Lowell Volunteer Fire Department

P.O. Box 239
2534 Route 100
Lowell, VT 05847

March 5, 2026

RE: Potential for Proposed Solar Generation Facility Causing Radio Interference

Chief Nick –

As we discussed at our last meeting, I reach out to our insurance agent, Aaron Rich, who is also Chief of the Lyme, NH fire department, to see if he knew of any problems other departments might have experienced with solar generation facilities.

His number one concern, given the location and size of the proposed Northland Solar facility, was the potential for interference with the department's VHF radio communications. From his experience, he said he would be concerned about the potential for interference from any such solar generation facility within 500 yards of our station (I'll note that Chief Rich's concerns regarding solar interference are shared by various Wilmington, VT town officials, as detailed below).

Following up on Chief Rich's comments, I contacted Eric Field, President of Burlington Communications ("BCS"), since BCS provides and services the department's radio equipment. Mr. Field as it turns out also has experience with the issue, and he promptly provided me with a copy of a report he prepared for the Lebanon, NH Police Department detailing how nearby solar generation equipment (located on the "Landfill Site") was interfering with that department's VHF radio communications.

A copy of that report is attached as Exhibit A.

Mr. Field also told me that he was helping Glover Ambulance determine if the trouble they were experiencing with their radio system's periodic inability to communicate was attributable to a nearby free-standing solar generation facility. Note that this situation is still being investigated, and the person I spoke with at Glover Ambulance made a point to clarify they had not yet completed the investigation into whether the nearby solar facility was the cause of their problems.

The gist of my discussions with Mr. Field was that the main cause of the radio interference, where it exists, stems from either the inverters or the optimizers connecting the solar panels. Once the

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interference exists, there is nothing that can be done to the radios to overcome the interference, it can only be fixed on the solar side of the equation.

As for how any such interference might cause problems for the Lowell Volunteer Fire Department ("LVFD"), there are two separate but related issues – each relating to our hand-held radios relatively low power (when compared to radios connected to a 12 volt or 120 volt power source). In the case of a fire fighter trying to communicate with the department's base station radio (located at the fire station), any such interference could reduce the ability of the transmissions to reach the station, or in the extreme, cut off such transmissions entirely. As you know, our firefighters are rarely at the station when we receive an emergency tone, or when we contact dispatch to request such a tone (as might be the case when we come upon a car accident, observe signs of a fire, or otherwise need to call for assistance). Our hand-held radios lack the power to reach dispatch directly, and thus our hand-held radios are actually communicating with the base station radio, which in turn relays those transmissions. Therefore, anything that reduces, or in the extreme prevents, such communications would severely impact our ability to protect the people and property located in the areas we serve as the first responders (whether related to fires, vehicular accidents, ambulance lift assists, or mutual aid calls).

Separately, any such interreference would negatively impact our hand-held radio to hand-held radio communications. Whether responding to a fire or vehicular accident, we routinely communicate directly with each other - as would be the case with fire fighters working the interior of a structure fire, or first responders working opposite ends of traffic control. Separate from an emergency at the proposed Northland facility, given its proximity to the center of the town village area (including the intersection of Route 100 and Route 58), the potential for an emergency immediately proximate to the solar facility is greater than almost anywhere else in town.

Relative to the proposed solar facility's potential to interfere with communications with the fire station, I provided Mr. Field with what limited information I was able to find about Northland Solar's proposal on the PUC's website, specifically the "Site Plan" on which I noted the approximate location of the fire station, as well as the pre-filed details on the proposed equipment. Unfortunately, based upon an initial review of those documents Mr. Field could not tell me whether he thought we might experience any interference issues.

Mr. Field has reached out to Northland Solar, more specifically Mr. Thomas Hand, to find out more details regarding the equipment they are proposing to assess the likelihood that the fire department's VHF communications system might be negatively impacted. I hope to be able to report more after Mr.

