Municipality of Arran-Elderslie

Battery Energy Storage System (BESS)

Presented by: SolarBank Corp

Feb 2025

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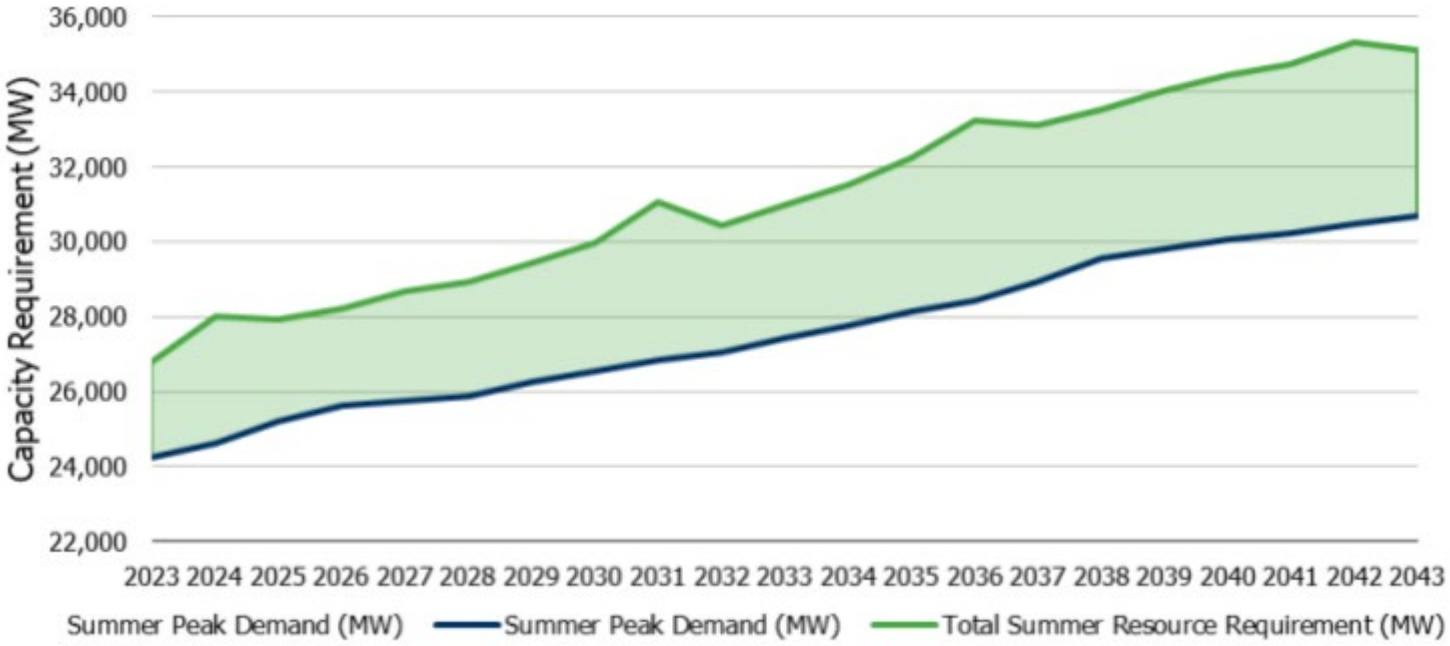
Ontario's Electricity Demand & Supply Gap

- Ontario is in a period of **emerging electricity system needs**, driven by increasing demand, the retirement of the Pickering nuclear plant, the refurbishment of other nuclear generating units, as well as expiring contracts for existing facilities.

- To address these needs, the Independent Electricity System Operator (IESO) launched the Expedited Long-Term RFP in 2022 to **competitively secure** new capacity with the intention to bring resources into service before 2027.

- The E-LT1 RFP acquired more than 1,100 MWs of new capacity to help meet system needs in the near and long term with the **BESS in Armour Township** being one of the successful projects that obtained a contract.



Independent Electricity System Operator | 2022 Annual Planning Outlook | Public

- There is a moderate **rise in the average growth of demand**, reaching about 1.9% annually compared to 1.7% in the 2021 forecast.
- This increasing rise, coupled with the impact of nuclear retirements and refurbishments, and expiring generation contracts over the next decade, is contributing to anticipated **capacity shortfalls** in the mid-2020s.

