BLUEWAVE

BWC Bogastow Brook, LLC
BlueWave Energy
116 Huntington Ave, Suite 601
Boston, MA 02116

06/23/2023

Holliston Planning Board
703 Washington Street
Holliston, MA 01746

Subject: 600 Central Street Proposed BESS Project – Updated Narrative and Submittal

Dear Members of the Planning Board:

BlueWave would like to submit the following narrative, updated site plans and stormwater report, and additional materials as a comprehensive overview and response to various major concerns regarding our proposed Battery Energy Storage System at 600 Central Street. This submittal is intended to address all primary concerns raised to date regarding the system, the inherent features and risks of the technology, and why the proposed system and site, as designed, mitigate and minimize potential risk to the inhabitants of Holliston from a health and safety perspective, as well as prevent harm and damage to Holliston's natural and environmental resources. BlueWave looks forward to discussion of this information and any additional concerns or questions the Board or public may have at the continued public hearing on July 13th, 2023.

I. Proposed System and Site Design

The proposed system is a 5MWAC, 4-hour duration lithium-iron phosphate (LFP) battery energy storage system. The project will interconnect into existing Eversource-owned electrical distribution lines running along Central Street, at a pole directly adjacent to the church parking lot. The 3-phase electrical line will proceed underground through the parking lot to the proposed access road entrance off of the rear of the parking lot. The access road will extend approximately 280ft. toward the rear and center of the property. The battery storage system will consist of concrete pads and crushed stone in between, enclosed by a sound mitigation barrier for a total footprint of ~8,000 sq. ft. Additional stormwater management and secondary containment features bring the total limit of work for the proposed project to ~1.5 acres.

The battery system proposed to be installed is a Powin Centipede storage system. The underlying cells utilized in the system are Lithium Iron Phosphate (LFP) battery cells. The system is composed of modular enclosures that are arranged in a row behind collection segments and the power conversion system (PCS) which consists of an inverter, transformer, and minor electrical switchgear. This 20MWh system utilizes 30 battery enclosures, arranged in two rows, with duplicate PCS equipment.

II. Technology Hazards & Risks

Due to the inherent characteristics of lithium-ion cells, and a battery system's use as a storage device for electricity, there are a number of base-level hazards present within the system and the site. In the *absence* of proper safeguards and preventative design, these hazards can create potential safety risks. However, each of these hazards are mitigated through reliance on design and compliance with standards that have been developed to specifically address the underlying risks present in energy storage systems and properly mitigate and prevent them from causing a public safety event.

A. Fire Hazard, Prevention, and Mitigation

A fire in an energy storage system can be caused by both internal and external exposures. For example, faulty wiring can short within an enclosure, causing an electrical fire. Alternatively, the cause of energy storage fires most commonly of concern, and the primary cause of large-scale events in the past, is thermal runaway propagating throughout a system's underlying cells.

All lithium-ion cells, regardless of specific chemistry, may exhibit thermal runaway when exposed to exacerbated thermal conditions. Thermal runaway is an event where an individual cell's temperature reaches a critical point where it continues to rise without further heat or external thermal input. This can, at times, cause a fire when combustible materials reach a high enough temperature. Previously, thermal runaway propagation could cause such a fire to spread across a system, and, for systems located in close proximity to sensitive exposures, presented a public safety risk.

Due to past fire events in operating standalone battery projects, organizations such as NFPA and UL have continued to update and refine standards for defining systems that are safe and mitigate public safety risk. These standards are comprehensive and address monitoring, prevention, and mitigation. Specifically, NFPA 855 and UL9540A fire testing are the preeminent standards for identifying well designed and safe energy storage systems. The New York Fire Department has adopted NFPA 855 and UL9540A as system design standards for the implementation of standalone storage projects to be sited in New York City, to create a "a pathway for safe widespread use of lithium- ion stationary storage battery systems[1] These criteria include testing certificates, 9540A test data, BMS protections and 24/7 monitoring, and more. In Massachusetts, NFPA 1, Chapter 52 on energy storage systems was amended in 2021 to include material from NFPA 855. These testing and compliance standards are continually evaluated and updated as the industry develops and more systems are deployed. As such, battery energy storage systems have evolved into a sophisticated and highly engineered product that employ layers of safeguards and preventions against inherent risks, primarily fire. All energy storage systems BlueWave deploys, including the proposed project at 600 Central Street, will meet full compliance with these standards prior to being put into operation, and any additional materials necessary for compliance with fire code submitted to the fire department and town prior to construction.

