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

Kathleen A. Theoharides
Secretary

Martin Suuberg
Commissioner

October 19, 2021

Boston Golf Club
Attn: Rodney Hine, Superintendent
19 Old County Road
Hingham, MA 02043

Town: Hingham
WMA Permit #: Permit 9P2-4-19-131.02
Program: Water Management Act
Action: Permit Renewal

Dear Mr. Hine:

Please find the following attached:

- Findings of Fact in Support of the renewal of Permit #9P2-4-19-131.02; and
- Water Management Act Permit #9P2-4-19-131.02 for the Boston Golf Club.

If you have any questions concerning this letter, please contact Julie Butler at (617) 292-5552 or Julie.Butler@mass.gov.

Sincerely,

Duane LeVangie
Water Management Program
Bureau of Water Resources

ecc: Samantha Woods, Weir River Watershed Association
Julia Blatt and Sarah Bower, Mass Rivers Alliance
Jim McLaughlin and Patti Kellogg, MassDEP SERO

Y:DWPArchive\SERO\2021\Hingham-9P241913102-WMA Final Permit-2021-10-19

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)

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

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

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ឯកសារនេះគឺមានសារៈសំខាន់និងគួរត្រូវបានបកប្រែភ្លាម។ ប្រសិនបើអ្នកត្រូវបានបកប្រែឯកសារនេះសូមទំនាក់ទំនងឆ្មោតជានាយក MassDEP នៅលេខទូរស័ព្ទដែលបានរាយខាងក្រោម។

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

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

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

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 PMassDE در شماره تلفن های ذکر شده در زیر.

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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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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.

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Findings of Fact in Support of
Water Management Permit #9P2-4-19-131.02
Boston Golf Club

The Department of Environmental Protection ("MassDEP" or "the Department") has completed its review of the Boston Golf Club ("BGC") Water Management Act (WMA) permit renewal application. This review was conducted in regard to the permit for BGC to withdraw water from the Boston Harbor Basin. The Department hereby issues Water Management Permit #9P2-4-19-131.02 (the "Permit") in accordance with the Water Management Act (M.G.L. c. 21G). The Department makes the following Findings of Fact in support of the attached Permit, and includes herewith its reasons for issuing the Permit and for the conditions of approval imposed, as required by M.G.L. c. 21G, § 11, and 310 CMR 36.00. The Permit is being issued since such action is necessary for the promotion of the purposes of M.G.L. c. 21G. The Department may modify, suspend or terminate the Permit, after notice and hearing, for violations of its conditions, of M.G.L. c. 21G, or of regulations adopted or orders issued by the Department, and when deemed necessary for the promotion of the purposes of the Water Management Act.

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

Withdrawal Description and History

The Boston Golf Club has operated an 18-hole golf course in Hingham since 2003 and was issued its original WMA Permit on April 11, 2003. The permit contained conditions on wetland and hydrologic monitoring, streamflow-triggered irrigation reductions, mitigation, drought management planning, and Section 61 (MEPA) findings. The permit was amended on February 4, 2008 and included several changes. In Special Condition 4 (Streamflow-Triggered Irrigation Reductions), the stream gage was changed to the Weir River at Leavitt St in Hingham, and the withdrawal limits were changed based on presumed aquifer recharge from wastewater discharge by a neighboring retirement community known as Linden Ponds (pursuant to MassDEP Groundwater Discharge Permit SE#1-772). Also, special conditions 6 (Mitigation), 7 (Drought Management Plan) and 8 (Section 61 Findings) were removed.

Special Condition 6 (Mitigation) of the original permit required a report on the feasibility of wastewater reuse by January 31, 2005, as well as a plan and schedule for implementation if reuse

was found to be feasible. Department records indicate that a wastewater reuse system was developed and implemented in 2009. In BGC's 2009 permit renewal application, it was described as "an innovative wick system constructed on the Boston Golf land… located in close proximity to our withdrawal points." At the time of this permit issuance, BGC expects the system to continue operating for the foreseeable future.

On October 18, 2019, the Department sent BGC a Permit Renewal Order to Complete (OTC) that outlined additional information necessary for BGC to complete the Boston Harbor Basin permit renewal process. BGC responded to the OTC on February 10, 2020 with additional information submitted in July and August of 2020.

