

Wind versus Water

Renewables in conflict with the Clean Water Act



Our current dilemma

Submitted to W. 2017, Carolyn, Lusk & ASO, March, February, 2020

1% take the water quality standards in the development of the water quality standards for the Grafton Woodlands Group

energy development

"...all of the above strategy..."

President Donald Trump, March 28, 2017

Energy production via domestic energy resources, such as coal, natural gas, oil, wind, solar, and nuclear, is a key component of our energy strategy.

Competing strategies

Current strategy of solar and wind in VT

Regulations are only as good as enforcement

2019/08/18 11:00:00 AM EST

The Department of Environmental Conservation (DEC) and the Vermont State Police (VSP) are currently investigating a potential violation of the Clean Water Act (CWA) at a site in the town of Grafton, Vermont. The site is a gravel pit used for aggregate material. The investigation is ongoing and the results will be reported to the public as soon as they are available.

...[more text]...

...[more text]...

...[more text]...

Windham and Grafton proposed ridgetline wind

26.5 Megawatt Facility

Conclusions

- Water quality standards are not being met at the site.
- The site is a source of sediment and other pollutants.
- The site is a source of erosion and other pollutants.
- The site is a source of sediment and other pollutants.

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President Donald Trump, March 21, 2017

Energy production via renewable energy

Renewable energy sources include wind, solar, hydro, geothermal, biomass, and tidal energy

Competing strategies

Current strategy of solar and wind in VT

Regulations are only as good as enforcement

2019/2020 10/11/2020/2021/2022/2023/2024/2025

The Department of Environmental Conservation (DEC) and the Vermont State Police (VSP) prepared by DEC, in March 2020, to enforce the Clean Water Act (CWA) and the Vermont State Police (VSP) to enforce the CWA. The CWA is a federal law that regulates the discharge of pollutants into navigable waters. The VSP is a state law enforcement agency that enforces the CWA in Vermont.

...over 1000

...study was begun in February 2020

...Period expires August 18, 2020

Windham and Grafton proposed ridgetop wind

26.5 Megawatt Facility

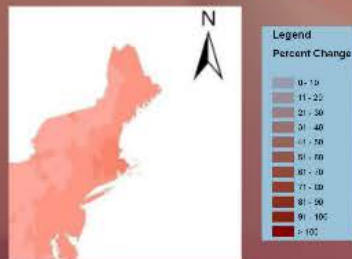
Conclusions

- Windham and Grafton proposed ridgetop wind facility is not a "major" project under the CWA.
- The facility is not a "major" project under the CWA.
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Our current dilemma

Sea-level Rise in 20th Century, Fastest in 3,000 Years, Rutgers, 2016

1% (aka 100-year) stream floods to have increases of 21-40% in flow
Northeast by 2100, AECOM, 2013



nasa



www.salon.com



<http://forum.woodenboat.com/showthread.php?2155015-Sjogin-news>

energy development

“...all-of-the-above strategy...”

President Barack Obama, March 15, 2012

and outlined in White Report of May 2014

major emphasis on domestic energy
renewables (wind, solar, hydro, geothermal, biomass, biofuels)
fossil fuels (natural gas, oil, "clean coal")
nuclear

Executive Order 13653

Obama, November 2013

Preparing the U.S. for the Impacts of
Climate Change

"already affecting communities,
natural resources, ecosystems,
economies and communities"

"reform policies and Federal funding programs that may, perhaps, unintentionally increase the vulnerability of natural or built systems, economic sectors, natural resources, or communities to climate related risks."

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Competing strategies

Preservation of Natural Resources

"Slow stormwater before it rushes into streams. Our steep mountain hillsides send water rushing downhill not only during storms like Irene, but also during the smaller storms..."

"Ensure that flood water has somewhere to go. Our farms, wetlands and fields provide a place where flooding rivers can spill out and slow down. Healthy forests also protect us by absorbing as much as 70 percent of the rain that falls on them before it flows overland to streams. Protecting these areas means less flood damage in our villages and homes."

-Op-Ed by Deb Markowitz, Secretary
Agency of Natural Resources
VT Digger, August 22, 2013

VT Renewable Energy Strategy

"Pursuing clean energy policies in Vermont isn't just about doing what is right for our environment and protecting our unrivaled quality of life. A thriving clean energy sector is also integral to our economy, keeping young people in Vermont, and making the state a more affordable place to live. That is why I feel so strongly that we must lead on creating a clean energy economy based on Vermont values. If we do so, we will add to the 15,000 jobs already supported by the clean energy industry, help homeowners save hundreds of millions on energy costs, and do our part to help combat climate change."