The initial line of defense for fire prevention and risk mitigation is constant, multi-level monitoring. All cells are monitored at the individual level 24/7 for temperature, voltage, and current conditions at a remote operations center. This monitoring extends to the stack and enclosure level as well. Within each enclosure, there are redundant hydrogen gas, smoke, and heat detectors which trigger before any critical levels are reached. If any abnormal conditions are detected, whether at the cell or enclosure level, the system will automatically cease all operations, and a technician crew will be dispatched to the site to inspect the system and remediate any issues.

The second line of defense for fire prevention and risk mitigation is designing the system to prevent propagation of thermal runaway. After initial fire incidents with energy storage systems, manufacturers began to design systems to prevent thermal runaway propagation in accordance with UL9540A testing. Battery systems are designed as multiple layers, from the cell to enclosure level, as seen in the below figure. UL9540A testing is a multi-level test for the spread of thermal runaway or flames within battery systems: it begins testing at the cell level, and then proceeds to the module and unit level if the system fails the lower-level test. The test utilizes four different methods of inducing thermal runaway within an individual test cell. If the thermal runaway propagates to adjacent cells in the test setup, the testing proceeds to the module level. Modules are groups of cells arranged within battery enclosures. The Powin Centipede UL9540A test report shows that thermal runaway does not propagate between modules within the enclosure. Thus, any thermal or fire event that originates within a cell or group of cells will not spread through a system's modules, and by extent through separate enclosures. This significantly limits risk and potential for any public safety endangerment from a fire event and allows

---

[1] https://www.nyc.gov/assets/fdny/downloads/pdf/codes/3-rcny-608-01.pdf

first responders adequate time to respond to a site event, contain the fire, and ensure that no hazards spread beyond the affected unit.

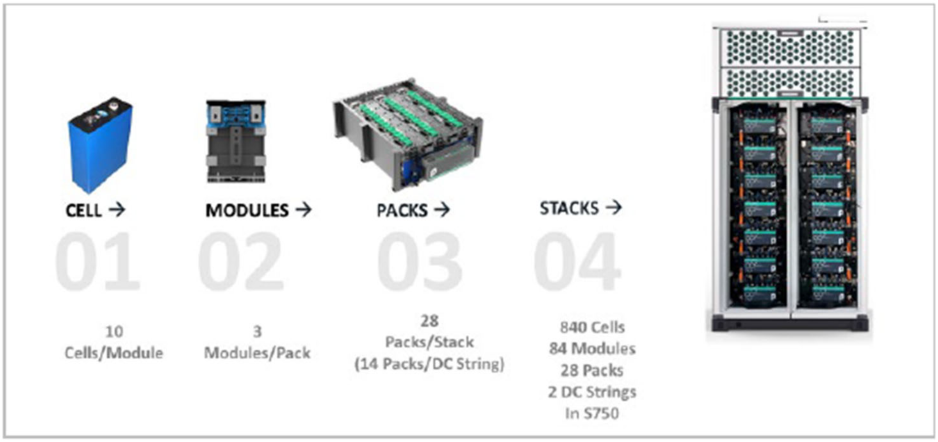

Figure: Powin Centipede Enclosure Breakdown

Finally, as part of the emergency response procedures for the site, a mixture of first responders and design features can address the presence of fire in the unlikely event a fire occurs on site. The system will be equipped with an aerosol, non-toxic suppression agent that can assist in putting out electrical-based fires that may occur within the system and could affect the battery cells. Additionally, first responders are recommended to use water as a containment measure and to cool down adjacent enclosures or site features in the event of a fire. A fire event should be limited and small in nature, allowing for efficient and effective containment as a controlled burnout is allowed to proceed.

NFPA 855 also dictates site design features to ensure site safety in a fire event. Storage systems are required to be setback a minimum of 20ft. form all property lines and sensitive receptors. As part of BlueWave's internal siting criteria, we always seek to site systems beyond the 20ft. setback, targeting a minimum 100ft. setback, which NFPA 855 defines as a "remote" energy storage system. The 600 Central Street design maintains a minimum 100ft. setback from all property lines and sensitive receptors to the nearest battery unit. NFPA 855 also specifies a setback from combustible material, such as vegetation, which our design is in compliance with. Furthermore, the addition of the sound barrier provides a natural fire wall for any potential open flames that may be emitting from a container in the event of a fire. The access road is 855 compliant and will allow for emergency vehicle access directly adjacent to the system and allow for first responders to set up an appropriate safety perimeter as specified in our Emergency Response Plan (ERP).

