



# Sand Wars in Cranberry Country



*An investigation into the money,  
politics and corruption behind  
sand mining and its silent  
environmental crisis in  
Southeastern Massachusetts*

# Table of Contents



*Franklin Marsh LLC, Plymouth-Carver MA*

**Cranberry agriculture?  
Or sand and gravel mining?**

# Table of Contents

|   |    |
|---|----|
| <b>Part I: Executive Summary</b>  | 5  |
| <b>Part II: The Impacts of Sand and Gravel Mining in Southeastern Massachusetts</b> | 9  |
| A. Forests and Biodiversity   | 10 |
| B. Native American History and Culture  | 16 |
| C. Ground and Surface Water   | 17 |
| D. Topography   | 27 |
| E. Human Health, Safety, and Welfare  | 30 |
| F. Climate Change   | 36 |
| <b>Part III: The Laws and How They Are Evaded</b>                                   | 40 |
| A. Overview   | 41 |
| B. Municipal Regulation of Earth Removal and Oversight Issues                       | 41 |
| C. The Intersection of Cranberry Agriculture and Mining                             | 47 |
| 1. Building cranberry bogs and ponds or mining?                                     | 49 |
| 2. Sanding the bogs or mining?  | 50 |
| 3. The world's largest cranberry grower   | 51 |
| D. Mining for Subdivisions  | 53 |
| E. Laws Regulating the Impacts of Sand and Gravel Mining                            | 55 |
| 1. Forests and Biodiversity   | 55 |
| 2. Native American History and Culture  | 56 |
| 3. Ground and Surface Water   | 59 |
| 4. Human Health, Safety, and Welfare  | 61 |
| 5. Environmental Studies and Climate Impacts  | 61 |
| <b>Part IV: The Economics of Sand</b>   | 62 |
| A. Overview   | 63 |
| B. Demand for Sand Driving Up Profits   | 64 |
| 1. Prices   | 64 |
| 2. Profits  | 64 |
| 3. Earth Removal Permit Fees  | 65 |
| C. Cranberry Economics vs. Sand and Gravel Mining                                   | 65 |
| D. Agricultural Subsidies   | 67 |
| 1. State Cranberry Revitalization Grants  | 67 |
| 2. State Cranberry Bog Renovation Tax Credit  | 69 |
| 3. Federal Agricultural Grants  | 70 |

# Table of Contents

|  |           |
|--|-----------|
| 4. Real Estate Tax Subsidies                     | 70        |
| 5. Solar Subsidies                               | 71        |
| 6. Labor Practices                               | 71        |
| <b>Part V: The Mining Sites</b>                  | <b>72</b> |
| A. Overview                                      | 73        |
| B. Sources and Methods Used to Identify Sites    | 75        |
| C. Method Used to Determine Earth Removal Volume | 76        |
| <b>Part VI: Recommendations</b>                  | <b>80</b> |
| <b>Appendix 1: Table of Sites</b>                | <b>83</b> |
| <b>Appendix 2: Site Profiles</b>                 | <b>83</b> |
| <b>References</b>                                | <b>83</b> |

**DISCLAIMER:** Every reasonable effort has been made to ensure the accuracy of the information in this report. Facts are taken from public records including municipal records of earth removal permits, municipal assessor's data bases, court records and state documents. Extensive public records requests were made to municipalities and the state to attempt to obtain complete and accurate information. Much information was lacking. Images and photographs are from open sources including MassMapper GIS, a GIS system maintained by the Commonwealth of Massachusetts and Google Earth Pro. All drone footage was obtained by a licensed drone pilot in accordance with state and federal laws. CLWC has used best efforts to verify and corroborate all facts before putting them in this report. Any inaccuracies are due to the lack of public information and the failure of regulators to ensure compliance with reporting requirements for commercial mining and cranberry agricultural operations, and failure to make accurate information available in the public domain. Any corrections or requests for revisions should be send to [environmentwatchsoutheasternma@gmail.com](mailto:environmentwatchsoutheasternma@gmail.com)

# Executive Summary

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*A.D. Makepeace Cranberry Co.,  
46 Federal Road, Carver MA*

**Cranberry agriculture?  
Or sand and gravel  
mining?**

# Part I: Executive Summary

This report is an investigation into the sand and gravel mining industry and its impacts on drinking water supplies, waterways, forests, biodiversity, the health and wellbeing of residents, and Indigenous Native American history and culture. It calls for a complete moratorium on sand and gravel mining, a thorough assessment of the damage caused to date, enforcement of environmental laws and remediation.

Sand, gravel and aggregates are the second most extracted resource on earth after water by volume. These materials, especially silica sand, are used in concrete, glass, silicon chips and endless consumer projects. There is a global shortage of this commodity. Southeastern Massachusetts has significant deposits of this global commodity and large landowners who are exploiting this resource.

The sand and gravel industry operates behind a veil of secrecy made possible by political corruption and weak regulatory oversight. For decades, local governments have allowed companies to evade regulations. An interconnected network of individuals and mining operators carry out projects that cause significant damage to the environment and communities. In recent years, the pace of mining has accelerated due to skyrocketing prices and a global shortage of sand. Local residents are exposing the regulatory failures and the damage. The scope and scale of the mining demands that state and federal officials step in to address the issues.

The serious environmental impacts include permanent removal of forests, sand and gravel that filter and protect the region's underground drinking water aquifer. At least 110 mining sites are in the Plymouth-Carver Aquifer area. This aquifer is the only drinking water supply for seven towns and more than 200,000 people. There are no environmental impact reviews. Some operations dredge in the aquifer to extract sand and gravel, exposing it to contamination.

The report's key findings are:

- Since about 1990 more than 110 sand and gravel mining operations have:
  - Stripped 2,600 acres of forested land down to bare soil or below and into the aquifer and irreversibly leveled topography,

# Part I: Executive Summary

- Extracted at least 61 million cubic yards of sand and gravel,
  - Exported at least 2.5 million truckloads of sand and gravel, enough to circumnavigate the globe 1.3 times<sup>1</sup>,
  - Destroyed some of the state's most significant areas of biodiversity including globally rare Pine Barrens forests, one of three on Earth, and impacted wetlands, rivers and streams,
  - Harmed the public health and well being, and
  - Destroyed evidence of Native American Indigenous use and occupation of the land.
- Sand and gravel mining extraction is regulated only on the municipal level. Cranberry landowners and developers exploit zoning and land use exemptions for “cranberry agriculture” or “subdivision preparation.”
  - The region's cranberry industry is responsible for about 71% of the mining extraction, conducted under the claim that this is protected “agriculture.”
  - The state's largest landowner, A.D. Makepeace Cranberry Co. and its subsidiary Read Custom Soils, LLC, are responsible for about half of the total volume of sand and gravel mined by the cranberry industry.
  - As of the date of this report, sand mining projects for an additional 6.7 million cubic yards of sand are proposed in Wareham, Kingston, Plymouth, Halifax, and Carver.
  - The global shortage of sand has driven profits up 5-fold in the last 5 years.

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<sup>1</sup> A tractor trailer truck holds 20 to 24 cubic yards. A truck is 70 to 80 feet long. A line of trucks to hold 61 million cubic yards is at least 31,700 miles long. The circumference of the globe is generally considered to be 24,885 miles. The line of trucks that have exported sand and gravel from Southeastern Massachusetts since about 1990 would circle the globe once and then at least another third of the way around.

# Part I: Executive Summary

- State and federal agricultural and solar energy subsidies play a key role in incentivizing sand and gravel mining.
- Remedial measures must address damage and future risks to the Plymouth-Carver Aquifer and other resources including public health impacts.

The report's estimate of 110 mining sites and approximately 61 million cubic yards of mined sand is very likely an underestimate. Inadequate oversight by local boards and committees and the absence of state level regulation allows much of the mining to go undetected and unreported. Further investigation is necessary.

The web based version of the report and the research behind it is at the website [sandwarssoutheasternma.org](http://sandwarssoutheasternma.org)

The report is summarized in a ten minute film *Cranberry Country Sand Wars* available on YouTube: Save the Pine Barrens Southeastern Massachusetts.

**Appendix 1** lists over 110 mining sites

**Appendix 2** has a Site Profile for each location

Find the Appendices at:

[www.sandwarssoutheasternma.org](http://www.sandwarssoutheasternma.org)

with an interactive map

**“Earth: all forms of soil, including but not limited to clay, gravel, hard pan, loam, peat, rock or sand”**

*-Town of Carver Earth Removal Bylaw, Definitions*



Watch drone footage of many sites on

**You Tube:** *Save the Pine Barrens  
Southeastern Massachusetts.*

Searchable playlists will locate a site,  
public hearing, or town meeting.

**Find photos at**

[www.jonesriver.smugmug.com/  
communitylandandwatercoalition](http://www.jonesriver.smugmug.com/communitylandandwatercoalition)

Read more in depth about the issues at  
[www.communitylandandwater.org](http://www.communitylandandwater.org)

**Sand mining is “silently creating a major  
environmental crisis”**

*-United Nations Environment Program*

# The Impacts



**Cranberry agriculture?  
Or sand and gravel mining?**

*Location: E.J. Pontiff Cranberries, Inc. and P.A. Landers, Inc., 140 Firehouse Road, Plymouth MA 20 acres. 2023*

## **Part II: The Impacts of Sand and Gravel Mining in Southeastern Massachusetts**

The sand and gravel mining described in this report is strip-mining with all the associated impacts: cutting down all trees, extracting stumps and root systems, removing top soil and then layers of sand and gravel - typically 20 to 50 feet across acres of land - and frequently dredging the groundwater aquifer to extract materials. These forests, vegetation and sand and gravel are the natural and only filtration protection for the underground, shallow unconfined aquifer. The 199-square mile Plymouth Carver Aquifer provides all of the drinking water for more than 200,000 people. Mining in towns outside the Plymouth Carver Aquifer also impact drinking water supplies that draw from underground reserves and surface water supplies.

No state or federal environmental impact study has addressed the individual or cumulative impacts associated with this mining. Individual projects that involve mining for future land uses such as cranberry bogs or subdivisions gloss over the mining operations as “site preparation” and do not address the impacts of the mining activity or permanent environmental damage.

### **A. Forests and Biodiversity**

The forests, vegetation and soils in the region are the result of thousands of years of ecological processes that occurred after the Laurentide Glacier retreated 12,000 years ago. After the glacier withdrew, the land was barren. It took thousands of years to establish today’s forests and ecosystems. Sand and gravel mining strips away these ancient ecosystems and leaves the land in a bare, sterile condition. It essentially resets the ecosystem where it was after the glaciers retreated.

Mining in the region creates “a sand pit [that] is a glaring, radiating zone without any ability to affect or modify its microclimate. The subsoil is sterile sand with few available nutrients, meaning nothing much will grow here again in any human timeframe...” (Booth, 2021)

## Part II: The Impacts of Sand and Gravel Mining in Southeastern Massachusetts

Southeastern Massachusetts has some of the highest rates of loss of open space in the state. Unregulated sand and gravel mining is contributing to the loss. This Report conservatively estimates least 2,500 acres of open space have been lost to sand and gravel mining since 1990.

Of the 351 towns in Massachusetts, six Southeastern Massachusetts towns - Carver, Kingston, Plympton, Plymouth, Wareham and Middleborough - make the top 20 list of municipalities with the highest rate of open space loss from 2012 to 2017 (Ricci et al., 2020). As of May 2021, "Satellite imagery from *Global Forest Watch* shows that forest loss [in the Wareham area] is particularly high...it doesn't even include the large amount of conversion to cranberry bogs and other uses from before 2000. In fact, pulling back, this area appears to have one of the highest rates of forest loss since 2000 in the entire state of Massachusetts." (Booth, 2021).

Southeastern Massachusetts hosts some of the highest concentrations of biodiversity in the state. It is the home to the globally rare Atlantic Coastal Pine Barrens, one of three remaining such ecosystems on Earth.



*Photo: A.D. Makepeace Cranberry Co.  
mining site, Carver MA, 2022*

## Part II: The Impacts of Sand and Gravel Mining in Southeastern Massachusetts

“The term ‘pine barrens’ refers collectively to several variations of plant communities, distinguished from each other by their relative proportions of two defining trees: pitch pine and scrub oak. In some areas, pitch pine forms a dominant overstory that shades the ground, resulting in a fairly open understory. In other areas, dense thickets of scrub oak dominate. And in others, a mixture of pitch pine and scrub oak occurs.” *The Nature Conservancy, The Pine Barrens of Southeastern Massachusetts*

***Our biodiversity is in crisis, in Massachusetts and globally.***

*Massachusetts Department of Fisheries and Wildlife (Biomap 3)*

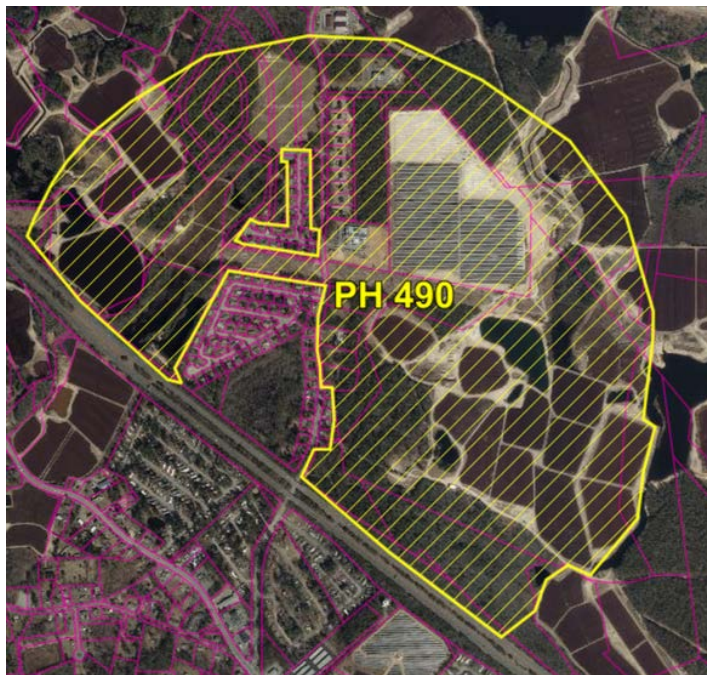
The Atlantic Coastal Pine Barrens supports 40 natural community types. Over 200 species protected under the Massachusetts Endangered Species Act (MESA) rely on its unique ecosystems. Some species such as the Northern Cooter and Long Eared Bat are protected under the federal Endangered Species Act. These plant and animal species are specifically evolved and adapted to survive in this ecoregion.

