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

March 6, 2017

Mr. Dan Mahoney, Chairman
Upper Cape Regional Water Supply Cooperative
P.O. Box 373
Mashpee, MA 02649

Town: Sandwich
PWS ID: 4261024
Program: Water Management Act
WMA Permit #: 9P2-4-22-261.03
Action: Final Permit Renewal

Dear Mr. Mahoney,

Please find attached the following:

- Findings of Fact in Support of the Permit Renewal Decision; and,
- Final Water Management Act Permit #9P2-4-22-261.03 for the Upper Cape Regional Water Supply Cooperative, Sandwich, Massachusetts.

If you have any questions regarding this information, please contact Julie Butler at 617-292-5552.

Sincerely,

Rebecca Weidman
Division of Watershed Management
Bureau of Water Resources

Enclosures: UCRWSC Hydraulic Monitoring Program of the June 2002 Baseline Monitoring Report, Section 3.0

ecc: Jennifer Pederson, Massachusetts Water Works Association
Donald Rugg, UCRWSC Primary Distribution Operator
Maura Callahan, Callahan Consulting
Tom Cambareri, Cape Cod Commission
Emily Holt, MassDFG Division of Fisheries and Wildlife

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Communication For Non-English Speaking Parties

310 CMR 1.03(5)(a)

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Dokiman sa-a se yon bagay enpòtan epi yo ta dwe tradui imedyatman. Si ou bezwen dokiman sa a tradui, tanpri kontakte Divèsite Direktè MassDEP a nan nimewo telefòn ki nan lis pi ba a.

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Tài liệu này là rất quan trọng và cần được dịch ngay lập tức. Nếu bạn cần dịch tài liệu này, xin vui lòng liên hệ với Giám đốc MassDEP đa dạng tại các số điện thoại được liệt kê dưới đây.

7 ប្រទេសកម្ពុជា (Kmer (Cambodian):
ឯកសារនេះគឺមានសារៈសំខាន់និងគួរត្រូវបានបកប្រែភ្លាម។ ប្រសិនបើអ្នកត្រូវបានបកប្រែឯកសារនេះសូមទំនាក់ទំនងឯកោតជានាយក MassDEP នៅលេខទូរស័ព្ទដែលបានរាយខាងក្រោម។

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هذه الوثيقة الهامة وينبغي أن تترجم على الفور. اذا كنت بحاجة الى هذه الوثيقة المترجمة، يرجى الاتصال مدير التنوع في MassDEPعلى أرقام الهواتف المدرجة أدناه.

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이 문서는 중요하고 즉시 번역해야합니다. 당신이 번역이 문서가 필요하면 아래의 전화 번호로 MassDEP의 다양성 감독에 문의하시기 바랍니다.

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Այս փաստաթուղթը շատ կարեւոր է եւ պետք է թարգմանել անմիջապես. Եթե Ձեզ անհրաժեշտ է այս փաստաթուղթը թարգմանվել դիմել MassDEP բազմազանությունը տնօրեն է հեռախոսահամարների թվարկված են ստորեւ.

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این سند مهم است و باید فورا ترجمه شده است.
اگر شما نیاز به این سند ترجمه شده، لطفا با ما تماس تنوع مدیر MassDEP در شماره تلفن های ذکر شده در زیر.

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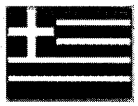

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Το έγγραφο αυτό είναι σημαντικό και θα πρέπει να μεταφραστούν αμέσως. Αν χρειάζεστε αυτό το έγγραφο μεταφράζεται, παρακαλούμε επικοινωνήστε Diversity Director MassDEP κατά τους αριθμούς τηλεφώνου που αναγράφεται πιο κάτω.

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यह दस्तावेज महत्वपूर्ण है और तुरंत अनुवाद किया जाना चाहिए. आप अनुवाद इस दस्तावेज़ की जरूरत है, नीचे सूचीबद्ध फोन नंबरों पर MassDEP की विविधता निदेशक से संपर्क करें.

