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FACT SHEET

DRAFT NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) GREAT BAY TOTAL NITROGEN GENERAL PERMIT FOR WASTEWATER TREATMENT FACILITIES IN NEW HAMPSHIRE

NPDES GENERAL PERMIT: NHG58A000

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I. Coverage Under This Permit

A. Introduction

The Director of the Water Division, EPA Region 1, is issuing the Great Bay Total Nitrogen General Permit ("GBTN GP" or "General Permit") with permit number NHG58A000 for discharges of nitrogen from wastewater treatment facilities (WWTFs) to certain waters of the State of New Hampshire. The 13 WWTFs located in New Hampshire that discharge wastewater into a surface water of the Great Bay watershed are covered by this General Permit. The discharge of all pollutants other than nitrogen shall continue to be covered under each WWTF's individual NPDES permit, including discharges of ammonia.

B. Coverage of General Permits

Section 301(a) of the Clean Water Act (CWA) provides that the discharge of pollutants is unlawful except in accordance with a National Pollutant Discharge Elimination System (NPDES) permit unless such a discharge is otherwise authorized by the CWA. Although such permits are generally issued to individual discharges, EPA's regulations authorize the issuance of "General Permits" to categories of discharges. *See* 40 C.F.R. § 122.28. Violation of a condition of a General Permit constitutes a violation of the CWA and subjects the discharger to the penalties in Section 309 of the CWA.

The Director of an NPDES permit program is authorized to issue a General Permit if there are a number of point sources operating in a geographic area that:

- Involve the same or substantially similar types of operations;
- Discharge the same types of wastes;
- Require the same effluent limitations or operating conditions;
- Require the same or similar monitoring requirements; and
- In the opinion of the Director, are more appropriately controlled under a General Permit than under individual permits.

Based on these factors, EPA has determined that discharge of nitrogen from WWTFs warrant coverage under a General Permit. First, all point sources covered under this General Permit are located in the same geographic area (*i.e.*, the Great Bay watershed in New Hampshire). Second, these point source discharges are all generated by substantially similar operations, which involve the treatment of municipal wastewater. Third, the wastewater generated from these point sources is similar in composition. Fourth, the same or similar effluent limitations and monitoring requirements are required for these point sources. Finally, these point sources represent multiple facilities that would be more efficiently, efficaciously and appropriately regulated under a General Permit than under individual permits for nitrogen.

When issued, the GBTN GP will enable the subject facilities to maintain compliance with the CWA, will provide timely responses to the permitting needs of the wastewater treatment industry and will help reduce the current backlog of administratively continued NPDES permits. Such an approach would, in EPA's judgment, be more expeditious and efficacious than individual permit issuances, because total nitrogen impacts can be addressed, and receiving water responses

evaluated, on a system-wide, holistic level, resulting from a gross reduction in that pollutant from multiple sources in the watershed at roughly the same time.

C. Subject Discharges

The 13 WWTFs located in New Hampshire that discharge wastewater into a surface water of the Great Bay watershed are covered by this General Permit. The discharge of all pollutants other than nitrogen shall continue to be covered under each facility's individual NPDES permit, including discharges of ammonia. These Permittees are listed below with the corresponding General Permit tracking number and their individual NPDES permit number, for reference.

Table 1 - List of Subject Facilities

Wastewater Treatment Facility	General Permit Tracking Number	Individual NPDES Permit Number
Rochester	NHG58A001	NH0100668
Portsmouth	NHG58A002	NH0100234
Dover	NHG58A003	NH0101311
Exeter	NHG58A004	NH0100871
Durham	NHG58A005	NH0100455
Somersworth	NHG58A006	NH0100277
Pease ITP	NHG58A007	NH0090000
Newmarket	NHG58A008	NH0100196
Epping	NHG58A009	NH0100692
Newington	NHG58A010	NHG581141[1]
Rollinsford	NHG58A011	NH0100251
Newfields	NHG58A012	NH0101192
Milton	NHG58A013	NH0100676

[1] The Newington WWTF is currently authorized to discharge under the General Permit for the Discharge of Wastewater from Certain Publicly Owned Treatment Works Treatment Plants (POTW Treatment Plants) and Other Treatment Works Treating Domestic Sewage in the State of New Hampshire.

This General Permit is designed to cover discharges of nitrogen from the 13 listed wastewater treatment facilities. These facilities must adhere to all effluent limitations, monitoring requirements, and other conditions set forth in the General Permit.

D. Limitations on Coverage

Discharges from facilities not listed in Part I.C above are excluded from coverage under this General Permit. Discharges from non-WWTF outfalls are excluded from coverage under this General Permit. Discharges to Class A waters are excluded from coverage under this General Permit.

II. Permit Basis: Statutory and Regulatory Authority

A. Statutory and Regulatory Authority

Congress enacted the Federal Water Pollution Control Act, codified at 33 U.S.C. § 1251-1387 and commonly known as the Clean Water Act (CWA), "to restore and maintain the chemical, physical, and

biological integrity of the Nation's waters." CWA § 101(a). To achieve this objective, the CWA makes it unlawful for any person to discharge any pollutant into the waters of the United States from any point source, except as authorized by specific permitting sections of the CWA, one of which is § 402. *See* CWA §§ 301(a), 402(a). Section 402(a) established one of the CWA's principal permitting programs, the NPDES Permit Program. Under this section, EPA may "issue a permit for the discharge of any pollutant or combination of pollutants" in accordance with certain conditions. CWA § 402(a). NPDES permits generally contain discharge limitations and establish related monitoring and reporting requirements. *See* CWA § 402(a)(1) and (2). The regulations governing EPA's NPDES permit program are generally found in 40 C.F.R. §§ 122, 124, 125, and 136.

"Congress has vested in the Administrator [of EPA] broad discretion to establish conditions for NPDES permits" in order to achieve the statutory mandates of Section 301 and 402. *Arkansas v. Oklahoma,* 503 U.S. 91, 105 (1992). *See also* 40 C.F.R. §§ 122.4(d), 122.44(d)(1), 122.44(d)(5). CWA §§ 301 and 306 provide for two types of effluent limitations to be included in NPDES permits: "technology-based" effluent limitations (TBELs) and "water quality-based" effluent limitations (WQBELs). *See* CWA §§ 301, 304(d); 40 C.F.R. Parts 122, 125, 131.

B. Technology-Based Requirements

The CWA provides for two different kinds of permit effluent limits: those based on the technology available to treat a pollutant and those necessary to protect the designated uses of the receiving water body. Technology-based effluent limits ("TBELs") reflect a specified level of pollutant-reducing technology required by the CWA for a given type of facility. *See* CWA § 301(b)(1)(A)-(B), 33 U.S.C. § 1311(b)(1)(A)-(B). As a class, POTWs must meet performance-based requirements based on available wastewater treatment technology. *See* CWA § 301(b)(1)(B), 33 U.S.C. § 1311(b)(1)(B). The performance level for POTWs is referred to as "secondary treatment." Secondary treatment is comprised of technology-based requirements expressed in terms of five-day biochemical oxygen demand ("BOD_5"), total suspended solids ("TSS"), and pH. *See* 40 C.F.R. pt 133. Technology-based effluent treatment requirements "represent the minimum level of control that must be imposed in a permit." 40 C.F.R. § 125.3(a)

C. Water Quality-Based Requirements

The CWA and federal regulations also require that permit effluent limits based on water quality considerations be established for point source discharges when such limitations are necessary to meet state or federal water quality standards that are applicable to the designated receiving water. This is necessary when less stringent TBELs would interfere with the attainment or maintenance of water quality criteria in the receiving water. *See* CWA § 301(b)(1)(C) and 40 C.F.R. §§ 122.44(d)(1), 122.44(d)(5).

1. Water Quality Standards

The CWA requires that each state develop water quality standards (WQSs) for all water bodies within the State. *See* CWA § 303 and 40 C.F.R. § 131.10-12. Generally, WQSs consist of three parts: 1) beneficial designated use or uses for a water-body or a segment of a water-body; 2) numeric or narrative water quality criteria sufficient to protect the assigned designated use(s); and 3) anti-degradation requirements to ensure that once a use is attained it will not be degraded and to protect high quality and National resource waters. *See* CWA § 303(c)(2)(A) and 40 C.F.R. § 131.12. The applicable State WQSs

can be found in the New Hampshire Code of Administrative Rules, Surface Water Quality Regulations, Chapter Env-Wq 1700 et seq. Also *See* generally, Title 50, Water Management and Protection, Chapters 485A, Water Pollution and Waste Disposal Section 485-A.

As a matter of state law, state WQSs specify different water body classifications, each of which is associated with certain designated uses and numeric and narrative water quality criteria. When using chemical-specific numeric criteria to develop permit limits, acute and chronic aquatic life criteria and human health criteria are used and expressed in terms of maximum allowable in-stream pollutant concentrations. In general, aquatic-life acute criteria are considered applicable to daily time periods (maximum daily limit) and aquatic-life chronic criteria are considered applicable to monthly time periods (average monthly limit). Chemical-specific human health criteria are typically based on lifetime chronic exposure and are therefore typically applicable to monthly average limits.

When permit effluent limitation(s) are necessary to ensure that the receiving water meets narrative water quality criteria, the permitting authority must establish effluent limits in one of the following three ways: 1) based on a "calculated numeric criterion for the pollutant which the permitting authority demonstrates will attain and maintain applicable narrative water quality criteria and fully protect the designated use," 2) based on a "case-by-case basis" using CWA § 304(a) recommended water quality criteria, supplemented as necessary by other relevant information; or, 3) in certain circumstances, based on use of an indicator parameter. *See* 40 C.F.R. § 122.44(d)(1)(vi)(A-C).

2. Antidegradation

Federal regulations found at 40 C.F.R. § 131.12 require states to develop and adopt a statewide anti-degradation policy that maintains and protects existing in-stream water uses and the level of water quality necessary to protect these existing uses. In addition, the antidegradation policy ensures that high quality waters which exceed levels necessary to support propagation of fish, shellfish, and wildlife and support recreation in and on the water, are maintained unless the State finds that allowing degradation is necessary to accommodate important economic or social development in the area in which the waters are located.

The New Hampshire Antidegradation Policy, found at Env-Wq 1708, applies to any new or increased activity that would lower water quality or affect existing or designated uses, including increased loadings to a water body from an existing activity. The antidegradation regulations focus on protecting high quality waters and maintaining water quality necessary to protect existing uses. Discharges that cause "significant degradation" are defined in NH WQS (Env-Wq 1708.09(a)) as those that use 20% or more of the remaining assimilative capacity for a water quality parameter in terms of either concentration or mass of pollutants or flow rate for water quantity. Where NHDES determined that a proposed increase would cause a significant increase, the applicant must provide documentation to demonstrate that the lowering of water quality is necessary, will provide net economic or social benefit in the area in which the water body is located, and that the benefits of the activity outweigh the environmental impact caused by the lower water quality. *See* Env-Wq 1708.10(b).

This General Permit is being issued with effluent limitations sufficiently stringent to satisfy the State's antidegradation requirements, including the protection of the existing uses of the receiving water.

3. Anti-Backsliding

A permit may not be renewed, reissued or modified with less stringent limitations or conditions than those contained in a previous permit unless in compliance with the anti-backsliding requirements of the CWA. *See* §§ 402(o) and 303(d)(4) of the CWA and 40 C.F.R. § 122.44(l)(1 and 2). Anti-backsliding provisions apply to effluent limits based on technology, water quality, BPJ and state certification requirements.

This General Permit is collectively more stringent than the existing nitrogen-related permit requirements for the subject facilities and, therefore, complies with the anti-backsliding requirements of the CWA.

4. Assessment and Listing of Waters and Total Maximum Daily Loads

The objective of the CWA is to restore and maintain the chemical, physical and biological integrity of the Nation's waters. To meet this goal, the CWA requires states to develop information on the quality of their water resources and report this information to EPA, the U.S. Congress, and the public. To this end, EPA released guidance on November 19, 2001, for the preparation of an integrated "List of Waters" that could combine reporting elements of both § 305(b) and § 303(d) of the CWA. The integrated list format allows states to provide the status of all their assessed waters in one list. States choosing this option must list each water body or segment in one of the following five categories: 1) unimpaired and not threatened for all designated uses; 2) unimpaired waters for some uses and not assessed for others; 3) insufficient information to make assessments for any uses; 4) impaired or threatened for one or more uses but not requiring the calculation of a Total Maximum Daily Load (TMDL); and 5) impaired or threatened for one or more uses and requiring a TMDL.

A TMDL is a planning tool and potential starting point for restoration activities with the ultimate goal of attaining water quality standards. A TMDL essentially provides a pollution budget designed to restore the health of an impaired water body. A TMDL typically identifies the source(s) of the pollutant from point sources and non-point sources, determines the maximum load of the pollutant that the water body can tolerate while still attaining WQSs for the designated uses, and allocates that load among to the various sources, including point source discharges, subject to NPDES permits. *See* 40 C.F.R. § 130.7.

For impaired waters where a TMDL has been developed for a particular pollutant and the TMDL includes a waste load allocation (WLA) for a NPDES permitted discharge, the effluent limitation in the permit must be "consistent with the assumptions and requirements of any available WLA". 40 C.F.R. § 122.44(d)(1)(vii)(B).

5. Reasonable Potential

Pursuant to CWA § 301(b)(1)(C) and 40 C.F.R. § 122.44(d)(1), NPDES permits must contain any requirements in addition to TBELs that are necessary to achieve water quality standards established under § 303 of the CWA. *See also* 33 U.S.C. § 1311(b)(1)(C). In addition, limitations "must control any pollutant or pollutant parameter (conventional, non-conventional, or toxic) which the permitting authority determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any water quality standard, including State narrative criteria for water quality." 40 C.F.R. § 122.44(d)(1)(i). To determine if the discharge causes, or has the reasonable potential to cause, or contribute to an excursion above any WQS, EPA considers: 1) existing controls on point and non-point sources of pollution; 2) the variability of the pollutant or pollutant

parameter in the effluent; 3) the sensitivity of the species to toxicity testing (when evaluating whole effluent toxicity); and 4) where appropriate, the dilution of the effluent by the receiving water. *See* 40 C.F.R. § 122.44(d)(1)(ii).

If the permitting authority determines that the discharge of a pollutant will cause, has the reasonable potential to cause, or contribute to an excursion above WQSs, the permit must contain WQBELs for that pollutant. *See* 40 C.F.R. § 122.44(d)(1)(i).

6. State Certification

EPA may not issue a permit unless the State Water Pollution Control Agency with jurisdiction over the receiving water(s) either certifies that the effluent limitations contained in the permit are stringent enough to assure that the discharge will not cause the receiving water to violate the State WQSs or it is deemed that the state has waived its right to certify. Regulations governing state certification are set forth in 40 C.F.R. § 124.53 and § 124.55. EPA has requested permit certification by the State pursuant to 40 C.F.R. § 124.53 and expects that the Draft General Permit will be certified.

If the State believes that any conditions more stringent than those contained in the draft General Permit are necessary to meet the requirements of either the CWA §§ 208(e), 301, 302, 303, 306 and 307 or the appropriate requirements of State law, the State should include such conditions and, in each case, cite the CWA or State law reference upon which that condition is based. Failure to provide such a citation waives the right to certify as to that condition. The only exception to this is that the sludge conditions/requirements implementing § 405(d) of the CWA are not subject to the § 401 State Certification requirements. Reviews and appeals of limitations and conditions attributable to State certification shall be made through the applicable procedures of the State and may not be made through the applicable procedures of 40 C.F.R. Part 124.

In addition, the State should provide a statement of the extent to which any condition of the draft GBTN GP can be made less stringent without violating the requirements of State law. Since the State's certification is provided prior to permit issuance, any failure by the State to provide this statement waives the State's right to certify or object to any less stringent condition.

It should be noted that under CWA § 401, EPA's duty to defer to considerations of state law is intended to prevent EPA from relaxing any requirements, limitations or conditions imposed by state law. Therefore, "[a] State may not condition or deny a certification on the grounds that State law allows a less stringent permit condition." *See* 40 C.F.R. § 124.55(c). In such an instance, the regulation provides that, "The Regional Administrator shall disregard any such certification conditions or denials as waivers of certification." *Id.* EPA regulations pertaining to permit limits based upon water quality standards and state requirements are contained in 40 C.F.R. § 122.4(d) and 40 C.F.R. § 122.44(d).

D. Monitoring and Reporting Requirements

1. Monitoring Requirements

Sections 308(a) and 402(a)(2) of the CWA and the implementing regulations at 40 C.F.R. Parts 122, 124, 125, and 136 authorize EPA to include monitoring and reporting requirements in NPDES permits.