BGC withdraws its irrigation water from four groundwater sources, which discharge to a 9 MG lined storage pond on the property. This permit renewal does not authorize a change in withdrawal sources. It does authorize a decrease in the annual average withdrawal volume, from 0.15 million gallons per day (MGD) to 0.12 MGD over a 165-day operating season (as explained in "Findings of Fact for Special Permit Conditions" below). The Permit renewal also adds conditions based on the 2014 Water Management Regulation revisions, and it removes the "Wetlands and Hydrologic Monitoring" condition. These changes are further described under "Findings of Fact for Special Permit Conditions".

Permit Extensions

BGC's original Boston Harbor Basin permit (later amended) was issued on April 11, 2003 and was originally set to expire on February 28, 2010. Because the expiration dates for all Water Management permits were extended for four years by Chapter 240 of the Acts of 2010, as amended by Chapter 238 of the Acts of 2012, collectively known as the Permit Extension Act, the Department accepted a renewal application from BGC dated November 1, 2009. The Department published notice of the permit renewal application in the Environmental Monitor on January 27, 2010 and on September 5, 2018. No comments on the permit were received.

In addition, in a letter dated March 28, 2016, the Department informed BGC 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 Boston Harbor 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), BGC's existing 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 Boston Harbor Basin will be February 28, 2030, in order to restore the staggered permitting schedule set forth in the regulations.

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

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

- Impact of the withdrawal on other water sources;
- Water available within the safe yield of the water source;
- Reasonable protection of existing water uses, land values, investments and enterprises;
- Proposed use of the water and other existing or projected uses of water from the water source;

- Municipal and Massachusetts Water Resources Commission (WRC) water resource management plans;
- Reasonable conservation consistent with efficient water use;
- Reasonable protection of public drinking water supplies, water quality, wastewater treatment capacity, waste assimilation capacity, groundwater recharge areas, navigation, hydropower resources, water-based recreation, wetland habitat, fish and wildlife, agriculture, flood plains; and
- Reasonable economic development and job creation.

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:

- Impact of the withdrawal on other water sources;
- Safe yield determinations for the major river basins based on a new methodology developed through SWMI (see description that follows);
- 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.
- 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; and
- The special permit conditions in each Water Management Act permit.

Safe Yield in the Boston Harbor 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 Boston Harbor Basin is 54.9 million gallons per day (MGD), and total registered and permitted withdrawals are 39.94 MGD. The maximum withdrawals that are authorized in this permit, and all other permits currently under review by the Department within the Boston Harbor Basin, will be within the Safe Yield and conditioned as outlined in the regulations. Withdrawal authorizations are further limited by other factors, such as the impact to local resources, water quality constraints, pumping rate limits placed on individual sources, and the regulatory requirement that permit holders demonstrate a need for the water.

Findings of Fact for Special Permit Conditions

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 Findings of Fact also explain any changes to special conditions from prior permits, when applicable. 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, authorized an annual average withdrawal volume 24.75 million gallons per year (MGY) of water, or 0.15 million gallons per day (MGD) over 165 days annually from BGC's four groundwater sources in the Boston Harbor Basin in its existing permit. In its 17-year permit history, BGC has never reported an annual withdrawal volume in exceedance of its authorized volume. The table below provides BGC's recent annual withdrawal volumes.

In its 2009 permit renewal application, BGC did not request an authorized volume. Items 1 through 5 of Section D2 (pages 7 and 8 of the application) were not completed. However, the sixth and final item of Section D2 was completed, and BGC indicated that they withdrew 0.05 MGD in 2008, that 2008 was reflective of an average year, and that they did not anticipate changes to withdrawal patterns. BGC's subsequent annual withdrawal volumes have agreed with this projection, as suggested in the table below (note that the 2015 and 2016 seasons were dry and led many Massachusetts golf courses to withdraw above-average volumes).

In its October 18, 2019 response to DEP's Order To Complete, BGC stated that it will request 0.12 MGD (or 20 MGY) rather than its previously authorized 0.15 MGD in light of its usage history.

2015-2020 Total Annual Withdrawal Volumes from Boston Golf Club (MGD)*

Boston Golf Club	2015	2016	2017	2018	2020
Reported Withdrawal	0.07	0.08	0.06	0.04	0.06

*A 2019 ARF was not submitted. BGC lost data in the 2nd half of the 2019 season due to lightning damage to the pumping control system on 7/17/2019 (according to BGC's 2/10/2020 OTC response).