MassDEP
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Findings of Fact in Support of the Permit Renewal Decision
Water Management Permit #9P2-4-22-261.03

The Department of Environmental Protection ("MassDEP" or "the Department") has completed its review of the Upper Cape Regional Water Supply Cooperative's Water Management Act (WMA) permit renewal application. This review was conducted in regard to the permit for the Upper Cape Regional Water Supply Cooperative (UCRWSC) to withdraw water from the Cape Cod Basin. The Department hereby **proposes to renew** the Water Management Permit #9P2-4-22-261.03 (the "Permit") in accordance with the Water Management Act (M.G.L. 21G). The Department makes the following Findings of Fact in support of the attached Permit, and includes herewith its reasons for renewing the Permit and for the conditions of approval imposed, as required by M.G.L. c.21G, s. 11 and 310 CMR 36.00. The Permit is being issued since such action is necessary for the promotion of the purposes of M.G.L. c. 21G. The Department may modify, suspend or terminate the Permit, after notice and hearing, for violations of its conditions, of M.G.L. c. 21G, or of regulations adopted or orders issued by the Department, and when deemed necessary for the promotion of the purposes of the Water Management Act.

The Department adopted revised Water Management Regulations at 310 CMR 36.00 on November 7, 2014, (described in greater detail below). Since that time, the Department has been working closely with each Water Management Act (WMA) permittee to fully consider all aspects of their individual situations and ensure thoughtful and implementable permits.

UCRWSC Water Withdrawal History

UCRWSC is authorized to withdraw from the Cape Cod Basin a total of 3.0 million gallons per day (MGD). The system currently operates three sources: Wells 1, 2, and 3 (4261024-01G, -02G, and -03G). The original permit was issued on June 8, 2001 to the Falmouth Department of Public Works, and later transferred on December 26, 2002 to UCRWSC. The system volume was not intended to increase overall water use in the area but instead was based upon the projected need of the neighboring water systems to supplement existing sources, to provide redundancy to existing source capacity potentially impacted by contamination emanating from the Massachusetts Military Reservation, and to replace the capacity of proposed sources already lost to contamination.

A permit amendment was issued by MassDEP in April 2016 in response to a permit amendment application submitted by the UCRWSC to eliminate a special condition (Special Condition 5). Under the Water Management Act, permittees must obtain a permit amendment for changes to permit conditions.

This Permit does not authorize an increase in water withdrawal volume, nor does it add a new withdrawal source. UCRWSC's authorized withdrawal volume under its WMA Permit will continue to be an annual average daily volume of 3.0 MGD from the Cape Cod Basin.

The Permit Extensions

WMA permits issued during the first 20-year permitting cycle for the Cape Cod Basin expired on November 30, 2010. All permittees seeking to renew their Water Management permit were required to file a renewal application on or before August 31, 2010. UCRWSC filed a timely renewal application and the Department published notice of the permit renewal application in the Environmental Monitor on September 30, 2010. No public comment was received concerning UCRWSC's Water Management Permit Renewal Application.

Subsequently, the expiration dates for all Water Management permits were extended for four years by Chapter 240 of the Acts of 2010 as amended by Chapter 238 of the Acts of 2012, collectively known as the Permit Extension Act. In addition, in a letter of September 25, 2015, the Department informed UCRWSC that the Department would need additional time before making a determination on the application in order to ensure that all permit renewal applicants in the Cape Cod Basin fully understood the new Water Management Regulations (discussed below), and to give proper consideration to all permit renewal applications within the basin. Pursuant to M.G.L. c. 30A, § 13, and 310 CMR 36.18(7), UCRWSC's permit continues in force and effect until the Department issues a final decision on the permit renewal application.

The expiration date for all permits going forward in the Cape Cod Basin will be November 30, 2030, in order to restore the staggered permitting schedule set forth in the regulations.

The Water Management Act

The WMA requires the Department to issue permits that balance a variety of factors including without limitation:

- Impact of the withdrawal on other water sources;
- Water available within the safe yield of the water source;
- Reasonable protection of existing water uses, land values, investments and enterprises;
- Proposed use of the water and other existing or projected uses of water from the water source;
- Municipal and Massachusetts Water Resources Commission (WRC) water resource management plans;
- Reasonable conservation consistent with efficient water use;
- Reasonable protection of public drinking water supplies, water quality, wastewater treatment capacity, waste assimilation capacity, groundwater recharge areas, navigation, hydropower resources, water-based recreation, wetland habitat, fish and wildlife, agriculture, flood plains; and
- Reasonable economic development and job creation.