The monitoring requirements included in this General Permit have been established to yield data representative of the Facility's discharges in accordance with CWA §§ 308(a) and 402(a)(2), and consistent with 40 C.F.R. §§ 122.41(j), 122.43(a), 122.44(i) and 122.48. The Draft General Permit specifies routine sampling and analysis requirements to provide ongoing, representative information on the levels of regulated constituents in the wastewater discharges. The monitoring program is needed to enable EPA and the State to assess the characteristics of the Facility's effluent, whether Facility discharges are complying with permit limits, and whether different permit conditions may be necessary in the future to ensure compliance with technology-based and water quality-based standards under the CWA. EPA and/or the State may use the results of the chemical analyses conducted pursuant to this permit, as well as national water quality criteria developed pursuant to CWA § 304(a)(1), State water quality criteria, and any other appropriate information or data, to develop numerical effluent limitations for any pollutants, including, but not limited to, those pollutants listed in Appendix D of 40 C.F.R. Part 122.

NPDES permits require that the approved analytical procedures found in 40 C.F.R. Part 136 be used for sampling and analysis unless other procedures are explicitly specified. Permits also include requirements necessary to comply with the *National Pollutant Discharge Elimination System (NPDES): Use of Sufficiently Sensitive Test Methods for Permit Applications and Reporting Rule*.[1] This Rule requires that where EPA-approved methods exist, NPDES applicants must use sufficiently sensitive EPA-approved analytical methods when quantifying the presence of pollutants in a discharge. Further, the permitting authority must prescribe that only sufficiently sensitive EPA-approved methods be used for analyses of pollutants or pollutant parameters under the permit. The NPDES regulations at 40 C.F.R. § 122.21(e)(3) (completeness), 40 C.F.R. § 122.44(i)(1)(iv) (monitoring requirements) and/or as cross referenced at 40 C.F.R. § 136.1(c) (applicability) indicate that an EPA-approved method is sufficiently sensitive where:

- The method minimum level[2] (ML) is at or below the level of the effluent limitation established in the permit for the measured pollutant or pollutant parameter; or

- In the case of permit applications, the ML is above the applicable water quality criterion, but the amount of the pollutant or pollutant parameter in a facility's discharge is high enough that the method detects and quantifies the level of the pollutant or parameter in the discharge; or

- The method has the lowest ML of the analytical methods approved under 40 C.F.R. Part 126 or required under 40 C.F.R. chapter I, subchapter N or O for the measured pollutant or pollutant parameter.

2. Reporting Requirements

The Draft General Permit requires the Permittee to report monitoring results obtained during each calendar month to EPA and the State electronically using NetDMR. The Permittee must submit a

[1] Fed. Reg. 49,001 (Aug 19, 2014).
[2] The term "minimum level" refers to either the sample concentration equivalent to the lowest calibration point in a method or a multiple of the method detection limit (MDL). Minimum levels may be obtained in several ways: They may be published in a method; they may be sample concentrations equivalent to the lowest acceptable calibration point used by a laboratory; or they may be calculated by multiplying the MDL in a method, or the MDL determined by a lab, by a factor. EPA is considering the following terms related to analytical method sensitivity to be synonymous: "quantitation limit," "reporting limit," "level of quantitation," and "minimum level." *See* Fed. Reg. 49,001 (Aug. 19, 2014).

Discharge Monitoring Report (DMR) for each calendar month no later than the 15th day of the month following the completed reporting period.

NetDMR is a national web-based tool enabling regulated CWA permittees to submit DMRs electronically via a secure internet application to EPA through the Environmental Information Exchange Network. NetDMR has eliminated the need for participants to mail in paper forms to EPA under 40 C.F.R. §§ 122.41 and 403.12. NetDMR is accessible through EPA's Central Data Exchange at https://cdx.epa.gov/. Further information about NetDMR can be found on the EPA NetDMR support portal webpage.[3]

With the use of NetDMR, the Permittee is no longer required to submit hard copies of DMRs and reports to EPA and the State unless otherwise specified in the Draft Permit. In most cases, reports required under the permit shall be submitted to EPA as an electronic attachment through NetDMR. Certain exceptions are provided in the permit.

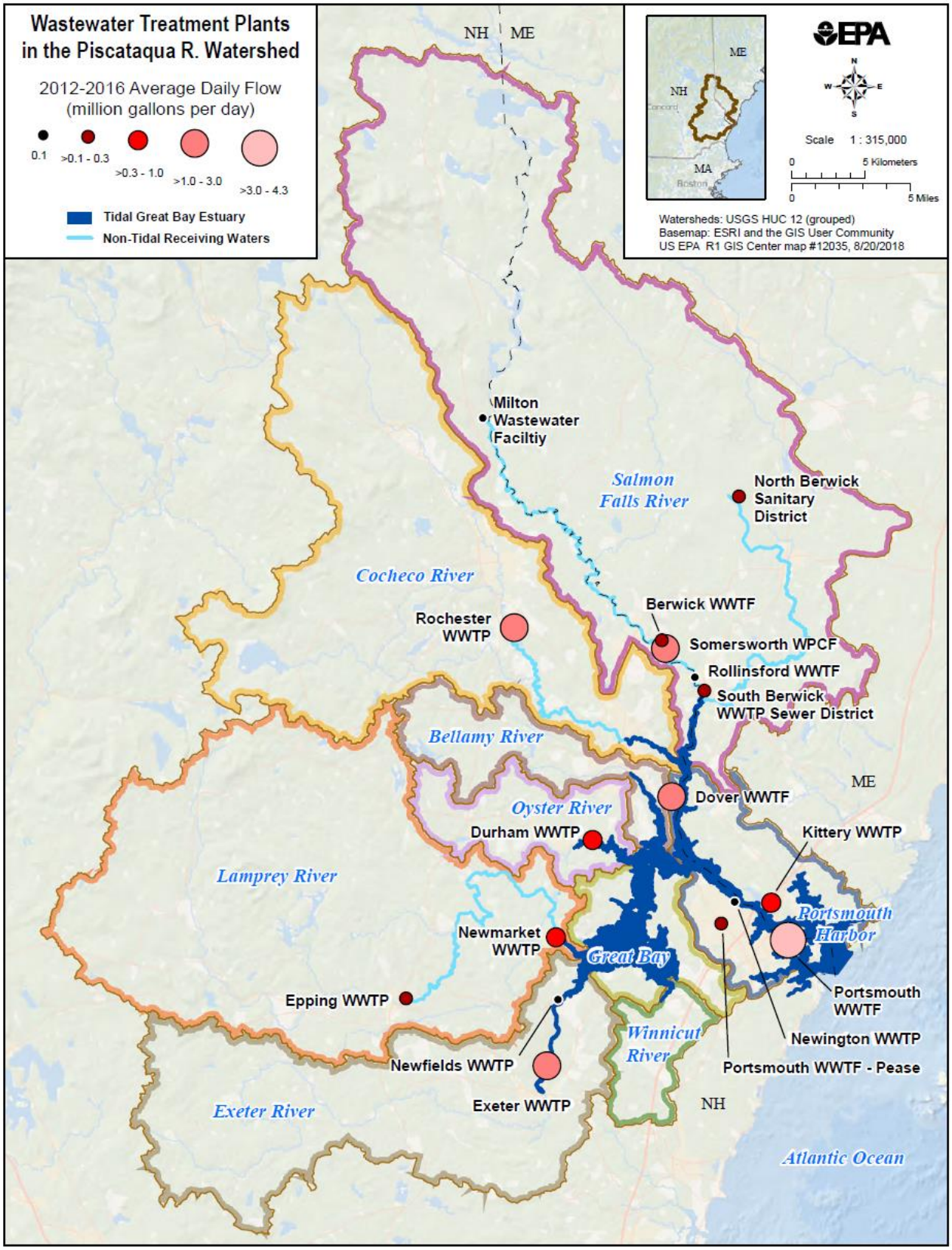
III. Explanation of the Permit Effluent Limitations

Background

The Great Bay estuary is composed of a network of tidal rivers, inland bays, and coastal harbors. The Estuary extends inland from the mouth of the Piscataqua River between Kittery, Maine and New Castle, New Hampshire to Great Bay proper and the Upper Piscataqua River. Over forty New Hampshire communities are entirely or partially located within the coastal watershed. The estuary receives treated wastewater effluent from 17 publicly owned treatment works (13 in New Hampshire and 4 in Maine). Great Bay is one of only 28 "estuaries of national significance" under the National Estuary Program (NEP), which was established in 1987 by amendments to the Clean Water Act to identify, restore and protect estuaries along the coasts of the United States. The Great Bay watershed and the 17 WWTFs that discharge into surface waters in the watershed are presented in Figure 1 below.

[3] https://netdmr.zendesk.com/hc/en-us/articles/209616266-EPA-Region-1-NetDMR-Information

Figure 1 - Wastewater Treatment Plants in the Great Bay Watershed



The Great Bay estuary encompasses Great Bay proper and Little Bay, which are fed by the Winnicut,

Squamscott, Lamprey, Oyster, and Bellamy Rivers. Other parts of the estuary include the Upper Piscataqua River (fed by the Cocheco, Salmon Falls, and Great Works Rivers), the Lower Piscataqua River, Portsmouth Harbor, and Little Harbor/Back Channel. The Great Bay Estuary is unusual because of its inland location, more than five miles up the Piscataqua River from the ocean**.** It is a popular location for kayaking, birdwatching, commercial lobstering, recreational oyster harvesting, and sportfishing for rainbow smelt, striped bass, and winter flounder.

The Great Bay estuary is a tidally-dominated embayment with estuarine waters covering approximately 21 square miles with 144 miles of shoreline. Tidal height ranges from 8.9 feet at the mouth of the estuary to 6.6 feet at Dover Point. Because of strong tidal currents and mixing, vertical stratification of the estuary is limited. However, partial stratification may occur during periods of intense freshwater runoff particularly at the upper tidal reaches of rivers entering the estuary.

Estuaries, especially large, productive ones like Great Bay, are extremely significant aquatic resources. An estuary is a partially enclosed coastal body of water located between freshwater ecosystems (lakes, rivers, and streams; freshwater and coastal wetlands; and groundwater systems) and coastal shelf systems where freshwater from the land measurably dilutes saltwater from the ocean. This mixture of water types creates a unique transitional environment that is critical for the survival of many species of fish, birds, and other wildlife. Estuarine environments are among the most productive on earth, creating more organic matter each year than comparably sized areas of forest, grassland, or agricultural land (EPA, 2001).

Maintaining water quality within an estuary is important for many reasons. Estuaries provide a variety of habitats such as shallow open waters, freshwater and saltwater marshes, sandy beaches, mud and sand flats, rocky shores, oyster reefs, tidal pools, and seagrass beds. Birds, mammals, fish, and other wildlife depend on estuarine habitats as places to live, feed, and reproduce. Many species of fish and shellfish rely on the sheltered waters of estuaries as protected places to spawn. Moreover, estuaries also provide a number of recreational values such as swimming, boating, fishing, and bird watching. In addition, estuaries have an important commercial value since they serve as nursery grounds for two thirds of the nation's commercial fish and shellfish, and support tourism drawing on the natural resources that estuaries supply (EPA, 1998). Consequently, EPA believes sound environmental policy favors a pollution control approach that is both protective and undertaken expeditiously to prevent degradation of these critical natural resources.

Because estuaries are the intermediary between oceans and land, both of these geographic features influence their physical, chemical, and biological properties. In the course of flowing downstream through a watershed to an estuary, tributaries pick up materials that wash off the land or are discharged directly into the water by land-based activities. Eventually, the materials that accumulate in the tributaries are delivered to estuaries. The types of materials that eventually enter an estuary largely depend on how the land is used. Undisturbed land, for example, will discharge fewer pollutants than an urban center or areas with large amounts of impervious cover. Accordingly, an estuary's overall health can be heavily impacted by surrounding land use.

Unlike free-flowing rivers, which tend to flush out sediments and pollutants relatively quickly, an estuary will often have a lengthy retention period as up-estuary saltwater movement interacts with down-estuary freshwater flow (EPA, 2001). Estuaries are particle-rich relative to coastal systems and have physical mechanisms that tend to retain particles. These suspended particles mediate many activities (*e.g.*, absorbing and scattering light, or absorbing hydroscopic materials such as phosphate and toxic contaminants). New particles enter with river flow and may be resuspended from the bottom by

tidal currents and wind-wave activity. Many estuaries are naturally nutrient-rich because of inputs from the land surface and geochemical and biological processes that act as "filters" to retain nutrients within estuaries (EPA, 2001). Consequently, waterborne pollutants, along with contaminated sediment, may remain in the estuary for a long time, magnifying their potential to adversely affect the estuary's plants and animals.

Scientific Literature & Reports

A growing body of technical and scientific literature describes the Great Bay estuary as an estuary in environmental decline because of nutrient overloading. In 1999, the National Oceanic and Atmospheric Administration (NOAA) released the "National Estuarine Eutrophication Assessment: Effects of Nutrient Enrichment in the Nation's Estuaries," which undertook to comprehensively assess the scale, scope, and characteristics of nutrient enrichment and eutrophic conditions in the nation's estuaries with the goal of developing a national strategy to limit nutrient enrichment problems. The assessment was based primarily on the results of the National Estuarine Eutrophication Survey, conducted by NOAA from 1992 to 1997, but was supplemented by information on nutrient inputs, population projections, and land use drawn from a variety of sources. It covers 138 estuaries, representing over 90 percent of the estuarine surface area of the coterminous United States. That report concluded that "By the year 2020, eutrophication symptoms are expected to worsen in about one-third of the systems, primarily due to increased nutrient inputs from population increases and the growth of the aquaculture industry. Of these estuaries, St. Croix River/Cobscook Bay, Great Bay, and Plum Island Sound are expected to worsen the most." (NOAA, 1999)

Additionally, NOAA's 1997 Estuarine Eutrophication Survey, Volume 3: North Atlantic Region noted, "In Great Bay, chlorophyll-a concentrations range from low to high and turbidity from low to medium. Nuisance and toxic algal blooms have an impact on biological resources in subareas of the mixing and seawater zones. Nitrogen and phosphorus concentrations are medium. There are no observations of anoxia, however hypoxia is reported in small subarea of the mixing zone. SAV coverage ranges from very low to high." (NOAA, 1997). A decade later, NOAA published *Effects of Nutrient Enrichment in the Nation's Estuaries: A Decade of Change* as an update to the earlier report. This 2007 report evaluated many of the influencing factors and determined the "susceptibility" to nitrogen-induced eutrophication of each estuary, the "overall eutrophic condition" of each estuary, and the "future outlook" for each estuary. Great Bay was characterized as "moderately susceptible" to nitrogen-induced eutrophication and as having a "moderate" overall eutrophic condition. The 2007 report also notes that "susceptibility can be used to forecast not only the extent to which eutrophic symptoms may occur, but also what symptoms may potentially occur. For example, in some shallow lagoonal systems, additional nutrients will result in increased macroalgal abundance rather than high concentrations of phytoplankton/chlorophyll *a* (Nobre et al. 2005)." As significant portions of the Great Bay Estuary are considered shallow, it is unsurprising that the report indicates the "eutrophic symptoms" of Great Bay as "low" for chlorophyll-a and "high," the worst characterization possible in the report, for macroalgae. Moreover, based on this information NOAA categorized the "future outlook" for Great Bay as "large deterioration," the worst characterization possible in the report. NOAA concluded as follows: "In Great Bay, increases in dissolved inorganic nitrogen have occurred over the past 20 years. Increases in chlorophyll-a and turbidity have been identified with augmented eutrophication in the inner estuary. As a result, eelgrass biomass has declined by 70% in the last 10 years and the occurrence of nuisance macroalgae is becoming more evident. Primary symptoms are high but problems with more serious secondary symptoms are still not being expressed. Nutrient related symptoms observed in the estuary are likely to substantially worsen." (NOAA, 2007)

In addition to federal agencies, individual National Estuary Programs, including the Piscataqua Region Estuaries Partnership (PREP), have collected, compiled and analyzed monitoring data to produce "State of the Estuary" reports (typically issued every 3-5 years). These NEP "State of the Estuary" reports are critical because they depict status and trends in the estuaries' environmental conditions. To gauge an estuary's health, each NEP develops environmental indicators – "specific, measurable markers that help assess the condition of the environment and how it changes over time." (NHEP, 2003) The environmental indicators relating to excessive levels of nutrients include dissolved oxygen, total nitrogen, and eelgrass.

PREP has released five State of the Estuary Reports, each of which detail a trend of increasing nitrogen-related impairments in the Great Bay estuary.