They are protected because they are at risk for extinction. Trees such as the rare Pitch Pine are not listed under MESA but are also threatened with extinction. The region’s wetlands and Atlantic Cedar Swamps are being dredged for sand and gravel.

## Part II: The Impacts of Sand and Gravel Mining in Southeastern Massachusetts

Areas designated under MESA as “Priority Habitat” for plant and animal species have been and continue to be destroyed by mining operations. Some projects obtain approval from the Natural Heritage and Endangered Species Program (NHESP) claiming they are exempt from regulation as “cranberry agriculture.” This exemption is leading to increased biodiversity loss. Many mining sites where biodiversity was negatively impacted are documented in this report.

*Below: 50 acres of Priority Habitat area destroyed by mining and solar.  
More information in Appendix 2, Site Profile for 71 Charlotte Furnace Road, Wareham*



*State map showing Priority Habitat (PH) Area 490 for Special Concern Species (Eastern Box Turtle)*



*Construction for industrial solar on Priority Habitat, July 2021*

## Part II: The Impacts of Sand and Gravel Mining in Southeastern Massachusetts

*Below: Loss of Priority Habitat: Before and after mining at 71 Charlotte Furnace Road, Wareham MA. Project by A.D. Makepeace Co. and Renewable Energy Development Partners (REDP). See Appendix 2 for additional REDP solar and mining projects at Swan Holt Bogs, Carver and 13A Gate Street, Carver*



Other examples of Priority Habitat lost for mining projects include 140 Firehouse Road, Plymouth and 160 Tihonet Road, Wareham. See Appendix 2, Site Profile for 140 Fire House Road and You Tube drone footage at Save the Pine Barrens Southeastern Massachusetts and Site Profile for 160 Tihonet Road, Wareham.

# Part II: The Impacts of Sand and Gravel Mining in Southeastern Massachusetts

## B. Native American History and Culture

*“Since time immemorial the Wampanoag people have inhabited Southeastern Massachusetts. The land contains their history: encampments, burial sites, homesites, and traditional lands where people hunted, gathered, and fished.”*

*“The sand and gravel mining industry in Southeastern Massachusetts has had a devastating effect on our tribal homelands and environment”*

*Melissa Ferretti, Herring Pond Wampanoag Tribe Chairperson, 2021, 2023*

Southeastern Massachusetts is the ancestral home of the Wampanoag people who occupied the land for millennia before colonization by Europeans. The land still contains archeological evidence of Indigenous people’s presence on the land. This includes artifacts, homesites, burials, and encampments. The land also has a spiritual and cultural significance for Indigenous people. The hills of Southeastern Massachusetts were historically the preferred burial sites for Indigenous people (Linda Coombs/CLWC 2021). Archeological sites have been destroyed by sand and gravel mining. This violates principles of environmental justice and human rights.

At the crux of the wanton destruction of Indigenous history are the many failures of the Massachusetts Historical Commission and Massachusetts Environmental Policy Act (MEPA) when it comes to assessing and mitigating the damage to historic resources by mining. These agencies operate behind a shroud of secrecy unlawfully shielding archeological surveys, assessments and decisions from public scrutiny. Part III(D) of this report reviews these failures.



## Part II: The Impacts of Sand and Gravel Mining in Southeastern Massachusetts

Approximately 71% of the mining in this report is for the alleged purpose of cranberry agriculture. The Cape Cod Cranberry Growers Association (CCCGA) uses the story of the Indigenous Wampanoag people's traditional cranberry harvest to market its products, [www.cranberries.org/history](http://www.cranberries.org/history). Today's Wampanoag Tribal members identify mining as a grave threat to Indigenous culture in Southeastern Massachusetts. (Deetz, June, 2023, "Sand and Gravel Mining, Real Estate, and "Green Energy" Threaten the Pine Barrens of Southeastern Massachusetts, Cultural Survival", [www.culturalsurvival.org/ne](http://www.culturalsurvival.org/ne) 71% of the mining in this report is for the alleged purpose of cranberry agriculture.

The You Tube channel Save the Pine Barrens Southeastern Massachusetts has videos and presentations by leaders of the Herring Pond, Aquinnah (Gay Head) and Mashpee Wampanoag Tribes about the devastating impacts of sand and gravel mining on their culture and history.

### C. Ground and Surface Water

Southeastern Massachusetts relies on groundwater or surface water reservoirs connected to the groundwater. The groundwater reserve is called an aquifer, an underground body of rock or sediment that holds water. The Aquifer consists of well sorted sand of high silica content and is highly permeable meaning the water flows easily underground like a river. The Aquifer is unconfined - meaning there is no layer of less permeable rock above it. The groundwater recharges directly from precipitation, runoff and snow melt across the land surface.

This report documents dozens of mining operations that have leveled topography and conducted subsurface excavation the aquifer to extract sand and gravel. This is a serious concern due to the characteristics of the regional groundwater aquifer.

# Part II: The Impacts of Sand and Gravel Mining in Southeastern Massachusetts

*“Groundwater is largely invisible: we often ignore it or take it for granted.”*

*-United Nations, World Water Day, 2022*

In Southeastern Massachusetts, where groundwater intersects with the land surface it creates a wetland, river, or kettle pond. What we see on the surface is the groundwater. The diagram below shows how this occurs.

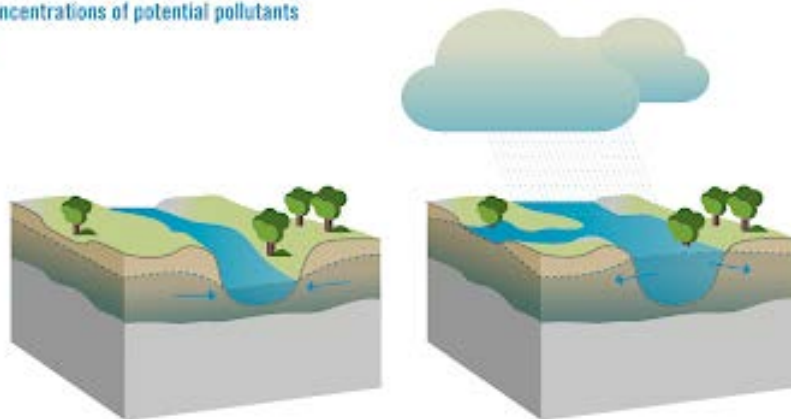
All residents, businesses and industries in this region get water from groundwater wells. These wells are straws pulling water from the underground pool of water or from surface water bodies that are expressions of the aquifer.

## The river's invisible twin

Surface water and groundwater tend to be highly interconnected.

When the river surface water level is high, river water infiltrates into the groundwater system. This is especially true during high flows, when both the river and adjoining floodplains and meadows can become flooded.

In drier periods, groundwater flows back into the river. This exchange includes quantities of water as well as concentrations of potential pollutants in the water that might be transferred.



## Part II: The Impacts of Sand and Gravel Mining in Southeastern Massachusetts

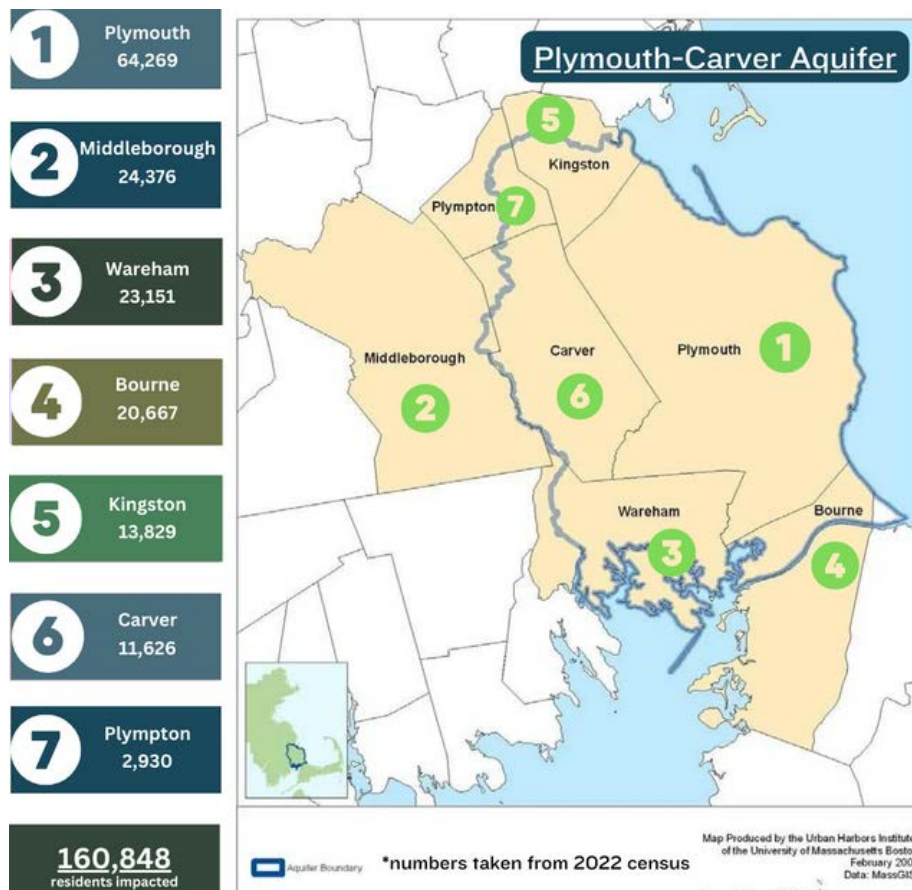
The groundwater wells are primarily individual private wells at each home. In neighborhoods where homes are close together, such as a planned community, or for other reasons, the well can be a “public water supply” well. This public water supply well can be privately owned by a development, or can be owned by the municipality. For example, Plymouth has all three types: private wells at people’s homes, “public water supply” wells that are privately owned like at the Red Brook Development, and “public water supply” wells owned by the Town and considered municipal water supplies. The key point is that all the water comes from the same groundwater aquifer. Even if water is piped to a home from a municipal well, it is the same source as the homeowner’s well.

In 1990, the U.S. Environmental Protection Agency used the federal Safe Drinking Water Act to designate 199-square miles in eight towns a “Sole Source Aquifer” area. This aquifer underlies Plymouth, Bourne and Sandwich north of the Cape Cod Canal, most of Carver and Wareham, substantial portions of Kingston and Plympton and part of Middleboro. This aquifer is the second largest sole-source aquifer in the state, second only to the Cape Cod aquifer, directly adjacent to it. According to the EPA in the 1990 SDWA designation:

*“Although the quality of the aquifer's groundwater is rated as good to excellent, it is highly vulnerable to contamination due to its geological characteristics (including shallow depths to groundwater)...the region's aquifer is a resource that fully deserves efforts to protect it.” (55 FR 32137).*

# Part II: The Impacts of Sand and Gravel Mining in Southeastern Massachusetts

*Below: Population map of the Plymouth Carver Aquifer. The City of Brockton also obtains water from the Plymouth-Carver Aquifer, bringing the total population that relies on the Aquifer for drinking water to over 200,000.*



Sand and gravel mining impacts water quality and quantity. Mining strips off the forests, vegetation and sand and gravel that provide the natural filtration and protection for the groundwater aquifer. This “significantly reduces the pollutant attenuation capacity within the recharge areas to the drinking water supplies.” (Horsley Testimony, Sept. 12, 2022, paragraphs 22, 26).

## Part II: The Impacts of Sand and Gravel Mining in Southeastern Massachusetts

Naturally forested areas assimilate more than 90% of the nitrate-nitrogen pollution concentrations in rainfall. Nitrate-nitrogen is a pollutant that causes contamination of drinking water by increasing nutrient levels. This is harmful for human health and the environment. Mining eliminates the assimilation of nitrogen by forests and allows nitrogen to be exported into ground and surface water systems and drinking water wells. (Horsley Testimony 2022 Paragraph 16.)

Local, state and federal laws exist to protect drinking water supplies from sand and gravel mining. Government regulators do not enforce the law as explained in Part III. Despite these laws, municipal bodies routinely issue mining permits for land designated protection zones around drinking water wells. They allow mining operations to dredge in the aquifer. Some mining operations run dewatering pumps to make it easier to dredge the aquifer for sand and gravel. Evidence shows sand and gravel washing and processing operations on site. There are no regulatory controls. A.D. Makepeace's mining operations on Federal Road in Carver MA are within the wellhead protection areas of public water supply wells. (Horsley, 2022).

## Part II: The Impacts of Sand and Gravel Mining in Southeastern Massachusetts

*Below: Impacts to the aquifer from mining. View from a satellite above the earth of a pond created by a mining operation in Carver MA. This was a forest and designated as BioMap 2 Critical Natural Landscape. It covers 27 acres. Forest clearing and mining began in 2019. See, Appendix 2, Site Profile for 24 Federal Road, Carver for more information. The landowner is A.D. Makepeace Cranberry Co., Wareham MA. Chronology of the mining available on You Tube  
Save the Pine Barrens Southeastern Massachusetts*



## Part II: The Impacts of Sand and Gravel Mining in Southeastern Massachusetts

Another example of mining in the aquifer is at 0 Meadow Street, Carver shown below. In March 2023, the ERC issued a second permit to the landowner (who claims to be a cranberry farmer) and to The Lopes Companies, LLC to continue a 12-year mining operation that is dredging the aquifer for sand and gravel. There was once a 100 foot forested hill here. Mining created an 11 acre pond allegedly for a water supply for 13 acres of cranberry bogs. This is an Interim Wellhead Protection Area of a public water supply well for the Meadow Woods Mobile Home Park and is within 600 feet of the Park's second well protection zone. (James, 2023). The site abuts the Weweantic River. In 2022, the Massachusetts Department of Environmental Protection (MassDEP) confirmed the pond is three times the size needed to provide water to the landowner's bogs. Yet, the agency is allowing the commercial mining operation to continue. See Appendix 2, Site Profile for Off Meadow Street, Carver for more information.