Sustainable Water Management Initiative (SWMI) and Water Management Regulation Revisions

In 2010 the Executive Office of Energy and Environmental Affairs (EEA) convened the Sustainable Water Management Initiative (SWMI) for the purpose of incorporating the best available science into the management of the Commonwealth's water resources. SWMI was a multi-year process that included a wide range of stakeholders and support from the Departments of Environmental Protection, Fish and Game, and Conservation and Recreation. In November 2012 the *Massachusetts Sustainable Water Management Initiative Framework Summary* (http://www.mass.gov/eea/docs/eea/water/swmi-framework-nov-2012.pdf) was released.

On November 7, 2014, the Department adopted revised Water Management Regulations at 310 CMR 36.00 that incorporate elements of the SWMI framework and the Water Conservation Standards adopted

by the Massachusetts WRC. The regulations reflect a carefully developed balance to protect the health of Massachusetts' water bodies while meeting the needs of businesses and communities for water.

Without limitation, the Department has incorporated the following into Water Management permitting on Cape Cod:

- Safe yield determinations for the major river basins based on a new methodology developed through SWMI (see the Safe Yield in the Cape Cod Basin section of this document);
- Water needs forecasts for public water suppliers developed by the Department of Conservation and Recreation, Office of Water Resources (DCR), using a methodology reviewed and approved by the Massachusetts WRC;
- Water supply protection measures for public water supplies including Zone II delineations for groundwater sources, and wellhead and surface water protection measures as required by Massachusetts Drinking Water Regulations (310 CMR 22.00);
- Water conservation and performance standards reviewed and approved by the WRC in July 2006 and revised in June 2012 (http://www.mass.gov/eea/docs/eea/wrc/water-conservation-standards-rev-june-2012.pdf), including without limitation:
    - performance standard of 10% or less unaccounted-for-water;
    - seasonal limits on nonessential outdoor water use;
    - a water conservation program that includes leak detection and repair, full metering of the system and proper maintenance of the meters, periodic review of pricing, and education and outreach to residents and industrial and commercial water users; and
- Environmental protections developed through SWMI, including without limitation:
    - protection for coldwater fish resources;
    - minimization of withdrawal impacts in areas stressed by groundwater use;
    - mitigation of the impacts of increasing withdrawals.

Safe Yield in the Cape Cod Basin

This permit is being issued under the safe yield methodology adopted by the Department on November 7, 2014, and described in the regulations at 310 CMR 36.13. As of the date of the issuance of this permit, the safe yield for the Cape Cod Basin is 266.00 million gallons per day (MGD), and total registered and permitted withdrawals are 51.87 MGD, leaving 214.13 MGD potentially available. The maximum withdrawals that will be authorized in this permit, and all other permits currently under review by the Department within the Cape Cod Basin, will be within the safe yield and may be further conditioned as outlined in the regulations. Also as noted this renewed permit does not allocate any increase in withdrawals volumes over those previously allocated so there is no change to the volumes available under safe yield.

Findings of Fact for Special Permit Conditions in the UCRWSC's Water Management Act Permit Renewal

The following Findings of Fact for the special conditions included in the permit generally describe the rationale and background for each special condition in the permit. This summary of permit special conditions is not intended to, and should not be construed as, modifying any of the permit special conditions. In the event of any ambiguity between this summary and the actual permit conditions, the permit language shall control.

Special Condition 1, Maximum Authorized Annual Average Withdrawal Volume, reflects the permitted withdrawal volume of 3.0 MGD. UCRWSC's actual water use has been substantially below this value. The average daily withdrawal volumes for the system for 2013, 2014, and 2015 were 1.06, 1.36, and 1.03 MGD, respectively.

