WATER MANAGEMENT ACT PERMIT AMENDMENT APPLICATION

PROPOSED WELLFIELD AT LYNCH SITE LINEBROOK ROAD

Ipswich, Massachusetts

December 2018

Submitted to:

Massachusetts Department of Environmental Protection
P.O. Box 4062
Boston, MA 02211

Submitted by:

AECOM
250 Apollo Drive
Chelmsford MA 01824

On behalf of:

Ipswich Utilities Department
272 High Street
Ipswich, Massachusetts 01938

Project No. 60567459

TABLE OF CONTENTS

Transmittal Form
BRP WM 02 Amendments to Existing Withdrawal Points
Project Narrative
FORM B For a Groundwater Withdrawal Point, TW 13-16
FORM B For a Groundwater Withdrawal Point, TW 14-16
FORM B For a Groundwater Withdrawal Point, TW 15-16
FORM B For a Groundwater Withdrawal Point, TW 16-16
FORM D2 - Projection of Withdrawal Volume Years 1-20
FORM H - Groundwater Hydraulic Analysis

APPENDIX A:
- Locus Map
- Site Plan

APPENDIX B:
- DEP Approval Letter – Lynch Wellfield, Site Exam/Pumping Test Proposal, June 27, 2018
- Public Notice

Enter your transmittal number → X282160
Transmittal Number

Your unique Transmittal Number can be accessed online:
http://www.mass.gov/eea/agencies/massdep/service/approvals/transmittal-form-for-payment.html

Massachusetts Department of Environmental Protection

Transmittal Form for Permit Application and Payment

1. Please type or print. A separate Transmittal Form must be completed for each permit application.

2. Make your check payable to the Commonwealth of Massachusetts and mail it with a copy of this form to: MassDEP, P.O. Box 4062, Boston, MA 02211.

3. Three copies of this form will be needed.

Copy 1 - the original must accompany your permit application. **Copy 2** must accompany your fee payment. **Copy 3** should be retained for your records

4. Both fee-paying and exempt applicants must mail a copy of this transmittal form to:

MassDEP
P.O. Box 4062
Boston, MA
02211

*** Note:**
For BWSC Permits, enter the LSP.

A. Permit Information

BRP WM 02
1. Permit Code: 4 to 7 character code from permit instructions

Water Management
2. Name of Permit Category

Amendment to Existing Withdrawal Permit, Proposed Well Field at the Lynch Site
3. Type of Project or Activity

B. Applicant Information – Firm or Individual

Ipswich Utilities Department
1. Name of Firm - Or, if party needing this approval is an individual enter name below:

2. **Last Name** of Individual
3. **First Name** of Individual
4. MI

272 High Street
5. Street Address

Ipswich
6. City/Town

MA
7. State

01938
8. Zip Code

978-356-6635
9. Telephone #

10. Ext. #

Ms. Vicki Halmen, Director, Water and Wastewater
11. Contact Person

12. e-mail address

C. Facility, Site or Individual Requiring Approval

TBD
1. Name of Facility, Site Or Individual

209/215 Linebrook Road
2. Street Address

Ipswich
3. City/Town

MA
4. State

01938
5. Zip Code

6. Telephone #

7. Ext. #

8. DEP Facility Number (if Known)

9. Federal I.D. Number (if Known)

10. BWSC Tracking # (if Known)

D. Application Prepared by (if different from Section B)*

AECOM
1. Name of Firm Or Individual

250 Apollo Drive
2. Address

Chelmsford
3. City/Town

MA
4. State

01824
5. Zip Code

978-905-2180
6. Telephone #

7. Ext. #

Douglas DeNatale
8. Contact Person

9. LSP Number (BWSC Permits only)

E. Permit - Project Coordination

1. Is this project subject to MEPA review? ☒ yes ☐ no
   If yes, enter the project's EOEA file number - assigned when an Environmental Notification Form is submitted to the MEPA unit: TBD
   EOEA File Number

F. Amount Due

DEP Use Only

Permit No:

Rec'd Date:

Reviewer:

Special Provisions:

1. ☒ **Fee** Exempt (city, town or municipal housing authority)(state agency if fee is $100 or less).
   There are no fee exemptions for BWSC permits, regardless of applicant status.
2. ☐ Hardship Request - payment extensions according to 310 CMR 4.04(3)(c).
3. ☐ Alternative Schedule Project (according to 310 CMR 4.05 and 4.10).
4. ☐ Homeowner (according to 310 CMR 4.02).

Check Number | Dollar Amount | Date

Massachusetts Department of Environmental Protection
Bureau of – Resource Protection – Watershed Management

BRP WM 02

X282160
Transmittal Number

Amendments to Existing Withdrawal Permits
Water Management Permit Amendment

A. General Information

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.

BRP WM 02
Permit Number

Parker River
Name of basin where withdrawal is located

Town of Ipswich, Utilities Department
Name of permit holder

Ms. Vicki Halmen, Director, Water & Wastewater
Contact Person

272 High Street
Mailing address

Ipswich
City

MA
State

01938
Zip

978-356-6635
Telephone

Is this a public water supply? ☒ Yes ☐ No

If yes, PWS ID# 3144000
PWS ID#

Is the demand for this withdrawal supplemented by withdrawals from another river basin, or will it be so supplemented in the future?

☒ Yes ☐ No If yes, identify locations and volumes:

Ipswich River Basin - Authorized Volume (Registered) 0.2 MGD, 73.4 MGY

B. Type of Amendment Sought

Fill in the applicable section(s) 1-8 that describe the type of amendment you are seeking.

1. Decrease in volume:

   a. Volume requested (average gallons per day) for:

   Years 1-5 Years 6-10

   Years 11-15 Years 16-20

   (subtract registered volume if applicable)

   b. Complete Forms D1 and D2 for each withdrawal point in your permit from which withdrawal rates will change, and complete a separate D1 and D2 for the new projected total system withdrawal rate.

2. Change or add withdrawal points:

   a. Total number of withdrawal points to be included in amended permit:

   Wellfield consisting of four (4) withdrawal points
   Groundwater Surface Water

B. Type of Amendment Sought (cont.)

b. Town(s) where new withdrawal points are located:

Ipswich MA

c. Does this application contain physically new withdrawals or construction which require an Environmental Notification Form?

☒ Yes ☐ No If an ENF is required, attach or forward a copy to DEP when it is prepared.

d. Are any of these withdrawal points subject to DEP's new source approval for public water suppliers?

☒ Yes ☐ No If yes, identify which ones and indicate the approved yield of each source:

Lynch Site, Linebrook Road: Proposed wellfield at test well sites TW 13-16, TW 14-16, TW 15-16, TW 16-16. Ipswich is not requesting an increase in the permitted withdrawal, only to add four new withdrawal points.

e. Where is this water discharged? (i.e., sewer system, individual septic systems, stream, etc.)

Combination of municipal sewer system and individual septic systems

f. Complete one Form B and one Form H for each new underground point and one Form C for each new surface water point included in this amended application.

g. Complete Form D1 for each new withdrawal point and each withdrawal point from which withdrawal rates will change, and complete separate Form D2 for the new projected total system withdrawal rate.

3. Change in use:

a. For what purpose will this water be used (in percent):

Agriculture	Cranberry	Commercial	Industrial
Municipal	Golf:	Residential	Unaccounted/Other

b. Where is this water discharged? (i.e., sewer system, individual septic systems, stream, etc.):

c. Is there an NPDES permit? ☐ Yes ☐ No

If yes, permit number:

B. Type of Amendment Sought (cont.)

Is there a groundwater discharge permit? ☐ Yes ☐ No

If yes, permit number:

d. What is the average annual daily discharge volume (in gallons per day)?

e. Is the discharge volume metered? ☐ Yes ☐ No

4. Change in days of operation each year:

a. Will this change result in an increase or decrease in the total annual volume of water withdrawn?

☐ Increase ☐ Decrease

b. Current number of days of operation and months of the year:

5. Change in discharge point(s):

a. Where is this water discharged? (i.e., sewer system, individual septic systems, stream, etc.)

b. Is there an NPDES permit? ☐ Yes ☐ No

If yes, permit number:

Is there a groundwater discharge permit? ☐ Yes ☐ No

If yes, permit number:

c. What is the average annual daily discharge volume (in gallons per day)?

d. Is the discharge volume metered? ☐ Yes ☐ No

e. Location of future discharge:

B. Type of Amendment Sought (cont.)

6. Change of permit condition, i.e., conservation requirements, Zone II delineation requirements, or other special conditions of the permit (please describe and use additional sheets if necessary):

7. Other amendment (please describe and use additional sheets if necessary):

   The Town of Ipswich is requesting a WMA Permit Amendment for the purpose of adding a wellfield consisting of four (4) new withdrawal points at the Lynch Site in the Parker River Basin. The Town is not requesting an increase in permitted withdrawal.

C. Certification Statement

I certify, under penalty of law, this is application and all attachments were prepared under my supervision, in accordance with a system designed to insure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information submitted in this application, the information submitted is, to the best of my knowledge and belief, true, accurate and complete.

Douglas DeNatale
Print Name

Authorized Signature

Senior Hydrogeologist
Position/Title

Date

Water Management Permit Amendment Application
Parker River Basin
Proposed Well Field at the Lynch Site
Ipswich, MA

Project Narrative

On behalf of the Town of Ipswich Utilities Department, AECOM is submitting the enclosed application for a Water Management Act (WMA) Permit Amendment in the Parker River Basin to build a well field of four gravel-packed wells at the Lynch Site. The Lynch Site represents the first, real opportunity for the Town to develop a new source of water supply in nearly 40 years, and will help address the Town's urgent and long-term water-supply needs. The Town asks the Massachusetts Department of Environmental Protection (DEP) water-management staff to consider the following circumstances when reviewing this application:

A. Permit Amendment Application Only to Add Withdrawal Points to WMA Permit:

    1. The Town is requesting only that DEP add withdrawal points to the Parker River Basin Permit. The Town is not requesting additional withdrawal volume above what is currently authorized to Ipswich.

B. Impact of Proposed Lynch Groundwater Withdrawal on Bull Brook:

    1. The Town conducted a 15-day pumping test at the Lynch Site in August 2018 under the New Source Approval process. Based on the pumping test, AECOM evaluated the possible impacts of the proposed well withdrawals on Bull Brook, and found evidence of a weak and indirect hydraulic link between the brook and the pumped aquifer (a semi-confined aquifer blanketed broadly by a layer of clay). AECOM estimates that a diversion of 0 to 18 gallons per minute (gpm) of streamflow might occur in August, depending on rainfall conditions and daily well-field pumpage. A diversion of 18 gpm is equivalent to 26,000 gallons on a 24-hour basis, and less than 10% of the August median streamflow of 216 gpm, estimated through the US Geological Survey Streamstats computer application (attached). The Town reports that Bull Brook is often without flow in August, which implies a potential diversion of 0 gpm when the weather is dry. The discussion of streamflow diversion due to pumping should be put into its proper perspective. In most cases, any volume of water that is diverted to the wells in dry times is water that would otherwise flow 2,000 feet downstream to recharge Bull Brook Reservoir.
    2. Based on the pumping test, the surface-water supply at Bull Brook and the groundwater supply at Lynch appear to be separate, almost mutually exclusive sources of water. In dry summers, little to no groundwater recharges Bull Brook Reservoir. If groundwater were a large component of recharge to the reservoir, we would expect the reservoir to be more resilient during drought. Instead, the reservoir often experiences a sharp decline in storage in dry summers, coinciding with no-flow conditions in Bull Brook.
    3. Based on a report completed recently for DEP, agricultural withdrawals in both the Parker and Ipswich River Basins of Ipswich amount to about 34,000 gallons per day (gpd) in a wet year, 64,000 gpd in an average year and 93,000 gpd during a dry year. These withdrawals apply from May to September of each year, when the Town needs the water the most. In the Bull Brook watershed, we are aware of at least four agricultural withdrawal points, with a total of about 110 acres of irrigated farmed land.
    4. Agricultural withdrawals directly impact Bull Brook by reducing streamflow and reservoir recharge, which hamper the Town's ability to meet demand.