*Above: Drone view of mining in the aquifer, Meadow Street, Carver MA. About 20 acres, active site. Video available on You Tube: Save the Pine Barrens Southeastern Massachusetts*

## Part II: The Impacts of Sand and Gravel Mining in Southeastern Massachusetts

Most mining operations that dredge in the aquifer claim they are creating “cranberry farm ponds”. This claim appears to be used to evade municipal earth removal laws as described below in Part III. Appendices 1 and 2 have specific information on mining operations that have dredged the aquifer for sand and gravel. At some sites, excavation in the groundwater was later covered with a cranberry bog.

**[Earth removal] causes significant alterations to the hydrology and water quality in downstream water resources**

*Scott Horsley, expert hydrogeologist (Horsley, 2022)*

The Meadow Street mining operation in Carver, shown above, like all other mining operations, may increase nitrogen pollution, eutrophication, and cyanobacteria algae blooms, and change the groundwater level and flow direction according to experts. (James Affidavit, 2023, paragraphs 62-64 and 83).

No government regulator has required a hydrology study or water quality testing on any mining site studied for this report.



## Part II: The Impacts of Sand and Gravel Mining in Southeastern Massachusetts

*“The additional nitrogen loading associated with the removal of tree cover on the Site has the potential to negatively affect the groundwater quality at the two adjacent public water supply wells and any private wells serving the residences abutting the parcel to the south and east. Nitrogen loading in drinking water has been linked to various public health issues including the increased prevalence of regulated drinking water contaminants including Volatile Organic Compounds (VOCs) and, according to the EPA, concentrations greater than 10 mg/L can lead to the development of methemoglobinemia in infants. Additionally, an unnatural excess of nitrogen in waterways can cause cultural eutrophication leading to hypoxia (defined as dissolved oxygen concentrations >2 mg/L) and cyanobacteria algae blooms which produce cyanotoxins. Cultural eutrophication and algae blooms pose risks to both environmental and human health.*

*Hydrologically, the exposed water surface of the [pond created by the mining operation] will have a direct impact on groundwater levels in the area. Based upon the lack of vegetative cover (and elimination of evapotranspiration), the recharge rate of the [10.99 acre pond] area will increase from an existing rate of 18” per year to 40” per year over the areas of the pond... Accordingly, the recharge volume will increase from 16.5 acre-feet to 36.7 acre-feet per year. This increase in recharge volume has the potential to modify the groundwater levels and flow direction adjacent to the Site, and the developed areas surrounding the Site, based upon the existing groundwater levels and quality.*

*... the groundwater flow in the region is to the south-southwest. Thus, and as shown...groundwater flow from this Site will move towards the two abutting private water supply wells at the Meadow Woods Mobile Home Park along Melanie Lane, north of the Weweantic River...[The excavation] significantly increases the vulnerability of groundwater resources to a variety of contamination sources including the nitrate-nitrogen noted above.”*

*-Gary James, P.E., Testimony, July 2023 about the water quality impacts of the mining site ate Off Meadow Street, Carver (James 2023)*

## Part II: The Impacts of Sand and Gravel Mining in Southeastern Massachusetts



*Above: Morse Brothers Cranberries, Halifax, January 2023. Mining has punctured the aquifer. This is on West Monponsett Pond, a public water supply classified as an “Outstanding Resource Water.” The pond also has an “impaired” status due to harmful elevated chlorophyll and cyanobacteria blooms from excess phosphorus pollution. The water quality of West Monponsett Pond is heavily influenced by its surrounding land use (MassDEP 2016). See Appendix 2, Site Profile for Lignan Street, Halifax for more information.*

**“Our hydraulic systems are vulnerable to overuse and contamination from the land surface because of its hydrogeological properties”**

*-Dr. David Boutt, U. Mass. Dept. of Earth, Geographic and Climate Sciences, CLWC  
Webinar, April 2021*

# Part II: The Impacts of Sand and Gravel Mining in Southeastern Massachusetts

## D. Topography

Sand and gravel mining has changed and continues to change the topography, aesthetics and environmental heritage of Southeastern Massachusetts. Mining operations have strategically targeted the region's highest hills and leveled them. Instead of a varied topography with hills up to over 200 feet contrasted by deep kettle holes or "frost pockets" the landscape is increasingly flat with little topographic variety.



*Map of Plymouth (O.H. Bailey & Co., 1882) looking west toward Plympton and Carver. Today most hills shown here have been eliminated by sand and gravel mining.*

## Part II: The Impacts of Sand and Gravel Mining in Southeastern Massachusetts

Changing the microtopography of a landscape changes the way water travels over and through the land, and can impact wetlands, groundwater recharge and runoff patterns. In 2022, the world-renown hydrologist Scott Horsley reported on the impacts of the alteration of Carver's highest hill by the mining project on Spring Street, next to a Great Pond and potential vernal pool. (Horsley, Feb. 2022). The report states,

*"Earth removal..... Lowers the elevation of the land's surface and depth to the water table (groundwater). This results in a permanent change to the pre-existing conditions and permanent changes in the surface contours of the land."*

Mining that results in alterations in topography and loss of vegetation changes runoff patterns. This can lead to more erosion. Sediment discharges to waterways and wetlands from sand and gravel mining occur regularly as documented in this report.



*Above: Drone photo from December 10, 2021 demonstrates the drastic topographic changes at 0 Spring Street, Carver. In the center of the image is the former height of land with standing trees. This was Carver's highest hill and covered the entire 19-acre site before mining.*

*See Appendix 2, Site Profile 0 Spring Street, Carver for more information.*

*Drone footage at You Tube: Save the Pine Barrens Southeastern Massachusetts*

## Part II: The Impacts of Sand and Gravel Mining in Southeastern Massachusetts

Elevation changes and removal of vegetated cover change stormwater runoff patterns and creates an erosion risk. According to MassDEP's Best Management Practices for Sand and Gravel Pits, "Erosion from sand and gravel pits can contribute a large amount of sediment to adjacent water courses." (MassDEP 2003). The example below shows erosion of sand into the Wewantic River in Carver from a mining site.

*Below: Rochester Road, Carver, Feb. 24 and 26, 2022. Following a report by a local resident, DEP inspected and stated publicly this was pollution of a waterbody by the Foley mining operation. In ruling under the wetlands law DEP claimed this is cranberry agriculture. There is no known enforcement. Sources available on request. See Appendix 2, Site Profile, 0 Rear Tremont St., Carver. Drone footage on You Tube Save the Pine Barrens Southeastern Massachusetts*



# Part II: The Impacts of Sand and Gravel Mining in Southeastern Massachusetts

## E. Human Health, Safety, and Welfare

People living in and visiting Southeastern Massachusetts suffer from many negative impacts during and after mining operations. The impacts are longstanding and ongoing. The individual and cumulative impacts of exposure to dust, diesel emissions from truck traffic and mining equipment, noise and vibrations of the earth near homes has never been addressed in any environmental study.

Most of the material being mined is sand containing silica, a carcinogen. Nearby residents are exposed to carcinogenic silica for years during mining operations. Operations are open pit mines where sand blows freely throughout the town even after the mining ceases.

Inhalation of silica dust can lead to lung irritation, inflammation, and scarring. Silicosis results when the lungs have a reduced ability to take in oxygen due to lung damage, and it can be fatal (CDC, 2023). (James 2023)

*“The USGS notes that the extraction of these sands is associated with safety and health hazards, namely the exposure to silica, which can damage the lungs. Furthermore, air pollution is caused by fine sand particles, which can also endanger nearby communities” (Buchholz, 2020).*

In July, 2023, the Mine Safety and Health Administration (MSHA) lowered the exposure level for miners. There has been no state or local government study of the exposure of residents to this carcinogenic silica. Some residents report they have pulmonary diseases and conditions. While there are federal Occupational Health and Safety (OSHA) standards for silica sand miners, which require either using a dust control method or measuring worker exposure to the silica there are no rules in Massachusetts that protect the public.

## Part II: The Impacts of Sand and Gravel Mining in Southeastern Massachusetts

**“Crystalline silica is a common mineral that is found in construction materials such as sand, stone, concrete, brick, and mortar. When workers cut, grind, drill, or crush materials that contain crystalline silica, very small dust particles are created. These tiny particles (known as “respirable” particles) can travel deep into workers’ lungs and cause silicosis, an incurable and sometimes deadly lung disease. Respirable crystalline silica also causes lung cancer, other potentially debilitating respiratory diseases such as chronic obstructive pulmonary disease, and kidney disease.”**

*-U.S. Occupational Health and Safety Administration*

Truck traffic from mining operations also exposes residents to air pollution. The typical mining site is permitted for 50 truck trips, meaning 100 back and forth. The permit limits are not enforced. Read Custom Soils general manager admits the company has 150 trucks daily leaving the Carver site. It is permitted to operate 6 days a week and has operated since at least 2011. These are a fraction of the trucks operating in the region.

This report documents enough sand to fill 2.5 million tractor trailer trucks. The health impacts have never been assessed. Truck routes pass through rural residential neighborhoods and Environmental Justice communities. Truck traffic on narrow roads creates a safety hazard to other drivers, pedestrians and bikers, and children on school buses. Video examples of the constant truck traffic are on You Tube Save the Pine Barrens Southeastern Massachusetts.

*“We hear constant “beeps” from the trucks, our house shakes when the tractor trailers drive by. We have cracks in our house foundation and our water has sand in it and we have lost water pressure.”*

*Resident living next to Carver mining site, 2023*

## Part II: The Impacts of Sand and Gravel Mining in Southeastern Massachusetts

Right: For years, sand and gravel trucks have traveled through Environmental Justice communities as often as 1 truck per minute. Location: Tihonet Road, Wareham on truck route used by A.D. Makepeace and Read Custom Soils for sand and gravel exports. See, You Tube, Save the Pine Barrens Southeastern Massachusetts



Left: Tractor trailer full of sand and gravel flips over on narrow country road in Carver near A.D. Makepeace mining site. A witness reports “he almost killed me and my granddaughter.” Listen to the Carver Police Audio [here](#).

Over 2.3 million truck loads of sand and gravel have been hauled from the area.



## Part II: The Impacts of Sand and Gravel Mining in Southeastern Massachusetts

Mining emits dust onto nearby properties and into the environment, covering vegetation and properties. Most sites are open pit mines with no vegetation to prevent offsite emissions of dust and sand. The slightest wind carries sand into the surrounding area. The dust emissions prevent residents from opening their windows and requires constant maintenance of vehicles, gutters and homes that become covered with sand.

*"The sand sticks to our home, driveway, vehicles, vegetation and trees. It fills up the gutters on our house, so that if they are not cleaned on a regular basis they will collapse. When we go outside the sand sticks to our skin and lips. We cannot open our windows. We wash our cars almost daily but within a half hour they are covered with dust again. It is like being a prisoner in your own home."*

*-Carver Resident, 2023*

*The images below are examples of the amount of sand that blows of mining sites in Carver and other towns. Hundreds if not thousands of people living next to sand mines are exposed and suffer harm to their well being by the constant battle with sand emissions.*



*Left: High Street, Carver, 2022. Sand has been blowing onto residences for about five years from the nearby mining site. For more information see the Site Profile for 0 Spring Street, Carver in Appendix 2, and drone footage at You Tube, Save the Pine Barrens Southeastern Massachusetts*

## Part II: The Impacts of Sand and Gravel Mining in Southeastern Massachusetts



*Left: Sand fills gutters of home, June 2023.*

*Below: Car covered with sand, 2022. Sand has been blowing onto Meadow Street residents for almost a decade from the mining site nearby.*

*For more information see the Site Profile for Off Meadow Street, Carver in Appendix 2 and drone footage at You Tube, Save the Pine Barrens Southeastern Massachusetts*



## Part II: The Impacts of Sand and Gravel Mining in Southeastern Massachusetts

Environmental justice populations are communities who bear a disproportionate burden of the burdens and harms from pollution. This report identifies the many mining operations located in Environmental Justice communities identified by the Commonwealth of Massachusetts. Truck traffic exposes more Environmental Justice communities to diesel emissions, traffic and noise. Carver and Wareham have high concentrations of mining sites and truck traffic. Fifty percent of these towns are designated Environmental Justice communities. Environmental Justice communities are identified in Appendices 1 (List of Sites) and 2 (Site Profiles).

*"I've lived in the center of Plympton for fifty years. I've never seen so many sand and gravel trucks passing my house as I have in the last few years."*  
*Lifelong Plympton MA resident*



*Above: Trucks idling in the early morning lined up to pick up sand and gravel on Rochester Road, Carver, January 2022. For more information see the Site Profile for 0 Rear South Main Street (Oiva Hannula Cranberry Co.) Carver in Appendix 2, and drone footage for the site on You Tube, Save the Pine Barrens SoutheasternMassachusetts*

# Part II: The Impacts of Sand and Gravel Mining in Southeastern Massachusetts

## F. Climate Change

Forests and forested landscapes with natural vegetation perform many ecosystem functions critical to climate resilience and mitigation: they buffer the impacts of tropical storms and floods and mitigate the effects of heat waves by cooling the air around them among other things. Southeastern Massachusetts is low lying and towns like Wareham are flood prone and vulnerable to sea level rise. Forest and wetlands loss and groundwater alteration from mining means higher volumes and rates of stormwater runoff and lost flood storage capacity, making the communities where where mining is occurring more vulnerable to climate impacts. In addition, clearing forests for mining eliminates the only source of carbon sequestration available to mitigate climate change.

Forest loss increases the exposure of the local population to air pollution and higher temperatures. Science shows that losing forests has negative impact on human health, welfare and quality of life.

Forests and their soils sequester carbon dioxide from the atmosphere. About 44% of forest carbon is stored in the soils and soil carbon can constitute more than 50-60% of ecosystem carbon.

## Part II: The Impacts of Sand and Gravel Mining in Southeastern Massachusetts

Stripping forests and soils for mining causes a sudden pulse of carbon to be emitted into the atmosphere -- the equivalent of a carbon bomb.



