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APRIL 16, 2024

REVISED JULY 22, 2024
(CORRECTED)

Andover Conservation Commission
36 Bartlett Street
Andover, MA 01810

**RE: MASSDEP File #090-1428, Haggetts Pond Rail Trail Project**
**0,051R & 52 Haggetts Pond Road, Andover, MA**

Dear Commissioners,

BSC Group, Inc. ("BSC") is providing this revised project narrative, plans and stormwater report on behalf of the Town of Andover ("The Applicant") for improvements to the Haggetts Pond Rail Trail project and associated parking improvements, MassDEP # 090-1428. The proposed revised documents are a result from the following:

1. LEC Environmental Consultants, Inc., letter dated January 9, 2024, and signed by Ann M. Marton.
2. LEC Environmental Consultants, Inc. email dated January 19, 2024 from Ann Marton.
3. Horsley Witten Group, Letter dated January 18, 2024, and signed by Janet Carter Bernardo, P.E., Associate Principal.
4. LEC Environmental Consultants, Inc. memo dated January 31, 2024, and signed by Ann M. Marton.
5. LEC Environmental Consultants, Inc. email dated January 31, 2024 stating:

   *"As you may recall, individual Commission members also requested additional information or requested that issues raised by the general public during the public hearing also be addressed…I do expect the Applicant to address each of the Commission members requests. I suggest that the Applicant's representative rely on their notes from the meeting and/or review the video of the public hearing."*

6. Horsley Witten Group, Letter dated June 7, 2024, and signed by Janet Carter Bernardo, P.E., Associate Principal.
7. June 11, 2024 BSC, Town Conservation staff, LEC Consultants, and Horsely Witten Group review meeting.

**To summarize the project, the project consists of four parts as follows:**

**Haggett's Pond Rail Trail** – The existing gravel trail consists of a straight trail from Haggett's Pond Road to High Plain Road, approximately 10-12 feet wide, 20-inch thick, compacted gravel former rail bed. The gravel is well compacted and practically impervious to water infiltration and has areas where existing tree roots have grown over the trail bed, and roots that have grown along the side of the trail due to dense gravel base material. This project intends keep intact the existing 20-inch gravel rail bed, protect existing tree roots, place a minimum of 4-inches of new compacted gravel over

the existing gravel rail bed, and to then pave with hot mix asphalt an 8-foot-wide accessible path over the compacted gravel. The paving is all located within the limits of the existing rail bed, other then approximately 600 sf newly disturbed gravel and pavement associated with the proposed five seating and two bike rack areas along the trail. The project looks to limit impacts and disturbance to the natural environment around the proposed trail improvements by avoiding tree removal, requiring measures to protect existing roots, provide new plantings at the vernal pools, and providing measure to keep visitors on the trail such as post and rail fencing and signage. Measures to protect existing tree roots include the requirement to use a mechanical sweeper for the removal of any organic material over the existing rail trail gravel, installation of root barriers where roots run along the side of the trail, and the installation of landscape fabric/blankets over areas where significant roots have grown over the existing rail bed prior to installing new gravel and paving to limit root damage and from from "pushing" up on the new asphalt path. Additionally, by constructing the new paved pathway over the existing rail bed, no trees are required to be removed for the trail improvement construction. Lastly, the proposed underdrain, required in "wet" portion of the existing trail, has been moved to the center of the trail, with approximately 2-ft of cover over the drain to limit root damage in close proximity to the existing trees.

**Boardwalk/Viewing Platform** – An accessible wooden boardwalk with two viewing platforms is proposed as a spur on the Haggett's Pond side of the trail. The boardwalk is proposed to be built on footings/helical piles to lessen the impact to existing trees, roots and vegetation outside the existing rail trail limits through the woods to the Pond. As proposed the boardwalk will require the removal of 5 Bylaw Trees (trees over 10-inches in caliper) to support its construction. Additionally, the boardwalk will traverse through 420 sf of a Local Bylaw Wetland. As mitigation for the Local Bylaw Wetland impact, the project proposes 1,200 sf of wetland/buffer plantings on either side of the boardwalk through the Local Bylaw Wetlands to improve the existing habit within this area.

**Haggett's Pond Road Parking Lot** – Currently cars pull off of Haggetts Pond Road onto the extended dirt shoulder to park. The project proposes to improve the overall safety of the parking and access to the trail. The project proposes a 14 space paved parking lot on the east side of Haggetts Pond Road. The proposed parking area is located more than 100-ft from Haggetts Pond and associated wetlands, thus, is outside of the 100-ft wetland buffer. The parking lot will require the clearing of approximately 13,000 sf (0.3 acres) and 30 Bylaw Trees (trees over 10-inches in caliper). Mitigation proposed for the Haggett's Pond Parking is includes No parking signage along a portion of Haggetts Pond Road, Resident Parking Only signage along Lakeside Circle, stormwater management for the runoff associated with the new parking lot reducing peak rates of runoff and improving stormwater quality and ground water infiltration. Additionally, in the vicinity of the Haggetts Pond parking lot, the project proposes the planting of 31 new trees.

**High Plain Road Parking Lot** – Currently cars pull off of High Plain Road and onto an extended dirt shoulder to park. The project also proposes to improve the overall safety of the parking and access to the trail from High Plain Road. The project also proposes a 14-spaces paved parking lot on the east side of High Plain Road. The proposed parking has been situated such that the parking area is located further away from the adjacent wetlands then previously proposed and the access path from the proposed parking area to the Haggetts Pond Rail Trail has been located to avoid any wetland filling. Attached to this letter is an extensive alternatives analysis undertaken to locate the proposed parking and access with the least amount of impact to the wetlands and associated buffer zones. Additionally, a summary of the alternative analysis can be found under Response #9 here in. No wetland impacts are proposed, and the parking lot and access will require the clearing of approximately 18,000 sf (0.4 acres) and the removal of 22 Bylaw Trees. Of the 18,000 sf of disturbance, 9,000 sf is associated with stormwater improvements and slope grading. These areas will be seeded and planted with buffer zone plantings to re-establish the buffer zone habitats outside of the paved parking and access pathway along with 22 newly planted trees. Additionally, the existing untreated roadway drainage discharge into the project site will be collected and treated prior to discharging to the wetlands.

The following is a summary of the buffer zones and impact.

**Table 1: Summary of Wetland, Vernal Pool, and Buffer Impacts**

| Impact Areas | Haggett's Pond Rail Trail | Boardwalk/Viewing Platform | Haggetts Pond Road Parking | High Plain Road Parking | Project Total |
|---|---|---|---|---|---|
| | Disturbance | Disturbance | Disturbance | Disturbance | Disturbance |
| MassDEP Wetland Disturbance | 0 sf | 0 sf | 0 sf | 0 sf | 0 sf |
| Local Bylaw Wetland Disturbance | 0 sf | 420 sf | 0 sf | 0 sf | 0 sf |
| Temporary ByLaw Wetland Disturbance for Mitigation Plantings | 0 sf | 1,150 sf | 0 sf | 0 sf | 0 sf |
| | | | | | |
| 0-50 NDZ (in area of existing rail bed) | 57,800 sf | 0 sf | 0 sf | 0 sf | 57,800 sf |
| 0-50 NDZ (new permanent disturbance) | 1,850 sf (1) | 3,250 sf | 0 sf | 4,030 sf (2) | 9,130 sf |
| 0-50 NDZ (temporary disturbance) | 3,770 sf (3) | 300 sf (4) | 0 sf | 4,160 sf (5) | 8,230 sf |
| | | | | | |
| 50-100 Disturbance (in area of existing rail bed) | 13,000 sf | 0 sf | 0 sf | 0 sf | 13,000 sf |
| 50-100 Disturbance (new disturbance) | 550 sf (6) | 0 sf | 0 sf | 9,705 sf | 10,255 sf |
| **Totals** | | | | | |
| Total MassDEP Wetland Disturbance | 0 sf | 0 sf | 0 sf | 0 sf | 0 sf |
| Total ByLaw Wetland Disturbance | 0 sf | 1,570 sf | 0 sf | 0 sf | 0 sf |
| | | | | | |
| Total 0-50 NDZ Disturbance | 63,420 sf | 3,550 sf | 0 sf | 8,190 sf | 75,160 sf |
| | | | | | |
| Total Buffer Zone Disturbance (in the area of existing rail bed) | 70,800 sf | 0 sf | 0 sf | 0 sf | 70,800 sf |
| Total Buffer Zone Disturbance (new disturbance) | 2,400 sf | 3,250 sf | 0 sf | 13,735 sf | 19,385 sf |
| Total Buffer Zone Disturbance | 73,200 sf | 3,250 sf | 0 sf | 13,735 sf | 90,185 sf |
| | | | | | |
| ByLaw Trees Lost | 0 trees | 5 trees | 30 trees | 22 trees | 57 trees |

**Table 2: Summary of Vernal Pool Impacts**

| | Vernal Pool W9 | Vernal Pool W4 & W3 | Total |
|---|---|---|---|
| | Disturbance | Disturbance | Disturbance |
| Vernal Pool Distance | 0 sf | 0 sf | 0 sf |
| 0-75 NDZ (in area of existing rail bed) | 2,760 sf | 11,020 sf | 13,780 sf |
| Mitigation Plantings (temporary Impacts) | 2,040 sf | 1,730 sf | 3,770 sf |
| **Totals** | | | |
| Total Vernal Pool Disturbance | 0 sf | 0 sf | 0 sf |
| Total 0-75 Vernal Pool NDZ | 4,800 sf | 12,750 sf | 17,550 sf |

**Table 3: Summary of Riverfront Impacts**

| | Haggett's Pond Rail Trail | Boardwalk/Viewing Platform | Totals |
|---|---|---|---|
| | Disturbance | Disturbance | Disturbance |
| Direct River Impacts | 0 sf | 0 sf | 0 sf |
| 0-200 Riverfront Area Impacts (in area of existing rail bed) | 13,850 sf | 0 sf | 13,850 sf |
| 0-200 Riverfront Area Impacts (temporary impacts) | 0 sf | 1,450 sf (4) | 1,450 sf |
| 0-200 Riverfront Area Impacts (New Impacts) | 750 sf (7) | 1,830 sf | 2,580 sf |
| **Totals** | | | |
| Total 0-200 Riverfront Impacts | 14,600 sf | 3,280 sf | 17,880 sf |

**Table Notes**

(1) New impacts to the 50-foot NDZ are associated with the park bench bump out areas, the riprap slope stabilization at the Haggetts Pond Culvert at Sta. 31+90+/-, and High Plain Road bike rack areas along the rail trail.

(2) Impervious impacts associated with the parking lot and paved walkway to the rail trail.

(3) New temporary impacts are a result of the planting mitigations at the vernal pools.

(4) New temporary impacts are a result of the planting mitigations at the Boardwalk.

(5) Newly graded 0-50 NDZ buffer with loam and buffer plantings to re-establish buffer zone.

(6) New impacts are associated with outlet protection riprap and the proposed bike rack area at Haggetts Pond Road.

(7) New impacts are associated with park bench bump out areas and the riprap slope stabilization at the Haggetts Pond Culvert at Sta. 31+90 +/-.

**Mitigation Summary**

The project has incorporated multiple mitigation measures to offset the project impacts as follows:

1. The Project proposes **native habitat enhancement plantings of 2,040 SF** in the habitat around the vernal pool at wetland W9 to enhance the vegetative buffer especially on the west side of the wetland between the delineated wetland edge and proposed trail, which is presently in a sparsely vegetated condition with little mid-story (shrub/sapling) vegetation. We also propose additional **native shrub plantings within an area of 1,730 SF** at wetland W3 to screen and protect the wetland. A dense planting of Sweet Pepperbush (*Clethra alnifolia*) would provide a physical and visual barrier to discourage off-leash dog access to the presumptive vernal pool, and improve shelter, non-breeding habitat, migratory, and feeding habitat functions of this wetland. The wetland W4 has a dense buffer of *Cletha* and is unlikely to accept additional plantings.

2. The Project proposes **native habitat enhancement planting of 1,450 sf** in the habitat around the proposed boardwalk at the Bylaw wetland crossing to mitigate the 420 sf of Bylaw impact associated with the boardwalk crossing. The plantings consist of Buttonbush, Dogwood and Viburnum varieties, as shown on plan sheet L-101 to enhance the sparsely vegetated condition at the crossing.

3. In coordination with the Natural Heritage & Endangered Species Program, Town of Andover Conservation Commission, and Water Department, establish a long-term management plan for approximately **6.5 acres (283,000 SF) of open field habitat for the benefit of rare wildlife** and commitment to no further trail development in the Priority Habitat area without a Division of Fisheries & Wildlife approved trail management plan. See Addendum 17-1, Mowing Advisory Guidelines in Rare Turtle Habitat and attached Operation and Maintenance Plan.

4. The proposed trail will be **closed to all motorized vehicles** other than medically necessary motorized conveyances. Electric bicycles, "e-bikes," will be prohibited. This will be posted on both kiosks at each end of the trail.

5. The Project will **establish 10,800 SF of native, shade-tolerant woodland trailside seeding** trail shoulders and grading stabilization, resulting in the improvement of wildlife habitat functional values of the trail surface on the Site which is currently devoid of wildlife habitat value due to existing conditions and trail usage.

6. The Project will **establish 8,850 SF of native, pollinator-friendly** High Plain Parking area plantings, seeding and grading stabilization, resulting in the improvement of wildlife habitat functional see plan sheet L-101.

7. Improved **control of on-street parking, with proposed signage,** to reduce and control on-trail traffic during peak usage periods, see plan sheet C-402.

8. Existing stormwater runoff from High Plain Road and Haggetts Pond/Lakeside Circle will be collected and treated per the MassDEP Stormwater Handbook to reduce TSS (Total Suspended Solids) that currently discharges to the wetland and pond areas. This runoff currently discharges untreated.

9. The planting of 60 trees to mitigate the 57 ByLaw trees that are required to be removed to support the project.

The following response addresses the comments received from LEC Environmental in the Initial Peer Review dated January 9, 2024 from Ann Marton.

***1) Eliminate BVW impacts associated with the proposed stormwater management and parking lot trail access south of High Plain Road.***

This parking lot was re-designed in the December 21, 2023 Supplemental Filing to eliminate all BVW impacts associated with the propose parking lot and access, see sheet C-101.

***2) Clarify whether the project includes culvert replacement or cleaning.***

This was addressed in the December 21, 2023 Supplemental Filing. No culverts are required to be replaced to support this project. All culverts within the limits of work will be cleaned.

***3) Locate and depict all trees within the limit of work on the site plans in accordance with the Bylaw Regulations.***

BSC has identified and located all trees over 10" caliper, measured one (1) foot from the ground surface (Bylaw Trees), within the limit of work for inclusion in the Site Plans. Tree locations, sizes and species can be found on sheets V-100 through V-103. Trees that must be removed are depicted on Site Plans with a circle with an 'X' and trees that require construction period protection and/or root zone protection are thusly depicted on the Site Plans, see sheets ESC-100 and ESC-101 and L-300 and L-301. A table of all of the Bylaw trees to be removed or protected are shown on sheet ECS-100 and ESC-101.

***4) Redesign the boardwalk crossing the Bylaw protected wetland using helical piles and elevating the boardwalk to allow unrestricted ebb and flow of water through the wetland.***

The Boardwalk was redesigned as requested in the December 21, 2023 Supplemental Filing, see sheet C-114.

***5) Consider replacing the proposed wetland replication (tree and shrub removal and soil excavation in the upland Buffer Zone) with enhancement plantings to provide greater habitat diversity and wetland protection in and adjacent to the Bylaw wetland, BVW, and the surrounding Buffer Zone in the vicinity of the boardwalk. The intent is to provide an equivalent or greater level of mitigation appropriate for this site and context and to decrease off-trail excursions into the wetlands, without impacting existing trees and shrubs in the Buffer Zone.***

The wetland replication has been removed as requested and supplemental plantings provided along the boardwalk in the vicinity of the wetlands. As suggested, supplemental plantings area shown to enhance the Bylaw wetland area as shown on sheet L-101. The Bylaw impact associated with the boardwalk is 420 sf, the supplemental plantings area proposed is 1,450 sf.

