Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

100 Cambridge Street Suite 900 Boston, MA 02114 • 617-292-5500

Maura T. Healey
Governor

Kimberley Driscoll
Lieutenant Governor

Rebecca L. Tepper
Secretary

Bonnie Heiple
Commissioner

July 18, 2024

Daniel Pelletier
Harwich Water Department
196 Chatham Road
Harwich, MA 02645

RE: Harwich Water Department
PWS Number: 4126000
WMA Permit #9P-4-22-126.01
Action: Final New Permit

Dear Mr. Pelletier:

Please find the attached documents:

- Findings of Fact in Support of the final new Permit #9P-4-22-126.01; and
- Water Management Act Permit #9P-4-22-126.01 (Cape Cod Basin) for the Harwich Water Department.

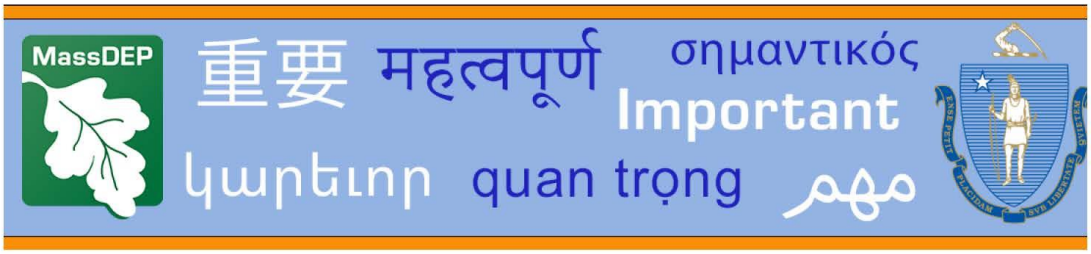
The signature on this cover letter indicates formal issuance of the attached document. If you have any questions regarding this information, please contact Shi Chen at 857-360-0042 or via e-mail at shi.chen@state.ma.us.

Very truly yours,

Duane LeVangie,
Chief, Water Management Program
Bureau of Water Resources

mass.gov.sharepoint.com/W:\DWP Archive\SERO\2024\Harwich-4126000-Harwich Water Department--9P42212601-Draft Permit -2024-07-18
mass.gov.sharepoint.com/W:\DWPWMA\Permits Renewals\Cape Cod\Harwich-4126000-Harwich Water Deparment-9P242212601-Draft Permit -2024-07-18

Ecc: Jen Pederson, MWWA
Julia Blatt, Massachusetts Rivers Alliance
Tom Cambareri, Cape Cod Commission
Andrew Gottlieb, Association to Preserve Cape Cod
Clara McLardy and Sandy McLardy, Harwich



Communication for Non-English-Speaking Parties

This document is important and should be translated immediately.

If you need this document translated, please contact MassDEP's Director of Environmental Justice at the telephone number listed below.

Español Spanish

Este documento es importante y debe ser traducido inmediatamente. Si necesita traducir este documento, póngase en contacto con el Director de Justicia Ambiental de MassDEP (*MassDEP's Director of Environmental Justice*) en el número de teléfono que figura más abajo.

Português Portuguese

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繁體中文 Chinese Traditional

本文檔很重要，需要即刻進行翻譯。
如需對本文檔進行翻譯，請透過如下列示電話號碼與 MassDEP 的環境司法總監聯絡。

简体中文 Chinese Simplified

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如果您需要翻译这份文件，请通过下方电话与 MassDEP 环境司法主任联系。

Ayisyen Kreyòl Haitian Creole

Dokiman sa a enpòtan epi yo ta dwe tradui l imedyatman. Si w bezwen tradui dokiman sa a, tanpri kontakte Direktè. Jistis Anviwònmantal MassDEP a nan nimewo telefòn ki endike anba a.

Việt Vietnamese

Tài liệu này và quan trọng và phải được dịch ngay. Nếu quý vị cần bản dịch của tài liệu này, vui lòng liên hệ với Giám Đốc Phòng Công Lý Môi Trường của MassDEP theo số điện thoại được liệt kê bên dưới.

ប្រទេសកម្ពុជា Khmer/Cambodian

ឯកសារនេះមានសារៈសំខាន់
ហើយគប្បីតួរត្រូវបានបកប្រែភ្លាមៗ.
ប្រសិនបើអ្នកត្រូវការអោយឯកសារនេះបកប្រែ
សូមទាក់ទងនាយកផ្នែកយុត្តិធម៌បរិស្ថានរបស់
MassDEPតាមរយៈលេខទូរស័ព្ទដែលបានរាយដូចខាងក្រោម។

Kriolu Kabuverdianu Cape Verdean

Es dokumentu sta important i tenki ser tradusidu immediatamenti. Se nho ta presisa ke es dokumentu sta tradisidu, por favor kontata O Diretor di Justisia di Environman di DEP ku es numero di telifoni menxionadu di baixo.

Contact Deneen Simpson 857-406-0738
Massachusetts Department of Environmental Protection
100 Cambridge Street 9th Floor Boston, MA 02114
TTY# MassRelay Service 1-800-439-2370 • https://www.mass.gov/environmental-justice
(Version revised 8.2.2023) 310 CMR 1.03(5)(a)

Русский Russian

Это чрезвычайно важный документ, и он должен быть немедленно переведен. Если вам нужен перевод этого документа, обратитесь к директору Департамента экологического правосудия MassDEP (MassDEP's Director of Environmental Justice) по телефону, указанному ниже.

العربية Arabic

هذه الوثيقة مهمة وتجب ترجمتها على الفور.

إذا كنت بحاجة إلى ترجمة هذه الوثيقة، فيرجى الاتصال بمدير العدالة البيئية فيMassDEP على رقم الهاتف المذكور أدناه.

한국어 Korean

이 문서는 중대하므로 즉시 번역되어야 합니다.
본 문서 번역이 필요하신 경우, 매사추세츠 환경보호부의 "환경정의" 담당자 분께 문의하십시오. 전화번호는 아래와 같습니다.

հայերեն Armenian

Այս փաստաթուղթը կարևոր է, և պետք է անհապաղ թարգմանել այն:
Եթե Ձեզ անհրաժեշտ է թարգմանել այս փաստաթուղթը, դիմեք Մասաչուսեթսի շրջակա միջավայրի պահպանության նախարարության (MassDEP) Բնապահպանական հարցերով արդարադատության ղեկավարին (Director of Environmental Justice)՝ ստորև նշված հեռախոսահամարով

فارسی Farsi Persian

این نوشتار بسیار مهمی است و باید فوراً ترجمه شود.
اگر نیاز به ترجمه این نوشتار دارید لطفاً با مدیر عدالت محیط زیستی MassDEP در شماره تلفن ذکر شده زیر تماس بگیرید.

Français French

Ce document est important et doit être traduit immédiatement. Si vous avez besoin d'une traduction de ce document, veuillez contacter le directeur de la justice environnementale du MassDEP au numéro de téléphone indiqué ci-dessous.