B. Explosion Hazard, Prevention, and Mitigation

Alongside concern for fire, concern over explosion potential and risk has been raised for energy storage systems due to past events, such as the McMicken Facility explosion in Surprise, AZ in April 2019. The cause for that event was the buildup of combustible gas, which first responders were not aware of and subsequently were harmed when they improperly opened the doors of a storage container and caused a sudden deflagration event. Lithium-ion cells, when reaching temperatures beyond normal operating ranges, will off-gas by design to prevent buildup of gas within individual battery cells. This gas mixture has various components, and the exact compounds and corresponding concentrations can be found in the UL9540A test report for the EVE LF280k cell. The primary gas of concern, and of largest concentration, is hydrogen gas, which can present risk of explosion at certain levels of concentration. In the past, energy storage systems were not properly designed to allow for venting or flaring of gas, which caused gas buildup and explosion risk. The Powin Centipede system, and all NFPA 855 and NFPA 69 (Standard on Explosion Prevention Systems) compliant products, incorporate design features to mitigate this risk inherent to lithium-ion systems. The Centipede system incorporates both an active and passive ventilation system, that will vent out built-up gas within each individual enclosure. Each enclosure utilizes hydrogen gas detectors that will trigger ventilation at 1% hydrogen concentration. Compliance with NFPA 69 requires that hydrogen gas concentrations remain at or below 25% of the lower explosive limit (LEL). Powin completed computational flow dynamic modeling to demonstrate that, even in a worst-case scenario, hydrogen concentration levels remain below the LEL. These modeling results can be provided to the Board and town at their request.

Furthermore, emergency response procedures specify that first responders do not approach the system or attempt to open any battery enclosures in the event of an alarm or abnormal system conditions are detected. This over-conservative approach, combined with the system features for gas ventilation, mitigates the risk for explosion and risk for bodily injury on-site.

C. Electrical Hazard, Prevention, and Mitigation

By nature of their function of charging and discharging large amounts of electricity, battery energy storage systems present an inherent risk of electrical hazard. The electric currents present on site operate at high voltages that can endanger anyone unfamiliar or unauthorized to be near the system. The system design and sound barrier provide a physical barrier to entry to deter individuals not authorized from entering the system where electric hazards exist and it is never recommended for anyone not trained in working around and with electrical hazards to approach the system. Signage on the barrier fence will give notice to those approaching that entry into the facility is unauthorized and presents a risk of bodily harm.

Mitigating electrical hazard and preventing safety incidents requires proper grounding of necessary system components and compliance with national electrical codes. For site technicians, proper PPE and lock-out/tag-out procedures must be followed to ensure that work is not conducted on live electrical components. All electrical components on site, including the battery enclosures, are locked at all times to prevent unauthorized access. Additionally, the presence of the sound barrier, which will have a locked gate only accessible by the operator and first responders, provides a natural physical barrier against unauthorized access. Proper, redundant warning signage will be posted informing anyone on-site as to the presence of high-voltage equipment.

D. Toxic Gas Hazard

During the normal and expected course of operation, battery energy storage systems, and specifically Lithium-Iron Phosphate (LFP) battery systems, do not emit gases. As described in Section II(B), battery cells, when exposed to temperatures beyond their operating ranges, can enter thermal runaway and off-gas. For the Powin Centipede system, the composition of the off-gassing mixture is detailed in the UL9540A testing report previously provided and as detailed in the table below.

Gas		Measured %
Carbon Monoxide	CO	11.191
Carbon Dioxide	CO_2	27.325
Hydrogen	H_2	48.013
Methane	CH_4	6.404
Acetylene	C_2H_2	0.107
Ethylene	C_2H_4	3.296
Ethane	C_2H_6	1.326
Propadiene (Allene)	C_3H_4	0.000
Propyne	C_3H_4	0.000
Propene	C_3H_6	0.948
Propane	C_3H_8	0.321
-	C4 (Total)	0.704
-	C5 (Total)	0.142
-	C6 (Total)	0.005
-	C7 (Total)	0.003
-	C8 (Total)	0.000
Benzene	C_6H_6	0.014
Toluene	C_7H_8	0.000
Dimethyl Carbonate	$C_3H_6O_3$	0.000
Ethyl Methyl Carbonate	$C_4H_8O_3$	0.201
Diethyl Carbonate	$C_5H_{10}O_3$	0.000
Total	-	100