*Above: April 5, 2023: Stripping topsoil at a mining site in Carver. This site is over 100 acres and claims to be conducting cranberry agriculture. See Appendix 2, Site Profile for Fuller Street (Johnson Brothers/Ryco) Carver and You Tube drone footage at Save the Pine Barrens Southeastern Massachusetts (listed as 0 Fuller Street and Middleboro/Carver Johnson)*

A 2021 report by Partnership for Policy Integrity analyzed the climate impacts of deforestation and mining at several A.D. Makepeace Co. sites in Wareham. The report states:

*“... where stumps and roots will be removed, the loss of biomass carbon is especially notable. The loss of soil carbon is also extreme. According to the data the proponents themselves cite (from EPA), soil carbon can constitute more than 50 - 60% of ecosystem carbon. The total removal of topsoil and the layers of subsoil that are most likely to store soil organic carbon in dissolved forms also needs to be taken into consideration. The state should require the proponents to find data that accurately reflect the aboveground and belowground carbon loss, including from soils, and do the calculation properly.” Booth, 2022*

## Part II: The Impacts of Sand and Gravel Mining in Southeastern Massachusetts



*Above: Tree stumps and vegetation removed by A.D. Makepeace for a mining operation on Federal Road in Carver, 2022. This is a typical stump pile at a mining site. Satellite images show that stumps and debris are sometimes buried in the hole created by the mining operation. For example, see Appendix 2, Site Profile, Carverside Bogs, Plymouth and You Tube Channel, Save the Pine Barrens, "SLT Possibly Burying Stumps". Sometimes the hole and debris are covered with a cranberry bog.*

## Part II: The Impacts of Sand and Gravel Mining in Southeastern Massachusetts



*Above: Soils stockpiled at A.D. Makepeace mining site, Carver, 2022.  
For more information see the Site Profile for 24 Hammond Street (in Appendix 2, and  
You Tube drone footage at Save the Pine Barrens Southeastern Massachusetts*

# Laws and How They Are Evaded

Plymouth  
Zoning Board of Appeals  
2023



## TOWN OF PLYMOUTH

11 Lincoln Street  
Plymouth, Massachusetts 02360

(508) 747-1620  
FAX: (508) 830-4062

**Board of Appeals**

**Decision**

**Case No. 3728**

**LANDOWNER:** A.D. MAKEPEACE COMPANY

**PETITIONER:** A.D.M. CRANBERRY CO., LLC.

**SUBJECT PROPERTY:** Off Federal Road, Carver, Massachusetts

**PARCEL ID NO'S:** 126-000-007-000, 126-000-011-000, and 126-000-012-000

**TITLE REFERENCE:** Plymouth County Registry of Deeds in BK 1418, PG 197-203 and BK 5189, PG 24

**DATE OF PUBLIC HEARING:** December 18, 2013 and concluding on February 19, 2014

\*\*\*\*\*

In exercise of its discretionary powers, the Plymouth Zoning Board of Appeals (Members: Peter Conner,

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PLYMOUTH, MA

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MAR 05 2014

PLANNING BOARD  
PLYMOUTH, MA



Permit from Plymouth Zoning Board of Appeals for 7.2 cubic yards of earth removal by A.D. Makepeace Cranberry Co.



# Part III: Laws and How They Are Evaded

## A. Overview

This Section addresses the local, state and federal laws relating to “earth removal” -- that is, mining. First, Parts III(B) and (C) review municipal laws governing the act of extracting sand and gravel from the earth and how cranberry agriculture is involved in this mining. Second, Part III(D) describes laws that are intended to protect the public and the environment from the impacts of mining and how they are evaded.

## B. Municipal Regulation and Oversight Issues

The “fox guarding the hen house” describes the municipal regulation of sand and gravel mining in Southeastern Massachusetts. The town bodies with the legal duty to regulate mining give permits for projects that do not meet standards. In Wareham, the Selectboard rarely requires a permit and looks the other way when it comes to large commercial mines on agricultural land. The cranberry industry and mining dominate town politics.

In Massachusetts, the activity of extracting sand and gravel from the earth is regulated only as a local land use under municipal law. The mining is called “earth removal”, a term that disguises this destructive strip mining. The seminal 1974 Boston College Environmental Affairs Law Review article, *Earth Removal and Environmental Protection* (Alexandra Dawson, Esq. outlines the legal framework for regulating earth removal in Massachusetts.

To evade bylaws and to try to shoehorn their projects into zoning laws, some landowners claim that the earth removal is a minor part of the primary use of the land. Where land is zoned agricultural, some landowners seek to take advantage of zoning protections for legitimate agriculture intended to ensure that local farmers are not overburdened with regulations. [2]

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[2] See, G.L. c. 40A, Section 3, paragraph 1 that applies to “the use of land for the primary purpose of commercial agriculture...” and says agriculture cannot be prohibited or unreasonably regulated and that municipalities cannot require a special permit for an agricultural use. Land that is used for mining for years is not a use of the land for the “primary purpose” of commercial agriculture.

## Part III: The Law and How They Are Evaded

*Below: Pond created by mining for alleged cranberry agriculture off Tremont Street, Carver, March 2022. See Appendix 2, Site Profile for 73 Tremont Edgewood Bogs-Great Cedar Cranberry, Carver and You Tube Save the Pine Barrens Southeastern Massachusetts.*



Municipalities have the legal power to “limit, control or prohibit the removal and sale of loam, sand, gravel, stone or other component parts of land” according to the court case of *Goodwin v. Board of Selectmen of Hopkinton* (1970) and Mass. General Law, c. 21, Section (passed in 1949). Municipalities can use zoning power or the general bylaw power or both to pass earth removal laws. The removal of loam and sand from its natural state may be regulated even where the material does not leave the landowner’s property. See, court cases of *Foster Masonry Prod. v. Board of Appeals of Acton* (1982) and *Toda v. Board of Appeals of Manchester* (1984).

## Part III: Laws and How They Are Evaded

Most if not all municipal bylaws in Southeastern Massachusetts are intended to or do prohibit or severely restrict stand alone sand and gravel mining operations. To obtain a permit, the earth removal use must be one legitimately connect to a use allowed by the underlying zoning district - usually residential and/or agricultural. If the mining can show it is legitimately connected to the underlying land use, such as building a bog or subdivision road, the volume of earth to be removed and the scope, scale and duration of the operation must be “incidental” or minor in significance to the allowed zoning use.

Table 1 below contains examples of municipal bylaws in Southeastern Massachusetts that regulate earth removal.

| Town     | Bylaw  | Municipal agency responsible for implementing |
|----------|--|---|
| Plymouth | Zoning Bylaw: Section 203-2, Natural Features Conservation (previously Section 205-18) | Zoning Board of Appeals: Special Permit       |
| Carver   | General Bylaw: Chapter 9, Environment, Section 9.1, Earth Removal                      | Earth Removal Committee                       |
| Wareham  | General Bylaw: Div. IV, Article III, Earth Removal Regulation                          | Selectboard                                   |
| Halifax  | General Bylaw, Chapter 144, Soil Removal   | Selectboard                                   |
| Plympton | General Bylaw, Chapter 145, Earth Removal  | Selectboard                                   |

## Part III: Laws and How They Are Evaded

This report shows that about 71% of the sand and gravel has been mined by companies that claim the removal is for cranberry agricultural purposes. For over a century the cranberry industry has wielded considerable political power in local town halls and on Beacon Hill. The industry group, Cape Cod Cranberry Growers Association (CCCCGA) is well connected and funded. Leading CCCCCGA members own and operate some of the sand mining enterprises identified in this report.

Ocean Spray, famous for cranberry juice, was started as a local cranberry grower cooperative in Southeastern Massachusetts but is now a multinational company owned about 50% by Pepsi. Ocean Spray maintains a processing facility on Federal Road in Carver, surrounded by industrial sand mining operations - the ground zero of mining.

Landowners whose property is not zoned for agriculture use legal protections for subdivision development to obtain mining permits. A state land use law protects earth removal for land development such as a subdivision, but the volume of earth to be removed for the subdivision must be limited: the volume must be "incidental" and a stand alone mine is prohibited.

Under both the agricultural and subdivision land use protections, the decision about whether the volume, scope and scale of the earth removal is really "minor and incidental" is left up to municipal officials who administer the earth removal bylaw.

In 1994, the state's highest court established the law on how to assess whether an earth removal operation is legitimate or a ruse to shoehorn a project into local zoning. The Supreme Judicial Court case of *Henry v. Board of Appeals of Dunstable* ruled that when the scope, scale, duration and profits from an earth removal operation are greater than the later use, such as agriculture, it is not legitimate earth removal and is a ruse to cover up mining. Another case is *Old Colony Boy Scouts Council v. Board of Appeals of Plymouth* from 1991. That case involved mining under the ruse of building a cranberry bog in Plymouth. The court ruled that because the mining operation was so large -- it would take two years, result in thousand of truck trips, and generate more profit than growing cranberries -- it was not a legitimate agricultural use and was prohibited. This proposed mining operation was minor compared to the massive sites excavating today.

## Part III: Laws and How They Are Evaded

In Plymouth, the Zoning Board of Appeals (ZBA) issues earth removal permits under the Zoning Bylaw. The ZBA has granted earth removal permits for what appear as pretenses for agriculture and subdivisions for decades and without questioning the true purpose of the project. The research for this report shows a pattern: as soon as one permit expires after multiple extensions granted with no public hearing (usually after 6 years), the operator submits a new permit for another project that is soon granted. The ZBA has issued permits to the same landowners year after year for new sites. For example, see Appendix 2, Site Profiles for E.J. Pontiff Cranberries, Inc. and Kapell Pinnacle Watercourse Trust (Plymouth) and two sites with the same operator, Plymouth Sand and Gravel/Raffaele Road and County Woodlot, 63 Camelot Drive, Plymouth.

*Below: County Woodlot, mining by Kingstown Trucking and Plymouth County Commissioners, 63 Raffaele Road, Plymouth with permit from Zoning Board of Appeals. Courtesy of Save the County Woodlot.*



(Those 12 foot tall machines sure do look tiny from the top of their pit).

## Part III: Laws and How They Are Evaded

In Wareham, the General Bylaw assigns the duty of mining regulation to the Selectboard. The Board allows mining companies to operate without permits, extracting tens of millions of cubic yards from the Town for decades. Wareham is the headquarters of A.D. Makepeace Cranberry Co., the world's largest cranberry grower. The company owns about half of the land in the town. This report identifies at least ten large scale unpermitted mining operations in Wareham. See Appendix 1. The Town has failed to collect hundreds of thousands of dollars in earth removal fees and the Selectboard has allowed mining to expose the sole source drinking water aquifer to unnecessary contamination. In the last two years, Wareham voters have almost unanimously passed two Town Meeting warrant articles on sand mining. One urged the Selectboard to hire an independent professional engineer to audit of the volume of earth removed from the town and determine the amount of earth removal fees owed. The second approved funding for this task. There are no results to date. In November 2022, residents sent the Town and the Attorney General a demand letter under the Citizen Suit Law for damage to the environment by unregulated sand mining. Neither responded.

The cranberry industry's marketing and political clout influences bylaws and decisions about earth removal regulation. The Carver earth removal bylaw was written so that the Selectboard could allow it to be dominated by members of the cranberry and trucking industries - which it has done for decades. The 7-member ERC is responsible for issuing earth removal permits based on the detailed criteria of the bylaw. The Town's Selectboard routinely appoints members from the cranberry and trucking industry. The ERC has issued dozens of permits for decades to "cranberry" companies with which they are involved and even issued a mining permit to its own chair of 30 years. ERC members have admitted publicly their business ties with permittees.

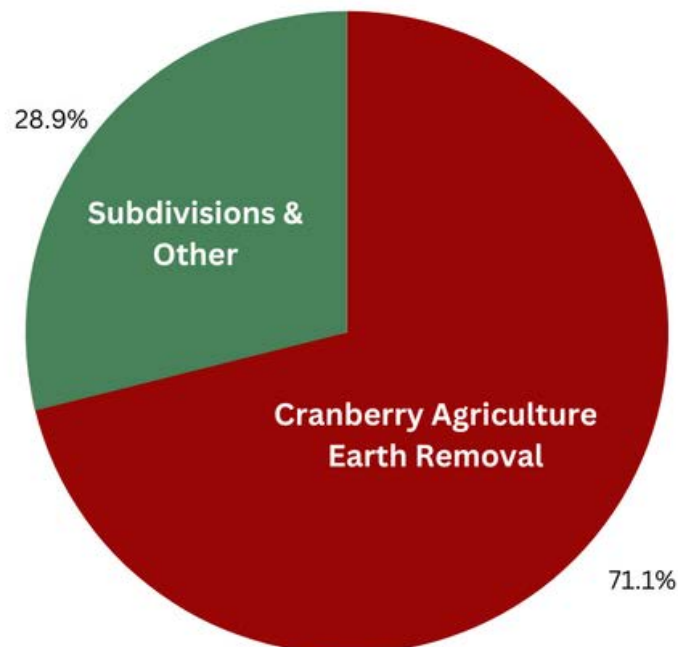
## Part III: Laws and How They Are Evaded

Recently, groups and residents in Southeastern Massachusetts are showing up, advocating and take legal action at zoning and planning boards, conservation commissions and Superior Court to show that the massive mining operations happening now are not allowed under the bylaws. The town officials and judges uniformly side with the mining and cranberry companies. They ignore the obvious, documented harm to the environment and residents. See Appendix 2 Site Profiles for 46 Federal Road, Carver and Off Meadow Street, Carver for examples of the legal actions.

### C. The Intersection of Cranberry Agriculture and Mining

Cranberry companies are responsible for about 71% of the sand and gravel mining identified in this report. State zoning laws provide limited protection for agricultural land uses to avoid overburdening farmers with regulation. Some cranberry landowners exploit these protections to obtain permits to mine sand and gravel from their land. They then sell the sand and gravel commercially for profit.

**Allocations of Volumes of Sand and Gravel Mining by Claimed Land Use**



## Part III: Laws and How They Are Evaded

This report profiles dozens of mining sites where cranberry landowners claim that leveling a hill over many acres is “necessary” to expand farming operations by locating a new cranberry bog or pond on the hill. This results in commercial mining for years. The need for new bogs and ponds is questionable because for over a decade the cranberry industry has been in overall decline or flat with no prospect of a turn around any time soon according to any number of industry, government and marketing sources.

