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

FINAL

July 03, 2018

Gene Fulmine
Pembroke Water Department
100 Center Street
Pembroke, MA 02359

RE: Pembroke Water Department
PWS Number: 4231000
WMA Permit #9P-4-21-231.01
Action: Final Permit (BRPWM03)

Dear Mr. Fulmine:

Please find the attached documents:

- Findings of Fact in Support of the New Permit #9P-4-21-231.01; and
- FINAL Water Management Act Permit #9P-4-21-231.01 (South Coastal Basin) for the Pembroke 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 (617) 292-5532 or via e-mail at shi.chen@state.ma.us.

Very truly yours,

Duane LeVangie,
Water Management Program Chief
Bureau of Water Resources

Y:\DWPWMA\PermitRenewals\South Coastal\Pembroke- FINAL Permit 9P42123101-2018-07-03
Ecc: Jen Pederson, MWWA
Michelle Craddock, DFW
Julia Blatt, Massachusetts Rivers Alliance
Jim McLaughlin, SERO
Samantha Woods, North & South Rivers Watershed Association
Ryan Trahan, Environmental Partners Group

Massachusetts Department of Environmental Protection
One Winter Street, Boston MA 02108 • Phone: 617-292-5751
Communication For Non-English Speaking Parties - 310 CMR 1.03(5)(a)

1 English:
This document is important and should be translated immediately. If you need this document translated, please contact MassDEP's Diversity Director at the telephone numbers listed below.

2 Español (Spanish):
Este documento es importante y debe ser traducido inmediatamente. Si necesita este documento traducido, por favor póngase en contacto con el Director de Diversidad MassDEP a los números de teléfono que aparecen más abajo.

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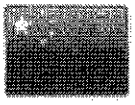
Este documento é importante e deve ser traduzida imediatamente. Se você precisa deste documento traduzido, por favor, entre em contato com Diretor de Diversidade da MassDEP para os números de telefone listados abaixo.



4(a) 中國（傳統）(Chinese (Traditional):
本文件非常重要，應立即翻譯。如果您需要翻譯這份文件，請用下面列出的電話號碼與 MassDEP 的多樣性總監聯繫。

4(b) 中国（简体中文）(Chinese (Simplified):
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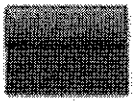
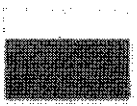


5 Ayisyen (franse kreyòl) (Haitian) (French Creole):
Dokiman sa-a se yon bagay enpòtan epi yo ta dwe tradui imedyatman. Si ou bezwen dokiman sa a tradui, tanpri kontakte Divèsite Direktè MassDEP a nan nimewo telefòn ki nan lis pi ba a.

6 Việt (Vietnamese):
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.

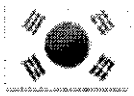
7 □□□□□□□□□ (Kmer (Cambodian):
ឯកសារនេះ□□មានសារៈសំខាន់និងគួរត្រូវបានបកប្រែ ឲ្យបាន។ ប្រសិនបើអ្នកត្រូវបានបកប្រែ ឯកសារនេះសូមទំនាក់ទំនងអ្នកគ្រប់គ្រង MassDEP នៅលេខទូរស័ព្ទ ដែលបានរាយ ខាងក្រោម។

8 Kriolu Kabuverdianu (Cape Verdean):
Es documento é importante e deve ser traduzido imidiatamente. Se bo precisa des documento traduzido, por favor contacta Director de Diversidade na MassDEP's pa es numero indicode li d'boche.



9 Русский язык (Russian):
Этот документ является важным и должно быть переведено сразу. Если вам нужен этот документ переведенный, пожалуйста, свяжитесь с директором разнообразия MassDEP по адресу телефонных номеров, указанных ниже.

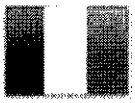
10 العربية (Arabic):
هذه الوثيقة الهامة وينبغي أن تترجم على الفور. اذا كنت بحاجة الى هذه الوثيقة المترجمة، يرجى الاتصال مدير التنوع في MassDEP على أرقام الهواتف المدرجة أدناه.



11 한국어 (Korean):
이 문서는 중요하고 즉시 번역해야합니다. 당신이 번역이 문서가 필요하면 아래의 전화 번호로 MassDEP 의 다양성 감독에 문의하시기 바랍니다.