Although actual withdrawal volumes have been significantly below those allocated, the Department has not changed the volumes authorized in this Permit. This system is expected to have largely varying demands based on the status of its interconnected systems, and its role in replacing sources lost due to contamination.

Special Condition 2, Maximum Authorized Daily Withdrawal Volumes from Each Withdrawal Point, reflects the volume of groundwater withdrawal expressed as a maximum daily rate for each source included in the Permit, according to Department-approved Zone II rates.

Special Condition 3, Zone of Contribution (Zone II or Zone III Delineations)
The requirement has been met and no further delineations are required as a condition of this Permit.

Special Condition 4, Wellhead Protection
The requirement has been met and no further wellhead protection measures are required as a condition of this Permit.

Special Condition 5, Shawme Lakes Long-Term Monitoring Plan
In the original Permit, the Department required monthly groundwater level monitoring in six wells located between the three UCRWSC water-supply wells and Shawme Lakes. The purpose of the monitoring was to evaluate the potential withdrawal impacts of Wells 1-3 on Shawme Lakes. Monitoring was conducted consistent with the plan included in Section 3.0 of the Hydraulic Monitoring Program of the June 2002 Baseline Monitoring Report and related updates. A detailed assessment of the monitoring results was required annually by the Department. Water-level monitoring continued through 2015.

Due to a lack of observed impacts over the monitoring period, an April 2016 Permit Amendment suspended the condition provided that UCRWSC's annual average withdrawal remains below 2.5 MGD (authorized annual average withdrawal volume of 3.0 MGD). If UCRWSC's annual average withdrawal volume reaches or exceeds 2.5 MGD in the future, the monitoring shall recommence to reevaluate the withdrawal impacts of Wells 1-3 on Shawme Lakes. Note that the suspension of Special Condition 5 has no effect on UCRWSC's water-quality monitoring requirements, which fall under the Department's Drinking Water Program.

Special Condition 6, Water Conservation and Reporting Requirements
UCRWSC's Annual Statistical Report shall provide an explanation of any difference between the total volumes reported to be withdrawn from the wells and the total volumes reportedly sold to neighboring systems. Should the volume withdrawn exceed the volumes sold by 10% or more, UCRWSC must provide a plan to the Department within 3 months to address this unaccounted-for water loss.

UCRWSC is required to provide a monthly breakdown of the volumes sold to each individual supplier with the Annual Statistical Report filed each year with the Department.

Special Condition 7, Chapter 30 Section 61 Permit Findings
The Department hereby finds that, with implementation by the proponent of the appropriate conditions described above, all practicable and feasible means and measures will be taken to avoid or minimize adverse water withdrawal and related impacts to the environment associated with the three water supply wells.

Minimization of Groundwater Withdrawal Impacts in Stressed Subbasins, requires permittees with permitted groundwater sources in subbasins[1] with net groundwater depletion of 25% or more during August to minimize their withdrawal impacts on those subbasins to the greatest extent feasible.

Because the UCRWSC's permitted sources are located on Cape Cod where August net depletion has not been established, minimization measures are not required in permits issued on the Cape at this time.

Coldwater Fish Resource Protection was incorporated into the Water Management Regulations in November 2014. Coldwater Fish Resource Protection is not a condition of this permit because the UCRWSC's withdrawals do not impact any waters that MA Division of Fisheries and Wildlife has identified as supporting coldwater fish at this time.

Mitigation of the Impacts of Increasing Withdrawals
Because UCRWSC acts as a wholesaler of water to other systems, mitigation was not applied to this Permit but is expected to be included as appropriate in the permits of Public Water Suppliers purchasing water from UCRWSC.

Nonessential Use Restrictions
Because UCRWSC acts as a wholesaler of water to other systems, the requirement to restrict nonessential seasonal uses has not be applied to this Permit but is expected to be included as appropriate in the permits of Public Water Suppliers purchasing water from UCRWSC.

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[1] Subbasins used for WMA permitting are the 1,395 subbasins delineated by the U.S. Geological Survey in *Indicators of Streamflow Alteration, Habitat Fragmentation, Impervious Cover, and Water Quality for Massachusetts Stream Basins* (Weiskel *et al.*, 2010, USGS SIR 2009-5272).