Special Condition 2, Maximum Authorized Daily Withdrawal from Authorized Withdrawal Points, authorizes a combined maximum daily withdrawal volume of 0.408 MGD

from BGC's four groundwater sources (Wells 1-02, 2-02, 3-02, and 10-02), which was based on the pumping rate during the long-term pumping test that was conducted during the permit application process. Recent maximum daily withdrawal volumes are provided in the table below. In the past five years on record, the combined maximum daily volume in BGC's Annual Report Forms has exceeded 0.408 MGD at least twice, in 2015 and 2017. Compliance with this condition is uncertain for most years on record because BGC reported maximum daily volumes from the individual wells on different dates. In order to assess compliance moving forward, BGC shall report the withdrawal volume of all four wells on whichever day Well 2-02's maximum withdrawal volume occurs. Well 2-02's withdrawals comprise the majority of the combined daily volume according to the annual reporting data.

2015-2020 Maximum Daily Withdrawal Volumes from Boston Golf Club (MGD)

Year	2015	2016*	2017	2018*	2020*
Well 2-02	0.282	0.223	0.227	0.153	0
Well 3-02	0.067	0.034	0.059	0.038	0.083
Well 10-02	0.149	0.117	0.088	NR	0.051
Well 1-02	0.124	0.044	0.088	0.081	0.083
Combined Total:	0.622	N/A	0.462	N/A	N/A

*The recorded maximum daily volumes for the four wells were not all on the same date; therefore a total maximum daily volume cannot be summed for a given day that year.

Special Condition 3, Streamflow-Triggered Irrigation Reductions, requires that irrigation be reduced during low-flow periods at a nearby USGS stream gage, namely the Weir River at Leavitt Street in Hingham, USGS Site #01105638. BGC is responsible for monitoring daily streamflow data on the USGS's website.

Table 4 of the permit provides the streamflow triggers and the actions required of BGC when those triggers are reached. BGC is also required to submit a report with its ARF each year that outlines dates when a response action was taken due to triggering of streamflow levels. Department records do not include any such reports despite the trigger values occurring in recent years, most notably in 2016 and 2020. In its October 18, 2019 OTC response, BGC stated that it commits to a renewed effort to adhere to streamflow triggers and response actions in this condition.

Special Condition 4, Water Conservation and Seasonal Demand Management Plans, requires that BGC follow the measures in the water conservation plan submitted to the Department in December 2002. The same requirement is in the renewed permit. In addition, for consistency with requirements recently set forth in WMA golf course permits statewide, BGC will be required to follow a Seasonal Demand Management Plan (SDMP) in its renewed permit. The SDMP is intended to address the necessary minimums of acceptable demand management required as dry conditions begin to impact our environment from May through September.

The SDMP reduces water use between May 1st and September 30th when the Massachusetts Drought Management Task Force declares a Drought Level 1 ("Mild", formerly "Advisory") or higher (Level 2-Significant, Level 3-Critical, or Level 4-Emergency) for the region in which the

golf course is located. BGC shall be responsible for tracking the Massachusetts Drought Management Task Force drought declarations and recording when drought-triggered restrictions are implemented.

The SDMP typically also requires water use reductions when streamflow falls below a designated low-flow value at an assigned U.S. Geologic Survey (USGS) stream gage. However, in lieu of those requirements, BGC will continue to follow the streamflow-triggered water use reductions outlined in Special Condition 3.

Section C of the SDMP provides three options for water use reduction; two are in table format and the third option is an open-ended alternative approach. The Acres Table requires the golf course to identify the number of irrigated acres for tees and greens, fairways, roughs, landscaping and ornamentals, along with a percent reduction per unit area with worsening drought. The Time Table requires the golf course to identify irrigation reductions based on changes to the timing of irrigation cycles.

In its October 18, 2019 OTC response, BGC selected the third option and proposed an alternative approach: to reduce water use based on evapotranspiration (ET) rates rather than on time or on acres. BGC operates an ET meter that is used to determine the turf's need for water replacement. The irrigation control system is calibrated to the measured ET rate, and the system then calculates the run time for individual sprinkler heads based on their arc, delivery rate, and spacing. BGC will use 2 to 3 days of cumulative ET before watering to try to elongate the interval between irrigation cycles. This alternative approach will reduce runtimes like the Time Table approach; however, the specific instruction to individual sprinkler heads is dictated by volume of precipitation equivalent rather than by minutes. The approach has been incorporated into the permit.

Special Condition 5, Coldwater Fisheries Resource (CFR) Protection, was incorporated into the Water Management Regulations in November 2014. Pursuant to 310 CMR 36.22, a CFR optimization is required of BGC because its withdrawals have been determined to impact Leary's Brook, which is a tributary to the Plymouth River and was designated as a CFR by the Massachusetts Division of Fisheries and Wildlife (DFW). The Department based its determination on the CFR's proximity to BGC's groundwater withdrawal sources (approximately 0.1 miles) and the shallow depths of the groundwater wells.

