Nagog Pond Water Treatment Plant
Acton, Massachusetts

MEPA Draft Environmental Impact Report

Aug 15, 2016

Prepared For:
Town of Concord
Public Works
Department

Environmental Partners GROUP
A partnership for engineering solutions

Quincy Office:
1900 Crown Colony Drive, Suite 402, Quincy, MA 02169
TL 617.657.0200 • FX 617-657-0201

Hyannis Office:
396 North Street, Hyannis, MA 02601
TL 508.568.5103 • FX 508.568.5125

Woburn Office:
18 Commerce Way, Suite 2000, Woburn, MA 01801
TL 781.281.2542 • FX 781.281.2543

www.envpartners.com

Environmental Partners GROUP
A partnership for engineering solutions.

August 15, 2016

Secretary Matthew A. Beaton
Executive Office of Energy and Environmental Affairs
Att. MEPA Office
100 Cambridge Street, Suite 900
Boston, Massachusetts 02108

RE: Town of Concord Nagog Pond Water Treatment Plant
MEPA Draft Environmental Impact Report
EEA Number: 15446

Dear Secretary Beaton:

On behalf of the Town of Concord, attached is the Draft Environmental Impact Report (DEIR) for the proposed Nagog Pond Water Treatment Plant, prepared pursuant to the Massachusetts Environmental Policy Act and Section 11.06 of the MEPA regulations (310 CMR 11.00).

The Town of Concord filed an Environmental Notification Form (ENF) and supplemental information for the project that was noticed in the Environmental Monitor on December 9, 2015. The Secretary's Certificate on the ENF, issued on February 12, 2016, requested a DEIR for the project. This DEIR provides a complete and detailed description and analysis of the project and its alternatives, an assessment of its potential environmental impacts, proposed Section 61 mitigation measures sufficient for the appropriate State agencies to fulfill their obligations in accordance with MGL c. 30, Section 61, and responses to all comments received on the ENF. Agencies and persons receiving copies of this DEIR are listed in Appendix S.

Once again, we appreciate the guidance that your staff has provided the Town as this DEIR was being prepared. Please feel free to contact me if you have any questions or need clarification with any of the information contained herein.

Very Truly Yours,
Environmental Partners Group, Inc.

Mark N. White
Principal

Hyannis:
396 North Street, Hyannis, MA 02601
TL 508.568.5103 • FX 508.568.5125

Headquarters:
1900 Crown Colony Drive, Suite 402, Quincy, MA 02169
TL 617.657.0200 • FX 617.657.0201

Woburn:
18 Commerce Way, Suite 2000, Woburn, MA 01801
TL 781.281.2542 • FX 781.281.2543

www.envpartners.com

Enclosure: MEPA Draft EIR for the Nagog Pond Water Treatment Plant (2 hard copies and one electronic)

Cc: Alan Cathcart, Water/Sewer Superintendent, Concord Department of Public Works
DEP – Boston Office
DEP – Central Regional Office
DEP – Northeast Regional Office
Massachusetts Department of Transportation - Public/Private Development Unit
Massachusetts Department of Transportation - District 3
Department of Fisheries and Wildlife
Massachusetts Historical Commission
Board of Underwater Archaeological Resources
Metropolitan Area Planning Council
Acton Board of Selectmen
Acton Planning Department
Acton Conservation Commission
Acton Board of Health
Department of Public Health – Director of Environmental Health
Carolyn M. Kiely, Esq. (On Behalf of the Quail Ridge Residents)
Acorn Park Condominium Association
Littleton Conservation Trust
Linda O. Rhen, Quail Ridge Resident
James Engell, Private Resident

Nagog Pond Water Treatment Plant

MEPA Draft Environmental Impact Report

Project Municipality: Concord, MA
Project Watershed: Nagog Pond Watershed
EEA Number: 15446

August 15, 2016

Environmental Partners GROUP
A partnership for engineering solutions

TABLE OF CONTENTS

LIST OF TABLES **3**

LIST OF FIGURES **4**

LIST OF APPENDICES **5**

MEPA ENVIRONMENTAL IMPACT REPORT FOR NAGOG POND WATER TREATMENT PLANT **6**

1.0 SUMMARY 7
1.1 Overview *7*
1.2 Need for the Project *8*
2.0 PROJECT DESCRIPTION 9
2.1 Description of the Project *9*
2.2 Notice of Project Change *10*
2.3 Water Treatment Plant *11*
2.4 Intake Pipe Construction and Dewatering of Nagog Pond *12*
2.5 Water System Demands *14*
2.6 Timetable *14*
2.7 Approximate Costs *15*
3.0 CONSISTENCY WITH PLANNING 16
3.1 Watershed Resource Protection Plan – Nagog Pond *16*
3.2 Water Quality and Treatment Requirements *16*
3.3 Town of Concord Water Facilities Planning *17*
4.0 ALTERNATIVES TO THE PROJECT 18
4.1 Background on the Preferred Alternative *18*
4.2 Alternative Design Considerations for the Intake Pipe and WTP Building *19*
4.2.1 Intake Pipe *19*
4.2.2 WTP Building *20*
5.0 EXISTING ENVIRONMENT 21
5.1 Physical Setting *21*
5.2 Geology and Soils *22*
5.3 Surface and Groundwater Hydrology and Water Quality *22*
5.4 Wetland Resource Areas *24*
5.5 Plant and Animal Species and Habitat *25*
5.6 Areas of Critical Environmental Concern and Outstanding Resource Waters *25*
5.7 Roadways and Traffic *25*
5.8 Scenic Qualities, Open Space and Recreational Resources *25*
5.9 Historic Districts, Structures and Archeological Sites *25*
5.10 Zoning *26*
6.0 ASSESSMENT OF IMPACTS 27
6.1 Effects Due to Dewatering for Intake Pipe Construction *27*
6.2 Wetlands *28*
6.3 Rare and Endangered Species *29*
6.4 ACECs and Outstanding Resource Waters *29*
6.5 Historic and Archeological Impacts *29*
6.6 Access Roadway *29*
6.7 Traffic *30*
6.8 Noise *30*
7.0 GREENHOUSE GAS EMISSIONS ANALYSIS AND ENERGY EFFICIENCY 32
8.0 STATUTORY AND REGULATORY STANDARDS AND REQUIREMENTS 34
8.1 Agency Coordination and Permitting *34*
8.2 Applicable Statutory and Regulatory Standards and Requirements *34*

8.3 Requests for Funding Assistance *35*
8.4 Other Coordination Related to Distribution System Installation *35*
9.0 MITIGATION MEASURES 37
9.1 Positive, Long Term Impacts of the Treatment System on Water Supply *37*
9.2 Long-Term Mitigation Measures *37*
9.3 Short-term (Construction-Related) Mitigation Measures *38*
10. PROPOSED SECTION 61 FINDINGS 45
11.0 RESPONSE TO COMMENTS 49
11.1 MEPA *49*
11.2 Massachusetts Historical Commission *51*
11.3 Quail Ridge Residents *51*
11.4 Massachusetts Department of Fisheries and Wildlife *52*
11.5 Massachusetts Board of Underwater Archaeological Resources *53*
11.6 Massachusetts Department of Environmental Protection Northeast and Central Region Office *53*
11.7 Private Residences *55*
11.8 Acorn Park Condominium Association *56*
REFERENCES 57

LIST OF TABLES

TABLE 1. PROJECT LAND ALTERATION SUMMARY.

TABLE 2. SUMMARY OF RAW WATER QUALITY DATA.

TABLE 3. PROJECT PERMIT REQUIREMENTS FOR NAGOG POND WTP.

TABLE 4. SUMMARY OF PROPOSED MITIGATION MEASURES.

LIST OF FIGURES

FIGURE 1. NAGOG POND WTP ON USGS QUAD LOCUS MAP

FIGURE 2. NAGOG POND WATERSHED.

FIGURE 3. NAGOG POND WTP ENVIRONMENTAL CONSTRAINTS.

LIST OF APPENDICES

APPENDIX A CERTIFICATE OF THE SECRETARY OF ENERGY AND ENVIRONMENTAL AFFAIRS ON THE ENVIRONMENTAL NOTIFICATION FORM (FEBRUARY 12, 2016)

APPENDIX B NOTICE OF PROJECT CHANGE FORM

APPENDIX C PLANS OF THE PROPOSED NAGOG POND WATER TREATMENT PLANT

APPENDIX D NAGOG POND PILOT TREATABILITY STUDY EXECUTIVE SUMMARY (EPG, 2014) AND DEPARTMENT OF ENVIRONMENTAL PROTECTION APPROVAL LETTER

APPENDIX E UNDERWATER INSPECTION OF THE RAW WATER INTAKE SUPPLY LINE

APPENDIX F NAGOG POND WATERSHED RESOURCE PROTECTION PLAN

APPENDIX G GEOTECHNICAL REPORT (EPG, 2015)

APPENDIX H ACTON CONSERVATION COMMISSION ORDER OF CONDITIONS

APPENDIX I MASSACHUSETTS HISTORICAL COMMISSION

- MHC RESPONSE LETTER – DECEMBER 9, 2015
- MHC RESPONSE LETTER – FEBRUARY 11, 2016
- MASHPEE WOMPANOAG TRIBE RESPONSE – MARCH 31, 2016
- MBUAR RESPONSE LETTER – NOVEMBER 13, 2015
- PROJECT NOTIFICATION FORM – NOVEMBER 12, 2015

APPENDIX J PAL ARCHAEOLOGY SENSITIVITY ASSESSMENT (PAL, 2016)

APPENDIX K NOISE EMISSIONS ANALYSIS MEMORANDUM

APPENDIX L GREEN HOUSE GAS EMISSIONS ANALYSIS MEMORANDUM

APPENDIX M STORMWATER REPORT

APPENDIX N ENF RESPONSE LETTERS

APPENDIX O APPLICABILITY OF ARTICLE 97 ANALYSIS

APPENDIX P DEIR DISTRIBUTION LIST

MEPA ENVIRONMENTAL IMPACT REPORT
FOR NAGOG POND WATER TREATMENT PLANT

This Draft Environmental Impact Report (DEIR) describes the proposed Nagog Pond Water Treatment Plant project owned and operated by the Town of Concord and located in Acton, Massachusetts. This DEIR has been prepared pursuant to the Massachusetts Environmental Policy Act (MEPA) and Section 11.06 of the MEPA regulations (310 CMR 11.00). The project meets the threshold for Environmental Impact Review because it proposes dewatering a portion of Nagog Pond and to temporarily expose 16.23 acres of Land Under Water (LUW) for up to four months (301 CMR 11.03(3)(a)(1)(b)).

The Town of Concord filed an Environmental Notification Form (ENF) and supplemental information for the project, which was noticed in the Environmental Monitor on December 9, 2015. The ENF and supplemental information was subject to an extended comment period and included a detailed description of the project, alternatives analysis, baseline environmental conditions, and identified project mitigation measures.

The Secretary's Certificate on the ENF and supplemental information was issued on February 12, 2016 (Appendix A). Concord had requested that the Secretary of Energy and Environmental Affairs waive the EIR, and the Secretary stated in the Certificate that they "…appreciate the Town's commitment to respond to issues, questions and comments that have arisen during the MEPA review period and acknowledge that the ENF and supplemental information provided to date provide a level of information regarding alternatives and mitigation commitments that is typically provided in a DEIR. However, I cannot make a determination that preparation of an EIR would result in an undue hardship to the Town. Therefore, the Proponent shall prepare a DEIR consistent with the Scope outlined below…" This DEIR complies with the scope requested by the Secretary and includes a detailed description of the project and any changes to the project since the filing of the ENF and supplemental information. The major change is the proposed use of a distributed power supply in place of the original solar photovoltaic (PV) array system as described in Section 2.2 and the Notice of Project Change (Appendix B).

1.0 Summary

1.1 Overview

The Town of Concord is proposing to make comprehensive improvements and upgrades to its existing surface water supply known as Nagog Pond, which has been utilized by Concord as a water supply since the early 1900s. Nagog Pond is located on the borders of the neighboring community of Littleton and Acton as shown in Figure 1. The proposed project has two major components: 1) replacing an existing treatment plant (the Ozone Disinfection Facility) that has limited treatment capability with a state-of-the-art filtration and disinfection facility, and 2) replacing an antiquated 16-inch cast iron intake pipe that extends into Nagog Pond with a new 16-inch high density polyethylene (HDPE) intake pipe. The new treatment plant will be powered with a gas-fired distributed power system, which will be independent of the electrical grid. This approach to powering the treatment plant is a modification from the solar PV system provided in the ENF. This modification is described in the attached Notice of Project Change and in Section 2.2.

The proposed Nagog Pond Water Treatment Plant (WTP) will have the same hydraulic design capacity as the existing facility, 1.5 MGD. With the proposed upgrades, the WTP will utilize the latest drinking water treatment technologies for the consistent production of high quality drinking water for Concord's water system customers in both Concord and Acton. Several physical and chemical water treatment processes will be incorporated, including: pre-oxidation with potassium permanganate; coagulation with polyaluminum chloride; two-stage, tapered flocculation; clarification using dissolved air flotation (DAF); primary disinfection using ozone; filtration using granular activated carbon (GAC) media; pH adjustment using potassium hydroxide; corrosion control using zinc polyphosphate; secondary disinfection using sodium hypochlorite; and fluoridation using sodium fluoride.

Water from Nagog Pond is obtained by means of an existing 16-inch diameter cast iron intake pipe (circa 1909). The intake pipe extends approximately 1,800 feet into Nagog Pond from the gate house at the dam and is partially supported by wooden cribbing. Physical inspections of the intake pipe have indicated that it has significantly deteriorated, resulting in decreased hydraulic carrying capacity and risk of failure. Due to the condition of the existing intake pipe, the Town of Concord

is proposing to replace it with a new 16-inch diameter HDPE pipe. The proposed replacement pipe will allow water to be drawn from two different levels within the pond, and will include an automated "air burst" cleaning system for the intake drum screens.