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Commissioner

WATER WITHDRAWAL PERMIT
MGL c 21G

This permit is issued pursuant to the Massachusetts Water Management Act for the sole purpose of authorizing the withdrawal of a volume of water as stated below and subject to the following special and general conditions. This permit conveys no right in or to any property.

PERMIT NUMBER: 9P2-4-22-261.03 **RIVER BASIN:** Cape Cod

PERMITTEE: Upper Cape Regional Water Supply Cooperative
P.O. Box 373
Mashpee, MA 02649

EFFECTIVE DATE: March 6, 2017

EXPIRATION DATE: November 30, 2030

TYPE AND NUMBER OF WITHDRAWAL POINTS:
Groundwater: 3
Surface Water: 0

USE: Public Water Supply

DAYS OF OPERATION: 365

LOCATION(S):

Table 1: Withdrawal Point Identification

Source	Source Code	Latitude	Longitude
Well #1	4261024-01G	40 43 14	70 29 35
Well #2	4261024-02G	41 44 00	70 30 27
Well #3	4261024-03G	41 44 10	70 30 45

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SPECIAL CONDITIONS

1. Maximum Authorized Annual Average Withdrawal Volume

This permit authorizes UCRWSC to withdraw water from the Cape Cod Basin at the rate described below (Table 2). The permitted volume is expressed in millions of gallons, both as an average daily withdrawal rate per year (MGD) and as a total annual withdrawal volume (MGY) for each of the five-year periods of the permit term.

The Department will use the raw water withdrawal volume from all authorized withdrawal points to assess compliance with the registered and permitted withdrawal volumes.

Table 2: Maximum Authorized Average Annual Withdrawal Volume

Permit Periods	Daily Average (MGD)	Total Annual (MGY)
3/6/2017 to 11/30/2020	3.0	1095.00
12/1/2020 to 11/30/2025	3.0	1095.00
12/1/2025 to 11/30/2030	3.0	1095.00

2. Maximum Authorized Daily Withdrawal Volume

Withdrawals from individual withdrawal points are not to exceed the approved maximum daily volume listed below (Table 3) without specific advance written approval from the Department. The authorized maximum daily volume is the approved rate of each source. In no event shall the combined withdrawals from the individual withdrawal points exceed the withdrawal volumes authorized above in Special Condition 1.

Table 3. Maximum Authorized Daily Withdrawal Volumes

Source	Source Code	Maximum Daily Rate (MGD)
Well #1	4261024-01G	1.5
Well #2	4261024-02G	1.5
Well #3	4261024-03G	1.5

3. Zone of Contribution (Zone II or Zone III) Delineations

Department records show that all three wells have MassDEP approved Zones of Contribution. Therefore, no further Zone of Contribution work is required as a condition of this permit.

4. Wellhead Protection

UCRWSC's records indicate that UCRWSC has adopted land use controls and water supply protection measures meeting the requirements of 310 CMR 22.21(2) in the Zone IIs of Wells 1, 2, and 3. These controls are authorized through the "*Groundwater Protection Policy*" and the "*Groundwater Resources Performance Standards*" established by the state's Environmental Management Commission in the Final Environmental Impact Report (EOEA #12277), which was found to have adequately and properly complied with the Massachusetts Environmental Policy Act in the Secretary's Certificate issued on April 1, 2002. The "*Groundwater Protection Policy*" was established as a Memorandum of Agreement (MOA), in 1997 by the MMR Environmental Quality Control Committee. The MOA includes controls for areas off the Camp Edwards Training area that are not covered in the "*Groundwater Resources Performance Standards*". Should the MOA expire and not be renewed, UCRWSC will need to demonstrate to the Department's satisfaction a "Best Effort" in encouraging the Town of Sandwich to amend the Sandwich Water Resources District Map (dated March 1995) to include the Zone II(s) for Wells 1-3. Provided either the MOA remains in place or the "Best Effort" standard is met, the Upper Cape Regional Water Supply Cooperative is in compliance with State Wellhead Protection requirements. Continued compliance with 310 CMR 22.21(2) is required as condition of this permit.

