Worthington Fire-Rescue Department
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To: Bart Niswonger, Chair & the Worthington Planning Board 26 February 2026

Worthington Fire - Rescue Department - Inputs, Questions for LSGMSVI at 190 Ridge Road, Worthington, MA

The Worthington Fire-Rescue Department (WFRD) respectfully provides the following input.

I. NFPA 855 - WFRD -Notes, Recommendations, Mitigations

Applicability: NFPA 855 applies since this proposed site involves a Battery Energy Storage System (BESS) in excess of NFPA Table 1-3 requirements, typically 20 – 70 kilowatt*hours (kW*hr.) for most battery technologies. Request Blue Wave Company (BWC), or Fire Risk Alliance (FRA), the BWC consultant, & Town selected Technical Consultant (as appropriate) respond to all comments, questions, requests, recommendations in this letter.

Further, per NFPA 855 (& other NFPA documents), the Fire Chief is the Authority Having Jurisdiction (AHJ), and provides the recommendations or requests made here-in based on preliminary information contained in the application or supplements. The AHJ reserves the right to amend or update recommendations or provide more detailed conditions and requirements, as more detailed design, construction, installation, commissioning, operation, maintenance & repair or decommissioning information becomes available.

1. DESIGN
   a. need to verify road and site access & clearances for driveways, equipment pads, solar array & perimeter pathway (if any), and access to on-site residence for WFRD and mutual aid Fire, Police, EMS emergency vehicles. Need to ensure adequate access to the site driveway, and on the site to equipment pads, solar arrays, residence etc. during typical & worst-case winters, snow removal & accumulation, wind drifts; periods of heavy rain / water run-off mud etc.
   b. site visit to be scheduled as weather / snow cover etc. permit.

c. As part of the design phase, or prior to the Construction Phase, request that BWC / Fire Risk Alliance consultant provides electronic, searchable versions of each of the NFPA, MA CMR or other documents defined below. This list may be amended as needed in the design & construction/installation or other phases of this project.

2. CONSTRUCTION

Per 4.2.1.1, plans & specs for ESS installation, replacement, renewal, commissioning, and use shall be submitted to AHJ for approval.

a. Request BWC & Fire Risk Alliance provide a plan and support discussions for ongoing (e.g., annual or bi-annual) Firefighter training modules (both classroom & applicable "hands-on" / practical sessions). Training to include specifics particular to this installation, the selected BESS/ESS equipment & related solar array & power conversion equipment. Training to be made available to WFRD and mutual aid departments, & be provided during the construction, installation, commissioning & operational phases of the project.
b. Location and layout diagram of the area in which the ESS is to be installed
c. Details on hourly fire-resistant-rated assemblies provided or relied upon in relation to the ESS
d. The quantities and types of ESS units, this includes the main proposed BESS, as well as batteries (e.g., Li-Ion, other types?) used in tracker systems. Request BWC defines the electrical system used for the array tracking system, including battery types etc.
e. Manufacturer's specifications, ratings, and listings of ESSs
f. Description of energy storage management systems and their operation
g. Location and content of required signage, disconnects & DC & AC shutdown devices.
h. Details on any on-site, integrated fire suppression, smoke detection, fire detection, gas/toxin detection, thermal management, exhaust ventilation, and explosion control and prevention systems, where installed. Includes details on selected/installed BESS batteries & tracker system batteries – Mean Time Between Failures (MTBFs), Material Safety Data Sheets (MSDSs), thermal profile during fire or "thermal runaway" conditions, as a function of State of Charge. Includes details on all remote/local monitoring, alert, alarm systems; automated & manual reporting to local authorities (i.e., 9-1-1 Northampton Dispatch, local Police, Fire, EMS).
i. Support arrangement associated with the installation, including any required seismic support
j. Are all these docs in current application submittal? **If not, when expected for construction & installation phase?**
k. In addition, WFRD requests BWC, FRA to conduct and provide a detailed Failure Modes and Effects Criticality Analysis (FMECA) defining failure mechanisms, probability, detectability, mitigation levels/effectiveness, risks, outcomes) for all this equipment, subsystems and overall installation, to be reviewed by WFRD, Town entities & Town technical consultant. A FMECA is a standard practice for risk assessment in large scale technical projects.

