EXHIBIT # 1

Scott W. Horsley

Water Resources Consultant and University Lecturer
Curriculum Vitae

Areas of Expertise

- Wastewater & Stormwater Treatment
- Water Quality Impacts & Restoration
- Green Infrastructure & Nature-Based Solutions
- Hydrologic Modeling & Assessment
- Integrated Water Management
- Wetlands
- Smart Growth/ Low Impact Development
- Climate Change Adaptation
- Watershed Planning & Assessment
- Education & Training

Professional Registrations

- LEED Accredited Professional
- LID Designer, State of Rhode Island

Professional Affiliation

- Tufts University, Graduate Department of Urban and Environmental Planning and Policy
- Harvard University, Extension, Graduate Department of Sustainability
- Massachusetts Stormwater Advisory Committee
- Massachusetts Sustainable Water Management Initiative Advisory Committee

Scott Horsley has over 30 years of professional experience as a consultant to federal, state, and local government agencies, non-profit organizations, and private industry throughout the United States, Bulgaria, Nicaragua, the Caribbean, the Pacific Islands, and China. Scott has been an innovator in the environmental profession and thrives on bringing innovative and interdisciplinary approaches to challenging projects. Scott has a strong understanding of the full range of technical, planning, and policy issues associated with water resources and land use management projects. Scott has served as an expert witness in the field of hydrology in numerous state and federal court cases. He has served as an instructor for a nationwide series of U.S. Environmental Protection Agency (EPA) workshops on water resource management. He has also served on numerous advisory boards and committees to the EPA, the National Academy of Public Administration, Massachusetts Department of Environmental Protection (MADEP), Massachusetts Executive Office of Energy and Environmental Affairs (EEA), National Groundwater Association, and Massachusetts Audubon Society. Scott has received national (EPA) and local awards (Mashpee Conservation Commission) for his work in the wetlands and stormwater management fields. Scott Horsley serves as Adjunct Faculty at Tufts University in the Graduate Department of Urban & Environmental Policy & Planning and at the Harvard Extension School in the Graduate Department of Sustainability.

REPRESENTATIVE PROJECTS

Watershed Restoration Research Project: Scott is currently working as a member of a research team that includes USEPA Office of Research & Development, United States Geological Survey (USGS), The Nature Conservancy, the Town of Barnstable and the Barnstable Clean Water Coalition. The project is designed to research, develop, and pilot-test multiple nature-based technologies to reduce nutrient loads to the coastal embayment known as Three Bays. Scott assisted in the design of a woodchip-based bioreactor/ permeable reactive barrier (PRB) and is now working with the research team to construct and monitor it as part of a wetland restoration project in a cranberry bog at the headwaters of the watershed. He is also advising on a project to evaluate the use of a new class of innovative and alternative septic systems that utilize a woodchip-based bioreactor. Preliminary data from these systems indicate nutrient reductions of 90%. The project includes the development of a Responsible Management Entity (RME) to oversee the operation, maintenance, and monitoring of the systems.

Expert Witness, Hydrologist - United States Environmental Protection Agency and United States Department of Justice – United States v. Charles Johnson (437 F.3d 157, First Circuit Court, 2006): Expert Witness for U.S. Environmental Protection Agency (EPA) and U.S. Department of Justice (DOJ) in a federal Clean Waters Act enforcement case involving the filling of wetlands in Carver, MA by the construction and operation of cranberry bogs. Scott served as the Hydrology Expert Witness and provided

- Massachusetts Climate Change Adaptation Advisory Committee

Awards

- Mashpee (MA) Conservation Commission Annual Environmental Achievement Award (2002)
- EPA Environmental Technology Innovator Award for Stormwater Treatment Design (1999)

Patent
United States Patent Number 5,549,817 for Stormwater Treatment System/Apparatus

Academic Background
Master of Arts, Marine Affairs - Environmental Protection, University of Rhode Island (1981)

Marine Ecosystems Research Laboratory, University of Rhode Island (1980)

Princeton Groundwater Pollution & Hydrology Course with David Miller, John Cherry, and Robert Cleary (1985)

Bachelor of Science, Biology, Southeastern Massachusetts University (1976)

testimony regarding the hydrologic interactions (or "nexus") between the subject wetlands, groundwater, and the adjacent stream. He provided advice on the application of the guidance from the Rapanos U.S. Supreme Court decision relative to the jurisdiction of wetlands in the Weweantic River watershed. He also developed a nutrient-loading and attenuation model and has provided expert witness testimony regarding the nutrient attenuation capabilities of wetlands and their nexus to the Weweantic River. Scott has also prepared a wetland restoration plan for the cranberry bogs to enhance the nutrient attenuation capabilities of wetlands (abandoned cranberry bogs) in the watershed. The case resulted in two favorable decisions for the United States enforcing the Clean Water Act.

Cape Cod 208 Water Quality Management Plan: Consultant to the Cape Cod Commission for the preparation and implementation of the Cape Cod 208 Water Quality Plan. Fifty-three estuaries are impacted by excessive nutrient loading derived from wastewater, stormwater, fertilizers and natural sources. The Cape Cod 208 Plan presents an innovative alternative approach that includes a broad range of traditional (sewage collection and treatment plants) and non-traditional (or nature-based) technologies including fertigation wells, shellfish restoration, permeable reactive barriers, fertilizer management, innovative & alternative septic system technologies, ecotoilets and other decentralized solutions. An adaptive management plan provides a practical framework to implement and optimize an integrated array of strategies to attain compliance with the Clean Water Act. Mr. Horsley led a team of scientists and engineers in the development of a non-traditional/nature-based approach and conducted dozens of public stakeholder workshops.

Expert Witness, Hydrologist - Massachusetts Supreme Judicial Court - Reynolds v. Stow Zoning Board of Appeals: Mr. Horsley served as an expert witness on wastewater impacts and groundwater hydrology. He conducted an assessment of water quality impacts associated with a proposed Chapter 40B high-density affordable housing project on neighboring private drinking water supplies. The case involved a proposed waiver of a local regulation governing wastewater impacts that the Court upheld the finding that the local board of health requirements were valid and the project was not permitted.

Massachusetts Department of Environmental Protection (MADEP) Title 5 (Septic System) and Groundwater Discharge Permitting Advisory Committee and Designation of Nitrogen Sensitive Areas: Mr. Horsley was invited by MADEP to participate in an advisory group tasked with updating and revising Title 5 Regulations and the associated Groundwater Discharge Permit program. This includes the designation of "Nitrogen Sensitive Areas", the development of wastewater loading standards, the use of alternative septic system technologies, and the roles of local Boards of Health in regulating wastewater and septic systems.

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Wellfleet Targeted Watershed Management Plan – Town of Wellfleet, MA: Consultant to the Town of Wellfleet in preparing a Targeted Watershed Plan including an adaptive management plan integrating non-traditional (nature-based) and traditional (wastewater treatment facilities) nutrient reduction technologies. The plan includes a permeable reactive barrier (PRB), shellfish and aquaculture, ecosystem restoration, stormwater remediation, fertilizer management, and the use of decentralized, on-site septic systems that utilize innovative and alternative technologies. The overall goal of the project is to provide the town guidance in obtaining a MADEP Watershed Permit and compliance with the Clean Water Act.

Three Bays Watershed Implementation Plan – Cape Cod Commission and Barnstable Clean Water Coalition, Inc.: Consultant for the design and implementation of integrated watershed restoration plan designed to reduce excessive nutrient loads. Mr. Horsley prepared conceptual designs for wetland restoration, pond restoration, alternative septic system technologies, stormwater bioretention, woodchip bioreactors, and permeable reactive barriers. He designed a Watershed Calculator tool to track the incremental and cumulative nutrient reductions associated with these projects.

Massachusetts Sustainable Water Management Initiative (SWMI): Mr. Horsley was asked by MADEP and MAEEA to serve as an advisor to an interdisciplinary panel to develop guidelines to implement the Massachusetts Water Management Act for the restoration of stream flow in Massachusetts Rivers. The Massachusetts Water Management Act provides the regulatory structure for water withdrawals in the state. The guidance was developed to provide ecological criteria for the decision making related to water withdrawal permit issuance. The criteria were based upon scientific relationships between flow characteristics and two indicator fish species - trout and black dace. The guidance includes a series of possible mitigation measures and offset practices that are designed to either reduce consumptive withdrawals and/or provide return flows to balance the hydrologic budget.

River Restoration for the Atlantic Salmon – United States Army Corps of Engineers and State of Maine: Served as a consulting hydrologist to the U.S. Army Corps of Engineers and the State of Maine for a hydrologic study of river systems in northeastern Maine to assess the relative impacts of various water users including irrigation pumping associated with the blueberry industry on the flow regime of the Narragaugus and Pleasant Rivers. The project included numerous meetings with a broad range of stakeholders including the U.S. Army Corps of Engineers, the State of Maine, blueberry industry representatives, and local government officials. The project resulted in a decision-making model and adaptive management plan to restore natural flows within the rivers for the purpose of providing an adequate habitat for the Atlantic Salmon.

California Water Code – Department of Water Resources: Served as Facilitator and Trainer for the implementation of Assembly Bill (AB) 3030. This project integrated groundwater and surface waters and provides the framework to develop local groundwater management plans to balance water withdrawals and recharge projects to mitigate impacts water resources. Mr. Horsley facilitated a series of workshops with stakeholders throughout the State of California.

Ipswich River Watershed Management Plan: Project Manager to develop a Management Plan for restoration of the Ipswich River. The Ipswich River is one of the most impacted rivers in the United States with significant flow alterations caused by excessive water withdrawals and inefficient land use practices. This Plan provides an analysis of the development patterns within the study area and the resulting hydrologic impacts of water supply withdrawals, sewerage systems, and stormwater management. The project included coordination with an interpretation of a USGS watershed modeling

project. It also provides an "Integrated Water Management" approval to a series of recommendations designed to balance the hydrologic budget. These include water conservation, alternative water supplies, stormwater management, and land use planning. Mr. Horsley provided facilitation at a series of meetings with a broad range of stakeholders including federal and state agencies, water suppliers, local government officials and others.

