination with the U.S. Department of Agriculture's announcement of the updated Empowering Rural America program, Connexus began considering stationary energy storage at strategic locations in its service territory to lower costs and improve reliability as load growth continued and climate-related weather vulnerabilities increased. Having already navigated multiple jurisdictions' (sometimes unpredictable) land-use permitting processes for building solar generating facilities, Connexus wanted to know how stationary battery storage facilities would be treated under the zoning code and permitting processes for each jurisdiction in the co-op's service territory.

Connexus worked with GPI, to assess how the landscape of jurisdictions would evaluate and permit standalone battery storage facilities (not part of a solar or wind energy project). Possible installations could be totally standalone or located at existing substations, so GPI and Connexus focused on the communities that hosted distribution substations, which included cities, counties, and townships with land-use ordinances.

GPI reviewed the published ordinances for these communities and then conducted a survey and a series of interviews with land-use planners and community development staff. The ordinance review revealed that only one jurisdiction referenced energy storage as a land use, and then only in the context of the solar ordinance (a solar + storage installation). In other jurisdictions, BESS would, therefore, either be treated as an accessory use, regulated under a general category such as "utility services," or not permitted. The survey and interview process focused on asking how the jurisdiction would likely treat BESS, should an application come forward.

The interviews documented that, while there were some consistencies across jurisdictions, the likely regulatory standards and permitting process varied from jurisdiction to jurisdiction. Most respondents were unfamiliar with the purpose of, need for, and land-use impacts and risks associated with battery storage.

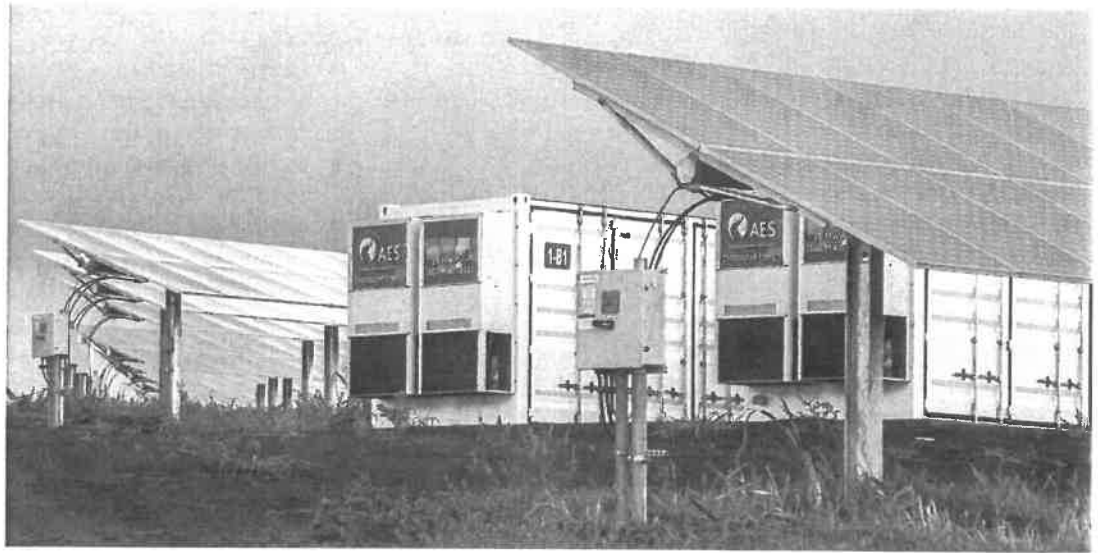
Responses as to how battery storage would be treated ranged from "it would not be allowed" to "it's a permitted accessory use at substations." The most common response was that large-scale battery systems would require a conditional use permit (CUP), and if located at an existing substation, would instead require a modification to the substation's CUP.

Respondents acknowledged that staff and decision makers would need to interpret their land-use standards in order to permit stationary battery storage. Several jurisdictions had an "essential services" or "public utility services" land-use category that included other electric system infrastructure, such as distribution lines, transformers, and related equipment. Such categories may or may not be deemed to include battery storage, depending on whether battery storage was considered a subset of the listed components. Such interpretive regulation creates uncertainty and can significantly affect permitting times, construction schedules and costs, and ultimate deployment.

The work demonstrates that as standalone battery storage projects become more common, there will be a need for establishment of zoning best practices and inter-jurisdictional consistency. Part of establishing best practices is helping local planners and decision makers understand the local need for energy storage, the role of storage as part of renewable projects, and the basics of the technology and its risks relative to more familiar land uses that include energy storage.

Connexus proactively addresses planned BESS installations with local government officials. Steps they take include education on safety for the local fire marshal provided by a third-party expert, presentations on the need for the installation for local reliability and cost savings, providing a tour of another battery facility to diminish uncertainty, conducting training for first responders, providing results of NFPA required safety tests, and helping local staff and decision-makers understand different battery chemistries.

*An integrated with
wholesale energy
battery system
at the AES Lawai
Solar Project in
Kauai County,
Hawaii (Photo by
Dennis Schroeder,
NREL 57997)*



Permit BESS as Accessory Uses

Permit BESS as an accessory use for sites with energy generation, particularly community- or utility-scale solar and wind facilities, subject to national safety standards (NFPA 855). Clarify that BESS are a permissible accessory use to substations within the substation footprint. Require a modification to an existing discretionary use permit or a new discretionary use permit for installations that would expand the substation area.

Allow BESS Across the Transect

Allow BESS as a conditional use in districts across the rural-to-urban transect. BESS can provide resilience and electric power quality benefits everywhere that the grid serves. How or where the electricity or power from the battery is used does not affect the land-use implications of the system, and generally should not affect how the BESS is regulated.

Require Compliance with NFPA 855

Require BESS applications to meet NFPA 855 standards, rather than adding additional local standards. Also, consider who will be responsible for preparing and training local first responders in BESS risks.

Require a Decommissioning Plan

Require BESS applications to provide a decommissioning plan. If the community requires financial surety for other kinds of uses, BESS should be subject to equivalent requirements. When BESS are

accessory to a new energy generation or substation facility, decommissioning and financial surety for the system should be incorporated into standards for the principal use.

Conclusions

Communities across the nation are seeing dramatic changes in our electric energy system, with new technologies and infrastructural investment occurring at an unprecedented speed and scale. One example is the rapid increase in use of battery energy storage systems (BESS), both in “behind-the-meter” installations in homes and businesses, and in utility-scale applications at substations on the grid and as part of new generations projects, primarily solar and wind energy deployments.

BESS are, however, new types of land uses not previously seen in most communities. While behind-the-meter installations do not have significant land-use implications, large-scale BESS is raising concerns due to the uncertainty associated with a new land use and because energy storage is necessarily associated with health and safety risks similar to those of other land uses with energy storage facilities such as gasoline stations, propane and ammonia businesses, and grain elevators.

BESS are a land use that can have value at any point on the electric grid. Communities need to assess how to host new technology including distributed generation, utility-scale generation, expanded

grid infrastructure, and energy storage facilities. Planners need to have a passing familiarity with energy storage basics and technologies, the risks and nuisances associated with batteries in different use cases, the benefits to the community of BESS deployment, and how batteries are similar to and different from existing forms of energy storage in the community.

Note: This issue is available free to all from Solar@Scale, a partnership between the International City/County Management Association (ICMA) and the American Planning Association (APA) that aims to help cities, towns, counties, and special districts understand and realize the potential benefits of large-scale solar development. For additional information about Solar@Scale visit icma.org/programs-and-projects/solarscale.

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March 8, 2024



Ann-Marie Aubrey
Planning and Development
Killingly Town Hall
172 Main Street 1st floor
Killingly, CT 06239

Subject: Windham Energy Center Technical Report Transmittal

To Whom it May Concern:

Enclosed please find a copy of the Technical Report prepared to describe information pertaining to the Windham Energy Center (the Project), a proposed battery energy storage system planned within an approximately 20-acre portion of a property located at 189 Lake Road, Killingly, Connecticut.

The Project is an electric storage facility that falls under the jurisdiction of the Connecticut Siting Council. Therefore, this Technical Report is being submitted by Windham Energy Center, LLC pursuant to Connecticut General Statutes (Conn. Gen. Stat.) §16-50I(e), which establishes local input requirements for the siting of an electric storage facility under the jurisdiction of the Connecticut Siting Council. These local requirements pertain to the municipality where a proposed facility will be located (in this case, the Town of Killingly) and to any municipality within 2,500 feet of the proposed facility location (the Towns of Putnam and Pomfret).

Each municipality may submit comments and recommendations on the Project to Windham Energy Center, LLC within 60 days of receipt of this information for consideration in the development and submittal of the filing of an application with the Connecticut Siting Council.

Should you have any questions or wish to discuss the Project, please do not hesitate to reach out.

A handwritten signature in black ink, appearing to read "Morgan Carachure".

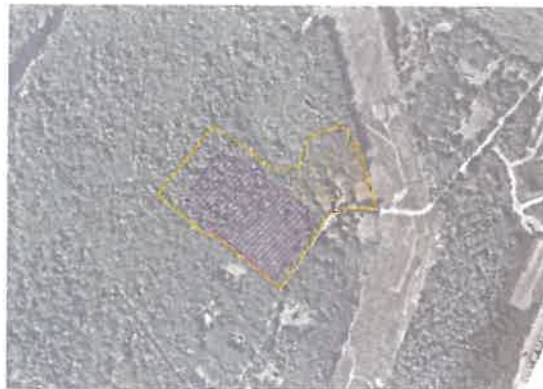
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RECEIVED

MAR 11 2024

PLANNING & ZONING DEPT.
TOWN OF KILLINGLY

**TECHNICAL REPORT
WINDHAM ENERGY CENTER
LAKE ROAD, KILLINGLY, CONNECTICUT**



by
Haley & Aldrich, Inc.

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MAR 11 2024

for
Windham Energy Center, LLC

**PLANNING & ZONING DEPT.
TOWN OF KILLINGLY**

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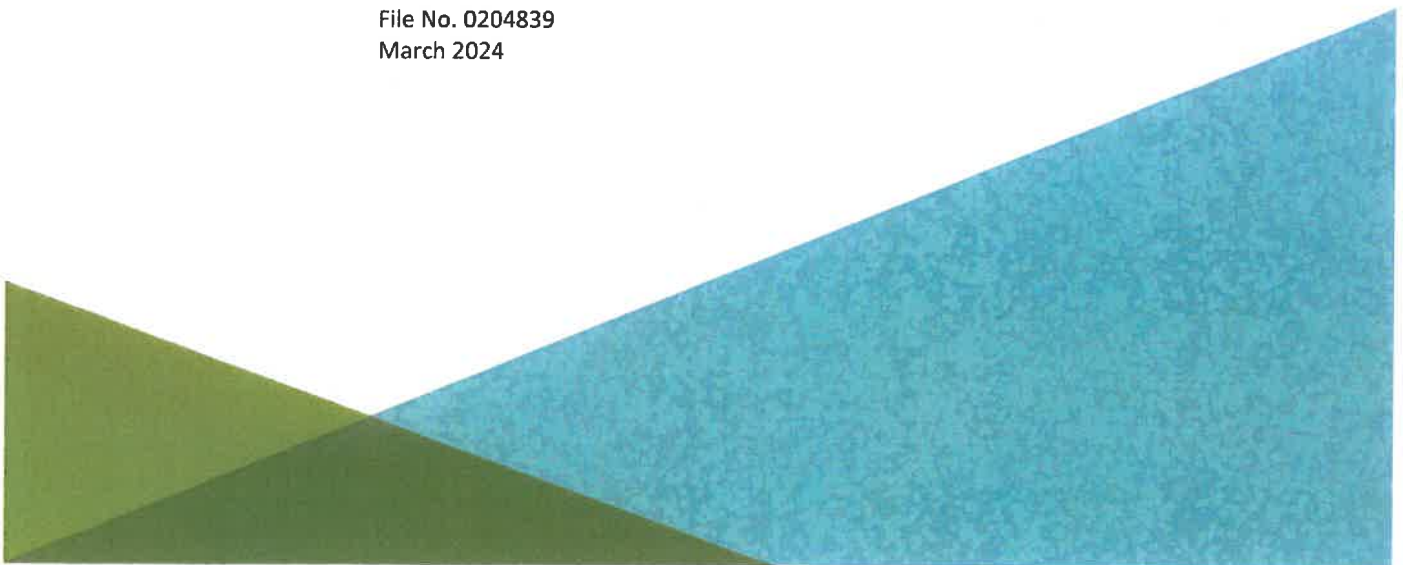


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List of Abbreviations

Abbreviation	Definition
AC	Alternating Current
Applicant	Windham Energy Center, LLC
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers
ASME	American Society of Mechanical Engineers
BESS	Battery Energy Storage System
BMP	Best Management Practice
BMS	Battery Management System
CATL	Contemporary Amperex Technology Co., Limited
Conn. Gen. Stat.	Connecticut General Statutes
Council	Connecticut Siting Council
CSC	Connecticut Siting Council
CTDEEP	Connecticut Department of Energy and Environmental Protection
D&M Plan	Development and Management Plan
dB	decibel
dBA	A-weighted decibel
DC	Direct Current
Eversource substation	Substation to interconnect to the existing Eversource electrical grid, to be designed, permitted, constructed, and owned by Eversource
FSS	Fire Suppression System
HVAC	Heating, Ventilation, and Air Conditioning
IPaC	Information for Planning and Consultation
kV	Kilovolt
MBMU	Main Battery Management Unit
MW	Megawatt
MWh	Megawatt-hour
NDDB	Natural Diversity Database
NFPA	National Fire Protection Association
NPDES	National Pollutant Discharge Elimination System
Project	Windham Energy Center, a 320-MW/640-Mhr battery energy storage system project
Project Area	an approximately 20-acre portion of a 62-acre property located off Lake Road proposed for development and operation of the Windham Energy Center
Project Substation	substation to transfer and provide step-up/step-down of energy between the Eversource substation and the BESS
PUESA	Public Utilities Environmental Standards Act
ROW	Right-of-Way
RSP17&19	2017 and 2019 ISO New England Regional System Plans
SBMU	Slave Battery Management Unit
SHPO	State Historic Preservation Office
SWPPP	Stormwater Pollution Prevention Plan
TMS	Thermal Management System
UL	Underwriter's Laboratory
USFWS	United States Fish and Wildlife Service
WEC	Windham Energy Center, LLC

1. Introduction

This Technical Report is submitted by Windham Energy Center, LLC (WEC or Applicant) pursuant to Connecticut General Statutes (Conn. Gen. Stat.) §16-50I(e), which establishes local input requirements for the siting of an electric storage facility under the jurisdiction of the Connecticut Siting Council (Council or CSC). This statutory provision requires the submission of technical information to officials of the municipality where a proposed facility may be located, and any municipality within 2,500 feet of the proposed facility location. In addition to officials in the Town of Killingly, copies of this Technical Report have been provided to officials in the Towns of Pomfret and Putnam, Connecticut, based on information shown in Figures 1 and 2.

WEC is proposing the development and operation of the Windham Energy Center (the Project) on an approximately 20-acre property that is part of a larger, 62-acre parcel located west of Lake Road in the Town of Killingly, Connecticut (the Project Area). The Project consists of an approximately 320-megawatt (MW)/640 MW-hour (MWh) battery energy storage system (BESS) and related substation (Project Substation), called collectively "Project," which will interconnect to the existing Eversource 345-kilovolt (kV) overhead electric transmission line within a right-of-way (ROW) located to the north and east of the Project Area (Eversource ROW). The interconnection will require an electrical substation which will be designed, permitted, constructed, owned, and operated by Eversource (Eversource substation). Eversource will provide a separate filing to address the Eversource substation and interconnection once design details have been confirmed. It is assumed that the Eversource substation will be located within a 300-foot by 300-foot area adjacent to the existing Eversource electric transmission line and that no material activities would occur outside of the Project Area. Best available information will be provided in the application to characterize the anticipated impacts associated with the Project, including assumptions for the Eversource substation.

1.1 APPLICANT INFORMATION

WEC is owned solely by SV Renewables LLC, which is owned and controlled by Sunflower US L.P. Sunflower US L.P. has successfully developed, financed, constructed, and operated renewable energy projects in Italy, Spain, Poland, and Israel. In addition, senior members of the Sunflower US L.P. team have over 5 years of previous experience developing renewable energy projects in the United States. Upon approval, the Project will be owned and controlled by WEC.

Vitis Energy is engaged in providing development services for SV Renewable LLC and is doing so for this project. In addition to WEC, Vitis Energy is actively developing more than two gigawatts of clean energy power generation assets, with around 800 MW (solar and battery storage) expected to begin construction this year. The company prides itself on its robust community partnerships, focusing on renewable energy initiatives to ensure sustainable and impactful development. The team at Vitis Energy boasts a combined total of over 100 years of experience in the development, construction, and operations of infrastructure and clean energy projects, underscoring their commitment to excellence in the renewable energy sector.

1.2 PROJECT PURPOSE AND INTENT

WEC is proposing the development and operation of the Project, an approximately 320-MW/640 MWh BESS and Project Substation to respond to the need for modernization and reliability enhancements in the region's electric infrastructure. These enhancements will provide the ability to store electricity generated during non-peak conditions for use to meet peak energy needs. BESS facilities have become increasingly important as the region's electric generation portfolio integrates increasing numbers of intermittent energy sources, such as wind and/or solar facilities. The Project is well suited to meet these growing energy needs while satisfying Connecticut customers and public policy requirements in a reliable, low-cost, and environmentally friendly manner.

The Project will interconnect with the existing 345-kV Eversource overhead electric transmission line via the proposed Eversource substation, which will be designed, permitted, constructed, owned, and operated by Eversource within the Project Area.

1.3 PROJECT SELECTION PROCESS

Alternative technology evaluation has not been undertaken, as the purpose of the Project is to provide a BESS facility to meet specific regional needs. In addition, no fuel is required for the Project. The following sections discuss the review of alternatives associated with Project size and location.

1.3.1 Consideration of Alternative Project Sizes

Identifying an appropriate size for the Project included engineering studies and consultation with local utilities to maximize efficiency and effectiveness. To appropriately size a BESS, a balance must be found between existing capacity to support network load and other limiting factors so that system reliability is not negatively impacted. Most BESS facilities within Connecticut intended to support ISO-New England¹ range between 4.9 MW and 7.0 MW. Based on economies of scale, it is sensible to propose the largest size BESS a given location can support.

1.3.2 Consideration of Alternative Project Sites

The 2017 and 2019 ISO New England Regional System Plans (RSP17 & 19) cited energy security and renewable resource integration as key issues that needed to be addressed. In response, the Applicant team and its advisors began searching for a viable energy storage site within the ISO-New England operating area. RSP17 & 19 identified that energy storage assets would be very beneficial in addressing the reliability issues caused by "just-in-time" fuel sources (i.e., natural gas) and intermittent generation, such as wind and solar. Therefore, beginning in 2019, WEC has made a concerted effort to search for a best-fit location to develop an ISO-New England energy storage resource.

WEC's initial site search prioritized locations with nearby electric transmission infrastructure, adequately sized parcels with nearby existing or planned industrial areas, and those with network infrastructure that would benefit from a reliable BESS solution.

WEC then weighed initial siting prospects on a set of criteria which narrowed viable site locations. The criteria included proximity to required infrastructure, community long-term plans and interest,

¹ The independent, non-profit Regional Transmission Organization that serves Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont.

probability of permitting, and consideration for financial and transmission planning modeling. Figure 3 illustrates Connecticut's existing electric transmission system and areas of renewable energy development within the state, which were used to evaluate potential Project locations.

As can be seen on Figure 3, one location where a convergence of electrical infrastructure and renewable development occurs is Windham County. Other locations of interest evaluated were determined to require more extensive infrastructure updates (such as the construction of lengthy transmission lines or more extensive system upgrades to transport the power).

Research identified the Town of Killingly's Plan of Conservation and Development: 2020 - 2030, which detailed Killingly's interest to continue to support growth of its designated commercial and industrial areas. WEC has conducted due diligence and met with stakeholders to discuss their general interest level, prospective site locations within the region, and existing infrastructure capabilities. WEC's development of the Project will provide critical support to the transmission network, further enabling growth within the current industrial and commercial development space. In addition, Killingly's experience with industrial and energy facilities in the area and the region has helped increase the Town's awareness that clean energy projects can be "good neighbors" that offer economic and community benefits.

Based on these discussions, several specific parcels were identified as potential alternative locations for the Project within Killingly, as shown in Figure 4. Each of the potential locations is located proximate to both the existing Eversource 345-kV overhead electric transmission line and the Killingly Industrial Park. Option A reflected an approximately 20-acre portion of property on the northwest side of Lake Road that had previously been approved as the location of an energy project (189 Lake Road). Option B focused on an approximately 11-acre area consisting of 3 parcels bounded to the west by existing natural gas pipeline infrastructure, located on the northwest side of Lake Road. Option C reflected an approximately 15-acre parcel further south, north of Cottons Bridge Road and northwest of Lake Road. Option D comprised approximately 14 acres and 4 parcels southeast of Lake Road.

All four siting options have potential access to existing electric transmission lines, with Option A reflecting the closest point of interconnection (adjacent to the existing Eversource ROW), and B and D reflecting other locations that are relatively close to the point of interconnection (approximately 1,000 feet and approximately 780 feet, respectively) than Option C (1,900 feet). Local distribution class networks are also important to support temporary power during construction and auxiliary power for Project operations, and are available for each of the four siting options. Options A, B and C reflect more level terrain, with Option D comprised of steeper slopes over much of the property. Three of the four options currently are the location of residential properties that would be demolished to support the Project; all site options are generally similar in character.

Table 1. Summary of Characteristics for Optional Sites

Attribute	Option A	Option B	Option C	Option D
Adequate Size/Configuration	Adequate size/compact site	Adequate size/compact site	Adequate size/compact site	Adequate size/less compact site
Distance from Point of Electrical Interconnection	Adjacent to interconnection	Slightly longer than Option D, but no crossing of Lake Road needed	Longer than both Options B and C	Short distance, but requiring Lake Road crossing
Land Use	Wooded, with 1 residence. Within an area designated for industrial growth. Within a site previously approved for an energy project.	Wooded, with 3 residences. Proximate to area designated for industrial growth.	Wooded. Closer to a denser residential area.	Wooded, with multiple residences.
Terrain	Relatively gentle, with steeper side slopes	Relatively gentle, but steeper surrounding slopes	Slightly steeper than Option B	Relatively gentle, but knoll-like

Option B was initially selected, based upon availability and more favorable attributes. WEC's preliminary design and due diligence activities, at this point, included—but were not limited to—easement assessments, legal review of prior development activity in the region, review of permitting efforts regarding energy generation projects in the region and statewide, revenue forecasting, review of natural resource conditions, and preliminary engineering. In 2021, WEC determined that the Project had a high probability for success and officially created Windham Energy Center, LLC for all efforts regarding the Project going forward.

The more detailed evaluation of Option B identified that significant retaining walls would be required to design the Project in this location. In addition, while a Lake Road crossing would not be required, the electrical lines would be required to extend across an access owned by the Wyndham Land Trust. Therefore, WEC reached out to property representatives with interest in Option A. This would allow for even greater proximity to the electrical interconnection and would move the Project to a property previously considered suitable for energy development and operation.

Activities have continued to refine engineering design, coordinate with Eversource, and engage in activities evaluating the Project at the proposed location (Option A).

2. Windham Energy Center – Project Description

The Project is a planned 320-MW/640-megawatt-hour (MWh) BESS installation, designed to work as a stand-alone facility that can store energy during off-peak times to hold in reserve and meet peak energy demands when needed. The Project will consist of lithium-ion batteries installed in racks within prefabricated containers; inverters; medium-voltage transformers; control equipment; switchgear; and a Project Substation that will collect and transfer voltage between 34.5 kV and 345 kV and connect to the Eversource substation. The Eversource substation will be designed, permitted constructed, owned, and operated by Eversource. The Eversource substation is proposed within an approximately 2-acre area adjacent to the existing Eversource ROW. The Project layout, including assumptions for the Eversource substation, is shown in Figures 5 and 6.

While the specific battery technology could change, FlexGen technology (represented by the materials provided in Appendix A), is reflected in this document as the likely design module. The batteries will be installed in pre-engineered containers with battery storage racks including relay and communications systems for automated monitoring and managing of the batteries to facilitate design performance. A battery management system (BMS) will be provided to control the charging/discharging of the batteries along with temperature monitoring and control of the individual battery cell temperature with an integrated cooling system. Batteries operate with direct current (DC) electricity that must be converted to alternative current (AC) for compatibility with the existing electric grid. Power inverters to convert between AC and DC, as well as transformers to step up the voltage, will be included in the layout. It is assumed that height of the BESS will be limited to approximately 10 feet.

Note that the layout indicates locations for future augmentation units. Because batteries operate less efficiently over time, it is anticipated that these smaller DC augmentation units will be added to supplement storage. These will be phased installations over the life of the Project, with the first augmentation targeted after approximately 3 years of operation, and additional augmentation every 5 years thereafter. The locations of the augmentation are shown to demonstrate the full build-out planned for the Project over time.

The Project will be located within the approximately 20-acre Project Area, as shown in Figures 5 and 6. Approximately 20-foot-wide gravel access roads will provide for movement throughout the Project Area, and the areas between equipment will also be gravel or grass-covered. The construction area designated on the plan will be used for operational and maintenance parking once construction is complete. All parking, including for construction, is anticipated to be accommodated within the Project Area. As shown in Figure 5, the Project will be set back from Lake Road by a minimum of approximately 75 feet, with a majority of the existing vegetation remaining in-place for visual screening, except in the location of the access drive. The Project will also be surrounded by a security fence and gate.

