



**CAMBRIDGE WATERTOWN GREENWAY
PROPOSED LIGHTING DESIGN REVIEW
CITY OF CAMBRIDGE, MASSACHUSETTS**

KLEINFELDER PROJECT #: 20170208.010A

JUNE 22, 2017

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June 22, 2017
Kleinfelder Project No. 20170208.010A

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**CAMBRIDGE WATERTOWN GREENWAY
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1 INTRODUCTION

Kleinfelder was retained by the City of Cambridge (the City) to perform a focused evaluation of the potential ecological impacts from a conceptual lighting design proposed to be added to the Cambridge Watertown Greenway (Greenway) which is proposed by the Massachusetts Department of Conservation and Recreation (DCR). The proposed Greenway within the City traverses a section of the Fresh Pond Reservation and a more urbanized section of Cambridge (**Figure 1**). The portion of the Greenway within Cambridge is expected to be approximately 3,600 feet long and will be used for commuting and recreation. The conceptual lighting design proposes that the Greenway be lighted in evening hours to reduce safety concerns by providing sufficient light levels so the surface of the path and approaching persons can be seen clearly, but also is sensitive to the “urban wild” nature of the Fresh Pond Reservation.

1.1 PROJECT DESCRIPTION

Within Cambridge, the proposed Greenway is a path that will be used for commuting and recreation by City of Cambridge residents and regional commuters. The Greenway will pass through several different ecological habitats including some forested wetlands, deciduous forest, coniferous forest, and suburban neighborhoods. Approximately 1,950 feet of the Greenway will pass through the Fresh Pond Reservation (from the Fresh Pond Water Treatment Facility to the Huron Avenue bridge) and the remaining 1,650 feet (Huron Avenue Bridge to Belmont Street) will traverse more suburban-like areas abutting residential yards, commercial parking lots, and other commercial and residential properties.

The City of Cambridge has developed a lighting design to minimize potential impacts to ecological resources in the vicinity of the project (LAM Partners, 2017). The conceptual design includes a scheme for lighting the Greenway for the safety of users during night time hours, but only up to 10pm.

These include potential effects on wildlife and plants such as:

- Biological clock disruption, light attraction, and altered foraging behavior.
- Impacts to plant photoperiodicity.
- Shifting of activity periods.

The purpose of this ecological evaluation is to evaluate if the proposed lighting design will potentially impact ecologically sensitive areas within Fresh Pond Reservation and the lighting effects on wildlife and plants throughout the Cambridge section of the Greenway.

2 METHODOLOGY

To gather information on the potential impacts to ecological sensitive communities, wildlife, and plant species potentially occurring on the Greenway, information regarding historical species occurrence, habitat types, general Site characteristics, as well as species habitat preferences were collected during a desktop analysis and site visit.

2.1 DESKTOP ANALYSIS

Kleinfelder performed a desktop analysis of readily available online records and information regarding ecological resources potentially present within the Greenway. Online resources searched include the following:

- United States Fish and Wildlife Service (USFWS), Environmental Conservation Online System (ECOS) Information for Planning and Conservation (IPaC) Webpage;
- USFWS National Wetlands Inventory; and
- Massachusetts Department of Energy and Environmental Affairs (EEA).

2.2 USFWS IPAC

The USFWS ECOS IPaC database is a project planning tool which streamlines the USFWS environmental review process. An IPaC Species Summary Report was generated on June 9, 2017. The IPaC Species Summary Report is provided in **Appendix A**. The results of the USFWS desktop analysis are described below.

2.3 USFWS NATIONAL WETLAND INVENTORY

The USFWS National Wetlands Inventory database was searched on June 9, 2017 to determine if any national wetlands were identified at the Site.

2.4 MASSACHUSETTS DEPARTMENT OF ENERGY AND ENVIRONMENTAL AFFAIRS

The EEA provides an official list of Endangered, Threatened, and Special Concern species found in the state. The Endangered, Threatened, and Special Concern Species List is prepared under the authority of the Massachusetts Endangered Species Act (MESA). This list was consulted prior

to the Site visit to determine if the habitat present within the project area is suitable for any state-listed species.

These data sources were used to develop an ecological profile to determine which species may be present throughout the Greenway and vicinity.

2.5 FIELD OBSERVATIONS

To document existing conditions, Kleinfelder conducted a Site visit on May 26, 2017. During the Site visit, Kleinfelder walked the length of the Cambridge section of the proposed Greenway and recorded observations of species, habitat type, and other pertinent information regarding the Site. It should be noted that several species observations were recorded during investigations not specifically focused on endangered, threatened, or rare species (ETR) species; however, observations made during these investigations provided valuable information for this assessment.