Operational changes, such as pumping certain wells more than others, would not be effective at reducing impacts to the CFR, because the source wells are similar distances from the CFR and are not divided among multiple subbasins. Alternatively, BGC has taken measures to reduce impacts to the CFR in other ways. These measures include: 1) stream restoration while BGC was under development; 2) replanting of riparian vegetation to address recent DFW and Hingham Conservation Commission concerns; and 3) maintaining certification in Audubon International's Audubon Cooperative Sanctuary Program (ACSP). These efforts are described below.

1) Despite no specific requirement for fisheries protection during the construction of the golf course, BGC proactively removed dumped trash and debris, tires and appliances from the streambed and surrounding area. A portion of the stream running through the golf course (an area accessible via Cushing Street) clearly suffered from vandalism and dumping. In coordination with the Conservation Agent and Commission, BGC enhanced the habitat value of the stream primarily through the addition of appropriately placed riffles and runs made up of boulders, stones and bank plantings. In its 2/10/2020 OTC

response, BGC reported that they began to see fish more regularly following these efforts.

2) In 2018 the DFW Southeast District met with BGC and the Hingham Conservation Commission about replanting an area of riparian vegetation that was cleared when a new tee was put in. BGC agreed to the replanting to help keep stream temperatures down. In response to the Department's 6/30/2020 request for a status update, BGC noted that the regrowth of the understory was coming along nicely. The plant community consists of native, lower height (6-10') plants that shade the stream but do not shade the green from morning and afternoon sun.
3) BGC became ACSP certified in 2009 and was last recertified in September 2020. ACSP focuses on environmental stewardship and includes a rigorous process of documenting course management practices and maintaining certification every three years. ACSP requires that a golf course meet environmental management standards in the following six program components: Environmental Planning, Wildlife & Habitat Management, Chemical Use Reduction & Safety, Water Conservation, Water Quality Management, and Outreach & Education. In the interests of CFR protection, BGC shall maintain its certification through the life of the permit.

Special Condition 6, **Minimization of Groundwater Withdrawal Impacts in Stressed Subbasins**. Pursuant to 310 CMR 36.22, a permit applicant with a groundwater source(s) in a subbasin having August net groundwater depletion (NGD) of 25% or greater shall submit a plan to minimize the impacts of the withdrawals to the greatest extent feasible. All of BGC's groundwater withdrawal sources are within Subbasin 21038, which has an August NGD of 113%; therefore, a minimization plan is required.

Minimization measures for golf courses are typically an extension of water conservation and demand management requirements. Golf courses do not generally have extra capacity and any that is available is typically in the same subbasin. Options for buying water are often prohibitively expensive, and golf courses lack the ability to make streamflow releases.

The Department included a table of eligible water conservation measures in its 10/18/2019 OTC and asked BGC to identify those that it implements or could feasibly implement in the future. Table 5 of the permit provides the measures that BGC included in its 2/10/2020 OTC response.

Special Condition 7, Mitigation of Impacts for Withdrawals that Exceed Baseline, requires mitigation, where feasible, of 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 withdrawal volume for Boston Golf Club is 14.3 MGY or 0.09 MGD, which was the average annual volume withdrawn from 2003 through 2005 plus 5%. Within the 16-year withdrawal record that the Department has on file, Boston Golf Club's water use has not exceeded its baseline volume except in 2003, which was a grow-in year.

This permit authorizes BGC to withdraw up to 0.12 MGD, which is 0.03 MGD above its Boston Harbor Basin baseline. BGC is therefore required to prepare and implement a plan to mitigate 0.03 MGD.

Mitigating the impacts of increasing withdrawals can be through direct or indirect mitigation activities. Direct mitigation activities can be volumetrically quantified and compared to the permittee's mitigation volume, whereas indirect mitigation activities will improve streamflow and/or fluvial habitat but cannot be volumetrically quantified. Accordingly, MassDEP assigns mitigation credits for indirect mitigation activities, in the amount of 0.01 MGD of mitigation per credit. Pursuant to 310 CMR 36.22(6), permittees shall first evaluate direct mitigation activities, which include, but are not limited to: surface water releases, stormwater recharge, or infiltration and inflow (I/I) removal from sewer systems.