Smart Growth and Smart Energy Toolkit, Massachusetts Executive Office of Environmental and Energy Affairs (EEA): Served as a consultant to the EEA to design an outreach tool for local governments and the development community. The Toolkit includes descriptions of twenty techniques, including transfer of development rights (TDR), transit-oriented development (TOD), village center zoning districts, open space residential design (OSRD), LID, agricultural preservation, integrated water, and wastewater management, brownfields redevelopment, and the newly-legislated Chapter 40R smart growth overlay districts. It also includes case studies and model bylaws on the twelve subject areas.

Massachusetts Climate Change Advisory Committee: Scott served as a member of the Coastal Zone and Oceans Subcommittee of the Climate Change Advisory Committee convened by the Secretary of Massachusetts Environtal and Energy Agency. The Committee was assembled to develop recommendations, strategies, and criteria to implement the *Global Warming Solutions Act* passed by the Massachusetts legislature last year. The main task of the subcommittee is to analyze strategies for adapting to the predicted impacts of climate change in the Commonwealth of Massachusetts. Among other recommendations, Scott proposed regulatory changes to accommodate the landward migration of wetland systems that will result from sea level rise.

Nicaragua Source Water Protection Project: As a consultant to U.S. Environmental Protection Agency (USEPA) and U.S. Agency for International Development (USAID), Scott conducted at two-year case study of three communities (Matagalpa, Esteli, and Ocotal) designed to strengthen the sustainability and resilience of local public drinking water supplies. The project included delineation of wellhead protection areas, identification of contaminant sources and the development of management strategies. It included numerous public hearings and the development of a comprehensive training manual.

PROFESSIONAL EXPERIENCE

2014 - Present	Scott Horsley, Water Resources Consultant
2014 - Present	Harvard University, Adjunct Faculty
1986 - Present	Tufts University, Adjunct Faculty
1988 - 2019	Horsley Witten Group, Inc., Founder and President
1984 - 1988	IEP, Inc., Senior Environmental Scientist
1981 - 1984	Cape Cod Commission, Water Resources Coordinator
1979 - 1981	Barnstable County Health Department, Environmental Research Director

PUBLICATIONS

Horsley, S. 2022, Wellfleet Harbor Targeted Watershed Plan, prepared for Town of Wellfleet, MA and approved unanimously by the Select Board, submitted to MADEP for a Watershed Permit.

Twichell JH., Mulvaney KK, Hubbell B, Erban LE, Berry W, Chintala MM, Crocker Z, Gleason TR, Horsley S, Munns, Jr. WR, Rea AW, Amith SN, Soto Reves S. 2019 "Solutions-Driven Research Pilot Problem Formulation Workshop: Report and Evaluation ", U.S. Environmental Protection Agency, Office of Research and Development, National Health and Environmental Effects Laboratory, Atlantic Ecology Division, Narragansett, RI, EPA 600-R-19/107.

Scott W. Horsley

Water Resources Consultant and University Lecturer
Curriculum Vitae

Liss, E., Harrigan, K., Horsley, S., 2018 "Marstons Mills Cranberry Bog Wetland Restoration Master Plan", prepared for the Barnstable Clean Water Coalition and the Town of Barnstable in collaboration with The Nature Conservancy.

Horsley, S., Durant, J., Nugent, K., Goodman, J., Monahan, K., Zhong, Y.,Hung, R, 2015 "Urine Diversion – An Opportunity for Nutrient Recycling on Cape Cod", Prepared with a grant from the Kelly Foundation.

Horsley, S., Perry, E. and Counsell, L, 2016, "Three Bays Estuary Watershed Restoration Plan: A Green Infrastructure Approach, Green Building Journal, Volume 11, No. 2, pp. 22-38.

Parece, T; Owen, M; Shreve-Bibb, Betsey; Niedzwiecki, Paul; Senatori, Kristy; Perry, Erin; and Horsley, Scott; 2015; Tools to Assist Cape Cod Communities Reach Sustainable Nitrogen Reduction Goals – Technology Matrix and Adaptive Management Practices, Journal of the New England Water Environment Association.

Horsley, S., 2013, "Low Impact Development – A Climate Adaptation Strategy", Massachusetts Audubon Society Lecture Series.

Horsley, S., 2011. "Balancing Water Supply Withdrawals, Wastewater Returns and Stormwater Recharge", New England Water Works Association.

Horsley, S. November 17, 2010. "Building to Code – Protecting Homes in Coastal Floodplains," StormSmart Coasts Program, Massachusetts Coastal Zone Management, Plymouth Town Hall, MA.

Horsley, S. 2009. "Low-Impact Development: A More Sustainable Approach to Site Design," Association of Massachusetts Wetlands Scientists (AMWS) Newsletter, January 2009.

Horsley S. 2006. "Planning and Urban Design Standards" American Planning Association; Sections on Water, Hydrologic Cycle; Aquifers, Groundwater Movement and Recharge, Wiley Graphic Standards.

Horsley, S. 2005. Smart Growth Toolkit, Massachusetts Executive Office of Environmental Affairs, Boston, MA.

Horsley, S. 2004. Low impact development strategies: approaches to smart growth, presented to the Annual Meeting of the Massachusetts Association of Land Surveyors and Engineers, Plymouth, MA, September 20, 2004.

Horsley, S. 2004. Hydrology and groundwater management, in Planning and Urban Design Standards, prepared by the American Planning Association,

John Wiley & Sons.

Horsley, S. 2003. Integrated coastal zone management in the Bahamas, prepared for the Inter-American Development Bank (IDB), Washington, DC.

Horsley, S. 2002. Groundwater, drinking water and stormwater protection: science and policy, in 2002

National CLE Conference, Environmental and Land Use Law, Law Education Institute, Steamboat,

Colorado, January 4-9, 2002.

Horsley, S. 2000. Stormwater Management, in Proceedings of the 19th Annual Pacific Islands Conference, Protecting Our Environmental Island Style: Success Stories, Continuing Challenges, Realistic Solutions, June 20-23, 2000, American Samoa.

Horsley, S. 1997. Watershed '97 Conferences. The StormTreat System: An Innovative Stormwater Treatment Technology, Baltimore, MD.

Horsley, S. and J. Witten. 1997. Tools for Watershed Protection, US Environmental Protection Agency.

Horsley, S. and J. Witten. 1996. Coastal Watershed Protection: Tools for Local Governments, prepared under contract to U.S. EPA.

Horsley, S. 1994. Septic Systems and Coastal Water Quality - Technical Assistance Document, U.S. Environmental Protection Agency.

River Basin, prepared by CME Associates, Inc. for the New England River Basins Commission.

Horsley, S. 1992. Buttermilk Bay – A Case Study: Nitrogen Loading Assessment, presented to U.S.

EPA-sponsored Nitrogen Loading Workshop at the University of Rhode Island, Graduate School of Oceanography.

Horsley, S. and J. Moser. 1990. Monitoring Ground Water for Pesticides at a Golf Course-A Case Study on Cape Cod, Massachusetts, National Water Well Association Ground Water Monitoring Review.

Horsley, S. 1990. Nantucket Water Resources Management Plan—A Case Study, Key Note Paper, National Water Well Association, Eastern Regional Ground Water Conference.

Horsley, S., S. Roy, and M. Nelson. 1990. Golf Courses and Water Quality. Seminars.

Nelson, M., S. Horsley and S. Roy. 1990. Delineation of Aquifer vs. Wellhead Protection Areas, National Water Well Association—National Convention Association of Ground Water Scientists and Engineers.

Horsley, S. and J. Witten. 1989. Aquifer Protection. Horsley & Witten, Inc. Seminars.

Cambareri, T., M. Nelson, S. Horsley, M. Giggey and J. Pinette. 1989. Solute Transport - A Simulation of Non-Point Source Nitrogen Impacts to Ground Water and Calibration of A Predictive Analytical Model. Accepted for publication with National Water Well Association, Proceedings - Solving Ground Water Problems with Models, Indianapolis, Indiana.

Nelson, M., S. Horsley, T. Cambareri and M. Giggey. 1988. Predicting Nitrogen Concentrations in Ground Water - An Analytical Model, in Proceedings of the FOCUS Conference on Eastern Regional Ground Water Issues, National Water Well Association, Stamford, Connecticut.

Horsley, S. and J. Witten. 1988. Land Planning and Development in Massachusetts, Horsley & Witten, Inc. Seminars.

Horsley, S. and J. Witten. 1988. Comprehensive Permits for Affordable Housing Development in Massachusetts. Horsley & Witten, Inc. Seminars.

Horsley, S. and J. Witten. 1988. Small Sewage Treatment Plants (Package Plants). Horsley & Witten, Inc. Seminars.

Horsley, S. and J. Witten. 1988. Land Development in the Coastal Zone: Impacts Upon Water Quality, Horsley & Witten, Inc. Seminars.

Kerfoot, W. and S. Horsley. 1988. Private Well Protection, Informational Bulletin No. 10 Association for the Preservation of Cape Cod.

Horsley, S. and J. Witten. 1986. The Town of Duxbury, Massachusetts, Aquifer Protection Plan: A Case Study in Innovative Water Quality

Blackmar, D., S. Horsley, L. Segal and Wolfe. 1984. Results of a Regional Household Hazardous Waste Collection Program, in Hazardous Waste Journal, Mary Anne Liebert Publishers, New York, Vol. I, Number 1.

Horsley, S. 1983. Delineating Zones of Contribution for Public Supply Wells to Protect Groundwater, in Proceedings of the National Water Well Association Eastern Regional Conference of Groundwater Management, Orlando, Florida.

Horsley, S. 1983. Regional Ground Water Management Needs for Cape Cod, Massachusetts. Prepared by Cape Cod Planning and Economic Development Commission for the United States Environmental Protection Agency.

Horsley, S. 1982. Beyond Zoning, Municipal Ordinances to Protect Ground Water, in Proceedings of the Sixty National Groundwater Symposium, National Water Well Association, Atlanta, Georgia.

Magnuson, P. and S. Horsley. 1981. Comprehensive Water Resources Monitoring Program for Cape Cod. Prepared by Cape Cod Planning and Economic Development Commission for the United States Environmental Protection Agency.