The proposed WTP and intake pipe replacement have an estimated construction cost of $13.94 Million. The Town of Concord will provide funding for the project.

1.2 Need for the Project

The proposed intake and WTP project are part of a master planning effort for the Nagog Pond water supply. The ultimate goal of this project is the consistent production of high quality drinking water that meets existing and future proposed drinking water standards. Nagog Pond and the Ozone Disinfection Facility are currently operating with a Filtration Avoidance Waiver under the United States Environmental Protection Agency (EPA) and Massachusetts Department of Environmental Protection (MassDEP) Surface Water Treatment Rule (SWTR). Compliance with and continued operation under the Filtration Avoidance Waiver requires strict conformance with federal and state water quality limits which have restricted the use of this water supply. The proposed WTP will be state of the art and allow for the consistent production of high quality water for Concord's water system customers in both Concord and Acton. Construction of the proposed WTP will allow Concord to release their Filtration Avoidance Waiver associated with the SWTR. These improvements will enable Concord to increase the reliability and resiliency of Nagog Pond as a public water supply source.

The installation of the intake pipe is an essential part of this project, as the existing intake line is significantly deteriorated and inhibiting the withdrawal capacity. If the intake pipe is not replaced, Concord will be at risk of not being able to meet their water demands, a situation that would be a significant public health issue.

2.0 Project Description

2.1 Description of the Project

The existing water supply system at Nagog Pond consists of a raw water intake and a limited disinfection treatment system. After this initial treatment, the disinfected raw water is pumped to a downstream station where additional treatment must be provided before the water enters the distribution system.

Raw water from Nagog Pond flows by gravity into the wetwell by means of a 16-inch intake pipe and gatehouse at the dam. Water is pumped from the wetwell through the contactors where ozone gas is added for oxidation and disinfection. Ozone treated water then flows by gravity to the Route 2A Satellite Pumping Station via a 16-inch cement lined cast iron main (circa 1909). Final treatment is provided at the Route 2A Satellite Pumping Station including additional disinfection with ultraviolet (UV) light, pH adjustment using potassium hydroxide, fluoridation using sodium fluoride, corrosion control using zinc polyphosphate, and secondary disinfection using sodium hypochlorite. Finished water is then pumped into Concord's water distribution system which provides service to the Town of Concord and residential and commercial businesses in Acton along Route 2A.

The project will be completed in two phases of construction: 1) the Nagog Pond WTP facility and 2) the Nagog Pond intake replacement. The proposed work area will include the entire developed portion of the existing Ozone Disinfection Facility site and temporarily dewatering a limited area of Nagog Pond to construct the new intake pipe. The project includes demolition of the existing Ozone Disinfection Facility, construction of the new water treatment plant and intake systems and installation of all supporting infrastructure and utilities. A breakdown of land alteration is provided in Table 1.

Table 1. Project Land Alteration Summary.

	Existing (Square Feet)	Proposed (Square Feet)
Building Footprint	1,297	7,646
Paved Area (50'-75' Wetland Buffer)	2,565	937
Paved Area (75'-100' Wetland Buffer)	3,074	3,035
Paved Area (>100' Wetland Buffer)	9,101	15,712
Pervious Cleared Area (50'-75' Wetland Buffer)	4,792	6,021
Pervious Cleared Area (75'-100' Wetland Buffer)	4,843	4,467
Pervious Cleared Area (>100' Wetland Buffer)	19,761	10,500

2.2 Notice of Project Change

Concord will use a distributed power supply for the new WTP. Under the MEPA regulations, the decision to utilize a distributed power supply is a material change from the solar PV array proposed in the original ENF. As such, a description of this change in the project is described below and the Notice of Project Change form is provided in Appendix B.

In response to local concerns, instead of the solar PV array system the new Nagog Pond WTP will have three micro-turbine distributed power units located southwest of the proposed WTP building. The proposed design includes three 100-kW gas fired reciprocating engines that will have a total capacity of 300 kW. In addition to using these units as the power supply for the WTP, the Town is evaluating use of the heat generated by these units to provide space heat to the WTP building. The three units will occupy approximately 210 square feet immediately adjacent to the building, as shown in the conceptual design plans included in Appendix C.

The proposed distributed power units more than satisfy even the stringent air quality requirements of the California South Coast Air Quality Management District and the New Jersey Department of Environmental Protection emission limits. Emissions from the proposed units are well below the MassDEP Environmental Results Program (ERP) emissions thresholds established for NOx and carbon monoxide. These attributes of the distributed power units are consistent with Concord's sustainability goals for the project.

As noted in the MEPA Notice of Project Change, this project change is considered to be insignificant. Using the distributed power units will significantly reduce the extent of clearing and

land disturbance compared to the original solar PV array. The power supply units will be located adjacent to the existing WTP facility and will not require any additional clearing of the forested area on the property. In addition, this change will reduce work proposed within the buffer zone to bordering vegetated wetlands and will eliminate work in areas that have been identified to be archaeologically sensitive. The use of energy efficient distributed power supply units located on-site next to the WTP will reduce energy costs and provide a long-term economic benefit to Concord.

2.3 Water Treatment Plant

The proposed treatment plant building will be a two story structure having a footprint of 7,165 square feet and a net floor space of 9,338 square feet. The exterior façade is proposed to be cement masonry unit (CMU) architectural block with sufficient windows to provide natural lighting to the interior. The building will house all of the treatment processes and equipment and ancillary support spaces such as a control room, water quality laboratory, and office/common area. The new building is larger than the existing plant due to the advanced treatment systems to be employed. To minimize impacts to the forested area on the property, the existing disinfection facility will be demolished and the new WTP will be constructed over the same footprint as the existing building. This allows the foundation system for the new building to utilize the same area cleared for the existing building, which required extensive blasting of bedrock. By taking this approach, minimal, if any, bedrock blasting is required for the new facility. The project also includes the installation of additional underground utilities (natural gas, water, and cable), fencing, parking areas, stormwater drainage and handling systems, and widening of the existing access road in response to the Fire Department's recommendations to improve the accessibility of fire equipment to the facility in the event of an emergency.

The proposed Nagog Pond WTP is being designed as a zero discharge facility. The Town's objective for the facility is to recycle all wastes, with the exception of sanitary wastes. The proposed WTP will include a small (20 gallons per day) disposal system for sanitary wastes (septic tank). Residuals generated from treating the water will be dewatered on site, and the solids will be transported off-site and blended with other materials to create a compost material. The plant

will also include suitable secondary containment and sufficient safety measures for the storage of water treatment chemicals in accordance with local and state requirements.

The treatment plant units that will be installed in the new WTP were selected and sized on the basis of data collected from two pilot studies, performed in August 2013 (warm water) and February 2014 (cold water) by Environmental Partners Group, Inc. (EPG). A summary of water supply and quality characteristics during these pilot studies are described in the Nagog Pond Pilot Treatability Study Final Report (EPG, 2014) attached as Appendix D. The treatment system consists of removal of source water iron and manganese, removal of low-density particulates, removal of natural organic matter, and removal of objectionable tastes and odors. To achieve treatment goals, the pilot study proposed a treatment system consisting of pH adjustment, pre-oxidation, in-line mixing, coagulation, flocculation, dissolved air floatation, ozone, and biologically activated carbon filters. Supplemental disinfection will include the addition of sodium hypochlorite dosed prior to the clearwell.

2.4 Intake Pipe Construction and Dewatering of Nagog Pond

The raw water supply from Nagog Pond is obtained by means of an aged (circa 1909) 16-inch diameter cast iron pipe. Physical inspections of the intake pipe have shown that it has significantly deteriorated, resulting in decreased hydraulic carrying capacity and risk of failure. An Underwater Inspection Report summarizing the condition of the existing intake pipe is included in Appendix E. Due to the condition of this intake pipe, it is to be replaced with a new 16-inch diameter HDPE. The intake pipe will be constructed so that the Town has the ability to draw water from two different levels within the water column, and includes an automated "air burst" cleaning system for the intake drum screens.

Installation of the new intake pipe will require temporarily draining a limited, relatively shallow area of the pond by installing a coffer dam with bypass piping. The coffer dam will utilize an existing, partially submerged coffer dam at the same location, which will be amended by installing an impermeable barrier/liner on its interior face and providing additional support using large sand bags, referred to as super sacks. Once the temporary coffer dam is in place, the existing Nagog Pond dam outlet structure will be utilized to dewater the lower section of the pond so that

replacement of the intake pipe can be accomplished in relatively dry working conditions, and within a shorter time frame.

The area of the pond to be dewatered is shown on Sheet C-5 of the preliminary design plans (see Appendix C) and encompasses an area of approximately 707,000 square feet. At full pond level, this area has a water volume of 19.65 million gallons. Water from this area is to be pumped from the cove area into the remainder of the pond, over a period of approximately 20 and 45 days. Controlled releases may be conducted to Nagog Brook, if needed. It is anticipated that the construction activities associated with the intake pipe construction, including draining the reservoir, will begin in either the fall of 2017 or 2018 (generally September through December). The goal is to complete construction of the intake line before the new WTP is placed into service, anticipated to be in the summer of 2018 or 2019, depending when the construction activities are started.

The existing 16-inch intake pipe will be removed and the new 16-inch intake pipe will be installed at the same location within the coffer dam area. All excavation work will be accomplished in such a manner that there will be no net increase in soils and sediments either removed or added to the pond bottom. All existing sediments and soils will remain and no new soils will be added. During the excavation process sediments will be stockpiled adjacent to the pipe trench and re-used to backfill the pipe.

The Contractor will be required to maintain several dewatering pumps to transfer water from isolated low spots within the dewatered area. Water will either be pumped to another isolated low spot not affecting the construction zone or pumped to the dam outlet zone for release downstream to Nagog Brook. Any water that is pumped will be monitored visually for the transport of solids/sediment. If solids/sediments are detected, then they will be allowed to settle within the dewatering area before being discharged to Nagog Brook.

The remaining section of the intake pipe to be installed beyond the area of the pond being dewatered will be placed using a barge. The HDPE pipe will be fused and concrete collars will be installed around the pipe at various locations. The pipe will be filled with air and positioned at the location it is to be installed. The pipe will then be filled with water and submerged. Due to the

buoyancy of HDPE, concrete collars 30" wide by 30" tall by 12" thick will be used to restrain the pipe. The concrete collars will be spaced approximately 10 feet apart along the entire length of the intake pipe, resulting in a total of approximately 253 concrete collars.

Divers will connect the intake screen and attached the intake line to a support tower. The support tower will also be deployed using a barge. The appropriate pipe locations will be determined using GPS equipment.

Potential impacts to the environment resulting from the intake pipe installation will be temporary and mitigated to the greatest extent possible by implementing the best management practices and procedures described in Section 9. At the recommendation of the Massachusetts Division of Fish and Wildlife and as required by the Acton Conservation Commission Order of Conditions, the Town will hire an independent Environmental Monitor to observe field conditions during the drawdown activities and review findings with the Acton Natural Resources Department.

2.5 Water System Demands

The current annual average daily water demand for the Town of Concord is approximately 2.0 MGD. These demands are met by six groundwater wells and one surface water supply (Nagog Pond).

The existing treatment facility at Nagog Pond has a hydraulic capacity of 1.5 MGD and consists of a raw water wetwell, pump control vault, two underground ozone contactors (for disinfection), and a brick and block building to house the ozone generation equipment. The proposed WTP will have the same hydraulic design capacity as the existing facility.

Concord's water supply system currently operates under a water withdrawal permit (#31406704) pursuant to the Massachusetts Water Management Act issued on December 31, 2007. The increased flexibility of withdrawal from Nagog Pond as a result of the WTP improvements will still comply with the requirements set forth in the Water Withdrawal Permit.

2.6 Timetable

The proposed project implementation plan will be conducted in phases. Construction of the WTP is anticipated to begin during the first half of 2017; however, the existing Ozone Disinfection

Facility will remain operational until the late summer or early fall of 2017. Once the existing Ozone Disinfection Facility is taken off-line for demolition, the intake project can also commence. Both the new intake and WTP are scheduled to be on-line between mid-2018 to early 2019. Concord's six groundwater supply wells will be used while Nagog Pond is not available during construction of the intake and WTP.

2.7 Approximate Costs

The estimated cost of the proposed intake and WTP project is $13.94 Million. The cost estimate is a Class 3 estimate classification based on the AACE Classification System. A Class 3 estimate is based on a project definition maturity level of 10% to 40%, and provides an expected accuracy range of -20% to 30%. Based on the level of design completed to date, a contingency range of 0% to 15% was considered appropriate for the estimate of probable costs.

3.0 Consistency with Planning

3.1 Watershed Resource Protection Plan – Nagog Pond

The Town of Concord has been very active in conserving and protecting the water quality of Nagog Pond, and coordinating these efforts with both Acton and Littleton. This program is described in Concord's Watershed Protection Plan for Nagog Pond, a copy of which (2014 version) is provided in Appendix F.

3.2 Water Quality and Treatment Requirements

The Surface Water Treatment Rule (SWTR) was promulgated by the United States Environmental Protection Agency (USEPA) in 1989 to protect public drinking water from waterborne microbiological pollutants such as Giardia and viruses. Under the provisions of the SWTR, all public water systems using surface water supplies or groundwater supplies under the direct influence of surface water must include disinfection as part of the treatment process. In addition, unless the water meets strict water quality criteria, filtration is required to physically remove waterborne microorganisms that are resistant to conventional disinfection practices (chlorination) and may be present in the water. For water systems in the Commonwealth of Massachusetts, detailed requirements of the SWTR are defined in 310 CMR 22.20A.

