



Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

One Winter Street Boston, MA 02108 • 617-292-5500

Charles D. Baker
Governor

Karyn E. Polito
Lieutenant Governor

Matthew A. Beaton
Secretary

Martin Suuberg
Commissioner

May 2, 2019

Ms. Vicki Halmen, Water & Wastewater Director
Ipswich Utilities Department
272 High Street
Ipswich, MA 01938

System: Ipswich Water Department
WMA Permit #: 9P2-3-16-144.01
Program: Water Management Act
Action: Permit Amendment Order to Complete

Dear Ms. Halmen:

The Massachusetts Department of Environmental Protection (MassDEP) has completed its initial review of the Ipswich Water Department's Water Management Act (WMA) permit amendment application submitted on December 26, 2018 for withdrawal from the Parker River Basin. The review of the permit amendment application also includes a review of the existing WMA permit dated May 24, 2002, which was appealed and remanded to MassDEP on April 30, 2009 to calculate the safe yield of the Parker River Basin.

MassDEP's review reveals that some required components of the application are incomplete, require clarification, or are technically deficient. WMA permit renewal applications are not complete until all relevant public comments and other required technical elements are addressed to the satisfaction of MassDEP. Without submission of the required information, the application is incomplete. **MassDEP requires you to submit a response to these questions within 90 days of issuance of this Order to Complete (OTC).**

MassDEP may, at its option, allow more time to submit this information if a written request for additional time is submitted before the deadline. If you fail to submit the additional information within the timeframe above, your application may be deemed withdrawn.

Following completion of the review of your response to this OTC, MassDEP will prepare a draft of the amended permit for review and comment.

MassDEP looks forward to working with you as we begin to finalize the review of your Water Management Act permit amendment application. **Please submit the following requested information and documentation as depicted in bold text** to MassDEP Water Management Program, Attn: Julie Butler, One Winter Street, Boston, MA 02108.

**ORDER TO COMPLETE
IPSWICH WATER DEPARTMENT**

WATER MANAGEMENT ACT PERMIT #9P2-3-16-144.01

The following outlines information necessary to complete the permit amendment process, and the proposed modifications to Ipswich's Water Management Act (WMA) permit last issued on May 24, 2002 in the Parker Basin. This Order to Complete describes the additional information required to complete the review. **By August 1, 2019 (90 days), please submit all requested information and documentation as depicted in bold text to the MassDEP Water Management Program, Attn: Julie Butler, One Winter Street, Boston, MA 02108.**

The regulations at 310 CMR 36.21 define the required contents of a complete permit amendment application. This section identifies all information necessary to complete the application as defined by the regulations. The information required by this Order to Complete must be provided to complete the review of the amendment application. Failure to submit the required information may result in a determination by MassDEP that no application for a WMA permit amendment has been made.

MassDEP may, at its option, agree to a request for an extension of the time allowed to submit all or part of the additional information required, if the request is received in writing within 90 days of issuance of this letter. Please note that failure to respond within timeframe could result in an enforcement action by MassDEP.

Following the completion of the review of your response to the Order to Complete, MassDEP will prepare a draft of the amended permit for review and comment. Any modified conditions of your permit amendment will be based upon your response, and will be consistent with the Massachusetts Water Conservation Standards approved by the Water Resources Commission in July 2018. These standards can be found at: <http://www.mass.gov/eea/docs/dcr/watersupply/intbasin/waterconservationstandards.pdf>.

In February 2018, Ipswich submitted a 20-year permit renewal application for its Parker River Basin permit. The Permit Extension Act (PEA), Section 173 of Chapter 240 of the Acts of 2010, as amended by Sections 74 and 75 of Chapter 238 of the Acts of 2012, extended all existing permits by four years. Therefore, the original expiration date for permits in the Parker River Basin was extended from February 28, 2015 to February 28, 2019. Pursuant to M.G.L. c. 30A, § 13, and 310 CMR 36.18(7), Ipswich's amended permit will continue in force and effect until the Department issues a decision on its renewal application. This action is an amendment of Ipswich's existing Water Management Act permit and is not a renewal of that permit. MassDEP has retained Ipswich's Parker Basin renewal application on file and will review that application when the Department begins the basin renewal process for all applications in the Parker River Basin in 2023. Note that MassDEP revised the Water Management Act Regulations (310 CMR 36.00) in November 2014 to require permittees, where applicable, to address the impact of withdrawals on Cold Water Fishery Resources, and develop Minimization and Mitigation Plans. You will be contacted at the time of the permit renewal application review should MassDEP need additional information to complete its review.