C. Ipswich Challenges in Maintaining an Adequate Water Supply:

1. In 1984, the Town's engineering consultant concluded that the Town's long-term water supply was adequate, provided that it could develop new surface-water sources (through river diversions and/or impoundments), and that the existing well sources did not lose capacity. In our modern regulatory environment, the permitting of river diversions and new surface-water supplies would be difficult or impossible to achieve. To our knowledge, no new surface-water supply has been permitted in New England in the last 40 years. In addition, the Town's wells *have* lost capacity due to a combination of water quality, age and WMA restrictions on sources in the Ipswich River Basin.
2. As stated on the Town's WMA Permit for the Parker River Basin, the Safe Yield of the reservoir system (Dow Brook and Bull Brook Reservoirs) is 0.8 million gallons per day (mgd), based on a one-in-20-year drought recurrence interval. Through its own daily experience, however, the Water Department doubts the Safe Yield figure of 0.8 mgd. This feeling was reinforced during the drought of 2016, when the Town had difficulty withdrawing the Safe Yield. This discrepancy is related in part to the results of recent bathymetric surveys of the two-reservoir system, which revealed that the storage capacity is 68 million gallons (MG), instead of 90 MG, calculated in previous studies. As alluded to above, the Lynch Wells will have a minor impact on Safe Yield, if any. These findings have emphasized the need for additional water supply, especially when conditions are dry.
3. Between 1893 and 1967, the Town installed test wells at over 100 sites in search of groundwater sources. Some of these sites were eventually developed as water-supply wells. However, due to a combination of factors, especially the complex geologic conditions, new groundwater supplies have been elusive. The identification of the Lynch Site in 2016 was fortuitous, coming after exploring six geographic areas over a two-year period, at a cost of roughly $250,000.

D. Limitations on Existing Sources of Water Supply

1. The aggregate maximum daily withdrawal rate authorized by DEP for the Town's three active groundwater sources in the Ipswich River Basin is 0.75 mgd. However, the Town's WMA Registration, limits production to 0.2 mgd on average over the year.
2. The maximum daily withdrawal rate authorized by DEP for the Town's best groundwater source in the Parker River Basin, the Browns Well, is 0.49 mgd. High levels of manganese have caused the Town to reduce production to about 0.1 mgd on average in 2016 and 2017.
3. In the summer of 2016, amidst an historic drought, reservoir storage was severely depleted. The Town was forced to declare a State of Water-Supply Emergency to conserve water.

E. Ipswich Efforts to Conserve Water and Manage Demand

1. In 2000, the Town instituted monthly billing, and in 2003, a seasonal rate-structure was introduced to manage summertime demands. Both actions dramatically and steadily reduced demands, as shown on the attached two graphs. Since 2006, the average daily demand has been well below the WMA authorized withdrawal volume (sum of registered and permitted volumes in the Parker and Ipswich River Basins) of 1.18 mgd. In 2016 and 2017, the residential gallon per capita per day (gpcd) was 46 gpcd, well below the DEP compliance standard of 65 gpcd.
2. In 2017, the Town adopted a Water-Use Restriction Bylaw which grants greater authority to the Town to impose restrictions to reduce consumption "at any time that conditions warrant", including restrictions on private wells.

3. Other water-conservation and demand-management actions are summarized in the Alternative Analysis, which is part of the Environmental Notification Form, attached herein.

In summary, the Town of Ipswich has made significant efforts over the years to increase, maintain and manage its water supply, in spite of continual challenges. Like all public water suppliers in Massachusetts, the Ipswich Utilities Department has an obligation to supply customers with a reliable supply of high-quality, potable water. The Town is requesting only that DEP add withdrawal points to the Parker River Basin Permit, not withdrawal volume. Development of the Lynch Site will help the Town solve some of its chronic problems by:

1. Increasing the Town's overall water-supply capacity;
2. Alleviating water-supply deficiencies;
3. Improving operational flexibility and reliability; and
4. Providing much needed drought resiliency.

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
ONE WINTER STREET, BOSTON, MA 02108 617-292-5500

ARGEO PAUL CELLUCCI
Governor

JANE SWIFT
Lieutenant Governor

BOB DURAND
Secretary

LAUREN A. LISS
Commissioner

February 5, 2001

Site Screening for Siting a New or Expanding Source of Public Water Supply

The Department of Environmental Protection (DEP) is committed to early identification of issues relevant during the New Source Approval process for public water supplies. The Site Exam phase will now require that project proponents complete alternatives analysis, a water conservation questionnaire, the attached site screening document and publish public notice in The Environmental Monitor. Conducting alternatives analysis and assessing water conservation measures earlier in the process, and the use of a preliminary screening tool and public notice will ensure that the project proponent and interested parties will have an opportunity to identify issues and state concerns about proposed source locations. Early identification of issues can help to minimize environmental impact and minimize cost and delay to the project proponent. Identification of these issues will assist the agencies and the proponent in determining whether the proposed source is economically viable and protective of the environment and other water users, and will increase technical and regulatory information needed for pumping test design. The public notice will be published in The Environmental Monitor for proposed public water supply sources subject to the Water Management Act. The Department of Environmental Protection will accept written comments regarding proposed sites for a short time following publication of the notice.

A variety of environmental laws may apply to new source development depending on the location and the project design. Applicable laws may include the Safe Drinking Water Act, the Water Management Act, the Wetlands Protection Act, the Interbasin Transfer Act, the Endangered Species Act, and the Clean Water Act. The Department's Guidelines and Policies for Public Water Systems provide additional guidance about the necessary approvals and the timing of obtaining them.

"Site Screening for Siting New or Expanding Source of Water Supply" will allow proponents to screen each site under consideration, enabling them to make informed decisions in selecting sites and evaluating alternatives for new source development. Project proponents of new sources that will exceed the withdrawal threshold of the Water Management Act noted herein, should apply the screening criteria to each source under consideration.
This guidance should not be considered to be a final determination of the approvability of sites, but is intended to provide direction regarding significant issues that will have to be addressed if a particular site is pursued.

It is the goal of DEP to ensure a reliable supply of safe drinking water at an affordable cost in a manner which has the least possible environmental impact. The Department promotes efficient operation and maintenance of water supply and distribution systems, and the use of storm water management and wastewater disposal systems that recharge groundwater. DEP promotes and implements policies which require the assessment of future demands, the improvement of the efficiency of water supply systems, and conservation to avoid the capital costs and environmental impacts associated with the development of new supplies.

Glenn Haas, Acting Assistant Commissioner
Bureau of Resource Protection

This information is available in alternate format by calling our ADA Coordinator at (617) 574-6872.

DEP on the World Wide Web: http://www.magnet.state.ma.us/dep
Printed on Recycled Paper

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
ONE WINTER STREET, BOSTON, MA 02108 617-292-5500

ARGEO PAUL CELLUCCI
Governor

JANE SWIFT
Lieutenant Governor

BOB DURAND
Secretary

LAUREN A. LISS
Commissioner

REQUEST FOR SITE EXAM
Water Management Program February 5, 2001

Site Screening Worksheet for Siting a New or Expanding Source of Public Water Supply

For a Public Water Supply Pumping 100,000 GPD or Greater

Submit two copies of this form for each source with the Request For Site Exam documentation to DEP/ Drinking Water Program.

Applicant: Ipswich Water Department, Ipswich, MA
Consultant: AECOM, 250 Apollo Drive, Chelmsford, MA Phone: 978-905-2180, D DeNatale
Site Name Lynch Site Basin: Rowley River Basin – draining to Plum Island Sound (Figure 1)

Section A: Demand Management

1. What is the maximum withdrawal rate you are seeking for your proposed source in million gallons per day (mgd)? 0.864 (new sources only)

	Existing	Final 5-yr block Permit Volume	Buildout (2040)
2. What is the average day demand (mgd) of your system?	1.01 mgd (2016)	1.18 mgd	1.39 mgd

3. What is the peak day demand (mgd) of your system? 1.86 mgd (2016)

4.a. What is the approved pumping rate (mgd) of your system? 3.89 mgd (aggregate max. daily approved rate for the active supplies)

b. Do any of these sources have restricted capacity? If so, briefly indicate which sources and the reasons for the capacity restrictions in the space below. Yes, Ipswich River basin well sources are restricted to 0.2 mgd annual average per WMA Registration; Fellows Road Well and Browns Well are now on restricted operation (restricted in terms of pumping rate and days of operation) due to high levels of manganese; Reservoirs have insufficient supply in most summers.

5. Can you meet your average day demand with your largest source off-line? Yes ☐ No x ☐

*Buildout: EOEA Community Preservation Initiative Buildout projections (See Appendix B). If these projections are not available for your town, note the source of your Buildout projections below.

Buildout demand based on Projected demand for year 2040, (AECOM, 2018)

Section A: Demand Management (cont.)

Note: Failure to meet water conservation standards may jeopardize your application.
Prior to commencement of the development of a new public source, the proponent should conduct a thorough analysis of system demand and have a viable water conservation program in place. Complete the Water Conservation Plan and refer to DEP/Water Management conservation guidelines, *Guidelines and Policies for Public Water Systems, Section 10, revised August, 1996, or as amended; and Water Conservation Standards for the Commonwealth of Massachusetts, adopted 1992.*

If your proposed withdrawal involves an interbasin transfer, also refer to DEM/Office of Water Resources Interbasin Transfer Act water conservation measures in, *Appendix A, Interbasin Transfer Act Performance Standards Guidance, approved 8/12/99, and A Guideline to the Application of the Interbasin Transfer Act and Regulations, December 1985.*

Section B. Potential Environmental Impact

Presence of sensitive or multiple receptors may limit site availability for water supply withdrawal.

1. Which of the following sensitive receptors exist within 1000' of your site?
   (Consult the most recent Massachusetts Natural Heritage Program Atlas, MassGIS and other sources.)

- Areas of Critical Environmental Concern Yes _____ No __x__
- Priority habitat for rare and endangered species Yes _____ No __x___
- Lakes and ponds (or other surface water features) Yes __x__ No _____
- Vernal pools Yes _____ No __x__
- Stocked trout streams Yes __x__ No _____
  (See Massachusetts Stocked Trout Waters listing on website: www.state.ma.us/dfwele*)*

Additional considerations:
- Cold water fisheries resource None
- NPDES permit sites (National Pollution Discharge Elimination System)

2. Which of the following potential threats or sensitive receptors exist within one-half mile of your site?
   (Consult the DEP website at www.state.ma.us/dep*, MassGIS and other sources)*

- Hazardous waste sites Yes _____ No __x__
- Wastewater treatment facilities Yes _____ No __x__
- CSOs or SSOs Yes _____ No __x__
- Landfills Yes _____ No __x__
- Agricultural uses Yes __x___ No ____
- Automobile graveyards and junkyards Yes _____ No __x__
- Industrial Park/plant Yes _____ No __x__
- Petroleum and oil bulk stations and terminals Yes _____ No __x__
- Public water withdrawals Yes _____ No __x__
- Private wells Yes ____ No _____

Section B-1. Stream and Basin Section

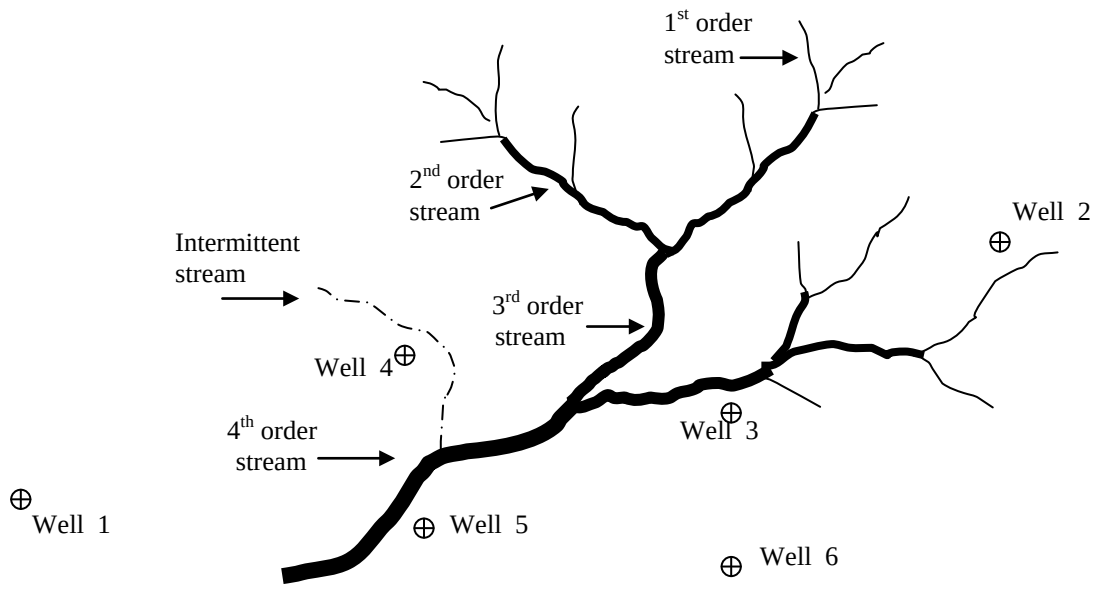
This section is intended to preliminarily evaluate the impacts of proposed sources on streamflow and availability of water in the river basin. The graphic below depicting stream order and well placement illustrates how well location may impact streamflow.