OZ-1 BESS

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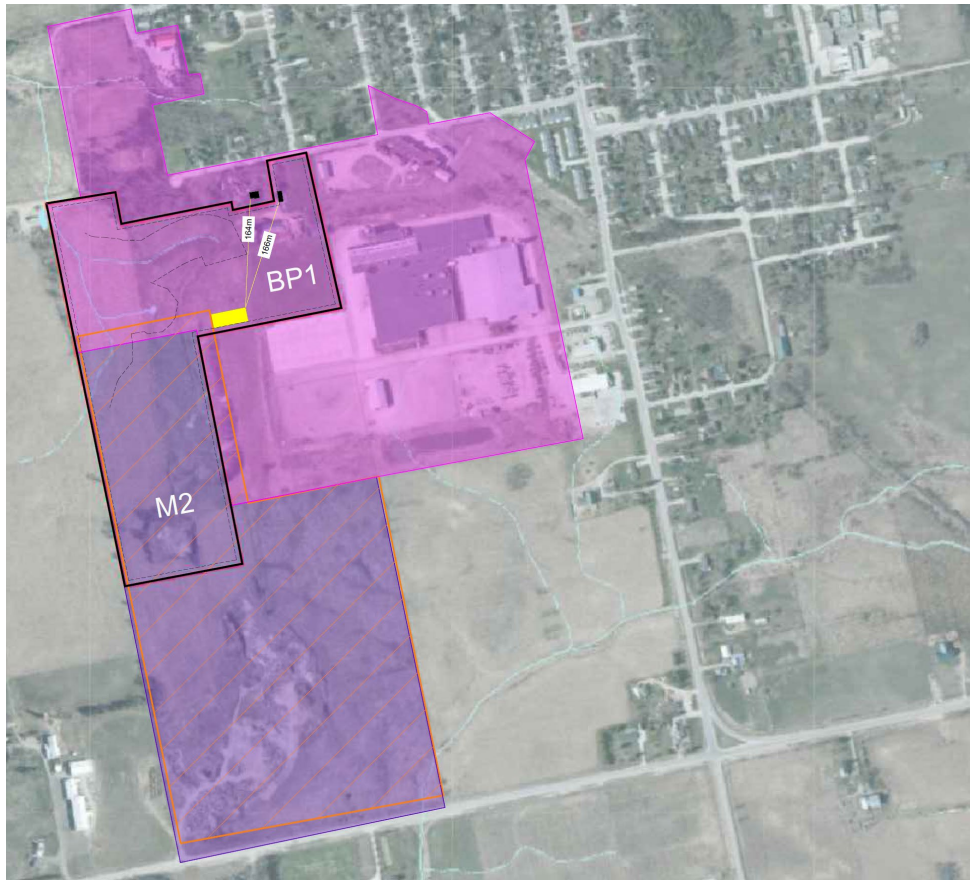
- The proposed BESS in Chesley is a 4.99 MW/19.96 MWh system, able to provide up to 4 continuous hours of power per discharge cycle to help the Ontario grid with its urgent demand for electricity.
- The site will contain 9 battery containers, 2 transformers, 5 Power Conversion Systems (PCS), and an electrical house for EMS panel and power panel, all fully contained in a fenced in area totaling 0.22 acres and only accessible by authorized personnel.
- The project will connect to Hydro One's distribution system via a privately owned 44kV tapline associated with and owned by an existing solar photovoltaic project onsite.
- The Facility will also include appropriate hazard detection systems, such as smoke, heat and gas detectors monitored by a control center 24/7 which will alert operators to emergency situations.
- The System would use Lithium Iron Phosphate battery chemistry and power conversion system tested and certified according to applicable standards. The battery manufacturer selected is EVLO and the product selected is called the EVLOFLEX.

BESS Location Overview



Stock Symbol
NASDAQ: SUUN
Cboe CA: SUNN

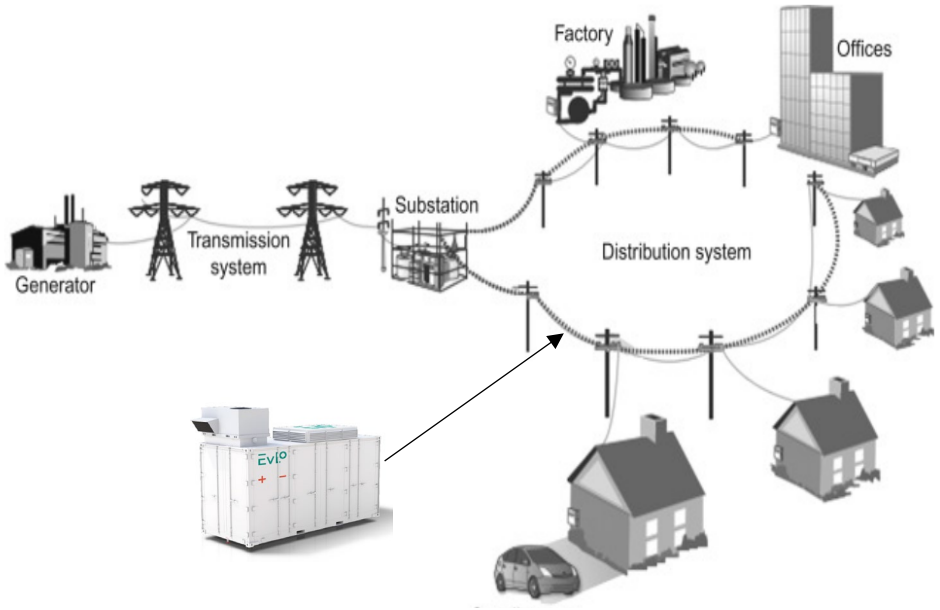
BESS – Benefits

BESS enhances the efficiency, reliability, and sustainability of energy systems, offering significant benefits for both utilities and end-users.