As described above (see "Withdrawal Description and History"), a wastewater reuse system was developed and implemented by BGC and the neighboring Linden Ponds development in 2009. Linden Pond's Groundwater Discharge Permit records show that BGC continues to receive wastewater from Linden Ponds. Linden Pond's recent Discharge Monitoring Reports show monthly discharge volumes ranging from 0.10 MGD to 0.14 MGD.

This system qualifies as direct mitigation and satisfies BGC's mitigation requirement, provided that BGC and Linden Ponds continue its operation through the permit period. At the time of this permit issuance, BGC is committed to continued coordination with Linden Ponds and continued acceptance of a minimum annual average of 0.03 MGD of treated wastewater recharge.

Wetlands and Hydrologic Monitoring was a condition of the previous permit. BGC monitored for the requisite five growing seasons, after which the Hingham Conservation Commission issued a Certificate of Compliance (COC) on November 12, 2009 for DEP File #34-683 authorizing the discontinuation of the monitoring program. BGC provided the Department with a copy of the COC in its 2/10/2020 OTC response.

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Executive Office of Energy & Environmental Affairs

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

WATER WITHDRAWAL PERMIT
M.G.L. c. 21G

This issuance of Permit #9P2-4-19-131.02 is approved 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.

PERMIT NUMBER: 9P2-4-19-131.02 **RIVER BASIN:** Boston Harbor Basin

PERMITTEE: Boston Golf Club
19 Old County Road
Hingham, MA 02043

ISSUANCE DATE: October 19, 2021

EXPIRATION DATE: February 28, 2030

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

USE: Golf Course Irrigation

DAYS OF OPERATION: 165

LOCATIONS:

Table 1. Withdrawal Point Identification

Source Well Name	Source ID
Well 2-02	WM8767-01G
Well 3-02	WM8767-03G
Well 10-02	WM8767-04G
Well 1-02	WM8767-02G

SPECIAL CONDITIONS

1. Maximum Authorized Annual Average Withdrawal Volume

This permit authorizes an annual average withdrawal volume of 20.00 million gallons per year (MGY) of water, or 0.12 million gallons per day (MGD) over 165 days annually from BGC's four groundwater sources in the Boston Harbor Basin, as shown in Table 2.

Table 2. Authorized Withdrawal Volumes – Boston Harbor Basin

Permit Periods		Permit	
		Daily Average (MGD)	Annual Total (MGY)
Period One Years 1-5	10/19/2021 to 2/28/2025	0.12	20.00
Period Two Years 6-10	3/1/2025 to 2/28/2030	0.12	20.00

2. Maximum Authorized Daily Withdrawal Volume

Withdrawals from Boston Golf Club's withdrawal points are not to exceed the combined maximum daily volume listed in Table 3 without specific advance written approval from the Department. The authorized maximum daily volume is the combined rate of the four sources on a single day; therefore, the individual withdrawal volumes reported in Boston Golf Club's Annual Report Form (ARF) must be from the same day. **Boston Golf Club shall report the withdrawal volume of all four of its sources on the day of Well 2-02's maximum withdrawal for the given year.**

Table 3. Maximum Daily Withdrawal Rates (MGD)

Well Name	Source ID	Maximum Daily Rate
Well 2-02	WM8767-01G	0.408 MGD
Well 3-02	WM8767-03G	
Well 10-02	WM8767-04G	
Well 1-02	WM8767-02G	

3. Streamflow-Triggered Irrigation Reductions

Boston Golf Club shall reduce irrigation withdrawals during low-flow periods at the Weir River at Leavitt Street in Hingham, USGS Site #01105638. Boston Golf Club is responsible for monitoring daily streamflow data on the USGS's website. Should the reliability of streamflow measurements at this stream gage be so impaired as to question their accuracy, the Permittee may request the Department's review and approval to transfer to another stream gage to trigger reductions. The Department reserves the right to require use of a different stream gage.

Table 4 provides the streamflow triggers and the required actions when those triggers are reached. Within 14 days of implementing water-use reductions, Boston Golf Club shall notify the Department by submitting the MassDEP Notification of Water Use Reductions Form for Golf Courses (https://www.mass.gov/media/1928991/download).

Table 4. Streamflow Triggers

Time Period	Trigger	Required Response Action
June thru mid-September	0.15 cfsm (2.11 cfs)	Reduce daily groundwater withdrawal volume to 0.075 MGD until streamflow returns to over 0.15 cfsm for one week's time.
April thru May	2.4 cfsm (33.8 cfs)	Reduce daily groundwater withdrawal volume to 0.075 MGD until streamflow returns to over 2.4 cfsm for one week's time.

