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 288 Central Avenue  
 Dover, New Hampshire 03820

**WATER QUALITY CERTIFICATION**  
**In Fulfillment of**  
**Section 401 of the United States Clean Water Act (33 U.S.C 1341)**  
**And NH RSA 485-A:12, III**

**WQC # 2019-404P-001**

<b>Activity Name</b>	Bellamy River Artificial Recharge Facility
<b>Activity Location</b>	Pudding Hill Road Dover, New Hampshire
<b>Affected Surface waters</b>	Bellamy River (NHRIV600030903-08) Unnamed Wetlands
<b>Owner/Applicant</b>	City of Dover
<b>Applicable Federal and State permit(s):</b>	<ul style="list-style-type: none"> <li>• U.S. Army Corps of Engineers General 404 Permit for NH</li> <li>• New Hampshire Department of Environmental Services (NHDES) Wetlands Permit</li> <li>• NHDES Shoreland Impact Permit</li> <li>• NHDES Groundwater Discharge Permit</li> <li>• NHDES Large Groundwater Withdrawal Permit</li> <li>• EPA NPDES Construction General Permit</li> </ul>
<b>Date of Approval</b> (subject to Conditions below)	June 19, 2020

**A. INTRODUCTION**

The City of Dover (Applicant) is proposing to construct an artificial recharge (AR) facility located in the Pudding Hill Aquifer along the Bellamy River in Dover, New Hampshire. The AR facility will withdraw water from the Bellamy River and discharge it to two infiltration basins (AR basins). Groundwater recharge is needed to increase the sustainable yield of two of the City’s water supply production wells (Ireland and DP #1) and to help manage groundwater quality within the Pudding Hill Aquifer. A more complete description of the Activity is provided in Finding 0 of this Certification.

This 401 Water Quality Certification (WQC or Certification) documents laws, regulations, determinations and conditions related to the Activity for the attainment and maintenance of New Hampshire (NH) surface water quality standards, including the provisions of NH RSA 485-A:8 and NH Code of Administrative Rules Env-Wq 1700, for the support of designated uses identified in the standards.

**B. 401 CERTIFICATION APPROVAL**

Based on the facts, findings and conditions noted below, the New Hampshire Department of Environmental Services (NHDES or DES) has determined that there is reasonable assurance that construction and operation of the Activity

will not violate surface water quality standards. NHDES hereby issues this Certification, subject to the conditions in Section E of this Certification, in accordance with Section 401 of the United States Clean Water Act (33 U.S.C. 1341) and RSA 485-A:12, III.

### C. STATEMENT OF FACTS AND LAW

C-1. Section 401 of the United States Clean Water Act (33 U.S.C. 1341) states, in part: “Any applicant for a federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may result in any discharge into the navigable waters, shall provide the licensing or permitting agency a certification from the State in which the discharge originates or will originate...that any such discharge will comply with the applicable provisions of sections 301, 302, 303, 306, and 307 of this title.....No license or permit shall be granted until the certification required by this section has been obtained or has been waived...No license or permit shall be granted if certification has been denied by the State...”

C-2. §401(d) of the CWA provides that: “Any certification provided under this section [401] shall set forth any effluent limitations and other limitations, and monitoring requirements necessary to assure that any applicant for a Federal license or permit will comply with [enumerated provisions of the CWA] ... and with any other appropriate requirement of State law set forth in such certification, and shall become a condition on any Federal license or permit subject to the provisions of this section.”

The U.S. Supreme Court has stated that, once the threshold of a discharge is reached (necessary for §401 certification to be applicable), the conditions and limitations in the certification may address the permitted activity as a whole.”<sup>1</sup>

C-3. NH RSA 485-A:12, III, states: “No activity, including construction and operation of facilities, that requires certification under section 401 of the Clean Water Act and that may result in a discharge, as that term is applied under section 401 of the Clean Water Act, to surface waters of the state may commence unless the department certifies that any such discharge complies with the state surface water quality standards applicable to the classification for the receiving surface water body. The department shall provide its response to a request for certification to the federal agency or authority responsible for issuing the license, permit, or registration that requires the certification under section 401 of the Clean Water Act. Certification shall include any conditions on, modifications to, or monitoring of the proposed activity necessary to provide assurance that the proposed discharge complies with applicable surface water quality standards. The department may enforce compliance with any such conditions, modifications, or monitoring requirements as provided in RSA 485-A:22.”

C-4. NH RSA 485-A: IV states: “No activity that involves surface water withdrawal or diversion of surface water that requires registration under RSA 488:3, that does not otherwise require the certification required under paragraph III, and which was not in active operation as of the effective date of this paragraph, may commence unless the department certifies that the surface water withdrawal or diversion of surface water complies with state surface water quality standards applicable to the classification for the surface water body. The certification shall include any conditions on, modifications to, or monitoring of the proposed activity necessary to provide reasonable assurance that the proposed activity complies with applicable surface water quality standards.”

C-5. NH RSA 485-A:8 and Env-Wq 1700 (Surface Water Quality Standards), together fulfill the requirements of Section 303 of the Clean Water Act that the State of New Hampshire adopt water quality standards consistent with the provisions of the Act.

C-6. Env-Wq 1701.02, entitled “Applicability”, states that these rules shall apply to:

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<sup>1</sup> PUD No. 1 of Jefferson County v. Washington Department of Ecology, 511 U.S. 700, 712 (1994).

- “(a) All surface waters; and
- (b) Any person who:
  - (1) Causes any point or nonpoint source discharge of any pollutant to surface waters;
  - (2) Undertakes hydrologic modifications, such as dam construction or water withdrawals; or
  - (3) Undertakes any other activity that affects the beneficial uses or the water quality of surface waters.”

C-7. Env-Wq 1703.01 entitled “Water Use Classifications; Designated Uses”, states the following:

- “(a) All surface waters shall be classified as provided in RSA 485-A:8, based on the standards established therein for class A and class B waters. Each classification shall identify the most sensitive use it is intended to protect.
- (b) All surface waters shall be restored to meet the water quality criteria for their designated classification including existing and designated uses, and to maintain the chemical, physical, and biological integrity of surface waters.
- (c) All surface waters shall provide, wherever attainable, for the protection and propagation of fish, shellfish and wildlife, and for recreation in and on the surface waters.
- (d) Unless high or low flows are caused by naturally-occurring conditions, surface water quantity shall be maintained at levels that protect existing uses and designated uses.”

C-8. Env-Wq 1702.44 defines surface waters as “surface waters of the state” as defined in NH RSA 485-A:2, XIV and waters of the United States as defined in 40 CFR 122.2.

NH RSA 485-A:2, XIV defines “surface waters of the state” as “perennial and seasonal streams, lakes, ponds and tidal waters within the jurisdiction of the state, including all streams, lakes, or ponds bordering on the state, marshes, water courses and other bodies of water, natural or artificial.”

40 CFR 122.2 defines “waters of the United States”.

- C-9. NH RSA 482-A:2, X. defines "Wetlands" as “[a]n area that is inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal conditions does support, a prevalence of vegetation typically adapted for life in saturated soil conditions.”
- C-10. Env-Wq 1702.07 states that ““Best management practices” means those practices that are determined, after problem assessment and examination of all alternative practices and technological, economic and institutional considerations, to be the most effective practicable means of preventing or reducing the amount of pollution generated by point or nonpoint sources to a level compatible with water quality goals.”
- C-11. Env-Wq 1702.05 states that ““Benthic community” mean the community of plants and animals that live on, over, or in the substrate of the surface water.”
- C-12. Env-Wq 1702.06 states that ““Benthic deposit” means any sludge, sediment, or other organic or inorganic accumulations on the bottom of the surface water.”
- C-13. Env-Wq 1702.08 states that ““Biological integrity” means the ability of an aquatic ecosystem to support and maintain a balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of similar natural habitats of a region.”
- C-14. Env-Wq 1702.26 states that ““Mixing zone” means a defined area or volume of the surface water surrounding or adjacent to a wastewater discharge where the surface water, as a result of the discharge, might not meet all applicable water quality standards.”

- C-15. Env-Wq 1702.15 states that ““Cultural eutrophication” means the human- induced addition of wastes that contain nutrients to surface waters, resulting in excessive plant growth or a decrease in dissolved oxygen, or both.”
- C-16. Env-Wq 1702.17 states that ““Designated uses” means those uses specified in water quality standards for each water body or segment whether or not such uses are presently occurring. The term includes the following:
- (a) Swimming and other recreation in and on the water, meaning the surface water is suitable for swimming, wading, boating of all types, fishing, surfing, and similar activities;
  - (b) Fish consumption, meaning the surface water can support a population of fish free from toxicants and pathogens that could pose a human health risk to consumers;
  - (c) Shellfish consumption, meaning the tidal surface water can support a population of shellfish free from toxicants and pathogens that could pose a human health risk to consumers;
  - (d) Aquatic life integrity, meaning the surface water can support aquatic life, including a balanced, integrated, and adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of similar natural habitats of the region;
  - (e) Wildlife, meaning the surface water can provide habitat capable of supporting any life stage or activity of undomesticated fauna on a regular or periodic basis; and
  - (f) Potential drinking water supply, meaning the surface water could be suitable for human intake and meet state and federal drinking water requirements after adequate treatment.”
- C-17. Env-Wq 1702.18 states that ““Discharge” means
- (a) The addition, introduction, leaking, spilling, or emitting of a pollutant to surface waters, either directly or indirectly through the groundwater, whether done intentionally, unintentionally, negligently or otherwise; or
  - (b) The placing of a pollutant in a location where the pollutant is likely to enter surface waters.”
- C-18. Env-Wq 1702.22 states that ““Existing uses” means those uses, other than assimilation waste transport, that actually occurred in the waterbody on or after November 28, 1975, whether or not they are included in the water quality standards.”
- C-19. Env-Wq 1702.33 states that ““Nuisance species” means any species of flora or fauna living in or near the water whose noxious characteristics or presence in sufficient number or mass prevent or interfere with a designated use of those surface waters.”
- C-20. Env-Wq 1702.38 states that ““Pollutant” means “pollutant” as defined in 40 CFR 122.2.” According to 40 CFR 122.2, “pollutant” means “dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, (except those regulated under the Atomic Energy Act of 1954, as amended (42 U.S.C. 2011 et seq.)), heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal, and agricultural waste discharged into water.”
- C-21. The term “discharge”, as applied under section 401 of the Clean Water Act means the potential for a discharge. It does not need to be a certainty, only that it may occur should the federal license or permit be granted. Further, the discharge does not need to involve the addition of pollutants (such as water released from the tailrace of a dam). As the U.S. Supreme Court has stated “[w]hen it applies to water, ‘discharge’ commonly means a ‘flowing or issuing out’” and an addition of a pollutant is not “fundamental to any discharge” <sup>2</sup>.

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<sup>2</sup> The Supreme Court case that is referred to is *S.D. Warren Co. v. Maine Board of Environmental Protection et al*, 547 U.S. 370, 126 S. Ct. 1853 (2006).

C-22. Env-Wq 1703.01 entitled "Water Use Classifications; Designated Uses" includes the following regarding flow quantity:

(d) Unless high or low flows are caused by naturally-occurring conditions, surface water quantity shall be maintained at levels that protect existing uses and designated uses.

C-23. Env-Wq 1703.03 entitled "General Water Quality" includes the following:

(c)(1) "All surface waters shall be free from substances in kind or quantity that:

- a. Settle to form harmful benthic deposits;
- b. Float as foam, debris, scum or other visible substances;
- c. Produce odor, color, taste or turbidity that is not naturally occurring and would render the surface water unsuitable for its designated uses;
- d. Result in the dominance of nuisance species; or
- e. Interfere with recreational activities."

C-24. Env-Wq 1703.06 includes water quality criteria for bacteria.

C-25. Env-Wq 1703.07 includes water quality criteria for dissolved oxygen.

C-26. Env-Wq 1703.08 entitled "Benthic Deposits" states the following:

"(a) Class A waters shall contain no benthic deposits, unless naturally occurring.

(b) Class B waters shall contain no benthic deposits that have a detrimental impact on the benthic community, unless naturally occurring."

C-27. Env-Wq, 1703.09, 1703.10 and 1703.12 include water quality criteria for oil and grease, color and slicks, odors, and surface floating solids respectively.

C-28. Env-Wq 1703.11 entitled "Turbidity" states the following:

"(a) Class A waters shall contain no turbidity, unless naturally occurring.

(b) Class B waters shall not exceed naturally occurring conditions by more than 10 NTUs.

(c) Turbidity in waters identified in RSA 485-A:8, III shall comply with the applicable long-term combined sewer overflow plan prepared in accordance with Env-Wq 1703.05(c).

(d) For purposes of state enforcement actions, if a discharge causes or contributes to an increase in turbidity of 10 NTUs or more above the turbidity of the receiving water upstream of the discharge or otherwise outside of the visible discharge, a violation of the turbidity standard shall be deemed to have occurred."

C-29. Env-Wq 1703.13 entitled "Temperature", states the following:

"(a) There shall be no change in temperature in class A waters, unless naturally occurring.

(b) Temperature in class B waters shall be in accordance with RSA 485-A:8, II, and VIII."

NH RSA-A:8, II states the following for Class B waters "[A]ny stream temperature increase associated with the discharge of treated sewage, waste or cooling water, water diversions, or releases shall not be such as to appreciably interfere with the uses assigned to this class."

NH RSA-A:8, VIII states the following: "In prescribing minimum treatment provisions for thermal wastes discharged to interstate waters, the department shall adhere to the water quality requirements and

recommendations of the New Hampshire fish and game department, the New England Interstate Water Pollution Control Commission, or the United States Environmental Protection Agency, whichever requirements and recommendations provide the most effective level of thermal pollution control.”

C-30. Env-Wq 1703.14, entitled “Nutrients”, states the following:

- “(a) Class A waters shall contain no phosphorous or nitrogen unless naturally occurring.
- (b) Class B waters shall contain no phosphorous or nitrogen in such concentrations that would impair any existing or designated uses, unless naturally occurring.
- (c) Existing discharges containing either phosphorous or nitrogen which encourage cultural eutrophication shall be treated to remove phosphorus or nitrogen to ensure attainment and maintenance of water quality standards.
- (d) There shall be no new or increased discharge of phosphorous into lakes or ponds.
- (e) There shall be no new or increased discharge(s) containing phosphorous or nitrogen to tributaries of lakes or ponds that would contribute to cultural eutrophication or growth of weeds or algae in such lakes and ponds.”

C-31. Env-Wq 1703.18, entitled “pH”, states the following:

- “(a) The pH of Class A waters shall be as naturally occurs.
- (b) As specified in RSA 485-A:8, II, the pH of Class B waters shall be 6.5 to 8.0, unless due to natural causes.
- (c) As specified in RSA 485-A:8, III, the pH of waters in temporary partial use areas shall be 6.0 to 9.0 unless due to natural causes.

C-32. Env-Wq 1703.19, entitled “Biological and Aquatic Community Integrity”, states the following:

- “(a) All surface waters shall support and maintain a balanced, integrated and adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of similar natural habitats of a region.
- (b) from naturally-occurring conditions shall be limited to non- detrimental differences in community structure and function.”

C-33. Env-Wq 1703.21 entitled “Water Quality Criteria for Toxic Substances” states the following:

- “(a) Unless naturally occurring or allowed under part Env-Wq 1707, all surface waters shall be free from toxic substances or chemical constituents in concentrations or combinations that:
  - (1) Injure or are inimical to plants, animals, humans or aquatic life; or
  - (2) Persist in the environment or accumulate in aquatic organisms to levels that result in harmful concentrations in:
    - a. Edible portions of fish, shellfish, or other aquatic life; or
    - b. Wildlife that might consume aquatic life.”

C-34. Antidegradation provisions are included in Env-Wq 1702 and Env-Wq 1708.

- a. Env-Wq 1702.03 states that ““Antidegradation” means a provision of the water quality standards that maintains and protects existing water quality and uses.
- b. Env-Wq 1708.02 states that “Antidegradation shall apply to: (a) Any proposed new or increased activity, including point source and nonpoint source discharges of pollutants, that would lower

water quality or adversely affect the existing or designated uses;(b) Any proposed increase in loadings to a waterbody when the proposal is associated with existing activities; (c) Any increase in flow alteration over an existing alteration; and (d) Any hydrologic modifications, such as dam construction and water withdrawals.”