Under the 1996 amendments to the Safe Drinking Water Act (SDWA), improvements to the SWTR were proposed by the USEPA in the form of an Enhanced Surface Water Treatment Rule (ESWTR). These changes address increased removal/inactivation requirements for poorer quality source waters and treatment requirements for the removal/inactivation of cryptosporidium (CT), which was found to be highly resistant to standard disinfection practices. The ESWTR applied to water systems already regulated by the SWTR.

The Town of Concord currently operates under a SWTR Filtration Avoidance Waiver for Nagog Pond. Under the waiver, the Town of Concord is subjected to the rigorous requirements of the SWTR for use of a public surface water supply that does not provide filtration treatment. Construction of the proposed WTP (with the addition of filtration treatment) will allow the Town to meet current and future water quality standards in accordance with the ESWTR and release its

SWTR filtration waiver. This will increase the reliability and resiliency of Nagog Pond as a public water supply.

3.3 Town of Concord Water Facilities Planning

In an effort to optimize the use of Nagog Pond as a water supply, the Town embarked on an evaluation of filtration treatment alternatives. Filtration treatment will allow Nagog Pond to be used as a safer and more reliable water supply regardless of natural variations in pond water quality. EPG performed a pilot study on behalf of the Town of Concord in August 2013 (warm water) and February 2014 (cold water). The results of the pilot study recommended the use of pH adjustment, pre-oxidation, coagulation, flocculation, dissolved air floatation, ozone, and biologically activated carbon filtration as treatment processes for Nagog Pond. The Nagog Pond Pilot Treatability Study Final Report (EPG, 2014) and MassDEP approval is provided in Appendix D.

4.0 Alternatives to the Project

The proposed Nagog Pond WTP is described in Section 2. Several alternative locations for the proposed facility were evaluated as discussed below.

4.1 Background on the Preferred Alternative

The preferred alternative consists of redeveloping the existing water treatment plant within the same footprint and replacing the intake pipe. The proposed treatment plant building is two stories having a footprint of 7,165 square feet and a net floor space of 9,338 square feet. The foundation for the proposed building will utilize the same footprint as the existing building, thereby minimizing the need for any additional bedrock removal (e.g., blasting) to accommodate the new structure. Minimal, if any, bedrock removal in the form of blasting is anticipated with the current WTP design.

Replacing the existing intake pipe and its support system is an essential part of this project, as the existing intake is aged and significantly deteriorated. If the intake pipe is not replaced, there is a high risk of its failure which would cut off the water supply entirely, leaving the Town of Concord unable to meet its water demands to Concord and Acton. Draining a portion of the pond is required so that the existing pipe can be excavated from its trench, with the new pipe laid in the same trench and buried. The pond in this area is shallow, so a new intake pipe cannot be laid at the surface of the pond sediments, as it would be exposed during seasonally low water conditions and subject to freezing during cold weather conditions. In addition to potential freezing concerns, the pond bathymetry along the intake pipe alignment is not uniform and would create multiple high spots for possible air entrapment, creating hydraulic restrictions.

To replace the existing pipe, Concord is proposing to temporarily dewater a small section of Nagog Pond, knows as the cove area, that is equivalent to 1.3% of the total pond volume and 5.8% of the total pond surface area, thereby allowing the existing pipe to be excavated under relatively dry conditions. To drain the pond a temporary coffer dam would be constructed at the site of the existing coffer dam (constructed as part of the original pipe installation), and bypass piping around the cofferdam be installed to allow water flow through the pond to continue. Dewatering this limited area of the pond will minimize the release of suspended solids into the larger pond as the pipe is installed.

The proposed construction activities for the intake pipe consist of two components: 1) for the segment between the treatment plant to the coffer dam, construction excavation at the pond bottom once it has been dewatered, and 2) for the segment from the coffer dam to the intake, fusing the pipe, floating it along the water surface, then submerging it into position along the pond bottom.

All excavation work will be accomplished such that there will be no net increase in soils/sediments removed/added to the pond bottom. All existing sediments/soils will remain and no new soils will be added. During the excavation process sediments will be stockpiled adjacent to the pipe trench and re-used to backfill the pipe.

4.2 Alternative Design Considerations for the Intake Pipe and WTP Building

4.2.1 Intake Pipe

Several alternative intake pipe designs were evaluated and considered, including rehabilitation of the existing 16-inch intake pipe, dredging and directionally drilling. These alternatives have significant technical and economical disadvantages to the proposed alternative discussed above.

Pipe Rehabilitation

One alternative involves the cleaning and lining of the existing intake pipe. This approach was one of the first to be considered, as it would involve the least amount of disturbance to the lands underneath the pond. However, after inspection of the existing intake, it has been determined that the reuse of the existing intake is not feasible. The integrity of the pipe is compromised and the wooden support cribbing has deteriorated in several areas, thereby making this alternative not feasible.

Dredging

One approach includes 425 cubic yards of sediment to be dredged for the installation of the intake pipe. Multiple pipe alignments were assessed in an effort to reduce the quantity of dredging that will be required. However, there is a potential for bedrock to be encountered during dredging activities and the results of field observations and probings. If bedrock were to be encountered, its excavation would likely require additional dewatering of the pond, making this alternative unfavorable.

Directional Drilling

Horizontal Directional Drilling (HDD) is a specialized drilling method which can be used to bore through most types of materials, including cobbles and high-quality granite. Discussions with HDD contractors indicate that the Nagog Pond project would be considered a moderately difficult project but well within the normal risk threshold for the industry. Drilling through cobbles and boulders can be challenging as the drill bit may wander off course and the drilled hole may collapse as cobbles often shift during drilling operations. There is also a risk of grout blow-out into the pond through the pond bottom, which could be detrimental to the pond bottom habitat.

4.2.2 WTP Building

Several alternative building locations on the existing site were considered. However, because of the site constraints (wetland boundaries and ledge/bedrock) reuse of the existing footprint was selected as being the most sustainable location. There are several advantages to this alternative including:

- Minimizing the amount of site clearing.
- Minimizing the amount of excavation including bedrock/ledge removal.
- Maximizing the buffer area between abutters.

This location selected for the building maximizes the use of land area that has already been developed. In addition, it takes advantage of the 25-ft deep excavations made into the bedrock for the installation of the existing raw water wetwell, meter and valve vault, and ozone contactors. These three subsurface bedrock excavations will be reused to accommodate the proposed raw water pumps, residuals storage tank, filter backwash waste tank, and filtered water wetwell. The proposed building location has the least environmental impact of any other location on the site and is the most economical by minimizing the amount of land clearing and excavation, including ledge/bedrock removal, and minimizing impacts to abutters.

5.0 Existing Environment

5.1 Physical Setting

The Town of Concord, Massachusetts is bordered by the communities of Carlisle to the north; Acton and Maynard to the west; Sudbury and Wayland to the south; and Bedford and Lincoln to the east. The current annual average daily water demand for the Town of Concord is approximately 2.0 MGD. Nagog Pond is a historic surface water supply for the Town of Concord that is located along the Littleton-Acton border northwest of the Town of Concord.

The site of the water treatment plant is located at 180/182 Skyline Drive in Acton and consists of two parcels of land owned by the Town of Concord (approximately 59.79 acres total). The parcels are only partially developed for use as the Town's water supply, including the existing dam/intake structure, ozone disinfection treatment plant, and associated appurtenant facilities (gate house, raw water wetwell, valve and meter vault, propane tank, electrical transformer, etc.). The remaining land is undeveloped forestland and has remained undeveloped for the purpose of sustaining water quality in the pond.

The area of Nagog Pond to be dewatered is referred to as the cove area. It is a small section of the pond, 16.23 acres in size, equivalent to 1.3% of the total pond volume and 5.8% of the total pond surface area. Nagog Pond discharges to Nagog Brook, which has been designated an intermittent stream by the Acton Conservation Commission.

The Town of Concord currently operates a dam on Nagog Pond which was originally constructed over 100 years ago and renovated in 2012. The dam consists of a 10-ft primary spillway, 20-ft auxiliary spillway, and 24-inch (square) low level outlet operated by a slide gate. The low level outlet was designed and constructed to allow for controlled drainage of the pond and includes a stone approach channel to minimize erosion of the pond bottom and stone/rip rap lined discharge channel for energy dissipation.

The existing water treatment facility was built in 1995 to meet evolving water treatment standards at that time, and the building has a footprint of approximately 1,297 square feet. The treatment facility is situated within 200 feet of Nagog Pond. The existing water intake pipe, like the dam, was also originally constructed over 100 years old and the pipe is in poor condition. The intake

pipe extends approximately 1,800 feet into Nagog Pond from the gate house at the dam, and consists of 16-inch diameter cast iron pipe, partially supported on wooden cribbing in the deeper portions of the pond.

5.2 Geology and Soils

The regional geology is was mapped on the USGS Geological Map and MASS GIS, completed as part of a study by U.S. Geological Survey (Surficial Geology, August, 2015). The lithology of the area predominately consists of till and bedrock, with features of thin and thick till, end moraine deposits, abundant areas of outcrop and shallow bedrock. Other areas are characterized as Stratified Deposits, Coarse, Glaciolacustrine Fine, and Glaciomarine Fine; areas of early postglacial inland Dune and Marine Regressive Deposits; and, Postglacial areas of Swamp Deposits, Floodplain Alluvium, Beach and Dune Deposits, and Artificial Fill.

A geotechnical investigation was performed in September 2015 by EPG as reported in the *Geotechnical Investigation and Construction Recommendations Memorandum* dated November 2015. A total of 15 borings were advanced in the vicinity of the proposed Nagog Pond WTP. Rock formation was encountered in all the test borings at depths between 9 and 10.5 feet below grade, which confirms that the entire site is underlain with bedrock. Weathered rock deposits were recorded in all of the borings at varying depths. The majority of the weathered rock encountered on site was found to be competent and sound, some angular and some rounded. The Geotechnical Investigation and Construction Recommendations Memorandum is included in Appendix G.

5.3 Surface and Groundwater Hydrology and Water Quality

The site of the existing (and proposed) WTP is downstream of the Nagog Pond watershed. Stormwater from the site generally flows toward Nagog Brook, however, stormwater from the project will be recharged on site. Groundwater was not encountered in any of the test borings. Groundwater levels can be expected to fluctuate in response to precipitation, snowmelt and seasonal variations, and could be significantly different than those observed at the time that the borings were performed. In general, it is expected that shallow groundwater and/or seepage may exist along the fill/rock interface within the deep cut areas of the underground tanks or within the drainage system during extended periods of rainfall.

Water quality sampling of Nagog Pond is routinely conducted on a daily, weekly, monthly, and annual basis (the frequency varies by water quality parameter) as part of Concord's treatment and operations program and to meet MassDEP sampling requirements. A summary of pertinent Nagog Pond raw water quality information, including characteristics encountered during the pilot study (Appendix D), are presented below in Table 2.

Table 2 – Summary of Raw Water Quality Data

Parameter		Historic	Summer Pilot	Winter Pilot
Temperature (°C)	Average	14.2	24.2	5.9
	Range	2.3 – 27.8	21.2 – 25.9	5.0 – 8.6
pH (S.U.)	Average	6.6	6.5	6.6
	Range	5.1 – 8.1	5.7 – 7.0	6.1 – 7.8
Alkalinity (mg/L CaCO3)	Average	8.5	11.3	11.2
	Range	1.0 – 26.0	9.6 – 12.9	10.1 – 12.4
Turbidity (NTU)	Average	0.73	1.16	0.61
	Range	0.20 – 6.99	0.74 – 1.6	0.22 – 0.95
Color (S.U.)	Average	15	23	15
	Range	0 – 85	5 – 40	0 – 65
UV-254 (1/cm)	Average	0.045	0.062	0.050
	Range	0.019 – 0.066	0.051 – 0.069	0.030 – 0.082
TOC (mg/L)	Average	3.4	4.7	3.4
	Range	1.2 – 19.0	4.4 – 5.4	3.0 – 4.6
SUVA (m^{-1}/mg/L)	Average	1.5	1.3	1.4
	Range	0.7 – 3.9	1.2 – 1.5	0.9 – 1.6
Fe (total) (mg/L)	Average	0.13	0.14	0.13
	Range	0.01 – 0.64	0.08 – 0.21	0.05 – 0.24
Mn (total) (mg/L)	Average	0.063	0.057	0.147
	Range	0.001 – 2.1	0.035 – 0.087	0.031 – 0.264
Algae (cells/L)	Average	1,263	1,736	85
	Range	1 – 40,000	140 – 6,600	60 – 100

Based on a review and evaluation of the existing raw water information described above, Nagog Pond is a high quality surface water supply with some seasonal variability: low turbidity (<1 NTU), moderate pH (6.0 to 7.0), low alkalinity (5 to 10 mg/L as $CaCO_3$), seasonally variable levels of natural organic matter (TOC: 2.5 to 5.5 mg/L), low levels of iron (Fe < ~0.2 mg/L), seasonally

variable manganese levels (0.1 to 0.3 mg/L), with consistent background levels of algae and susceptible to algal blooms. Detailed information of Nagog Pond's water quality data is provided in the Pilot Treatability Study included as Appendix D.

5.4 Wetland Resource Areas

The wetland resources in the vicinity of the project area include Bordering Vegetated Wetland and Land Under Water, based on information provided through MassGIS and a wetland delineation performed at the site.

The existing intake pipe is located within Nagog Pond, which is an Outstanding Resource Water. Replacement of the intake pipe is an essential part of this project, as the existing pipe is significantly deteriorated and inhibiting the withdrawal capacity. The existing pipe will be replaced with a 16" HPDE pipe that will traverse the bottom of Nagog Pond at generally the same location as the existing pipe for approximately 2,530 feet to a position that will optimize the raw water intake. For the section of the pipe that is to be installed within the dewatered pond area utilizing the existing pipe trench, all excavation work will be accomplished such that there will be no net increase in soils/sediments removed/added to the pond bottom. All existing sediments/soils will remain and no new soils will be added. During the excavation process sediments will be stockpiled adjacent to the pipe trench and re-used to backfill the pipe. For the section of the pipe to be installed beyond the coffer dams and where it is to be fixed in place using concrete collars, the collars equates to an alteration of approximately 632.5 square feet of the pond bottom.

