Permitting Artificial Turf Fields – Case Studies

MACC Lunch & Learn

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Establishing Wetland Jurisdiction under the WPA

3-Part Test - You must have a permit for:

1. Work (land disturbing activities) in a
2. Jurisdictional wetland or its buffer zone that will
3. Alter the wetland

- *Activities outside Resource Areas and Buffer Zones are not subject to regulation **unless and until** the activity alters a resource area*
- *Exception: activities that result in a point source discharge (e.g., storm water) within a resource area or buffer zone may be reviewed in order to condition the discharge*

Source: MACC Unit 102

Why Wetlands are Protected

8 Wetland Functions & Values or "Interests" of WPA

1. **Private & Public Water Supply**
2. **Groundwater Protection**
3. **Pollution Prevention**
4. **Flood Prevention**
5. **Prevention of Storm Damage**
6. **Land Containing Shellfish**
7. **Fisheries**
8. **Wildlife Habitat**

Protected by Complying with Performance Standards 310 CMR 10.00

4 Summary Functions and Values

- **Protect water quantity**

  Infiltrate and slowly release water

- **Protect water quality**

  Absorb nutrients and trap pollutants

- **Prevent flood and storm damage**

  Store water and buffer structures

- **Provide fish and wildlife habitat**

  Provide native vegetation & substrates

Source: MACC Unit 102

Artificial Turf Field - Components

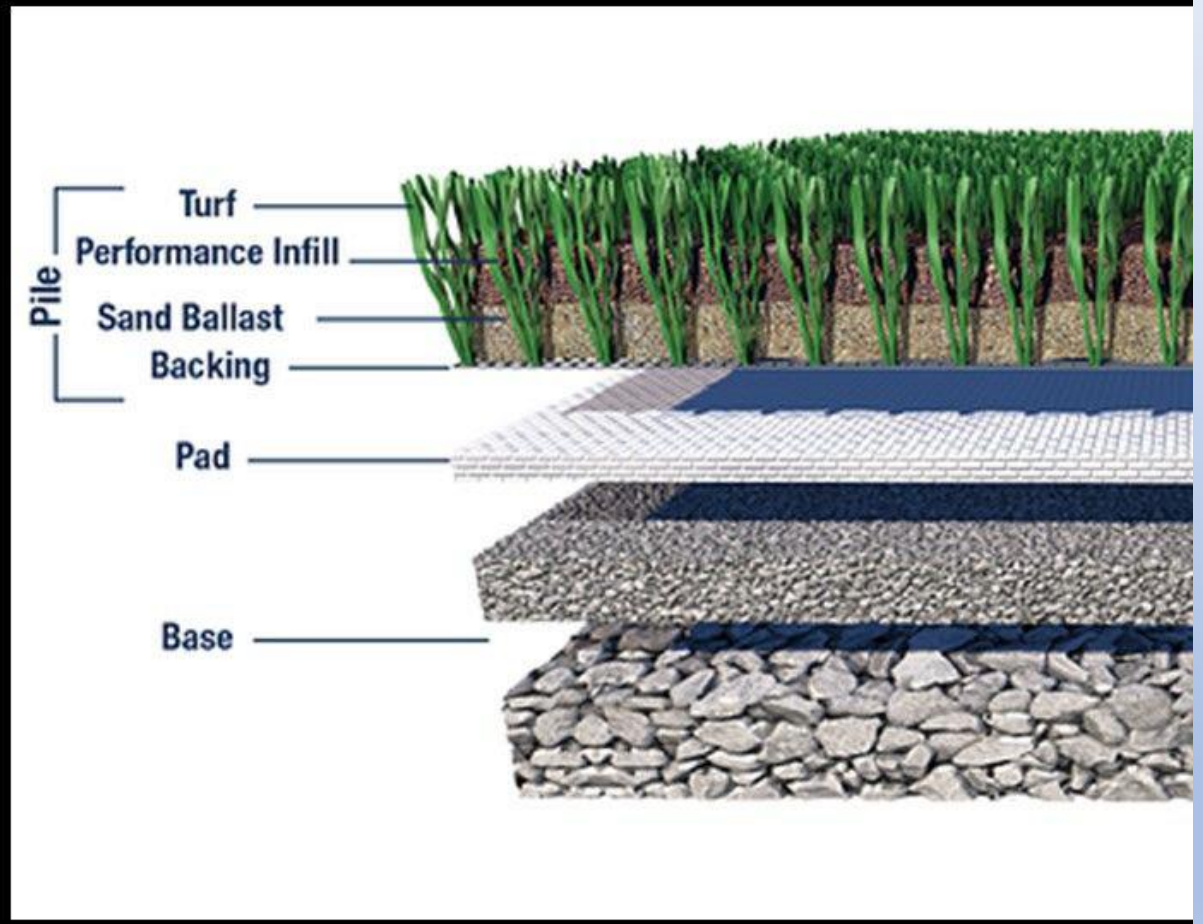
Synthetic Turf System

Turf 'Carpet'