Nothing contained in this Order to Complete should be interpreted to preclude MassDEP from requiring any additional information it deems reasonable and necessary to review your permit amendment application. MassDEP reserves the right to take future enforcement action for any violation of the Water Management Act, or its regulations, found during this review.

INTRODUCTION:

On December 26, 2018, the Department received a WMA Permit Amendment Application from the Town of Ipswich. The application requests an amendment to the WMA Parker River Basin Permit held by the Town of Ipswich to add a new wellfield composed of four wells located at 215 Linebrook Road in Ipswich. The Town is not applying for an increase in their authorized system-wide withdrawal volume but would instead like to add the new source to improve the resiliency and redundancy of the Town's water supply. The new wellfield is proposed to have a maximum daily approved volume of 0.73 million gallons per day (mgd).

In addition to the WMA permit amendment application, the Department also reviewed the following related materials: Ipswich's Request for Site Exam and Pumping Test Proposal submitted to DEP on April 20, 2018; Ipswich's Prolonged Pumping Test and New Source Final Report submitted to DEP on December 26, 2018; Ipswich's Environmental Notification Form (ENF) submitted to the Massachusetts Environmental Protection Act (MEPA) Program on January 22, 2019; a MEPA Certificate issued to Ipswich on March 8, 2019; Ipswich's response to ENF comments, dated February 22, 2019; Ipswich's Water Demand and Supply Evaluation Final Report, dated February 2019; Ipswich's Water Conservation Questionnaire, dated February 28, 2018; and Ipswich's existing WMA permit, dated May 24, 2002.

EXISTING PERMIT CONDITIONS:

Special Condition 1, Maximum Authorized Annual Average Withdrawal Volume

Ipswich is authorized by WMA registration #316144.01 to withdraw 0.64 million gallons per day (mgd) and by WMA permit #9P2-3-16-144.01 to withdraw an additional 0.34 mgd from the Parker River Basin. Ipswich is also authorized by WMA registration #317144.02 to withdraw 0.20 mgd from the Ipswich River Basin. Ipswich's reported withdrawals in the Parker River Basin have been below the authorized annual average volume of 0.98 mgd since it received a permit in 2002. While Ipswich's reported withdrawals in the Ipswich River Basin have been in compliance¹ with the Water Management Act, with the exception of 2016 when an Emergency Declaration was issued allowing for the additional volumes, withdrawals have consistently been above their registered volume. Table 1 provides the most recent five years of Ipswich's reported withdrawals in each basin.

Because the permit amendment application does not request a change in the authorized annual average withdrawal volume in the Parker River Basin, this condition will not change in the amended permit.

Table 1. Ipswich's recently reported withdrawals

Year	2014	2015	2016	2017	2018
Parker River Basin Reported Withdrawals (mgd)	0.71	0.81	0.65	0.78	0.79
Ipswich River Basin Reported Withdrawals (mgd)	0.23	0.27	0.32	0.23	0.25
Total Reported Withdrawals (mgd)	0.94	1.08	0.97	1.01	1.01

Special Condition 2, Authorized Withdrawal Points

The Department's review of the past ten years of Ipswich's ASRs show that the authorized maximum daily withdrawal volumes of the permitted wells in the Parker River Basin (Mile Lane Well and Browns Well) have routinely exceeded their authorized volumes. However, in the past three years of record (2015-2017), the Browns Well maximum daily withdrawals have not exceeded the authorized volume.

Q1. Please provide an explanation of the frequent exceedances of the authorized maximum daily withdrawal volume from the Mile Lane and Browns Wells, and steps that Ipswich could take to prevent future exceedances.

¹ Withdrawals may exceed registered volumes by 0.1 mgd without requiring a Water Management Act Permit.

As noted above, Ipswich is proposing to add a well field consisting of four wells: TW 13-16, TW 14-16, TW 15-16, and TW 16-16 located on Linebrook Road in Ipswich (Table 2). The permit amendment application requests a maximum daily approved volume of 0.73 million gallons per day (mgd). The requested maximum daily approved volume will be supported by the results of the constant-rate pumping test required via the Department's New Source Approval process, pursuant to 310 CMR22.00. Although stabilization criteria were ultimately achieved in the final 24 hours of the test (and the Department therefore permitted the cessation of the test), a drawdown rate increase occurred on the 14th day of the constant-rate pumping test. Given the potentially limited extent of the tested aquifer (as described in Ipswich's Request for Site Exam and pumping test report), one objective of running an extended (15-day) test was to ensure that no negative boundaries would be encountered. The pumping test analysis should provide assurance of the wellfield's viability as a long-term water-supply source for the Town, to the extent possible.