Cheney, P. and S. Horsley. 1980. Nonstructural Flood Plain Management Planning in the Connecticut River Basin, New England River Basins Commission.

EXHIBIT # 2

Scott Horsley
Water Resources Consultant
39 Chestnut Street • Boston, MA 02108 • 508-364-7818

November 29, 2022

Michael King, Chair
Town of Wareham
54 Marion Road
Wareham, MA 02571

Re: 0 Route 25, Wareham, MA

Dear Mr. King and Board Members:

I have been retained by Citizens Opposed to 0 Route 25 Site, Wareham, MA to review the proposed project at 0 Route 25, Wareham, MA. I am writing to provide comments regarding the proposed project and its hydrologic and water quality impacts.

Qualifications: I have over 30 years of professional experience in the fields of hydrology and water resources management. I have served as a consultant to federal, state, and local government agencies, non-governmental organizations (NGOs), and private industry throughout the United States, Central America, the Caribbean, the Pacific Islands, Bulgaria, and China. I have assisted in the development and presentation of a nationwide series of U.S. Environmental Protection Agency (USEPA) workshops on drinking water protection, wetlands management, and watershed management. I served as a consultant to the Commonwealth of Massachusetts in the development of the Smart Growth Toolkit. I have also served on numerous advisory boards to the USEPA, the National Academy of Public Administration, Massachusetts Department of Environmental Protection (DEP), Massachusetts Executive Office of Energy and Environmental Affairs (EEA), and the National Groundwater Association. I have received national (USEPA) and local awards for my work in the water resources management fields. I currently serve as Adjunct Faculty at Harvard University Extension School and Tufts University, where I teach courses in water resources policy, wetlands management, green infrastructure (GI), and low impact development (LID). These courses focus on the critical role of local governments who have the primary responsibility and authority of regulating land uses in critical water resource protection areas. I have served as an expert witness in state and federal courts as a hydrologist in matters relative to the federal Clean Water Act, the Massachusetts Wetlands Protection Act and Regulations, Massachusetts Environmental Code (Title 5), Massachusetts Surface Water Quality Regulations, Massachusetts Stormwater Standards, Massachusetts Wetlands Protection Regulations, and the Massachusetts Groundwater Discharge Permit Regulations.

General Comments: The proposed project is comprised of the development of a large-scale, ground-mounted solar power installation on approximately 22.4 acres of land The area is comprised of permeable glacial outwash materials with shallow water table and is adjacent to and upgradient of several wetland resource areas.

The applicant is currently requesting permits for the project in accordance with the Wareham Zoning Bylaw including, but not limited to, Article 5, Section 590 (Solar Energy Generation Facilities), Article 12, Section 1267 (Performance Standards), and Article 15 (Site Plan Review). The proposed project does not meet minimum performance standards in the Bylaw, will cause groundwater mounding, and will result alterations to the adjacent wetlands and downstream water resources. My specific comments are as follows.

The site is constrained by shallow water table additional test pit data are required. The applicant's hydrologic analysis is limited to two test pits in one location (downgradient of proposed infiltration system 1), on one date (April 15, 2021). No data is at infiltration system 2 or for the remainder of the site (see figure 1

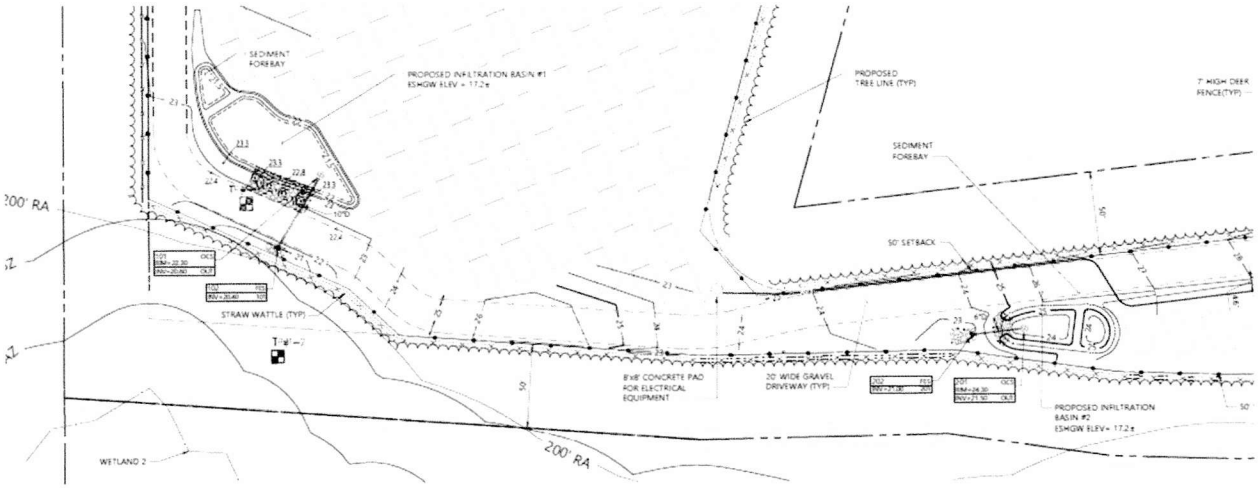


Figure 1 - Site Plan Showing Proposed Stormwater Infiltration Basins and Test Pit Locations (Source, VHB, August 2, 2021)

The MADEP Stormwater Handbook (Volume 2, Chapter 2, pages 89 - 90) requires a minimum of three test pits within each proposed infiltration system. Therefore, multiple additional test pits are compulsory. The Handbook states, *"take one soil boring for every 5000 square feet of (infiltration) basin area, with a minimum of three borings for each infiltration basin. MassDEP requires that borings be at least 20 feet deep or extend to the depth of the limiting layer*".

The applicant estimated the seasonal water table at elevation 17.2 feet based upon water depth measurements at the two test pits downgradient of infiltration system 1[1]. MADEP Stormwater Handbook, Volume 3 (page 14) states, *"When redox features are not available, installation of temporary push point wells or piezometers should be considered. Ideally, such wells should be monitored in the spring when groundwater is highest and results compared to nearby groundwater wells monitored by the USGS to estimate whether regional groundwater is below normal, normal or above normal (see: http://ma.water.usgs.gov)".*

To determine the conformance of these reported water levels with long term records I plotted the hydrograph for the nearby USGS groundwater well 51 Wareham MA (see figure 2). This graph compares the water level measured by the applicant on April 15, 2021 with long term water levels and indicates an adjustment of + 2.1 feet to account for historical, measured water table fluctuations at the USGS index well.

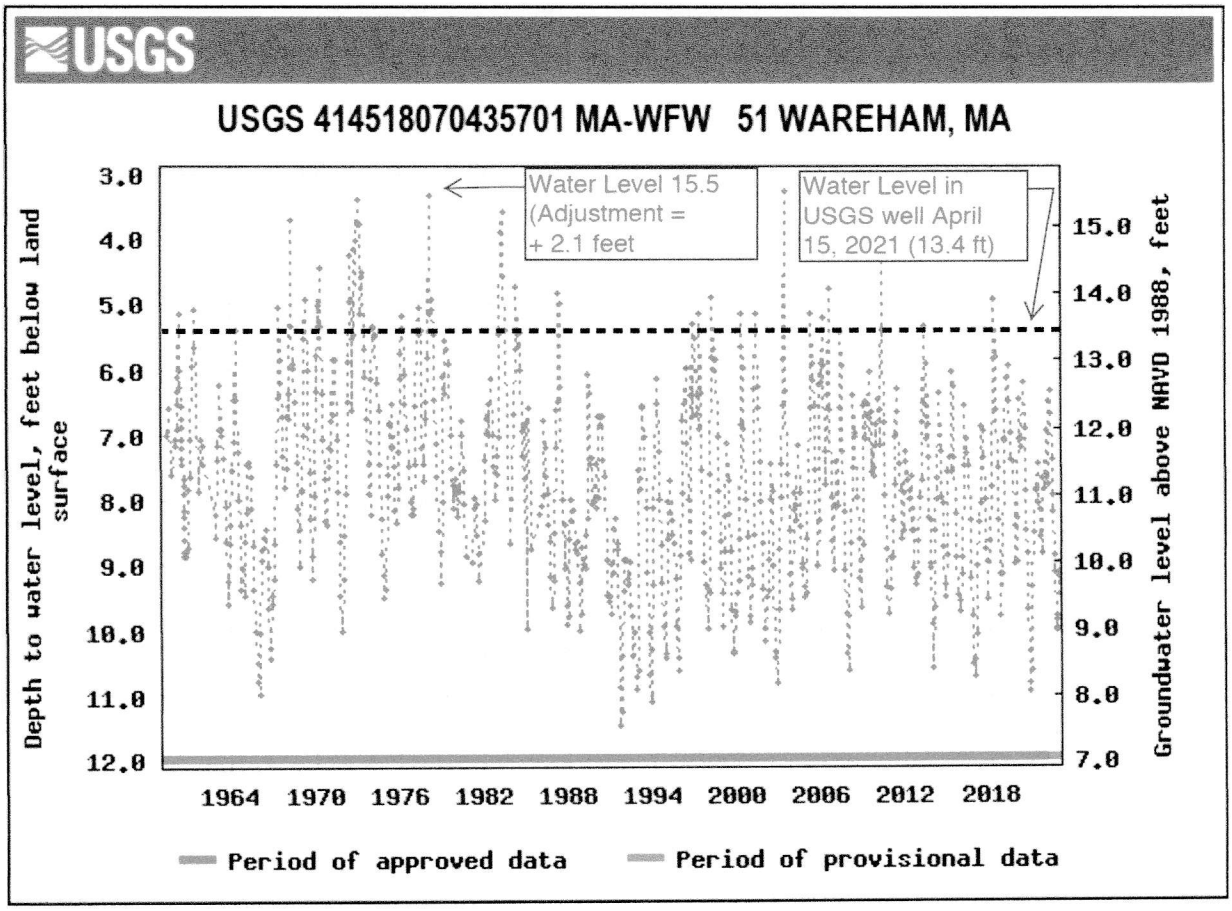


Figure 2 - USGS Index Well Water Levels

[1] VHB, Site Plan – Proposed Large-Scale Ground-Mounted Solar Photovoltaic Installation, Sheet C2.00, August 2, 2021.