-Governor Peter Shumlin
An Energy Innovation Program for Vermont
<http://governor.vermont.gov/node/2219>

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Current strategy of solar and wind in VT

South Forty Solar

Burlington, VT



Wetland Alteration:		Buffer Zone Alteration:	
Wetland Imp:	0 sq.ft.	Impervious:	0 sq.ft.
Other Parameter:	52,186 sq.ft.	Permeable:	65,404 sq.ft.
Total Wetland Impact:	52,187 sq.ft.	Total Buffer Zone Impact:	65,404 sq.ft.

2.5 MW Solar Array



Lowell Kingdom Community Wind

21 turbines at 63 MW
7 miles of new roads
50 "manner of discharge" points
52 stormwater structures



South Forty Solar

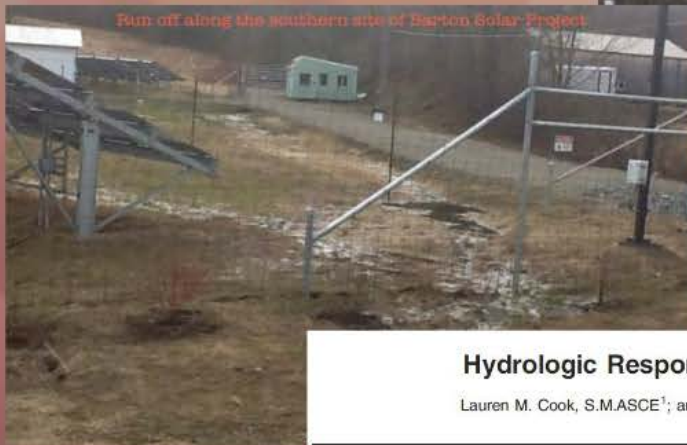
Burlington, VT



Wetland Alteration:		Buffer Zone Alteration:	
Wetland Fill:	91 sq.ft.	Temporary:	0 sq.ft.
Temporary:	0 sq.ft.	Permanent:	65,404 sq.ft.
Other Permanent:	52,136 sq.ft.	Total Buffer Zone Impact:	65,404 sq.ft.
Total Wetland Impact	52,227 sq.ft.		

2.5 MW Solar Array





Hydrologic Response of Solar Farms

Lauren M. Cook, S.M.ASCE¹; and Richard H. McCuen, M.ASCE²

Abstract: Because of the benefits of solar energy, the number of solar farms is increasing; however, their hydrologic impacts have not been studied. The goal of this study was to determine the hydrologic effects of solar farms and examine whether or not storm-water management is needed to control runoff volumes and rates. A model of a solar farm was used to simulate runoff for two conditions: the pre- and postpaneled conditions. Using sensitivity analyses, modeling showed that the solar panels themselves did not have a significant effect on the runoff volumes, peaks, or times to peak. However, if the ground cover under the panels is gravel or bare ground, owing to design decisions or lack of maintenance, the peak discharge may increase significantly with storm-water management needed. In addition, the kinetic energy of the flow that drains from the panels was found to be greater than that of the rainfall, which could cause erosion at the base of the panels. Thus, it is recommended that the grass beneath the panels be well maintained or that a buffer strip be placed after the most downgradient row of panels. This study, along with design recommendations, can be used as a guide for the future design of solar farms. DOI: 10.1061/(ASCE)HE.1943-5584.0000530. © 2013 American Society of Civil Engineers.

CE Database subject headings: Hydrology; Land use; Solar power; Floods; Surface water; Runoff; Stormwater management.

Author keywords: Hydrology; Land use change; Solar energy; Flooding; Surface water runoff; Storm-water management.