Deutsch German

Dieses Dokument ist wichtig und muss sofort übersetzt werden. Wenn Sie eine Übersetzung dieses Dokuments benötigen, wenden Sie sich bitte an MassDEP's Director of Environmental Justice *(Direktor für Umweltgerechtigkeit in Massachusetts)* unter der unten angegebenen Telefonnummer.

Ελληνική Greek

Το έγγραφο αυτό είναι πολύ σημαντικό και πρέπει να μεταφραστεί αμέσως. Αν χρειάζεστε μετάφραση του εγγράφου αυτού, παρακαλώ επικοινωνήστε με τον Διευθυντή του Τμήματος Περιβαλλοντικής Δικαιοσύνης της Μασαχουσέτης στον αριθμό τηλεφώνου που αναγράφεται παρακάτω

Italiano Italian

Questo documento è importante e deve essere tradotto immediatamente. Se hai bisogno di tradurre questo documento, contatta il Direttore della Giustizia Ambientale di MassDEP al numero di telefono sotto indicato.

Język Polski Polish

Ten dokument jest ważny i powinien zostać niezwłocznie przetłumaczony. Jeśli potrzebne jest tłumaczenie tego dokumentu, należy skontaktować się z dyrektorem ds. sprawiedliwości środowiskowej MassDEP pod numerem telefonu podanym poniżej.

हिन्दी Hindi

यह दस्तावेज महत्वपूर्ण है और इसका अनुवाद तुरंत किया जाना चाहिए। यदि आपको इस दस्तावेज का अनुवाद कराने की जरूरत है, तो कृपया नीचे दिए गए टेलीफोन नंबर पर MassDEP के पर्यावरणीय न्याय निदेशक से संपर्क करें।

Contact Deneen Simpson 857-406-0738
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Findings of Fact in Support of
Water Management Permit # 9P-4-22-126.01
Harwich Water Department

The Department of Environmental Protection (the Department) makes the following Findings of Fact in support of the attached Final Water Management Permit #9P-4-22-126.01, and includes herewith its reasons for issuing the Final Permit and for conditions of approval imposed, as required by M.G.L. c. 21G, § 11. The issuance of this permit is in response to a water withdrawal permit renewal application submitted on August 11, 2010, and a new water withdrawal permit application submitted on June 12, 2017, by the Harwich Water Department (Harwich) for the purpose of public water supply.

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.

The Permit Extensions

Harwich's WMA permit was initially issued on January 31, 1992 and was set to expire on November 30, 2010. 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, WMA permits for withdrawals in the Cape Cod basin were extended to November 30, 2014. The Department accepted a renewal application from the Harwich Water Department on August 11, 2010 and published notice of the permit renewal application in the Environmental Monitor on September 22, 2010. No comments were received.

In addition, in a letter on September 25, 2015, the Department informed Harwich 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), Harwich'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 March 6, 2032 in order to restore the staggered permitting schedule set forth in the regulations.

The Water Management Act (M.G.L. c. 21G)

The Water Management Act (Act) 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.

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. For a water source where an estimate of natural annualized streamflow is not applicable because the water source is groundwater-driven, the Safe Yield is determined through estimates of groundwater recharge during drought conditions. For more information on the Safe Yield methodology, go to the November 28, 2012 SWMI Framework Summary and Appendices;
- 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 2018 (https://www.mass.gov/files/documents/2018/09/11/ma-water-conservation-standards-2018.pdf), including;
    - 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;
- Environmental protections developed through SWMI, including;
  - protection for coldwater fish resources;
  - 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 issuance of this permit, the safe yield for the Cape Cod Basin is 266.0 million gallons per day (MGD), and total allocated withdrawals are 50.87 MGD. This proposed new permit increases the total allocation by 0.47 MGD, for a total allocation in the Cape Cod Basin of 51.34 MGD. 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.

Findings of Fact for Permit Conditions in Harwich's Water Management Act Permit

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 registered withdrawal volume of 1.20 MGD and a permitted increase of up to 1.43 MGD, for a total potential authorized withdrawal volume of 2.63 MGD through March 6, 2032. The additional authorized withdrawal volume is based on the Department of Conservation and Recreation`s Office of Water Resources (OWR)`s most recent Water Needs Forecast for Harwich of 2.39 MGD by the year of 2030 with a 10% buffer that potentially increase that value by 0.24 MGD, for a total allocation of up to 2.63 MGD. The 10% buffer is to accommodate uncertainty in the growth projections, and/or to accommodate the water demand of a community that has met the 10% UAW performance or has not met the performance standard but has met the functional equivalence requirement included in this permit.

Harwich may increase its annual average daily withdrawals to the maximum authorized volume (2.63 MGD), if Harwich is meeting the requirements of Special Conditions of 6, 7 and 8 outlined in the permit. Specifically, Harwich may increase annual average daily withdrawals to 2.63 MGD if Harwich is meeting:

- Unaccounted-for-water (UAW) of 10%, or all UAW functional equivalence requirements;
- Seasonal limits on nonessential outdoor water use; and
- Water conservation requirements;

as included in this permit. If not, Harwich is constrained to the volumes identified for each period outlined in the permit.

Note that only Wells #8, #9, #10 and #11 are included in this permit and have access to the full authorized volume of 2.63 MGD. Harwich`s remaining registered wells are not included in the WMA

permit and therefore their combined total annual daily average withdrawals are limited to no more than the registered volume of 1.20 MGD.

As noted above Cape Cod Basin permits will now expire on March 6, 2032, as result the Department has extended the possibility of the 2.63 MGD through March 6, 2032.

Special Condition 2, Maximum Authorized Daily Withdrawals Points, reflects the MassDEP-approved Zone II maximum daily pumping rate for each of Harwich's permitted wells based on prolonged pumping tests. Withdrawals in excess of these maximum daily rates require approval from the Department.

Special Condition 3, Zone II Delineations, all of Harwich`s permitted sources have approved Zone II`s delineated. No further Zone II work is required as a condition of this permit.

Special Condition 4, Wellhead Protection, MassDEP records indicate Harwich adopted a floor drain regulation in 1997 but it is not included in the Board`s list of regulations identified on their website, nor was it submitted to the Board of Health Central Register at MassDEP. Therefore, this required prohibition is considered lacking until its adoption and implementation is confirmed by the Board of Health. Harwich shall submit a letter confirming the adoption and implementation of a Board of Health Floor drain regulation pursuant to 310 CMR22.21 (2)(a) within 90 days of the issuance of the final permit.

Special Condition 5, Vernal Pool Monitoring has been amended. Harwich submitted vernal pool monitoring data that included information on water levels in the vernal pool, precipitation data, and withdrawal records for Well #11 for the years of 2007-2017. MassDEP and NHESP reviewed the data and found that the data submitted were not sufficient to address the concerns about the potential pumping impacts on the vernal pool. MassDEP has revised the vernal pool monitoring condition to clarify the requirements.