The Project will not require a water supply. The BESS incorporates integrated Underwriters Laboratory (UL)-certified fire suppression and a liquid-cooled thermal management system, which should limit external firefighting needs. No wastewater discharge is anticipated. No process water requirements are associated with a BESS installation, and no operations building that would require domestic utilities is planned. Stormwater management will be necessary in association with the Project, as discussed further in Section 4.5.

3. Regulatory Review Process

The following sections provide an overview of the regulatory review processes anticipated to apply to pre-construction approval of the Project.

3.1 CONNECTICUT SITING COUNCIL

Municipal jurisdiction over the siting of the proposed BESS described in this report is pre-empted by provisions of the Public Utilities Environmental Standards Act (PUESA), Conn. Gen. Stat. §16-50g et seq. The PUESA gives exclusive jurisdiction over the location, type, and modification of electric storage facilities to the Council (Conn. Gen. Stat. §§16-50i(a)(3); 16-50x(a); and 16-50x(d)). Accordingly, the Project described in this report is exempt from the Town of Killingly's land use (zoning and wetlands) regulations.

Upon receipt of an application, the Council will assign a docket number, and following a completeness review, set a docket schedule, including a hearing date. At that time, the Towns of Killingly, Putnam, and Pomfret may choose to participate in the Council's proceeding. Other procedures followed by the Council include serving WEC and other participants with interrogatories, holding a pre-hearing conference, and conducting a public hearing. Following the public hearing, the Council will issue findings of fact, an opinion, and a decision and order.

Prior to construction, the Council will also require WEC to submit a development and management plan (D&M Plan), which is in essence, a final site development plan showing the details of the facility incorporating any conditions imposed by the Council. These procedures are also outside the scope of the Town's jurisdiction, and are governed by the Conn. Gen. Stat., the Regulations of Connecticut State Agencies, and the Council's Rules of Practice. If the Council approves the electric generating facility described in this Technical Report, WEC or its contractor will submit an application for approval of building and electrical permits, as required, to the Building Official. Under Section 16-50x of the Conn. Gen. Stat., which provides for the exclusive jurisdiction of the Council, the Building Official must honor the Council's decision.

3.2 OTHER STATE AND FEDERAL PROGRAMS

Table 2 provides a list of potential environmental permits required prior to construction for the Project. As Project details are further developed, additional review may be required at the state and federal level, and additional pre-construction permits could be required.

Table 2. Potential Environmental Permitting Requirements – Pre-Construction

Agency	Permit/Approval	Comments
State Permits, Reviews, and Approvals		
Connecticut Siting Council	Certificate of Environmental Compatibility and Public Need	Required prior to Project construction.
Connecticut Department of Energy and Environmental Protection (CTDEEP)	Natural Diversity Database (NDDb) – endangered species program	Review request submitted on 28 September 2023; response received 11 October 2023. To be updated to reflect adjusted property.

Agency	Permit/Approval	Comments
	National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater – Construction Activity General Permit	Required prior to Project construction that disturbs greater than 1 acre of ground area.
Connecticut Commission on Culture and Tourism – History Division	Historic and archaeological resource review	Correspondence on 6 September 2016 confirmed no additional archaeological investigations are warranted and no historic properties will be affected at 189 Lake Road.
Federal Permits, Reviews, and Approvals		
None known to be required.		

3.3 MUNICIPAL CONSULTATION PROCESS

Pursuant to Conn. Gen. Stat. §16-50I of the General Statutes, Town officials are entitled to receive technical information regarding the proposed electric storage facility at least 60 days prior to the filing of an application with the Council. In accordance with these provisions, this Technical Report is provided to the Town of Killingly (the host municipality) and the Towns of Pomfret and Putnam (municipalities within 2,500 feet of the Project Area) and includes: information on the public need and benefit of the Project; details of the Project; a description of the site selection process; and a discussion of potential environmental effects associated with the Project.

Each municipality may conduct public information hearings or meetings, as it deems necessary, to develop and advise WEC of its recommendations concerning the Project. Notice of any public information meeting or hearing will be sent to abutting landowners and will be published in a newspaper of general circulation in the municipality, at least 15 days prior to the hearing.

(*) Within 60 days of the initial consultation, the municipalities are required to issue recommendations on the Project to WEC. Within 15 days of the filing of the application, WEC must provide the Council with copies of all materials provided to the municipality, a summary of the consultation effort, and all recommendations issued by the Town(s).

(*) In addition, Conn. Gen. Stat. §16-50x(d) states that the Town's Planning and Zoning Commission and Inland Wetlands Agency may issue orders to "regulate and restrict" the Project's proposed location. All such orders must be in writing and recorded in the records of the respective community. Notice of the issuance of such orders must also be provided to WEC or other parties affected by the orders. The "regulate and restrict" orders must be filed with the Council not more than 65 days after the filing of the facility application. These orders are subject to appeal to the Council within 30 days after the giving of the notice by the municipality.

4. Environmental Considerations

The following narrative provides preliminary information describing consideration of key environmental factors that will be evaluated by the Council for the Project. Preliminary details have been provided if available; otherwise, a discussion of pending studies to be completed has been provided. Topics addressed in the following sections are: air quality; wetlands and watercourses; wildlife and endangered species; water use and discharge; stormwater management; visual impacts; cultural resources; noise; traffic; solid waste disposal; emergency response; and electric and magnetic field effect.

4.1 AIR QUALITY

The Project will have no air emissions during normal operation, and no air permitting would be required. Because construction activities are minimal, it is not expected that dust or other emissions associated with the construction phase will have a significant adverse environmental effect. Best management practices (BMPs) will be used, and state guidance followed, to minimize the potential for such temporary impacts.

4.2 WETLANDS AND WATERCOURSES

The Project Area has been evaluated to identify wetlands and watercourses within its boundaries and on adjacent parcels, and none have been identified. The majority of the wooded areas within the Project Area are evergreen woods dominated by white pine. Smaller areas of less homogenous tree cover extend into the Project Area. Mixed hardwood and old field habitats are present in more eastern portions of the Project Area; this includes the mowed/maintained yard associated with the residence located within the Project Area.

The Project Area was previously evaluated in 2016 to identify where wetlands and watercourses were located within a larger property. A confirmatory review of the Project Area was conducted in September 2023 and February 2024 to affirm that conditions had not changed (Appendix B). All Project activities are proposed within upland forest. Wetlands known to be proximate to the Project-related features are shown on Figure 7. None of these wetland areas are located within 100 feet of any proposed Project improvements.

4.3 WILDLIFE AND SPECIES EVALUATION

Detailed avian, amphibian, and reptile surveys were completed in 2016 for an area that encompassed the Project Area. The Project Area reflects residential use and upland forest; no wetland impact is proposed.

The potential for the Project to impact species, particularly protected species, has been considered in order to incorporate appropriate species protection measures. An Information for Planning and Consultation (IPaC) was completed in February 2024 for the Project Area. According to the United States Fish and Wildlife Service (USFWS), the Project Area is located within the range of the northern long-eared bat (*Myotis septentrionalis*) and the monarch butterfly (*Danaus plexippus*). WEC plans to restrict tree clearing such that no mature tree clearing would occur during the bat pupping season (June and July); therefore, no impact to this species is expected. The monarch butterfly relies on milkweed plants

to lay their eggs and feed. Due to the Project Area being mainly forested, the monarch butterfly is not likely to be present within the Project Area.

The Project Area is within a property that was the subject of review by the CTDEEP in 2016. A submittal was made to the CTDEEP NDDB (filed on 27 September 2023) for a location that includes much of the Project Area to update that review and confirm whether additional species measures or studies would be warranted. A response was provided by CTDEEP on 11 October 2023, that was consistent with prior reviews for the area. Updated correspondence to CTDEEP will be provided to adjust to the current Project Area, with the outcome expected to be consistent with the below discussion.

CTDEEP correspondence on 11 October 2023 concurred with providing the following measures to avoid impacts to listed bats and turtle species:

- For any construction work done during the eastern box turtles' active period of 1 April through 1 November, the following precautionary measures will be employed:
 - Prior to construction, silt fencing will be installed around the work area. The area within the perimeter of the silt fence will be canvassed for the presence of turtles by a qualified individual one day prior to installation of the silt fencing and for five consecutive days following installation. Any turtles found within the bounds of the silt fence shall be relocated.
 - During construction, work crews will be apprised of the species description and possible presence. Work crews will search the work area for turtles prior to the start of each construction day. Any turtle encountered in the work area will be moved unharmed to an area immediately outside the fenced area and oriented in the same direction it was walking when found.
 - All precautionary measures will be taken to avoid degradation to wetland habitats, including any wet meadows and seasonal pools. No work is proposed in such areas for the Project Area.
 - Precautions will be taken to avoid turtles when heavy machinery or vehicles are traveling to the work area.
 - All silt fencing will be removed after work is completed when soils are stable so that reptile and amphibian movement is not restricted.
- Restriction of tree clearing such that none will occur during the months of June and July to avoid the pup season for bat species. Once construction is complete, no further impact is anticipated, with species continuing to use the remaining forested areas.

CTDEEP also requested, in the 11 October 2023 correspondence, consideration of potential lepidoptera habitat enhancements. A prior project had set aside a small area for such purposes that was within the old field habitat within the Project Area, and WEC will work with CTDEEP to determine how best to respond to this habitat recommendation.

No wetlands or vernal pools have been identified within the Project Area. The closest known and mapped vernal pool to the Project Area is over 500 feet to the northwest of the Project Area (as shown on Figure 7). Adequate Critical Terrestrial Habitat Area will remain to accommodate the lifecycle of vernal pool species.

Agency correspondence is provided in Appendix C.

4.4 WATER USE AND DISCHARGE

The Project will not require water use or discharge in association with its operation and function. Stormwater, addressed in Section 4.5, will be the only water discharge associated with the Project.

4.5 STORMWATER MANAGEMENT

WEC will incorporate careful consideration of stormwater management into its Project design and will develop a Stormwater Pollution Prevention Plan (SWPPP) to detail its BMPs. Calculations to determine the volumes and direction of stormwater flows across the Project Area will be undertaken to mimic this existing flow in the post-development design scenario. This will include the incorporation of BMPs consistent with state requirements, as outlined in the 2023 Connecticut Stormwater Quality Manual, which will include appropriate stormwater management design to prevent the potential for off-site impact.

4.6 VISUAL IMPACTS

The BESS consists of structures that will have a maximum height of 10 feet, with the exception of certain electrical equipment in the Project Substation that could be approximately 75 feet tall. The BESS structures will be set back a minimum of 75 feet from Lake Road, with most of the existing mature trees being retained along the Lake Road frontage, except where the site access drive is proposed. Given the limited height of the structures and the vegetative screening, the Project is not expected to be visually intrusive. A rendering of the Project is provided in Figure 8.

Similarly, the Eversource substation will be set back from Lake Road by approximately 75 feet, with vegetation remaining in the intervening area. Structure heights are anticipated to range from 75 to 120 feet within the limited Eversource substation footprint.

4.7 CULTURAL RESOURCES

The Connecticut Department of Economic & Community Development, Offices of Culture and Tourism acts as the State Historic Preservation Office (SHPO) for review of historic and cultural resource issues in Connecticut. Archaeological investigations were completed at the Project Area in accordance with SHPO requirements in 2016. No evidence of prehistoric occupations was identified during Phase 1B shovel testing, and SHPO concurrence was received on 6 September 2016 (Appendix D). It is not anticipated that further consideration or review of historic or archaeological features will be warranted.

4.8 NOISE

The Project will meet all applicable noise requirements at both the state and local level. The stringent standards define acceptable sound levels generated by an industrial facility at its property boundary. The acceptable levels vary depending upon the abutting land use; CTDEEP noise limits are summarized in Table 3, with typical sound levels profiled in Table 4.

Table 3. CTDEEP Noise Limits (A-Weighted Decibels [dBA])

Emitter	Receptor			
	Class C	Class B	Class A Daytime (7 a.m. – 10 p.m.)	Class A Nighttime (10 p.m. – 7 a.m.)
Class C – Industrial	70	66	61	51
Class B – Commercial and Retail Trade	62	62	55	45
Class A – Residential Areas and other sensitive areas	62	55	55	45

Table 4. Typical Noise Sources and Acoustic Environments

Noise Source or Activity	Sound Level (A-Weighted Decibels)	Subjective Impression
Vacuum cleaner (10 feet)	70	Moderate
Passenger car at 65 mph (25 feet)	65	
Large store air-conditioning unit (20 feet)	60	
Light auto traffic (100 feet)	50	Quiet
Quiet rural residential area with no activity	45	
Bedroom or quiet living room	40	Faint
Bird calls	40	
Typical wilderness area	35	
Quiet library, soft whisper (15 feet)	30	Very quiet
Wilderness with no wind or animal activity	25	Extremely quiet
High-quality recording studio	20	
Acoustic test chamber	10	Just audible
	0	Threshold of hearing

Adapted from: Kurze and Beranek (1988) and USEPA (1971).

CTDEEP regulations also prescribe provisions for impulse noise, prohibiting impulse noise in excess of 80 decibels (dB) (peak) during nighttime hours in any Class A zone, and 100 dB (peak) at any time in any zone. Audible discrete tones also require special consideration. A limit of 100 dB pertains to infrasonic and ultrasonic noise. Construction noise is exempt from CTDEEP noise regulations.

The Town of Killingly provides noise level standards applicable to the Project under Chapter 12.5, Article VI (Sections 120-131) of the Code of Ordinances. The Town standards are consistent with those prescribed by the CTDEEP, although the definition of daytime varies. The Town of Killingly considers daytime to be 7 a.m. to 9 p.m., Monday through Saturday, and 9 a.m. to 9 p.m. on Sundays. If measured background levels exceed the noise standard, a proposed source can contribute an additional 5 dBA over ambient levels; however, in no event can the proposed source exceed 80 dBA. No impulse sound greater than 80 dBA at night, or greater than 100 dBA at any time is allowed. Construction during daytime hours is exempt from the noise level standards, as is blasting between 8 a.m. and 5 p.m. (with proper permits).

WEC has focused on integrating mitigation elements into the design and layout of the Project. For example, the BESS facility will incorporate sound attenuation of its fans, and placement of the Project within the Project Area will provide setbacks from surrounding property boundaries. A noise modeling

study will be completed, the results of which will influence the final Project design and will be included in the Project's full application to the Council.

4.9 TRAFFIC

The Project Area is located approximately 1.2 miles to the west of I-395, a major transportation corridor. Temporary impacts to current traffic levels are anticipated to occur during the construction phase of the Project. Truck traffic delivering equipment and construction materials to the Project Area, as well as increased traffic associated with construction workers traveling to and from the Project Area, will occur at varying levels over the approximately 14-month construction process. There will be approximately 8 to 10 flatbed trucks per day and 30 to 40 workers during peak construction of around 2 months. The Eversource substation may require additional workers and would be expected to be completed within a similar time frame.

Traffic will occur along the segment of Lake Road that extends from I-395 to the Project Area. Much of this is within the current or planned industrial and commercial development area of Killingly. Coordination will occur with the Town to address scheduling to avoid peak commuter periods along that road, and to identify periods when manual control or other measures will be useful to minimize impact to existing users of that local road.

No permanent staff will be located at the Project; limited regular access for maintenance and monitoring will occur. Traffic levels would only increase during major maintenance periods, these instances are expected to be very minimal due to the nature of the technology employed.

It is not expected that traffic studies will be needed, although details will be provided to describe anticipated construction traffic levels in the application to the Council.

4.10 SOLID WASTE DISPOSAL

The Project will not result in unusual demand to local solid waste disposal infrastructure or systems. During construction, demolition debris, worker-related daily wastes (i.e., food wastes), packaging materials, and other debris typical of BESS construction would be expected. Once the Project is completed, no substantial solid waste generation is anticipated in association with normal operations.

4.11 EMERGENCY RESPONSE

Safety is of paramount importance in locating, designing, and operating energy projects, including BESS facilities, because BESS are most efficiently used when placed near the communities they serve. While grid-scale BESS have been in operation since at least 1996, adoption of lithium-ion chemistry BESS technology has been advancing since 2011 due to technological innovations and increased manufacturing capacity.² These technologies are continually evolving. Safety incidents that have occurred during early adoption of BESS have been drivers toward use of different material composition, as well as configuration and design. As BESS technologies have matured, test methods have been established to subject BESS technologies to rigorous conditions to allow for safety certifications and availability of safer BESS modules with more effective layout options.

² National Renewable Energy Laboratory, 2019. "Greening the Grid FAQs." Accessed September 2023 at <https://www.nrel.gov/docs/fy19osti/74426.pdf>.

WEC is committed to providing this Project as an energy solution that integrates well with its host community. One key design goal has been the selection of equipment with minimal safety risk.

4.11.1 Equipment Characteristics

The selected battery containers are EnerC+ units, shown in Figure 9, manufactured by Contemporary Amperex Technology Co., Limited (CATL). Each battery container (a rectangular box approximately 20 feet long, 8 feet wide, and 9.5 feet high) is designed to be fully enclosed as an independent operating system. The EnerC+ is a modular fully integrated product, consisting of rechargeable lithium-ion batteries with the characteristics of high-energy density, long service life, and high efficiency. The primary components of the safety and control system consists of the BMS, the Thermal Management System (TMS), and the Fire Suppression System (FSS).

Each storage container represents approximately 4 MWh of energy storage capability. Within each container, a racking system holds the individual battery modules. There are five battery racks in each container. Each rack holds eight individual battery modules, and each module contains 52 battery cells. The batteries are designed both separately and together to meet several relevant safety standards (UN38.3, UL1973, IEC62619, and UL9540A). Key safety systems are described in the sections below.

4.11.1.1 Battery Management System

The BMS monitors the battery voltage, current, and temperature. It uses the detected information to manage energy absorption and release, thermal management, low-voltage power supply, high-voltage security monitoring, and fault diagnosis and management.

The BMS architecture includes three primary levels of electrical controls. The first is the Main Battery Management Unit (MBMU), which is the core electronic control unit of the container. The MBMU oversees five Slave Battery Management Units (SBMUs) that each regulate a main compartment. Each cell is also equipped with a Cell Supervision Circuit that monitors the activity of each cell. The BMS, through its three-level distributed scheme (Cell Supervision Circuit, SBMU, and MBMU), controls the BESS unit to ensure the stable operation of the energy storage system.

Once operational, the internal sensors and communications system will allow a remote operations team to continuously monitor the systems, maintain battery performance, and control the BESS facility. Should any of the monitored factors indicate non-standard operation, remote shutdown can be initiated for a technician to identify and correct for any issues before they become a safety concern. In the event of a more significant failure or emergency, programmed alarms will alert the operations team to any faults with the batteries and the team is able to remotely shut down the facility. The operations team is also in charge of gauging the need for battery replacement and/or augmentation based upon facility performance.

4.11.1.2 Thermal Management System

The TMS provides liquid cooling to maintain the temperature of the BESS within an allowable operating temperature range. To maintain a stable temperature, each container includes a chiller and heater with a liquid cooling pipe distributed inside each battery module.

In addition to preventing heat buildup, this allows batteries to operate at ideal conditions for energy management. If unsafe temperatures are detected, an internal high-speed fuse is included that provides a switch that can cut off the high-voltage connection as needed, allowing individual modules to be remotely shut down and electrically isolated if an anomaly is detected.

4.11.1.3 Fire Suppression System

As an outdoor non-walk-in BESS, the EnerC+ provides a complete FSS with detection, explosion control, and fire extinguishing functions. Independent from the TMS, the FSS has its own detectors for heat, smoke, and hydrogen. The FSS is also electronically isolated with its own fire control panel. In total, the FSS consists of smoke detectors, temperature detectors, hydrogen detectors, the fire control panel, the aerosol, the explosion-proof fan, and an independent power supply. The control panel will also control and record information for the FSS during all events. The location of the detectors for each EnerC+ unit are depicted in Figure 9.

An extraction fan system is included which meets the National Fire Protection Association (NFPA) 855 and 69 standards. Should a thermal runaway event be detected in the container, the combustible gas can be pumped to the outside of the container to prevent dangerous concentrations of combustible gases from accumulating.

4.11.2 Current Safety Standards

The Connecticut Fire Code is based on NFPA-1 fire code and incorporates the Standard for the Installation of Stationary Energy Storage Systems, NFPA 855. This standard was first introduced in 2020, but the most current version of NFPA 855 was issued in 2023.

The most straightforward demonstration for a BESS project would be demonstration of compliance by using pre-engineered battery storage systems listed under UL9540. UL9540 serves as the system certification and does so by incorporating and making references to many other codes. It references over 60 other rules, which include UL1973 (batteries), UL1741 (inverters), American Society of Mechanical Engineers (ASME) B31 (power piping), ASME B & PV (boiler & pressure vessel), American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) 62.1 (ventilation), and NFPA 70 (electrical). With the new UL9540 requirements in place, systems larger than 50 kilowatt-hours or with separations less than 3 feet cannot be listed to the second edition of UL9540 without complying with appropriate UL9540A fire test performance requirements. The local fire authority may approve installations with larger energy capacities and smaller separation distances based on large-scale fire testing conducted in accordance with UL9540A, the Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems Standard.

UL9540A, Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage, can be used by technology developers to evaluate battery performance under a variety of adverse conditions to determine if a thermal runaway event (e.g., the risk of a fire in one location to spread) would occur at the cell, unit, enclosure, and installation level. Depending on the results, recommendations may be derived for that particular technology in terms of space or enclosure design, etc.

The results from the UL9540A Test Method can be requested from the manufacturer and presented to the local fire code official to address or waive building code and fire safety concerns involving BESS installation, ventilation requirements, effectiveness of protection, and fire response methods.

The CATL EnerC+ has completed UL9540A testing as discussed below.

4.11.3 Project Technology Testing

The battery cells, battery modules, and EnerC+ containers have been certified in accordance with the UL9540A test method. In order to satisfy the requirements of NFPA 855, the testing must indicate:

- No fire spread to surrounding equipment
- No array-to-array propagation
- No fire spread through fire resistance-rated barrier
- Explosion containment
- Explosions cannot injure occupants/first responders
- Toxic gases do not exceed Immediately Dangerous to Life or Health Levels
- Gas released will not exceed 25% of Lower Flammable Limit in their installed environment

4.11.4 Failure Modes and Effects Analysis

The NFPA 855 Standard for the Installation of Stationary Energy Storage Systems requires a hazard mitigation analysis for energy storage systems. This analysis is provided to the licensing fire authority and will evaluate the consequences of the following failure modes:

- A thermal runaway or mechanical failure condition in a single BESS unit
- Failure of an energy storage management system or protection system that is not covered by the product listing failure modes and effects analysis
- Failure of a required protection system including, but not limited to, ventilation (heating, ventilation, and air conditioning [HVAC]), exhaust ventilation, smoke detection, fire detection, fire suppression, or gas detection.

Under the NFPA 855 standard, the Project will only be approved if the consequences of the analysis demonstrate the following:

- Fire will be contained within unoccupied energy storage rooms for the minimum duration of the fire resistance rating specified in NFPA 855
- Fire and products of combustion will not prevent occupants from evacuating to a safe location
- Deflagration hazards will be addressed by an explosion control or other system.

The EnerC+ units are uniquely designed to satisfy these requirements, as the units are outdoor containers located in a secure facility and not within any occupied areas. The Project is also well spaced, allowing adequate access for emergency personnel. Additionally, as previously described, if a thermal

runaway event is detected in the container, the combustible gas can be pumped to the outside of the container to prevent dangerous concentrations of combustible gases from accumulating.

4.11.5 Additional Safety Precautions

Safety has been a primary metric in the selection of the technology used, the vendor design selected, and the layout proposed. The safety measures inherent in each container are intended to quench fires internally such that impacts would be limited to one specific container, or at most, a group of containers, allowing the damaged units to readily be replaced.

Highly stable chemistry is used in each battery. Electrical safety controls include an emergency-stop design, multiple fuse protection design, electrical and thermal monitors, multi-channel isolation design, and lightning protection design.

The fire protection design includes alarms, ventilation, and aerosol extinguishers to prevent fire spread.

Even with low anticipated levels of risk, it is important to plan for unanticipated events. The following reflect some measures planned in order to provide the community, first responders, and the Project team with assurances that appropriate actions are being taken and continuous improvement in safety performance is achieved.

- Although the containers will be monitored in real time such that any out-of-specification operation will be noted and both automated and manual responses initiated, signs will be posted on the fencing with a contact number in the event anyone in the local community were to observe something requiring action or investigation. The contact (telephone and email) will be monitored for immediate response.
- As noted above, the containers are designed to self-control and typical measures involve remaining at a safe distance as the incident is internally controlled and burns itself out. In addition, quick-connect piping will be available on the outside of the containers in the event that additional water is deemed beneficial to incident control.
- Training opportunities will be facilitated for local firefighters to review current state of the science and risk management procedures for actions, including when special respirator measures may be warranted during either a fire incident or during decommissioning of a damaged container. An outline of safety measures is provided in Appendix E.
- When an unanticipated event occurs, whether at this facility or in the industry more broadly, a continual review of safety procedures will occur that will update for any lessons learned.

4.12 ELECTRIC AND MAGNETIC FIELD EFFECT

Potential changes in electric and magnetic field effects would be entirely located on private property associated with the Project. Therefore, it is not anticipated that an assessment of electric and magnetic field effects will be warranted in the application.

5. Public Benefits

The Project will provide considerable benefits by bringing a cost-effective, highly efficient, and flexible resource that will increase grid reliability and support efficient generation resources. The Project will also contribute to the local community by providing tax payments.