5. Shawme Lakes Long-Term Monitoring Plan

In the April 2016 Permit Amendment, the Department approved a suspension of the groundwater-level monitoring required by Special Condition 5, provided that UCRWSC's annual average withdrawal volume remains below 2.5 MGD of their authorized annual average withdrawal volume of 3.0 MGD. If UCRWSC's annual average withdrawal volume reaches or exceeds 2.5 MGD in the future, the monitoring shall recommence to reevaluate the withdrawal impacts of Wells 1-3 on Shawme Lakes. The monitoring shall be consistent with the plan included in Section 3.0 of the Hydraulic Monitoring Program of the June 2002 Baseline Monitoring Report (attached) and related updates. A detailed assessment of the monitoring results for the prior calendar year must be filed on or before April 15th with: MassDEP, Attn: Water Management Program, One Winter St, 5th floor, Boston, MA 02108.

6. Water Conservation & Reporting Requirements

UCRWSC's Annual Statistical Report shall provide an explanation of any difference between the total volumes reported to be withdrawn from the wells and the total volumes reportedly sold to neighboring systems. Should the volume withdrawn exceed the volumes sold by 10% or more, the Cooperative must provide a plan to the Department within three months to address this unaccounted-for water loss.

UCRWSC is required to provide a monthly breakdown of the volumes sold to each individual supplier with the Annual Statistical Report filed each year with the Department.

7. **Chapter 30 Section 61 Permit Findings**

The Department hereby finds that, with implementation by the proponent of the appropriate conditions described above, all practicable and feasible means and measures will be taken to avoid or minimize adverse water withdrawal and related impacts to the environment associated with the three water supply wells.

GENERAL CONDITIONS (applicable to all permittees)

No withdrawal in excess of 100,000 gallons per day shall be made following the expiration of this Permit, unless before that date the Department has received a renewal permit application pursuant to 310 CMR 36.00.

1. **Duty to Comply** The permittee shall comply at all times with the terms and conditions of this Permit, the Water Management Act and all applicable State and Federal statutes and regulations.

2. **Operation and Maintenance** The permittee shall at all times properly operate and maintain all facilities and equipment installed or used to withdraw water so as not to impair the purposes and interests of the Act.

3. **Entry and Inspections** The permittee or the permittee 's agent shall allow personnel or authorized agents or employees of the Department to enter and examine any property over which the Permitee has authority, title or control, for the purpose of determining compliance with this Permit, the Act or the regulations published pursuant thereto, upon presentation of proper identification and an oral statement of purpose.

4. **Water Emergency** Withdrawal volumes authorized by this Permit are subject to restriction in any water emergency declared by the Department pursuant to M.G.L. c. 21G ss 15-17, M.G.L. c. 150 ss 111, or any other enabling authority.

5. **Transfer of Permits** This Permit shall not be transferred in whole or in part unless and until the Department approves such transfer in writing, pursuant to a transfer application on forms provided by the Department requesting such approval and received by the Department at least thirty (30) days before the effective date of the proposed transfer. No transfer application shall be deemed filed unless it is accompanied by the applicable transfer fee established by 310 CMR 36.33 and 310 CMR 4.00.

6. **Duty to Report** The permittee shall complete and electronically submit annually, via eDEP available through the Department's website, all of the information required by the electronic Annual Statistical Report (eASR) including, without limitation, a certified statement of the withdrawal. Such report shall be received each year by the Department by the date specified on the eASR.

7. **Duty to Maintain Records** The permittee shall maintain withdrawal and all other records and other information in sufficient detail to demonstrate compliance with this Permit.

8. **Metering** All withdrawal points included within the Permit shall be metered within one year of the date of issuance of the Permit. Meters shall be maintained and replaced as necessary to ensure the accuracy of the withdrawal records.

9. **Right to Amend, Suspend or Terminate** The Department may amend, suspend, or terminate the permit in accordance with M.G.L. c. 21G and 310 CMR 36.29.

