STATE OF VERMONT
PUBLIC UTILITY COMMISSION

Petition of Green Mountain Power for a Certificate of Public Good pursuant to 30 V.S.A. § 248(j), authorizing the installation and operation of a battery storage system on the GMPSolar Panton Project site located in Panton, Vermont, to be known as the "GMP Panton Battery Storage Project"	))))))	Case No. 17-2813-PET

AFFIDAVIT OF KIRK SHIELDS

1. My name is Kirk Shields. I am Director of Development and Risk Management at Green Mountain Power ("GMP"). My business address is 2152 Post Road, Rutland, VT 05701.
2. I previously submitted testimony in support of the Section 248 petition submitted by GMP for the Panton Battery Project (the "Project"), which was issued a CPG on January 22, 2018. The Project is located on a subleased portion of the GMPSolar Panton Project, a 4.90 MW solar generation facility off of Panton Road in Panton, Vermont. The Project is contained entirely within the fenced in portion of the GMPSolar Panton Project, which was issued a CPG in Docket No. 8637 on July 8, 2016.
3. As part of the Section 248 petition for the Project, GMP discussed the plan for the Project to eventually evolve to include the capability of operating as a distribution island for a defined geographic area in Panton. Creation of such an island would enable customers in that area to be disconnected from the bulk grid and still remain powered by local distributed energy and energy storage from the Project during planned outages and emergency situations i.e. storm damage. See, e.g., Shields direct pft. at 3. GMP also noted that "additional equipment and advanced micro-grid[1] control systems may be needed to fully implement

[1] The terms "island" and "microgrid" appear in different places in testimony. GMP uses these terms interchangeably to describe a network of electricity customers with a local source of supply that is normally attached to a broader distribution grid but is also able to function independently of the larger grid.

islanding capabilities on this circuit" and that "[t]he combination of resources on this circuit provides additional learning experiences as we seek to further develop islanding capabilities on our systems." Belarmino direct pft. at 10.

4. Creating a distribution island with the Panton Battery Project would represent a significant achievement for GMP with potential for industry-wide interest in the Project and its advancement of inverter-based islanding. GMP understands that to date, distribution circuit islanding has been largely limited to generation technology utilizing a rotating machine, such as a diesel generator, in order to provide the stability needed to maintain the island.

5. Since the Project began operating, GMP has been working to determine the best approach and design partner for adding microgrid capability to the Project. GMP has been working with Schweitzer Engineering Laboratories ("SEL") and TESLA on designing an islanding system for the Project. Between SEL's expertise on protection and control systems, TESLA's knowledge of battery systems and our knowledge of the distribution system, we have been able to design an inverter-only based islanding system that will operate reliably and safely.

6. After extensive engineering analysis conducted in partnership with SEL, GMP has concluded that the Project microgrid can be accomplished with a relatively small number of additional pieces of protection and control equipment on the site and distribution system, including a pad-mounted recloser and a 1,500 kVA pad-mounted ground bank transformer inside the perimeter fence. In addition, three new reclosers will be added to the distribution line outside the Project area, and will be mounted on existing GMP utility poles on Panton Road and Jersey Street. One of these reclosers is replacing an existing recloser with more modern controls necessary for the islanding system. There will be no need for tree clearing

or any other impacts to existing natural resources as a result of installing the pole-mounted reclosers. The locations of the pole-mounted reclosers relative to the Project and to Panton Town buildings are indicated by the blue dots here:

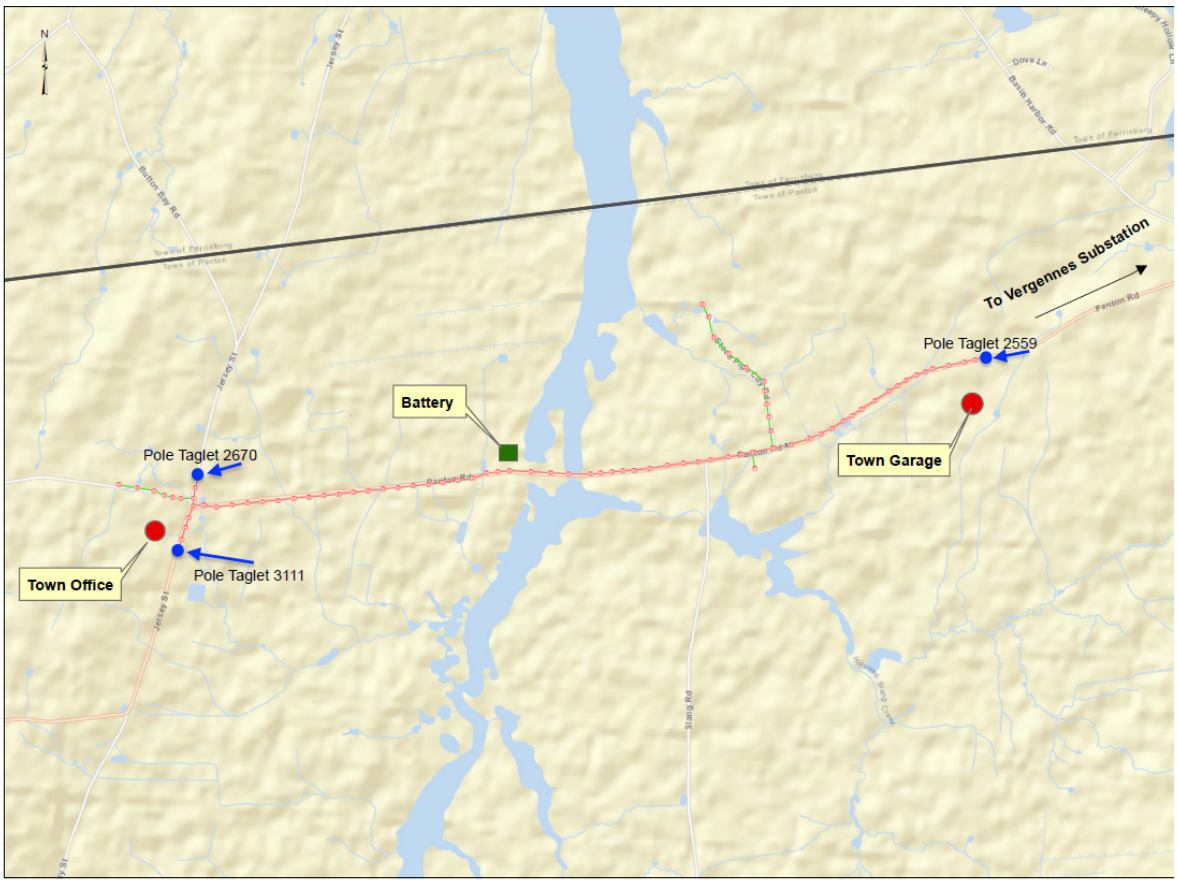

Figure 1

7. The pad-mounted transformer and recloser will be located on a concrete pad directly adjacent to the existing similar Project transformer and recloser, as shown on the Revised Site Plan included as *Attachment 1*, the area of which will be subleased from GMPSolar Panton. This equipment will be interconnected with the existing equipment through the same interconnection point as the existing solar and storage components of the Project.

8. GMP estimates that the additional equipment would take approximately 60 days to install, with limited trips for delivery and construction vehicles. Following installation, there would be no additional traffic to the site outside of regular Project maintenance, as per normal operation of the site.
9. With these upgrades, the Project would initially be capable of islanding about 51 customers during testing. When the protection equipment has been tested in island mode and proven effective for this number of customers, the island can be expanded to provide the same grid resiliency and emergency back-up benefits to potentially several hundred more customers located within this area.
10. GMP has long discussed the potential for the Project to island portions of the surrounding Project area with the Town of Panton, and the Town of Panton is supportive of this proposal and the proposed Project changes necessary to implement this capability. See *Attachment 2 – Letter of Support from the Town of Panton.*
11. Automated fault detection and switching is a key component of the islanding initiative. Through this automation, in the event of an outage, the island will transition seamlessly without any human intervention, as well as transition back to normal grid operation. This automation is designed to be quick enough that it is not noticeable to the customers within the island.
12. As the proposed changes to the Project involve adding only a recloser and transformer within the Project fence line, and the footprint of this equipment is very limited, there is no potential for significant impact under any of the Section 248 criteria applicable to the Project as further identified by experts in the other affidavits supporting this motion.