As with other lithium-ion systems, the primary components are hydrogen, carbon monoxide, carbon dioxide, and a mix of other hydrocarbons. In the event of a fire, combustion products can include other toxic compounds found in all modern structural and plastics fires, such as hydrogen chloride (HCL), hydrogen fluoride (HF), and carbon monoxide (CO). Thus, mitigation of toxic gas exposure from a fire is focused on the prevention of thermal runaway and a large-scale fire across an entire system. UL9540A testing results for the Powin Centipede system show that thermal runaway and fire does not propagate beyond the module level, minimizing the potential for the creation of toxic gas or smoke. Additionally, the likelihood of a thermal runaway or fire event occurring is extremely low. A DNVGL 2019 study found that, with proper system and site safeguards (which are incorporated into this system and site as detailed in this submittal and in accordance with UL standards), that “the final probability of failure or likelihood of the event (which accounts for all safeguards) is between once in 100,000 years (1 x 10-5 per year) to once in 1,000,000 years (1 x 10-6 per year).”[2] Furthermore, their study found that, for a proposed system sized at 40,000kWhs (twice the size of the 600 Central Street proposed project), “a potential worst -case scenario could mean a release of CO that could go ~ 30’ downwind of the facility.” The proposed battery system at 600 Central Street project is located a minimum of 100ft from all property lines and sensitive receptors. While the levels of toxic gas from a fire or off-gassing event have a potential to be elevated in close proximity to a system, the majority of gas emission occurs within the first 30 minutes of an event, and site setbacks and proper emergency response procedures ensure that no members of the public are exposed to harmful levels of gases. The emergency response plan (ERP) recommends a conservative safety stand-off of 100 feet in any event, and for all first responders to be equipped with a Self-Contained Breathing Apparatus (SCBA). Combined, design and site measures, along with an extremely low probability of event, mitigate against a potential risk for a larger public safety concern.

E. Emergency Response Plan

An additional layer of safety assurance and risk mitigation is the creation and implementation of an Emergency Response Plan (ERP) tailored to the specific site. This is now a requirement of NFPA 855 and has been identified in the past as a vital component to ensuring public safety and the safety of first responders.

The ERP details all hazards of the system identified in this submittal, as well as proper procedures that should be taken by first responders and the operator of the system, BlueWave. BlueWave partnered with the Energy Safety Response Group, https://www.energyresponsegroup.com/ , (ESRG) for the creation and submittal of the draft ERP that has submitted to the Board as part of our special permit application. This ERP will remain in draft form through final design, construction, and commissioning of the system. Once built, ESRG will conduct a site visit in coordination with the Holliston Fire Department to conduct a thorough inspection of the site and to confirm that the design features of the site necessary for ensuring public safety are present and in accordance with the plans on file with the building department.

ESRG, as an abundance of caution, provides over-conservativeness, whether regarding the distance of a safety perimeter or in specifying that first responders do not approach the system directly until told to do so by a Subject Matter Expert (SME). While the design and response to battery fires has evolved substantially in recent years, ESRG and BlueWave look to exercise caution to ensure public and personnel safety is preserved in even a worst-case scenario.

[2] https://www.dnv.com/Publications/quantitative-risk-analysis-for-battery-energy-storage-sites-154811

III. Stormwater Management

As the proposed project involves a degree of tree-clearing and groundcover change, changes to stormwater flow on-site are addressed in the design to comply with Massachusetts DEP Stormwater Standards. As part of the Massachusetts DEP Stormwater Standards, the project must incorporate stormwater management features that, when constructed as designed, generally maintain the same peak flow stormwater runoff as in pre-development conditions.

The site design incorporates a number of stormwater management features and best management practices (BMPs). The access road will be graded to direct stormwater west toward the proposed sediment forebays, which will provide stormwater pretreatment, followed by the infiltration basin, which will provide stormwater runoff peak rate attenuation and stormwater recharge/runoff quality control, to the north directly adjacent to the sound mitigation barrier. Diversion swales will be incorporated to divert flows exiting the existing stormwater basin on-site and properly direct flows down gradient to further infiltrate. Additional details on the stormwater design can be found in the updated site plan and stormwater management report. HydroCAD calculations show that the design as proposed will generally maintain stormwater flows and will not cause any additional risk of flooding to adjacent neighbors.