6) ***Relocate the two ADA parking spaces and remove the retaining wall north of Haggetts Pond Road, positioned very close to the BVW, and within the 50-foot No Disturbance Zone (NDZ).***

This parking lot has been removed as shown in the December 21, 2023 Supplemental Filing, see sheet C-112.

7) ***Appendix A of Bylaw Regulations requires all individual trees over 10" in caliper to be survey located and shown on the plans. To properly locate these trees, the diameter must be measured one foot above the soil line at the base of the tree, not diameter at breast height (DBH). It is my understanding that BSC Group located trees 15" DBH or greater along the trail and/or within the Limit of Work (LOW). Revisit the site and ensure that all 10" caliper trees within the LOW are shown on the plans. Clearly show which trees will be removed, with an "X" through the tree on the plans and provide a table with the quantity, caliper, and species of trees to be removed.***

At the instruction of the Peer Reviewer BSC has measured, flagged, and GPS-located all 10" caliper trees (Bylaw Trees, measured at 12" from the ground surface) within the Limit of Work according to the Appendix A requirements as requested, see sheets V-100 through V-103. Trees that must be removed are depicted on Site Plans with an 'X' and trees that require construction period protection and/or root zone protection are thusly depicted on the Site Plans. A table of all of the Bylaw trees to be removed or protected are shown on sheets ESC-100 and ESC-101. The Project proposes to mitigate the loss of the Bylaw trees with the replacement of 60 trees as shown sheets L-101 and L-102.

8) ***The project is within the Haggetts Pond Watershed. Therefore, the setbacks on the table in Section (3) of the Bylaw Regulations are increased. Review the setback distances in column "B" of the table and revise the setbacks on the site plans.***

Plans have been revised to show Vernal Pool 75-ft NDZ (No Disturb Zone), Wetland 50-ft NDZ, which are applicable to this project. All impact calculations have been updated based upon the revised required setbacks and breakdown of the impacts can be found in Tables 1 and 2 in the summary portion of this response on page 3.

9) ***The parking lot and associated grading south of High Plain Road are proposed within the 50-foot NDZ and the 75-foot Setback for Parking Lots with Greater than 4 Spaces. Prepare an alternatives analysis to avoid and/or reduce the extent of this work including relocating or reducing the size of the parking lot, providing retaining walls, and providing mitigation to offset such impacts in compliance with the Bylaw Regulations.***

As requested by the Peer Review, attached is the Draft Alternative Analysis for the High Plain Road Parking Area and Trail Connection for your review and comment. BSC has located and identified all of the ByLaw trees within the limit of work, as shown on the attached and have incorporated Alternative 4 in the attached plans set and calculation herein based on initial feedback received. A summary of the Alternatives are as follows. Please note that the impact calculations area limits below include a portion of the rail trail because the parking alternatives impact the elevation of the trail to ensure ADA compliance with the connecting walkway between the parking lot and the trail.

1. **No Parking Improvements Alternative**

   Currently the parking on High Plain Road consists of a dirt parking area along High Plain Road for approximately 4-6 vehicles, with no accessible parking. Cars park head on into the area and are required to back out onto High Plan Road when leaving. The current parking creates an unsafe backing out onto to High Plain Road and provides no accessible parking as required. Parking in this area cannot be expanded without impacts to the wetlands and their buffer zones.

**2. Alternate 1 (12/20/23 Design)**

This design intent was to eliminate any wetland impacts while maintaining a vegetative buffer to the adjacent road/driveway for screening and shading of the proposed parking area in response to the initial review comments that we received on the project during the first Conservation Commission meeting.

| | Wetland Impacts | 0-25 FT NDZ | 25-50 ft NDZ | 50-75 ft Disturbance | 75-100 ft Disturbance | Total Buffer Zone Disturbance | ByLaw Trees Lost |
|---|---|---|---|---|---|---|---|
| Alternative 1 | 0 sf | 7,760 sf | 6,836 sf | 5,287 sf | 908 sf | 20,791 sf | 28 Trees |

**3. Alternative 2**

The 12/20/23 Alternate 3 parking lot design was moved towards the west approximately 9 feet and approximately 20-ft to the north to provide less disturbance in the 0-50 wetland buffer, while avoiding any wetland impacts. This alternative still doesn't allow for any infiltration of stormwater runoff under the parking lot and requires significant stormwater management grading in the 50-ft NDZ to treat to meet MassDEP and the Town of Andover Stormwater Management standards.

| | Wetland Impacts | 0-25 FT NDZ | 25-50 ft NDZ | 50-75 ft Disturbance | 75-100 ft Disturbance | Total Buffer Zone Disturbance | ByLaw Trees Lost |
|---|---|---|---|---|---|---|---|
| Alternative 2 | 0 sf | 3,932 sf | 5,806 sf | 5,890 sf | 3,837 sf | 19,465 sf | 27 Trees |

**4. Alternate 3**

This alternate takes Alt 2 and provides a bridge crossing over the wetlands to limit disturbance in the 0-50 NDZ. Significant retaining walls up to 3+/- ft would be required which would require excavation and removal of the root zones under the retaining walls. Additionally, handrails would be required and the raising of the main rail trail approximately 2.5 ft to accommodate the connection. The heights of the retaining walls would prevent wildlife from crossing the rail trail and parking lot walkway connection. It should be noted that the project team is not in favor of this Alternative due to the increased construction impacts associated with the retaining wall construction. This alternative still doesn't allow for any infiltration of stormwater runoff under the parking lot and requires significant stormwater management grading in the 50-ft NDZ to treat to meet MassDEP and the Town of Andover Stormwater Management standards.

| | Wetland Impacts | 0-25 FT NDZ | 25-50 ft NDZ | 50-75 ft Disturbance | 75-100 ft Disturbance | Total Buffer Zone Disturbance | ByLaw Trees Lost |
|---|---|---|---|---|---|---|---|
| Alternative 3 | 40 sf | 3,792 sf | 5,652 sf | 5,890 sf | 3,920 sf | 19,294 sf | 26 Trees |

**5. Alternative 4 (current design)**

This alternate moves the parking as far away from the wetlands as possible, without requiring a retaining wall on the adjacent side street. This further reduces buffer impacts, preserves some of the southern existing tree buffers and provides stormwater infiltration under the parking lot to reduce storm water runoff flows and eliminate the need for the previously proposed second bio-retention area in the 50-ft NDZ buffer. This option moves the parking the maximum distance from the wetlands, 32-ft without requiring costly retaining walls that could impact the adjacent side street. Alternate 4 has been incorporated into Permitting Drawing set as the preferred design option.

| | Wetland Impacts | 0-25 FT NDZ | 25-50 ft NDZ | 50-75 ft Disturbance | 75-100 ft Disturbance | Total Buffer Zone Disturbance | ByLaw Trees Lost |
|---|---|---|---|---|---|---|---|
| Alternative 4 | 0 sf | 3,932 sf | 6,304 sf | 5,755 sf | 2,754 sf | 18,745 sf | 22 Trees |

Below is a comparison Summary of the Alternative Analysis performed on the High Plain Road parking lot area design options.

**Summary of impacts are as follows for the Alternative Analysis:**

| | Alternate 1 (12/20/23 Design) | | Alternate 2 Moved Away from Wetlands Slightly | | Alternate 3 (Retaining Walls) | | Alternate 4 (Current) | |
|---|---|---|---|---|---|---|---|---|
| | Disturbance | | Disturbance | | Disturbance | | Disturbance | |
| Wetland crossing | 0 | sf | 0 | sf | 40 | sf | 0 | sf |
| 0-25 Disturbance | 7,760 | sf | 3,932 | sf | 3,792 | sf | 3,932 | sf |
| 25-50 Disturbance | 6,836 | sf | 5,806 | sf | 5,652 | sf | 6,304 | sf |
| 50-75 Disturbance | 5,287 | sf | 5,890 | sf | 5,890 | sf | 5,755 | sf |
| 75-100 Disturbance | 908 | sf | 3,837 | sf | 3,920 | sf | 2,754 | sf |
| Total Buffer Zone Disturbance | 20,791 | sf | 19,465 | sf | 19,294 | sf | 18745 | sf |
| ByLaw trees lost | 28 | trees | 27 | trees | 26 | trees | 22 | trees |

***10) The updated plan has eliminated BVW impacts for access from the High Plain Road parking lot to the trail by extending the access path parallel to and within very close proximity to the BVW. During the December 1, 2023 Site Walk, we discussed a straight clear span over the narrow BVW. Prepare an alternative plan showing the access path spanning the narrow BVW to access the trail and reducing grading in the buffer zone. Incorporate retaining walls to limit grading as necessary for this access and the parking lot.***

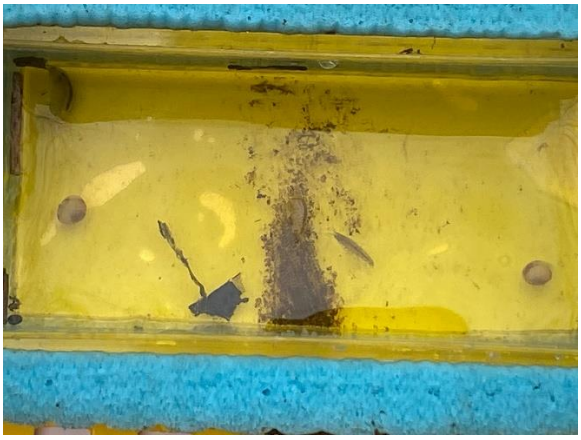
Alternative 3 under #9 above conceptually provides a span across the wetlands as requested. Significant retaining walls up to 3+/- ft, for approximately 300 lf would be required to bridge over the wetland. This would require excavation and removal of the soils and root zones in the retaining wall locations along the connecting pathway and for a portion of the existing Haggetts Pond Rail Trail. Because the parking lot cannot be lowered due to the adjacent street grades, and with limited connecting sidewalk length and distance at ADA maximum grades, the connection at the existing trail is approximately 3 ft higher then the trail surface today, thus requiring significant retaining walls on both sides of the main rail trail and connecting pathway. The heights of the retaining walls would prevent wildlife from crossing the rail trail and parking lot walkway connection. While there would be a reduction of approximately 792 sf of disturbance in the 50-ft NDZ we believe the impact of the retaining walls and their construction would be more impactful. The retaining walls would have a greater long-term impact on the surrounding habitats, especially since we can re-establish the areas impacted by slope grading outside of the paved portion of the walkway and parking lot. It should be noted that the project team is not in favor of this Alternative due to the increased construction impacts associated with the retaining wall construction.

***11) Two depressions along the trail delineated by flags W3-100 through W3-110 and W9-101 through W9-108 exhibit distinct vernal pool characteristics. BSC Group should opine in writing on the likelihood that these areas provide vernal pool habitat and function as vernal pools. Add to the plans the appropriate vernal pool setbacks. LEC recommends that BSC Group evaluate measures to increase habitat diversity and wetland protection in the vicinity of these pools. You must provide mitigation to offset impacts within the VP setbacks to demonstrate compliance with the Bylaw Regulations and/or to receive a Waiver for this work.***

Previously, two wetlands, W3 and W9 were discussed as exhibiting vernal pool characteristics. There are no Potential Vernal Pools in the vicinity of the project, but the heavy conifer cover in the Haggetts Pond area may have contributed to their absence from the Potential Vernal Pool data, and there is no certified vernal pool as of the date of this response letter. Conservation staff have shared observations of vernal pool indicator species provided by a local resident in various locations throughout the Site. BSC therefore conducted a field investigation of all waterbodies that appear to have potential to provide vernal pool function on April 11, 2024 in an attempt to verify observations to the extent possible.

**Figure 1**

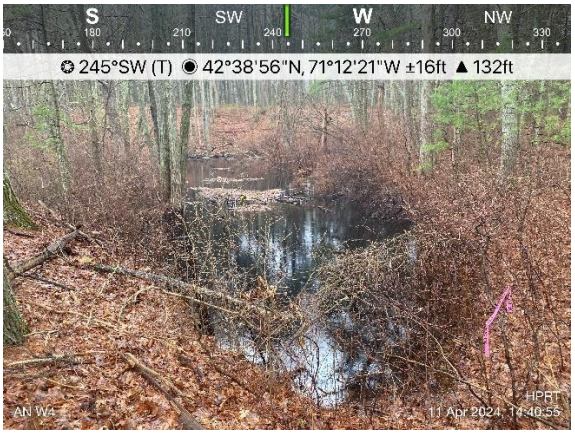
Wetland W9 from railbed at culvert crossing looking North. Stream feeds ponded area and continues eastward through a culvert at photo center.



Amphipods and fingernail clams found in W9. No amphibian evidence was found.


Wetland W3 from railbed. No amphibian egg masses found. Very full of algae throughout pool.


Depredated duck nest found in W3.



Wetland W4 from railbed.

Many wood frogs egg masses found in W4.

Based upon our field evaluations on April 11, 2024, we have detected vernal pool obligate wildlife in Wetland 4 but were unable to find egg masses or other indicators of vernal pool organisms in Wetland 3 or Wetland 9. Conditions were not ideal for the survey, so based upon general characteristics of Wetlands 3 and 9, BSC assumes that they are most likely functional vernal pools, at least in some years, and therefore has not made any change to the assumption that they are vernal pools. Wetland 4 has been added as a vernal pool in project plans and associated calculations.

A report has been made of Wood Frogs breeding in the physically connected to Haggetts Pond north of the culvert crossing and proposed spur trail location (i.e., "the rainbow pool"). We note that this is clearly physically connected to the reservoir by surface water connection at the time of our April 11 site visit, and that it therefore does not meet the definition of "Vernal Pool" in the Andover Bylaw (Section 7(5)(b)) or the Wetlands Protection Act regulations and is a vegetated wetland bordering on a Lake or Pond (i.e., Bordering Vegetated Wetland, or BVW). The report of amphibian breeding in this wetland, however, clearly demonstrates the importance of that wetland to the wildlife habitat functional value protected by the WPA and Bylaw. We have evaluated the ditches along the side of the trail immediately north of Haggetts Pond where poor drainage affects the trail surface and found no evidence of breeding by vernal pool dependent wildlife.

The project will occur within close proximity to vernal pools located adjacent to the existing trail, but work is constrained to the existing historic rail bed that is heavily trafficked by pedestrians, domestic dogs, and bicycles. **The project proposes no direct impact to these wetland resource areas.** The trailway itself is composed of an organic soil material that has accumulated over a compacted gravel ballast base. The public has documented wildlife that may use vernal pools (e.g., Painted Turtle, *Chrysemys picta,* Green Frog, *Lithobates clamitans* and Wood Frog, *Lithobates sylvaticus*) crossing the trailway. BSC acknowledges that the trailway itself provides migration habitat, but due to the existing conditions, it likely does not provide other important habitat functions for vernal pool dependent species (Burne, pers. obs.). Published research has demonstrated amphibian reluctance to cross paved surfaces when evaluated under experimental conditions that compare preferential use of forest versus open turf versus paved surfaces, e.g., and have shown clear preferences to unpaved surfaces under such comparisons. It is well known, however, that amphibians migrate across roads wherever their breeding habitat is separated from non-breeding habitat by pavement. There is clearly no reluctance to travel over paved surfaces during the spring migration (M. Burne, pers. obs.). The proposed trail will have no vehicle traffic during nighttime hours, and this project a de minimus, if any, impact migrating amphibians. The project will not adversely impact the use of the trailway by vernal pool dependent wildlife for migration.

