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**City of Rochester, New Hampshire**
**May 8, 2020**

# Public Comments to the Draft NPDES Great Bay Total Nitrogen General Permit for Wastewater Treatment Facilities in New Hampshire (NPDES General Permit: NHG58A000)

The City of Rochester, New Hampshire (Rochester), hereby submits its public comments to the draft NPDES Great Bay Total Nitrogen General Permit for Wastewater Treatment Facilities in New Hampshire (NPDES General Permit: NHG58A000).

Rochester's public comments consist of the comments set forth herein, as well as all the Attachments 18 that are hereby incorporated, particularly those submitted by Rochester's consultants Gradient, Brown & Caldwell, Geosyntec and VHB, and HDR.

## 1.0 Background and Issuance of Draft General Permit

The City of Rochester, New Hampshire owns and operates a wastewater treatment facility (WWTF) which discharges treated effluent to the Cocheco River. The Cocheco River is within the Great Bay watershed and forms the Piscataqua River at the confluence of the Cocheco and Salmon Falls Rivers. "…[T]wo thirds of the 930 square mile Piscataqua River drainage is located within NH, with the remainder in southern Maine." (Jones et al. 2000, 6). Numerous communities, towns, and townships in both Maine and New Hampshire are part of the Great Bay Estuary watershed. In Maine, at least 4 communities (Kittery, Berwick, North Berwick and South Berwick) operate WWTFs that discharge effluent into the waters of the Great Bay. In New Hampshire, 13 communities and one county operate WWTFs that discharge wastewater either directly into the GBE or into groundwater adjacent to waters of GBE.

The Rochester WWTF operates under a National Pollutant Elimination Discharge (NPDES) Permit which expired in 2002. The expired permit includes the following pollutant limitations:[1]

| Parameter | NPDES Permit Limit |
|---|---|
| Carbonaceous biochemical oxygen demand | 6 mg/L summer, 13 mg/L winter |
| Total suspended solids | 6 mg/L summer, 13 mg/L winter |
| Total ammonia as $NH_3$ (ave monthly) | 3.61 mg/L summer, 7.65 mg/L winter |
| pH | 6.5 to 8.0 SU |
| Dissolved oxygen | 7.0 mg/L |
| E-coli | 126/100 mL (geo mean), 406/100 mL (max day) |

On January 8, 2020, EPA Region 1 issued the Draft Great Bay Total Nitrogen General Permit (Draft GP) for thirteen wastewater treatment facilities (WWTFs) located in twelve communities that discharge treated wastewater containing nitrogen within the Great Bay watershed. Rochester is one of those communities.

According to EPA, Draft GP nitrogen reductions are in response to concerns regarding loss of eelgrass in the Great Bay Estuary (GBE). According to the Piscataqua Region Estuaries Partnership (PREP), despite significant reductions in nitrogen loading from WWTFs in recent years, eelgrass acreage in 2016 (1,625 acres) is only 54% of the PREP goal of 2,900 acres by 2020. Although there are many factors that may affect eelgrass health, EPA has determined that nitrogen levels in GBE continue to be a contributing factor related to eelgrass decline, and that nitrogen levels in the Bay should be significantly lower.

Based on that determination, EPA has selected a 100 kilogram per hectare per year (kg/ha/yr) Total Nitrogen (TN) loading goal for the Great Bay Estuary. Further, EPA has imposed TN load limitations on each of the WWTFs based on a TN waste load allocation of a certain number of pounds per day (lbs/day). In Rochester's case, the TN load limit is 198 lbs/day as a maximum amount of TN discharge from its facility, without regard to current and future flow rates.

In addition to the reductions to the WWTFs TN Point Source (PS) discharges, the Draft GP calls for "Optional" Nonpoint and Stormwater Source (together, NPS) TN reductions, with a goal of the twelve communities achieving a 45% reduction in their total current estimated NPS TN load to Great Bay. Although stated as an "Optional" effort, the Draft GP also adds that "[i]n 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) …and incorporate any more stringent nitrogen effluent limits for the WWTFs necessary to ensure compliance with water quality standards." U.S. Envtl. Prot. Agency, Fact Sheet—Draft National Pollutant Discharge Elimination System (NPDES) Great Bay Total Nitrogen General Permit For Wastewater Treatment Facilities in New Hampshire 31 (2020) at 31.

[1] Brown and Caldwell. 2020. Technical Memorandum (Jan 23, 2020) (Attachment 18).

The Draft GP also imposes on the twelve communities significant Adaptive Management Ambient Monitoring Program requirements at twenty-five ambient monitoring stations throughout the GBE.

## 2.0 THE ARBITRARY AND CAPRICIOUS STANDARD

In its Fact Sheet the EPA notes broadly that "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)." The municipality of Rochester ("Rochester") is keenly aware that in order to make up for the impact of non-point source and legacy pollution the Court, relying on *Chevron U.S.A. Inc. v. Natural Resources Defense Council, Inc.,* 467 U.S. 837, 104 S.Ct. 2778, 81 L.Ed.2d 694 (1984), has held that EPA's interpretation of CWA provisions is entitled to "substantial deference." *Arkansas* at 467 U.S. 110. Armed with the ability to be shielded by what is commonly referred to as *Chevron* deference, EPA has been able to mandate effluent limitations so long as under the Administrative Procedure Act its actions are not "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with the law" 5 U.S.C. § 706(2)(A).

Rochester understands that the scope of review under the "arbitrary and capricious" standard is often narrow and a court is typically not to substitute its judgment for that of the agency. The reality, however, is that "arbitrary and capricious" is not an unfettered license to disrupt entire communities and require compliance to murky, arbitrary, and unachievable standards. The U.S. Supreme Court has offered a variety of ways in which agencies may be found to have acted in an arbitrary and capricious manner.

It is axiomatic, for instance, that an agency must act in accordance with the law. Further, at a minimum, any agency must examine the relevant data and articulate a satisfactory explanation for its action including a "rational connection between the facts found and the choice made." *Burlington Truck Lines v. United States,* 371 U.S. 156, 168, 83 S.Ct. 239, 245–246, 9 L.Ed.2d 207 (1962). Ultimately any agency decision must be examined to "consider whether the decision was based on a consideration of the relevant factors and whether there has been a clear error of judgment." *Bowman Transp. Inc. v. Arkansas-Best Freight System, supra,* 419 U.S., at 285, 95 S.Ct., at 442; *Citizens to Preserve Overton Park v. Volpe, supra,* 401 U.S., at 416, 91 S.Ct., at 823. Normally, an agency rule would be arbitrary and capricious if the agency has relied on factors which Congress has not intended it to consider, entirely failed to consider an important aspect of the problem, offered an explanation for its decision that runs counter to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise. Thus while true that courts should refrain from shallowly substituting its judgment for that of an agency, no court should attempt to make up for agency deficiencies: "We may not supply a reasoned basis for the agency's action that the agency itself has not given." *SEC v. Chenery Corp.,* 332 U.S. 194, 196, 67 S.Ct. 1575, 1577, 91 L.Ed. 1995 (1947).

In *Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29 (U.S. 1983), the Supreme Court built on the *Overland Park* recognition of alternative grounds for finding arbitrariness.[2] The Court in *State Farm* found a variety of grounds on which a National Highway Traffic Safety Administration's (NHTSA's) decision to rescind a rule requiring passive new restraints was arbitrary and capricious. In the first place the Court found that by failing to examine the viability of an airbags-only requirement the Court found that the "agency submitted no reasons at all" for its decision and was therefore impermissibly arbitrary. *Id* at 50. Further, and in addition to the "no reasons at all" logic, the Court found that the NHTSA acted arbitrarily because it "was too quick to dismiss the safety benefits of automatic seatbelts: and was therefore flawed because it did not reflect the agency " bring[ing] its expertise to bear on the question." *Id* at 54. Finally the Court found that an arbitrary and capricious finding could be supported by an agency's failure to provide a logical nexus between its reasons for a decision and the decision itself: "…[b]y failing to analyze [the nondetachable belt] … in its own right, the agency …has failed to offer the rational connection between the facts and the judgment required to pass muster under the arbitrary and capricious standard." *Id* at 56

Thus a decision by an agency may be found arbitrary and capricious for a variety of reasons, including:

1) Where an agency fails to follow the law *Arkansas v. Oklahoma*, 503 U.S. 91, 105 (1992);
2) Where an agency fails to examine the relevant data and articulate a satisfactory explanation for its action including a "rational connection between the facts found and the choice made." *Burlington Truck Lines v. United States,* 371 U.S. 156, 168 (1962);
3) Whether the agency decision was based on a consideration of the relevant factors and whether there has been a clear error of judgment *Bowman Transp. Inc. v. Arkansas-Best Freight System*, *supra*, 419 U.S., at 285, 2; *Citizens to Preserve Overton Park v. Volpe*, supra, 401 U.S., at 416;
4) Where the agency has relied on factors which Congress has not intended it to consider, entirely failed to consider an important aspect of the problem, offered an explanation for its decision that runs counter to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise. *SEC v. Chenery Corp*., 332 U.S. 194, 196 (1947);
5) Where an agency is too quick to dismiss relevant factors, fails to bring its expertise to bear on a question, and fails to provide a logical nexus between its reasons for a decision and the decision itself. *Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29 (U.S. 1983).

Arbitrary and capricious activity sufficient to block agency decisions thus comes in many forms. Importantly, the City of Rochester notes that the flawed process and minimal effort over decades by the EPA and New Hampshire Department of Environmental Services (NHDEP) are not the result of one or two isolated incidents involving poor judgement. Instead decades of neglect of Great Bay Estuary issues by EPA, whether due to lack of funding, reduced staffing, or general lack of interest are reflected in a draft General Permit and Fact Sheet that build on numerous poor decisions that ignore relevant data and consistently fail to offer a rational connection between the relevant facts and data as they exist and the choices made by EPA. This document highlights many decisions made by the EPA in this matter that fail to consider important aspects

[2] Louis J. Virelli III, *Deconstructing Arbitrary and Capricious Review*, 92 North Carolina Law Review (2014)

of the problem, illustrate clear errors of judgement, demonstrate a pervasive unwillingness by EPA to brings its own expertise to bear on the problems of the Great Bay, and dismiss factors clearly vital to rational and logical decision making. The factors discussed in this document and in the supporting comments of experts and consultants must be viewed individually and cumulatively. If Rochester brought to light only one or two isolated incidences of poor decisions the possibility exists that the EPA could hide behind the substantial deference provisions of the Administrative Procedures Act. Rochester submits, however, that not only does every decision highlighted in this comment package rise to the level of arbitrary and capricious, but viewed *cumulatively* the decisions made by EPA as reflected in the draft GP and Fact Sheet are so tainted by flawed judgment and illogical, irrational assertions, assumptions, and decisions that the draft GP cannot be sustained.

Given the very real implications of the arbitrary and capricious standard, and using that standard to evaluate the Draft GP and Fact Sheet in this matter, the City of Rochester respectfully submits that the Draft GP and Fact Sheet reflect either a fundamental misunderstanding of the nature of the law related to NPDES permit standards, the fundamental ecology of the Great Bay Estuary, or a combination of both. The rational, objective science as depicted in the attached comments provided on behalf of the City of Rochester by Gradient, Geosyntec Consultants and VHB, and Brown & Caldwell Consultants provide a compelling foundation to reject the vague, poorly substantiated, and ultimately arbitrary and capricious justifications proffered in the EPA Fact Sheet as incorporated in the Draft GP. Each of the attached comments by the City's consultants are hereby incorporated fully into Rochester's overall comments on the Draft GP.

## 3.0 THE 100 KG/HA/YR TOTAL NITROGEN LOADING RATE IS ARBITRARY AND CAPRICIOUS

As is discussed in detail below, the proposed total nitrogen (TN) loading rate is arbitrary and capricious because (1) the EPA entirely failed to consider background TN and has selected a loading threshold that is unachievable; (2) the EPA failed to consider an important aspect of the problem by failing to consider significant nitrogen sources in the GBE watershed that should be considered in addition to other background components; (3) the Draft GP and Fact Sheet are devoid of any objective water quality standards and a timeframe for achieving same; (4) the load limit is inconsistent with sound science and was determined without the application of *any* actual measurements of the nitrogen levels or the health of the eelgrass in Great Bay; (5) the TN load limit ignores the evidence before the EPA that eelgrass beds are actually increasing at current TN loading in excess of 200 kg/ha/yr; (6) the methodology to derive the proposed loading rate is contrary to EPA's own guidance and practice documents; and (7) the methodology is inconsistent with how EPA has established load limits in other systems.

### 3.1 The Draft GP and its Fact Sheet Entirely Failed to Consider Background Nitrogen Loads and Set Loading Thresholds That Are Not Achievable.

The determination of background nitrogen loads is critically important to a determination of the reduction amounts that may be achievable by WWTFs. If background loads approach or exceed the mandated loading threshold it is strong evidence that the thresholds defined in the draft GP are unachievable. Gradient evaluated background loads in the GBE under two scenarios. Gradient first examined a scenario in which the entire GBE watershed was assumed to be covered by natural vegetation with no anthropogenic sources, using the pristine environment of New Hampshire's Hubbard Brook region and three other forested watersheds in the Lamprey and Oyster River watersheds for comparison. Gradient then used a second scenario and, again relying on the same NH DES (2014) model relied upon by EPA in the Fact Sheet, evaluated the extreme scenario where all of the towns subject to the Draft GP were removed and replaced with natural vegetation. Gradient, Comments on the Draft National Pollutant Discharge Elimination System (NPDES) Great Bay Total Nitrogen General Permit for Wastewater Treatment Facilities in New Hampshire, Section 2, (May 8, 2020) (Attachment 1).