"VHB conducted two preliminary test pits on April 14, 2021 in the vicinity of proposed infiltration. Information gathered indicated that the soils on site consisted of Sandy Loam from 4" below surface grade to approximately 24"-27". Groundwater was encountered at 44" below surface grade at TP1-1 and 50" below surface grade at TP1-2. These elevations were used as estimated seasonal high ground water (ESHGW) for modeling purposes. Additional test pits will be conducted prior to construction in accordance with the Massachusetts DEP Stormwater Handbook".

2. The proposed stormwater infiltration systems will result in groundwater mounding that will further compromise both vertical and horizontal minimum separation distances. Groundwater mounding refers to increased groundwater levels that result from concentrated stormwater discharges to the ground (see figure 3). Groundwater mounding analysis is required *"when the vertical separation from the bottom of an exfiltration system to seasonal high groundwater is less than four (4) feet"* (MADEP Stormwater Handbook, Volume 3, Chapter 1, page 28.

In this case two infiltration systems are proposed. A groundwater mounding analysis should be performed to evaluate the resulting rises in water table elevations. The groundwater mounding analysis can then be used to determine if minimum vertical separation distance requirements to groundwater will be maintained and if any hydrologic impacts occur in the adjacent wetlands.

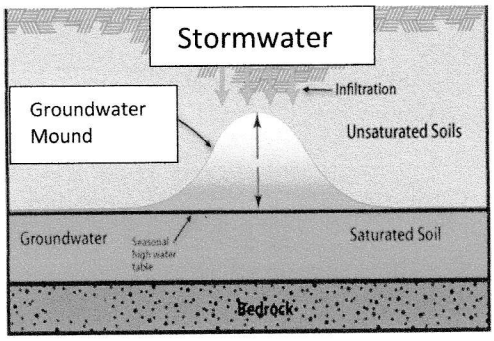


Figure 3 - Groundwater Mounding Beneath Stormwater Infiltration System

3. The proposed project does not meet the requirements of the Wareham Zoning Bylaw Performance Standards. Section 593.4 states, *"A stormwater management plan detailing the existing environmental and hydrological conditions of the site, proposed alterations of the site and all proposed components of the drainage system and any measures for the detention, retention, or infiltration of water, for the protection of water quality and protection from flooding shall be prepared in accordance with Article 1260 et seq. of these Zoning Bylaws, including the Massachusetts Stormwater Management Handbook Vol 1 and 2, including any updates thereto"* (emphasis added).

Article 1260 (and specifically Section 1267 (3) states, *"The annual recharge from the post-development Site shall approximate the annual recharge from pre-development conditions based on soil type"*. No analysis is provided comparing pre- and post-development recharge rates.

Recharge is defined as the amount of water (from precipitation) that enters the underlying groundwater. Groundwater levels are largely controlled by recharge rates. Recharge can be estimated from the annual precipitation rate and subtracting surface runoff and evapotranspiration (see figure 4). Under existing forested conditions (in the southern portion of the site) a significant portion of the annual precipitation is infiltrated, becomes soil moisture and is returned to the atmosphere via evapotranspiration (ET) by plants.

The proposed project will include clear-cutting and grubbing of the existing forested areas. This will result in significantly reduced evapotranspiration (ET) rates and increased recharge rates (see figure 5). The applicant suggests that some "meadow mix" planting is proposed after construction. However, it is clear that the post-development hydrology will be significantly altered. Lower evapotranspiration (ET) rates and higher groundwater recharge rates are expected.

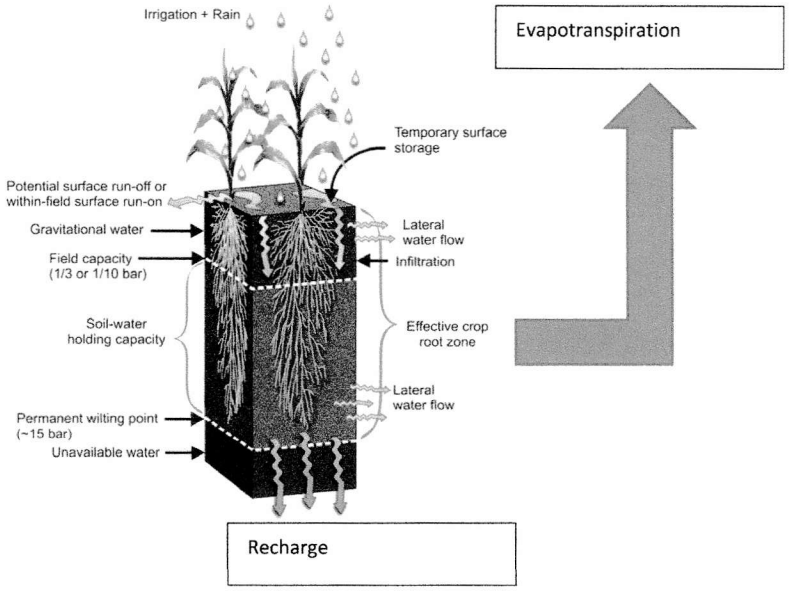


Figure 4 - Cross Section - Hydrologic Components

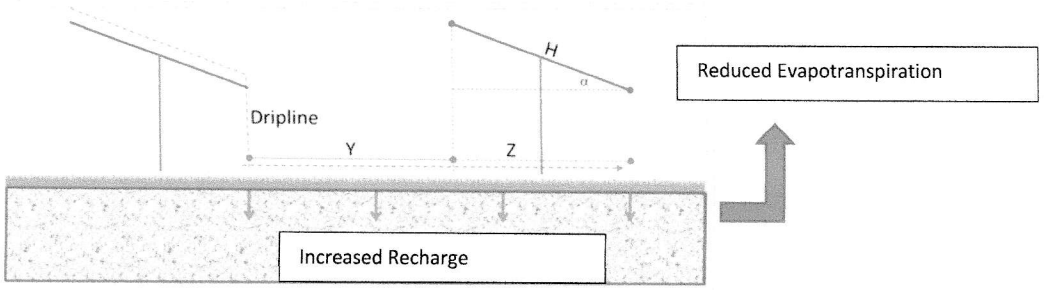


Figure 5 - Cross Section Showing Concentration and Recharge of Stormwater (Source: Minnesota Stormwater Manual)

4. The hydrologic analysis provided in the Stormwater Report uses outdated data for the 100-year storm.

The applicant's Stormwater Report prepared by VHB revised November 2022 utilizes a value of 7.58 inches for the 100-year storm. However, this value is based upon outdated precipitation data.

According to the Northeast Regional Climate Center (Cornell University) the current design storm depth for the 100 -ear event is 8.62 inches (http://precip.eas.cornell.edu/data). The Stormwater report should be revised using this higher value.

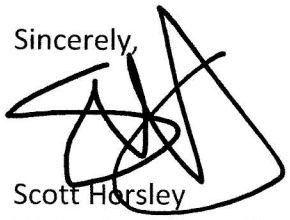
5. A more detailed hydrologic assessment is required. Section 1534 of the Wareham Bylaw requires an *"Impact Statement"* that should include an analysis of, *"The ecology of the area within the site and any significant off-site impacts"*. This Impact Statement must address how the project conforms with the Evaluation Standards stated in Section 1540 that include*: "(7) reduce the amount of stormwater runoff from the site, and (8) conform to the stormwater management design standards found in Article 1260 et seq. of this Zoning Bylaw [Amended October 2022 Town Meeting] "*

The applicant attempts to rely upon a hydrologic impact analysis conducted for another site at Fearing Hill in Wareham. However, the Fearing Hill site is comprised of glacial till and steep slopes and is hydrologically very different from the proposed project site at 0 Route 25. A site-specific study in accordance with the Wareham Zoning Bylaw is required for this project. It should include the following components:

1. additional test pits and water level measurements,
2. high water table adjustments using the USGS index well method,
3. groundwater mounding analysis,
4. pre- and post- groundwater recharge analysis,
5. evaluation of downstream hydrologic and ecological impacts
6. evaluation of water quality impacts and proposed monitoring program

Thank you for the opportunity to submit these comments. Please contact me with any questions.

Sincerely,



Scott Horsley
Water Resources Consultant

EXHIBIT # 3

See :

https://www.mdpi.com/1996-1073/14/3/692

EXHIBIT # 4

First Solar

Date: July, 22, 2022

To: Wareham Planning Board

Subject: CdTe PV safety

Dear Planning Board Members,

First Solar is America's largest solar manufacturing company and a leading solar panel technology supplier to project developers throughout the country. We are writing to offer some background on our company and to seek to address any concerns that you may have about our thin film cadmium telluride photovoltaic (CdTe PV) technology. CdTe PV is a mature technology and First Solar panels have been safely deployed for more than two decades.

Founded in Ohio in 1999, First Solar employs more than 2,000 U.S. associates, and is the only American solar manufacturer to have sold more than 40,000 megawatts of solar panels around the world (equivalent to more than 200 million solar panels) and are the only American company to rank among the world's ten largest solar manufacturers. Recognized as a trusted technology partner within the solar industry, approximately half of all utility-scale solar capacity in the U.S. in the past decade utilizes First Solar PV panels – a testament to our product and its track record. The strong demand for our products is reflected in our AA Bankability score from PV ModuleTech – among the highest in the industry. Our commitment to excellence through American manufacturing runs deep and we are currently constructing our third U.S. manufacturing facility in Northwest Ohio.