The purpose of this section is not to approve or deny siting a new source, but rather to provide an advisory for caution where siting a withdrawal that may have a significant impact on streamflow.

Stream Order:
A stream of first order is one that has no tributaries. When two streams of first order join, a stream segment of second order begins that may have one or several first-order tributaries along its length. When two streams of second order join, a single stream of third order begins. This stream extends until joined by another third-order river, and there, the fourth order begins, and so on. A junction with a lower-order channel does not change the order of the higher-order stream. (Adapted from the Handbook of Hydrology, 1993)

WATER WITHDRAWAL CONSIDERATION ON STREAMFLOW

PROXIMITY AND STREAM ORDER



Assuming the same pumping rate and a hydrological connection for induced infiltration between a well and a stream, proximity and stream order are two factors which may have a serious impact on flow. Generally, the nearer the withdrawal is to a stream, the greater the impact on flow; and the lower the level of stream order, the greater the impact of a withdrawal on flow. As illustrated above, Wells 1 and 6 may have minimal or no impact on streamflow. Well 5, located near a higher order stream may have less impact on flow than Well 3. Wells 2 and 4 may have the greatest impact on flow due to their close proximity to a first order stream and an intermittent stream.

The following stream screening criteria provides guidance concerning a withdrawal's potential for impact on flow. Generally, for a withdrawal pumping rate less than 7Q10 flow, no significant impact is anticipated. Withdrawals greater than 7Q10 flow, let alone larger pumping volumes greater than 50% of August Median flow, may have significant impacts on flow. Low flow stream statistics (7Q10 and August Median) may be obtained from U.S. Geological Survey (USGS) website noted below. However, statistics obtained from this website are based on unregulated streams and do not take into account cumulative effects on streamflow from existing withdrawals or other impacts, and the proposed withdrawal may warrant further site screening assessment. Stream threshold indicators may also be more restrictive in basins that DEP has determined to be hydrologically stressed.

Responses to the following questions will require internet access to obtain low flow stream statistics from the USGS steamflow statistics website, http://ma.water.usgs.gov/streamstats. The USGS website provides streamflow statistics and basin characteristics for locations of interest by use of an automated procedure that measures characteristics of the land surface area (basin) that drains to the stream and inserts those characteristics into equations that estimate the streamflow statistics (7Q10, August Median, etc).

This methodology is designed to estimate the impact on flow from one proposed withdrawal on an unregulated stream. Withdrawals impacting more than one stream, or where multiple withdrawals or other impacts in the drainage area already exist, will require additional site-specific screening.

Basically, the application allows a user to mouse-click on a point in a stream, from which the program will delineate the contributing watershed drainage area on a map and generate low flow stream statistics along with basin characteristics. Instructions for use are on the website. The USGS display map and corresponding data printout for the proposed withdrawal must be enclosed with this application. Once the low flow statistics have been obtained, the data must be converted into cubic feet per second per square mile (cfsm) and compared to the withdrawal rate.

The click point for the application is the point where the stream intersects the downgradient extent of the preliminary Zone II. The preliminary Zone II delineation is a requirement in the Drinking Water Request For Site Exam part of this application. DEP assumes 100% hydrogeologic communication between the well and the stream so that every drop of water pumped comes from the stream. However, the Department will also consider applied site specific stream depletion methodologies (Jenkins, Barlow, etc.), that attempt to quantify stream flow depletion by wells under Zone II conditions. In such cases, the reduced flow impact may substitute for the withdrawal when comparing the withdrawal rate to stream indicators 7Q10 and 50% of August Median.

To determine the withdrawal's impact on streamflow, follow the steps below.

Step 1: Convert the proposed withdrawal rate given in million gallons per day (Page 1, Section A, Question 1) to gallons per day, and then to cubic feet per second using the following formula:

$$\frac{\textbf{860,000}\ \text{gpd (new sources only)}}{7.48\ \text{gal/cu.ft.} \times 1440\ \text{min/day} \times 60\ \text{seconds/minute}} = \textbf{1.33}\ \text{cfs}$$

Step 2: Determine the contributing drainage area in square miles for the proposed withdrawal location. This area must be determined with the USGS watershed tools by clicking on the stream intersect with the preliminary Zone II at the downgradient point.

What is the contributing drainage area of the proposed withdrawal? **2.59** square miles

What is the distance in feet from the proposed withdrawal to the nearest stream? **160** feet

Step 3: Conversion to cfsm:
Find the flow per unit area (cfsm) for the withdrawal at this location by dividing the cfs flow found in Step 1 by the contributing drainage area in Step 2:

$$\frac{1.33\ \text{withdrawal (cfs)}}{2.59\ \text{drainage area (sq. mi.)}} = \mathbf{0.51\ \ cfsm}$$

Example: Find cfsm for a proposed withdrawal at 0.5 mgd with an upgradient watershed of 5 square miles.
Note: 0.5 mgd converts to .77 cfs

$$\frac{\text{withdrawal (0.5 mgd) or } 0.77\ \text{cfs (Step 1)}}{\text{upgradient watershed } 5\ \text{sq. mi. (Step 2)}} = 0.154\ \text{cfsm (Step 3)}$$

Step 4: The 7Q10 streamflow, measured in cfs, represents the probable minimum flow over a 7-day period that will occur on average once in 10 years. With the USGS website, obtain the 7Q10 cfs flow for the stream location point, convert 7Q10 cfs to cfsm (Step 3), and compare this flow with your proposed withdrawal.

7Q10 flow 0.081 cfs (36 gpm)
7Q10 flow 0.031 cfsm

CAUTION

Withdrawals which are greater than 7Q10 cfsm of a stream have the potential to increase the frequency and duration of low flow, and may result in moderate to significant environmental impact. Such withdrawals may be unapprovable or severely restricted by permit conditions. This guidance should be used as a planning tool, and applicants are encouraged to select alternatives that minimize environmental impact and meet other water supply planning objectives for water quality and productivity. Further analysis will be necessary to determine the potential impact of all proposed withdrawals and mitigating circumstances.

Step 5: With the USGS website, obtain the August Median cfs flow for the stream at the designated point, convert the August Median cfs to cfsm (Step 3), take 50% of August Median (cfsm) and compare this flow with your proposed withdrawal in cfsm.

August Median: 0.482 cfs (216 gpm)
August Median: 0.186 cfsm
50% August Median: 0.093 cfsm

CAUTION

Impacts on streamflow are best determined through physical characteristics of the watershed, site hydrology and pumping tests, but as a screening guideline, a proposed source in which the withdrawal rate of a watershed area is **50% of the August Median** (cfsm) or greater, is considered to have the potential to significantly reduce streamflow. Such withdrawals may be unapprovable or severely restricted by permit conditions. This guidance should be used as a planning tool, and applicants are encouraged to select alternatives that minimize environmental impact and meet other water supply planning objectives for water quality and productivity. Further analysis will be necessary to determine the potential impact of all proposed withdrawals and mitigating circumstances.

Since the August Median statistic may reflect wide ranging and relatively high flows, particularly in small watershed drainage areas, the more conservative 50% of August Median flow was selected as the screening threshold level to protect impacts on river flow from withdrawals.

Section C. Regulatory Review

1. Name all potential water supplies which you have under consideration, including regional sources and those located in other communities, and attach a locus map depicting the location of each.
   Lynch Site: TW 13-16, TW 14-16, TW 15-16, TW 16-16

2. Massachusetts Environmental Policy Act (MEPA) *(MGL ch 30 s. 61 through 62H) (301 CMR 11.00)*
   MEPA provides meaningful opportunities for public review of the potential environmental impacts of projects for which agency action is required. The MEPA review is an informal administrative process of environmental planning that enables the proponent and each participating agency to consider the positive and negative, short-term and long-term, and cumulative potential environmental impacts for all phases of a project. *(See MEPA website at www.ma.state.us/MEPA.)*

   MEPA review thresholds for water: *(301 CMR 11.03(4)) (other non-water thresholds may also apply)*
   ENF and Other MEPA Review if the Secretary So Requires.
   - new withdrawal or expansion of withdrawal of 100,000 or more gpd from a new water source that requires new construction for the withdrawal.

- new withdrawal or expansion of withdrawal of 500,000 or more gpd from a water supply system above the lesser of current system-wide authorized withdrawal volume or three-years' average system-wide actual withdrawal volume.
- construction of one or more new water mains five or more miles in length.
- construction of a new drinking water treatment plant with a capacity of 1,000,000 or more gpd.
- expansion of an existing drinking water treatment plant by the greater of 1,000,000 gpd or 10% of existing capacity.
- alteration requiring a variance in accordance with the Watershed Protection Act, unless the project consists solely of one single family dwelling.
- non-bridged steam crossing 1,000 or less feet upstream of a public surface drinking water supply for purpose of forest harvesting activities.

ENF and Mandatory EIR*:*

- new withdrawal or expansion in withdrawal of
  - 2,500,000 or more gpd from a surface water source; or
  - 1,500,000 or more gpd from a groundwater source.
- new interbasin transfer of water of 1,000,000 or more gpd from a surface or groundwater source or any amount determined significant by the Water Resource Commission.
- construction of one or more new water mains ten or more miles in length.
- new water service to a municipality across a municipal boundary through new or existing pipelines.

Will your water withdrawal require MEPA review Yes [x] No [ ]

3. Water Management Act (WMA) Permit/ DEP Water Management Program *(310 CMR 36.00)*

A water withdrawal permit is required for new or expanded water withdrawals above the threshold volume. Water withdrawal uses may include, but not be limited to **public water supply**; industrial uses; agricultural uses, such as **cranberry growers**; and irrigation uses, such as for **golf courses**.

Threshold volume means:

- an average daily volume of 100,000 gallons for any period of three consecutive months, from a total withdrawal of not less than 9,000,000 gallons; or
- an average daily volume of 100,000 gallons for periods which exceed three consecutive months, calculated by dividing the total withdrawal by the period of operation.
- a permit amendment is required for existing permit holders adding a new source where system wide withdrawal volumes are not being increased.

3a. Will your water withdrawal require a WMA permit? Yes [x] No [ ]

Permit Amendment

3b. Are you currently a Registrant and/or a Permitee under the WMA? Yes [x] No [ ]

If yes, provide registration and permit numbers:

Registration Number(s)	Permit Number(s)
31614401 (Parker)	**WMA Permit #9P2-3-16-144.01 (Parker)**
31714402 (Ipswich)	

4. Interbasin Transfer (IBT) Act Approval / Water Resource Commission *(MGL ch 21 ss. 8B-8D)*

(See Massachusetts Major Basin Map at http://ma.water.usgs.gov/basin)

An interbasin transfer is defined as any transfer of the surface and groundwater, including wastewater of the Commonwealth outside a river basin. A water transfer must cross one of the basin boundaries and a municipal boundary line to be considered an interbasin transfer. If a community is sewered to another town out of the basin of the water supply, the Interbasin Act may be triggered.