12 հայերեն (Armenian):
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.

13 فارسی (Farsi (Persian):
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.



14 Français (French):
Ce document est important et devrait être traduit immédiatement. Si vous avez besoin de ce document traduit, s'il vous plaît communiquer avec le directeur de la diversité MassDEP aux numéros de téléphone indiqués ci-dessous.

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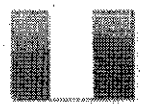
Dieses Dokument ist wichtig und sollte sofort übersetzt werden. Wenn Sie dieses Dokument übersetzt benötigen, wenden Sie sich bitte Diversity Director MassDEP die in den unten aufgeführten Telefonnummern.

16 Ελληνική (Greek):
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.



17 Italiano (Italian):
Questo documento è importante e dovrebbe essere tradotto immediatamente. Se avete bisogno di questo documento tradotto, si prega di contattare la diversità Direttore di MassDEP ai numeri di telefono elencati di seguito.

18 Język Polski (Polish):
Dokument ten jest ważny i powinien być natychmiast przetłumaczone. Jeśli potrzebujesz tego dokumentu tłumaczone, prosimy o kontakt z Dyrektorem MassDEP w różnorodności na numery telefonów wymienionych poniżej.

19 हिन्दी (Hindi):
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.

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection
One Winter Street Boston, MA 02108 • 617-292-5500

Findings of Fact in Support of
FINAL Water Management Permit # 9P-4-21-231.01
Pembroke 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-4-21-231.01, 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 new water withdrawal permit application by the Pembroke Water Department 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

As noted in the previously renewed Water Management permit issued to Pembroke on November 14, 2016, the expiration date for all permits going forward in the South Coastal Basin will be August 31, 2030, 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:

- Safe yield determinations for the major river basins based on a new methodology developed through SWMI (see the Safe Yield in the South Coastal Basin section of this document or 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 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 65 residential gallons per capita day or less;
    - 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 South Coastal 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 calculation for the South Coastal Basin is 70.1 million gallons per day (MGD), and total registered and permitted withdrawals are 44.90 MGD (not including the additional 0.58 MGD authorized by this permit increase). The maximum withdrawals that will be authorized in this permit, and all other permits currently under review by the Department within the South Coastal Basin, will be within the safe yield and may be further conditioned as outlined in the regulations.

Findings of Fact for Permit Conditions in Pembroke'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. Note that Special Conditions 2 through 9, and 12 and 13 have not changed from the conditions included in the November 14, 2016 permit renewal issued.

Special Condition 1, Maximum Authorized Annual Average Withdrawal, reflects the authorized annual average withdrawal volume for each period during the life of this permit. The system-wide withdrawal volumes issued in this permit increase from the 1.26 MGD issued in the 2016 renewed permit to 1.84 MGD, based on the water needs forecasts developed by the Department of Conservation and Recreation, Office of Water Resources (DCR) in 2010. Pembroke may increase its annual average daily withdrawals to the maximum authorized volume (1.84 MGD) prior to September 1, 2025, if Pembroke is meeting the requirements of Special Conditions of 5, 6, 7 and 8 outlined in the permit. If not, Pembroke is constrained to the volumes identified for each period outlined in the permit.

Special Condition 2, Maximum Daily Withdrawals from Groundwater Withdrawal Points, reflects the MassDEP approved Zone II maximum daily pumping rate for each of Pembroke'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 Pembroke'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, requirements have been met and are up to date as of the issuance of this permit.

Special Condition 5, Performance Standard for Residential Gallons Per Capita Day (RGPCD) Water Use, for all PWS is 65. Pembroke is required to meet 65 RGPCD within 2 full

calendar years, i.e. by December 31, 2018. Permittees that cannot comply within the timeframe in the permit must meet Functional Equivalence Requirements outlined in Appendix A. As accepted by the Department, Pembroke's RGPCD for the most recent three years has been:

Pembroke RGPCD		
2016	2015	2014
52	53	49

Special Condition 6, Performance Standard for Unaccounted for Water (UAW), for all PWS is 10%. Pembroke is required to meet 10% or less UAW for 2 of the 3 most recent years throughout the permit period. Pembroke shall be in compliance with this performance standard by December 31, 2019. 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 B. As accepted by the Department, Pembroke's UAW for the most recent three years has been:

Pembroke UAW		
2016	2015	2014
8%	4%	10%

Special Condition 7, Seasonal Limits on Nonessential Outdoor Water Use, reflects the restrictions on nonessential outdoor water use from May through September. The options outlined in Special Condition 7 are based on whether reported RGPCD for the previous year was in compliance with the RGPCD Performance Standard (see Special Condition 5, Performance Standard for RGPCD).