Furthermore, BlueWave is assessing potential opportunities to improve the condition and/or design of the church's existing stormwater management system for the parking lot. At the time of construction of the battery system, the existing stormwater management system, inclusive of the drain pipes, water quality tank, and existing stormwater basin, would be inspected. Any deficiencies will be corrected as needed to improve stormwater management for the existing development at the site.

Additionally, the Project will comply with all construction stormwater management standards as required under the construction general permit which is issued by the US Environmental Protection Agency (US EPA). The Project will apply for and obtain this permit prior to the start of any construction on site in order to remain in compliance with the 2022 National Pollutant Discharge Elimination System (NPDES) Issuance of General Permit for Stormwater Discharges From Construction Activities.

IV. Wildlife Habitat Impacts

The Massachusetts Endangered Species Act (MESA), passed in 1990, recognizes the importance of Massachusetts' plant and animal populations and the need to protect from threats that could lead to their extinction. The overall goal of the legislation is to conserve, protect, restore, and enhance any endangered or threatened species and their essential habitat.

A desktop review analysis of the Project area indicated that the Project area is not located within designated priority habitat or estimated habitat for any rare, threatened, or endangered species protected by the Massachusetts Natural Heritage and Endangered Species Program. The project will also be subject to the requirements of the Federal Endangered Species Act under a permit condition for a NPDES general construction permit. As such a US Fish and Wildlife (USFWS) Information for Planning and Consultation (IPaC) was completed for the Project area and the species hit that came back was for northern long eared bat (NLEB).

NLEB use caves and abandoned mines for hibernation during the winter and are found in wooded or semi-wooded habitat during the summer months. This bat also uses crevices and loose bark on trees for roosting. The Study Area has some forested sections that may provide suitable roosting and foraging habitat for the NLEB. The MA NHESP data shows that there are no known NLEB hibernacula in the Project area.

The project will follow all best management practices (BMP's) during construction to limit impacts to species during construction.

V. Groundwater Impacts

Concerns have been raised regarding potential for groundwater impact from the energy storage system. This concern can relate to two primary areas: potential for release of battery electrolyte, and runoff from water used in suppression of a battery fire.

A. Electrolyte Release

All LFP cells are manufactured with a liquid electrolyte. However, during operation of the system, the electrolyte becomes absorbed into the cathode and anode plates of the battery cells, and becomes jelly-like in structure. Thus, during the system's lifetime, the actual amount of free-standing liquid electrolyte present that could pose a spill risk is effectively de minimis. Consistent with this view, NFPA 855 does not require any spill controls for lithium-ion batteries for code compliance. The potential for a large-scale release of electrolyte during the normal course of operation, or in the event a number of cells are compromised within the containers, is extremely unlikely. Cell rupture and spill may be the result of a manufacturing error, which are rare, or the result of a fire event, as discussed in the UL9540A testing results. A fire event should not result in propagation at the module level and therefore in a fire event the release of a large volume of electrolyte is not a risk. In addition to each cell being hermetically sealed, they are further housed within steel enclosures that are NEMA 3R/IP55 rated. In the event any amount of electrolyte were to be released within an enclosure, the enclosure would be able to contain the release until an appropriate hazardous materials and emergency response is present on site to mitigate and prevent any further release. A spill event would result in a system alarm notifying, system shutdown and remotely conveyed to BlueWave's asset management, operations, and maintenance teams which would be immediately responded to with SME on site as soon as possible and immediate notice given to the Holliston Fire Department and Massachusetts DEP for spill clean-up. Overall, the design and operational nature of the cell and product prevent the possibility of a large electrolyte spill, even in an emergency event.

B. Fire Suppression Runoff

Another concern highlighted is the risk to groundwater that fire suppression runoff may have. At a base level, all fires, regardless of the source and fuel, contain pollutants that, when treated with water suppression, can absorb into any soils present on-site. This is true of any modern structural or plastics fire, such as a residential home or office building. Thus, any fire present on a modern developed site warrants a hazardous materials response to test soils in the immediate vicinity after a fire has been contained and put out, and any identified remediation conducted.