An interbasin transfer is any action that increases the ability to transfer water or wastewater out of a donor basin over the present rate of interbasin transfer. Actions requiring review include but are not limited to:

- drilling of production wells;
- significantly increasing the capacity of a well;
- development of a reservoir or enlargement of reservoir storage capacity;

- building of transfer facilities, such as pumps, pipelines, tunnels or other conveyance facilities;
- building of water filtration plants where such plants increase the ability to transfer water out-of-basin;
- changes in any withdrawal constraints contained in any provision of MGL, Special Acts, Judicial decree, regulatory agency rule or operating rule of a water supplier;
- structural change in a wastewater system that causes an increase in the transfer out of a donor basin.

Will your water withdrawal require an IBT application review? Yes [ ] No [x]
see ** below

** If your proposed withdrawal will require an IBT review:

- be advised that certain performance standards, including prerequisite requirements, must be met for application approval. See *Interbasin Transfer Act: Performance Standards Guidance, adopted August 12, 1999.*
- the applicant also must meet with DEM/Office of Water Resources staff before the Alternative Analysis is completed and submitted as part of the Request For Site Exam application.

5. Wetlands Permit / Massachusetts Wetlands Protection Act *(MGL ch 131, s. 40) (310 CMR 10.00)*
   Administered by DEP and Local Conservation Commissions
   Any work in a wetlands or within 100' buffer of the wetlands. This includes creating an access way to the water withdrawal, as well as drilling, pumping, and filling wetlands.

   5a. Will your water withdrawal require a Wetlands Permit? **TBD** Yes [ ] No [ ]

   5b. Is your proposed withdrawal within the 200' riverfront area? Yes [x] No [ ]

6. 404 Permit / Army Corps of Engineers (*Clean Water Act of 1977)*
   Are you planning any dredging or filling for your water withdrawal in a waterway or wetland?
   Section 404 of the Clean Water Act defines the landward limit of jurisdiction as the high tide line in tidal waters and the ordinary high water mark as the limit in non-tidal waters. When adjacent wetlands are present, the limit of jurisdiction extends to the limit of the wetlands.

   Will your water withdrawal require a 404 Permit? Yes [ ] No [x]

7. 401 Permit / DEP 401 Water Quality Certification Program *(314 CMR 9.00)*
   Provides added protection for projects with the potential for large or cumulative impacts to ensure compliance with the surface water quality standards. Actions, involving but not limited to, any one activity listed below, that require a 401 application review are:
   - loss of greater than 5,000 square feet of wetlands;
   - within an Outstanding Resource Water;
   - involving any real estate subdivision;
   - not subject to the Wetlands Protection Act
   - containing rare or endangered species habitat in isolated vegetated wetlands;
   - within a salt marsh;
   - dredging greater than 100 cubic yards.

   Will your water withdrawal require a 401 Permit? Yes [ ] No [x]

APPENDIX A

Department of Environmental Management
Office of Water Resources
Basin Plan Status, August 2000

BASIN	VOLUMES	UPDATES
Hudson River Basin	I, II, III*	
Ipswich River Basin (including communities in the North Coastal)	I, II, III	
Charles River Basin	I, II, summary draft III (never completed)	Demands
Concord River Basin	I; Short Hydrology	Some Demands
Blackstone River Basin	I; conceptual plan (3 versions)	Demands?
Nashua River Basin	I	Demands
Neponset River Basin	I; I,II,III combined plan	Demands
Taunton River Basin	I; I,II,III combined plan	Demands + inflow/outflow
North Coastal	I,II,III combined plan	
Mystic River Basin	Short Hydrology/Demands	
Ten Mile River Basin	Short Hydrology/Demands	
Weymouth-Weir Basin	Draft I; Short hydrology/demands	
South Coastal	Draft I; I,II,III combined plan	
Cape Cod	Basin plan	
Islands	Short Hydrology/Demands	
Deerfield River Basin	Short Hydrology/Demands	
Housatonic River Basin	Basin Plan	
Westfield River Basin	Short Hydrology/Demands	
Farmington River Basin	Short Hydrology (combined with Westfield) No Demands	
Millers River Basin	Short Hydrology/Demands	
Chicopee River Basin	Short Hydrology/Demands	
Connecticut River Basin	Short Hydrology/Demands	
Buzzards Bay	Basin Plan	
Parker	no plan	Demands only

*Unless otherwise noted, Volumes I, II and III make up a full basin plan

APPENDIX B

Supportive materials:

- Basin Plans (see Appendix A)
  Contact DEM / Office of Water Resources for further information.
- Outstanding Resource Waters (ORWs)
  Contact DEP Regional Office for further information.
- Stream indicators (7Q10 and August Median) and low flow statistics
  USGS Water Resources Data for Massachusetts
  USGS Gazetteers of Hydrologic Characteristics of Streams in Massachusetts
  USGS websites: http://ma.water.usgs.gov/basin
  http://ma.water.usgs.gov/streamstats
- References:
  - Jenkins, C.T., 1970 Computation of Rate and Volume of Stream Depletion By Wells. USGS Techniques of Water-Resources Investigations, Book 4, Chapter D1.
  - Barlow, P.M., 1999 USGS/ Documentation of Computer Program STRMDEPL – A Program to Calculate Streamflow Depletion by Wells Using Analytical Solutions. (Work in progress)
- NPDES sites
  Contact DEP / Watershed Permitting Program / Surface and Groundwater Sections

List of related programs and phone numbers:

EOEA Basin Team Leader Information ……..		617 727-9800
EOEA Community Preservation Buildout …….		617 626-1153
Massachusetts Natural Heritage Program		508 792-7270
MEPA		617 626-1020
MassGIS		617 727-5227
DEM/	Office of Water Resources	617 973-8755
	Water Resource Commission	617 626-1050
	Interbasin Transfer Act	617 973-8745
Army Corps of Engineers / 404 Permit		800 362-4367
DEP/	Boston switchboard	617 292-5500
	Western Region	413 784-1100
	Central Region	508 792-7650
	Northeast Region	978 661-7600
	Southeast Region	508 946-2700
	DEP Basin Chiefs, contact DEP regional offices	
	Water Management Program	617 292-5706
	Drinking Water Program	617 292-5770
	Wellhead Protection Program	617 556-1070
	Wetlands and Waterways	617 292-5695
	401 Water Quality Certification Program	617 292-5655
	Bureau of Waste Site Cleanup	617 292-5648
	DEP GIS	617 556-1115

StreamStats Output Report

State/Region ID	MA	
Workspace ID	MA20180319155203906000	
Latitude		42.69554
Longitude		-70.86997
Time		3/19/2018 11:52:17 AM

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	2.33	square miles
ELEV	Mean Basin Elevation	73.8	feet
LC06STOR	Percentage of water bodies and wetlands determined from the NLCD 2006	27.64	percent
DRFTPERSTR	Area of stratified drift per unit of stream length	0.18	square mile per mile
MAREGION	Region of Massachusetts 0 for Eastern 1 for Western	0	dimensionless
BSLDEM250	Mean basin slope computed from 1:250K DEM	2.764	percent
BSLDEM10M	Mean basin slope computed from 10 m DEM	5.875	percent
PCTSNDGRV	Percentage of land surface underlain by sand and gravel deposits	64.53	percent
FOREST	Percentage of area covered by forest	74.56	percent

Peak-Flow Statistics Parameters 100 Percent Peak Statewide 2016 5156

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	2.33	square miles	0.16	512
ELEV	Mean Basin Elevation	73.8	feet	80.6	1948
LC06STOR	Percent Storage from NLCD2006	27.64	percent	0	32.3

*** Peak-Flow Statistics Disclaimers ***

Warnings One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report 100 Percent Peak Statewide 2016 5156

Statistic	Value	Unit
2 Year Peak Flood	42.1	ft^3/s
5 Year Peak Flood	69.6	ft^3/s
10 Year Peak Flood	91.3	ft^3/s
25 Year Peak Flood	122	ft^3/s
50 Year Peak Flood	148	ft^3/s
100 Year Peak Flood	174	ft^3/s
200 Year Peak Flood	203	ft^3/s

500 Year Peak Flood	243	ft^3/s	

Flow-Duration Statistics Paramete 100 Percent Statewide Low Flow WRIR00 4135

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	2.33	square miles	1.61	149
DRFTPERSTR	Stratified Drift per Stream Length	0.18	square mile per mil	0	1.29
MAREGION	Massachusetts Region	0	dimensionless	0	1
BSLDEM250	Mean Basin Slope from 250K DEM	2.764	percent	0.32	24.6

Flow-Duration Statistics Flow Rep 100 Percent Statewide Low Flow WRIR00 4135

PII: Prediction Interval- Lower, PIu: Prediction Interval- Upper, SEp: Standard Error of Prediction, SE: Standard Error (other-- see report)

Statistic	Value	Unit	PII	PIu	SE	SEp
50 Percent Duration	2.26	ft^3/s	0.915	5.56	17.6	17.6
60 Percent Duration	1.59	ft^3/s	0.663	3.77	19.8	19.8
70 Percent Duration	0.953	ft^3/s	0.413	2.17	23.5	23.5
75 Percent Duration	0.732	ft^3/s	0.316	1.68	25.8	25.8
80 Percent Duration	0.625	ft^3/s	0.262	1.47	28.4	28.4
85 Percent Duration	0.456	ft^3/s	0.187	1.1	31.9	31.9
90 Percent Duration	0.35	ft^3/s	0.138	0.866	36.6	36.6
95 Percent Duration	0.197	ft^3/s	0.0677	0.553	45.6	45.6
98 Percent Duration	0.124	ft^3/s	0.0369	0.392	60.3	60.3
99 Percent Duration	0.0887	ft^3/s	0.0248	0.299	65.1	65.1

Low-Flow Statistics Parameters 100 Percent Statewide Low Flow WRIR00 4135

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	2.33	square miles	1.61	149
BSLDEM250	Mean Basin Slope from 250K DEM	2.764	percent	0.32	24.6
DRFTPERSTR	Stratified Drift per Stream Length	0.18	square mile per mil	0	1.29
MAREGION	Massachusetts Region	0	dimensionless	0	1

Low-Flow Statistics Flow Report 100 Percent Statewide Low Flow WRIR00 4135

PII: Prediction Interval- Lower, PIu: Prediction Interval- Upper, SEp: Standard Error of Prediction, SE: Standard Error (other-- see report)

Statistic	Value	Unit	PII	PIu	SE	SEp
7 Day 2 Year Low Flow	0.199	ft^3/s	0.0649	0.588	49.5	49.5
7 Day 10 Year Low Flow	0.0808	ft^3/s	0.021	0.29	70.8	70.8

August Flow-Duration Statistics P 100 Percent Statewide Low Flow WRIR00 4135

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	2.33	square miles	1.61	149

BSLDEM250	Mean Basin Slope from 250K DEM	2.764	percent	0.32	24.6
DRFTPERSTR	Stratified Drift per Stream Length	0.18	square mile per mil	0	1.29
MAREGION	Massachusetts Region	0	dimensionless	0	1

August Flow-Duration Statistics Fl 100 Percent Statewide Low Flow WRIR00 4135

Pll: Prediction Interval- Lower, Plu: Prediction Interval- Upper, SEp: Standard Error of Prediction, SE: Standard Error (other-- see report)

Statistic	Value	Unit	Pll	Plu	SE	SEp
August 50 Percent Duration	0.482	ft^3/s	0.194	1.18	33.2	33.2

Bankfull Statistics Parameters 100 Percent Bankfull Statewide SIR2013 5155

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	2.33	square miles	0.6	329
BSLDEM10M	Mean Basin Slope from 10m DEM	5.875	percent	2.2	23.9

Bankfull Statistics Flow Report 100 Percent Bankfull Statewide SIR2013 5155

Statistic	Value	Unit	SEp
Bankfull Width	20.3	ft	21.3
Bankfull Depth	1.18	ft	19.8
Bankfull Area	23.7	ft^2	29
Bankfull Streamflow	60.6	ft^3/s	55