Turf Fiber

Backing

Secondary Backing



Environmental: Chemical Concerns

- Toxic Metals including Lead and Zinc
- Polyaromatic hydrocarbons (PAHs)
- PFAS Per- and Poly-fluoroalkyl Substances
- Plastic Chemicals – phthalates & bisphenol A
- Microplastics – Blades and infill
- Over 350 chemicals identified in EPA literature review for tire crumb rubber; confirmed presence of known carcinogens & neurotoxicants
- 6PPD-quinone from oxidized tires

R. Massey, L. Pollard, & H. Harari, Journal of Environmental & Occupational Health Policy, February 23, 2020 (Vol 30, Issue 1): Artificial Turf Infill: A comparative Assessment of Chemical Contents
https://journals.sagepub.com/doi/full/10.1177/1048291120906206

Toxic Use Reduction Institute (TURI), April 2019: Athletic Playing Fields – Choosing Safer Options for Health and the Environment
https://www.turi.org/content/download/11980/188623/file/TURI+Report+2018-002+June+2019.+Athletic+Playing+Fields.pdf

Environmental: Infill Particle Migration

Artificial Turf Field, Arlington, MA 2021 [Photo credit: S. Chapnick]

Environmental Chemical Concerns: PFAS

Per- and polyfluoroalkyl substances (PFAS)

- Class of almost 15,000 “forever” chemicals
- Resulting from the manufacturing of turf system components

- New England communities have found PFAS in artificial turf and runoff – most recently in Burrillville, RI:
  - Upgradient well = non-detect for 6 PFAS
  - Downgradient well = 61 ng/L (ppt)
  - “RIDOH and RIDEM are most concerned about the potential for PFAS from the turf field to contaminate groundwater in the area.”

Lowell Center for Sustainable Production, UMass-Lowell, Aug 2024. Per- and Poly-fluoroalkyl Substances (PFAS) in Artificial Turf
https://www.uml.edu/docs/PFAS%20in%20Artificial%20Turf%20-%20Academic%20Municipal%20%26%20Other%20Tests%20Aug%202024_tcm18-386957.pdf
Letter to Burrillville Town Council from the RI Department of Environmental Management and the RI Department of Health, August 15, 2024
https://www.burrillville.org/sites/g/files/vyhlif2886/f/uploads/doh_dem_letter_with_response_from_trc_1.pdf

Fisheries & Wildlife Habitat

- Chemical runoff and toxicity alters fisheries & habitat
- Tire Crumb Rubber Infill: 6PPD-quinone EPA Acute Freshwater Aquatic Life Screening Value = 11 ng/L (Federal Register, June 2024)
- Loss of habitat for insects, invertebrates, foraging for birds, disrupted habitats/connectivity

Mill Brook, Arlington

River Herring [photo credit MyRWA]

Fields Shed Infill & Weathered, Broken Plastic Blades

Arlington Catholic Turf Field, 2022 [Photo: S. Chapnick]