In its 2003 report, the Partnership noted, "[d]espite the increasing concentrations of nitrate + nitrite in the estuary, there have not been any significant trends for the typical indicators of eutrophication: dissolved oxygen and chlorophyll-a concentrations. Therefore, the load of nitrate + nitrite to the bay appears to have not yet reached the level at which the undesirable effects of eutrophication occur." [4]

The 2006 report concluded that "more indicators suggest that the ecological integrity of the estuaries is under stress or may soon be heading toward a decline." It observed that "Dissolved oxygen concentrations consistently fail to meet state water quality standards in the tidal tributaries to the Great Bay Estuary." Additionally, the report cautioned, "[n]itrogen concentrations in Great Bay have increased by 59 percent in the past 25 years. Negative effects of excessive nitrogen, such as algae blooms and low dissolved oxygen levels, are not evident. However, the estuary cannot continue to receive increasing nitrogen levels indefinitely without experiencing a lowering of water quality and ecosystem changes."

In the 2009 report, eleven of 12 environmental indicators show negative or cautionary trends – up from seven indicators classified this way in 2006. According to the 2009 report, nitrogen is increasing and eelgrass is decreasing within the estuary. The total nitrogen load to the Great Bay Estuary has increased by 42% in the last five years. In Great Bay, the concentrations of dissolved inorganic nitrogen, a major component of total nitrogen, have increased by 44% in the past 28 years. Eelgrass cover in Great Bay has declined by 37% between 1990 and 2008 and has disappeared from the tidal rivers, Little Bay, and the Upper Piscataqua River. Dissolved oxygen is currently exhibiting a cautionary trend. While dissolved oxygen standards are rarely violated in the bays and harbors, they are often violated in the tidal rivers. The negative effects of the increasing nutrient loads on the estuary system are evident in the decline of water clarity, eelgrass habitat loss, and failure to meet water quality standards for dissolved oxygen concentrations in tidal rivers (PREP, 2009).

The 2009 report notes that the most pressing threats to the estuaries relate to population growth and the associated increases in nutrient loads and non-point source pollution (PREP, 2009). Watershed-wide development has created new impervious surfaces at an average rate of nearly 1,500 acres per year. In 2005, there were 50,351 acres of impervious surfaces in the watershed, which is 7.5 percent of the watershed's land area. Nine of the 40 sub-watersheds contained over 10 percent impervious cover, indicating the potential for degraded water quality and altered storm water flow. Land consumption per person, a measure of sprawling growth patterns, continues to increase (PREP, 2009).

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[4] An earlier report—The State of New Hampshire's Estuaries (New Hampshire Estuary Project, 2000) indicates that declining water quality, in part due to nutrient overloading, has been a concerning trend for a decade or more.

The 2013 State of the Estuary (SOE) report for the Great Bay Estuary evaluated 22 key indicators of the health of the estuary. Of the 22 indicators, 15 are classified as having cautionary or negative conditions or trends, while 7 show positive conditions or trends. The overall assessment concludes that there is reason to be concerned about the health of our estuary, and that increased efforts to study and restore our estuaries are needed. "At this time the Great Bay Estuary exhibits many of the classic symptoms of too much nitrogen: low dissolved oxygen in tidal rivers, increased macroalgae growth, and declining eelgrass" (SOE 2013, pg. 12). Additionally, the report indicates that "…there have been persistent and numerous violations of the dissolved oxygen standards at stations in the tidal rivers that flow into the estuaries" (SOE 2013, pg. 18).

Eelgrass (*Zostera marina*) is the base of the estuarine food web in the Great Bay Estuary. Healthy eelgrass beds filter water and stabilize sediments (Short and Short, 1984) and provide habitat for fish and shellfish (Duarte, 2001; Heck et al., 2003). While eelgrass is only one species in the estuarine community, the presence of eelgrass is critical for the survival of many species. Loss of eelgrass habitat changes the species composition of the estuary, resulting in a detrimental difference in the aquatic community. In particular, if eelgrass habitat is lost, the estuary will likely be colonized by macroalgae species which do not provide the same habitat functions as eelgrass (Short et al., 1995; Hauxwell et al., 2003; McGlathery et al, 2007).

According to the 2013 SOE report, "[d]ata indicate a long-term decline in eelgrass since 1996 that is not related to wasting disease." Additionally, the report notes that "There are also indications, based on estimates of the density of the eelgrass beds, that the remaining beds contain fewer plants and, therefore, provide less habitat." Statistically significant declines in eelgrass have been observed in Great Bay proper and the Piscataqua River as well as downstream in Little Harbor and Portsmouth Harbor. The loss of eelgrass results in increased suspended sediments which block light penetration and can lead to further eelgrass losses. "When this habitat is lost, the sediments are more easily stirred up by wind and waves." (SOE 2013, pgs. 20 & 22).

The 2018 SOE report expanded its evaluation to 24 indicators of a healthy estuary, including social indicators for the first time. Of the 24 indicators, 14 are classified as having a cautionary or negative trend or status, while 6 show a positive trend or status and 4 are too new to establish trends of any kind. Nutrient loading is categorized as either "point source" or "non-point source," the former showing a positive trend and the latter showing a cautionary trend. On the positive side, it is encouraging that low rainfall and nitrogen loading reductions at several WWTFs during 2012-2016 resulted in a 26% reduction of nitrogen loading from 2009-2011 levels. However, the report notes that "[s]ince the human population and impervious cover continue to increase, nitrogen management remains a high priority." Further stating that "[n]utrient loading is a critical stressor. Although we have been making impressive improvements since 2012, nutrients remain of high concern, particularly during rainy years where more runoff leads to increased loading." (SOE 2018, pgs. 6 & 16)

Despite some reductions in nitrogen loading, eelgrass loss continues to have a negative trend with eelgrass acreage in 2016 (1,625 acres) only 54% of the PREP goal of 2,900 acres by 2020. The 2018 report states that "[e]elgrass in the Great Bay Estuary shows an overall decline and, more importantly, a clear deterioration in its ability to recover from episodic stress." The report notes that the "main causes of temperate (between the tropics and the polar regions) seagrass loss are nutrient loading, sediment deposition, sea-level rise, high temperature, introduced species, biological disturbance (*e.g.*, from crabs and geese), and wasting disease. Toxic contaminants such as herbicides that are used on land can also stress eelgrass. All of these causes are plausible in the Great Bay Estuary and many magnify each other

to stress eelgrass and make habitats less resilient. Proactive actions to increase resilience for eelgrass habitat are critical as climate science predicts an increase of stressful events, such as extreme storms with increased rains and higher winds." (SOE 2018, pgs. 6 & 24)

Additional scientific literature confirms that cultural eutrophication from increased nitrogen loads to estuaries has been shown to be a major cause of seagrass disappearance worldwide (Burkholder et al., 2007; Short and Wyllie-Echeverria, 1996). Increasing nitrogen concentrations in shallow estuaries favor the proliferation of ephemeral macroalgae over seagrasses and other perennial submerged aquatic vegetation (McGlathery et al., 2007; Fox et al., 2008). Macroalgae have lower light requirements in high nutrient environments (Fox et al. 2008). The proliferation of macroalgae species can be responsible for eelgrass loss due to shading and changes in water chemistry near the sediments (Hauxwell et al., 2001; Hauxwell et al., 2003). When macroalgae forms dense mats on the sediment surface, it can prevent the re-establishment of eelgrass in these areas (Short and Burdick, 1996).

Receiving Water Quality Violations

Great Bay and many of the rivers that feed it are approaching or have reached their assimilative capacity for nitrogen and are suffering from the adverse impacts of human-derived nutrient over-enrichment, including cultural eutrophication. The impacts of excessive nutrients are evident throughout the Great Bay estuary, including the Piscataqua River.

New Hampshire classifies the Great Bay estuary as a class B water. Per New Hampshire water quality standards (NHWQS), "[a]ll 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. 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." Env-Wq 1703.01(b) & (c). Class B waters must also meet the numeric water quality criterion of at least 75% of dissolved oxygen saturation (daily average) and an instantaneous minimum of 5 mg/L of dissolved oxygen. Env-Wq 1703.07. Furthermore, they must satisfy the following narrative water quality criteria:

- 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. Env-Wq 1703.19(a).

- Class B waters shall contain no phosphorus or nitrogen in such concentrations that would impair any existing or designated uses, unless naturally occurring. Existing discharges containing phosphorus or nitrogen, or both, which encourage cultural eutrophication shall be treated to remove the nutrient(s) to ensure attainment and maintenance of water quality standards. Env-Wq 1703.14(b) & (c).

"Cultural eutrophication" is defined in the NHWQS as "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." Env-Wq 1702.15.

Section 303(d) of the Clean Water Act requires states to identify those waterbodies that are not expected to meet surface water quality standards after implementation of technology-based controls. Therefore,

New Hampshire has developed a Comprehensive Assessment Listing Methodology (CALM) [5] to determine the impairment status for nutrient-related parameters such as chlorophyll-a, DO (concentration and percent saturation), estuarine bioassessments (eelgrass), water clarity (light attenuation coefficient) and total nitrogen.

Based upon this listing methodology, the Great Bay estuary, including its tributaries, have been included on the State of New Hampshire's Section 303(d) list. New Hampshire's 2012 Section 303(d) list includes significant nutrient-related impairments throughout the Great Bay estuary, as presented in Table 2 below.

Table 2 - 2012 Nutrient-Related Water Quality Impairments in the Great Bay Estuary

Assessment Zone	Chlorophyll-a	DO (mg/L)	DO (% Sat)	Estuarine Bioassessments (eelgrass)	Water Clarity (Light Attenuation Coefficient)	Total Nitrogen
Squamscott River South	5-P	5-P	5-M			5-P
Squamscott River North	5-P	5-P		5-P	5-P	5-P
Lamprey River North	5-M	5-P	5-M			5-M
Lamprey River South	5-M			5-P	5-P	5-P
Winnicut River				5-P		
Great Bay				5-P	5-M	5-M
Little Bay				5-P	5-M	5-M
Oyster River	5-M	5-P	5-M	5-P	5-P	5-P
Bellamy River				5-P		5-P
Cocheco River	5-M					5-P
Salmon Falls River	5-P	5-P	5-M			5-M
Upper Piscataqua River				5-P	5-P	5-P
Lower Piscataqua River North				5-P		
Lower Piscataqua River South				5-P		
Portsmouth Harbor				5-P	5-M	5-M
Little Harbor/Back Channel				5-P	5-M	5-M
Sagamore Creek				5-P		

5-P indicates a water quality designation of "Impaired, Poor Water Quality"
5-M indicates a water quality designation of "Impaired, Marginally Below Criteria"

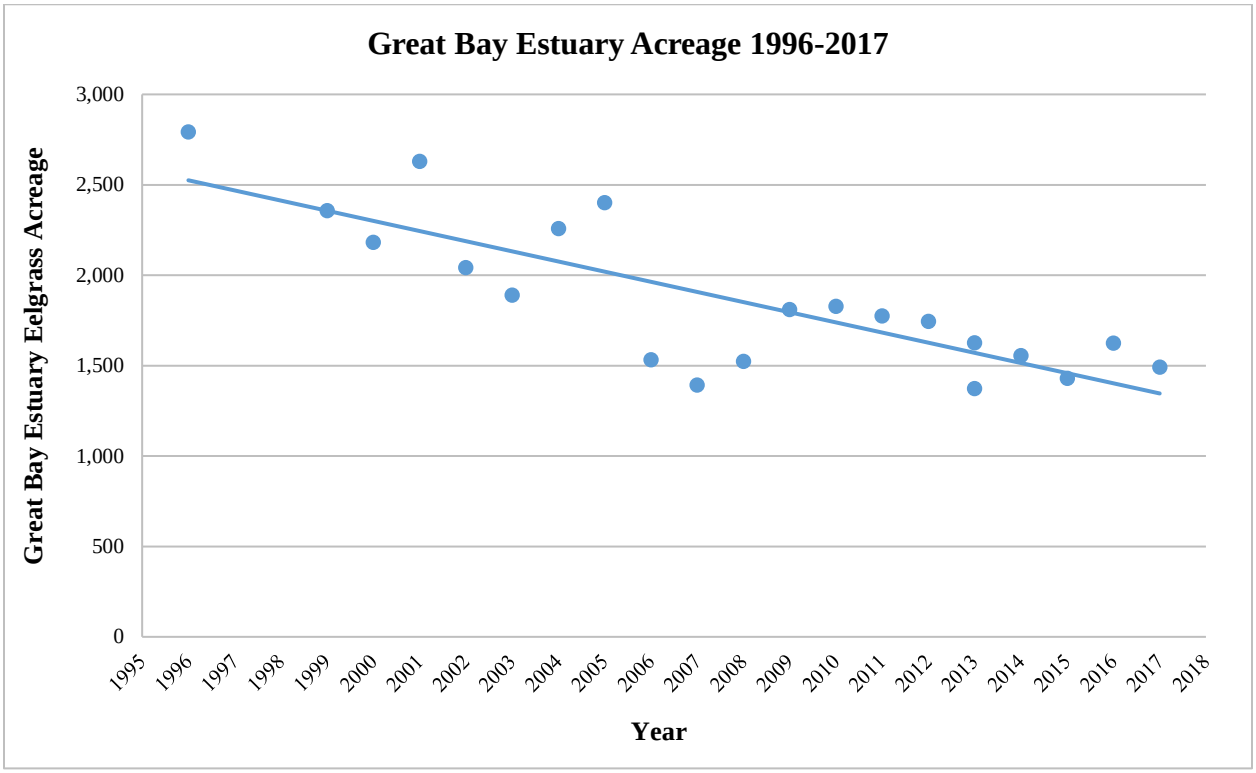
EPA acknowledges that the specific subset of water quality impairments in each assessment zone in Table 2 may be unique from other nearby assessment zones and, as with any estuary, certain assessment zones may be considered more susceptible than others to elevated nitrogen loads. EPA notes, however, that the entire Great Bay estuary is a single estuarine system characterized by different levels of mixing of the same source waters, continual exchange of waters among estuarine segments, the same sources for sediment, and the same climatic conditions. Given that there are 50 individual impairments throughout the estuary listed in Table 2, it is apparent that the entire estuary is suffering from significant and pervasive nutrient-related impacts which are not isolated to the most susceptible areas.

[5] The most recent update to the CALM can be found at the NHDES website: https://www.des.nh.gov/organization/divisions/water/wmb/swqa/index.htm

In the 2014, 2016 and 2018 Section 303(d) lists proposed by NHDES, certain assessment zones listed above are proposed for delisting with respect to total nitrogen. EPA has not yet taken action on this proposed delisting, pending further evaluation. However, the decision as to whether these assessment zones are ultimately delisted for total nitrogen would have no bearing on the terms of this General Permit. NHDES's rationale for the proposed delisting of these assessment zones rests on NHDES's assumption that an assessment zone should be listed for total nitrogen only if it is clear that the eutrophication effects on designated uses can be attributed to total nitrogen alone. This is not the same standard used to determine whether it is necessary to establish permit limits. Rather, 40 C.F.R. § 122.44(d)(1)(i) states that a permit limit must be established for any pollutant that "may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality." As detailed in the *Nitrogen Threshold* and *Reasonable Potential Analysis* sections below, EPA has determined—and NHDES has concurred—that the overall nitrogen loading to the Great Bay estuary has exceeded the estuary's assimilative capacity. Given the tidal nature of the estuary, all significant discharges of nitrogen throughout the watershed (including the 13 WWTFs subject to this permit) are clearly contributing to this excessive load and are, therefore, contributing to a variety of excursions of water quality standards. EPA and NHDES note that these assessment zones would, even if delisted for nitrogen, continue to be listed for other eutrophication-related impairments, and there is ample evidence that nitrogen has a reasonable potential to contribute to those impairments. Based on this reasonable potential determination, these discharges must receive effluent limits, regardless of whether certain individual assessment zones are delisted for total nitrogen. EPA and NHDES concur in this view.