*“The past 10 years prices have been close to or at the cost of production.”  
-Hilary Sandler, Director of the University of Massachusetts Cranberry Station  
July 2023*

*“Falling prices and other factors are leading some farmers to consider other alternatives for their land, as well documented by the Massachusetts Legislature’s Cranberry Bog Revitalization Taskforce.”*

*Massachusetts Department of Agricultural Resources, <https://www.mass.gov/cranberry-bog-program>, October, 2023*

It appears that many cranberry landowners are turning to sand and gravel mining as an alternative to growing unprofitable cranberries.

The cranberry industry owns about 62,000 acres of land in Southeastern Massachusetts. Less than one-sixth of the land is actually in cranberry production. The rest is typically upland forest containing sand and gravel deposits. The total acres of cranberry bogs in production in Massachusetts has not changed in any material way in decades. As of 2023, there are about 13,250 acres of cranberry bogs in all counties, including Plymouth, Bristol and Barnstable. <https://www.mass.gov/cranberry-bog-program>

Nevertheless, throughout this unrelenting and substantial decline in cranberry demand, pricing and resulting profitability, industrial-scale earth removal operations across the region have eviscerated innumerable hills and leveled topography to below grade. When the applications for earth removal permits for the for the alleged purpose of materially expanding cranberry acreage in Southeastern Massachusetts are viewed through this lens, serious questions are raised.



# Part III: Laws and How They Are Evaded

## 1. Building New Bogs and Ponds or Mining?

By objective standards, most mining projects do not qualify for permit for agricultural purposes. This report is based on a years-long review of earth removal permit applications from cranberry landowners who conduct sand and gravel mining. Some plans are available on the website for this report. The standard set by the case of *Henry v. Board of Appeals of Dunstable* and local bylaws for permits are clear: unless the mining operation is “minor” and “necessary and incidental” to the later end use, it is prohibited. The scope and scale of today’s operations that continue for years as stand alone mines dwarf any later use of the land - if any - for cranberry agriculture. Some mining operations continue for a decade or more and landowners delay the construction of the cranberry project indefinitely. See, Appendix 2, Site Profile for 46 Federal Road, Carver (A.D. Makepeace Cranberry) and 0 Tremont Street, Carver (Slocum Gibbs Cranberry).

Some mining holes appear to be filled in with debris and covered up with a cranberry bog according to satellite images and reports. See, Appendix 2, Site Profile for Carverside Bogs, Plymouth (A.D. Makepeace Cranberry). “Floating solar”, “agricultural canal solar” and “dual use solar” have been built on and are proposed for bogs that were once mines.

Mining to create agriculture ponds poses a grave threat to water quality and groundwater flow patters. The underground aquifer has sandy soils and the flows underground at a relatively fast rate. Mining into the aquifer exposes it to contamination and can change groundwater flow patterns and rates. This report identifies many mining projects to create ponds and others where surface mining extended into the aquifer. Subsurface mining can produce valuable “river stone”. There are reports that at least one mine has dredged up to 100 feet into aquifer. Some operations use dewatering pumps and conduct on sand washing and material processing.

Cranberry operations use two types of ponds. The first is a water supply pond to irrigate the bogs, referred to as a “water hole”. Sometimes the cranberry landowner claims the pond will replace water withdrawals from a sensitive resource, such as a river. See Appendix 2, Site Profile for 0 Meadow Street, Carver. Research to date has been unable to confirm that the landowners actually use the pond instead of the river or other source.

## Part III: Laws and How They Are Evaded

Second, numerous cranberry operations have been building unlined “tailwater recovery ponds”. They claim polluted water from bog operations will be discharged into the new pond instead of to a sensitive resource like a wetland or water body. The water discharge is referred to as “irrigation return flows” and results from flooding the bogs for harvesting. This water is contaminated with agricultural chemical fertilizers and pesticides. The application may claim that construction and use of the pond will benefit the environment by eliminating pollution discharges to wetlands and ponds. Efforts to document whether the tailwater ponds are actually being used and are benefitting water quality have been unsuccessful. The University of Massachusetts Cranberry Station in Wareham, the Agricultural Research Service of the U.S. Department of Agriculture and the Natural Resources Conservation Service (NRCS) Agricultural Extension Service were asked for site specific data on the water quality benefits of specific tail water recovery ponds but provided only theoretical case studies. The Plymouth ZBA that grants permits for tailwater recovery ponds was unable to provide any data to support the claim of water quality benefits. In the case of a tailwater pond in Plymouth that is supposed to eliminate discharges to White Island Pond, there is no evidence of a benefit to water quality and no evidence that anyone is even checking. See Appendix 2, Site Profile for 150 Firehouse Road, Plymouth.

### 2. Sanding The Bogs or Mining?

Some cranberry growers claim an exemption from earth removal permitting by asserting the earth removal is to excavate sand for cranberry bog maintenance. Research appears to show that this is used as a pretense to conduct mining without a permit. Traditionally, cranberry bog maintenance entails applying sand to the bogs for nourishment. In addition, bogs are periodically renovated using earth materials including sand and peat. However, the volume of sand and peat needed for periodic sanding and bog renovation is minute compared to the volumes being extracted. Sanding the bogs occurs only every three to five years and requires only a thin layer of two to three inches of sand. Traditionally, cranberry bogs have a nearby “borrow pit” for a sand supply in the remnants of the adjacent hill (where often the land was leveled and mined to install the bog). Some cranberry landowners claim they are using the pit solely for use on their own bogs.

## Part III: Laws and How They Are Evaded

Researchers have also documented that some cranberry growers claiming this exemption claim they are taking sand from their land in one town to a bog in another town. This makes it difficult to track where the sand is going.

### 3. The World's Largest Cranberry Grower

A.D. Makepeace Cranberry Co. (Makepeace), based in Wareham, claims to be the world's largest cranberry grower and Massachusetts' largest landowner. It owns about 12,000 acres in Southeastern Massachusetts with about 1,750 acres of that used for cranberry agriculture. [3] Makepeace has diversified business operations in real estate development and sand and gravel mining and distribution. Its subsidiary Read Custom Soils, LLC is located on Federal Road in Carver adjacent to the Ocean Spray processing facility. Some reports state Read is the largest supplier of sand, gravel and earth materials in the Northeast United States. The Read website states it is located in the "heart of its endless reserves" of sand.

#### " Why buy from Read?

**Read Custom Soils offers the most consistent source of sand. Period. We literally have millions of cubic yards of sand reserves that guarantee a consistent source for the foreseeable future. What's more, our unique sand has virtually no silt or clay content. It is perfect for USGA applications."**

- Read Custom Soils LLC

Website accessed 5/24/2023  
<http://readcustomsoils.com/golf-courses>

[3] "Today, the company farms some 1,750 acres of bog in the towns of Carver, Middleborough, Plymouth, Rochester and Wareham." A.D. Makepeace Co. [admakepeace.com/cranberries/](http://admakepeace.com/cranberries/) accessed 5/28/2023

## Part III: Laws and How They Are Evaded

The Carver Earth Removal Committee has awarded Makepeace at least eleven permits to mine sand and gravel for commercial sale based on public records.. Plymouth awarded Makepeace the largest known permit. The two municipalities issued the permits claiming that the mining is agriculture. The company has conducted mining at other sites with no permits. Data appears to show the company has mining operations at least twenty locations, historic or active. About 2/3 of the total volume estimated by this report appears attributable to this company. (See, Part III for an explanation of how volumes were calculated.) Makepeace has made public plans for two proposed mining operations totaling about 3 million cubic yards. Its 7.2 million cubic yard operation in Plymouth is underway.

Makepeace's mining operations are extensive. It uses 60 independent truck operators and supplies "12 customers in Massachusetts involved in manufacturing concrete and asphalt. In addition, Makepeace sells earth materials to numerous other customers in Massachusetts and New England, including youth sports leagues, towns, school districts, colleges and universities, and Massachusetts state agencies". See, Affidavit of Makepeace President and CEO, October 24, 2022, Superior Court Civil Action No. 2283 CV 00585.

Perhaps the largest contiguous area of mining in the region is on Makepeace lands on Federal Road in Carver. This area surrounds the company's Read Custom Soils facility. About 150 acres is being mined including an 85 acre site allegedly cranberry agriculture. Meanwhile, adjacent to this site is 46 Federal Road where Makepeace has been mining since 2008 for the construction of new bogs and ponds which are not yet built. See Appendix 2, Site Profiles for A.D. Makepeace sites in Carver.

Municipal bodies at all levels routinely reject the notion that the industrial scale of earth removal in the region and at specific sites is not "agriculture" but prohibited stand alone mining.

## Part III: Laws and How They Are Evaded

### D. Mining for Subdivisions

A 1967 state law prohibits municipalities from banning earth removal done “in compliance with the requirements of a subdivision plan approved by the town planning board.” 1967 Mass.Acts 870.; G.L. 40, Section 21(17). Municipal bylaws incorporate these exemptions with the caveat that the permit applicant must show the volume of earth to be removed is “necessary” to site the project and not a pretense for mining.

“Planning boards in towns with [General Law Chapter] 40 regulations have found themselves confronted with what they suspected were “fake” subdivision plans: massive earth removal operations masquerading as “site preparation.” (Dawson, *Earth Removal and Environmental Protection*, page 171.) In the legal case of *DeMatteo Construction Co. v. Board of Appeals of Hingham*, 3 Mass. App. Ct. 4456 (1975) the town called the subdivision plan a “ruse” to access sand and gravel for a mining operation. Municipal bodies in Plymouth and Carver reject challenges that massive industrial scale mining operations are something other than “subdivisions.”

An example of a mining operation approved as a “subdivision” is the site at 10 Collins Avenue in Plymouth. The Town of Plymouth Planning Board, Zoning Board of Appeals and Building Commissioner approved the mining operation as “necessary” to prepare the site for a commercial use. The excavation is digging about 50 feet below the surrounding land. The adjacent buildings were built on the existing topography without digging out 50 feet of sand and gravel. The landowner claimed mining the sand and gravel to lower the building site was necessary to shield the building from the view of tourists on Route 3. See Appendix 2, Site Profile for 10 Collins Ave., Plymouth for more information.

## Part III: Laws and How They Are Evaded



Above: 10 Collins Ave., Plymouth, Feb. 22, 2023. Photo credit:  
[jonesriver.smugmug.com](http://jonesriver.smugmug.com)

# Part III: Laws and How They Are Evaded

## E. Laws regulating the impacts of sand and gravel mining

### 1. Forests and Biodiversity

Laws for the protection of forests and biodiversity from mining are rarely enforced.

Southeastern Massachusetts is home to the globally rare Atlantic Coastal Pine Barrens forest one of three on Earth. The ecosystem includes 40 Natural Communities, groups of plants and associated animals classified and described by their dominant biological and physical features.

About 200 species of plants and animals found in the region are listed for protection under the Massachusetts Endangered Species Act are found in this area. The law is G.L. c. 131, Sections 1-7; 321 C.M.R. 10.00 . Killing the species or destroying their habitat requires a state permit or mitigation plan. The state Natural Heritage and Endangered Species Act (NHESP) in the Division of Fisheries and Wildlife (MassWildlife) is responsible for the MESA law. NHESP maintains a GIS database called *BioMap: The Future of Conservation in Massachusetts* that identifies the protected habitats of plants and animals. Some species are listed under the federal Endangered Species Act. Mining in Priority Habitats requires approval from NHESP under the MESA law.

This report documents that mining operations claiming to be cranberry agriculture exploit protections in the MESA law for agriculture. This report provides examples in Part II(A). Site Profiles for the mining sites provide specific details. NHESP has permitted the “take” of many Pine Barrens species by mining operations that then install large ground mounted solar project. See Appendix 2, Site Profiles for 160 Tihonet Road and 71 Charlotte Furnace Road in Wareham and 276 Federal Road in Carver for a few examples.

# Part III: Laws and How They Are Evaded

## 2. Native American History and Culture

Laws administered by the Massachusetts Historical Commission (MHC), MEPA and federal agencies require that mining operations do not destroy or disturb areas of importance to Native American people without proper review. These laws include the National Historic Preservation Act (Section 106 consultation) and the Native American Graves Protection and Repatriation Act (NAGPRA) that protects graves from mining operations. MHC operates behind a cloak of secrecy and unlawfully claims that archeological surveys and information about its regulatory reviews are not “public records”. The MHC’s failures are the key reason why archeological sites are being destroyed by mining.

Southeastern Massachusetts is the ancestral home of the Wampanoag people who occupied the land for millennia before colonization by Europeans. The land still contains archeological evidence of Indigenous people’s presence on the land. This includes artifacts, homesites, burials, and encampments. The land also has cultural and spiritual significance for Indigenous people. When mining is done without proper archeological review this physical, cultural and spiritual history is permanently erased.

Most mining projects completely evade archeological review for a number of reasons. MHC and other agencies allow projects that undergo archeological review to avoid a thorough and transparent analysis. Many project applications to MHC and MEPA appear incomplete, misleading and inaccurate and fail to accurately describe the scope and scale of mining operations. The agencies ignore the obvious impacts of the extensive land alterations and excavation caused by mining.