Harwich may continue to operate GPW Well #11 (12G) throughout the year, but is required to monitor and record water levels weekly on an existing or proposed staff gage, approved by MassDEP, within the vernal pool and keep daily pumping records for GPW Well #11 (12G) year round, and have an experienced biologist implement biological monitoring of the vernal pool twice annually as described in Appendix C for 5 years starting on 2025. A monitoring report including the contents listed in Appendix C and a written section interpreting, evaluating and summarizing the monitoring data must be prepared by professional biologists/hydrologists and submitted to MassDEP for its review by September 30th every year. MassDEP will evaluate the monitoring data and decide if the monitoring requirements should be continued, amended or discontinued after 5 years.

Special Condition 6, Performance Standard for Unaccounted for Water, for all PWS permittees is 10%. Permittees that cannot comply within the timeframe in the permit must meet Functional Equivalence requirements based on the AWWA/IWA Water Audits and Loss Control Programs, Manual of Water Supply Practices M36, as outlined in Appendix A. As accepted by the Department, Harwich's UAW for the most recent three years has been:

2020	2021	2022
9%	6%	6%

Special Condition 7, Seasonal Limits on Nonessential Outdoor Water Use, requires Harwich to implement nonessential outdoor water use restrictions from May 1 to September 30, beginning in 2025. Harwich can choose to implement the restrictions based on the calendar (all summer) or when groundwater levels in a U.S. Geological Survey (USGS) monitoring well fall below certain defined levels for at least 60 consecutive days and when a drought advisory or greater is declared by the Drought Management Task Force for Cape Cod.

If Harwich selects the USGS monitoring well approach, it has been assigned the USGS monitoring well 414632070014901 (MA-BMW 22R) at Brewster, MA.

Nothing in this permit prevents Harwich from implementing additional water use restrictions and Harwich shall notify MassDEP within 14 days of when the restrictions are put in place.

Special Condition 8, Water Conservation Requirements, incorporates the Water Conservation Standards for the Commonwealth of Massachusetts reviewed and approved by the Water Resources Commission in July 2018 (https://www.mass.gov/files/documents/2018/09/11/ma-water-conservation-standards-2018.pdf).

Special Condition 9, Requirements to Report Raw and Finished Water Volumes, ensures that the information necessary to evaluate compliance with the conditions included herein is accurately reported.

Special Condition 10, Mitigation of Impacts for Withdrawals that Exceed Baseline, requires mitigation, where feasible, for withdrawals over a baseline volume. Baseline withdrawal means the volume of water withdrawn during calendar year 2005 plus 5%, or the average annual volume withdrawn from 2003 through 2005 plus 5%, whichever is greater provided that:

(a) baseline cannot be less than a permittee's registered volume;
(b) baseline cannot be greater than the permittee's authorized volume for 2005; and
(c) if, during the period from 2003 to 2005, the permittee's withdrawals from the water source were interrupted due to contamination of the source or construction of a treatment plant, the Department will use best available data to establish a baseline volume from the water source.

The calculated baseline volume for Harwich is 788.4 MGY or 2.16 MGD, which was the authorized withdrawal volume in 2005. This permit authorizes Harwich to withdraw up to 2.63 MGD, and therefore Harwich needs to mitigate the difference between the authorized volume and the baseline volume (i.e., 0.47 MGD). A wastewater adjustment can be applied against the volume required to be mitigated for systems where the water withdrawn is returned to the ground as wastewater within the same major basin as the withdrawal. Harwich reported on its permit renewal application that 100% of the wastewater is disposed of through on-site disposal systems. MassDEP will assume that 85% of the new wastewater generated by the additional withdrawal over baseline of 0.47 MGD will be returned to the ground within the same major basin as the withdrawal, thus reducing the amount needing to be mitigated. This adjustment results in a volume to be mitigated of 70,500 gallons per day (0.0705 MGD) for Harwich.

Harwich's Wastewater Adjustment Calculation for Mitigation
1. Permitted amount above Baseline = 0.47 MGD • Permitted amount above Baseline: 2.63 – 2.16 = 0.47 MGD
2. Adjustment for Wastewater Discharge to Local Groundwater = 0.3995 MGD • 100% of increased withdrawals are delivered to areas with on-site septic systems:

0.47 MGD x 1.0 (100%) = 0.47 MGD • 85% of water delivered to areas with on-site septic systems returns to groundwater: 0.47 MGD x 0.85 (85%) = 0.3995 MGD
3. Amount to be Mitigated after Adjustment for Wastewater Discharge to Local Groundwater = 0.0705 MGD • Permitted amount above baseline (0.47 MGD) – adjustment for wastewater discharge to local groundwater (0.3995 MGD) = 0.0705 MGD or 70,500 gallons per day

Because Harwich`s authorized volume exceeds its baseline volume, a mitigation plan is required. Harwich submitted a mitigation plan for MassDEP`s review that included stormwater recharge projects, water supply protection and non-water supply conservation land protection projects and the development and implementation of a wetlands bylaw.

Stormwater BMPs that were built on or after January 1, 2005 that infiltrate stormwater from previously directly connected impervious surfaces[1] are eligible for the mitigation credits. The BMP mitigation credit is calculated based on average annual precipitation, BMP design infiltration depth[2], and the area of directly connected impervious surface built prior to 2005 re-directed to the BMP built on or after January 1, 2005. Harwich identified two stormwater BMPs for direct mitigation evaluation. They are the Wychmere Harbor and the Allen Harbor Landing Property. Later Harwich confirmed that there is no formal operation and maintenance plans for those stormwater BMPs. Therefore, those two stormwater BMPs do not qualify for direct mitigation credits.

Without additional eligible direct mitigation activities, indirect mitigation activities were evaluated to meet the mitigation requirements of 0.0705 MGD. Harwich identified land purchased for water supply protection and non-water supply conservation purposes as one of its indirect mitigation options. The protection of lands for water supply purposes must be accomplished in compliance with M.G.L.c.40 to receive the full 0.2 credits per acre., or they may be eligible for 0.1 credits per acre, for up to 10 mitigation credits. Harwich identified a total of 7.48 acres of land protected for water supply purposes and confirmed that those lands were not acquired per MassDEP`s approval process. Therefore, Harwich receives 0.1 credits per acre, for a total of 0.748 indirect credits for the lands protected for water supply purposes. The protection of lands for non-water supply conservation purposes may be eligible for 0.2 credits per acre if the lands are deemed as Priority Conservation Lands, or 0.1 credits for each acre not covered under Priority Conservation Lands but which is for wildlife and habitat conservation purposes, for up to a maximum of 5 credits. MassDEP reviewed the land purchase and protection documents submitted by Harwich and determined that Harwich qualifies for 5 indirect credits for land protected for non-water supply conservation purposes as 50.725 acres of protected land are identified as Priority Conservation Lands in the MassMapper and 20.02 acres are protected for wildlife and habitat conservation purposes. As outlined in the 2014 Water Management Act Permit Guidance, 1 indirect mitigation credit translates into 0.01 MGD of required mitigation, which means total credits achieved through land protection translates to 0.0575 MGD of mitigation volumes. The details on each parcel purchased and protected is in Appendix B of this permit.