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Field and Mr. Hand speak (as of today, which is a Thursday, Mr. Hand has not responded to Mr. Field's request of last Friday).

Relative to your communications with the Town Selectboard, you might ask them (note that herein I am using alphabetic introductory formatting to designate things I feel the Town should ask of the PUC):

A) To ask Mr. Hand to respond to Burlington Communications inquiry, if Mr. Hand has not done so already.

Mr. Field also mentioned how despite the issue of solar generation's interference with first responder communications systems just becoming more widely understood, the problem is well known relative to HAM Radio communications. He directed me to the American Radio Relay League ("ARRL") for more information. As of this moment I have not had the time to investigate this lead further.

The point was also mentioned, I believe by several if not all the people with whom I spoke, that even though the generation components likely comply with FCC regulations, those regulations are insufficient to prevent interference.

Chief Rich further told me about zoning changes that were, or are being implemented in Lyme, NH to protect their fire department's communications. Specifically, the fire department is to be considered an abutter of any parcel upon which a solar generation facility is proposed (with distances varying based on specifics of the proposed facility) so they will have the ability to request that the requisite permits be refused in order to protect their communication system. In support of this, in addition to the above referenced BCS report regarding the Lebanon, NH Police Department, I also note the following studies to which Chief Rich directed my attention:

1). "Renewable Energy, Photovoltaic Systems Near Airfields: Electromagnetic Interference", April 2015, Naval Facilities Engineering Command Engineering and Expeditionary Warfare Center (https://docs.nrel.gov/docs/fy15osti/63310.pdf), with the Executive Summary recommending a 250-foot setback from airport communication equipment (I'll note that aircraft communicate on different frequencies than the fire department and the various mutual aid agencies, and I suspect all the radios used in air traffic control operations operate at a higher transmission power than our handheld radios, so this study would seemingly just serve to validate the potential for interference observed elsewhere).

2) "Electromagnetic Interference from Solar Photovoltaic Systems: A Review", Division of Electromagnetic Engineering and Fusion Science, Department of Electrical Engineering, KTH Royal Institute of Technology, republished 24 December, 2024 by MDPI (https://www.mdpi.com/2079-9292/14/1/31), with the article as described in the introductory abstract presenting "a review of the important EMC aspects of solar photovoltaic installations as an disturbance source".

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3) "Interference Impact from Solar-Panel Systems on Air Traffic Control Communications", 2019 International Symposium on Electromagnetic Compatibility – EMC Europe, republished Sept 2019 by IEEE (https://ieeexplore.ieee.org/document/8871512) stating in the abstract: "the results show that considerable interference impact, in terms of reduced communication range and increased receiver-noise level, can be caused by radiated interference from solar panels at co-locations distances of 20-30 meters and below". I was unable to read the article because it is hidden behind a pay wall, so I was unable to determine how the size of solar facilities studied compared to the Northland Solar proposal - but again, I note that the frequencies involved, and likely the power of the radios, are different than those used by the fire department.

4) I could not locate a copy of a 2020 study published by the Swedish Armed Forces addressing interference with radio rescue service communication frequencies Chief Rich also forwarded as relevant, as the URL – www.forsvarsmakten.se/en/news/2020/12/solar-panels-may-cause-radio-frequesncy-interference-on-aircraft-radio-rescue-service-communication-channels-radio-broadcsats-and-sigint - returned an error message (and subsequent internet searches were unsuccessful). It is worth noting that the rescue service communication frequencies used in Sweden are likely different than those used by our fire department, so again this article would only seemingly serve to validate the potential for interference.