Environmental Concern: Heat Stress

Artificial Turf Field Temperature Data

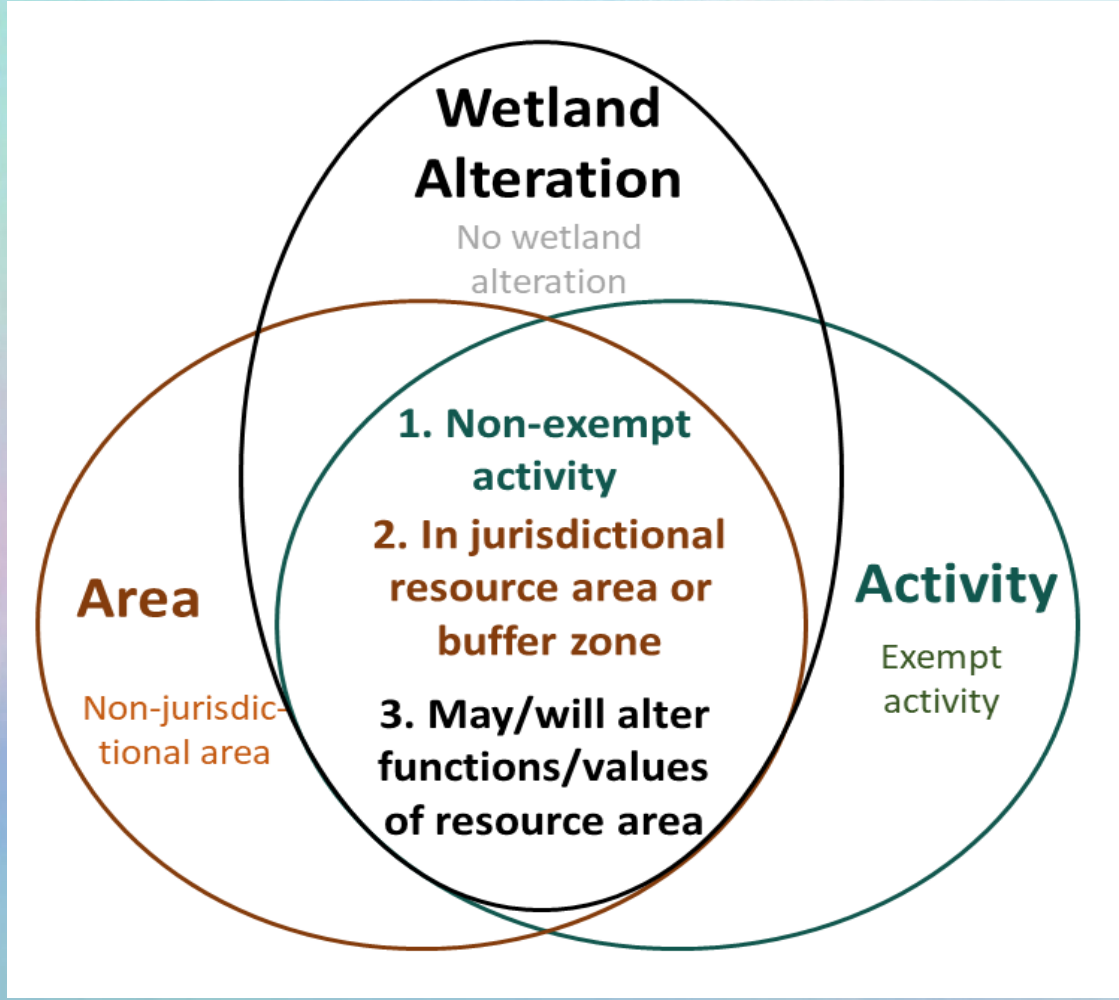
Thermal data measured on synthetic turf (Field Turf) with sand and crumb rubber infill at Westford Academy on June 19, 2020			
Time	**Weather Conditions**	**Air Temp Off Field °F**	**Air Temp @ Turf Field Surface °F**
5:30 AM	Light Clouds Light Wind	88.9	**119.5**
7:30 AM	Light Clouds Light Wind	82.8	81.7
1:30 PM	Light Clouds Light Wind	91.6	**155.7**
3:30 PM	Light Clouds Light Wind	90.7	**142.5**

Presented to the Conservation Commission for the Arlington High School permit, 2020.

Regulating Artificial Turf

under the Wetlands Protection Act and Regulations

MACC Lunch and Learn
2/10/2025



Regulatory Framework

- **The Act**
  - Purpose: "to protect the private or public water supply; to protect the ground water; to provide flood control; to prevent storm damage; to prevent pollution; to protect land containing shellfish; to protect wildlife habitat; and to protect the fisheries."
  - Requires the Commission to "impose such conditions as will contribute to the protection of the interests described herein".
- **The Regs**
  - 10.01(2) (Purpose) "contribute to" the interests of the Act
  - 10.04 (Definitions) the "interests" (the Act's "significances", "wetland functions and values")
  - 10.06(6) (Notices of Intent) requires the Commission to "impose such conditions as are necessary to meet the performance standards ... and prohibit any work or any portion thereof that cannot be conditioned to meet said standards"
  - 10.03(1)(a) (General Provisions. Burden of Proof) demonstrating to the issuing authority: (2) that the proposed work within a resource area will contribute to the protection of the interests identified in M.G.L. c. 131, § 40 by complying with the general performance standards established by 310 CMR 10.00 for that area


Albemarle Sports Complex
Reconstruction Project


Artificial
Turf

Albemarle Field: RFA Performance Standards (10.58) Any / All work in RFA

- 10.58(1) Preamble.
- 10.58(2) Definitions, Critical Characteristics and Boundaries.
- 10.58(3) Presumption.
- **10.58(4)(a) Protection of Other Resource Areas.**
- **10.58(4)(b) Protection of Rare Species.**

Albemarle Field: RFA Performance Standards
10.58(4) Work in areas not "Previously Developed"

- 10.58(4)(c) Practicable and Substantially Equivalent Economic Alternatives.
- **10.58(4)(d) No Significant Adverse Impact** : can develop 10% of the RFA **if**:
  - **a 100-foot-wide area of undisturbed vegetation** is provided (as possible),
  - **stormwater is managed**,
  - **wildlife habitat functions are not impaired**, and
  - **groundwater and surface water quality are protected by means of erosion and non-point source pollution controls."**