The existing Nagog Pond Ozone Disinfection Facility is within the 75-ft wetland buffer for structures, which is a setback requirement of the Acton Conservation Commission regulations. At its closest point, the existing building is 70 feet from the wetland boundary. The proposed building will have the same footprint of the existing building, and therefore the same wetland setback characteristics. The locations of the wetland resource areas adjacent to the project are presented on the project plans. The wetlands resource areas were confirmed and the work approved in an Order of Conditions issued by the Acton Conservation Commission on January 6, 2016. A copy of the Order of Conditions are provided in Appendix H.

5.5 Plant and Animal Species and Habitat

Massachusetts Natural Heritage and Endangered Species program (NHESP) mapping of Priority Habitat of Rare Species and Estimated Habitat of Rare Wildlife was reviewed using the 2008 Massachusetts Priority and Estimated Habitat online maps created by NHESP. The Nagog Pond WTP is not located within a NHESP-mapped area of habitat of rare wildlife or rare species.

5.6 Areas of Critical Environmental Concern and Outstanding Resource Waters

There are no Areas of Critical Environmental Concern (ACECs) within the project area. As noted above, replacement of the existing intake line will take place within Nagog Pond, which is designated as an Outstanding Resource Water.

5.7 Roadways and Traffic

The proposed treatment plant is located on an existing access road off of Skyline Drive. In response to a request by the Acton Fire Department, the width of the existing roadway is to be increased from 12 feet to 18 feet with a one-foot wide crushed stone shoulder on each side (to minimize impervious areas) to accommodate emergency vehicles.

The project does not exceed any MEPA review thresholds for traffic generation nor does it require any state permits related to state-controlled roadways.

5.8 Scenic Qualities, Open Space and Recreational Resources

Nagog Pond is located within a larger open space. Areas surrounding the approximately 0.45 square mile Nagog Pond are largely forestland, vegetated wetlands, and vernal pools.

5.9 Historic Districts, Structures and Archeological Sites

Consultation with the Massachusetts Historic Commission (MHC) was requested through a Project Notification Form (PNF) that described the proposed water system using a solar PV array. The PNF was reviewed by the MHC, the Acton Historic Commission, the Massachusetts Bureau of Underwater Archaeology Resources (MBUAR) and the Mashpee Wompanoag Tribal Historic Preservation Officer, as appropriate, to confirm that these construction activities will avoid impacts to these sensitive archeological and historic resources. A copy of the PNF and PNF response letters are provided in Appendix I.

According to the MHC and MBUAR responses, no recorded historic or archaeological resources are identified in the Inventory of Historic and Archaeological Assets. Undisturbed portions of the project area were identified to be archaeologically sensitive due to stony outcroppings and ledges in the proximity of Nagog Brook. The MHC recommended that an intensive archaeology survey in accordance with 950 CMR 70 be conducted in the project impact areas. Additionally, the Mashpee Wompanoag Tribal Historic Preservation Officer agreed with the MHC recommendations in a letter dated March 31, 2016. PAL, Inc. (PAL) performed an Archaeological Sensitivity Assessment for the Nagog Pond WTP on behalf of the Town of Concord, provided in Appendix J. The results of the sensitivity assessment identified two zones of high archaeological sensitivity in the vicinity of the project area; however, these areas are not within the limits of work for the revised project.

When Concord was considering installation of a PV system, the proposed location of the solar panels was within these areas of archaeological sensitivity. However, the Town is no longer proposing this PV system and is instead proposing distributed energy units for their power supply. The distributed power units will be located immediately adjacent to the treatment plant, and not within the archaeologically sensitive area, all as described in the Notice of Project Change accompanying this EIR (Appendix B and Section 2.2.1).

5.10 Zoning

Nagog Pond's zoning districts are shown on Figure 2 of the Nagog Pond Watershed Protection Plan (Appendix F). All of the Concord-owned watershed lands in the towns of Acton and Littleton are zoned "residential." The major land use categories within the Nagog Pond Watershed are forest, cropland, residential, pasture, woody perennial, open land, and industrial.

Concord submitted applications to the Town of Acton Board of Selectmen for a Special Use Permit and Site Plan Special Permit for the project in a residential district. The project complies with the special permit criteria, and Concord is requesting a Special Use Permit and Site Plan Special Permit during the of Fall 2016.

6.0 Assessment of Impacts

The proposed Nagog Pond WTP system will have a positive benefit to the community because it will provide a reliable and high quality source of drinking water and provide flexibility to the drinking water supply. The project will also bring the use of the Nagog Pond, a surface water supply, into compliance with federal and state mandated regulations for treatment of surface water supplies, as described in Section 1.

6.1 Effects Due to Dewatering for Intake Pipe Construction

The existing, aged 16-inch diameter cast iron intake pipe is to be replaced in two segments using two construction methods. The first segment will be located in the cove area, a small, relatively shallow section of the pond 16.23 acres in size, equivalent to 1.3% of the total pond volume and 5.8% of the total pond surface area. In this area the intake pipe will be installed by temporarily dewatering the cove area, excavating the existing pipe, and burying the new pipe in the same trench. For the second segment, which extends beyond the cove into the larger pond to the intake terminus, the pipe will be floated, positioned into place, submerged and anchored using concrete collars.

A coffer dam will be installed at the location of the original coffer dam to segregate the cove area from the remainder of the pond. By-pass piping will also be installed that will allow streamflow into Nagog Brook to continue. Once these are in place, the shallow cove area will be temporarily dewatered – only to the limit necessary to install the new pipe.

Temporarily lowering the water level of a pond to expose the pond bottom is a common and effective means by which lakes and ponds are maintained typically for aquatic plant management. Numerous guidance documents and policies have been developed by Massachusetts regulatory authorities regarding the appropriate methodology for achieving drawdown in lakes and ponds, including "Eutrophication and Aquatic Plant Management in Massachusetts, Final Generic Environmental Impact Report" by the Department of Environmental Protection and Department of Conservation and Recreation (Executive Office of Environmental Affairs), dated 2004. The dewatering methodology proposed for this project follows the guidance described in these documents. Maintaining the aesthetics and the water quality of Nagog Pond is a priority for

Concord, and it may utilize the aquatic plant management methods described in these documents either as part of the dewatering activities or in the future.

The effects of dewatering will be mitigated with proper planning and implementation of the following best management practices:

- Beginning the drawdown in early November.
- Achieving the target drawdown by early December.
- Achieving full lake level by early April.
- Maintaining an outflow equivalent discharge rate during drawdown of less than 4 cubic feet per second (cfs) per square mile.
- After drawdown, maintaining stream flows to try and match outflow with inflow, to the greatest extent possible.
- Maintaining an outflow equivalent discharge rate during refill above 0.5 cfs per square mile.
- Contacting the Department of Fish and Wildlife (DFW) if the drawdown is to exceed 3 feet.

Concord has met with representatives of the DFW to discuss the project, and DFW will be involved during the drawdown period to make observations of any trapped fish and determine if they should be moved. DFW also recommended that outflows to Nagog Brook during the drawdown should be controlled so that target downstream flow rates are not exceeded, especially during periods when fish are spawning.

6.2 Wetlands

The wetland resources in the vicinity of the project area include Bordering Vegetated Wetland (BVW) and Land Under Water. The water body, Nagog Pond, is an Outstanding Resource Water as determined by information provided through MassGIS and a wetland delineation performed by Pinebrook Consulting as part of the RDA process. The locations of the wetland resource areas adjacent to the project is shown in Figure 3 and are presented on the project plans.

Replacement of the existing intake line will take place within the Outstanding Resource Water (Nagog Pond) and the associated impacts are discussed above. The remainder of the project will take place in upland area, and a portion of the Buffer Zone to BVW. The existing treatment plant is approximately 70 feet from the wetland boundary, and therefore within the setback are for structures defined in the Acton Conservation Commission bylaws (minimum 75' set back); however, the proposed treatment plant building will occupy the same footprint as the existing structure and therefore will not change from existing conditions. The total proposed alteration within the 75-ft buffer zone as a result of the project is approximately 619 square feet.

6.3 Rare and Endangered Species

There will be no impacts to rare and endangered species as a result of the project. 2008 Massachusetts Priority and Estimated Habitat online maps created by NHESP was used to confirm that there are no rare or endangered species located within the project area.

6.4 ACECs and Outstanding Resource Waters

There are no ACECs within the project area. Nagog Pond is considered an Outstanding Resource Water and project impacts to Nagog Pond are discussed above.

6.5 Historic and Archeological Impacts

No impact to historical or archaeological resources is anticipated. An Archaeological Sensitivity Assessment for the Nagog Pond WTP was performed by PAL, Inc., which identified two zones of high archaeological sensitivity in the vicinity of the project area. These areas were within the area being considered for photovoltaics; however, because Concord is no longer proposing to install a solar PV system these areas are now outside the limit of work area for the project. This is described in the Notice of Project Change accompanying this EIR.

6.6 Access Roadway

The existing access roadway is to be widened from a 12-foot to an 18-foot paved surface with one-foot gravel shoulders on each side as described in Section 5.7. Minimal tree removal will be required in order to accommodate this access road.

6.7 Traffic

The project will have minimal effect on traffic patterns in the area. Traffic will increase slightly during construction with vehicles exiting off Skyline Drive and utilizing the access road to go to the Nagog Pond WTP. Daily vehicle trips to the facility associated with the operations and maintenance of the WTP are expected to only slightly increase from what currently occurs. Water treatment plants of a similar size to the one proposed are typically staffed by approximately three operators that would generate approximately six vehicle trips per day. Routine traffic as a result of operations activities, including chemical deliveries and residuals management, will slightly increase the average daily trips. Seven chemical deliveries per month are anticipated with no more than two deliveries per day and residuals management may occur twice per week. Conservatively, a total of 10 to 15 trip ends per day are anticipated for the water treatment plant with an occasional increase for additional maintenance, well below MEPA thresholds that would trigger the need for a traffic impact study (3,000 or more new average daily traffic, for an ENF or EIR). Only five parking spaces are being planned for the facility, a reflection of the low traffic activity that is anticipated at the facility.

6.8 Noise

A Noise Emissions Analysis was prepared to evaluate ambient noise conditions. The analysis was conducted to assess the project's compliance with the MassDEP Noise Policy that limits sound operations to be no more than 10 A-weighted decibels (dBA) above the lowest nighttime ambient sound level at the residential property lines and prohibits a 'pure tone' condition. A Noise Analysis Memorandum is included as Appendix K, and is summarized below.

Ambient sound measurements were continuously collected from Thursday, July 28 to Monday, August 2, 2016 near the site property line. Late night ambient sound levels were measured at the site property boundary and at the nearest residences on Skyline Drive and Hazelnut Street and acoustic modeling was used to predict future contributions to sound levels in the neighborhood from the proposed WTP. Based on the measurements of ambient sound and acoustic modeling, an increase of 1.5 dBA to 9.2 dBA above existing nighttime ambient sound levels is predicted at the nearest residences due to the proposed WTP design. Therefore, the results of noise emissions

analysis demonstrates that the proposed WTP design will comply with the MassDEP Noise Policy. Additionally, the acoustic analysis indicated that the proposed WTP will not create any pure tones.

Although the project meets the MassDEP Noise Policy threshold, additional structural and mechanical noise mitigation measures (such as acoustic louvers and sound barriers) are being considered as part of the facility design in the event that seasonal ambient noise conditions, including the winter conditions, are less than that measured during the time that this study was performed. When these mitigation measures are incorporated into the noise modeling, sound levels at the nearest residences from the WTP is reduced to 0.3 dBA to 6.0 dBA. In addition, the manufacturers of the distributed energy units being considered for the project are continuously developing advanced measures for attenuating sound, and the most current of these that are available during the design effort will also be considered.

7.0 Greenhouse Gas Emissions Analysis and Energy Efficiency

A Greenhouse Gas (GHG) emissions analysis was prepared in accordance with the GHG Policy and Protocol of the Executive Office of Environmental Affairs (final version May 2010), and as required under the MEPA regulations. The MEPA office was consulted to discuss the appropriate approach for preparing this GHG analysis. The results of the GHG emissions analysis are summarized below. The GHG Analysis Memorandum is included as Appendix L.

The GHG analysis was prepared consistent with the EOEEA "Greenhouse Gas Emissions Policy and Protocol" (May 5, 2010; the "Policy"), and characterizes CO_2 emissions for a base case, using the ASHRAE 90.1-2007 code, and mitigation alternatives that include building energy savings measures, as well as an analysis of utilizing on-site renewable energy.

The GHG emissions for the Project are reduced by the following building design, process equipment and operational energy efficiency measures:

- Using higher efficiency windows and building envelopes (roof and wall insulation);
- Specifying high-efficiency heating and cooling systems;
- Sealing, insulating, and testing HVAC supply ducts;
- Using high-efficiency LED lighting for the interior of the building;
- Using LED lighting for parking lots;
- Installing Energy STAR equipment in the office and lab;
- Installing higher efficiency process equipment; and,
- Using environmentally friendly building materials.

The mitigation alternatives will reduce stationary sources of CO_2 emissions by 16.7% compared to the base case.

Two potential on-site alternative energy systems were analyzed as part of this GHG analysis: a solar PV array and a distributed power system. The solar PV array is designed to have an approximate capacity of 195 kilowatts (kW), which would reduce CO_2 emissions by 72.6 tons per year (tons/yr) from the estimated 467.4 tons/yr under the base case. Evaluation of the distributed power supply alternative is based on the use of three Tecogen INV-100e+ Ultra-Low Emissions units providing a total capacity of 300 kW. The Tecogen units would be powered by natural gas

and would results in an increase CO_2 emissions by 328.2 tons/yr from 467.4 tons/yr estimated under the base case.