Lowell Kingdom Community Wind

21 turbines at 63 MW

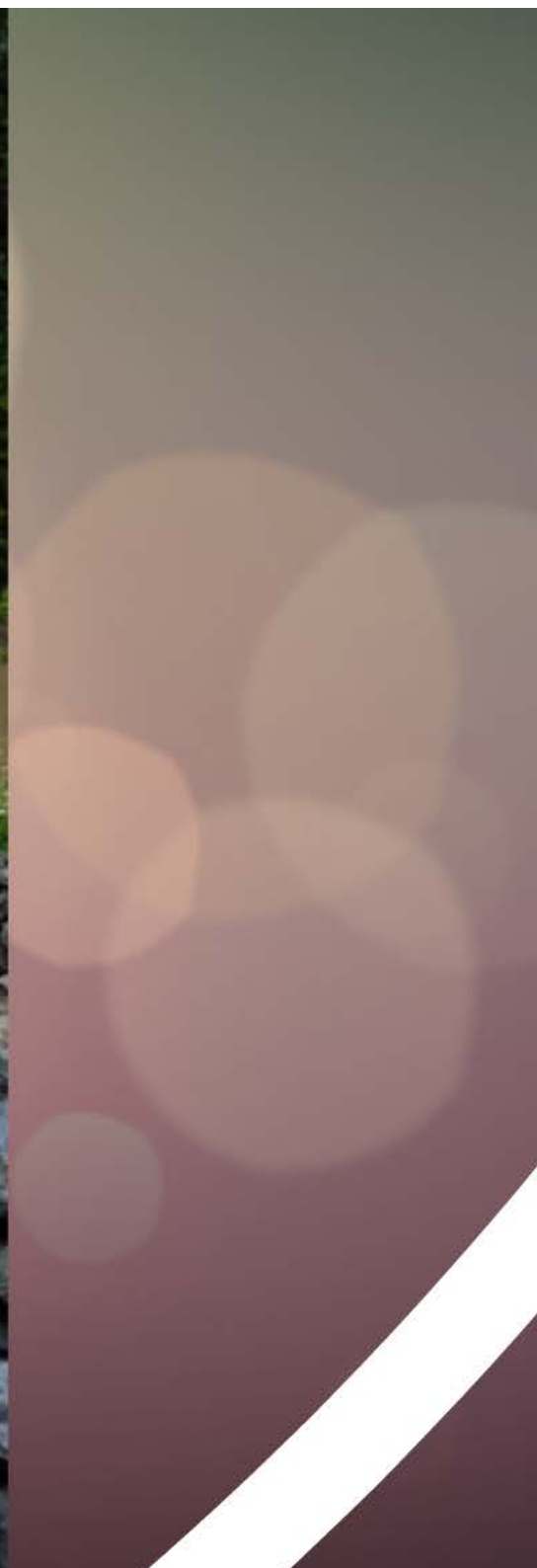
7 miles of new roads

50 "manner of discharge" points

52 stormwater structures











Regulations are only as good as enforcement

Condition 14 of Operational Stormwater Permit -

The Operational Phase Stormwater Management Alternative Design and Performance Monitoring Plan, prepared by VHB, Inc., dated 9/20/2010, and last revised 12/9/2010, shall not commence until the new-design alternative treatment system has been in place for one full year from the date of construction completion....

.....3-year study

....no study has begun as of February 2016

....Permit expires August 19, 2016

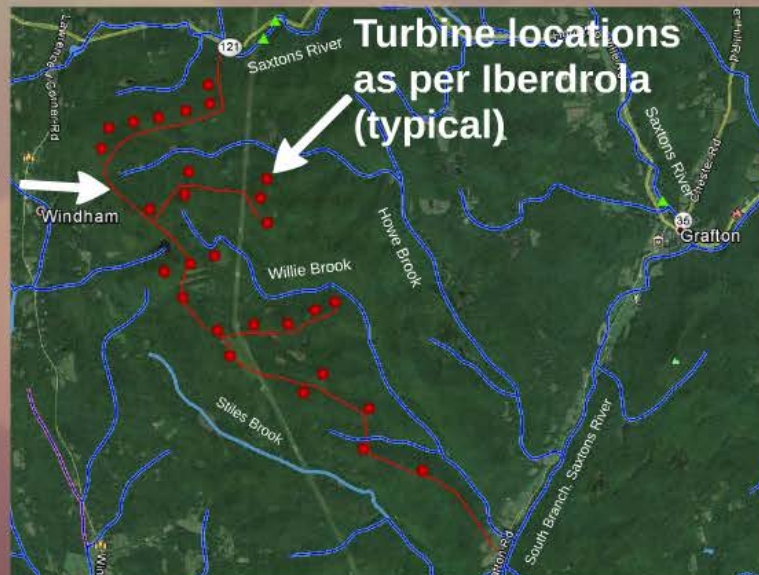
Windham and Grafton proposed ridgeline wind