4. Water Conservation and Seasonal Demand Management Plans

Boston Golf Club shall follow the measures in its Water Conservation Plan that was submitted to the Department in December 2002. In addition, Boston Golf Club shall follow the attached Seasonal Demand Management Plan (SDMP). The SDMP reduces water use between May 1st and September 30th when the Massachusetts Drought Management Task Force declares a Drought Level 1 ("Mild", formerly "Advisory") or higher (Level 2-Significant, Level 3-Critical, or Level 4-Emergency) for the region in which the golf course is located. Boston Golf Club shall reduce irrigation according to the evapotranspiration-based approach outlined in Section C of the SDMP.

Boston Golf Club shall be responsible for tracking the Massachusetts Drought Management Task Force drought declarations and recording when drought-triggered restrictions are implemented. Within 14 days of implementing water-use reductions, Boston Golf Club shall notify the Department by submitting the MassDEP Notification of Water Use Reductions Form for Golf Courses (https://www.mass.gov/media/1928991/download).

5. Coldwater Fisheries Resource (CFR) Protection

Boston Golf Club's withdrawals have been determined to impact Leary's Brook, which was designated a CFR by the Massachusetts Division of Fisheries and Wildlife (DFW). Pursuant to 310 CMR 36.22, Boston Golf Club shall reduce impacts to the CFR by maintaining its Audubon Cooperative Sanctuary Program certification through the life of the permit.

6. Minimization of Groundwater Withdrawal Impacts in Stressed Subbasins

Boston Golf Club shall minimize the impacts of its groundwater withdrawals from sources in Subbasin 21038 through the water conservation measures in Table 5. Compliance with the Table 5 minimization measures shall be reported to the Department upon request.

Table 5. Water Conservation Measures in Boston Golf Club's Minimization Plan

- Maintain the impervious lining of the existing 9MG irrigation pond.
- Use of a weather app and an onsite weather station combined with an automated sprinkler system governed by atmospheric conditions.
- Use of a computerized irrigation management system equipped with flow management to increase irrigation efficiency.
- Reduction of irrigation rates in secondary rough areas and, where possible, elimination of irrigation in non-play areas.
- Use of soil moisture sensors to monitor soil moisture.
- Use of low-water-use turf grass where applicable.

- Use of environmentally safe wetting agents to improve water infiltration and minimize evaporation.
- Use of low water-use landscaping or native drought-tolerant plants where feasible around buildings, parking areas or other appropriate places.
- Employee training in water conservation and management.
- Improving irrigation uniformity through careful evaluation of design criteria such as nozzle size, spacing, scheduling coefficient and pressure selection.
- Use of low-pressure alarms on water pumps.

7. Mitigation of Impacts for Withdrawals that Exceed Baseline

Boston Golf Club is required to mitigate 0.03 MGD for its permitted withdrawals over its baseline volume. The requirement will be met through direct mitigation in the form of a wastewater reuse system that has been implemented by Boston Golf Club and a neighboring development (Linden Ponds) since 2009. Boston Golf Club shall continue to accept at least 0.03 MGD of treated wastewater on average each year through the permit period.

In the event that the wastewater reuse falls below an annual average of 0.03 MGD or ceases altogether, Boston Golf Club shall notify the Department in writing within thirty days of the modification. The notice shall provide the reasons for the change.

GENERAL PERMIT CONDITIONS (applicable to all Permittees)

No withdrawal in excess of 100,000 gallons per day over the registered volume (if any) shall be made following the expiration of this permit, unless before that date the Department has received a renewal permit application pursuant to and in compliance with 310 CMR 36.00.

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

10/19/2021

Duane LeVangie
Water Management Program
Bureau of Water Resource

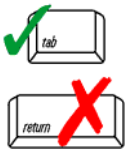
Date

Massachusetts Department of Environmental Protection
Bureau of Water Resources – Water Management Act Program
Seasonal Demand Management Plan
For Permitted Water Management Golf Courses

Boston Golf Club
Facility Name
9P2-4-19-131.02
Permit #
Hingham
City or Town

Plan Requirements

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



Golf courses permitted under the Water Management Act (WMA) are required to implement a Seasonal Demand Management Plan (SDMP) that, at a minimum, implements Best Management Practices throughout the season and reduces irrigation during dry periods based on the criteria below.

The SDMP irrigation reductions will go into effect from May 1st through September 30th when a Drought Advisory or greater (i.e., Watch, Warning or Emergency) is declared by the Massachusetts Drought Management Task Force[1] (MDMTF), or when the groundwater or streamflow trigger outlined in the WMA permit is reached.