- c. Antidegradation applies to all parameters as evidenced by Env-Wq 1708.08 (Assessing Waterbodies) which states “The applicant shall characterize the existing water quality and determine if there is remaining assimilative capacity for each parameter in question.”
- d. According to Env-Wq 1708.03 (b), “A proposed discharge or activity shall not eliminate any existing uses or the water quality needed to maintain and protect those uses”.
- e. Env-Wq 1702.04 states that “Assimilative capacity” means the amount of a pollutant or combination of pollutants that can safely be released to a waterbody without causing violations of applicable water quality criteria or negatively impacting uses.”
- f. Env-Wq 1708.08 describes the process for assessing waterbodies to determine if there is remaining assimilative capacity for each parameter in question.
- g. Env-Wq 1708.09 entitled “Significant or Insignificant Determination” states the following: (a) Any discharge or activity that is projected to use 20% or more of the remaining assimilative capacity for a water quality parameter, in terms of either concentration or mass of pollutants, or volume or flow rate for water quantity, shall be considered a significant lowering of water quality.  
(b) The department shall not approve a discharge or activity that will cause a significant lowering of water quality unless the applicant demonstrates, in accordance with Env-Wq 1708.10, that the proposed lowering of water quality is necessary to achieve important economic or social development in the area where the waterbody is located.
- h. Env-Wq 1708.01(b)(1), in general, states that: For significant changes in water quality, where the quality of the surface waters exceeds levels necessary to support propagation of fish, shellfish, and wildlife, and recreation in and on the water, that quality shall be maintained and protected unless the department finds, after full satisfaction of the intergovernmental coordination and public participation provisions and the analysis required by Env-Wq 1708.10, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the surface waters are located. In allowing such degradation or lower water quality, the department shall assure water quality adequate to fully protect existing uses. Further, the department shall assure that the highest statutory and regulatory requirements shall be achieved for all new and existing point sources and that all cost effective and reasonable best management practices for nonpoint source control shall be implemented.
- i. Env-Wq 1708.01(b)(2), in general, states that: The department shall not approve any proposed discharge or activity that might cause degradation or lower water quality, without such conditions as are necessary to ensure that:
  - a) Water quality will be adequate to protect existing uses; b) The highest statutory and regulatory requirements will be achieved for all new and existing point sources; and c) All cost effective and reasonable best management practices for nonpoint source control will be implemented.

C-35. Env-Wq 1708.04 entitled “Protection of Water Quality in ORW” states that the following:

- “(a) Surface waters of national forests and surface waters designated as natural under NH RSA 483:7-a, I, shall be considered outstanding resource waters (ORW).
- (b) Subject to (c), below, water quality shall be maintained and protected in surface waters that constitute ORW.
- (c) The department shall allow a limited point or nonpoint source discharge to an ORW only if:
  - (1) The discharge will result in no more than temporary and short-term changes in water quality, wherein “temporary and short term” means that degradation is limited to the shortest possible time;
  - (2) The discharge will not permanently degrade water quality or result at any time in water

quality lower than that necessary to protect the existing and designated uses in the ORW;  
and

(3) All practical means of minimizing water quality degradation are implemented.”

C-36. “Protection of Class A Waters” states the following:

- “(a) As specified in RSA 485-A:8, I, discharges of sewage or waste to class A waters shall be prohibited.
- (b) Proposed new or increased activities that the department determines do not involve the discharge of sewage or waste shall be reviewed in accordance with this part.”

C-37. Env-Wq 1708.06 entitled “Protection of Water Quality in High Quality Waters” states the following:

- “(a) Subject to (b) through (d) below, high quality waters shall be maintained and protected.
- (b) The department shall evaluate and authorize insignificant changes in water quality as specified in Env-Wq 1708.09.
- (c) The department shall allow degradation of significant increments of water quality, as determined in accordance with Env-Wq 1708.09, in high quality waters only if the applicant can demonstrate to the department, in accordance with Env-Wq 1708.10, that allowing the water quality degradation is necessary to accommodate important economic or social development in the area in which the receiving water is located.
- (d) If the waterbody is Class A Water, the requirements of Env-Wq 1708.05 shall also apply.”

C-38. Env-Wq 1708.12 states the ““transfer” means the intentional conveyance of water from one surface water to another surface water for the purpose of increasing volume of water available for withdrawal from the receiving surface water. The term does not include the transfer of stormwater, for the purpose of managing stormwater during construction, between basins created or otherwise lawfully used for stormwater detention or treatment, or both, and does not include the discharge of stormwater from a detention or treatment basin to a surface water.”

C-39. NH RSA 488:3 regarding registration of withdrawals and discharges states the following:

- I. No person shall withdraw or discharge a cumulative amount of more than 20,000 gallons of water per day, averaged over any 7-day period, or more than 600,000 gallons of water over any 30-day period, at a single real property or place of business without registering the withdrawal or discharge with the department. Transfers of such volume of water shall also be registered. Registration shall be in addition to any required permits.
- II. No registration shall be transferred to another person without written notification to the commissioner.

C-40. NH RSA 485:61 regarding Rules for Water Conservation, states the following:

- “I. The department shall adopt rules, pursuant to RSA 541-A, for water conservation practices for water users. These rules shall strike a reasonable balance between environmental, energy, and economic impacts and be consistent with current industry standards and practices for different types of water users.
- II. The water conservation rules in paragraph I of this section shall apply to all new permit applicants and applications for water withdrawals subject to the provisions of RSA 485:3, RSA 485:48, RSA 485-C:21 and section 401 of the Clean Water Act.
- III. Water conservation rules shall be consistent with applicable state or federal rules and regulations. Water Conservation Rules were adopted May 14, 2005 codified as Env-Wq 2101.”

C-41. Env-Wq 2101.24 entitled “Water Conservation Plan Required”, states that

“(a) The applicants for approval of a source that would be a conservation source shall submit a water conservation plan that demonstrates compliance with the applicable provisions of Env-Wq 2101.05 through Env-Wq 2101.22 in accordance with the following:”

“(5) For a new withdrawal from a surface water associated with a project requiring a 401 Water Quality Certification, the water conservation plan shall be submitted prior to or in conjunction with the application for a 401 Water Quality Certification pursuant to Section 401 of the federal Clean Water Act;

(6) For a new withdrawal from a surface water that requires water quality certification pursuant to RSA 485-A:12, IV, the water conservation plan shall be submitted prior to or in conjunction with the certification request”.

Env-Wq 2101.23, entitled Waivers, allows DES to grant waivers of certain provisions in Env-Wq 2101 provided the person requesting the waiver submits a written request to DES that includes the information specified in Env-Wq 2101.23(d).

- C-42. In 2010, DES published guidance (hereinafter called the [2010 instream flow guidance](#) or [2010 ISF guidance](#)) for estimating instream flow requirements for the protection of aquatic life for situations.
- C-43. Section 303(d) of the Clean Water Act (33 U.S.C. 1313(d)) and the regulations promulgated thereunder (40 C.F.R. 130.0 – 40 C.F.R. 130.11) require states to identify and list surface waters that are violating state water quality standards (i.e., Section 303(d) List) that do not have an approved Total Maximum Daily Load (TMDL) for the pollutants causing impairment. For these water quality- impaired waters, states must establish TMDLs for the pollutants causing the impairments and submit the list of impaired surface waters and TMDLs to EPA for approval. TMDLs include source identification, determination of the allowable load and pollutant reductions (by source) necessary to meet the allowable load. Once a TMDL is conducted, the pollutant/surface water is transferred to the list of impaired waters with approved TMDLs (known as Category 4A waters). The Section 303(d) List is, therefore, a subset of all impaired waters. The most recent Section 303(d) list of impaired waters submitted to EPA is the [2018 Section 303\(d\) List](#). A list of all impaired waters is available through the [NHDES website](#).
- C-44. On December 20, 2007, EPA approved the Northeast Regional Mercury TMDL 3 which addressed mercury impairments in all New Hampshire fresh surface waters.
- C-45. On September 21, 2010, EPA approved the Statewide Bacteria TMDL for 394 surface waters listed as impaired on the 2008 30(d) List of impaired waters <sup>4</sup>.
- C-46. When a surface water does not meet water quality standards (i.e., when it is impaired), the addition of pollutants causing or contributing to impairment should be avoided as indicated in the following regulation and statute:

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<sup>3</sup> Northeast Regional Mercury Total Maximum Daily Load. Connecticut Department of Environmental Protection, Maine Department of Environmental Protection, Massachusetts Department of Environmental Protection, New Hampshire Department of Environmental Services, New York State Department of Environmental Conservation, Rhode Island Department of Environmental Management, Vermont Department of Environmental Conservation, New England Interstate Water Pollution Control Commission. October 24, 2007.

<sup>4</sup> Final Report, New Hampshire Statewide Total Maximum Daily Load (TMDL) for Bacteria Impaired Waters. Prepared by FB Environmental Associates, Inc. for the New Hampshire Department of Environmental Services. September, 2010.

Env-Wq 1703.03 (a) states that “The presence of pollutants in the surface waters shall not justify further introduction of pollutants from point or nonpoint sources, alone or in any combination”.

NH RSA 485-A:12 (I) (Enforcement of Classification) states that “After adoption of a given classification for a stream, lake, pond, tidal water, or section of such water, the department shall enforce such classification by appropriate action in the courts of the state, and it shall be unlawful for any person or persons to dispose of any sewage, industrial, or other wastes, either alone or in conjunction with any other person or persons, in such a manner as will lower the quality of the waters of the stream, lake, pond, tidal water, or section of such water below the minimum requirements of the adopted classification”.

- C-47. NHDES Alteration of Terrain regulations (Env-Wq 1500) include design criteria for stormwater best management practices (BMPs) as well as criteria for minimizing the hydrologic impacts of stormwater runoff both during and after construction. Further, BMP design details as well as guidance for preparing pollutant loading analyses using the “Simple Method” are provided in [the New Hampshire Stormwater Manual](#).
- C-48. In accordance with §402 of the federal Clean Water Act, EPA issued the federal National Pollutant Discharge Elimination System (NPDES) Construction General Permit on May 14, 2019 with an effective date of June 27, 2019.
- C-49. On March 6, 2020, NHDES issued a wetlands permit (file # 2019-03499) for the proposed intake and monitoring well in the Bellamy River and on December 17, 2019 NHDES issued a Shoreland Impact Permit (# 2019-03615) for replacement of the primary structure control building, realignment of the driveway and other facility improvements within the protected shoreland. In April, 2020, NHDES issued a Permit by Notification (PBN) for areas of impact not included in the original Shoreland Impact Permit application.
- C-50. On June 14, 2018, NHDES received an application dated June 8, 2018 from the Applicant for Section 401 Water Quality Certification for the Activity. Supplemental information was provided by the Applicant through May 6, 2020.
- C-51. On January 10, 2020, NHDES issued a Groundwater Discharge Permit (Site #198401044/ Project # 39074/ Activity #376013) for the discharge of surface water to the ground via unlined infiltration basins for aquifer storage and recovery in Dover, NH.
- C-52. Pursuant to the authority in RSA 485-C:21, NHDES issued a Large Groundwater Withdrawal Permit (No. LGWP-2016-0001) to the Applicant on June 15, 2016 with conditions, including limitations on the volume that can be withdrawn from Well DPH #1, the Ireland Well and the Griffin Well.
- C-53. The U.S. Army Corps of Engineers has issued a Clean Water Act (CWA) section 404 General Permit for New Hampshire (ACOE# NAE-2016-02415), which became effective August 18, 2017 (i.e., general 404 permit). On August 17, 2017, NHDES issued section 401 Water Quality Certification 2017-404P-001 for the general 404 permit.
- C-54. NHDES issued a draft section 401 Water Quality Certification for public comment.

#### D. FINDINGS

*Activity Description:* The proposed Activity is described in the text and plans provided in the application for Section 401 Water Quality Certification filed by the Applicant (see Fact C-50). In general, the Activity includes construction of a replacement artificial groundwater recharge facility in Dover, New Hampshire that

will withdraw water from the Bellamy River and discharge it to artificial recharge (AR) basins to replenish the groundwater in the Pudding Hill Aquifer. AR is needed to enhance recharge to two of the Applicant's water supply production wells and to help prevent the migration of contaminants from a nearby source to the two Production Wells. Primary components of the new recharge facility include the following (see Figure 1):

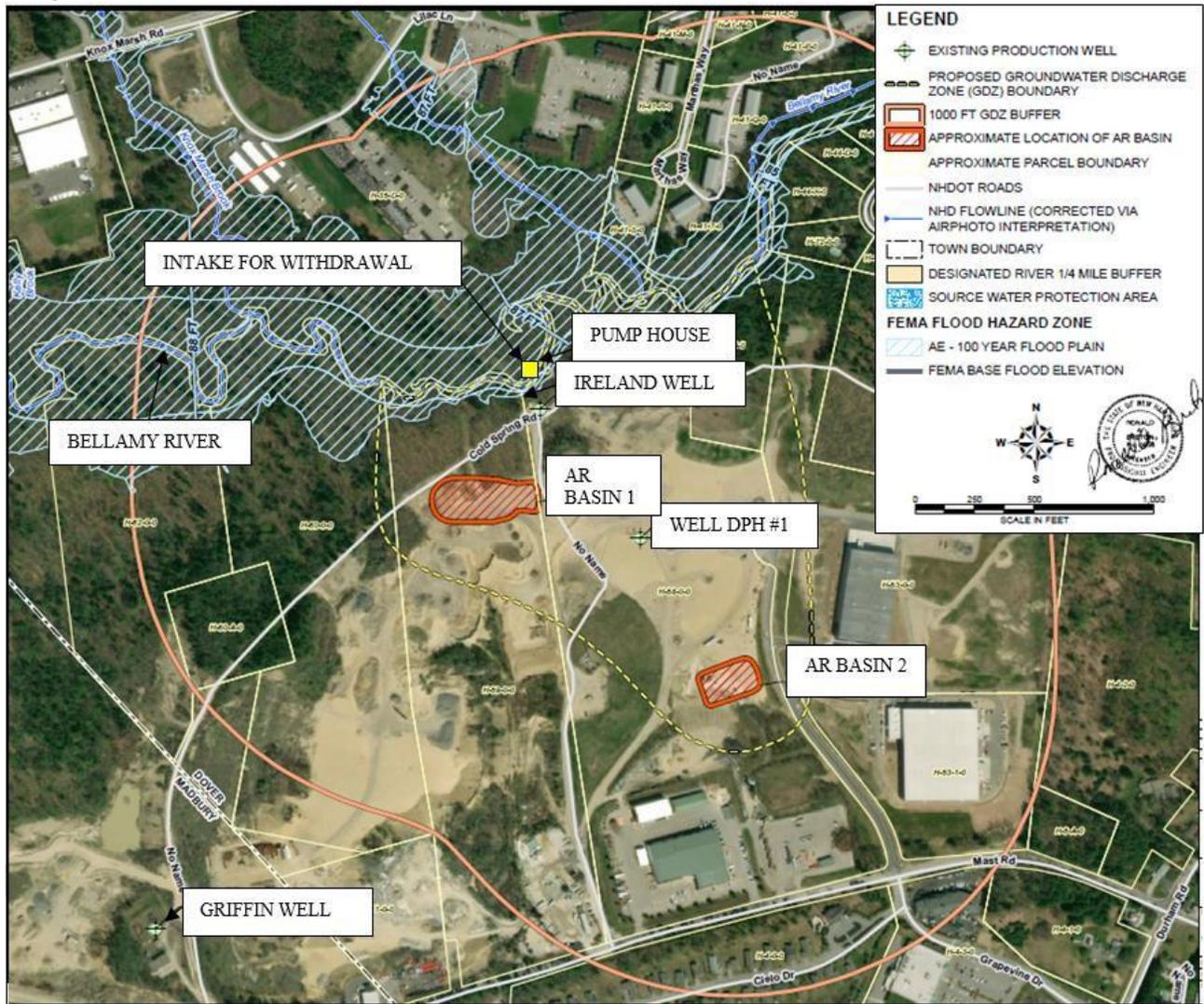
- A new pumping station/control building located near the existing surface water intake station (which will be demolished);
- a new water intake structure with an intake screen at the existing temporary intake location in the Bellamy River;
- flow gaging stations in the Bellamy River including a new stilling well at the DPH-SW1 gaging station;
- two (2) artificial recharge basins located in the Pudding Hill Aquifer with new piping and valves, new outlet structures, flow controls, flow meters to each basin and level monitoring in each basin; and
- a monitoring well network to monitor groundwater quality and levels;

The Applicant requests to withdraw a maximum of 800 gallons per minute (gpm) from the Bellamy River. The withdrawal is a "consumptive" use meaning that the withdrawn water will not be returned to the Bellamy River. After use and treatment, the withdrawn water is discharged to the Piscataqua River. The Applicant proposed in their application to withdraw water when flows are above the seasonal D80 flow (i.e., the flow that is exceeded 80 percent of the time) based on flow statistics generated by the United States Geological Survey (USGS) StreamStats web application<sup>5</sup> (see Table 1).

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<sup>5</sup> [USGS StreamStats web application](#)

Figure 1– Site Plan<sup>6</sup>



<sup>6</sup> From the February 25, 2019 Groundwater Discharge Permit Application submitted to NHDES by Emery and Garrett Groundwater Investigations, a Division of GZA (EGGI). Labels and arrows shown on Figure 1 were added by NHDES.