l. The basic approach to a BESS fire is to stand back, apply water/suppression agents to nearby exposures to reduce/eliminate spread between BESS units or other nearby installation electrical equipment.
m. WFRD requests consideration of installation (size, location TBD with BWC, FRA, Town consultants) of a fire water pond & hydrant hook-up onsite to reduce the time/burden of water supply during any initial or protracted emergency response.
n. WFRD requests consideration of installation (size, location TBD with BWC, FRA, Town consultants) of an additional Structure for containment of FF suppression agents (water, foam etc.) and related incident "run-off" below & around BESS/ESS equipment, transformers / inverters/ converters. Essentially a waterproof "bathtub enclosure" under all key electrical elements at risk of fire & related suppression/exposure operations. Goal to contain any "run-off" (i.e., fire byproducts / toxins / contaminants) from entering the ground water/aquifers, nearby well systems, or other protected water supplies.

3. INSTALLATION

Per 4.2.1.1, other NFPA docs/sections, - see details in other sections.

a. For the final design& "as-installed" system (e.g., solar arrays, tracking system/mechanisms, BESS & components, inverters, converters, switchgear etc.) – provide finalized/ updated MSDSs, MTBF calculations.

4. COMMISSIONING

Per 4.2.1.1, other NFPA docs/sections, - see details in other sections.

5. OPERATIONS
a. There have been numerous experiences of brush/vegetation fires under agricultural solar arrays in the northeast region. Worthington (& Westen Mass) has been under elevated brush fire risk for the last several years, due to changing weather patterns (climate change). This site is especially vulnerable as there are significant, sustained winds at these elevations.
b. Request BWC, FRA, (& possibly Town technical consultant) work to obtain brush fire risk data (for last 5-7 years for trends) & predictions for 5, 10 -20 years into future; from MA Bureau of Forest Fire Control (BFFC) & Department of Conservation & Recreation (DCR) District 10. WFRD has a list of potential contacts.
c. Request BWC, FRA provide needed emergency shutdown procedures & signage / training as needed. Provide a detailed plan for regularly scheduled (monthly, quarterly, yearly or condition/hours-based maintenance) preventive & corrective maintenance for all equipment, list of approved OEM replacements (for batteries & all electrical / electromechanical & related installed equipment), plans for disposal of service items, etc. Expected lifecycles for all electrical and related support equipment (monitoring, suppression, lighting, HVAC, etc.)
    i. Do we (Town entities) get access to maintenance reports or records?

d. Request BWC or their consultants provide an updated Erosion Control Plan (Att B, Dwg G-001) based upon "as installed" configuration for control of water flow during high/heavy rain periods or snow melt coming off ~ 7500 solar panels & total arrays during construction, & operations for WFRD & other mutual-aid response access during construction & during operations. Discuss any exposed slopes with > 3:1 gradient or other in consultation with other Town entities.

6. MAINTENANCE

Per 4.2.1.1, other NFPA docs/sections, - see details in other sections.

a. Request BWC, FRA provide a defined schedule for regular maintenance, staging, swap-out, disposal & controls for all LSGMSVI components, particularly BESS batteries, tracker batteries (Li-ION or other?), panels, inverters/converters & related components.
b. Request BWC, FRA define methods for interested Town entities/departments to access and review of quarterly/ annual maintenance records and reports, including information pertaining to equipment or component failures, wear out and repairs. Discussions to include recommendations for improved maintenance schedules as warranted.

7. DECOMMISSIONING

Per 4.2.1.1, other NFPA docs/sections, - see details in other sections.