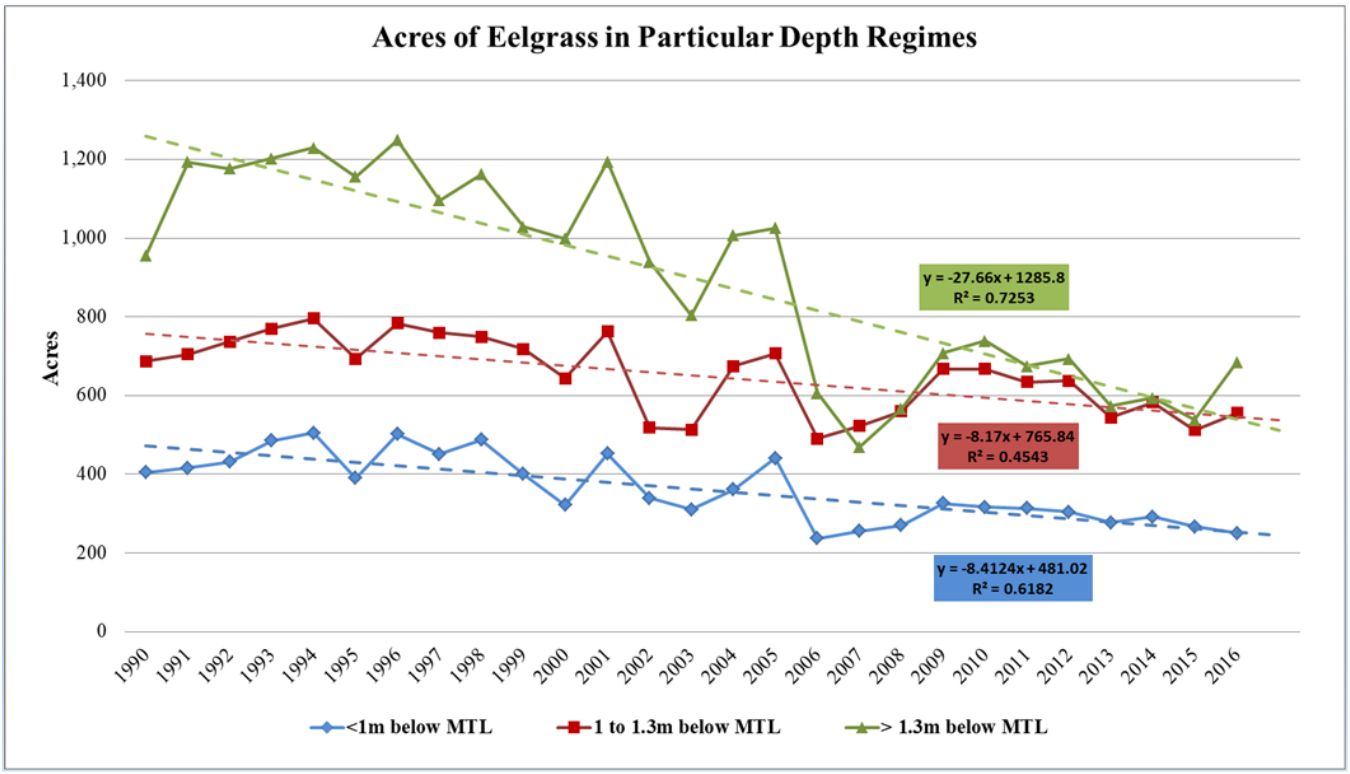
Further evidence of broad water quality impairment due to nutrient over-enrichment is the declining trend of eelgrass throughout the estuary. As clearly discussed in the *Scientific Literature and Reports* section above, the Great Bay estuary has been experiencing severe declines in eelgrass acreage for many years. Figure 2 presents this loss in acreage from 1996 to 2017. During this period the Great Bay estuary lost 1300 acres, or nearly half of its eelgrass acreage. Additionally, all eelgrass has been lost in the tidal tributaries feeding into the Great Bay Estuary and in the upper Piscataqua River.

Figure 2 - Eelgrass Acreage in the Great Bay Estuary from 1996-2017



More specifically, Figure 3 below shows that the majority of eelgrass loss has taken place in locations of greater depth (> 1.3 meters below mean tide level) within the estuary. Although nutrient loadings impact light attenuation at all depths, eelgrass is less sensitive to nutrient loading in areas of the estuary that are shallower because those meadows are able to receive their light requirements during low tides when the shoots are exposed directly to the sun. Clearly, the impact of nutrient loading on light penetration and eelgrass coverage is more crucial at locations of greater depth as reflected in the trends below. This further supports the determination that nutrient loadings to the Great Bay estuary are contributing to water quality impairments, especially in areas of greater depth.

Figure 3 - Eelgrass Trends in Particular Depth Regimes



Nitrogen Threshold

Under the federal regulations implementing the NPDES program, permit issuers are required to determine whether a given point source discharge "causes, has the reasonable potential to cause, or contributes to" an exceedance of the narrative or numeric criteria set forth in state water quality standards. *See* 40 C.F.R. § 122.44(d)(1)(ii). If a discharge is found to cause, have the reasonable potential to cause, or contribute to an exceedance of a numeric or narrative state water quality criterion, NPDES regulations implementing section 301(b)(1)(C) provide that a permit *must* contain effluent limits as necessary to achieve state water quality standards. *See* 40 C.F.R. §§ 122.44(d)(1), 122.44(d)(5) (providing in part that a permit must incorporate any more stringent limits required by CWA § 301(b)(1)(C)).

The regulatory mechanism used by permit writers to interpret narrative water quality criteria and establish numeric water quality-based effluent limits is set forth at 40 C.F.R. § 122.44(d)(1)(vi). Where a state has not established a numeric water quality criterion for a specific chemical pollutant that is present in the effluent at a level that causes or has a reasonable potential to cause a violation of narrative water quality standards, the permitting authority must establish effluent limits in one of three ways: (i) based on a "calculated numeric criterion for the pollutant which the permitting authority demonstrates will attain and maintain applicable narrative water quality criteria and fully protect the designated use"; (ii) on a "case-by-case basis" using CWA § 304(a) recommended water quality criteria, supplemented as necessary by other relevant information; or (iii) in certain circumstances, based on an "indicator parameter." 40 C.F.R. § 122.44(d)(1)(vi)(A)-(C). EPA in this case relied upon subsection (A) to translate the relevant narrative criterion into a numeric limit.

When establishing water quality-based effluent limitations in the absence of numeric criteria for

phosphorus and nitrogen, EPA looks to a wide range of materials, including nationally recommended criteria, supplemented by other relevant materials, such as EPA technical guidance and information published under Section 304(a) of the CWA, peer-reviewed scientific literature, and site-specific surveys and data. 40 C.F.R. § 122.44(d)(1)(vi)(A)

Below is a summary of several scientific studies evaluating nitrogen loading rates necessary to protect estuarine environments, along with other information, which form the basis for demonstrating what level of nitrogen will "attain and maintain applicable narrative water quality criteria and will fully protect the designated use." 40 C.F.R. § 122.44(d)(1)(vi)(A)

One study confirmed the sensitivity of seagrass meadows to nitrogen loading in order to examine the possible role of coastal fringing wetlands to protect seagrass meadows from land-derived nitrogen loads. Data from over 30 diverse estuaries worldwide were evaluated, including the Great Bay estuary. This study observed a "50% - 100% reduction in seagrass production and habitat area as land-derived N loads exceed 100 kg N ha^{-1} yr^{-1}." The study further notes that nitrogen loading of 20-100 kg ha^{-1} yr^{-1} is the "critical range" where fringing wetlands may intercept and retain a sufficient portion of the land-derived nitrogen load to protect seagrass meadows. However, above 100 kg ha^{-1} yr^{-1}, wetland retention of nitrogen is below 10% due to the fringing marshes being "overwhelmed" by high loads. (Valiela & Cole, 2002).

A second study evaluated the role of nitrogen in eelgrass loss in temperate estuaries and the effect of light limitation imposed by algae. This study evaluated the specific role of opportunistic algae, including epiphytes and macroalgae, on light attenuation limiting newly recruiting eelgrass shoots. The study, referencing Valiela & Cole 2002, concludes with a management recommendation, as follows: "watersheds should be developed or managed such that land-derived [nitrogen] loads are kept low. The threshold value necessary for eelgrass preservation is difficult to establish accurately, since many factors may influence land-derived nitrogen loading and fate in estuaries (*i.e.*, retention by surrounding marsh, water residence time: Valiela et al., 2000a, 2001), but the present results and others (Valiela et al. 2000b, Valiela & Cole 2002) suggest that eelgrass is likely to decline substantially at values < 30 to 100 kg N ha^{-1} yr^{-1}." (Hauxwell et al., 2003)

A third study evaluated the relationship between eelgrass extent and watershed-derived nitrogen loading for 62 estuarine embayments in New England. This study concluded that "area-normalized nitrogen inputs are proportional to eelgrass loss and that the data exhibit threshold behavior." More specifically, the estuaries could be grouped into three loading categories (*i.e.*, < 50 kg ha^{-1} yr^{-1}, 51-99 kg ha^{-1} yr^{-1}, and ≥ 100 kg ha^{-1} yr^{-1}) resulting in various levels of eelgrass loss. In the category between 51 and 99 kg ha^{-1} yr^{-1} the "ability of eelgrass to thrive diminishes markedly" and with loading rates above 100 kg ha^{-1} yr^{-1} "eelgrass is essentially absent." (Latimer & Rego, 2010) EPA recognizes that the Great Bay Estuary is much larger than the embayments evaluated in this study, but notes that the Great Bay Estuary is comprised of many smaller sections that are comparable to the embayments evaluated in this study.

The susceptibility and eutrophic characteristics of Great Bay described in the 2007 NOAA report, referenced above, as well as the inclusion of Great Bay itself in the Valiela & Cole 2002 study of comparable estuaries, confirm that the recommended nutrient thresholds presented in the scientific literature are applicable to the Great Bay estuary. Although there is some variability of the "critical range" of nutrient loads presented in these studies (*e.g.*, 50-100, 20-100, 30-100 kg N ha^{-1} yr^{-1}), there is a clear maximum threshold of 100 kg ha^{-1} yr^{-1}, above which eelgrass is unable to thrive and significant or complete loss is inevitable.

Given the range of potential thresholds set forth in the literature, EPA has chosen to adopt the maximum loading rate as an initial threshold to protect the Great Bay estuary from "large deterioration" and to restore the estuary to a healthy condition. EPA notes that any threshold in the range presented in the scientific literature above (*i.e.*, 20/30/50 to 100 kg ha^{-1} yr^{-1}) would fall within a zone of relevant literature values. As the literature suggests, a threshold even lower than 100 kg ha^{-1} yr^{-1} may be necessary in the future if the system does not fully recover once brought into compliance with this initial threshold. EPA has chosen the least stringent threshold within the "critical range" as a reasonable next step in an adaptive management approach.

EPA views adaptive management as an approach to natural resource management that emphasizes learning through management where knowledge is incomplete, and when, despite inherent uncertainty, managers and policymakers must act. Unlike a traditional trial and error approach, adaptive management has explicit structure, including a careful elucidation of goals, identification of alternative management objectives, and procedures for the collection of data followed by evaluation and reiteration. The process is iterative, and serves to reduce uncertainty, build knowledge and improve management over time in a goal-oriented and structured process. Consistent with this approach, EPA has chosen the above threshold to be a reasonable next step to reach the goal of achieving water quality standards, including the restoration of healthy eelgrass, throughout the estuary. EPA stresses the importance of achieving this threshold while implementing a robust monitoring program to assess the health of the estuary in response to nitrogen load reductions. Both required load reductions and monitoring requirements are described in detail below. EPA notes the inherent uncertainty of achieving water quality standards by selecting the high end of the range of potential thresholds and emphasizes that a more stringent threshold may be necessary in the future, should the system not fully recover once the higher threshold is achieved.

For comparison, this threshold of 100 kg ha^{-1} yr^{-1} is empirically consistent with recent water quality improvements that have been observed in a much larger estuary, Narragansett Bay. Like Great Bay, Narragansett Bay is an estuary with significant tidal and riverine inputs and exhibits complex flow patterns and mixing dynamics. In recent years, EPA, MassDEP and the Rhode Island Department of Environmental Management (RIDEM) have undertaken extensive efforts to address significant nutrient-related water quality impacts by reducing nitrogen loads to the system. While the surface area of the estuary is much larger than that of Great Bay (197.5 sqmi compared to 21 sqmi), the area-normalized nitrogen loading rate is quite comparable. In 2000-2004, the loading rate to Narragansett Bay was 157.6 kg ha^{-1} yr^{-1}. This loading rate corresponded to significant DO and chlorophyll impairments and contributed to eelgrass loss throughout the estuary (NBEP 2017). "The decline [of seagrass] was caused by stressors such as nutrient enrichment and physical disturbances (*e.g.*, dredging, removal through boating or other activities, and storms), as well as by a seagrass disease outbreak in the 1930s that caused extensive losses along the Atlantic coast (Costa 1988, Short et al. 1993, Doherty 1995, Kopp et al. 1995)." (NBEP 2017, at 224) Based on effective nutrient management throughout the estuary in recent years, the nitrogen loading rate in 2013-2015 dropped to 80.1 kg ha^{-1} yr^{-1}, a 49% reduction from 2000-2004 levels. Corresponding with the loading rate dropping below 100 kg ha^{-1} yr^{-1}, water quality improvements have been observed in dissolved oxygen and chlorophyll-a levels and seagrass levels have generally rebounded (NBEP 2017; Oviatt et al. 2017). "Between 2006 and 2012 seagrass acreage increased by 37 percent in areas of Narragansett Bay that were mapped both years…." (NBEP 2017, at 231) "The recent gains in seagrass acreage in Narragansett Bay likely stemmed from improved water quality. A reduction in nutrient loading from local wastewater treatment facilities (see 'Nutrient Loading' chapter) likely reduced epiphyte coverage on seagrass leaves, phytoplankton blooms, and macroalgae growth, improving water clarity (see 'Water Clarity' chapter). Improved water clarity allows light to penetrate to greater depths, allowing seagrass beds to flourish and expand into deeper waters."

(NBEP 2017, at 229).

EPA notes that in the case of the Narragansett Bay estuary, further nitrogen reductions are still required to address nutrient-related water quality impairments that continue to exist in certain sections of the estuary (*e.g.*, Mount Hope Bay and the Taunton River estuary). Furthermore, rising water temperatures in southern New England pose additional stress on the continued recovery of eelgrass in Narragansett Bay, and may be responsible for the 7 percent decline in seagrass acreage between 2012 and 2016. Although seagrass acreage is still well above 2006 levels, further nitrogen reductions may be necessary to off-set the negative effects of rising temperatures. While Narragansett Bay and Great Bay have some obvious distinctions, the comparison supports the conclusion that a loading threshold of 100 kg ha^{-1} yr^{-1} in larger estuaries with riverine inputs and complex flow patterns and mixing dynamics is a reasonable goal as part of an adaptive management approach.

In summary, the three scientific studies described above, the comparison to Narragansett Bay, and site-specific reports, analyses and conclusions which confirm the applicability to the Great Bay estuary constitute a consistent and reasonable basis for the 100 kg ha^{-1} yr^{-1} nitrogen loading threshold to protect water quality standards. EPA's analysis does not rely on any single study or comparison as the sole basis for this approach but relies on a broad understanding of available literature and site-specific data in Great Bay as well as comparable estuaries. More specifically, the first two scientific studies (i.e., Valiela & Cole, 2002 and Hauxwell et al., 2003) provide a threshold of area-normalized nitrogen loads for entire estuaries. This threshold is clearly applicable to the Great Bay Estuary based on Great Bay's specific inclusion in the study. The third scientific study (*i.e.*, Latimer & Rego, 2010), provides a smaller scale analysis by evaluating estuarine embayments and concludes that area-normalized nitrogen loading to such embayments must also not exceed the same upper threshold. Finally, the comparison to Narragansett Bay acts to provide a direct comparison on a larger scale that actual area-normalized nitrogen load reductions similar to those proposed in this permit have been effective towards achieving water quality standards. This comparison confirms that such an approach is justified and that it is reasonable to expect a similar result in the Great Bay estuary. This is particularly true given that the 2007 NOAA report discussed above characterizes both Great Bay and Narragansett Bay with the same degree of susceptibility to nitrogen-induced eutrophication (*i.e.*, "moderately susceptible"). While any one of these lines of support may be sufficient to establish the threshold of 100 kg ha^{-1} yr^{-1} as a reasonable target, the fact that they each independently reinforce the same threshold gives EPA confidence that this threshold, as part of an adaptive management approach, is an effective means to protect eelgrass and achieve water quality standards throughout the Great Bay Estuary.

Finally, given the impacts of overall water quality on eelgrass health, EPA expects that nutrient reductions necessary to effectively restore and protect eelgrass will also bring the Great Bay estuary into attainment of water quality standards for all other nutrient-related impairments (*i.e.*, chlorophyll-a, dissolved oxygen and light attenuation). Accordingly, the GBTN GP is requiring a robust ambient monitoring for eelgrass and each of these water quality parameters as part of this adaptive management approach. *See* discussion of the Adaptive Management Ambient Monitoring Program in Part IV of this Fact Sheet. EPA notes that once water quality standards are met consistently for all nutrient-related parameters throughout the Great Bay estuary, no further nitrogen loading reductions will be necessary (assuming that nitrogen loads do not increase from that level because of significant changes in land use, weather, atmospheric deposition or other reasons that can affect water quality).

Reasonable Potential Analysis

Given the numeric threshold chosen above, EPA must determine whether the discharge of nitrogen is at

a level which will cause, have the reasonable potential to cause, or contribute to an excursion of water quality standards. The words "contribute to" indicate that nitrogen need not be the sole cause of any potential violation of a state standard. *See* 54 Fed. Reg. 23,868, 23,873 (June 2, 1989). As described in the scientific literature section above, nutrient loading is one of several factors noted in the 2017 SOE report that "magnify each other to stress eelgrass and make habitats less resilient," contributing to the water quality impairments throughout the Great Bay estuary. EPA emphasizes that the factors "magnify[ing] each other" would make the estuary more sensitive to nutrient loading, resulting in a greater need to limit nutrient loading rather than alleviating the need for nutrient controls.