The concern then must address whether or not battery storage systems present a greater risk to groundwater than a fire from any other modern developed structure. As described in NFPA 855 Annex C.7, compounds present in runoff from lithium-ion battery fires are similar to those from structural and plastics fire: this is due to the fact that the materials that can burn within the battery system are similar in composition to the materials found in any regular residential structure. A 2017 DNVGL study on battery energy storage safety also found that "many of the same contaminants found from plastics fires were common to those found from battery fires"[3] and that "battery fires are less toxic than plastics fires (on average)".[4] Furthermore, as research into proper design and response to lithium-ion battery fires has progressed, the recommended emergency response by both experts and manufacturers is to not utilize significant amounts of water for fire suppression. In the past, water has been utilized primarily as an effective cooling agent to keep temperatures of battery cells in thermal runaway from continuing to escalate and propagate across a system. The water is not utilized or effective in putting out any open flames resulting from a battery incident. Updated system designs have focused on preventing thermal runaway from propagating, as described in Section II(A), and enclosures that can suitably contain and assist in flames or heat from spreading. Thus, the recommended response for fire departments is to monitor a system in the event of any observed fire, as it should be limited to just the affected cells or singular enclosure, and not be at risk of spreading across a system and creating a larger public safety concern. Thus, the limited amount of water recommended to be utilized on-site further reduces any potential for pollutants, normal and present in every modern fire, from entering the ground and presenting risk for pollution of groundwater.

As the 600 Central Street site is in a Zone II groundwater protection zone, this concern has been further elevated. In 2018, the Massachusetts DEP Bureau of Resource Protection Drinking Water Program issued guidance on the siting of solar, wind, and batteries within groundwater protection areas, specifically Zone I protection zones. The guidance did specify that batteries should not be sited within Zone Is; however, no such restriction was suggested for Zone II areas. Under the Holliston Groundwater Protection bylaw, liquid hazardous materials are allowed within Zone II areas, provided that secondary

---

[3] https://www.nyserda.ny.gov/-/media/Project/Nyserda/files/Publications/Research/Energy-Storage/20170118-ConEd-NYSERDA-Battery-Testing-Report.pdf
[4] https://www.dnv.com/cases/considerations-for-battery-storage-safety-in-new-york-89392

containment is incorporated into the construction of a site. To date, there has not been a clear indication from the Planning Board or Town that the battery electrolyte is considered a liquid hazardous material. The electrolyte itself is not listed on the Massachusetts Toxic or Hazardous Substance List[5] or the federal EPA consolidated "List of Lists"[6] as a regulated hazardous substance. Furthermore, as previously described, the electrolyte is primarily contained within the hermetically sealed cell container, and further enclosed in a steel enclosure that would prevent a mass release of any large amount of electrolyte, in the extremely unlikely event such a situation were to occur.

Despite the aforementioned mitigations and information, BlueWave seeks to ensure both the Board and public that such a risk is prevented and mitigated beyond any reasonable doubt. Therefore, we have incorporated additional secondary containment measures into the stormwater management system and design for the site, through the inclusion of impervious burrows. Thus, in the unlikely event that any electrolyte were to somehow release from the battery enclosures, it would flow into these burrows and be held for a suitable amount of time for an emergency and hazardous materials response team to arrive and provide additional suitable containment and remediation as needed. Furthermore, while fire suppression runoff is expected to be similar in nature to any other modern structural fire and limited in quantity as stated previously, the secondary containment system will also serve to channel and capture any potential pollutants present in water used for fire suppression or defensive purposes.

As mentioned previously, while the battery cells are initially filled with a liquid electrolyte, due to the inherent operational chemistry the electrolyte is almost entirely absorbed into the electrodes. This results in an extremely low amount of free-standing liquid electrolyte present at any time during operation of the system. Nonetheless, for purposes of calculating a potential secondary containment volume, we utilized the amount of liquid electrolyte utilized during the initial manufacturing and state of the cell. The anticipated cell to be used in the Powin Centipede system for this design will utilize an EVE LF280K cell, which initially contains approximately 917mL of electrolyte per cell. Each battery enclosure contains 840 cells, resulting in a total volume of electrolyte across the 30 enclosures of ~6,000 gallons.

The proposed secondary containment volume is 10% of the total initial electrolyte volume, which is ~600 gallons or 80 cubic feet. The secondary containment system consists of the crushed stone yard which is graded to direct runoff to the sediment forebays to the west. Additionally, an underdrain system is proposed beneath the crushed stone yard to capture any discharge that infiltrates through the stone and direct flows to the sediment forebays. The sediment forebays are designed with a minimum 12-inch impervious soil borrow liner with a maximum hydraulic conductivity of $1x10^{-7}$ cm/sec. The total storage capacity of the sediment forebays is 483 cubic feet which provides over 6 times the calculated containment volume.