The Department therefore expected that Ipswich's pumping test report would include an evaluation of the drawdown rate increase that occurred toward the end of the test. Specifically, the Department expected the following in the pumping test report:

1. a description of the observed magnitude, timing, and duration of the drawdown rate increase;
2. a log of the available pumping records (in gallons per minute) during the test;
3. an interpretation of the potential cause(s) of the drawdown change; and
4. verification that field staff did not adjust the pumping rate after the drawdown rate change occurred.

None of the above was in Ipswich's pumping test report. Ipswich did provide a discussion of what may have caused the drawdown change in its response to ENF comments; however, the level of detail outlined above was not provided.

Q2. Please provide items 2 and 4 in the outline above.

Table 2: Lynch Site Wells

<u>Source</u>	<u>Location</u>	<u>Latitude</u>	<u>Longitude</u>
TW 13-16	215 Linebrook Rd	42 41 16.78	70 52 49.63
TW 14-16	215 Linebrook Rd	42 41 16.70	70 52 50.30
TW 15-16	215 Linebrook Rd	42 41 16.79	70 52 48.92
TW 16-16	215 Linebrook Rd	42 41 16.22	70 52 49.52

In its response to ENF comments, Ipswich stated that, because the annual average withdrawal rate is projected to be less than the pumping test rate (0.3 vs. 0.43 mgd), actual impacts will also be less than those observed during the pumping test. The Department would like to clarify that the WMA Program evaluates the potential peak-use rate (i.e. the requested maximum daily withdrawal of 0.73 mgd) rather than the estimated annual average withdrawal in order to adequately assess impacts during that peak-use period (typically summertime). Furthermore, even if the peak-use rate was equal to or less than the pumping test rate, the assumption that impacts would be less is invalid because long-term use can lead to impacts that were not apparent during a 15-day test.

Special Condition 3, Zone of Contribution (Zone II or Zone III) Delineations

This condition of the permit requires that each of the Town's groundwater sources have a DEP-approved Zone II delineation. Ipswich has DEP-approved Zone II delineations for all of its existing wells. This condition will also be required for the new source prior to final approval. At this time the Department's Drinking Water Program has not completed its review of Ipswich's New Source Approval Report.

Special Condition 4, Wellhead Protection

This condition of the permit requires that Ipswich establish land use controls and water supply protection measures within the Zones of Contribution of its groundwater sources in order to comply with 310 CMR 22.21(2). Ipswich has met the requirements of 310 CMR 22.21(2) for all of its existing wells. This condition will also be required for the new source prior to final approval.

Special Condition 5, Safe Yield of Surface Water Supplies

Ipswich's permit amendment application noted that the Town believes Bull Brook Reservoir's Firm Yield to be less than the 0.8 mgd estimated in 2002 and identified in the WMA permit issued to the Town on May 24, 2002. As such, in its February 12th comments on Ipswich's ENF, the Department recommended that the Town estimate the reservoir system's existing Firm Yield and the extent to which it will be further reduced by the new groundwater withdrawals if the well field supplies 30-50% of the Town's average-day demand (as projected in the permit amendment application). The Department further recommended that the Town evaluate the net increase in its system-wide capacity after accounting for the Firm Yield reduction, and that the evaluation assume a strong hydraulic connection between the semi-confined aquifer, shallow unconfined aquifer and surface water locally. The Department found evidence of a substantial hydraulic connection in the pumping test report, including the lowering of Richards Pond during the test and recovery following the test; the sodium chloride, nitrate, and fecal coliform sampling results that the report attributes to local road treatment and land use; and the water level and seepage meter data from the four drive points installed alongside Bull Brook for the test. The Department finds the report's 18 gpm depletion estimate to be on the low end of potential depletion rates rather than a "worst case scenario" because the flow in Bull Brook was likely low relative to other times of year. Groundwater contributions could be considerably greater at other times of year or if upstream summertime diversions were reduced. The Lynch Site withdrawals could lead to greater depletion rates throughout the year and lengthen the summer period in which the stream experiences little to no flow, which in turn could deplete Bull Brook Reservoir. The Department concludes that the reservoir itself could also be depleted given that the test results, such as observed impacts to Richards Pond, suggest the marine clay layer is locally discontinuous.

In its February 2019 "Water Demand and Supply Evaluation Final Report", the Town provided a revised Firm Yield estimation. The Firm Yield is estimated to be 0.41 mgd, or roughly half of the previously estimated value. This revision is based on 2018 bathymetric surveys, and an estimation approach that appears to be derived by AECOM on behalf of the Town (see below for further comments on this approach). The recent analysis by AECOM did not evaluate how the Firm Yield could be further reduced by the new source withdrawals upstream of Bull Brook Reservoir. Likewise, the analysis did not include an estimation of the net increase in system-wide capacity after accounting for the Firm Yield reduction caused by the new source withdrawals.