During the expected 14-month construction period, 40 to 50 construction jobs will be required for the BESS, with additional workers associated with the Eversource substation. During this time, workers will be contributing to the local economy through the use of local restaurants, hotels, retailers, etc. The Project is not expected to be staffed once operational. WEC plans to use local labor, local service providers, and local subcontractors whenever possible during the construction of the Project.

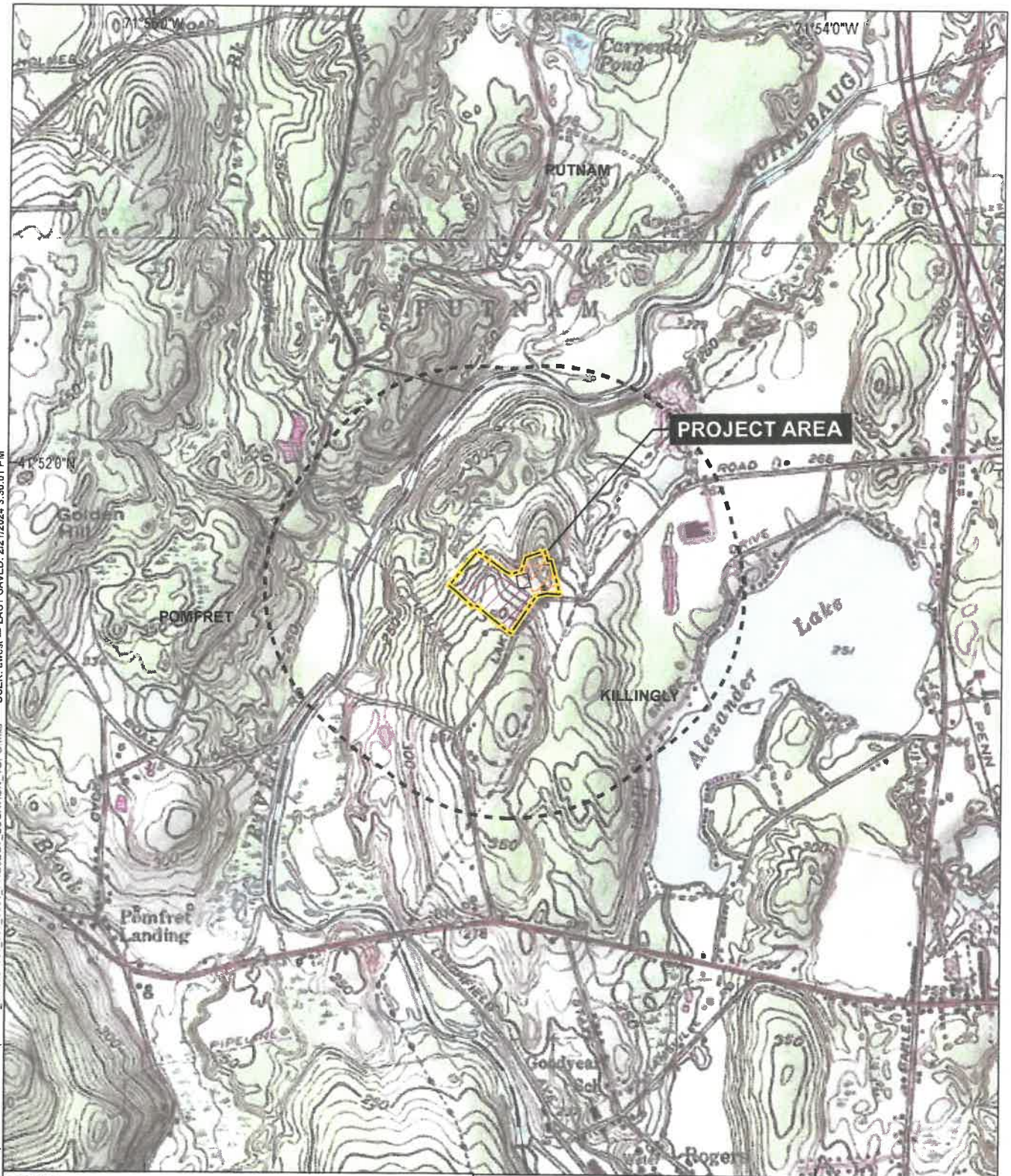
6. Project Schedule

An anticipated schedule is shown in Figure 10. WEC is currently working to complete studies to support the CSC application filing and anticipates that this filing will be made during the spring of 2024. Agency review and public participation will be ongoing throughout 2024, with a goal of having major permits issued for the Project in the first quarter of 2025.

The Applicant expects to commence construction during the first quarter of 2025 and will require approximately 14 months to complete site preparation, construction, and testing for the BESS to support operation by the early 2026. The detailed schedule for permitting and construction of the Eversource substation is unknown at this time but must be completed timely to support testing of the Project.

FIGURES

GIS FILE PATH: \\haleyaldrich.com\share\CP\Projects\0204839\GIS\W\aps\0204_0204839_000_0001_PROJECT_LOCATION_TOPO.mxd — USER: awest — LAST SAVED: 2/21/2024 3:30:01 PM



LEGEND

- 2,500-FOOT BUFFER
- PROJECT AREA
- PROJECT SUBSTATION
- EVERSOURCE SUBSTATION
- BESS
- TOWN BOUNDARY



MAP SOURCE: USGS
SITE COORDINATES: 41°51'44"N, 71°54'54"W

**HALEY
ALDRICH**

WINDHAM ENERGY CENTER
KILLINGLY, CONNECTICUT

**PROJECT LOCATION
(TOPOGRAPHIC MAP)**

APPROXIMATE SCALE 1" = 2 MILES

FIGURE 1



LEGEND

-  BESS
-  PROJECT SUBSTATION
-  EVERSOURCE SUBSTATION
-  PROJECT AREA
-  PARCEL BOUNDARY
-  WYNDHAM LAND TRUST PARCEL

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE
2. ASSESSOR PARCEL DATA SOURCE: CONNECTICUT DEPARTMENT OF ENERGY & ENVIRONMENTAL PROTECTION
3. AERIAL IMAGERY SOURCE: NEARMAP, 14 SEPTEMBER 2022



HALEY ALDRICH

WINDHAM ENERGY CENTER
KILLINGLY, CONNECTICUT

PROJECT LOCATION
(AERIAL IMAGERY)

FIGURE 2

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LEGEND

- ELECTRIC TRANSMISSION LINE
- BATTERY ENERGY FACILITY
- SOLAR ENERGY FACILITY
- WIND ENERGY FACILITY

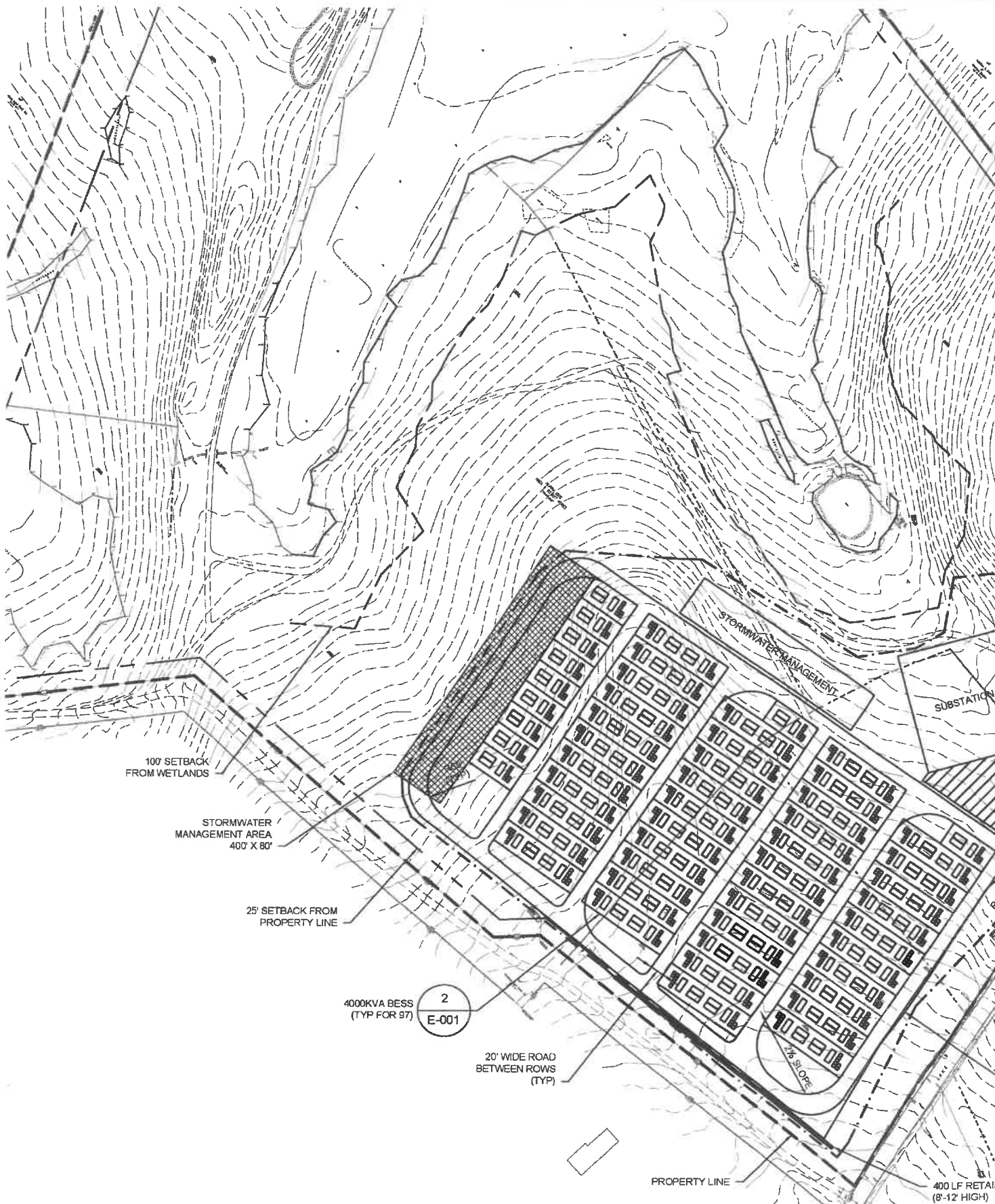
HALEY
ALDRICH

ELECTRIC TRANSMISSION AND
RENEWABLE ENERGY
DEVELOPMENT

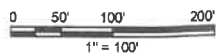
FIGURE 3



FIGURE 4










1 ELECTRICAL LAYOUT
E-001 1" = 100'





LEGEND

-  BESS
-  PROJECT SUBSTATION
-  EVERSOURCE SUBSTATION
-  PROJECT AREA
-  ACCESS ROAD
-  SUBSTATION
-  BESS LAYOUT

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE
2. ASSESSOR PARCEL DATA SOURCE: CONNECTICUT DEPARTMENT OF ENERGY & ENVIRONMENTAL PROTECTION
3. AERIAL IMAGERY SOURCE: NEARMAP 14 SEPTEMBER 2022



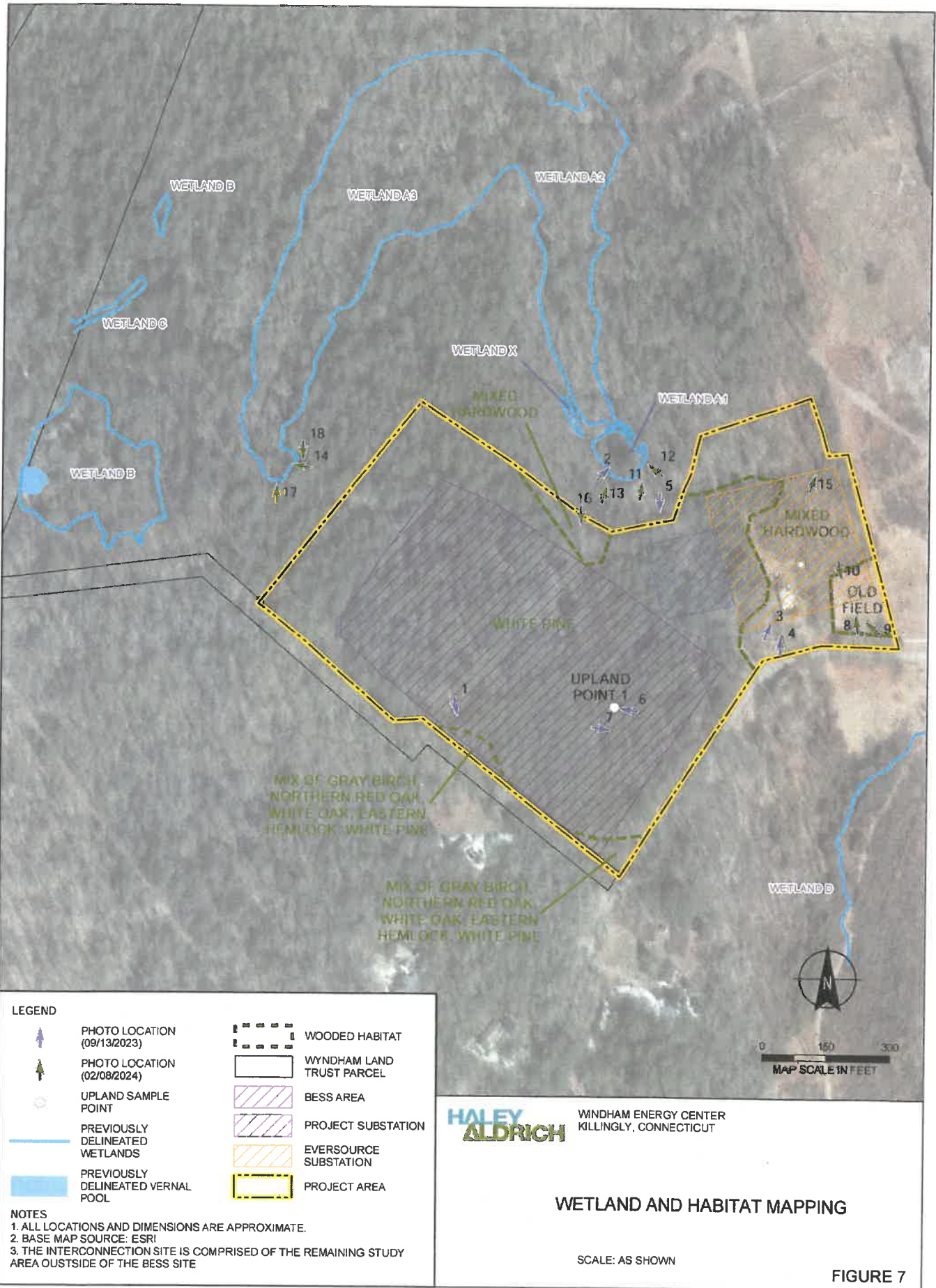
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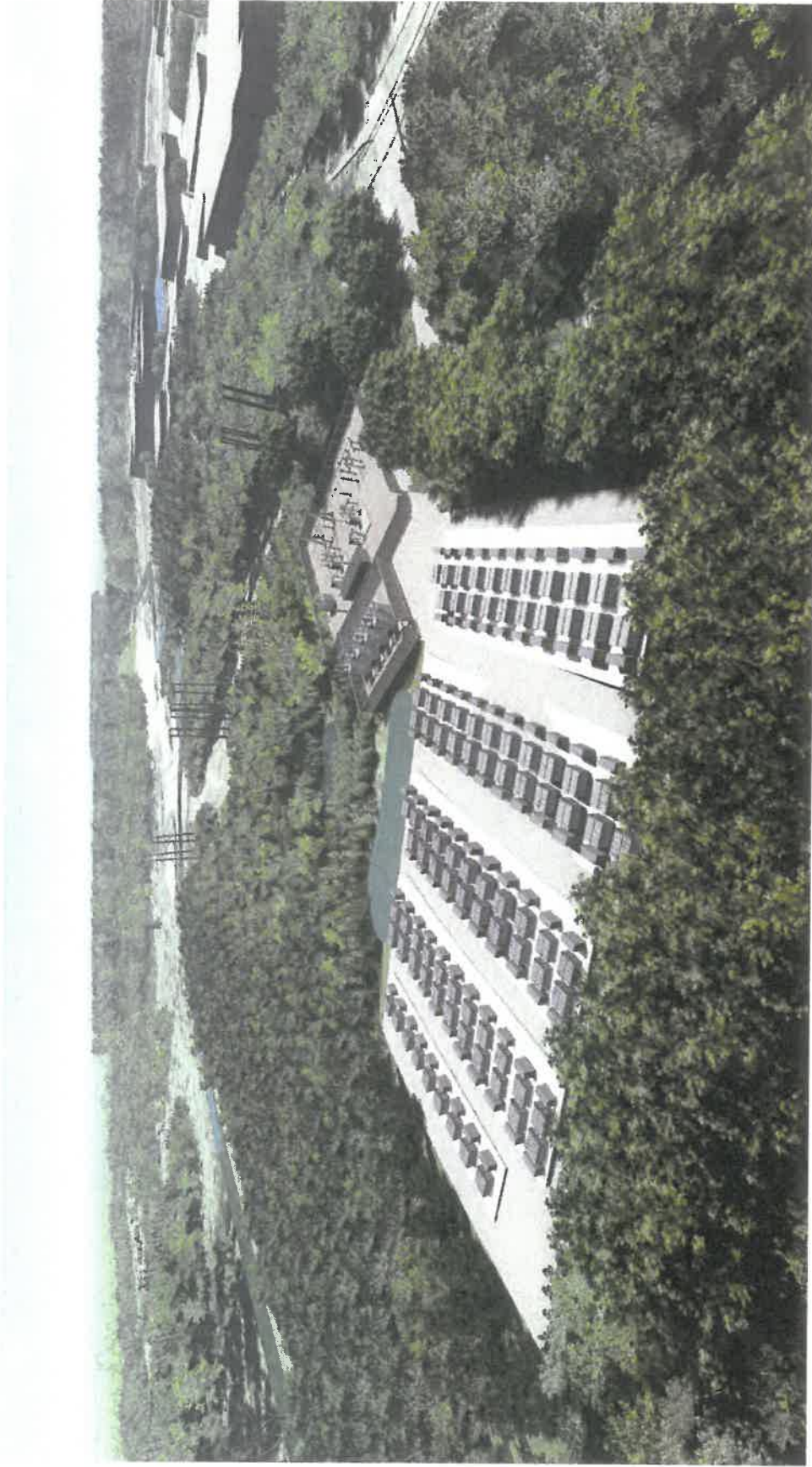
WINDHAM ENERGY CENTER
MILLINGLY, CONNECTICUT

PROJECT AND
INTERCONNECTION LAYOUT

FIGURE 6

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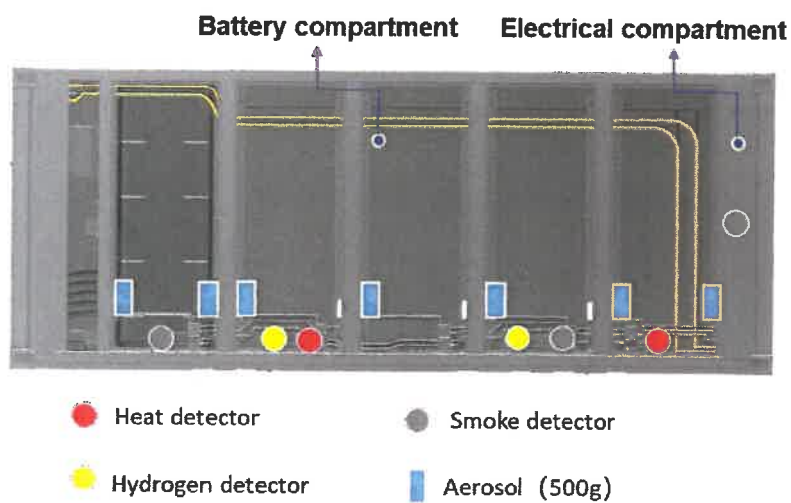
HALEY
ALDRICH
WILLIAM ENERGY CENTER
KILLBUCK, CONNECTICUT

PROJECT RENDERING

FIGURE 8



EnerC+ Liquid Cooling Energy Storage Container – Side View*

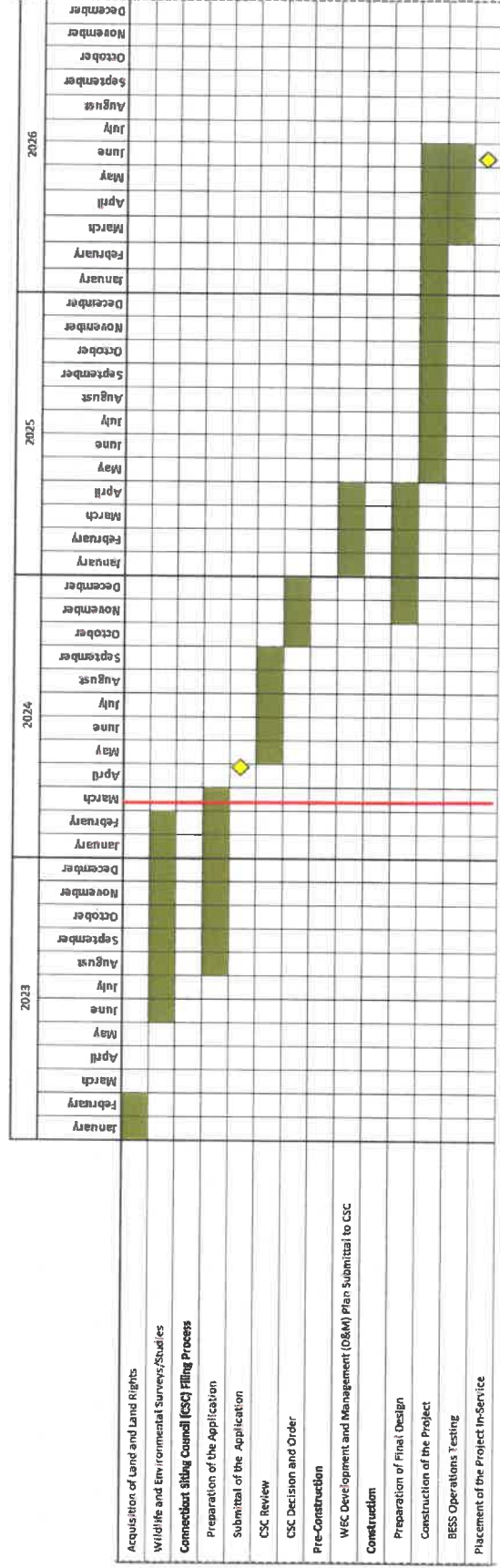


Type and Location of Detectors**

FIGURE 9
EQUIPMENT DETAILS

*CATL, November 2022. EnerG+306 Container Product Specification.

** CATL, July 2023. Hazard Mitigation Analysis for EnerC+.



APPENDIX A

Vendor Specifications



EnerC+ 306 Container Product Specification

Version	Date	Changes
1.0	Nov. 30, 2022	First Release

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1 General Introduction

1.1 Confidentiality

This product specification is intended to be seen only by persons directly involved in this project. Transfer to other parties, especially to partners without the approval of CATL, has to be coordinated by the person in charge of this project in CATL and is governed by declarations relating confidentiality in the development contract.

1.2 Purpose of Document

This document is a product specification formulated by Contemporary Amperex Technology Company Limited (CATL) for Battery Energy Storage System developed by CATL. It describes and stipulates the performance index, basic functions, interface and communication, key parameters, safety characteristics, this product, as well as matters needing attention of users and relevant legal statements.

The specifications and parameters of the products are provided in this document. If the contract parties find any inadequacies, they shall inform us so as to develop better products.

CATL possesses the right to update and clarify this document.

1.3 Definitions and Abbreviations

1.3.1 Definitions

BESS: Battery Energy Storage System, using electrochemical cells to storage electrical energy.

Frequency Modulation: The grid should work under stable frequency while other uncontrol events will disturb the frequency. So, the active power shall be supplied to modulate the frequency of grid. The BESS shall provide the active power for the grid.

Voltage Modulation: The grid should work under stable voltage while other uncontrol events, especially the inductive load and capacitive load will disturb the voltage. So, the reactive power shall be supplied to modulate the voltage of grid. The BESS shall provide the reactive power for the grid.

Peak shaving and Valley filling: When the power plants generate more energy than the demand, the containers shall absorb the excess energy which called peak shaving. When the power plants generate less energy than the demand, the containers shall release the lack of energy which called Valley filling.

PV: Photovoltaic power generation.

Wind power: Power get from the rotation blade driven by wind.

Modbus TCP: The Modbus protocol including three kinds of messages: ASCII, RTU, TCP. Modbus TCP is a kind of communication protocol which is widely used in the industrial field.

Container: The container for the battery energy storage system.

Module: A mechanically integrated arrangement of cells connected in series and/or parallel, complete with packaging, thermal management, output DC connections, and associated cell sensing.

Cell: The smallest non-divisible component of the EnerC+ System, assembled into a battery module in series and parallel arrays.

RTE: Round-trip Efficiency, defined as discharging of the system from 100% SOC to 0% SOC at kWp immediately followed by charging the system from 0% SOC to 100% SOC at kWp. The Round-trip DC-DC energy efficiency shall be measured at the DC terminals of the container.

1.3.2 Abbreviations

BMS: Battery Management System.

TMS: Thermal Management System.

CAN: Controller Area Communication.

FSS: Fire Suppression System.

PCS: Power Conversion System.

BOL: Beginning of Life.

EOL: End of Life.

SOC: State of Charge.

SOH: State of Health.

CSC: Cell Supervision Circuit, the base unit of battery management.