Harwich has also developed and implemented a wetland regulation that meets several of MassDEP`s credit criteria, including the enforceability of the bylaw, wetland resource areas are subject to

[1] Directly connected impervious surfaces are those whose runoff discharges to a surface water body.
[2] BMP design infiltration depth is the inches of runoff from 24 hours of precipitation that is infiltrated via a BMP in 72 hours, per MA Stormwater Handbook, Vol. 3, Ch. 1, page 25

jurisdiction whether or not they are bordering, a minimum 25-ft no-build or no-disturb setback in buffer zones and impervious surface runoff be directed to subsurface infiltration structures. Harwich will receive 4 credits, which is translated to 0.04 MGD of mitigation volumes.

According to MassDEP`s review, Harwich has identified a total of 0.0975 MGD in mitigation volumes through its water supply protection and non-water supply conservation land protection projects and the wetlands regulation, which is in excess of the required mitigation volume of 0.0705 MGD. Should there be any changes to these mitigation activities during the life of the permit, Harwich should contact MassDEP about the changes and the mitigation requirements that will need to be reassessed.

Harwich's Mitigation Credit & Volumes		
		Total Required
Mitigation required for withdrawals over 2.16 mgd baseline up to 2.63 mgd		Up to 70,500 gpd
	Credit & Volume available at permit issuance	**Total Available**
Indirect Mitigation Credit & Volumes – Land Acquisition for Water Supply and non-Water Supply conservation purposes	5.748 credits = 57,500 gpd	0.0575 mgd
Indirect Mitigation Credit – Wetlands Bylaw	4 credits = 40,000 gpd	0.04 mgd

Minimization of Groundwater Withdrawal Impacts in Stressed Subbasins, requires permittees with permitted groundwater sources in subbasins[3] with net groundwater depletion of 25% or more during August to minimize their withdrawal impacts on those subbasins to the greatest extent feasible.

Since Harwich`s permitted sources are located in the Cape Cod Basin where August net depletion has not been established, they are not currently required to implement measures to minimize their withdrawal impacts.

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 Harwich's withdrawals do not impact any waters that MA Division of Fisheries and Wildlife has identified as supporting coldwater fish at this time.

Responses to Public Comments
Two comment letters on Harwich`s new permit application were received. One of the comment letters was submitted by Clara and Sandy McLardy, Harwich residents, and the second was submitted by Andrew Gottlieb, Executive Director of the Association to Preserve Cape Cod. Both letters expressed concerns over the effectiveness of the water conservation efforts within the Town and the increased withdrawals` potential impact on sensitive surface water features such as ponds, vernal pools and other wetlands.

[3] 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).

Harwich has submitted documentation demonstrating that it has developed water conservation educational literature for the town and it is in compliance with the Water Conservation permit requirements. MassDEP has included the seasonal nonessential outdoor water use restriction in this new permit to promote water conservation during droughts. Harwich also stated that it has started to implement and enforce nonessential outdoor water use restrictions on its own since 2023. Based on a review of the monitoring data on the vernal pool next to the Well #11, MassDEP has amended the permit to require Harwich to implement an enhanced monitoring plan to ensure that the increase withdrawals will not degrade the viability of the vernal pool.

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection
100 Cambridge Street Suite 900 Boston, MA 02114 • 617-292-5500

Maura T. Healey
Governor

Kimberley Driscoll
Lieutenant Governor

Rebecca L. Tepper
Secretary

Bonnie Heiple
Commissioner

WATER WITHDRAWAL PERMIT
#9P42212601
Harwich Water Department

This permit is issued pursuant to the Massachusetts Water Management Act (WMA) 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 beyond the right to withdraw the volume of water for which it is issued.

PERMIT NUMBER: 9P-4-22-126.01 **RIVER BASIN:** Cape Cod

PERMITTEE: Harwich Water Department

EFFECTIVE DATE: July 18, 2024

EXPIRATION DATE: March 6, 2032

NUMBER OF WITHDRAWAL POINTS:
Groundwater: 4
Surface Water: 0

USE: Public Water Supply

DAYS OF OPERATION: 365

WITHDRAWAL POINT IDENTIFICATION

Source Name	PWS Source ID Code
GPW #8	4126000-09G
GPW #9	4126000-10G
GPW #10	4126000-11G
GPW #11	4126000-12G

SPECIAL CONDITIONS

1. Maximum Authorized Annual Average Withdrawal Volume

This permit authorizes the Harwich Water Department ("Harwich") to withdraw water from the Cape Cod Basin at the rate described in Table 1. The volume reflected by this rate is in addition to the 1.20 million gallons per day previously authorized to Harwich under Water Management Act (WMA) Registration #4-22-126.01. The permitted volume is expressed both as an annual average daily withdrawal rate (million gallons per day or MGD), and as a total annual withdrawal volume (million gallons per year or MGY).

The Department of Environmental Protection (MassDEP) bases these withdrawal volumes on the raw water withdrawn from the authorized withdrawal points, and will use the raw water amount to assess compliance with the registered and permitted withdrawal volumes.

Table 1: Authorized Raw Water Withdrawal Rates

Permit Periods	Total Raw Water Withdrawal Volumes			
	Permit*		Permit + Registration	
	Daily Average (MGD)	Total Annual (MGY)	Daily Average (MGD)	Total Annual (MGY)
7/18/2024 to 3/06/2027	1.11	405.15	1.11+1.20 = 2.31	843.15
3/07/2027 to 3/06/2032	1.19 (1.43*)	434.35 (521.95*)	1.19 + 1.20 = 2.39 (1.43+1.20 = 2.63*)	872.35 (959.95*)

*With specific advance written approval from MassDEP, Harwich is authorized to increase the maximum authorized annual average daily withdrawal volume to 2.63 MGD, provided that Harwich is meeting the following Special Permit Conditions:

- unaccounted-for-water use (UAW) of 10% or less, or all UAW functional equivalence requirements in Appendix A;
- seasonal limits on nonessential outdoor water use in Special Condition #7; and
- water conservation requirements in Special Condition 8.

2. Maximum Authorized Daily Withdrawals from each Withdrawal Point

Withdrawals from permitted withdrawal points are not to exceed the approved maximum daily volumes listed below without specific advance written approval from MassDEP (Table 2). 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 in Special Condition 1.

Table 2: Maximum Daily Withdrawal Volumes

Source Name	PWS Source Code ID	Maximum Daily Rate (MGD)
GPW #8	4126000-09G	0.72

GPW #9	4126000-10G	0.72
GPW #10	4126000-11G	0.67
GPW #11	4126000-12G	0.89

3. Zone II Delineations

MassDEP records show that all of Harwich`s sources, both registered and permitted, have MassDEP approved Zone II delineations. No further Zone II work is required as a condition of this permit for these sources.