RFA Performance Standards
10.58(5) Redevelopment in Previously Developed Areas

- "Notwithstanding 10.58(4)(c) and (d), …
  - **An Altern. Anal. is not required and**
  - **the "No Significant Adverse Impact" standard is not relevant.**
- "… the issuing authority may allow work … provided the work improves existing conditions."
  - **The ConCom has broad latitude**
- "Work to redevelop previously developed riverfront areas shall conform to the following criteria.
  - **Minimum performance standards must be met or exceeded.**
    a. **Ecological and/or hydrological improvements beyond the requirements.**
    b. **Stormwater standards will be met.**
    c. **Work shall not be located closer to the river than existing conditions.**
    d. **Work shall be located away from the river.**
    e. **If/once 10% of the lot is already degraded, mitigate 2:1 for new degraded area.**
    f. **If/once10% of the lot is already degraded, restore 1:1 for new degraded.**
    g. **Mitigation and restoration areas must be protected in perpetuity**

The Challenge of Addressing Concerns about Groundwater

- **Protecting “the ground water” and "prevention of pollution"** are in the Act’s purpose and Riverfront Area’s significances and the Reg’s purpose and interests … BUT
- **Applicant’s Burden is limited.** 10.03(1)(a) states that an applicant must demonstrate that the proposed **work will contribute to the protection of the interests** of the Act **“by complying with the general performance standards established by 310 CMR 10.00 for that area.”**
    - Groundwater isn't a jurisdictional resource area.
    - There are no performance standards for groundwater in the Regs with which a project must comply.
- **Conclusion:**
    - **There is no express regulatory authority to deny a project because of potential groundwater quality alterations.**
    - Groundwater quality is regulated by regulations other than the Wetlands Protection Act.

The Challenge of Addressing Concerns about Pollutants

- **Despite the known problems** of toxicants and pollutants (e.g., PFAS, microplastics, and thermal pollution), r**egulation of toxicants and pollutants under the Act and Regs is not facilitated**
    - "Toxic" only appears in Stormwater Stds 7 (LUHPPL) and 10 (Illicit Discharge)
        - Artificial Turf is not likely to qualify as a LUHPPL
        - Artificial Turf is not likely to have illicit discharges
    - "Thermal" doesn't appear anywhere in the standards.
- **Conclusion:**
    - **There is clear regulatory authority or performance standards on which to deny a project because of potential toxicants.**
    - The selected turf has low to no PFAS, reflective grass blades, and more stable infill.
    - The infiltration and retention system will allow stormwater to cool.

The Challenge of Addressing Concerns about Wildlife

- The Act and Regs protect wildlife habitat, not wildlife itself

- Bylaws and Ordinances may protect wildlife

Approve or Deny?

- **To approve** a project, ConCom must provide findings and justifications that the project, as conditioned, would:
    - **Protect the interests of the Act per 10.05(6)**
    - **Meet relevant performance standards: 10.58(5)(a)-(h) and 10.58(4)(a) and (b)**
- **To deny** a project, the ConCom must provide findings and justifications that the project, as conditioned, would not:
    - Protect the interests of the Act per 10.05(6)
    - Burden of Proof – Applicant must demonstrate that the proposed work within a resource area will contribute to protection of the interests of the Act by complying with the pertinent performance standards in 310 CMR 10.03(1)(a)
    - Meet relevant performance standards: 10.58(5)(a)-(h) and 10.58(4)(a) and (b)

Newton Conservation Commission's Interpretation of 310 CMR 10.58(5)(a-h) for Restoration & Mitigation