8. WFRD concerns, regarding all the above:

a. Overall Risk to Town & WFRD/mutual aid/wider resources vs. benefit to Town?
b. Current roster is small (~8 – 12) and aging, even though we've recruited new, younger folks. Many are, as always, working out of town on weekdays, or are unavailable weekends (travel etc.). Future # of personnel is always questionable. Similar situations exist in most of our mutual-aid departments.
c. Need to understand the reliability & MTBF of all BESS components & total installation, i.e., the solar panels, arrays, tracking mechanisms (and tracking system batteries), converters, inverters, transformers, Utility POI, etc. Has a detailed Failure Modes and Effects Criticality Analysis (FMECA) defining failure mechanisms, probability, detectability, mitigation levels/effectiveness, risks, outcomes) been done for all this equipment, subsystems and overall installation?
d. Need to understand all the impacts & work w/ BWC, FRA, Town entities, Town tech consultant & Emergency Management Director (EMD) **to update town Emergency Response Plan to address potential multiple LSGMSVI in town (and occurring in other mutual aid Towns or wider response area Towns).**
e. Reliance and impact on mutual aid towns, ability to marshal Town / WFRD & mutual aid / extended resources for large scale, multi-day incidents, including mutual aid towns, mobilizing state resources e.g., Massachusetts Emergency Management Agency (MEMA), Department of Conservation & Recreation (DCR) District 10, others; Dept of Environmental Protection (DEP); Dept of Fire Services (DFS), etc.

II. Blue Wave – Main Proposal & Site Plan Review (SPR)

General Q&A: – Battery Energy Storage System (BESS)

1. Although BlueWave cannot commit to any BESS solution at this point, there will need to be a specific main BESS (~1 – 5 MW*hours capacity) defined for construction period. Request BWC / FRA define the following:
   a. What are the current (3) leading BESS chemistries? E.g., LiFeP04, flow-type, advanced lead acid, other? And provide detailed information, e.g., Material Safety Data Sheets (MSDS), Mean Time Between Failure (MTBF calcs) for a BESS of proposed size (1 – 5 MW*hours)
   b. What are the current/leading associated fire suppression & containment approaches for each of the (3) leading types / chemistries?
   c. What are the temperatures, toxins (waterborne, airborne, ash, soil etc.) for each of the leading BESS options & recommended suppression actions and agents? What are the impacts to humans, animals & agriculture/plant life.
   d. When do they expect to make a BESS-type selection?
   e. What are typical resources, training, mitigations etc. provided to towns like Worthington for these size installations?
   f. What are the BESS trends in the last 5-10 years & predictions for next 3 – 5 years?
      i. Chemistry & Fire Suppression technologies
      ii. Energy density (e.g., MW*hour/m3) & cost functions (e.g., $/energy density) during installation, 20–30-year ops/maintenance, decommission

2. Due to the many substantial and valid concerns of many town entities and residents to BESS, AHJ requests BWC, FRA & Town consultants address possible other Energy Storage Solutions (ESS) that may be available. E.g., electro-mechanical, like flywheels & compressed air energy storage (CAES). Would like to see an analysis of these alternate ESS technologies for application to this site in the next 3 – 5 years. What are the other ESS trends & engineering / capacity improvements in the last 5-10 years & predictions for next 3 – 5 years?
   a. E.g., what would it take for High Power Flywheels to scale up to the 1 – 5 MW*hour range? Request feasibility study including size, cost, fire/toxin release risk, etc.
   b. E.g., what would it take for CAES to scale to the 1 – 5 MW*hour range? Request feasibility study including size, cost, fire/toxin release risk, etc.
   c. What would it take to move the BESS/ESS solution off this site, to an area with less/no impact on the water supply, wells etc. as defined by other Boards, towns people? E.g. move BESS/ESS, via HV connection to an Eversource / other site that could be available or more suitable in Town?
   d. Related hazards & Suppression / mitigation technologies for each of the above
   e. Energy density (e.g., MW*hour/m3) & cost functions (e.g., $/energy density) during installation, 20–30-year operations & maintenance periods, including decommissioning for all (3) main BESS & possible ESS approaches.