In order to protect potential vernal pools and other adjacent wetland resource areas, buffer zone work has been minimized to the greatest extent possible. The width of the proposed trail has been reduced from the previously proposed 10-ft wide to 8-ft wide. It should be noted that MassDOT specifications suggest a 12-ft width for shared use paths such as this trail, and allows for a reduction in width to 8-ft for environmentally sensitive areas. The

compacted gravel walking surface that was originally proposed along the  has been removed. Compacted gravel trail shoulders have been replaced with loamed-and-seeded trail shoulders, which will provide greater wildlife and aesthetic value.  The proposed seed mix proposed is a woodland trailside seed mix applicable this type of woodland setting.  As such, the Project protects the interests of the Massachusetts Wetlands Protection Act and complies with the associated regulations (310 CMR 10.00 *et seq.*). Please refer to responses to Comment 17 for a full accounting of project avoidance, minimization, and mitigation measures.

The Andover Wetland Protection Regulations establish General Provisions for Vegetative Buffer Zones at Section 4(2), for Building/Structure Setbacks at Section 4(3), and specific performance standards for work proposed in vernal pools (Section 7(5)) and within 100 feet of vernal pools, the Buffer Zone (Section 7(6)). Compliance with these provisions of the Wetland Protection Regulations is discussed below.

**Section 4: General Provisions; (2) Vegetative Buffer Zone**

> "There shall be no removal of vegetation, excavation or filling within…75 feet of any vernal pool…"

- The trail portion of the project is located entirely within the existing railroad bed, an existing unvegetated disturbed area, and will not require removal of vegetation within 75 feet of any presumptive or verified vernal pool. The proposed improved trail surface will require removal of the organic soil material that has accumulated over the existing compacted ballast rail bed and placement of new compacted gravel as a base for the proposed trail. This will be required within the 75-foot NDZ at the vernal pools. The Project will require a waiver of strict compliance with the relevant provisions of the bylaw for such work. **It should be noted that any ADA compliant trail surface shall require such excavation and fill,** and that BMPs (including sediment and erosion controls), will be in place during site preparation and construction to ensure that Impacts to adjacent wetland resource areas are avoided.  All work related to the trail construction within the 75-foot vernal pool NDZ is within the existing rail bed.  Additional temporary impacts to the 75-ft NDZ shown in Table 2 in the response summary on page 3 are related to mitigation plantings of Clethra and Viburnum to enhance the buffer between the pathway and the vernal pool.  The project proposes a total of 106 Clethra and 8 Viburnum plantings as part of the buffer zone mitigation to keep people and pets out of the vernal pool areas.

**Section 4: General Provisions; (3) Building/Structure Setbacks**

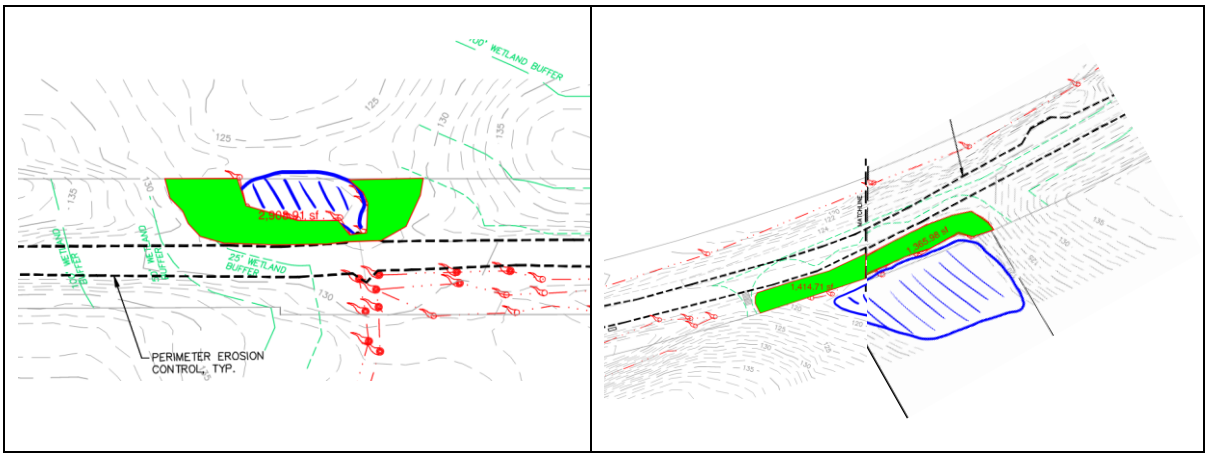
> "The following setbacks are established for buildings/structures placed adjacent to;… C: Any vernal pool"

Section 4 establishes minimum setbacks for buildings and structures, defined as "any combination by man of matter composed of parts or materials assembled and joined or mixed together in some definite manner or pattern at a certain location for whatever purpose or use, whether or not affixed to the land," (Section 5: Definitions). **It should be noted that any ADA compliant trail surface shall meet this definition** of "Building/Structure" and shall be subject to the setback requirements of Section 4(3). The proposed asphalt trail does not require a building permit (Section 4(3) 2.) and is not an Access Road (Section 4(3) 6.) or a Driveway (Section 4(3) 11.), and therefore the Wetland Protection Regulations would require a setback of 75 feet from vernal pools.

The Project proposes an 8-foot-wide asphalt path within the existing railroad track bed. The paved path will be located within approximately 20 feet of the presumptive vernal pool located within wetland W3, approximately 18 feet of wetland W4, and approximately 16 feet of wetland W9. The proposed trail will result in 7,376 square feet (SF) of Building/Structure within the 75-foot setback area for the vernal pool in W3 and W4 combined, along with 1,677 SF of Building/Structure within the 75-foot setback area for the vernal pool in W9. Proposed work within vernal pool 75-foot setback area on the site totals 9,063 SF. Note that the entirety of 75-foot setback area around vernal pools on the site is already heavily disturbed by pedestrian and bike traffic and does not provide important wildlife habitat functions.

- The Project does not comply with the minimum setback for Building/Structures in the Andover Wetland Protection Regulations at Section 4(3) and will therefore require a waiver of this bylaw requirement. To mitigate unavoidable work within the 75-foot vernal pool building/structure setback, BSC is recommending improvements to the habitat around the vernal pool at Wetland W9 to enhance the vegetative buffer especially on the west side of the wetland, which is presently in a sparsely vegetated condition with little mid-story (shrub/sapling) vegetation. A dense planting of Sweet Pepperbush (*Clethra alnifolia*) comprising approximately 2,040 SF at wetland W9 and additional Sweet Pepperbush plantings within approximately 1,730 SF of the Buffer Zone screening wetland W3 would provide a physical and visual barrier to discourage off-leash dog access to the presumptive vernal pool, and improve shelter, non-breeding habitat, migratory, and feeding habitat functions of this wetland. We note that existing *Clethra* populations at W4 are very dense and don't believe that additional plantings would be feasible or beneficial at this location. Please see sheet L-100 for the buffer plantings.

**Figure 2**




W9 habitat enhancement planting area

W3 habitat enhancement planting area

**Section 7: Performance Standards; (5) Vernal Pools**

Section 7(5)(c) Presumption states that "where a proposed activity involves the removing, filling, dredging or altering of a vernal pool, the Conservation Commission shall presume that such an area is significant to the protection of wildlife habitat, particularly amphibian habitat."

- The Project does not propose to remove, fill, dredge, or alter a vernal pool, and therefore meets the General Performance Standards at Section 7(5)(d).

Section 7(5)(d)2.: If a project meets 7(4)(d)1. [sic], above, the Conservation Commission may issue a permit for activities within non-certified vernal pools provided that the project meets the performance standards of the resource area within which it is located.

- The Project does not propose to remove, fill, dredge, or alter a vernal pool, and therefore meets the Performance Standards at Section 7(5)(d)2.

Section 7(5)(d)3.: Habitat evaluations associated with activities which may have an impact on vernal pools may be conducted in accordance with Massachusetts DEP policy…

- The project proposes improvements to the existing rail trail that is within the Vernal Pool buffer zone. No additional impacts are proposed other than temporary impacts for mitigation of a dense planting of Sweet Pepperbush (*Clethra alnifolia*) between the existing rail trail and vernal pools W9 and W3. The project is therefore in compliance with Section 7(5)(d)3.

Section 7(5)(d)4.: There shall be no removal of vegetation, excavation, or filling within 75 feet of any vernal pool…

- The Project does not propose to remove vegetation within 75 feet of any vernal pool, in compliance with the Performance Standard at Section 7(5)(d)4. As discussed above, any ADA-compliant trail surface at this Site shall require removal of accumulated organic soil materials and preparation of a new compacted gravel base, which is not in compliance with Section 7(5)(d)4. and will require a waiver from strict compliance with the relevant provisions of the bylaw for such work.

Section 7(5)(d)5.: Refer to Section 4(3) for setback requirements to any vernal pool. Any exception shall be allowed only as permitted …if no practicable alternative is determined to be available after completion of an alternatives analysis.

- Refer to the Section 4(3) analysis above. An alternatives analysis is presented below:

*Alternative I: No Build*

Avoidance of placing a regulated structure (an improved trail surface) can be achieved with a no build alternative. The trail at Haggetts Pond would remain in its current condition, impassable to people with disabilities. The Town of Andover would remain without an ADA compliant trail. The existing trail has impassable conditions located north of Haggetts Pond where compaction and poor drainage cause consistent muddy conditions. Alternative, "coyote" trails have developed to avoid such conditions in several locations. Impacts associated with unmanaged trails include erosion, soil compaction, additional fragmentation, and greater human and domestic dog activity through the forest. This alternative does not achieve the project purpose to provide an ADA compliant trail in Andover, therefore, this alternative is rejected.

*Alternative II: Realignment of the proposed trail*

Avoidance of work in the buffer zone of Wetland W9 is theoretically possible by re-routing the trail eastward through the Andover Water Department land starting just east of 278 High Plain Road using the existing trail through open field habitat and following existing trails toward Haggetts Pond, returning to the railroad Right of Way approximately 1400 feet south-southwest, just north of the marsh associated with Haggetts Pond Brook (Figure 3a). Avoidance of the buffer zone associated with the vernal pool located in Wetland W4 is theoretically possible with new trails cut into the Bolton and Pray properties to the west of the existing rail trail (Figure 3b). Due to its location at the south border of the Pray property and its shape and length, similar avoidance of the buffer zone associated with W3 is not feasible.

ADA compliance feasibility, as well as additional wetland and wetland buffer zone impacts based on MassGIS maps and our knowledge of the surrounding area would result in significant additional impacts to the forest and fields in the Haggetts Pond watershed and Priority Habitat identified in the northern portion of the Site relative to the use of the existing rail bed alternative.

**Figure 3**


Theoretical alternative trail alignment to avoid presumptive vernal pool buffer zone at W9


Theoretical alternative trail alignment to avoid presumptive vernal pool buffer zone at W4. There is no potential alternative route that avoids the buffer zone to W3

*Alternative III: Proposed trail*

The Project as proposed requires work within the 75-foot setback area of two presumptive vernal pools (W3 and W9) and one confirmed (W4). The trail is proposed within an existing heavily used recreational trail on a historic railroad bed. There is no native vegetation within the existing trailway that needs to be removed for this alternative. Habitat values of the existing trail are minimal as discussed above, comprising migration habitat and possible feeding habitat for some wildlife. The project as proposed will result in loss of a *de minimus* amount of available habitat in the vicinity of the site. The width of the new trail surface (which could be a perceived barrier to amphibian and small animal migration), has been reduced, and vegetated margins will provide cover and habitat for wildlife. The creation of a more defined, formal trail surface will reduce off-trail disturbance and erosion, while improving accessibility for all. Mitigative measures have been proposed for unavoidable impacts associated with this preferred alternative which include woodland seed mix planting along the trail edges and the vernal pool buffer dense planting of Sweet Pepperbush (*Clethra alnifolia*) to improve the buffer habitat and provide protection of the sensitive vernal pool areas. Additionally, the project proposes to provide stormwater treatment from both the Haggetts Pond Road and High Plain Road culverts that discharge untreated roadway runoff into the site wetlands. The project has incorporated structured Water Quality structures, meeting MassDEP Standards, the use of a rain garden (High Plan Road) and rip rap outlet protection (Haggetts Pond Road) to improve the overall runoff water quality from the adjacent roadway runoff discharges.

**Section 7: Performance Standards; (6) Buffer Zones**

The Project proposes work in the Buffer Zone, which is subject to regulation at Section 7(6) of the Wetland Protection Regulations. The regulations establish a rebuttable presumption that work within the buffer zone will result in alteration of the resource area. As discussed above, the trail is proposed in an existing abandoned railroad Right of Way, comprising compacted ballast with an accumulated organic surface layer of varying thickness. There is no vegetation within the proposed trail layout within the subject vernal pool buffer zones.

- Existing conditions and current uses combined with the proposed mitigation overcome the presumption that work proposed within the buffer zone of vernal pools will have an adverse impact on vernal pools (Section 7(6)(b)).

General performance at Section 7(6)(c) state that "one of the following must apply: 1. Any work should not result in alteration of any …vernal pool… or 2. a. if work within 100 feet of any …vernal pool… is permitted by the Conservation Commission, the alteration of the resource area shall comply with the applicable performance

requirements for the altered resource area and any other conditions the Conservation Commission may require to enforce those performance requirements."

- The proposed project will not result in the alteration of any vernal pool. Robust erosion and sedimentation controls shall be used to ensure protection of all vernal pools from the proposed construction activities within the existing rail trail limits.

- The Project complies with the performance standards established, and proposes no work in any vernal pool, Section 7(5) and proposes no new permanent impacts to the associated vernal pool 75 ft NDZ buffer and is therefore in compliance with Section 7(6)(c) 1. and 2.a and therefore complies with the Buffer Zone Section of the Andover Wetland Protection Regulations.

12) ***Locate in the field and depict on the plans any zones of exposed surface tree roots that will require cutting or root barriers and depict on the plans. When and where to cut the roots and install root barriers cannot be left completely up to the Landscape Architect during construction. Provide in writing a detailed explanation of the 3X Trunk Diameter Rule referenced during the January 4, 2024 Public Hearing.***

Please refer to BSC responses to comments 3 and 7, above regarding the field locating of trees. Please also refer to extensive comments in response to Comment 34, below regarding root zone projections proposed. Additionally, see Sheets L-300 and L-301 for tree and root protection.

13) ***Explain in greater detail in writing specifically how "the trail will avoid impacting mature trees to the greatest extent feasible" and how "roots of mature trees will be protected." Evaluate whether the 4-inch depth of the compacted gravel borrow subbase beneath the trail at these locations is sufficient to protect the trees and to ensure the long-term integrity of the trail.***

The Project proposes removal of no Bylaw trees within the linear footprint of the paved trail. Consistent with general best practices when working in proximity to mature trees, measures will be taken to reduce the risk of inadvertent impacts, including by providing physical protection to trees greater than 10" caliper that are located within 2 feet of the Limit of Work (LOW). Please see Sheets L-300 and L-301 for the specific detailed tree and root zone protection measures which indicates areas of vertical root barriers and areas of root barrier fabric to protect existing roots that have grown over the existing rail bed.

14) ***Oversight by the Town/Engineer during construction is not sufficient for tree protection along the trail. Show which trees immediately adjacent to the trail will be protected during construction and add a tree protection detail to the plan set.***

Trees immediately adjacent to the proposed trail are shown on the revised plans. Please see Sheets L-300 and L-301 for the specific detailed tree and root zone protection measures. Which include root barriers and banded tree protection measures.