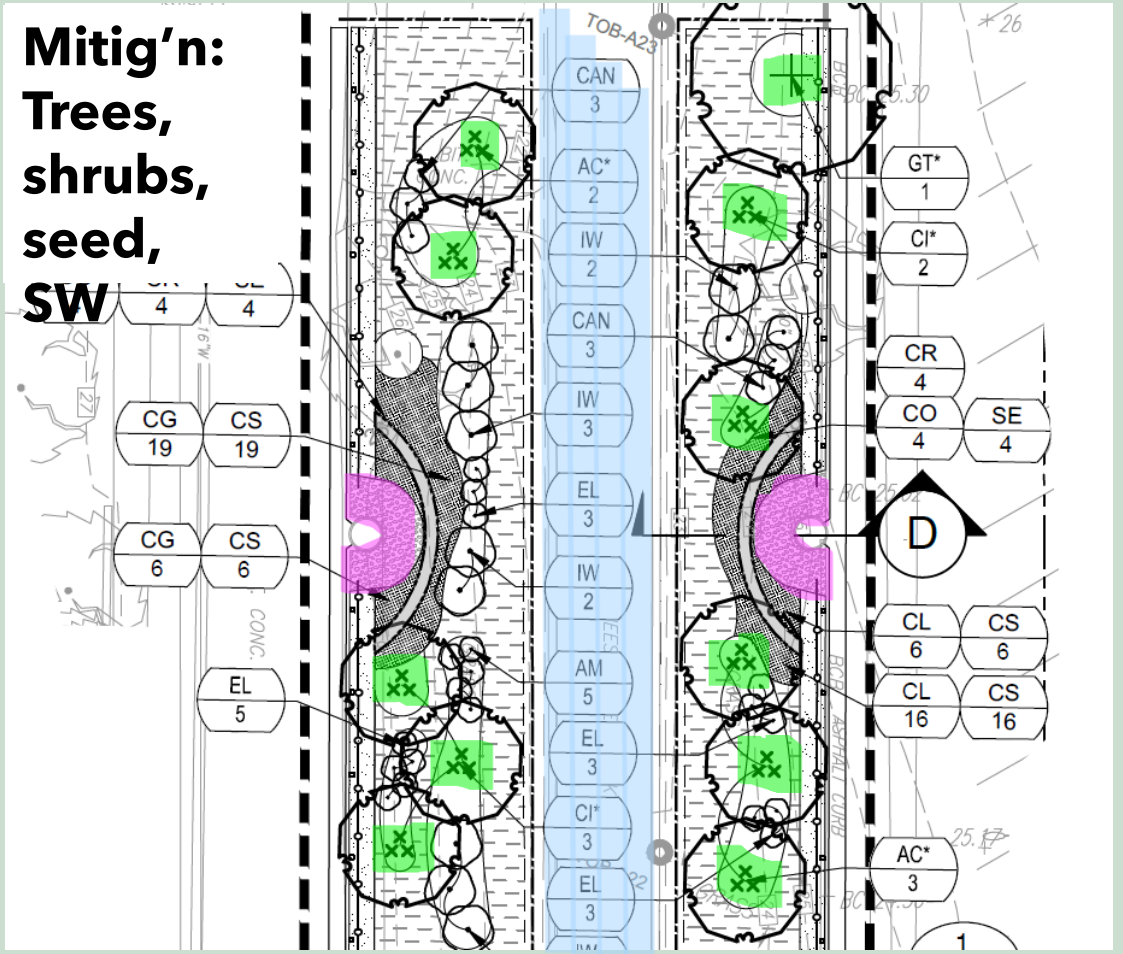
So decisions will be objective and predictable

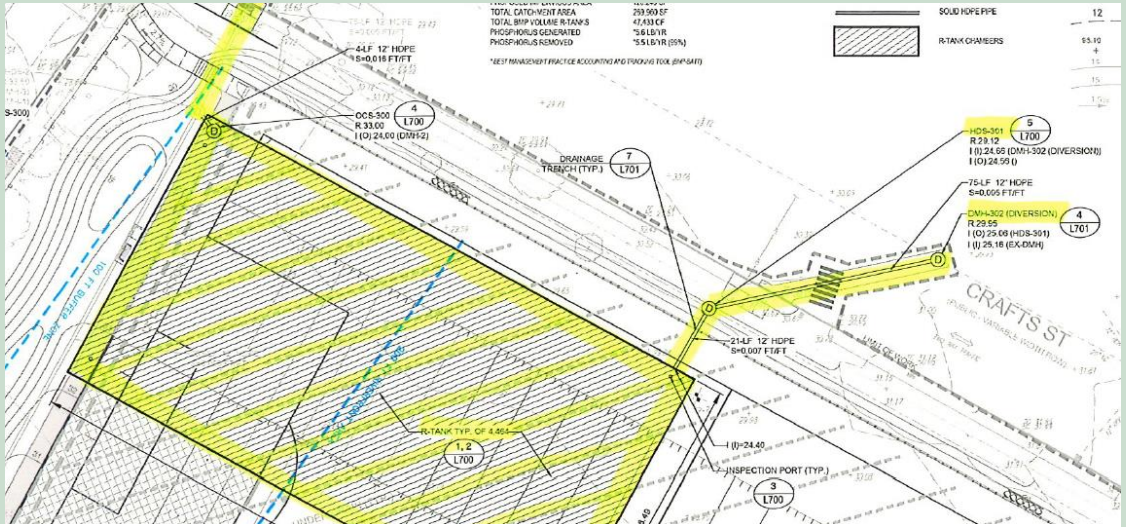
(c) Proposed work* shall **not be located closer to the river than existing conditions** or 100 feet, whichever is less, except in accordance with 310 CM… 10.58(5)(f) or (g).	☐ N… 0 feet …velopment closer to it than currently (c) will be compensated for by …g to the formula: V = (R + M/2)
(d) Proposed work*, includi… outside the riverf… **from the river**, ex…	…ned by the shortest lines … boundary **… is a sub-set of (c), for the**
(e) **The area of propos…** (but the proposed w… 10% of the riverfront… (g).	…d …% allowance but further from the river than …), will be compensated for by V = (R + M/2) …r expansion over the 10% allowance but closer to the river than existing conditions (V), will be compensated for by V = 2(R + M/2)
(f) When an applicant prop… alteration may be allowe… (d), and (e) at a ratio in sq… alteration not conforming…	…t area, …310 CMR 10.58(5)(c), …1:1 of restored area to area of …criteria. ☐ No expansion or construction closer to the river is proposed, so no compensation is required or proposed ☐ 1:1 Restoration for (c) alone areas will be provided, or ☐ 1:1 Restoration for (e) alone areas will be provided, or ☐ 1:1 Restoration for (c) and 1:1 restoration for (e) areas will be provided
(g) When an applicant proposes on-site or off-site **mitigation**, alteration may be allowed notwithstanding the criteria of 310 CMR 10.58(5)**(c), (d), or (e)** at a ratio in square feet of **at least 2:1** of mitigation area to area of alteration not conforming to the criteria or an equivalent level of environmental protection where square footage is not a relevant measure.	☐ No expansion or construction closer to the river is proposed, so no compensation is required or proposed ☐ 2:1 Mitigation for (c) alone violation will be provided, or ☐ 2:1 Mitigation for (e) alone violation will be provided, or ☐ 2:1 Mitigation for (c) and 2:1 mitigation for (e) violation areas will be provided