In addition, outdoor water use by suppliers, like Pembroke, with wells in August net groundwater depleted subbasins[1] is limited to 1or 2 days per week to minimize withdrawals from depleted subbasins.

Each year Pembroke may choose one of two options for implementing nonessential outdoor watering restrictions.

- **Calendar triggered restrictions** are in place from May 1st through September 30th. Many public water suppliers find this option easier to implement and enforce than the streamflow triggered approach
- **Streamflow triggered restrictions** are implemented at those times when streamflow falls below designated flow triggers measured at an assigned, web-based, real-time U.S. Geologic Survey (USGS) stream gage from May 1st through September 30th. At a minimum, restrictions commence when streamflow falls below the trigger for three consecutive days. Once implemented, the restrictions remain in place until streamflow at

[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).

the assigned USGS local stream gage meets or exceeds the trigger streamflow for seven consecutive days.

If Pembroke selects the streamflow trigger approach, it has been assigned USGS stream gage 01105730 Indian Head River at Hanover, MA. The May-June streamflow trigger is 31 cubic feet per second (cfs), and the July-September streamflow trigger is 13 cfs. Should the reliability of flow measurement at the Indian Head River gage be so impaired as to question its accuracy, Pembroke may request the Department review and approval to transfer to another gage to trigger restrictions. The Department reserves the right to require use of a different gage.

- **The 7-Day Low Flow Trigger**, at which restrictions increase, is incorporated into both Calendar and Streamflow Triggered restrictions in order to provide additional protection to streamflows when flows are very low. The 7-day low flow trigger for Pembroke is 4.9 cfs.

Pembroke may choose to implement limits on nonessential outdoor water use that are stricter than those required by the permit. Note that this condition has not changed from the requirements included in the November 14, 2016 permit.

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 2006 and revised in June 2012 (http://www.mass.gov/eea/docs/dcr/watersupply/intbasin/waterconservationstandards.pdf).

Special Condition 9, Coldwater Fish Resource (CFR) Protection, requires permittees with permitted withdrawals that impact streamflow at a CFR, identified at http://maps.env.state.ma.us/flexviewers/SWMI_Viewer/index.html to shift withdrawals to their other withdrawals points, as feasible, to minimize impact at the CFR.

Pembroke's sources 4231000-01G, 02G, 04G and 05G are located in Subbasin 22023, which supports a coldwater fishery in Herring Brook. Department of Fish and Game review of Pembroke's sources in Subbasin 22023 shows that only Well 01G is close enough to Herring Brook to impact streamflow at the CFR. Well 01G has been off-line since 2009 due to water quality concerns and withdrawals have been shifted to other wells away from the CFR. No further optimization is required unless Pembroke anticipates using Well 01G again during the life of this permit.

Special Condition 10, Minimization of Groundwater Withdrawal impacts in Stressed Subbsins, requires permittees with permitted groundwater sources in subbasins with net groundwater depletion of 25% or more during August to minimize their withdrawal impacts on those subbasins to the greatest extent feasible, through optimization of groundwater source use, surface water releases to improve streamflows, outdoor water use restrictions and water conservation programs that go beyond standard Water Management permit requirements.