The solar PV array approach for powering the WTP was the Town's initial choice for on-site power generation. However, since the proposed solar PV array design was made public various parties have opposed the solar PV array approach as evidenced in the comment letter received in response to the ENF for the project. As a result, the distributed power supply using the Tecogen or similar units is an acceptable alternative that will provide a cost-effective, grid-independent power supply for the WTP. As described in Section 2, the distributed power units are favored because of their low NOx and particulate emission characteristics that are well below the most stringent regulatory limits in the country.

8.0 Statutory and Regulatory Standards and Requirements

8.1 Agency Coordination and Permitting

Concord had extensive involvement with federal, state, regional and local regulatory bodies during project development. Specifically:

- The Town has actively engaged the Massachusetts Division of Fish and Wildlife to discuss the proposed project. Mr. Richard Hartley requested that the Division be contacted during the drawdown period to make observations of any trapped fish and determine if they should be moved. Mr. Hartley also recommended that any outflows to Nagog Brook during the drawdown should be controlled so that target downstream flow rates are not exceeded during periods of fish spawning. Concord agrees to these requests.
- Consultation with Massachusetts Historic Commission and the Acton Historic Commission assured that archaeological and historic resources adjacent to the project area are avoided. The Mashpee Wompanoag tribal historic preservation office was also consulted during the initial ENF submittal. The change from the solar PV array to the distributed power system avoids any impacts to archaeological and historical resources.
- Consultation with the US Army Corps of Engineers is ongoing in preparation of an application for a general permit.
- Pre-application meetings were held with the MEPA staff of the Executive Office of Energy and Environmental Affairs to guide the preparation of this DEIR and NPC.

8.2 Applicable Statutory and Regulatory Standards and Requirements

Implementation of the Nagog Pond WTP will require the following federal-level permits: a NPDES General Construction Permit for stormwater from EPA, and a General Permit from the US Army Corps of Engineers for the work in Nagog Pond. Reviews and approvals are also required from the following state agencies: a MEPA Certificate from the Secretary of the Executive Office of Energy and Environmental Affairs under MEPA, the Massachusetts Department of Environmental Protection, and the Massachusetts Historical Commission.

Local-level permitting is also required with the Town of Acton, including the Board of Selectman, as the Special Permit Granting Authority, the Conservation Commission (completed), the Planning Department, the Board of Health and the Building Department. Concord and EPG, the Town's

engineer of record for the project, conducted several coordination and pre-application meetings with most of these agencies. A listing of the specific permitting needs for the project and their status is provided in Table 3.

TABLE 3. PROJECT PERMIT REQUIREMENTS FOR THE NAGOG POND WTP.

Permit	*Status*
1. State Permits	
Department of Environmental Protection	
Water Withdrawal Permit (BRP WM 03)	To be submitted
Notice of Intent (BRP WPA 03)	Submitted November 18, 2015. Order of Conditions issued on January 6, 2016.
401 Water Quality Certificate	To be submitted
Chapter 91 Waterways Permit (BRP WW 01)	To be submitted
Approval to Construct Water Supply (BRP WS 20)	To be submitted
Approval to Construct Facility to Treat > 1 MGD (BRP WS 24)	To be submitted
Disposal System Construction Permit (310 CMR 15.00)	To be submitted
New drywell installation (BRP WS6b)	To be submitted
Executive Office of Environmental Affairs – MEPA	
Environmental Notification Form	Submitted November 25, 2015. Secretary's Certificate received February 12, 2016 that requested a Draft EIR.
Notification of Project Change (NPC)	Submitted August 15, 2016.
Draft EIR Environmental Impact Report	Submitted August 15, 2016.
Massachusetts Historical Commission - MHC	
Project Notification Form	Submitted November 12, 2015.
2. Federal Permits and Notices	
United States Army Corps of Engineers	
Army Corps General Permit	To be submitted
Environmental Protection Agency	
NPDES Construction General Permit	To be filed by Construction contractors
3. Local Permits	
Acton Conservation Commission	
Notice of Intent	Order of Conditions issued on January 6, 2015
Town of Acton Board of Selectmen	
Special Use Permit and Site Plan Special Permit	Submitted November 20, 2015 and pending
Town of Acton Building Department	
Building permit for renovation of existing WTP facility	To be submitted following 100% design drawings

8.3 Requests for Funding Assistance

The Town of Concord is not seeking funding assistance from State or federal government agencies.

8.4 Other Coordination Related to Distribution System Installation

Implementation of the Nagog Pond WTP will also require coordination with the following parties:

- Acton. The Town of Concord applied for a Special Use Permit and Site Plan Special Permit under the Town of Acton Zoning By-law. The applications will be considered at the September 12, 2016 Board of Selectmen's Meeting.

9.0 Mitigation Measures

This Section provides a description of proposed management techniques that will either produce positive, long-term benefits as a result of the project, or that will avoid, minimize or mitigate short-term (construction-related) impacts. Where applicable, alternatives to these mitigation measures are also discussed together with the reasons for selecting the proposed approach.

9.1 Positive, Long Term Impacts of the Treatment System on Water Supply

The Town of Concord conducted a treatability study of the water supply, approved by MassDEP on March 25, 2015 (see Appendix D), MassDEP approved a pilot study report that presented the results of the treatability study. MassDEP commented that the Town's proposed water treatment system will increase the operational flexibility.

9.2 Long-Term Mitigation Measures

Measures are to be undertaken to ensure the quality of the Town's natural resources for the long-term protection of the water supplies, and that operation of the water system does not adversely impact these resources. Long-term mitigation measures are provided in the Nagog Pond Watershed Protection Plan included in Appendix F. Key components of the plan include the following:

- Non-regulatory control measures for watershed land use (best management practices, pesticide regulation), urban runoff (limited use of road salt, eliminate direct stormwater discharge), septic tank maintenance, policing to deter trespassing, prevention of accidental spills, and controlling domestic animals (prohibit horseback riding).
- Nonstructural controls including watershed maintenance programs, public education, water quality monitoring, and inter-municipal water quality protection.
- Regulatory control measures including sedimentation and erosion control, earth removal/excavation control, posting to deter trespassing, compliance with the Order of Conditions, and Site Plan Special Permit.

9.2.1 Distributed Power System

The units for the distributed power supply were selected among other units available because of their design features that provide quieter operation and greater noise mitigation features, as well as their superior low NOx and particulate emission characteristics that are below stringent emission standards. Additional long-term mitigation measures may be incorporated to further reduce noise conditions from the distributed power system units to abutters, as described in Section 6.8.

9.3 Short-term (Construction-Related) Mitigation Measures

Measures for minimizing or mitigating short-term impacts associated with the construction activities of the project are described below.

9.3.1 Wetland Resources

The limit of work for the proposed treatment plant building is within the 100-foot buffer zone of a BVW, and replacement of the existing intake pipe is located on Land Under Water within Nagog Pond, which has been identified as an Outstanding Resource Water, as described in Section 5.1.

The Town of Acton Conservation Commission issued an Order of Conditions for the project under the Wetlands Protection Act and the Acton Wetlands Bylaw (Appendix H). In accordance with conditions associated with the Order of Conditions, prior to the commencement of construction activities erosion and sediment controls will be placed between the limits of work and the wetland boundaries.

9.3.2 Dewatering of Nagog Pond for Intake Pipe Replacement

The proposed measures for mitigating the temporary, construction-related activities associated with the intake pipe construction, and more specifically associated with the dewatering of Nagog Pond that is to be conducted as part of this effort, have been developed on the basis of guidance documents available through the Executive Office of Energy and Environmental Affairs (*Eutrophication and Aquatic Plant Management in Massachusetts, 2004)* and discussions with the Massachusetts DFW. The following mitigation measures are to be implemented as part of these construction activities during the drawdown and refill of the cove area of Nagog Pond:

1. The DFW will be contacted when the drawdown is going to commence to coordinate a site visit to make observations. Concord will modify the drawdown operations based on recommendations of the DFW.

2. As recommended by the MassDEP and stated in the Secretary's Certificate on the ENF (Appendix A), "*The Town will hire an independent Environmental Monitor to observe field conditions during drawdown and review findings with the Acton Natural Resources Department.*"

3. A dewatering pumping system will be installed to pump water from the cove to the main body of Nagog Pond. Turbidity curtains will be installed on the both the suction and discharge sides of the dewatering system. Screens on the suction side of the dewatering pumps will be selected based on recommendations provided by the DFW.

4. If the low level outlet slide gate is used, a bar rack will installed immediately in front of the dam outlet structure to capture large debris and to prevent it from being discharged to Nagog Brook. The bar rack will be monitored daily and cleaned to remove debris and maintain flow. In addition, turbidity curtains will be deployed ahead of the dam outlet to ensure that turbid waters are not discharged into the Brook. These turbidity curtains will remain in place for the duration of the construction activities, including during the drawdown and refilling of Nagog Pond.

5. Water quality will be visually observed, monitored, and measured for the duration of all of the intake pipe construction effort, including during the pond drawdown, construction, and refilling phases.

6. The targeted time frame for performing the intake pipe replacement construction activities is between early September and late April. The Nagog Pond water levels are typically at their lowest during September, and is therefore the appropriate time to initiate these activities because this would minimize the volume of water that would need to be removed from the cove area. Commencing the construction activities in the early fall is anticipated to provide adequate time for the intake pipe to be installed prior to the onset of frozen (winter) conditions, thereby allowing the Pond to be re-filled sooner than would otherwise occur. If construction is delayed and occurs during winter frozen conditions, the pace of

construction is slower and the construction period could be extended. The objective is to have as short a construction period as possible, thereby minimizing the period of time that the cove area of the pond remains dewatered.

7. As described previously, dewatering of the cove area is to be achieved by slowly pumping water from this area to the main body of the pond on the other side of the coffer dams. Historic water level data of the pond collected from 1933 through 2015 shows that during the fall season, and specifically during September, water levels are low and the pond has an excess of available storage capacity, exceeding 200 million gallons. The water volume to be transferred from the cove area to the remainder of the pond is approximately 19 million gallons, and therefore Nagog Pond will be able to accommodate this volume.

8. It is anticipated that discharges to Nagog Brook from Nagog Pond will rarely occur during these construction activities. Should there be a wetter than normal year preceding or during construction, a contingency program for discharging water to Nagog Brook has been developed based on the streamflow recommendations included in the MassDEP Final Generic Environmental Impact Report (FGEIR; 2004) and the Nagog Pond Watershed Protection Plan.

9. In addition to the proposed temporary coffer dam, the Contractor will be required to install a bypass system to transfer water from the main body of Nagog Pond to Nagog Brook, after the cove is drained. The by-pass system will be operated to maintain a constant water level within the upper portion of Nagog Pond (to remain impounded). This objective will also allow for any net inflow to Nagog Pond to be discharged to Nagog Brook, if required, to meet the recommended guideline from the FGEIR (2004) best management practices. The by-pass system will be designed to meet historic maximum inflow rates to protect the coffer dams from breaching and also allow for flood capacity and discharge to Nagog Brook.

10. The pond dewatering activities are not anticipated to affect private, residential water supply wells in the vicinity of the project area. A plan showing the location of adjacent residential properties, the 400-ft Zone A buffer of the watershed, and the location of the temporary coffer dams to Breezy Point Island (where the coffer dam is to terminate from the shoreline) is shown in Figure 2. Five residential properties are located on Breezy Point

Road in proximity to the cove section of Nagog Pond, northeast of Breezy Point Island. Only three of these properties are within the watershed boundary and none of them are within the 400-ft Zone A buffer area. A review of existing available private well information in Acton indicates that two of these properties on Breezy Point Road (#10 and #14) have private domestic wells. These two wells are reported to be bedrock wells drilled to depths greater than 300 feet below the surface. Therefore, given the proximity and depths of known and potential domestic water supply wells in relation to the watershed and target area, it is anticipated that the proposed drawdown will not have any impacts on these private water supply wells.

11. During construction, the Contractor will be required to maintain several dewatering pumps to transfer water from isolated low spots in the target dewatered area. Water will either be pumped to another isolated low spot not affecting the construction zone, pumped back into the main body of Nagog Pond, or pumped to the dam outlet zone for release downstream. Any water which is pumped will be monitored visually for the transport of solids/sediment. If solids/sediments are detected, then they will be allowed to settle within the dewatering area before being discharged to Nagog Pond or Nagog Brook.

12. The Construction Documents for the proposed intake pipe replacement project will include the above-described project performance requirements that the Contractor will be required to adhere to. In addition, the Contractor will be required to prepare and submit a detailed dewatering plan which lists all materials and equipment to be used as well as the means and methods to be undertaken. The dewatering plan will be reviewed and approved by both the Town of Concord or their representative and the Town of Acton Conservation Agent prior to implementation.

13. Because Nagog Pond has been used for a water supply source for over a hundred years, there is a history of cyclical low water levels which result in exposure of the side slopes along the shoreline. The majority of the shoreline within the cove is made up of course gravel, cobbles, and stone, and the side slopes are relatively gradual. Therefore, there does not appear to be a risk of significant shoreline erosion during the dewatering period.

14. There are no reported endangered species or habitat associated with the target dewatering zone. The proposed temporary drawdown of the target section of Nagog Pond is not expected to have any long-term negative impacts on native wetland plant species.
15. DFW will be consulted during the drawdown phase and the project proponent will assist with the implementation of required mitigation activities.