- BESS can respond rapidly to changes in grid frequency, helping to stabilize the grid and ensure a consistent power supply.
- BESS allows for load shifting, where energy is stored during off-peak times and used during peak times, optimizing energy use.
- By improving energy diversity, BESS contributes to reducing greenhouse gas emissions and supporting a cleaner energy mix.
- BESS can be deployed at various locations within the grid, providing localized energy storage that enhances the resilience of the overall energy system.
- The rapid response capability of BESS helps address sudden changes in energy supply or demand, improving system stability.
- BESS provides various ancillary services, such as spinning reserve, load following, and regulation services, which are essential for maintaining grid stability and reliability.

BESS: Enhance Grid Resilience in Arran-Elderslie's Local Communities

- The energy stored from the BESS would directly benefit your community – the BESS is connected to the local distribution system. The IESO have forecasted reliability issues on the Ontario grid as early as 2026.
- Connection - Voltage Level: 44 kVA distribution system.
- Name of Hydro One Station: Hanover TS



Project and Connection Data

A. Project Identification	
1. Project ID	48,480
2. Project Name	OZ-1
3. Program Type	IESO E-LT1 RFP (to supply grid load when requested by IESO)
4. Project Type	Battery Energy Storage System
5. BESS facility Single Line Drawing No.	E-3 Rev. 01
B. Information for Connection to Hydro One System	
1. Name of Hydro One Station	Hanover TS (115 kV / 44 kV)
2. Nominal Voltage	44 kV
3. Feeder Operating Designation	M4
4. Approximate Distance from Station to PCC	19.4 km
5. Approximate length of BESS Facility's owned tap line	0.696 km

Screenshot from Hydro One's CIA Report

Community Benefit Agreement

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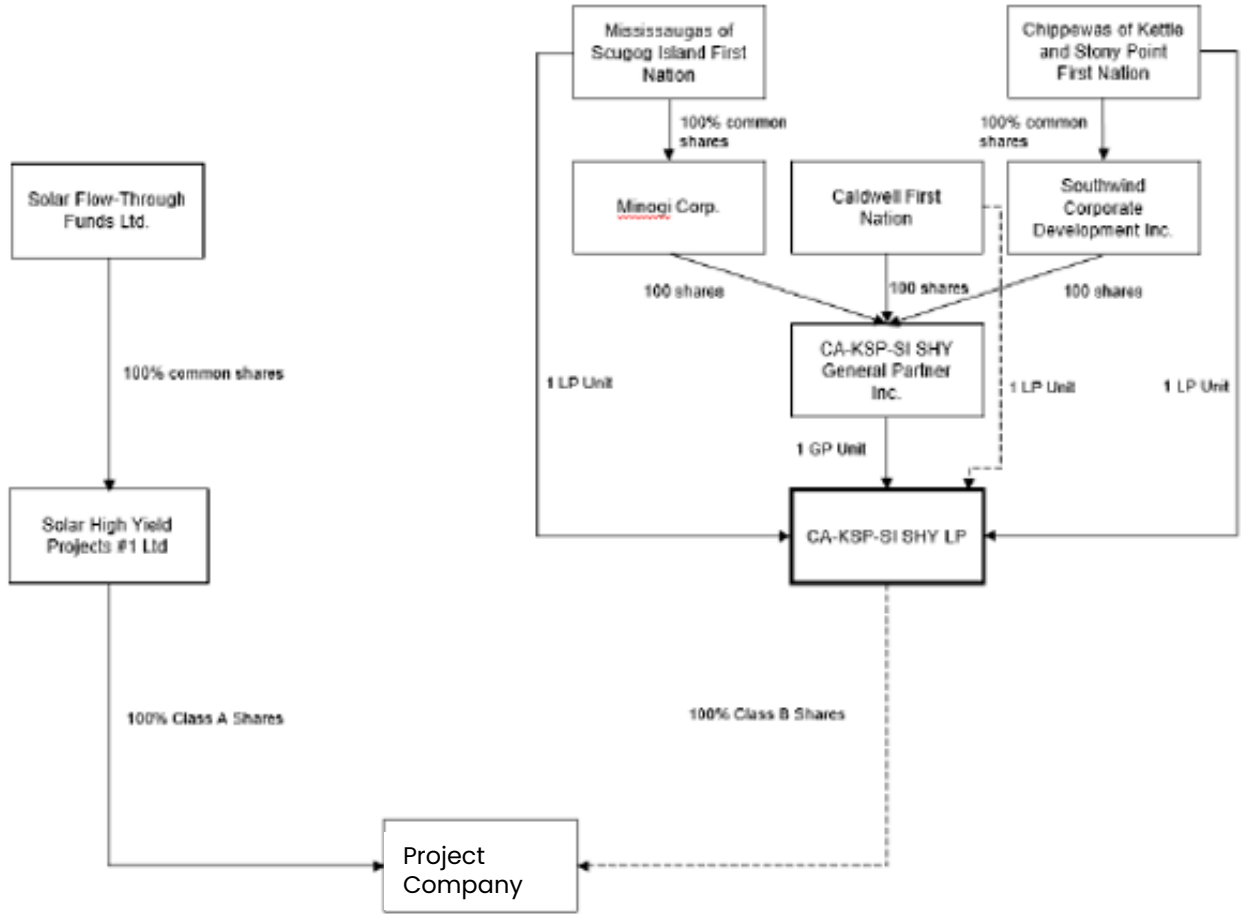
- We are committed to entering into a Community Benefit Agreements with the Municipality.
- This Agreement will consist of Financial Benefits and, in addition to the Air Monitoring System and training for the fire department, and we are working with the Municipality on further Community Benefits.
- Financial Benefit to the Municipality will be either in $100,000 lump sum or $6,000 annual payment.