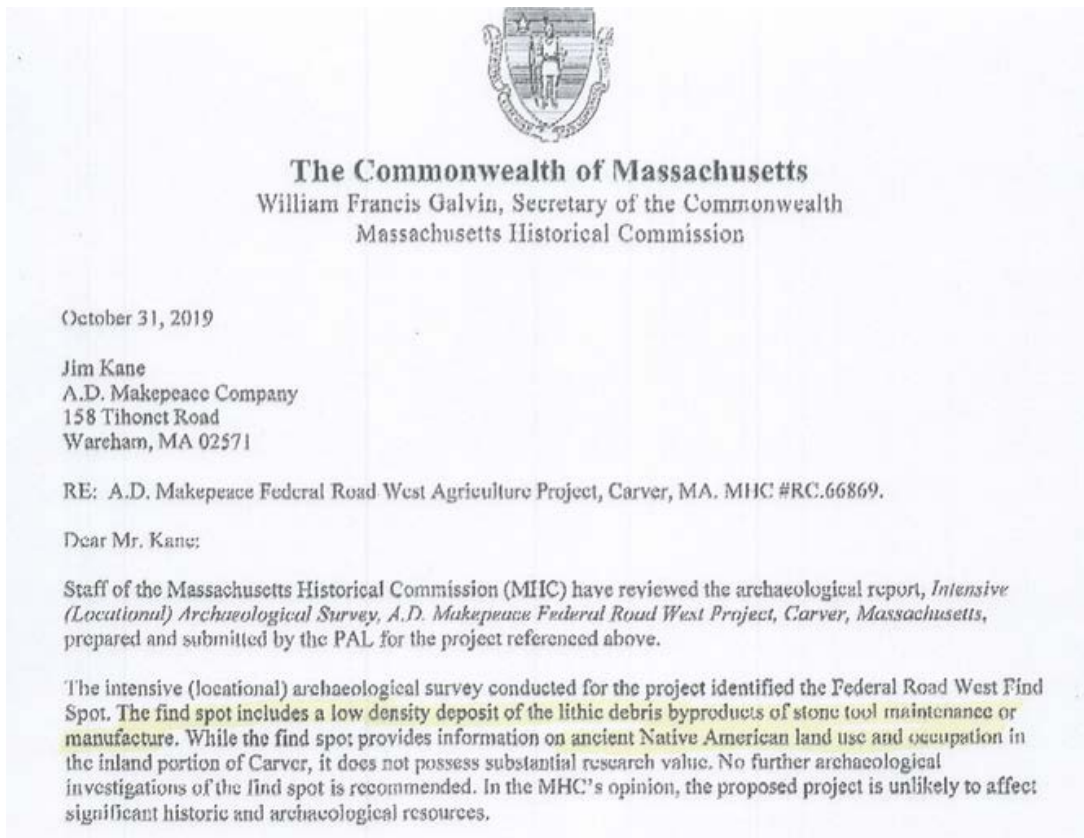
## Part III: Laws and How They Are Evaded

About 71% of the mining operations in this report claim they are cranberry agricultural projects. "Agriculture" implies that the depth of the land disturbance will be only a few feet. In reality, mining operations for agriculture can level hills by 20 to 50 feet or more increasing the likelihood of disturbing archeological sites. Mining for subdivisions also appears to evade proper archeological review by inaccurately describing the full extent of the project. When MHC does review a mining project, even where archeological surveys document evidence of Indigenous use and occupation of the land, MHC approves the project making findings such as the evidence has no "substantial research value" for this state agency. This is done behind closed doors and without a fair and open process for consulting with Indigenous people who are impacted.

Research for this report evaluated at least twelve A.D. Makepeace Co. mining projects portrayed to MHC as "agriculture" or "site preparation" for industrial ground mounted solar projects. MHC allowed the mining to continue at many of these sites, even where preliminary surveys showed evidence of Indigenous people's use and occupation of the land. See, Appendix 2, Site Profiles for 71 Charlotte Furnace Road, Farm to Market Rd., 160 Tihonet Road, and 140 Tihonet Road. in Wareham; Carver sites at 24, 46, 59 and 276 Federal Road, and Swan Holt; and Off Federal Rd./Tihonet in Plymouth. MHC never required more in depth surveys where evidence was found, according to this research.

For example, in 2019 MHC found that although a preliminary archeological report for a proposed Makepeace mining site at 59 Federal Road, Carver contained evidence of Native Americans including stone tool making artifacts, these did not have "substantial research value" for MHC. MHC approved the mining and it is underway. Makepeace portrayed the project as agriculture. It is 85 acres of mining for over 4 million cubic yards of sand and gravel. See Appendix 2, Site Profile for 59 Federal Road, Carver for more information. An excerpt of the letter is below.

## Part III: Laws and How They Are Evaded



Above: Letter from State Archeologist Brona Simon to A.D. Makepeace company for the "agriculture project" at 59 Federal Road, Carver shown below.



## Part III: Laws and How They Are Evaded

In 2010, the MHC identified Makepeace's mining site at 46 Federal Road as containing such significant evidence of Native Americans that it was potentially eligible for listing on the National Register of Historic Places. MHC required further study and possible protection of the site. MHC will not provide evidence this was done. Makepeace portrayed the project as agriculture. It is now about 50 acres of mining. See Appendix 2, Site Profile for 46 Federal Road, Carver for more information.

The mining site at 0 Spring Street is in Annasnappet Pond archeological site area where previous surveys revealed Archaic artifacts between 8,000 and 6,000 years, some of the most significant in the Northeastern United States. The archeological study for the mining operation appears insufficient. In 2018, MEPA stated the MHC found the mining operation is "unlikely to result in any effect on significant historic or archeological resources" based on an incomplete survey. MHC has refused to make compliance records available. See, Appendix 2, Site Profile for 0 Spring Street, Carver for more information.

### 3. Ground and Surface Water

Federal Safe Drinking Water Act (SDWA). The U.S. Environmental Protection Agency designated most of the area covered by this report as a Sole Source Drinking water aquifer under the SDWA in 1990. The Plymouth-Carver Aquifer Committee was formed to study how to protect the Aquifer and issued the *2007 Aquifer Action Plan Final Report*. The report recommended addressing the impacts of sand and gravel mining on the aquifer. The Report Section 5.1 reviews municipal sand and gravel bylaws and urges municipalities to use them to reduce "potential contamination of aquifer" and "adverse effects to landscape" (Fuss & O'Neill, 2007, Table 13). None of the Report's recommendations have been followed, and the Committee was disbanded.

The SDWA requires development projects receiving federal funding to be evaluated by the EPA for their impacts to the Aquifer. If EPA determines that the project may contaminate the Aquifer, it may prevent federal funds from being used for the project. No sand and gravel mining project has been reviewed under the SDWA despite clear adverse impacts to groundwater and repeated requests from residents to the EPA to get involved.

## Part III: Laws and How They Are Evaded

State Drinking Water Regulations Massachusetts drinking water regulations administered by MassDEP protect the aquifer from the impacts of sand and gravel mining. The laws prohibit earth removal within four feet of the historical high groundwater table around public drinking water wells:

“Wellhead protection zoning and non-zoning controls.....shall collectively prohibit the siting of the following....The removal of soil, loam, sand, gravel or other mineral substance within 4 feet of the historical high groundwater elevation table,” 310 CMR 22.21(2)(b)(6). State agencies ignore mining operations that mining into the groundwater in violation of the state drinking water regulations. This report identifies numerous sites where mining in the aquifer has occurred and continues to occur. See Appendix 2, Site Profiles for Fuller Street, Carver Johnson Brothers Cranberry/Ryco Excavating.

Some municipal bylaws establish aquifer protection districts that also prohibit mining within a certain number of feet of the groundwater table. Municipal officials nonetheless issue permits for mining in these districts. See Appendix 2, Site Profile for 59 Federal Road, Carver.

Water Management Act The state’s Water Management Act (WMA) requires a permit to withdraw more than 100,000 gallons a day from a water source. This law relates to sand and gravel mining because when a landowner claims it is excavating a pond to supply cranberry bogs with water, the law requires reporting and accounting for that water use. The WMA requires cranberry bog owners to file annual reports of water use and registration renewal.

Cranberry bog owners were “grandfathered” the right to use a certain water volume from a nearby water source such as a river. Some cranberry bog owners continue to withdraw water from rivers and other water bodies while also claiming that their ongoing mining is necessary to build the alternative water supply. This report documents numerous earth removal permits obtained under the claim that mining was necessary to create a cranberry pond to help the environment by eliminating the grower’s water withdrawal from a sensitive waterway such as a river. Cranberry bogs have Water Management Act registrations allowing them to withdraw water from specific water sources and the promise made is that these withdrawals would end. Research for this report has not been able to document that this is the case.

# Part III: Laws and How They Are Evaded

## 4. Human Health, Safety, and Welfare

Sand and gravel mining and processing emits dust and creates noise and vibration of the earth. It emits silica dust, a carcinogen. See, Part II, Impacts. There are no state or federal standards in Massachusetts that limit silica dust emissions from sand and gravel mines. Municipal boards of health regulate noise and dust emissions, but there is no known instance of enforcement against mining operations despite repeated, on going reports from residents. There has been no environmental regulation or control of these emissions. Regulators simply fail to do their job.

## 5. Environmental Studies and Climate Impacts

The Massachusetts Environmental Policy Act (MEPA) law requires environmental impact studies for projects that meet a size criteria and involve state permits or funding. The state office that administers the law, the MEPA Unit under the Secretary of Energy and Environmental Affairs, allows mining operations to evade review using misinterpretations of the law that favor the cranberry industry and mining operators. In the 2018 MEPA Certificate for the Ricketts Pond Business Park development project, a large mine on Spring Street in Carver, MEPA effectively ignored the impacts of the sand and gravel mining. In 2022, Save the Pine Barrens requested that MEPA review of A.D. Makepeace's mining operations under the Special Review Procedure in EEA # 13940. MEPA refused to address the mining impacts stating the "MEPA thresholds" do not address "depth and volume" of land alteration caused by mining and that there is no "agency actions" involved in Makepeace's mining operations that claim to be agricultural projects. See, MEPA Certificate #13940, June 1, 2022. This MEPA decision was erroneous.

The National Environmental Policy (NEPA) is the federal counterpart to MEPA. It was triggered by at least one mining operation, the SLT Construction project for the Ricketts Pond Business Park on Spring Street in Carver that was sold to SLT by MassDOT that acquired it with federal highway funds. There are questions about whether NEPA was properly followed.

# The Economics of Sand

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Cranberry agriculture?  
Or sand and gravel  
mining?

# Part IV: The Economics of Sand

## A. Overview

“Follow the Money” to unravel the story of sand and gravel mining in Southeastern Massachusetts. “Yellow gold” is the local term for the deposits of the unique quartz-like materials the U.S. Department of Agriculture classifies as “Carver sand”. The global sand shortages and skyrocketing prices are causing the frantic rush to extract as much as fast as possible from the region. Forbes Magazine reports “the price of sand [globally] has about quintupled in the past 30-40 years.”

For landowners with these sand deposits mining the earth for commercial sale is windfall. Many cranberry landowners have owned their land for decades, keeping their land in Chapter 61A to reduce real estate taxes and can profit substantially by mining. While cranberry prices continue their decade long free fall sand mining is easy money. [4] It is easy and cheap to obtain a permit from the municipal bodies who are sympathetic to the cranberry industry and developers. In Carver, an earth removal permit costs \$100.00. The ERC allows mining operators are allowed to recycle 10 year old engineering plans for permit applications making permitting a smooth sail. See Appendix 2, Site Profiles for Off Meadow Street, Carver (Alex Johnson Co.) and 46 Federal Road, Carver (A.D. Makepeace Co.). As so-called “agricultural” businesses, some mining operators obtain federal and state agricultural subsidies intended for legitimate cranberry agriculture. Cranberry landowners engaged in sand and gravel mining also benefit from state tax incentives, the Chapter 61 current use program and solar subsidies.

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[4] Source: United States Department of Agriculture. While the price for fresh berries was up to \$49.20 per barrel from \$47.40 in 2021, only a fraction of berries harvested are sold as fresh berries. The value of cranberries produced in Massachusetts in 2022 was \$79,158,000 for processed berries compared to \$3,002,000 for fresh berries. The crop value has ranged from a high of about \$150 million in 2015 to a low of about \$79 million in 2021.

# Part IV: The Economics of Sand

## B. Demand for Sand Driving Up Profits

### 1. Prices

In the last five years, the market price of sand and gravel in the region has gone up five fold according to one source. According to expert testimony, in 2016 the price of sand was at least \$2.50 per cubic yard. (Indianhead Realty, Intervenor's Post-Trial Brief, 2018, footnote 6). [5] A 2023 phone survey shows the current retail price is \$7 to \$57 depending on the type of material, with an average price of \$24.48<sup>1</sup>. Price lists from two suppliers, Ryco Excavating in Middleboro MA and Maderios & Sons Construction Inc. in Dartmouth MA show a similar range. An expert analysis puts the average price at about \$16.25 per cubic yard. The prices vary depending on the type of aggregate product (sand, gravel, stones etc.). Stones separated out command a significantly higher price.

### 2. Profits

Sand and gravel mining is extremely profitable. The overhead cost is minimal and the capital investment is basically the cost of an excavator and operator. The trucking is usually done by independent contractors. (A.D. Makepeace Cranberry Co. uses about 60 independent truckers to haul sand and gravel from its sites.) Based on one analysis, as prices have risen profits on one million cubic yards may have even doubled<sup>2</sup>.

The current profit on a cubic yard of sand is currently about \$5.00 or \$5 million for 1 million cubic yards according to sources used for this report. Municipal earth removal permits typically allow excavation of anywhere from 500,000 cubic yards, worth \$2.5 million in profits. The Plymouth Zoning Board of Appeals in 2014 awarded A.D. Makepeace Cranberry Co. the largest known permit ever issued, for 7.2 million cubic yards worth about \$70 million in profits at today's prices. The permit is allegedly for building cranberry bogs over 20 years. Makepeace has started the mining project which will eventually cover 217 acres, obliterating hills and pristine forested Pine Barrens.

*[5] See, trial testimony in Indianhead Realty, Inc. v. Peter Conner et al (Plymouth Zoning Board of Appeals). The town of Plymouth denied Indianhead Realty a sand and gravel permit and the landowner has filed four lawsuits against the town to try to obtain the permit. See, Massachusetts Land Court Dockets 01 MISC 272013 (2001); 14 MISC 486199 (2014); 15 MISC 00285 (2015); and 16 MISC 00727 (2016). The latest lawsuit is in litigation.*



## Part IV: Prices, Profits, and Subsidies

In July 2020, the Carver Earth Removal Committee granted Makepeace an Earth Removal Permit for another large permit, 4 million cubic yards worth about \$20 million in profits. See Appendix 2, Site Profile for 59 Federal Road, Carver.