Table 1 – Applicant’s Proposed Withdrawal and Seasonal River Flow Thresholds

Flow Season	Low-Flow Threshold Minimum River Flow			Proposed Withdrawal		Min. Required Flow for Withdrawal to Occur		
	Flow Stat.	(cfs)	(gpm)	(gpm)	(cfs)	(gpm)	(cfs)	Estimated Effective Flow Stat.
Summer (Jun -Oct)	D80 Flow	1.78	799	800	1.78	1,599	3.56	Approx. D58 Flow
Fall (Nov - Dec)	D80 Flow	7.97	3,577	800	1.78	4,377	9.75	Approx. D75 Flow
Winter (Jan – Mar 15)	D80 Flow	14.2	6,373	800	1.78	7,137	15.98	Approx. D78 Flow
Spring (Mar 16 - May 31)	D80 Flow	27.30	12,252	800	1.78	13,052	29.08	Approx. D78 Flow
When river flow is less than 800 gpm above the low-flow threshold withdrawals will be decreased so that flow downstream of the withdrawal point is always greater than or equal to the low-flow threshold.								

D-1. *Background:* The City of Dover has historically used the Ireland Well and Griffin Well in the Pudding Hill Aquifer as potable groundwater supplies to meet the City’s water system demands. The existing Bellamy Recharge Facility (BRF) was built by the Applicant in the 1980s to pump water from the Bellamy River to the Pudding Hill Aquifer. In 2002, the Applicant stopped withdrawing water from the Bellamy and using the existing BRF because gravel washing at the nearby Pruven Aggregate facility supplied adequate artificial recharge to the Aquifer until it stopped operation in approximately 2011. The existing BRF has not been used since 2002.

In 2015, the City stopped using the Griffin Well due to the presence of elevated concentrations of organic compounds including Methyl-t-butyl ether (MtBE), 1,4-Dioxane, and per- and polyfluoroalkyl substances (PFAS). The source of the contaminants has been documented to be associated with the New England Metal Recycling (NEMR), Madbury, New Hampshire LLC facility <sup>7</sup> on Pudding Hill Road, which is located west (i.e. upstream along the Bellamy River) of the proposed AR facility. [The above is from footnote 6.]

The City then hired a consultant [Emery and Garrett Groundwater Investigations, a Division of GZA (EGGI)], to develop and permit a new water supply in the Pudding Hill Aquifer. Based on hydrogeologic investigations a new production well (DPH #1) was installed in April 2016 northeast of the Griffin Well and south of the Ireland Well. On June 15, 2016, NHDES issued a Large Groundwater Withdrawal Permit (LGWWP) for Well DPH #1 (see Fact C-52) with conditions, including limitations on the volume that can be withdrawn from Well DPH #1, the Ireland Well and the Griffin Well. The permit expires on June 15, 2021 if the withdrawal is not activated and on June 15, 2026 if the withdrawal is activated. EGGI’s evaluation of the permitting for DPH #1 indicated that (1) the combined groundwater withdrawals from the Ireland Well and Well DPH #1 that are needed to meet the City’s water demands will potentially be greater than the amount of available natural recharge and (2) the potential exists for groundwater contaminants to migrate from the western portion of the Pudding Hill Aquifer to these two wells and that the potential is increased when the Griffin Well is not in use. Based on these findings, EGGI recommended that Artificial Recharge (AR) be utilized to enhance recharge to the Ireland Well and Well DPH #1 and create a means of hydraulically limiting the transport of contaminants from the NEMR site to these wells. [The above is from footnote 6.]

Based on the above recommendations, the City of Dover contracted with EGGI/GZA to test and develop AR within the Pudding Hill Aquifer. Testing of a pilot recharge facility began in April 2017 <sup>6</sup>. The NHDES Watershed Management Bureau (WMB) authorized the pilot study, with conditions, as it would provide

<sup>7</sup> Formerly called the Madbury Metals Facility which is now owned by Schnitzer Steel Industries, Inc.

information needed to prepare a 401 Water Quality Certification for the proposed Activity<sup>8</sup>, with the understanding that withdrawal conditions may change in the final Water Quality Certification. Conditions included measuring flow in the river, withdrawing a maximum of 600 gpm (1.34 cfs) during the pilot study and only withdrawing water when the river flow upstream of the withdrawal exceeds the sum of the proposed withdrawal plus the river flow shown in Table 2. River flows shown in Table 2 are from the United States Geological Survey (USGS) StreamStats web application<sup>5</sup>.

Table 2 - NHDES Interim Seasonal River Thresholds for Pilot Study

Season	River Flow (cfs)	Comments
Summer (July through October)	3.42	D60 flow
Fall (November through December)	16.7	D60 flow
Winter (January through March 15)	19.9	D60 flow
Spring (March 16 through June)	27.3	D80 flow
Withdrawals may only occur when the river flow upstream of the withdrawal exceeds the sum of the proposed withdrawal plus the river flow shown above.  D60 is the river flow that is exceeded, on average, 60 percent of the time. D80 is the river flow that is exceeded, on average, 80 percent of the time.		

Testing of the potential water quality impacts from utilizing AR in the Pudding Hill Aquifer was performed under NHDES Temporary Groundwater Discharge (TGP) Permits (TGP-198401044-D-001, 002 and 003) from March 24, 2017 to February 25, 2019. The TGPs required monthly water quality sampling of the Ireland Well, Well DPH#1 and quarterly samples in the Bellamy River for per- and polyfluoroalkyl substances (PFAS), volatile organic compounds (VOCs) and low level 1,4 dioxane.

Water quality samples were collected in the Bellamy River before the Pilot Test and during the Extended Pilot Test in 2018. Results indicated the presence of PFAS above detection levels in the River.

Use of the Ireland Well was temporarily suspended by the City after June 28, 2018 due to the detection of PFAS chemicals [Perfluorooctanoic Acid (PFOA) and perfluoro-octanesulfonate (PFOS)]. The Ireland Well and Well DPH#1 have been used intermittently since early 2018. Well DPH#1 is currently only being used when the City's other water sources are insufficient to meet the City's water supply demand. [The above is from footnote 6.]

In August 2018, groundwater seeps flowing to the Bellamy River from the aquifer were observed for the first time. The seeps are believed to be due to the combined effects of the reduction in groundwater withdrawals, use of AR during the pilot test, and precipitation which have resulted in an increase in groundwater levels in the Pudding Hill Aquifer and the associated reemergence of groundwater springs and seeps adjacent to the southern shoreline of the Bellamy River. The City plans to withdraw water from the river when the water levels within the Aquifer are low enough to prevent flow from the springs to the Bellamy River. The City is currently evaluating the groundwater level elevations in the Aquifer, spring flow, and use of the Ireland Well to develop a Groundwater and AR Management Program to help protect the water quality of the River and maximize use

<sup>8</sup> From NHDES letters to the City of Dover dated March 30, 2017, April 7, 2018, and May 24, 2019.

of the Ireland Well. Samples of the seeps and springs and of the Bellamy River were collected and analyzed for PFAS and 1,4-dioxane, which were detected. [The above is footnote 6.]

On January 10, 2020, NHDES issued a Groundwater Discharge Permit for the discharge of surface water into the ground via rapid infiltration basins for aquifer recharge in Dover, NH (see Fact C-51). The Groundwater Discharge Permit includes monitoring of groundwater and the Bellamy River [DPH-SW1 and DPH-SW3 (see Figure 3)] and submittal of the sampling results to the NHDES Environmental Monitoring Database (EMD). Surface water monitoring includes the following:

DPH-SW1: PFAS and GWDP suite of parameters monthly during active recharge periods.

DPH-SW3: PFAS twice a year during April/May and August/September and the GWDP suite of parameters monthly during active recharge periods.

(The GWDP suite of parameters includes UV254, temperature, dissolved oxygen, ORP, specific conductivity, dissolved iron, dissolved manganese, pH, turbidity, true color and nitrate.)

As mentioned above, the source of PFAS and 1,4 dioxane in the groundwater and Bellamy River has been documented to be the NEMR facility <sup>7</sup> located west and upstream (along the Bellamy River) of the new AR facility. A Remedial Action Plan (RAP) was submitted to NHDES by Sanborn Head & Associates (SHA) dated April 8, 2019 (Site #198705022 Project #8795). The report evaluated three remedial alternatives and recommended monitored natural attenuation (MNA) along with wellhead treatment for the public water supply wells and completion of certain source removal. On October 30, 2019, the NHDES Waste Management Division, Hazardous Waste Remediation Bureau issued conditional approval of the RAP<sup>9</sup> for the NEMR site. For reasons discussed in the RAP, the selected alternative is “Monitored Natural Attenuation” (MNA). MNA includes on-going groundwater monitoring (on and off-site monitoring wells and Dover water supply wells) to collect data to further support the premise that the site-sourced contaminant plumes (principally PFAS and 1,4-dioxane) are stable or attenuating, and to assess the anticipated improvements in groundwater quality following implementation of the on-site remedial action (removal and off-site disposal of buried auto-shredder residue) which commenced in August, 2019.

Underwood Engineers (UE) is under contract with the City of Dover to develop preliminary design of a treatment facility for the wells in the Pudding Hill Aquifer, that will address iron/manganese, PFAS, 1,4-dioxane and MtBE contaminants. The design will be based on the Aquifer yield of 780 gpm (assuming AR is in place). The design contaminant concentrations are based on the highest levels observed in the Aquifer as identified by EGGI; however, AR will help to reduce the contaminant concentrations as noted above which will reduce Operation and Maintenance (O&M) costs for the treatment facility. UE has submitted to the City a proposed scope of work for final design of treatment facilities. [The above is from footnote 10.]

D-2. The Applicant is responsible for the Activity.

D-3. Surface waters are navigable waters for the purposes of certification under Section 401 of the Clean Water Act. Surface waters are jurisdictional wetlands for the purposes of wetlands permitting under RSA 482-A.

D-4. The named and unnamed streams and wetlands affected by the Activity, are surface waters under Env-Wq 1702.44 (see Fact C-8) and are therefore subject to New Hampshire Surface Water Quality Standards (Env-Wq 1700 – see Fact C-5). NHDES has assigned Assessment Unit (AU) identification numbers to many, but not all surface waters. Surface waters that do not have an AU number are considered surface waters of the State in

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<sup>9</sup> Letter from NHDES Waste Management Division, Hazardous Waste Remediation Bureau to NEMR of Madbury, New Hampshire, LLC dated October 30, 2019

<sup>10</sup> November 14, 2019 email from Tom Page of Underwood Engineers.

accordance with Env-Wq 1702.44 (see Fact C-8). Surface waters that could be potentially affected by the Activity and their associated AU numbers (where available) include, but are not limited to the following:

Assessment Unit ID	Description
NHRIV600030903-08	Bellamy River
	Unnamed wetlands

- D-5. The Bellamy River and its tributaries from the headwaters downstream to the crest of the former dam at the Bellamy Park municipal swimming area are Class A<sup>11</sup>. This includes the portion of the river where the withdrawal is proposed. Downstream of the former dam, the Bellamy River is Class B. According to RSA 485-A:8, I, Class A surface waters shall be of the highest quality and shall not have any discharges of sewage or waste. The goal of Class A and B surface waters is to support aquatic life, primary and secondary contact recreation, fish consumption, wildlife, and, after adequate treatment, as a water supply (see Fact C-16).
- D-6. The Applicant must comply with New Hampshire surface water quality standards (see Fact C-5). Surface water quality standards include designated uses (such as aquatic life, recreation, etc. – see Fact C-16), the criteria to protect the designated uses and antidegradation provisions. Designated uses apply “...whether or not such uses are presently occurring” (Env-Wq 1702.17 – see Fact C-16).
- D-7. Stormwater runoff during construction and/or operation of the Activity, including snowmelt runoff, and groundwater flow from within the area affected by the Activity, are discharges as defined in Env-Wq 1702.18 (see Fact C-17). They are also discharges as applied under Section 401 of the Clean Water Act (see Fact C-21). If not properly controlled, such discharges may cause the permanent alteration of, or temporary impacts to surface water quality, quantity, or both.
- D-8. If not properly controlled, withdrawals from rivers and streams can result in impairment of designated uses, including, but not limited to, aquatic life. Examples of how aquatic life can be adversely impacted by withdrawals include, but are not limited to, reductions in wetted habitat, reductions in river velocity due to less water which can cause higher water temperatures and lower dissolved oxygen levels, all of which can contribute to violations of the Biological and Aquatic Community Integrity (see Fact C-32) criterion in the surface water quality regulations. As stated in Finding D-6, all designated uses (including but not limited to aquatic life) apply whether or not the uses are presently occurring.
- D-9. The Activity includes dredge and fill of jurisdictional wetlands in New Hampshire for installation of the new water intake in the Bellamy River and therefore requires a NHDES Wetlands Permit (or permits) under NH RSA 482-A. This 401 Certification decision relies, in part, on an approved permit (or permits) from the NHDES Wetlands Bureau for the potential impacts to jurisdictional wetlands. Through its processing and issuance, NHDES wetlands permits issued for the Activity will address the dredge and fill impacts to jurisdictional wetlands. A NHDES Wetlands Permit has been issued for the Activity (see Fact C-49).
- Work associated in the wetlands for the Activity will also be covered under the U.S. Army Corps of Engineers Clean Water Act (CWA) section 404 General Permit for New Hampshire, which became effective August 18, 2017 (i.e., General 404 Permit) (see Fact C-53).
- D-10. On August 17, 2017, NHDES issued section 401 Water Quality Certification (WQC) 2017-404P-001 for the General 404 Permit (see Fact C-53). Condition E-3 of that WQC states the following:

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<sup>11</sup> Bellamy River and its tributaries [Barrington, Madbury, etc.]. 1961, 40:1, V. Bellamy River and all its tributaries, in the towns of Barrington and Madbury and the city of Dover, from their sources to the crest of the dam at Bellamy Park municipal swimming area in Dover, Class A.

“... If NHDES determines that surface water quality standards are being violated by a specific project or there is reasonable potential to expect that water quality standards will be violated, NHDES may modify this 401 Certification or issue an individual 401 Certification for the specific project to include additional conditions to ensure compliance with surface water quality standards when authorized by law, and after notice and opportunity for hearing.”

NHDES has decided that an individual 401 Certification for the Activity with additional conditions, as authorized by the WQC 2017-404P-001 and state statute RSA 485-A:12, III (see Fact C-3), is necessary to help ensure that the discharges and withdrawal associated with the Activity will be comply with state surface water quality standards. NHDES has received an application from the Applicant for 401 Water Quality Certification (see Fact C-50).

- D-11. On January 20, 2020, staff in the NHDES Alteration of Terrain Bureau advised the Applicant’s engineering consultant, Underwood Engineers, that a NHDES Alteration of Terrain permit is not needed for this Activity.
- D-12. The shoreland of the Bellamy River is protected under the Shoreland Water Quality Protection Act (SWQPA) in accordance with RSA 483-B. Because the Activity includes work within 250 feet of the shoreline of the Bellamy River, the Applicant will need a NHDES SWQPA permit (i.e., Shoreland Impact Permit or SIP). The SWQPA includes limitations on impervious surfaces, vegetation maintenance requirements and the establishment of a permit requirement for many, but not all, construction, excavation and filling activities within the protected shoreland. This 401 Certification decision relies, in part, on an approved NHDES SIP for the potential impacts on water quality in the Bellamy River due to work on the shoreland. Through its processing and issuance, the NHDES SIP issued for the Activity will help to prevent potential water quality impacts in the Bellamy River. NHDES has issued a SIP for the Activity as well as a Permit by Notification for work not included in the original SIP (see Fact C-49).
- D-13. The Activity is not within ¼ mile of a Designated River under the Designated Rivers Program (RSA 483). As such, the Activity is not within the jurisdiction of the Designated Rivers Program.
- D-14. The surface waters in the vicinity of the Activity are not Outstanding Resource Waters (Env-Wq 1708.04).
- D-15. The Activity does not involve an interbasin transfer as defined in RSA 483:4.
- D-16. The Activity does not involve a “transfer” of water as defined in Env-Wq 1708.12(a).
- D-17. Pursuant to RSA 488:3, water users in the state withdrawing, transferring, or discharging more than 140,000 gallons of water per week or more than 600,000 gallons in a month are required to register all sources and destinations with the NHDES Water Use Registration and Reporting Program (WURR) and report water use. The Applicant is currently a water user registered with WURR and reports monthly water use on a quarterly basis. On August 1, 2018, staff from the NHDES Water Conservation Program confirmed that the proposed withdrawal from the Bellamy River and discharge to the recharge basins associated with the Activity, requires Water Use Registration (see Fact C-39) but that a Water Conservation Plan (WCP) is not required because the Applicant already has a WCP (see Fact C-40 and C-41).
- D-18. If not properly controlled, the disturbance of earth during construction may temporarily increase turbidity levels in surface waters adjacent to and downstream from the area affected by the Activity, particularly during wet weather events, and may contribute to long-term sediment retention in and/or transport through the surface water adjacent to and downstream from the Activity site. Details regarding proposed erosion and sediment control measures that will be employed during construction are included in the NHDES wetlands permit application and will also be included in the SWPPP for the NPDES Construction General Permit (see Fact

C-47 and Finding D-19). To ensure that erosion and sediment control measures are properly functioning the SWPPP will also include procedures for inspection and maintenance of the control measures.