4. Wellhead Protection

Harwich shall submit a letter confirming the adoption and implementation of a Board of Health floor drain regulation pursuant to 310 CMR 22.21 (2)(a) within 90 days of the issuance of the final permit.

5. Vernal Pool Monitoring

Water levels within the vernal pool situated approximately 225 feet north of GPW #11 (Certified Vernal Pool #356) shall be monitored and recorded weekly year-round. A twice per year biological surveying of the vernal pool shall be conducted following the Vernal Pool Monitoring Protocol outlined in Appendix C. A report interpreting, evaluating and summarizing the monitoring data as described in the Appendix C shall be submitted to MassDEP for its review by September 30th every year starting on 2025.

6. Performance Standard for Unaccounted for Water

Harwich Water Department's Performance Standard for Unaccounted for Water (UAW) is 10% or less of overall water withdrawal for 2 of the most recent 3 years throughout the permit period. Harwich shall be in compliance with this performance standard by December 31, 2026. See Appendix A for additional information on requirements if the Performance Standard for UAW is not met.

Nothing in the permit shall prevent a permittee who meets the 10% performance standard from demonstrating compliance with the UAW performance standard by developing and implementing a water loss control program following the *AWWA M36 Water Audits and Loss Control Programs*.

Permittees meeting the Performance Standard for Unaccounted for Water through implementation of a water loss control program based on AWWA M36 annual water audits and guidance shall continue to report UAW annually as required in the Annual Statistical Report for public water suppliers.

7. Seasonal Limits on Nonessential Outdoor Water Use

Harwich Water Department shall limit nonessential outdoor water use through mandatory restrictions from May 1st through September 30th as outlined in Table 3 below. Harwich shall start implementing the seasonal limits on nonessential outdoor water use on May 1, 2025.

Harwich shall be responsible for tracking groundwater levels and drought advisories and recording and reporting when restrictions are implemented if groundwater level triggered restrictions are implemented. See Table 3 *Instructions for Accessing U.S. Geologic Survey Groundwater Level and Massachusetts Drought Advisory Website Information.*

Harwich shall also document compliance with the seasonal limits on nonessential outdoor water use annually in its Annual Statistical Report (ASR), and indicate whether it anticipates implementing calendar triggered restrictions or USGS monitoring well triggered restrictions during the next year.

Restricted Nonessential Outdoor Water Uses

Nonessential outdoor water uses that are subject to mandatory restrictions include**:**

- irrigation of lawns via sprinklers or automatic irrigation systems;
- filling swimming pools;
- washing of vehicles, except in a commercial car wash or as necessary for operator safety; and
- washing exterior building surfaces, parking lots, driveways or sidewalks, except as necessary to apply surface treatments such as paint, preservatives, stucco, pavement or cement.

The following uses may be allowed, before 9 am and after 5 pm, when mandatory restrictions are in place:

- irrigation to establish a new lawn and new plantings during the months of May and September;
- irrigation of public parks and recreational fields by means of automatic sprinklers outside the hours of 9 am to 5 pm;
- irrigation of gardens, flowers and ornamental plants by means of a hand-held hose or drip irrigation systems; and
- irrigation of lawns by means of a hand-held hose.

Water uses NOT subject to mandatory restrictions are those required:

- for health or safety reasons;
- by regulation;
- for the production of food and fiber;
- for the maintenance of livestock; or
- to meet the core functions of a business (for example, irrigation by golf courses as necessary to maintain tees, greens, and limited fairway watering, or irrigation by plant nurseries as necessary to maintain stock).

Public Notice of Seasonal Nonessential Outdoor Water Use Restrictions

Harwich shall notify its customers of the restrictions, including a detailed description of the restrictions and penalties for violating the restrictions.

Notice that restrictions have been put in place shall be filed each year with the Department within 14 days of the restriction's effective date. Filing shall be in writing on the form "Notification of Water Use Restrictions" available on MassDEP website.

To the extent feasible, all summer outdoor water use should take place before 9 am and after 5 pm when evaporation and evapotranspiration rates are lower.

Nothing in the permit shall prevent Harwich Water Department from implementing water use restrictions that are more stringent than those set forth in this permit.

Table 3: Seasonal Limits on Nonessential Outdoor Water Use

Permittee must at a minimum implement the following outdoor water use restrictions:

Groundwater level Triggered Restrictions from May 1st through September 30th

Nonessential outdoor water use is allowed no more than TWO DAYS per week before 9 am and after 5 pm whenever:

a) Groundwater levels at USGS Monitoring Well 414632070014901 (MA-BMW 22R) Brewster, MA decline to or below the groundwater trigger for 60 consecutive days. The monthly trigger levels are listed below and are the period of record monthly 25th percentile depth to water level values, as determined and published by the USGS. Restrictions could start on May 1, so monitoring of BMW 22R begins on March 1 of each year.

Trigger Values for Outdoor Water Use Restrictions (feet below land surface)*

March	April	May	June	July	Aug	Sept
31.51	31.08	31.05	31.06	31.20	31.59	31.77

*As of 2/25/2019

Once implemented, the restrictions shall remain in place until the daily value of the groundwater levels at the assigned USGS monitoring well have recovered to less than the trigger for 30 consecutive days (when the water table elevation has risen above the trigger level).

AND;

b) A Level 1-Mild Drought or higher is declared by the Massachusetts Drought Management Task Force for Cape Cod.

Instructions for Accessing U.S. Geologic Survey Groundwater Level and Massachusetts Drought Advisory Website Information

Groundwater level information is available at the USGS National Water Information System (NWIS): Web Interface. The USGS NWIS default shows Massachusetts groundwater levels in real time, i.e., the most recent, usually hourly, water level measured and recorded at each USGS monitoring well.

Seasonal Limits on Nonessential Outdoor Water Use are implemented when the daily mean depth to water level exceeds the designated trigger for 60 consecutive days (*i.e.*, when the depth to water becomes larger than the trigger value as the water table elevation declines). The daily water level is compared to the trigger for that month. To determine if restrictions must be implemented on May 1 it is necessary to monitor the daily water level in March and April.

Mean daily groundwater level readings are available at the USGS NWIS Web Interface at http://waterdata.usgs.gov/ma/nwis/current/?type=gw&group_key=county_cd

• Scroll down to 414632070014901 MA-BMW 22R, Brewster, MA. • Click on the station number. • Scroll down to "Show today`s statistics" and click on the "Change time span" tab. • Under "Available Parameters" click on "72019 Water level, depth LSD (Mean)". • Under "Select a date range" and enter the number of days of records (entering 60 will give you the past 60 days of data) or the desired date range (from "Begin date" to "End date") and hit "Change time span". • The graph provides the "Depth to water level, feet below land surface" for the most recent number of days or desired date range chosen. • Compare each day`s value to its month's trigger value (25th percentile) in your permit. Outdoor water use restrictions must be implemented when the daily depth to water has been at or below (i.e. a greater value than) the trigger values for 60 consecutive days.
Drought Status information is available at https://www.mass.gov/info-details/drought-status. • Restrictions are implemented when a Mild Drought, Significant Drought, Critical Drought or Emergency Drought is announced in your region through the website.