BESS – Project Ownership

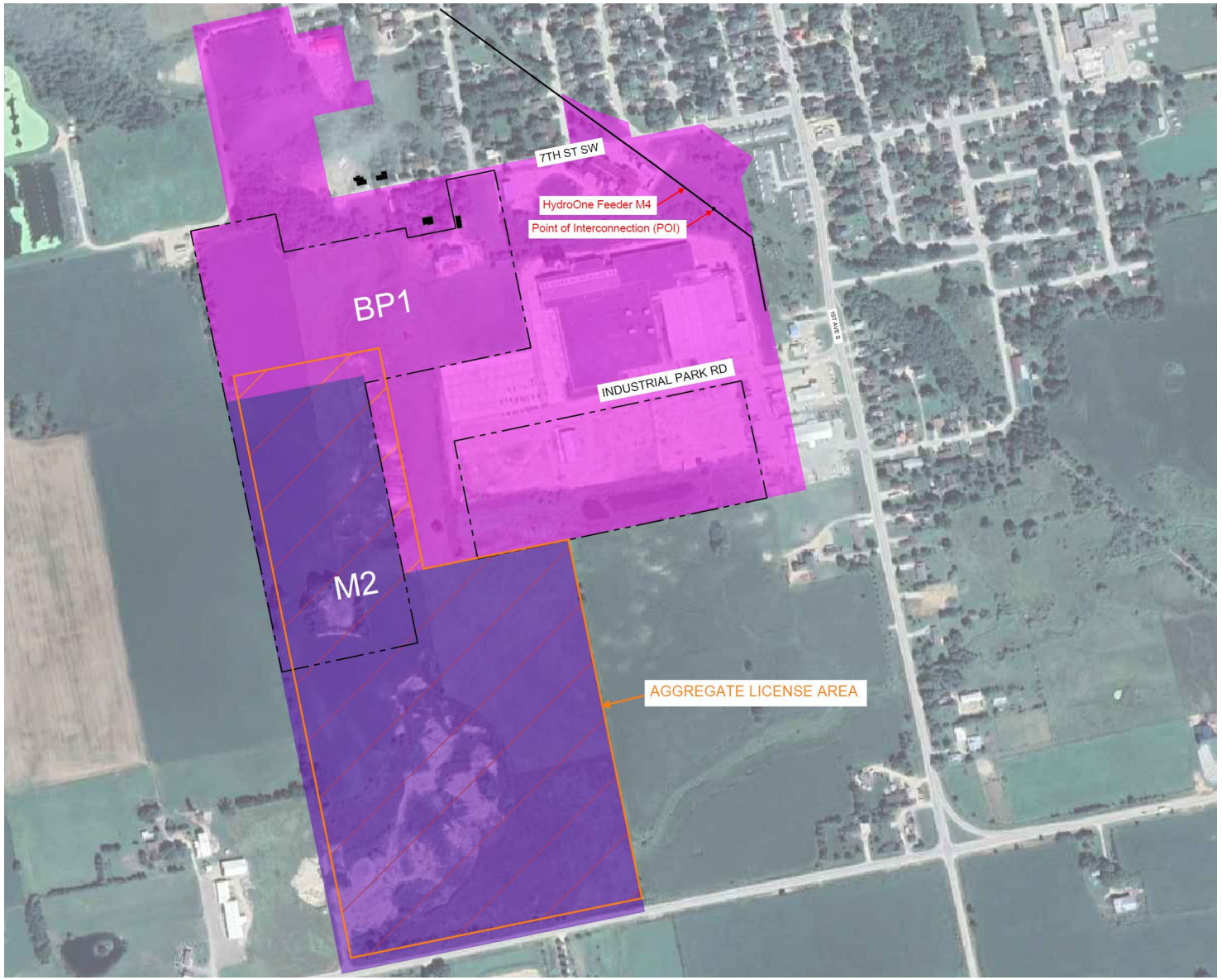
- The BESS is co-owned by 3 First Nations communities in Ontario: Mississaugas Scugog Islands First Nation, Caldwell First Nation, and Chippewas of Kettle and Stony Point First Nation.
- The First Nations Communities have a 50% ownership in the project.



Planning and Zoning Overview

- We have received a Municipal Support Resolution for the BESS to be located on 157 7th SW Street St.
- Solarbank submitted the alternative Site Plan Approval Application which revealed the following issues:

1. Aggregate License #4880: The Municipality owns an Aggregate License that extends to part of the subject lands.
2. County of Bruce Official Plan designated as Mineral Resource – Open Quarry
3. Arran-Elderslie Zoning By-Law designated as M2 – Extractive Industrial.