15) ***The NOI Form does not quantify the square footage of Riverfront Area alteration. Please provide this calculation. If greater than 5,000 square feet, please prepare a wildlife habitat evaluation for impacts to Riverfront Area.***

BSC has updated Project Plans showing Riverfront Area that is associated with two streams running through the marsh to the west of Haggetts Pond between US Route 495 and the proposed trail that flow through the cattail marsh and drain into the pond under the right of way at the stone culvert located approximately at Sta 32+00. BSC delineated Bank associated with the open water areas at the toe of slope on the west side of the historic rail bed and used aerial photo interpretation to estimate the location of each channel, which is somewhat obscured by a tortured path through the marsh. BSC completed a StreamStats analysis (see attached StreamStats reports, Addendum 15-1 and 15-2) for both streams to estimate bank-full width and thereby determine jurisdictional riverfront area in accordance with 310 CMR 10.58(2), as recommended by the Peer Reviewer (A. Marton, pers. comm.). The

StreamStats analysis provided a calculated width for the northern stream of 12.3 feet and for the southern stream 12.1 feet.

Perennial stream bank was established based on the foregoing evaluation, and BSC has determined that the project will result in 8,491 SF of new impervious surface in riverfront area, over the existing rail bed. The marsh associated with the two perennial streams are identified as MassDEP Habitat of Potential Regional or Statewide Importance (Addendum 15-3). As such, BSC is providing an Appendix B wildlife habitat evaluation for work in the riverfront area on the site in accordance with the Massachusetts Wildlife Habitat Protection Guidance for Inland Wetlands (MassDEP, 2006)(Addendum 15-4). Mitigation for the proposed paving is part of the overall mitigation proposed associated with the project and summarized on page 4 of this letter.

16) ***Since the path width has been reduced to 8 feet with 1-foot shoulders on each side, can the very large tree at flagging station BF 703 remain and be protected during construction?***

Yes. This tree has been added to the site plans and called out for protect per our tree protection plans.

17) ***The NOI Application and supplemental submission state that the project has been designed to avoid and minimize impacts. Clarify these statements with specific detail and elaborate in detail the proposed mitigation to offset the remaining impacts.***

**Avoidance and Minimization:** A detailed narrative discussing project modifications to avoid and minimize impacts to areas within the jurisdiction of the Andover Conservation Commission was provided in the Supplemental Project Narrative submitted with revised Plans, Stormwater Report and Operations and Management Plan on December 21, 2023. To summarize, Project impacts within the jurisdiction of the Andover Conservation Commission have been avoided and minimized as follows:

- The trail width has been reduced from a the previously proposed 10-foot width according to DOT standards to an 8-foot width, **eliminating 10,800 SF of impervious surface** relative to the DOT minimum standard. It should be noted that the preferred DOT shard use path width is 12-ft and allow for a reduction to 8-ft in environmentally sensitive areas.

- The originally proposed 3-foot gravel trail section adjacent to the paved path was removed from the project proposal, **eliminating 16,200 SF of proposed impervious surface**.

- The trail has been designed over the existing old railroad bed. As such, **the trail will require no cutting of trees**, for the trail construction and excavation has been limited to the removal of organics over the old rail bed to existing gravel material, for plantings, post and rail fence posts, boardwalk and bench footings, and for the installation of an underdrain in limited areas of the trail. The construction of the High Plain Road parking lot, located within the 100-ft buffer to a wetland will require the removal of 22 Bylaw trees and has undergone an extensive alternative analysis under comment #9 above. The proposed parking on Haggetts Pond Road has been located such that is outside of any 100-ft buffer zone to any wetland resource area.

- The trail is designed to slightly raise the trail surface such that existing **tree roots can be protected**, per project Tree and Root Zone Protection Plans, L-300 & L-301.

- Proposed **wetland fill has been eliminated**.

- **Parking areas have been reduced** to 14 parking spots in each parking area (28 total), from the originally proposed 21 parking spaces in the High Plain Parking lot, 2 parking spaces on the north side of Haggetts Pond Road (this parking lot has been eliminated) and 12 parking spaces on the South side of Haggetts Pond Road (35 total). On-street parking will be controlled through signage approved by the Conservation Commission and Select Board to control maximum trail usage. See signage plan on sheet C-402.

- The parking lot proposed on the north side of Haggetts Pond Road has been eliminated.

- The stormwater management has been designed as underground structures within the proposed parking lots to **reduce the amount of clearing** that would be required for a stormwater pond or similar natural bmp feature.

- The **look-out spur has been redesigned as a wooden boardwalk supported on helical piles**. The use of the boardwalk feature reduces disturbance of the existing soils and roots and allows wildlife and water to pass under the boardwalk. Additionally, the proposed Bylaw jurisdiction crossing utilizes helical piles to further heighten the boardwalk 18-inches over the Bylaw wetland to provide greater water flow through the wetland area.

- A proposed **wetland replication area has been eliminated** at the look-out spur to reduce impacts to a sensitive plant population, replaced with enhanced native buffer zone planting in the adjacent state-jurisdictional wetland on the north side of the proposed spur boardwalk.

**Mitigation:** Unavoidable impacts are being mitigated with proposed restoration and enhancement plantings of natural vegetation within wetland buffer zones, native pollinator seed mixes for High Plain Road parking area upland slope, native woodland trailside seed mix along the trail and parking lot edges, mowing and long-term management agreements for maintenance of high quality wildlife habitat resources within and adjacent to the Site (approximately 4.5 acres for the northern field and 2 acres for the southern field), increased signage to control on-street parking and reduce peak usage through parking controls, increased signage along the trail noting the sensitivity of this environment and its protection (see sheets C-400 – C-402), installation of trash and dog waste stations at each trail head to reduce litter, installation of stormwater BMPS to treat the existing runoff from High Plain Road and Haggetts Pond Road/Lakeside Circle, measures to reduce the existing erosion of the existing tail surface into the adjacent wetlands and Haggetts Pond, and educational signage that engages the public in appreciation of unique and important natural features of the Site and an Operation and Management Plan outlining the methods, times and procedures to maintain the proposed improvements..

- The Project proposes **native habitat enhancement plantings of 2,040 SF** in the habitat around the vernal pool at wetland W9 to enhance the vegetative buffer especially on the west side of the wetland between the delineated wetland edge and proposed trail, which is presently in a sparsely vegetated condition with little mid-story (shrub/sapling) vegetation. We recommend additional **native shrub plantings within an area of 1,730 SF** at wetland W3 to screen and protect the wetland. A dense planting of Sweet Pepperbush (*Clethra alnifolia*) would provide a physical and visual barrier to discourage off-leash dog access to the presumptive vernal pool, and improve shelter, non-breeding habitat, migratory, and feeding habitat functions of this wetland. The wetland W4 has a dense buffer of *Cletha* and is unlikely to accept additional plantings.

- The Project proposes **native habitat enhancement planting of 1,450 sf** in the habitat around the proposed boardwalk at the Bylaw wetland crossing to mitigate the 420 sf of Bylaw impact associated with the boardwalk crossing. The plantings consist of Buttonbush, Dogwood and Viburnum varieties, as shown on plan sheet L-101 to enhance the sparsely vegetated condition at the crossing.

- In coordination with the Natural Heritage & Endangered Species Program, Town of Andover Conservation Commission, and Water Department, establish a long-term management plan for approximately **6.5 acres (283,000 SF) of open field habitat for the benefit of rare wildlife** and commitment to no further trail development in the Priority Habitat area without a Division of Fisheries & Wildlife approved trail management plan. See Addendum 17-1, Mowing Advisory Guidelines in Rare Turtle Habitat.

- The proposed trail will be **closed to all motorized vehicles** other than medically necessary motorized conveyances. Electric bicycles, "e-bikes," will be prohibited. This will be posted on both kiosks at each end of the trail.

- The Project will **establish 10,800 SF of native, shade-tolerant woodland trailside seeding** trail shoulders and grading stabilization, resulting in the improvement of wildlife habitat functional values of the trail surface on the Site which is currently devoid of wildlife habitat value due to existing conditions and trail usage.

- The Project will **establish 2,700 SF of native, pollinator-friendly** High Plain Parking area slope seeding and grading stabilization, resulting in the improvement of wildlife habitat functional see plan sheet L-101.

- Improved **control of on-street parking** to reduce and control on-trail traffic during peak usage periods, see plan sheet C-402.

- Existing stormwater runoff from High Plain Road and Haggetts Pond/Lakeside Circle will be collected and treated per the MassDEP Stormwater Handbook to reduce TSS (Total Suspended Solids) that currently discharges to the wetland and pond areas. This runoff currently discharges untreated.

18) ***Trail improvements are proposed within large stretches of the 50-foot No Disturbance Zone. This work is unavoidable to achieve the project purpose. However, you must provide mitigation to offset these impacts and to demonstrate compliance with the Bylaw Regulations and/or to receive a Waiver for this work.***

The Project proposes a total of 75,160 SF of trail and parking improvements within 50' No Disturbance Zones on the Site. Of the 75,160 sf of impacts, 57,800 sf are within the existing rail trail limits, 9,130 sf are new impacts associated with the High Plain Parking lot, sitting area and bike rack bump outs, and riprap erosion control, and 8,230 sf are temporary impacts and will be planted and restored buffer zones. See Table 2 on page 3 of this response for a summary. Unavoidable impacts are being mitigated with proposed restoration and enhancement plantings of natural vegetation within wetland buffer zones, proposed long term management agreements for important wildlife habitat adjacent to the Site, increased signage to control on-street parking and control peak usage through parking controls, and use of pollinator-friendly, and native seed mixes for stabilization of the Site, including proposed vegetated shoulders on the trail. Given current conditions and uses of the existing trail, shoulder stabilization with native, pollinator-friendly species will provide a significant improvement in the wildlife habitat and ecological values of the Site. **Please also refer to response to question 17 above.**

19) ***Section 2.1.4 of the NOI Application states that "given that the Project is in the public interest and will limit disturbance to the footprint of the existing railbed and necessary parking areas, the Applicant is requesting a waiver from the setback conditions of the Andover By-Law…" Furthermore, Section 5 quotes Article XIV section 8, stating that "The Commission may waive the provision of this by-law…when in its judgement, such action is consistent with the purpose and intent of this by-law and when strict enforcement of the requirements of this by-law would result in hardship to the applicant." The burden is on the Applicant to prove this hardship and provide mitigation to offset the impacts.***

***Document in writing how this statement fits into the framework of the Bylaw and Bylaw Regulations. LEC recommends that you provide on or off-site mitigation to offset impacts to the NDZ associated with improvements to the trail.***

Peer Review comment 18 states that "Trail improvements are proposed within large stretches of the 50-foot No Disturbance Zone. This work is unavoidable to achieve the project purpose." BSC agrees with this assessment. The Project purpose at the Site cannot be accomplished without a waiver of the strict enforcement of the bylaw setbacks. Without such waiver, an ADA-compliant trail will not be built which represents a hardship for the Town of Andover due to legal requirements for providing such trail accessibility. **The final trail surface treatment, which appears to be the fundamental point of contention in this project, has no bearing on work that would be required within the 50-foot No Disturbance Zone**. Site preparation, including removal of accumulated organic material on the existing trail bed, addition of compacted gravel base material and preparation for a final surface will require the same work.

The Project has been designed to avoid wetland impacts to the maximum extent possible while still locating an improved trail within an existing abandoned railroad right of way and trail bed and provide adequate and safe parking. The Project has further been designed to minimize impacts as detailed in response to Comment 17. The Project proposes a comprehensive mitigation package for unavoidable impacts to bylaw interests. Please refer to the response to Comment 17, above for specific measures taken to avoid, minimize, and mitigate impacts from the Project.

Please refer to our responses to Peer Review comment 9, 11, 15, 17, and 18 for analysis and details on the project efforts to **avoid and minimize project impacts and to mitigate impacts that are unavoidable** while still implementing a program of trail improvements at Haggetts Pond for the purpose of establishing Andover's first and only ADA-compliant trail.

***20) Quantify the acreage of the "proposed long-term management commitments to maintain open field conditions" as described in the Operation & Maintenance (O&M) Plan. The location and extent of this mitigation must be specifically depicted on a plan. Details for the locking access gates must be included in the plan set.***

Acreage of existing open field habitat is approximately 4.5 acres in the northern field and 2.0 in the southern field. The detail for the locking access gates is shown on sheet C-302 of the site plans previously provided and dated 12/21/2023. The location and acreage of the open field O&M has been included in the O&M Plan.

***21) Update the Revised Project Impact Evaluation Table and adjust the table to accurately reflect the 50-foot NDZ, the 75-foot Setback for Parking Lots with 4 or more Spaces, the No Structure Zone (for any retaining walls), and Riverfront Area. Clarify why impacts to Outstanding Resource Waters remains on the table. Clarify the Surface Water Protection Zone (SWPZ), where this zone is depicted on the plans, and specifically how this zone is being protected.***

The revised project plans have been revised to show both the 50-foot NDZ and the 75-FT setback areas and Riverfront Areas. Additionally, the project impacts table has been updated/revised based on the plan revision to address comments received. ORW impacts have been removed from the table, and the SWPZ limits added to the site plans. Please see Tables on page 3 of this response for impacts.

Haggetts Pond provides the public water supply for the Town of Andover. It is a large surface water supply that is fed by two adjacent watersheds, the Haggetts Pond watershed (approximately 1400 acres) and the Fish Brook watershed (approximately 2400 acres) originating in the Merrimack River at Fish Brook and extending southward to Belview Road, westward to Brown Street at Route 133, southeastward to Indian Ridge Country Club and eastward to the West Parish Church Cemetery at Route 133 and Chandler Road.

- The project is being reviewed under the Massachusetts Wetlands Protection Act and its regulations (310 CMR 10.00), the Andover Wetlands Protection Bylaw. However, the work on the proposed rail trail project is **not** subject to the Massachusetts Surface Water Quality Standards (314 CMR 4.00) and 401 Water Quality Certification regulations (314 CMR 9.00), and to the Massachusetts Drinking Water Regulations (310 CMR 22.00). The Project will not result in a discharge subject to certification under section 401 of the Federal [Clean Water] Act.

**Massachusetts Drinking Water Regulations**

As a public water supply, Haggetts Pond is subject to the Massachusetts Department of Environmental Protection's Drinking Water Regulations at 310 CMR 22.00. The regulations establish Surface Water Supply Protections at 310 CMR 22.20B (Surface Water Supply Protection) and 310 CMR 22.20C (Surface Water Supply Protection for New and Expanded Class A Surface Water Sources). Haggetts Pond and its tributaries are buffered by a 400-foot Zone A Surface Water Supply Protection Area within which requirements of 310 CMR 22.20B and C apply.

Surface Water Supply Protection provisions require that:

310 CMR 22.20B(2) public water systems prohibit the following new or expanded land uses within Zone A:

(a) All underground storage tanks.

(b) Above ground storage of hazardous material, or liquid propane or liquid petroleum products (with exceptions).

(c) Treatment or disposal works subject to groundwater discharge permits (with exceptions).

310 CMR 22.20B(3)

(a) All on-site subsurface sewage disposal systems shall be in compliance with Title V.

(b) All sewer lines and appurtenances are prohibited (with exceptions).

(c) All pumping stations shall have standby power if located within 1000' of a surface water or tributary.

(d) Additional controls as deemed necessary by the Department of Environmental Protection.

310 CMR 22.20B(4) prohibits livestock within 100 feet of a surface water source or tributary (with certain provisions).

310 CMR 22.20B(5) prohibits burials and certain cemetery functions.

310 CMR 22.20B(6) prohibits swimming and other recreational activities, and

310 CMR 22.20B(8) prohibits herbicides with certain provisions.

The only provision pertaining to new pavement or increased impervious surfaces within the Surface Water Supply Protection provisions of the Drinking Water Regulations is for "New and Expanded Class A Surface Water Sources," (310 CMR 22.20C). These provisions prohibit "land uses that result in the rendering impervious of more than 15%, or more than 20% with artificial recharge, or 2500 square feet of any lot, whichever is greater," (310 CMR 22.20C(I)).

- **The Project fully complies with 310 CMR 22.00**. Section 310 CMR 22.20(C) does not apply to the project because the Project does not involve a new or expanded Class A Surface Water Source.