Additional measures to be utilized to mitigate the effects of construction activities within Nagog Pond during the intake pipe replacement include the following:

- All equipment and materials that come in contact with the water will be thoroughly inspected prior to construction to ensure that no foreign substances enter the source water.
- Erosion and sedimentation control devices (i.e., filter sock) will be installed at the perimeter of the limits of work as shown on the design plans, and will be installed in accordance with the detail on Sheet CD-5 (see Appendix C). This measure will control sedimentation and erosion in the upland areas and also serve to define the upland limits of work. Erosion and sedimentation control devices will be inspected and maintained daily during the construction period.
- Silt sacks will be installed in all catch basins within and immediately adjacent to the work zone.
- Soil materials either dredged from Nagog Pond or used as part of the intake pipe construction are not anticipated to be maintained on-site. In general, soil materials used for construction will be delivered to the site an as-needed basis. However, if stockpiling is required, then suitable erosion control measured will be employed including perimeter silt fencing.
- Areas that are disturbed during construction will be kept to a minimum, and all disturbed areas will be restored to pre-construction conditions (loam and seeding, paved areas) after the construction activities are completed.
- Water produced as part of trench dewatering activities during construction shall pass through dewatering bags as shown on the design drawings in Appendix C.

9.3.3 ACECs and Outstanding Resource Waters

No ACECs are located within the project area. Nagog Pond is recognized as being an Outstanding Resource Water, due to the presence of Bordering Vegetative Wetlands and Land Under Water. For these reasons, additional oversight will be provided as construction activities are ongoing within these areas to ensure that no adverse impacts occur as a result of these activities.

9.3.4 Cultural and Historical Resources

In the original configuration of the project with a solar PV array, portions of the project were located in areas of archeological sensitivity and in the vicinity of historic resources. An Archaeological Sensitivity Assessment for the Nagog Pond WTP was performed by PAL and confirmed there are two zones of high archaeological sensitivity in the vicinity of the solar PV array area in the original design.

As described in the Notice of Project Change accompanying this EIR, Concord is no longer proposing to install a PV system. With the distributed power units, these sensitive areas are now outside the limit of work area for the project.

9.3.5 Traffic Management

Construction of the WTP and intake pipe will occur off of any publically utilized road. However, construction equipment and vehicles will be travelling to the project area from Skyline Drive to the access road. A traffic management program will be developed to control entering and exiting the construction site. The contractor will be responsible for establishing and maintaining the traffic signage around the work zone each day.

9.3.6 Solid and Hazardous Waste

The Contractor will be required to submit an alternatives assessment for the re-use and recycling of solid materials associated with the demolition of the existing ozone disinfection facility. Existing asphalt surfaces and other earth materials will be reclaimed for use on-site. The Town has evaluated the process mechanical equipment and determined that it has reached is useful service life so that re-use is not practical. Asphalt, brick and concrete (ABC) generated during demolition activities will be processed and disposed in accordance with MassDEP regulations.

9.3.7 Stormwater Management

Please refer to Appendix M for the full stormwater report prepared for this project. When the full stormwater report was prepared, Concord was considering installation of a PV system. Since the Town is no longer proposing this PV system and is instead proposing a distributed power supply that will be located on the existing building footprint, the proposed condition analyzed in the stormwater report has changed. The project change, which significantly reduces the amount clearing of vegetation, will not increase stormwater runoff.

10. Proposed Section 61 Findings

As required by the Secretary's Certificate on the ENF, this Section provides a consolidated overview of the proposed mitigation and other environmental and community benefits proposed in order to minimize potential impacts from the proposed water system. A draft template for Section 61 Findings is also provided pursuant to the Secretary's Certificate and in accordance with Massachusetts General Laws (MGL) Chapter 30, Section 61 that states: "Any determination made by any agency of the Commonwealth shall include a finding describing the environmental impact, if any, of the project and a finding that all reasonable measures have been taken to avoid or minimize said impacts." Draft Chapter 61 Findings are provided for those issues that are within the scope of this EIR. The only State agency from which a permit will be required for the project is from the Department of Environmental Protection for the following approvals:

- Water Withdrawal Permit (BRP WM 03)
- 401 Water Quality Certification (BRP WW 10 or 11)
- Approval to Construct Water Supply (BRP WS 20)
- Approval to Construct Facility to Treat > 1 MGD (BRP WS 24)
- Work In, Under, or Over a Great Pond (Chapter 91 License; BRP WW01)
- Decommissioning an Old Drywell/Installing a New Drywell (BRP WS06d/b)

A proposed mitigation plan is provided in Table 4 (next page) and draft Section 61 Findings are provided for each anticipated State agency permit.

Table 4. Summary of Proposed Mitigation Measures.

Category	*Impact*	*Mitigation Measures*
Water Management Act	Increasing withdrawl from Nagog Pond.	The mitigation requirements for water withdrawls from Nagog Pond will be determined as part of the DEP Water Management Act permit renewal. Nagog Pond is currently managed through the Town of Concord's existing Water Management Act permit which authorizes a total annual withdrawl volume for the Town of Concord. If the need for offsetting the Town's water withdrawls is required, alternative measures for meeting the mitigation goals may include water conservation programs, additional infiltration measures and others.
Water Supply Protection	Threats contributing to the surface water quality at Nagog Pond.	The protection of the Nagog Pond watershed is currently implemented through the Nagog Pond Watershed Protection Plan which stipulates measures to guard against intentional and unintentional contamination threats to the water supply.
Wetlands and Wetland Buffer Zones	Temporary dewatering of Nagog Pond.	Submit a Notice of Intent (NOI) for all areas where construction activities occur within the wetlands or wetland buffer zones; for all areas where construction activities occur within buffer zones. Restore the areas to pre-existing conditions. Work performed in these areas is to be performed in accordance with the Orderr of Conditions, and will include requirements for the installation and maintenance of erosion and sediment controls by the construction contractor. The Town will hire an independent Environmental Monitor to observe field conditions during the drawdown of Nagog Pond and will review the findings with the Acton Natural Resources Department.
Outstanding Water Resource	Construction activities within Nagog Pond.	An application for a Chapter 91 License will be submitted for work in/under or over a great pond. Provide oversight of construction activities to ensure that no adverse impacts occur as a result of the construction.
Historic and Cultural Resources	Potential impacts to historic and cultural resources.	Through pre-construction coordination with Massachusetts Historical Commission and the Acton Conservation Commission, avoid impacts to identified sites or unexpected resources encountered.

Table 4. Summary of Proposed Mitigation Measures.

Category	*Impact*	*Mitigation Measures*
Archaeological Resources	Potential impacts to significant archaeological resources.	Pre-construction coordination with Massachusetts Historical Commission, the Acton Conservation Commission and Public Archaeology Laboratories have identified archaeologically sensitive areas in the vicinity of the project area. Avoid and minimize impacts to archaeological resources by contractor awareness programs and construction phase monitoring.
Construction Equipment	Diesel emmissions from construction vehicles and equipment.	Construction contractors will be required to use Ultra Low Sulfer Diesel Fuel for their construction equipment.
Energy Efficiency	Electrical energy demands of the intake pumping station	The pumps and motors for the intake will be premium efficiency and sized for the anticipated loads. The pumping systems will be equipped with variable frequency drives to enhance their efficiency.

Executive Office of Energy and Environmental Affairs
Massachusetts Department of Environmental Protection
Division of Water Supply

Draft Findings Pursuant to MGL Ch. 30, Section 61

Project Name: Nagog Pond Water Treatment Plant
Project Location: Acton, Massachusetts
Project Proponent: Town of Concord
EEA Number: 15446

Permit: Water Withdrawal Permit (BRP WM 03)
401 Water Quality Certification (WW10 or 11)
Approval to Construct Water Supply (BRP WS 20)
Approval to Construct Facility to Treat > 1 MGD (BRP WS 24)
Work In/Under or Over a Great Pond (Chapter 91)
New drywell installed (BRP WS6b)

Project Description: The Town of Concord is proposing to make comprehensive improvements and upgrades to its existing public water supply system infrastructure located in Acton. The proposed project includes replacement of the existing 16-inch cast iron intake pipe into Nagog Pond with a new 16-inch high density polyethylene (HDPE) intake pipe, and replacement of the existing Ozone Disinfection Facility with a new Water Treatment Plant for the production of potable water. The design capacity for the new WTP will match the existing facility of 1.5 MGD.

The project includes the following components:

- Demolition of the existing Nagog Pond WTP facilities
- Construction of a new WTP
- Construction of the Nagog Pond intake facilities
- Installation of Distributed Power system

MEPA History: The MEPA review was initiated on November 25, 2015 with the filing of an Environmental Notification Form (ENF) that was noticed in the December 9, 2015 edition of the Environmental Monitor. The Secretary issued a Certificate on February 12, 2016 that requested a Draft Environmental Impact Report (EIR). The Draft EIR was submitted on August 15, 2016.

Project Impacts and Mitigation: Refer to Table A for a list of impacts and corresponding mitigation measures relative to the construction of the intake pipe and WTP.

Table A. Summary of Intake Pipe and WTP Mitigation.

Category	*Impact*	*Mitigation Measures*
Water Management Act	Increasing withdrawl from Nagog Pond.	The mitigation requirements for water withdrawls from Nagog Pond will be determined as part of the DEP Water Management Act permit renewal. Nagog Pond is currently managed through the Town of Concord's existing Water Management Act permit which authorizes a total annual withdrawl volume for the Town of Concord. If the need for offsetting the Town's water withdrawls is required, alternative measures for meeting the mitigation goals may include water conservation programs, and additional infiltration measures.
Water Supply Protection	Threats contributing to the surface water quality at Nagog Pond.	The protection of the Nagog Pond watershed is currently implemented through the Nagog Pond Watershed Protection Plan which stipulates measures to guard against intentional and unintentional contamination threats to the water supply.
Wetlands and Wetland Buffer Zones	Temporary dewatering of Nagog Pond.	A Notice of Intent (NOI) was submitted and an Order of Conditions (OOC) issued for all areas where construction activities occur within the wetlands or wetland buffer zones; for all areas where construction activities occur within buffer zones. Restore the areas to pre-existing conditions. Work in these areas is to be performed in accordance with the OOC, and will include requirements for the installation and maintenance of erosion and sediment controls by the construction contractor. In accordance with the OOC, the Town will hire an independent Environmental Monitor to observe field conditions during the drawdown of Nagog Pond and will review the findings with the Acton Natural Resources Department.
Outstanding Water Resource	Construction activities within Nagog Pond.	An application for a Chapter 91 License will be submitted for work in/under or over a great pond. Provide oversight of construction activities to ensure that no adverse impacts occur as a result of the construction.
Water Quality	Construction activities within Nagog Pond.	An application for a 401 Water Qaulity Ceritfication will be submitted. Provide oversight of construction activities to ensure that no adverse impacts occur as a result of the construction.

Findings: Based in its review of the MEPA documents, the permit application, public comments, and with implementation by the Proponent of the mitigation measures described in the attached Table A, all practical means and measures will be taken to avoid or minimize the adverse impacts to the environment related to the Project. MassDEP will include appropriate conditions associated with this Section 61 Finding in the Water Withdrawal permit, Water Quality Certification, Approval to Construct Water Supply permit, Approval to Construct Facility to Treat > 1 MGD permit, Work In/Under or Over a Great Pond permit, and, New Drywell Installed permit.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

_____ _____

BY **DATE**

11.0 Response to Comments

The ENF and supplemental information for the proposed Nagog Pond WTP was noticed in the Environmental Monitor on December 9, 2015 and the Secretary's Certificate on the ENF and supplemental information was issued on February 12, 2016. The comments received on the ENF and supplemental information are summarized in the Certificate (Appendix A) and the comment letters received from State agencies accompanies the Certificate. The comment letters are provided in Appendix N. The comments received and responses to these comments are provided below.

11.1 MEPA

The following correction is noted in the Certificate's summary of the project:

- Under the description of the Wetlands and Waterways (page 6 of the Certificate) the summary stated that, as recommended by the MassDEP, the Town will hire an independent Environmental Monitor to observe field conditions during drawdown process during dewatering of Nagog Pond and review findings with the Acton Natural Resources Department.

The Certificate requests that the ENF provide the following additional information in the EIR:

- *Updated site plans for existing and proposed conditions*

  Updated plans for construction are included in Appendix C. These plans provide the preliminary design status through early July 2016.

- *An updated description of applicable statutory and regulatory standards and requirement, and how the project will meet these standards.*

  A description of the applicable statutory and regulatory standards for the project and the status of the permitting for the project is provided in Section 8.

- *Provide a list of required State permits, financial assistance, or other State approvals and provide an update on the status of each of these pending actions.*

  The status of the regulatory permitting activities for the project is provided in Section 8.3, and has been updated through early July 2016.

- *The DEIR should address whether the land was taken for purposes consistent with Article 97 or was designated for Article 97 uses subsequent to acquisition. A transfer of an interest in Article 97 land requires legislative authorization and compliance with Article 97.*

  The Nagog Pond WTP improvements do not require compliance with Article 97. A detailed analysis of Article 97's applicability to the project is provided in Appendix O.

- *The town should clarify whether an air quality permit is required from MassDEP for the back-up generator and whether the Town will seek Financial Assistance in the form of State Revolving Funds (SRF) from MassDEP.*

  The project proposes the use of a gas-fired distributed power system, which will act as the primary energy source as well as an emergency power source in the event of a grid power shut off. An air quality permit from MassDEP is not required as the proposed distributed power system does not exceed MassDEP ERP emission thresholds under 310 CMR 7.02. A registration will be submitted to MassDEP certifying that the distributed power systems do not exceed their thresholds. The Town of Concord will not seek financial assistance in the form of State Revolving Funds (SRF).

- *The DEIR should identify the total amount of land alteration and include a breakdown of alteration associated with each project element, including buildings, roadways, water and stormwater infrastructure, landscaping, and the PV array.*

  A breakdown of land alteration associated with each project development is included in Section 2.1.