Under the first scenario Gradient determined the background loads corresponding to a GBE watershed entirely covered by natural vegetation (i.e. the only nitrogen inputs are atmospheric deposition and natural nitrogen fixation in soils). The resulting range of background loads is almost entirely above the non-point source guidance value in the Draft GP of 64.6 kg $ha^{-1}$ $yr^{-1}$ and the upper end of the range is almost as high as the loading threshold of 100 kg $ha^{-1}$ $yr^{-1}$. Under Scenario 1 it is clear that the non-point source guidance value from the Fact Sheet is not achievable even if the entire GBE watershed were converted to natural vegetation. *Id.* at Section 2.1

Under Scenario 2, Gradient used the same NH DES (2014) loading data relied upon by EPA, with all towns subject to the Draft GP removed and replaced with natural vegetation. The results as depicted in Table 2.2 of Section 2.2 demonstrate that the loading threshold of 100 kg/ha/yr is at or *below* the range of background NPS loads contributed to the GBE by areas of natural vegetation and municipalities that are not regulated under the Draft GP. *Id.* at Section 2.2.

Under both scenarios, even if EPA were to require municipalities regulated in the Draft GP to eliminate all WWTF and NPS nitrogen loads, there would be no basis to expect that it could achieve the loading threshold of 100 kg/ha/yr.

### 3.2 The Draft GP and its Fact Sheet Entirely Failed to Consider Certain Nitrogen Sources in the GBE Watershed that should be Added to Other Components of Background.

Gradient identified at least two sources of nitrogen in the GBE estuary that were overlooked by the EPA *Id.* at Section 3. The Farmington, NH wastewater treatment facility discharges its effluent into rapid infiltration basins located adjacent to the Cocheco River upstream of Rochester. The Farmington WWTF does not currently operate under the terms of a NPDES permit. However, the wastewater discharged from this facility contributes a nitrogen load to the GBE. According to information from Discharge Monitoring Reports (DMRs) in the EPA ECHO database, the Farmington WWTF discharged an average nitrogen load of 34 lb/day to the Cocheco River (upstream of Rochester, NH) from 2007-2010 under NPDES Permit NH0100854 (US EPA, 2020). This daily nitrogen discharge corresponds to a load of 1.0 kg $ha^{-1}$ $yr^{-1}$.[3]

In addition, the Rockingham County WWTF operates under NPDES permit NH0100609 and is located in the Exeter River Basin. No information could be found on the nitrogen load in wastewater discharged from this facility.

[3] The calculated delivered load was not adjusted for a delivery factor through the Cocheco River due to lack of information with which to specify such a factor.

The EPA may choose not to regulate these sources, but to fail to include their wastewater TN loads as components of background demonstrates a failure by the EPA to consider important and relevant factors, clear error of judgment, and an apparent unwillingness to extend its expertise to the problem of TN in the Great Bay.

### 3.3 The Recent Supreme Court Decision in County of Maui v. Hawaii Wildlife Fund Requires EPA to Amend the Draft GP to Include the Farmington WWTF.

During the comment period for the NPDES Great Bay Total Nitrogen General Permit for Wastewater Treatment Facilities in New Hampshire (NPDES General Permit: NHG58A000) the U.S. Supreme Court rendered a decision of fundamental importance to the content and substance of the draft General Permit. On April 23, 2020 the U.S. Supreme Court handed down its decision in *County of Maui v. Hawaii Wildlife Fund*, 590 U.S. ___ (2020)[4]. In *Maui* the county wastewater reclamation facility collects sewage from the surrounding area, partially treats it, and pumps some 4 million gallons of treated water daily into groundwater through rapid infiltration basins. The effluent travels roughly a half mile, through groundwater, to the Pacific Ocean. The question before the Court was whether the Clean Water Act[5] requires a permit when pollutants originate from a point source but are conveyed to navigable waters by a nonpoint source. Writing for a 6 – 3 majority, Justice Breyer answered the question in the affirmative: "We conclude that the statutory provisions at issue require a permit if the addition of the pollutants through groundwater is the functional equivalent of a direct discharge from the point source into navigable waters." *Maui, slip opinion* at 1.

The *Maui* decision has important ramifications on the pending New Hampshire NPDES General Permit (GP). By its express terms, the draft GP covers only "[t]he 13 WWTFs located *in New Hampshire* that discharge wastewater into *a surface water* of the Great Bay watershed are covered by this General Permit." Fact Sheet at 5. Additionally the terms and limitations of the draft GP, are expressly made applicable to WWTFs in New Hampshire who discharge effluent directly into the "waters of the United States." See CWA §§ 301(a), 402(a); Fact Sheet at 6.

The *Maui* decision highlights the fact that there are important sources of TN in the GBE that are arbitrarily omitted from EPA decisions pertaining to the Great Bay. The Gradient comments point out at Section 3 that the City of Farmington, NH, operates a wastewater treatment facility upstream of the Rochester WWTF. The Draft GP and Fact Sheet fail to account for Farmington's discharge of TN into rapid infiltration basins adjacent (within a few hundred feet) to the Cocheco River even though the discharge is certainly part of the background load impacting Rochester and the GBE.

Farmington has been allowed to discharge wastewater into groundwater adjacent to the Cocheco River without a NPDES permit. Under *Maui*, *supra*, WWTFs may no longer discharge pollutants through groundwater if the process is the functional equivalent of a direct discharge

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[4] https://supreme.justia.com/cases/federal/us/590/18-260/

[5] Federal Water Pollution Control Act, §§301(a), 502(12)(A), as amended by the Federal Water Pollution Control Act Amendments of 1972 (Clean Water Act) §2, 86 Stat. 844, 886, 33 U. S. C. §§1311(a), 1362(12)(A)

from the point source into navigable waters. Given that Farmington discharges its municipal wastewater into groundwater through rapid infiltration basins in close proximity to the Cocheco River, Farmington must now operate under a NPDES permit. The Draft GP and Fact Sheet expressly states that WWTFs "...located in NH that discharge wastewater into a surface water of the Great Bay watershed are covered by the General Permit." Fact Sheet at 5. The failure to include the Farmington WWTF in the Draft GP, and/or to reissue a new Draft GP with opportunity for public comment, demonstrates EPA's pattern of failing to consider important aspects of the problem as well as its failure to bring its expertise to bear on the problems of the Great Bay.

Further, the Rockingham County WWTF operates under NPDES permit NH0100609 and is located in the Exeter River Basin. To the extent that this facility discharges effluent into the waters of the Great Bay Estuary, either through a point source or through groundwater and is the functional equivalent of a direct discharge, the holding of the Supreme Court in *Maui* should also apply to this facility

### 3.4 The Draft GP and Fact Sheet are Devoid of any Objective Water Quality Standards and a Timeframe for Achieving Same.

As explained more fully in Section 6.1 of the Gradient comments (Attachment 1), the Fact Sheet conditions the "reopening" of the permit on achieving water quality standards (WQS), without once defining any objective "water quality standards." As stated in the draft Fact Sheet: "In the event the activities described above are not carried out and water quality standards are not achieved, EPA may reopen the General Permit..." EPA Fact Sheet at 31.

The only WQS referenced in the Draft GP or Fact Sheet is the "narrative" NH DES WQS. Narrative standards, however, are by definition not objective and must be translated into a numerical value for the purposes of a NPDES permit. EPA, apparently aware of this, asserts at page 21 of the Fact Sheet that: "EPA in this case relied upon subsection (A) to translate the relevant narrative criterion into a numeric limit," citing to 40 C.F.R. 122.44(d)(1)(vi)(A)-(C). The language of 40 C.F.R. 122.44(d)(1)(vi)(A) is as follows (emphasis added):

> (A) Establish effluent limits ***using a calculated numeric water quality criterion*** for the pollutant which the permitting authority demonstrates ***will attain and maintain applicable narrative water quality criteria*** and ***will fully protect the designated use***. Such a criterion may be derived using a proposed State criterion, or an explicit State policy or regulation interpreting its narrative water quality criterion, supplemented with other relevant information which may include: EPA's Water Quality Standards Handbook, October 1983, risk assessment data, exposure data, information about the pollutant from the Food and Drug Administration, and current EPA criteria documents;

The plain language of 40 C.F.R. 122.44(d)(1)(vi)(A) expressly requires the establishment of a numeric WQS criterion.[6] Yet the only numeric WQS that can be found in the draft GP or Fact Sheet is a 100 kg/ha/yr loading threshold. In correspondence from EPA to the NH Department of Environmental Services (DES) on March 16, 2020, the agency stated "the proposed long-term nitrogen loading endpoint – 100 kg $ha^{-1}$ $yr^{-1}$ – drawn from multiple lines of evidence including the Latimer & Rego (2010) paper and others is *not* an enforceable limit or other such permit requirement" [emphasis added] (US EPA, 2020) (Attachment 2). By definition, a water quality criterion is an enforceable limit and, since EPA has stated the loading threshold is not an "enforceable limit," it cannot be a water quality criterion.[7]

The EPA attempt to condition the evaluation of WQS achievement without defining the goal or objective in an enforceable or understandable fashion is a clear error of judgement and fails to explain how a WWTF subject to the proposed terms of the draft GP could objectively judge progress toward attainment. There is no rational connection between the facts and data available to the EPA and the choices made by the EPA in its Draft GP and Fact Sheet.

### 3.5 The 100 kg/ha/yr TN Load Limit (100 Kg Load Limit) is Not Based on Site-Specific Data and is Contrary to the Evidence Before the EPA.

EPA has selected a nitrogen loading rate goal for the Great Bay Estuary (GBE) of 100 kilograms per hectare per year (kg/ha/yr) based upon three research studies done a decade or longer ago. (Cole and Valiela 2002; Hauxwell, et al. 2003; Latimer and Rego 2010). These studies each recommended that nitrogen loading of 20 to 100 kg/ha/yr – or less - is "the critical range" to protect seagrass. In particular, one study postulated that "with loading rates above 100 kg ha yr 'eelgrass is essentially absent.'" (Latimer and Rego, 2010, 8). Time and further observation have, however, proven this statement incorrect or at least limited to a select few small embayments. In 1996, for instance, when eelgrass in the Great Bay Estuary was considered thriving and resilient, and the eelgrass coverage in GBE was estimated at just below 2900 acres, the total nitrogen loading rate for GBE was approximately 252 kg/ha-yr. Cole, Comparative Evidence, supra, at 94; Piscataqua Region Estuaries Partnership, State of Our Estuaries at 24 (2018) ("The year 1996 also represents the highest amount of eelgrass on record for the Great Bay Estuary.")

The nitrogen load in the Great Bay Estuary was calculated to be approximately 245 kg $ha^{-1}$ $yr^{-1}$ based on an average of total nitrogen (TN) loads from 2010, 2011 and 2017. See HDR, Development of Great Bay Estuary System Total Nitrogen Model 22 (Dec. 2, 2019) (Attachment 3). Yet despite these TN loads, more recent observations indicate that eelgrass acreage is increasing in the Great Bay Estuary. In a December 22, 2019 Associated Press article, Professor Fred Short of the University of New Hampshire, who has been studying eelgrass health in the GBE for decades, observed recently "[i]t [eelgrass] actually looks better than it did last year at

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[6] As explained, *supra,* WWTFs in Maine that discharge into the Great Bay Estuary must monitor water quality to make sure that Total Nitrogen in the water column does not exceed 0.32 mg/L. In *City of Taunton, Massachusetts v. United States Environmental Protection Agency,* 895 F.3d 120 (1st Cir 2018), *cert. denied sub nom. City of Taunton, Mass. v. E.P.A., 139 S. Ct. 1240, 203 L. Ed. 2d 256 (2019)* (Feb. 19, 2019), the 1st Circuit let stand the EPA's calculated numeric WQS for TN of 0.45 mg/L as protective.

[7] See Gradient, Section 6.1.

this time and better than [it] has in many years." Michael Casey & Andrew Selsky, Scientists Struggle to Save Seagrass From Coastal Pollution, Associated Press, Dec. 22, 2019, at 1. (Attachment 4).

This observation of eelgrass improvement is also reported in a recent Piscataqua Region Estuaries Partnership (PREP) publication. In a February 28, 2020 report by Seth Barker entitled *Eelgrass Distribution in the Great Bay Estuary and the Piscataqua River in 2019: Final Project Report submitted to the Piscataqua Region Estuaries Partnership* (Attachment 5). Mr. Barker stated:

> Eelgrass distribution in Great Bay, Little Bay, and the Piscataqua River Estuary was mapped from aerial photography acquired on August 2, 2019. The total area of eelgrass beds with 10% or greater cover and a polygon area equal to or greater than 100 square meters was 625.9 hectares or 1677.7 acres. ... The largest concentration of eelgrass was found in Great Bay with lesser amounts in the vicinity of Portsmouth Harbor. The total area of eelgrass beds has increased by 131 acres which is approximately an 8.5% increase from 2017 and very nearly equal to that mapped in 2013.