8. Water Conservation Requirements

At a minimum, Harwich shall implement the conservation measures listed in Table 4. Compliance with the water conservation requirements shall be reported to MassDEP upon request, during all interim permit reviews, and at the time of permit renewal, unless otherwise noted below.

Table 4: Minimum Water Conservation Requirements
System Water Audits and Leak Detection
1. At a minimum, conduct a full leak detection survey every three years.
2. Conduct leak detection of the entire distribution system within one year whenever the percentage of UAW increases by 5% or more (for example an increase from 3% to 8%) over the percentage reported on the ASR for the prior calendar year. Within 60 days of completing the leak detection survey, submit to the Department a report detailing the survey, any leaks uncovered as a result of the survey or otherwise, dates of repair and the estimated water savings as a result of the repairs.
3. Conduct field surveys for leaks and repair programs in accordance with the *AWWA Manual 36.*
4. Harwich shall have repair reports available for inspection by MassDEP. Harwich shall establish a schedule for repairing leaks that is at least as stringent as the following: • Leaks of 3 gallons per minute or more shall be repaired within 3 months of detection. • Leaks of less than 3 gallons per minute at hydrants and appurtenances shall be repaired as soon as possible. • Leaks of less than 3 gallons per minute shall be repaired in a timely manner, but in no event more than 6 months from detection, except that leaks in freeway, arterial or collector roadways shall be repaired when other roadwork is being performed on the roadway. Leaks shall be repaired in accordance with Harwich's priority schedule including leaks

up to the property line, curb stop or service meter, as applicable. Harwich shall have water use regulations in place that require property owners to expeditiously repair leaks on their property.
Metering
1. Calibrate all source and finished water meters at least annually and report date of calibration on the ASR.
2. Harwich reports its system is 100% metered. All water distribution system users shall have properly sized service lines and meters that meet AWWA calibration and accuracy performance standards as set forth in AWWA Manual M6 – Water Meters.
3. Harwich shall have an ongoing program to inspect individual service meters to ensure that all service meters accurately measure the volume of water used by its customers. The metering program shall include regular meter maintenance, including testing, calibration, repair, replacement and checks for tampering to identify and correct illegal connections. The plan shall include placement of sufficient funds in Harwich's annual water budget to calibrate, repair, or replace meters as necessary.
Pricing
1. Harwich shall maintain a water pricing structure that includes the full cost of operating the water supply system. Harwich shall evaluate rates at a minimum of every three years and adjust costs as needed. Full cost pricing factors all costs - operations, maintenance, capital, and indirect costs (environmental impacts, watershed protection) - into prices.
2. Harwich reports using an increasing block rate structure and shall continue to do so.
Residential and Public Sector Conservation
1. Harwich shall meet the standards set forth in the Federal Energy Policy Act, 1992 and the Massachusetts Plumbing Code.
2. Harwich reports metering water used by contractors using fire hydrants for pipe flushing and construction and shall continue to do so.
3. Harwich shall ensure that water savings devices are installed in all municipal buildings as they are renovated, and shall ensure water conserving fixtures and landscaping practices are incorporating into the design of new municipal capital projects.
Industrial and Commercial Water Conservation
1. Harwich shall ensure that the best available technologies for water conservation practices are being used in all development proposals, particularly low flow devices and water-wise landscaping practices.
Lawn and Landscape
1. Harwich shall update as necessary its water use restriction bylaw in accordance with the restricted nonessential outdoor water uses condition.
Public Education and Outreach
1. Harwich shall keep implementing a Water Conservation Education Plan. Harwich's Water Conservation Education Plan shall be designed to educate Harwich's water customers of ways to conserve water. Without limitation, Harwich's plan may include the following actions: • Include in bill stuffers and/or bills, a work sheet to enable customers to track water use and conservation efforts and estimate the dollar savings; • Public space advertising/media stories on successes (and failures); • Conservation information centers perhaps run jointly with electric or gas company; • Speakers for community organizations;

• Public service announcements; radio/T.V./audio-visual presentations; • Joint advertising with hardware stores to promote conservation devices; • Use of civic and professional organization resources; • Special events such as Conservation Fairs; • Develop materials that are targeted to schools with media that appeals to children, including materials on water resource projects and field trips; and • Make multilingual materials available as needed.
2. Upon request of MassDEP, Harwich shall report on its public education and outreach effort, including a summary of activities developed for specific target audiences, any events or activities sponsored to promote water conservation and copies of written materials.

9. Requirement to Report Raw and Finished Water Volumes

Harwich shall report annually as required by completing the electronic Annual Statistical Report (eASR) for public water suppliers and shall provide other reporting as specified in the Special Conditions above.

10. Mitigation of Impacts for Withdrawals that Exceed Baseline

Harwich Water Department is required to mitigate 0.0705 MGD for its new permitted withdrawals over the baseline. Harwich`s mitigation will be met through a combination of the indirect credits achieved through water supply protection and non-water supply conservation land protection and the development and implementation of a wetlands bylaw.

Harwich acquired and protected a total of 7.48 acres for water supply purposes and 70.75 acres for non-water supply conservation purposes between the years of 2007 and 2022 that qualify for indirect mitigation credits. The parcels purchased and protected since 2005 (see Appendix B) eligible for credits received a total of 5.75 indirect mitigation credits which is equivalent to equals to 0.0575 MGD.

Harwich has developed and implemented a wetlands bylaw that is eligible for receiving 4 indirect mitigation credits which is equivalent to 0.04 MGD.

Harwich Water Department shall contact MassDEP should there be changes to the status of the mitigation projects.

General Permit Conditions (applicable to all Permittees)

1. **Duty to Comply** The Permittee shall comply at all times with the terms and conditions of this permit, the 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 up to the authorized volume 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 MassDEP to enter and examine any property, inspect and monitor the withdrawal, and inspect and copy any relevant records, 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 MassDEP pursuant to M.G.L. c. 21G, §§ 15-17, M.G.L. c. 111, § 160, or any other enabling authority.
5. **Transfer of Permits** This permit shall not be transferred in whole or in part unless and until MassDEP approves such transfer in writing, pursuant to a transfer application on forms provided by MassDEP requesting such approval and received by MassDEP 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 36.37.
6. **Duty to Report** The Permittee shall submit annually, on a form provided by MassDEP, a certified statement of the withdrawal. Such report is to be received by MassDEP by the date specified by MassDEP. Such report must be mailed or hand delivered to the address specified on the report form.
7. **Duty to Maintain Records** The Permittee shall be responsible for maintaining withdrawal records as specified by this permit.
8. **Metering** Withdrawal points shall be metered. Meters shall be calibrated annually. Meter shall be maintained and replaced as necessary to ensure the accuracy of the withdrawal records.
9. **Amendment, Suspension or Termination** The Department may amend, suspend or terminate this permit in accordance with M.G.L. c. 21G or 310 CMR 36.29.