- *The DEIR should indicate how alteration could be reduced to limit clearing. I note abutters' concerns regarding potential glare and desire to maintain a visual buffer to the site. I encourage the Proponent to consider these comments and potential revisions to design and/or mitigation could be addressed accordingly*

  The design has been revised as noted in Section 2.2.1 and in the Notice of Project Change (NPC) (Appendix B). This design change will significantly reduce the amount of land alteration and clearing.

- *In addition, the DEIR should include the written certification provided to MassDEP indicating that the project will not have a significant adverse impact upon the water supply and provide documentation to support this finding in accordance with MassDEP guidelines titled "Information to be Submitted to MassDEP for Proposed Wind and Solar Energy Projects on Lands Owned or Controlled By Public Water Systems for Drinking Water Purposes."*

  The solar PV array is no longer an aspect of the Nagog Pond WTP as noted in Section 2.2.1 and in the NPC (Appendix B).

- *The DEIR should identify potential impacts to wetlands and waterways, address how the Preferred Alternative is designed to meet regulatory standards and requirements and identify measures to avoid, minimize and mitigate impacts. The DEIR should address DFW comments regarding compliance with Standard 6 regarding Critical Areas and use of protective BMPs, such as subsurface, infiltration, gravel wetland and bioretention should be used that ensure that no untreated or warmwater runoff from impervious surfaces directly enters coldwater fisheries resources.*

  Construction mitigation measures with the respect to the preferred alternative are provided in Section 10. Additionally, refer to Appendix M for the full stormwater report prepared for this project.

- *The DEIR should include an analysis of GHG emissions and mitigation measures in accordance with the standard requirements of the Policy, which requires projects to quantify carbon dioxide (CO2) emissions and identify measures to avoid, minimize or mitigate these emissions.*

  A GHG emissions analysis for the proposed Nagog Pond WTP project is provided in Section 7.

- *The DEIR should identify construction period impacts, including erosion and sedimentation, air quality and solid waste disposal, and strive to minimize construction impacts (including but not limited to land disturbance, noise, dust, odor, nuisance, vehicle emissions, and construction-related traffic) and consider feasible measures that can be implemented to eliminate or minimize these impacts.*

  A description of short-term construction related impacts are provided in Section 9.3.

- *Mitigation and Section 61 Findings – include a separate chapter summarizing the proposed mitigation measures, with a draft Section 61 Findings for each State Agency that will issue permits for the project.*

  The Section 61 proposed mitigation measures are provided in Section 10 of this EIR.

- *Responses to Comments/Circulation – Include a copy of the Secretary's Certificate on the Expanded ENF and a copy of each comment letter received. Include direct responses to the comments the extent that they are within MEPA jurisdiction. Circulate a hard copy of the Single EIR to each State and local Agency from with permits will be requested, and to all parties that submitted individual written comments.*

  The Secretary's Certificate and comment letters are provided in Appendix A. The distribution list for the DEIR is provided in Appendix P.

11.2 Massachusetts Historical Commission

- *Please submit project information to the Acton Historic Commission for their review and comment.*

  The ENF and project PNF were submitted to the Acton Historic Commission for their review. Submittal of the PNF, response letters and actions are discussed in Section 5.9.

11.3 Quail Ridge Residents

The Quail Ridge Residents provided comments regarding the originally proposed solar PV array and the applicability of Article 97. Regarding these comments, the solar PV array is no longer being considered for Nagog Pond WTP (as discussed in Section 2.2.1) and a detailed analysis of Article 97's applicability to the project is provided in Appendix O. Additional comments from the Quail Ridge Residents are discussed below.

- *Alternatives Analysis for Powering the Facility*

  Various alternatives for powering the facility were reviewed including a solar PV array, a distributed power supply, and the use of electricity from the grid. The solar PV array provided the most economical and environmentally friendly option. However, due to neighborhood concerns and archeologically sensitive historic quarry pits, it was not selected.

- *Alternatives Analysis for Building Location*

  An alternatives analysis for the WTP building location is provided in Section 4.2.2. Furthermore, constructing the building on the existing developed site (rather than off-site) minimizes the need for additional disturbances and development.

- *Mitigation Measures*

  Mitigation measures are presented in Section 10. The proposed mitigation measures are assumed to be acceptable and sufficient. The project proponent will consider additional mitigation measures if they are recommended by the Executive Office of Energy and Environmental Affairs.

- *Public Benefit to Acton – Water Benefit*

  The project is being proposed in the Town of Acton on land owned by the Town of Concord. The proposed project not only provides regulatory compliance with the federal Safe Drinking Water Act, Long-term Enhanced Surface Water Treatment Rule, it will increase the reliability and availability of this essential source of drinking water and fire protection to both residential and commercial customers in Acton (along a large corridor of Route 2A).

- *Septic Issue*

  The requirement for obtaining approval of the proposed Title 5 septic system is noted in Table 3 of Section 8 (310 CMR 15.000).

11.4 Massachusetts Department of Fisheries and Wildlife

- *To minimize potential impacts to fisheries resources during the drawdown, we recommend the proponent follow the guidelines outlined in the Drawdown Section of the 2004 Eutrophication and Aquatic Plant Management in Massachusetts Final Generic Environmental Impact Report, to the greatest degree practicable with emphasis on keeping outflow during drawdown below a discharge equivalent of 4 cfs per square mile.*

  Mitigation measures with respect to drawdown activities are discussed in Section 9.3 and adhere to the guidelines presented in the *2004 Eutrophication and Aquatic Plant Management in Massachusetts Final Generic Environmental Impact Report.* Additionally, the Town of Concord is actively working with the DFW to minimize project impacts.

- *Per DEP's stormwater management standards for **critical areas** such as coldwater fisheries resources, BMPs are required that assure no untreated or warmwater runoff from impervious surfaces directly enters these resources.*

  Please refer to Appendix M for the full stormwater report prepared for this project. The stormwater report evaluates existing and proposed stormwater conditions and proposes environmentally sensitive design and low impact development techniques for the project. The report details best management practices (BMPs) to meet the MassDEP stormwater management standards including drainage piping and catchment basins. The proposed BMPs treat the MassDEP *Required Water Quality Volume* and provide 80% total suspended solids removal.

11.5 Massachusetts Board of Underwater Archaeological Resources

- *The Board of Underwater Archaeological Resources did not identify a record of underwater archaeological resources and indicated that the project is unlikely to impact submerged or terrestrial cultural resources. The Board recommended that if unknown submerged or terrestrial cultural resources are encountered during the project, steps to limit adverse effects should be taken and that the Board, along with the MHC be notified immediately.*

  Should submerged or terrestrial cultural resources be encountered during the course of the project, the Board of Underwater Archaeological Resources, MHC, as well as other appropriate agencies will be notified immediately pursuant to the *Policy Guidance for the Discovery of Unanticipated Archaeological Resources*.

11.6 Massachusetts Department of Environmental Protection Northeast and Central Region Office

- *MassDEP presumes that construction of the proposed filtration plant will eliminate the use of the Rte. 2A pump station as a treatment facility. However, this is not explicitly stated in the ENF.*

  The Route 2A pump station houses an ultra violet (UV) disinfection system which will serve as a back-up for CT compliance when the new Nagog Pond WTP is active. The Route 2A pump station was not selected for the proposed WTP building location due to its insufficient size and the inability to expand the existing building.

- *The ENF does not state whether Concord intends to lease or otherwise convey a portion of its property at Nagog Pond to another party for operation of the PV array.*

  No lease or other conveyance is proposed under the Notice of Project Change. The solar PV array is no longer an aspect of the Nagog Pond WTP as noted in Section 2.2.1 and in the NPC (Appendix B).

- *The ENF does not describe the plans for an emergency power supply for the treatment plant. An emergency power generator for the plant may require an air quality permit from MassDEP, in accordance with 310 CMR 7.02. If the engine in the generator will have a rated power output of 37 kilowatts or more, and was constructed, substantially*

reconstructed or altered after March 23, 2006, then Concord must comply with the requirements of 310 CMR 7.26(42).

The distributed power supply system (as described in Section 2.2.1) will act as an emergency power supply to the building. A source registration will be filed with the MassDEP.

- *Given the amount of temporary and permanent impacts to LUWB associated with the drawdown of the pond, the proponent will be required to file a 401 Water Quality Certification (WQC) pursuant to 314 CMR 9.00. As long as less than 100 cubic yards of LUWB is proposed, it is unlikely that a 401 WQC for dredging will be required from DEP Wetlands in Boston.*

  A 401 Water Quality Certification (WQC) for the drawdown of Nagog Pond will be submitted. The exact amount of dredged material is expected to be minimal. Should the final design require greater than 100 cubic yards, a 401 WQC for dredging will be submitted.

- *The proponent should discuss how turbidity will be minimized and controlled (i.e., using silt curtains, booms, etc.), during dredging of the pond bottom. An erosion control specialist or monitor is recommended to be onsite or conduct regular inspections of erosion, sedimentation and turbidity controls during construction.*

  Due to the dewatering of the pond, dredging activities will be minimal. Mitigation measures proposed for the dewatering of the pond are included in Section 9. Additionally, per the MEPA Certificate, an Environmental Monitor will be on-site to observe field conditions during drawdown process during dewatering of Nagog Pond.

- *The proponent should consult with the US Army Corps of Engineers (USACOE) to determine if a 404 permit is required.*

  A project planning meeting with USACOE took place in February 2016. A 401 WQC for the drawdown of Nagog Pond is required as well as a Massachusetts General Permit. Coordination with the USACOE is on-going.

- *The proponent is advised that demolition activities must comply with both Solid Waste and Air Pollution Control regulations, pursuant to M.G.L. Chapter 40, Section 54. For the purposes of implementing the requirements of M.G.L. Chapter 40, Section 54, MassDEP considers an asphalt, brick, and concrete (ABC) rubble processing or recycling facility, (pursuant to the provisions of Section (3) under 310 CMR 16.05, the Site Assignment regulations for solid waste management facilities), to be conditionally exempt from the site assignment requirements, if the ABC rubble at such facilities is separated from other solid waste materials at the point of generation. The demolition activity also must conform to current Massachusetts Air Pollution Control regulations governing nuisance conditions at 310 CMR 7.01, 7.09 and 7.10.*

  Demolition activities will conform to the current Massachusetts air pollution control regulations as stated above. The Contractor selected for the project will comply with the Solid Waste and Air Pollution Control regulations (M.G.L. Cha. 40, Section 54). These requirements will be included in the Contract Documents.

11.7 Private Residences

Letters were submitted to the MEPA office in response to the ENF and supplemental information from private residences. The comments are summarized below.

- *Concord has acquired land surrounding Nagog Pond to protect the natural resources and enhance water quality. Once water filtration is implemented on the water stream from Nagog Pond, there is no need to prohibit public access on the protective surrounding lands.*

  Public access is restricted as part of the Nagog Pond Watershed Protection Plan (Appendix F). The lands associated with the Nagog Pond WTP are considered water supply lands and are protected from trespassers under M.G.L. Chapter 266 Section 123A as specified in the Watershed Protection Plan. The need to limit access is underscored by the recent vandalism at the Concord town well, resulting in a significant disruption to the water supply service.

- *Need for more comprehensive archaeological study in the vicinity of Nagog Pond and perhaps land areas now underwater due to Concord's constructions of a water dam and consequent flooding.*

  The Town of Concord retained PAL to perform an Archaeological Sensitivity Assessment for the Nagog Pond WTP. The results of the sensitivity assessment are discussed in Section 6.

- *Ecological concerns caused by the massive expansion of Concord Water Plant Construction, expanded water withdrawal, and extensive disruption of water bodies.*

  The design has been revised as noted in Section 2.2.1 and in the NPC (Appendix B). This design change will significantly reduce the amount of land alteration/expansion. The increased flexibility of withdrawl from Nagog Pond due to WTP improvements will comply with the water withdrawl requirements set forth by the Massachusetts Water Management Act under the Town of Concord's Water Withdrawl Permit.

- *Representatives claim the entire project could be completed with 10 vehicle trips per day at least that is what I thought they said. If so, even if the proposed project is done in phases, that estimate is hard to believe.*

  The stated 10 vehicle end trips per day represents the average anticipated during operation of the proposed WTP. During construction, vehicle trips per day will temporarily increase.

- *It is disturbing, therefore, to read that in its communication with MEPA Concord proposed draining ("dewatering") more than 16 acres of the Pond in September, not November, as recommended. September and October are months when birds are active and migrations may be beginning. It is also hard to accept that there will not be fish stranded, perhaps many, though the waiver request goes so far as to suggest that there might not be any at all ("make observations of any trapped fish and determine if they should be moved"). To*

my knowledge, Concord has not done a study of wildlife in this area, or of the impact on wildlife that this proposed project would have.

The Town of Concord has consulted with the DFW in regards to the dewatering of Nagog Pond. Water levels are typically lowest at the beginning of Fall, which would minimize the volume of water required to be removed and area/habitat impacted by the drawdown. This will achieve a shorter construction duration as the cove will both drain and refill faster. A shorter construction duration will also minimize the duration of any short-term environmental impacts.

- *Chemicals of an unnamed nature are to be transported into the proposed new facility, apparently almost every day. Concord has not stated explicitly what these chemicals are.*

  Seven chemical deliveries per month are anticipated with no more than two deliveries per day. Chemicals to be delivered include the following: potassium hydroxide, potassium permanganate, polyaluminum chloride, calcium thiosulfate, fluoride, sodium hypochlorite, zinc methaphosphate, and liquid oxygen.

11.8 Acorn Park Condominium Association

- *The proposed solar array requires legislative authorization.*

  The design has been revised to no longer include the solar PV array as noted in Section 2.2.1 and in the NPC (Appendix B). In any event, Concord disagrees with the assertion.

- *Concord has not adequately explained the need for a treatment plant that is 442% larger than the current structure to treat 10% of its total drinking water.*

  Refer to Section 1.2 regarding the need for the project.