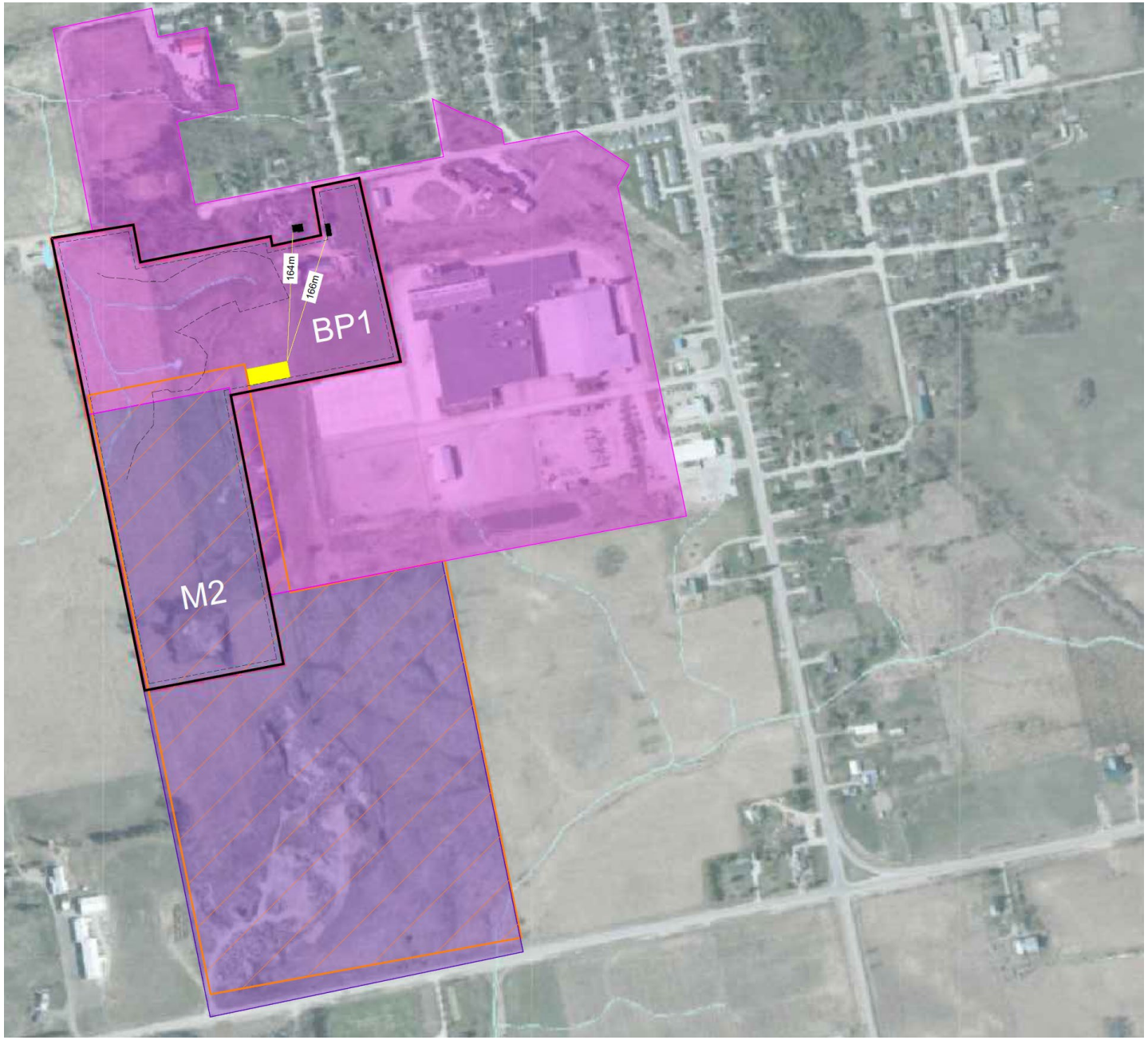


Solution:

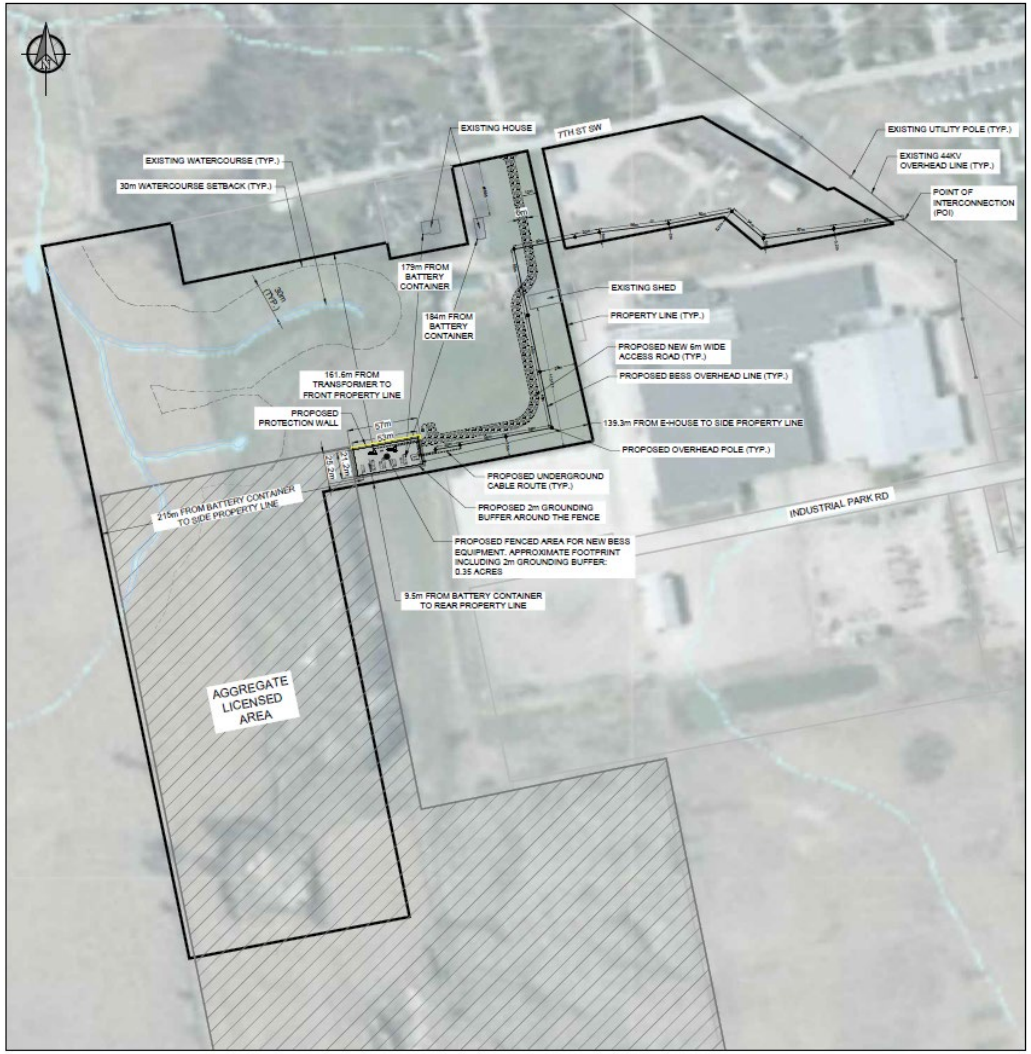
- Solarbank proposes to move the BESS location right outside the aggregate license area, while remaining a good distance from residents (165 m).

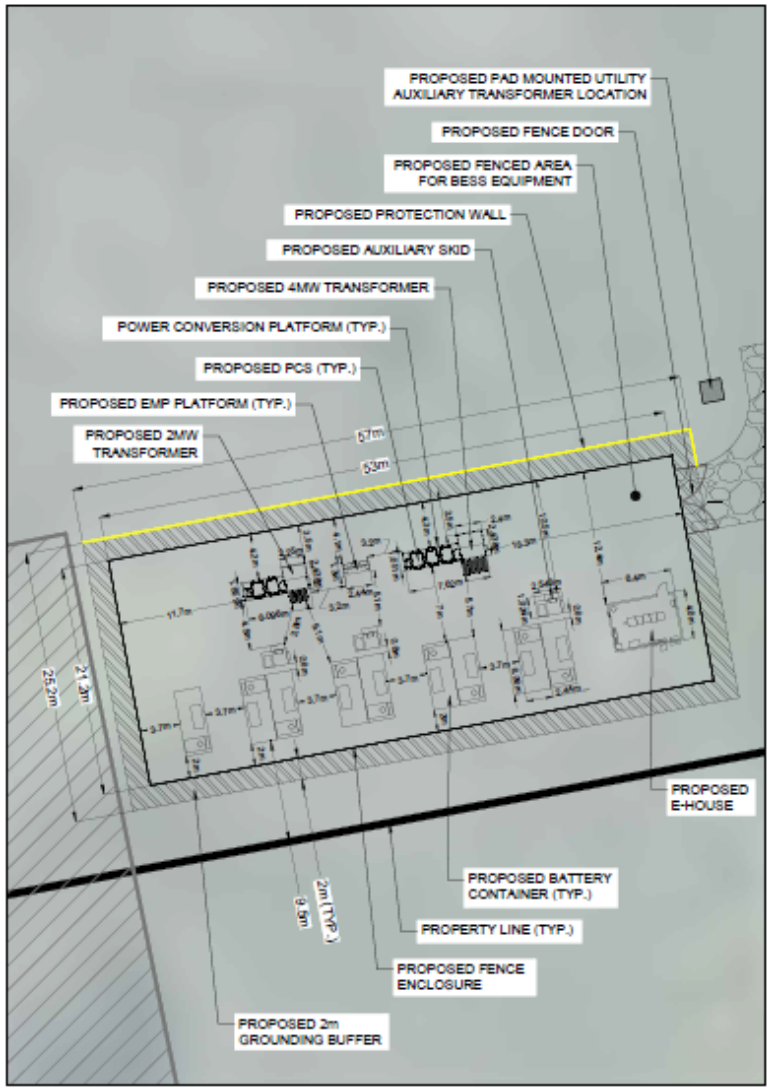
- This would eliminate the need for an Aggregate License Amendment.