APPEALS

Any person aggrieved by this decision may request an adjudicatory hearing on this Permit by timely filing a Notice of Claim for an Adjudicatory Appeal ("Notice of Claim") in accordance with 310 CMR 36.37 and 310 CMR 1.01 within twenty-one (21) days of its receipt of this Permit. The Notice of Claim shall state specifically, clearly and concisely the facts that are grounds for the appeal, the relief sought, and any additional information required by applicable law or regulation. A copy of this Permit shall be included with a Notice of Claim. No request for an appeal of this Permit shall be validly filed unless a copy of the request is sent at the same time by certified mail, or delivered by hand, to the local water resources management official in the community in which the withdrawal point is located; and for any person appealing this decision, who is not the Permittee, unless such person notifies the Permittee of the appeal in writing by certified mail or by hand within five (5) days of mailing the appeal to the Department.

The Notice of Claim and supporting documentation must be sent by certified mail or hand delivered to:

Case Administrator
Office of Appeals and Dispute Resolution
Department of Environmental Protection
100 Cambridge Street, Suite 900
Boston, MA 02114

In addition, the Department's fee transmittal form, together with a valid check made payable to the Commonwealth of Massachusetts in the amount of $100 for the appeal filing fee, if required, must be mailed to:

Commonwealth of Massachusetts Lock Box
Department of Environmental Protection

P.O. Box 4062
Boston, MA 02211

The Notice of Claim may be dismissed if the filing fee is not paid, unless the appellant is exempt or granted a waiver. The filing fee is not required if the appellant is a city, town (or municipal agency), county, district of the Commonwealth of Massachusetts, or a municipal housing authority. The Department may waive the adjudicatory filing fee for a person who shows that paying the fee will create an undue financial hardship. A person seeking a waiver must file, along with the hearing request, an affidavit setting forth the facts believed to support the claim of undue financial hardship.

Duane LeVangie

7/18/2024

Duane LeVangie
Water Management Program Chief
Bureau of Water Resources

Date

Appendix A – Functional Equivalence with the 10% Unaccounted for Water Performance Standard

MassDEP will consider PWS permittees who cannot meet the 10% UAW performance standard to be functionally equivalent, and in compliance with their permit, if they have an on-going program in place that ensures "best practices" for controlling water loss. The water loss control program will be based on annual water audits and guidance as described in the AWWA/IWA *Manual of Water Supply Practices – M36, Water Audits and Loss Control Programs* (AWWA M36).

If, as of December 31, 2026, the permittee fails to document compliance with the Unaccounted for Water performance standard (UAW of 10% or less for 2 of the 3 most recent years throughout the permit period), then the permittee shall develop and implement a water loss control program following the *AWWA M36 Water Audits and Loss Control Programs* within 5 full calendar years.

1. Conduct an annual "top down" water audit, calculate the data validity level/score using AWWA Water Loss Control Committee's Free Water Audit Software, and submit the AWWA WLCC Free Water Audit Software: Reporting Worksheet and data validity score annually with its Annual Statistical Report (ASR).
    - If a PWS's data validity level/score is less than Level III (51-70), steps recommended through the audit(s) shall be taken to improve the reliability of the data prior to developing a long-term program to reduce real and apparent water losses.
    - Data with a validity score of 50 or less are considered too weak to be used to develop a component analysis or for infrastructure planning and maintenance.
    - Developing data with an acceptably strong validity score can be a multi-year process.
2. When the data validity score meets the Level III (51-70) requirement, the permittee shall conduct a component analysis to identify causes of real and apparent water loss and develop a program to control losses based on the results of the component analysis. The Permittee shall submit the component analysis and water loss control program with a proposed implementation schedule to the Department.
3. Continued implementation will be a condition of the permit in place of meeting the 10% UAW performance standard.
4. Upon request of the Department, the permittee shall report on its implementation of the water loss control program.

A PWS permittee may choose to discontinue the water loss program implementation if UAW, as reported on the ASR and approved by DEP, is below 10% for four consecutive years, and the water audit data validity scores are at least Level III (51-70) for the same four years.

NOTE FOR SMALL SYSTEMS: For small systems with less than 3,000 service connections or a service connection density of less than 16 connections per mile of pipeline, the Unavoidable Annual Real Loss (UARL) calculation and the Infrastructure Leak Index (ILI) developed as the final steps of the top down water audit may not result in valid performance indicators, and may not be comparable to the UARL and ILI calculations for larger systems.

However, these small systems can benefit from developing reliable data and conducting an annual top down water audit. Small systems can rely on the real losses (gallons per mile of main per day) performance indicator developed in the water audit as a measure of real water loss when developing a water loss control program. The M36 Manual discusses the audit process for small systems, and includes a chapter to guide small systems in understanding the results of their audits and in developing a water loss control program (*Manual of Water Supply Practices – M36, Fourth Edition, Chapter 9: Considerations for Small Systems*, pp. 293-305).

MassDEP UAW Water Loss Control Measures: Permittees who do not have MassDEP approved Water Loss Control Programs in place by 6th calendar year after 2019 will be required to implement the MassDEP UAW Water Loss Control Measures outlined below:

- An annual water audit and leak detection survey, as described in the AWWA M36 Manual, of the entire system.
  - Within one year, repair 75% (by water volume) of all leaks detected in the survey that are under the control of the public water system;
  - Thereafter, repair leaks as necessary to reduce permittee's UAW to 10% or the minimum level possible.
- Meter inspection and, as appropriate, repair, replace and calibrate water meters:
  - Large Meters (2" or greater) – within one year
  - Medium Meters (1" or greater and less than 2") – within 2 years
  - Small Meters (less than 1") - within three years
  - Thereafter, calibrate and or replace all meters according to type and specification.
- Bill at least quarterly within three years.
- Water pricing structure sufficient to pay the full cost of operating the system.

Hardship - A permittee may present an analysis of the cost effectiveness of implementing certain conservation measures included in the MassDEP UAW Water Loss Control Measures and offer alternative measures. Any analysis must explicitly consider environmental impacts and must produce equal or greater environmental benefits. Suppliers will be able to present:

- Reasons why specific measures are not cost effective because the cost would exceed the costs of alternative methods of achieving the appropriate standard;
- Alternative specific conservation measures that would result in equal or greater system-wide water savings or equal or greater environmental benefits than the conservation measures included in the MassDEP UAW Functional Equivalence Plan; and
- When applicable, an analysis demonstrating that implementation of specific measures will cause or exacerbate significant economic hardship.