To assess reasonable potential, EPA has evaluated recent nitrogen loadings into the Great Bay estuary for comparison with the chosen threshold. The 2018 SOE report indicated that the average loading rate from 2012-2016 was approximately 150 kg ha^{-1} yr^{-1} to the Great Bay estuary. While this estimate included most nitrogen sources throughout the Great Bay watershed, it did not include the full contribution of point source and non-point source nitrogen loadings in the Lower Piscataqua River (LPR) sub-basin of the estuary. Loads from WWTFs into the LPR described in the 2018 SOE report were only partially accounted for based on delivery factors to the upper sections of the estuary; the full WWTF load into the estuary (*i.e.*, giving all discharges directly into the GBE a delivery factor of 100%) results in approximately 82.4 kg ha^{-1} yr^{-1}. Table 3 describes these WWTF loads from 2012-2016. Note that the total load of 2,717.1 lb/day converts to 82.7 kg ha^{-1} yr^{-1}.

Table 3 - 2012-2016 WWTF Nitrogen Load to the Great Bay Estuary

Town	2012-2016 Ave Flow (mgd)	2012-2016 Ave TN Conc (mg/l)	Actual Load in Effluent (lb/day)	Delivery Factor (%)	Actual Load to GBE (lb/day)
Rochester	2.97	16.9	418.8	75.56	316.4
Portsmouth	4.03	30	1009.4	100	1009.4
Dover	2.46	18.2	372.9	100	372.9
Exeter	1.61	22.6	304.0	100	304.0
Durham	0.90	12.8	95.7	100	95.7
Kittery	0.90	19.4	146.1	100	146.1
Somersworth	1.44	6.8	81.6	94.94	77.5
Pease ITP	0.64	16.4	87.4	100	87.4
Berwick	0.21	16.7	28.9	94.55	27.3
North Berwick	0.31	18.2[1]	47.1	51.56	24.3
Newmarket	0.52	39.1	170.2	100	170.2
South Berwick	0.28	5.9	13.9	100	13.9
Epping	0.25	18.2[1]	37.4	58.2	21.8
Newington	0.11	17.6	15.6	100	15.6
Rollinsford	0.08	18.2[1]	11.5	98.96	11.4
Newfields	0.09	21.5	16.0	100	16.0
Milton	0.07	18.2[1]	10.8	65.7	7.1
Total			2,867.4		2,717.1

[1]Estimated (no data)

Additionally, non-point source and stormwater point source loads from the LPR were not included in the 2018 SOE report. Therefore, EPA referred to the NHDES 2014 Great Bay Non-Point Source Study

to determine the 2009-2011 average non-point source and stormwater point source loading rate of approximately 9.1 kg ha^{-1} yr^{-1} from the LPR sub-basin. Primarily due to lower rainfall during 2012-2016 (35.2 in/yr) than in 2009-2011 (46.9 in/yr), the non-point source and stormwater point source load (not including the LPR) reduced proportionally from 139.2 kg ha^{-1} yr^{-1} in 2009-2011 to 100.0 kg ha^{-1} yr^{-1} in 2012-2016. By applying the same proportional reduction to the known non-point source and stormwater point source load from the LPR of 9.1 kg ha^{-1} yr^{-1}, the resulting LPR contribution was determined to be approximately 6.6 kg ha^{-1} yr^{-1} for 2012-2016. Adding this load to the known non-point source and stormwater point source load from the rest of the watershed, results in a total non-point source and stormwater point source load of 106.6 kg ha^{-1} yr^{-1}. Therefore, the total average loading rate from the entire Great Bay watershed to the Great Bay estuary in 2012-2016 was calculated to be approximately 189.3 kg ha^{-1} yr^{-1} (*i.e.*, 106.6 plus 82.7), well above the 100 kg ha^{-1} yr^{-1} threshold.

Based on recent permitting efforts and collaboration with NHDES and the Great Bay municipalities, several of the WWTFs have seen recent and ongoing plant upgrades and efforts to optimize nitrogen removal, including Rochester, Portsmouth, Dover, Exeter, Durham, Newmarket and Newington. EPA notes that these recent and anticipated load reductions account for approximately 40 kg ha^{-1} yr^{-1} total load reduction from 2012-2016 levels. These reductions are substantial and are expected to benefit the water quality of the estuary. However, without further reductions the total loading rate is expected to remain well above the 100 kg ha^{-1} yr^{-1} threshold. This substantial exceedance of the maximum threshold set forth in the literature paired with significant water quality impairments throughout the estuary (see Table 2 above), clearly indicate that nitrogen loads exceed the assimilative capacity of the estuary. Therefore, EPA concludes that all significant discharges of nitrogen into the Great Bay estuary, have the reasonable potential to cause or contribute to system-wide violations of water quality standards. This specifically includes the discharge of treated municipal wastewater from the 17 WWTFs located throughout the Great Bay watershed.

To the extent recent or ongoing nitrogen reductions will achieve compliance with the limitations set forth in the Draft Permit for specific WWTFs (described below), EPA notes that the issuance of this GBTN GP will act to "lock in" these reductions to ensure that loads do not increase in the future.

Effluent Limitations

To achieve acceptable nitrogen loads consistent with the established nutrient threshold, significant point source and non-point source reductions are necessary. An evaluation of existing loads from all 17 WWTFs in the watershed indicated that approximately 85% of the WWTF load from 2012-2016 was from the largest 7 WWTFs (design flow > 2 mgd) and the remaining fraction was from the smaller 10 WWTFs (design flow < 2 mgd)[6]. Based on this analysis, EPA determined that the most environmentally-beneficial and cost-effective reductions in nitrogen should be applied to the largest WWTFs. To achieve the necessary WWTF reductions, the 7 largest dischargers are given annual TN load limits based on 2012-2016 average annual flow and an effluent TN concentration of 8 mg/L. EPA selected the basis of 8 mg/L at average flows for these largest facilities because this is considered the level of treatment achievable at most of the existing facilities without requiring major upgrades in the near future. The remaining 10 smaller dischargers are given annual TN load limits based on 2012-2016 average annual flows and available average effluent TN concentrations (*i.e.*, a "hold the load" requirement). The one exception to this is Newmarket which has upgraded its facility and is achieving an effluent concentration of 8 mg/L and will receive a corresponding load limit of 35 lb/day (*i.e.*, 8

[6] For four of these smaller WWTFs (*i.e.*, North Berwick, Epping, Rollinsford, and Milton), the average effluent TN concentration was not known so an estimate of 18.2 mg/L was used.

mg/L * 0.52 MGD * 8.345). For all 17 WWTFs, an annual average limit (instead of a seasonal limit) was chosen in order to be consistent with the chosen annual loading threshold of 100 kg ha^{-1} yr^{-1}. Based on the increased ability of WWTFs to remove nitrogen in warmer weather, EPA expects that seasonal variation will occur resulting in lower point source loads in the warmer months and higher point source loads in the colder months. This seasonal variation is expected to further benefit the Great Bay estuary during the most critical months of the growing season, when nitrogen loads are expected to have the most impact on water quality. Table 4 below presents the waste load allocations for all 17 WWTFs to achieve the chosen threshold.

Table 4 - Annual Nitrogen Load Allocations

WWTF	TN Load Allocations (lb/day)	Delivery Factor (%)	Actual Load to GBE (lb/day)
Rochester	198	75.56	149.8
Portsmouth	269	100	269.2
Dover	164	100	163.9
Exeter	108	100	107.6
Durham	60	100	59.8
Kittery[1]	60	100	60.2
Somersworth	96	94.94	91.1
Pease ITP	87	100	87.4
Berwick[1]	29	94.55	27.3
North Berwick[1]	47	51.56	24.3
Newmarket	35	100	34.8
South Berwick[1]	14	100	13.9
Epping	37	58.2	21.8
Newington	16	100	15.6
Rollinsford	12	98.96	11.4
Newfields	16	100	16.0
Milton	11	65.7	7.1
Total	1,259	---	1,161

[1] Kittery, Berwick, North Berwick and South Berwick WWTFs discharge in the state of Maine. Because EPA is not the permitting authority in the state of Maine, these facilities are not subject to this general permit. EPA expects the Maine Department of Environmental Management to regulate nitrogen discharges from these facilities.

In addition to meeting the annual load limits in Table 4, each Permittee must also optimize nitrogen removal throughout the year to minimize the nitrogen load from these facilities. As specified in the draft General Permit, each Permittee must develop, implement and maintain a Nitrogen Optimization Plan (NOP) which will evaluate alternative methods of operating the existing wastewater treatment facility to optimize the removal of nitrogen, including, but not limited to, operational changes designed to enhance nitrification (seasonal and year-round), incorporation of anoxic zones, septage receiving policies and procedures, and side-stream management. The annual load limits and the year-round optimization requirements will serve to keep the annual discharge load as low as possible at each WWTF.

EPA notes that some of the load allocations in Table 4 are somewhat more stringent than the existing loads for each WWTF. While EPA expects most of these WWTFs to be able to comply with the

allocations in Table 4 immediately through nitrogen optimization, EPA is soliciting comments regarding the need for a compliance schedule for any WWTFs that may need to implement more significant process improvements and/or upgrades to comply with the annual average effluent limit. EPA notes that under NPDES regulations, schedules must lead to compliance "as soon as possible." 40 C.F.R. § 122.47(a)(1). Therefore, any request for a compliance schedule and the length of such a schedule must be clearly justified and must include reasonable yearly milestones. Moreover, such a schedule, if granted, would incorporate an interim limit based on the WWTF's most recent annual average load (*i.e.*, "hold the load").

Non-Point Source and Stormwater Point Source Nitrogen

While the discharge of nitrogen from the 17 WWTFs represents a significant portion of the controllable nitrogen load into the Great Bay estuary, non-point sources and stormwater point sources of pollution still represent the majority of the nitrogen load. EPA has engaged in extensive discussions with NHDES and with Great Bay permittees, and both the state and the permittees have made it clear that they favor an approach that includes both achievable reductions at WWTFs and significant reductions in non-point source and stormwater point source nitrogen loads. On October 21, 2019, NHDES sent a letter to EPA regarding *An Adaptive Nutrient Management Strategy for the Great Bay Estuary*. In this letter, NHDES highlights the importance of restoring the Great Bay estuary through an adaptive management approach designed to address both point sources and non-point sources of nitrogen and supports the use of the 100 kg ha^{-1} yr^{-1} numeric loading threshold as an appropriate translation of the state's narrative water quality standards. Accordingly, the draft GBTN GP includes achievable WWTF limits and describes optional measures to reduce non-point source and stormwater point source loads to achieve the numeric loading threshold.

The total WWTF allocations above represent a delivered nitrogen load of 1,161 lb/day, or 35.4 kg ha^{-1} yr^{-1}. This leaves 64.6 kg ha^{-1} yr^{-1} for non-point source and stormwater point source loads in order to achieve the overall 100 kg ha^{-1} yr^{-1} loading threshold. As mentioned above, non-point source and stormwater point source loads between 2012 to 2016 averaged 106.6 kg ha^{-1} yr^{-1}. This would indicate a non-point source and stormwater point source load reduction of approximately 39% (in addition to the point source loadings described above) is necessary to achieve the overall loading threshold. However, non-point source and stormwater point source loads are highly correlated to annual rainfall and rainfall in 2012 to 2016 was below average (40.9 in/yr, in Durham, NH from 2012-2016). EPA would expect the non-point source and stormwater point source load to increase proportionally as rainfall returns to average levels in the future. To account for this, EPA normalized the 2012 to 2016 average non-point source and stormwater point source load to average rainfall (45.2 in/yr, in Durham, NH from 1988-2017), resulting in a non-point source and stormwater point source load of approximately 117.0 kg ha^{-1} yr^{-1}. Given this normalized load, the necessary non-point source and stormwater point source reduction is approximately 45% to achieve the chosen threshold.

EPA notes that the 2017 New Hampshire Small Municipal Separate Storm Sewer System General Permit (the MS4 GP) authorizes stormwater discharges from 18 municipalities within the Great Bay Watershed; nine of these municipalities will also be subject to the GBTN GP. The requirements of the MS4 GP include stormwater best management practices such as post-development stormwater ordinance requirements; fertilizer, grass cutting, and leaf litter management on municipal property; more frequent street sweeping and/or leaf litter collection programs in areas discharging to the nitrogen impaired waters; public education to target nutrient sources; nitrogen source identification in stormwater catchments; and tracking of structural stormwater control nitrogen reductions. The GBTN GP does not supersede any permit requirements contained in the MS4 GP. EPA anticipates that the next reissuance

of the MS4 GP will contain updated nitrogen control requirements for all communities covered under the MS4 GP based on data gathered through the Adaptive Management Ambient Monitoring Program of the GBTN GP (See Part IV of this Fact Sheet below), current impairment status of waterbodies, relevant stormwater reductions of TN necessary to meet water quality standards, stormwater control performance, and any other relevant information to ensure the requirements of the MS4 GP result in the attainment of water quality standards in the Great Bay estuary. In addition, EPA will consider incorporating a requirement in a future modification or reissuance of the MS4 GP for all permitted municipalities within the Great Bay watershed to contribute equitably to the Adaptive Management Ambient Monitoring Program described in Part IV of this Fact Sheet and Part 2.3 of the GBTN GP.

EPA has determined, in the context of inherent scientific uncertainty and technical complexity, that the numeric limitations and optimization requirements for the WWTFs through the GBTN GP, along with significant non-point source and stormwater point source reductions which are planned to occur outside the requirements of this permit, will ensure that the discharges do not cause or contribute to violations of applicable water quality standards, including narrative water quality standards for nutrients, in accordance with Section 301(b)(1)(C) of the CWA. Accordingly, the GBTN GP contains effluent limitations for the WWTFs and presents an optional pathway to achieve non-point source and stormwater point source reductions. This optional pathway, which is not a requirement of the permit, is described below and is included in the draft GBTN GP as Appendix II to provide the municipalities with guidance for achieving the initial loading threshold.

Optional Non-Point Source and Stormwater Point Source Nitrogen Reduction Pathway

The State of New Hampshire and many of the Great Bay communities expressed a preference to invest in non-point source and stormwater point source reductions before significant additional investments in WWTF upgrades. This permit sets forth an optional pathway to achieve such gross reductions at the scale needed to meet water quality standards and attain designated uses. The target may be achieved through collaboration between EPA, NHDES and numerous public, private and commercial watershed stakeholders. To provide communities with guidance on the level of reductions needed, EPA and NHDES have identified a pathway to achieve this goal through a long-term, adaptive management approach. Communities who choose to adopt this optional approach would achieve the reductions through fulfillment of the following:

1. Upon the effective date of this permit, each Permittee may, at their election, coordinate with NHDES, other Great Bay communities and stakeholders to develop and utilize the Pollution Tracking and Accounting Program (PTAP) or its successor, a comprehensive subwatershed-based tracking/accounting system, for quantifying the nitrogen loading changes to the Great Bay estuary associated with activities within each municipality. These activities include, but are not limited to:

    a. new/modified septic systems,
    b. decentralized wastewater treatment facilities,
    c. changes to the amount of effective impervious cover,
    d. changes to the amount of disconnected impervious cover,
    e. conversion of existing landscape to lawns/turf, and
    f. any new or modified structural or non-structural Best Management Practices.

2. Within 12 months of the effective date of this permit, each Permittee may, at their election,

develop, submit to NHDES (with a copy to EPA), and begin to implement a near-term nitrogen non-point source and stormwater point source control plan ("Short-Term Nitrogen Control Plan"), including:

a. a schedule of three years for implementing specific short-term (*i.e.*, beginning within one year of submittal) control measures (*e.g.*, fertilizer reduction) to address identified non-point source and stormwater point source nitrogen loadings in each municipality that contribute nitrogen to the Great Bay estuary;
b. the identification of specific control measures and suitable locations within the Great Bay watershed for each of these control measures based on nitrogen reduction credits approved by PTAP or its successor at the time of plan submittal, cost, and site characteristics to achieve optimal reduction of nitrogen to the Great Bay estuary;
c. the estimated cost of each control measure identified in the schedule shall include a description of appropriate financing and regulatory mechanisms to implement the necessary reductions;
d. an operations and maintenance plan for control measures, as necessary; and
e. an explanation of any category of non-point source loadings that are not included in the plan.