3. Array Tracker – Electrical System and Batteries. Request BWC / FRA provide further definition of the electrical system (e.g., controllers, AC or DC tracker motor drives, batteries, etc.) across an array totaling ~ 7000 panels, including items below:
    a. Request Blue Wave define the solar panel array electrical configurations – how many panels in a "string" or "sub-array"? How many panels / subarrays are controlled by the tracker alignment system?
    b. What is the electrical design (1-line diagram, detailed equipment, arrangement, configuration) for the tracker system (sensors, controls and motive power) Is there remote or local detection (monitoring/reporting) for "stuck" or failed tracker mechanisms, overload/overheating, etc.? Is the tracker system tied into the overall installation monitoring & reporting system?
    c. What is the proposed battery type (chemistry, size, rating, etc.) & configuration for the tracker system (Li-Ion, LiFeP04, or other?). E.g.., is it 1 battery for each of ~7000 panels; 1 battery for a "string" or "sub-array" of a group of panels tracking together? Provide detailed information, e.g., Material Safety Data Sheets (MSDS), Mean Time Between Failure (MTBF calcs) for the proposed/ selected tracker system and arrangement / configuration: batteries, drive motors / actuators, controls, sensors, linkages and other related electric or electromechanical components.
    d. What are the associated fire suppression approaches for the tracker system, particularly batteries, motors/actuators, controllers, etc.?
    e. What are the temperatures, toxins (waterborne, airborne, ash, soil etc.) for the tracker batteries or other tracker system HazMat & suppression agents? To humans, animals & agriculture/plant life.
    f. What are typical resources, training, mitigations etc. provided to towns like Worthington for these tracker systems & all related installation equipment (i.e., inverters, converters, switchgear, etc.)?
    g. What are the tracker battery trends in the last 5-10 years & predictions for next 3 – 5 years?
        i. Chemistry & Fire Suppression technologies
        ii. Energy density (e.g., MW-hour/m3) & cost functions (e.g., $/energy density) during installation, 20–30-year ops/maintenance, decommission

III. Town Docs & Bylaws

a. If the Planning Board would like WFRD to address any specific Town by-laws or other inputs received from a Fire Department or Fire & Emergency Response perspective, please let us know.

IV. Requested NFPA, MA CMR, other related Docs to be provided in electronic, searchable format

1. Mass Fire Safety Code 527 CMR 1.00 & related subsections
2. Dept of Environmental Protection (DEP) 310 CMR 6.0 Air Quality Standards
    a. 310 CMR 7.0 Air Pollution Control

b. 310 CMR 8.0 Prevention / Abatement of Air Pollution Emergencies

3. NFPA 13, Standard for the Installation of Sprinkler systems, 2025 ed.
4. NPFA 15, Standard for Water Spray Fixed systems for Fire Protection, 2022 edition
5. NFPA 68, Standard on Explosion Protection by Deflagration Venting, 2023 edition
6. NFPA 69, Standard on Explosion Prevention Systems, 2024 edition
7. NFPA 704, Standard Systems for the Identification of Hazards of Materials for Emergency Response, 2022 ed.
8. NFPA 1142, Standard on Water supplies for Suburban and Rural Firefighting, 2022 ed.
9. NFPA 1660 Chapters 1 – 3, 17-23 for Emergency Response Plan

V. Things to Do with respect to Town & WFRD

1. For awareness, recommendations, resources, references, concerns, etc.:
   a. Call/notify MA DCR District 10 (Gil Loud) for state forest land etc. Per Special Permit Application (SPA), MA Division of Fisheries & Wildlife (251 Causeway Street, Suite 400, Boston, MA 02114-2152) are registered abutters
   b. Call/notify MA MEMA regional rep (Todd Zutkowsi)
   c. Call/notify MA DEP (Joel Rees, Western Regional Office) for site equipment (solar array, power conversion, transmission, and BESS) for fire protection, suppression, etc. concerns
   d. Contact other Fire Chiefs in area with large scale Solar/BESS in their towns: Peru, Windsor, Blandford, Plainfield, Hadley, others?
   e. Contact DFS BESS rep (Jake Nunnemacher)

I'm sure there will be questions or additional discussion, please feel free to contact me.

Respectfully submitted to the Worthington Planning Board,

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