Additionally, the project's Stormwater Management has been designed in accordance with the Massachusetts Stormwater Management Handbook, specifically in accordance with Table CA 2: Standard 6, relative to stormwater discharges near to Outstanding Resource Waters, including vernal pools and surface water sources for public water systems.

**Figure 4**


Haggetts Pond Surface Water Source Zone A

22) ***The Narrative states that Filtrexx TM Silt Sock will be used for erosion control. However, the Sediment Control Barrier detail on plan sheet C-300 depicts a 12" diameter installed "tube" but does not specify FiltrexxTM Silt Sock. Correct this detail to reference Filtrexx TM Silt Sock compost filter sock. Remove the notation on the detail allowing the engineer to authorize use of 9" sock for flatter surfaces.***

The narrative has been revised to replace "Filtrexx TM Silt Sock" with "Composite Filter Sock" consistent with the Stormwater Report and Site Plans. We have also removed the note for 9" socks as requested.

23) ***The Supplemental Narrative references an attached Wetland Delineation Field Data Form supporting the Local Bylaw only determination, but no data form is attached. Provide the data forms.***

See Attached Addendum 23-1.

24) ***Confirm a total of six (6) culverts will be inspected and cleaned. Regular culvert inspection and cleaning must be included in the O&M Plan.***

Six (6) existing culverts have been identified on the revised site plans. Culverts will be cleaned during this project. Additionally, the O&M Plan has been updated for the regular inspection and maintenance of these culverts.

25) ***Trash and dog waste stations must be shown on the plans and included on the detail sheets.***

Trash and dog waste stations have been added to the project plans.

26) ***The Supplemental Narrative fails to address the potential for the asphalt trail surface to impact the Public Water Supply (PWS) and adjacent wetlands. Provide an assessment and comparison between the impacts of an 8-foot-wide asphalt trail versus an 8-foot-wide stone dust trail on the PWS and adjacent wetlands.***

Construction of an ADA compliant trail of any surface type poses the same risks to wetlands during the construction phase. The initial construction phase of either surfacing option requires removal of organic soil material that has accumulated over the compacted ballast rail bed, minor grading, and resurfacing with compacted base material. Erosion and sedimentation controls following best management practices (BMPs) must be followed to reduce risks of impacts to the adjacent wetlands during construction.

Preparation for either trail surface theoretically creates risk of exposure to contaminants from the historic rail bed. BSC has tested samples of the base material along the existing Haggetts Pond rail bed and found no reportable

levels of contamination that poses a risk to human health, the environment or wildlife. Please refer to BSC responses to Comments #36 regarding potential contamination from the base materials in place within the rail bed.

BSC has found relatively little published research related specifically to the effects of fine particulates on wildlife though we note that excessive sedimentation can smother eggs of many amphibians and alter food sources. The North American dusky salamander (*Desmognathus fuscus*) and the spring salamander (*Gyrinophilus porphyriticus*) are reportedly very sensitive to effects of bank erosion, sedimentation, and turbidity (Campbell 1974, Orser and Shure 1972). However, the effects of sedimentation/burial (e.g., of amphibian eggs) on overall community structure of herptiles apparently have not been documented in wetlands, and indicator assemblages of "most sensitive species" remain speculative for this stressor (*10.0 Amphibians and Reptiles | Monitoring & Assessment | US EPA*, n.d.).

While stone dust trails provide the benefit of a more natural look, the use of this material presents long-term risk of wetland impact over its life span that a paved trail does not. In a Rails-to-Trails Conservancy survey (2015), trail manager respondents reported that water and erosion accounted for 77% of the major causes of damage to trails. The wetlands adjacent to the trail are downslope and fairly close to the trail, creating a high likelihood that a storm event could erode a stone dust trail and cause sedimentation in the wetlands on a frequent basis. Inadvertent sedimentation can also be caused by snow removal or snow melt. A similar stone dust trail located on flat, 0% grade and 0% side slope within riverfront area in Malden, Massachusetts failed within the first year following construction (Figure 5). This failure resulted in direct discharge of stone dust to the adjacent waterbody and riverfront area.

**Figure 5**


Typical failure profile of stone dust trail surfaces.

Stone dust is notoriously difficult to remove from wetlands, as the fine particles easily spread and integrate with the existing soil. Sediment removal and restoration causes significant disturbance in important habitat, natural soils, and sensitive plant species. A stone dust trail requires frequent regrading, repair, and monitoring. More opportunities for trail washouts can be expected as climate change models predict increases in total and extreme precipitation events for the Northeast by the end of the century (Picard et al. 2023).

Asphalt trails provide consistent and reliable ADA-access, and require less frequent maintenance than stone dust, or natural trails. As described here-in, an asphalt trail will result in minimal wetland impacts (direct or indirect), which are not substantially different from those associated with stone dust trail. In many respects, an asphalt trail will result in fewer wetland impacts, avoiding the risk of sediment and stone dust wash-out, and the migration of trail surface material into vegetated margins. Due to the site conditions, expected traffic, and 90-100% tree canopy cover, an asphalt trail would see less weathering by the sun and subsequently require infrequent preventative and corrective maintenance as outlined in the O&M Plan. While an asphalt trail surface will have a slightly higher runoff

rate than a crushed stone surface, the Project has been designed to mitigate the increase in impervious area by oversizing the stormwater infiltration systems at both the proposed Haggetts Pond Road and High Plain Road subsurface infiltration systems. These two systems provide the required infiltration and peak rate of runoff to mitigate the trail paving. During storm events, runoff from the trail will sheet flow off the trail into vegetated filter strip on the opposite side of the trail from Haggett's Pond, allowing any sediments that may accumulate on the trial to be filtered out of the runoff, such as dirt, leaves, or other debris. Additionally, the existing wetland buffer zones will also provide additional filtering of the runoff from the trail surface. Stormwater runoff from an asphalt trail will be lower in sediment and dust inputs than that produced from a stone dust trail, reducing the risk of Impacts to associated wetlands. Note that chemical contaminants associated with asphalt roadways are predominantly linked to drippings and/or tire and brake dust from vehicles, chemical deicers, and road salt, none of which will be used on the trail proposed. Chemical sealants which have been linked to amphibian toxicity (including coal-tar sealants), will not be used in the trail surface. Additionally, the project is prohibiting the use of any recycled asphalt materials in any imported gravel base material as stated on Plan Sheet C-301, Hot Mix Asphalt Rail Trail Section, note #8.

Please refer to the response to Comment #33 for more information regarding water quality and maintenance in relation to the proposed asphalt trail.

BSC has found little scientific research on any specific environmental or toxicological impacts from asphalt, per se, though we note that the most important factors affecting wildlife that we have been able to identify include the width of a roadway and the associated risk of vehicle collisions (which is not relevant on a footpath that is unlikely to be open to the public at night), chemical toxicity from deicing and salt runoff, and chemical toxicity from vehicle tire and brake dust, both of which are not be applicable to the proposed project.

In evaluating the risks of a paved trail to the public water supply, please refer to the response to Peer Review Comment 33, below, in which BSC has provided a response to a public comment relative to the environmental hazards associated with bituminous pavement. Further, BSC reviewed traffic data from the MassDOT Transportation Data Management System (https://mhd.public.ms2soft.com/tcds/tsearch.asp?loc=Mhd&mod=) to contextualize the additive impacts of a new 8-foot wide paved trail surface near Haggetts Pond.

Impervious surfaces within the Haggetts Pond watershed (not including the contributory Fish Brook Watershed) total approximately 5,190,000 square feet. The Haggetts Pond watershed notably contains Interstate Route 495, Interstate Route 93, State Route 133, and many surface roads including Haggetts Pond Road and High Plain Road. Total paved area of the five roads within the watershed is approximately 4,080,000 square feet. These roads support approximately 280,000 vehicles in annual average daily traffic (AADT) and discharge untreated stormwater directly into Haggetts Pond and the streams and wetlands that feed Haggetts Pond (see figures below).


**Figure 6.** Direct discharge of untreated Route 133 stormwater.


**Figure 7.** Direct discharge of untreated Haggetts Pond Road stormwater.

The proposed trail comprising 68,000 square feet of pavement, represents an increase of 1.3% of paved area within the Haggetts Pond Watershed Protection Overlay District. However, the trail will not allow motorized vehicles so will not increase the AADT within the watershed, and the project treats the stormwater it generates as well as treating currently untreated stormwater contributions from both High Plain Road (9,760 sf) and Haggetts Pond Road/Lakeside Circle (47,755 sf)

| Road | Pavement area within watershed (SF) | Annual Ave Daily Traffic (AADT) | Year |
|---|---|---|---|
| Route 93 | 1,586,500 | 140,038 | 2022 |
| Route 495 | 1,586,500 | 116,447 | 2022 |
| 133 (2-way) | 396,600 | 22,750 | 2023 |
| High Plain Road | 206,600 | 2,379 | 2022 |
| Haggetts Pond Road | 303,000 | 1,941 | 2022 |
| *Proposed Trail* | *68,000* | *0* | *Proposed* |

**The Project therefore results in a net benefit to the water quality of Haggetts Pond** by improving stormwater management within the contributing watershed. Pavement is more stable and will not experience erosive wash out, protecting adjacent wetland resource areas from deposition of fill that results with the use of stone dust.

***27) The Supplemental Narrative states that "stormwater is being treated…which will prevent over-heated water from entering natural wetland systems in the vicinity of the trail." Provide specific detail on how the stormwater management will prevent heated water from the asphalt paved parking lot and trail from entering vernal pools and adjacent wetland systems.***

The project has been designed such that the proposed paved tail is over the existing trail bed and no trees are required to be removed. Additionally, measures are provided to protect the existing roots along the trail to prevent tree death. These measures will ensure that the existing significant tree canopy remains and provides the required shading to reduce heat island affect associated with paved trail. Lastly, because the trail runoff is designed to sheet flow off the pavement and not be collect, resulting in a point discharge, the surrounding buffer zone are capable of cooling and infiltrating the runoff.

The Haggetts Pond parking lot has been designed to capture and infiltrate the 100-year runoff, and the High Plain parking lot, the 25-year runoff, thus reducing the heated runoff from directly entering the adjacent wetlands and pond associate with the proposed parking areas.

***28) The Supplemental Narrative states that "Best practices for construction include precautions to reduce risks associated with heavy equipment." Elaborate specifically on such risk reduction precautions that can be included as special conditions in an Order of Conditions to protect natural resources.***

1. All contractors and subcontractors shall be informed that equipment, machinery, and vehicle storage, and refueling operations shall be situated in upland areas at a distance greater than 100-feet from wetland resources (proposed Haggetts Pond Parking areas) unless otherwise approved by the Andover Conservation Commission. All machinery shall be checked daily for leaking fluids.

2. During work on this Project, there shall be no discharge or spillage of fuel, oil, or other pollutants, including sediments, into any part of the site. The applicant shall take all reasonable precautions to prevent the release of pollutants by ignorance, accident, or vandalism.

3. All contractors shall be informed that no cleaning and/or power washing of equipment is allowed on site

4. Vehicles exiting the construction Site shall not be allowed to track-out sediment, mud, or other materials onto public or private roads. Where track-out of such materials has occurred onto a roadway, it shall be swept off the road by the end of the same workday.

Notes above have been included on project plan set Notes Sheet.

***29) The Supplemental Narrative states that "the project is in compliance with the performance standards for work within the jurisdiction of the Andover Conservation Commission." This statement must be supported with written documentation. Prepare a narrative clearly demonstrating compliance with the Riverfront Area Standards at 310 CMR 10.58 (4) and clearly demonstrating the Bylaw Standards for work in the Buffer Zone and Setbacks within the Haggetts Pond Watershed.***

Please also refer to responses to Peer Review Comment 11, above for analysis of compliance with Bylaw Standards for work in the Buffer Zone. The Project is in compliance with the Massachusetts Wetlands Protection Act Riverfront Area Standards at 310 CMR 10.58 through compliance with section 310 CMR 10.53(6).

> "Notwithstanding the provisions of 310 CMR 10.58, the Issuing Authority may issue an Order of Conditions permitting as a limited project the construction, rehabilitation, and maintenance of footpaths, bike paths, and other pedestrian or nonmotorized vehicle access to or along riverfront areas but outside other resource areas, provided that adverse impacts from work are minimized and that the design specifications are commensurate with the projected use and are compatible with the character of the riverfront area. Generally, the width of the access shall not exceed ten feet of pavement, except within an area that is already altered (e.g., railroad beds within rights of way)."

The portion of the proposed Project that occurs within Riverfront Area qualifies as a Limited Project pursuant to 310 CMR 10.53(6) and is therefore not subject to the performance standards at 310 CMR 10.58(4). The Project design has minimized impacts by reducing the width of the proposed trail to 8 feet, which is smaller than a typical trail of this nature (refer to response to Comment 17). The project avoids vegetation clearing for its entire length, with minor exceptions for improved parking which is well outside of Riverfront Area, and as detailed extensively in responses to peer review and general public comments. Wetland fill in any MassDEP wetland has been eliminated from the Project, further minimizing overall project impacts. A comprehensive impact mitigation strategy for unavoidable work in locally regulated Buffer Zones has been offered in response to peer review and general public comments (please refer to Comment 11). The design is commensurate with the projected use of an ADA-compliant public trail.

The riverfront area on the site is a historic railroad right of way with an existing rustic walking path on the railbed. There is no vegetation within the 10- to 12-foot wide (typical) existing trail through the riverfront area. The trail is heavily used, and its surface is compacted earth with a variable depth of accumulated organic soil material. There are benches located within the riverfront area. Haggetts Pond is encircled in close proximity by Interstate Route 93, Interstate Route 495, Route 133, High Plain Road, and Haggetts Pond Road. Route 133 and Haggetts Pond Road directly abut Haggetts Pond with no buffer at various points and discharge untreated stormwater directly to the pond. The proposed 8-foot wide paved trail along the west side of Haggetts Pond will not substantively change the character of the riverfront area on the site and is therefore consistent with the limited project provision at 310 CMR 10.53(6).

The Project will require a waiver of strict adherence to the bylaw performance standards for work in the Buffer Zone and setbacks within the Haggetts Pond watershed as discussed in response to Peer Review comments 3, 5, 7, 8, 9, 10, 11, 13, 17, 18, and 19.

***30) Be more specific in the O&M Plan. Remove vague language such as "Items to consider," "on a regular basis," "It is recommended," "regularly scheduled basis" or "should be." The O&M Plan must detail and specify the frequency for all maintenance and repair.***

The O&M Plan has been revised as requested.

***31) Confirm all the signage, physical barriers, and restrictions recommended in the September 11, 2023 Chris Cronin, Director of DPW Memorandum (see attached) have been incorporated into the project design and signage. These measures must be shown on the plans and recommended signage included as details.***

BSC has incorporated all of the 9/11/2023 comments and has provided the requested signage plan as part of the revised plan set.

- *Restrict permissible activities to those that are passive in nature, including, walking, running, hiking, and use of non-motorized equipment (except in cases where they are medically necessary, such as motorized wheelchairs).*
- *Allow non-motorized biking only on the designated path, with no off-road biking allowed.*
- *Limit fishing to the shoreline (no wading) and rowboats (no motors of any kind), an no expansion as part of this initiative.*
- *No recreational boating allowed.*
- *Erect physical barriers to prevent unauthorized motor vehicle access, and/or access to unauthorized areas within the water supply grounds.*
- *Swimming and/or wading remains prohibited in accordance with Mass General Law*
- *Implement frequent patrols of the area to deter negative behaviors.*
- *Place signage reminding visitors of these restrictions.*

Signage will be proved at each Kiosk at the trail head regarding the rules and activities that are prohibited. Additionally, the following measures are shown on the attached plan set to address the concerns above.

- No swimming signs are shown along the Pond.
- Bollards are shown at the trail entrance to prohibit vehicles from entering the trail.
- The Town has had positive discussions with the Andover Police Department regarding additional patrolling of the trails and parking areas.