a. A project that does not meet standard (c) alone, must restore 1:1 and/or mitigate 2:1.

b. A project that does not meet standard (e), alone, must restore 1:1 and/or mitigate 2:1.

c. A project that does not meet the standards (c) **and** (e) must restore for each "exceedance".





BONUS: Street SW infiltrated before discharge

Albemarle Field: Approved

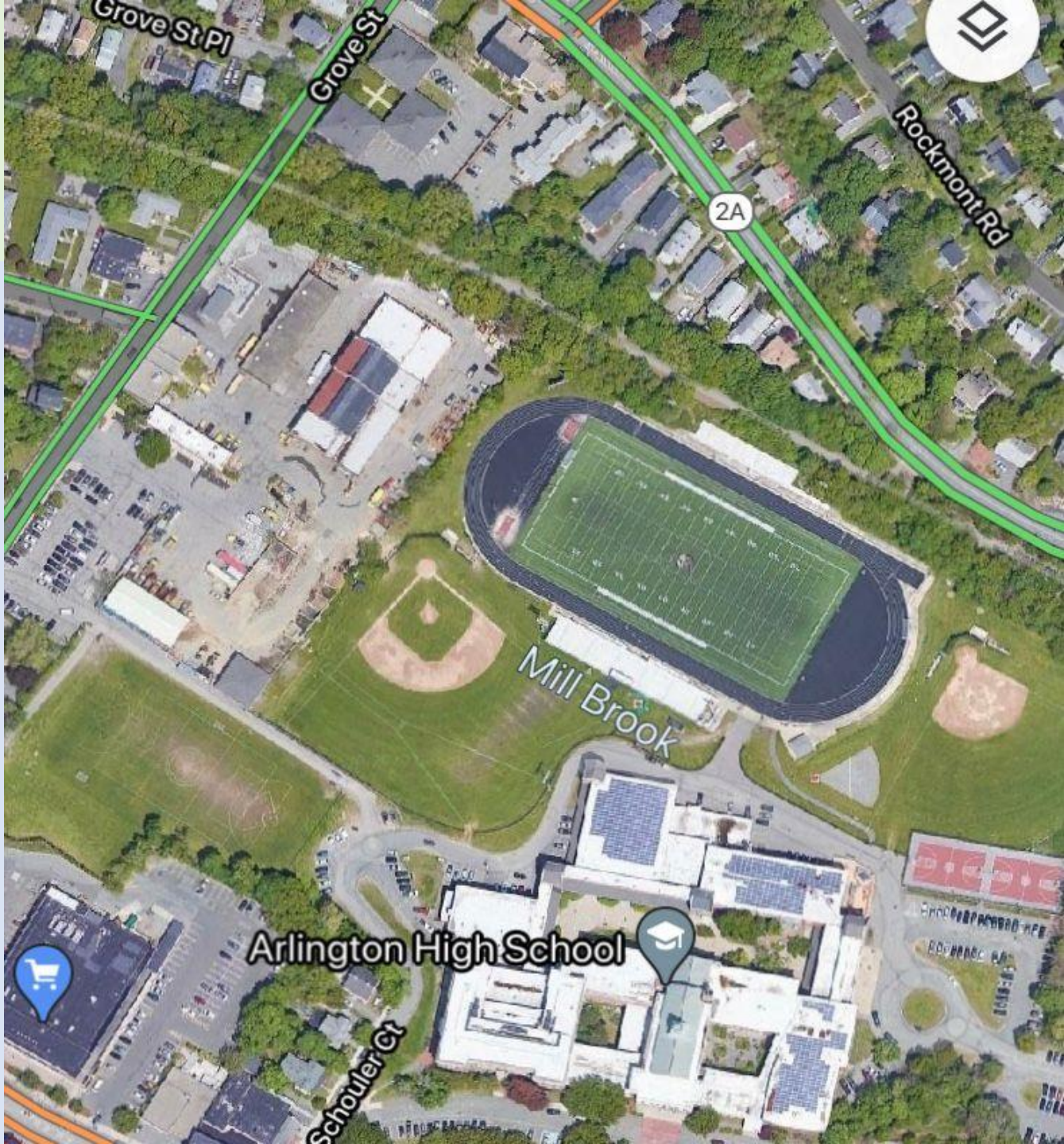
- **Permitted the project objectively**
- **Considered project's overall ecological and hydrological effects**
    - Existing large athletic complex had limited ecological and hydrological value:
        - Stream is channelized
        - Only part of the field was in outer RFA on the far side of a road
        - Fields have limited wildlife habitat value
    - Riverfront mitigation areas will create wildlife habitat
    - Project exceeds all performance standards in 10.58(5)(a)-(h) and 10.58(4)(a) and (b)
        - Significant stormwater management improvements
        - Large, robust mitigation planting for increased degraded area (2.4 : 1) along beleaguered stream
    - Project provided improvements it was not otherwise obligated to provide
        - Extensive planting of canopy trees and shrubs on the site
        - Treatment of Albemarle Road stormwater
        - Treatment of Crafts Street stormwater