Barker, Final Project Report, supra, at 2. If the Valiela & Cole (2002), Hauxwell, *et al.* (2003), and Latimer and Rego (2010) conclusions are applicable, then the Great Bay Estuary should have *no* surviving eelgrass, never mind increasing acreage, given the current TN loads that are in excess of 100 kg/ha/yr.

Nitrogen loads are related to nitrogen concentrations. Data for both nitrogen loads and concentrations from the GBE were available to EPA when it was developing the Draft GP and Fact Sheet. For example, EPA relied on nitrogen loading data to the GBE from PREP publications in the Draft GP and Fact Sheet (*e.g.*, PREP, 2018; PREP, 2013). PREP has determined nitrogen loads to the GBE for multiple periods, as far back in time as 2003. Using the same methods as EPA in the Fact Sheet, Gradient used the PREP loading data to calculate delivered nitrogen loads to the GBE for each period in which PREP has provided loading data. See Gradient Comments, Section 4.2. (Attachment 1).

Nitrogen concentrations within the GBE from long term monitoring stations were also available to EPA when it developed the Draft GP and Fact Sheet. For each period in which PREP provided data on nitrogen loads, Gradient found the median total nitrogen concentration at each of the three long term monitoring stations in the main stem GBE, *i.e.*, Great Bay (GRBGB), Adams Point (GRBAP), and Coastal Marine Lab (GRBCML).

As discussed in greater detail in Section 3.7, below, Gradient also points out that data available to EPA demonstrate how nitrogen loads to the GBE and nitrogen concentrations measured at monitoring stations in the GBE are correlated (See Gradient Comments, Section 4.2, Figures 4.1 and 4.2). Regressions on the data were used to determine nitrogen concentrations that correspond to the loading threshold of 100 kg $ha^{-1}$ $yr^{-1}$ proposed in the Draft GP and Fact Sheet. At the Coastal Marine Lab monitoring station, a 100 kg $ha^{-1}$ $yr^{-1}$ loading rate corresponds to a nitrogen concentration of 0.18 mg/L, which is approximately equal to the background concentration of total nitrogen of 0.2 mg/L in the Gulf of Maine adjacent to the GBE (NH DES, 2009 and references therein). Thus, consistent with Gradient's determination that the loading threshold is near the range of background loads and therefore unachievable, (Gradient, Section 2), the available data on nitrogen loads and concentrations buttress that finding.

From the above, and based upon data readily available to the EPA, it is abundantly clear that EPA failed to consider relevant data from the GBE when it proposed the loading threshold. Perhaps more striking are the internally inconsistent arguments advanced by the EPA in its defense. As noted in the Gradient comments, the US EPA initially defends its selection of a single overall TN loading rate for the entire GBE despite its size and the numerous unique "assessment zones" by asserting that the "*...entire Great Bay estuary is a single estuarine system* [emphasis added] 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." Four pages later, however, EPA's characterization of the GBE undergoes a stark change as the agency defends its use of studies of much smaller estuaries including Latimer and Rego (2010), to establish a loading rate by asserting that "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* [emphasis added]" (Fact Sheet, p. 22). Characterizing the GBE as "*many smaller sections that are comparable to...embayments*" for one purpose, and an "*...entire ...single estuarine system*" for another is illogical and inconsistent. *Which is it?* To describe one estuary as both of these extreme opposites contributes to the arbitrary and capricious approach and flawed logic relied upon by EPA in the Draft GP. It also demonstrates all too clearly the failure of the EPA to provide a logical nexus between the data and its asserted reasons for drastic WWTF effluent reductions and its TN load threshold "alternatives."

Beyond the plain meaning of data readily available to the EPA for consideration while writing the draft GP and Fact Sheet, other data and resources available to EPA were overlooked or ignored. According to Rochester's hydrodynamic modeling consultant, HDR, Inc, the 100 Kg Load Limit is the equivalent to a TN concentration of 0.24 mg/l in GBE – approaching the background level of about 0.20 mg/l TN found in the Gulf of Maine (Atlantic Ocean). *See* HDR, Development of Great Bay Estuary TN Model, supra, at 22 (Attachment 3). Setting such a low TN limit approaching boundary conditions is unprecedented for an estuary surrounded by significant anthropogenic development.

The New Hampshire Department of Environmental Services ("DES") has agreed that the HDR hydrodynamic model of the Great Bay Estuary, once calibrated to DES' satisfaction, is an excellent tool for developing TN concentrations and loads in the GBE using a numeric nitrogen concentration endpoint that is deemed protective of the Estuary.

Beyond the considered and well-supported views of Gradient and HDR, Rochester asked Dr. Brian Howes to review the HDR model report. Dr. Howes is an expert on the restoration of estuarine nutrient related habitat and a Professor at the UMass/Dartmouth School of Marine Science and Technology (SMAST). Dr. Howes concluded that "[i]t appears that the hydrodynamic/nitrogen model is sufficiently robust, calibrated and verified to make useful predictions of nitrogen concentrations and gradients in the Great Bay Estuary under different loading scenarios." Letter from Dr. Brian L. Howes, Professor, Univ. of Mass. to Dean Peschel, Consultant, Great Bay Municipal Coalition 1, 4 (Jan. 27, 2020) at 1. (Attachment 6).

Dr. Steven Chapra, a professor in the Civil and Environmental Engineering Department at Tufts University and a recognized expert in surface water quality modeling, reviewed the Latimer and Rego (2010) paper and concluded that their areal loading approach was not consistent with accepted scientific methods for assessing TN impacts on estuarine systems, and further that the Latimer and Rego analysis is intended as a screening tool and "has no apparent applicability to the Great Bay system." Letter from Steven C. Chapra, Professor, Tufts University to Dean Peschel, Consultant, Great Bay Municipal Coalition 3 (Mar. 22, 2019) (Attachment 7). Relevant excerpts of Dr. Chapra's letter follow:

> The approach employed by Latimer and Rego (2010) is a generalized and greatly simplified approach (e.g., a screening tool) based upon limited data, hypothetical eelgrass loss/coverage assumptions, and a limited set of ecological/estuarine conditions . . . .
>
> ...[T]his approach has no apparent applicability to the Great Bay system. In fact, the data for the Great Bay system confirm it is inapplicable as TN loadings have greatly exceeded the upper TN loading Latimer and Rego indicate will eradicate all eelgrass growth (100 kg/ha-yr) while robust eelgrass growth was maintained in the 1990s through 2005.

Chapra, supra, at 2, 3. The Latimer and Rego paper states that "...at loading rates greater than 100 Kg/ha-yr eelgrass is essentially absent." Latimer, Empirical Relationship, supra, at 8. As noted above, eelgrass in the Great Bay Estuary is far from "essentially absent" and, in fact, acreage has increased in 2019 compared to 2017.

Dr. Brian Howes has also advised the City of Rochester regarding the proper approach to setting a scientifically based nitrogen criteria for GBE. SMAST, under Dr. Howes' leadership, partnered with the Massachusetts Department of Environmental Protection (DEP) in the Massachusetts Estuary Project (the Project). The Project, through SMAST, is providing the scientific and technical support to the DEP for the development and implementation of policies on nitrogen sensitive estuaries. The program is performing the data collection and modeling required for the management and restoration of the 89 embayment systems comprising the coastline of southeastern Massachusetts.

We asked Dr. Howes to review the Valiela and Cole (2002) and the Latimer and Rego (2010), research papers to determine their applicability to the Great Bay Estuary. In his letter of January 20, 2020, Dr. Howes, like Dr. Chapra, agreed that the application of these research papers to develop a nitrogen criteria for the Great Bay system was not appropriate because it did not analyze GBE-specific data and was more of a general "survey" across many estuaries.

> The study, which will be referred to as the Eelgrass-NLM approach, has merits by bringing forward the cautionary note that external N loading to estuaries can result in eelgrass loss and therefore source reductions are needed in some areas for eelgrass protection. However, the Eelgrass-NLM study is more of a "quick look" survey across estuaries to see what relationships might exist between N-loading and eelgrass loss, rather than a quantitative estuary specific analysis to support watershed management actions, a conclusion that appears to be supported by the lead author as well.

Letter from Dr. Brian L. Howes, Professor, Univ. of Mass. to Dean Peschel, Consultant, Great Bay Municipal Coalition 1, 8 (Jan. 20, 2020) at 1 (Attachment 8).

> The Eelgrass-NLM approach has not been verified to be generally applicable. We reviewed Valiela and Cole 2002 as Great Bay is listed within the tables of that publication, but examination of the document reveals no recommendations or information on eelgrass loss that is relevant to Great Bay. However, the TN loading to Great Bay was noted as 252 kg/ha-yr (Table I at 94) citing Short and Mathieson (1992), but does not contain an independent loading analysis or level of eelgrass present in the system. None-the-less, it is significant that the presented eelgrass mapping data for the system (1990-1996) confirms robust eelgrass growth throughout Great Bay but at an apparently higher TN loading rate well above the threshold of 100 kg/ha-yr suggested in Latimer and Rego (2010).

Id. at 8.

> Taken together, it is not possible to recommend the Eelgrass-NLM approach as a scientifically defensible method for setting a nitrogen threshold or target or to use as the basis for watershed nitrogen load reductions. There are simply too many data gaps, uncertainty in the NLM loadings and a wide variation in the eelgrass coverage at similar watershed nitrogen loadings (graph 2, Latimer and Rego 2010). Further the developer of the NLM noted the issues in the 1997 paper, where he directly stated that the "**loading rates calculated using the model should not be interpreted and used as hard, well-defined values of thresholds, but rather as fuzzy guidelines.**" Valiela et al 1997, p.374 referring to nitrogen loading rates derived by the land use model that enter the estuary.

Id. at 10 [emphasis added].

> ... Since other approaches are now available to increase the certainty of threshold analysis and which cover the data gaps mentioned above, employing some of these seems reasonable to produce a robust, quantitative, defensible nitrogen threshold concentration and load for the Great Bay Estuary.

Id. at 10.

The three research papers that were relied upon by EPA to select the 100 Kg Load Limit were based upon research done a decade or longer ago. Since that time, alternative approaches have been more finely developed – and applied by EPA – throughout New England and the United States, in order to produce a "quantitative" and "defensible" nitrogen threshold concentration. EPA is required to hold the communities surrounding the Great Bay to the same standards it applies to other New England bays and waterways throughout the country. To hold the Great Bay communities to a higher standard is not appropriate. This is especially true when more recent studies of the Great Bay Estuary demonstrate ongoing improvement in eelgrass health. EPA's reliance on inapplicable studies from over a decade ago to establish a TN load limit of 100 kg/ha/yr deemed by EPA to be necessary to protect eelgrass in the GBE is contrary to the evidence before the agency that demonstrates clearly that eelgrass remains healthy in GBE at TN loads greater than 200 kg/ha/yr.

### 3.6 The Selection of the 100 Kg Load Limit is Contrary to EPA Guidance and Practice

We are not aware of EPA Region I selecting the 100 Kg/ha/yr Load Limit in any other TN NPDES permit in New England or the mid-Atlantic. To the contrary, of the many NPDES

Permits and Fact Sheets that we have reviewed, virtually all contained "other approaches" to increase the certainty of threshold analysis to develop a robust, quantitative, defensible nitrogen threshold concentration and load.

According to Dr. Howes, because of the major limitations to using the NLM nitrogen loads to set nitrogen limits, "others have used more estuarine specific quantitative assessment and modeling approaches." Id. at 8. He cites the example of the approach used in the Massachusetts Estuaries Project (MEP) that he directed.

> The MEP Linked Watershed-Embayment Management Model Approach was established because many of the previously developed tools (like the Eelgrass-NLM Approach) for predicting loads and concentrations tend to be generic in nature, and overlook some of the specific characteristics of a given water body as well as details of estuarine dynamics that drive habitat function to varying degrees. The MEP approach focuses on linking water quality model predictions, based upon watershed nitrogen loading (inclusive of integrated measure of attenuation across the entirety of the watershed) and embayment recycling and system hydrodynamics, to actual measured values for specific nutrient species within estuarine waters. The linked watershed-embayment approach is built using embayment specific measurements, thereby enabling calibration of the prediction process for specific conditions in each of the coastal embayments of southeastern Massachusetts. To date, MassDEP and USEPA have been developing TMDLs for 70 estuaries in Massachusetts based upon the MEP assessment and modeling approach.

Howes, Letter (Jan. 20, 2020), supra, at 10.

Dr. Howes also advised that in these MEP assessments and modeling approaches, *estuary specific data is critical* to the development of an appropriate Total Nitrogen (TN) endpoint:

> The eelgrass TN thresholds developed by SMAST were fundamentally based on intra and intersystem comparisons of eelgrass and measured water quality (including TN, water clarity, salinity, depth) with tidally averaged TN from the validated numerical water quality modeling. However, the modeling of TN was a refinement and is not always critical to developing a threshold. It is the comparison of TN levels across a variety of eelgrass sites (areas with healthy eelgrass and stable beds, areas with thinning beds, areas where eelgrass beds have been declining or have recently disappeared) that underpins threshold analysis for the eelgrass endpoint. **This comparative approach is used to develop a variety of thresholds in aquatic systems and is generally accepted as the best approach because it is based upon actual measurements of the constituent of interest (nitrogen) and the "health" of the selected endpoint (in this case eelgrass, but also benthic animals). The approach is both robust and verifiable and can be augmented by the use of indexes or models.**

Letter from Dr. Brian L. Howes, Professor, Univ. of Mass. To Dean Peschel, Consultant, Great Bay Municipal Coalition 2 (October 7, 2019) [emphasis added]. (Attachment 9).