**The following additional information was requested in an email from LEC Environmental Consultants, Inc, dated January 19, 2024.**

***32) 2024-01-19-1. Instead of using a standard grass seed mix on the side slopes of the trail, I recommend that you consider using a more specialized, <u>all native</u>, shade tolerant pollinator seed mix. You might have to create your own seed mix, which you can do through Ernst.***

BSC recommends using a native woodland trailside seed mix that is more appropriate for the shady conditions along the trail. An upland sun native wildflower pollinator seed mix is recommended along the upland slope of the High Plain Parking area. These areas are shown on the landscape plans in the attached revised plan set, see sheets L-100 – L-200.

***33) 2024-01-19-2. Respond or address the below study attached to the 1.16.24 email from Maureen Looney (Sun and Rain Transform Asphalt Binder Into Potentially Toxic Compounds, Sciencedaily.com)***

On January 16, 2024, Maureen Looney provided a comment to the Andover Conservation Commission expressing concern over a 2020 Science Daily article (ScienceDaily, 15 July 2020, www.sciencedaily.com/releases/2020/07/200715123140.htm) that reported on results of a Florida State University study in which "chemists show that asphalt binder, when exposed to sun and water, leaches thousands of potentially toxic chemicals into the environment." The publication that Science Daily reported upon was published in the journal Environmental Science & Technology, 2020 (Niles, et al., 2020, Addendum 33-1).

**The Niles et al. report was based on experiments in which asphalt was exposed to extreme conditions of constant submersion in water and exposure to artificial sunlight for multiple days.** A related study by Crawford, et al. (2023, Addendum 33-2) that replicates methods from the Niles, et al. study found that asphalt exposed to natural sunlight followed by similar submersion in water provided a more accurate representation of typical conditions. Under these more realistic conditions, the asphalt leached 4-9% of the contaminants that the asphalt under extreme conditions did.

In any case, the asphalt proposed for the Haggetts Pond Rail Trail would never be exposed to constant submersion. Further, the proposed trail will be shaded by the existing canopy which will remain unchanged at 90-100% canopy cover over the length of the trail during the growing season (see photo pages from original filing). The trail will have minimal direct sun exposure during summer, greatly reducing the risk of weathering effects reported in the Niles et al. study. While asphalt binder leaching may occur under typical conditions, the extreme conditions at the root of the study presented by Ms. Looney would more accurately simulate long term effects under constant sun exposure like many roads and highways surrounding Haggetts Pond (e.g., I-495, I-93, Route 133).

In a comprehensive review of research conducted over the last 30 years, Kriech and Osborn (2022, Addendum 33-3) report that "normally constructed asphalt and concrete pavements were found to release low levels of contaminants during their life," but note that "deposition from atmospheric pollutants and materials dispersed by vehicles on pavements do have a measurable impact on the quality of stormwater runoff" during the first flush of storm events.

The design for the parking lots includes stormwater treatment measures to control contaminants associated with runoff from the paved parking areas. The parking areas employ water quality units catch basins, rain gardens, as well as a stormwater detention/infiltration system at the High Plain Road parking lot and the Haggetts Pond Road parking lot. The trail design has also been altered to shed runoff away from Haggetts Pond through a 1-ft vegetative filter strip. Rain Garden soil material, typically a sand/loam material, is over 90% effective at removing PAHS and other contaminants at the particulate and dissolved phase (McIntyre et al., 2016, Addendum 33-4). The soil to be used for the vegetative filter strip along the trail and near the parking lots is also loam material, providing effective runoff treatment, see sheet L-200 and/or C-301.

BSC notes that the 2022 Phosphorus Source Identification Report prepared for Andover by Comprehensive Environmental Inc. states that Haggett's Pond has multiple phosphorous point source pollution outfalls that need to be addressed per the NPDES MS4 Permit. The stormwater improvements proposed as part of this project would address some of those priority areas suggested for retrofits in the report.

There is ample precedent for installation of paved recreational trails in close proximity to critical drinking water supplies. A recent example is the new Fresh Pond Path entirely encircling Fresh Pond in Cambridge, a vital part of the drinking water supply system for the City of Cambridge (https://www.cambridgema.gov/water/freshpondreservation#:~:text=Fresh%20Pond%20Reservoir%20is%20a,Reservoir%20in%20Weston%20and%20Waltham.).

***34) 2024-01-19-3. Address the yellow highlighted comments in the 1.18.24 Email from Steve Walther regarding the Critical Root Zone (CRZ), the basis for how it should be measured, and any required setback to trees, impacts to trees, potential tree loss, etc.***

*Mr. Walther provided a detailed comment regarding tree removal criteria concerns in an email to the Conservation Commission (CDPConservation@andoverma.us), dated January 18, 2024 9:36PM. The Peer Reviewer has requested a response to the highlighted comment "criteria used to determine the critical root zone (CRZ)."*

The project proposes removal of a number of trees for parking and the spur trail. The main trail will not require removal of any mature trees. It is the intent of the Applicant to protect all mature trees adjacent to the proposed trail according to the revised project plans which show all trees greater than 10" caliper measured at 12" from the ground surface (refer to response to Comments 3 and 7). To accomplish this purpose, it will be necessary to provide physical protection of trees during construction and will require attention to reduction of harm to roots to minimize the risk of long-term damage to existing trees.

Trees growing in close proximity to the historic railbed in some locations along the trail have produced roots that are near or at the existing trail surface because the dense ballast presents a barrier to normal root penetration in the ground. The Applicant has presented a discussion about its strategy to protect large roots to the greatest extent possible within a distance that is three-times the diameter (3x-diameter) of a mature tree trunk, measured as 3-times the diameter measured at breast height (DBH), which is a typical arboricultural measure of a tree's basal diameter measured at approximately 4.5' above the ground surface. Given the nature of the proposed project, we are not suggesting that the trail could entirely avoid existing roots or the 3x-DBH area around mature trees**.** Complete avoidance of roots within the 3x-DBH area for all mature trees located along the trail is not possible nor has the Applicant proposed such avoidance.

Mr. Walther raised the question of Critical Root Zone (CRZ), which is generally calculated by many sources between 6x to 18x DBH, though "there are no universally accepted methods to calculate the CRZ" (Methaney et al. 2023) and many factors influence a tree's root system including the type and age of the tree, irregular root spread due to landscape features, and physical constraints such as the restrictive, compacted rail bed found in this project site (Matheny et al., 2023; Day et al., 2010).

The International Society of Arboriculture's *Best Management Practices: Managing Trees During Site Development and Construction (3rd Edition)* (Matheny et al. 2023) as well as several references Mr. Walther mentioned, including *Construction and Trees: Guidelines for Protection* from Purdue University and TreePlotter's CRZ Calculator, all acknowledge that CRZ radii cannot always be accommodated due to site constraints on a project site. Sources recommend following best management practices to prevent excessive damage and allow healthy trees to survive the disturbance of a proposed project, such as, temporary truck and root zone protection where construction vehicle access must pass within reach of protected trees, follow arborist approved industry standard pruning methods for tree branch and root trimming, prevention of exposed roots from drying, and limiting root zone disturbance.

Care has been taken in the project design to provide the existing trees as much space and protection as possible. However, due to the linear nature of the project as well as the site constraints (narrow existing rail bed with berms on either side in some locations), the Plans show Tree Protection Zones which incorporate Critical Root Zones (CRZ) that are adjusted in size and shape to accommodate available space as outlined by the ISA's *BMPs* (Matheny et al. 2023).

There isn't a statistical model to predict increased risk to tree health within 2 ft of the edge of the asphalt trail as the systems and circumstances are too complex to model. Similar conditions on past projects have not resulted in unacceptable losses, hazards, or costs. Site conditions are somewhat favorable for tree success, as tree roots are likely already restricted due to the existing 8-12 ft wide compacted rail bed material, the existing conditions offer a natural supportive network and open soil resources, and minimal root cutting would occur.

The Project proposes the following Best Management Practices, and standard tree protections will be followed before, during, and after construction to allow existing trees the best possible chance of success including, but not limited to:

- Preservation of trees shading the trail.
- Where necessary, providing physical barriers at the trunk or root zone to prevent unintentional damage during construction, see sheet L-301 for banded tree protection measures during construction.
- Corrective pruning, watering, or supplements where damage occurs.
- Existing roots at the trail surface will be covered by geotextile and trail base material. To the maximum extent practicable, pavement will not be placed closer than 2 ft of tree trunks to allow for growth, root flare irregularities, and recovery and to avoid development of asymmetry. See plan sheets L-300 and L-301.
- Avoid cutting roots within 3x DBH of mature, mapped trees.

- If tree roots must be cut, no more than 25% of roots will be cut and individual clean pruning methods (as opposed to linear excavation) will be used.

As part of the revised plan set, a Sheets L-300 and L-301 show the specific areas and details for the proposed root protection.

*The Peer Reviewer has requested a response to the highlighted comment "The consultant also claimed that they would use a 3x tree diameter rule for cutting of tree roots, without identifying where the tree diameter is measured or how this is consistent with a 2 ft gap between paving and trees.*

As discussed above, a typical arboricultural/forestry measure of trees is the diameter at breast height, or DBH. That is measured at approximately 4.5 feet above the ground surface. For any tree within the Limit of Work, the DBH is measured, multiplied by three (3), resulting in the 3x-DBH dimension.

*The Peer Reviewer has requested a response to the highlighted comment "The consultant claimed this criteria [3x CRZ criteria used in the presentation] came from an "ISA or International Society of Arboriculture" which the commentor has attempted to find, but reports, "I have not found any document or publication defining a CRZ or justifying such a uniquely small CRZ criteria as claimed by the consultant.*

The International Society of Arboriculture publication that has been referenced is Matheny, N., Smiley, E. T., Gilpin, R., & Hauer, R. (n.d.). Best Management Practices: Managing Trees During Site Development and Construction (3rd ed.). International Society of Arboriculture. This is available for purchase from the ISA (https://www.isa-arbor.com/store/product/139/) but unfortunately is not made available as a downloadable PDF that could be shared as an addendum to this response.

**References from Mr. Walther**:

- *Treeplotter*. TreePlotter. (2018, May 9). https://support.treeplotter.com/knowledge-base/tree-protection-zone/
- *What is the critical root zone around a tree?*. Uc Berkeley Forest Pathology And Mycology Lab. (n.d.). https://nature.berkeley.edu/matteolab/?sp_faq=what-is-the-critical-root-zone-around-a-tree
- *TPZ and SRZ calculator*. Arborlogix. (n.d.). https://arborlogix.com.au/services/tpz-and-srz-calculator-as-4970-2009/
- Purcell, L. (2015). Department of Forestry & Natural Resources, Purdue University. *Construction and Trees: Guidelines for Protection*. https://www.extension.purdue.edu/extmedia/FNR/FNR-463-W.pdf

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- Day, S., Wiseman, P. E., Dickinson, S., & Harris, J. R. (2010). Contemporary concepts of root system architecture of urban trees. Arboriculture & Urban Forestry, 36(4), 149–159. https://doi.org/10.48044/jauf.2010.020
- Matheny, N., Smiley, E. T., Gilpin, R., & Hauer, R. (n.d.). Best Management Practices: Managing Trees During Site Development and Construction (3rd ed.). International Society of Arboriculture.
- Smiley, E. T. (2008). Root pruning and stability of young Willow Oak. Arboriculture & Urban Forestry, 34(2), 123–128. https://doi.org/10.48044/jauf.2008.016


***35) 2024-01-19-4. Clarify impacts to trees (species, size, and location) and general impacts to the understory for the proposed trail and parking within the Commission's jurisdiction.***

Please refer to responses to Comments 3, 7, 13, and 17. All trees that require removal for parking at the northern end of the project at High Plain Road are documented and inventoried on project plans. Within the proposed parking

area, there is a very sparse understory vegetation typical of well-drained upland areas in the vicinity. No trees will be removed for the trail. There is no understory along the trail. Please see sheets trees.ESC-100 and ESC-101.

36) ***2024-01-19-5. Review and address the yellow highlighted comments raised in the 1.19.24 email from Bill Mounts regarding tree root pruning methods, impacts, etc.; depth of soil excavation and pollutants embedded in the railbed; specifications, frequency and use of pavement crack fillers/sealants; and requirement to use non-toxic EPA approved boardwalk deck sealant.***

*At the January 4 meeting, the proponents described a tree root pruning method described by the ISA as only cutting roots that were 3x the tree diameter from the tree. If you review this resource (https://aplustree.com/how-much-of-a-trees-roots-can-you-remove/#:~:text=Cut%20roots%20as%20far%20away%20from%20the%20trunk%20as%20possible.&text=A%20good%20way%20to%20decide,away%20from%20the%20trunk%20base.), they describe tree stability when removing only one tree root according this this specification. The proponents provided no such condition.*

2. ***Based on the guideline, can BSC please mark any and all trees that will need to be removed or have roots cut based on this guideline? The proponents agreed that walking the trail path and providing information about which trees would be lost to this project was a good idea. This still has not occurred. This was supported by Chairman Cooper at the January 4 meeting and should occur immediately.***

    1. ***What trees will be impacted?***

    The Applicant has conducted an inventory and ground-based survey of every tree that measures 10" *caliper* within the project Limit of Work, as required per Peer Review Comments 3, 7, 13, 17, and 35. The results of the inventory are shown on the revised plan set.

    2. ***How many trees will be impacted?***

    The following ByLaw trees (trees over 10-inches in caliper) will be required to be removed.

    - Haggetts Pond Rail Trail – 0 trees
    - Boardwalk Spur - 5 trees
    - High Plain Road Parking Lot -22 trees
    - Haggetts Pond Road Parking Lot -30 trees

    **Total ByLaw Trees to be removed = 57 trees.**

    As part of the High Plain and Haggetts Pond Landscape Improvements, the following trees are proposed to be planted, See sheets L-101 and L-102.

    - American Sycamore 3 trees
    - Dogwood 4 trees
    - Winter King Hawthorn 2 trees
    - White Oak 5 trees
    - Scarlet Oak 3 trees
    - American Linden 4 trees
    - White Spruce 8 trees

- Black Spruce 9 trees
- White Cedar 22 trees

**Total New Trees** **= 60 trees**

3. ***How do the proponents expect to lessen the impact of tree removal and alteration?***

   See above. The project proposed to plant a total of 60 new trees to replace the 57 Bylaw trees lost.

5. ***MassDOT and others reference ANSI standard A300 for tree pruning and armoring. Why would this project not follow the ANSI A300 standards? In the current version of the Site Plan (https://andoverma.gov/DocumentCenter/View/13986), on page C-300, the proponents describe "trim(ming) branches flush with trunk". This does not adhere to ANSI or any common standard for trimming branches which typically requires avoiding the branch collar. Why are the proponents not aligning to industry best standards? Does the method proposed by the proponents further jeopardize the habitat? What does the Conservation Commission say to this?***

   Detail has been revised to trim branches back to branch collar.

6. ***The current Site Plans suggest that the proponents will "protect all healthy trees within 1-ft of the trail edge, yet I don't understand how this can occur while following the 3x trunk diameter rule. Wouldn't tree clearing of significant trees along the trail border have to extend past the 1 foot suggested limit?***

   There is no plan to cut trees along the trail border. Please refer to the Applicant's detailed response to Peer Review Comment 34.

***At the January 4 meeting, the proponents briefly described an Operation and Maintenance Plan for the path...***

2. ***How far down do the proponents expect to dig into the existing trail to construct the paved path?***

   Accumulated organic soil material will be removed from the existing compacted gravel railroad bed. Depth of this material will vary from less than an inch to several inches based on existing conditions along the length of the project. The removal of tis topsoil will be done with a mechanical sweeper to limit any damage to the existing roots within the trail limits.

   Additionally, in the location of the proposed underdrain, the underdrains along both sides of the trail have been modified to run a single under drain down the middle of the trail to limit root damage. The underdrain is required to provide proper drainage in the area of the trail that is lower than the existing adjacent side grades.