- D-19. The Applicant must comply with conditions in the federal National Pollutant Discharge Elimination System (NPDES) Construction General Permit (CGP)<sup>12</sup>. CGPs are typically reissued by the U.S. Environmental Protection Agency (EPA) every 5 years. The most recent CGP was issued in 2017 and became effective on February 16, 2017. Activities must comply with the CGP if they “[d]isturb 1 or more acres of land, or will disturb less than 1 acre of land but is part of a common plan of development or sale that will ultimately disturb 1 or more acres of land”. The CGP covers construction related stormwater discharges (including stormwater runoff, snowmelt runoff and surface runoff and drainage) as well as other discharges, including but not limited to, construction dewatering that has been treated by an appropriate control. The CGP requires development of a Stormwater Pollution Prevention Plan (SWPPP) that describes how the Activity will meet the requirements of the CGP. This includes identification of the stormwater team, a description of the nature of construction activities, emergency-related projects, identification of other site operators, the sequence and estimated dates of construction activities, a site map, identification of construction site pollutants and non-stormwater discharges, buffer documentation, a description of stormwater control measures, pollution prevention procedures, procedures for inspection, maintenance and corrective requirements, SWPPP Certification and Post-Authorization Additions to the SWPPP. According to the CGP the SWPPP must be made available to NHDES upon request.
- D-20. As part of the Wetlands permit application for the proposed water intake in the Bellamy River, the Applicant contacted the Natural Heritage Bureau (NHB) for information regarding rare, threatened and endangered species and species of special concern. Two State threatened species, one State endangered species and one species of “Special Concern” were noted in the vicinity. Of the four, only the species of “Special Concern” (i.e., the American Eel) was found in the Bellamy River. As discussed in Finding D-21, the American Eel has been found in recent fish surveys of the Bellamy River.
- D-21. According to the New Hampshire Fish and Game Department (NHFGD), the Bellamy River is a warm water fishery, however, the NHFGD does stock trout in the Madbury section of the river (put and take) and there is now the potential for diadromous fish migration in the river due to the recent removal of the Sawyer Mill Dams located downstream in Dover. Fish surveys conducted by the NHFGD in 2016 approximately 1.6 miles upstream of the proposed withdrawal at station 07-BLM, and in 2018 in the vicinity of the proposed withdrawal identified Fallfish, Longnose Dace, Largemouth Bass, Yellow Perch, Common White Sucker and the American Eel (a New Hampshire species of “Special Concern”). Other species were identified in fish surveys at other locations in the Bellamy River conducted by the NHFGD in 1985, 2000 and 2006. Although fish were found, their abundance and diversity were relatively low.
- D-22. Many amphibians and reptiles (such as turtles and frogs) hibernate under water in the winter with some (such as turtles) burying themselves in the sediment. To protect these organisms, the Activity’s withdrawal from the Bellamy River (and adjacent wetlands) should be prevented from lowering the river level below that which would cause the hibernating organisms to freeze and die. NHDES expects the withdrawal restrictions discussed in Finding D-28 and required in Condition E-15 will be protective of hibernating aquatic organisms. This is because withdrawals must essentially stop (with the exception of de minimis withdrawals) in the winter and spring at flows which are greater than the flow in the fall (October/November) when aquatic organisms begin to hibernate (see Finding D-28, Table 5, Q tier 1).
- D-23. According to the 2018 305(b)/303(d) lists of impaired waters (see Fact C-43), the following surface waters in the vicinity of the proposed Activity are listed as impaired. All impairments, with the exception of those highlighted in bold (which have approved TMDLs) and “Habitat Assessment”, are on the Section 303(d) List:

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<sup>12</sup> The [2017 Construction General Permit](#) is available through the EPA website.

Assessment Unit (AU)	Waterbody Name	Cause of Impairment (Designated Use Impaired)
NHRIV600030903-08	Bellamy River (from the Bellamy Reservoir dam downstream to a point approximately 0.1 miles upstream of Bellamy Rd)	<b>Mercury (FC)</b> Aluminum (AL) Benthic Macroinvertebrates (AL) Habitat Assessment (AL) pH (AL) <b>E.coli (PCR)</b>
Notes: AL = Aquatic Life, PCR = Primary Recreation, SCR = Secondary Recreation, FC = Fish Consumption, SFC = Shellfish Consumption Impairments highlighted in bold have approved TMDLs. All other impairments are on the Section 303(d) List. All fresh surface waters are impaired mercury due to elevated levels of mercury in fish tissue which has resulted in statewide fish consumption advisory.		

When a surface water does not meet water quality standards (i.e., when it is impaired), the addition of pollutants causing or contributing to impairment should be avoided (see Fact C-46). As noted above, all fresh surface water in New Hampshire are impaired for mercury due to concentrations found in fish tissue which have resulted in a statewide fish consumption advisory. On December 20, 2007, EPA approved the Northeast Regional Mercury TMDL which addressed mercury impairments in all New Hampshire fresh surface waters (see Fact C-44). The primary source of mercury is atmospheric deposition from in-state and out-of- state emissions. The proposed Activity is not expected to have a significant impact on mercury levels in fish tissue or on aluminum, pH or E. coli levels in the river. See Findings D-24 and D-25 for discussions regarding the benthic macroinvertebrate and habitat assessments respectively.

D-24. As indicated in Finding D-23, the river segment that includes the proposed withdrawal is listed as impaired for benthic macroinvertebrates. This is based on benthic macroinvertebrate biomonitoring conducted by NHDES in the summer of 2000, as well as the summers of 2013 through 2018 at station 07-BLM in Madbury. Station 07-BLM is located approximately 1.6 miles upstream of the proposed withdrawal at the railroad crossing located just upstream of the Route 155 road crossing. Results are compared to a threshold equal to 90 percent of the Benthic Index of Biological Integrity (B-IBI) or 53.1<sup>13</sup>. As shown, all failed to meet this threshold with the exception of biomonitoring conducted in 2016. The reason why the samples did not meet the B-IBI threshold is unknown but could be related to the amount of water released from the Bellamy Reservoir, which can be limited at times due to withdrawals by the City of Portsmouth (see Finding D-27). Because the benthic macroinvertebrate data is from a station located upstream of the proposed withdrawal, NHDES has concluded that the benthic macroinvertebrate data conducted at station 07-BLM, should not preclude the Applicant from withdrawing water from the Bellamy River downstream, provided it is conducted in accordance with the conditions of this certification.

Station	Year	NH B-IBI	90 % Threshold	B-IBI Ratio	Ratio Pass Fail
07-BLM	2000	36.5	53.1	69%	Fail
07-BLM	2013	47.8	53.1	90%	Fail
07-BLM	2014	49.9	53.1	94%	Fail
07-BLM	2015	48.5	53.1	91%	Fail

<sup>13</sup> See the [New Hampshire 2018 Consolidated Assessment and Listing Methodology](#) for details on how assessments are made for various water quality parameters.

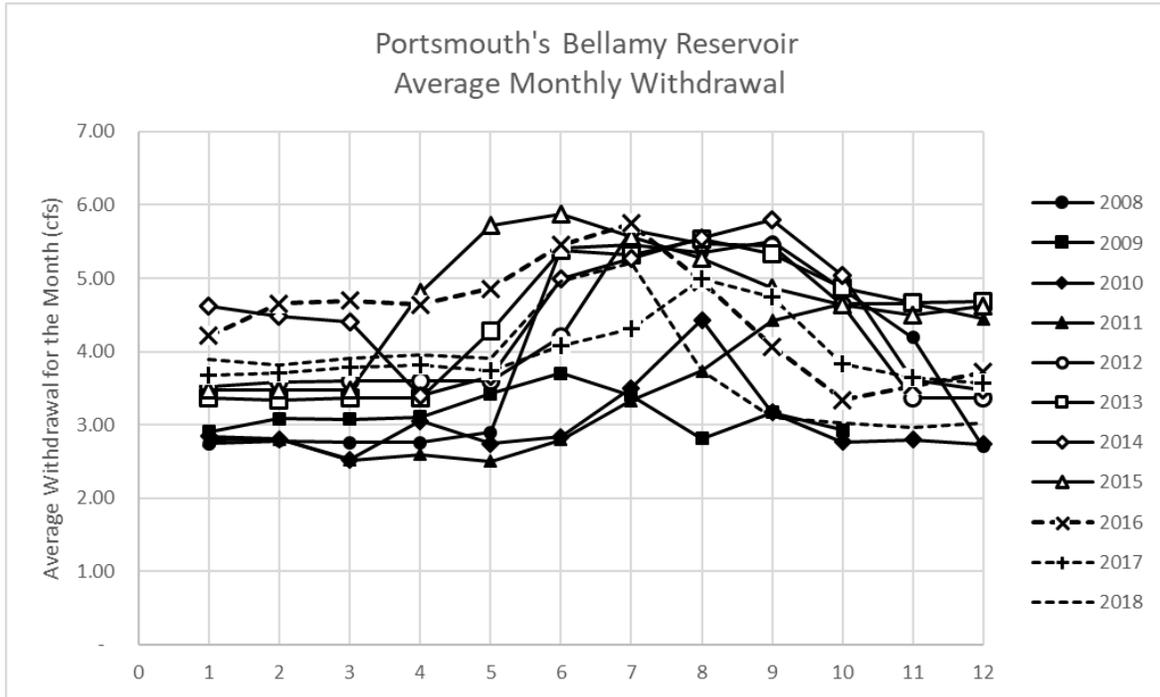
Station	Year	NH B-IBI	90 % Threshold	B-IBI Ratio	Ratio Pass Fail
07-BLM	2016	55.6	53.1	105%	Pass
07-BLM	2017	40.9	53.1	77%	Fail
07-BLM	2018	42.5	53.1	80%	Fail

- D-25. As indicated in Finding D-23 the river segment that includes the proposed withdrawal is listed as impaired for habitat assessments. This is based on a habitat assessment conducted in 2000 at station 07-BLM, which is located upstream of the proposed withdrawal (see Finding D-24 for a description of the location). Because this data is from a station located upstream of the proposed withdrawal, is now almost 20 years old and is not based on the current methodology for assessing habitat<sup>13,14</sup>. NHDES has concluded that the habitat assessment conducted in 2000 should not preclude the Applicant from withdrawing water from the Bellamy River downstream, provided it is conducted in accordance with the conditions of this Certification.
- D-26. Underwood Engineers and EGGI/GZA met with NHFGD on 10/25/2019 to review intake screen requirements. According to Underwood Engineers, based on the meeting, an earlier site visit with NHFGD, and follow up discussions, it was agreed to use a screen design velocity of 0.36 feet/second to protect fish from impingement.
- D-27. *Portsmouth Withdrawal:* The Bellamy Reservoir (and dam) is located approximately 2.5 miles upstream of the Activity on the Bellamy River. The drainage area to the dam is approximately 21.58 square miles (sm), which is approximately 84 percent of the drainage area at the Applicant’s proposed withdrawal point (25.56 sm). The Reservoir serves as a water supply for the City of Portsmouth and was constructed for this purpose in the early 1960s. Based on records from the NHDES Water Use Registration and Reporting Program, average daily withdrawals (equal to the monthly volume divided by number of days in the month) from the Reservoir vary by month and year with a range of approximately 2.5 to 6 cfs (Figure 2). This represents a significant amount of water that is withdrawn from the watershed upstream of the proposed Bellamy River Recharge Facility. In addition, the dam is operated such that relatively little water typically flows out of the dam during low flow periods of the year.

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<sup>14</sup> According to current methodology for assessing waters, habitat is only listed as impaired if one or more of the assessment parameters scores less than or equal to 10 (out of 20) and a biological assessment also indicates that the waterbody is impaired. Habitat parameters include epifaunal substrate/available cover, pool substrate characterization, pool variability, sediment deposition, channel flow status, channel alteration, channel sinuosity, bank stability, vegetative protection, and riparian vegetative zone width.

Figure 2- Average Monthly Withdrawal from Portsmouth's Bellamy Reservoir



EGGI<sup>15</sup> measured flows and various river properties at four stations on the Bellamy River which, from upstream to downstream are DPH-SW3, a station adjacent to the temporary intake, DPH-SW1, and DPH-SW4 (see Figure 3). Results are presented in Table 3. As shown in Table 3, the aquatic habitat and velocity in Bellamy River generally decreases as flow decreases. As river flow, depth and velocity decreases, dissolved oxygen levels in the surface water may decrease due to less aeration (i.e. fewer or smaller falls, rapids and riffles), longer residence times (which can result in higher temperatures), and higher concentrations of oxygen demanding and other pollutants due to lower dilution. In addition, low river flows may result in areas where fish passage is limited due to insufficient depth.

<sup>15</sup> Emery and Garret Groundwater Investigations, LLC. *Results of Streamflow Monitoring, Bellamy River, City of Dover Water System, Dover, New Hampshire*. May, 2018. This report was included as Attachment E in the Applicant's 401 Water Quality Certification Application.

Figure 3 - Surface Water Monitoring Locations on the Bellamy River (from footnote 15)

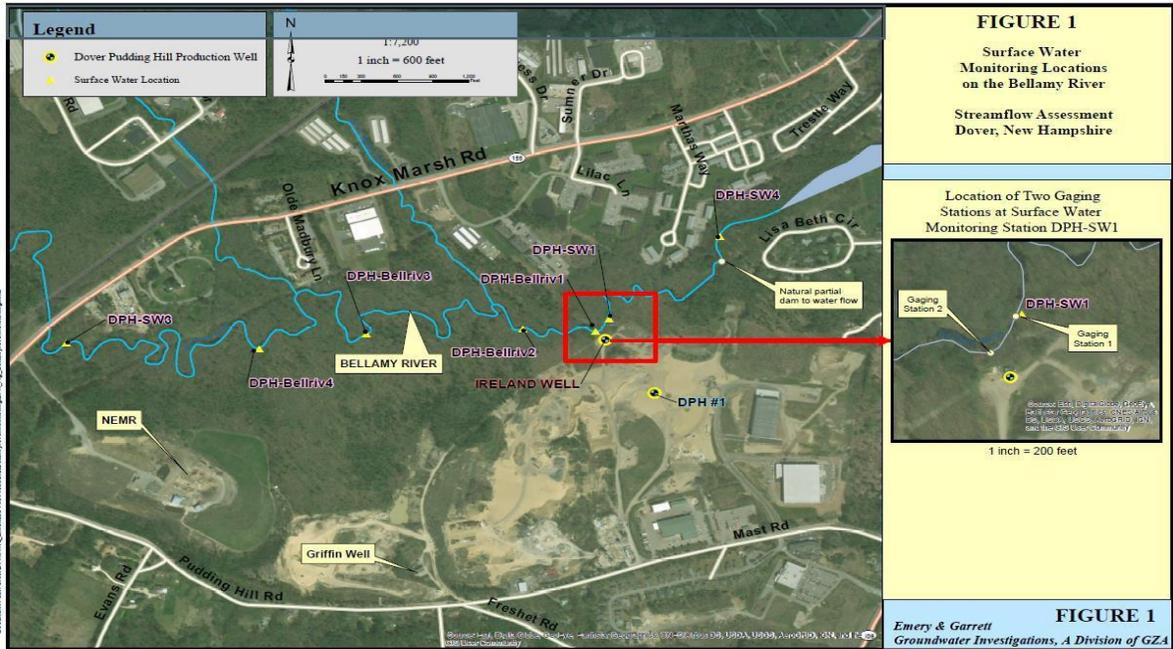
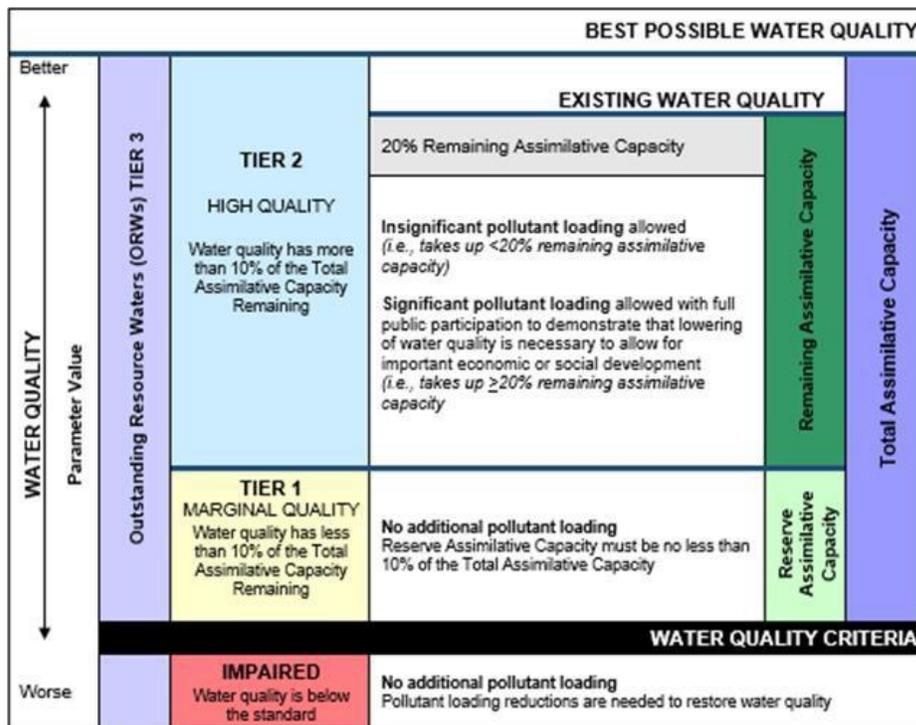