### 3. Earth removal permit fees

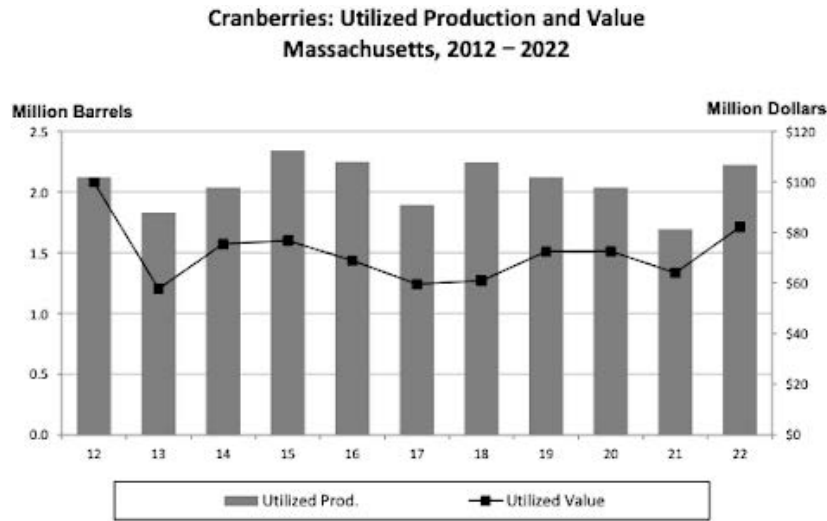
Municipal earth removal laws typically impose a fee per cubic yard of earth removed. Typical fees range from 10 to 25 cents per cubic yard in Carver, depending on whether the removal is “agricultural” or commercial. In Wareham it is 25 cents per cubic yard. The Plymouth Zoning Board of Appeals asks for a “gift” of 10 cents per cubic yard. Of these three municipalities, only Wareham has the fee written into the bylaw. Imposing a fee appears to be in the discretion of the local body.

A.D. Makepeace Co. may have evaded an estimated \$625,000.00 in earth removal fees by conducting commercial mining in Wareham without a permit according to a March 17, 2023 Notice of Intent to Sue Letter sent to the Town by a Ten Residents Group to the company and the Massachusetts Attorney General under the state’s Citizen Suit Law. (Wareham Notice, 2023) In 2021, the Town confirmed the Selectboard had not issued earth removal permits to A.D. Makepeace for mining at the 160 Tihonet Road site. (Wareham, 2021). The Town has not confirmed any earth removal permits were issued to A.D. Makepeace for any sites in the Town despite requests. Yet, as shown in this report, it appears A.D. Makepeace conducted mining operations at numerous Wareham sites on at least 130 acres. See Appendix 2, Site Profiles for 71 Charlotte Furnace Road, 160 Tihonet Road, Farm to Market Road. In its April 14, 2023 reply, A.D. Makepeace does not deny doing earth removal but asserts it did not damage the environment. (Makepeace, April, 2023). The Town and Attorney General never responded to the Notice of Intent to Sue.

### C. Cranberry Economics vs. Sand and Gravel Mining

Selling sand and gravel is far more profitable than growing cranberries. A.D. Makepeace Cranberry Co. of Wareham, the world’s largest cranberry grower is wholly dependent on sand and gravel revenues according to testimony from its President and CEO. The cranberry economy is in a decades long decline with no sign of recovery any time soon - despite decades of taxpayer funded infusions of cash: the Massachusetts “Cranberry Revitalization Grant” program and an ever expanding list of tax breaks including Chapter 61 exceptions for solar on cranberry bogs.

## Part IV: The Economics of Sand



*Source: United States Department of Agriculture, May 8, 2023 "Massachusetts Cranberries"*

Health conscious consumers are rejecting sweetened cranberry products: Ocean Spray Cranberry Juice has more sugar than cola. Other parts of North America have lower costs of production for cranberries. About 95% of cranberries are used for processed foods.

About 20 to 25 companies claiming to be primarily cranberry growers are responsible for about 75% of the sand and gravel volume documented in this report. The reasons are simple: the cranberry industry owns about 62,000 acres and includes the state's largest landowner, A.D. Makepeace Cranberry Co. that owns about 12,000 acres. Growing cranberries is a break even business according to government sources. Of the 62,000 acres owned by cranberry companies, only about 23% of 14,000 acres are used for agricultural production (as of 2021). Most of the land contains valuable sand deposits.

The repeated, decades long claim by the cranberry industry that earth removal is necessary to expand the region's cranberry bogs to produce more berries does not add up. Why expand your business by building more bogs, tailwater ponds and reservoirs when the market for your product is flat at best? The numbers tell the story.

## Part IV: The Economics of Sand

For example, A.D. Makepeace regularly produces about 375,000 barrels of cranberries, generating gross revenue in 2021 of about \$14.5 million based on the price of a barrel (about \$36-37.00). Makepeace reports the aggregate acres of cranberry bogs it maintains in production has not changed substantially over the past decades - remaining at about 1,700 acres in total. The profit margin, if any, for a barrel of cranberries, at this time, is break even at best according to the University of Massachusetts Cranberry Station. In comparison, one mining permit from the Carver ERC is worth about \$20 million in profits over a few years and requires little overhead or capital investment. This is almost straight profits with none of the costs of production of cranberries. One mining site could generate more profit in a few years than Makepeace will make in annual gross revenues from growing cranberries on all of its 1,700 acres of bogs.

Makepeace's mining operations are so extensive and worth the investment that annually the company spends about \$3.7 million in payroll to generate profits from sand mining according to the President and CEO.

### D. Agricultural Subsidies

The Massachusetts Department of Agriculture (MDAR) plays a key role in propping up the cranberry industry with numerous subsidy programs. In addition to crop subsidies, the companies also benefit from real estate tax subsidies and solar energy subsidies.

#### 1. State Cranberry Revitalization Grants

As of 2023, MDAR's "Cranberry Revitalization" grant program is in its fifth year with more grants planned for fiscal year 2023. Some of the largest grant recipients have been conducting industrial scale mining operations for decades. The program awards about \$1 million per year to about 20 different "cranberry" companies. The grant program grew out of the 2016 MDAR "Cranberry Revitalization Task Force, Final Report: A review of the Massachusetts cranberry industry, the complex challenges ahead and recommendations geared towards stabilizing and revitalizing this critical sector of agricultural production." MDAR subsidized improvements such as "squaring off bogs" is linked to very large earth removal projects. Some growers claim they have to dig ponds or expand into upland in order to "stay competitive."

## Part IV: The Economics of Sand

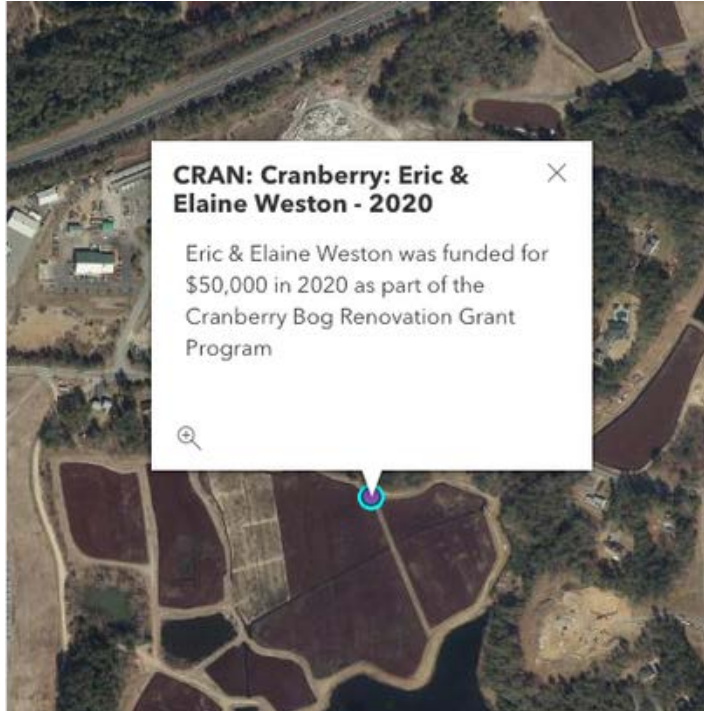
*“The importance of staying competitive was emphasized through renovation, modernization, retooling, and rehabilitation, though it is expensive. Removing old vines, squaring off bogs, and leveling the base can cost upwards of \$10K/acre. Renovating older bogs that are not level may require a 4”-10” layer of coarse sand. 1,100 yards/acre sand can cost from \$5/yard.”*

*-Matt Beaton, Sure-Cran Services, 2019 MDAR Report, Renovation Initiatives subcommittee, Introduction.*

The Carver-based Federal Furnace Cranberry received an MDAR grant of \$49,000.00 and federal agricultural subsidies of \$303,407.00. The company has been conducting earth removal since about 2010. The company has mined at least 2,250,000 cubic yards from the site. Some of the mined areas now have large “dual use” ground mounted solar installations subsidized by the Massachusetts Department of Energy Resources (DOER) SMART solar program. See Appendix 2, Site Profile for 104 Tremont Street, Carver.

The Morse Brothers, Inc. cranberry operation on Lignan Street in Middleborough received an MDAR grant of \$75,000. See Appendix 2, Site Profile for Lignan Street, Halifax. The company is also associated with commercial sand and gravel mining.

# Part IV: The Economics of Sand



North Weston Cranberries, Inc. received an MDAR grant of \$32,000. The Carver Earth Removal Committee gave the company an earth removal permit in 2021 that will generate about 1 million in profits. The company may also have received a grant for \$50,000 in 2020. Source: MDAR “Storyboard” from MDAR Website, accessed April 2023. See Appendix 2, Site Profile for 0 Plymouth Street, Carver.

## 2. State Cranberry Bog Renovation Tax Credit

This law provides a tax credit for companies “primarily engaged in cranberry production” who have cranberry production revenue “equal to 50% or more of its total revenue.” Many cranberry operations are engaged “primarily” in sand and gravel mining for commercial sale – not cranberry production. Whether the company is “primarily” engaged in cranberry agriculture or commercial mining is easily determined when revenue from cranberries is measured against that of sand mining sales. See, 301 CMR 16.01 and 16.02, the Cranberry Bog Renovation Tax Credit program. A “Taxpayer Primarily Engaged in Cranberry Production” is allowed a credit against the state taxes equal to 25% of the total “Qualified Renovation Expenditures” incurred in connection with the Qualified Renovation of a Cranberry Bog during a taxable year.

# Part IV: The Economics of Sand

## 3. Federal Agricultural Grants

The Environmental Working Group (EWG) Farm Subsidy Database shows total federal US Department of Agriculture subsidies in Plymouth County from 1995 to 2021 totaled just over \$30 million (the data base states 93 percent of farms in MA did not collect subsidies). In 2021, commodity subsidies for Plymouth County totalled \$444,000. Some of the top recipients of federal farm grants are mining operations. For example, from 1995 to 2021, the top 7 grant recipients in Carver, Massachusetts are cranberry companies engaged in commercial sand and gravel mining during this period.

| <b>Name of Cranberry Company</b> | <b>Grant Amount</b>    |
|----------------------------------|------------------------|
| Federal Furnace Cranberry        | \$303,407.00           |
| Oiva Hannula & Sons, Inc.        | \$262,532.00           |
| Edgewood Bogs LLC                | \$259,244.00           |
| Slocum Gibbs Cranberry Co. *     | \$212,404 (2019, 2020) |
| River's Edge Realty Co. LLC *    | \$30,122 (2020)        |
| Weston Cranberry Corporation     | \$205,449              |

## 4. Real estate tax subsidies

“The Chapter 61 programs give Massachusetts landowners ... an opportunity to reduce [their] property taxes in exchange for providing important public benefits like clean water, wildlife habitat, rural character, wood products, food, and outdoor recreation,” (Van Fleet et al.).

## Part IV: The Economics of Sand

To obtain the tax benefit the landowner must meet strict requirements to prove every year that the land is in an approved Chapter 61A use, such as agriculture.

“Types of eligible land in Ch. 61A: In addition to meeting the minimum acreage requirement, the landowner must demonstrate annual agricultural product sales of at least \$500 for the first 5 acres and \$5 for every additional productive agricultural acre or \$0.50 for every additional productive forestland acre,” (Van Fleet et al.).

Each year, the landowner must certify under oath that the land is in agricultural use. If the landowner uses Chapter 61A to evade taxes they can be subject to a criminal fine or imprisonment. Some cranberry landowners in Southeastern Massachusetts use their land for sand mining while claiming Chapter 61A status.

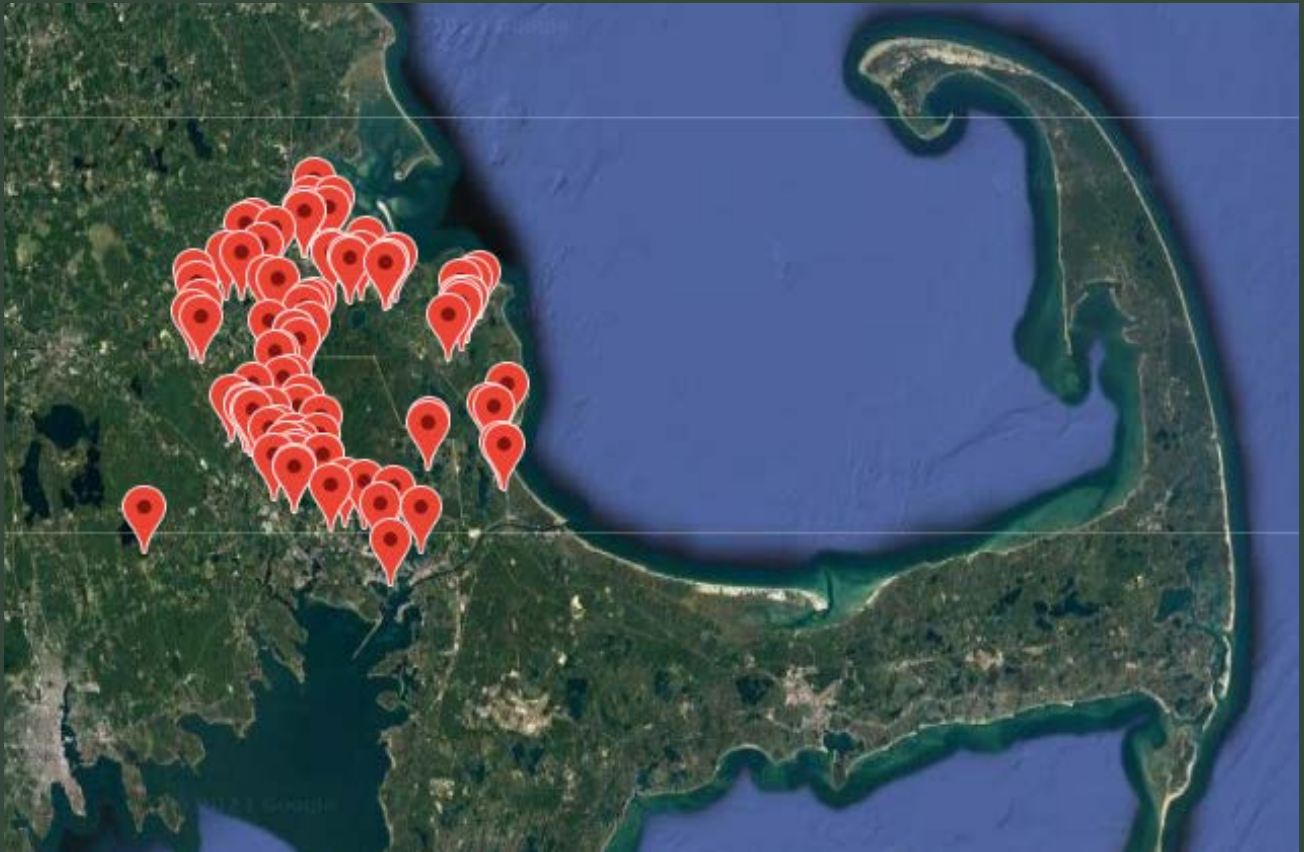
### 5. Solar subsidies

Many “cranberry” landowners conduct sand and gravel mining operations, then install large ground mounted solar arrays after the sand is extracted. These solar projects are subsidized by rate payers through the Massachusetts “SMART” solar program at the Department of Energy Resources. These include subsidized “dual use” agro voltaics, where sand mining is sometimes conducted on adjacent or upland parts of the site. Appendix 1 to this report identifies mining sites where solar is being installed or proposed.