Pembroke's groundwater sources 4231000-01G, 02G, 04G and 05G are located in Subbasin 22023, which is 59.4% August net groundwater depleted. Based on Department records and information submitted by Pembroke, the Department finds that minimization requirements will be met as follows:

- Pembroke has one registered groundwater source, Well #03G, in an unassessed coastal area in which August net groundwater depletion cannot be readily determined. There are other resources including anadromous fisheries and a public water supply source near Well #03G. Department review of Pembroke's pumping records show that Pembroke has consistently pumped Well #03G at between 60% and 65% of its Department-approved maximum daily capacity throughout the past 5 summers. This permit does not require that Pembroke shift additional pumping to well #03G because increased pumping could have adverse effects on sensitive resources in the area.
- Pembroke has no surface water supplies and, therefore, cannot make releases to improve streamflow.
- The limits on nonessential outdoor water use set forth in Special Condition 7 are restrictions developed to minimize withdrawals in August net groundwater depleted subbasins.
- Pembroke outlined its current conservation measures that go beyond standard Water Management permit requirements. The continued implementation of those measures is required in **Special Condition 10**.

Special Condition 11, 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 the Pembroke is 459.9 MGY or 1.26 MGD, which is the 2005 authorized volume. This permit authorizes Pembroke to withdraw up to 1.84 MGD, and therefore Pembroke needs to mitigate the difference between the authorized volume and the baseline volume (i.e., 0.58 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. Pembroke reported on its new permit application that about 5% of its wastewater is discharged to the Taunton Basin through private septic systems and the remaining 95% of the wastewater is disposed of through on-site sewage disposal systems to the South Coastal Basin. MassDEP is going to assume that the wastewater generated by the additional withdrawal over baseline of 0.58 MGD will be returned to groundwater via septic systems in the Taunton and South Coastal Basin in the same percentages as is returned now. Water that is returned to groundwater in the South Coastal Basin will receive 85% wastewater return adjustment and water that is returned to groundwater in the Taunton

Basin will receive 43% wastewater return adjustment. This adjustment results in a volume of 0.099 MGD to be mitigated by Pembroke.

Because Pembroke's authorized volume exceeds its baseline volume, a mitigation plan is required. Pembroke identified the acquisition of several cranberry bogs that ceased production permanently since 2005 for inclusion in a mitigation plan. Cranberry bogs that have ceased operation after January 1, 2005 may qualify for the direct mitigation credits. Only the portion of water consumptively lost to the basin during the baseline period is eligible for direct credits. Based on industry-wide standards, cranberry bogs are estimated to consume 22.5% of their allocated water via irrigation and evapotranspiration losses, with the remaining 77.5% returned to the basin. Permittees who acquire or own cranberry bogs that cease operation may receive a direct mitigation credit based on the cultivated acreage reported in compliance with their WMA registration or permit between the periods of 2003-2005.

According to MassDEP`s records and the information submitted by Pembroke, the cranberry bogs eligible for direct mitigation credits in this permit include properties formally known as the Edgewood Bogs, the Andruk Bogs, and the Oldham Bog. The total irrigated acreage during the baseline period for these three bogs was 84.5 acres for the part of the Edgewood Bogs located in the Taunton portion of Pembroke, 25.53 acres at the Andruk Bogs, and 6 acres at the Oldham Bog. Because the eligible Edgewood Bogs are located in the Taunton Basin, Pembroke will receive 50% of the calculated credits for this property. Pembroke will receive 100% of the calculated credits for the other two bogs. The total direct mitigation credits achieved through the decommissioning of these cranberry bogs is 0.148 MGD. Details are presented in Appendix C.

According to MassDEP`s review, Pembroke has identified a total direct mitigation credits through its decommissioning of cranberry bogs (0.148 MGD), sufficient to address their mitigation volume of 0.09918 MGD. Should there be any changes to the status of those three cranberry bogs during the life of this permit, Pembroke should contact MassDEP about the changes and the mitigation requirements will need to be reassessd.

Special Condition 12, Water Conservation Levels requires that withdrawals from Well #5 cease if the water level in Great Sandy Bottom Pond falls below 52.1 feet above MSL as measured by the Abington-Rockland Joint Water Works.

Special Condition 13, Reporting Requirements, ensures that the information necessary to evaluate compliance with the conditions included herein is accurately reported.