Q3. Please evaluate how the Firm Yield could be reduced by the new source withdrawals upstream of Bull Brook Reservoir, and estimate the net increase in system-wide capacity after accounting for the Firm Yield reduction. The analysis should assume a strong hydraulic connection between the semi-confined aquifer and local surface water.

The Department would also like clarification on the methodology that Ipswich used to revise its Firm Yield value. Page 10 of Ipswich's Water Demand and Supply Evaluation Final Report notes that AECOM discussed Firm Yield approaches with the Department and learned that the Department worked with the USGS in the 2000s to formalize a Firm Yield methodology, which included the development of a model that is documented in the USGS report titled "Refinement and Evaluation of the Massachusetts Firm Yield Estimator Model Version 2.0" (herein referred to as the USGS FYE 2.0 model). Ipswich's report noted that "AECOM used the USGS model to estimate the Firm Yield of the reservoir system. The model predicted that..." However, the Firm Yield section of Ipswich's report (Section 3) details another approach that was developed by AECOM. This section indicates that documentation of the USGS model and the Department's

older (1996) Firm Yield Estimator model were referenced but neither model was run. AECOM's methodology appears to deviate from the USGS FYE 2.0 model in a few ways, and some details of the approach are lacking.

Q4. Please provide the input datasets from the AECOM model (e.g. daily precipitation, daily evaporation, daily streamflow, and bathymetry) in Excel or tab-delimited text file format.

Special Condition 6, Drought Management Plan

The Department accepted a final "Town of Ipswich, Drought Management Plan", which was based in part on the estimated response of the Bull Brook and Dow Brook Reservoir system to the 1/20 year drought. The plan identifies drought indicators, drought stages, and mitigation measures to be taken at the various stages.

Q5. Please provide an update to the Drought Management Plan that accounts for the revised Firm Yield.

Special Condition 7, Water Conservation Requirements

The Department evaluates a permittee's compliance with the water conservation requirements based on its responses to the Water Resources Commission's Water Conservation Questionnaire for Public Water Suppliers and your response to any specific issues outlined below. Ipswich submitted this questionnaire with its Parker River Basin permit renewal application in February of 2018.

Q6. Provide additional information on your efforts to address the following conservation conditions in your existing permit:

- a. **Metering** – Please confirm compliance with all Special Condition 7 metering requirements, or indicate which requirements have not been met.
- b. **Leak detection surveys** – The permit requires a full leak detection survey whenever Ipswich's Unaccounted for Water (UAW) exceeds 10% or increases by 5% from one calendar year to another. Your questionnaire indicates that a full leak detection program is conducted annually. Please note any identified leaks that may have led to the recent rise in UAW (11% in 2015, 14% in 2016, and 16% in 2017) and the estimated savings achieved by repairing them.
- c. **Water audits** – Your questionnaire indicates that water audits are not conducted annually and a date of the last audit was not provided. Given Ipswich's recent high UAW values, a water audit may be warranted if leak detection surveys are not resolving the sources of UAW.
- d. **Large Commercial and Industrial Water Conservation Program** – Please report on the status of this permit requirement.
- e. **Retrofitting public buildings with water-saving devices** – The existing permit specifies a deadline of April 30, 2004. Is retrofitting complete?

PUBLIC COMMENTS:

The Department reviewed public comments submitted during the ENF comment period (January 23 – February 26, 2019) and the WMA permit application comment period (February 20 – March 22, 2019). Relevant concerns that were not previously identified in this OTC are detailed below.

Alternatives Analysis

With its response to ENF comments, Ipswich provided a detailed alternatives analysis, titled "Water Demand and Supply Evaluation Final Report" (Feb 2019). However, the report did not discuss the alternative sites that were briefly touched upon in Ipswich's January 2019 ENF. The table in Attachment B of the ENF summarized the six sites that the Town explored for a new groundwater source, including the Lynch Site. The Department would like further detail on work performed at the other five sites. The Water Demand and

Supply Evaluation Final Report cited three reports that were submitted by AECOM to the Town in 2016 and 2017.

Q7. Please provide copies of these three reports, or summarize the work performed and findings at each site, such as boreholes drilled, test wells installed, pumping tests run, and water quality samples collected.

