AN ENVIRONMENTAL SCIENTIST AND FEDERAL REGULATOR'S PERSPECTIVE
ON THE SCIENCE BEHIND HB 1319
(2-mile buffer between new solid waste landfills and NH state parks)

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I have heard of some concern expressed that the 2-mile buffer zone in HB 1319 is "arbitrary" and "not based on sound science." **Neither claim makes sense,** as I hope I can explain here**.**

Laws and regulations contain seemingly "arbitrary" limits all the time, simply because *any* quantitative analysis will always be surrounded by some uncertainty, and because there is never only one right way to balance costs and benefits. Is the 65 mph national speed limit on interstate highways "arbitrary"? I believe it is: but so was the 55 mph limit it replaced. We are grateful for legislators who ask: "is what we're considering **more or less arbitrary** than the status quo?"

The most important concept involved in setting a distance between landfills and state parks is this: *the General Court has **already** set a very arbitrary limit—namely, a **"zero-inch"** buffer—* because it has apparently never considered the science connecting landfills and parks. The entire section of the NH Code of Administrative Rules (Env-Sw 100 through 2107) contains a very few buffer requirements (e.g., landfills must be 200 feet away from rivers and lakes), but the word "park" is never mentioned. So this complaint about HB 1319 is akin to someone concerned about a proposed "arbitrary" 65 mph speed limit, *if currently there were no speed limits at all.*

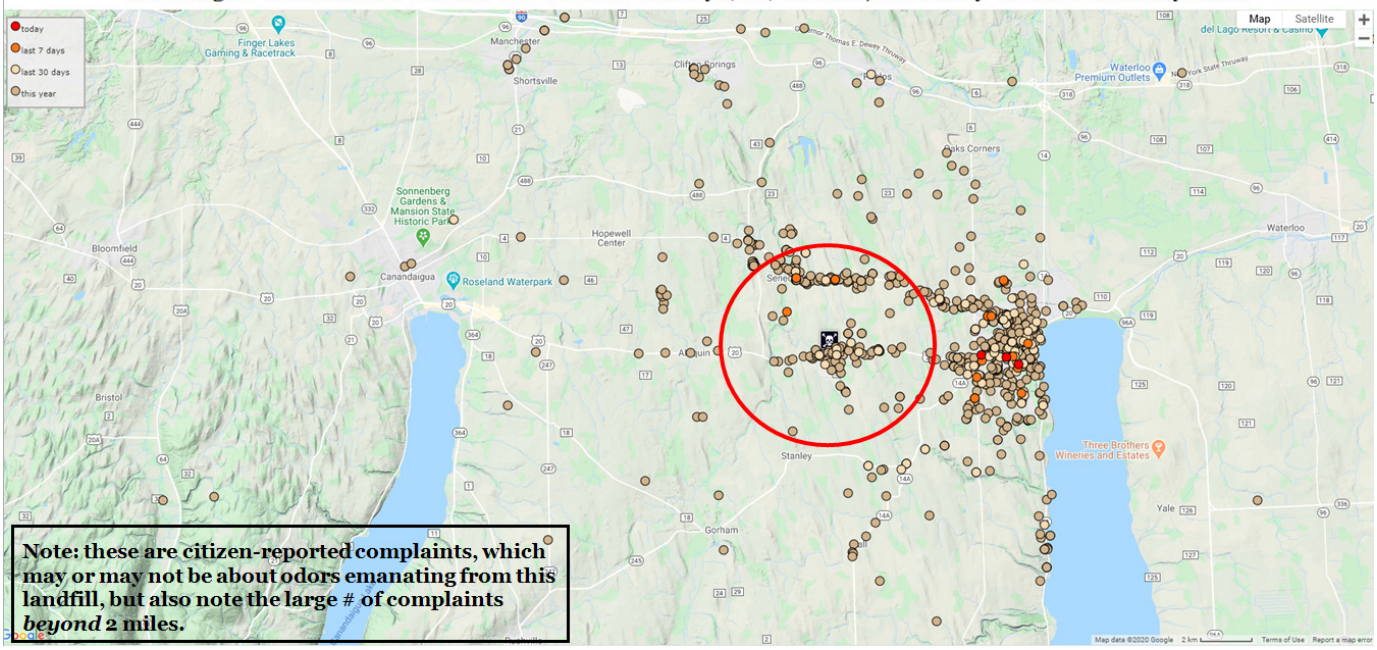
And while there is **no science** behind the status quo that allows landfills to be built right up to the edge of any NH state park, there **is** a sound scientific basis for a 2-mile buffer:

- The speed at which groundwater flows varies tremendously (over perhaps 10 orders of magnitude between porous sand and unfractured granite, and we have both types of environment in NH), so *any* state-wide buffer distance will of course be "arbitrary." According to "Basic Concepts of Groundwater Hydrology" (http://groundwater.ucdavis.edu/files/156562.pdf), groundwater flows at about 1 to 10 feet/day in fractured rock (it moves faster than this in gravel or sand, and slower in clay). At the midpoint of this range, 5 feet/day is equal to about 1800 feet/year, which means that polluted groundwater could move from a landfill to a state park 2 miles away in **less than six years.** Is 6 years a "short time" or a "long time?" That is *exactly* the kind of value judgment elected officials have the authority and responsibility to make. [In my professional opinion, given that remediating a contaminated plume can take decades to accomplish once it's been created, six years is *not* a "long time."]

- Odors can extend for inches or for tens of miles, so *any* buffer, including the current zero-inch one, is or would be "arbitrary." But for merely one data point, consider this news report (which happens to be about a Casella landfill), which refers to a family *three miles* from the landfill who reports odors strong enough to smell through their clothes dryer: https://www.chronicle-express.com/news/20190114/residents-are-reporting-ongoing-intense-odor-

from-ontario-county-landfill. *Again, there is nothing magical about 2 miles, but there is nothing sensible about zero inches.* Below is a screenshot from a website regarding the same landfill, upon which I've superimposed a 2-mile radius—note that most of the odor complaints are downwind and about *4-5 miles* from the site.

Screenshot Taken March 4, 2020, of the online complaint site https://www.itstinks.org
--showing a 2-mile radius around the Ontario County (NY) landfill, owned by Casella Waste Systems



For a peer-reviewed article on the general migration of odors from landfills, see Tansel 2019 (https://www.ncbi.nlm.nih.gov/pubmed/31079649). Table 5 from that article shows that, at night when the atmosphere is more stable, modeled concentrations of landfill gases *2.2 miles away from a site* can exceed odor thresholds, considering only some of the more odorous pollutants.

In summary, a 2-mile buffer between a new solid waste landfill and any of New Hampshire's state parks ***corrects*** *an arbitrary past inaction* by the State that de facto set no buffer at all. The science of groundwater flow and air pollution transport suggests that a 2-mile buffer may not be adequately large, but it is certainly more scientific and less "arbitrary" than the current buffer.

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