The Project has also coordinated with the US EPA to determine if any additional stormwater management permit may be required at a higher level than the 2022 construction general permit given this concern. In discussions with the US EPA the project would not be required to file for a Multi Sector Industrial Permit. The project does not meet any of the categories that require additional permitting such as:

---

[5] https://www.mass.gov/doc/301-cmr-41-toxic-or-hazardous-substance-list/download
[6] https://www.epa.gov/system/files/documents/2022-12/List_of_Lists_Compiled_December%202022.pdf

- Category One (i): Facilities subject to federal stormwater effluent discharge standards at 40 CFR Parts 405-471;
- Category Two (ii): Heavy manufacturing (e.g., paper mills, chemical plants, petroleum refineries, steel mills and foundries);
- Category Three (iii): Coal and mineral mining and oil and gas exploration and processing;
- Category Four (iv): Hazardous waste treatment, storage, and disposal facilities;
- Category Five (v): Landfills, land application sites, and open dumps with industrial wastes;
- Category Six (vi): Metal scrapyards, salvage yards, automobile junkyards, and battery reclaimers;
- Category Seven (vii): Steam electric power generating plants;
- Category Eight (viii): Transportation facilities that have vehicle maintenance, equipment cleaning, or airport deicing operations;
- Category Nine (ix): Treatment works treating domestic sewage with a design flow of 1 million gallons a day or more;
- Category Ten (x): Construction sites that disturb 5 acres or more (permitted separately)

VI. Sound Impact & Mitigation

Additional sound generated by the energy storage system comes primarily from two sources: the inverters that are part of the PCS, and fans utilized as part of the thermal management and cooling system for each battery enclosure. The inverters will only generate noise when the system is actively charging or discharging energy, which at its longest will only comprise an 8-hour portion of each day. The fans associated with the HVAC system will run as local climate dictates in order to keep the internal temperature of the system within normal operating ranges.

Epsilon Associates was hired to provide sound measurements and proposed conditions sound analysis of the system when in operation. Sound measurements were taken over the course of a continuous 7-day period. Any proposed sound mitigation is compared against the average broadband decibel rating of the proposed system at night for purposes of compliance with DEP Sound Regulations. The average ambient sound level of the site today at night is 23 dB.

The sound analysis was updated based on the revised site location and design. As the system location is central to the property, the sound impact, *without mitigation*, is fairly consistent along the western and northern property boundaries. Compliance with DEP requires no more than a 10dB increase over existing ambient noise levels at the property line.

The analysis demonstrated a need for a 16ft tall sound barrier around the system, and the system will also self-impose operational restrictions overnight in order to keep sound levels at or below the 10dB sound increase. These mitigation measures are currently incorporated into the design of the system as proposed, and details on final sound barrier material and design will be provided prior to construction. If additional sound mitigation is identified prior to final design and construction that can be reasonably incorporated to the site design, such mitigation will be identified and provided to the Planning Board for confirmation. Additionally, BlueWave would conduct sound measurements once the system is in operation to ensure compliance with DEP requirements.

VII. Property Value Impacts

There have been concerns raised over potential for property value impact due to the presence of the energy storage system. For example, one study referenced in public comment through the University of Rhode Island studied the effect of solar projects on property values. The study concluded that "utility-scale" projects had a noticeable impact on property values within 0.1 miles of the projects; however, the study only examined projects 1MW or greater with a minimum footprint of 5 acres.[7] The proposed project at 600 Central Street has a total proposed limit of work of 1.5 acres, and the footprint of the storage system itself is only 0.18 acres. Therefore, such a comparison is not valid, as the examined solar developments have significantly larger and more visible footprints from neighboring properties. Another study conducted by UC Berkley and published in March of 2023 assessed the impacts of solar installations on property values across six states, including Massachusetts. The results of the study show that "changes in sales price are not statistically significant for CA, CT, and MA."[8]

Furthermore, when assessing the impact systems such as battery facilities have on neighboring property values, the primary factors for assessing impact are: sound, visuals, odor, and safety.

As described in Section V, the additional sound generated by the energy storage system is mitigated through both a physical sound barrier and self-imposed operating restrictions on the project. The mitigation provided is within compliance of DEP Sound Regulations and presents a minimal to negligible impact on neighboring properties.

As described in the below Section VII, visual impact of the system is completely mitigated through both existing vegetation and the presence of the physical sound barrier, The buildout of the facility and associated limit of work will not change the character of the neighborhood, nor will it materially affect the viewshed of neighboring properties toward 600 Central Street, which currently consists of vegetated forests and will remain as such after construction.