Kleinfelder also visited the Alewife Reservation which forms a wildlife corridor, along with Fresh Pond Reservation and Mt. Auburn Cemetery, for many species of wildlife (**Figure 2**).

3 RESULTS

Section three provides a discussion of the ETR species identified by federal agencies as occurring within the Site and its vicinity as well as a brief description of incidental observations of species during Kleinfelder's investigations conducted in May, 2017.

3.1 DESKTOP ANALYSIS

3.1.1 USFWS

The IPaC Species Summary Report did not identify any federally-listed species, critical habitats, or national wildlife refuges within the Greenway or vicinity.

3.1.2 USFWS NATIONAL WETLANDS INVENTORY

No national wetlands were identified along the Greenway.

3.2 FIELD OBSERVATIONS

A total of 31 bird species were recorded during the site visit. A wildlife species list is provided as **Appendix B**. Of those 31 species, one state-listed special concern bird species, the Blackpoll Warbler (*Dendroica striata*) was identified in the Greenway vicinity. However, the site visit occurred during the migration season, which the Blackpoll Warbler is a common migrant through Massachusetts. The special concern status of the Blackpoll Warbler is for the breeding population only. It is highly unlikely that the Site contains habitat to support breeding Blackpoll Warblers as there is no known breeding populations found in the Fresh Ponds Reservation; the closest known breeding population of Blackpoll Warblers in the state exists in the Berkshire mountains.

A total of 22 plant species were identified during the Site visit. No state-listed plant species were identified. A plant species list is provided as **Appendix C**.

During the site visit, several habitat types including deciduous forest, coniferous forest, and suburban habitats were observed. The Greenway will be mostly located in a small ravine on the eastern edge of the Fresh Pond Reservoir, and the western edge of the coniferous forest section of Fresh Pond Reservation.

4 DISCUSSION AND RECOMMENDATIONS

Potential impacts to the ecological resources will be minimized due to the current design of the lighted pathway. The lighting design has implemented several light minimizing techniques to reduce the amount of light being emitted into the natural resource areas of Fresh Pond Reservation including:

- Using a type 2 light distribution with backlight shield;
- Using a pole height of 11 feet and minimizing the number of poles (lights) with a spacing of 100 feet between poles instead of the standard 13 foot pole with 70 foot spacing;
- Institute a wireless dimming control to dim the light output at 9:30 pm and then shut off at 10:00 pm; and
- Using LED fixtures and a color temperature of 3000K to minimize shorter wavelength light and eliminate ultraviolet emissions.

The proposed pathway at the Water Treatment Facility will be located on an old railroad line that will be removed at the onset of this project. The Cambridge portion of the Greenway will be mostly located in a small ravine on the eastern edge of the Fresh Pond Reservoir, and the western edge of the coniferous forest section of Fresh Pond Reservation. The location of the Greenway and the proposed lighting design will have minimal impacts to the natural resources of Fresh Pond Reservation, including plants and wildlife.

The type 2 distribution lights with a backlight shield is designed to distribute the light along the pathway and minimize the light emitting beyond the walkway surface. This implementation will minimize the effects on plant periodicity because the amount of light emitting into the environment will be minimal. This type of light will attract insects, which has the potential to attract bats at night. However, there is no greater risk to bats than the flood lights located at the homes and buildings adjacent to the reservation.

To keep the amount of light on the pathway to a minimum, the design will utilize 11 foot poles instead of the standard 13 foot poles which will keep the light focused on the pathway. The design increases pole spacing from the standard 70 feet to 100 feet decreasing the number of poles from

approximately 28 to 20, respectively. These design features will reduce the amount of light substantially within the reservation, which will minimize the impact to the environment.

The dimmer control that will turn the lights down to 10 percent at 9:30 p.m. and then off at 10:00 p.m. will have minimal effect on nocturnal species such as owls, bats, fox, deer, and rodents. Lights that would run all night could potentially effect nocturnal species, but using a dimmer control and 10:00 p.m. shut off will greatly minimize the impact to the biological clock of wildlife species or detrimental impact nocturnal species since there will be daily periods of complete darkness throughout the Greenway. This lighting schedule will mimic natural summer light periods during winter months. Nocturnal species may potentially be effected during this time of year, however, most species found at night will not be effected. During the winter, most plants are dormant, herp species (frogs and salamanders) are hibernating, and bats migrate out of the area. Other species should acclimate to this lighting schedule during winter months. However, there is potential for the lighting to effect foraging predators around the Greenway during winter months. A study demonstrated that 10 to 15 minute exposures to artificial light delayed the biological clock of wild caught mice approximately 1.5 hours. This could potentially effect night time predators in searching for food in already harsh conditions during the winter (Halle and Stenseth, 2000). However, due to the relatively small size of the project, this is not anticipated to represent a major impact.