Table 3 - Bellamy River Properties at Various Stations and Flows

Station	Date	Flow (cfs)	Top Width of Water (feet)	Wetted Surface (feet)	Average Depth (feet)	Total Wetted Area (square feet)	Average Velocity (feet/second)
DPH-SW3	4/11/18	47.96	29.90	31.19	1.58	50.52	0.95
	8/23/17	11.56	17.50	18.18	0.96	17.29	0.67
	9/21/15	1.27	13.0	13.72	0.76	10.20	0.12
Adjacent to Temporary Intake	4/11/18	56.73	27.0	28.36	0.96	26.75	2.12
DPH-SW1	8/23/17	16.52	21.5	22.62	1.40	29.38	0.56
	9/21/15	1.40	16.5	17.11	1.00	17.00	0.08
DPH-SW4	8/23/17	14.30	26.0	26.65	1.06	28.54	0.50
	7/26/17	5.32	24.0	24.60	0.95	23.85	0.22
	9/22/15	1.63	15.5	16.31	0.88	14.15	0.12

D-28. Antidegradation provisions of the NH surface water quality standards are included in Env-Wq 1708 and apply to water withdrawals [Env-Wq 1708.02(d)]<sup>16</sup>. According to Env-Wq 1702.03 ““Antidegradation” means a provision of the water quality standards that maintains and protects existing water quality and uses.” Figure 4 shows how the various antidegradation terms (i.e., total assimilative capacity, water quality criteria, reserve and remaining assimilative capacity, etc.) relate to one another. The following describes how antidegradation was applied to determine flows that would be protective of the aquatic life designated use and allowable withdrawals from the Bellamy River that would be considered “insignificant” as defined in the antidegradation regulations.

Figure 4– Antidegradation Schematic



**a. Equations for Determining Total, 10% Reserve (Tier 1) and Remaining Assimilative Capacity.**

Rules for assessing surface waters to determine the total, 10% reserve and remaining assimilative capacity are included in Env-Wq 1708.08, Assessing Waterbodies. Applicable regulations are provided below.

Env-Wq 1708.08 (a) “The applicant shall characterize the existing water quality and determine if there is remaining assimilative capacity for each parameter in question.”

Env-Wq 1708.08 (c) “Where flows will or might be altered, existing conditions shall be established based on the existing maximum allowed water withdrawals or impoundment, diversion, or fluctuation of streamflow, as applicable.”

<sup>16</sup> Env-Wq 1708.02: Antidegradation shall apply to: (a) Any proposed new or increased activity, including point source and nonpoint source discharges of pollutants, that would lower water quality or adversely affect the existing or designated uses;(b) Any proposed increase in loadings to a waterbody when the proposal is associated with existing activities; (c) Any increase in flow alteration over an existing alteration; and (d) Any hydrologic modifications, such as dam construction and water withdrawals.”

Env-Wq 1708 (d) "Remaining assimilative capacity shall be evaluated by comparing existing water quality, as specified in (b) and (c) above, to the state's water quality criteria."

Env-Wq 1708.08 (f): "Subject to (h) below, if the department determines, based on the information submitted, that there is no remaining assimilative capacity for a specific parameter, no further degradation with regard to that parameter shall be allowed."

Env-Wq 1708.08(g): "Subject to (h) below, if the department determines that there is some remaining assimilative capacity, then the department shall proceed in accord with Env-Wq 1708.09."

Env-Wq 1708.08 (h): "Determinations made pursuant to (f) or (g), above, shall account for Env-Wq 1705.01, which requires the department to reserve no less than 10% of the surface water's assimilative capacity."

(Env-Wq 1705.01(a): "Subject to (b) below, the department shall hold not less than 10 percent of the assimilative capacity of each surface water in reserve to provide for future needs.")

Env-Wq 1703.01 entitled "Water Use Classifications; Designated Uses" includes the following regarding flow quantity:

(d) Unless high or low flows are caused by naturally-occurring conditions, surface water quantity shall be maintained at levels that protect existing uses and designated uses.

As shown in Figure 4 and the following equation, the Total Assimilative Capacity (TAC) is equal to the "Best Possible Water Quality" (or in this case the Best Possible Flow or Q best) minus the Water Quality Criteria flow or Q wqc.

$$\text{Equation 1: } TAC = Q_{\text{best}} - Q_{\text{wqc}}$$

Referring once again to Figure 4, the flow corresponding to 10% reserve assimilative capacity (10%RESAC, Tier 1) can be determined by the following equation:

$$\text{Equation 2: } Q_{(10\%RESAC \text{ or tier } 1)} = Q_{\text{wqc}} + (0.10 \times TAC)$$

According to Figure 4 and the following equation, the remaining assimilative capacity (REMAC), is equal to the Existing Water Quality (or in this case the Existing Flow or Q exist) minus the Q tier 1.

$$\text{Equation 3: } REMAC = Q_{\text{exist}} - Q_{\text{tier } 1}$$

According to Env-Wq 1708 (d), the Remaining Assimilative Capacity (REMAC) is evaluated "... by comparing existing water quality, as specified in (b) and (c) above, to the state's water quality criteria." Env-Wq 1708 (c) states that "Where flows will or might be altered, existing conditions shall be established based on the existing maximum allowed water withdrawals or impoundment, diversion, or fluctuation of streamflow, as applicable." As discussed later, existing flows for this Activity will be based on near-continuous, real-time instream flow measurements made by the Applicant so that existing flows will always be representative of what is actually occurring upstream, both now and in the future. Whenever upstream river flows fall below specified thresholds, withdrawals will need to be reduced to de minimis levels (with the possible exception of temporary, relatively infrequent and short-term excursions associated with situations beyond the control of the Applicant that may adversely impact human health.)

**b. Equation for Withdrawal to be “Insignificant”**

Conditions that will allow the withdrawal to be considered “insignificant” are described below.

According to Env-Wq 1708.09 “Significant or Insignificant Determination”:

“(a) Any discharge or activity that is projected to use 20% or more of the remaining assimilative capacity for a water quality parameter, in terms of either concentration or mass of pollutants, or volume or flow rate for water quantity, shall be considered a significant lowering of water quality.”

“(b) The department shall not approve a discharge or activity that will cause a significant lowering of water quality unless the applicant demonstrates, in accordance with Env-Wq 1708.10, that the proposed lowering of water quality is necessary to achieve important economic or social development in the area where the waterbody is located.”

Therefore, in terms of flow, withdrawals can be considered “insignificant” for antidegradation purposes, if the withdrawals use no more than 20% of the remaining assimilative capacity (REMAC). This can be accomplished by installing an upstream river gage and a pumping system that can automatically vary the rate of withdrawal based on the upstream river flow. The rate of withdrawal at any time would be calculated in accordance with the following equation:

$$\text{Equation 4: } WD \text{ insig} = 0.20 \times [Q \text{ exist} - Q \text{ tier 1}]$$

Where:

WD insig = the maximum that can be withdrawn to be considered “insignificant” [i.e., without exceeding 20% of the remaining assimilative capacity (REMAC)],

Q exist = Q up = the river flow measured at a gage upstream of the withdrawal or the river flow measured just downstream of the withdrawal plus the current rate of withdrawal.

Q tier 1 = Tier 1 (see Equation 2)

This certification is focused on withdrawals that are considered “insignificant” in terms of the antidegradation regulations. By doing so, the Applicant is not required to go through a full antidegradation review as described in the next section.

**c. Additional Antidegradation Requirements If Withdrawal is “Significant”**

If the Applicant wants to withdraw more than 20% of the remaining assimilative capacity in the Bellamy River, the withdrawal would be considered “significant” and the Applicant would need to demonstrate, in accordance with Env-Wq 1708.10, that

- the proposed additional withdrawal is necessary to accommodate the Activity;
- the Activity will provide net economic or social development in the area in which the waterbody is located; and
- that net social and economic benefits outweigh the environmental impact.

To determine if the above criteria are met, the Applicant would need to submit an Alternative Analysis as described in Env-Wq 1708.10(d), (e), and (f). If, after reviewing the information provided by the Applicant, NHDES makes a preliminary determination to approve the request, NHDES must provide opportunity for public

comment (including a public hearing if requested) in accordance with Env-Wq 1708.11. Following the public participation process, NHDES would then make a final decision to allow or deny the request. Note that in this case, NHDES may also require a site specific study to determine flows necessary to protect select fish/macroinvertebrate species and life stages (such as a study based on the Instream Flow Incremental Method or IFIM).

**d. Methodology for Determining “Insignificant” Withdrawals**

As previously discussed, the allowable withdrawal is dependent on the existing upstream flow ( $Q_{exist}$ ) and  $Q_{tier 1}$  (see Equation 4).  $Q_{tier 1}$  is dependent on the TAC which is dependent on knowing  $Q_{wqc}$  and  $Q_{best}$  (see Equation 1 and Equation 2 above).

Ideally, a Water Management Plan (WMP), such as the one for the Lamprey River watershed (see Finding D-30) would be prepared to determine the magnitude, frequency, duration and timing of flows necessary to support designated uses such as aquatic life in the river (i.e.,  $Q_{wqc}$ ). The WMPs include biological studies and models to determine protective instream flows (PISFs) for various species and life stages of fish, macroinvertebrates and other species of aquatic life. Such studies, however, are very expensive and typically take several years to complete. In lieu of a WMP or biological study, for this certification NHDES relied on a hydrologic approach to determine protective instream flows (PISFs) (i.e.,  $Q_{wqc}$ ). Hydrologic analyses have been developed and used by others such as the U.S. Fish and Wildlife Service’s New England Aquatic Base Flow Policy<sup>17</sup> to estimate protective flows for aquatic life. To help validate the selection of a hydrologic-based  $Q_{wqc}$ , NHDES then compared the results to the Lamprey River WMP watershed yields (see Finding D-30, Table 7).

NHDES believes it is important to be as consistent as possible with the Natural Flow Paradigm (NFP) (see Finding D-30). As discussed in Finding D-30, utilizing this approach, the protective instream flows (PISFs) for the Lamprey River WMP were based on a long-term hydrograph that was adjusted to reflect natural conditions (i.e., without human influence). The following describes the process used to develop a “natural” hydrograph and flow statistics for the Bellamy River and how this information was used to determine PISFs (i.e.,  $Q_{wqc}$ ) and withdrawals that would be considered “insignificant” (i.e., withdrawals that will use no more than 20 percent of the remaining assimilative capacity of the river in terms of flow).

The Bellamy River does not have a long-term gage, and flows in the river are, at times, considerably impacted by the City of Portsmouth’s withdrawals from the Bellamy Reservoir (one of Portsmouth’s water supply sources<sup>18</sup>). Further, NHDES does not have long-term daily records of flow actually released below the Bellamy Reservoir dam. Fortunately, however, the U.S. Geological Survey (USGS) Oyster River (OR) gage (No. 01073000) is located nearby (approximately 2.4 miles southwest of the Activity). The OR gage has a long term record of flows (84 years from 1935 to present) and a 12.1 square mile (sm) drainage area that is relatively rural and unregulated. When a river does not have a long term gage, a synthetic hydrograph for the ungaged river can be developed by applying the “Area Transposition Method” which simply involves multiplying flows from the selected gaged river by the ratio of the drainage area at the ungaged river to the drainage area at the selected gage<sup>19</sup>.

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<sup>17</sup> [U.S. Fish and Wildlife Service’s New England Aquatic Base Flow Policy](#)

<sup>18</sup> Portsmouth has been withdrawing water from the Bellamy Reservoir, one of the City’s public water supplies, since the early 1960s.

<sup>19</sup> Monomy Goswami and Kieran Micahel O’Connor. *Flow simulation in an ungaged basin: an alternative approach to parameterization of a conceptual model using regional data*. Large Sample Basin Experiments for Hydrological Model Parameterization: Results of the Model Parameter Experiment. MOPEX. IAHS Pbul. 307, 2006. [GOSWAMI-OCONNOR, Flow Simulation in an Ungaged Basin](#)

Using the Area Transposition Method, a long-term synthetic hydrograph for the Bellamy River at the point of withdrawal was developed by multiplying the historical flows from the OR gage by the ratio of drainage areas (i.e.,  $2.11 = 25.56 / 12.1$ ) for the period 1990 through 2018. This period of time was selected to be more representative of current climatic conditions.

Statistics were then run on the “natural” hydrograph to determine flow percentiles for each month (i.e., the percent of time flows were less than a given flow in each month, which is the same as the percent of time a flow is not exceeded). Monthly statistics were selected because flows can change significantly by month, different aquatic species and life stages are more dependent on flows during various months, and it is important to retain as much natural variability as possible according to the concept of the Natural Flow Paradigm (see Finding D-30).

Percentile flows are often noted as Q20, Q30, etc. For instance, Q25 represents the 25th percentile of all flows in the month and is the flow that is not exceeded 25 percent of the time in that month [or, conversely, the flow that is exceeded 75% of the time (i.e., 100-25)]. This would be considered a relatively low flow. Likewise, Q75, represents the 75th percentile of all flows and is the flow that is not exceeded 75 percent of the time (or is exceeded 25 percent of the time). This would be representative of a relatively high flow. Q50 is the middle flow meaning it is the flow that is both exceeded, and not exceeded, 50 percent of the time (i.e. the median flow). Estimated monthly and seasonal statistics for the Bellamy River in the “natural” condition are shown in Table 4.

Table 4– Estimated “natural” flow percentiles by month in Bellamy River (based on area transposition of Oyster River gage from 1990 through 2018)

Month	Q10	Q20	Q25	Q30	Q40	Q50	Q60	Q70	Q75	Q80	Q90
<b>1</b>	14.44	18.22	21.08	23.24	28.73	33.69	38.45	46.47	51.49	59.15	84.75
<b>2</b>	13.52	17.32	18.86	21.12	25.35	29.57	33.80	42.25	51.75	65.48	109.63
<b>3</b>	25.14	35.45	40.35	45.14	58.98	69.71	84.50	104.99	118.29	133.08	183.80
<b>4</b>	26.83	38.02	42.46	46.47	57.54	69.71	85.76	105.56	120.41	136.21	187.90
<b>5</b>	12.18	17.97	20.80	23.66	29.15	35.91	42.25	51.48	58.94	67.60	100.51
<b>6</b>	5.12	7.60	8.87	10.15	13.02	16.90	21.12	29.02	32.79	39.63	67.60
<b>7</b>	1.90	2.75	3.17	3.59	4.63	5.91	7.63	10.98	13.10	15.65	27.04
<b>8</b>	1.18	1.86	2.11	2.34	3.11	3.97	5.58	8.03	9.59	12.59	25.56
<b>9</b>	0.95	1.69	1.94	2.20	2.77	3.80	5.28	7.60	9.55	12.07	23.24
<b>10</b>	2.18	3.49	4.31	5.13	6.59	9.19	14.01	22.18	28.09	33.80	63.16
<b>11</b>	7.45	11.74	13.64	15.81	21.21	26.72	33.80	42.25	48.80	57.03	95.88
<b>12</b>	13.33	17.40	21.12	24.99	29.57	38.02	45.75	58.66	67.60	78.50	108.77
<b>Annual</b>	<b>2.75</b>	<b>5.91</b>	<b>8.03</b>	<b>10.98</b>	<b>16.81</b>	<b>24.08</b>	<b>32.32</b>	<b>44.36</b>	<b>52.81</b>	<b>64.43</b>	<b>104.99</b>

All flows are in cubic feet per second (cfs)

For the proposed Activity, Q75 was selected as Q best and Q25 was initially selected as Q wqc for each month (from Table 4). With regards to frequency of occurrence, these flows equally bracket the Q50 flow (i.e., the median or middle flow). NHDES believes that if the Q wqc is set below the median, Q best should be set above the median to minimize the impact of the withdrawals on the “natural” median value for each month.