The Howes' recommendation on the approach to setting a TN concentration was endorsed by Dr. Victor Bierman, in a peer review report of the Long Island Sound TN endpoint study, entitled Summary Report - Technical Review of Select Memorandums Supporting the Development of Nitrogen Endpoints for Three Long Island Sound Watershed Groupings: 23 Embayments, 3 Large Riverine Systems, and Western Long Island Sound Open Water - Prepared for:

Envtl Prot. Agency Region 1 by HydroAnalysis, Inc., (Jan. 2019) (Attachment 10). In his peer review comments, Dr. Bierman observed:

> To ensure that the TN endpoints are protective of all portions of the embayment when applying the methods to non-homogenous embayments, it would be appropriate to consider the sentinel station approach used in the MEP [Massachusetts Estuary Project]. As stated on Page 204 in Howes et al. (2006):
>
> > *The approach for determining nitrogen loading rates, which will maintain acceptable habitat quality throughout an embayment system, is to first identify a sentinel location within the embayment and second to determine the nitrogen concentration within the water column which will restore that location to the desired habitat quality (threshold nitrogen level). The sentinel location is selected such that the restoration of that one site will necessarily bring the other regions of the system to acceptable habitat quality levels.*

Id. at 29. In the Draft GP, EPA Region 1 analyzed *no* Great Bay Estuary specific data. It made *no* comparison of TN levels across a variety of actual eelgrass sites within the Great Bay Estuary. It made *no* assessment of *any* actual measurements of the nitrogen or the health of the eelgrass in Great Bay. Rather than undertaking the necessary scientific analysis to develop an appropriate TN endpoint for the Great Bay Estuary, EPA Region 1 failed to bring its expertise to bear on the question and arbitrarily and capriciously selected three research papers based on general studies completed more than a decade earlier that derived a "one size fits all estuaries" TN endpoint. This is a highly inadequate substitution for the scientific approach that should have been undertaken and is the approach that EPA has itself undertaken in other estuarine permits, and it is unfair to the Great Bay communities that will be put at a serious financial and economic disadvantage because of this extremely low TN endpoint.

Such an approach is also contrary to EPA's published guidance on how to properly set nutrient reduction requirements for an estuarine system. *See* U.S. Envtl. Prot. Agency, Nutrient Criteria Technical Guidance Manual—Estuarine and Coastal Marine Waters (Oct. 2001).

The Guidance Manual makes clear that generalized criteria are not appropriate for the development of nutrient criteria in estuaries. "...**[E]stuarine and coastal marine waters tend to be far more unique**, and development of individual waterbody criteria rather than for classes of waterbodies (such as glacial temperate lakes) is a greater likelihood. Also, estuaries will likely require classification by **residence time** or subdivision by salinity or density gradients." Id. at 1-8 (emphasis added). "Within these contiguous segments, the reference stations should have similar **residence time**, salinity, general water chemistry characteristics, depth, and grain size or bottom type." U.S Envtl. Prot. Agency, Technical Guidance Manual, supra, at 1-15. [emphasis added]

According to Dr. Howes, the Great Bay Estuary "system **residence time** is low, in comparison to the small embayments cited by Latimer and Valiela. This key factor confirms that application of the simplified assessment methods are not relevant to the Great Bay system." Howes, Letter (Jan. 20, 2020), supra, at 5 (Attachment 8).

According to the Guidance Manual, the steps necessary to develop nutrient criterion include investigation of historical information to determine the background ambient nutrient levels associated with the *specific water body*, determination of current reference conditions for the *specific water body*, use of a hydrologic model to understand the hydrodynamics of the *specific water body*, and the interpretation of this data by regional specialists responsible for developing the criteria.

> An outline of the recommended process for coastal and estuarine criteria development is as follows: (1) Investigation of historical information to reveal the nutrient quality in the past and to deduce the ambient, natural nutrient levels associated with a period of lesser cultural eutrophication, (2) determination of present-day or historical reference conditions for the waterbody segment based on the least affected sites remaining, such as areas of minimally developed shoreline, of least intrusive use, fed by those tributaries of least developed watersheds, (3) use of loading and hydrologic models to best understand the density and flow gradients, including tides, affecting the nutrient concentrations, (4) the best interpretation of this information by the regional specialists and Regional Technical Assistance Group (RTAG) responsible for developing the criteria, and (5) consideration of the consequences of any proposed criteria on the coastal marine waters that ultimately receive these nutrients to ensure that the developed criteria provide for the attainment and maintenance of these coastal uses. This concept, as illustrated in Figure 1-4, is the basis for the National Nutrient Criteria Program and is explained throughout this text.
>
> EPA believes that nutrient criteria need to be established on an individual estuarine or coastal water system basis and must be appropriate to each waterbody type. ...
>
> Nutrient criteria consist of judicious incorporation of present **reference condition information** about the primary variables [in this case, Nitrogen], together with a **knowledge of historical conditions** and trends in the nutrient quality of the resource. These two factors, possibly augmented by **data extrapolations or models**, are analyzed objectively by a **panel of regional specialists** well versed in the biology, physics, and chemistry of the systems of concern. The criteria are also evaluated with respect to the **possible consequences of their implementation on downstream receiving waters**. All of these elements are required for the development of a nutrient criterion.

U.S Envtl. Prot. Agency, Technical Guidance Manual, supra, at 1-8, 1-10, xv, [emphasis added].

EPA utterly failed to follow the scientific approach set forth in the EPA Guidance Manual for development of nutrient criteria in estuaries such as the Great Bay. In fact, it made no attempt to develop or analyze *any* Great Bay Estuary-specific data. Instead, it arbitrarily and capriciously relied upon three generic research papers to select the 100 Kg Load Limit nitrogen criteria used in the Draft General Permit.

Furthermore, EPA is fully aware of the appropriate scientific methodology followed by Dr. Howes and others, ***including EPA***, to develop a nitrogen endpoint, and yet chose not to do so here. In *City of Taunton, Massachusetts v. United States Environmental Protection Agency*, *infra,* the Court found that EPA had implemented a "well-reasoned exercise" in its selection of a nitrogen criteria for the Mount Hope Bay. 895 F.3d 120, 141 (1st Cir. 2018). EPA's methodology in that case stands in stark contrast to its method of selecting a TN endpoint for the Great Bay Draft GP.

In *Taunton*, the Commonwealth of Massachusetts had failed to prescribe specific methodologies for deriving a numeric nitrogen limit that corresponded with its narrative criteria, so it was left to EPA to do so. The Court reviewed EPA's steps to determine that the site-specific nitrogen criteria of 0.45 mg/l selected by EPA for Mount Hope Bay was reasonably supported by scientific data.

> The EPA looked to an interim report prepared for the Massachusetts Department of Environmental Protection (MassDEP) known as the "Critical Indicators Report." See Massachusetts Estuaries Project, Site-Specific Nitrogen Thresholds for Southeastern Massachusetts Embayments: Critical Indicators, July 21, 2003. [The Critical Indictors Report was developed by Dr. Howes and his SMAST colleagues.]
>
> ...[T]he report listed various criteria, or "indicators," to guide assessments of the present health of a given body of water, including the amount of oxygen, nitrogen, and chlorophyll present in that body. In this sense, those "indicators" serve as factors to consider when assessing how healthy a body of water is. The interim report also provided what it describes as "straw man" threshold levels -- to be "further refined with the collection of additional data and modeling." For example, per those thresholds, Class SB waters are not impaired when, among other things, "oxygen levels are generally not less than 5.0 mg/l," chlorophyll-a levels are between 3-5 mg/l, and nitrogen levels are between 0.39-0.50 mg/l. ...
>
> The EPA then looked to data from a three-year water quality monitoring study that The School for Marine Sciences and Technology at University of Massachusetts Dartmouth (SMAST) had carried out. [Dr. Howes led this three-year study.] The study involved taking monthly water samples from 22 sites across the Taunton Estuary and Mount Hope Bay from 2004 to 2006. ...
>
> The EPA also considered data from another monitoring station in Mount Hope Bay, operated by the Narragansett Bay Water Quality Network. ...

Id. at 26-29. The EPA then used the Critical Indicators Report, the *site-specific* data from monitoring stations across the Taunton Estuary and Mount Hope Bay, and a reference to one of the monitoring stations to develop a total nitrogen threshold for the estuary that EPA found protective of water quality.

> To calculate that total nitrogen threshold, the EPA -- employing what is known as a "reference-based" approach -- looked to one of the monitoring stations in the SMAST study, MHB16, that "consistently met dissolved oxygen standards." As the EPA detailed in the response to comments, MHB16 was, among all of the unimpaired sites in the SMAST study, the site with the highest nitrogen concentration. The nitrogen concentration at MHB16, 0.45 mg/l, also fell within the range that the Critical Indicators Report held out as consistent with unimpaired conditions (0.35- 0.5 mg/l). The EPA further explained in the fact sheet that this nitrogen threshold was consistent with "total nitrogen concentrations previously found to be protective of [acceptable dissolved

oxygen levels] in other southeastern Massachusetts estuaries [which] have ranged between 0.35 and 0.55 mg/l." Mindful that all of the sites in the SMAST study with a nitrogen concentration above 0.45 mg/l suffered from nutrient impairment, the EPA explained in the response to comments that "there is simply no evidence that a higher target [total nitrogen] concentration would be sufficiently protective in the Taunton River Estuary." The EPA therefore selected 0.45 mg/l as the target nitrogen concentration that would serve as the basis for the effluent limitations the permit would impose on the Facility.

*Taunton*, 895 F.3d 120 at 35–36.

Once again, the contrast is striking between the scientific, quantitative methodology EPA employed to develop the nitrogen criteria for the Taunton River Estuary and Mount Hope Bay, and EPA's efforts in the Draft GP. EPA's reliance on three research papers done a decade or longer ago, with merely a passing reference in one of those papers to the Great Bay Estuary, is an inappropriate, arbitrary and capricious manner of selecting a TN endpoint or load threshold.

As noted in Section A, above, the 100 Kg Load Limit is equivalent to a 0.24 mg/L TN concentration in the Great Bay Estuary, close to the 0.20 mg/l TN concentration in the boundary waters of the Gulf of Maine (Atlantic Ocean). In *Taunton,* EPA determined that 0.45 mg/l was protective of the Taunton Estuary and Mount Hope Bay. Our review of many other estuaries (most of them in the MEP) where EPA has selected a TN criteria deemed protective of water quality, indicates that the range of growing season TN concentrations approved by EPA and deemed protective of eelgrass is 0.30 mg/l to as high as 0.52 mg/l, with an average of 0.40 mg/L TN. *See* TN Endpoint Summary Table attached to Howes, Letter (Oct. 7, 2019), supra, (Attachment 9). See also Gradient Comments, Section 4.1 (Attachment 1).

Based on his extensive experience, we asked Dr. Howes for his opinion as to the appropriate range of nitrogen concentrations that would be protective of eelgrass resources in the Great Bay Estuary. Dr. Howes stated:

> [f]or eelgrass, the protective growing season TN concentration identified by SMAST typically ranged from 0.32 to 0.45 mg/l, as you have properly identified in the summary attachment (Enclosure). For the Great Bay system, selecting a growing season average in the range of 0.32-0.35 mg/l should be protective of that resource based on our experiences with the nearby Massachusetts estuarine waters.

Howes, Letter (Oct. 7, 2019), supra, at 2 (Attachment 9). A range of 0.32 to 0.35 mg/l TN is significantly higher than the 0.24 mg/l TN that equates to the 100 Kg Load Limit in the GBE.

The State of Maine has also adopted an interim total nitrogen threshold for receiving water of 0.32 mg/l for the protection of eelgrass.

> If the receiving concentration (Cffr) is above the interim total nitrogen threshold for the receiving water (0.32 mg/L in proximity to eelgrass or 0.45 mg/L in the absence of eelgrass), the discharge is determined to have a Reasonable Potential to cause or contribute

> to an excursion above applicable water quality standards. These interim nitrogen thresholds are based on data from Maine, New Hampshire and Massachusetts, and are subject to change based on the Department's nutrient criteria development process. If an exceedance of a threshold value occurs based on the RP calculation, the Department will determine the potential need to establish water quality based limits and/or the appropriate monitoring requirements.

Letter from Brian Kavanah, Director, Division of Water Quality Management, Maine Dept. of Entvl. Prot. 3 (Apr. 23, 2015) (Attachment 11).

In the Fact Sheet of the MEPDES Permit to the Town of Falmouth, Maine, the Maine DEP explains further:

> As of the date of this permitting action, the State of Maine has not promulgated numeric ambient water quality criteria for total nitrogen. According to several studies in USEPA's Region 1, numeric total nitrogen criteria have been established for relatively few estuaries, but the criteria that have been set typically fall between 0.35 mg/L and 0.50 mg/L to protect marine life using dissolved oxygen as the indicator. While the thresholds are site-specific, nitrogen thresholds set for the protection of eelgrass habitat range from 0.30 mg/L to 0.39 mg/L. Based on studies in USEPA's Region 1 and the Department's best professional judgment of thresholds that are protective of Maine water quality standards, the Department is utilizing a threshold of 0.45 mg/L for the protection of aquatic life in marine waters using dissolved oxygen (DO) as the indicator, and 0.32 mg/L for the protection of aquatic life using eelgrass as the indicator. …

Town of Falmouth, Approval of MEPDES ME0100218 & WDL W002650-6D-I-R (Maine Dep't Entvl. Prot. Dec. 4, 2018) at 15-16. (Attachment 12).