Probability Statistics Parameters 100 Percent Perennial Flow Probability

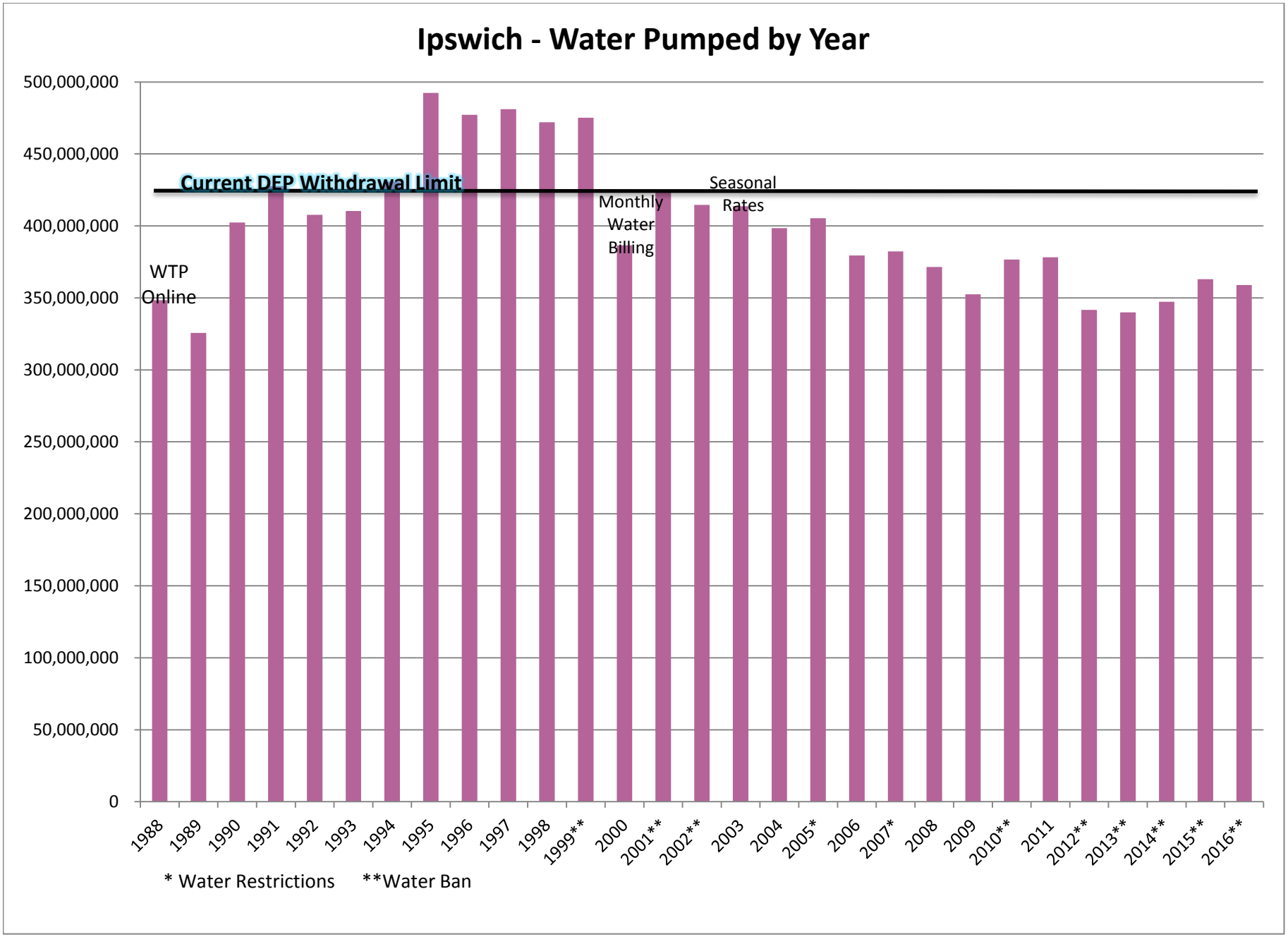
Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	2.33	square miles	0.01	1.99
PCTSNDGRV	Percent Underlain By Sand And Gravel	64.53	percent	0	100
FOREST	Percent Forest	74.56	percent	0	100
MAREGION	Massachusetts Region	0	dimensionless	0	1

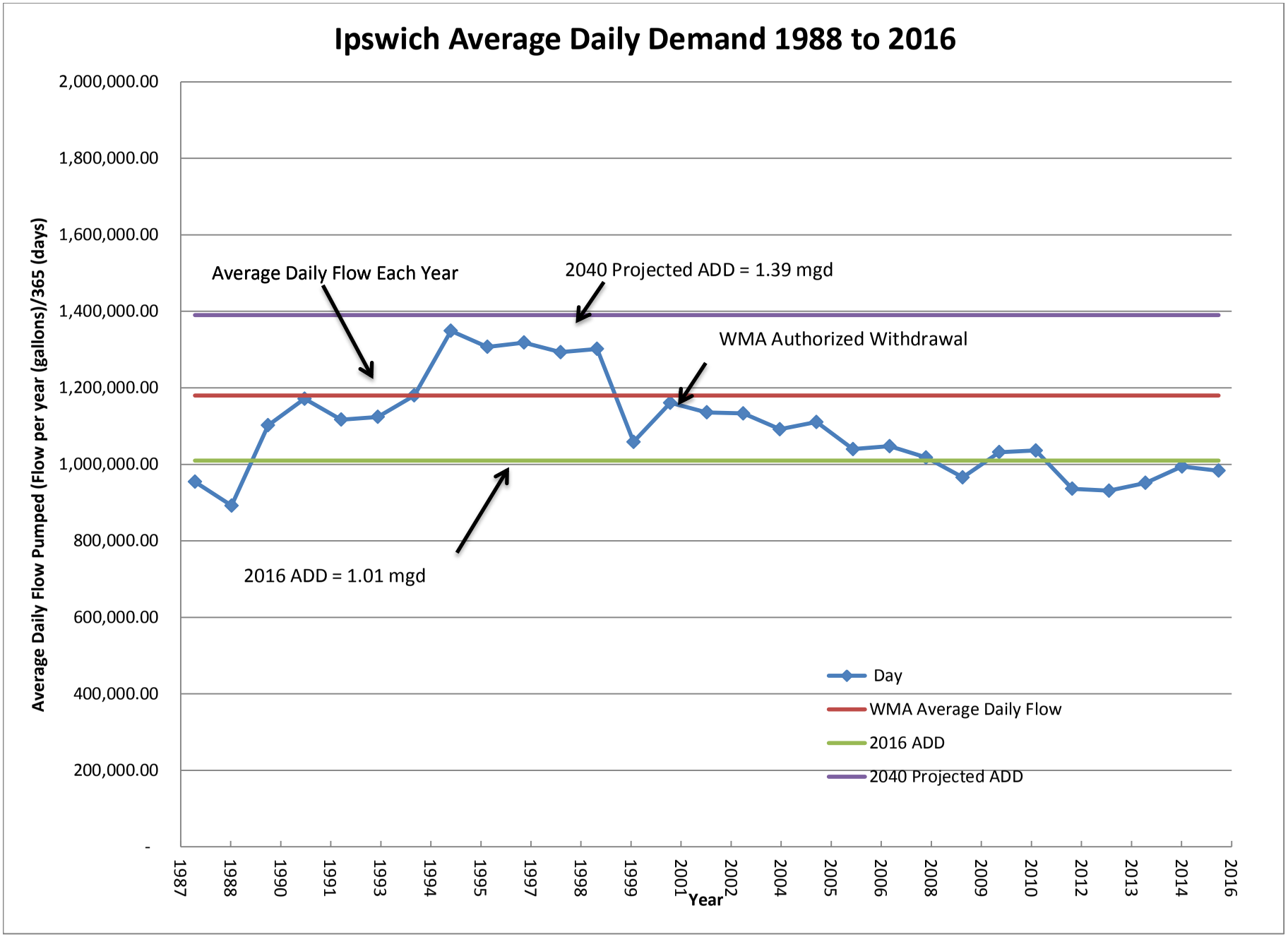
*** Probability Statistics Disclaimers ***

Warnings One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Probability Statistics Flow Report 100 Percent Perennial Flow Probability

Statistic	Value	Unit
Probability Stream Flowing Peren	0.932	dim


Ipswich - Water Pumped by Year
500,000,000
450,000,000
400,000,000
350,000,000
300,000,000
250,000,000
200,000,000
150,000,000
100,000,000
50,000,000
0
Current DEP Withdrawal Limit
WTP Online
Monthly Water Billing
Seasonal Rates
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999**
2000
2001**
2002**
2003
2004
2005*
2006
2007*
2008
2009
2010**
2011
2012**
2013**
2014**
2015**
2016**
* Water Restrictions
**Water Ban



\\uschl1fp001.na.aecomnet.com\data\Projects\Wakefield\Data_2\Everyone\Ipswich, MA\60550038 Water Supply Master Plan\400\401 Information from Town\water pumped per month 88-present.xls Avg Daily

FORM B

FOR GROUNDWATER WITHDRAWAL POINTS
PROPOSED WELLFIELD AT THE LYNCH SITE
TEST WELLS TW 13-16, TW 14-16, TW 15-16, TW 16-16

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Water Management Act Program

WMA Form B

Groundwater Withdrawal Point

Please provide a separate Form B for each withdrawal point source. Please answer only if the requested information is known and reliable.

A. Withdrawal Point Information

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.

1. Name and Address of Withdrawal Point

   Lynch Site, Test Well Site TW 13-16
   Name of Withdrawal Point

   215 Linebrook Road
   Street Address

   Ipswich — City
   MA — State
   01938 — Zip Code

   To be assigned
   Source Code (for public water supplies)

2. Has this well been registered? ☐ Yes ☒ No

   Month and year put in operation or planned: 2020

3. Has this well been in regular operation at any time? ☐ Yes ☒ No

   Month and year put in operation or planned: 2020

4. USGS quadrangle name: Georgetown

5. Latitude and Longitude: 42˚ 41' 16.78" N (Latitude) 70˚ 52' 49.63" W (Longitude)

   Please provide a locus map of the withdrawal and any associated reservoirs or ponds.

B. Geologic Information

1. Aquifer type: ☐ Bedrock ☒ Confined ☐ Unconfined
2. Depth to bedrock: 56 ft below ground surface (feet)

C. Well Information

1. Well type: ☒ Gravel pack ☐ Gravel developed ☐ Tubular well field ☐ Dug well

   ☐ Other (describe):

2. Year to be installed (if not already installed): 2019-2020
3. Well depth: 56 feet
4. Depth to water level when installed: 9 feet

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Water Management Act Program

WMA Form B

Groundwater Withdrawal Point

C. Well Information (cont'd)

5. Name and address of well driller:

Proposed Well at TW 13-16
Name of Withdrawal Point

Well Drilling Contractor TBD
Street Address

City | State | Zip Code

D. Pumping Information

1. Was a pump test conducted on this well? ☒ Yes ☐ No

   If yes, provide date: August 2018

   Firm conducting the test: AECOM/Maher Services Inc.

   If no, is one planned? ☐ Yes ☐ No

Items 2-7 are for Public Water Supplies.

2. Has a Zone II delineation been performed for this well? ☒ Yes ☐ No
3. If yes, has this Zone II been approved by the Department? ☐ Yes ☒ No
4. Date of Zone II delineation: November 2018, pending approval
5. Firm conducting Zone II delineation: AECOM
6. What is the maximum daily withdrawal rate? 510 gpm, well field capacity, pending approval
7. Is this a DEP-approved withdrawal rate? ☐ Yes ☒ No

E. Meter Information

1. If in operation, is this well metered? ☐ Yes ☐ No
2. If proposed, when will meter(s) be installed? before well is in operation
3. Type of flow measurement device installed or planned:

   ☐ weir ☐ flume ☐ venturi ☒ other meter ☐ other (describe): Magnetic flow meter

4. Capacity of flow measurement device: Capable of measuring all flow
5. Recordings are: ☒ continuous ☐ manual
6. Last date of calibration, if in operation: Flow meter to be installed after well is built

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Water Management Act Program

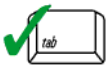
WMA Form B

Groundwater Withdrawal Point

Please provide a separate Form B for each withdrawal point source. Please answer only if the requested information is known and reliable.