Separately, I was able to locate the following referenced 2024 article (updating an earlier 2009 article) published by the Institute of Electrical and Electronics Engineers ("IEEE") that appears to not only validate the ongoing nature of the potential for interference, but also specifically address the fact that the fire department's radio communications could be negatively impacted:

5) "EMC Issues in High-Power Grid-Connected Photovoltaic Plants: An Update After 15 Years" states relative to radio-frequency that "…radiation effects have emerged as a major concern and cannot be disregarded anymore because several new plants have been constructed near military installations, airports, or communication facilities sensitive to EM disturbances" (quoting paragraph 1 of Section III of the article found at: https://ieeexplore.ieee.org/document/10666819).

Reinforcing the above, the Brattleboro Reformer just yesterday quoted Wilmington, VT Police Chief Matt Murano, Wilmington Assistant Fire Chief Bill Spirka, and Wilmington Town Manager Scott Tucker expressing concerns about potential radio interference from a solar generation facility proposed for the roof of their building ("Wilmington Rejects Solar Project", March 4, 2026, Brattleboro Reformer). Chief Murano, in particular, talked about how "It took years in one case to reduce interference to a usable level", and how he investigated moving his department's radio equipment offsite, but determined it was not feasible. I have not yet had a chance to reach out to the various Wilmington officials, and although the facility proposed there was on-site, it was also exponentially smaller than the one proposed by Northland Solar.

At this point, with no one on the department having the educational or professional background to dig into this issue in more depth, the department not having the financial resources to hire someone to do

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so, and the permitting schedule providing little time for any investigations, I would strongly suggest that we (or rather the Town of Lowell) ask the PUC to either (continuing with the alphabetic ordering of suggested requests for the town to make as a party to the permit proceedings):

B) Require that Northland Solar conduct a pre-construction and post-construction survey so it can be determined that the proposed solar facility does not interfere with the fire department's communications; or

C) If there is not time to conduct a pre-construction survey given what I understand is a tight permitting schedule, at the very least require Northland Solar to remedy any interference with the fire department's radio communications that is later identified as being caused by the solar generation facility (including reimburse the fire department for any costs incurred seeking such a remedy).

Neither of the above two suggestions will prevent the potential for short-term impacts to the fire department's communication system (i.e. during the period in which such interference might be identified and remedied), but they would put the end cost of any harm caused by Northland Solar's equipment where it should be – on Northland Solar (as opposed to the wider community). Of course, if there is no harm, then the last option would result in no cost to anyone as there would be no interference to remedy.

I will keep you apprised of additional information as I learn of it.

Respectfully,

Ben "Trip" Wileman

LVFD Member

Doug Albanese
Lebanon Police Department
36 Poverty Lane
Lebanon, NH 03766

06/09/2020

RE: Landfill Site Noise

Doug,

We did site noise testing at the Landfill Site to investigate the portable “talk in” issues in West Lebanon and possible solutions. To summarize the results, you are experiencing a 25.6 dB increase in site noise during daylight hours when the solar system is active vs nighttime when the solar system is idle. This is impacting your receiver’s ability to receive by a factor of 365:1. We also performed this test at Police Headquarters. The result was a 7 dB increase in site noise during the day vs night. This is a factor of 7:1. This site may not be impacted as greatly as the Landfill because your antennas are on the opposite side of the roof from the solar panels.