96 Megawatt Facility

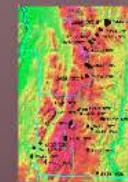
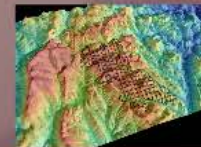
Estimated infrastructure

- 10 miles of access/crane path roads
- >71 discharge-compliance points/stormwater facilities
- 74 stormwater structures

hypothetical
access/
crane paths

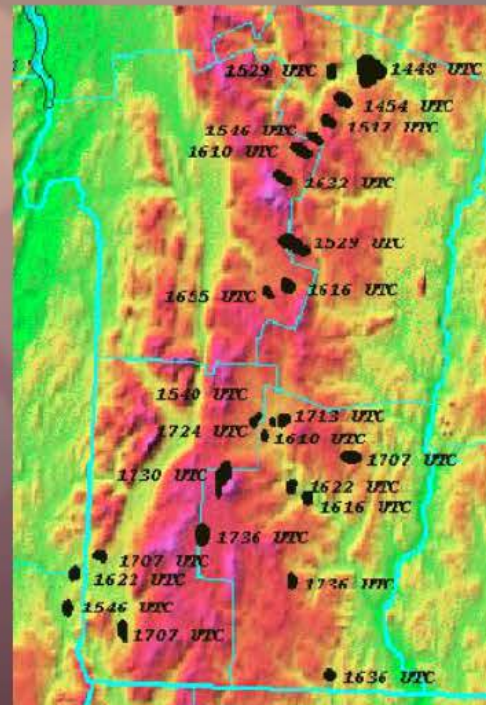
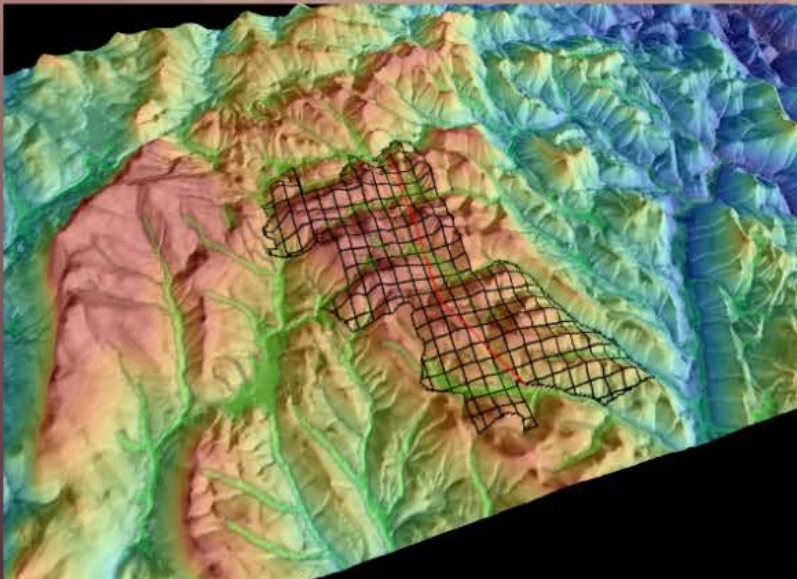


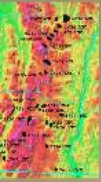
NOAA Technical Report
"The Grafton, VT, Flood, 12-13 June 1996"
• series of thunderstorms
• many road washouts
• 8-9 inches of rain in 2 days
• Convergent upslope flow likely caused storms to form.



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Conclusions

- Vermont has yet to enforce the provisions of the study protocols for KCW in Lowell.
 - As a result, VT is heading toward violation of its delegated authority under the Clean Water Act.
 - The success of the experiment at Lowell is in question.
 - None of the monitoring protocols for Condition 14 or the WQC monitoring test the flood attenuation modeling of the application.
- Deerfield Wind is permitted using the same solutions as at KCW.
- Grafton-Windham Wind would be almost 50% larger than KCW with an estimated 10 miles of new roads.
- Grafton is subject to severe flooding via convergent upslope induced storms, typical of the Green Mountains.
- None of the current and proposed projects incorporate the effects of climate change in their designs, nor is the current or proposed VT Stormwater Management Manuals include provisions to address climate change.