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection
One Winter Street Boston, MA 02108 • 617-292-5500

WATER WITHDRAWAL PERMIT
Pembroke 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-4-21-231.01 **RIVER BASIN:** South Coastal

PERMITTEE: Pembroke Water Department

EFFECTIVE DATE: July 03, 2018

EXPIRATION DATE: August 31, 2030

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
Hobomock Well #1	4231000-01G
Center Street Well #2	4231000-02G
Bryantville Well #4	4231000-04G
Windswept Well #5	4231000-05G

SPECIAL CONDITIONS

1. Maximum Authorized Annual Average Withdrawal Volume

This permit authorizes Pembroke Water Department to withdraw water from the South Coastal Basin at the rate described below (Table 1). The volume reflected by this rate is in addition to the 0.99 million gallons per day previously authorized to Pembroke under Water Management Act (WMA) Registration #4-21-231.01 for withdrawal from the South Coastal Basin. 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) for each permit period over the term of this permit.

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: Maximum Authorized Withdrawal Volumes

Permit Periods	Total Raw Water Withdrawal Volumes			
	Permit		Registration + Permit	
	Daily Average (MGD)	Total Annual (MGY)	Daily Average (MGD)	Total Annual (MGY)
7/3/2018 to 8/31/2020	0.65	237.25	0.99+0.65=1.64	598.6
9/1/2020 to 8/31/2025	0.71	259.15	0.99+0.71=1.70	620.5
9/1/2025 to 8/31/2030	0.85	310.25	0.99+0.85=1.84	671.6

2. Maximum Authorized Daily Withdrawals from Groundwater Withdrawal Points

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 above in Special Condition 1.

Table 2: Maximum Daily Withdrawal Volumes

Source Name	PWS Source Code ID	Maximum Daily Rate (MGD)
Hobomock Well #1	4231000-01G	0.53

Center Street Well #2	4231000-02G	1.00
Bryantville Well #4	4231000-04G	1.00
Windswept Well #5	4231000-05G	Approved for 0.50 MGD annual average daily rate per letter of 7/26/2000 from MassDEP. In addition, pumping shall cease when the water level of Great Sandy Bottom Pond falls below 52.1 feet above MSL. See Special Condition 11.

3. **Zone II Delineation**
   MassDEP records show that all Pembroke's sources have approved Zone II delineations. Therefore, no further Zone II delineation work is required.

4. **Wellhead Protection**
   MassDEP records show that Pembroke has implemented municipal controls that comply with the Wellhead Protection Regulations, 310 CMR 22.21(2) for all the sources included in this permit.

5. **Performance Standard for Residential Gallons Per Capita Day Water Use**
   The Town of Pembroke's performance standard for residential gallons per capita day (RGPCD) is 65 gallons or less. Pembroke shall be in compliance with this performance standard by December 31, 2018. If Pembroke does not meet the standard, it shall be in compliance with the functional equivalence requirements outlined in Appendix A.

6. **Performance Standard for Unaccounted for Water**
   The Town of Pembroke'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. Pembroke shall be in compliance with this performance standard by December 31, 2019. If Pembroke does not meet the standard, it shall be in compliance with the functional equivalence requirements outlined in Appendix B.

   Nothing in the permit shall prevent a permittee who meets the 10% performance standard from developing and implementing a water loss control program following the *AWWA M36 Water Audits and Loss Control Programs.* Permittees implementing 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**
   Pembroke shall limit nonessential outdoor water use through mandatory restrictions from May 1st through September 30th as outlined in below (Table 3). 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.