As one of the world's leading solar manufacturers, First Solar takes safety and environmental responsibility very seriously:

- Our modules are manufactured in facilities certified to globally recognized standards for quality, environmental management and occupational health and safety (ISO 9001, ISO 14001, ISO 45001).
- **Our U.S. manufacturing facilities have received the Ohio EPA's top environmental stewardship award- the** Encouraging Environmental Excellence Platinum Level Award- which recognizes an organization's exceptional achievements in environmental stewardship and contributions to the local community.
- **Our solar panels are the first and only solar products to be included in the** EPEAT registry for sustainable electronics**, a globally recognized and independently validated ecolabel used by the U.S. federal government and other large purchasers**. EPEAT-registered products meet minimum performance standards in areas such as energy efficiency, toxicity reduction, recycling and material selection.
- **We are the only solar manufacturer with global in-house solar panel recycling capabilities** and we

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Tempe, Arizona 85281 USA

Telephone 602 414 9300
Facsimile 602 414 9400

www.firstsolar.com

First Solar

have more than 15 years of experience operating high-value recycling facilities which can recycle our semiconductor material up to 41 times over for reuse in new First Solar modules. We established the industry's first global recycling program in 2005 and continue to demonstrate our commitment to product stewardship by offering industry-leading PV recycling services.

- For more information about First Solar's sustainability practices and approach to Responsible Solar, please see our corporate sustainability report.

More than 50 researchers from leading U.S. and international institutions (including MIT, Brookhaven National Lab, National Renewable Energy Laboratory, North Carolina State University and Virginia Tech) have confirmed the environmental benefits and safety of CdTe PV technology over its entire life cycle; during normal operation, exceptional accidents such as fire or module breakage, and through end-of-life recycling and disposal:

- In 2019, scientists from Virginia Tech investigated this topic in their report entitled "Assessment of the Risks Associated with Thin Film Solar Panel Technology." After reviewing experimental results, theoretical worst-case modeling, and observational data from historical events, they concluded that **CdTe PV installations "pose little to no risk under normal operating conditions and foreseeable accidents such as fire, breakage, and extreme weather events like tornadoes and hurricanes."**
- A 2020 peer review conducted by the Massachusetts Institute of Technology and Arizona State University concluded: "**Based on our review of competitiveness, safety, and life cycle environmental performance, CdTe photovoltaic technology is expected to make a valuable contribution to the U.S. energy transition.** These conclusions are drawn on the basis of eco-efficiency... the concept of creating more economic value with lower environmental impacts."
- A 2020 study by Columbia University entitled "Sustainability evaluation of CdTe PV: An update" evaluated conflicting leaching results and concluded that **"some studies alerting to cadmium leaching risks used completely invalid assumptions, e.g., grinded and/or un-encapsulated modules, whereas the most comprehensive studies showed absolutely no risks during normal conditions and insignificant risks during extreme conditions like major storm events."** It is worth emphasizing that un-encapsulated CdTe solar technologies are not commercially produced and/or sold anywhere in the world and that First Solar's technology uses an industrial-strength adhesive to fully encapsulate the semiconductor material within the solar panel to eliminate any risk of exposure to the environment.
- While the above referenced leaching results were laboratory studies, Fraunhofer Institute conducted a field study entitled "Health, Safety and Environmental Risks from the Operation of CdTe and CIS Thin-Film Modules" of the fate of CdTe in broken solar module pieces. This study found no critical increase in soil Cd concentrations after 1 year of leaching in an outdoor experiment with actual rainwater.
- In their 2003 report entitled "CdTe PV: Real and Perceived EHS Risks", the U.S. National Renewable

First Solar

Energy Laboratory and Brookhaven National Laboratory concluded that environmental risks from CdTe PV are minimal due to the use of stable materials in an encapsulated solid device.

In summary, First Solar's proven safety track record is based on the use of stable materials and thorough testing. First Solar panels have durable glass/glass construction and are subjected to rigorous reliability testing to meet national and international product safety standards from UL and IEC. With regard to weather impacts, First Solar PV modules are the only products in the industry warranted against cell cracking and micro-cracking which can be caused by excessive thermal and mechanical stress. This is particularly important in high wind and severe hail risk regions. First Solar modules consistently rank as "Top Performer" in PVEL's reliability scorecard which evaluates long-term durability and performance.

First Solar is also the only solar technology to meet the sustainability leadership standard (NSF/ANSI 457) through our products' inclusion in the EPEAT registry for green electronics, a globally recognized and independently validated ecolabel. As part of our EPEAT registration, the chemical composition of our products and manufacturing process are annually screened and contain no perfluoroalkyl substances (PFAS). In accordance with the U.S. federal waste characterization test (TCLP), First Solar warranty and end-of-life returns are characterized as a federal non-hazardous waste.

We recognize there is a lot of misinformation circulating about CdTe solar technology and would welcome the opportunity to speak with members of the Planning Board to share more information on our technology's safety track record and help address any concerns that you may have.

Sincerely,

Parikhit (Ricky) Sinha, Ph.D.

Sr. Scientist, Sustainability Research

Attachments

- First Solar Thin Film PV factsheet and FAQ

First Solar

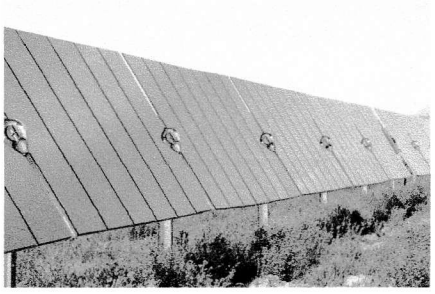
First Solar Thin Film PV.

Proven Benefits of CdTe Technology

CONVERTING WASTE BYPRODUCTS INTO A STABLE CdTe COMPOUND

CdTe is sustainably sourced from byproducts of the zinc and copper industries. Cadmium, a waste byproduct of zinc refining, and tellurium, a byproduct of copper refining, are converted into a stable CdTe compound. Once encapsulated in First Solar modules, CdTe produces clean, affordable energy for 30+ years.

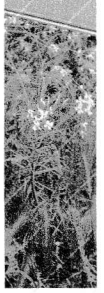
"CdTe PV systems that use cadmium as a raw material should be considered as one of the solutions for a sustainable use of cadmium." [4]



OPTIMAL SEMICONDUCTOR MATERIAL

First Solar's cadmium telluride (CdTe) photovoltaic (PV) systems represent a breakthrough in large-scale renewable energy solutions. The thin layer of CdTe semiconductor material used in First Solar PV modules is optimal for absorbing and converting sunlight into useful electricity, enables high-volume manufacturing and has amongst the highest efficiency potential of all PV semiconductor materials.[1] In addition, First Solar thin film PV modules have a proven performance advantage over conventional silicon modules in harsh operating environments due to their superior spectral response and low temperature coefficient.

First Solar's advanced thin film PV solutions are the industry's leading eco-efficient technology due to their superior energy yield, competitive cost and lowest environmental impacts.[2] On a life cycle basis, First Solar modules have the smallest carbon footprint, lowest water use and fastest energy payback time of any solar technology on the market. First Solar fully integrated manufacturing process uses less energy, water and semiconductor material than conventional silicon modules. First Solar's thin film PV solutions are designed to meet today's global energy demands by generating clean and reliable electricity, minimizing fuel price volatility, and boosting energy and water security.



LEADING ECO-EFFICIENT PV TECHNOLOGY

- Proven energy yield advantage over competing PV technologies in areas of high temperature and high humidity results in a lower levelized cost of electricity (LCOE)
- Cost competitive with conventional energy sources
- Fixed pricing and low operating costs reduces fuel price volatility risks and eliminates hedging costs
- Generates clean electricity for 30+ years with no carbon emissions or other air pollutants
- Requires no water to generate electricity and uses less water on a life cycle basis than other PV technologies (3X times less than crystalline silicon PV)
- Smallest carbon footprint and fastest energy payback time of all solar technologies on a life cycle basis

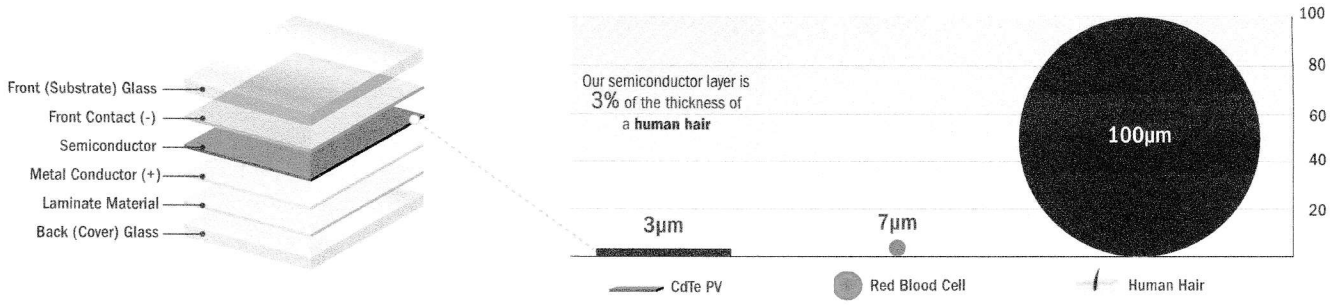
Energy payback time— is the amount of time a system must operate to recover the energy required to produce, install, operate and recycle it.

"CdTe PV technology can contribute to large-scale deployment of renewable energy solutions in an environmentally sustainable way addressing the increasing global demand for low-carbon energy." [3]

FIRST SOLAR'S THIN FILM TECHNOLOGY

DESIGNED FOR SAFETY AND DURABILITY

"In the exceptional case that an accident like fire or breakage occurs, the emission of cadmium has been proven to be negligible and do not represent a potential risk for human health nor for the environment." [5]



First Solar modules consist of a thin layer of CdTe, approximately 3 percent the thickness of a human hair or less than half the size of a red blood cell, that is encapsulated between two protective sheets of glass and sealed with an industrial laminate, resulting in a strongly bonded monolithic structure. The glass-on-glass design is more robust against fire and damage than the glass-on-backsheet design of other PV technologies.[6] First Solar modules have been tested for safety during breakage, fire, flooding and hail storms and meet rigorous performance testing standards, demonstrating their long-term durability and reliability in real-world environments (UL 1703, IEC 61215, IEC 61730, Thresher test).

"CdTe differs from elemental Cd and other Cd compounds due to strong bonding that leads to an extremely high chemical and thermal stability" [7]

More than 50 researchers from leading international institutions have confirmed CdTe PV's safety over its entire life cycle during normal operation, foreseeable accidents such as fire or module breakage and through end-of-life recycling and disposal.