There is little if any disagreement in the peer-reviewed literature that ambient water quality for total nitrogen in estuaries in New England and mid-Atlantic of between 0.30 mg/L and 0.50 mg/L is protective of marine life, including eelgrass. Benson et al (2013) studied estuaries in Southeastern Massachusetts and determined tidally-averaged total nitrogen concentration of 0.34 to 0.38 mg/l protective of marine life. Howes, *et al* (2003) examined numerous Southeastern Massachusetts embayments and concluded that a summer seasonal average for TN of between 0.39 mg/L and 0.50 mg/L was protective of eelgrass (summer seasonal average of 0.39 to 0.50 mg/l); Wazniak et al., examined numerous coastal embayments and estuaries and determined that for total nitrogen a concentration of 0.55 mg/l was the biologically relevant threshold. Concentrations below the threshold were considered "better than seagrass objective" and supportive of eelgrass populations. Section 4 of the Gradient comments explore the topic of generally accepted thresholds for water concentrations of nitrogen in more detail.

EPA's actions in selecting the 100 Kg Load Limit are arbitrary and capricious for failing to undertake any analysis of the GBE site-specific data regarding measured water quality or a comparison of a variety of GBE eelgrass habitat and for failing to examine or explain away the readily available data pertaining to nitrogen concentrations in the Great Bay Estuary. The methodology employed by the EPA is contrary to its own Nutrient Criteria Technical Guidance Manual, is contrary to its practice in other NPDES permits throughout New England, and entirely fails to consider the available essential scientific information necessary to determine an appropriate TN criteria for the GBE.

### 3.7 The Failure of US EPA to Establish a Numeric Water Quality Criterion for TN in the GBE Forces the City of Rochester to Expend Enormous Unnecessary Costs.

The City of Rochester respectfully submits that the great weight of evidence supports the conclusion that water quality concentrations of between 0.30 mg/L and 0.50 mg/L for total nitrogen are protective of eelgrass populations in estuaries throughout the mid-Atlantic and Northeast U.S.

Data for both nitrogen loads and concentrations from the GBE were available to the EPA when it was developing its draft GP and Fact Sheet. EPA selectively used some of the data from PREP publications in the Fact Sheet to support its proposed nitrogen loading threshold. As more fully explained at Gradient section 4.2, however, Gradient followed the same methods used by the EPA in its Fact Sheet to calculate delivered nitrogen loads to the GBE. The data used by Gradient were historic and current PREP nitrogen loading data from long term monitoring stations in the GBE, all of which were readily available to the EPA. Gradient also used available data to determine the median total nitrogen concentrations. The resulting nitrogen loads and concentrations are expressed in Gradient's Table 4.1 (Attachment 1).

| | | Median Total Nitrogen Concentration in GBE (mg/L) | | |
|---|---|---|---|---|
| **Period** | **Nitrogen Load (kg $ha^{-1}$ $yr^{-1}$)** | **Adams Point** | **Great Bay** | **Coastal Marine Lab** |
| 2003-2004 | 227.9 | 0.360 | 0.4075 | 0.270 |
| 2005-2006 | 311.2 | 0.4285 | 0.391 | 0.294 |
| 2007-2008 | 257.4 | 0.3865 | NA | 0.33775 |
| 2009-2011 | 253.3 | 0.35475 | 0.3995 | 0.2535 |
| 2012 | 216.1 | 0.285 | 0.304 | 0.27875 |
| 2013 | 209.7 | 0.3815 | 0.343 | 0.2675 |
| 2014 | 215.0 | 0.301 | 0.342 | 0.2515 |
| 2015 | 163.3 | 0.2935 | 0.317 | 0.2075 |
| 2016 | 153.3 | 0.31125 | 0.3285 | 0.2035 |
| 2012-2016 | 189.3 | 0.30675 | 0.3285 | 0.228 |

Table 4.1 makes clear that while the nitrogen loads in the GBE for the past 15 years have exceeded the 100 Kg Load Limit set by EPA in the Draft GP, the concentrations of nitrogen at various points within GBE remain within the range of 0.30 mg/L – 0.50 mg/L which has been demonstrated as protective of eelgrass populations throughout the Mid-Atlantic and Northeast. It should also be noted that the median total nitrogen concentrations at the Great Bay monitoring station are biased high because the data was only recorded at low tide. See Gradient Section 4.1 (Attachment 1).

Further, Figure 4.1 of Gradient's comments depicts the results of Gradient's regression analysis to determine nitrogen concentrations that correspond to various loading thresholds within the GBE. At the Coastal Marine Lab monitoring station, a 100 kg $ha^{-1}$ $yr^{-1}$ loading rate corresponds to a nitrogen concentration of 0.18 mg/L, which is approximately equal to the background concentration of total nitrogen of 0.2 mg/L in the Gulf of Maine adjacent to the GBE (NH DES, 2009) and references therein. At the Adams Point monitoring station in Great Bay, the loading threshold corresponds to a nitrogen concentration of 0.25 mg/L.[8]

The hydrodynamic model developed by HDR with input from NH DES has also been used to analyze the relationship between loads and concentrations in the Great Bay Estuary. (See HDR Comments (Attachment 3). The HDR model results are consistent with Gradient's demonstrated correlation between loads and concentrations seen in the data. (Gradient Section 4.2). The HDR model calculates that a 100 kg $ha^{-1}$ $yr^{-1}$ loading rate corresponds to an annual average Great Bay nitrogen concentration of 0.24 mg/L, compared to Gradient's 0.25 mg/L TN calculated at Adams Point. Since 1/3 of the GBE drainage basin is in Maine, which uses a 0.32 TN threshold concentration, the EPA's Draft GP senselessly holds NH communities to an effective threshold concentration far below the Maine criteria and far below the range of TN criteria found to be protective of eelgrass throughout the Northeast. For the EPA to require Rochester and New Hampshire communities to comply with a nitrogen loading threshold that would force them to reduce nitrogen concentrations approaching the background level of TN in the Gulf of Maine is so starkly implausible that there can be no imaginable scenarios that support such a result. Standing alone, the EPA draft GP and Fact Sheet imposition of an effective threshold TN concentration of 0.24 mg/L will cost the City of Rochester dearly for absolutely no benefit to eelgrass populations. This demonstrates a complete disconnect between the known data and the choices made by the EPA, as well as a clear error of judgment. Requiring the City of Rochester to spend hundreds of millions of scarce tax dollars for no defensible purpose related to TN concentrations in the GBE is by definition arbitrary and capricious.

There is an approach that EPA could implement to benefit water quality and provide meaningful water quality criterion for TN concentrations in the GBE. Instead of relying on three dated research papers to select a TN loading factor for GBE that is inappropriate and unreasonable, EPA could simply use that same approach used for the current draft GP but instead adopt the protective TN concentration water quality criteria applied in other New England and mid-Atlantic estuaries of 0.30-0.50 mg/L TN. This would result in measurable, reliable Water Quality Criterion for total nitrogen that would be protective of marine life and not arbitrarily impose enormous financial burden on the New Hampshire communities around the Great Bay watershed. In its Fact Sheet EPA fails to explain why this reasonable alternative was rejected.

Alternatively, the EPA might consider examining water quality issues related to TN by analogy to the Use Attainability Analysis (UAA) component of the Clean Water Act. The UAA process was designed to assist the EPA and States to work together to refine or delete uses that are ordinarily included in any States' designation of water quality standards. While UAA is normally a tool used by States to withdraw certain uses pertaining to designated waterbodies, the logical factors used by states could provide valuable insight into the development of objective water quality standards for TN in the Great Bay Estuary.

In its Fact Sheet (p. 21), for instance, the EPA explains that it used 40 C.F.R. 122.44(d)(1)(vi)(A) in the Draft GP, which establishes "effluent limits ***using a calculated numeric water quality criterion*** for the pollutant which the permitting authority demonstrates ***will attain and maintain***

[8] The same is true when considering the relationship of concentration to load at the GRBGB station, which is biased high due having only low tide measurements.

***applicable narrative water quality criteria*** and ***will fully protect the designated use***" [emphasis added]. Although UAA is intended for states who seek to withdraw certain key designated uses from their water body designations and listings, EPA has recommended that the Use Attainability Analysis process should be better integrated with regulatory developments. As EPA's Office of Science and Technology states in a 2006 Memorandum to its regional water division directors:

> "We need to work together with states and tribes to ensure that as we develop TMDLs, we also coordinate on issues related to use attainability as needed. In practice, information gathered to develop a TMDL, and the allocations in a TMDL, may point to the need to pursue a UAA."

(US EPA, 2006)

To the best of our knowledge, a prospective analysis of future attainability of the designated use on the basis of eelgrass coverage has not been conducted for the GBE in light of the proposed nitrogen load threshold. However, such an analysis would be informative and in keeping with 40 C.F.R. 122.44(d)(1)(vi)(A) and prior EPA actions as further described below. As EPA states:

> "We do not believe that setting unattainable uses advances actions to improve water quality."

(US EPA, 2006)

While there are very few who would expect that NH DES has the capacity or budget to carry out a UAA with respect to designated uses in the GBE, there is nothing preventing the EPA from using the UAA framework to analyze the material benefits and detriments of water quality standards applicable to the New Hampshire portion of the GBE.

Among the factors that would be considered in a UAA (40 CFR 131.10[g]), the following are relevant as they relate to the use of the proposed loading threshold or eelgrass as the indicator of achieving water quality standards for the GBE:

1. Naturally occurring pollutant concentrations prevent the attainment of the use;
2. Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses; or
3. Controls more stringent than those required by sections 301(b) and 306 of the Act would result in substantial and widespread economic and social impact. (See Gradient, Section 5) (Attachment 1).

With respect to the Draft GP, all of the above three factors are applicable to EPA's use of eelgrass health to determine attainment of water quality standards in the GBE.

**Factor 1: Naturally occurring pollutant concentrations prevent the attainment of the eelgrass use.**

Section 5.0 of the Gradient comments makes it clear that there have been documented changes in conditions in the GBE that are known to cause changes in eelgrass coverage. Two factors—changing hydrologic flows (as driven by changes in precipitation) and wasting disease—are clearly evident in the monitoring record that extends to the 1980s. A conceptual diagram illustrating the nature of more recent changes is shown in Figure 5.1 of the Gradient comments (Attachment 1).

The Gradient analysis demonstrates that one of the observations that is inconsistent with EPA's proposition that eelgrass health (the EPA indicator for "designated use") is tied to nitrogen loads is the observation that recent eelgrass coverage has decreased alongside substantial decreases in nitrogen loads. If nitrogen loads were the contributing cause of a failure to attain a designated use, eelgrass coverage would not be expected to decline as the nitrogen load is lessened. In contrast, there have been substantial increases in long-term average precipitation alongside the eelgrass declines; precipitation is a principal driver of hydrological flows into the GBE. As shown in the Piscataqua Region Estuaries Partnership (2018) State of Our Estuaries Report, turbidity has also increased in parts of the GBE over time, consistent with hydrologic changes driven by the increasing precipitation regime. There are clear relationships in the data between precipitation and eelgrass coverage, indicating that natural hydrological conditions are limiting attainment of designated uses, yet US EPA failed to consider this important aspect of the problem in the Draft GP and Fact Sheet.

The Gradient analysis also discusses the role of wasting disease as a factor that impacts eelgrass populations. Further, the change in watershed hydrology, as indicated by the change in long-term precipitation, co-varies with the recent record of eelgrass coverage in the Great Bay and Portsmouth Harbor areas (the two areas with largest eelgrass coverage in the GBE; See Gradient, supra, at Figure 5.4) (Attachment 1). As average annual precipitation increases, eelgrass coverage decreases in lockstep at Portsmouth Harbor. Eelgrass coverage in Great Bay is more variable, but also indicates that eelgrass coverage declines as average annual precipitation increases. Here, several major storms are indicated on the plot—the year 2006, which experienced the so-called Mother's Day Storm (an extreme hydrologic event), and the years 1987 and 2007, which also experienced large (c. 100-yr) storms (see Gradient, supra, at Figure 5.4) (Attachment 1). At Great Bay, these years affected by extreme storm events were associated with lower eelgrass coverage than other years with similar long-term average precipitation—a further indication of the role of hydrology in attaining designated uses. These relationships in the data from the GBE indicate there is an underlying hydrologic condition that has limited eelgrass coverage in the recent record that needs to be considered when attainment of designated use is predicated on eelgrass coverage as an indicator.

The Gradient analysis at section 5 documents the fact that the effects of flow conditions have been used to revise water use designations using the logic of a UAA approach. Examples from California, Maryland and the Chesapeake Bay can prove instructive to the issues confronting the Great Bay Estuary. It makes no sense for EPA Region 1 to fail to adopt positive, rational, and logical approaches to the problems of the GBE, even if those approaches come from other regions.

As the Gradient comments demonstrate, rather than proposing a nutrient threshold based on an indicator that is driven by other factors and waiting for it to fail in attaining the designated use for the GBE, EPA should consider information that is readily available now and directly relevant to specific factors of a UAA. Such consideration would allow EPA to develop a scientifically supportable threshold that has a much greater likelihood of meeting appropriately set, but still protective, uses for the GBE.

