Oak Bluff MA Planning Board
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November 11, 2020

RE: Proposal to install a synthetic athletic field on Martha's Vineyard

To Whom It May Concern,

I am writing in regard to the proposal to install a synthetic athletic field in Oaks Bluffs, MA. Synthetic athletic fields are typically composed of three primary layers: 1) artificial grass fibers (polyethylene, nylon, or a blend of polyethylene and nylon), 2) infill (rubber made from one or more sources, or a mixture of sand and rubber), and 3) carpet backing (a blend of polypropylene, polyamide 6, polyolefins, and/or polyurethane). My primary concern revolves around the use of plastic materials (e.g. in layer #1 and 3) and the potential ramifications of increased plastic pollution in the watershed as a result.

I am a PhD Candidate at the University of Massachusetts Boston exploring how microfibers impact the larvae of the eastern oyster, *Crassostrea virginica*, an economically important shellfish in Massachusetts and especially to the Cape and Islands. Water samples from Wellfleet, Nantucket, Duxbury, Boston Harbor and Gloucester have found microfibers at concentrations ranging from 0-50 per liter (Tobin unpublished data). An initial laboratory study found that oyster larvae can ingest microfibers and that exposure of polyester fibers by oyster larvae has a significant negative impact on their survival and shape development. With parts of the proposed site near the Lagoon Pond watershed where two hatcheries of the Martha's Vineyard Shellfish Group are located, additional considerations must be taken into account about the potential impact on the local hatcheries.

Once introduced into the environment, plastic degrades via bacteria, UV light, and abrasive processes (e.g. waves and wind), which causes parent plastic compounds to break into fragments. Once plastics are between 100 nanometers and 5 millimeters in size, they are considered microplastics. Microplastics are transported across land and waterways and can be easily mistaken for food.

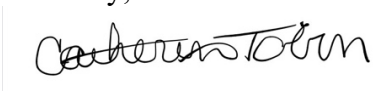
Microplastics contain various chemicals additives which were supplied during the manufacturing process of the parent plastic products (i.e. inorganic fillers, plasticizers, thermal and ultraviolet stabilizers, flame retardants and colorings). Additionally, plastics/microplastics can act as a sponge, adsorbing persistent, bioaccumulative and toxic (PBT) contaminants from the environment. Due to the combination of these properties, the presence of plastics (and, subsequently, microplastics) in the environment raises question, particularly for species that filter large volumes of water, such as oysters.

Microplastics have been documented in varying species, including oysters. Impacts of microplastic ingestion have been explored in the common shore crab (*Carcinus maenas*). *C. maenas* was exposed to fibrous polypropylene rope (< 5mm in length), which was chosen given its abundance in surveys of microplastics in coastal sediments and waters. The crabs were fed varying concentrations of rope over a 4-week period. As a result of microfiber consumption, there was a statistically significant decrease in growth, possibly a result of decreased food consumption over the time period.

Oysters are a keystone species in the environment. Their role in water purification is integral for the sustainability of the ecosystems they comprise. Oysters are valued by humans socially (oysters for human consumption), economically (oysters as a source of employment), and environmentally (oysters as an ecosystem service). The international trade of fishery and aquaculture, for example, has a significant role in employment, food supply, income, and contributes to economic growth and development. In terms of social implications, aquaculture has increased 7% annually in the past decade, and growth hasn't reached its maximum potential yet. Economically, there is an available market for oysters that highlight their importance in the food chain. For example, the American cupped oyster (*Crassostrea virginica*) is worth $45 million and the Pacific cupped oyster (*Crassostrea gigas*) is worth USD 33 million. Environmentally, as storm frequencies increase and sea-level continues to rise, oyster reefs are being valued as an ecosystem service by local governments for their ability to withstand the impact of storm surges, protecting communities against flooding. Given that a single oyster can filter up approximately 7.08 liters per hour, microplastics can be readily ingested by oysters because of their size. As such, microplastics threaten the values of oysters socially, economically, and environmentally.

I urge your committee to take plastic pollution (and its impact on not only a local fishery, but also a business) into consideration when reviewing this proposal. Please reach out if you have any additional questions.

Sincerely,



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