The alternative analysis report stated that, in addition to adding the Lynch Site wellfield as a supply source, Ipswich intends to replace Browns Well and construct a transmission main to the Water Treatment Plant (referred to as "Alternative 2a" in Ipswich's February 2019 report). The WMA Program supports this plan and may consider it in source management planning in future reviews of this permit. The Department finds Alternative 2A to be a worthwhile endeavor to improve the Town's water supply resiliency while also minimizing subbasin impacts. Some form of Browns Well rehabilitation was also supported by several commenters.

Q8. Please verify whether or not Alternative 2a will be pursued concurrently with the Lynch Site development. If so, please provide a timeline for completion of the plan.

Impacts to Bull Brook and Bull Brook Subbasin

Ipswich, in its WMA permit application, ENF, and response to ENF comments, suggested that the proposed withdrawals be put into proper perspective, stating that any streamflow captured by the new wellfield would otherwise be captured by the Town's downstream reservoir (Bull Brook Reservoir). In response to this assertion, the IRWA, Kerry Mackin, the Parker River Watershed Association, and Massachusetts Division of Marine Fisheries (DMF) commented that flow should be allowed to continue past the dam for the benefit of fish habitat in the Egypt River. They highlighted that the Bull Brook/Egypt River system is a former coldwater fishery and that 1990s-2000s sampling data show it to be a historically active migratory and spawning pathway for rainbow smelt, alewife, blueback herring, and white perch. They further noted that the USGS classifies Bull Brook as perennial and its low summertime flow in recent years is most likely the result of relatively new withdrawals and land use changes.

Q9. Please respond to the concerns that the Lynch Site withdrawals will impact the Egypt River, understanding the impact that the withdrawals will have on Bull Brook Reservoir storage (see the Special Condition 5 discussion above) and spillover downstream.

The previously mentioned commenters also recommended streamflow and biological monitoring of Bull Brook and the Egypt River to determine the current state of year-round flow and habitat conditions, and to establish baseline data with which to assess future impacts.

Q10. Please address these recommendations.

Ipswich stated in its response to ENF comments that "it is possible that a large proportion of the groundwater recharged to the confined aquifer travels easterly through the aquifer toward the coast, does not interact with surface water, and ultimately discharges beneath the ocean. This conclusion is suggested not only by recent groundwater exploration by the Town, but also by US Geological Survey investigations and by test borings at the coast at the Town's WWTP, two miles east of the Lynch Site."

Q11. Please cite the USGS reports (and preferably the pages of the reports) that provide evidence of semi-confined sand and gravel aquifers in this area having no interaction with local surface water.

Impacts to Existing Local Water Uses

As previously noted, the Department finds that the pumping test results show a clear communication between groundwater and surface water at the site, which may impact surface water uses over the long term.

Comments were received from Donald Galicki of Galicki Farms, Marini Farm, Carolyn Britt, the Ipswich Agricultural Commission, and the Massachusetts Department of Agricultural Resources who identified concerns over impacts to local agricultural operations, including a potential reduction in water supply for farming irrigation. The commenters noted that their concerns are supported by observations during the pumping test, such as the apparent depletion of Richards Pond, located approximately 500 to 600 feet from the wellfield.

The Town has acknowledged the impact of pumping the Lynch Site wells on Richards Pond, and has indicated a commitment to work with the farmers to identify an alternative water source for irrigation before the Lynch Wellfield is operational (as stated in the ENF Certificate and Ipswich's February 22nd response to public comments).

Q12. Please describe the alternative source(s) considered thus far and whether or not the local farmers are in agreement with the alternative(s). If the Town and local farmers have not yet discussed the topic, please indicate when/if a meeting has been scheduled.

If you have any questions concerning this letter, please contact Julie Butler at the number listed above, or me at (617) 292-5706 and Duane.LeVangie@state.ma.us.

Sincerely,



Duane LeVangie, Chief
Water Management Program
Bureau of Water Resources

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Cc: Ipswich Office of the Select Board, Ipswich Town Hall, 25 Green Street, Ipswich, MA 01938
ecc: Michele Drury, DCR OWR
Doug DeNatalie, AECOM
Jennifer Pederson, MWWA
Julia Blatt, Mass River Alliance
Wayne Castonguay, Ipswich River Watershed Association
Kerry Mackin, Town of Ipswich resident
Donald Galicki, Galicki Farm
Richard Nysten, Jr, Lynch, DeSimone & Nysten, LLP on behalf of Marini Farm
David Peirce, MassDMF
George Comiskey, Parker River Clean Water Association
Jay Stanbury, Ipswich Agricultural Commission
Carolyn Britt, Town of Ipswich resident
Barbara Hopson, MassDAR
Jim Persky, MassDEP NERO