**Factor 2: Physical conditions related to the natural features of the water body, such as the lack of a proper substrate … unrelated to water quality, preclude attainment of aquatic life protection uses.**

Dr. Jud Kenworthy noted in the 2014 Joint Report of Peer Review (Attachment 13), that substrate type and substrate quality are significant factors that could control the presence or absence of eelgrass.

> Eelgrass growth, abundance and distribution are also controlled by temperature, nutrient availability (primarily nitrogen and phosphorus), tidal range, water motion, wave action, water residence time, bathymetry, substrate type, substrate quality, severe storms, disease, plant reproduction and anthropogenic disturbances. (citations omitted). …
>
> A critical deficiency in the DES 2009 Report was the fact that DES did not attempt to present evidence for ruling out the other factors listed above that could be controlling the presence or absence of eelgrass (e.g., temperature, water motion, wave action, bathymetry, water residence time, substrate type, substrate quality, severe storms, disease, epiphytes, and plant reproduction). …
>
> Spatial variation in factors such as natural watershed landscape characteristics, non-point source water runoff, water depth, sediment type, substrate stability, wind and wave exposure, tidal velocities, freshwater discharge, non-point source runoff, groundwater discharge and land use are known to interact and determine different eelgrass distributions in shallow water coastal ecosystems (Thayer et al. 1984, Larkum et al. 2006, Orth et al. 2010 a, b). Stochastic events like severe storms, ice scour and climate variation were not considered even though these are known to affect eelgrass (Frederiksen et al. 2000 a, b, Orth and Moore 2006, Krause-Jensen et al. 2008). The assessment completely ignored biological aspects of the system including plant reproduction, grazing and bioturbation. Some [of] these factors can limit eelgrass growth, reproduction and distribution to the extent that the species can be completely eliminated from an estuary (citation omitted). …
>
> Another assumption DES makes in their approach, but fails to address, is whether the target depth will support eelgrass. Are the substrate and environmental conditions at the proposed target depths throughout a zone suitable for eelgrass growth? This is an important question that should be acknowledged and addressed by DES before anyone can fully understand and predict the implications of the proposed [nitrogen] criteria.

Bierman, Joint Report, supra, at 13, 14, 16, 56 [emphasis added] (Attachment 13). Severe storms have been demonstrated to cause severe damage to aquatic plant life such as eelgrass. According to a special report on the effects of waves on aquatic plants:

> ...[S]torms and spates can destroy or restructure aquatic plant communities and may be responsible for the cyclical growth of vegetation (Haslam 1987). The frequency and intensity of storms may determine the interval in which plant communities develop, so that after frequent or very severe storms vegetation may recover very slowly (Haslam 1978; Carter et al. 1985). Major declines in reed populations have been noted after severe storms (Ostendorp 1989; Stark and Dienst 1989). ... Floods may change species composition and decrease seed production by aquatic vegetation (Birch et al. 1988). Hurricanes result in heavy runoff which scours channels, uproots vegetation, and redeposits sediments. In Chesapeake Bay, the effects of hurricanes can be seen in the deposition of sedimentary layers (Bayley et al. 1978). The loss of submersed vegetation in the tidal Potomac River and Estuary was likely due to uprooting and/or siltation caused by extensive storm damage in the 1930s, during which sediment was deposited to a depth of over 200 mm (Carter et al. 1985). ...

Anne Kimber & John W. Barko, A Literature Review of the Effects of Waves on Aquatic Plants 6 (August 1994). *See also* John E. Costa, Eelgrass in Buzzards Bay: Distribution, Production, and Historical Changes in Abundance (EPA Sept. 1988) (Other natural disturbances remove eelgrass including catastrophic storms, periodic storms, sediment transport, ice damage, and biological removal); Harlin, Thorne-Miller & Boothroyd, Seagrass-Sediment Dynamics of a Flood-Tidal Delta in Rhode Island (U.S.A), 14 Aquatic Botany 127 (Dec. 1982); Jacobs et al., Grazing of the Seagrass Zostera noltii by Birds at Terschelling (Dutch Wadden Sea), 10 Aquatic Botany 241 (Dec. 1981); P.H. Nienhuis & E.T. van Ireland, Consumption of Eelgrass, Zostera marina, by Birds and Invertebrates During the Growing Season in Lake Grevelingen (SW Netherlands), 12 Netherlands J. of Sea Research 180 (Nov. 1978); Robert J. Orth, Destruction of Eelgrass, Zostera marina, by the Cownose Ray, Rhinoptera bonasus, in the Chesapeake Bay, 16 Chesapeake Science 205 (Sept. 1975); Ian A. Robertson & K.H. Mann, Disturbance by Ice and Life-History Adaptations of the seagrass Zostera marina, 80 Marine Biology 131 (May 1984).

Rather than proposing a nutrient threshold based on an indicator that is driven by other factors and waiting for it to fail in attaining the designated use for the GBE, US EPA should consider information that is readily available now and are directly relevant to specific factors operating within the GBE ecosystem, whether via a UAA analysis or simply adopting the rational guidance provided by the UAA factors. Such consideration would allow EPA to develop a scientifically supportable threshold that has a much greater likelihood of meeting appropriately set, but still protective, uses for the GBE.

**Factor 3: Controls more stringent than those required by sections 301(b) and 306 of the Act would result in substantial and widespread economic and social impact.**

Wastewater Treatment Facility Costs of Upgrades and Economic Impact

The 100 Kg Load Rate will impose enormous financial and economic hardship on the City of Rochester. The Draft GP requires Rochester to "hold the load" of nitrogen using the same average flow rate of 2.97 million gallons/day (MGD) derived from 2011 through 2016. Rochester's current 2020 average flow rate for the past 12 months is well above that, at 3.337 MGD, and has been trending upward in the last few years. In addition, the Draft GP requires Rochester to operate the WWTF at an average concentration of 8 mg/l TN on an *annual* average. Currently, Rochester is operating its WWTF at 11-14 mg/l TN on an *annual* average.

The combined Draft GP limitations will require Rochester to limit its total WWTF nitrogen discharges to *198 lbs/day* on an annual rolling average. According to the City's consultants, Brown & Caldwell, this mass based limitation means that Rochester's plant would have to meet a 6.4 mg/l TN limit if the WWTF flows were at 3 MGD, or closer to a 3 mg/l TN if the flows were at 5 MGD (design flow) on an annual rolling average basis. A membrane biological reactor (MBBR) was determined by Brown & Caldwell to be the most cost-effective technology to reliably meet low level annual average TN limits. Brown & Caldwell, Technical Memorandum: Total Nitrogen Cost Updates, 2 (Jan. 30, 2020) (Attachment 14).

> This General Permit will limit Rochester's total nitrogen discharge to an annual average of 198 pounds per day of total nitrogen. This mass based permit will limit Rochester's WWTF discharge to 7.9 mg/L TN at 3.0 MGD and 4.8 mg/L TN at 5.0 MGD on an annual rolling average basis. To meet these permit limits, a dedicated nitrogen removal process will be required at the WWTF. ...
>
> Following standard engineering practice, the design of the MBBR would be based on 80 percent of the nitrogen limit to provide a 20 percent buffer between the permit limit and actual operations. The design buffer is required to account for operational variables such as influent and recycle flows. Influent TN load and water temperature. Therefore, for a TN limit of 8 mg/L [equivalent to 7.9 mg/L], the system would be designed to meet an effluent TN level of 6.4 mg/L and for a TN limit of 3 mg/L [3 mg/L would be the same capital cost for an MBBR to meet a TN of 4.8 mg/L], the system would be designed to meet an effluent TN level of 2.4 mg/L.

Id. at 2,3.

Contrary to EPA's statements that this permit will offer communities "cost-effective" and "flexible" options to achieve nitrogen discharge limitations, that is simply not the case for Rochester. Rochester will have to implement expensive upgrades to its WWTF to meet these TN limits. According to Brown & Caldwell's opinion of cost set forth in its Technical Memorandum, the WWTF TN upgrades are estimated at a capital cost of between $12.9 and 14.2 million. Increased annual operations and maintenance of these upgrades will cost between $840,000 and $980,00. Id. at 3.

These are the costs to Rochester for total nitrogen treatment upgrades. In addition, EPA previously has informed the City that it will also have to treat total phosphorus (TP) to reduce its WWTF discharge to as low as 0.12 mg/l. The cost for the TP upgrades is estimated at $15.6 million, with an additional $260,000 per year for operations and maintenance. Brown & Caldwell, Technical Memorandum: Total Phosphorus Treatment Cost Updates 3 (Jan. 30, 2020)

(Attachment 15). *The combined cost of the TN and TP upgrades are roughly $30 million, with an additional $1.25 million in annual operating costs.*

If Rochester is forced to implement these TN and TP upgrades, the impact to the sewer rates would be substantial. The current sewer rate is $6.75 per 100 cubic feet of water used. Rochester has up to $40 million of planned upgrades to the system for FY20-FY24, estimated at an additional $4 per unit increase in fees, equaling a rate of $10.75 per unit by 2024. *See* City of Rochester, EPA Sewer Financial Impacts Debt Service & User Rates 3 (Feb. 20, 2020) (Attachment 16). Rochester's Finance Department has estimated that the direct cost impact of the TN and TP upgrades would be an additional $5 per unit –raising the rate to $15.75. Id. at 6. Based upon the City's experience when rates are substantially increased, the City would expect that such increases will cause indirect costs such as significant water conservation efforts, increase in customer delinquencies, increases in requests for sewer deduct meters, increases in system tampering and additional Meter Technician staffing requirements – together increasing the rate by an additional $2.00 to $3.00 per unit. Id. at 7.

And finally, such a significant increase to sewer rates will result in other consequences, such as the loss of one of the largest industrial water users in the City. If that occurred, rates would increase by an additional $2.00 to $3.00 per unit. The cumulative potential sewer rate increase of $15.00 per unit would raise the sewer user rate to $21.75 – more than triple the current rate. This will have a serious economic impact to the City's residents, businesses and industries. It would also pose an impediment to future growth and economic development in the City, putting it at a competitive disadvantage compared with surrounding communities.

The City of Rochester has also completed a Financial Capability Assessment pursuant to EPA's Guidance Documents, and independently submitted this to EPA on March 16, 2020. The conclusion of that analysis is that the economic burden to the City and its residents of the TN and TP WWTF upgrades is "high." This is particularly so because the median household income in the City is below the national median household income. Thus, imposing such low TN load limits on Rochester resulting in significant sewer rate increases would have a severe economic impact on the City's residents and its businesses.

Non-Point Source Reductions, Costs and Economic Impact

In addition to the $30 million capital cost for upgrades to the Rochester WWTF, and the annual increased operating costs of $1.25 million imposed by the Draft GP, the EPA is also seeking "optional" reductions by each community of its non-point and stormwater point sources of nitrogen (collectively NPS). EPA has indicated in the Draft GP that if the "optional" substantial non-point and stormwater nitrogen source reductions are not implemented, EPA will impose even more stringent limits on the communities' WWTFs in the future. EPA, Fact Sheet, supra, at 31. ("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").

Rochester has the largest non-point and stormwater source (collectively NPS) reduction "optional" goal of all the regulated communities, requiring reductions of about 42,000 lbs/yr achieved over 20 years "…to achieve a cumulative reduction of nitrogen delivered to the Great Bay estuary equivalent to 45% of the original municipality-specific baseline" (baseline is defined in fn7 of the Fact Sheet as that set forth in the NHDES 2014 Great Bay Nitrogen Non-Point Source Study). Id. *See also*, GeoSyntec & VHB, Memorandum: Response to Environmental Protection Agency Region 1 Draft Great Bay Total Nitrogen General Permit at 2 (Apr. 15, 2020) (Attachment 17). This 45% TN load reduction required for NPS is derived by subtracting the total annual amount of TN discharges from the regulated WWTFs as limited by the Draft GP from the 100 Kg TN Load Limit applied to the entire estuary.

GeoSyntec Consultants and VHB have been working with the City for several years to help identify opportunities for the City to reduce its nitrogen stormwater and non-point source discharges. Rochester asked them to determine what would be necessary to reach the "optional" 42,000 lbs of annual TN NPS reduction as required in the Draft GP. Following a thorough review of all potential efforts, they informed the City that the reduction goal for Rochester was not practically or economically achievable without the extraordinary expenditure of over $400 million by the City, which is impossible for Rochester to fund. Id. To do so would require efforts such as:

(1) A complete ban on all fertilizer throughout the City, including private property;
(2) Installation of structural stormwater BMPs on City-owned, State-owned and privately-owned property, at the City's cost of approximately $220 million; and
(3) Installation of advanced septic systems for 4,600 homes at a cost to the City of approximately $170 million (would need State septic system law changes).

Geosyntec noted the following:

> Non-point source load reduction strategies evaluated to achieve a 45% reduction (42,151 lbs N/yr) in non-point source loads included structural and non-structural best management practices (BMPs); sewer extensions; and advanced septic system retrofits. An extensive literature review was conducted as part of this evaluation to review the current nationwide state of the practice of nutrient reduction management strategies. We also took into full consideration the status of the NHDES and University of New Hampshire Pollutant Tracking and Accounting Program, (PTAP) … and we applied the EPA 2017 New Hampshire Municipal Separate Storm Sewer System (MS4) General Permit non-structural and structural removal efficiencies.