REFERENCES

Department of Environmental Protection and Department of Conservation and Recreation (Executive Office of Environmental Affairs), *Eutrophication and Aquatic Plant Management in Massachusetts, Final Generic Environmental Impact Report*, 2004.

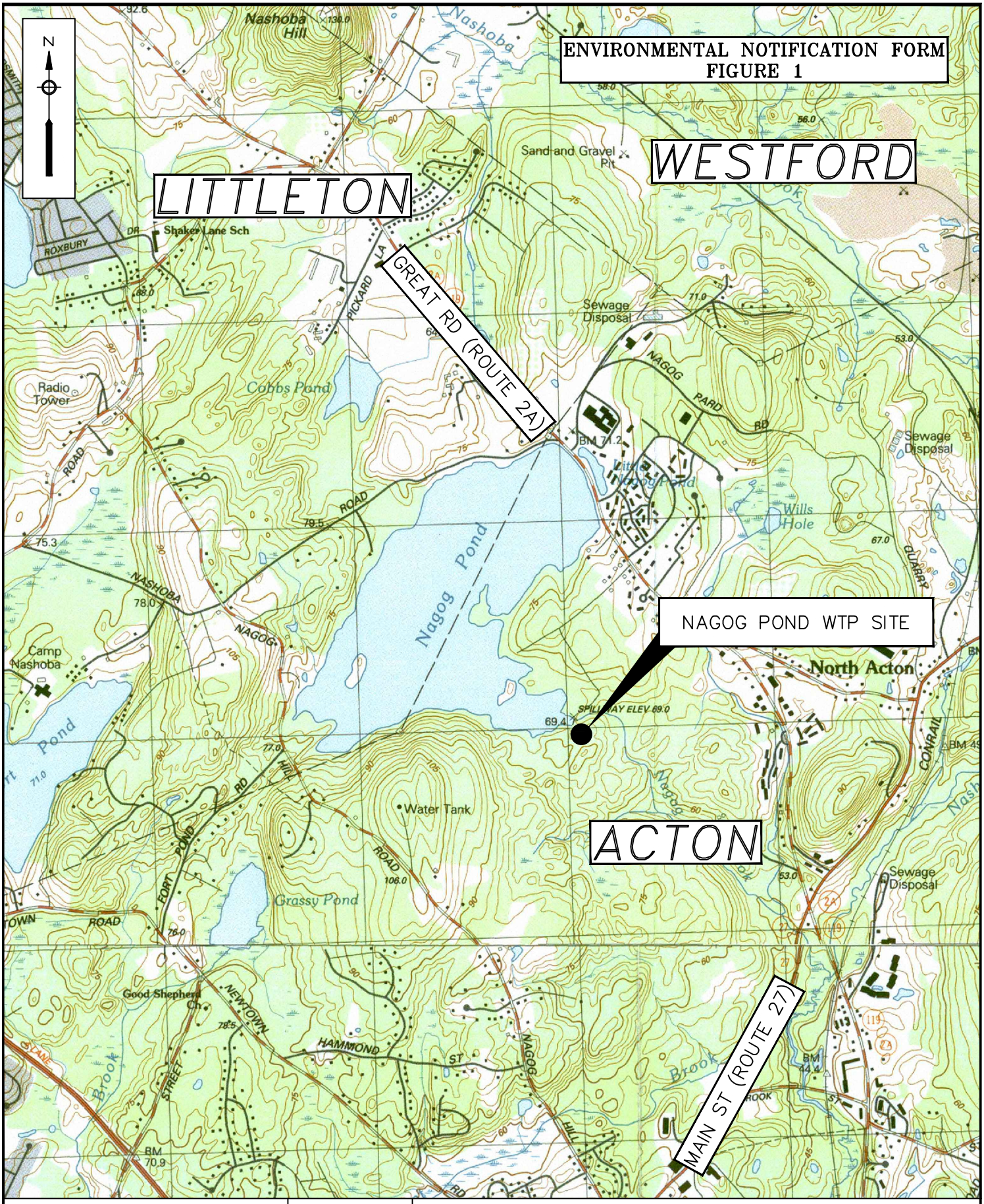
Environmental Partners Group, Inc., *Nagog Pond Pilot Treatability Study Final Report, Town of Concord*, October 2014.

Environmental Partners Group, Inc., *Geotechnical Investigation and Construction Recommendations Memorandum, Nagog Pond, Town of Concord*, November 2015.

Levin, S.B., Archfield, S.A., and Massey, A.J., Refinement and evaluation of the Massachusetts firm-yield estimator model version 2.0: U.S. Geological Survey Scientific Investigations Report 2011–5125, p49, 2011.

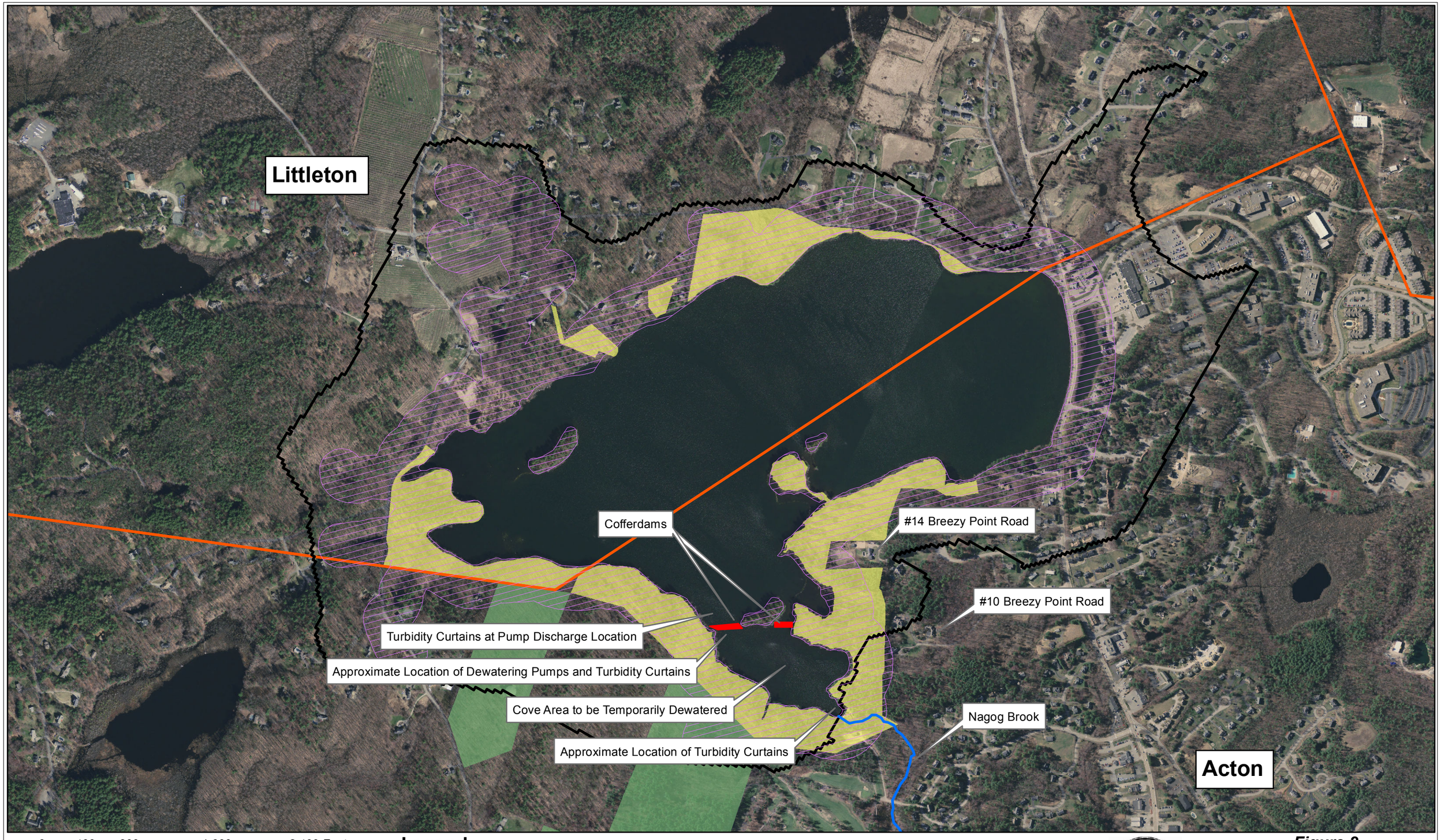
Natural Heritage and Endangered Species Program of the Division of Fisheries and Wildlife, online database, http://maps.massgis.state.ma.us/PRI_EST_HAB/viewer.htm, accessed July 2016.

Town of Concord, *Watershed Resource Protection Plan, Nagog Pond*, Revised December 2014.



Environmental Partners GROUP
A partnership for engineering solutions.
Quincy, MA Hyannis, MA Woburn, MA
TL 617-657-0200 www.envpartners.com

AUGUST 2016	APPLICANT: TOWN OF CONCORD
200-1501	NAGOG POND WATER TREATMENT PLANT
1" = 2,000'	USGS QUADS LOCUS MAP



0 400 800 1,600 2,400 Feet

1 in = 800 feet

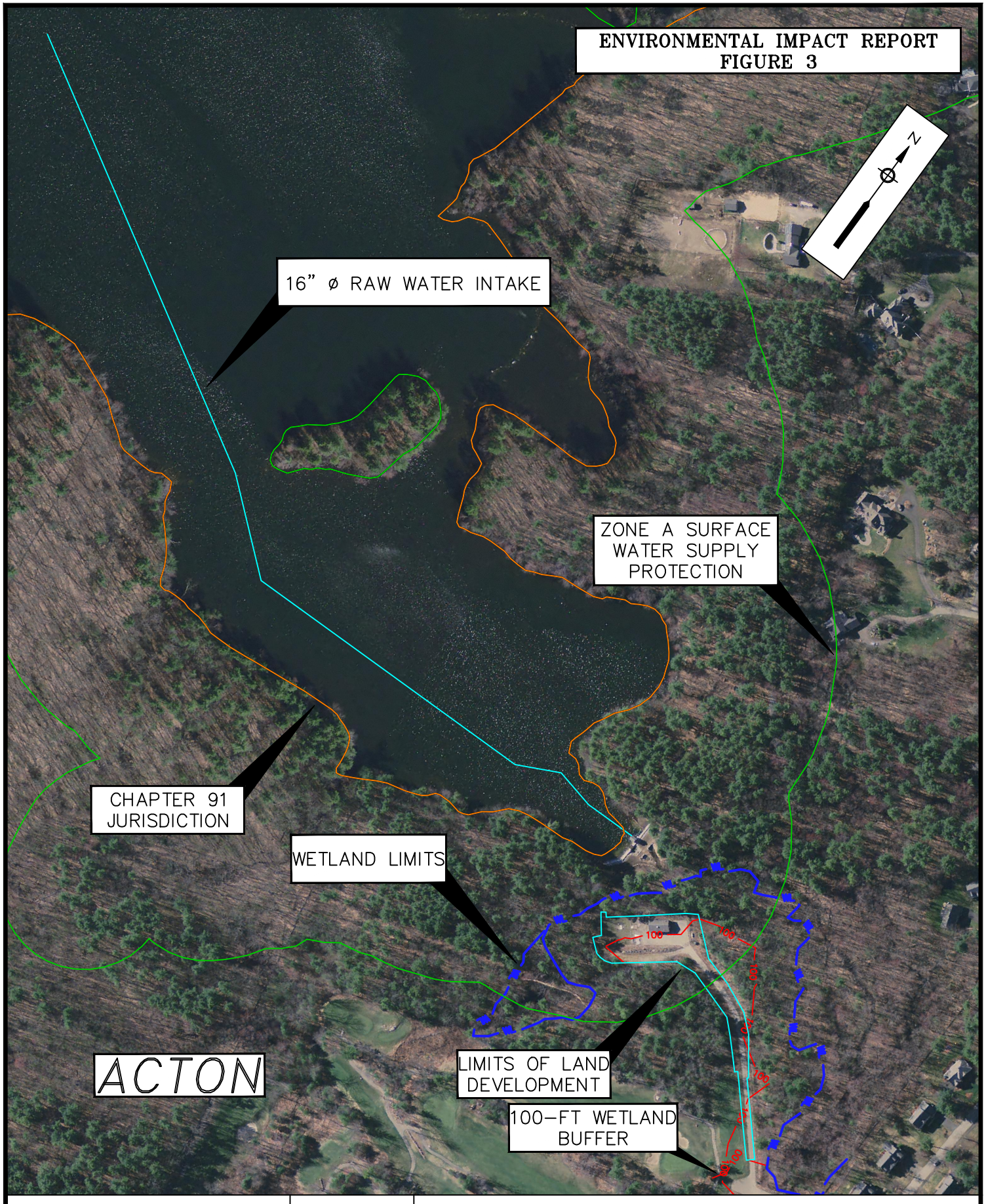
Environmental Partners GROUP
A partnership for engineering solutions.

Legend

- Watershed
- Zone A
- Town of Concord Property
- Town of Acton Property
- Town Border

Figure 2
Nagog Pond Watershed
Town of Concord, MA
August 2016

ENVIRONMENTAL IMPACT REPORT
FIGURE 3



Environmental Partners GROUP A partnership for engineering solutions. Quincy, MA Hyannis, MA Woburn, MA TL 617-657-0200 www.envpartners.com	NOVEMBER 2015	APPLICANT: TOWN OF CONCORD
	200-1501	NAGOG POND WATER TREATMENT PLANT
	1" = 300'	ENVIRONMENTAL CONSTRAINTS

I:\CONCORD.200\200-1501 NAGOG POND WTP CONCEPTUAL DESIGN\05 PERMITTING\ENF\APPENDIX C-LOCUS MAPS\BOUNDARY LOCATIONS.DWG