- Next Steps would be to work with Municipality and County staff to re-submit all required permitting Site Plan Approval Application with the new engineering plans.



Updated Site Plan:





Planning Considerations

Planning Policy Conformity

- The proposed BESS is consistent with the policies of the Provincial Policy Statement, the Bruce County Official Plan and the Municipality of Arran-Elderslie Official Plan that support energy infrastructure that supports local residents, agricultural operations and the business community.

Environmental Protection

- The BESS has been designed to protect the natural environment including groundwater, air, and natural heritage resources throughout its life cycle.

Technical Considerations

✓ Environmental Site Assessments are completed and underway

✓ No water or sanitary services are required

✓ No traffic will be generated other than periodic visits following construction

✓ Gravel pad base will facilitate stormwater flows

✓ Automated fire protection systems will protect the BESS

Land Use Compatibility

The proposed BESS facility is compatible with the adjoining energy facilities and the surrounding agricultural and rural residential land uses.

Battery Supplier - EVLO

- EVLO is a wholly **owned subsidiary of Hydro-Québec**, North America's largest producer of renewable energy headquartered in Montreal, Canada.
- Their patented, **eco-friendly** battery chemistry is the culmination of several decades by parent company (Hydro-Quebec)'s advanced innovation lab.
- EVLO was launched in 2020, **after 7 years of BESS R&D**, with a clear focus on commercializing grid-scale solutions.
- They provide customized lithium iron phosphate (LFP) based BESS with enhanced **safety-by-design features** that allows safer operations by eliminating the risk of thermal runaway
- EVLO has **never experienced thermal runaway** on their sites.
- **Safety considerations** that differentiate EVLO:
  - Nail penetration test must be passed successfully
  - Slow down propagation & limit gas volume: thermal barriers at module and tray level
  - Do not allow gas accumulation: NFPA69 selected
  - NFPA69++: Do not rely on auxiliary power source or communication (Fail-safe). Active venting + passive venting (chimney & emergency vent opening)
  - Use a multi level detection: heat (BMS), heat (enclosure), smoke, hydrogen
  - Accelerate detection: highly sensitive hydrogen detection
  - Test and test again : Validation tests above UL9540

Stock Symbol
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Cboe CA: SUNN

BESS – Operations

- To keep BESS operating efficiently and safely, regular inspection, maintenance and monitoring services will be provided for this project.
- The BESS equipment will be monitored remotely to check the health of the batteries, performance and temperature to identify any issues. In cases of emergency, O&M personnel will be dispatched to site right away and will follow the emergency response and remediation plans.
- Regular preventative maintenance will be done on the BESS equipment to ensure the system is operating efficiently and safely
- Corrective maintenance will be done to correct any issue that is preventing safe and efficient operation of the BESS. Spare parts will be maintained to reduce downtime.
- The BESS containers are fed with auxiliary power from the grid such that the HVAC and monitoring equipment are still operating in case the BESS containers are not. This allows us to continue to monitor the health of the system.

BESS – Emissions

- **Noise Emissions:**
  - An Acoustic Assessment is required to be conducted by an independent Acoustic Engineer using guidelines and regulations in place by the Ministry of the Environment, Conservation & Parks (MECP).
  - The guidelines state that the sound level limits are 50 dBA for daytime, and 45 dBA for evening and nighttime which were the values used to assess compliance in the study.
  - The worst-case scenario was assumed in the acoustic model, which is when all noise sources operate at the same time for a full hour during evening and nighttime periods.
- **Air Emissions:**
  - Evaluation on air emissions was done by an independent Senior Air Quality Scientist summarized below:
    - There are no gas emissions from the battery storage containers in normal operation.
    - If there is a fire or the system is not in function for 24hr, the gas evacuation flaps will open, however all simulations show that most reactive gases remain within the equipment, the hot gas evacuated from the equipment elevates in altitude very quickly, eliminating any risk to human safety.

BESS – Emissions, continued

- **Thermal Emissions:**
  - Unlike fossil fuel-based energy systems, BESS does not contribute to air pollution or greenhouse gas emissions. They only generate heat as a byproduct of their operation, which is managed to ensure safe and efficient operation.
  - **Heat Generation in BESS**
    - Internal Heat Production: Batteries in the BESS generate heat as a byproduct of their operation. This heat is produced during both charging and discharging processes.
    - Cooling Requirements: To maintain optimal performance and longevity, the BESS has a cooling system to manage and dissipate this heat. Efficient thermal management ensures that batteries operate within their specified temperature ranges.
  - **Thermal Management Systems**
    - Air Cooling: An HVAC system is used to dissipate heat.
    - Thermal Insulation: Thermal barriers are used in the module and tray designs to maintain temperature stability and protect the batteries from temperature extremes.
  - **Safety and Efficiency**
    - Temperature Monitoring: Advanced Battery Management Systems (BMS) continuously monitor the temperature of battery cells to prevent overheating and ensure safe operation.
    - Thermal Runaway Prevention: BESS design includes numerous safety features to prevent thermal runaway.