Table 3: Seasonal Limits on Nonessential Outdoor Water Use

Restrictions if Pembroke has met the 65 RGPCD Standard for the preceding year RGPCD ≤ 65 as reported in the ASR and accepted by MassDEP	
Calendar Triggered Restrictions	Nonessential outdoor water use is restricted to: a) **two (2) days per week** before 9 am and after 5 pm; and b) **one (1) day per week** before 9 am and after 5 pm when USGS stream gage 01105730 – Indian Head River at Hanover, MA falls below 7-day the low-flow statistic **4.9 cfs** for three (3) consecutive days. Once streamflow triggered restrictions are implemented, they shall remain in place until streamflow at the gage meets or exceeds **4.9** cfs for seven (7) consecutive days.
Streamflow Triggered Restrictions	Nonessential outdoor water use is restricted to: a) **two (2) days per week** before 9 am and after 5 pm when USGS stream gage 01105730 – Indian Head River at Hanover, MA falls below: • May 1 – June 30: **31 cfs** for three (3) consecutive days • July 1 – September 30: **13 cfs** for three (3) consecutive days b) **one (1) day per week** before 9 am and after 5 pm when USGS stream gage 01105730 – Indian Head River at Hanover, MA falls below the 7-day low-flow statistic **4.9 cfs** for three (3) consecutive days. Once implemented, the restrictions shall remain in place until streamflow at the gage meets or exceeds the trigger streamflow for seven (7) consecutive days.
Restrictions if Pembroke has not met the 65 RGPCD standard for the preceding year RGPCD > 65 as reported in the ASR and accepted by MassDEP	
Calendar Triggered Restrictions	Nonessential outdoor water use is restricted to **one (1) day per week** before 9 am and 5 pm.
Streamflow Triggered Restrictions	Nonessential outdoor water use is restricted to **one (1) day per week** before 9 am and after 5 pm when USGS stream gage 01105730 – Indian Head River at Hanover, MA falls below: • May 1 – June 30: **31 cfs** for three (3) consecutive days • July 1 – September 30: **13 cfs** for three (3) consecutive days Once implemented, the restrictions shall remain in place until streamflow at the gage meets or exceeds the trigger streamflow for seven (7) consecutive days.

Instructions for Accessing Streamflow Website Information
If Pembroke chooses Streamflow Triggered Restrictions, Pembroke shall be responsible for tracking streamflows and drought advisories and recording and reporting to MassDEP when restrictions are implemented.
Streamflow information is available at the USGS National Water Information System (NWIS): Web Interface. The USGS NWIS default shows Massachusetts streamflows in real time, i.e., the most recent, usually quarterly hourly, reading made at each USGS stream gage. Seasonal Limits on Nonessential Outdoor Water Use are implemented when the mean daily streamflow falls below the designated trigger. The mean daily flow is not calculated until after midnight each day when the USGS computes the hourly data into a mean daily streamflow. As a result, permittees must use the mean

daily streamflow from the preceding day when tracking streamflows.

Mean daily streamflow gage readings are available at the USGS NWIS Web Interface at http://waterdata.usgs.gov/ma/nwis/current/?type=flow.

- Scroll down to 01105730 – Indian Head River at Hanover, MA.
- Click on the gage number.
- Scroll down to "Provisional Date Subject to Revision – Available data for this site" and click on the drop down menu.
- Click on "Time-series: Daily data" and hit GO.
- Scroll down to the "Available Parameters" box. Within the box, be sure "00060 Discharge (Mean)" is checked, then, under "Output Format" click "Table" and hit GO.
- Scroll down to "Daily Mean Discharge, cubic feet per second" table and find the current date on the table.
- Compare the cubic feet per second (cfs) measurement shown on the table to the cfs shown under Streamflow Triggered Restrictions above.

Pembroke shall document compliance with the Seasonal Nonessential Outdoor Water Use Restrictions annually in its Annual Statistical Report (ASR), and indicate whether it anticipates implementing calendar triggered restrictions or streamflow 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 of exterior building surfaces, parking lots, driveways or sidewalks, except as necessary to apply surface treatments such as paint, preservatives, pavement or cement.

The following uses may be allowed 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 before 9 am and after 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 minimal fairway watering, or irrigation by plant nurseries as necessary to maintain stock).

Public Notice of Seasonal Nonessential Outdoor Water Use Restrictions

Pembroke shall notify its customers of the restrictions and the consequences of failing to adhere to the restrictions.

- For calendar-triggered restrictions, customers shall be notified by April 15th each year.
- For streamflow-triggered restrictions, when streamflow at the assigned USGS local stream gage falls below a streamflow trigger for three consecutive days, customers shall be notified as soon as possible, but within three days of implementing the restrictions.

Notice that restrictions have been put in place shall be filed each year with MassDEP 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's website.