"Replacing existing grid electricity with large-scale CdTe PV arrays would result in a reduction of greenhouse gases, criteria air pollutants, heavy metals and radioactive species by 89 to 98 percent." [8]

COMMITMENT TO RESPONSIBLE LIFE CYCLE MANAGEMENT

Recycling is an integral part of responsible product life cycle management and is important to the whole PV sector as environmentally sensitive materials (e.g. lead, selenium, and cadmium compounds) are common in the industry.

First Solar provides a global industry-leading recycling service that recovers over 90% of the semiconductor material for reuse in new modules and ~90% of the glass for reuse in new glass products, setting the international standard for high-value recycling of PV panels. Our recycling facilities are scalable to accommodate high volume recycling as more modules reach the end of their 30+ year life.

1 Shockley, W., & Queisser, H. J. (1961). Detailed balance limit of efficiency of p - n junction solar cells. Journal of applied physics, 32(3). 510-519.

2 M. Seitz, M. Kroban, T. Pitschke, S. Kriebe, 2013, Eco-Efficiency Analysis of Photovoltaic Modules, Bifa Environmental Institute.

3 Study of the Environmental, Health, and Safety of Cadmium Telluride (CdTe) Photovoltaic Technology, King Saud University, Kuwait Institute for Scientific Research, Kuwait University, University of Jordan, King Abdullah University of Science and Technology, Masdar Institute of Science and Technology, 2012.

4 Scientific Review on the Environmental and Health Safety (EHS) aspects of CdTe photovoltaic (PV) systems over their entire life cycle, University of Tokyo and Yokohama National University, Japan, May 2012.

5 First Solar CdTe Photovoltaic Technology: Environmental, Health and Safety Assessment, National Renewable Energy Centre (CENER) and Fundación Chile, October 2013.

6 German Ministry of Economics and Technology, TUV Rheinland, and Fraunhofer ISE, Assessment of the Fire Risk in Photovoltaic Systems and Elaboration of Safety Concepts for Minimization of Risks, March 2015.

7 Executive Summary, Study of the Environmental, Health, and Safety of Cadmium Telluride (CdTe) Photovoltaic Technology, IIT-Delhi, India, July 2012.

8 Fthenakis, V.M., Kim H.C., and Alsema, E. 2008. Emissions from Photovoltaic Life Cycles. Environ. Sci. Technol. 2008, 42, 2168–2174.

First Solar

THIN FILM PV TECHNOLOGY FAQ

Q: WHAT MAKES FIRST SOLAR'S THIN FILM PV MODULES COMPETITIVE?

A: First Solar thin film modules are manufactured using a fully integrated and resource efficient process which enables affordable, high volume production with the lowest environmental impacts in the industry. In addition, First Solar's high efficiency thin film modules are proven to deliver more usable energy per watt than conventional silicon-based modules, resulting in a lower levelized cost of electricity ($/MWh).

Source: Dirnberger et al., "On the impact of solar spectral irradiance on the yield of different PV technologies," Solar Energy Materials & Solar Cells, vol. 132 pp. 431–442, 2015.

Q: WHAT ARE THE ENVIRONMENTAL BENEFITS OF THIN FILM PV TECHNOLOGY?

A: First Solar's advanced thin film PV solutions are the industry's leading eco-efficient technology due to their superior energy yield, competitive cost and smallest life cycle environmental impacts. By using less grid electricity during manufacturing, First Solar modules have the smallest carbon footprint, fastest energy payback time and lowest life cycle water use and air pollutant emissions of any PV technology.

Sources: Louwen, Atse, Ruud E.I. Schropp, Wilfried G.J.H.M. van Sark, and André P.C. Faaij. "Geospatial Analysis of the Energy Yield and Environmental Footprint of Different Photovoltaic Module Technologies". Solar Energy 155 (October 2017): 1339–53. https://doi.org/10.1016/j.solener.2017.07.056.

Leccisi, Enrica, Marco Raugei, and Vasilis Fthenakis. "The Energy and Environmental Performance of Ground-Mounted Photovoltaic Systems—A Timely Update". Energies 9, Nr. 8 (08 August 2016): 622. https://doi.org/10.3390/ en9080622.

Q: HOW DOES CDTE DIFFER FROM CADMIUM?

A: First Solar modules contain cadmium telluride (CdTe) which is a stable compound that is insoluble in water and has an extremely high chemical and thermal stability. These properties limit its bioavailability and potential for exposure. First Solar modules contain very little CdTe. The semiconductor layer in First Solar modules is a few microns thick, equivalent to 3% the thickness of a human hair. Additionally, the thin film semiconductor is encapsulated between two sheets of glass and sealed with an industrial aminate, further limiting the potential for release into the environment in the event of fire or breakage.

Source: Kaczmar, "Evaluating the Read-Across Approach on CdTe Toxicity for CdTe Photovoltaics," in SETAC North America 32nd Annual Meeting, Boston, 2011..

Q: ARE THIN FILM MODULES DURABLE IN THE FIELD?

A: Yes. First Solar modules are tested for safety during breakage, fire, flooding and hail storms, and meet rigorous long-term durability and reliability testing standards. First Solar modules are the only PV module in the industry warranted against cell cracking and micro-cracking, which can be caused by excessive thermal and mechanical stress. First Solar modules have also consistently ranked as "Top Performer" in PVEL's reliability scorecard which evaluates long-term durability and performance.

Source: PVEL, Cracking Down on PV Module Design: Results from Independent Testing, 2020. https://www.pvel.com/wp-content/uploads/PVEL-White-Paper_Mechancial-Stress-Sequence_Cracking-Down-on-PV-Module-Design.pdf

Q: IS THIN FILM PV TECHNOLOGY SAFE FOR THE ENVIRONMENT?

A: Yes. More than 50 researchers from leading international institutions have confirmed the environmental benefits and safety of First Solar's thin film PV technology over its entire life cycle; during normal operation, exceptional accidents such as fire or module breakage, and through end-of-life recycling and disposal. First Solar provides the PV technology of choice for leading utilities and power buyers such as Southern Power Co., NRG Energy, and Capital Dynamics. With more than 40,000MW sold worldwide, First Solar modules have a proven record of safe and reliable performance.

Source: http://www.firstsolar.com/Resources/Sustainability-Documents?ty=Peer+Reviews&re=&ln=

Q: CAN FIRST SOLAR MODULES BE RECYCLED AT END-OF-LIFE?

A: Yes. First Solar offers global, competitively-priced and flexible PV module recycling services. First Solar has a long-standing leadership position in PV recycling with more than 15 years of experience in operating high-value PV recycling facilities on a global and industrial scale. First Solar's high-value recycling process recovers more than 90% of a PV module for reuse in new modules and glass products.

Source: Sinha, Parikhit, Sukhwant Raju, Karen Drozdiak, and Andreas Wade. "Life cycle management and recycling of PV systems". PV Tech, 19 December 2017. https://www.pv-tech.org/technical-papers/life-cycle-management-and-recycling-of-pv-systems.

EXHIBIT # 5

	P	Q	R	S	T	U	V	W
1	**Method**	**Maximum Contamina**	**Lab Reported Detecti**	**Required Detection L**				
2	EPA 537.1	20	0.5000 NG/L	2.0000				
3	EPA 537.1	20	2.1000 NG/L	2.0000				
4	EPA 537.1	20	Not Recorded	2.0000				
5	EPA 537.1	20	0.5980 NG/L	2.0000				
6	EPA 537.1	20	2.0000 NG/L	2.0000				
7	EPA 537.1	20	Not Recorded	2.0000				
8	EPA 537.1	20	0.6130 NG/L	2.0000				
9	EPA 537.1	20	2.2000 NG/L	2.0000				
10	EPA 537.1	20	Not Recorded	2.0000				
11	EPA 537.1	20	0.5000 NG/L	2.0000				
12	EPA 537.1	20	0.6210 NG/L	2.0000				
13	EPA 537.1	20	1.8000 NG/L	2.0000				
14	EPA 537.1	20	Not Recorded	2.0000				
15	EPA 537.1	20	0.5950 NG/L	2.0000				
16	EPA 537.1	20	1.8000 NG/L	2.0000				
17	EPA 537.1	20	Not Recorded	2.0000				
18	EPA 537.1	20	0.4000 NG/L	2.0000				
19	EPA 537.1	20	0.4000 NG/L	2.0000				
20	EPA 537.1	20	Not Recorded	2.0000				
21	EPA 537.1	20	2.1000 NG/L	2.0000				
22	EPA 537.1	20	2.2000 NG/L	2.0000				
23	EPA 537.1	20	0.5000 NG/L	2.0000				
24	EPA 537.1	20	2.1000 NG/L	2.0000				
25	EPA 537.1	20	Not Recorded	2.0000				
26	EPA 537.1	20	0.5890 NG/L	2.0000				
27	EPA 537.1	20	Not Recorded	2.0000				
28	EPA 537.1	20	Not Recorded	2.0000				
29	EPA 537.1	20	Not Recorded	2.0000				
30	EPA 537.1	20	Not Recorded	2.0000				
31	EPA 537.1	20	Not Recorded	2.0000				

Results

EXHIBIT # 6

SOLAR ENVIRONMENTAL PROTOCOLS

PHASE I ENVIRONMENTAL SITE ASSESSMENT WITH SUBSURFACE SOIL AND GROUNDWATER SAMPLING

1.0 INTRODUCTION AND SCOPE OF WORK

Prior to construction and commencement of operations of the Solar Photovoltaic Facility, the Applicant shall conduct a Phase I Environmental Site Assessment (Phase I ESA) and a Subsurface Soil and Groundwater Assessment (SSA) to establish an environmental baseline for soil and groundwater quality at the subject property. Subsequently, each year after commencement of operations, a groundwater monitoring and sampling event will be conducted and, every five (5) years after commencement of operations and at the time of decommissioning of the facility, the Applicant shall conduct an SSA to evaluate potential changes in soil and groundwater quality as a result of ongoing operation of the facility.