3. Within 36 months of the effective date of this permit, each Permittee may, at their election, develop, submit to NHDES (with a copy to EPA), and begin to implement a five-year nitrogen non-point source and stormwater point source control plan ("Long-Term Nitrogen Control Plan – 1"), for implementing specific long-term control measures to achieve a reduction of nitrogen delivered to the Great Bay estuary equivalent to 11% of the municipality-specific baseline to address identified non-point source and stormwater point source nitrogen. The plan may include:

a. a municipality-specific baseline of non-point source and stormwater point source nitrogen delivered to the Great Bay estuary using data directly from the 2014 Great Bay Non-Point Source Study[7] (GBNPSS) or optionally providing a defensible update, normalized to average rainfall;
b. the identification of specific control measures and suitable locations within the Great Bay watershed for each of these control measures based on nitrogen reduction credits approved by PTAP or its successor at the time of plan submittal, cost, and site characteristics to achieve optimal reduction of nitrogen to the Great Bay estuary;
c. the estimated cost of each control measure identified in the schedule shall include a description of appropriate financing and regulatory mechanisms to implement the necessary reductions;
d. an operations and maintenance plan for control measures, as necessary; and
e. an explanation of any category of non-point source loadings that are not included in the plan.
f. If the municipality's WWTF nitrogen loading is below the annual average allocation, the difference between actual annual average loading and the permitted annual average allocation can be applied toward the non-point source and stormwater point source loading reduction target.[8]

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[7] This report uses data from 2009 to 2011. Any update of the municipality-specific baseline shall include all non-point source and stormwater point source changes (*i.e.*, increases and/or reductions) from that municipality since 2011. The report may be found on the NHDES website at: https://www.des.nh.gov/organization/divisions/water/wmb/coastal/great-bay-estuary.htm

[8] Note that the Town of Newmarket was discharging an average of 170 lb/day from 2012-2016 and upgraded their facility to achieve approximately 8 mg/L (converted to 35 lb/day). Therefore, to maintain equitability among each of the smaller WWTFs, the difference between Newmarket's previous load of 170 lb/day and Newmarket's actual annual average loading can be applied toward Newmarket's optional non-point source and stormwater point source loading reduction target.

4. Within 8 years of the effective date of this permit, each Permittee may, at their election, develop, submit to NHDES (with a copy to EPA), and begin to implement a long-term nitrogen non-point source and stormwater point source control plan ("Long-Term Nitrogen Control Plan – 2"), for implementing specific long-term control measures to address identified non-point source and stormwater point source nitrogen to achieve a cumulative reduction of nitrogen delivered to the Great Bay estuary equivalent to 22% of the original municipality-specific baseline. The plan may include items (b) through (f) listed in Part 3 above.

5. Within 13 years of the effective date of this permit, each Permittee may, at their election, develop, submit to NHDES (with a copy to EPA), and begin to implement a long-term nitrogen non-point source and stormwater point source control plan ("Long-Term Nitrogen Control Plan – 3"), for implementing specific long-term control measures to address identified non-point source and stormwater point source nitrogen to achieve a cumulative reduction of nitrogen delivered to the Great Bay estuary equivalent to 33% of the original municipality-specific baseline. The plan may include items (b) through (f) listed in Part 3 above.

6. Within 18 years of the effective date of this permit, each Permittee may, at their election, develop, submit to NHDES (with a copy to EPA), and begin to implement a long-term nitrogen non-point source and stormwater point source control plan ("Long-Term Nitrogen Control Plan – 4"), for implementing specific long-term control measures to address identified non-point source and stormwater point source nitrogen to achieve a cumulative reduction of nitrogen delivered to the Great Bay estuary equivalent to 45% of the original municipality-specific baseline. The plan may include items (b) through (f) listed in Part 3 above.

The optional cumulative reduction targets identified above may be adjusted to account for non-point source and stormwater point source changes that occur outside of the scope of the Permittees' efforts (*e.g.*, changes in atmospheric deposition of nitrogen to the watershed).

In the event the activities described above are not carried out and water quality standards are not achieved, EPA may reopen the General Permit within the timeframe of the permit (5 years) or reissue the General Permit beyond the timeframe of the permit (5 years) and incorporate any more stringent nitrogen effluent limits for the WWTFs necessary to ensure compliance with water quality standards. Conversely, if water quality standards are achieved before the activities described above are fully carried out, further nitrogen reductions from non-point source and stormwater point sources or from more stringent nitrogen effluent limits for the WWTFs may not be necessary (assuming that nitrogen loads do not increase from that level because of significant changes in land use, weather, atmospheric deposition or other reasons that can affect water quality).

IV. Adaptive Management Ambient Monitoring Program

The Permittees shall all participate in the annual ambient monitoring program detailed in this section. The draft GBTN GP requires that each Permittee shall be responsible for a percentage of the overall monitoring cost equivalent to the percentage of the design flow of their WWTF(s) divided by the total design flow of all WWTFs covered by the permit. While this cost allocation is proposed in the draft GBTN GP, EPA is soliciting comments regarding the implementation and cost allocation of this ambient monitoring program.

This monitoring program is intended to provide annual data for nutrients and the response variables to support adaptive management decision making relative to the control of nutrients. This monitoring program is not intended to support evaluations of all potential impairment causes but rather is intended to allow for evaluations of the role of nutrient enrichment relative to water quality impairments. Monitoring focused on impairment causes other than nutrients may be conducted outside the scope of this monitoring program and is not included in the GBTN GP. Furthermore, while this monitoring program may be helpful relative to establishing numeric nutrient criteria, it was not developed for the purpose of establishing numeric nutrient criteria.

The monitoring is organized into three categories: head of tide chemistry monitoring; estuary chemistry monitoring; and estuary biological monitoring. Specific details relative to location, frequency, and parameters are provided below.

Head of Tide Chemistry

Monitoring shall be conducted twice monthly from March through December and monthly from January through February (as conditions allow) at eight head of tide locations in order to characterize annual nitrogen loads to the estuary. Table 5 lists the head of tide station for each tributary. Sample parameters to include:

Grab Samples:

- Total Dissolved Nitrogen (TDN)
- Ammonia-N (NH3)
- Nitrite + Nitrate-N
- Total Particulate Nitrogen (TPN)

Table 5 - Head of Tide Stations for Each Tributary

Head of Tide Station	Tributary
05-OYS	Oyster River
02-WNC	Winnicut River
09-EXT	Exeter/Squamscott River
05-LMP	Lamprey River
05-BLM	Bellamy River
07-CCH	Cocheco River
05-SFR	Salmon Falls River
02-GWR	Great Works River

Estuary Chemistry

Monitoring shall be conducted once per month from April through December at 17 stations in the estuary shown in Tables 6 and 7 below. Eleven of these stations (Table 6) are current trend monitoring stations, including nine that have datasondes. Additional monitoring stations (Table 7) were identified in order to provide more comprehensive spatial coverage. The stations with datasondes is expanded to include six additional stations (GRBGBW, GRBGBE, GRBUPR, GRBLPR, GBRLLB, and LAMP02) shown in Figure 4 below.

Sampling at each station in Tables 6 and 7 is to be conducted between mid-ebb and low tide at a depth of 1 meter at each station. Note that all sampling locations do not need to be sampled on the same day. Sample parameters to include:

Grab Samples:

- Total Dissolved Nitrogen (TDN)
- Ammonia-N (NH_3)
- Nitrite + Nitrate-N
- Total Particulate Nitrogen (TPN)
- Dissolved Oxygen Concentration
- Dissolved Oxygen Saturation
- Chlorophyll-a corrected for pheophytin
- Light Attenuation Coefficient (K_d)

Datasondes:

- Dissolved Oxygen Concentration
- Dissolved Oxygen Saturation
- pH
- Turbidity
- Salinity
- Specific Conductance
- Water Temperature
- Chlorophyll-a

Table 6 - 2018 Trend Monitoring Stations

Station	Location	Latitude	Longitude
GRBAP	Jackson Estuarine Laboratory	43.0922	70.8650
GRBCL	Chapmans Landing	43.0394	70.9283
GRBGB	Great Bay Datasonde	43.0722	70.8694
GRBLR	Lamprey River Datasonde	43.0800	70.9344
GRBOR	Oyster River Datasonde	43.140	70.9110
GRBSQ	Squamscott River Datasonde	43.0417	70.9222
GRBUPR	Upper Piscataqua River Datasonde	43.1589	70.8302
GRBGBE*	Great Bay – Eastern Lobe Datasonde	43.06004	70.85593
GRBULB	Upper Little Bay Datasonde	43.10486	70.86738
GRBBR	Bellamy River Datasonde	43.1590	70.8537
GRBCR	Cocheco River Datasonde	43.183891	70.837240

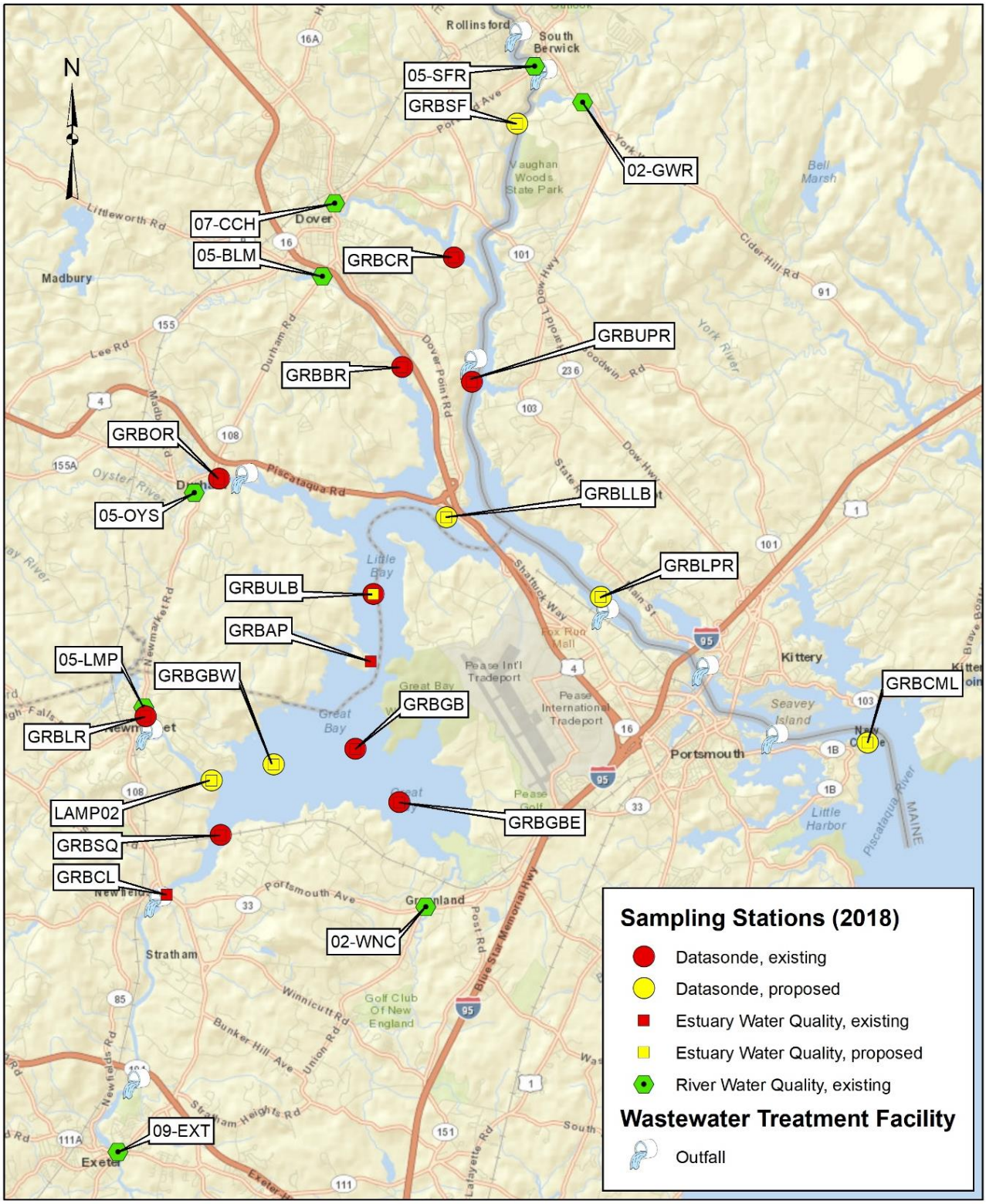
Table 7 - Additional Monitoring Stations

Station	Location	Latitude	Longitude
GRBCML	Coastal Marine Laboratory Datasonde	43.0724	70.7103
GRBSF	Salmon Falls River Datasonde	43.2142	70.8172
GRBGBW*	Great Bay – Western Lobe Datasonde	43.06887	70.89481
GRBLPR	Lower Piscataqua River Datasonde	43.10628	70.79264
GRBLLB	Lower Little Bay Datasonde	43.12623	70.86580
LAMP02	Lower Lamprey River Datasonde	43.065258	70.914041

* One datasonde shall be alternated between GRBGBW and GRBGBE each year.

Figure 4 below shows the location of each monitoring station throughout the Great Bay estuary.

Figure 4 - Great Bay Estuary Ambient Monitoring Stations



Estuary Biology

A benthic aquatic community assessment shall be conducted annually using Sediment Profile Imaging (SPI) and benthic grab samples. SPI samples should be taken at 100 randomly dispersed monitoring stations throughout the saltwater portion of the tributaries and the estuary. Benthic grab samples shall be collected at 8 stations each year (stations should coincide with estuarine chemistry and SPI stations and rotated each year). The SPI samples will be used to determine the presence and type of epifaunal and infaunal species, the depth of the redox discontinuity layer, and presence/absence of macroalgae. Benthic grab samples will be sorted and infauna identified to the lowest taxon possible.

Aerial mapping of eelgrass beds throughout the estuary shall be mapped and ground-truthed each year for each assessment zone within the Great Bay Estuary. For each assessment zone where eelgrass is present a survey shall be done once per year during July/August in a representative location. In each meadow a series of randomly dropped quadrats shall be dropped within the meadow to determine density, biomass, percent cover, and abundance of epiphytic growth. Additionally, the percent cover of macroalgae in each plot shall be determined and the deep edge of the meadow shall be marked and monitored each year.

Assessment Zones within the Great Bay Estuary include:

- Squamscott River North
- Squamscott River South
- Lamprey River North
- Lamprey River South
- Winnicut River
- Great Bay (proper)
- Little Bay
- Oyster River
- Bellamy River
- Cocheco River
- Salmon Falls River
- Upper Piscataqua River
- Lower Piscataqua River – North
- Lower Piscataqua River – South
- North Mill Pond
- South Mill Pond
- Portsmouth Harbor
- Little Harbor/Back Channel
- Sagamore Creek
- Gerrish Island
- Odiorne Point
- Berry’s Brook

GPS coordinates shall be recorded for all SPI, benthic grab, and eelgrass monitoring locations.

The permittees covered under this General Permit shall coordinate to submit an annual ambient monitoring report summarizing the monitoring results for the previous calendar year, along with all

supporting data in spreadsheet format, via email to EPA (R1NPDESReporting@epa.gov) and NHDES (WQdata@des.nh.gov) by November 1 of each year.

V. Federal Consistency and Other Legal Requirements

A. Essential Fish Habitat

Under the 1996 Amendments (PL 104-267) to the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. §§ 1801 et seq. 1998), EPA is required to consult with National Oceanographic and Atmospheric Administration Marine Fisheries Service (NOAA Fisheries) if EPA's actions or proposed actions that it funds, permits or undertakes, "may adversely impact any essential fish habitat." 16 U.S.C. § 1855(b).

The amendments broadly define "essential fish habitat" (EFH) as "waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity." 16 U.S.C. § 1802(10). "Adverse impact" means any impact which reduces the quality and/or quantity of EFH. *See* 50 C.F.R. § 600.910(a). Adverse effects may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey, reduction in species' fecundity), site specific or habitat wide impacts, including individual, cumulative or synergistic consequences of actions.

EFH is only designated for fish species for which Federal Fisheries Management Plans exist. *See* 16 U.S.C. § 1855(b)(1)(A). EFH designations for New England were approved by the US Department of Commerce on March 3, 1999. On January 3, 2018, NOAA Fisheries approved updated EFH designations for New England. Updated designations can be found in the New England Fishery Management Council's Omnibus Essential Fish Habitat Amendment 2.[9]

The federal action being considered in this case is EPA's proposed National Pollutant Discharge Elimination System (NPDES) Great Bay Total Nitrogen General Permit (GBTN GP) for the discharge of total nitrogen from thirteen wastewater treatment facilities (WWTFs) to Great Bay Estuary in New Hampshire. The GBTN GP provides coverage to facilities located in New Hampshire described in Part I.C. of this Fact Sheet whose discharge consists of treated municipal and industrial wastewaters. The GBTN GP replaces authorization for total nitrogen in each of the thirteen WWTF's current individual NPDES permits. Each WWTF will continue to require individual NPDES permit authorization for the discharge of pollutants other than total nitrogen.