The impacts of wavelength on the environment is still unknown. Further study is needed to determine if using 3000K lights is better for wildlife. However, using LED light fixtures will eliminate ultraviolet emissions, which will be a benefit to commuters using the path.

No federally-listed species was identified by the USFWS IPaC database. Only one special concern species, the Blackpoll Warbler, was identified in databases as potentially occurring within the Site, by EEA. It is Kleinfelder's opinion that this species is unlikely to breed in the Site and is unlikely to be affected by this project as the closest know breeding area of the Blackpoll Warbler is in the Berkshire Mountains. No national wetlands were found on the Site.

The wildlife corridor made up of the Alewife Reservation, Mt. Auburn Cemetery, and Fresh Pond Reservation is an important resource for migratory birds, mammals, reptiles, and amphibians. According to the information reviewed and collected during the site visit, it is Kleinfelder's opinion

that the proposed lighting along the Greenway will have minimal impacts, if any, on wildlife using this corridor.

4.1 RECOMMENDATIONS

Based on the findings of this assessment, no additional focused field studies are recommended as there are no anticipated impacts on any of the state or federal listed species in the area of the Greenway. However, a pre-construction light study assessing the amount of light present along the Greenway would give insight to the current conditions found in the reservation. Following up with a post-construction light study will allow the City of Cambridge to quantify post-construction light levels, should future similar projects be considered.

One concern identified during the public hearings was if the light would attract or deter wildlife species in the area. A natural resource study looking at current wildlife species along the Greenway and then another study approximately one year post-construction to determine changes in the ecosystem could address this question. This type of study, along with the light study, would give the City of Cambridge a reference for future projects that may include lighting in natural areas.

5 REFERENCES

Halle, S., and N.C. Stenseth. 2000. Activity patterns in small mammals: an ecological approach. *Ecological Studies*, 141.

Lam Partners, 2017. Watertown-Cambridge Greenway Lighting Study. Pages 1-13.

Massachusetts Department of Energy and Environmental Affairs.

<http://www.mass.gov/eea/agencies/dfg/dfw/natural-heritage/species-information-and-conservation/mesa-list/list-of-rare-species-in-massachusetts.html>, June 9, 2017.