SBMU: Slave Battery Management Unit, collects and analyses the data from CSC, and uploads to the MBMU.

MBMU: Main Battery Management Unit. The core control unit of the container.

EMS: Energy Management System. Monitoring and manage the charge and discharge of the BESS.

Sub Control Box: Including the SBMU fuse isolation switch and other components.

Master Control Box: Including the IMM, MBMU ETH fiber conversion module.

Distribution Box: Including auxiliary power system, UPS and other components.

2 System Description

2.1 Application

The EnerC+ container is a modular fully integrated product, consisting of rechargeable lithium-ion batteries, with the characteristics of high energy density, long service life, high efficiency. It can provide over 4MWh energy when the batteries are fully charged. The EnerC+ Energy Storage product is capable of various on-grid applications, such as frequency regulation, voltage regulation, arbitrage, peak shaving and valley filling, and demand response. Furthermore, the EnerC+ container can be used for PV storage integration and Wind storage integration. The system can also operate as a microgrid to support backup and islanded systems.

2.2 Overview

The overview of the container is shown in Figure 1. The detailed information can be found in the following chapters.



Figure 1 EnerC+ Liquid Cooling Energy Storage Container – Sideview



Figure 2 EnerC+ Liquid Cooling Energy Storage Container – Sideview Without Door

The EnerC+ container consists of following parts: batteries, BMS, FSS and TMS, which are integrated together to keep the normal working of the container.

2.2.1 Battery

The capacity of cell is 306Ah, 2P52S cells integrated in one module, 8 modules integrated into one rack, 5 racks integrated into one container. As the core of the energy storage system, the battery releases and stores energy.

2.2.2 BMS

BMS adopts the distributed scheme, through the three-level (CSC--SBMU--MBMU) architecture to control the BESS, to ensure the stable operation of the energy storage system. It can manage energy absorption and release, the thermal management system and low voltage power supply according to the detected information: battery voltage, current and temperature. It can monitor high voltage DC/AC security, diagnosis and analysis faults according information from various detectors and dry-contacts. And it can keep communication with PCS and EMS through CAN. The BMS is the most important control unit of EnerC+ container. The BMS possesses the UPS to keep normal function when facing the temporary out of power.

2.2.3 FSS

FSS consists of smoke detectors, temperature detectors, H2 detectors, the fire control panel, the aerosol, the dry pipe, the explosion-proof fan and the UPS. FSS undertakes functions : monitor the thermal run-away risks of container through the detectors, extinguish the thermal run away, especially the flame fire, control the loss to minimum. The control panel will control and record information for the fire suppression system. The FSS is independent with any other system and it is the security guard of EnerC+ container.

2.2.4 TMS

TMS consists of one powerful chiller, the PTC heater and the liquid cooling pipe distributed in each battery module. The TMS will control and keep the temperature of battery within reasonable range. The battery will work at best state and reach longest life under the thermal management system.

2.3 Advantages

Our EnerC+ container possesses the advantages below:

- 1) **Standard design.** The 20ft design is very convenient for the transportation. The standard design can be installed one-stop.
- 2) **New generation Cell.** EnerC+ container integrates the LFP 306Ah cells from CATL, with more capacity, slow degradation, longer service life and higher efficiency.
- 3) **High integrated.** The cell to pack and modular design will increase significantly the energy density of the same area. The system is highly integrated, and the area energy density is over 270 kWh/m². EnerC+ can support back-to-back arrangement and save more area.
- 4) **Extreme safety.** The system supports three levels of safety:

Firstly, the cell safety, the highly stable lithium iron phosphate is used in the EnerC+ container. LFP is a kind of safety material especially for the BESS.

Secondly, the electrical safety: a) E-Stop design; b) multiple fuse protection design; c) insulation monitor voltage monitor; d) multi-channel isolation design; e) lightning protection design.

Thirdly, the fire protection design, CATL has four-level fire control strategy. The first-level is the alarm. The second-level is ventilation and smoke exhausting to prevent deflagration. The third-level is aerosol to extinguish initial fire, and the fourth-level is the dry pipe sprinkle fire protection to prevent fire spread.

Adaptive thermal management. EnerC+ integrated single-cluster water pump, temperature control

strategy automatically adjusted with battery status, prolonging battery life.

5) **Easy extension.** It is very convenient for the augmentation of containers or racks. Furthermore, the EnerC+ support one PCS connected to 2 containers; this will decrease the covered area significantly.

6) **Independent UPS.** EnerC+ container have integrated two UPS system, one is for FSS which available capacity is 24 hours, another one is for BMS which available capacity is 10 minutes

3 System Specifications

In this chapter, the systems specifications will be introduced in detail. For the BESS, the system specifications included the power and energy, electrical specifications, the environmental specifications, the mechanical specifications and certification standards. The product model is C02306P05L01.

3.1 Power and Energy

Table 1 Power and Energy of EnerC+

DC Side Data		
Product Model	C02306P05L01	Remark
P-Rate	0.5P	
Cell		
Cell type	LFP	
Cell capacity	306Ah	
Cell Voltage range	2.5-3.65V	
Cell rated Energy	979.2Wh	
System		
Configuration	5P2P416S	
Rated Energy	4073.47kWh	
Rated Voltage	1331.2VDC	
Voltage Range	1164.8~1497.6VDC	
Rated Charging Current	1530A	
Maximum Charging Current	1748A	
Rated Charging Power	2036.73kW	
Rated Discharging Current	1530A	
Maximum Discharging Current	1748A	
Rated Discharging Power	2036.73kW	

3.2 Electrical Specifications

Table 2 Electrical specifications of EnerC+

Auxiliary Power & Communication			
Product Model		C02306P05L01	Remark
P-Rate		0.5P	
Auxiliary Power 1	Voltage Range	3AC+N+PE 380V~480V $\pm 10\%$, 50/60HZ	
	Power	Max. 36.7kW	
	Inrush Current	$\leq 65A$, $< 5S$	
	Voltage Range	AC+PE 230 V $\pm 10\%$, 50/60HZ	

Auxiliary Power 2	Power	Max. 0.8kW (Continuous)	The UPS is only used to supply power to BMS components.
	Inrush Current	5A	
UPS	Capacity	DC24V. 7Ah capacity.@25°C	
Communication Protocol		CAN, Modbus/TCP	

3.3 Mechanical Specifications

Table 3 Mechanical Data of EnerC+

Mechanical Data		
Product Model	C02306P05L01	Remark
Transportation	Land or sea transportation	
Size	2896mm(H)*2438mm(D)*6058mm(W)	
Weight	~36t	
Color	RAL7042	
IP Level	IP55 (Battery Room)	
	IPX5 (Electrical Room)	
	IPX5(Cooling unit)	

3.4 Environmental Specifications

Table 4 Environmental Specifications of EnerC+

Environment condition		
Charge Temperature Range	-25°C...+55 °C	Remark
Discharge Temperature Range	-25°C...+55 °C	
Storage Temperature Range	-30°C...+60°C	
Application Altitude	≤2000m (no derating)	
Relative Humidity	0 ~ 95 % (non-condensing)	
Degree of Anti-corrosion of Battery Unit	C4, (optional C5)	
Seismic Level	IEEE 693-2018 Moderate design level	

3.5 Certification Standard

Table 5 Certification Standard

Standards & Certificates		
Cell	UN38.3	UN Transportation Testing for Lithium Batteries
	UL1973	Batteries for Use in Light Electric Rail (LER) Applications and Stationary Applications
	IEC62619	Safety requirements for secondary lithium cells and batteries, for use in industrial applications
	UL9540A	Energy Storage Systems and Equipment
Container	UL1973	Batteries for Use in Light Electric Rail (LER) Applications and Stationary Applications
	NFPA855	Standard for the Installation of Stationary Energy Storage Systems
	UL9540A	Energy Storage Systems and Equipment
	IEC 62477	Safety requirements for power electronic converter systems and equipment – Part 1: General
	IEC 62619	Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for secondary lithium cells and batteries, for use in industrial applications
	IEC 62933-5-2	Electrical energy storage (EES) systems – Part 5-2: Safety requirements for grid-integrated EES systems – Electrochemical-based systems
	IEC 61000-4 IEC 61000-6 IEC61000-4-6	Generic standards – Emission standard for industrial environments Electromagnetic compatibility (EMC) –Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields

4 Battery Management System(BMS)

4.1 BMS Overview

BMS is used in energy storage system, which can monitor the battery voltage, current, temperature, managing energy absorption and release, thermal management, low voltage power supply, high voltage security monitoring, fault diagnosis and management, external communication with EMS and ensure the stable operation of the energy storage system.

4.2 BMS Architecture

BMS includes three-level constructure, composed of 1 unit of MBMU, 1 unit of IMM, 1 unit of ETH, 1 unit of media converter, 5 units of SBMUs, 40 units of CSCs. This is the architecture that one PCS connected to one container (Figure 3). What's more, the system can also support one PCS match 2 containers (Figure 4).

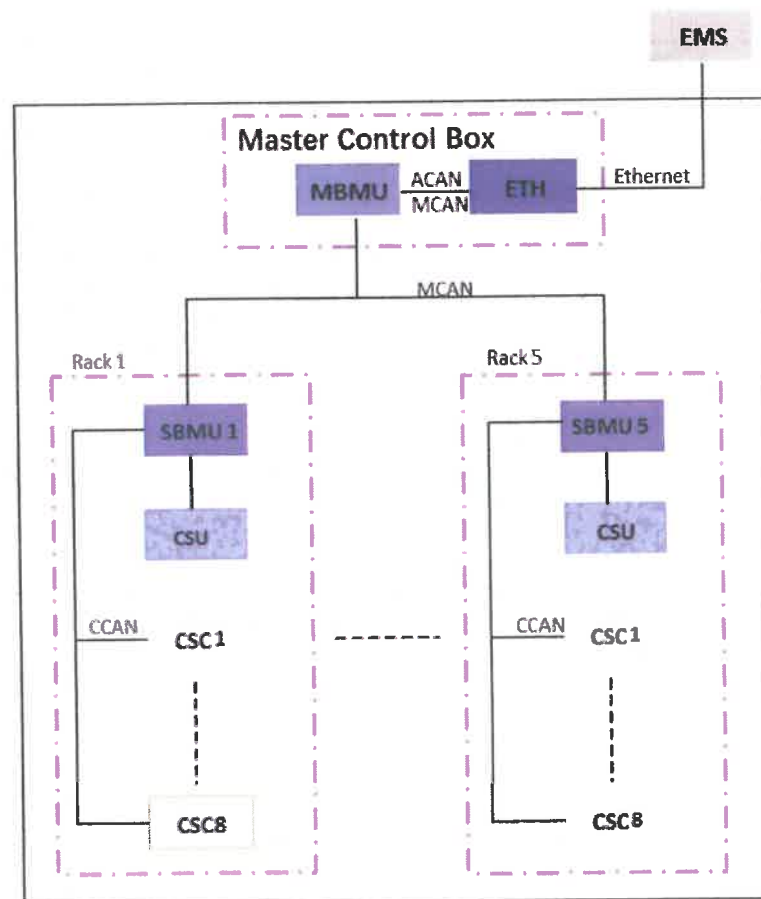


Figure 3 Three-Level BMS Architecture for One Container in Parallel

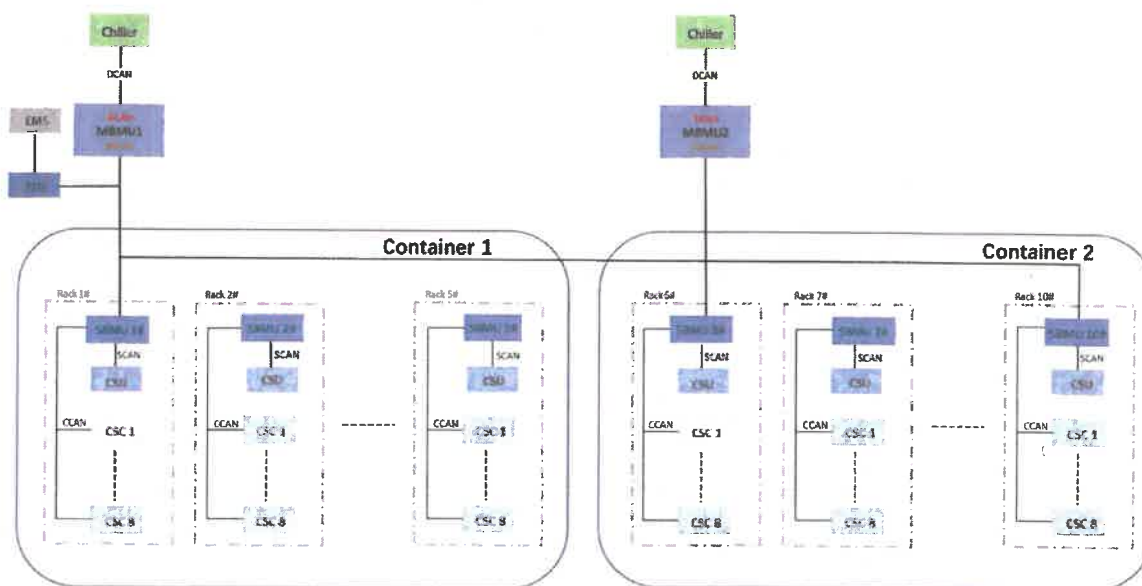


Figure 4 Three-level BMS Architecture for Two Containers in Parallel

4.3 BMS Function

The detailed information of BMS can be seen in Table 6. The parameters including: Cell voltage sampling, Cell temperature sampling, Current sampling, HV sampling, Ambient temperature detection, Insulation detection and other important parameters.

Table 6 Detailed Performance Parameters of BMS

Item	Performance Parameters	Value	Note
Working voltage	Range	20V~26V	
	Range	1V~4.85V	
Cell voltage sampling	Accuracy	±5mV	0°C ~ +60°C
		±10mV	-40°C ~ 0°C or 60°C ~ 85°C
Cell temperature sampling	Range	-40°C ~ +125°C	
	Accuracy	±2°C	-20°C ~ +60°C
		±3°C	-40°C ~ -20°C & +60°C ~ +85°C
Current sampling	Range	± 500A	
	Sampling period	10ms	
	Accuracy	<1%FSR	-40°C ~ 85°C
HV sampling	Range	0V ~ 1500V	
	Accuracy	1%FSR	
Cell balance	Current	100mA@3.2V	Opened in all channels

SOC	Accuracy	$< \pm 5\%$	LFP, according to specific conditions
SOH	Accuracy	$< \pm 5\%$	
Ambient temperature detection	Range	$-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$	
	Range	$\pm 3^{\circ}\text{C}$	
Insulation detection	Range	$0 \sim 10\text{M}\Omega$	
	Accuracy	$-30\% \sim 0\%$	
	Detection Time	$\leq 10\text{s}$	Y capacitor $< 0.47\mu\text{F}$ (for single side)

4.3.1 Battery Status Monitoring

- 1) BMS monitors the battery's parameters, including cell voltage, module temperature, battery module current and total battery module voltage.
- 2) BMS detects the battery status such as State of Charge (SOC) accurate to within 5%, SOH and the calculation of SOP.
- 3) BMS functions as a safety management system in such cases as under voltage, over discharge, over voltage, over temperature, and over current of the battery. In case of failure, the system will give an alarm to the supervisory equipment, limit the charge and discharge current or power, and control the disconnection of all HV contactors. This can protect the battery while safeguarding the power systems security.
- 4) BMS shall provide battery information (including data recording and fault waveform recording) to EMS.

4.3.2 Charging/Discharging Management

- 1) BMS controls and monitors the high voltage main contactors, auxiliary relays and low voltage coils.
- 2) BMS has pre-charge control within the parallel connection among racks.
- 3) BMS works in the management of charge and discharge. It will calculate the charge and discharge power limit according to the existing status of the battery (temperature, SOC) and actual performance of electrical components and then report to EMS which has the function of controlling to these limits.
- 4) BMS has the function of balance management to extend the reliability of the battery system.

4.3.3 Thermal Management

- 1) BMS has the function of sample collecting of battery cell temperature and chiller operating status.
- 2) BMS controls the liquid cooling TMS system based on cell & coolant's temperature.

4.3.4 Program Refreshing

BMS can flash programs on site, which supports the flashing of MBMU, SBMU, IMM, CSC and ETH by using the host computer through MCAN. BMS has the function of remote software flash, which enables to update BMS from a remote client via Ethernet. Furthermore, the system supports the BMS program refreshing through EMS.

4.3.5 High Voltage Safety Monitoring

- 1) BMS has the function of system insulation detection.
- 2) BMS has the function of high voltage sampling (collecting data of the main positive voltage).
- 3) BMS supports the detection of the dry contact of MSD, Fuse and Switch, as well as the auxiliary contact of the primary loop contactor.

4.3.6 Peripheral Monitoring and Control Management

- 1) BMS has the function of ambient temperature sampling and humidity sampling, which matches according to project requirements
- 2) BMS has multiple high-side drivers and can drive and control peripheral devices according to project requirements.
- 3) BMS has multiple dry contact interfaces and can monitor external signals according to project requirements.

4.3.7 Fault Diagnosis Management

- 1) BMS stores information such as operational parameters and historical alarms that can be viewed by ESS host computer.
- 2) BMS enables storage of latest historical alarms.

5 Fire Suppression System(FSS)

5.1 FSS Overview

As an outdoor non-walk-in battery energy storage system, EnerC + provides a perfect set of fire suppression system solutions with detection, explosion control and fire extinguishing functions. The fire extinguishing control strategy is divided into four levels:

- First level, alarm warning;
- Second level, ventilation and smoke exhaust to prevent deflagration;
- Third level, aerosol is released to extinguish the initial fire;
- Fourth level, dry pipe spraying to control the spread of fire.

5.2 FSS Function

The fire suppression system is divided into three parts: detection system, explosion-proof system and fire extinguishing system. The information of the interactive interface is shown in the following Figure 5.

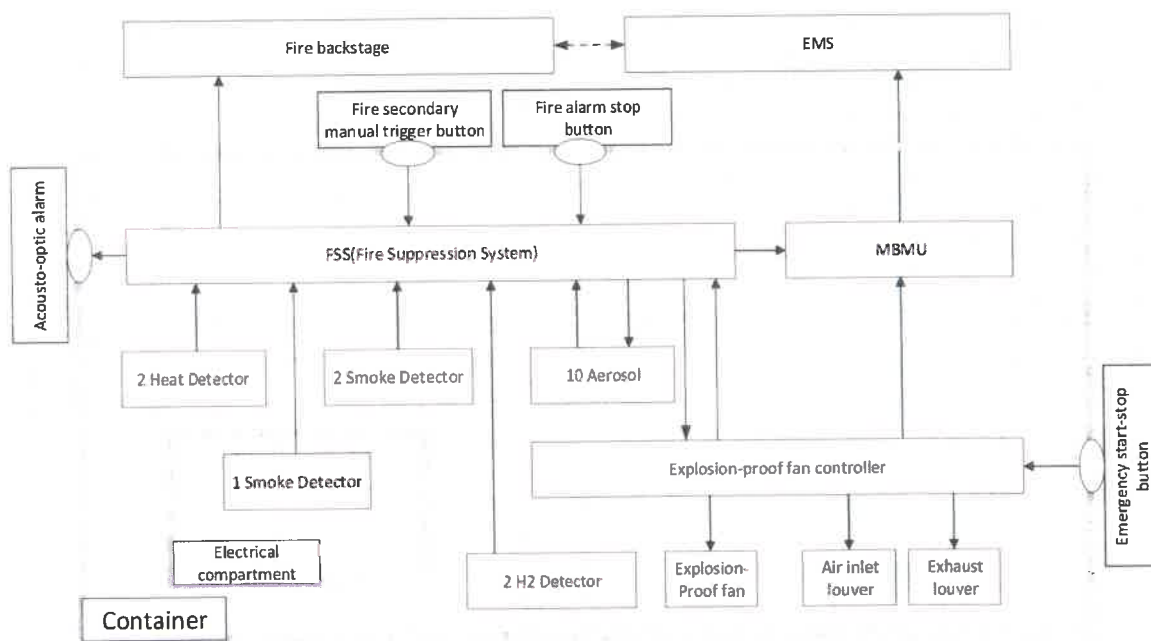


Figure 5 The Interactive Interface of FSS

5.2.1 Detection System

The detection system has three types of detectors, the number and installation position of which are shown in Table 7 and Figure 6. All detection signals are received and processed by the fire control panel, and the hydrogen(H₂) detector can be linked with the explosion-proof fan system.

Table 7 Detector Type and Position Description

No	type	quantity	remarks
1	Heat detector	2	Detection of temperature, in the battery room
2	Smoke detector	2+1	Detection of smoke particles, two in the battery room, and one in the electrical room
3	H ₂ detector	2	Detection of H ₂ , in the battery room
4	Fire control panel	1	Receive detector signals and control fire extinguishing system and explosion-proof system, in the electrical room

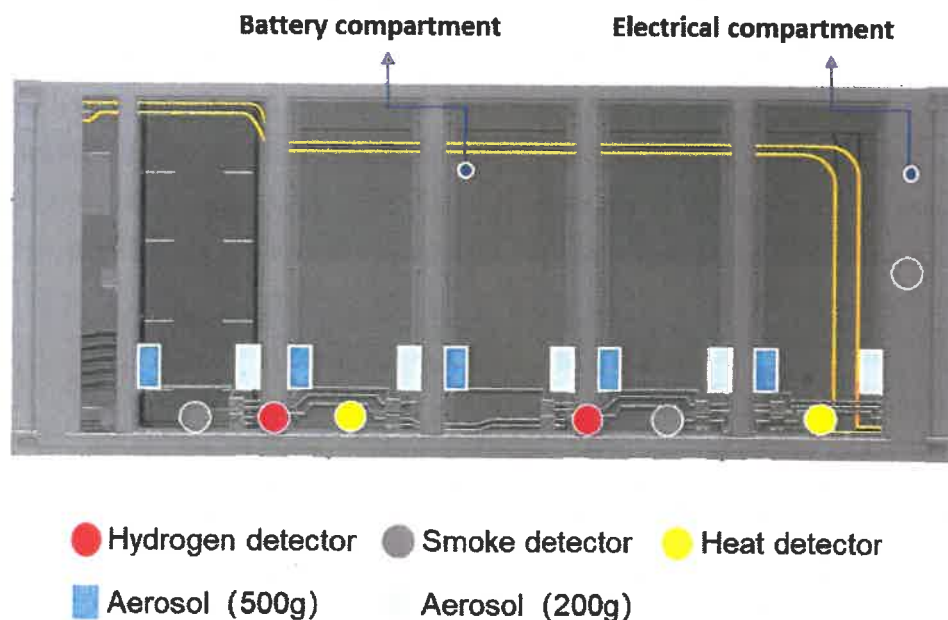


Figure 6 Type and Location of Detectors

5.2.2 Explosion-Proof System

Explosion-proof fan system meets NFPA855 (NFPA 69) standard and has the ATEX certification, which is

地址：福建省宁德市蕉城区漳湾镇新港路2号 ADD: No.2 Xin'gang Road, Zhangwan Town, Jiaocheng District, Ningde City, Fujian, PRC 352100
<http://www.CATL.com>

shown in Figure 7



Figure 7 Explosion-Proof Fan System

The air inlet electric louver receives the alarm signal sent by the hydrogen(H_2) detector and opens the electric louver. When one of these two signals is received, the air inlet electric louver automatically closes. One signal comes from the hydrogen (H_2) detector, indicating that the combustible gas concentration is within a reasonable threshold range, and the other signal is a secondary alarm signal. The parameters of the Inlet are shown in Table 8.

Table 8 The Parameters of the Inlet

Item	Specification
Supply voltage	24V DC
Rated power	60W
Inrush power	85W
Position	Integrate in Rack
Certification	In the process of ATEX certification

The air outlet electric louver will turn on the explosion-proof fan and releases the combustible gas in the battery room after receives the alarm signal from the hydrogen(H_2) detector. The explosion-proof exhaust fan will automatically turn off when the concentration of combustible gas falls within the reasonable

threshold. The parameters of the exhaust port are shown in Table 9.

Table 9 The Parameters of the Exhaust Port

Item	Specification
Supply voltage	230V AC
Rated power	72W
Inrush power	102W
Position	Integrate in Rack
Maximum air volume	820CFM
Certification	ATEX

5.2.3 Fire Extinguishing System

5.2.3.1 Aerosol

When an initial fire occurs in the battery room, a fire alarm signal will occur, and the fire extinguishing system will automatically control the release of aerosol, which can also be triggered manually. The fixed position of aerosol is shown in Figure 6.

5.2.3.2 Dry pipe

As the last line of defense, the dry pipe system can effectively control the spread of fire, which is shown in Figure 8.