A. Withdrawal Point Information

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



1. Name and Address of Withdrawal Point

   Lynch Site, Test Well Site TW 14-16
   Name of Withdrawal Point

   215 Linebrook Road
   Street Address

   Ipswich — City
   MA — State
   01938 — Zip Code

   To be assigned
   Source Code (for public water supplies)

2. Has this well been registered? ☐ Yes ☒ No

   Month and year put in operation or planned: 2020

3. Has this well been in regular operation at any time? ☐ Yes ☒ No

   Month and year put in operation or planned: 2020

4. USGS quadrangle name: Georgetown

5. Latitude and Longitude: 42˚ 41’ 16.70” N (Latitude) 70˚ 52’ 50.30" W (Longitude)

   Please provide a locus map of the withdrawal and any associated reservoirs or ponds.

B. Geologic Information

1. Aquifer type: ☐ Bedrock ☒ Confined ☐ Unconfined
2. Depth to bedrock: 55 ft below ground surface (feet)

C. Well Information

1. Well type: ☒ Gravel pack ☐ Gravel developed ☐ Tubular well field ☐ Dug well

   ☐ Other (describe):

2. Year to be installed (if not already installed): 2019-2020
3. Well depth: 55 feet
4. Depth to water level when installed: 9 feet

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Water Management Act Program

WMA Form B

Groundwater Withdrawal Point

C. Well Information (cont'd)

5. Name and address of well driller:

Proposed Well at TW 14-16
Name of Withdrawal Point

Well Drilling Contractor TBD
Street Address

City | State | Zip Code

D. Pumping Information

1. Was a pump test conducted on this well? ☒ Yes ☐ No

   If yes, provide date: August 2018

   Firm conducting the test: AECOM/Maher Services, Inc.

   If no, is one planned? ☐ Yes ☐ No

Items 2-7 are for Public Water Supplies.

2. Has a Zone II delineation been performed for this well? ☒ Yes ☐ No
3. If yes, has this Zone II been approved by the Department? ☐ Yes ☒ No
4. Date of Zone II delineation: November 2018, pending approval
5. Firm conducting Zone II delineation: AECOM
6. What is the maximum daily withdrawal rate? 510 gpm, well field capacity, pending approval
7. Is this a DEP-approved withdrawal rate? ☐ Yes ☒ No

E. Meter Information

1. If in operation, is this well metered? ☐ Yes ☐ No
2. If proposed, when will meter(s) be installed? before well is in operation
3. Type of flow measurement device installed or planned:

   ☐ weir ☐ flume ☐ venturi ☒ other meter ☐ other (describe): Magnetic flow meter

4. Capacity of flow measurement device: Capable of measuring all flow
5. Recordings are: ☒ continuous ☐ manual
6. Last date of calibration, if in operation: Flow meter to be installed after well is built

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Water Management Act Program

WMA Form B

Groundwater Withdrawal Point

Please provide a separate Form B for each withdrawal point source. Please answer only if the requested information is known and reliable.

A. Withdrawal Point Information

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.

1. Name and Address of Withdrawal Point

   Lynch Site, Test Well Site TW 15-16
   Name of Withdrawal Point

   215 Linebrook Road
   Street Address

   Ipswich — City
   MA — State
   01938 — Zip Code

   To be assigned
   Source Code (for public water supplies)

2. Has this well been registered? ☐ Yes ☒ No

   Month and year put in operation or planned: 2020

3. Has this well been in regular operation at any time? ☐ Yes ☒ No

   Month and year put in operation or planned: 2020

4. USGS quadrangle name: Georgetown

5. Latitude and Longitude: 42˚ 41’ 16.79” N (Latitude) 70˚ 52’ 48.92" W (Longitude)

   Please provide a locus map of the withdrawal and any associated reservoirs or ponds.

B. Geologic Information

1. Aquifer type: ☐ Bedrock ☒ Confined ☐ Unconfined
2. Depth to bedrock: 53 ft below ground surface (feet)

C. Well Information

1. Well type: ☒ Gravel pack ☐ Gravel developed ☐ Tubular well field ☐ Dug well

   ☐ Other (describe):

2. Year to be installed (if not already installed): 2019-2020
3. Well depth: 53 feet
4. Depth to water level when installed: 9 feet

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Water Management Act Program

WMA Form B

Groundwater Withdrawal Point

C. Well Information (cont'd)

5. Name and address of well driller:

Proposed Well at TW 15-16
Name of Withdrawal Point

Well Drilling Contractor TBD
Street Address

City State Zip Code

D. Pumping Information

1. Was a pump test conducted on this well? ☒ Yes ☐ No

   If yes, provide date: August 2018

   Firm conducting the test: AECOM/Maher Services, Inc.

   If no, is one planned? ☐ Yes ☐ No

Items 2-7 are for Public Water Supplies.

2. Has a Zone II delineation been performed for this well? ☒ Yes ☐ No
3. If yes, has this Zone II been approved by the Department? ☐ Yes ☒ No
4. Date of Zone II delineation: November 2018, pending approval
5. Firm conducting Zone II delineation: AECOM
6. What is the maximum daily withdrawal rate? 510 gpm, well field capacity, pending approval
7. Is this a DEP-approved withdrawal rate? ☐ Yes ☒ No

E. Meter Information

1. If in operation, is this well metered? ☐ Yes ☐ No
2. If proposed, when will meter(s) be installed? before well is in operation
3. Type of flow measurement device installed or planned:

   ☐ weir ☐ flume ☐ venturi ☒ other meter ☐ other (describe): Magnetic flow meter

4. Capacity of flow measurement device: Capable of measuring all flow
5. Recordings are: ☒ continuous ☐ manual
6. Last date of calibration, if in operation: Flow meter to be installed after well is built

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Water Management Act Program

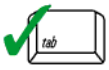
WMA Form B

Groundwater Withdrawal Point

Please provide a separate Form B for each withdrawal point source. Please answer only if the requested information is known and reliable.

A. Withdrawal Point Information

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



1. Name and Address of Withdrawal Point

   Lynch Site, Test Well Site TW 16-16
   Name of Withdrawal Point

   215 Linebrook Road
   Street Address

   Ipswich — City
   MA — State
   01938 — Zip Code

   To be assigned
   Source Code (for public water supplies)

2. Has this well been registered? ☐ Yes ☒ No

   Month and year put in operation or planned: 2020

3. Has this well been in regular operation at any time? ☐ Yes ☒ No

   Month and year put in operation or planned: 2020

4. USGS quadrangle name: Georgetown

5. Latitude and Longitude: 42˚ 41’ 16.22” N (Latitude) 70˚ 52’ 49.52" W (Longitude)

   Please provide a locus map of the withdrawal and any associated reservoirs or ponds.

B. Geologic Information

1. Aquifer type: ☐ Bedrock ☒ Confined ☐ Unconfined
2. Depth to bedrock: 56 ft below ground surface (feet)

C. Well Information

1. Well type: ☒ Gravel pack ☐ Gravel developed ☐ Tubular well field ☐ Dug well

   ☐ Other (describe):

2. Year to be installed (if not already installed): 2019-2020
3. Well depth: 56 feet
4. Depth to water level when installed: 9 feet

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Water Management Act Program

WMA Form B

Groundwater Withdrawal Point

C. Well Information (cont'd)

5. Name and address of well driller:

Proposed Well at TW 16-16
Name of Withdrawal Point

Well Drilling Contractor TBD
Street Address

City State Zip Code

D. Pumping Information

1. Was a pump test conducted on this well? ☒ Yes ☐ No

   If yes, provide date: August 2018

   Firm conducting the test: AECOM/Maher Services, Inc.

   If no, is one planned? ☐ Yes ☐ No

Items 2-7 are for Public Water Supplies.

2. Has a Zone II delineation been performed for this well? ☒ Yes ☐ No
3. If yes, has this Zone II been approved by the Department? ☐ Yes ☒ No
4. Date of Zone II delineation: November 2018, pending approval
5. Firm conducting Zone II delineation: AECOM
6. What is the maximum daily withdrawal rate? 510 gpm, well field capacity, pending approval
7. Is this a DEP-approved withdrawal rate? ☐ Yes ☒ No

E. Meter Information

1. If in operation, is this well metered? ☐ Yes ☐ No
2. If proposed, when will meter(s) be installed? before well is in operation
3. Type of flow measurement device installed or planned:

   ☐ weir ☐ flume ☐ venturi ☒ other meter ☐ other (describe): Magnetic flow meter

4. Capacity of flow measurement device: Capable of measuring all flow
5. Recordings are: ☒ continuous ☐ manual
6. Last date of calibration, if in operation: Flow meter to be installed after well is built

FORM D2

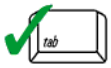
PROJECTION OF PARKER RIVER BASIN WITHDRAWAL VOLUMES
YEARS 1 - 20

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Water Management Act Program

Form WMA-D2

Projection of Withdrawal Volume - Years 1-20

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



1. Fill in the projected daily average water withdrawal in millions of gallons in Column 1. NOTE: 100,000 gallons = 0.10 MG
2. In Column 2, fill in the number of days you expect to operate. For **year-round withdrawals**, enter 365 days. For **seasonal withdrawals**, multiply the number of months that you will operate each year by 30 to get the days of operation (e.g., a golf course that irrigates during April, May, June, July, August, September, and October would enter 7 months of operation x 30 days = 210 days of operation).
3. Multiply the average daily water withdrawal (Column 1) by the days of operation (Column 2) to get the total annual water withdrawal. Enter the number in Column 3.

	Year	Average Daily Withdrawal Volume	Days of Operation	Total Annual Water Withdrawal
	2020	0.30 Lynch Wellfield only	60	18
	2021	0.30	365	110
	2022	0.31	365	113
	2023	0.31	365	113
Years 1-5	2024	0.32	365	117
	2025	0.32	365	117
	2026	0.33	365	120
	2027	0.33	365	120
	2028	0.34	365	124
Years 6-10	2029	0.34	365	124
	2030	0.35	365	128
	2031	0.35	365	128
	2032	0.36	365	131
	2033	0.36	365	131
Years 11-15	2034	0.37	365	135
	2035	0.37	365	135
	2036	0.38	365	139
	2037	0.38	365	139
	2038	0.39	365	142
Years 16-20	2039	0.39	365	142

--Continued on following page--

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Water Management Act Program

Form WMA-D2

Projection of Withdrawal Volume - Years 1-20

4. The requested withdrawal volume during Years 1-5, Years 6-10, Years 11-15 and Years 16-20 of the permit period is shown in Column 1.

Average daily withdrawal volumes:	0.98 Years 1-5	Permit Renewal	Permit Renewal	Permit Renewal

5. If part of this volume is registered, subtract the registered volume from the average daily withdrawal volumes for Years 1-5, Years 6-10, Years 11-15 and Years 16-20 to get the requested permit volumes.

0.34 Permitted Average daily withdrawal volume for Years 1-5	-	0.64 Registered volume	=	No additional volume requested Requested permit volume for Years 1-5
Renewed Permit Volume Average daily withdrawal volume for Years 6-10	-	0.64 Registered volume	=	Requested permit volume for Years 6-10
Renewed Permit Volume Average daily withdrawal volume for Years 11-15	-	0.64 Registered volume	=	Requested permit volume for Years 11-15
Renewed Permit Volume Average daily withdrawal volume for Years 16-20	-	0.64 Registered volume	=	Requested permit volume for Years 16-20

6. Enter these requested permit volumes on Form A, Number 5, Years 1-5, Years 6-10, Years 11-15, and Years 16-20.

For withdrawals with seasonal variation

7. Withdrawals are often made at varying rates over the course of the season or year. For example, golf courses typically irrigate for six or seven months per year, with peak irrigation taking place during the summer months; an industry might eliminate one shift during the summer; or a public water supplier might have a large summer population to supply.