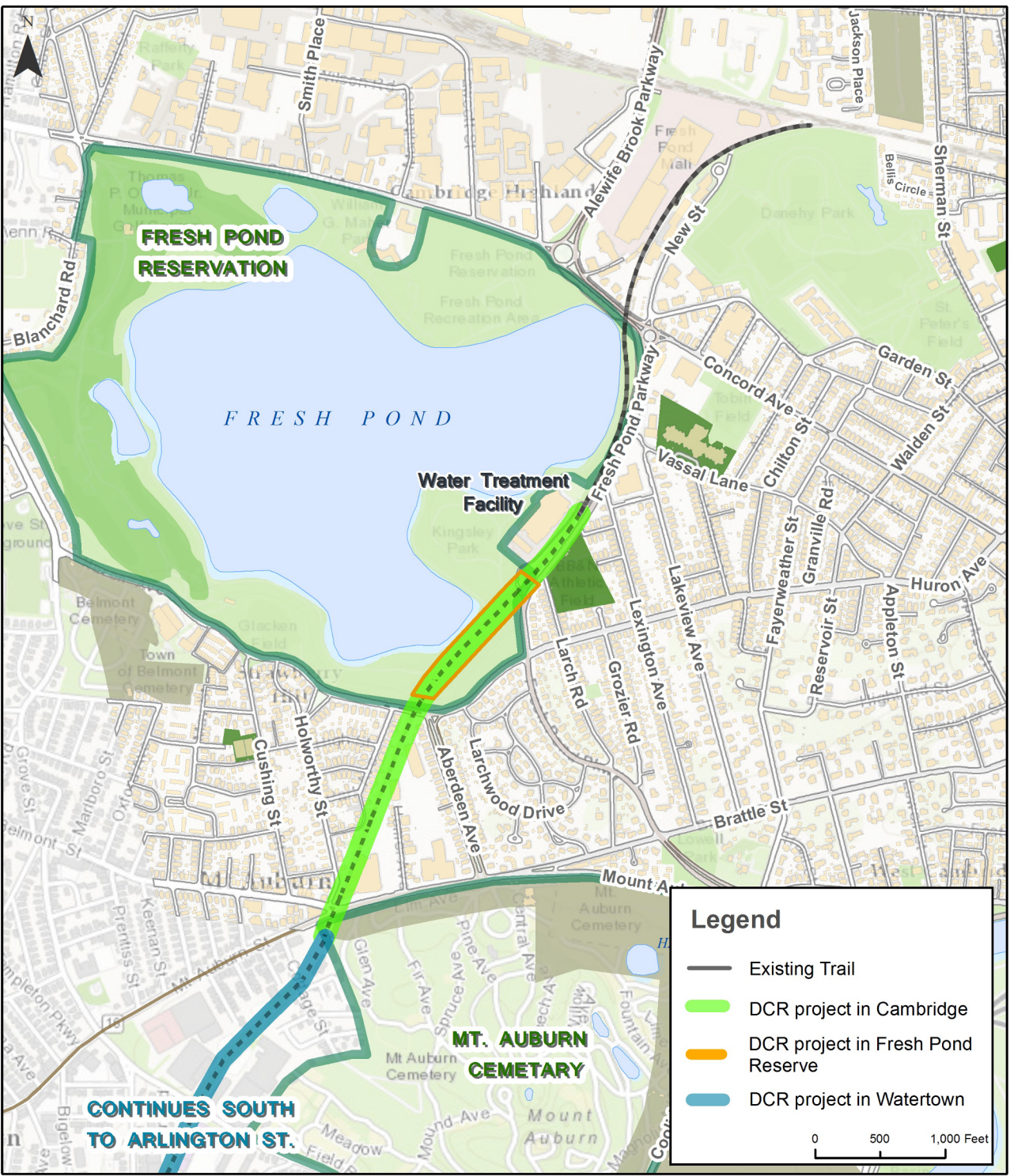
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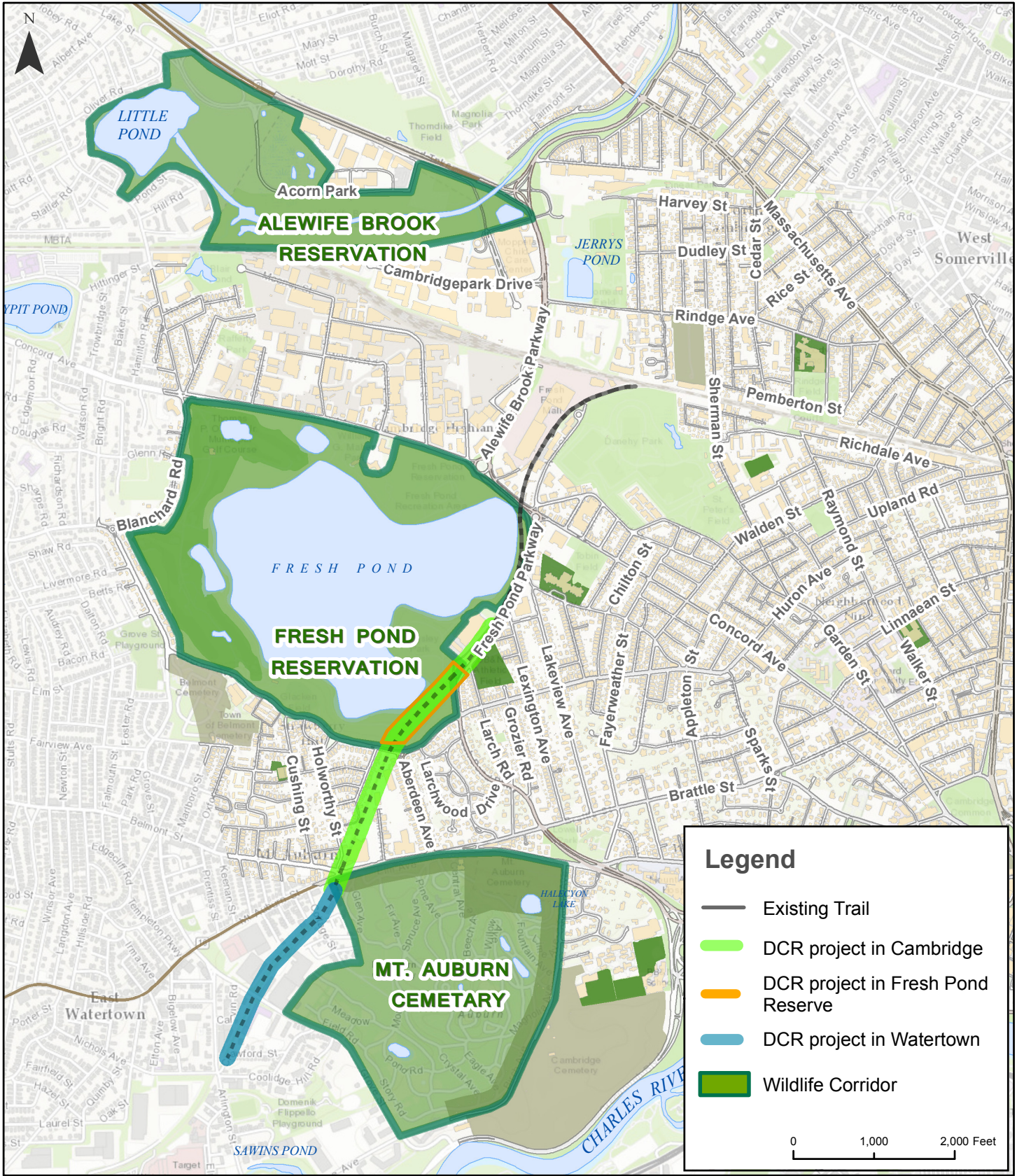
<https://ecos.fws.gov/ipac/>. June 9, 2017.