Before proceeding it is important to note that whatever flow is selected for Q wqc for each month, NHDES is not implying that it is appropriate to withdraw water down this flow for the entire month. Rather, selection of Q wqc and Q best allows one to calculate Q tier 1 which sets the threshold for antidegradation purposes, above which some limited withdrawals may be allowed as long as there are no violations of surface water quality standards and the withdrawals do not appreciably affect the natural variability of flows by “flatlining”<sup>20</sup> the hydrograph.

<sup>20</sup> Flatlining the hydrograph means the downstream river flow remains constant or at a near-constant level for a substantial

Upon further analysis, it was realized that the selection of Q25 for all months may unnecessarily limit the amount of water that could be withdrawn during months of high flow (such as during the spring). If withdrawals are necessary, it's generally best to allow them when river flows are relatively high. It was therefore decided to lower the Q wqc depending on the maximum percentage of water that the proposed Activity could withdraw. This is based on the following theory:

As the maximum percent of river flow withdrawn increases, the frequency that it is allowed to occur should decrease to minimize the impact on the resource and the monthly median flow.

Based on the above theory, the following criteria were selected to guide the selection of Q wqc for the proposed withdrawal. As indicated below, these criteria allow up to 15 percent of the water to be withdrawn when flows are at or above Q25. This percentage is relatively high but less frequent and is considered necessary for this Activity (provided it does not cause or contribute to water quality standard violations) because it involves a public water supply and withdrawal is needed to protect the quality of the Aquifer from contamination (see Finding 0 and D-1). For other projects involving withdrawals or diversions, different criteria may apply.

Monthly Q wqc = Monthly Q10 if the maximum percent of upstream river flow withdrawn is no more than 5%.

Monthly Q wqc = Monthly Q20 if maximum percent of upstream river flow withdrawn is greater than 5% and no more than 10%.

Monthly Q wqc = Monthly Q25 if maximum percent of upstream river flow withdrawn is greater than 10% and no more than 15%.

Knowing Q wqc and Q best for each month, Equation 1, Equation 2, Equation 3 and Equation 4 (see sections a. and b. of this Finding) were then used to determine the monthly TAC, Q tier 1, REMAC and withdrawal that would not exceed 20% of the REMAC, respectively. The maximum percent of river that could be withdrawn each month was determined by setting Equation 4 equal to the maximum proposed withdrawal of 1.78 cfs (800 gpm), solving for Q up, and then dividing 1.78 cfs by Q up.

Final monthly values of Q wqc, Q best, and Q tier 1 that will result in withdrawals that are considered "insignificant" (i.e., will use no more than 20 percent of the remaining assimilative capacity), are shown in Table 5. The maximum percent of river withdrawn each month by the proposed Activity is also presented.

Table 5– Monthly Values of Q wqc, Q best, and Q tier 1 to be "Insignificant"

Month	Q wqc (cfs)	Approximate Percentile for the month of Q wqc	Q best = Q75 for month (cfs)	Maximum % used of Remaining Assimilative Capacity (REMAC)	Q tier 1	Approximate Percentile of Q tier 1	Maximum Pump Rate (cfs)	Min Qup to pump 1.78 cfs and be less than 20% REMAC (cfs)	Max Pump Rate / Min Qup (%)
1	18.2	Q20	51.5	20%	21.5	Q27	1.78	30.5	6%
2	17.3	Q20	51.8	20%	20.8	Q28	1.78	29.7	6%
3	25.1	Q10	118.3	20%	34.5	Q19	1.78	43.4	4%
4	26.8	Q10	120.4	20%	36.2	Q17	1.78	45.1	4%
5	18.0	Q20	58.9	20%	22.1	Q26	1.78	31.0	6%

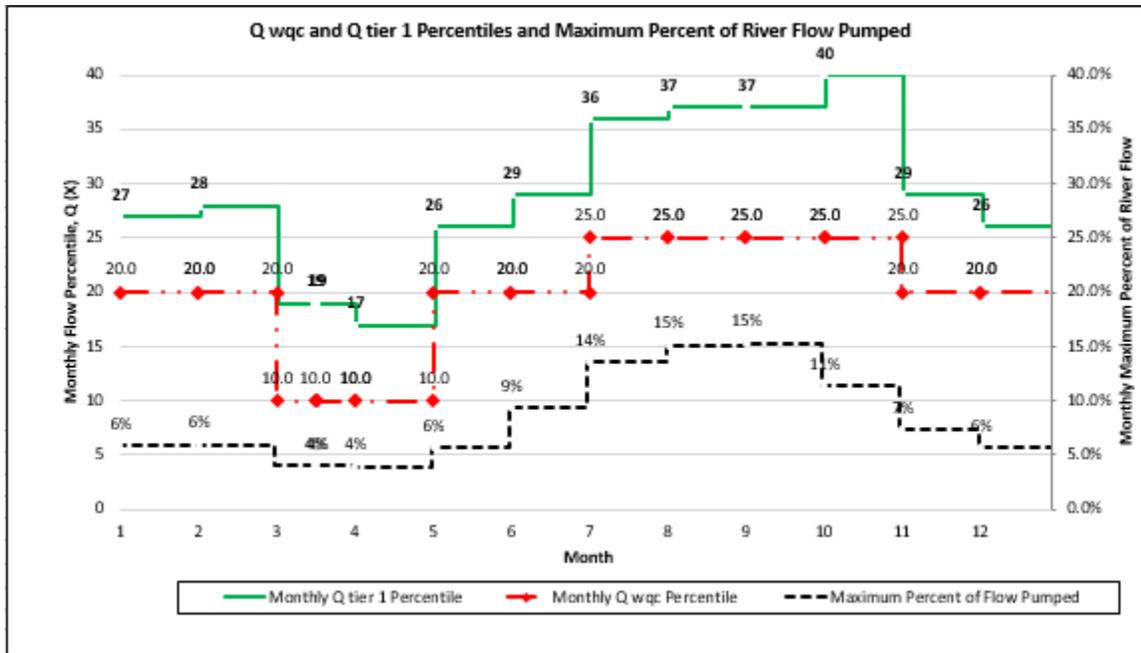
amount of time (hours) due to the withdrawal.

Month	Q wqc (cfs)	Approximate Percentile for the month of Q wqc	Q best = Q75 for month (cfs)	Maximum % used of Remaining Assimilative Capacity (REMAC)	Q tier 1	Approximate Percentile of Q tier 1	Maximum Pump Rate (cfs)	Min Qup to pump 1.78 cfs and be less than 20% REMAC (cfs)	Max Pump Rate / Min Qup (%)
6	7.6	Q20	32.8	20%	10.1	Q29	1.78	19.0	9%
7	3.2	Q25	13.1	20%	4.2	Q36	1.78	13.1	14%
8	2.1	Q25	9.6	20%	2.9	Q37	1.78	11.8	15%
9	1.9	Q25	9.5	20%	2.7	Q37	1.78	11.6	15%
10	4.3	Q25	28.1	20%	6.7	Q40	1.78	15.6	11%
11	11.7	Q20	48.8	20%	15.4	Q29	1.78	24.4	7%
12	17.4	Q20	67.6	20%	22.4	Q26	1.78	31.3	6%

As shown in Table 5 and in Figure 5, the monthly percentile for the monthly Q wqc (as well as for the monthly Q tier 1 flows) increases as the maximum percent of the river flow pumped [Max Pump Rate/ Min Q up (%)] increases.

This is in accordance with the previously presented theory and criteria for establishing Q wqc. As discussed in Finding D-30, the values for Q wqc shown in Table 5 (when expressed in cubic feet per second per square mile of drainage or cfs/m), fall within the range of flows (expressed as cfs/m) used in the Lamprey River WMP.

Figure 5– Monthly Q wqc and Q tier 1 Percentiles and Maximum Percent of River Flow Pumped



**e. De minimis Withdrawal**

In studies such as the Lamprey River WMP (see Finding D-30), a de minimis withdrawal equal to 5 percent of the 7Q10 flow<sup>21</sup>, is allocated to water users regardless of inflow. If new water users are added, the de minimis amounts are reapportioned as needed. For this study, NHDES has decided to set the de minimis

<sup>21</sup> The 7Q10 in the Bellamy River at the point of withdrawal based on transposition (by drainage area) of the Oyster River gage is 1.1 cfs (= 0.529 cfs x 25.56 sm/12/1 sm). Five percent of the 7Q10 is 0.056 cfs or 25 gpm.

withdrawal equal to 1% of Q up, provided they do not result in any surface water quality violations and provided there are no new water users that require a portion of this de minimis flow. Having a de minimis based on the percent of upstream flow allows less water to be withdrawn during low flow periods and more water to be withdrawn as flows increase. This is expected to be protective of aquatic life and allow at least some volume of water to be withdrawn year-round to maintain the groundwater mound in order to prevent contamination of the Aquifer. As indicated in the example presented in section g. of this Finding (presented below), the total volume that could be withdrawn assuming a de minimis of 1 percent of the Q up, agrees well with the total volume that could be withdrawn assuming a de minimis equal to 5 percent of the 7Q10.

**f. Summary of Allowable Withdrawals**

The amount of withdrawal that can be withdrawn at any time to be considered “insignificant” in terms of antidegradation (WD insig) is equal to Equation 4. Equation 4 indicates that when the upstream river flow (Q up) is at or below the monthly Q tier 1 flow, no withdrawals are allowed. Because of the importance of maintaining the groundwater mound to prevent contamination of the Aquifer, the Applicant will be allowed to withdraw 1 percent of the upstream river flow (which, for this Activity, NHDES considers to be de minimis) or WD insig, whichever is greater, up to a maximum of 1.78 cfs (800 gpm). This will allow a de minimis amount of water to help maintain the groundwater mound when flows are near or below the Q tier 1. This assumes the withdrawals do not cause or contribute to any surface water quality violations and that there are no new withdrawals that require a portion of the de minimis withdrawal.

**In summary, the allowable withdrawal is equal to the greater of the following with a maximum of 1.78 cfs (800 gpm):**

**WD insig = 0.20 x (Q up – Monthly Q tier 1) Where:**

**Q up is equal to the river flow measured at a gage upstream of the withdrawal or the river flow measured just downstream of the withdrawal plus the current rate of withdrawal,**

**and**

**Monthly Q tier 1 is from Table 5 (varies monthly).**

**Or**

**WD demin = 1% of Q up.**

**g. Examples**

Figure 6 and

Figure 7 show the maximum withdrawal, Q tier 1 and Percent of River Withdrawn (shown as Max Pump Rate/Qup) as a function of the upstream river flow (Q up) for a low flow month (September) and a high flow month (April).

Figure 6 – Maximum Withdrawal, Q tier 1 and Percent of River Withdrawn - September

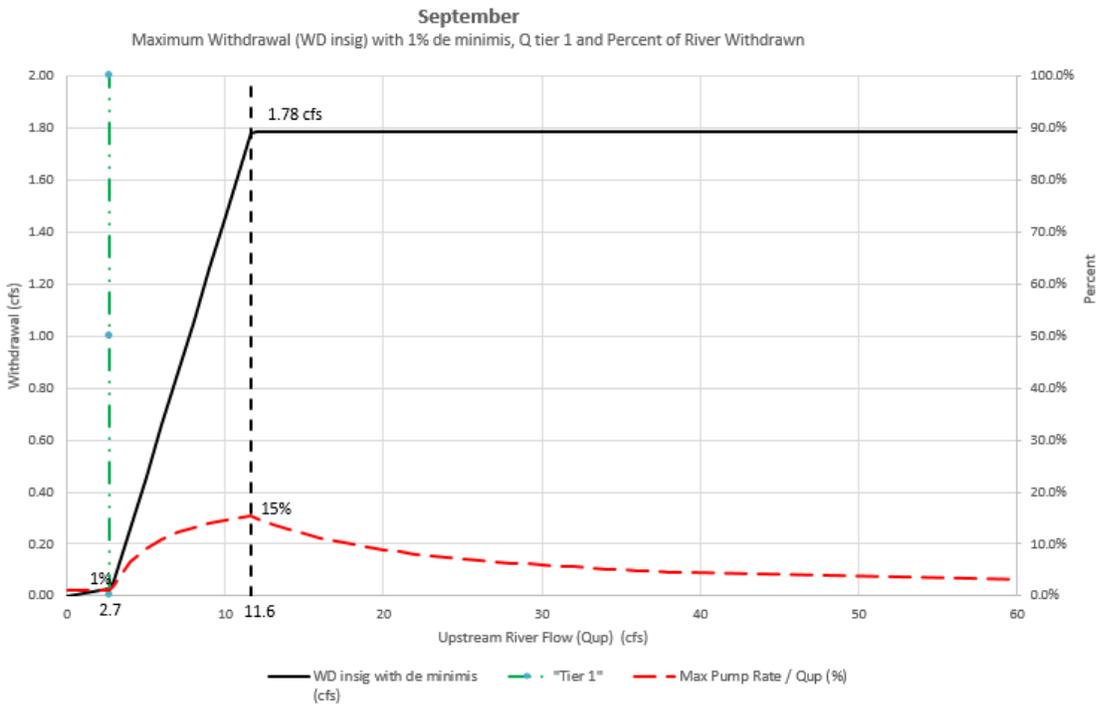


Figure 7 – Maximum Withdrawal, Q tier 1 and Percent of River Withdrawn - April

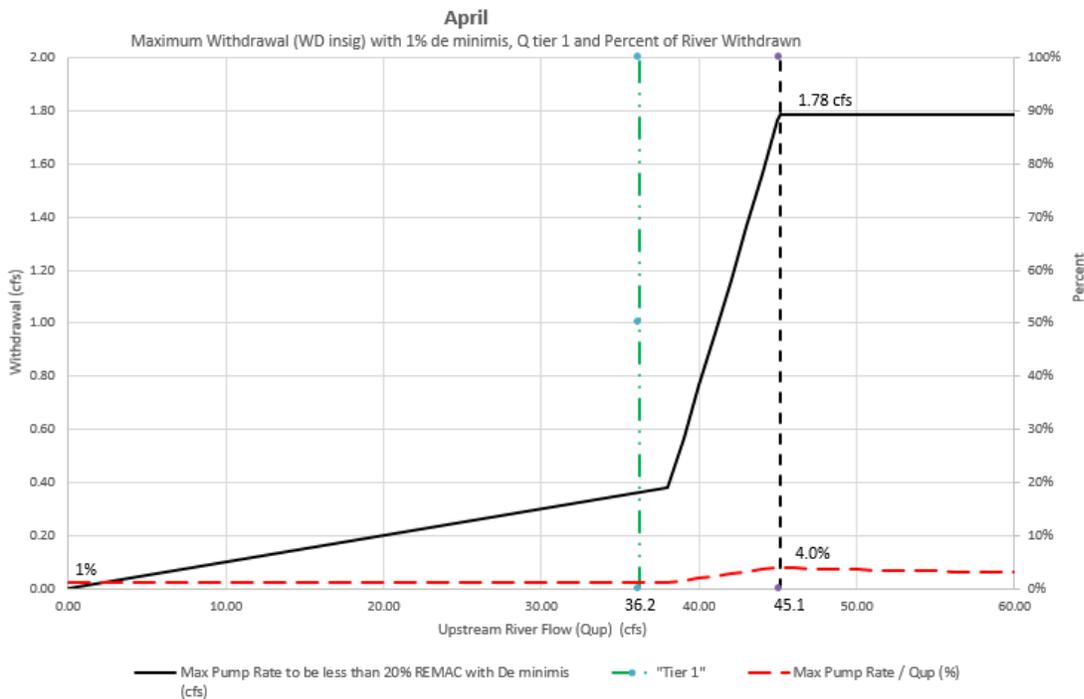


Figure 8 and Figure 9 provide an example of how much water could have been withdrawn each month during the pilot period based on the withdrawal conditions presented in section f. above. River flow was based on river

flows measured by the Applicant at surface water monitoring station SW-DPH1 during the pilot recharge test for the period April 25, 2017 through October 11, 2018. This monitoring station was located just downstream of the withdrawal pipe during the pilot test. Therefore, to be representative of flows upstream of the withdrawal, the pilot test withdrawal flows on each day were added back in based on what the Applicant reported for withdrawals. The measured flows account for all other upstream withdrawals, including withdrawals by Portsmouth from the Bellamy Reservoir.

Figure 8 and Figure 9 assume the following:

- The withdrawal criteria in section f. above;
- Upstream gage installed by the Applicant to record stage and river flow on a near-continuous basis; and
- Variable speed pumps which can adjust pumping rate on a real-time basis based on river flow.