APPEAL RIGHTS AND TIME LIMITS
This Permit is a decision of the Department. Any person aggrieved by this decision may request an adjudicatory hearing as described herein and in accordance with the procedures described at 310 CMR 36.37. Any such request must be made in writing, by certified mail or hand delivered and received by the Department within twenty-one (21) days of the date of receipt of this permit. The hearing request, including proof of payment of the filing fee, must be mailed to:

Case Administrator
MassDEP Office of Appeals and Dispute Resolution
One Winter Street
Boston, MA 02108

No request for an appeal of this permit shall be validly filed unless a copy of the request is sent by certified mail or delivered by hand to the local water resources management official in the city or town in which the withdrawal point(s) is located; and for any person appealing this decision, who is not the applicant, unless such person notifies the permit applicant of the appeal in writing by certified mail or by hand within five (5) days of mailing the appeal to the Department.

CONTENTS OF HEARING REQUEST
310 CMR 1.01(6)(b) requires the request to include a clear and concise statement of the facts which are the grounds for the request and the relief sought. In addition, the request must include a statement of the reasons why the decision of the Department is not consistent with applicable rules and regulations, and for any person appealing this decision who is not the applicant, a clear and concise statement of how that person is aggrieved by the issuance of this Permit.

FILING FEE AND ADDRESS
The Department's fee transmittal form, together with a valid check, payable to the Commonwealth of Massachusetts in the amount of $100 must be mailed to:

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

The request shall be dismissed if the filing fee is not paid, unless the appellant is exempt or granted a waiver as described below.

EXEMPTIONS
The filing fee is not required if the appellant is a city or town (or municipal agency), county, district of the Commonwealth of Massachusetts, or a municipal housing authority.

WAIVER
The Department may waive the adjudicatory hearing filing fee for any person who demonstrates to the satisfaction of the Department that the fee will create an undue financial hardship. A person, seeking a waiver must file, together with the hearing request, an affidavit setting forth the facts, which support the claim of undue hardship.

Rebecca Weidman
Director of the Division of Watershed Management

March 6, 2017
Date

3.0 HYDRAULIC MONITORING PROGRAM

3.1 Introduction

A detailed analysis of Upper and Lower Shawme Lakes conducted as part of the New Source Approval process indicated no effect on surface water elevations although the potential exists that at non-stop higher withdrawal rates groundwater entering the Lakes may be intercepted. To ensure protection of the resource, hydrogeologic monitoring of the lake system was incorporated into the LTMP. The program includes measurement of stream discharge leaving the lake system and monitoring of six existing and one newly installed well on a monthly basis to record groundwater levels. The combined water level will be compared to historical data from USGS well SDW-253.

SDW-253 is located far enough from the production wells that it is not affected by pumping. Data collected over approximately 40 years by the USGS will be used to differentiate normal seasonal fluctuations from potential impacts from the project. Seasonal fluctuation can not be accounted for in the numerical groundwater flow model.

A monitoring well couplet will be installed on the northern shore of Upper Shawme Lake, by the Sandwich Water Department during the summer of 2002. Water table elevation, as well as a vertical hydraulic gradient will be recorded from this location on a monthly basis by the members of the Shawme Ponds Association and provided to the Cooperative.

The data from the monitoring program will allow the system operators and regulators to verify results from groundwater modeling and provide a better understanding of the groundwater aquifer.

3.2 Baseline Conditions at Shawme Lakes

The Army Corps of Engineers contracted the USGS establish baseline conditions at Shawme Lakes. The USGS installed staff gauges and developed rating curves in both Upper and Lower Shawme Lakes early this fall at Shawme Lakes under non-pumping conditions.

The USGS installed a staff gauge at the discharge of Lower Shawme Lake, on the upstream side of Main Street above a small wooden weir. Flow in Mill Creek was measured weekly to establish a rating curve for this gauge and was shown to fluctuate from 8 cubic feet per second (cfs) in the spring months and 5 cfs during the summer. These measurements will be used to relate stage to discharge in Mill Creek for long term monitoring. Another staff gauge was installed at the canoe launch on Lower Shawme Lake, which will be used to record lake levels.