   If your withdrawal has large seasonal variations, please show the pattern of monthly withdrawals for a typical year in the space below. The numbers you use can be actual projections for one year during the permit period.

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Year												

   If you expect the seasonal variation in your withdrawal to change during the permit period, or if you feel that there is any unique aspect to the pattern of your withdrawal, please provide that information in the space below.

-- Continued on following page --

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Water Management Act Program

Form WMA-D2

Projection of Withdrawal Volume - Years 1-20

8. For each withdrawal point in your application provide the portion (percent) of the projected withdrawal that you expect to take from each withdrawal point, e.g., Well #1 = 25%, Well 2 = 25%, Well 3 = 50%.

Year	Lynch WF Point Name	Reservoirs Point Name	Browns well Point Name	Mile Lane well Point Name	Total Parker Point Name
2020	10%	60%	20%	10%	100%
2021	30%	50%	10%	10%	100%
2022	30%	50%	10%	10%	100%
2023	30%	50%	10%	10%	100%
2024	30%	50%	10%	10%	100%
2025	30%	50%	10%	10%	100%
2026	30%	50%	10%	10%	100%
2027	30%	50%	10%	10%	100%
2028	30%	50%	10%	10%	100%
2029	30%	50%	10%	10%	100%
2030	30%	50%	10%	10%	100%
2031	30%	50%	10%	10%	100%
2032	30%	50%	10%	10%	100%
2033	30%	50%	10%	10%	100%
2034	30%	50%	10%	10%	100%
2035	30%	50%	10%	10%	100%
2036	30%	50%	10%	10%	100%
2037	30%	50%	10%	10%	100%
2038	30%	50%	10%	10%	100%
2039	30%	50%	10%	10%	100%

FORM H

GROUNDWATER HYDRAULIC ANALYSIS
WELLFIELD AT WELL SITES TW 13-16, TW 14-16, TW 15-16, TW 16-16

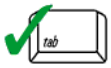
Note: Complete groundwater hydraulic analysis is contained in the New Source Final Report submitted to DEP/SERO in December 2018 under Transmittal Number X282145.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Water Management Act Program

WMA Form H - Groundwater Hydraulic Analysis

A. Applicant Information

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



Ipswich Utilities Department
Name

272 High Street
Mailing Address

Ipswich
City

Massachusetts
State

01938
Zip Code

978-356-6635
Telephone Number

Signature

Date

B. Pumping Test Report

Submit the pumping test report as outlined in Appendix F.

AECOM
Consultant Name

Douglas DeNatale
Reviewer's Name

250 Apollo Drive
Mailing Address

Chelmsford
City

Massachusetts
City

978-905-2180
Telephone Number

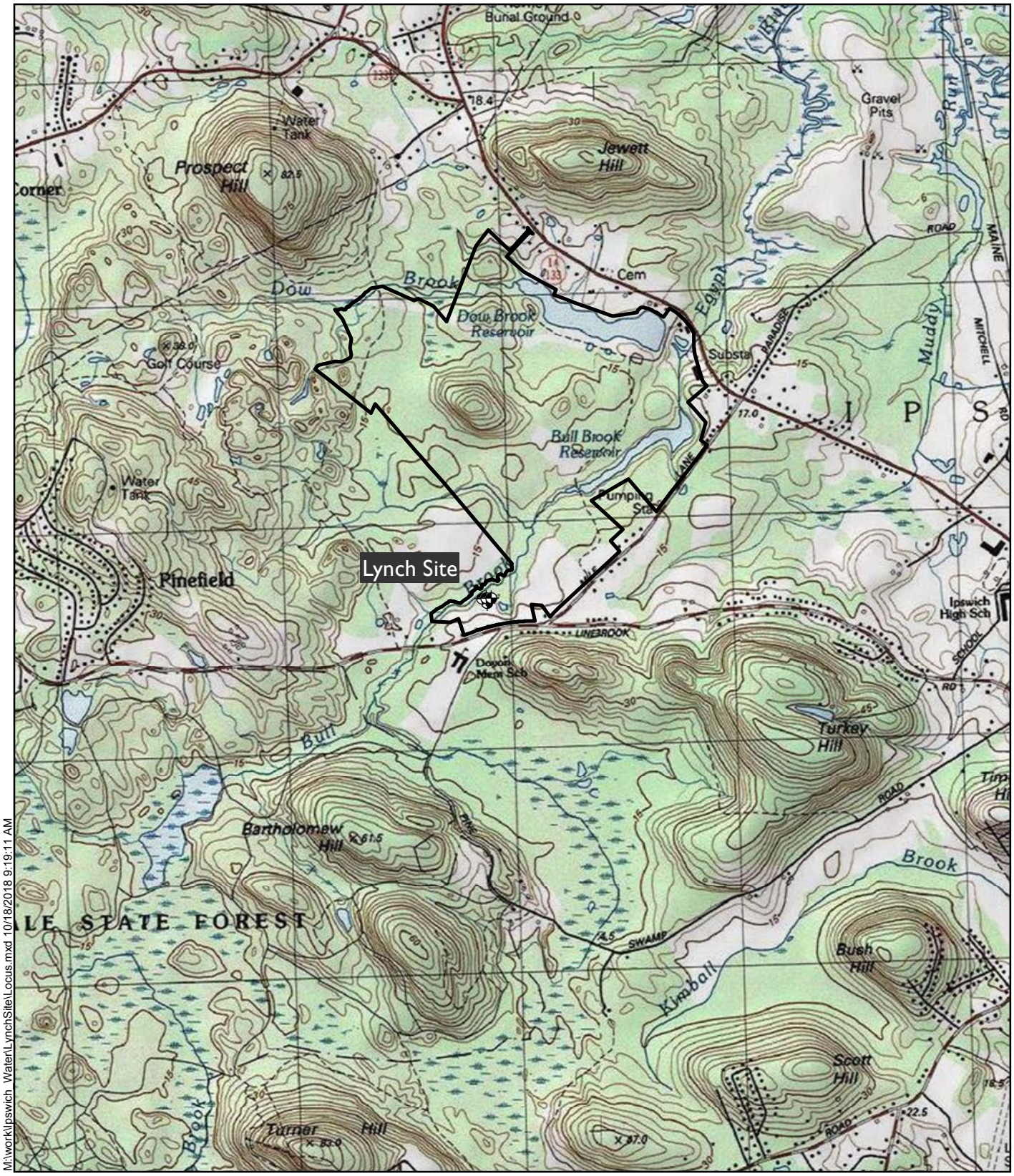
978-905-2180
Telephone Number

Signature

December 2018
Date

APPENDIX A

FIGURE 1-1, LOCUS MAP
FIGURE 1-2, SITE PLAN
PROPOSED WELLFIELD AT THE LYNCH SITE
TEST WELL SITES TW 13-16, TW 14-16, TW 15-16, TW 16-16



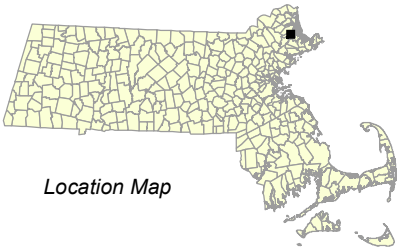
M:\work\Ipswich_Water\LynchSite\Locus.mxd 10/18/2018 9:19:11 AM

Sources: MassGIS and Esri

Well Locations - Lynch Site

Property Boundary
Town of Ipswich Land

0 1,000 2,000 4,000 Feet

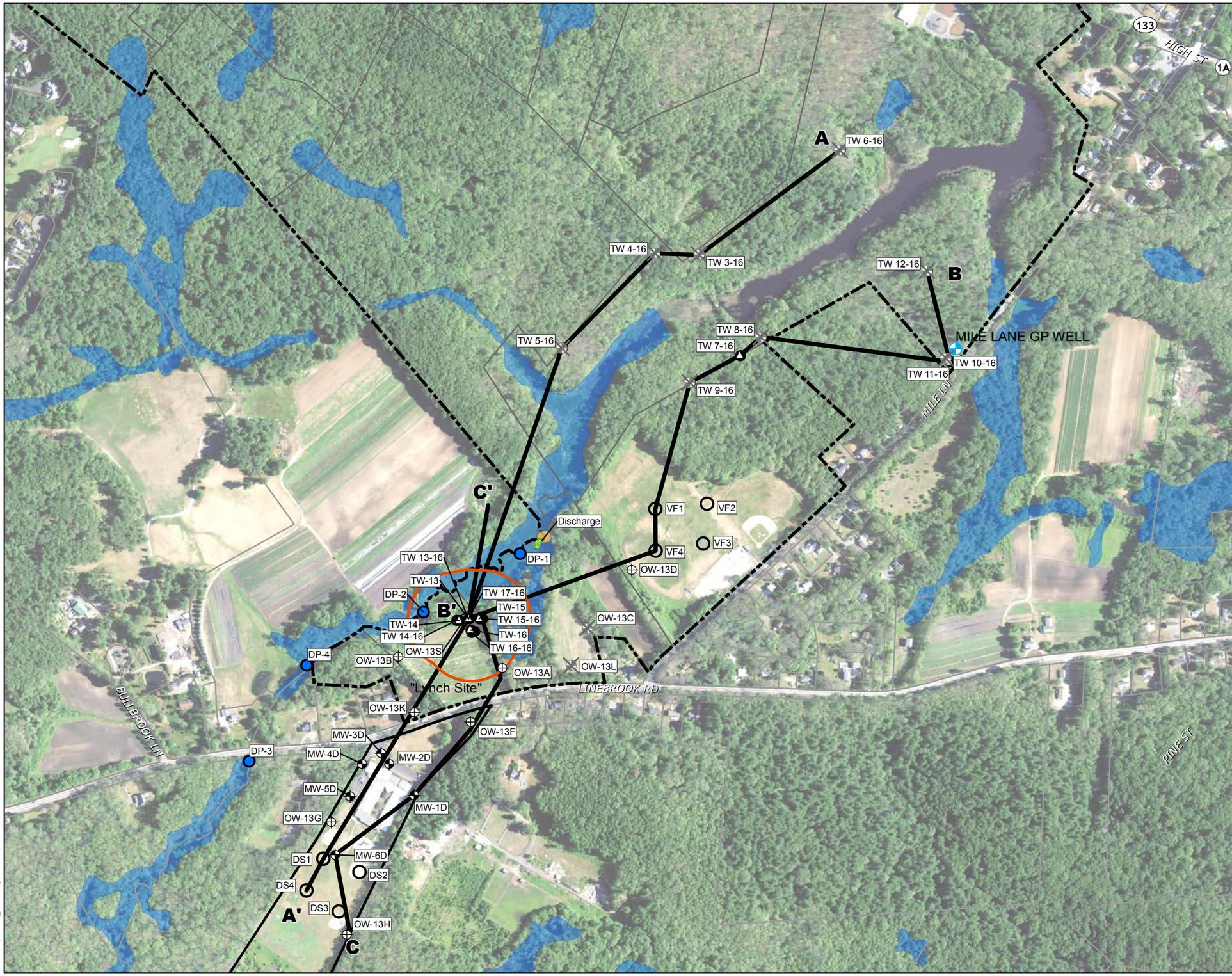


Location Map

Figure 1-1
Locus Map
Lynch Site
Ipswich, MA

November 2018

AECOM



AECOM Imagine it. Delivered.