Figure 8 shows the upstream river flow (light blue), the Q75 flow (green), Q tier 1 (red), and the allowable pumping rate (dark blue) for this example. Figure 9 shows that, for this example, the average number of gallons pumped per day per month (blue) would vary from approximately 126,000 gallons per day (gpd) to 1,152,000 gpd and that the highest monthly average (red) and maximum (orange) percent of river flow pumped would be approximately seven and 15 percent respectively. Overall, for the entire 18-month period, approximately 345 million gallons could have been pumped. This compares well with the predicted volume that could have been pumped (344 million gallons) if a de minimis withdrawal equal to 5 percent of the 7Q10 low flow had been used. For comparison, the Applicant’s requested withdrawal conditions shown in Finding 0, Table 1 would have resulted in a maximum of 50 percent of the river being pumped which would have violated the New Hampshire’s surface water antidegradation regulations in Env-Wq 1708.

Figure 8 – Predicted Daily Pumping Rates (April 25, 2017 – October 11, 2018)

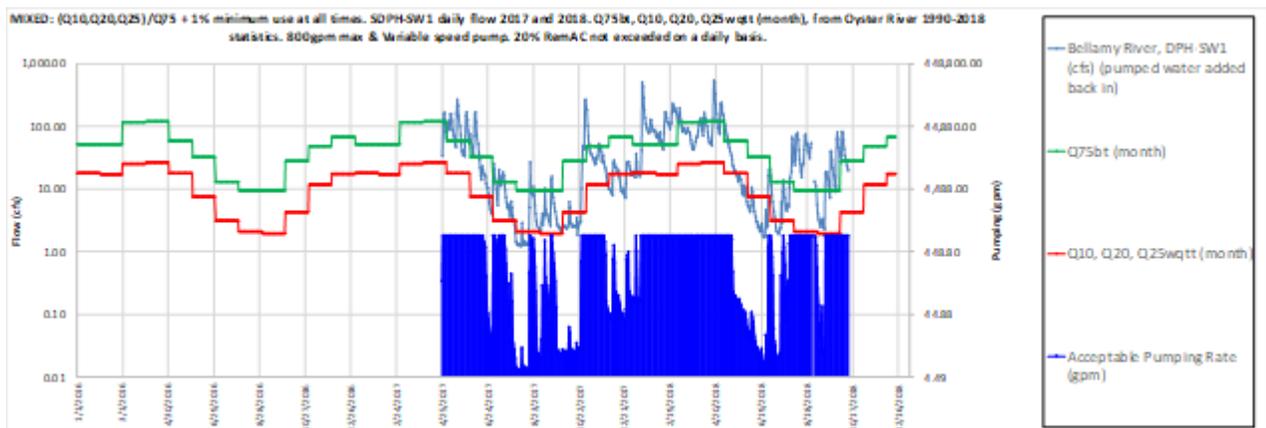
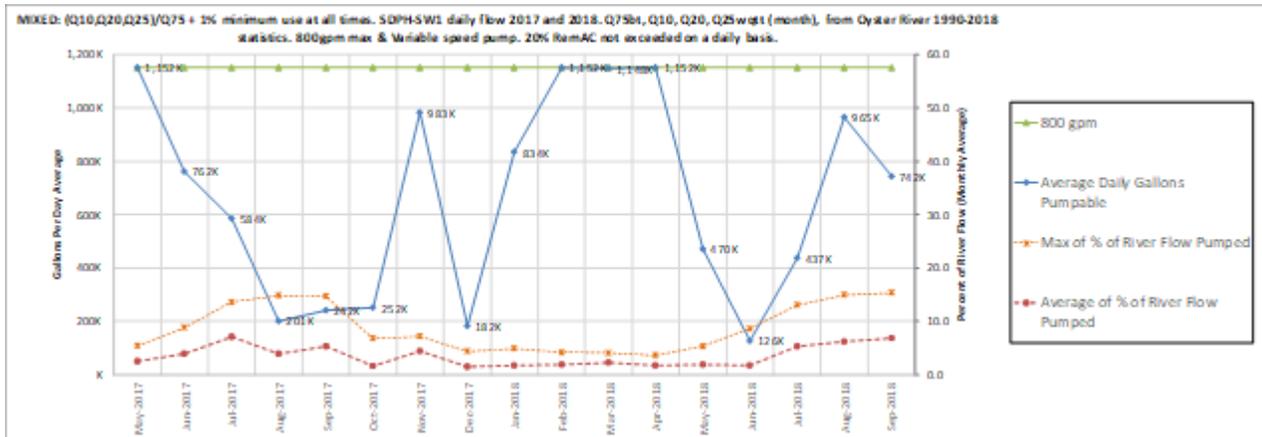


Figure 9 – Predicted Average Daily Pumping Rate, and Average Daily and Maximum Percent of River Flow Pumped in each month (May 2017 through September 2018)



D-29. Fact C-34.h and C-34.i this Certification includes excerpts from Env-Wq 1708 regarding antidegradation which state that “the department shall assure that the highest statutory and regulatory requirements shall be achieved for all new and existing point sources and that all cost effective and reasonable best management practices for nonpoint source control shall be implemented”. In addition to being cost effective and reasonable, best management practices must be selected to ensure attainment of water quality standards in receiving waters as evidenced by the following:

As stated in Fact C-10 of this Certification, “Best Management Practices” (BMPs) are defined in Env-Wq 1702.07 as “those practices which are determined, after problem assessment and examination of all alternative practices and technological, economic and institutional considerations, to be the most effective practicable means of preventing or reducing the amount of pollution generated by point or nonpoint sources to a level compatible with water quality goals”.

- a. Env-Wq 1708.01 (b)(1) and (b)(2) (see Fact C-34.h and C-34.i of this Certification) which states “In allowing such degradation or lower water quality, the department shall assure water quality adequate to fully protect existing uses”.

NHDES has determined that, if properly constructed and maintained, the BMPs required to satisfy the conditions of this Certification, satisfy the above regulations.

D-30. *Validation of flows with Lamprey River Watershed Management Plan:* As a validation step, the protective flows developed for this certification were compared to the Lamprey River Watershed Management Plan (WMP) <sup>22</sup>.

Development of protective instream flows to support the designated uses in a river are complex and resource intensive. In recognition of this, the state legislature created a pilot instream flow program through Chapter 278 (HB 1449-A) which directed NHDES to study and establish protected instream flows and watershed management plans (WMPs) for the designated portions of the Lamprey and Souhegan Rivers. A protected instream flow is defined as the amount of water needed to support the human and natural uses that depend on the river; the management plans details the action to be implemented to maintain the protected flows.

<sup>22</sup> Lamprey River Watershed Management Plan. New Hampshire Department of Environmental Services with contractor assistance from Normandeau Associates, Inc., University of New Hampshire, and Rushing Rivers Institute. NHDES-R-WD-11-9. August 28, 2013.

Adherence to the WMPs is expected to allow attainment of water quality standards in these two rivers.

To date, two WMPs have been developed in New Hampshire, and, the development of protected instream flows has begun on two more rivers. Development of protective instream flows in the WMPs reference the Natural Flow Paradigm (NFP) and are based on the river in its “natural” condition (i.e., flows without human modification). The NFP recognizes that the description of protective flows requires the use of the following stream flow components: flow magnitude, frequency, duration, timing, and rate of change. Compliance with the WMPs and protective instream flows is expected to result in attainment of surface water quality standards.

The Lamprey River WMP implements the protected flows described in the Lamprey River Protected Instream Flow report <sup>23</sup> with input from the affected users and from lakefront property owners. The protected instream flows (PISFs) recognize that wildlife, plants and habitats, and most human uses are best supported by maintaining natural river flows. The PISFs for humans consider instream dependent public uses of the river. The PISFs for aquatic life take into account: native fish; introduced fish; fish that travel back and forth between fresh and saltwater to lay their eggs; mussels; insects; and rare, threatened or endangered fish species. PISFs were calculated for six distinct biological periods or “bioperiods”, that describe different times of the year when various species of fish have critical flow needs.

To develop PISFs for fish in the Lamprey River WMP, the flows used in modeling (MesoHABSIM <sup>24</sup>) were based on a “naturalized” 30-year hydrograph. That is the 30-year hydrograph for the USGS Packers Falls gage on the Lamprey River was adjusted to reflect flows in the river without human modification. This was done by adjusting recorded stream flow for net water use (withdrawal minus return flow) and storage and release of water from lakes and reservoirs, and major physical modifications of the river channel. To determine the protected flow magnitude, as well as the duration and frequency for a bioperiod, the natural availability of habitat was determined using the MesoHABSIM model and the “naturalized” hydrograph.

An example of PISFs developed for fish from the Lamprey River WMP is shown in shown Table 6. As shown, PISFs were developed for six bioperiods. For each bioperiod, the flow magnitude and duration is specified for three categories “Common Flow”, “Critical Flow” and “Rare Flow” with “Allowable” and “Catastrophic” durations specified for each category. As river flows reach certain flow and duration thresholds, more actions under the WMP take effect. Also of note is that the common, critical and rare flows in Table 6 are also expressed in terms of watershed yield (cubic feet per second per square mile). The Lamprey River WMP also specifies a de minimis amount of water use at any river location equal to 5 percent of the 7Q10 flow at that location. The de minimis amount is apportioned between users with surface water impacts.

Table 6 – Protected Instream Flows for the Lamprey River (based on table in footnote 22)

Lamprey Protected Flows For Fish		Common Flow			Critical Flow			Rare Flow		
Time of Year / Bioperiod	Protected Entity Controlling Flows	Common Flow (cfs)	Allowable Duration (days)	Catastrophic Duration (days)	Common Flow (cfs)	Allowable Duration (days)	Catastrophic Duration (days)	Common Flow (cfs)	Allowable Duration (days)	Catastrophic Duration (days)
Dec 9 – Feb 28 Overwintering	Flow	1.3	20	57	0.6	10	37	0.4	7	30

<sup>23</sup> Final Lamprey River Protected Instream Flow Report. Normandeau Associates, Inc., Rushing Rivers Institute, and University of New Hampshire. NHDES-R-WD-08-26. July 13, 2009

<sup>24</sup> The MesoHABSIM model establishes the river-specific relationship between stream flow and habitat availability. The model evaluates the time distribution of habitat availability to identify significant changes in habitat frequency and duration. Protection is identified that will limit stream flow below these significant changes in habitat frequency and duration.

Lamprey Protected Flows For Fish		Common Flow			Critical Flow			Rare Flow		
Mar 1 – May 4 Spring Flood	Flow	3.4	14	42	1.3	10	19	0.8	3	9
May 5 – Jun 19 Clupeid Spawning	Shad spawning	0.78	13	28	0.34 / <b>0.85</b>	5	13	0.31 / <b>1.3</b>	4	10
June 20 – Jul 4 GRAF Spawning	GRAF spawning	0.55 / <b>0.55</b>	-- / <b>11*</b>	15*	0.10 / <b>0.85</b>	5*	10*	0.87 / <b>1.3</b>	2*	3*
Jul 5 – Oct 6 Rearing & Growth	Common Shiner	0.57	46	82	0.1	15	32	0.087	5	15
Oct 7 – Dec 8 Salmon Spawning	Atlantic Salmon	0.49	17	55	0.22	11	33	0.11	6	11

Bold values are upper limits for instream flow for protection of clupeid and GRAF spawning. Management activities should not create flows that exceed these magnitudes and durations.  
 Watershed area for calculating cfsm is 183 square miles at the index location used. Index location is the gage USGS 01073500 LAMPREY RIVER NEAR NEWMARKET, NH.  
 -- No Common Flow Allowable duration is described for this bioperiod because high flows and catastrophic durations are limiting.  
 \* GRAF spawning and Clupeid spawning partly overlap, so durations during the GRAF Spawning bioperiod begin counting May 5 (previous bioperiod) but apply only during this bioperiod.

To get an idea of how the selected Q wqc values in this certification compare to flows used in the Lamprey River WMP, the yields (expressed in cubic feet per second per square mile of drainage or cfsm) used in the Lamprey River WMP for “Common” and “Critical” flows presented in

Table 6 above, were compared to the yields for the Bellamy River based on the selected Q wqc and Q tier flows (in cfs) divided by drainage area at the point of withdrawal (25.56 square miles). As shown in Table 6, yields for the Lamprey River WMP are provided for six different bioperiods which may or may not be applicable to the Bellamy River.

However, assuming for the moment that because of their relatively close proximity the yields for the two watersheds would be similar, Table 7 suggests that for most months the yields in the Bellamy River based on the Q wqc and Q tier 1 flows are within the range of the “Critical” and “Common” yields used in the Lamprey River WMP and, in many cases, are closer to the lower yields associated with the “Critical” category. For example, for July, the yields for the Q wqc and Q tier 1 flows range from 0.1 to 0.2 cfsm which are within the range of the Lamprey River yields (0.1 to 0.57 cfsm). Though not totally conclusive because a WMP and associated PISFs for the Bellamy River have not been developed, this exercise does help to validate the values selected for Q wqc and Q tier 1 in Table 5 of Finding D-28.

Table 7- Comparison of Yields (cfsm) from the Lamprey River WMP to the Bellamy River

Month	"Critical" Yield from Lamprey River WMP (cfsm)	"Common" Yield from Lamprey River WMP (cfsm)	Q wqc for Bellamy River (cfs)	Q tier 1 for Bellamy River (cfs)	Yield for Q wqc for Bellamy River (cfsm)	Yield for Q tier 1 for Bellamy River (cfsm)
1	0.6	1.3	18.2	21.5	0.7	0.8
2	0.6	1.3	17.3	20.8	0.7	0.8
3	1.3	3.4	25.1	34.5	1.0	1.3
4	1.3	3.4	26.8	36.2	1.0	1.4
5	0.34	0.78	18.0	22.1	0.7	0.9
6	0.34	0.78	7.6	10.1	0.3	0.4
7	0.1	0.57	3.2	4.2	0.1	0.2
8	0.1	0.57	2.1	2.9	0.1	0.1
9	0.1	0.57	1.9	2.7	0.1	0.1
10	0.22	0.49	4.3	6.7	0.2	0.3
11	0.22	0.49	11.7	15.4	0.5	0.6
12	0.6	1.3	17.4	22.4	0.7	0.9

**E. WATER QUALITY CERTIFICATION CONDITIONS**

Unless otherwise authorized or directed by NHDES, the following conditions shall apply:

- E-1. **Compliance with Certification Conditions:** The Applicant shall construct and operate the Activity to comply with this Certification.
- E-2. **Compliance with Water Quality Standards:** The Activity shall not cause or contribute to a violation of New Hampshire surface water quality standards.
- E-3. **Modification of Certification:** The conditions of this Certification may be amended and additional terms and conditions added as necessary to ensure compliance with New Hampshire surface water quality standards, when authorized by law, and, if necessary, after notice and opportunity for hearing.
- E-4. **Proposed Modifications to the Activity:** The Applicant shall consult with and receive prior written approval from NHDES regarding any proposed modifications to the Activity that could have a significant or material effect on the conditions of this Certification including any changes to project operation or approved plans required by this Certification. If necessary, NHDES may modify the Certification in accordance with condition E-3 of this Certification.

E-5. **Compliance Inspections:** In accordance with applicable laws, the Applicant shall allow NHDES to inspect the Activity and affected surface waters to monitor compliance with the conditions of this Certification.

E-6. **Transfer of Certification:** Should this Certification be transferred to a new owner, contact information for the new owner (including name, address, phone number and email) shall be provided to NHDES within 30 days of the transfer.

E-7. **Compliance with Other Permits:** The Applicant shall comply with all applicable permits associated with the Activity, and any amendments or reissuances including, but not limited to, the following:

- U.S. Army Corps of Engineers General 404 Permit for NH (see Fact C-53)
- NHDES Wetlands Permit (see Fact C-49)
- NHDES Shoreland Impact Permit (see Fact C-49)
- NHDES Groundwater Discharge Permit (see Fact C-51)
- NHDES Large Groundwater Withdrawal Permit (see Fact C-52)
- EPA NPDES Construction General Permit (see Fact C-47)

The conditions of these permits shall become conditions of this Certification upon issuance of this Certification. Should there be any discrepancies between permit requirements, the more stringent requirement as it relates to compliance with New Hampshire surface water quality standards shall apply.

E-8. **Water Use Registration and Reporting:** The Applicant shall register the withdrawal from the Bellamy River with the NHDES Water Use Registration and Reporting Program (WURRP) and comply with all WURRP requirements<sup>25</sup>.

E-9. **Water Intake Structure:**

- a. The water intake in the Bellamy River shall be equipped with a screen to prevent impingement of fish and other aquatic organisms. Prior to withdrawing water from the proposed water intake structure in the Bellamy River, the Applicant shall provide NHDES with written evidence that the water intake and screen is acceptable to the NHFGD.
- b. Maintenance of the intake structure, including cleaning of the screen, shall not result in violations of surface water quality standards, including, but not limited to, turbidity criteria (Env-Wq 1703.11).