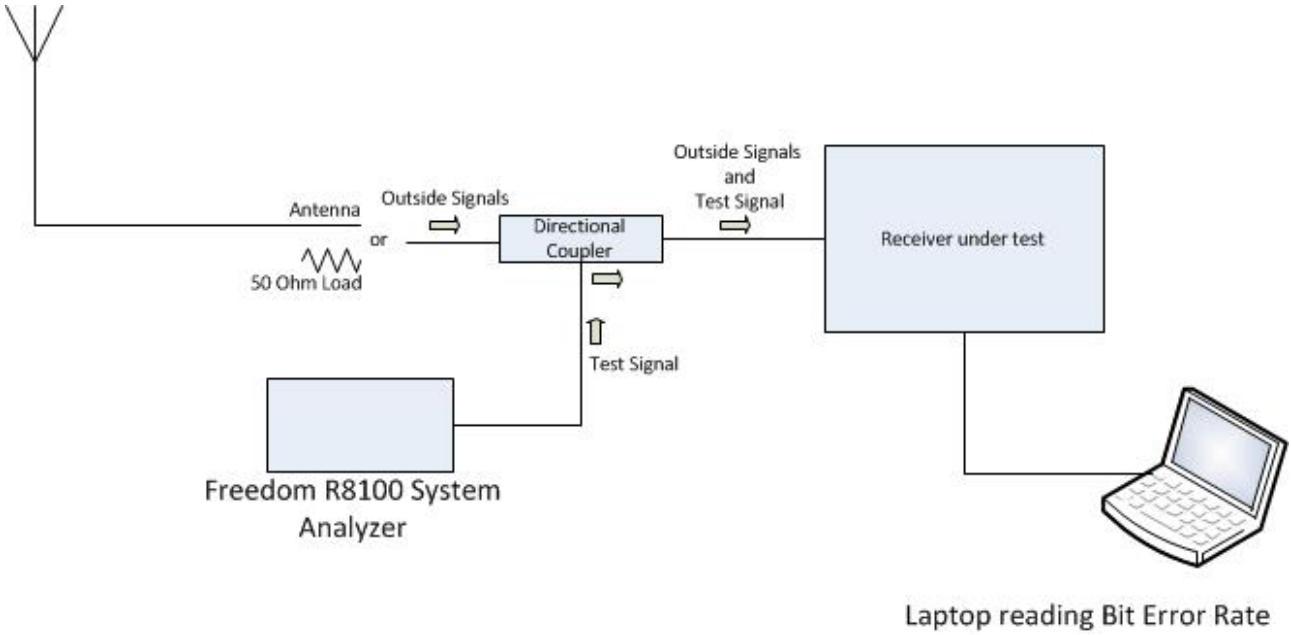
I have detailed our test procedure, and listed our results. I have also listed recommendations on how we may resolve this issue.

Sincerely,

Eric Field, CETsr
Service Team Leader / President
Burlington communications
4735 Williston Road
Suite 30
Williston, VT 05495

To begin with, I should explain that we use the dBm scale, decibels referenced to 1 mW (milliwatt) to measure signal level. 0 dBm equals 1 mW. A change of 10 dB is a factor of 10, 10 dBm equals 10 mw, 20 dBm equals 100 mW, 30 dBm equals 1000 mW or 1 Watt. This is also true in the negative scale, -10 dBm equals 0.1 mW, -20 dBm equals 0.01 mW. The important thing to remember is that a change of 10 dB is a factor of 10, 10 dB is 1:10, 20 dB is 1:100, 30 dB is 1:1000, 40 dB is 1:10,000.

The site noise testing was performed using a Freedom (formerly General Dynamics) Model R8100 Communications System Analyzer, a directional coupler to couple a test signal in to the antenna system, and the Motorola receiver's built in test to measure receiver quality by monitoring the Digital Bit Error Rate.



Test setup for measuring the impact of site noise

The image above shows the test setup used for measuring the impact of site noise on a receiver. The directional coupler is placed at the receiver's antenna port, and allows the injection of a test signal of known signal strength. A laptop running the receiver's service software allows us to measure the receiver's performance; in this case we are measuring the digital bit error rate of the test signal. We start the test with a 50 ohm load attached to the input of the directional coupler. This will allow us to establish a reference test signal level to measure the receiver's performance without the influence of any external signals. The reference test signal is adjusted until we read a 5 percent bit error rate. This is maximum error rate that receiver can process before the signal goes "digital". We then remove the 50 ohm load, and connect the antenna the directional coupler. If there is noise, the bit error rate will increase. The test signal level being injected in to the directional coupler is increased until the bit error rate drops back to 5 percent. The difference in dB between the reference signal and increased signal is how much the receiver is being affected by external noise.

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Here are the test results.