Id. at 6.

GeoSyntec and VHB reviewed the NPS TN load reductions possible from a Catch Basin Cleaning Program, a Street Sweeping and Leaf Collection Program, an Agricultural Nutrient Reduction Program, a City-wide Nitrogen Fertilizer Ban, a Pet Waste Collection Program, Structural Stormwater BMP Retrofits, Sewer Extensions, and Advanced Septic System Retrofits. Some of these programs are both economically and practically feasible and the City will implement them (such as Catch Basin Cleaning, Street Sweeping, Leaf Collection, and a Pet Waste Collection Program).

However, implementation of a City-wide Nitrogen Fertilizer Ban would be difficult to enforce and would be most effective if a region-wide ban is put in place by the State of New Hampshire, which is not the case currently. Structural Stormwater BMP Retrofits are of limited effect because approximately 85% of the total land area in Rochester is privately owned. Even assuming that private landowners and the State of New Hampshire would allow the City to make these retrofits on their property, at the City's expense, the cost estimate for treating 75% of the impervious area in the City (653 acres of City-owned property, 276 acres of State-owned property, and 1,144 acres of privately-owned property) is estimated at a 20-Yr Present Value Cost of $220.4 million. Similarly, about 4600 households would need to upgrade their private septic systems with advanced septic systems. "The estimated cost of approximately $92 million (one-time capital cost) to fund and incentivize 4600 property owners to upgrade their septic systems to an advanced treatment system capable of denitrification is not even close to being cost effective or practical." Id. at 15. In addition, the State of New Hampshire regulates the requirements for privately-owned septic systems. State law would have to be changed to mandate such advanced treatment septic systems.

In Section III of the GeoSyntec Memorandum it summarizes its findings as follows:

> Non-point source load reduction strategies evaluated to achieve a 45% reduction (42,151 lbs N/year) in non-point source delivered load included a variety of structural and non-structural BMPs; sewer extensions; and advanced septic system retrofits. Table 5 provides a summary of the estimated potential load reductions associated with these various structural treatment and nonstructural control measures and the estimated costs to implement to meet the GBTN GP optional load reduction target.
>
> The results of this analysis indicate that to achieve EPA's estimated 42,150 lbs N/year reduction target would require extraordinary structural measures that rely on extensive and determined participation of private property owners with an estimated 20-year life cycle cost of approximately $415.6 Million. The overall annual cost would be approximately $20 Million dollars. This cost would be shared by both the City, State and private property owners, as the load reduction could not be accomplished on City property alone. More specifically, to achieve the reduction target, not only would 100% of the impervious area on City and State property and 60% of impervious area on private property would need to be treated with structural stormwater BMPs, but the City would also have to adopt and enforce a City-wide fertilizer ban and somehow fund and convince approximately 4,600 property owners with septic systems to upgrade their system to an advanced treatment system capable of denitrification. All three of these major undertakings would be required and are clearly unachievable. . . .
>
> EPA has often stated in previous discussions regarding this proposed permit that they expect most of the future load reductions can be achieved through non-structural BMPs and good housekeeping measures. While many of the non-structural BMPs are certainly cost-effective, applying the good housekeeping measures City-wide has only produced a combined total load reduction estimate of approximately 4,500 lbs N/year (5% reduction of the total baseline delivered load) using the load reduction credits contained in the MS4 Permit. EPA has alluded to the fact that the crediting values are likely to increase in the

> future based upon more recent research. This may well be the case, but the load reduction crediting values or removal efficiencies would have to increase by at least an order of magnitude, if not more, if these measures are going to have a meaningful difference in not having to rely as much on the more costly structural measures described above to meet the optional load reduction targets.

Id. at 14,15.

To conclude, after undertaking a thorough review of the state-of-the art opportunities for non-point source nitrogen reduction, the City's consultants concluded that the goal of 42,000 lbs/year is simply not achievable under current law and is economically infeasible. Assuming the laws were changed to allow these upgrades, the cost is estimated – *just for the City of Rochester* – at over $400 million over twenty years. EPA's imposition of these more stringent nitrogen controls generating extraordinary costs for the City of Rochester, multiplied by the other 11 regulated municipalities, would result in substantial and widespread economic and social impact throughout the Seacoast region.

## 4.0 THE DRAFT GP AND FACT SHEET FAILED TO INCORPORATE ANY ELEMENTS OF ADAPTIVE MANAGEMENT AND APPROPRIATE MANAGEMENT

### 4.1 The Draft GP and Fact Sheet Failed to Actually Incorporate Any Elements of "Adaptive Management" and Instead Used the Term in Name Only.

The US EPA claims to rely upon "adaptive management" in the Draft GP and Fact Sheet to justify its selection of a TN loading threshold of 100 kg $ha^{-1}$ $yr^{-1}$ for the GBE. However, the Draft GP and Fact Sheet bear none of the characteristics of adaptive management (or adaptive governance).

Adaptive management (or adaptive governance) is an approach to the governance of human activities that impact the environment. Adaptive management is often considered a subpart of a much broader ecosystem-based governance (or ecosystem management) approach. It has gained traction as an alternative to traditional management approaches, due to its flexibility to overcome the fragmentation inherent in management approaches that focus on individual industrial sectors or jurisdictions. Importantly, adaptive management, as a component of a broader, more flexible, regime, requires that the approach be applied within a geographic framework determined primarily by ecological, not political, boundaries. An adaptive management approach, therefore, recognizes that natural systems, as well as social and economic systems, are complex. Problems related to natural resources and ecosystem degradation are thus complex systems problems dominated by uncertainty and involving the additional complexity of interactions between natural and social systems often operating at different scales (Holling 1995; Berkes, Colding et al. 2003).

In order to help deal with complex natural systems adaptive governance prescribes a mode of learning that allows for decision makers undertaking management of a complex environmental issue to learn by (Ludwig, D., R. Hilbon, et al. (1993), "Uncertainty, Resource Exploitation and

Conservation: Lessons from History" Science **260**(17, 36); Holling 1995; NRC (2009), Informing Decisions in a Changing Climate, Washington, D.C., The National Academies Press. Unexpected ecosystem responses stemming from the timing or character of complex feedback mechanisms often occur in practice and require adaptable approaches to governance. To cope with the dynamic nature of environmental issues, a system is needed that defines clear goals and gathers information on an ongoing basis under defined rules to generate information that enables participants to learn from their mistakes and continually adapt and efficiently progress toward the stated goal (Costanza, Low et al. 2001). Under an adaptive governance approach, policy choices and interventions are treated as experiments (NRC 2009), relying explicitly on monitoring, evaluating, and terminating failed policies instead of confining the approach to prescriptive technologies *a priori* (Brunner and Steelman et al. 2005). Adaptive governance regimes generally include additional characteristics to empower management efforts, including the mobilization of local knowledge and a *bridging organization* that connects and navigates the interests of different stakeholders across organizational levels (Ludwig, Hilborn et al. 1993; Reid, Berkes et al. 2006).

In its Fact Sheet US EPA acknowledges some of the necessary characteristics for adaptive governance:

> 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 Fact Sheet at 23. In the very sentence the EPA describes what it means when it uses "uncertainty:"

> 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...*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. [emphasis added]

Id. Thus while the Fact Sheet describes some characteristics of adaptive management, and claims to incorporate the approach in the Draft GP, nothing in the substance of either the Draft GP or Fact Sheet resembles actual adaptive management. Adaptive management requires that there be objective goals. There is no other way to determine whether measures are worthwhile or would benefit from adjustments. In the context of the Draft GP, establishing a goal for adaptive management would require a better understanding of the complex factors that impact ecosystem health and resilience in the GBE. TN would be one component and goals could be established to determine the impact of TN concentrations on marine life. This would require translation of the New Hampshire narrative water quality standards to a numeric water quality criterion for the GBE. Since US EPA failed to develop objective WQC in the Draft GP and Fact Sheet, there is no objective goal to work towards in an adaptive management framework. Other, likely more influential factors are left for another day. Further, and starkly inconsistent with adaptive management, the Draft GP and Fact Sheet avoid the fact that the Great Bay Estuary lies in two states: Maine and New Hampshire. The Draft GP only applies to New Hampshire WWTFs. The EPA is seeking to invoke adaptive management to govern human behavior in only a portion of the Great Bay Estuary watershed.

Given what adaptive management is in reality, the Draft GP and Fact Sheet are the exact opposite of adaptive management. Instead of specifying a structured trial-and-error approach and framework for identifying successful and unsuccessful control measures, *i.e.*, a method consistent with adaptive management, EPA has set a prescriptive set of measures that must be done by municipalities or risk reopening or reissuing the permit. US EPA's approach is more commonly known by another term - top-down command-and-control - not adaptive management.

### 4.2. The Ambient Monitoring Plan Contained in Section 2.3 of the Draft General Permit is not an Adaptive Management Plan.

Adaptive management is used when there is significant uncertainty regarding the efficacy and scope of various remediation efforts necessary to restore impaired uses. The US Environmental Protection Agency (EPA) Watershed Academy document entitled *Watershed Analysis and Management (WAM) Guide for Tribes* describes the concept as follows:

> Adaptive management is the process by which new information about the health of the watershed is incorporated into the watershed management plan. Adaptive management is a challenging blend of scientific research, monitoring, and practical management that allows for experimentation and provides the opportunity to "learn by doing." It is a necessary and useful tool because of the uncertainty about how ecosystems function and how management affects ecosystems. Adaptive management requires explicit consideration of hypotheses about ecosystem structure and function, defined management goals and actions, and anticipated ecosystem response (Jensen et al. 1996).
>
> The results of this process are essential to validate the Watershed Assessment, to ensure that ecosystem relationships were considered adequately in Synthesis, and to show that management solutions have been implemented and are effective at achieving watershed objectives.

EPA, Watershed Analysis and Management (WAM) Guide for Tribes: Step 5 Adaptive Management 1 (Sept. 2000). Thus, approach seeks to eliminate environmental impairments by (1) identifying priority actions and areas of uncertainty, (2) monitoring, before and after, the effects of implementing the priority measures, and (3) using such information to assess the need for and scope of further remediation efforts to ensure use attainment and protection.

The communities around the Great Bay Estuary have achieved tremendous success in reducing the total nitrogen point source discharges to the Bay over the past 6 years. Rochester has achieved a TN effluent reduction of *more than 70%* and is now operating its wastewater treatment facility (WWTF) at a seasonal average TN effluent of 8 - 10 mg/l versus more than 40 mg/l prior to 2014. It is also in the process of investing another $3 million in upgrades to its WWTF to further reduce its TN effluent.

Other communities have recently experienced similar nitrogen effluent reductions:

- Since 2016 the City of Dover, New Hampshire has been operating at a TN seasonal average below 8 mg/l compared to 23 mg/l – a 75% reduction.
- Since 2017 the Town of Newmarket, New Hampshire has been operating at a seasonal average below 8 mg/l, compared to 39 mg/l – an 80% reduction.
- The Town of Durham, New Hampshire has also upgraded its plant and is operating at or below a seasonal 8 mg/l.
- Portsmouth, New Hampshire's Peirce Island plant will only recently came online in 2020, and has not yet optimized it operation, which will be operating at a seasonal average of 8 mg/l or lower, compared with 30 mg/l - a 75% reduction.
- Exeter, New Hampshire's new plant came online in 2019 and is operating at a seasonal average TN of 8 mg/l or lower, compared with 23 mg/l - more than a 65% reduction.

The impact of these significant cumulative reductions in nitrogen discharges to the GBE have not yet been fully measured.

The EPA Fact Sheet states "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." EPA, Fact Sheet, supra, at 32. As Brown & Caldwell observed:

> The draft permit describes the monitoring program as an Adaptive Management Monitoring Program but fails to discuss any adaptive management strategy. Incorporating adaptive management strategy and criteria will be an important component for the permittees to ensure their efforts toward achieving the goal address inherent uncertainty and allow for program revisions based on environmental outcomes. The draft permit fact sheet states only that "a threshold even lower than 100 kg/ha/yr may be necessary in the future if the system does not fully recover once brought into compliance with this initial threshold. …" (NHG58A000, p. 23). This is an overly simplistic view of adaptive management and is insufficient to address the uncertainty in the permit approach to GBE restoration.
>
> The adaptive management approach needs to address the full range of uncertainty in implementing the nutrient target, including what measures should be taken if GBE begins to recover at nutrient levels above the target, not just further reductions if no recovery is observed. The program needs to allow for revisions to monitoring constituents, locations,

> and frequency if analysis of the data reveals the need to do so. In addition, data from the monitoring program could show that revisions to the success criteria are needed to adequately achieve the restoration goal.
>
> To achieve this, the adaptive management program should be described in terms of the known uncertainty in the permit limits, goals, and success criteria, and describe how and when these changes could be made during permit implementation. This could be completed by setting interim criteria …
>
> The adaptive management program should be developed in conjunction with EPA, the New Hampshire Department of Environmental Services (DES), other experts, and the permittees to build consensus for iterative actions that are linked to permit compliance. As currently written, the lack of adaptive management in the draft permit does not provide confidence to permittees their actions are linked to meaningful management of GBE.