Property Boundary Town of Ipswich Land

DEP Wetland

Public Water Supply Groundwater

Soil Boring by Others

Hand-Driven Well Point

Monitoring Well

Observation Well

8-Inch Diameter Test Well

Pumping Test Temporary Discharge

Removed Test Well/ Boring

Proposed 250-Ft Zone I Boundary (Four Well Sites)

A A' Line of Geologic Cross-section (See Figs: 2-3, 2-4, & 2-5)

Base map data provided by MassGIS and USDA.
Date of photo: 2016

November 2018

Figure 1-2

Site Plan

Lynch Site
Ipswich, MA

0 250 500 1,000 Feet

M:\work\Ipswich_Water\LynchSite\SitePlan.mxd 10/18/2018 4:30:53 PM

APPENDIX B

DEP SITE EXAM/PUMPING TEST PROPOSAL - APPROVAL LETTER

Public Notice of Application for a Water Management Act Permit Amendment
In the Parker River Basin
Ipswich Utilities Department, 272 High Street, Ipswich, MA 01938

The Town of Ipswich has applied to the Massachusetts Department of Environmental Protection (DEP) for a Water Management Act Permit Amendment in the Parker River Basin. The Town is seeking to construct a municipal well field of four wells at the former Lynch Property on Linebrook Road to supplement the Town's existing water supply, and to promote drought resiliency. The capacity of the well field is 510 gallons per minute (gpm). The new wells will not result in an increase in the water allocated to Ipswich for withdrawal under its Water Management Act permit. A copy of the application is available for review at the Ipswich Utilities Department, 272 High Street, Ipswich, MA 01938. Please contact Ms. Vicki Halmen, Water and Wastewater Director, at 978-356-6635, to arrange an appointment.

Written comments on the application may be submitted within 30 days of [insert date of publication of the notice in local paper]. Written comments are to be submitted to Ms. Vicki Halmen and to MassDEP, 1 Winter Street, 5th Floor, Boston, MA 02108, Attention: Duane Levangie.

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

Northeast Regional Office • 205B Lowell Street, Wilmington MA 01887 • 978-694-3200

Charles D. Baker
Governor

Karyn E. Polito
Lieutenant Governor

Matthew A. Beaton
Secretary

Martin Suuberg
Commissioner

June 27, 2018

Vicki Halmen
Ipswich Water & Sewer Division
P.O. Box 151
Ipswich, MA 01931

RE: City/Town: Ipswich
PWS Name: Ipswich Water & Sewer Division
PWS-ID No.: 3144000
Program: System Modifications
Action: Approval— Lynch Wellfield Site Exam/Pumping Test Proposal
Transmittal No.: X280136

Dear Ms. Halmen:

Please find attached the following information:

Approval of the site examination and pumping test proposal for a proposed public supply wellfield located off of Linebrook Road in Ipswich.

Please note that the signature on this cover letter indicates formal issuance of the attached document. **Please contact this office at least 5 days prior to the start of the prolonged pumping test.** If you have any questions regarding this letter, please contact James Persky at (978) 694-3227.

Sincerely,

James H. Persky
Environmental Analyst
Drinking Water Program

Sincerely,

Thomas Mahin
Drinking Water Section Chief
Northeast Regional Office

cc: DWP/Boston Office (no attachment)
Bruce Bouck, MassDEP, Drinking Water, Boston
Julie Butler, MassDEP, Water Management, Boston
Douglas DeNatale, AECOM, 250 Apollo Drive, Chelmsford, MA 01824

File Name: Y:\DWP Archive\NERO\Ipswich-3144000-System Modifications-2018-06-27

This information is available in alternate format. Call Michelle Waters-Ekanem, Diversity Director, at 617-292-5751. TTY# MassRelay Service 1-800-439-2370
MassDEP Website: www.mass.gov/dep

Printed on Recycled Paper

DESCRIPTION OF PROJECT

The Massachusetts Department of Environmental Protection (MassDEP) has reviewed an April 20, 2018 report by your hydrogeologic consultant, AECOM, which contains a site examination request and prolonged pumping test design for a proposed public supply wellfield for the Town of Ipswich Water & Sewer Division.

The Town has been investigating potential locations to supplement or replace its existing supplies, in order to provide redundancy and to minimize the use of two existing municipal wells that have elevated levels of naturally occurring manganese.

Based on 2016 test well drilling, the Town has identified a location off of Linebrook Road to site an additional public water supply source. This location, which is adjacent to Bull Brook upstream from the Town's Bull Brook Reservoir, is called the Lynch site, after a previous property owner. The parcel is now owned by the Town. AECOM estimates that a wellfield of four wells at the site could yield 300 to 400 gallons per minute (gpm). The aquifer at the site is a thin layer of gravel (4 to 6 feet thick) that is 45 to 50 feet below the ground surface. The gravel layer is overlain by a confining layer of glaciomarine clay, with fine sand and silt above that.

MassDEP representatives inspected the wellfield site on June 11, 2018. The Town parcel where the wellfield is located is presently leased for strawberry farming. Roughly 30% of the Zone I protective radius for the wellfield is cultivated fields, though not all of this area is currently in production. Additional farms are located to the north and northwest of the wellfield, outside the Zone I. Bull Brook is about 160 feet north of the nearest proposed well. The land north of Bull Brook is not owned by the Town, and is also leased for farming. This property includes a small portion of the Zone I that includes wetlands and a portion of a farm pond, but no cultivated land. Farming is also being done on Town property about 375 feet east of the wellfield, and on private property 1,000 feet south of the wellfield. A school is located 850 feet southwest of the wellfield, and athletic fields are located 850 feet east of the wellfield.

Preliminary water quality samples were collected from the wellfield at the end of an 8-hour pumping test on August 31, 2016. Total coliform bacteria were detected in the water, which AECOM attributes to contamination of the sample during the sample collection. Iron and manganese levels were below the Secondary Maximum Contaminant Levels for those metals. The water was hard, with a hardness of 134 milligrams per liter (mg/L). The pH was measured in the field as 7.9. The sodium concentration was 104 mg/L, higher than the level in any of Ipswich's current sources of water supply.

Pumping Test Proposal

Subsequent to the submittal of the AECOM April 20, 2018 report, several revisions have been made to the pumping test proposal in electronic mail between AECOM and MassDEP. This description of the pumping test design includes these revisions.

Four 8-inch test wells will be installed at the wellfield site, to serve as production wells during the test. Because the proposed withdrawal rate from the wellfield exceeds 50% of the estimated August median flow in Bull Brook, a 15-day pumping test will be conducted.

For the first 48 hours of the test, a single production well will be pumped at 300 gpm to evaluate the aquifer characteristics. After 48 hours, the pumping rate in that well will be dropped to 75 gpm, and the other three wells will begin pumping at 75 gpm each. The pumping test will then continue for another 13 days. The pumped water will be discharged to Bull Brook roughly 650 feet downstream from the wellfield, outside the Zone I. The four wells will be discharged via separate pipes, so that the pumping rate in each well can be measured, and adjusted as needed (water quality samples will therefore be a composite of samples from the four discharge lines).

After 15 days, the end-of-test water quality samples will be collected. The wells will then be turned off, and recovery measurements will be collected.

Water level measurements will be collected at 15 observation wells, and at 4 drive points along Bull Brook. Seepage meters will be installed at two of the drive points if field conditions permit. The drive point shown as DP-3 in the AECOM report will be moved farther upstream, to Linebrook Road. Two existing wells about 8,000 feet northeast of the wellfield will be used as ambient wells, and real-time data from U.S. Geological Survey groundwater monitoring network wells in Newbury and Wenham will also be used to evaluate ambient groundwater trends. MassDEP had sought to relocate one of the planned observation wells to the north side of Bull Brook, but the land owners did not grant permission for the Town to install a well on that property.

APPROVAL AND REQUIREMENTS

MassDEP **approves** the Lynch wellfield site for further testing for public water supply. MassDEP also **approves** the design of the prolonged pumping test. **Please note that this letter does not constitute approval for water production or use from the site.** Such approval will depend on the results of water quality and water quantity testing of the site, as described in *Guidelines for Public Water Systems*. Pursuant to MassDEP's authority under 310 CMR 22.04(7) to require that each supplier of water operate and maintain its system in a manner that ensures the delivery of safe drinking water to consumers, this permit is made subject to the following conditions:

1. The pumping test must accomplish the work described in AECOM's April 2018 proposal, as amended herein.

2. The pumping test must be conducted within two years of the date of this letter. After this date, a new approval will be required.

3. This office must be informed as to when the pumping test is expected to begin.

4. In addition to the proposed water quality sampling, the wellfield must be sampled at the end of the pumping test for six perfluorinated compounds via EPA Method 537: Perfluorooctanoic acid (PFOA), perfluorooctanesulfonate (PFOS), perfluorononanoic acid (PFNA), perfluorohexanesulfonic acid (PFHxS), perfluoroheptanoic acid (PFHpA) and Perfluorobutane sulfonate (PFBS). MassDEP is requiring that all testing of new and replacement public water supply sources include testing for perfluorinated compounds. MassDEP will accept analyses done by laboratories that were approved by the U.S. Environmental Protection Agency for Method 537 during the Unregulated Contaminant Monitoring Rule UCMR3 testing. A listing of these laboratories can be found at:

   https://www.epa.gov/sites/production/files/2016-10/documents/ucmr3-lab-approval.pdf

5. Sampling and analysis of gross beta particle activity is not required.

6. To avoid complications that have occurred on some pumping tests, please make sure that the laboratory analyzing the water quality samples is aware that 1) the samples are drinking water samples, and must be analyzed using drinking water analytical methods, detection limits, and holding times; and 2) nitrate, nitrite, and perchlorate must be included in the inorganic analyses. All laboratory water quality samples must be analyzed by laboratories certified by the Commonwealth of Massachusetts to perform these analyses.

7. A Source Final Report containing the results of the pumping test must be submitted to this office for approval, in order to continue with the permitting process for the well. Two copies of this document must be submitted, along with a MassDEP transmittal form and an application for MassDEP Permit Category BRPWS19.

8. The Source Final Report must include a surveyed site plan that includes at least the entire Zone I area, at a scale large enough to accurately show the locations of the production and observation wells relative to one another and to the property lines.

9. The Source Final Report must include an evaluation of the corrosivity of the water (using secondary contaminants such as pH, alkalinity, chloride, sulfate, and hardness) to determine the need for corrosion control treatment, including whether changes are needed to any corrosion control strategy that may already be in place for Ipswich's existing water sources.

10. The Ipswich Water & Sewer Division will need to obtain a Water Withdrawal Permit amendment in the Parker River Basin to add the Lynch Wellfield as an authorized withdrawal point on its existing permit. If you will exceed your 0.98 million gallon per day authorized withdrawal volume (average daily withdrawal over a calendar year) in the Parker River Basin as a result of the new wellfield, then a new Water Withdrawal Permit will be needed. The Water Withdrawal Permit or amendment application must be submitted at the same time as the Source Final Report; MassDEP will review the two applications concurrently. **A completed Water Conservation Questionnaire must be**

submitted as part of this application, if it has not been submitted prior to the time of application. If you have questions regarding Water Management Act permitting, please contact Julie Butler at (617) 292-5552.

11. If the final wellfield design will use individual submersible pumps in each well rather than a suction pumping system, then the pump intake depths may be no greater than 28 feet below the ground surface. (In order to be eligible for the 250 foot Zone I radius, a wellfield of wells with submersible pumps must mimic the drawdown limitation of a suction lift system.)

12. The Town does not presently own the entire Zone I protective radius for the wellfield. MassDEP will not approve construction of the permanent pumping facilities for the wellfield until the Town demonstrates that it has obtained ownership or control of the Zone I. Control of the Zone I is generally established via easement and Conservation Restriction, as described in MassDEP Drinking Water Program Policy # 94-03. The Conservation Restriction and easement language must be reviewed by MassDEP. Acquisition of water supply land or rights in land requires MassDEP approval and a public hearing.

13. The Town of Ipswich presently has zoning and non-zoning controls that meet the standards of 310 CMR 22.21(2) to protect the Zone II wellhead protection area for the Mile Lane Well. This Zone II is very similar to the estimated Zone II for the Lynch Wellfield. If the final Zone II delineation for the Lynch Wellfield includes any areas that are not part of the existing Zone II for the Mile Lane Well, then the Town must add these areas to the Zone II Groundwater Protection Areas on its Water Supply Protection District Map. MassDEP will not grant final approval to place the Lynch Wellfield on-line for public water supply until the Town demonstrates that the Zone II for the Lynch Wellfield is protected by zoning and non-zoning controls that meet the standards of 310 CMR 22.21(2).