Part I.C. of this Fact Sheet lists the specific discharges subject to this General Permit in the Great Bay watershed and does not include any discharges to ocean sanctuaries, territorial seas, or Class A waters in New Hampshire. EPA has identified 13 WWTFs in New Hampshire for coverage under the GBTN GP. A review of the relevant EFH information from NOAA Fisheries indicates that the action area for the 13 WWTF discharges, which are located in the coastal and inland waters of Great Bay Estuary and its tributaries, exists within the designated EFH for 20 federally managed species. The EFH species and life stages are listed in Table 8. Great Bay is also included in the Inshore Juvenile Cod Habitat Area of Particular Concern (HAPC), which is a subset of EFH for Atlantic cod. This designation signifies the importance of this area to juvenile cod, particularly as it provides two key ecological functions: protection from predation and readily available prey. The potential inshore impacts of nutrients on Atlantic cod EFH is considered moderate threat for all life stages.

[9] https://www.nefmc.org/library/omnibus-habitat-amendment-2

Table 8 - Essential Fish Habitat Designation for Great Bay and the Great Bay Watershed[10]

Species	Eggs	Larvae	Juveniles	Adults
Atlantic salmon *Salmo salar*			X	X
Atlantic cod *Gadus morhua*	X	X	X	X
Haddock *Melanogrammus aeglefinus*	X	X		
Pollock *Pollachius virens*	X	X	X	X
Red hake *Urophycis chuss*		X	X	X
White hake *Urophycis tenuis*	X	X	X	X
Winter flounder *Pseudopleuronectes americanus*	X	X	X	X
Yellowtail flounder *Limanda ferruginea*	X	X		
windowpane flounder *Scophthalmus aquosus*	X	X	X	X
Atlantic sea scallop *Placopecten magellanicus*			X	X
Atlantic herring *Clupea harengus*		X	X	X
Atlantic wolfish *Anarhichas lupus*	X	X	X	X
Bluefish *Pomatomus saltatrix*			X	X
Atlantic mackerel *Scomber scombrus*	X	X	X	X
Bluefin tuna *Thunnus thynnus*				X
Smooth skate *Malacoraja senta*			X	
Thorny skate *Amblyraja radiata*			X	
Little skate *Leucoraja erinacea*			X	X
Winter skate *Leucoraja ocellata*			X	

As described above, the GBTN GP authorizes the discharge of nitrogen from WWTFs in the Great Bay watershed, except into those waters excluded in Part I.D of this Fact Sheet. EPA has only considered

[10] Source: NOAA Office of Habitat Conservation Essential Fish Habitat Mapper https://www.fisheries.noaa.gov/resource/map/essential-fish-habitat-mapper accessed September 6, 2018 and Final Omnibus Essential Fish Habitat Amendment 2 Volume 2: EFH and HAPC Designation Alternatives and Environmental Impacts. New England Fishery Management Council. October 25, 2017. https://www.habitat.noaa.gov/application/efhmapper/oa2_efh_hapc.pdf#page=36

impacts due to nitrogen in this analysis as this General Permit only authorizes the discharge of nitrogen. All other impacts have been considered in each individual permit issuance and will be considered upon re-issuance of any individual permit.

Excessive nitrogen can increase abundance of macroalgae and phytoplankton, which, in turn, can smother benthic habitat, reduce water quality (*e.g.*, by lowering dissolved oxygen levels), and reduce light penetration, which limits the growth of rooted aquatic vegetation that serves as a critical habitat for fish and other aquatic organisms. The loss of vegetation can impact young-of-the-year and juvenile EFH species such as Atlantic cod, pollock, and winter flounder, which use vegetated habitats for protection from predation and may experience enhanced survival and/or growth in structurally complex habitats like eelgrass (Final Omnibus EFH Amendment 2, 2017).

The objective of the nitrogen limitations and permit conditions in the GBTN GP is to reduce nitrogen loading to a level that will protect the Great Bay estuary from "large deterioration" and restore the estuary to a healthy condition. To achieve the necessary WWTF reductions, the 7 largest dischargers are allocated annual TN loads based on 2012-2016 average annual flow and an effluent TN concentration of 8 mg/L. The remaining smaller discharges are allocated annual TN loads based on 2012-2016 average annual flows and available average effluent TN concentrations (*i.e.*, a "hold the load" requirement). In addition, each Permittee must also optimize nitrogen removal throughout the year to minimize the nitrogen load by evaluating alternative methods of operating the existing wastewater treatment facility to optimize the removal of nitrogen, including, but not limited to, operational changes designed to enhance nitrification and denitrification, incorporation of anoxic zones, septage receiving policies and procedures, and side stream management. The annual load limits and the year-round optimization requirements will serve to keep the annual discharge load as low as possible at each WWTF. See Part III of this Fact Sheet.

The nitrogen limitations described above represent a delivered nitrogen load of 1,161 lb/day, or 35.4 kg ha^{-1} yr^{-1} from 17 WWTFs into the Great Bay estuary, which is a reduction of 42% from the 2012-2016 actual estimated WWTF load to Great Bay estuary (See Table 3 in Part III, above). These reductions in nitrogen loading from the WWTFs, combined with anticipated reductions in non-point source and stormwater point source loading achieved through community and stakeholder engagement, will facilitate reaching EPA's initial goal of a maximum nitrogen loading threshold of 100 kg ha^{-1} yr^{-1}. This threshold was chosen as the level above which eelgrass is unable to thrive and significant or complete loss is inevitable. The GBTN GP limits and conditions ultimately target the recovery and protection of eelgrass, which would benefit designated EFH and life stages of managed species that use eelgrass or that prey on species that rely on eelgrass habitat.

EPA's Finding of Potential Impacts to EFH Species

- The Draft GBTN GP does not represent a new or increased discharge of total nitrogen; rather, the GP proposes to decrease the combined annual load of total nitrogen from 13 WWTFs currently discharging total nitrogen in compliance with individual NPDES permits;
- The Draft GBTN GP requires WWTFs to minimize the nitrogen load by evaluating alternative methods of operating the existing wastewater treatment facility to optimize the removal of nitrogen;

- The total nitrogen effluent limits and conditions in the Draft Permit were developed to decrease the total nitrogen load to Great Bay and its tributaries as compared to the existing load;

- The target total nitrogen load that forms the basis of the effluent limits in the GBTN GP was chosen to encourage the growth of eelgrass and to minimize significant or complete loss.

Given the impacts of overall water quality on eelgrass health, EPA expects that nutrient reductions necessary to effectively restore and protect eelgrass will also bring Great Bay into attainment of water quality standards for other nutrient-related impairments (*i.e.*, chlorophyll-a, dissolved oxygen and light attenuation). Accordingly, the GBTN GP requires robust ambient monitoring for eelgrass and each of these water quality parameters as part of this adaptive management approach.

EPA believes that the conditions and limitations in the GBTN GP adequately protects all aquatic life, including those species with designated EFH in the receiving waters, as well as their habitat and forage species. Further mitigation is not warranted. Should adverse impacts to EFH be detected as a result of this permit action, or inf new information is received that changes the basis for EPA's conclusions, NOAA Fisheries will be contacted and an EFH consultation will be re-initiated. This Fact Sheet and the GBTN GP, which support EPA's finding, is attached in a letter sent to NOAA Fisheries Habitat Division during the public comment period.

B. Endangered Species

The Endangered Species Act (ESA) of 1973, as amended, grants authority and imposes requirements of federal agencies regarding endangered or threatened species of fish, wildlife, or plants (listed species) and habitat of such species that has been designated as critical (a "critical habitat").

Section 7(a)92) of the ESA requires every federal agency, in consultation with and with the assistance of the Secretary of Interior, to ensure that any action it authorizes, finds, or carries out, in the United Stated or upon the high seas, is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat. *See* 16 U.S.C. § 1536(a)(2), 50 C.F.R. § 402 and 40 C.F.R. § 122.49(c). The U.S. Fish and Wildlife Service (USFWS) administers Section 7 consultations for freshwater species. The a National Oceanographic and Atmospheric Administration's Marine Fisheries Service (NOAA Fisheries) administers Section 7 consultations for marine and anadromous species.

The federal action in this case is EPA's proposed issuance of the GBTN GP for the discharge of total nitrogen from 13 WWTFs to the inland and coastal waters of Great Bay and its tributaries. The Draft GBTN GP is intended to replace the authorization to discharge total nitrogen in each of the 13 subject WWTF's current individual permits. As the federal agency charged with authorizing the discharge of total nitrogen from theses facilities, EPA determines the potential impacts to federally listed species and initiates consultation when required under Section 7(a)(2) of the ESA.

EPA has reviewed the federal endangered or threatened species of fish, wildlife, or plants in the action area to determine if any listed species might potentially be impacted by the issuance of

this General Permit.[11] The following are federally listed endangered or threatened species in the vicinity of the WWTF discharges in the Great Bay watershed ("action area"):

- Red Knot (*Calidris canutus rufa)*
- Roseate Tern (*Sterna dougallii dougallii*)
- Small whorled Pogonia (*Isotria medeoloides*)
- Northern long-eared Bat *(Myotis septentrionalis)*
- Atlantic Sturgeon (*Acipenser oxyrinchus*)*
- Shortnose Sturgeon (*Acipenser brevirostrum*)*

* These species are listed under the jurisdiction of NMFS, while all others are listed under the jurisdiction of USFWS

The general distribution of northern long-eared bat is confined to forested habitats in summer and caves and mines in winter; EPA expects that there will be no effect from the proposed action on this species. Similarly, the distribution of small whorled pogonia is occurs on upland sites in forests. EPA expects that there will be no effect from the proposed action on either terrestrial species. EPA will not be considering effects to northern long-eared bat or small whorled pogonia further in this consultation.

In addition to the presence of these listed species, NMFS designated critical habitat for the Gulf of Maine, New York Bight, Chesapeake Bay, and South Atlantic Distinct Population Segments (DPSs) of Atlantic sturgeon, which became effective on September 18, 2017. The designated critical habitat in the action area includes the Piscataqua River from its confluence with the Salmon Falls and Cocheco rivers downstream to where the main stem discharges at its mouth into the Atlantic Ocean as well as the Cocheco River from the confluence with the Piscataqua River upstream to the Cocheco Falls Dam and the Salmon Falls River from the confluence with the Piscataqua River upstream to the Route 4 Dam (also known as the South Berwick Dam) (Gulf of Maine DPS Unit 4). *See* 84 Fed. Reg. 39160 (August 17, 2017).

In addition to the listed species and critical habitat described above, the following are federally protected marine species listed under the jurisdiction of NMFS that are present in the near coastal waters New Hampshire.

- Loggerhead Sea Turtle *(Caretta caretta)*
- Leatherback Sea Turtle *(Dermochelys coriacea)*
- Kemp's Ridley Sea Turtle *(Lepidochelys kempii)*
- Green Sea Turtle *(Chelonia mydas)*
- North Atlantic Right Whale *(Eubalaena glacialis)*
- Fin Whale *(Balaenoptera physalus)*

Although these species may be migrating and foraging in coastal areas, EPA does not expect or foresee any impact of the discharge of nitrogen within the action area under this General Permit that would

[11] For species under jurisdiction of USFWS, EPA accessed the Information for Planning and Consultation (IPaC) available at https://ecos.fws.gov/ipac/ on October 22, 2019. For species under the jurisdiction of NMFS, EPA accessed the Section 7 Mapper of estimated range of for listed species and critical habitat in the Piscataqua River available at http://noaa.maps.arcgis.com/apps/webappviewer/index.html?id=1bc332edc5204e03b250ac11f9914a27 on October 18, 2019.

impact sea turtles or marine mammals. EPA will not be considering effects to sea turtles, whales, and right whale habitat further in this consultation.

The explanation of effluent limitations in the GBTN GP are described in Part III of this Fact Sheet. The GBTN GP effluent limits are sufficiently stringent to assure the protection of water quality standards for both aquatic life and human health. The effluent limitations established in the GBTN GP ensure protection of aquatic life and maintenance of the receiving water as an aquatic habitat. In addition, the requirements in this General Permit are consistent or more stringent than requirements for nitrogen discharges considered to be protective by the Services during the development of their respective individual NPDES permits. EPA finds that a the GBTN GP is not likely to adversely affect any threatened or endangered species or its critical habitat.

According to USFWS, the red knot is a medium sized shorebird that migrates from its breeding grounds in the central Canadian Arctic to wintering grounds in the southeastern U.S. and points south (Atlantic coasts of Argentina and Chile, north coast of Brazil, and the northwest Gulf of Mexico). The red knot may use coastal habitat in New Hampshire during its fall and spring migrations although it is not currently known to use coastal habitat in Great Bay. Given that the known migratory habitat for red knot does not occur in the action area, and that the limits in the GP are designed to reduce nitrogen loading and improve water quality, EPA expects that any effect of the authorization for the discharge of nitrogen on this species will be extremely unlikely to occur and thus, will be discountable.

Roseate terns nest on small rocky or sandy islands, barrier beaches, and salt marshes and typically occur in the Northeast from April through August before migrating to wintering grounds. In New Hampshire, the only known nesting colony occurs on Seavey Island in the Isle of Shoals. During the breeding season, roseate terns forage on small fish at the surface of coastal waters near the nesting site, favoring shallow bays, tidal inlets and channels, tide-rips, and sandbars, which could include areas within Great Bay given the proximity to Isle of Shoals and abundance of key forage species, including American sand lance (*Ammodytes americanus*), Atlantic herring (*Clupea harengus*), and white hake (*Urophycis tenuis*). Juveniles of these prey species may use eelgrass habitat for protection or foraging, which is a primary consideration under the GBTN GP. EPA expects that nutrient reductions necessary to protect eelgrass will help to bring Great Bay into attainment of water quality standards for other nutrient-related impairments (i.e., chlorophyll-a, dissolved oxygen and light attenuation). In addition, there is no evidence that current levels of nitrogen loading in Great Bay are reducing the abundance of fish such that prey availability for the roseate tern is impacted. EPA has made the preliminary determination that any effects from the discharge of nitrogen on roseate tern will be unable to be meaningfully measured, detected, or evaluated and will be insignificant.

According to NOAA Fisheries, the distribution of shortnose sturgeon includes the entirety of the Piscataqua River including the Cocheco River from its confluence with the Piscataqua to Cocheco Falls Dam and waters of the Salmon Falls River from its confluence with the Piscataqua to the Route 4 (South Berwick) Dam. The Piscataqua River likely supports seasonal foraging habitat for adult and subadult sturgeon during fall and winter migrations. The Piscataqua River is suspected to have historically supported shortnose sturgeon spawning, though there is currently no evidence of spawning by shortnose sturgeon in this river. Presence of adults in the river has been confirmed through the detection of three tagged adult shortnose sturgeon by acoustic receivers. The available information indicates that adult shortnose sturgeon may spend brief periods in the Piscataqua system (limited to days or weeks) between

April and November. Based on the habitat available in the action area, NOAA Fisheries expect transient adult shortnose sturgeon to be moving through and opportunistically foraging in the action area.

Atlantic sturgeon may be found in the Piscataqua River up to the confluence with the Salmon Falls and Cocheco Rivers (rkm 15), including Great Bay. The distribution of Atlantic sturgeon also includes the Salmon Falls River up to the Route 4 (South Berwick) Dam (rkm 7) and the Cocheco River up to the Cocheco Falls Dam (rkm 6). Subadults and adults are present year-round and presence of eggs, larvae, and juveniles is possible. The Piscataqua River supports foraging habitat for Atlantic sturgeon adults and subadults migrating along the coast to and from natal spawning grounds during spring and fall. In addition, the Salmon Falls and Cocheco Rivers exhibit habitat suitable for spawning based on the presence of features necessary to support reproduction and recruitment, including hard substrate and low salinity. Juveniles are potentially present year-round throughout the river.

Given the impacts of nutrients on overall water quality, EPA expects that the TN loading threshold chosen to protect eelgrass will also bring Great Bay into attainment of water quality standards for other nutrient-related impairments (i.e., chlorophyll-a, dissolved oxygen and light attenuation). EPA has made the preliminary determination that any effects from the discharge of nitrogen on shortnose sturgeon adults or Atlantic sturgeon adults, subadults, juveniles, eggs, or larvae will be unable to be meaningfully measured, detected, or evaluated and will be insignificant.