Date of Test	Reference Level For 5% BER with 50 Ohm Load	Level Required with antenna to obtain 5% BER	Amount of Impact on Receiver	Notes
5/7/2020	-100 dBm	-61.5 dBm	38.5 dB 10,000:1	Landfill Site Existing AstroTAC receiver,roof mounted antenna at peak,sky was partly cloudy.
5/27/2020	-103.5 dBm	-73.5 dBm	30 dB 1,000:1	Landfill Site New GTR repeater, clear sky, roof mounted antenna at peak
5/27/2020	-103.5 dBm	-84 dBm	19.5 dB 100:1	Landfill Site New GTR repeater, clear sky, antenna suspended 45 feet at proposed tower location.
5/27/2020	-103.5 dBm	-83 dBm	20.5 dB 100:1	Landfill Site New GTR repeater, clear sky, antenna suspended 55 feet at proposed tower location.
5/27/2020	-103.5 dbm	-84 dBm	19.5 dB 100:1	Landfill Site New GTR repeater, clear sky, antenna suspended 75 feet at proposed tower location.
5/27/2020	-103.5 dBm	-88 dBm	15.5 dB 40:1	Landfill Site New GTR repeater, clear sky, antenna

				suspended 75 feet with ladder positioned at fence line.
5/29/2020	-103.5 dBm	-73.5 dBm	30 dB 1,000:1	Landfill Site New GTR repeater, partly cloudy sky, roof mounted antenna at peak
6/8/2020	-103.5 dBm	-96.6 dBm	4.4 dB 2.75:1	Landfill Site New GTR repeater, roof mounted antenna at peak Test performed at midnight to ensure that solar system was fully idle.
5/18/2020	-101 dBm	-83.3 dBm	17.7 dB 59:1	PD HQ New GTR repeater, partly cloudy sky, daytime antenna mounted on dormer
6/8/2020	-101 dBm	-90.7 dBm	10.4 dB 10:1	PD HQ New GTR repeater, antenna mounted on dormer Test performed at midnight to ensure that solar system was fully idle.

Typically, it is not unusual to see about a 6 dB, 4:1 impact in the VHF band at a site. There is always going to be “background” noise. The table on the previous pages shows the results of testing that was performed. I have expressed the receiver impact in dB and in power ratios rounded off for simplicity. The first test that was performed on 5/7/2020 results may have been skewed due to the receiver type. The test on 5/18/2020, at Police Headquarters, was performed the day before new system cutover because of the previous test results at the Landfill. The tests on 5/27/2020 start with the roof mounted antenna, and progresses with the antenna being suspended from a ladder truck at different heights, to simulate a tower, and finishing with the antenna suspended at the fence line to see if any improvement could be yielded with horizontal separation. Even though we did see an improvement with the increased height, especially at the fence line, the noise is still higher than what I would consider acceptable. The test on 5/29/2020 was to measure the impact on an overcast day. The last test performed on 6/8/2020 between 11:00 PM and 12:00 AM to ensure that the solar system was fully idle. Here is the analogy that I can give for why the interference is impacting reception. Imagine that you are at a party and you are trying to listen to someone speaking to you softly, an officer with a portable, while next to you there is another person speaking very loudly, the interference. You are going to have a hard time trying to hear that person trying to talk to you unless the soft spoken person raises their voice, or the other person lowers their voice. Adding filters to the receivers won’t help as the noise is very broad banded and encompasses your operating frequencies.

Here are my recommendations.

1. BCS works with Revision Solar to mitigate the interference with installing ferrite suppressors and grounding all conduits. This would not be covered by our current service agreement, and I cannot guarantee that this will result in a sufficient reduction in noise.
2. Remove the solar panels from the Landfill and Police Headquarters sites
3. Another suggestion would be to investigate the construction of a “receive only” site, located at one of the buildings on 12A to improve the talk back from portables inside the buildings.