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

8. Water Conservation Requirements

At a minimum, Pembroke shall implement the following conservation measures forthwith. 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. Pembroke shall have repair reports available for inspection by MassDEP. Pembroke 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 Pembroke's priority schedule including leaks up to the property line, curb stop or service meter, as applicable. Pembroke 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. Pembroke 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. Pembroke 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 Pembroke's annual water budget to calibrate, repair, or replace meters as necessary.
Pricing
1. Pembroke shall maintain a water pricing structure that includes the full cost of operating the water supply system. Pembroke shall evaluate rates at a minimum every three to five 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. Pembroke reports using an increasing block rate structure and shall continue to do so.
Residential and Public Sector Conservation
1. Pembroke shall meet the standards set forth in the Federal Energy Policy Act, 1992 and the Massachusetts Plumbing Code.
2. Pembroke reports metering water used by contractors using fire hydrants for pipe flushing and construction and shall continue to do so.
3. Pembroke 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. Pembroke shall ensure water conservation practices in all development proposals, particularly low flow devices and water-wise landscaping practices.
Public Education and Outreach
1. Pembroke shall continue to implement its water conservation and education efforts designed to educate the Town's water customers on ways to conserve water. Without limitation, Pembroke'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 • Provide multilingual materials as needed.
2. Upon request of MassDEP, Pembroke 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. Coldwater Fish Resource (CFR) Protection

Pembroke's sources 4231000-01G, 02G, 04G and 05G are located in Subbasin 22023, which supports a coldwater fishery in Herring Brook. Review shows that only Hobomock Well 01G is close enough to Herring Brook to impact streamflow at the CFR. Well 01G has been off-line since 2009 due to water quality concerns, but it is still maintained as an active source.

Should Pembroke anticipate resuming withdrawals from Well 01G, prior to resuming withdrawals, Pembroke shall notify MassDEP and develop an optimization plan to minimize impacts to Herring Brook by managing the timing and magnitude of pumping at Well 01G in order to minimize streamflow impacts, to the extent feasible, using Pembroke's other available sources.

10. Minimization of Groundwater Withdrawal Impacts in Stressed Subbasins

Pembroke shall minimize the impacts of its groundwater withdrawals from sources 4231000-01G, 02G, 04G and 05G, located in Subbasin 22023, as follows:

- Implement seasonal limits on nonessential outdoor water use as outlined in Special Condition 7;
- Continued implementation of the Town by-law prohibiting automatic irrigation systems connecting to the town's water distribution system;
- Continue evaluating rate structure every two years;
- Continue to provide customers with water consumption information in gallons and their consumption history;
- Continue to implement and maintain the automatic drive-by meter reading system.

11. Mitigation of Impacts for Withdrawals that Exceed Baseline

Pembroke Water Department is required to mitigate 0.099 MGD for its permitted withdrawals over the baseline. Pembroke's mitigation will be met with the direct mitigation credits achieved through the Town's purchase and decision to cease cranberry cultivation of the Edgewood Bogs, the Andruk Bogs and the Oldham Bog. The qualified acreage associated with calculating the direct mitigation credits during the period of 2003-2005 for these three bogs was 84.5 acres, 25.53 acres and 6 acres respectively. The qualified irrigation areas for the Edgewood bogs are located in the Taunton Basin. The qualified irrigation areas for the Andruk Bogs and the Oldham Bog are located in the South Coastal Basin. Therefore Pembroke Water Department receives a total of 0.148 MGD direct mitigation credits from

the acquisition and decision to cease cultivating these three cranberry bogs. Please see Appendix C for details.

12. Water Conservation Levels

Groundwater withdrawals from Windswept Well #05G shall be constrained by water levels in Great Sandy Bottom Pond as described below:

- When water levels in Great Sandy Bottom Pond fall below the base level of 52.1 feet above mean sea level (MSL), surveyed to National Geodetic Vertical Datum (NGVD), all withdrawals from Windswept Well #5 shall cease, and shall not resume until such time as the level of the pond has returned to 52.1 feet above MSL.
- Pembroke shall request to receive either electronically or by U.S. Mail, reservoir water level readings for Great Sandy Bottom Pond from the Abington Rockland Joint Water Works on the first of each month.
- Pembroke shall keep a record of all monthly reservoir water level readings for Great Sandy Bottom Pond and shall provide them to the Department annually as an attachment to Pembroke's Annual Statistical Report (ASR), or upon request of the Department.
- Should a catastrophic event occur causing the level of the pond to drop significantly for an extended period, the Town would no longer be able to operate the Windswept Well #5 without the permission of MassDEP. In such an event, MassDEP agrees to respond to any reasonable request for relief by the Town of Pembroke from this permit condition as expeditiously as possible consistent with existing rules and regulations.