During a Drought Advisory or greater, or when the WMA permit streamflow or groundwater trigger is reached, irrigation shall not occur between the hours of 9 a.m. and 5 p.m. when evapotranspiration rates are highest, except that hand-watering of hot spots may occur at any time as necessary.

During a Drought Advisory or greater, or when the WMA permit streamflow or groundwater trigger is reached, reductions are required in the irrigation of fairways and roughs as outlined in Section C of this document.

During a Drought Emergency, more stringent water use reductions may be required. At a minimum, irrigation of all fairways, roughs, and ornamentals must cease.

Water use reductions are based on the drought level for the MDMTF Drought Region where the golf course is located (see https://www.mass.gov/service-details/drought-regions), or by streamflow or groundwater levels measured at a United States Geological Survey (USGS) stream gage or groundwater monitoring well assigned in the WMA permit based on the golf course's location.

Golf course facility managers shall be responsible for tracking drought declarations and streamflow or groundwater levels. They shall also be responsible for recording when water use reductions are implemented. Each golf course permit will include instructions on tracking this information. Within 14 days of implementing water use reductions, golf course facility managers shall notify MassDEP of implementing reductions by submitting the MassDEP Notification of Water Use Reductions Form for Golf Courses (https://www.mass.gov/service-details/outdoor-water-use-restrictions-for-cities-and-towns).

If you have any questions, contact Duane LeVangie at 617-292-5706, or Shi Chen at 617-292-5532.

A. Golf Facility Information

Boston Golf Club
Facility Name

Hingham
City/Town

Rodney Hine
Course Manager

781-789-1044
Phone Number

rhine@bostongolfclub.org
Email

Date

[1] See Massachusetts Drought Management Task Force at https://www.mass.gov/orgs/drought-management-task-force.

B. Best Management Practices (BMPs)

Check the following BMPs for water conservation and management that you implement.

☒ Yes ☐ No 1. Water use is 100% metered. (Required by WMA permit.)

☒ Yes ☐ No 2. Source meters are calibrated annually. (Required by WMA permit.)

☒ Yes ☐ No 3. New and existing irrigation ponds are lined with impervious material.

☒ Yes ☐ No 4. Implementation of an irrigation system inspection and maintenance program that includes leak detection and repair, sprinkler head maintenance and replacement on a weekly basis.

☒ Yes ☐ No 5. Irrigating in the early morning or evening hours, when evaporation is lowest.

☒ Yes ☐ No 6. Improving irrigation uniformity through evaluation of design criteria such as nozzle size, spacing, scheduling coefficient and pressure selection.

☒ Yes ☐ No 7. Use of soil sensors and/or soil samples to monitor soil moisture.

☒ Yes ☐ No 8. Use of a weather app or an onsite weather station combined with an automated sprinkler system governed by atmospheric conditions.

☒ Yes ☐ No 9. Use of a computerized irrigation management system equipped with flow management to increase irrigation efficiency.

☒ Yes ☐ No 10. Installation of rain shutoff switches on new and existing irrigation systems.

☒ Yes ☐ No 11. Use of environmentally-safe wetting agents to improve water infiltration and minimize evaporation.

☒ Yes ☐ No 12. Use of low water-use turf grass where applicable.

☒ Yes ☐ No 13. Raising turf height during dry weather and drought conditions.

☒ Yes ☐ No 14. Regular aeration of turf to increase the percolation of water into the soil.

☒ Yes ☐ No 15. Reduction of irrigation rates in secondary rough areas and, where possible, elimination of irrigation in non-play areas.

☒ Yes ☐ No 16. Use of mulch materials in planting beds to improve water-holding capacity.

☒ Yes ☐ No 17. Use of low water-use landscaping or native drought-tolerant plants around buildings, parking areas, or other appropriate places.

☒ Yes ☐ No 18. Employee training in water conservation and management.

☒ Yes ☐ No 19. Installation of low-pressure alarms on water pumps and variable-speed drives.

☒ Yes ☐ No 20. Installation of 3rd-party retrofit nozzles.

☒ Yes ☐ No 21. Reuse of wastewater and/or stormwater for irrigation.

Comment:

C. Seasonal Demand Management Approach for Irrigation Reductions

Demand management protocols frequently require more stringent water use reductions as the water supply availability worsens and triggers dictate when different responses are needed.