Albemarle Field: OOC Select Conditions

- **Construction management plan**
  - ← concerns about construction tracking
- **Low wall and windscreen**
  - ← concerns about infill leaving the site
- **Monthly (then annual) reports per “Integrated Monitoring & Maintenance Protocol**
  - ← concerns about infill getting into the stream
- **Reports from the maintenance crews regarding the loss of infill**
  - ← concerns about infill leaving the site
- **“Dark sky” compliant exterior lighting**
  - ← concerns about increased activity near stream

Arlington High School

- 2 new artificial turf athletic fields proposed for baseball fields –
- 1 within 100’ buffer (WPA) & Adjacent Upland Resource Area (Bylaw) to Mill Brook



Arlington High School
DEP #091-0323

- Permitted with special conditions for Artificial Turf: July 2020
- 1-Year Permit extension granted: August 2023
- AHS building committee requested 3-year Permit Extension: March 2024
  - Bylaw / Wetland Regulations standards for permit extension
  - Presentation of scientific references reporting toxic effects of 6PPD-quinone
  - EPA website: 6PPD-quinone posted February 2024

    https://www.epa.gov/chemical-research/6ppd-quinone
- Artificial Turf Permit Conditions carried forward from 2020 permit:
  - **Testing of turf carpet and infill prior to constructio**n for Metals, PFAS, VOCs, SVOCs with test methods, detection limits, and relevant standards defined
  - **New NOI for replacement** of field required

AHS Artificial Turf Permit Conditions

- Artificial Turf Amendment Permit Conditions added 2024:
  - Protocol for **sampling and testing of stormwater discharge** from field drainage system sampling port for 6PPD-quinone
  - Specifications for sampling frequency; documentation of laboratory capability to perform EPA draft Method 1634; **requirement to compare to regulatory standard** – when one is established
  - Frequency for inspection & cleaning to **control migration of tire crumb rubber infill**
- All applicable conditions defined as “continuing condition that survives the expiration of this permit/order and shall be included in any Certificate of Compliance as a continuing condition in perpetuity.”

Sharon High School Field
DEP #280-0617

- Existing natural grass field: 100’ Buffer to jurisdictional lake and wetlands
- Construction of 88,000 sq ft artificial turf athletic field; 8,800 sq ft within buffer zone; 12” stone layer for runoff storage
- **Sharon Wetlands Protection Bylaw**
  - No disturb setbacks in buffer zone
- Issues raised during hearings
  - Stormwater management
  - PFAS
  - Impact to Buffer Zone “change in character in the way the buffer would function if a turf field were to be installed” (meeting minutes June 4, 2020)
  - Commission’s role to protect wetlands

Sharon High School Artificial Turf Field Denial

- June 2020 – Sharon ConCom vote failed to authorize the proposed installation of an artificial turf field at the Sharon High School.
- September 2020 – Hearing closed & Permit denied without prejudice under both the state WPA & the Sharon Wetlands Protection Bylaw

"This denial is based upon the belief that the proposed alteration of an existing natural grass field to an artificial turf field at this location within the 100 foot buffer zone and 75 foot local no-disturbance buffer zone is reasonably anticipated to result in unwarranted impacts to Lake Massapoag, down gradient wetlands, surface waters, groundwater, and water quality of jurisdictional resource areas."