13. Reporting Requirements

Pembroke 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.

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.

APPEAL RIGHTS AND TIME LIMITS

This permit is a decision of MassDEP. Any person aggrieved by this decision may request an adjudicatory hearing. Any such request must be made in writing, by certified mail and received by MassDEP within twenty-one (21) days of the date of receipt of this permit.

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 community in which the withdrawal point 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 MassDEP.

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 MassDEP 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 his permit.

FILING FEE AND ADDRESS

The hearing request, 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 municipality (or municipal agency), county, district of the Commonwealth of Massachusetts, or a municipal housing authority.

WAIVER

MassDEP may waive the adjudicatory hearing filing fee for any person who demonstrates to the satisfaction of MassDEP 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.

Duane LeVangie
Water Management Program Chief
Bureau of Water Resources

7/3/2018
Date

Appendix A – Functional Equivalence with the 65 Residential Gallons Per Capita Day Performance Standard

MassDEP will consider PWS permittees who cannot meet the 65 RGPCD 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 residential water use as described below.

If the permittee fails to document compliance with the RGPCD performance standard in its Annual Statistical Report (ASR), or in any ASR thereafter, then the permittee must file with that ASR a Residential Gallons Per Capita Day Compliance Plan (RGPCD Plan) which shall include, at a minimum:

1. A description of the actions taken during the prior calendar year to meet the performance standard;
2. An analysis of the cause of the failure to meet the performance standard;
3. A description of the actions that will be taken to meet the performance standard which must include, at a minimum, at least one of the following:
    a) a program that provides water saving devices such as faucet aerators and low flow shower heads at cost;
    b) a program that provides rebates or other incentives for the purchase of low water use appliances (washing machines, dishwashers, and toilets), or
    c) the adoption and enforcement of an ordinance, by-law or regulation to require the installation of moisture sensors or similar climate related control technology on all automatic irrigation systems;

    and may include, without limitation, the following:
    d) the use of an increasing block water rate or a seasonal water rate structure as a tool to encourage water conservation;
    e) a program that provides rebates or other incentives for the installation of moisture sensors or similar climate related control technology on automatic irrigation systems;
    f) the adoption and enforcement of an ordinance, by-law or regulation to require that all new construction include water saving devices and low water use appliances;
    g) the adoption and enforcement of an ordinance, by-law or regulation to require that all new construction minimize lawn area and/or irrigated lawn area, maximize the use of drought resistant landscaping, and maximize the use of top soil with a high water retention rate;
    h) the implementation of a program to encourage the use of cisterns or rain barrels for outside watering;
    i) the implementation of monthly or quarterly billing.
4. A schedule for implementation; and
5. An analysis of how the planned actions will address the specific circumstances that resulted in the failure to meet the performance standard.

If the permittee is already implementing one or more of these programs, it must include in its RGPCD plan the continued implementation of such program(s), as well as implementation of at

least one additional program. All programs must include a public information component designed to inform customers of the program and to encourage participation in the program.

RGPCD plans may be amended to revise the actions that will be taken to meet the performance standard. Amended RGPCD plans must include the information set forth above.

If a RGPCD plan is required, the permittee must:

1. submit information and supporting documentation sufficient to demonstrate compliance with its RGPCD plan annually at the time it files its ASR, and
2. continue to implement the RGPCD plan until it complies with the performance standard and such compliance is documented in the permittee's ASR for the calendar year in which the standard is met.

Appendix B – 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, 2019, 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 C
Direct Mitigation Credit
Acreage Purchased by Pembroke Where Cranberry Cultivation Has Ended

Bog Name	Basin	End Date	WMA Registered/ Permitted Number	Registered Acres	Registered Volume (MGD)	Consumptive Use (22.5% of total) (MGD)
Edgewood Bog	Taunton	3/24/2009	42505220	84.5	0.75	0.085 (50% credit as withdrawals are outside of South Coastal basin)
Andruk Bog-Indian Head Bog	South Coastal	6/30/2009	42112302	18.61	0.166	0.037
Andruk Bog-Nine Owls Bog	South Coastal	7/1/2015	42112302	6.92	0.062	0.014
Oldham Bog	South Coastal	6/30/2012	42123921	6	0.05	0.012
Total						0.148