### 6. Cranberry industry labor practices

To keep the cost of production as low as possible some cranberry growers employ temporary farm laborers. Often these are immigrant day workers from nearby cities like New Bedford. The workers are subjected to brutal and unsafe working conditions. Safety practices to protect them from the heavy pesticide and fertilizer applications are often absent. The growers do not always provide proper training on the use and application of these pesticides that include Round-up, Caseron and others.

Historic documentation raises questions about unfair labor practices in the cranberry industry.



# The Mining Sites



# Part V: The Mining Sites

## A. Overview

This Report provides detailed information on the approximately 110 sites identified through years of research and review of records. It estimates at total volume of earth removed to be about 61 million cubic yards, enough trucks to circle the globe 1.3 times. Many more sites are undetected.

Most information is from public sources. It is presented in two ways: **Appendix 1** is a Table summarizing the sites and volumes and **Appendix 2** contains separate Site Profiles on each location. Appendices 1 and 2 are available at the website: [www.sandwarssoutheasternma.org](http://www.sandwarssoutheasternma.org)

Where available, the Appendices contain this information:

- Street and/or assessor's map and lot number
- Satellite image view before and after the mining operation
- Landowner's name and trucking/excavation company
- Volume of earth removed based on permit information or the Digital Elevation Model described below
- Size in acres
- Duration of the operation and whether active or not
- Claimed reason for mining (cranberry agriculture about 75%, subdivision or other about 25%)
- Environmental Justice populations, if any
- Proximity to Zone II of protection for public drinking water wells and/or location in the Plymouth Carver Sole Source Aquifer
- Whether the mining operation obtained agricultural or solar subsidies
- Wetlands and waterways impacted
- Use of the site for industrial ground mounted solar

# Part V: The Mining Sites

## Example: Appendix 2 Site Profile 0 Rear Plymouth Street/Plymouth and Carver Franklin Marsh Cranberry Co.

Profiles for about 110 sites are available at  
[www.sandwarssoutheasternma.org](http://www.sandwarssoutheasternma.org)

Location: 0 Rear Plymouth Street, Border of Carver and Plymouth MA



**Owner:** Franklin Marsh Cranberry LLC, Carver MA

**Operator:** Ryco Excavating, Middleboro, MA

Area Impacted: 18 acres

**Volume of Earth Removed:** Estimated at 2,494,913 cubic yards.

**Permit:** Plymouth Zoning Board of Appeals issued [a permit in 2018](#) for 635,000 cubic yards for cranberry agriculture and then issued two extensions of the Permit. The Carver Earth Removal Committee issued a permit in March 2018 for 410,000 for cranberry agriculture. The permits from both Towns are expired and were unlawfully granted. [An enforcement request was sent to Carver in 2022](#) and ignored. Operations are believed to be continuing as of mid-2023. On August 31, 2023, the Carver ERC met to "close out" the permit. The total permitted volume is 1,045,000 cubic yards. There has been no independent verification.

**Claimed Reason for Mining:** Construction of cranberry bog reservoir and new bogs.

There was no evidence that the reservoir is properly sized for the acres of bogs.

**Solar:** Yes, floating solar approved by Plymouth; "Float Lane Subdivision Plan" filed in [Carver for ReWild Renewables \(Portsmouth NH\)](#); application by Beals+Thomas.

- **Water Supply:** Yes, near Plymouth Darby Pond Well.

# Part V: The Mining Sites

## B. Sources and Methods Used to Identify Sites

The following sources were used to identify the sites and information about them:

- Municipal earth removal (mining) permits, and state and federal permits if any;
- Mine Safety and Health Administration (MSHA) database of mines
- Visual observations, drone footage, photographs and local knowledge
- Plymouth Carver Sole Source Aquifer Action Plan, 2007
- MassMapper Data Layers
- Municipal GIS property information
- For Plymouth, an analysis done in 2016 of earth removal permits issued by the Plymouth Zoning Board of Appeals
- For Carver, the Carver Earth Removal Committee (ERC) Earth Removal Permit list 2015 to 2021

# Part V: The Mining Sites

**As of 2015, the Town of Plymouth had lost 22.7 million cubic yards of sand to mining operations – enough to cover 20% of the Town (22 square miles) with a foot of sand (Clark, 2015).**

## **C. Method Used to Determine Earth Removal Volume**

This report estimates that approximately 61 million cubic yards of sand and gravel has been removed from the region since the mid-1990s. This does not include the volume from some of the largest sites or the entire volume removed by subsurface excavation to create a cranberry agriculture pond.

There is no public data base or reliable public source to determine the volumes of earth removed from a site. Mining operations that obtain municipal permits are allowed to self-report the volume removed. Research establishes that the results of self reporting to municipalities are extremely inaccurate and underreport the volumes removed. Records are incomplete or withheld from public view. The depth of excavation for agricultural ponds is repeatedly reported by witnesses and photographic evidence to far exceed the depth shown on permit application plans.

Many large mines operate without earth removal permits particularly in the Town of Wareham. There is no public record of the earth removed at these sites. These regulatory flaws mean because this is no government or other source for determining the volume, it was necessary to develop a model based on public data.

## Part V: The Mining Sites

To estimate the volume, this Report uses one of one of two methods. If the landowner obtained a municipal earth removal permit and visual observation by drone or GIS generally corroborates that the mine is operating with the scope of the permit, the permit volume was used. Alternatively, if the permit could not be located or one was not obtained, the volume was estimated using a Spaceborne Digital Elevation Model (SDEM). The model is combination of topographic data obtained from a satellite, visual observations, and GIS maps. It was created for the purpose of this report. The Space Borne Digital Elevation Model or Merit DEM is presented by topographic-map.com. It is described in Geophysical Research Letters Volume 44, Issue 11 published June 16, 2017 and available here.

(<https://agupubs.onlinelibrary.wiley.com/doi/full/10.1002/2017GL072874>)

The SDEM is a digital survey technique based on satellites that measure topography on the Earth's surface from space. The particular space flight that that produced the data for Southeastern Massachusetts used in this report occurred in February 2000. This produced a snapshot in time of a relatively accurate set of elevations of the topography in the region as of February 2000. Ten "before" elevations of the site were obtained from the SDEM averaged together and used to estimate the elevation before mining.

To determine the "after" elevation for each site, researchers selected a nearby location approximates the current elevation of the chosen site. Ten random points surrounding the site that appear to approximate its current elevation were selected and averaged together. The after elevation was subtracted from the before election to determine the difference. Using this method to estimate the change in elevation, the next step was to draw a polygon around the area disturbed by the mining operation based on MassMapper GIS. Once the total acres disturbed was determined the change in elevation volume was applied across the total acres to obtain a volume. The SDEM model result is a basic mathematical table as shown below.

## Part V: The Mining Sites

### Example of estimation of volume of earth removed using the SDEM method.

The location analyzed below is 71 Charlotte Furnace Road, Wareham MA. Sand and gravel was removed by A.D. Makepeace Cranberry Co. In the chart below, the left column represents the ten random elevation locations chosen to estimate the “before” site elevation and the right column is the then “after” elevations. The ten points are averaged in each column and difference in elevation between the two is shown as 37.7 feet. The acres mined is 50.3 and the 37.7 feet in elevation difference is converted to total cubic yards of 3,059,380. A.D. Makepeace did not obtain an earth removal permit from Wareham for this site so there is no other data available of the volume removed.

| 71 Charlotte Furnace Road | Nearby Pond                     |
|---------------------------|---------------------------------|
| 99                        | 56                              |
| 96                        | 56                              |
| 89                        | 56                              |
| 96                        | 56                              |
| 94                        | 63                              |
| 96                        | 60                              |
| 96                        | 56                              |
| 93                        | 56                              |
| 86                        | 56                              |
| 103                       | 56                              |
| 94.8                      | 57.1                            |
| Difference in Elevation   | Foot to Yard Conversion         |
| 37.7                      | 12.56666667                     |
| Area in Acres             | Acres to Square Yard Conversion |
| 50.3                      | 243452                          |
| Total Cubic Yards         |                                 |
| 3059380.133               |                                 |

## Part V: The Mining Sites

The SDEM method provides an estimate only. Its limitations include the following:

- Only covers sites excavated after the year 2000
- Does not account for excavation and mining below the surface of the land.
- Not possible to measure the depth of excavation below the surface of the land by operations that dredge into the aquifer to create ponds or otherwise.
- Smaller sites are more difficult to assess.
- Remote sites with higher elevations make it difficult to establish a low elevation for an “after” point.

Generally, the highest natural elevations in the region are or were up to about 210 feet (Pine Hills, Plymouth). Generally a 25 acre site with hills up to about 150 feet will yield about 500,000 cubic yards of sand and gravel, without considering the volume of material extracted from below grade in the aquifer. Mining in the aquifer can extend as far as 100 feet according to eyewitnesses.

### Quick Facts:

**Carver: 37 sites over 37 square miles**

**Plymouth: 40 sites over 96.5 square miles**

**Wareham: 15 sites over about 35 square miles**

# Recommendations



Johnson Brothers, Fuller Street, Carver. Satellite view of pond and piles of sand mined from the aquifer, 2021

**Cranberry agriculture?**  
**Or sand and gravel**  
**mining?**



## Part VI: Recommendations

1. Immediately shut down all sand and gravel mining operations pending a thorough investigation and review of all permits, financial incentives and environmental impacts
2. Immediately enforce and implement the Safe Drinking Water Act with regard to the Plymouth-Carver Sole Source Aquifer and sand and gravel mining
3. Investigate the role and responsibilities of the following Massachusetts agencies in allowing and subsidizing sand and gravel mining: Department of Environmental Protection (MassDEP), Department of Agriculture, Division of Fisheries and Wildlife, Department of Transportation
4. Investigate the role of the MassDEP in failing to protect human health and the environment from the impacts of airborne silica dust from mining operations;
5. Immediately investigate the role of Massachusetts Historical Commission in allowing the discretion of Native American sites by the sand and gravel and cranberry industries
6. Convene a coordinated state and federal investigation and environmental assessment of the cumulative impacts of the active and historic sand and gravel mining operations on land, water and human health and well being
7. Immediately suspend Massachusetts Department of Agricultural Resources (MDAR) Cranberry Revitalization Grants for 2023 and beyond pending a thorough investigation of the sand and gravel mining operations receiving subsidies

## Part VI: Recommendations

8. Immediately suspend all Massachusetts Department of Energy Resources (DOER) SMART solar approvals for dual use solar on cranberry lands and ensure an independent investigation by the Office of the Inspector General of all current dual use solar “Statements of Qualification”
9. Investigate fraud in the “current use” real estate tax program, M.G.L. c. 61 as it applies to cranberry and forest land being used for sand and gravel mining in the Towns of Carver, Plymouth, Wareham, Rochester, Middleboro, Plympton, Halifax and others
10. Fund and implement training for municipal officials on the impacts of sand and gravel mining on the aquifer and how it relates to their duties and responsibilities, including selectboards, planning boards, conservation commissions, earth removal permit granting authorities (Carver Earth Removal Committee, Plymouth Zoning Board of Appeals, Wareham Selectboard etc.), boards of health, water commissioners, and building and zoning enforcement officers
11. Create legislation to establish an Atlantic Coastal Pine Barrens Commission with development oversight similar to the Cape Cod Commission
12. Work with the United Nations Environment Program to pursue best practices for sustainable alternatives to using sand for industrial uses

“Whoso diggeth a pit shall fall therein; and he that rolleth a stone, will return upon him.” *Proverbs, XXVI, 27*

Alexandra D. Dawson, Esq, *Earth Removal and Environmental Protection*,  
Boston College Environmental Affairs Law Review, 1974

*This report was produced by Community Land and Water Coalition (CLWC) and a network of volunteers. CLWC is a project of Save the Pine Barrens, Inc., a non-profit corporation. CLWC's mission is to preserve, protect and steward the land and water resources of Southeastern Massachusetts.*

*For more information: [www.communitylandandwaters.org](http://www.communitylandandwaters.org)  
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# Appendices

# References

Visit

[www.sandwarssoutheasternma.org](http://www.sandwarssoutheasternma.org)

To view drone footage and  
film *Sand Wars in Cranberry Country*  
visit

You Tube *Save the Pine Barrens*  
*Southeastern Massachusetts*

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