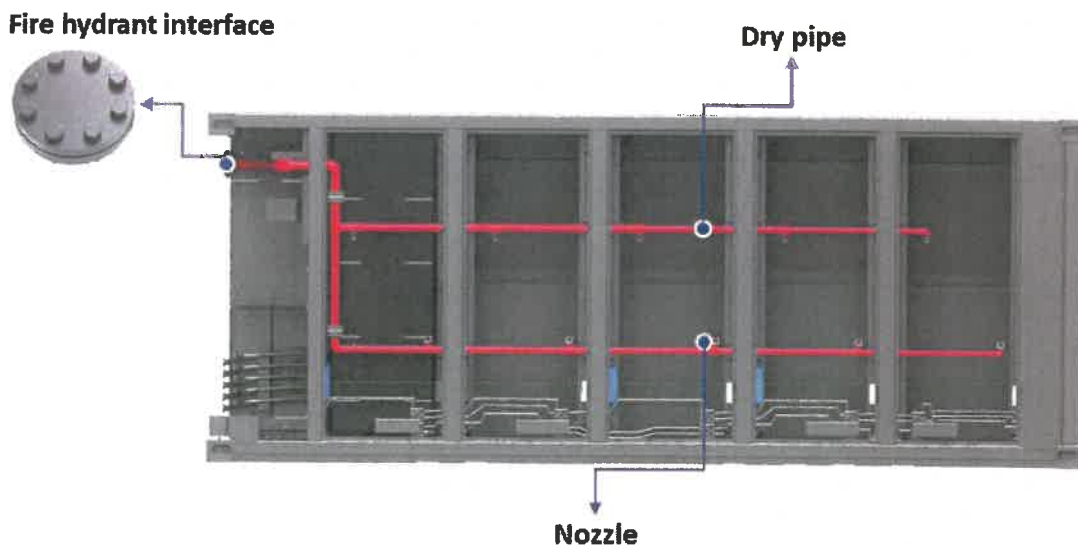


Figure 8 Dry Pipe System

The flange is installed at the entrance of the dry pipe fire protection system, for the connection between the pipes. The parameters of the flange are shown in Table 10.

Table 10 The Parameters of The Flange

Item	Specification
Model	DN65
Standard	EN1092-1
Material	ASTM A105
Class	PN 16
Flange type	TYPE 01 Plate flange for welding TYPE 05 Blind flange
Certificate	PED 4.3 for material
End connection	Integrate in Rack

The HD Medium Velocity Water Spray Nozzles are open type (non-automatic) nozzles with rubber plug, designed for directional spray application in fixed fire protection system. The parameters of the nozzle are shown in Table 11.

Table 11 The Parameters of the Nozzle

Item	Specification
Model	MV-A Brass Material
Type	MV-A
Maximum working pressure	12bar (175 psi)
End connection	½ BSPT
Heat Sensor Position	Integrate in Rack

6 Thermal Management System(TMS)

6.1 TMS Overview

The TMS system of EnerC+ is liquid cooling, which main function is to maintain the temperature of the battery system to an allowable operating temperature range. Thus, the battery shall work at the best conditions, adsorb and release the maximum energy, slow degradation the SOH and maintain the longest life.

The Thermal management system is composed with the high-efficiency liquid cooling unit, the liquid cooling pipe under the bottom of battery and the PTC heater. The TMS works under the control of BMS. BMS sends the start up or shut down signals to the cooling unit, then the cooling unit and the PTC heater will work together to change the temperature of circulating coolant liquid for heat exchange in the cooling pipe. The circulating liquid will exchange the heat with the battery through the pipe. Thus, the temperature of battery will increase or decrease into appropriate range.

For example, the cooling unit will be started if the BMS detect the battery temperature over the setting value. The cooling mode will be activated to decrease the temperature of circulating liquid until reaching the setting value. When the BMS detects the battery temperature less than the setting value, the heat mode will be activated to increase the temperature of circulating liquid until the setting value. Detailed information will be described below.

6.2 TMS architecture



Figure 9 Overview of the cooling unit of EnerC+

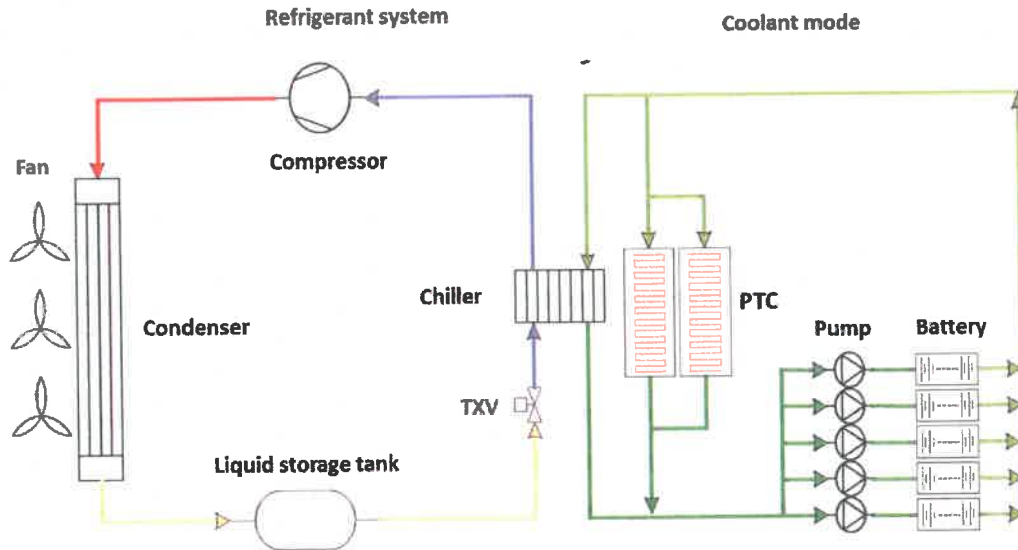


Figure 10 Architecture of Thermal Management System


The overview of cooling unit has been listed in Figure 9. EnerC+ own one high power cooling unit at the side of the container. TMS architecture can be described above (Figure 10). The composites parts are listed below:

- a) **Compressor.** The function of compressor is to compress the low temperature and low pressure refrigerant gas into high temperature and high pressure refrigerant gas. Then the gas flow to the condenser through the pipe.
- b) **Condenser.** The function of condenser is condensing the high temperature and high pressure refrigerant gas into ambient temperature and high pressure refrigerant liquid. Excess liquefaction heat will be taken away by the fan. Then the liquid flow to the chiller through the pipe.
- c) **Chiller.** The function of chiller is to exchange the heat from the refrigerant liquid with the coolant. The ambient temperature and high pressure refrigerant liquid will evaporate into low temperature and low pressure refrigerant gas. The heat will transfer from the coolant to the refrigerant liquid. The low temperature coolant will flow to the cooling plate to cool the batteries while the refrigerant gas return to the compressor. The circle process will continue and the heat of battery will be taken away.
- d) **PTC Heater.** The positive temperature co-efficiency resistance. The PTC will heat the coolant when the TMS get signals that the temperature of coolant is below the setting value. Then the coolant will be heated until the temperature increases to the setting value. The battery will be warmed up by the coolant.

- e) **Pump.** The pump will force the coolant into circulating in the pipe.

6.3 TMS Specification

Table 12 Main Feature of Thermal Management System

	Coolant: Basf GLYSANTIN G30
	Max. ambient temperature: 55°C
	Power supply: 3AC 380...480V
	40kW Cooling capacity for 0.5P System
	Cooling capacity is auto-adjustable according to ambient temperature & discharge/charge status

The main features of TMS are listed above, which is shown in Table 12. The TMS will work under the ambient temperature range from -25 °C to 55 °C. The cooling power is auto-adjustable according to ambient temperature & discharge/charge status. There are four operating modes for the TMS, including shutdown mode, cooling mode, heating mode and self-circulation mode.

Table 13 Power Consumption of Thermal Management System

Type of EnerC+	0.5P System
Cooling Capacity	40kW
Maximum Heating Power	18kW
Maximum Cooling Power	31kW
EER	≥2.6(18°C@35°C)

7 User Interface

7.1 PCS Requirements

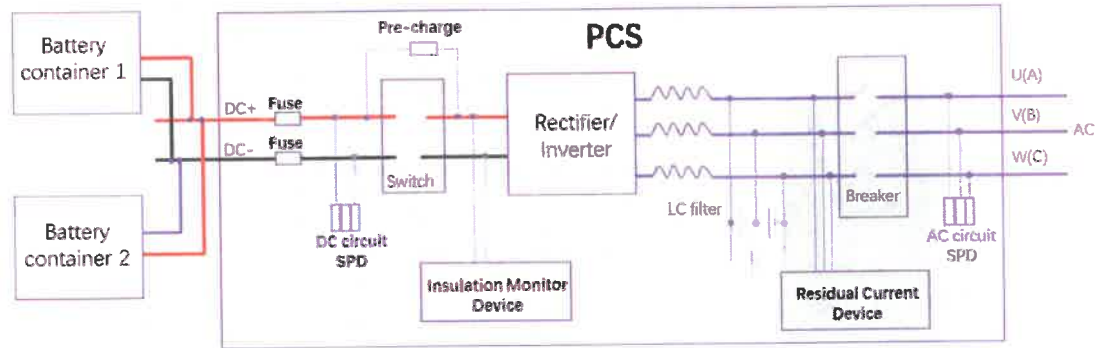


Figure 11 PCS Matching

- Please make sure to use one single copper Busbar for two battery containers cable connection for positive or negative pole in PCS side.
- Please make sure to use Fuse(F) for DC circuit in PCS. The Fuse breaking time in PCS should less than the breaking time of fuse in battery container when short circuit occurs.
- Please make sure PCS have pre-charge circuit.
- Please make sure the PCS has a main circuit switch on the DC side .
- One PCS can match up to 2 battery containers.
- PCS should have SPD in DC high voltage bus.
- PCS should have SPD in AC side.
- PCS should have insulation monitor device. BMS monitor the insulation of DC bus before battery DC relay is closed. PCS monitor the insulation of DC bus after battery DC relay is closed.
- PCS should have residual current device to monitor the leakage current on AC side.
- When the battery is in a low SOC state after discharge, the grid cannot charge the battery in time and needs short-term storage. In this scenario, it is necessary to ensure that PCS is disconnected from the battery to prevent the battery from being over discharged.

7.2 Fuse Matching

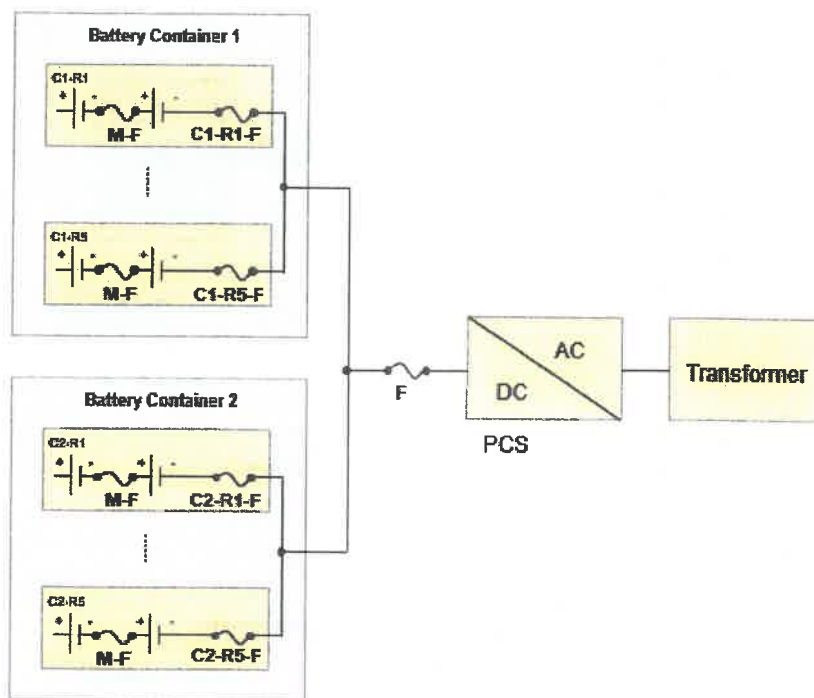


Figure 12 Fuse Matching

- The principle of fuse matching:
- Fuse Breaking Time: $F < C-R-F < M-F$.
- Voltage Level: 1500V
- One Container Fuse F Breaking ability: $> 72.72\text{kA}$
- Two Container Fuse F Breaking ability: $> 145.44\text{kA}$

1. One PCS can connect two battery containers. Every container has 5 racks .
2. One rack short circuit current is 14.544kA.
3. PCS DC side fuse is Fuse F.
4. Battery rack fuse is C-R-F.
5. Module fuse is M-F.

7.3 Common Mode Voltage

● One PCS for one transformer

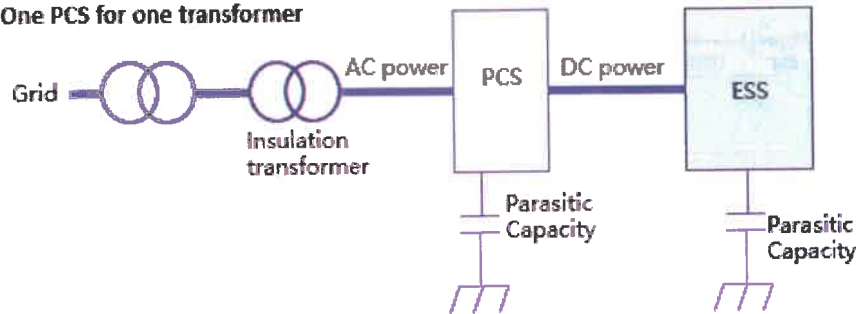


Figure 13 One PCS for One Transformer

● Multiple PCS for one transformer

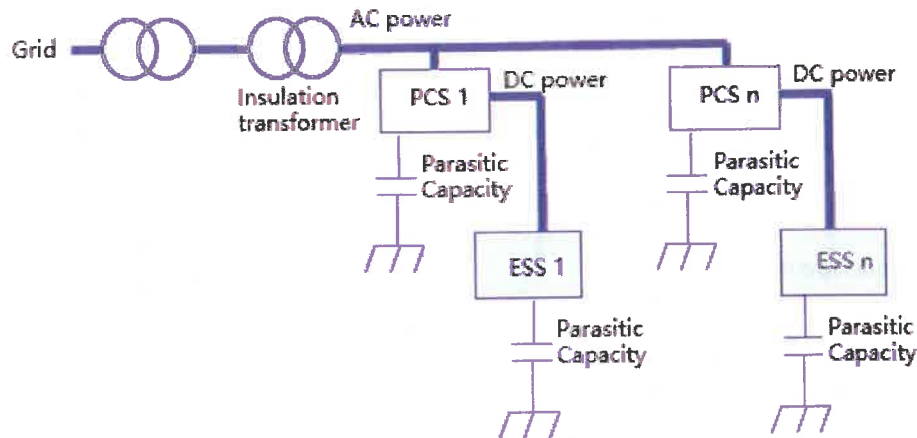


Figure 14 Multiple PCSs for One Transformer

The common mode voltage or current will affect the BESS reliability and personal safety. PCS will generate the common mode voltage and current due to the converter theory. Due to parasitic capacitance, the PCS should improve the insulation resistance isolation. And it is recommended to use insulation transformer. When multiple PCS are parallel connected, make sure that the switching of IGBT inside each PCS will not affect the other PCS to reduce the common mode voltage. The carrier synchronization should be considered in PCS control.

Common mode voltage value in DC side <100VDC, <15kHz

Make sure not to mix the AC and DC power cables, not to mix input and output cables, not to mix power cables and control cables.

7.4 Communication

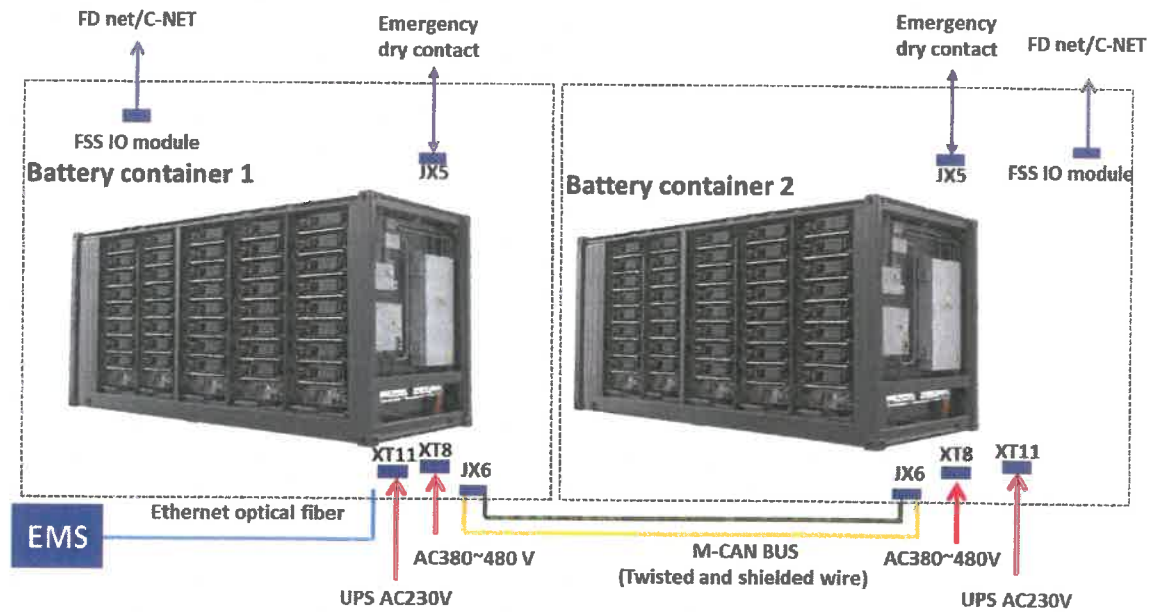


Figure 15 The Communication Architecture of the System

PCS should respond within 1s after BMS sending out the requirement.

PCS should respond within 1s after BMS sending out the emergency requirement by emergency dry contact.

PCS operation power should not exceed battery power limitation.

PCS should derating power to 0 W within 2s once receiving BMS limit to ZERO current requirement.

When the length of CAN communication loop exceeds to 30m, it is necessary to add CAN bridge to enhance communication signal.

It is recommended to use Ethernet optical fiber to communicating with EMS.

The A-CAN Bus or 485 Bus can be optional. If using the A-CAN Bus or 485 Bus, the Ethernet optical fiber will be not used.

8 Appendix

The attached is the triple view and the dimensions of EnerC+. The front view, the side view, the top view. The detailed installation information can be found in the users' manual.

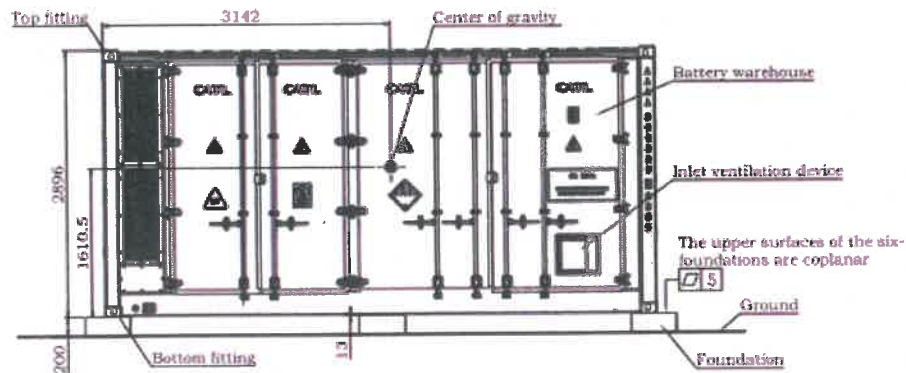


Figure 16 The Front View and Dimensions of EnerC+

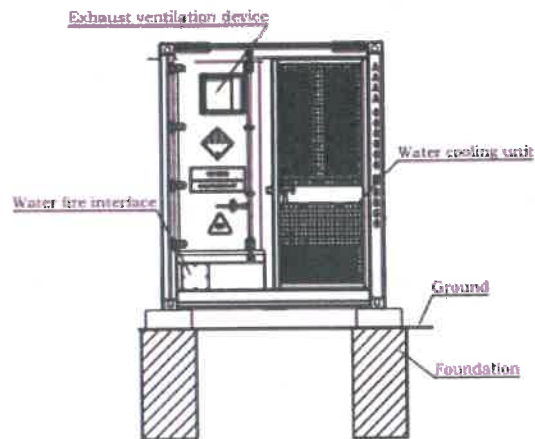


Figure 17 The Side View and Dimensions of EnerC+

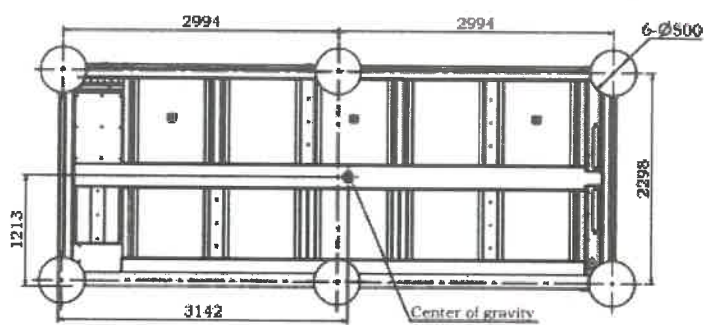


Figure 18 The Top View and Dimensions of EnerC+

Contact us

Note

To find the contact ways for your region

please refer to our webpage:

www.catl.com

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APPENDIX B
Natural Resources Report



HALEY & ALDRICH, INC.
3 Bedford Farms Drive, Suite 301
Bedford, NH 03110
603.625.5353

MEMORANDUM

22 February 2024
File No. 0204839-000

TO: Windham Energy Center, LLC

FROM: Haley & Aldrich, Inc.
James Pippin, Wetland Biologist
Michael Martin, Wetland Biologist
Stephanie Grimaldi, Environmental Scientist

SUBJECT: Wetland and Stream Delineation – No Findings Memo
Windham Energy Center
Town of Killingly, Windham County, Connecticut

On behalf of Vitis Energy, Haley & Aldrich, Inc. (Haley & Aldrich) conducted a field visit to confirm that wetlands and streams are not located within and immediately adjacent to the proposed Windham Energy Center (Project). The Project Area is located adjacent and northwest of Lake Road, Town of Killingly, Windham County, Connecticut (see Figure 1). It consists of a total of approximately 20 acres, within which a proposed a battery energy storage system (BESS) and related infrastructure is proposed.

In June 2016, REMA Ecological Services, LLC (REMA) prepared a *Wetland Report: Existing Conditions* that included a formal wetland and stream delineation for property, a portion of which is now considered the Project Area. None of the delineated wetlands from the 2016 report were located within the current Project Area. Because the information provided in the prior delineation report is somewhat dated, the Haley & Aldrich evaluation is intended to confirm conditions within and near the Project Area.

Methodology

Prior to field investigations, in addition to reviewing the previously prepared report, a desktop review of publicly available data sources was conducted. Data consulted include United States Geological Survey (USGS) topographic quadrangle maps, U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) maps, the Natural Resources Conservation Service (NRCS) County Soil survey, Federal Emergency Management Agency (FEMA) Flood Insurance maps, the National Hydrography Dataset, and the Connecticut Environmental Conditions Online Maps and Geospatial Data.

The wetland and stream delineation was performed in accordance with criteria set forth in the U.S. Army Corps of Engineers (USACE) *Corps of Engineers Wetland Delineation Manual* (1987) and the 2012 *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Supplement* (Version 2.0).

In 1972, the Connecticut state legislature enacted the Inland Wetlands and Watercourses Act (IWWA). This law establishes the regulatory process that protects the state's inland wetlands and watercourses and allows for the municipal regulation of activities affecting these aquatic resources. As a result, every municipality (169 within the state) has established an inland wetlands agency to implement and enforce the law.

Project Setting

The Project Area is bounded by wooded property and the Quinebaug River to the west; residential properties and Lake Road to the south; residential and commercial properties to the northeast; and Lake Road, commercial properties, and Alexander Lake to the east. An existing overhead electric transmission line also extends along the eastern boundary of the Project Area. One residence is located within the Study Area. The majority of the Study Area is wooded. The topography of the Study Area includes a mix of flat and uneven terrain, with a few hills located in the central and eastern portions. A map including topography and soil classifications is shown in Figure 2. USFWS NWI mapping indicates a large palustrine forested wetland and pond located to the north of the Project Area (Figure 3).

Results

Field investigations to delineate wetlands and streams within and adjacent to the Project Area were completed by Haley & Aldrich's wetland biologist, James Pippin, and environmental scientist, Stephanie Grimaldi, on 13 September 2023. A second field investigation was completed by Haley & Aldrich's wetland biologist, Michael Martin, and environmental scientist, Stephanie Grimaldi, on 8 February 2024 following adjustments to the Project Area. There were no wetlands or streams, nor any evidence of surface hydrology observed within the Project Area during either field investigations.

The vegetation cover type of the Project Area consisted primarily of white pine, with an area of mixed hardwood and open field in the easterly area adjoining the existing electric transmission line. Smaller areas of mixed forest also extend into the Project Area. Photographs are provided in Attachment A, with locations shown and habitat types indicated on Figure 4.

Soil sampling was conducted at one location within the Project Area; Upland Point 01 (see Attachment B). The soil sample location (Upland Point 01) was taken at the southern central portion of the Project Area. Silt loam soil was observed at Upland Point 01. According to the associated NRCS Soil Survey, the Soil Map Unit Name is Canton and Charlton fine sandy loams. The color observed at Upland Point 01 was 10YR 3/6 at a depth of 0 to 16 inches. The dominant species of vegetation in the area surrounding Upland Point 01 was white pine. Based on field investigations, no hydrophytic species, hydric soil, or other hydrologic indicators were observed.

The closest locations previously delineated as wetlands were observed during the field investigations. Amphibians (green frogs) were observed on 13 September 2023 in the small pond located northeast of the Project Area, which was confirmed to be outside of the Project Area boundary. The location of this small pond was consistent with the USFWS NWI mapping and the prior delineation. A photo log, including of vegetative cover, soil sample location, and other observations in the Project Area is provided in Attachment A. The location of the photos is also shown in Figure 4, along with delineation of cover types, boundaries of previously delineated off-site areas, and the location of the Upland Point.