Gile Field, Milton
DEP #046-0630

- Natural grass field; floodplain; Riverfront to Pine Tree Brook; BVW; EJ neighborhood
- Conservation Commission issued OOC for AT field Dec. 2023
  - Prior to construction, 2 surface water sampling locations for baseline of PFAS
  - Sample discharge water from stormwater system for PFAS within 72h of any 24-h rain event of > 2.5 inches.
  - Standards for PFAS = National Ambient Water Quality Criteria or MCP Method 1 GW-1. Exceedance of > 20% of either baseline or standard – needs action
  - Monitoring Plan for infill and synthetic grass blade migration to resource areas
  - Maintenance & reporting of Stormwater system screens to capture infill and blades
- 10 resident group filed request for SOC
  - Applicant failed burden of proof to show the project would not “Alter” the wetlands or brook

Gile Field, Milton
Appeal to DEP

- Appeal - SOC request concerning:
  1. PFAS
  2. Alteration of site hydrology [EPA Region 1: AT = impervious surface]
  3. Heated runoff affects - wetlands and cold-water fishery
  4. Microplastics and wood infill affects
  5. Field lighting affects on habitat
  6. Equity issues - EJ neighborhood
- DEP site visit Feb 2024 & two information requests to-date:
  - Refile stormwater report – details on meeting redevelopment standards
  - Refile report with Estimated Seasonal High Groundwater & detail 2-foot separation between bottom of structures and ESHGW
    - Applicant performed ESHGW test pits on Dec. 6, 2024

Hamilton-Wenham Regional HS
DEP #172-0642

- Natural Grass Softball Field – conversion to AT with stadium lighting
- Resource Areas = Inland Bank, 100’ Buffer to Bank, BVW, 100’ Buffer to BVW & Bylaw resource areas of Associated Upland Resource Area
- OOC: permitted separately under WPA and Wetlands Bylaw – same conditions
- Specific Conditions
  - Baseline testing of PFAS in wetlands
  - Testing of AT for PFAS prior to construction
  - Stormwater discharge point testing of PFAS after 6” rain in 12-h (100-y event)
  - Stadium lighting to be dark sky certified and resource areas shielded from light pollution

Hamilton-Wenham
Procedural Issues / Litigation

1. Bylaw OOC expired after 1-y. New NOI under Bylaw filed same as original / OOC same
   - **Commission waived the enforcement of the Bylaw no-build and no-disturb zones** because….

2. Abutter appealed the local Bylaw OOC to the court – issues:
   - Construction begun prior to testing for PFAS
   - Baseline PFAS testing in surface water showed elevated levels of PFAS already in wetlands
   - PFAS test results for AT: inconsistent with permit
   - No corrective actions listed if PFAS detected in AT components
   - No detail in conditions on what compliance means for stadium lighting – photometric plans show light falling into BVW

3. Lawsuit dismissed because of new law extending by 2-y all permits existing in 2023 & 2024

Brooke Charter School, Dorchester
WET-2024-022

- Urban forested lot (undeveloped) --> Artificial Turf Field + infrastructure
- 100’ Buffer Zone to BVW & Bank; Riverfront Area
- SOC issued by NERO affirmed the OOC approved by Boston Conservation Commission, with added requirements for stormwater management and a 25-ft vegetative buffer in Riverfront Area
- 10 Resident Group challenged SOC & motion to stay the appeal
  1. Fails to apply environmental justice policies and requirements as established by the Climate Roadmap Act
  2. FEMA flood map of 7/3/2024 was not considered in the SOC (issued 7/10/24)
  3. Fails to comply with performance standards within buffer zone to BVW
  4. Fails to avoid alteration of the BVW, including runoff containing PFAS

Brooke Charter School, Dorchester
Ruling and Order – January 2025

Office of Appeals and Dispute Resolution: January 10, 2025 Ruling and Order

1. Granted the applicant and MassDEP's motion to stay the proceedings until March 10, 2025
2. Remanded the matter to MassDEP's NERO for further SOC review of new information
   - Consider BLSF newly identified on the FEMA map relative to issuance of a determination

Regulatory Permitting Authority

- **Permitting authority under the WPA**
  - Riverfront Area – discretion
  - BVW impacts
  - Stormwater
  - Points of interpretation: impacts on the resource areas' ability to protect the 8 interests
- **Permitting authority under Local Wetland Bylaws & Regulations**
  - Buffer Zone – no disturb / no build
  - Climate Change resilience standards
  - Local Stormwater standards
  - Additional interests: wildlife / climate change protection (heat, etc.)

Advocacy, Education, & Communication

- **Advocacy**
  - EJ communities / Urban Heat stress
  - Microplastics
  - Climate Impacts / Sustainability
  - Education
- **Interdepartmental Coordination**
  - Park & Rec
  - School Committee
  - Planning Boards