United States Fish and Wildlife Service, National Wetlands Inventory Database.






<https://www.fws.gov/wetlands/data/mapper.html>. June 9, 2017.

FIGURES





Legend

-  Existing Trail
-  DCR project in Cambridge
-  DCR project in Fresh Pond Reserve
-  DCR project in Watertown
-  Wildlife Corridor

0 1,000 2,000 Feet

APPENDIX A
USFWS IPaC SPECIES LIST REPORT



United States Department of the Interior



FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104
<http://www.fws.gov/newengland>

In Reply Refer To:

June 09, 2017

Consultation Code: 05E1NE00-2017-SLI-1817

Event Code: 05E1NE00-2017-E-03984

Project Name: Fresh Ponds Reservation

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the

human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2) (c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

<http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF>

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 et seq.), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (<http://www.fws.gov/windenergy/>) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm>; <http://www.towerkill.com>; and <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html>.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

New England Ecological Services Field Office

70 Commercial Street, Suite 300

Concord, NH 03301-5094

(603) 223-2541

Project Summary

Consultation Code: 05E1NE00-2017-SLI-1817

Event Code: 05E1NE00-2017-E-03984

Project Name: Fresh Ponds Reservation

Project Type: RECREATION CONSTRUCTION / MAINTENANCE

Project Description: A new walking trail with a lighted path has been proposed through fresh ponds reservation.

Project Location:

Approximate location of the project can be viewed in Google Maps:

<https://www.google.com/maps/place/42.37878071284692N71.14771505229416W>



Counties: Middlesex, MA

Endangered Species Act Species

There is a total of 0 threatened, endangered, or candidate species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area. Please contact the designated FWS office if you have questions.

Critical habitats

There are no critical habitats within your project area.