Appendix B – Summary of Harwich Land Purchase and Protection Indirect Mitigation Credits

Municipal Assessor`s Map and Parcel	Parcel Purchase Date	Effective Date of Conservation Restriction/ Easement	CR Book Page	Water Supply Protected Land Area (acres)	Priority Conservation Land Area (acres)	Other Conservation Land (acres)
Map 27, E-1	June 30, 2014	July 25, 2014	28284-85		6.5	
Map 99, G7	June 27, 2014	June 27, 2014	28231-113		9.68	
Map 75, J3-3, J3-4, J3-5, J3-6	January 22, 2018	January 22, 2018	30543-259		15	
Map 83, 56	January 29, 2010	June 25, 2010	24642-96		7.34	
Map 49, A2-2	December 18, 2009	May 11, 2010	24543-253		2.905	
Map 49, A6	March 27, 2006	December 14, 2007	22537-100		4.45	
Map 49, A7	March 27, 2006	December 14, 2007	22537-100		4.85	
Map 64, C1-A, C2, C8 & C9	June 15, 2011	June 17, 2011	25515-213, 217			20.02
Map 43, E-7, E-9, E-9A, E-10, E-12	June 16, 2022	June 16, 2022		7.48		
			Total Acres	7.48	50.725	20.02
			Total Credits	0.748	5	

Appendix C – Harwich Vernal Pool Monitoring Protocol

Water levels within the vernal pool situated approximately 225 feet north of GPW #11 (Certified Vernal Pool #356) shall be observed and recorded weekly year-round. The water level data should be presented in graphic format with precipitation, pumping periods and pumping rate in the monitoring report. Biological surveying of the pool is required to be conducted by an experienced biologist twice per year. Harwich should survey the vernal pool according to the following approach. A report interpreting, evaluating and summarizing the monitoring data shall be submitted to MassDEP for its review by September 30 every year. Specifically, the monitoring report should at least include the following contents:

1. A brief summary of the biological survey work performed (explanations are needed if the biological surveys do not follow the approach established in this document);
2. Summary tables reflecting the amphibian data metrics in (a) number of egg masses by species and condition (i.e., in vs. out of water) observed along each transect for each survey within a given year, (b) total number of egg masses by species and condition (i.e., in vs. out of water) observed among all transects combined for each survey within a given year, (c) average (per survey) number of egg masses by species and condition (i.e., in vs. out of water) observed among all transects combined for each year, and (d) date, weather conditions (e.g., wind speed, % cloud cover), observer name, pool water level for each survey;
3. Summary tables reflecting the proportion of the pool area that was not inundated during each amphibian egg-mas survey, as determined by the number of linear feet of each survey transect that was observed without surface water at the time of survey;
4. Summary tables of weekly precipitation inputs, pool water levels, and pumping volumes;
5. Descriptions of any challenges encountered during monitoring; and
6. Descriptions of any other noteworthy circumstances that might aid in interpretation of biological and/or environmental data compiled (e.g., clustering of eggs in certain portions of the pool).

Biological surveying approach:

(1) Install long-term (semi-permanent) markers for survey transects. Place the markers (e.g., stakes) (a) along each of the east and west sides of the pool, opposite one another in an east-west orientation, (b) at the high-water boundary of the pool, and (c) spaced 4 meters apart. Number each stake (e.g., from 1 to 10) on one side of the pool, then do the same (e.g., from 1 to 10) for the corresponding stake on the opposite side of the pool. The hypothetical, west-to-east, straight line between the two northernmost stakes will be Transect 1; the hypothetical, west-to-east, straight line between the two, next most northern stakes will be Transect 2, etc.

(2) For each survey, the observer walks slowly through the pool basin, from west-to-east (or vice versa) on the first hypothetical transect line, counting egg masses observed "on" the transect line and within 2 meters to each side. Egg masses observed in the water will be tallied separately from those that are completely exposed on land (e.g., as a result of a receding water line). Upon reaching the end of the first transect, the observer records the total number of egg masses (by species, and whether in water or out of water) observed, plus an estimate of the amount of the transect (in linear feet) that was not surveyed due to high water (or other reason). The observer proceeds to survey the remaining transects in identical fashion. Transects should be surveyed in order so that adjacent transects are surveyed "back-to-back" (will help reduce chances of counting some egg masses more than once).

(3) At the end of the survey, the observer measures and records the amount of each transect (in linear feet) that was not inundated during the survey.
(4) Conduct two egg-mass surveys per year. The first survey should occur 2 weeks after the onset of Spotted Salamander breeding migrations in southeastern Massachusetts during a given year (as may be determined via monitoring of the Vernal Pool listserv and/or consulting the NHESP). The second survey should occur 4 weeks after the onset of Spotted Salamander breeding migrations. [*Note: During the past 10 years, the earliest onset of the breeding migrations was on or around February 22rd, and the latest was on or around April 3rd.*]

Additional notes regarding protocol:

- At the end of each survey, all egg mass counts should be totaled for a "pool-wide count". However, data should still be compiled transect-by-transect (and species-by-species) so that variation in egg-mass distribution within the pool from year-to-year can be evaluated in addition to pool-wide counts. That is, in addition to tracking pool-wide counts from year-to-year, individual transect counts should also be tracked.
- Surveys should be planned for calm, sunny days to the extent possible. If surveying during the day, the observer should always wear polarized sun glasses and carry a flat, opaque object (e.g., laminated sheet of paper) to shade the water surface as necessary to reduce/eliminate glare and reflection when conducting egg-mass counts. These practices will help to maximize egg-mass detection probability. Alternatively, the observer can conduct the surveys at night during calm, non-rainy conditions with use of a strong flashlight and/or headlamp (no polarized sunglasses necessary). A survey should be paused whenever wind is disturbing the water surface, and under no circumstance should a survey be performed while it is raining.
- To the extent possible, the same observer should conduct all surveys, and weather conditions (sunlight, wind) should be similar among surveys. These two practices will help to maximize consistency in egg-mass detection probability so that data can be compared among years without excessive bias.
- If the pool lacks shrubs, the observer should be extra careful to note egg masses deposited on the pool bottom in thickets of grass and/or aggregates of leaves (some masses may be obscured by grass or leaves, and masses may occur in "piles" of 30 or more).
- The observer should avoid surveying portions of the pool exceeding 4 feet in depth during a given survey. If any portion of a transect is not traversed for that or any other reason, the observer should record approximately how many linear feet of the transect was not surveyed.
- To avoid double-counting of egg masses during a survey, the observer must exercise care to stay on the hypothetical transect line and count only those egg masses occurring within 2 meters of the line. Recommend marking the tops of each stake in alternating colors along a given side of the pool, then matching that color scheme on the opposite side of the pool, so that it is easy for the observer to visualize which stake is his/her target at the far end of the pool while trying to remain on a given transect.
- The entire length of each transect that has <4 feet of water should be traversed whenever surveying, even if portions of the transect are not inundated at all. Any egg masses observed out of the water (i.e., on exposed land) should be counted and recorded separately for each transect.

- Total length of each transect should be documented somewhere for future reference during data analysis.