Conclusion

Haley & Aldrich performed a wetland and stream delineation assessment on 13 September 2023 and 8 February 2024 and found no wetlands or streams, nor any evidence of surface hydrology observed within or immediately adjacent to the Project Study Area. This memorandum serves to record and document that the Project Area was evaluated for the presence of jurisdictional wetlands and/or streams, and that no jurisdictional wetlands and/or streams were recorded. This memorandum further demonstrates that Windham Energy Center, LLC has completed its due diligence pursuant to Section 401/404 and the Connecticut IWWA.

Enclosures:

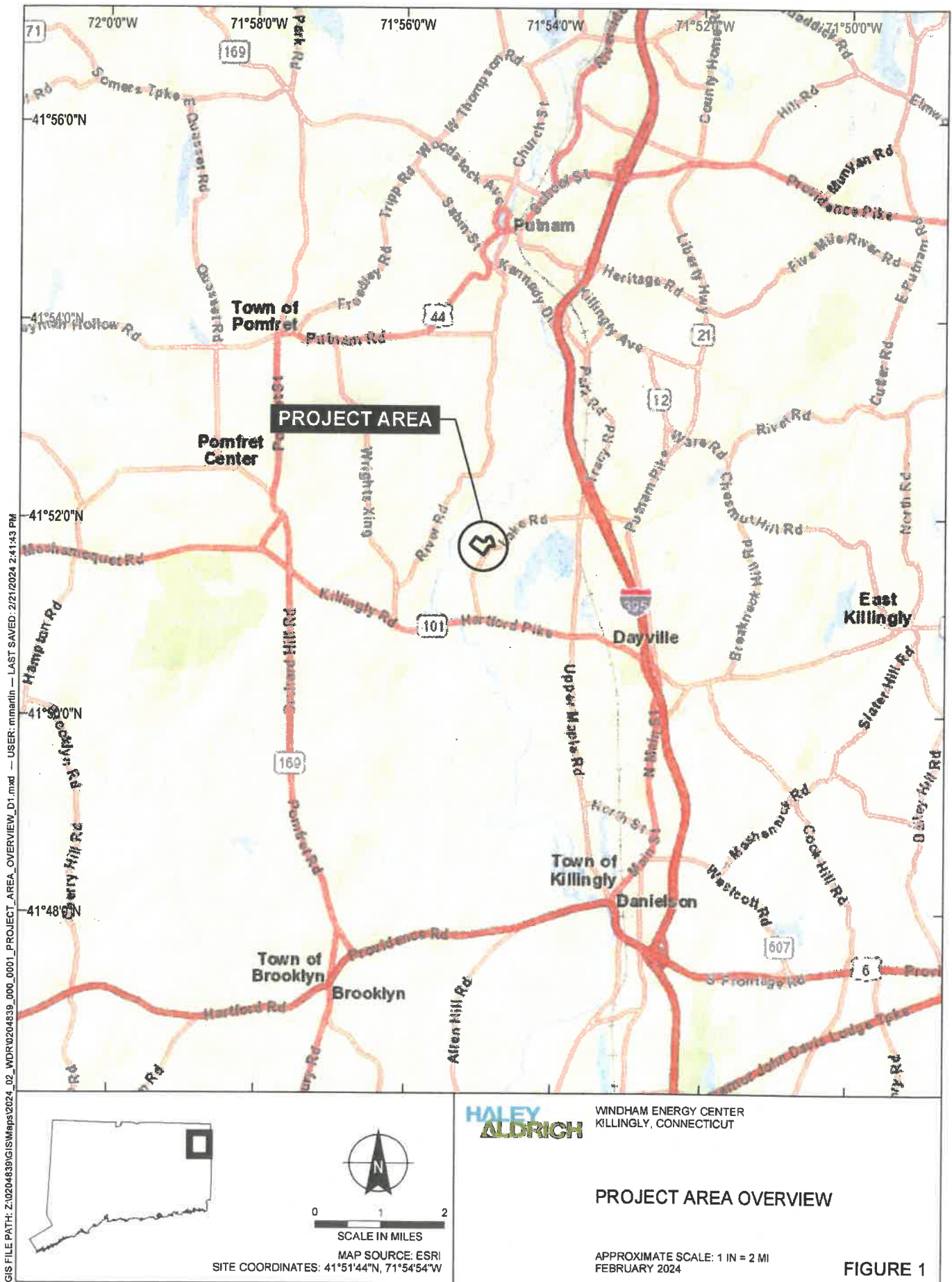
- Figure 1 – Study Area Overview
- Figure 2 – Topography and Soils
- Figure 3 – Federal and State Mapped Aquatic Resources
- Figure 4 – Delineated Features

Attachment A – Photo Log

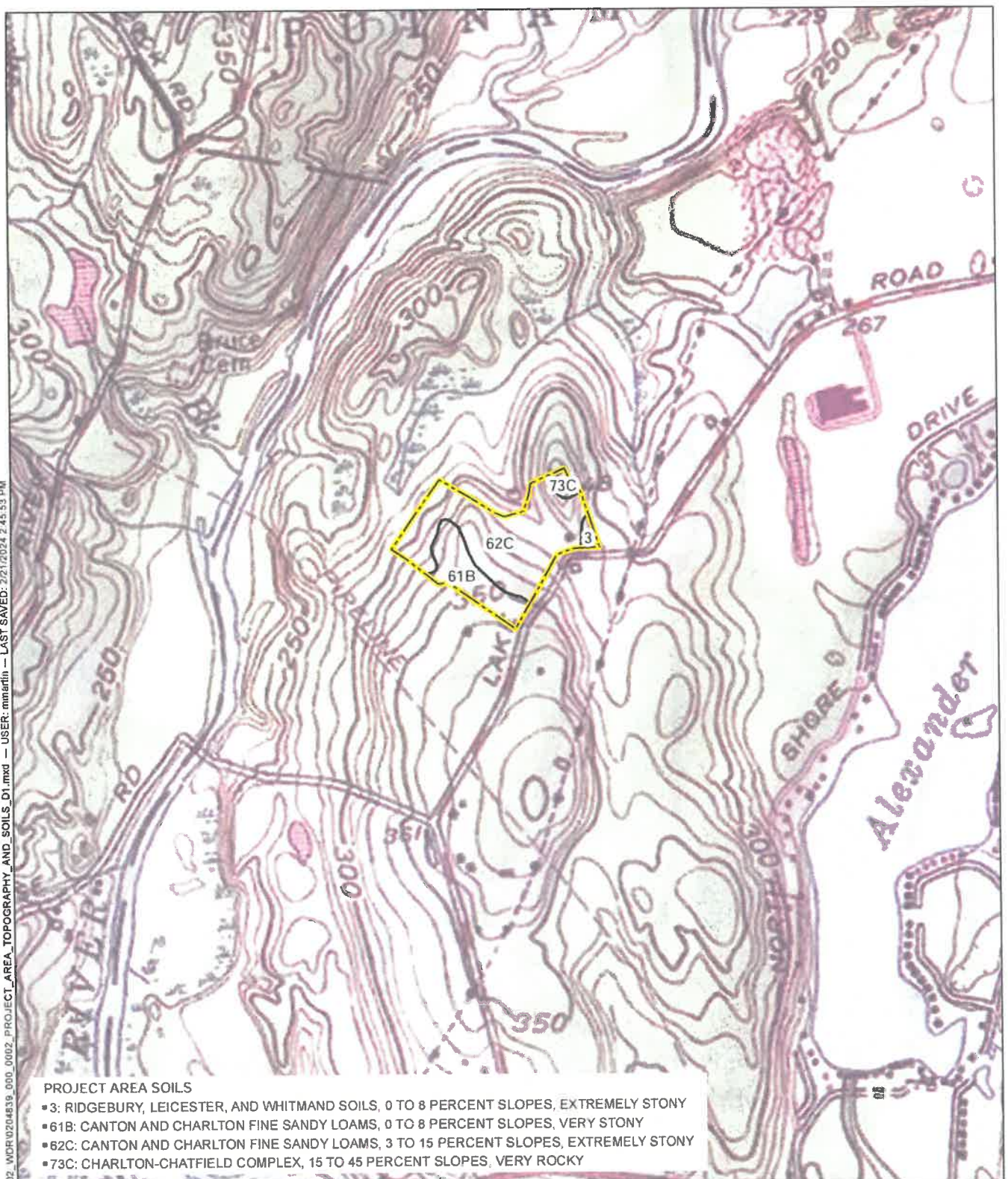
Attachment B – Routine Wetland Determination and Stream Inventory Forms

\\haleyaldrich.com\share\CF\Projects\0204839\Wetlands-Natural Resources\2024-02-08_Site Visit\Memo\2024-0222_WEC - No Findings Memo.docx

FIGURES



GIS FILE PATH: Z:\0204839\GIS\Maps\2024_02_WOR\0204839_000_0002_PROJECT_AREA_TOPOGRAPHY_AND_SOILS_01.mxd — USER: mmartin — LAST SAVED: 2/21/2024 2:45:53 PM



PROJECT AREA SOILS

- 3: RIDGEBURY, LEICESTER, AND WHITMAM SOILS, 0 TO 8 PERCENT SLOPES, EXTREMELY STONY
- 61B: CANTON AND CHARLTON FINE SANDY LOAMS, 0 TO 8 PERCENT SLOPES, VERY STONY
- 62C: CANTON AND CHARLTON FINE SANDY LOAMS, 3 TO 15 PERCENT SLOPES, EXTREMELY STONY
- 73C: CHARLTON-CHATFIELD COMPLEX, 15 TO 45 PERCENT SLOPES, VERY ROCKY

LEGEND



PROJECT AREA



0 500 1,000

SCALE IN FEET

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. BASE MAP SOURCE: USGS

**HALEY
ALDRICH**

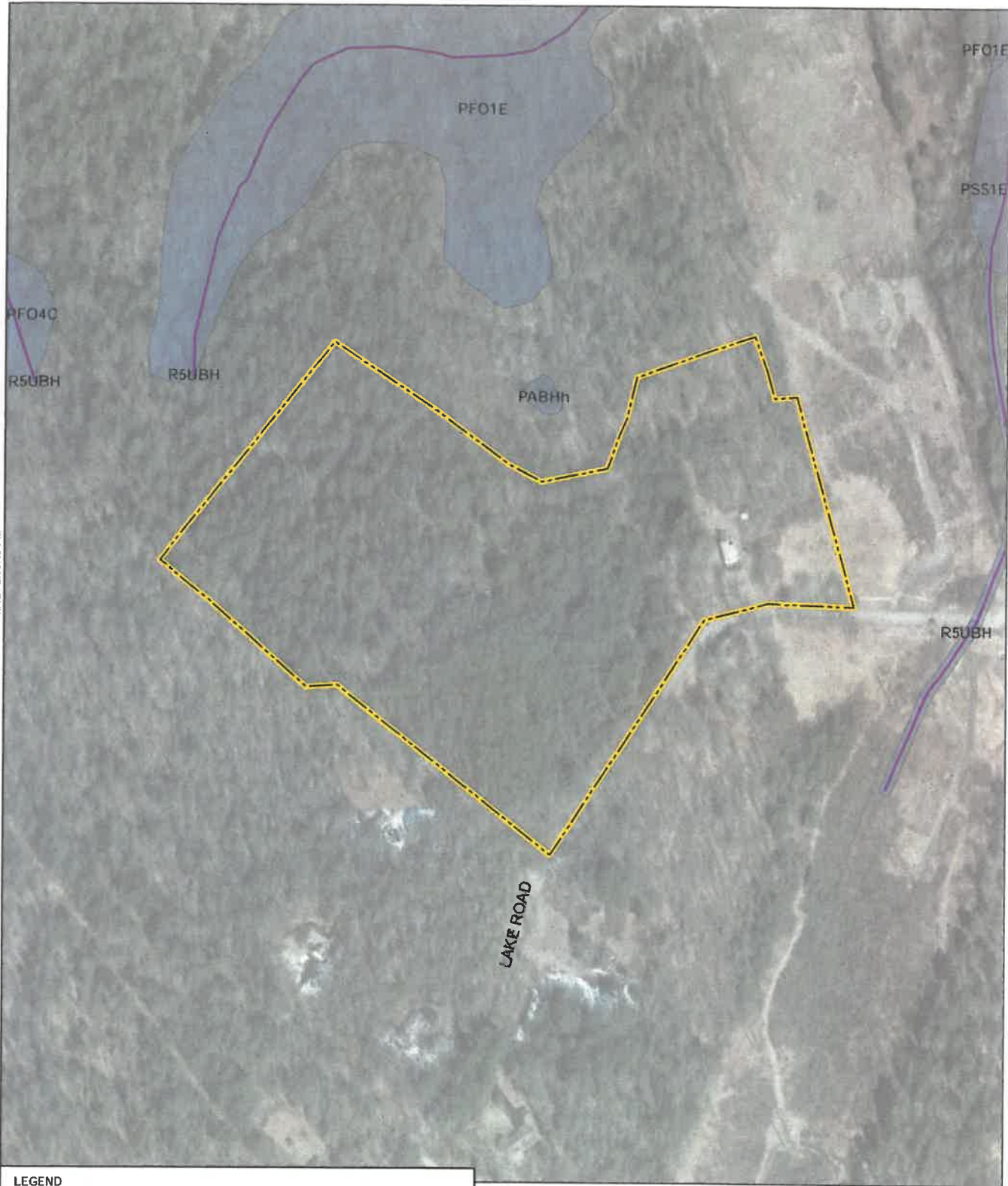
WINDHAM ENERGY CENTER
KILLINGLY, CONNECTICUT

PROJECT AREA TOPOGRAPHY AND SOILS




SCALE: AS SHOWN
FEBRUARY 2024

FIGURE 2

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LEGEND

-  MAPPED NHD
-  NWM MAPPED
-  PROJECT AREA

NOTES

1. NHD STREAM DATA SOURCE: U.S. GEOLOGICAL SURVEY
2. NWM WETLAND DATA SOURCE: U.S. FISH AND WILDLIFE SERVICE
3. AERIAL IMAGERY SOURCE: ESRI



0 150 300
SCALE IN FEET

**HALEY
ALDRICH**

WINDHAM ENERGY CENTER
KILLINGLY, CONNECTICUT

**FEDERAL AND STATE
MAPPED AQUATIC RESOURCES**

SCALE: AS SHOWN
FEBRUARY 2024

FIGURE 3

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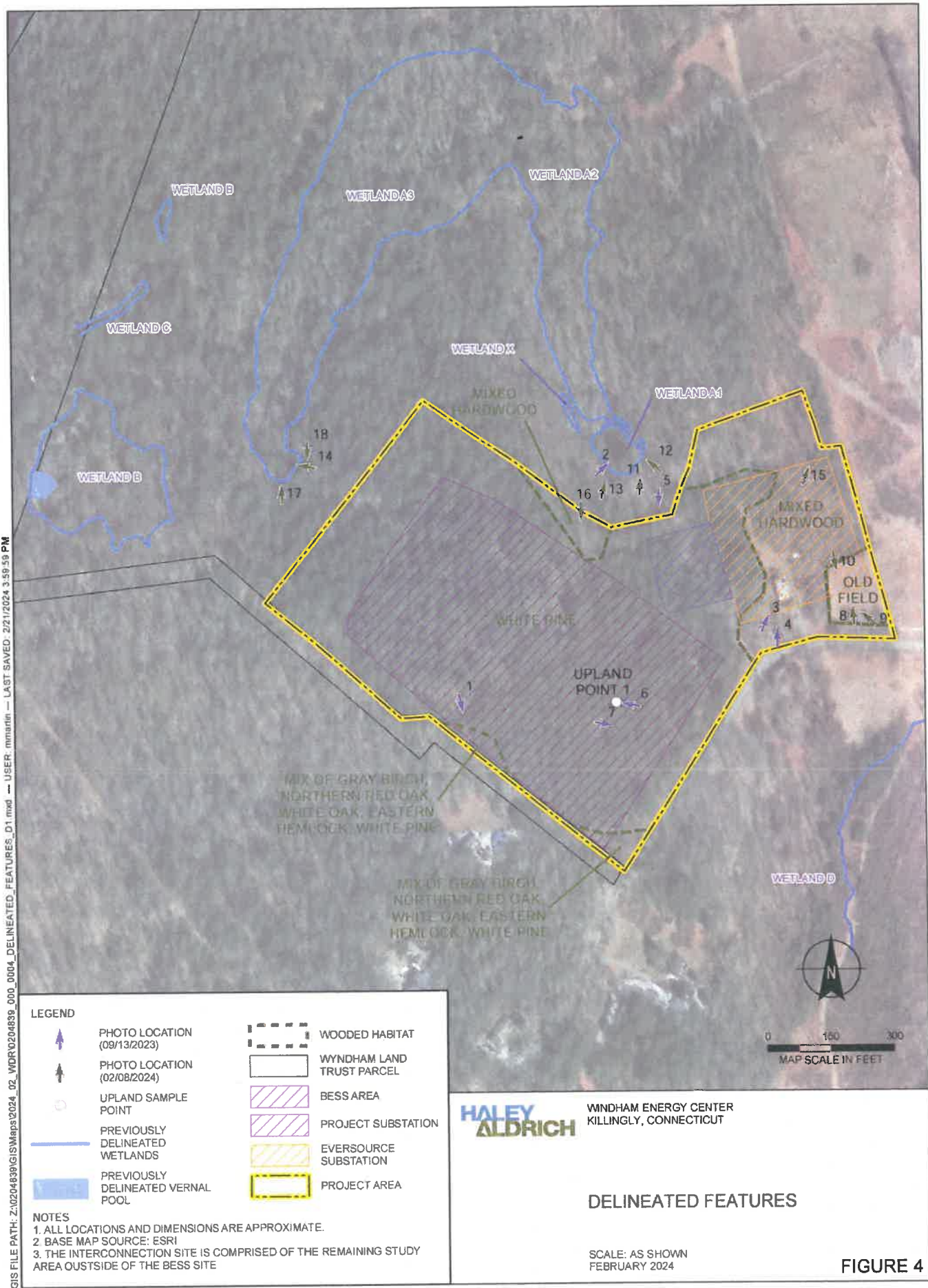


FIGURE 4

ATTACHMENT A

Photo Log

**WINDHAM ENERGY CENTER
WINDHAM COUNTY, CONNECTICUT
File No. 0204839-001
Date Photographs Taken: 13 September 2023**



Photo 1: View of typical vegetation cover in the Project Area.



Photo 2: View of a small pond located northeast of the proposed Project Area consistent with NWI mapping and former delineations; confirmed to be outside of the Project Area.

**WINDHAM ENERGY CENTER
WINDHAM COUNTY, CONNECTICUT
File No. 0204839-001
Date Photographs Taken: 13 September 2023**



Photo 3: View of the residence located within the Project Area.



Photo 4: View of the herbaceous layer located at the residence within the Project Area.

**WINDHAM ENERGY CENTER
WINDHAM COUNTY, CONNECTICUT
File No. 0204839-001
Date Photographs Taken: 13 September 2023**



Photo 5: White pine stand within the Project Area.



Photo 6: View of the soil sample taken at Upland Point 01.



Photo 7: View of white pine surrounding Upland Point 01.

**WINDHAM ENERGY CENTER
WINDHAM COUNTY, CONNECTICUT
File No. 0204839-001
Date Photographs Taken: 08 February 2024**



Photo 8: Old field located on the eastern side of the proposed Eversource substation area, facing north.



Photo 9: Old field located on the eastern side of the proposed Eversource substation area, facing northwest.



Photo 10: Old field located on the eastern side of the proposed Eversource substation area, facing south.



Photo 11: Covered spring outside of Study Area, facing north.



Photo 12: Spring entering the pond north of the Project Area, facing northwest. This stream begins at the point of which the photo is taken and is located outside of the Project Area.



Photo 13: Spring fed pond located outside of the Project Area, facing northeast.



Photo 14: View of wetland from the spring located north of the Project Area, facing northwest.



Photo 15: East portion of the Project Area, facing northeast.

**WINDHAM ENERGY CENTER
WINDHAM COUNTY, CONNECTICUT
File No. 0204839-001
Date Photographs Taken: 08 February 2024**



Photo 16: Stone wall in the central portion of the Project Area, facing south.



Photo 17: Wetland located north of the Project Area, facing north.



Photo 18: Spring located north of the Project Area.

ATTACHMENT B

Wetland Determination and Stream Inventory Data Forms

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Windham Energy Center City/County: Windham County Sampling Date: 2023-09-13
Applicant/Owner: Vitis Energy State: Connecticut Sampling Point: Upland Point 1
Investigator(s): Pippin/Grimaldi Section, Township, Range: Killingly
Landform (hillslope, terrace, etc.): Hill Local relief (concave, convex, none): Convex Slope (%): 5
Subregion (LRR or MLRA): R 144A Lat: 41.86160892 Long: -71.91530792 Datum: WGS 84
Soil Map Unit Name: Canton and Charlton fine sandy loams NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes _____ No <input checked="" type="checkbox"/> If yes, optional Wetland Site ID: _____
Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/>	
Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	
Remarks: (Explain alternative procedures here or in a separate report.) Not a wetland	

HYDROLOGY

Wetland Hydrology Indicators:		Secondary Indicators (minimum of two required)
Primary Indicators (minimum of one is required; check all that apply)		
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Water-Stained Leaves (B9)	<input type="checkbox"/> Surface Soil Cracks (B6)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Aquatic Fauna (B13)	<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Marl Deposits (B15)	<input type="checkbox"/> Moss Trim Lines (B16)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Dry-Season Water Table (C2)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)	<input type="checkbox"/> Crayfish Burrows (C8)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)	<input type="checkbox"/> Stunted or Stressed Plants (D1)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Thin Muck Surface (C7)	<input type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)		<input type="checkbox"/> Microtopographic Relief (D4)
		<input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations:		
Surface Water Present? Yes _____ No <input checked="" type="checkbox"/>	Depth (inches): _____	Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>
Water Table Present? Yes _____ No <input checked="" type="checkbox"/>	Depth (inches): _____	
Saturation Present? Yes _____ No <input checked="" type="checkbox"/> (includes capillary fringe)	Depth (inches): _____	
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available: No hydrologic data supporting this as wet.		
Remarks: No hydrology or indicators of hydrology observed.		

VEGETATION – Use scientific names of plants.

Sampling Point: Upland Point 1

Tree Stratum (Plot size: <u>30 ft r</u>)	Absolute % Cover	Dominant Species?	Indicator Status															
1. <u>Pinus strobus</u>	<u>80</u>	<u>✓</u>	<u>FACU</u>	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>0</u> (A) Total Number of Dominant Species Across All Strata: <u>1</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>0.00</u> (A/B)														
2. _____	_____	_____	_____															
3. _____	_____	_____	_____															
4. _____	_____	_____	_____															
5. _____	_____	_____	_____															
6. _____	_____	_____	_____															
7. _____	_____	_____	_____															
<u>80</u> = Total Cover																		
Sapling/Shrub Stratum (Plot size: <u>15 ft r</u>)																		
1. _____	_____	_____	_____	Prevalence Index worksheet: <table style="width: 100%;"> <thead> <tr> <th>Total % Cover of:</th> <th>Multiply by:</th> </tr> </thead> <tbody> <tr> <td>OBL species <u>0</u></td> <td>x 1 = <u>0</u></td> </tr> <tr> <td>FACW species <u>0</u></td> <td>x 2 = <u>0</u></td> </tr> <tr> <td>FAC species <u>0</u></td> <td>x 3 = <u>0</u></td> </tr> <tr> <td>FACU species <u>80</u></td> <td>x 4 = <u>320</u></td> </tr> <tr> <td>UPL species <u>0</u></td> <td>x 5 = <u>0</u></td> </tr> <tr> <td>Column Totals: <u>80</u> (A)</td> <td><u>320</u> (B)</td> </tr> </tbody> </table> Prevalence Index = B/A = <u>4.00</u>	Total % Cover of:	Multiply by:	OBL species <u>0</u>	x 1 = <u>0</u>	FACW species <u>0</u>	x 2 = <u>0</u>	FAC species <u>0</u>	x 3 = <u>0</u>	FACU species <u>80</u>	x 4 = <u>320</u>	UPL species <u>0</u>	x 5 = <u>0</u>	Column Totals: <u>80</u> (A)	<u>320</u> (B)
Total % Cover of:	Multiply by:																	
OBL species <u>0</u>	x 1 = <u>0</u>																	
FACW species <u>0</u>	x 2 = <u>0</u>																	
FAC species <u>0</u>	x 3 = <u>0</u>																	
FACU species <u>80</u>	x 4 = <u>320</u>																	
UPL species <u>0</u>	x 5 = <u>0</u>																	
Column Totals: <u>80</u> (A)	<u>320</u> (B)																	
2. _____	_____	_____	_____															
3. _____	_____	_____	_____															
4. _____	_____	_____	_____															
5. _____	_____	_____	_____															
6. _____	_____	_____	_____															
7. _____	_____	_____	_____															
<u>0</u> = Total Cover																		
Herb Stratum (Plot size: <u>5 ft r</u>)																		
1. _____	_____	_____	_____	Hydrophytic Vegetation Indicators: ___ 1 - Rapid Test for Hydrophytic Vegetation ___ 2 - Dominance Test is >50% ___ 3 - Prevalence Index is ≤3.0 ¹ ___ 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) ___ Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.														
2. _____	_____	_____	_____															
3. _____	_____	_____	_____															
4. _____	_____	_____	_____															
5. _____	_____	_____	_____															
6. _____	_____	_____	_____															
7. _____	_____	_____	_____															
8. _____	_____	_____	_____															
9. _____	_____	_____	_____															
10. _____	_____	_____	_____															
11. _____	_____	_____	_____															
12. _____	_____	_____	_____															
<u>0</u> = Total Cover																		
Woody Vine Stratum (Plot size: <u>30 ft r</u>)																		
1. _____	_____	_____	_____	Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height.														
2. _____	_____	_____	_____															
3. _____	_____	_____	_____															
4. _____	_____	_____	_____															
<u>0</u> = Total Cover																		
Remarks: (Include photo numbers here or on a separate sheet.) No hydrophytic vegetation observed																		

SOIL

Sampling Point: Upland Point 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

<u>Depth</u> <u>(inches)</u>	<u>Matrix</u>		<u>Redox Features</u>				<u>Texture</u>	<u>Remarks</u>
	<u>Color (moist)</u>	<u>%</u>	<u>Color (moist)</u>	<u>%</u>	<u>Type¹</u>	<u>Loc²</u>		
0 - 16	10YR 3/6	100					Silt Loam	Non hydric soil.
-								
-								
-								
-								
-								
-								
-								
-								
.								
-								
-								

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- | | |
|--|---|
| ___ Histosol (A1) | ___ Polyvalue Below Surface (S8) (LRR R, MLRA 149B) |
| ___ Histic Epipedon (A2) | ___ Thin Dark Surface (S9) (LRR R, MLRA 149B) |
| ___ Black Histic (A3) | ___ Loamy Mucky Mineral (F1) (LRR K, L) |
| ___ Hydrogen Sulfide (A4) | ___ Loamy Gleyed Matrix (F2) |
| ___ Stratified Layers (A5) | ___ Depleted Matrix (F3) |
| ___ Depleted Below Dark Surface (A11) | ___ Redox Dark Surface (F6) |
| ___ Thick Dark Surface (A12) | ___ Depleted Dark Surface (F7) |
| ___ Sandy Mucky Mineral (S1) | ___ Redox Depressions (F8) |
| ___ Sandy Gleyed Matrix (S4) | |
| ___ Sandy Redox (S5) | |
| ___ Stripped Matrix (S6) | |
| ___ Dark Surface (S7) (LRR R, MLRA 149B) | |

Indicators for Problematic Hydric Soils³:

- ☐ 2 cm Muck (A10) (LRR K, L, MLRA 149B)
☐ Coast Prairie Redox (A16) (LRR K, L, R)
☐ 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
☐ Dark Surface (S7) (LRR K, L)
☐ Polyvalue Below Surface (S8) (LRR K, L)
☐ Thin Dark Surface (S9) (LRR K, L)
☐ Iron-Manganese Masses (F12) (LRR K, L, R)
☐ Piedmont Floodplain Soils (F19) (MLRA 149B)
☐ Mesic Spodic (TA6) (MLRA 144A, 145, 149B)
☐ Red Parent Material (F21)
☐ Very Shallow Dark Surface (TF12)
☐ Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ☒

Remarks:

No hydric soil indicators observed.