The designated critical habitat in the action area includes the Piscataqua River from its confluence with the Salmon Falls and Cocheco rivers downstream to where the main stem discharges at its mouth into the Atlantic Ocean as well as the Cocheco River from the confluence with the Piscataqua River upstream to the Cocheco Falls Dam and the Salmon Falls River from the confluence with the Piscataqua River upstream to the Route 4 Dam (also known as the South Berwick Dam) (Gulf of Maine DPS Unit 4). *See* 82 Fed. Reg. 39160. The action area where discharges from the 13 eligible WWTFs will occur includes areas designated as critical habitat in the Piscataqua River. Physical or biological features (PBFs) in the action area overlapping with designated critical habitat include PBF 1 (hard bottom substrate), PBF 2 (soft substrate for juvenile foraging and physiological development), PBF 3 (water of appropriate depth and absent physical barriers to movement), and PBF 4 (appropriate levels of temperature, salinity, and oxygen). The conditions and limitations of the Draft GBTN GP will ensure that any effect on the ability of hard substrate to support settlement of fertilized eggs, refuge, growth, and development of early life stages (PBF 1) or the temperature, salinity, and oxygen values necessary to support Atlantic sturgeon spawning, adult and larval survival, and larval growth, development, and recruitment (PBF 4) will be too small to be meaningfully measured, detected, or evaluated and will be insignificant. Effects of the nitrogen discharges on PBF 2 (salinity and soft substrate for juvenile foraging) and PBF 3 (appropriate water depth and unimpeded movement of adults) are extremely unlikely to occur and will be discountable.

EPA has made the preliminary determination that the discharges of nitrogen authorized under the GBTN GP may affect, but is not likely to adversely affect, the relevant life stages of listed species expected to inhabit the coastal and inland waters of Great Bay and its tributaries. In addition, EPA has made the preliminary determination that the impact of the proposed action on federally listed species and designated critical habitat in the action area will be insignificant or discountable. Therefore, EPA has determined that a formal consultation pursuant to Section 7 of the ESA is not required. EPA is seeking concurrence from NOAA Fisheries and USFWS regarding this preliminary determination. A letter under separate cover will be submitted to both

USFWS and NOAA Fisheries with an evaluation supporting this preliminary determination and requesting concurrence.

Reinitiation of consultation will take place if: (a) new information reveals effects of the action that my affect listed species or critical habitat in a manner or to an extent not previously considered in the informal consultation; (b) if the identified action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in the consultation; or (c) if a new species is listed or critical habitat is designated that may be affected by the identified action.

C. Historic Preservation

Facilities which adversely affect properties listed or eligible for listing in the National Registry of Historic Places under the National Historic Preservation Act of 1966 (NHPA), 16 USC §§ 470 *et seq*. are not authorized to discharge under the GBTN GP. Based on the nature and location of the discharges, EPA has determined that the 13 subject facilities for authorization under this General Permit do not have the potential to affect a property that is either listed or eligible for listing on the National Register of Historic Places.

Electronic listings of National and State Registers of Historic Places are maintained by the National Park Service (http://www.nps.gov/nr/) and the New Hampshire Historical Commission (http://www.nh.gov/nhdhr/programs/national_register.html).

D. The Coastal Zone Management Act

The Coastal Zone Management Act (CZMA), 16 U.S.C. § 1451 et seq., and its implementing regulations (15 C.F.R. Part 930) require that any federally licensed activity affecting a State's coastal zone be consistent with the enforceable policies of approved State management programs. Federal regulations at 40 C.F.R. § 122.49(d) prohibit EPA from issuing a permit for an activity affecting land or water in the coastal zone until the applicant certifies that the proposed activity complies with the State Coastal Zone Management program, and the State or its designated agency concurs with the certification, or the Secretary of Commerce overrides the State's nonconcurrence. In the case of general permits, EPA has the responsibility for making the consistency certification and submitting it to the States for concurrence. EPA certifies that the activities authorized by this general permit comply with the enforceable policies of the States' approved programs and that the activities authorized by this general permit will be conducted in a manner consistent with the programs.

The New Hampshire CZM program has established enforceable policies that address natural, cultural, social, and economic resources, which are listed below. EPA has addressed the policies identified as applicable by New Hampshire CZM to the issuance of this general permit as the discharges are within CZM boundaries. Policies that were not applicable are noted with "N/A". EPA has requested State concurrence with this determination for this general permit from the Federal Consistency Officer, New Hampshire Coastal Program and expects that CZM will find the discharge of total nitrogen as proposed under the Draft GBTN GP consistent with its policies.

Protection of Coastal Resources:

Policy #1: *Protect and preserve and, where appropriate, restore the water and related land resources of the coastal and estuarine environments. The resources of primary concern are coastal and estuarine waters, tidal and freshwater, wetlands, beaches, sand dunes, and rocky shores.*

The GBTN GP is consistent to the maximum extent practicable with this enforceable policy by prohibiting any discharge that EPA determines will have the reasonable potential to cause or contribute to an excursion above any applicable water quality standards, requiring sampling of the discharge to ensure compliance with numerical limits, and requiring the optimization of nitrogen removal to reduce the discharge of pollutants. Discharges authorized under the GBTN GP must meet nitrogen effluent limitations necessary to protect aquatic life. The full list of effluent limitations and monitoring requirements are found in Part 2.1 of the Draft Permit.

Policy #2: *Manage, conserve and, where appropriate, undertake measures to maintain, restore, and enhance the fish and wildlife resources of the state.*

The GBTN GP is consistent to the maximum extent practicable with this enforceable policy by prohibiting any discharge that EPA determines will cause, have the reasonable potential to cause, or contribute to an excursion above any applicable water quality standards such that discharges will not interfere with the attainment and maintenance of water quality. Discharges authorized under the GBTN GP must meet nitrogen effluent limitations necessary for the protection of aquatic life. Additionally, discharges authorized under the GBTN GP must optimize nitrogen removal to reduce the discharge of pollutants. These requirements are designed to maintain fish and wildlife resources by preventing the discharge of pollutants to surface waters of the United States. The entrainment and impingement of aquatic organisms is not expected in association with this general permit, as sites covered under this general permit do not utilize cooling water intake structures.

Policy #3: *Regulate the mining of sand and gravel resources in offshore and onshore locations so as to ensure protection of submerged lands, and marine and estuarine life. Ensure adherence to minimum standards for restoring natural resources impacted from onshore sand and gravel operations.* **N/A**

Policy #4: *Undertake oil spill prevention measures, safe oil handling procedures and when necessary, expedite the cleanup of oil spillage that will contaminate public waters. Institute legal action to collect damages from liable parties in accordance with state law.* **N/A**

Policy #5: *Encourage investigations of the distribution, habitat needs, and limiting factors or rare and endangered animal species and undertake conservation programs to ensure their continued perpetuation.*

The GBTN GP is consistent to the maximum extent practicable with this enforceable policy by prohibiting any discharge that EPA determines will cause, have the reasonable potential to cause, or contribute to a violation of water quality standards. Part 2.1 of the General Permit requires permittees to meet water quality-based effluent limitations for the only pollutant that is authorized to be discharged by the General Permit (*i.e.*, Total Nitrogen).

Policy #6: Identify, designate, and preserve unique and rare plant and animal species and geologic formations which constitute the natural heritage of the state. Encourage measures, including acquisition strategies, to ensure their protection.

Please see response to Policy #5, above.

Recreation and Public Access:

Policy #7: Provide a wide range of outdoor recreational opportunities including public access in the seacoast through the maintenance and improvement of the existing public facilities and the acquisition and development of new recreational areas and public access. – **N/A**

Managing Coastal Development:

Policy #8: Preserve the rural character and scenic beauty of the Great Bay estuary by limiting public investment in infrastructure within the coastal zone in order to limit development to a mixture of low and moderate density. – **N/A**

Policy #9: Reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to preserve the natural and beneficial value of floodplains, through the implementation of the National Flood Insurance Program and applicable state laws and regulations, and local building codes and zoning ordinances. – **N/A**

Policy #10: Maintain the air resources in the coastal area by ensuring that the ambient air pollution level, established by the New Hampshire State Implementation Plan pursuant to the Clean Air Act, as amended, is not exceeded. – **N/A**

Policy #11: Protect and preserve the chemical, physical, and biological integrity of coastal water resources, both surface and groundwater.

The GBTN GP is consistent to the maximum extent practicable with this enforceable policy by prohibiting any discharge that EPA determines will cause, have the reasonable potential to cause, or contribute to a violation of WQSs such that discharges will not interfere with the attainment and maintenance of water quality (*i.e.*, the chemical, physical, and biological integrity of water resources). Discharges authorized under the GBTN GP must meet nitrogen effluent limitations necessary for the protection of the coastal and estuarine environment and to meet WQSs for the designated uses of coastal water resources. Additionally, discharges authorized under the GBTN GP must optimize nitrogen removal to reduce the discharge of pollutants and protect the chemical, physical, and biological integrity of the receiving waters. The full list of effluent limitations and monitoring requirements are found in Part 2.1 of the Draft Permit. Part 2.2 of the Draft Permit describes the nitrogen removal optimization requirement established by the GBTN GP. In addition, regulations only allow EPA to permit discharges to surface waters, not groundwater. For these reasons, EPA does not expect the discharges from WWTFs covered under this General Permit to adversely affect coastal groundwater or surface water resources.

Policy #12: Ensure that the siting of any proposed energy facility in the coast will consider the national interest and will not unduly interfere with the orderly development of the region and will not

have an unreasonable adverse impact on aesthetics, historic sites, coastal and estuarine waters, air and water quality, the natural environment and the public health and safety. – **N/A**

Coastal Dependent Uses:

Policy #13: Allow only water dependent uses and structures on state properties in Portsmouth-Little Harbor, Rye Harbor, and Hampton-Seabrook Harbor, at state port and fish pier facilities and state beaches (except those uses or structures which directly support the public recreation purpose). For new development, allow only water dependent uses and structures over waters and wetlands of the state. Allow repair of existing over-water structures within guidelines. Encourage the siting of water dependent uses adjacent to public waters. – **N/A**

Policy #14: Preserve and protect coastal and tidal waters and fish and wildlife resources from adverse effects of dredging and dredge disposal, while ensuring the availability of navigable waters to coastal-dependent uses. Encourage beach renourishment and wildlife habitat restoration as a means of dredge disposal whenever compatible. – **N/A**

Preservation of Historic and Cultural Resources:

Policy #15: Support the preservation, management, and interpretation of historic and culturally significant structures, sites and districts along the Atlantic coast and in the Great Bay area.

The GBTN GP is consistent to the maximum extent practicable with this enforceable policy by excluding coverage under this General Permit to discharges which adversely affect properties listed or eligible for listing in the National Registry of Historic Places under the National Historic Preservation Act of 1966, 16 USC Sections 470 et seq. Based on the nature and location of the discharges, EPA has determined that the 13 subject facilities for authorization under this General Permit do not have the potential to affect a property that is either listed or eligible for listing on the National Register of Historic Places. (See Part V.C of this Fact Sheet).

Marine and Estuarine Research and Education:

Policy #16: Promote and support marine and estuarine research and education that will directly benefit coastal resource management. – **N/A**

E. Section 404 Dredge and Fill Operations

The GBTN GP does not constitute authorization under 33 USC § 1344 (§ 404 of the Clean Water Act) of any stream dredging or filling operations.

VI. Obtaining Authorization to Discharge and Other Administrative Requirements

A. Obtaining Coverage

To obtain coverage under the GBTN GP, facilities identified in Part I.C of this Fact Sheet may submit a notice of intent (NOI) in accordance with 40 C.F.R. § 122.28(b)(2)(i) & (ii). The contents of the notice of intent shall include at a minimum, the legal name and address of the owner or operator, the facility name and address, type of facility or discharges, the receiving

stream(s) and be signed by the operator in accordance with the signatory requirements of 40 C.F.R. § 122.22. All NOIs submitted after December 21, 2020 must be submitted electronically. The NOI shall be submitted within 60 days from the effective date of the General Permit and authorization to discharge will be effective upon the date indicated in written notice from EPA.

Based on 40 C.F.R. § 122.28(b)(2)(vi), the Director may notify a discharger (or treatment works treating domestic sewage) that it is covered by a general permit, even if the discharger (or treatment works treating domestic sewage) has not submitted a notice of intent to be covered. EPA has determined that the 13 facilities identified in Part I.C all meet the eligibility requirements for coverage under the GBTN GP and may be authorized to discharge under the General Permit by this type of notification. Such authorization to discharge will be effective upon the date indicated in written notice from EPA.

The nitrogen requirements in this General Permit, once effective, will supersede the nitrogen requirements in each Permittee's individual NPDES permit. The Towns of Exeter and Newmarket have effluent limits for total nitrogen in their individual permits which are both expired. Both permittees have submitted a timely application for permit renewal and the GBTN GP represents the reissuance of the authorization to discharge for nitrogen only. All other pollutants will continue to be regulated by the current, or administratively continued, individual permits until such permits are reissued in the future.

B. When an Individual NPDES Permit for Nitrogen Discharges May Be Requested

In accordance with 40 C.F.R. § 122.28(b)(3)(iii), any owner or operator authorized by this General Permit may request to be excluded from the coverage of this General Permit by applying for an individual permit which would include authorization to discharge nitrogen. The owner or operator shall submit an application under §122.21, with reasons supporting the request, to the Director no later than 90 days after the publication by EPA of the General Permit in the Federal Register. The request shall be processed under Part 124. The request shall be granted by issuing of an individual permit if the reasons cited by the owner or operator are adequate to support the request.

When an individual NPDES permit is issued to an owner or operator otherwise subject to this General Permit, the applicability of this General Permit to that owner or operator is automatically terminated on the effective date of the individual permit.

C. Termination of Operations

Permittees shall notify EPA and NHDES in writing with any request to terminate the authorization to discharge under this General Permit, at the addresses listed below.

U.S. Environmental Protection Agency Region 1
Enforcement Appliance and Assurance Division (ECAD)
Water Technical Unit (04-SMR)
5 Post Office Square, Suite 100
Boston, MA 02109-3912

New Hampshire Department of Environmental Services
Water Division, Wastewater Engineering Bureau
29 Hazen Drive, P.O. Box 95
Concord, NH 03302-0095

D. Continuation of this General Permit after its Expiration

If this General Permit is not reissued or replaced prior to the expiration date, it will be administratively continued in accordance with the Administrative Procedure Act (5 U.S.C. § 558(c)) and 40 C.F.R. § 122.6) and remain in force and in effect for discharges that were authorized prior to expiration. Any Permittee who was granted permit coverage prior to the expiration date will automatically remain covered by the continued permit until the earliest of:

1. Authorization under a reissuance of this General Permit; or
2. The Permittee's submittal of a Notice of Termination; or
3. Issuance or denial of an individual permit for the Permittee's discharge of nitrogen; or
4. A formal permit decision by EPA not to reissue this General Permit, at which time the Permittee must seek coverage for the discharge of nitrogen under an alternative General Permit or an individual permit.

If a facility is not notified by EPA that it is covered under a reissued permit, or does not submit a timely, appropriate, complete, and accurate NOI requesting authorization to discharge under the reissued permit, or a timely request for authorization under an individual or alternative General Permit, authorization under this permit will terminate on the effective date of the reissued permit, unless otherwise specified in the reissued permit.

VII. Standard Conditions

Permittees must meet the standard permit requirements of 40 C.F.R. §§ 122.41 and 122.42, as applicable to their discharge activities. Specific language concerning these requirements is provided in Appendix I of the GBTN GP.

VIII. Public Comments, Hearing Requests and Permit Appeals

All persons, including applicants, who believe any condition of the draft GBTN GP is inappropriate must raise all issues and submit all available arguments and all supporting material for their arguments in full by the close of the public comment period, to Michael Cobb, U.S. EPA, Water Division, Municipal Permits Section, 5 Post Office Square, Suite 100 (06-1), Boston, Massachusetts 02109-3912 or via email to cobb.michael@epa.gov.

Any person, prior to the close of the public comment period, may submit a request in writing for a public hearing to consider the draft GBTN GP to EPA and NHDES. Such requests shall state the nature of the issues proposed to be raised in the hearing. A public meeting may be held if the criteria stated in 40 C.F.R. § 124.12 are satisfied. In reaching a final decision on the Draft Permit, the EPA will respond to all significant comments and make these responses available to the public at EPA's Boston office.

Following the close of the comment period, and after any public hearings, if such hearings are held, the EPA will issue a Final Permit decision, forward a copy of the final decision to the applicant, and provide

a copy or notice of availability of the final decision to each person who has submitted written comments or requested notice.

General permits may not be appealed to the Environmental Appeals Board. Procedures governing actions by persons affected by a general NPDES permit, including petitions and applications for individual permits, as well as judicial appeals, are set forth in 40 C.F.R. § 124.19(o) and 40 C.F.R. § 122.28.

IX. EPA Contact

The administrative record on which this Draft Permit is based may be obtained between the hours of 9:00 a.m. and 5:00 p.m., Monday through Friday, excluding holidays from:

Michael Cobb
U.S. EPA, Region 1
5 Post Office Square, Suite-100 (06-1)
Boston, MA 02109-3912
Telephone: (617) 918-1369
Email: cobb.michael@epa.gov

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Date

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Ken Moraff, Director
Water Division
U.S. Environmental Protection Agency