A third staff gauge was installed on Cook's Dam on Upper Shawme Lake. Here the USGS is attempting to relate lake stage at the dam to the discharge over the dam. However, the configuration and condition of the dam makes obtaining an accurate measurement difficult. The spillway over the dam is very narrow, steep, turbulent and short in length. These factors create an insensitive rating in which a small change in lake levels result in a large change in discharge. Thus, the USGS is attempting to measure flow below the spillway in an area where the flow enters the lake.

The initial USGS report is included in Appendix F. The report indicates that the discharge at Mill Creek can be adequately monitored. The report also states that the discharge at Lower Shawme Lake is largely controlled by the release of water through the gristmill located at the

northern end of Lower Shawme Lake, The discharge has been shown to almost double when the grist mill is operated and has been recorded at up to 13 cfs or almost double the average discharge when not running. It also indicates that the leaks in the Upper Shawme Lakes dam make it difficult to get accurate reading, between the Lakes.

The staff gauges will continue to be recorded on a weekly basis by members of the Shawme Ponds Watershed Association, through September of 2002.

3.3 Baseline Groundwater Monitoring

The baseline monitoring of six existing wells has been accomplished by recording groundwater levels in the proposed wells except well S-7, which has not yet been located. Water levels have also not been recorded in well P-1, as it has not yet been installed. Background water levels are reported in Table 3-1 below for May and July of 2000 and for March of 2002. Based on this initial data it appears that water table fluctuation throughout the aquifer is currently fairly consistent.

Table 3-1
Groundwater Level Data

Well	Northing	Easting	TOC Elevation (ft msl)	Water Elevation (May 2000)	Water Elevation (July 2000)	Water Elevation (March 2002)
LRWS3-1	270414.96	873298.00	69.05	44.22	44.30	43.29
MW-101	271387.50	874847.60	121.2	NM	42.07	40.93
MW103S	272746.60	874895.90	NA	38.44	NM	37.44
S-7	NA	NA	NA	NM	NM	NM
SDW-263	277154.00	866866.00	NA	36.04	36.35	35.03
SM-5	273317.78	869850.18	115.26	40.69	40.81	39.63
P-1	TBD	TBD	NA	NM	NM	NM

The water levels in SDW-253 have been compared to historical data from USGS well SDW-253 and it appears that the groundwater fluctuation recorded in this well are similar to what has been observed to date in the selected wells.

As discussed earlier, seasonal groundwater fluctuations can not be accounted for in the numerical groundwater flow model nor can seasonal variation in recharge (precipitation). As part of this baseline evaluation rainfall data provided by the Sandwich Water District was reviewed an is attached in Appendix G.

The rainfall data which has been collected since 1989 indicates that the average yearly rainfall in Sandwich is approximately 48 inches, which is higher than the 44 inches that is normally referred to for Cape Cod. How this increase effects recharge of the groundwater

system is beyond the scope of this report, however it indicates that the groundwater modeling effort may have conservatively under-estimated recharge.

The seasonal rainfall data indicates that the majority of the recharge is in March and April when almost 20 percent of the rainfall occurs. Therefore it would be expected that seasonal groundwater highs as in most of Massachusetts would occur during this time. However, it appears that in the Sandwich area this is not true based upon USGS water level records.

The water levels in SDW-253 have been recorded for forty years and are tabulated in Appendix G. A graph of this data presented in Figure 3-1 indicates that highest water levels seen in the aquifer are in July although they have also been recorded at the end of June or in August. The highest level ever recorded was on July 30, 1973, while the lowest level was on February 28, 1967. Resulting in a maximum water table fluctuation of over nine feet.

Based on the graph there appears to be a lag time between the high recharge events of March and April and the high water levels of June, July and August. The lower recharge period of July and August cause a lower water table in the fall months. This pattern appears to be consistent in almost every recorded year, even in years of drought.

Comparison of discharge data and water levels recorded in the five monitoring wells currently installed within the aquifer indicate that as water levels in the aquifer drop the discharge from the lake system is effected. Further collection of data through the spring summer of 2002 by the USGS and Sandwich Water Department will allow for a more detailed evaluation of this relationship.