APPENDIX C

Species Correspondence



United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104



In Reply Refer To:
Project Code: 2024-0045731
Project Name: Windham Energy Center

February 06, 2024

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

Updated 4/12/2023 - Please review this letter each time you request an Official Species List, we will continue to update it with additional information and links to websites may change.

About Official Species Lists

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Federal and non-Federal project proponents have responsibilities under the Act to consider effects on listed species.

The enclosed species list identifies threatened, endangered, proposed, and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested by returning to an existing project's page in IPaC.

Endangered Species Act Project Review

Please visit the “New England Field Office Endangered Species Project Review and Consultation” website for step-by-step instructions on how to consider effects on listed

species and prepare and submit a project review package if necessary:

<https://www.fws.gov/office/new-england-ecological-services/endangered-species-project-review>

NOTE Please do not use the **Consultation Package Builder** tool in IPaC except in specific situations following coordination with our office. Please follow the project review guidance on our website instead and reference your **Project Code** in all correspondence.

Northern Long-eared Bat - (Updated 4/12/2023) The Service published a final rule to reclassify the northern long-eared bat (NLEB) as endangered on November 30, 2022. The final rule went into effect on March 31, 2023. You may utilize the **Northern Long-eared Bat Rangewide Determination Key** available in IPaC. More information about this Determination Key and the Interim Consultation Framework are available on the northern long-eared bat species page:

<https://www.fws.gov/species/northern-long-eared-bat-myotis-septentrionalis>

For projects that previously utilized the 4(d) Determination Key, the change in the species' status may trigger the need to re-initiate consultation for any actions that are not completed and for which the Federal action agency retains discretion once the new listing determination becomes effective. If your project was not completed by March 31, 2023, and may result in incidental take of NLEB, please reach out to our office at newengland@fws.gov to see if reinitiation is necessary.

Additional Info About Section 7 of the Act

Under section 7(a)(2) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to determine whether projects may affect threatened and endangered species and/or designated critical habitat. If a Federal agency, or its non-Federal representative, determines that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Federal agency also may need to consider proposed species and proposed critical habitat in the consultation. 50 CFR 402.14(c)(1) specifies the information required for consultation under the Act regardless of the format of the evaluation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

<https://www.fws.gov/service/section-7-consultations>

In addition to consultation requirements under Section 7(a)(2) of the ESA, please note that under sections 7(a)(1) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species. Please contact NEFO if you would like more information.

Candidate species that appear on the enclosed species list have no current protections under the ESA. The species' occurrence on an official species list does not convey a requirement to

consider impacts to this species as you would a proposed, threatened, or endangered species. The ESA does not provide for interagency consultations on candidate species under section 7, however, the Service recommends that all project proponents incorporate measures into projects to benefit candidate species and their habitats wherever possible.

Migratory Birds

In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts see:

<https://www.fws.gov/program/migratory-bird-permit>

<https://www.fws.gov/library/collections/bald-and-golden-eagle-management>

Please feel free to contact us at **newengland@fws.gov** with your **Project Code** in the subject line if you need more information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat.

Attachment(s): Official Species List

Attachment(s):

- Official Species List

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
(603) 223-2541

PROJECT SUMMARY

Project Code: 2024-0045731

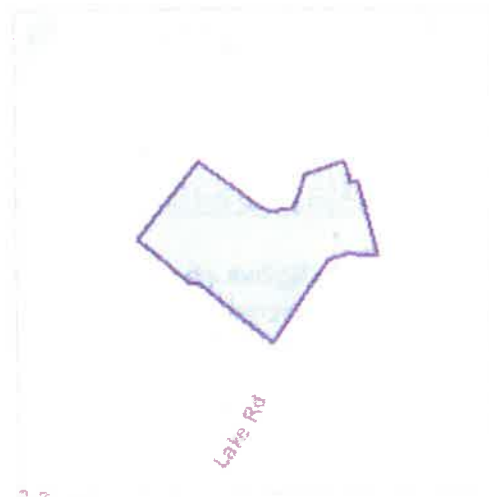
Project Name: Windham Energy Center

Project Type: Power Gen - Other

Project Description: WEC is proposing the development and operation of the Windham Energy Center within an approximately 20-acre property located west of Lake Road in the Town of Killingly, Connecticut (the Project Site).

Project Location:

The approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@41.8620594,-71.91559413096917,14z>



Counties: Windham County, Connecticut

ENDANGERED SPECIES ACT SPECIES

There is a total of 2 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

-
1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME

STATUS

Northern Long-eared Bat *Myotis septentrionalis*

Endangered

No critical habitat has been designated for this species.

Species profile: <https://ecos.fws.gov/ecp/species/9045>

INSECTS

NAME

STATUS

Monarch Butterfly *Danaus plexippus*

Candidate

No critical habitat has been designated for this species.

Species profile: <https://ecos.fws.gov/ecp/species/9743>

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

IPAC USER CONTACT INFORMATION

Agency: Haley & Aldrich
Name: Audrey West
Address: 8899 Gander Creek Drive
City: Miamisburg
State: OH
Zip: 45342
Email: awest@haleyaldrich.com
Phone: 6033913325



**Connecticut
Department of Energy &
Environmental Protection**



10/10/2023

Lynn Gresock
HALEY & ALDRICH, INC.
3 BEDFORD FARMS DR
BEDFORD, NH 03110
lgresock@haleyaldrich.com

Subject: Windham Energy Center

Filing #: 101310

NDDDB - New Determination Number: 202307235

Expiration Date: 10/10/2025

Location: Northwest of Lake Rd, between 345-kv Eversource line and Cotton Bridge, Killingly, CT

I have reviewed Natural Diversity Data Base (NDDDB) maps and files regarding this project. According to our records, there are State-listed species (RCSA Sec. 26-306) documented nearby the proposed project area.

Frosted elfin (*Callophrys irus*)- State Threatened

Fragile dagger moth (*Acronicta fragilis*)- State Special Concern

Eastern box turtle (*Terrapene carolina carolina*)- State Special Concern

Wood turtle (*Glyptemys insculpta*)- State Special Concern

Red bat (*Lasiurus borealis*)- State Special Concern

Frosted elfin (*Callophrys irus*)- State Threatened

Populations of frosted elfin (*Callophrys irus*) are declining nationally. The frosted elfin holds the distinction of being the non-federally listed butterfly with the greatest number of state level listings. Its major threats are urban development or agricultural development, vegetation management that results in declines in hostplant populations, and pesticide use. This butterfly in Connecticut is primarily associated with the plant species wild indigo (*Baptisia tinctoria*), and secondarily, wild blue lupine (*Lupinus perennis*). The host plant, *Baptisia tinctoria*, prefers at least 6 hours of direct sun, and well-drained soil. The butterfly lays a single egg on the hostplant, and the caterpillars eat the leaves of the host plant. The butterfly hibernates in a loose cocoon in litter beneath the plant. It is important to retain areas of leaf litter around host plants for overwintering and provide other flowering plants to provide nectar nearby.

Fragile dagger moth (*Acronicta fragilis*)- State Special Concern

Habitat: Woodlands and forests, but anecdotal suggestions that nearby rock outcrops in open areas may be important.

- Do not use pesticides directed at gypsy moth in your project area.
- Maintaining and creating connectivity of frosted elfin colonies is important and is likely to be critical for long term persistence of populations. If suitable habitat exists on your site, you should manage for host plants.
- If supplementing habitat, do not supplement with nursery stocks. Instead, gather seed and spread on soil.

We recommend where suitable habitat exists, you identify and protect suitable habitat and host plants (if applicable) for this state species in your project area. You can benefit this species by seeking help from an invertebrate biologist or plant ecologist to create a management plan to enhance habitat where opportunities exist. Keep the following recommendations in mind as you manage your habitat:

- Minimize ground impact to sensitive habitat, and do not import other types of permanent fill.
- To the extent practicable, conduct construction activities in winter months when plants are dormant and ground may be frozen.
- If sensitive habitats are disturbed, it is best to allow them to revegetate naturally or propagate only locally collected seed. Avoid commercially available seed mixes. They include plant species which are not considered native to Connecticut. Even mixes marketed as 'New England' or 'Northeast' mixes include high percentages of species not native to the Connecticut or the region. Additionally, commercially available seed mixes include plants that are listed as invasive in CT or which include non-local genotypes.
- Minimize the use of pesticides and herbicides in general and consider alternatives. Take precautions that species are not impacted by chemical use including using spot treatment techniques.

Eastern box turtle

In Connecticut, these turtles are found in well-drained forest bottomlands and a matrix of open deciduous forests, early successional habitat, fields, gravel pits, and or powerlines. Turtles are dormant between November 1 and April 1 and hibernate in only a few inches from the surface in forested habitat. The greatest threat to this species is habitat loss, fragmentation, and degradation due to development.

Land disturbance activities need to consider local habitat features and apply fencing and/or time of year restrictions as appropriate. We recommend you consult with a herpetologist familiar with preferred habitats to assist you with proper techniques to ensure the best protection strategies are employed for your site and the scope of your project.

Your project indicates that ground disturbance work will occur in an area that is forested and is potential overwintering habitat for Eastern box turtle. To minimize collision with these species during their breeding season, I recommend you:

- Do not begin ground disturbance work in forested habitat between November 1- March 31.

For construction work conducted between March 16- October 31:

- Exclusionary practices will be used to prevent any herp access into disturbance areas. These measures will need to be installed at the limits of disturbance as shown on the plans, or specifically designated by a herpetologist who can assess the conditions at your site.

Exclusionary fencing be at least 20 in tall and must be secured to and remain in contact with the ground and be regularly maintained (at least bi-weekly and after major weather events) to secure any gaps or openings at ground level that may let animal pass through.

- All staging and storage areas, outside of previously paved locations, regardless of the duration of time they will be utilized, must be reviewed to remove individuals and exclude them from re-entry.
- All construction personnel working within the turtle habitat must be apprised of the species description and the possible presence of a listed species.
- The Contractor search the work area each morning prior to any work being done.
- Any turtles encountered within the immediate work area shall be carefully moved to an adjacent area outside of the excluded area and fencing should be inspected to identify and remove access point. This animal is protected by law and should not be relocated off-site.
- In areas where silt fence is used for exclusion, it shall be removed as soon as the area is stable and disturbance is finished to allow for reptile and amphibian passage to resume.

Red bat (*Lasiurus borealis*)- State Special Concern

Red bats are a migratory "tree bat" species that is found throughout Connecticut between April- October in a variety of forested habitats. They roost out in the foliage of deciduous and coniferous trees, camouflaged as dead leaves or cones. Red bats are primarily solitary roosters. They can be found roosting and feeding around forest edges and clearings. Typically, larger diameter trees (12-inch DBH and larger) are more valuable to these bats. Additionally, trees with loose, rough bark such as maples, hickories, and oaks are more desirable than other tree species due to the increased cover that the loose bark provides. Large trees with cavities are also utilized by this species.

- Do not remove trees between May 15- July 21 to protect the critical period for flightless tree roosting bat pups.

Your submission information indicates that your project requires a state permit, license, registration, or authorization, or utilizes state funding or involves state agency action. This NDDB - New determination may be utilized to fulfill the Endangered and Threatened Species requirements for state-issued permit applications, licenses, registration submissions, and authorizations.

Please be aware of the following limitations and conditions:

Natural Diversity Database information includes all information regarding listed species available to us at the time of the request. This information is a compilation of data collected over the years by the Department of Energy and Environmental Protection's Natural History Survey and cooperating units of DEEP, land owners, private conservation groups and the scientific community. This information is not necessarily the result of comprehensive or site-specific field investigations. Current research projects and new contributors continue to identify additional populations of species and locations of habitats of concern, as well as enhance existing data. Such new information is incorporated into the Database and accessed through the ezFile portal as it becomes available. New information may result in additional review, and new or modified restrictions or conditions may be necessary to remain in compliance with certain state permits.

- During your work listed species may be encountered on site. A report must be submitted by the observer to the Natural Diversity Database promptly and additional review and restrictions or conditions may be necessary to remain in compliance with certain state permits. Please fill out the [appropriate survey form](#) and follow the instructions for submittal.
- Your project involves the state permit application process or other state involvement, including state funding or state agency actions; please note that consultations with your permit analyst or the agency

may result in additional requirements. In this situation, additional evaluation of the proposal by the DEEP Wildlife Division may be necessary and additional information, including but not limited to species-specific site surveys, may be required. Any additional review may result in specific restrictions or conditions relating to listed species that may be found at or in the vicinity of the site.

- If your project involves preparing an Environmental Impact Assessment, this NDDB consultation and determination should not be substituted for biological field surveys assessing on-site habitat and species presence.
- The NDDB - New determination for the Windham Energy Center as described in the submitted information and summarized at the end of this document is valid until 10/10/2025. This determination applies only to the project as described in the submission and summarized at the end of this letter. Please re-submit an updated Request for Review if the project's scope of work and/or timeframe changes, including if work has not begun by 10/10/2025.

If you have further questions, please contact me at the following:

Shannon Kearney
CT DEEP Bureau of Natural Resources
Wildlife Division
Natural Diversity Database
79 Elm Street
Hartford, CT 06106-5127
(860) 424-3170
Shannon.Kearney@ct.gov

Please reference the Determination Number 202307235 when you e-mail or write. Thank you for consulting the Natural Diversity Data Base.

Shannon Kearney
Wildlife Division- Natural Diversity Data Base
79 Elm Street
Hartford, CT 06106-5127
(860) 424-3170
Shannon.Kearney@ct.gov

Application Details:

Project involves federal funds or federal permit:	No
Project involves state funds, state agency action, or relates to CEPA request:	Yes
Project requires state permit, license, registration, or authorization:	Yes
DEEP enforcement action related to project:	
Project Type:	Energy and Utility Production Facilities and Distribution Infrastructure
Project Sub-type:	New facility construction
Project Name:	Windham Energy Center
Project Description:	Approximately 11 acres for the proposed BESS facility and approximately 14 acres to encompass Eversource electrical interconnection components. Both properties



Connecticut
**Department of Energy &
Environmental Protection**
WILDLIFE DIVISION

CPPU USE ONLY

App #: _____

Doc #: _____

Check #: No fee required

Program: Natural Diversity Database
Endangered Species

Hardcopy _____ Electronic _____

Request for Natural Diversity Data Base (NDDDB) State Listed Species Review

This form was auto-populated with information provided through the DEEP ezFile portal NDDDB review application.
There are no fees associated with NDDDB Reviews.

Part I: Preliminary Screening & Request Type

Before submitting this request, you must review the most current Natural Diversity Data Base "State and Federal Listed Species and Significant Natural Communities Maps" found on the [DEEP website](#). These maps are updated twice a year, usually in June and December.

This form is being submitted for a:

☒ New NDDDB request

☐ Renewal of a NDDDB Request **without** modifications and within **two years** of issued NDDDB determination (no attachments required)

[CPPU Use Only - NDDDB-Listed Species Determination # 1736]

☐ New **Safe Harbor Determination**; must be associated with an application for a GP for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities (Attachment D of this form is required)

☐ Renewal/Extension of an existing Safe Harbor Determination

☐ With modifications

☐ Without modifications (no attachments required)

[CPPU Use Only - NDDDB-Safe Harbor Determination # 1736]

Enter NDDDB Determination Number for Renewal:

Enter Safe Harbor Determination Number for Renewal/Extension:

1. Does your project utilize federal funds or require a federal permit? ☐ Yes ☒ No

If yes, your project may be subject to Federal rules regarding the Northern long-eared bats or other federally listed species. Information on the Northern long-eared bat and the 4-D rule may be found at:

<http://www.fws.gov/midwest/endangered/mammals/nlebat/>

Information on other federally listed species and Section 7 consultations may be found at:

<https://www.fws.gov/newengland/EndangeredSpec-Consultation.htm>

2. Does your project utilize state funding, involve state agency actions, or relate to a CEPA request?

☒ Yes ☐ No

3. Does your project require state permits, licenses, registrations or authorizations? ☒ Yes ☐ No

If yes, list permit type(s): Stormwater Discharge - Construction

If an active enforcement action exists regarding this project, enter number:

If known, enter DEEP analysts reviewing this project: Connecticut Siting Council (not listed above)

II: Requester Information

If the requester is a corporation, limited liability company, limited partnership, limited liability partnership, or a statutory trust, it must be registered with the Secretary of the State. If applicable, the name shall be stated **exactly as it is registered with the Secretary of the State. Please note, for those entities registered with the Secretary of the State, the registered name will be the name used by DEEP. This information can be accessed at the Secretary of the State's Business Records Search. (<https://service.ct.gov/business/s/onlinebusinesssearch>)*

If the requester is an individual, provide the legal name (include suffix) in the following format: First Name; Middle Initial; Last Name; Suffix (Jr, Sr., II, III, etc.).

If there are any changes or corrections to your company/facility or individual mailing or billing address or contact information, please complete and submit the [Request to Change company/Individual Information](#) to the address indicated on the form.

1. Requester*

Company Name: HALEY & ALDRICH, INC.

Contact Name: Lynn Gresock

Address: 3 BEDFORD FARMS DR

City/Town: BEDFORD

State: NH

Zip Code: 03110

Business Phone: 16033913325 Ext:

**E-mail: lgresock@haleyaldrich.com

****By providing this email address you are agreeing to receive official correspondence from the department, at this electronic address, concerning this request. Please remember to check your security settings to be sure you can receive emails from "ct.gov" addresses. Also, please notify the department if your e-mail address changes**

a) Requester can best be described as:

☐ Individual ☐ Federal Agency ☐ State agency

☐ Municipality ☐ Tribal ☒ *business entity (* if a business entity complete i through iii):

i) Check type ☐ corporation

☐ limited liability company

☐ limited partnership

☐ limited liability partnership

☐ statutory trust

☐ Other:

ii) Provide Secretary of the State Business ID #: 0168234 This information can be accessed at the Secretary of the State's Business Records Search (<https://service.ct.gov/business/s/onlinebusinesssearch>)

iii) ☐ Check here if your business is **NOT** registered with the Secretary of the State's office.

b) Acting as (Affiliation), pick one:

☐ Property owner

☐ Consultant

☐ Engineer

☐ Facility owner

☒ Applicant

☐ Biologist

☐ Pesticide Applicator

☐ Other representative:

Part III: Site Information

This request can only be completed for one site. A separate request must be filed for each additional site.

SITE NAME AND LOCATION

Project Name (for use in correspondence): Windham Energy Center

If your Project site has a street address, please enter below:

Street Address:

Town(s):

If your Project has no street address, please enter a description of the site location:

Location Description: Northwest of Lake Road, between the 345-kV Eversource transmission lines and Cotton Bridge Road.

Town(s): Killingly

Size in acres, or site dimensions: 24.79

Describe existing land conditions:

he WEC Study Area consists of approximately 25 acres. Approximately 11 acres is the location of the proposed battery energy storage system project (the Project Site); this portion of the Study Area includes residences and residential yards (structures, maintained lawns, and formal landscaping), as well as upland forested land, including oak and birch/locust dominated deciduous woods, white pine and Eastern hemlock dominated evergreen woods, and mixed deciduous/evergreen woods.

This request also includes approximately 14 acres of the Study Area, portions of which are intended for use for an Eversource substation and electric transmission corridor (the

Interconnection Site) to reach the existing 345-kilovolt electric transmission infrastructure. This portion of the Study Area consists of upland forested land.

Of the total Study Area, approximately 6.5% is residential, and 93.5% is upland forest of varying kinds, as show on the attached materials.

Part IV: Project Information

1. **Project Type:**

Choose Project Category: Construction, Development

Choose Project Type: Energy and Utility Production Facilities and Distribution Infrastructure

Choose Project Subtype: New facility construction

2. **Brief Project Description:** Approximately 11 acres for the proposed BESS facility and approximately 14 acres to encompass Eversource electrical interconnection components. Both properties consist of residences and residential yards as well as upland forest.
3. **Provide a schedule for all phases of the project including the year, the month that the proposed activity will be initiated and the duration of the activity.**
- Construction start is planned for Q4 2024, with an approximately 14-month construction schedule; operation is planned by the end of 2025.
4. **Is the subject activity limited to the maintenance, repair, or improvement of an existing structure within the existing footprint?** ☐ Yes ☒ No If yes, add explanation in No. 4 below.
5. **Give a detailed description of the activity which is the subject of this request and describe the methods and equipment that will be used. Include a description of steps that will be taken to minimize impacts to any known listed species.**

Approximately 11 acres of the Study Area will be developed as a BESS facility and associated switchyard. In addition to the BESS facility, review is requested for an approximately 14 acres area, a smaller portion of which is planned for use by Eversource for the utility substation and electrical corridor. All work will be on the northwest side of Lake Road, no impacts to wetlands or streams are proposed. An unrelated project was previously reviewed and received NDDB determinations (NDDB Determination Numbers 201601996, 201614263, 201903145, and 202102808). The following steps will be taken to minimize impact to species:

- For any construction work done during the eastern box turtles' active period of April 1 through November 1, the following precautionary measures will be employed:

- Prior to construction, silt fencing will be installed around the work area. The area within the perimeter of the silt fence shall be canvassed by a qualified individual one day prior to installation of the silt fencing, and for five consecutive days following installation for the presence of turtles. Any turtles found within the bounds of the silt fence shall be relocated outside the bounds of the silt fence.

- During construction, work crews will be apprised of the species description and possible presence. Work crews shall search the work area for turtles prior to the start of each construction day. Any turtle encountered in the work area shall be moved unharmed to an area immediately outside the fenced area and oriented in the same direction it was walking when found. All precautionary measures will be taken to avoid degradation to wetland habitats, including any wet meadows and seasonal pools. No work is proposed in such areas for the preparation of the construction laydown area. Precautions shall be taken to avoid turtles when heavy machinery or vehicles are traveling to the work area. All silt fencing shall be removed after work is completed when soils are stable so that reptile and amphibian movement between uplands and wetlands is not restricted.

- Restriction of tree clearing such that none will occur during the months of June and July in order to avoid the pup season for bat species. Once construction is complete, no further impact is anticipated, with species continuing to use the remaining forested areas.

6. If this is a renewal or extension of an existing Safe Harbor request *with* modifications, explain what about the project has changed.

Part VI: Supporting Documents

Check each attachment submitted as verification that *all* applicable attachments have been supplied with this request form. Label each attachment as indicated in this part (e.g., Attachment A, etc.) and be sure to include the requester's name, site name and the date. **Please note that Attachments A and B are required for all new requests. Attachment C is required for requests associated with: new state or federal permit applications, modifications of existing permits, permit enforcement actions, site management/planning that requires details species recommendations, and state funded projects, state agency activities, and CEPA requests.** Renewals/Extensions with no modifications do not need to submit any attachments. Attachments C and D are supplied at the end of this form.