E-10. **River Stage and Flow Monitoring:** Prior to withdrawing water from the proposed water intake structure in the Bellamy River, the Applicant shall submit a plan to NHDES for approval to automatically measure and record river stage (i.e., elevation) and river flow on a near-continuous basis (preferably at least every 30 minutes) at a location (hereinafter called river flow monitoring station 1 or RFMS1) in the Bellamy River to evaluate the flows upstream of the proposed withdrawal relative to the withdrawal criteria set forth in Finding D-28, section f. If requested by NHDES, the Applicant shall also submit a plan for NHDES approval to automatically measure and record river stage at a location to be established downstream of both the proposed withdrawal and RFMS1. The

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<sup>25</sup> For information regarding the NHDES Water Use Registration and Reporting program, see [the Water Use Registration and Reporting Program webpage](#).

Applicant shall then implement the approved plan(s). The plan(s) shall include, but not be limited to, the following:

- a. monitoring location,
- b. methods used,
- c. equipment make and accuracy,
- d. installation of river staff gages tied to a permanent benchmark (to facilitate manual readings),
- e. recalibration of the stage/discharge relationship on an annual basis (or other frequency acceptable to NHDES), and
- f. the ability to automatically monitor and record stage/flow and to transmit that information on a near-real time continuous basis to the automated system controlling the pumps and rate of water withdrawal.

E-11. **Water Temperature and Dissolved Oxygen Monitoring:** Prior to withdrawing water from the proposed water intake structure in the Bellamy River, the Applicant shall prepare, and obtain NHDES approval of, a detailed Monitoring Plan (MP or Plan) to collect dissolved oxygen and water temperature data on a near-continuous basis (i.e., preferably every 15 minutes but no more than every 30 minutes) that is representative of conditions upstream and downstream of the proposed intake within the Bellamy River from July 1<sup>st</sup> through September 30<sup>th</sup> for at least one year, and possibly additionally years depending on if the data adequately addresses the monitoring purpose. The purpose of the monitoring is to determine the impact of the proposed withdrawal on dissolved oxygen levels in the Bellamy River and if additional withdrawal restrictions need to be imposed to prevent violations of dissolved oxygen criteria. The plan shall include, but not be limited to, the following to help ensure that high quality data is collected:

- a. Purpose of monitoring;
- b. qualifications of those conducting the work;
- c. parameters that will be sampled;
- d. a plan showing where samples will be collected (including latitude and longitude);
- e. the monitoring frequency and duration;
- f. the make, model, accuracy, precision and range of all field monitoring equipment;
- g. how field monitoring equipment will be deployed;
- h. how field measuring equipment will be calibrated and the frequency of calibration (especially for long term, near continuous datasonde deployments);
- i. QA/QC procedures including, but not limited to, measurement performance criteria, a description of the QC sample and/or activity that will be used to assess measurement performance, field checks of datasondes using handheld meters, etc.;
- j. a copy of field data sheets;
- k. when data will be entered into the NHDES Environmental Monitoring Database (EMD)<sup>26</sup>; and
- l. how data will be summarized and reported.

The Applicant shall then implement the NHDES approved MP. Results shall be included in the Annual Report (see Condition E-18). The data shall be summarized and presented in a manner that clearly shows, via text, tables and plots, the spatial and temporal effect of the proposed withdrawal on river flow and dissolved oxygen (concentration and percent saturation) and if New Hampshire surface water quality criteria for dissolved oxygen are met. Any deviations from the MP (including QA/QC

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<sup>26</sup> Instructions for entering data into the NHDES Environmental Monitoring Database (EMD), and contact information, are provided on the [NHDES Environmental Monitoring Database](#) website.

objectives) shall be clearly identified. All valid data shall be entered in the NHDES Environmental Monitoring Database (EMD). In addition to the report, data shall also be provided to NHDES in a MS Excel workbook, or other approved format.

After the first year of monitoring, NHDES will determine if additional monitoring is necessary. If NHDES determines that additional monitoring is necessary, the Applicant shall conduct the additional monitoring. If NHDES determines that the proposed withdrawal is causing or contributing to violations of dissolved oxygen water quality criteria, the Applicant shall submit a plan to NHDES for approval within 60 days (or other time period acceptable to NHDES) to prevent withdrawals from causing or contributing to violations of dissolved oxygen. The Applicant shall then implement the NHDES approved plan.

E-12. **Groundwater Mound Elevation Monitoring:** Prior to withdrawing water from the proposed water intake structure in the Bellamy River, the Applicant shall prepare, and obtain NHDES approval of, a plan (including QA/QC and reporting provisions) to automatically measure and record the groundwater mound elevation beneath the recharge basins on a near-continuous basis (preferably at least every 30 minutes) at a location (or locations) acceptable to NHDES. The purpose of the plan is to ensure that withdrawals do not occur when the groundwater mound elevation is sufficiently high to prevent 1) the transport of contaminants from the NEMR site to Dover's municipal wells or 2) the creation of seeps or springs that may be contaminated and flow into the Bellamy River. The Applicant shall then implement the approved plan. Results shall be included in the Annual Report (see Condition E-18) and shall clearly show how the proposed withdrawal varied with groundwater mound elevation.

E-13. **Fish Passage:** The NHFGD will identify the appropriate target fish species and fish passage standards for the project based on literature such as USFWS 2019<sup>27</sup>. Based on available information, fish passage requirements are anticipated to focus on requirements of American eel (*Anguilla rostrata*), potential anadromous fish which include alewives, blueback herring and shad (*Alosa* Spp.) and fallfish (*Semotilus corporalis*). NHFGD currently plans to review fish passage conditions downstream of the withdrawal annually. If NHFGD identifies conditions downstream of the withdrawal where fish passage (based on literature values for the target species and/or field observations) is or could become limited due to withdrawals, NHFGD will strive to report their findings to NHDES and the Applicant by August 1. The Applicant shall then consult with NHFGD and take photographs and cross sections (including depth, wetted width and area, velocity and flow) at the location(s) identified by the NHFGD and provide this information to NHFGD and NHDES for review. Cross sections shall be established so that repeat measurements (if necessary) can be accurately made at the same location. Elevations taken at each cross section shall be tied to a fixed elevation in the vicinity of the cross section (different cross sections may have different fixed elevations). The Applicant shall be responsible for collecting data at cross sections no more than a total of ten times unless the data collected is of insufficient quality or quantity in which case NHDES may require additional cross sections be taken. Prior to monitoring the Applicant shall submit a monitoring plan to NHDES and NHFGD for approval and then implement the approved plan. NHFGD will review the information based on appropriate methodologies, that may include, but not be limited to, Kline et al. 2009<sup>28</sup>. NHFGD will then provide its findings and recommendations in writing to NHDES and the Applicant. If NHDES concurs with the NHFGD that additional withdrawal limitations are necessary to provide fish passage (to support the aquatic life designated use), NHDES will notify the Applicant in writing, and the Applicant shall update the Operations and Reporting Plan (ORP) and implement the revised ORP

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<sup>27</sup> USFWS. 2019. Fish Passage Engineering Design Criteria. USFWS, Northeast Region, Hadley, Massachusetts.

<sup>28</sup> Kline, M., C. Alexander, S. Pytlik, S. Pomeroy. May 2009. Vermont Stream Geomorphic Assessment. Phase 2 Handbook – Rapid Stream Assessment Field Protocols. Vermont Agency of Natural Resources. 92 pp.

in accordance with Condition E-16 of this Certification. As an alternative to altering withdrawal operation due to fish passage concerns, or to minimize the withdrawal operational changes necessary to address fish passage concerns, the Applicant may propose instream habitat improvements to maintain/improve fish passage in the area of concern. If acceptable to NHDES and NHFGD, the Applicant shall then implement the approved habitat improvements (and associated operational changes, if applicable) after receiving all applicable permits. NHDES reserves the right to require follow-up monitoring to confirm the effectiveness of the operational changes and/or habitat improvements.

- E-14. **Maintain Natural Variability in River Flows:** The river hydrograph just downstream of the withdrawal shall mimic the shape of the upstream river hydrograph to the maximum extent practicable. Flatlining<sup>20</sup> of the downstream river hydrograph due to the withdrawal shall be avoided.
- E-15. **Withdrawal Conditions:** Withdrawals from the Bellamy River for the proposed Activity shall comply with the following:
- a. Withdrawals shall not cause or contribute to surface water quality violations (including, but not limited to, dissolved oxygen, see Condition E-11 regarding dissolved oxygen).
  - b. The magnitude, duration and frequency of withdrawals shall be minimized to the maximum extent practicable.
  - c. The withdrawal shall not cause flatlining of the river hydrograph downstream of the withdrawal (see Condition E-14).
  - d. The withdrawal rate shall not exceed 800 gallons per minute (gpm) at any time.
  - e. Unless the Applicant receives NHDES permission to withdraw more water, or for brief periods when it is necessary to prime the pump<sup>29</sup>), the rate that can be withdrawn at any time shall not exceed the rate specified in Finding D-28, section f. of this Certification.
  - f. Withdrawals shall not occur when the groundwater mound level beneath the recharge basins is at an elevation that results in groundwater flow (or seeps resulting from groundwater) that may flow into the Bellamy River (see Condition E-12).
  - g. Withdrawals shall not occur if fish passage is limited (see Condition E-13).
  - h. Temporary, relatively infrequent and short-term excursions from the above withdrawal conditions may be allowed for situations beyond the control of the Applicant that may adversely impact human health, provided the Applicant receives prior approval from NHDES of a written request submitted by the Applicant that includes, but is not limited to, the reason for the requested withdrawal, the conditions of this Certification that will not likely be met if the withdrawal is allowed to occur, the requested withdrawal rate, volume and duration and the predicted impact on the river and a description of water conservation measures that will be enforced by the Applicant (such as water use restrictions and bans) to minimize the magnitude and duration of the withdrawal excursions.
- E-16. **Operations and Reporting Plan:** Prior to withdrawing water from the proposed water intake structure in the Bellamy River, the Applicant shall prepare, and obtain NHDES approval of, an Operations and Reporting Plan (ORP) that describes, in detail, how the withdrawal will be automated and results recorded on a near-continuous basis so that it complies with Condition E-15 of this Certification. The plan shall also describe how the results will be reported to comply with Conditions E-17 and E-18 of this Certification. The Applicant shall then implement the NHDES approved plan. If, at any time, revisions to the conditions in this Certification that affect the ORP are directed by or approved by NHDES, the Applicant shall update the ORP as necessary within 60 days

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<sup>29</sup> It is recognized that when it is necessary to prime the suction lift withdrawal pump, the flow needed to prime the pump (estimated to be approximately 400 gpm) may temporarily exceed the flow specified in Finding D-28 for short periods (i.e., up to 15 minutes).

(or other time period acceptable to NHDES) of being notified by NHDES, submit the revised ORP to NHDES for approval, and then implement the most recently approved ORP.

- E-17. **Notification:** The Applicant shall notify NHDES within 48 hours of any non-compliances of the NHDES approved Operations and Reporting Plan (see Condition E-16 of this Certification). Such notification shall include, but not be limited to, the reasons for non-compliance and corrective actions taken to prevent such non-compliances from reoccurring.
- E-18. **Annual Report:** By March 1<sup>st</sup> of each year beginning the year after this Certification is issued, the Applicant shall prepare and submit a report to NHDES demonstrating compliance (via text, tables and plots) with each of the conditions in this Certification for the previous calendar year. Should there be any non-compliances, the Applicant shall provide a summary of the non-compliances including the reasons for the non-compliance and corrective actions taken to prevent such non-compliances from reoccurring.
- E-19. **Antidegradation – Request for Change in “Insignificant” Withdrawal:** No sooner than three years from the date of issuance of this Certification, the Applicant may, based on historical experience and data collected using the Artificial Recharge system, and other information if requested by NHDES, submit a written request with supporting information, to withdraw more water but still be considered an “insignificant” withdrawal per the antidegradation requirements specified in Env-Wq 1708 (see Finding D-28). If NHDES approves the request, the revised criteria for “insignificant” withdrawal and any conditions associated with it, shall become conditions of this Certification. Further, the Applicant shall revise the ORP in accordance with Condition E-16 to reflect the revised withdrawal conditions.
- E-20. **Antidegradation – Request for “Significant” Withdrawal:** If the Applicant requests an increase in withdrawals that that are “significant” in accordance with Env-Wq 1708 [i.e., represent more than 20 percent of the remaining assimilative capacity (REMAC)], and, after completing the antidegradation requirements specified in Env-Wq 1708 and any other analyses or studies requested by NHDES (e.g. biological studies), and, if NHDES approves the “significant” withdrawal, the “significant” withdrawal and any conditions associated with it, shall become conditions of this Certification. Further, the Applicant shall revise the ORP in accordance with Condition E-16 to reflect the revised withdrawal conditions.
- E-21. **Input of Surface Water Quality Data into the EMD:** By March 1st of each year beginning the year after this Certification is issued, the Applicant shall provide NHDES with a list of all surface water quality sampling in the Bellamy River that has been conducted by the Applicant, or on its behalf, in the previous calendar year for this Activity, or for other purposes or permits (e.g., NHDES Groundwater Discharge Permit), and shall input the sampling results and associated metadata into the NHDES Environmental Monitoring Database (EMD). The list shall include, but not be limited to, the purpose of sampling, the parameters being sampled, the sampling locations and the frequency and duration of sampling.
- E-22. **Water Quality Monitoring:** NHDES reserves the right to require additional water quality monitoring to determine if surface water quality standards (Env-Wq 1700) are met for various parameters, including, but not limited to, PFAS 1,4 dioxane and any other parameter that may be impacted by the proposed withdrawal. If requested by NHDES, the Applicant shall prepare a Sampling and Analysis Plan (SAP) for NHDES approval within 90 days (or other time period acceptable to NHDES) of receiving a written request from NHDES. The SAP shall include, but not be limited to, the purpose of sampling; the parameters that will be sampled as well as where, when and how they will be sampled; field data sheets; chain of custody sheets; QA/QC provisions including duplicates, field

blanks, etc.; laboratory methods as well as detection and reporting limits; sample preservation methods and holding times; when and how data will be reported; and when data will be input into the NHDES EMD. The Applicant shall then implement the NHDES approved SAP.

#### F. APPEAL

Any person aggrieved by this decision may appeal to the N.H. Water Council (“Council”) by filing an appeal that meets the requirements specified in RSA 21-O:14 and the rules adopted by the Council, Env-WC 100-200. The appeal must be filed directly with the Council within 30 days of the date of this decision and must set forth fully every ground upon which it is claimed that the decision complained of is unlawful or unreasonable. Only those grounds set forth in the notice of appeal can be considered by the Council. Information about the Council, including a link to the Council’s rules, is available on the [New Hampshire Environmental Council website](#) (or more directly at the [Water Council page](#)). Copies of the rules also are available from the NHDES Public Information Center at (603) 271-2975.

If you have questions regarding this Certification, please contact Gregg Comstock at (603) 271-2983 or [Gregg.Comstock@des.nh.gov](mailto:Gregg.Comstock@des.nh.gov).

Approved electronically by email (see Attachment A of this Certification)

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Thomas E. O’Donovan, P.E., Director  
NHDES Water Division

cc via email:  
Michael Hicks, US Army Corps of Engineers  
Rick Becksted, Mayor, City of Portsmouth  
Eric Fiegenbaum, Administrator, Town of Madbury  
Carol Henderson, NHFGD

**Attachment A**  
**Email from Thomas E. O'Donovan, P.E., Director, NHDES Water Division**  
**Approving WQC #2019-404P-001**

From: O'Donovan, Thomas  
Sent: Friday, June 19, 2020 11:22 AM  
To: Comstock, Gregg  
Cc: Diers, Ted; Guerdet, Carolyn  
Subject: RE: Ready for Approval - Water Quality Certification for Bellamy River Artificial Recharge Facility

Approved and thanks.

Thomas E. O'Donovan, PE, PMP  
Director, Water Division  
New Hampshire, Department of Environmental Services

"The mission of the Department of Environmental Services is to help sustain a high quality of life for all citizens by protecting and restoring the environment and public health in New Hampshire."

From: Comstock, Gregg <Gregg.Comstock@des.nh.gov>  
Sent: Friday, June 19, 2020 9:31 AM  
To: O'Donovan, Thomas <Thomas.ODonovan@des.nh.gov>  
Cc: Diers, Ted <Ted.Diers@des.nh.gov>  
Subject: Ready for Approval - Water Quality Certification for Bellamy River Artificial Recharge Facility

Tom,

Water Quality Certification (WQC # 2019-404P-001) for the proposed Bellamy River Artificial Recharge Facility in Dover, New Hampshire is ready for your review and approval. Please send me an email indicating your approval (which I will attach at the end of the WQC) today.

S:\DES-COMMON\Gregg\_C\Bellamy River Withdrawal\2019-404p-001-final-wqc.docx

Should you have any questions, please do not hesitate to contact me.

Thank you.  
Gregg

Gregg Comstock, P.E.  
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Watershed Management Bureau  
Water Division, NH Department of Environmental Services  
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