BESS – Safety Features

- **Hydrogen detection:** Each EVLOFLEX container is equipped with a hydrogen detector connected to the container's fire system and monitored by the SPPC/EMS*.
- **Smoke Detection:** Each EVLOFLEX container is equipped with 2 smoke detectors connected to the container's fire system and monitored by the SPPC/EMS.
- **Temperature monitoring:** Battery cell temperatures are constantly monitored by the battery container's fire system and the SPPC/EMS.
- **Gas Evacuation:** The gas evacuation flaps (located on the top of the container) and the ventilation flap (located at the bottom of the control and distribution compartment) open automatically in case of a thermal event or detection of high hydrogen concentration. The purpose of the gas evacuation system is to prevent the accumulation of hydrogen gas within the battery container and introduce fresh air in the enclosure.
- **Fast Stop:** The F-Stop system will activate automatically in a multitude of scenarios including, most prominently, hydrogen gas detection, smoke detection and thermal events outside of normal operational parameters. It can also be activated manually using the operator web interface or an F-Stop button present on certain major components of the EVLOFLEX system.
- **Thermal barriers:** Slow down propagation & limit gas volume by placing thermal barriers at module and tray level
- **Regulatory:** UL9540 certified & NFPA69 compliant

***SPPC/EMS** (Smart Power Plant Controller/Energy Management System): Main control cabinet of the BESS.

BESS – Thermal Events Management

EVLO has **never had a thermal runaway event** at any of their sites, however we have still consulted third party BESS fire experts, Fire & Risk Alliance, to provide their recommendations as well as fire training to the Burk's Falls and District Fire Department once the BESS site construction is complete.

Summary of Fire & Risk Alliance recommendations on thermal event management:

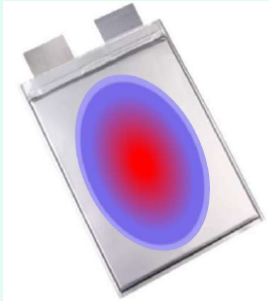
- The proposed battery containers have safety features to mitigate the effects of cell failure and stop cell propagation within the module. In the rare event that a battery container becomes fully involved, the recommendation for intervention is limited to intermittent application of water for exposure protection within the site. **Fixed systems provide no value and, in some cases, intensify conditions.**
  - There are no listed agents or system for the suppression of Lithium-Ion battery fires that will not exacerbate conditions or place the user at risk.
  - The failure of a cell within a module is a deep-seated fire. Cells are tightly housed within modules and modules snugly packed within racks **preventing the egress of water from these systems to the effected area**. In response, the application of water in this matter would not be for suppression, but to limit propagation.
  - The proposed BESS site meets the definition of Remote Location and presents a **minimal risk of fire propagation** to neighboring communities which is why suppression, or a water supply is not required in the code as noted in NFPA855 §9.5.2.5 .
  - Remote Location is defined in NFPA855 §9.3.2 as: "Energy storage system located more than 100 ft (30.5 m) from buildings, lot lines that can be built upon, public ways, stored combustible materials, hazardous materials, high-piled stock, and other exposure hazards not associated with electrical grid infrastructure."

BESS Safety Standards

- BESS will be monitored even on the cell level 24/7/365 by IESO, EVLO, and O&M Provider.
- Uses a much safer chemistry (LFP technology instead of NMC)
- Immediately notified if battery heat is above normal (>55 degrees) and **will remotely shut down and cool off.**
- The BESS has active venting that ensures no buildup of gas in the container.
- UL 9540A test: even in the worst-case scenario, there is no module-to-module propagation and **no flame.**
- EVLO's NFPA 69++: failsafe venting panels automatically open to release heat or pressure at the beginning of a thermal event detected

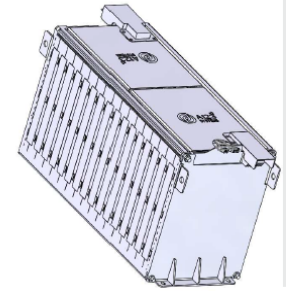
Cell ✓

- August 22th 2022
- Lab: CSA
- Venting: 144°C
- Thermal Runaway: 215°C



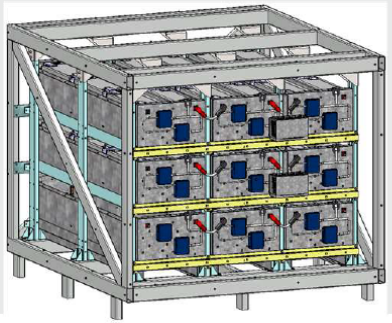
Module ✓

- March 23rd 2023
- Lab: TUV / ESRG
- Propagation: 6 out of 32 cells / 34 minutes
- No flame, no explosion, TR contained by module
- Rate: <6 mins/cell



Unit ✓

- April 27th 2023
- Lab: TUV / ESRG
- Module to module propagation : **none**
- No flame
- Highest adjacent module T°< 90°C



EVLO

Q&A and Thank You!

Please send any follow-up questions to:

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