   ***Does the Conservation Commission have any concern about disturbing pollutants that may be embedded in the railbed and that might cause significant pollution to Priority Habitat flora and fauna? I see no mention of this in the proponent's plan. MassDOT has significant writing and Best Management Practices to deal with such situations, yet I see no mention of this in the proponents' writings. This seems like a large oversight. Remember that significant toxicity for wild flora and fauna can be achieved and much lower concentrations than might impact humans. We must protect the Priority Habitat.***

   A BSC Licensed Site Professional, has reviewed the soils associated with the rail bed. Based on samples that we have had tested, none of the constituents detected in the soil exceeded their respective Massachusetts Department of Environmental Protection's (MassDEP) Reportable Concentrations (RCs). MassDEP established the RCs at concentrations that are protective of both human health and environmental receptors of all types. A copy of our findings is attached.

***There has been much discussion about the paved rail trail and parking lots and their safety. Once cured, it is true that these surfaces are mostly inert. The concerns I have is the time before curing which generally is small, but then the time and methods for applying crack fillers and sealants as part of the recommended maintenance plan. I see no real mention of this in the presentation to the Conservation Commission***

1. ***Given the trail dimensions, surrounding vegetation, local weather conditions and patterns, what is the expected frequency of sealant application to the paved trail, parking lots, and connectors?***

   BSC has evaluated similar rail trails in Westford, Concord, Acton, and Arlington. Crack repair is evident in trail segments that were repaved in 2002 (Arlington) but were not observed in trail segments that opened in 2018 (Westford, Concord). BSC assumes that crack repair would become necessary after a decade in use.

2. ***How much sealant material (or similar) is expected to be used on an annual basis?***

   This is hard to anticipate. The Applicant expects that an 8-foot wide trail would require far less sealant than is used annually on Route 133, Route 495, Route 93, Haggetts Pond Road, and High Plain Road individually or in the aggregate.

3. ***The US EPA has published this document (link here) that details leaching of contaminants from sealants estimating sealing every 2-3 years and discusses detrimental effects to water quality and those dependent on that water.***

   1. ***Materials in this product are listed as both "Possibly carcinogenic to humans" and "Animal carcinogen". See Section 11: Toxicological information.***

   2. ***With 7.1 above, how will visitors, the priority habitat and wetlands, other areas, and the Andover water supply be protected from use of these materials?***

   3. ***What protective measures will be provided to protect against accidents, spills, etc?***

   4. ***How will SDS documents be captured and communicated to the Conservation Commission? To the public?***

   Sealants are likely to be required in the future to repair cracks. As part of the O&M Plan, environmentally friendly sealants, such as BioSealcoat, are required and will need to be approved by the Andover Water Department prior to use.

***Similar to pavement and its maintenance, I have similar concerns with the proposed Boardwalk. Under 'Boardwalk' on page 4 of the Maintenance and Operation Plan, the plan mentions pressurized wood drying requirements and application of sealer. The plan recommends "use of a non-toxic EPA approved formula to seal the boardwalk deck as needed to protect the decking."***

1. ***How will deck sealant be selected?***

   The sealant used by the selected contractor will need to be reviewed and approved prior to use in accordance with the O&M Plan. An Eco-friendly, non-toxic sealer will be required.

2. ***How will deck sealant selection and application be communicated to the Conservation Commission? To the public?***

   The Applicant is happy to provide the sealant specifications prior to sealing for approval.

3. ***How will SDS documents be captured and communicated to the Conservation Commission? To the public?***

   See #2 above.

37) ***2024-01-19-6. Has any soil testing been performed within the railroad corridor? If not, how do you intend to address the potential for contaminated soils due to the prior railroad use? Review and address the yellow highlighted comments raised in the 1.24.24 email from Jenicka Engler (Attachment D) regarding disturbance of potentially contaminated soils within the railbed corridor.***

*Ms. Engler expressed concern regarding "preparation required for paving the trail…would disturb the potentially contaminated old railbed soil that can further contaminate our water supply.*

*The Commonwealth has state that most old railbeds are contaminated, so much so that even the dust from construction needs to be addressed so as not to harm the construction workers or abutters. The also recommend (on page 10) that since it is so hazardous to store the disturbed soil so that 'do not stockpile in or near storm drains or watercourses'…*

*The Project committee has not stated anything that will specifically address potentially contaminated soil runoff into our water supply."*

A BSC Licensed Site Professional, has reviewed the soils associated with the rail bed. Based on samples that we have had tested, none of the constituents detected in the soil exceeded their respective Massachusetts Department of Environmental Protection's (MassDEP) Reportable Concentrations (RCs). MassDEP established the RCs at concentrations that are protective of both human health and environmental receptors of all types. A copy of our findings is attached.

**The following response addresses the comments received from Horsley Witten Group in the Initial Stormwater Peer Review dated January 18, 2024 and June 7, 2024 from Janet Carter Bernardo, P.E.**

***38) Standard 1 states that no new stormwater conveyances (e.g. outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.***

***a. The Applicant has provided stormwater management primarily associated with the two parking lots. HW notes that the Applicant is required to manage the stormwater along the trail itself to the maximum extent practicable. It does not appear that the Applicant has provided adequate documentation to confirm it has made all reasonable efforts to meet each of the Standards. HW recommends that the Applicant demonstrate compliance in accordance with Volume 1, Chapter 1, page 3 of the MSH. HW specifically recommends that the Applicant evaluate the low points along the trail at Stations 2+77.20, 5+79.87, 31+88, 34+19, and 39+66, as well as the proposed Flared End Sections (FES). Two FES near Station 8+00, one FES near Station 14+25, three FES at Station 18+50, and two FES near Station 24+00. Where feasible the Applicant may consider options such as narrow vegetated swales, crushed stone trenches, or plunge pools to reduce the velocity of the runoff and encourage infiltration.***

In an effort to manage stormwater runoff directly from the trail surface to the maximum extent practicable, the areas suggested have been reviewed for viable measures to slow this runoff and encourage infiltration. Several factors precluded some of these area for added stormwater detention/infiltration, including close proximity and alteration of wetlands, shallow seasonal groundwater expected in the area, additional clearing of mature trees, or extensive grading required to provide a suitable additional BMP. The low points at STA 34+19 and STA 39+66 appear to be viable locations for additional detention/infiltration BMPs with a lesser degree of impact to nearby sensitive resources or mature trees and have been shown on the plans.

It should be noted that all proposed flared end sections also include a riprap apron per the plan set details to slow runoff exit velocity and inhibit erosion, with some of these flared ends instead including a stone dissipation bowl/forebay for added detention and protection.

**June 7, 2024 - No further action requested by Horsely Witten Group**

***b. The Applicant has provided Existing and Proposed Watershed Plans for the two proposed parking lots. For the High Plain Road parking lot, it appears that the Applicant has not delineated the catchment area for the sloped area east of the roadway and west of the parking lot that is captured in Bioretention Area #1. This area should be included in catchment area 1S under existing conditions and as a separate catchment area under proposed conditions. Furthermore, the area that sheet flows into Bioretention Area #2 should be included as a separate catchment area under proposed conditions. To confirm the overflow from Bioretention Area #2 does not cause erosion in the W10 series wetland, all surface area captured by the stormwater system should be included. HW***

***further recommends that the Applicant review the proposed 130 contour on the east side of the parking lot and access walkway.***

The catchment area for the new Rain Garden #1 (formerly Bioretention Area #1) has been delineated and included in both existing and proposed conditions HydroCAD models as recommended. The modeled contributory areas to the former Bioretention Area #2 have also been updated as recommended, including the direct sheet flow surface and any other contributing areas. The proposed 130 contour to the east of the parking lot/access walkway has been updated as recommended.

**June 7, 2024 - No further action requested by Horsely Witten Group**

c. ***For the Haggetts Pond Road parking lot the Applicant has not included the proposed contours on the west side of the parking lot, so HW was not able to confirm the delineated watershed. HW recommends that the Applicant confirm that the extent of the Haggetts Pond Road included in proposed subcatchment 3S is reasonable. HW further recommends that the Applicant include the watershed area that is captured by Rain Garden #2. To confirm the overflow from Rain Garden #2 does not cause erosion in the W2 series wetland, all surface area captured by the stormwater system should be included.***

The applicant has revised the plans to show proposed grades west of the Haggetts Pond Road parking lot to allow a review of the delineated watershed and has confirmed subcatchment 8S to the existing catch basin in Haggetts Pond (formerly subcatchment 3S) to be reasonable. The former rain garden at Haggetts Pond Road known as Rain Garden #2 has since been omitted from plans, but an appropriately sized rip rap sediment forebay has been added to the existing culvert headwall discharging to the W2 series wetland in order to not cause erosion. This Rain Garden was eliminated based on revising the stormwater to provide the required 80% TSS removal prior to discharging at the existing headwall. This helped to reduce impacts in the wetland buffer zones and maintain existing vegetation.

**June 7, 2024: The Applicant has included the proposed contours on the west side of Haggetts Pond Road. HW notes that there is a missing connection of the 132-contour on the west side of the access walkway. HW recommends that the Applicant confirm it is intending to raise the low point on the west side of the parking lot from elevation 128 to elevation 132. HW further recommends that the Applicant revisit the 132 contour and confirm if it is intending to create a depression within the 132-contour area on the west side of the parking lot. As currently graded HW does not agree that the pervious surface area to the west of the Haggetts Pond parking lot flows onto the parking lot and into the subsurface infiltration system as part of subcatchment area 9S. It may flow towards the catch basin in the road, CB-1, as part of subcatchment 8S. HW recommends that the Applicant revisit the grading in this area.**

The Applicant has revisited the grading to the west of the Haggetts Pond Rd parking lot as recommended. All contours in the area have been checked and connected appropriately, and the depression created by the proposed 132-contour has been eliminated. The majority of pervious surfaces west of the parking lot sheds to subsurface infiltration 4P, and subcatchment areas 8S and 9S have been adjusted accordingly in the revised Proposed Watershed Plan included in the Stormwater Report. A revised Water Quality Flow Rate calculation sheet has also been included to account for the revised subcatchments.

d. ***HW notes that the Applicant has proposed a 4-inch underdrain along various sections of the proposed trail. It is not clear why some segments indicate that the underdrain will be placed greater than 2 feet below the existing surface. For example, near Station 17+00 on Sheet C-104. HW recommends that the Applicant revisit the depth of the underdrain and reduce it where feasible to avoid the deep excavations.***

The underdrain has been updated on the revised plans and profiles as requested.

**June 7, 2024 - No further action requested by Horsely Witten Group**

***39) Standard 2 requires that stormwater management systems shall be designed so that post- development peak discharge rates do not exceed pre-development peak discharge rates.***

***a. HW notes that to confirm compliance with Standard 2 the Applicant will need to adjust the existing and proposed watershed areas as noted above.***

The revised Stormwater Report with the revised watersheds demonstrates that the project as a whole does not increase the pre-development peak discharge rates. This is accomplished by oversizing the stormwater underground detention/infiltration systems under the proposed parking areas.

**June 7, 2024 - The Applicant has adjusted the catchment areas as requested. Further clarification is required per comment #1.c above.**

The Applicant has the catchment areas as requested, which can be found in the Storemwater Report watershed plans as outlined in comment #1.c. response above.

***b. HW has reviewed the curve numbers, times of concentration, and precipitation rates applied to the HydroCAD model and found them to be reasonable. No further action requested.***

**June 7, 2024 - No further action requested by Horsely Witten Group**

***c. HW recommends that the Applicant adjust the naming convention for Rain Garden #2 in the HydroCAD model to be consistent with the plan callout.***

Naming has been revised based on the revised design provided here-in.

**June 7, 2024 - No further action requested by Horsely Witten Group**

***d. The Applicant has conducted a test pit in the footprint of High Plain storage system. The test pit indicates that the estimated seasonal high groundwater (ESHGW) is at elevation 134.4. The bottom of the system is set at 132.25. HW agrees that the Applicant cannot provide recharge within this system unless the parking lot is raised more than four feet. No further action requested.***

Based on an Alternatives analysis performed to reduce impacts to the wetland buffer zones, the High Plain parking areas was push away from the wetlands and subsequently raised such that infiltration is now feasible. This allowed for the elimination of the former Bio-Retention Area #2 in the buffer zone to further reduce buffer zone impacts.

**June 7, 2024: The Applicant has shifted the subsurface chamber system within the High Plain parking lot. The test pit indicates ESHGW is at elevation 131.8 nand the bottom of the system is set at elevation 134.30. The Applicant has included a detail of the Shea Concrete chambers on Sheet C-300. The detail is not consistent with the HydroCAD model. HW recommends that the Applicant include a detail for the 4-foot by 8-foot chambers as modeled in HydroCAD.**

The Applicant has corrected the subsurface chamber detail to accurately reflect the structure modeled in HydroCAD calculations and laid out in the parking lot plans. Updated detail Sheet C-300 has been included.

***e. The Applicant has modeled Rain Garden #1 with a 6-foot-wide weir at elevation 131.65. Sheet C-120 includes a 12-inch pipe with an invert of 129.75. HW recommends that the Applicant revisit the design for Rain Garden #1 and confirm that the plans and HydroCAD model are consistent.***

Rain Garden #1 has been revised.

**June 7, 2024 - No further action requested by Horsely Witten Group**

f. ***HW notes that the existing surface at Rain Garden #1 is approximately 131 and the bottom of the Rain Garden is set at elevation 129. HW recommends that the Applicant confirms it has adequate separation to include the exfiltration in the HydroCAD model.***

The applicant acknowledges the insufficient depth to high seasonal groundwater and has removed exfiltration credit at this BMP in the model and calculations.

**June 7, 2024: The existing surface grades at Rain Garden #1 are between elevation 137 and 140. The proposed bottom is at elevation 135.5. The Applicant has stated that it removed the exfiltration from the HydroCAD model. However, it appears it is still part of the model. HW recommends that the Applicant eliminate exfiltration for Rain Garden #1.**

The Applicant has removed exfiltration from Rain Garden #1 (pond 2P) as recommended. Updated HydroCAD printouts and calculations within the provided Stormwater Report have been included to account for this revised pond.

g. ***HW suggests that the Applicant consider including Bioretention Area #1 in the HydroCAD model.***

Bioretention Area #1 has changed to a Rain Garden (Rain Garden #1). This area collects runoff from the vegetative slope only. No runoff from paved areas are directed to the new Rain Garden #1.

h. ***HW notes that the existing surface at Bioretention Area #2 is approximately 131 and the bottom of the Bioretention Area is set at elevation 131.5. HW recommends that the Applicant confirms it has adequate separation to include the exfiltration in the HydroCAD model.***

Bioretention Area #2 has been eliminated to reduce impacts to the wetland buffer. The parking lot runoff exceeds 80% TSS removal, such that this Bioretention is not needed to satisfy the Stormwater requirements.

**June 7, 2024 - No further action requested by Horsely Witten Group**

i. ***HW notes that the existing surface at Rain Garden #2 is approximately elevation 125 and the bottom of the Rain Garden is set at elevation 123. HW recommends that the Applicant confirms it has adequate separation to include the exfiltration in the HydroCAD model.***

Rain Garden #2 has been eliminated. The project exceeds the required 80%TSS removal prior to discharging to the existing headwall. This rain garden has been eliminated to reduce impacts in the buffer zone.

**June 7, 2024 - No further action requested by Horsely Witten Group**

j. ***HW notes that the Applicant has included a swale detail on Sheet C-300. It is not obvious where the swale will be utilized. HW recommends that the Applicant clarify where this stormwater practice will be installed.***

Swale detail has been removed.