2.0 DEFINITIONS

2.1 Phase I ESA

The Phase I ESA shall be conducted utilizing industry standards and guidelines for conducting Environmental Site Assessments established by the American Society for Testing and Materials (ASTM), in general accordance with ASTM's Standard Practice for Environmental Site Assessments E 1527-13 (ASTM November 2013) and the All Appropriate Inquiry requirements specified in 40 CFR Part 312.20 and is intended to identify the presence of recognized environmental conditions at the Subject Property.

Recognized environmental conditions are defined as "the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release or a material threat of a release of hazardous substances or petroleum products in structures on the property or into the ground, groundwater, or surface water of the property."

2.2 Subsurface Soil and Groundwater Assessment (SSA)

The SSA with subsurface sampling of site soils and groundwater shall be conducted in accordance with regulations as stated in Massachusetts General Laws (MGL) c. 21E and specifically regulations of the Massachusetts Contingency Plan (MCP) 310 CMR 40.0000 and associated guidance and best management practices.

3.0 ENVIRONMENTAL PROFESSIONALS

The Phase I ESA shall be conducted under the direction and supervision of an Environmental Professional as defined in ASTM # 1527-13. The Environmental Professional shall possess sufficient specific education, training, and relevant experience necessary to exercise professional judgement to develop opinions and conclusions regarding conditions indicative of releases or threatened releases on, at, in, or to a property.

The Subsurface Soil and Groundwater Assessment or SSA, shall be conducted under the direction and supervision of a Massachusetts Licensed Site Professional (LSP), or hazardous waste site cleanup

professional, as defined in MGL c. 21A§19A, who will render professional judgement, opinions and conclusions regarding releases or threats of releases to site soils and groundwater as compared to promulgated standards for oil and hazardous materials as listed in the MCP at 310 CMR 40.0000.

4.0 TIMING OF THE WORK

The Phase I ESA and SSA shall be completed and report submitted to the Town of Warren prior to commencement of operations of the solar facility. At the anniversary date of each 5-year period of operation of the solar facility and at termination of operations of the solar facility, an SSA will be completed PRIOR to the anniversary or termination date.

A groundwater monitoring and sampling event will be conducted annually for the duration for the operation of the solar facility.

The SSA at termination of operations of the facility shall be completed PRIOR to commencement of decommissioning and removal of any photovoltaic equipment (panels, racking systems, conduit, etc) from the Site and any earthwork. No rutting or land disturbance shall take place until the SSA has been completed and final report submitted to the Town of Warren. Approval must be granted by the Town before proceeding with decommissioning.

5.0 SUBSURFACE SOIL AND GROUNDWATER SAMPLING

In performance of the SSA, the Applicant will conduct subsurface soil and groundwater sampling to evaluate the potential presence of a hazardous materials release as a result of Applicant's operation of the site as a solar photovoltaic facility.

For the purposes of this Section 5.0, a solar voltaic facility is considered to be an area of land containing solar voltaic panels, all supporting equipment, access roads, constructed retention basins, associated water outlets, and other drainage control systems.

Prior to conducting soil and groundwater sampling, Applicant shall submit a Site Plan to the Town indicating all soil and groundwater sampling locations. The Site Plan and sampling locations must be approved by the Town prior to collection of samples.

5.1 Soil Sampling Procedures

Soil sampling shall be conducted beneath the footprint of the solar array, surface and subsurface equipment, utilities, equipment staging areas, battery storage containers (if present), and from all retention basins constructed on the property. A minimum of five (5) grab soil samples will be collected per acre or part acre on a grid basis beneath the solar array for laboratory analysis. Care should be taken to collect samples beneath the lower drip-edge of the panels and beneath damaged or fractured panels. Additional grab samples will be collected from beneath surface and subsurface equipment and retention basins as described above. All samples will be collected using hand auger equipment to a depth of 6-12 inches. Screening of all soil samples will be conducted using a portable Photoionization Detector (PID) and Massachusetts Department of Environmental Protection (DEP) methodology. The locations of all samples collected shall be incorporated into a site plan and included in the final report of the SSA.

5.2 Soil Analytical Methods

All soil samples shall be transported on ice under Chain of Custody documentation to a Massachusetts-certified laboratory for the following analyses:

1) US EPA Priority Pollutant Metals 13 6010/7470/7471
2) US EPA Method 6010 for Silicon
3) US EPA Method 8260C-D for Volatile Organic Compounds
4) US EPA Method SW 846 8015C for Total Petroleum Hydrocarbons fingerprint

All analytical results shall be tabulated and incorporated as part of the final report. Comparison of analytical results with applicable MCP soil standards will be included.

5.3 Groundwater Sampling Procedures

In performance of the SSA, the Applicant shall install a minimum of six (6) groundwater monitoring wells per 25-acre, or part acre, area of the facility. A minimum of six (6) soil borings will be advanced to beneath the groundwater table and two-inch diameter PVC slotted casings will be constructed within the borings using standard industry materials and practices for installation and completion of groundwater monitoring wells. All groundwater monitoring wells will be completed with standard road boxes.

A minimum of four (4) groundwater monitoring wells shall be located along the property line adjacent to any retention basins in an inferred downgradient direction of groundwater flow from the areas of solar panel installations. Two (2) groundwater monitoring wells shall be located in an upgradient location of inferred groundwater flow. Depths to groundwater shall be measured and the direction of groundwater flow determined.

For each SSA, one groundwater sample shall be collected from each monitoring well using standard industry practices and methodology. The locations of the monitoring wells and direction of groundwater flow shall be incorporated into a site plan and included in the final report of the SSA.

Between each 5-year SSA assessment on an annual basis, groundwater sampling, laboratory analysis, depth to groundwater monitoring, flow direction, and reporting will be conducted by the Applicant for each groundwater monitoring well installed. Laboratory analyses shall be as provided in Section 5.4.

5.4 Groundwater Analytical Methods

Groundwater samples shall be transported on ice under Chain of Custody documentation to a Massachusetts-certified laboratory for the following analyses:

1) US EPA Priority Pollutant Metals 13 6010/7470/7471
2) US EPA Method 6010 for Silicon
3) US EPA Method 8260C-D for Volatile Organic Compounds
4) US EPA Method SW 846 8015C for Total Petroleum Hydrocarbons fingerprint

All analytical results will be tabulated and incorporated as part of the final report. Comparison of analytical results with applicable MCP groundwater standards will be included.

6.0 FINAL REPORTING, CONCLUSIONS AND RECOMMENDATIONS

Fifteen (15) copies of the initial Phase I ESA and SSA Final Report shall be submitted to the Town of Warren 30 days prior to commencement of operations of the facility. Subsequent annual groundwater monitoring reports shall be submitted within 30 days of each 1-yearly anniversary. SSA Final Reports shall be submitted to the Town of Warren within 30 days of each 5-year anniversary of operations and within 30 days of cessation of operations of the facility. All Final Reports shall fully describe the objectives, methodology, field observations, field procedures, soil and groundwater analytical results, and conclusions of all work completed. Attached exhibits shall include but not be limited to a Site plan, soil sampling location plan, groundwater monitoring well location plan with direction of groundwater flow and groundwater contours, tabulated analytical results and comparison to applicable MCP standards, copies of laboratory analytical reports, and all related information as required under the MCP at 310 CMR 40.0000.

The Environmental Professional shall render an opinion as to the presence or likely presence of recognized environmental conditions at the property and recommend additional investigation as appropriate based on the results of the Phase I ESA. The LSP shall render an opinion and recommend additional investigation as appropriate based on all results of the Subsurface Soil and Groundwater Assessments in accordance with regulations of the Massachusetts Contingency Plan.

EXHIBIT # 7

Charles L. Rowley, PE, PLS

Consulting Engineer and Land Surveyor

5 Carver Road
PO Box 9
West Wareham, MA 02576

Tel: 508-295-1881
Cell: 508-295-0545
E-mail: crsr63@verizon.net

November 3, 2021

Town of Wareham Planning Board
Memorial Town Hall
54 Marion Road
Wareham, MA 02571

Re: Site Plan Review for
PVI, LLC Solar Project
0 Route 25, Wareham

Attention: Richard Swenson, Chairman

Dear Chairman Swenson:

I am in receipt of an application for site plan review, a set of plans consisting of 13 sheets dated August 2, 2021 and Stormwater Calculations dated August, 2021 by VHB, Professional Engineers and have the following comments for the Board's consideration.

General

1. The Abutter Notice list appears to be incomplete and should be checked. There are six lots that may have been left out of the notice list for abutters and abutters to abutters within 300 feet of locus.
2. This review is conducted with reference to the current Wareham Zoning By-Law including the change to the By-Law approved by Town Meeting vote in June, 2021.
   With the exception of two provisions of the By-Law change which reduce the maximum site area to 10 acres and requiring land used for large ground mounted solar projects to have been previously cleared, all other provisions of the 2019 By-Law appear to apply. The Narrative supplied refers to the 2018 Zoning By-Law which has been superseded.
3. The project narrative interprets Sections 594.1.3 and 594.1.4 as only requiring 10-foot wide buffers around the perimeter of the site claiming that the project does not "abut" a residential zoning district and is not across the street from a residential district or development.
   This interpretation of these sections has never been at issue in all of the previous ground mounted solar projects that are located in residentially zoned areas. In each and every case, the minimum 50-foot wide buffer has been used and in some cases extended significantly.
   The following comments are based on a minimum 50-foot wide buffer as previously accepted by both the Planning Board and a number of different applicants in a variety of similar solar projects that were ultimately approved.

Plans

Sheet C-2.00

1. The plans do not conform to the minimum setback requirements as defined in Sections 594.1.3 and 594.1.4.

2. No portion of the buffer that is required can be used for fencing, drainage facilities or other openings except as required to gain access to the property. Reference is made to Section 594.3.7 of the Zoning By-Law.
3. The Zoning Summary Chart, Note 5 states that the property does not abut a residential district and is eligible for 10-foot wide buffers.
4. Not only does the property abut the remainder of the R-130 Residential Zoning District that surrounds it, it is located in it. The minimum 50-foot wide buffer should apply. Further comments regarding this will follow.