APPENDIX B
WILDLIFE SPECIES LIST

Wildlife Species List				
Wildlife	Common Name	Scientific Name	EEA Status	USFWS Status
Birds	Canada Goose	<i>Branta canadensis</i>	Unlisted	Unlisted
	Mallard	<i>Anas platyrhynchos</i>	Unlisted	Unlisted
	Mute Swan	<i>Cygnus olor</i>	Unlisted	Unlisted
	Great Blue Heron	<i>Ardea herodias</i>	Unlisted	Unlisted
	Red-tailed Hawk	<i>Buteo jamaicensis</i>	Unlisted	Unlisted
	Ring-billed Gull	<i>Larus delawarensis</i>	Unlisted	Unlisted
	Mourning Dove	<i>Zenaida macroura</i>	Unlisted	Unlisted
	Red-bellied Woodpecker	<i>Melanerpes carolinus</i>	Unlisted	Unlisted
	Downy Woodpecker	<i>Picoides pubescens</i>	Unlisted	Unlisted
	Northern Flicker	<i>Colaptes auratus</i>	Unlisted	Unlisted
	Warbling Vireo	<i>Vireo gilvus</i>	Unlisted	Unlisted
	Blue Jay	<i>Cyanocitta cristata</i>	Unlisted	Unlisted
	American Crow	<i>Corvus brachyrhynchos</i>	Unlisted	Unlisted
	Fish Crow	<i>Corvus ossifragus</i>	Unlisted	Unlisted
	Tree Swallow	<i>Tachycineta bicolor</i>	Unlisted	Unlisted
	Black-capped Chickadee	<i>Poecile atricapillus</i>	Unlisted	Unlisted
	Tufted Titmouse	<i>Baeolophus bicolor</i>	Unlisted	Unlisted
	White-breasted Nuthatch	<i>Sitta carolinensis</i>	Unlisted	Unlisted
	Carolina Wren	<i>Thryothorus ludovicianus</i>	Unlisted	Unlisted
	Eastern Bluebird	<i>Sialia sialis</i>	Unlisted	Unlisted
	American Robin	<i>Turdus migratorius</i>	Unlisted	Unlisted
	Gray Catbird	<i>Dumetella carolinensis</i>	Unlisted	Unlisted
	European Starling	<i>Sturnus vulgaris</i>	Unlisted	Unlisted
	Cedar Waxwing	<i>Bombycilla cedrorum</i>	Unlisted	Unlisted
	Northern Parula	<i>Setophaga americana</i>	Unlisted	Unlisted
	Blackpoll Warbler	<i>Setophaga striata</i>	Listed (Breeding)	Unlisted
	Pine Warbler	<i>Setophaga pinus</i>	Unlisted	Unlisted
	Northern Cardinal	<i>Cardinalis cardinalis</i>	Unlisted	Unlisted
	Baltimore Oriole	<i>Icterus galbula</i>	Unlisted	Unlisted
	American Goldfinch	<i>Spinus tristis</i>	Unlisted	Unlisted
House Sparrow	<i>Passer domesticus</i>	Unlisted	Unlisted	
Mammals	Eastern Gray Squirrel	<i>Sciurus carolinensis</i>	Unlisted	Unlisted

APPENDIX C
PLANT SPECIES LIST

Plant Species List				
Common Name		Scientific Name	NYSDEC Status	USFWS Status
Trees	Red maple	<i>Acer rubrum</i>	Unlisted	Unlisted
	Sugar Maple	<i>Acer Saccharum</i>	Unlisted	Unlisted
	Gray birch	<i>Betula populifolia</i>	Unlisted	Unlisted
	Eastern Hemlock	<i>Tsuga canadensis</i>	Unlisted	Unlisted
	Eastern white pine	<i>Pinus strobus</i>	Unlisted	Unlisted
	Quaking aspen	<i>Populus tremuloides</i>	Unlisted	Unlisted
	Tree of Heaven	<i>Ailanthus altissima</i>	Invasive	Unlisted
	Black locust	<i>Robinia pseudoacacia</i>	Invasive	Unlisted
Shrubs and Vines	Japanese barberry	<i>Berberis thunbergii</i>	Invasive	Unlisted
	Oriental bittersweet	<i>Celastrus orbiculatus</i>	Invasive	Unlisted
	Sweet pepperbush	<i>Clethra alnifolia</i>	Unlisted	Unlisted
	Japanese knotweed	<i>Fallopia japonica</i>	Invasive	Unlisted
	Japanese honeysuckle	<i>Lonicera japonica</i>	Invasive	Unlisted
	Sassafras	<i>Sassafras albidum</i>	Unlisted	Unlisted
	American red raspberry	<i>Rubus idaeus</i>	Unlisted	Unlisted
	Eastern poison ivy	<i>Toxicodendron radicans</i>	Unlisted	Unlisted
	Summer grape	<i>Vitis aestivalis</i>	Unlisted	Unlisted
Herbs	Garlic mustard	<i>Alliaria petiolata</i>	Invasive	Unlisted
	Common mugwort	<i>Artemisia vulgaris</i>	Invasive	Unlisted
	Christmas Fern	<i>Polystichum acrostichoides</i>	Unlisted	Unlisted
	Common reed	<i>Phragmites australis</i>	Invasive	Unlisted
	Broad-leaved cattail	<i>Typha latifolia</i>	Unlisted	Unlisted

United States Department of Agriculture (USDA) Natural Resources Conservation Service, *Threatened & Endangered, Protected Plants for all Scientific Names*. Available from: <http://plants.usda.gov/java/threat>. Accessed July 28, 2015.