The system will produce no odors during the normal course of operation. A system fire may produce smoke and/or odors for a limited time; however, this is no different from the potential for a fire of any modern residential structural fire to produce smoke or odor.

Finally, as described comprehensively in this submittal, safety risks inherent to lithium-ion battery systems are effectively mitigated through a combination of system design, site design, and emergency response procedures. Risk analysis conducted for comparably sized lithium-ion battery systems with

---

[7] https://www.uri.edu/news/wp-content/uploads/news/sites/16/2020/09/PropertyValueImpactsOfSolar.pdf

[8] Shedding light on large-scale solar impacts: An analysis of property values and proximity to photovoltaics across six U.S. states: https://www.sciencedirect.com/science/article/pii/S0301421523000101

such design features and site measures shows that the risk for an event is much lower than the risk of other events in day-to-day life, such as a car accident or internal combustion engine fire.[9]

VIII. Visual Impacts

Visual impact of the system to both neighbors and the church will either be non-present or entirely mitigated. The proposed location and design necessitate the clearing of some number of trees and ground-level vegetation. Along the western property boundary, approximately 67ft. of existing vegetative buffer will be left in place, over twice the required side-yard setback required in the residential zone. At this distance and with existing vegetation, combined with the sound barrier which will be a color suitable to blend in with the existing background, there will be no visual impact. Similarly, to the north and northwest abutters, the setback increases to over 100ft of existing vegetation, providing ample visual buffer between the system and the property line.

With respect to the church and their outdoor facilities, the system will be situated approximately 10ft below the grade of the church parking lot and playground. Existing vegetation will be left in place where possible, and additional plantings will be provided along the access road to further screen the road and system from the church. Combined with the sound barrier which will be a neutral background color, there will be no equipment visible to the church, its outdoor facilities, or any resident of Holliston driving down Central Street.

IX. Hazard and Mitigation Analysis (HMA)

NFPA 855 requires submittal of a formal hazard mitigation analysis prior to installation of a system for any energy storage system proposed greater than 600kWh. While this submittal gives an overview of the risks and associated mitigations, a site HMA will be prepared and provided to the fire department and town prior to issuance of a building permit consistent with NFPA 855 criteria and compliance. If desired, BlueWave will also provide funds to the town for engaging a third-party consultant who can review the site HMA to ensure compliance with NFPA 855, and that any inherent hazards associated with the energy storage system are properly prevented and mitigated as stated in this submittal and the HMA to be prepared.

[9] https://www.dnv.com/Publications/quantitative-risk-analysis-for-battery-energy-storage-sites-154811

X. Zoning Bylaw Conformance

As detailed in previous submittals, BlueWave submitted a Special Permit application for the proposed 600 Central Street battery system as an allowed use under the "[o]utdoor storage of building or other materials or equipment not covered elsewhere in this by-law." use detailed in Holliston's 2017 Zoning Bylaw. Furthermore, standalone battery energy storage systems receive the protection of G.L. c. 40A, § 3, ¶ 9 ("the Dover Amendment"), the basis of which has been described in previous submittals and hearings, and is further detailed in the attached memo from Tad Heuer of Foley Hoag to BWC Bogastow Brook, LLC dated June 16th, 2023.

Additionally, concern over conformance with Holliston's zoning bylaws in regard to the siting of hazardous materials has been raised as a concern. Mr. Heuer's memo provides additional information and explanations as to why the proposed system is not in violation of the Town's bylaws, and, furthermore, why the proposed system cannot be prohibited at this location. If there are remaining questions in regard to zoning bylaw conformance, those questions can be discussed with the Board, Town Counsel, BlueWave, and Mr. Heuer at the July 13th public hearing.

XI. Conclusion

BlueWave hopes that this submittal, along with the supplemental materials accompanying it, provides a complete overview of all the concerns raised to-date, both in regard to lithium-ion storage system risks and also the specific potential impacts on the 600 Central Street site, neighboring properties, and the town of Holliston. We feel that the information presented herein accurately conveys the actual risk present with these types of systems, and how such risks are appropriately and sufficiently mitigated to a degree that prevents impact to the inhabitants of Holliston, while providing substantial benefit through the reduction of carbon emissions on our modern grid and enhancing grid resiliency. We look forward to discussing the submittal and any additional comments or questions received at the July 13th public hearing.

BLUEWAVE

Sincerely,

____

Michael Zimmer – *Managing Director of Energy Storage*