Sheet C-2.01

1. The plan shows two proposed infiltration areas that would intercept and collect stormwater runoff from the site. Each infiltration area is fed by swales that are several hundred feet long beside site access roads that will not be paved. The site access roads are graded all toward each swale that could collect and carry sediment to the infiltration areas rendering each one ineffective. Sediment forebays need to be established prior to allowing runoff to enter each infiltration basin.

Sheet C-2.02

1. Placing the underground electric connection (UGE) down the centerline of the 20-foot wide access easement from Charge Pond Road renders the easement unusable for an unspecified time by others who have rights of access to their properties. Is there an alternate route available?
2. Certain critical pieces of information should be made part of the record for the project:
   a. That the project proponent has the right to lay electric lines over and under land that is not theirs (owned by the Town of Wareham) and that they have the right to do so by the taking of the access easement in behalf of property owners by the Commonwealth of Massachusetts and
   b. That property owners who also have rights of access to their property have been given notice that their access may be blocked by construction activity within the easement. This may be very critical to these other owners who rely on this access for their cranberry operations and to other solar project operators that lie to the east of the current project.
3. The plan shows that a thin buffer zone would be established against the sideline of the Route 25 layout. The grade of Route 25 in this area varies from being nearly level with the project area at the southeast corner to as much as 20 feet below the project site along the sideline.
   In a previous solar project to the east of the subject property, a 50-foot wide buffer was required along the sideline of Route 25 and no trees lower than 40 feet in height were allowed to be cut within this buffer. The reasoning was twofold:
   a. There is no guarantee that the vegetation that exists as a buffer within the Route 25 layout would remain but could be cleared by the Mass. DOT at any time and
   b. It was determined that trees over 40 feet in height could be cut to reduce shadows over the solar field but that the stumps would have to remain so as not to disturb the undergrowth vegetation. Trees to be

cut were marked by the project contractor and were approved for cutting by the approving authority.

Since this project has much the same visibility issue along Route 25, it is recommended that these provisions be incorporated into any decision the Board may make regarding the Site Plan Special Permit, nothwithstanding the right of the Board to increase the buffer to something greater than 50 feet if it determines further buffering is necessary.

Sheet C-2.03

1. Assuming the project site layout remains as shown on the plans, certain portions of the activity including the location of chain link fences and access roads lie within the 100-foot Wetlands buffer zone. This will require approval from the Wareham Conservation Commission either in the form of a Negative Determination of Applicability or an Order of Conditions that would allow the work to proceed.

Sheet C-3.01

1. Concrete Pad Detail: Identify the gravel material by specification
2. Flared End Detail: Identify the size of stone for pipe ends. The depth should be at least twice the maximum stone size. Show the stone as extending 2 feet under the flared end section to prevent scouring.
3. Gravel Access Road Detail: This detail applies only to the internal access roads around the site. A separate detail should be added for the road within the 20-foot wide access easement that shows the width, depth of materials and shape that is commensurate with the previous approval for its use as a solar project access.
4. Outlet Control Structure Detail: Show the structure resting on a base of 6 inches of crushed stone.
5. Grass Swale Detail: Add dimensions to the cross section for each one.
6. Add a Sediment Forebay Detail for each infiltration basin.

Sheet C-3.02

1. Relocate the single Evergreen Tree Detail to available space on Sheet C-3.01 or other detail sheet that is convenient.

Sheet Sv-1

1. Other than it being used as a key sheet for the plans that follow, this sheet does not depict any of the details that are referenced in the General Notes. Lot boundaries and the 20-foot right of way limits should be shown. If the details are available on another existing plan it could be incorporated into the plan set. Other details should be labeled for identification.

Sheet Sv-2

1. The existing conditions plan shows that much of the solar array behind the Municipal Maintenance facility with be highly visible. The single line of evergreens is insufficient to effectively block the solar array from view. Consideration should be given to creating a wider buffer and by increasing the number of plantings in a second staggered row. As these evergreens grow there will be a tendency for lower branches to die off leaving gaps in the buffer. The staggered rows will help to minimize that possibility. Spacing should be determined and marked on the plans.

Stormwater Calculations

1. The calculations have been reviewed and are found to be in compliance with accepted practice for the soil types, ground slope and vegetation. However, the sub-catchment areas contributing to each infiltration area should be delineated on one of the 40 scale plans for clarity and ease in interpreting direction of runoff.
2. Based on the calculation results and the highest storm elevations within the infiltration areas for the 100-year storm, there does not seem to be a need for an elaborate outfall. Runoff does not reach the opening grate even for the 100-year event. Further explanation would clarify the requirement for the overflow design.

This concludes the initial review of the project for the information presented. Please feel free to contact me if you have any questions.

Very truly yours,

Charles L. Rowley

Charles L. Rowley, PE, PLS

Cc Planning Board members
Ken Buckland, Wareham Town Planner
Aaron Shaheen, Asst. Town Planner
David Pichette, Conservation Agent
Jim Munise, BOS liaison to Planning Board
Sarah Ebaugh, PE, VHB

List 2011

Scott and Susan Varrieur
283 Charge Pond Road
Wareham, MA 02571

Douglas and Laura Kearns
217 Charge Pond Road
Wareham, MA 02571

Paul and Beth Souza
203 Charge Pond Road
Wareham, MA 02571

Timothy and Joyce Madden
293 Charge Pond Road
Wareham, MA 02571

Richard and Marion Anderson
292 Charge Pond Road
Wareham, MA 02571

EXHIBIT # 8

barry cosgrove

From: Derek Sullivan <dsullivan@wareham.ma.us>
Sent: Tuesday, June 14, 2022 5:39 PM
To: bcosgrove02@gmail.com; Richard Bowen
Subject: Fw: Solar Releases - David Fletcher/Sure-Cran
Attachments: Releases - Sure-Cran, David Fletcher.pdf

Gentlemen, I have attached copies of the Fletcher and Sure-Cran releases from that were signed about 4 and half years ago.

Mr. Cosgrove, you have asked if these sites are under investigation and I have stated that we are not targeting one entity for potential earth removal violations so any sites that have had earth removal operations are being reviewed. Therefore, you have not misrepresented what I have said and although the agreements provide certain releases they could not release future activities.

My understanding is that Mr. Fletcher stated that we have been in contact. We had not. Ironically, today he stopped by the office to speak and it is the first time I've seen or spoken to him that I can presently recall since signing those agreements. I did inform him that I told you what I stated above and that you were not making it up because if he has done earth removal from those locations after or outside the releases than he certainly would be a reviewed site.

I hope this helps clarify matters.

Best,

Derek Sullivan
Town Administrator
508-291-3100 ext 3110

From: Patty Neal
Sent: Tuesday, June 14, 2022 10:24 AM
To: Derek Sullivan
Subject: Solar Releases - David Fletcher/Sure-Cran

Cordially,
Patty Neal
Project Coordinator
Administration Office
54 Marion Road
Wareham, MA 02571
508-291-3100 x3110

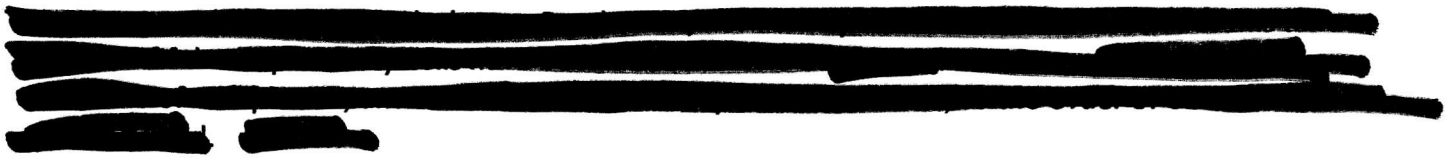
EXHIBIT # 9

bcosgrove02@gmail.com

From: David Pichette <dpichette@wareham.ma.us>
Sent: Tuesday, August 9, 2022 10:14 AM
To: bcosgrove02@gmail.com
Subject: Re: Two Questions

Hi Barry,

Regarding the 0 Rte 25 solar project site, I did review the site and there was unpermitted work done in the buffer zone to wetlands at the site. The Commission will be addressing this matter with the property owner in the near future.



David D. Pichette, Conservation Administrator
Town of Wareham
54 Murion Road
Wareham, MA 02571
Phone: (508) 291-3100 x6565
Fax: (508) 291-3116

EXHIBIT # 10

TOWN OF WAREHAM
54 Marion Road
Wareham, Massachusetts 02571

Town Administrator
Derek D. Sullivan
(508) 291-3100, ext. 3110

TO: Ken Buckland, Director of Planning and Community Development

FROM: Derek D. Sullivan, Town Administrator

DATE: June 2, 2022

RE: 0 Route 25 Solar project

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The Town respectfully asks the Planning Board to request information on the changes in hydrogeology under the site, similar to what the Board is requesting on other sites for solar development. We are interested in the changes in the groundwater elevations and flow, resulting from the original or historic topography and the expected mounding of groundwater at that time, and the current groundwater levels that could be determined by test pits or borings, and the current groundwater flows, which could be determined by the present soil strata and composition under the site.

Thank you for your consideration in this matter.

cc: Planning Board
David Pichette

EXHIBIT # 11

From: Kenneth Buckland
Sent: Tuesday, June 7, 2022 4:11 PM
To: Planning Board
Cc: Betsy Mason; crsr63@verizon.net; Richard Bowen; Derek Sullivan
Subject: 0 Route 25 Solar Project SIte Plan Review

Two issues have come up regarding the SIte Plan Review considerations for this project:

1. The easment that provides access across the town property at the Municipal Maintenance facilities should be presented by the applicant and shown to include the right to install a utility-grade transmission line within the easement. If it does not then compensation may be appropriate to allow the construction.
2. The grading of the property has and will impact the hydrogeology of the adjacent municipal land. I recommend that similar to the review of the Fearing Hill project that a hydrogeo study of the project be requested. To determine the change in groundwater elevations and flows, the current groundwater regime on the Municipal property should be analyzed and the original grades of the private property should be produced to allow an estimation of the previous regime and the change in groundwater flows and elevations as a result of the change in topography.

I recommend that the Board consider these at their next hearing date.

Kenneth Buckland
Director of Planning and Community Development
Town of Wareham
508.291.3100 x 6501