The two tables below reflect two approaches to water use reductions. You may choose to complete the Acres Table or the Time Table to reflect your water use reduction approach, or otherwise describe your specific water use reduction plan (Option 3). The Acres Table reduces water use by limiting the number of irrigated acres for fairways, roughs, and ornamentals. Notice the water use acreage percent reduction per unit area. The Time Table reduces irrigation by limiting the length of irrigation cycles.

Check and complete Option 1, 2 or 3.

☐ Check box if choosing Option 1.

1. ACRES TABLE (Fill in number of acres in all blank cells)

Irrigating Less Acreage as Drought Severity Increases Watering allowed up to designated percent								
Massachusetts Drought Level	Irrigated Tees & Greens		Irrigated Fairways		Irrigated Roughs		Irrigated Landscape & Ornamentals	
	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres
Normal	100%		100%		100%		100%	
Advisory or WMA Permit Trigger is reached	100%		80%†		50%†		0%	
Watch	100%		60%†		0%		0%	
Warning	100%		40%†		0%		0%	
Emergency **	TBD		0%		0%		0%	

† Irrigation shall not occur between the hours of 9 a.m. and 5 p.m., except that hand-watering of hot spots may occur at any time

** Mitigation actions to be determined by the Governor's Emergency Proclamation.

C. Seasonal Demand Management Approach for Irrigation Reductions

☐ Check box if choosing Option 2.

2. TIME TABLE (Fill in time in minutes in all blank cells)

Irrigating for Shorter Durations as Drought Severity Increases Reduced Minutes in Irrigation Cycles								
Massachusetts Drought Levels	Irrigated Tees & Greens		Irrigated Fairways		Irrigated Roughs		Irrigated Landscape & Ornamentals	
	Percent	Time (min.)	Percent	Time (min.)	Percent	Time (min.)	Percent	Time (min.)
Normal	Full cycle		Full cycle		Full Cycle		100%	
Advisory or WMA Permit Trigger is reached	Full cycle		80%†		50%†		0%	
Watch	Full cycle		60%†		0%		0%	
Warning	Full cycle		40%†		0%		0%	
Emergency **	TBD		0%		0%		0%	

† Irrigation shall not occur between the hours of 9 a.m. and 5 p.m., except that hand-watering of hot spots may occur at any time

** Mitigation actions to be determined by the Governor's Emergency Proclamation.

Along with completing one of the tables, provide any additional description or narrative explanation as warranted on how your golf course plans to implement required irrigation reductions as drought conditions worsen. This could be through such practices as: limited rotation of sprinkler heads, limits on water pressure, limiting irrigation to hot spots, eliminating non-target watering, etc. (Attach additional pages as necessary.)

☒ Check box if choosing Option 3.

3. Alternative Approach

MassDEP offers flexibility for equivalent irrigation reductions. Golf courses that have developed an equivalent plan that quantifies real water use reductions by other means that can relate to the Massachusetts Drought Management Task Force action levels, may submit their plan for MassDEP's review and approval.

(Attach additional pages as necessary.)

Please see attached table that depicts measuring evapotranspiration (ET) rates as the limiting factor for irrigation.

Option 3. Evapotranspiration Rate (ET) TABLE

Irrigating for Shorter Durations as Drought Severity Increases Reduced ET Rates in Irrigation Cycles								
Massachusetts Drought Levels	Irrigated Tees & Greens		Irrigated Fairways		Irrigated Roughs		Irrigated Landscape & Ornamentals	
	Percent	Time (min.)	Percent	Time (min.)	Percent	Time (min.)	Percent	Time (min.)
Normal	Full cycle	100% ET	Full cycle	90% ET	Full Cycle	90% ET	100%	
Advisory or WMA Permit Trigger is reached	Full cycle	90% ET	80%†	80% ET	50%†	50% ET	0%	
Watch	Full cycle	80% ET	60%†	60% ET	0%	10% ET	0%	
Warning	Full cycle	80% ET	40%†	40%ET	0%	0%	0%	
Emergency **	TBD	70% ET	0%	10% ET	0%	0%	0%	

The Club has an ET meter that evaporates water from a tube and relates the water loss in inches and parts of inches. From that information and direct field observation the Superintendent and staff determine the need of the turf for water replacement. Once determined, the Superintendent sets up the irrigation to run at just under that water need (or ET). The irrigation control system is calibrated to water in inches and typically even less than that (sub-inch). The highly sensitive, state-of-the-art system then calculates the run time for individual heads based on their arc, delivery rate and spacing. The Club believes that this is the most accurate and efficient way to irrigate, if possible and has reported very encouraging results.