<input checked="" type="checkbox"/> Attachment A:	Project Detail Map: an 8 1/2" X 11" print/copy of the relevant portion of a USGS Topographic Quadrangle Map clearly indicating the exact location of the site.
<input checked="" type="checkbox"/> Attachment B:	GIS file (for uploaded GIS polygons): fine scaled map showing site boundary and area of work details on aerial imagery with relevant landmarks labeled. (Site and work boundaries in GIS [ESRI ArcView shapefile, in NAD83, State Plane, feet] format can be substituted for detailed maps, see instruction document)
<input checked="" type="checkbox"/> Attachment C:	Supplemental Information (attached, DEEP-APP-007C): Site plans, photographs and biological reports
<input type="checkbox"/> Attachment D:	Safe Harbor Report Requirements (attached, DEEP-APP-007D)

Part VII: Requester Certification

The requester *and* the individual(s) responsible for actually preparing the request must sign this part. A request will be considered incomplete unless all required signatures are provided.

<p>"I have personally examined and am familiar with the information submitted in this document and all attachments thereto, and I certify that based on reasonable investigation, including my inquiry of the individuals responsible for obtaining the information, the submitted information is true, accurate and complete to the best of my knowledge and belief."</p>	
Gresock Lynn	9/28/2023
Signature of Preparer (a typed name will substitute for a handwritten signature)	Date
Gresock Lynn	
Name of Preparer (print or type)	Title (if applicable)
Signature of Preparer (if different than above)	Date
Name of Preparer (print or type)	Title (if applicable)

Note: Please submit the completed Request Form and all Supporting Documents to:

CENTRAL PERMIT PROCESSING UNIT
DEPARTMENT OF ENERGY & ENVIRONMENTAL PROTECTION
79 ELM STREET
HARTFORD, CT 06106-5127

Or email request to: deep.nddbrequest@ct.gov

Attachment C: Supplemental Information and Attachments

1. Existing & Proposed Conditions

If available provide site plans, drawings or imagery showing existing conditions and proposed changes. If not available, describe all natural and man-made features including wetlands, watercourses with direction of flow, fish and wildlife habitat, floodplains and any existing structures potentially affected by the subject activity. Such features should be depicted and labeled on the site plan.

☐ Annotated Site Plan(s) attached

2. Photographs depicting site conditions can be helpful to reviewers. Provide and label photographs, if available.

☐ Site Photographs (optional) attached

3. Biological Surveys

Has a biologist visited the site and conducted a biological survey to determine the presence of any endangered, threatened or special concern species ☐ Yes ☐ No

If yes, submit any reports of biological surveys, documentation of the biologist's qualifications, and any NDDDB survey forms. Reports should include biologist(s) name, habitat and/or species targeted by survey, plant and animal species observed, dates when surveys were conducted.

☐ Reports of biological surveys attached

☐ Documentation of biologist's qualifications attached

☐ [NDDDB Survey forms](#) for any listed species observations attached

Attachment D: Safe Harbor Report Requirements

Submit a report, as Attachment D, that synthesizes and analyzes the information listed below. Those providing synthesis and analysis need appropriate qualifications and experience. A request for a safe harbor determination shall include:

1. Habitat Description and Map(s), including GIS mapping overlays, of a scale appropriate for the site, identifying:

- wetlands, including wetland cover types;
- plant community types;

- topography;
 - soils;
 - bedrock geology;
 - floodplains, if any;
 - land use history; and
 - water quality classifications/criteria.
2. **Photographs** - The report should include photographs of the site taken from the ground and also all reasonably available aerial or satellite photographs and an analysis of such photographs.
 3. **Inspection** - A visual inspection(s) of the site should be conducted, preferably when the ground is visible, and described in the report. This inspection can be helpful in confirming or further evaluating the items noted above.
 4. **Biological Surveys** - The report should include all biological surveys of the site where construction activity will take place that are reasonably available to a registrant. A registrant shall notify the Department's Wildlife Division of biological studies of the site where construction activity will take place that a registrant is aware of but are not reasonably available to the registrant.
 5. **Based on items #1 through 4 above, the report shall include a Natural Resources Inventory of the site of the construction activity.** This inventory should also include a review of reasonably available scientific literature and any recommendations for minimizing adverse impacts from the proposed construction activity on listed species or their associated habitat.
 6. **In addition, to the extent the following is available at the time a safe harbor determination is requested, a request for a safe harbor determination shall include and assess:**
 - Information on Site Disturbance Estimates/Site Alteration information
 - Vehicular Use
 - Construction Activity Phasing Schedules, if any; and
 - Alteration of Drainage Patterns

APPENDIX D
Cultural Resources Correspondence



Department of Economic and
Community Development

Connecticut
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September 6, 2016

Ms. Lynn Gresock
Tetra Tech
2 Lan Drive, Suite 210
Westford, MA 01886

Subject: Killingly Energy Center
180 and 189 Lake Road
Killingly, Connecticut.

Dear Ms. Gresock:

The State Historic Preservation Office (SHPO) has reviewed the Phase I Cultural Resources Reconnaissance Survey Report and National Register of Historic Places (NRHP) Eligibility Evaluation Report prepared by Tetra Tech for the referenced energy facility. SHPO understands that the proposed project area is comprised two lots designated as 180 and 189 Lake Road. The electric generating facility will be constructed within a 63 acre parcel on the western side of Lake Road (#189) and an associated switchyard will be constructed across the street within a 10 acre parcel (#180). The context and background research in the reports demonstrates knowledge of the project area and the fieldwork appears to meet the standards set forth in the *Environmental Review Primer for Connecticut's Archaeological Resources*.

The project areas currently contain a number of above ground features including a historic farmstead, a family cemetery, several building foundations, and stone walls. SHPO understands that construction will avoid the Lippitt Family Cemetery. SHPO recommends that a 50 ft buffer be established around the cemetery to prevent construction related impacts and that this area be marked as a sensitive resource on construction maps. A comprehensive assessment of the historic farmstead included a consideration of the residence, a barn, 3 utilitarian sheds, and dry-laid stone walls. SHPO understands that the farmstead will be demolished to accommodate new construction. This office concurs with the findings of the NRHP Eligibility Evaluation Report that the farmstead does not possess the qualities of significance for individual listing on the NRHP nor is it a contributing element to a potential historic district. The remaining ruinous features also do not possess the qualities of significance for listing on the NRHP.

The proposed project areas are characterized by a variety of environmental conditions with variable archeological sensitivity. As a result, SHPO accepts the stratified systematic subsurface testing methodology employed to comprehensively examine those areas delineated as having a high or moderate archeological sensitivity that may be impacted by the proposed construction. During the archeological reconnaissance survey, shovel tests were excavated systematically at 15 meter intervals within testing blocks. A total of 245 shovel test pits were completed throughout

State Historic Preservation Office

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the project areas; of which 74 shovel test pits contained historic period artifacts. A concentration of artifacts was identified in association with the no longer extant Lippitt house on the eastern side of Lake Road. This cluster of artifacts has been designated State of Connecticut Site 69-103. Please include this site number in copies of the final report for future research. SHPO does not consider this small and common artifact assemblage to possess research potential. As a result, this office concurs that Site 69-103 is not eligible for listing on the NRHP. Scatters of historic and modern materials were also identified throughout the project areas, but they did not merit archeological site status. Based on the information provided to our office, SHPO concurs with the findings of the report that no additional archeological investigations are warranted and that no historic properties will be affected by the proposed energy facility project. This comment is conditional upon the submission of two bound copies of the final reports to our office for permanent curation and public accessibility, as well as an unbound copy of the site form for Site 69-103.

This office appreciates the opportunity to review and comment upon this project. These comments are provided in accordance with the Connecticut Environmental Policy Act and Section 106 of the National Historic Preservation Act. For additional information, please contact me at (860) 256-2764 or catherine.labadia@ct.gov.

Sincerely,

Catherine Labadia
Deputy State Historic Preservation Officer

State Historic Preservation Office

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APPENDIX E

Safety Procedures



Hazard Mitigation Analysis for EenrC Plus

Version	Date	Changes
1.0	JUL. 18, 2023	First Release

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1 General Introduction

1.1 Purpose of Document

This document mainly analyzes the relevant failure modes of EnerC plus battery energy storage system, and gives corresponding solutions to mitigate the hazard of energy storage system.

1.2 Applicable Standard

NFPA 855 Standard for the Installation of Stationary Energy Storage Systems, section 4.4 requires hazard mitigation analysis for energy storage systems. The analysis shall evaluate the consequences of the following failure modes:

- 1) A thermal runaway or mechanical failure condition in a single ESS unit
- 2) Failure of an energy storage management system or protection system that is not covered by the product listing failure modes and effects analysis (FMEA)
- 3) Failure of a required protection system including, but not limited to, ventilation (HVAC), exhaust ventilation, smoke detection, fire detection, fire suppression, or gas detection

The AHJ shall be permitted to approve the hazard mitigation analysis as documentation of the safety of the ESS installation if the consequences of the analysis demonstrate the following:

- 1) Fire will be contained within unoccupied ESS rooms for the minimum duration of the fire resistance rating specified in 9.6.4
- 2) Fire and products of combustion will not prevent occupants from evacuating to a safe location
- 3) Deflagration hazards will be addressed by an explosion control or other system

1.3 Abbreviations

BESS: Battery Energy Storage System.

HMA: Hazard Mitigation Analysis.

BMS: Battery Management System.

TMS: Thermal Management System.

FSS: Fire Suppression System.

FCP: Fire Control Panel.

BOL: Beginning of Life.

EOL: End of Life.

CSC: Cell Supervision Circuit, the base unit of battery management.

SBMU: Slave Battery Management Unit, collects and analyses the data from CSC, and uploads to the MBMU.

MBMU: Main Battery Management Unit. The core control unit of the container.

EMS: Energy Management System. Monitoring and manage the charge and discharge of the BESS.

Sub Control Box: Including the SBMU fuse isolation switch and other components.

Master Control Box: Including the IMM, MBMU ETH fiber conversion module.

2 Introduction to EnerC Plus System

The EnerC plus is a modular fully integrated product, consisting of rechargeable lithium-ion batteries, with the characteristics of high energy density, long service life, high efficiency. The overview of EnerC plus is shown in Figure 1, which consists of batteries, BMS, TMS and FSS.

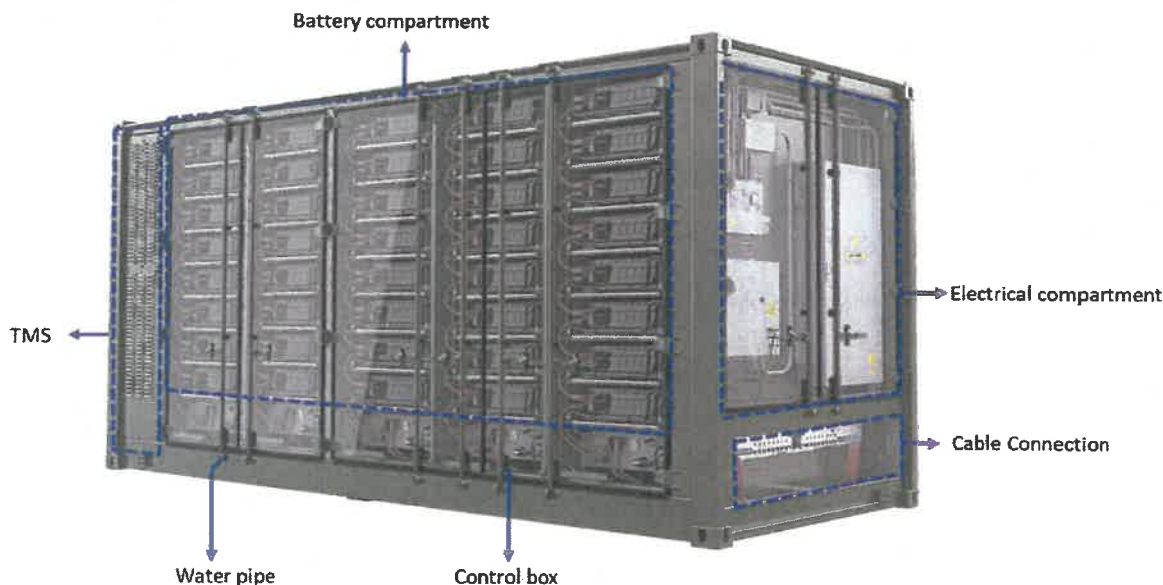


Figure 1 EnerC Plus Liquid Cooling Energy Storage Container

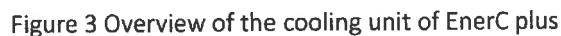
2.1 Battery Management System (BMS)

BMS is used in energy storage system, which can monitor the battery voltage, current, temperature, managing energy absorption and release, thermal management, low voltage power supply, high voltage security monitoring, fault diagnosis and management, external communication with EMS and ensure the stable operation of the energy storage system.

BMS includes three-level constructure, composed of 1 unit of MBMU, 1 unit of IMM, 1 unit of ETH, 1 unit of media converter, 5 units of SBMUs, 40 units of CSCs. This is the architecture that one PCS match 2 containers (Figure 2).



The TMS system of EnerC plus is liquid cooling, which main function is to maintain the temperature of the battery system to an allowable operating temperature range. Thus, the battery shall work at the best conditions, aerosol and release the maximum energy, slow degradation the SOH and maintain the longest life.



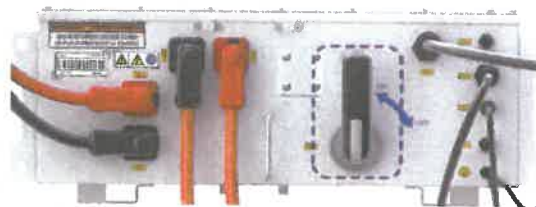
EnerC plus is equipped with double level protection devices, such as module fuse, manual maintenance

2

switch(MSD), sub control box fuse, sub control box relay and isolating switch. When the system fails in external short circuit, the fuse can be fusing quickly to avoid fire .



a) MSD of module



b) isolating switch of sub control box

Figure 4 Electrical Protection Devices

2.4 Fire Suppression System (FSS)

As an outdoor non-walk-in BESS, EnerC plus provides a perfect set of fire suppression system solutions with detection, explosion control and fire extinguishing functions.

2.4.1 Detection System

The detection system has three types of detectors, the number and installation position of which are shown in Table 1 and Figure 5. All detection signals are received and processed by the fire control panel, and the hydrogen(H_2) detector can be linked with the Extraction Fan system.

Table 1 Detector Type and Position Description

No	type	quantity	remarks
1	Heat detector	2	Detection of temperature, in the battery room
2	Smoke detector	2+1	Detection of smoke particles, two in the battery room, and one in the electrical room
3	Hydrogen detector	2	Detection of H_2 , in the battery room
4	Fire control panel	1	Receive detector signals and control fire extinguishing system and explosion-proof system, in the electrical room

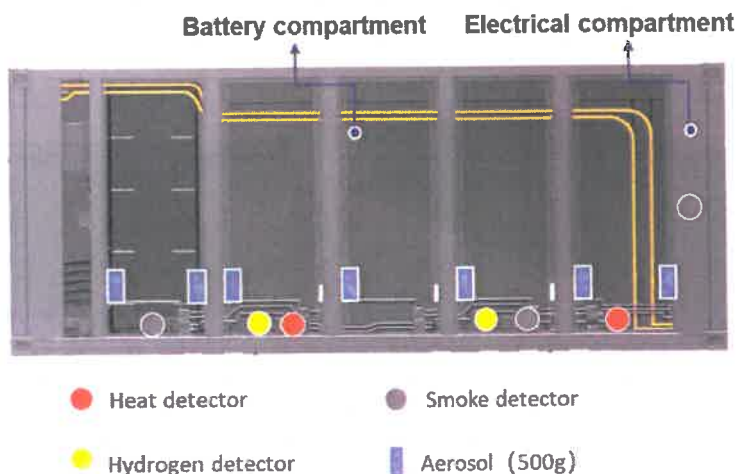


Figure 5 Type and Location of Detectors

2.4.2 Extraction Fan System

Extraction Fan system meets NFPA855 (NFPA 69) standard and has the ATEX certification, which is shown in Figure 6. When the battery thermal runaway in EnerC plus, the combustible gas can be pump to the outside of the container in time to prevent the combustible gas from gathering and deflagration.



Figure 6 Extraction Fan System

When the concentration of combustible gas in container reaches the threshold, the hydrogen detector will give an alarm to FCP. At the same time, the inlet and outlet electrical louver will open and the exhaust fan will turn on, and the combustible gas inside the container will be pumped out. The parameters of the louver and the exhaust fan are shown in Table2.

2.4.3 Fire Extinguishing System

As the last line of defense, the dry pipe system can effectively control the spread of fire, which is shown in

Figure 7.

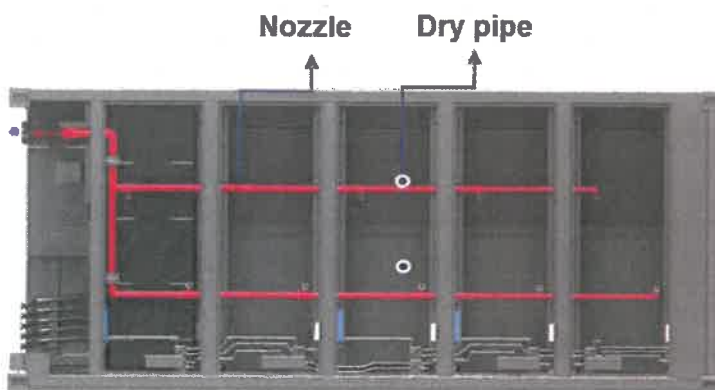


Figure 7 Dry Pipe System

3 Safety Standard Test and Certification

Battery, system/sub-system and Battery Management System (BMS) meet the following standards:

Table 2 Safety standard

Item	Safety standards
Battery	UN38.3, UL1973, IEC62619, UL9540A
System/Sub-system	UL1973, IEC62619, IEC63056, UL9540A
BMS	IEC60730, UL1973

3.1 Battery Safety Certification

For battery safety testing, the test items included in each safety standard are as follows:

Table3 Safety test items for battery

No.	Item	Safety Standards		
		IEC62619	UL1973	UN38.3
1	Overdischarge	✓	✓	✓
2	Overcharge	✓	✓	n.a
3	External short circuit	✓	✓	✓
4	Internal short circuit	✓	n.a	n.a
5	Heating	✓	✓	n.a
6	Thermal runaway	n.a	n.a	n.a
7	Thermal test	n.a	n.a	✓

8	Crush	n.a	n.a	✓
9	Impact	✓	✓	n.a
10	Drop	✓	✓	n.a
11	Altitude simulation	n.a	n.a	✓

Remark: n.a represents that this test is not in the standard

3.2 Module/System Safety Certification

For system or subsystem safety testing, the test items included in each safety standard are as follows:

Table 4 Safety test items for a system or subsystem

No.	Item	Safety Standard	
		IEC62619	UL1973
1	External short	✓	✓
2	Reverse connection protection	✓	n.a
3	Overdischarge protection	✓	✓
4	Overcharge protection	✓	✓
5	Overcurrent protection	✓	n.a
6	Overheating protection	✓	n.a
7	Insulation detect	✓	n.a
8	Drop	✓	✓
9	Thermal propagation	✓	✓

Remark: n.a represents that this test is not in the standard

地址: 福建省宁德市蕉城区漳湾镇新港路 2 号 ADD: No.2 Xin'gang Road, Zhangwan Town, Jiaocheng District, Ningde City, Fujian, PRC 352100
<http://www.CATL.com>

4 Failure Mode and Solution

A4.4.1 of Appendix A of NFPA 855 explicitly states that one form of hazard mitigation analysis (HMA) is a failure mode and effects analysis (FMEA), which is a systematic technique for failure analysis. In this chapter, the potential failure modes and corresponding solutions of battery, BMS and FSS are mainly analyzed.

No.	Failure mode	Failure consequences	Action
1	The battery temperature exceeds the upper limit of use	May induce battery thermal runaway	1) BMS alarm 2) Thermal management system cooling 3) Power-off protection
2	Single battery undervoltage	Accelerates battery aging and reduces capacity	1) Battery meets IEC62619/UL1973 undervoltage requirement 2) BMS has undervoltage protection function
3	Single battery overvoltage	May induce battery thermal runaway	1) Battery meets IEC62619/UL1973 overcharge requirement 2) BMS has overvoltage protection function
4	Battery bears vibration and impact conditions during transportation	May cause battery leakage	UN 38.3 test
5	Insufficient design of creepage distance or electrical	System insulation fault alarm, and	1) According to the energy storage system DC1500V

No.	Failure mode	Failure consequences	Action
	clearance	abnormally work	voltage, electrical clearance>10.4mm, creepage distance>15mm (4000m) 2) Check the creepage distance and clearances of the system
6	Corrosion of container enclosure	The insulation withstand voltage performance of the system is reduced, and personnel have the risk of electric shock	1) Design and test of C5 standard 2) Periodic inspection/maintenance of products
7	Coolant leakage	System insulation failure may induce short circuit fire risk	1) 100% airtight detection 2) Pressure monitoring of cooling system under working condition 3) System insulation withstand voltage detection 4) The water cooling connector is outside the battery pack 5) The wiring harness adopts IP67 design to prevent coolant infiltration
8	No Voltage/Temperature/Current data.	CSC or current sensor are	1) CSC test.

No.	Failure mode	Failure consequences	Action
		damaged.	2) Eol testing.
9	Insulation detection failure	IMM is damaged. The insulation of HV circuit is aging.	1) Design review 2) IMM test.
10	SOC/SOH too low	Software failure	BMS software testing
11	SOC/SOH too high	Software failure	BMS software testing
12	No protection	Software failure. The protection value is improper.	BMS software testing
13	No diagnosis function	Software failure	BMS software testing
14	Emergency function failure	Software failure. Emergency wire is loosen.	Emergency function testing
15	Misoperation during installation and debugging, resulting in short circuit of the positive and negative terminals	Short circuit fire, may endanger the safety of operators	1) Design foolproof 2) On-site training for operators
16	Short circuit at the module level	Battery temperature is too high,	Pack is designed with fuse protection

No.	Failure mode	Failure consequences	Action
		may induce thermal runaway	
17	Short circuit at the cabinet level	Battery temperature is too high, may induce thermal runaway	Electric cabinet is designed with fuse protection
18	Protection device can not break the circuit	Improper fuse selection	1) Design review 2) Short circuit test
19	The bus bar can not withstand a maximum short-circuit current	The bus bar cross-sectional area is too small, the fixed torque is insufficient	1) Design review 2) Short circuit test
20	DC cables cannot withstand the maximum short-circuit current	DC cables have a too small cross-sectional area	1) Design review 2) Short circuit test
21	Wirings does not meet rated voltage requirements	Improper selection	1) Design review 2) Short circuit test
22	Wirings does not meet constant current requirements	Improper selection	1) Design review 2) power testing
23	Wirings does not meet max.pulse current requirements	Improper selection	3) Short circuit test

No.	Failure mode	Failure consequences	Action
24	Relay is damaged when short circuit	Improper selection	1) Design review 2) Short circuit test
25	Busbar is damaged when short circuit	Improper selection	1) Design review 2) Short circuit test
26	Battery thermal runaway, and generates combustible gas	Fire and deflagration, and may cause personal safety	1) BMS alarm 2) FSS detection system alarm 3) Exhausting smoke by the Extraction Fan and pumping out combustible gas inside the container
27	A fire broke out inside the container	Product failure, causing property loss or personal safety	1) FSS alarm 2) Aerosol fire extinguishing 3) Dry pipe fire extinguishing
28	The fire spread to adjacent containers	Causing great property damage or personal safety	1) The flame retardant grade of container materials meets the requirements of UL 94-V0 2) The container enclosure is sandwich structure, and the internal rock wool meets EI60 fire resistance rating 3) Dry pipe fire extinguishing, and controls the

No.	Failure mode	Failure consequences	Action
			spread of fire
29	The smoke detector failed	May affect aerosol release	1) Design of two smoke detectors 2) Two heat detectors can also trigger the secondary fire alarm and release aerosol 3) Regular maintenance
30	The heat detector failed	May affect aerosol release	1) Design of two heat detectors 2) One smoke detector and one heat detector can also trigger the secondary fire alarm and release aerosol 3) Regular maintenance
31	The hydrogen detector failed	Extraction Fan system may not open properly to exhaust smoke	1) Design of two hydrogen detectors 2) The Extraction Fan is designed with manual switch, which can be started manually 3) Regular maintenance
32	Failure of automatic starting function of Extraction Fan	The combustible gas inside the container cannot be discharged in	1) The Extraction Fan is designed with manual switch, which can be started manually

No.	Failure mode	Failure consequences	Action
		time, resulting in deflagration hazard	2) Regular maintenance
33	Aerosol loop failure	The aerosol cannot be released and the fire cannot be extinguished in time	1) The aerosol loop has automatic detection function 2) Regular maintenance

5 Conclusion

According to hazardous mitigation analysis, conclusion as below:

Compliance Requirement	Comments
NFPA 855 chapter 4.4.3 The AHJ shall be permitted to approve the hazard mitigation analysis as documentation of the safety of the ESS installation if the consequences of the analysis demonstrate the following:	
1) Fire will be contained within unoccupied ESS rooms for the minimum duration of the fire resistance rating specified in 9.6.4	Not applicable. The EnerC plus outdoor containers are located in a remote outdoor location and not within any ESS rooms.
2) Fire and products of combustion will not prevent occupants from evacuating to a safe location	Not applicable. CATL only provides EnerC plus containers, and the design of emergency access is not CATL's responsibility
3) Deflagration hazards will be addressed by an explosion control or other system	EnerC plus is equipped with Extraction Fan system. When battery thermal runaway, the combustible gas is pumped to the outside of the container through the fan system to prevent deflagration