**June 7, 2024 - No further action requested by Horsely Witten Group**

**40) Standard 3 requires that the annual recharge from the post-development site should approximate the annual recharge rate from pre-development or existing site conditions, based on soil types.**

a. **The Applicant has conducted a test pit in the footprint of the Haggetts Pond Road parking lot subsurface infiltration system. The test pit indicates that the ESHGW estimated is at elevation**

**127.0. The bottom of the system is set at elevation 129. HW agrees that the Applicant can provide recharge within this system with the minimum of two feet of separation. HW recommends that the Applicant provide a mounding analysis in accordance with Volume 3, Chapter 1, page 38 of the MSH.**

Mounding analysis is provided in the attached revised Stormwater Report.

**June 7, 2024 - No further action requested by Horsely Witten Group**

**b. The Applicant has included recharge calculations for the parking lots only. As noted previously HW recommends that the Applicant demonstrate that it has met the recharge calculations to the maximum extent practicable for the entire length of paved trail. It is HW's opinion that the proposed boardwalk is not considered impervious.**

The attached Stormwater Report has been revised to show that the total project meets the required recharge volume requirements.

**June 7, 2024 - No further action requested by Horsely Witten Group**

**c. HW agrees with the volume of recharge provided in the three practices listed in the Stormwater Report as well as the draw down calculations. No further action requested.**

These calculations have been revised based on the attached redesign to address the review comments here-in.

**June 7, 2024: The Applicant has provided adequate recharge volume. However, HW did not locate the drawdown calculations in the Stormwater Report provided. HW recommends that the Applicant provide the drawdown calculations.**

Drawdown calculations were included in the table shown on page 9 of the previous and updated Stormwater Reports.

***41) Standard 4 requires that the stormwater system must be designed to remove 80% of the average annual load of Total Suspended Solids (TSS) and be sized to capture the required water quality volume.***

***a. The Applicant has indicated that the bioretention basins and infiltration system with deep sump catch basins, sediment forebay, and proprietary separators will provide the required 90% removal of total suspended solids required by the Town of Andover. HW recommends that the Applicant provide documentation from a third- party reviewer to justify the TSS removal rate used for the proprietary separators. It is HW's understanding that MassDEP considers a Stormceptor STC 450i to provide 25% TSS removal.***

The Rhode Island Department of Environmental Management (RIDEM) has reviewed and re-certified as recently as June, 2022 the use of Stormceptor hydrodynamic separators, approving the product's removal of 75% total suspended solids (a copy of the latest re-certification is included with this letter). Total suspended solids calculations sheets included in the attached Stormwater Report have been updated to reflect this 75% removal.

**June 7, 2024 - No further action requested by Horsely Witten Group**

***b. The Applicant has included water quality calculations for the parking lots only. As noted previously HW recommends that the Applicant demonstrate that it has met the water quality calculations to the maximum extent practicable for the entire length of the paved trail.***

Water Quality for the proposed trail is only met to the extent practicable. Measures include the following:

1. Trash and dog waste stations.
2. Sloping the path away from Haggetts Pond to allow for buffer zone treatment.
3. Designed to not concentrate runoff from the path.
4. Incorporating a 1-ft vegetative filter strip to infiltrate and filter the runoff.
5. Utilize the existing wetland buffer and vegetation to infiltrate and filter the runoff.
6. Depression areas as shown on the plans to collect and infiltrate runoff from portions of the trail.

Any additional treatment measures will require vegetation and tree removal. TSS within this runoff is anticipated to be very minimal if any and would be an improvement over the existing gravel/dirt trail. There is no TSS associated with vehicle traffic and snow removal, thus, any TSS will be attributed to dust and natural debris that is blown on to the trail. We anticipate that trash and dog waste will be diminished with the installation of trash and dog waste stations.

Recharge and Peak Rate of Runoff volumes and flow rates have been mitigated within the parking lot subsurface systems.

**June 7, 2024 - No further action requested by Horsely Witten Group**

**42) Standard 5 is related to projects with a Land L/se of Higher Potential Pollutant Loads (LUHPPL).**

**a. The proposed trail project is not considered a LUHPPL; therefore Standard 5 is not applicable.**

Agreed

**June 7, 2024 - No further action requested by Horsely Witten Group**

***43) Standard 6 is related to projects with stormwater discharging into a critical area, a Zone II or an Interim Wellhead Protection Area of a public water supply.***

***a. The proposed project is located within Zone A, an Outstanding Resource Water, therefore Standard 6 is applicable. HW notes that in accordance with Volume 1, Chapter 1, page 15 of the MSH "Stormwater discharges fo a Zone I or Zone A are prohibited unless essential to the operation of the public water supply." HW understands that the Water Department has no objection to the walking path therefore any proposed discharges should comply with the additional requirements listed on page 18, Volume 1, Chapter 1 of the MSH.***

The applicant agrees that proposed discharges are within the Zone A Outstanding Resource Water and meet the additional treatment requirements of Standard 6 of the MSH for the parking lots. As noted above, the paved trail meets the requirements to the extent practicable.

**June 7, 2024 - No further action requested by Horsely Witten Group**

***b. Project is required to provide a Stormwater Pollution Prevention Plan (SWPPP). The***

***Applicant has provided a draft SWPPP in the Stormwater Report. HW suggests that the Conservation Commission require receipt of a signed SWPPP a minimum of 28 days prior to land disturbance to provide the Town adequate time to review it.***

Agreed. SWPPP to be provided 28 days prior to land disturbance.

**June 7, 2024 - Suggested Special Condition.**

***c. HW recommends that the Applicant document the distance that the discharge points from the parking lots stormwater systems are set back from Haggetts Pond.***

High Plain Road discharge – 18 feet. This is a new culvert that is to be installed under the proposed sidewalk connect from the parking lot to the Haggetts Pond Rail Trail.

Haggetts Pond Road discharge – This discharge point is existing and remains at 62+/- feet from the existing headwall.

**June 7, 2024 - No further action requested by Horsely Witten Group**

***d. HW notes that the Applicant intends to design the stormwater practices in accordance with the specifications and sizing methodologies in Volumes 2 and 3 of the MSH. HW recommends that the Applicant address the suggested modifications in this letter.***

The Project has addressed the suggested modifications while meeting the design practices outlined in the Mass Stormwater Handbook.

**June 7, 2024 - No further action requested by Horsely Witten Group**

***e. HW recommends that the Applicant revisit the TSS removal prior to the subsurface infiltration system to confirm it meets the 44% removal rate required.***

The applicant has confirmed that pretreatment BMP's prior to the subsurface infiltration system remove at least 44% TSS. TSS calculations sheets included in the attached Stormwater Report have been updated to reflect this more clearly.

**June 7, 2024 - No further action requested by Horsely Witten Group**

***f. As noted above HW recommends that the Applicant provide documentation from a third-party reviewer to justify the TSS removal rate used for the proprietary separators. HW notes that deep sump catch basins and sediment forebays are appropriate pretreatment practices. HW further notes that bioretention areas/rain gardens are appropriate treatment systems and subsurface infiltration systems are appropriate infiltration practices.***

As noted above, the Rhode Island Department of Environmental Management (RIDEM) has reviewed and re-certified as recently as June, 2022 the use of Stormceptor hydrodynamic separators, approving the product's removal of 75% total suspended solids (a copy of the latest re-certification is included with this letter).

**June 7, 2024 - No further action requested by Horsely Witten Group**

***44) Standard 7 is related to projects considered Redevelopment. A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural best***

***management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable.***

***a. The Applicant has stated that the project is not a redevelopment and intends to meet all 10 standards for new development of the parking lots. No further action requested.***

Agreed

**June 7, 2024 - No further action requested by Horsely Witten Group**

***45) Standard 8 requires a plan to control construction-related impacts including erosion, sedimentation and other pollutant sources during construction and land disturbance activities.***

***a. The proposed development will be disturbing more than 1 acre of land and therefore is required to develop a Stormwater Pollution Prevention Plan (SWPPP) in accordance with the Environmental Protection Agency (EPA) National Pollutant Discharge Elimination System (NPDES) Stormwater Program. The Applicant has provided a SWPPP in the Stormwater Report dated December 21, 2023. HW recommends that the Applicant provide a final signed SWPPP to the Andover Conservation Commission a minimum of 28 days prior to land disturbance commences. Included in the SWPPP should be proposed locations and sizes of temporary sediment basins to be used to control stormwater during construction.***

Agreed. Signed SWPPP shall be provided to the Andover Conservation Commission 28 days prior to land disturbance activities.

**June 7, 2024 - Suggested Special Condition**

***b. HW recommends that the Applicant provide tree protection measures for trees that are within 20 feet of the center of the proposed trail.***

A tree protection plan has been provided as part of the revised plans.

**June 7, 2024 - No further action requested by Horsely Witten Group**

***c. The Applicant has included a detail for slope stabilization. It is not obvious where this will be used. HW recommends that the Applicant provide slope stabilization measures for any slope that is proposed to be 3:1 or steeper.***

See added note on sheet C-301.

**June 7, 2024 - No further action requested by Horsely Witten Group**

***d. HW recommends that the sediment filter inlet protection is placed in all new catch basins when they are installed.***

See added note on sheet C-300.

**June 7, 2024 - No further action requested by Horsely Witten Group**

***46) Standard 9 requires A long-term operation and maintenance (O&M) plan shall be developed and implemented to ensure that stormwater management systems function as designed.***

***a. The Applicant has provided a standalone Operation & Maintenance Plan dated December***

***2023. HW recommends that the Town of Andover confirm that it has read and agrees to the maintenance operations listed. The Andover Conservation Commission may choose to require receipt of a signed O&M Plan prior to land disturbance.***

The Operation and Maintenance Plan has been reviewed by DPW and as stated at the Public Meeting held on 1/4/2024, agrees to the Plan and has been updated as required to address these peer review comments.

**June 7, 2024 - Suggested Special Condition**

***b. Per MSH Volume 1 Chapter 1 Page 23, HW recommends that the Applicant include the following in the O&M Plan:***

***i. A list of the individual structures to be inspected as part of the Checklist, for example WQU #1, WQU #2, etc.***

Checklist as requested is provided in the revised O&M Plan.

***ii. A simple plan that is drawn to scale and shows the location of all stormwater practices requiring inspections and long-term maintenance; and***

A Site Plan has been provided in the revised O&M Plan.

***iii. An estimated operations and maintenance budget.***

An estimated O&M budget has been provided in the revised O&M plan.

**June 7, 2024: The Applicant has revised the O&M Plan as suggested. The Commission may choose to require a signed O&M Plan prior to any land disturbance.**

***47) Standard 10 states that all illicit discharges to the stormwater management system are prohibited.***

***a. HW recommends that the Applicant provide an Illicit Discharge Statement signed by the property owner prior to land disturbance.***

Agreed

**June 7, 2024 - Suggested Special Condition**

**BSC has reviewed the recording of the public hearing held on January 4, 2024 and has identified the following comments or concerns that have not otherwise been addressed.**

***48) Several questions were raised regarding the proposed spur trail and its proposed mitigation. The spur trail is proposed as a board walk that will be built upon helical piles to eliminate ground contact of any structural component (with exception of the piles) that goes through an area that shows hydric soil conditions but does not meet the 50% hydrophytic vegetation requirement to meet jurisdictional requirements under the state Wetlands Protection Act. This area is therefore regulated as a wetland only under the local bylaw.***

The proposed construction will result in limited physical alteration of the soil or hydrology, though a small number of trees will need to be removed to place the proposed boardwalk. The Applicant originally proposed a wetland replication area to be located in upland buffer zone immediately adjacent to the delineated wetland line south and east of the boardwalk's location. This area has been shown to support lady slippers, which BSC has addressed in its Supplemental Project Narrative, dated December 21, 2023. Due to the presence of this sensitive species, the Applicant recommends that the requirement to replicate local jurisdictional wetland

affected by the spur trail in the area where lady slippers have been documented should be waived. However, the project has proposed as mitigation to provide 1,450 sf of plantings at the proposed boardwalk crossing of the local jurisdictional wetland as shown on sheet L-101.

Based upon the project change from a ground-contact boardwalk design to a structure supported by helical piles, the project avoids impact to wetland functional values and creating the replication area would eliminate the lady slipper population in the proposed replication area footprint. Waiving the replication area requirement for the spur trail will have direct benefit to native plant populations and we believe it will protect a local habitat of value.

***49) A member of the public inquired why the proposed trail could not be designed to the same width specifications of the Bruce Freeman Trail west of Lowell, indicating that it is a paved trail that is six (6) feet wide and adequate for multiple users at any given time.***

BSC visited several locations along the Bruce Freeman Trail, in Westford, Acton, and Concord and measured the paved width of the trail at 10 feet. The proposed trail is two feet narrower than the Bruce Freeman Trail in these locations (Figure 8).

**Figure 8**


Photos of paved section of Bruce Freeman Rail Trail in Westford and Acton, MA

***50) A member of the public expressed concern that the project would disturb wetland soils and underlying permafrost, and therefore cause a release of methane gas, exacerbating global climate change.***

The loss of permafrost across the globe is affecting global methane emissions and having an impact on the rate of planetary warming. Methanogenesis is the final step in the biogeochemical cycling of organic matter that occurs in wetlands when redox potentials of the soil are below -200mV, after other terminal electron acceptors ($O_2$, $NO_3$, and $SO_4^-$) have been reduced (Mitsch, et al, 2023). A recent Scientific American article (Luhn, 2024) explained that "within [the permafrost] layer is animal and plant matter holding twice as much carbon as the atmosphere does. When permafrost thaws, microbes begin to digest this matter and emit carbon dioxide and methane."

According to the National Snow and Ice Data Center (a part of CIRES at the University of Colorado Boulder), "Permafrost is soil, sand, sediment, or rock **that remains at or below 0 °C (32 °F) for at least two years**... In total, permafrost occupies approximately 23 million square kilometers (9 million square miles) or about 25 percent of the exposed land surface in the Northern Hemisphere, with approximately 65 percent in Eurasia and the other 35 percent in North America and Greenland. However, most permafrost in the Northern Hemisphere occurs poleward of 60°N in Russia, Canada, and northern Alaska."

Haggetts Pond is located at 42°00′ N in a zone that experiences seasonally frozen ground that reaches depths between 36″ and 72″ for up to several weeks in most winters but is approximately 700 miles south of the nearest areas of permafrost in North America, which reach no lower than approximately 50°N in eastern Quebec and the northern maritime provinces (Figure 9).

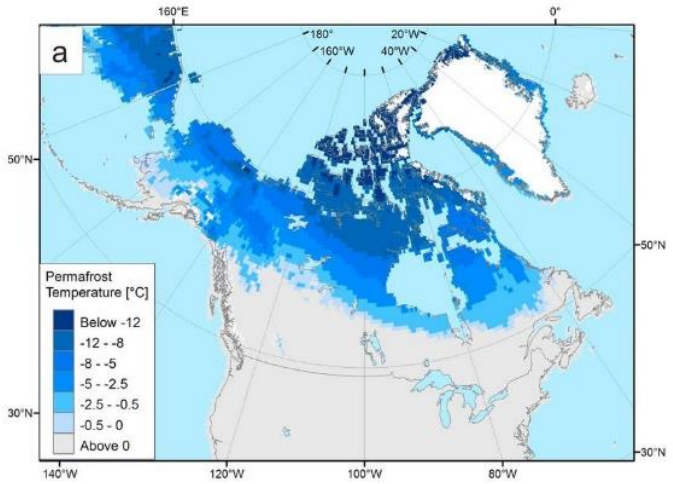


**Figure 9** This project will have no effect on permafrost or global methane emissions from its thawing, and nonetheless does not propose to disturb wetland soils in any way. The project will therefore have no effect of releasing carbon stored in permafrost as methane gas as posited by the commenter at the January public hearing.

We look forward to discussing these changes. If you have any questions regarding the enclosed information, please contact me at 617-896-4347, or at dbiancavilla@bscgroup.com.

Sincerely,
**BSC Group, Inc.**

**David Biancavilla, P.E.**
Vice President - Engineering Services

**Matt Burne, PWS**
Senior Ecologist

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