13. Rather, in many ways, the proposed changes to the Project will serve to increase the Project's benefits to customers. Adding islanding capability to the Project will increase GMP's ability to continue providing electricity to customers in the Town of Panton during a blackout or other emergency, and will also provide GMP with valuable data and experience that bridges the gap between theory and successful application. The islanding protection scheme implementation will provide operational and protection experience that GMP will be able to apply to other areas of its distribution system. During widespread outages, GMP restoration efforts will also be able to be focused on other areas of need while the islanded Panton customers continue to be served inside the island.

14. Adding the microgrid equipment to the Project does not change the conclusion that the Project provides economic benefit to the State and its residents. While the cost of the equipment may reduce the original NPV slightly (when not taking into account reliability benefits), the Project will still be net positive over its lifetime and will provide important cost savings to customers. GMP used the online ICE Calculator[2] that was developed by Lawrence Berkeley National Laboratory and Nexant, Inc. to estimate the economic benefits of reliability improvements to islanded customers for comparison to the cost of implementing the island. The customer makeup of the initial island consists of 45 residential customers, Panton Town Hall, Panton Town Garage facility, a farm and three other commercial customers. The economic value of islanding these 51 customers was estimated by the ICE Calculator to be approximately $100,000 net present value ("NPV") over a 40-year benefit timeframe. Once the initial island has been well-established and tested, GMP plans to explore expanding the island size to include more customers, which would increase

[2] ICE Calculator, https://www.icecalculator.com/build-model?model=reliability, June 30, 2020

the economic benefits significantly. For example, extending the island to 551 customers (approximately one-half of the customers on the circuit) would increase the economic benefits to about $1.2 million NPV. GMP solicited competitive bids on the required equipment and determined that the estimated all-in cost of the islanding, including the protection study and design, equipment, controls and installation will be about $628,000. Thus while the ICE Calculator value of the small initial islanding is less than the implementation cost, the post-testing expansion of the island to a reasonably achievable customer population would result in a positive benefit according to the ICE calculator.

15. GMP notes that adding islanding capabilities to the Project is also consistent with GMP's most recent Integrated Resource Plan ("IRP")[3] and the State Energy Plan. The 2018 IRP discusses the planned development of a microgrid in Vergennes (Panton) to improve the reliability of the electric system. The IRP also introduces the concept of developing microgrids generally as a tool for mitigating and isolating power quality issues on the system. Similarly, the Comprehensive Energy Plan recommends learning about progress in microgrid technology as it evolves, which the proposed Project enhancements would promote.
16. When installing the proposed new equipment, GMP will abide by all CPG conditions, including Condition #5 related to the existing osprey nest on the eastern edge of the Project parcel.
17. Based on the above, and further information provided by Mr. Kane, Mr. Nadeau, and Mr. Dixon in their supporting affidavits, the proposed Project changes do not have the potential to change any of the Commission's conclusions with respect to the Project's compliance

[3] Green Mountain Power, https://greenmountainpower.com/wp-content/uploads/2019/03/IRP-Transmission-and-Distribution.pdf, June 30, 2020

with the applicable Section 248 criteria. These changes will not result in any potential for significant impacts to the identified Section 248 criteria, and in fact in many cases will increase the benefits provided by the Project to the Town of Panton and the State. GMP therefore respectfully requests that the Commission find them to be non-substantial in nature and issue an order approving the added equipment as soon as possible.

I declare that the above statement is true and accurate to the best of my knowledge and belief. I understand that if the above statement is false, I may be subject to sanctions by the Commission for contempt.

Dated at Benson, Vermont this 14th day of July, 2020.

Respondent Signature

By: Kirk Shields
Kirk Shields