Brown & Caldwell, Technical Memorandum: Great Bay Ambient Monitoring Program Comments and Recommendations, 4,5 (Apr. 14, 2020) (Attachment 18). An adaptive management approach would provide first for the gathering of data across the GBE to understand the current ambient TN levels as a result of the substantial WWTF TN reductions, determining whether the TN levels are within the range of criteria found to be protective of eelgrass in both Massachusetts and Maine (0.30-0.35 mg/l TN), and undertaking site-specific studies to assess the health of the eelgrass based on the ambient TN levels in the GBE. Only then can EPA make a science-based determination of whether further TN load reductions are necessary to protect eelgrass in GBE, or whether factors other than nitrogen are causing eelgrass impairments.

In our view, it is more appropriate to set an interim concentration goal of 0.30 to 0.35 mg/l TN, consistent with what EPA has approved in other estuaries throughout Massachusetts and Maine. Over time, the adaptive management monitoring program can evaluate periodically whether this interim goal is adequately protective or needs to be revised based on sound science and decision making. This process should involve the regulators, the municipalities, the experts in the field, and other stakeholders.

Instead of utilizing a truly adaptive management approach, EPA's Draft GP has arbitrarily and capriciously selected the 100 Kg Loading Limit which imposes stringent WWTF discharge limits for each regulated municipality, and prescribed "optional" NPS nitrogen reductions which are unrealistic and unachievable. If the NPS activities described in the Fact Sheet are not carried out and water quality standards are not achieved (which are not defined in the Draft GP or Fact Sheet), "EPA may reopen the General Permit … and incorporate any more stringent nitrogen effluent limits for the WWTFs… ." EPA, Fact Sheet, supra, at 31. This is not an adaptive management approach. Rather, this is a traditional command-and-control EPA top-down directive based on arbitrary and capricious decision making.

### 4.3 EPA's Ambient Monitoring Program Lacks Clear Goals and Objectives.

Brown & Caldwell also noted that EPA's Ambient Monitoring Program lacks the clear goals required in order to implement an effective monitoring plan.

The draft NPDES permit (NHG58A000) Fact Sheet states "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." The permit goes on to say the 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." The obvious intent of the program is to focus on TN discharges and impacts of TN to GBE, which is not surprising for a TN-focused general permit. However, the stated goal in the permit fact sheet is not clear, nor does it provide enough focus from which to develop a meaningful and robust monitoring program designed to track progress and measure success.

The monitoring program described in the draft permit also fails to outline objectives to achieve a stated goal. In other words, the program fails to address the questions "*Why are we monitoring?*" and "*How will we measure progress and success?*" Given that the monitoring program is required in an NPDES permit and has a compliance target (100 kg/ha/yr), the program needs to address how compliance will be measured, including how the data collected under the program will be used to assess progress toward compliance. In order for the monitoring program to be effective and provide confidence to the permittees that their efforts are meaningful, the program needs a common goal and a measurable pathway to achieving that goal. . . .

Given that this is a permit with loading limits for each permittee and requirements for compliance, the evidence presented in the permit is insufficient to provide confidence to permittees that they have a clear and achievable path to compliance. With no defined understanding of how the 100 kg/ha/yr target is linked to water quality standard attainment, and no eelgrass restoration goal, the permit lacks an explicit goal and understanding of how permittees will be able to attain compliance. This raises several questions such as:

- *Will permittees achieve compliance if their daily and annual loading limits are met?*
- *Is compliance only achieved when water quality standards are met in the GBE?*
- *What, in fact, are the water quality standards that must be achieved?*
- *Is compliance linked to some restoration target for eelgrass?*

Without answers to these questions, it is not clear what the monitoring program is expected to achieve. Given the significant cost of implementation, the permittees require a clear goal in order to implement an effective monitoring program.

The draft permit lacks a clear goal and appears to confuse water quality improvement with a target set for eelgrass protection and restoration. While we understand there may be expected linkages between the two, the permit needs to set clear goals that can be measured with data collected by a required monitoring program designed to determine when success is achieved.

Brown & Caldwell, Technical Memorandum, supra at 3 (Attachment 18).

### 4.4 EPA's Ambient Monitoring Program Lacks Appropriate Measurement Parameters.

While the Draft GP and Fact Sheet make clear that EPA's monitoring program focuses on measuring nitrogen and its effect on GBE, it has selected the 100 Kg Load Limit based on its goal of protecting the eelgrass health in the estuary. If eelgrass restoration is in fact EPA's goal in setting a TN load limit, then as discussed above, other factors affecting the health of eelgrass should be studied and measured as well.

> [T]he general permit must allow for characterizations of factors that affect eelgrass coverage, distribution, and biomass other than nutrients. Factors such as sediment characteristics; suspended sediment concentrations and loads; bioturbation; epiphytic growth; and macroalgal community abundance all play a role in eelgrass distribution and abundance. Data collection for these constituents should be included in the monitoring program if the goal is eelgrass restoration. Only by including these other factors can the monitoring program and analysis truly understand the role of nutrients.
>
> Focusing only on nutrients in the general permit will prevent a complete characterization and understanding of effects on eelgrass. For example, if eelgrass coverage continues to decline in GBE even in the presence of declining nutrient inputs, it may appear that nutrients are still too high and additional reductions are necessary for recovery. This is because nutrients are the only constituent being collected and other environmental variables linked to eelgrass decline have not been investigated. The result would be additional strain on already strained resources for each permittee, with no clear understanding of what is causing the decline. However, by including additional potential eelgrass stressors in the permit, the data would be available to assess which stressor(s) may be causing or contributing to the eelgrass decline. By addressing all of the potential stressors to eelgrass, resources can be directed to actions that will have the most impact and create meaningful restoration for GBE.

Brown & Caldwell, Technical Memorandum, supra, at 5. The authors of the 2014 Joint Report of Peer Review repeatedly observed that there are many other confounding factors besides nitrogen levels that affect eelgrass health in GBE. For example, Dr. Jud Kenworthy noted:

> Eelgrass growth, abundance and distribution are also controlled by temperature, nutrient availability (primarily nitrogen and phosphorus), tidal range, water motion, wave action, water residence time, bathymetry, substrate type, substrate quality, severe storms, disease, plant reproduction and anthropogenic disturbances (Short and Wyllie Echeverria 1996, Koch 2001, Short et al. 2002, Kemp et al. 2004, Moore and Short 2006, Krause-Jensen et al. 2008). Eelgrass distribution and abundance in an estuary results from the complex interaction of some or all of the factors listed above, and no two estuaries or sub-embayments of an estuary are identical in all of these factors (see Figure 5 in KrauseJensen et al. 2008). In order to determine if one or more of these are "controlling" it would be necessary to either consider all of them and their interactions, or be able definitively [to] eliminate certain factors as insignificant contributors.

Joint Report, supra, at 13,14 (Attachment 13). Six years ago the four national experts on the Joint Peer Review Panel each agreed that factors other than simply nitrogen should be studied to better understand what, in fact, is the cause of eelgrass decline in GBE. EPA's Ambient Monitoring Program should include these additional parameters, or we may never determine what, in fact, is causing the eelgrass decline in GBE.

### 4.5 The Costs of EPA's Ambient Monitoring Program Are Unfairly Allocated and Insufficient Time is Provided to Develop the Program.

The Draft GP requires only the 13 WWTFs (12 municipalities) subject to the permit to share in the cost of the EPA Ambient Monitoring Program. According to the Fact Sheet, "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." EPA, Fact Sheet, supra, at 31.

First, it is unusual for an NPDES permit to impose on the permittees the costs of ambient water quality monitoring for an entire estuary. In this case, the EPA's Monitoring Program overlaps considerably with existing data collection efforts in GBE, which have historically been paid for by a combination of funds from participating municipalities, the EPA, the DES and other non-profit stakeholders. If we assume that EPA's Ambient Monitoring Program will replace all of those efforts, suddenly the full cost of those monitoring efforts, plus the cost of the additional monitoring parameters in the EPA Monitoring Program, are placed squarely and exclusively on the 12 municipal permittees.

Second, for the reasons set forth in more detail in Section 2.3 of Brown & Caldwell's Technical Memorandum (Attachment 18), there are excessive and costly components included in EPA's Ambient Monitoring Program that the municipalities should not be required to pay for.

Third, there are more than 40 communities in New Hampshire and Maine that contribute to the nitrogen loading in GBE. The cost of the monitoring program in GBE should be shared more equitably among all stakeholders, including all municipalities that contribute nutrients to the estuary, EPA, DES and non-profits.

Finally, the EPA should expect that it will take considerable effort to develop, coordinate and implement the Ambient Monitoring Program. The Draft GP currently provides that it becomes effective within 60 days after signature. This will not be sufficient time. Rather, the permit should provide *at least one year* from its effective date to allow all stakeholders to develop, coordinate and implement an appropriate Ambient Monitoring Program.

## 5.0 THE DRAFT GP ARBITRARILY LIMITS ROCHESTER'S WWTF DISCHARGES BASED ON 2012 – 2016 AVERAGE FLOWS RATHER THAN DESIGN FLOWS.

The Draft GP specifies that WWTFs are required to either "hold the load" for TN or reduce loads to specified levels. To determine required loads in the Draft GP, EPA made calculations based on average WWTF discharges in the 2012-2016 period. WWTFs in the GBE watershed were not designed solely for the years 2012-2016, but rather for current and reasonably foreseeable demands. For perspective, the Rochester WWTF discharged at an average rate of 2.97 MGD during 2012-2016, but has a design flow capacity of 5.03 MGD. Thus, the 2012-2016 average discharge was only 59% of design flow, illustrating that there is substantially greater flow capacity than EPA has factored into its analysis.

In addition, by EPA's own admission, the years 2012 – 2016 were below average rainfall years. See EPA Fact Sheet at 26, ("Primarily due to lower rainfall during 2012–2016 (35.2 in/yr) than in 2009–2011 (46.9 in/yr) [the NPS loads for 2012–2016 were proportionally adjusted].") The decision to design and build a WWTF to meet the sewerage needs of the Rochester community is clearly within the purview of the City of Rochester, not EPA. By using the below average discharge rates from 2012-2016 rather than design flow, EPA has used a random procedure for setting TN load limits. The use of flows from a random set of years rather than design flow is clearly an arbitrary and capricious position of EPA in the Draft GP which will require substantial and costly TN WWTF upgrades to manage.

## 6.0 ADDITIONAL CONCERNS RAISED BY THE DRAFT GP

### 6.1 The Draft GP and Fact Sheet Arbitrarily Treat Rochester Differently from Other WWTFs Based on Delivery Factor.

In the Draft GP and Fact Sheet, US EPA specifies discharge limits for each WWTF in the New Hampshire portion of the GBE watershed. The discharge limits in Table 4 of the Fact Sheet list a TN load allocation for Rochester based on 8 mg/L of TN in its discharge. US EPA then applies a delivery factor of 75.56% to this load to account for the fact that some of the nitrogen discharged from Rochester is attenuated in the Cocheco River before reaching the GBE. The procedure used by US EPA to specify discharge limits inappropriately takes the benefit of the delivery factor for Rochester and spreads it across the WWTFs that discharge directly to the GBE (*i.e.*, with no attenuation). Effectively, using the current construct of the Draft GP, Rochester would discharge 8 mg/L TN to the Cocheco River that would be attenuated by 24.44% to 6.0 mg/L when it reaches the head of tide in the GBE. Thus, while other WWTFs in the Draft GP are allowed to discharge 8 mg/L directly to the GBE, the Rochester WWTF is only allowed to discharge 6 mg/L. Such inconsistent treatment of the Rochester WWTF is inappropriate, and effectively gives the benefit of Rochester's delivery factor to other WWTFs that discharge directly to the GBE (*via* increased allowable loads at those other facilities). To avoid being arbitrary, US EPA must appropriately factor the unique situation of Rochester into the Draft GP by specifying an adjusted permit concentration of 10.59 mg/L TN that would equate to a delivered concentration of 8 mg/L for all WWTFs rather than requiring Rochester to meet some stricter standard.

### 6.2 Certain Provisions of the Draft GP Should be Amended

6.2.1 Page 4, Part 2.1, Table 2, Footnote 1 states that effluent samples shall yield data "representative of the discharge." The term "representative of the discharge" is not defined in the permit. This should be amended to say that samples should yield representative data under normal operating conditions. The same footnote states that "[a] routine sampling program shall be developed in which samples are taken at the same location, same time and same days of the week each month. This requirement should be amended to require that all sampling be taken 1/week based on the EPA DMR calendar week definition of Sunday through Saturday;

6.2.2 Page 5, Part 2.1, states that the permit limit (in units of average pounds per day) is based on a rolling average annual load limit. The rolling annual average should be modified to a rolling seasonal average of June 1 through October 31annually to be comparable to other WWTF NPDES permits throughout New England;

6.2.3 The ammonia limit in Rochester's current NPDES permit should be removed and replaced with the TN limit only. Ammonia is a component of the whole total nitrogen;

## 7.0 CONCLUSION

Using the arbitrary and capricious standard discussed in Section 1 above to evaluate the Draft GP and Fact Sheet in this matter, the City of Rochester respectfully submits that the Draft GP and Fact Sheet reflect an unlawful application of the NPDES permit standards and a misunderstanding of the fundamental ecology of the Great Bay Estuary. The rational, objective science as set forth in the attached comments provided on behalf of the City of Rochester by Gradient, Geosyntec Consultants and VHB, Brown & Caldwell Consultants and HDR contrast sharply with the poorly substantiated and vague justifications in the EPA Fact Sheet.

As we discussed in detail in Section 3, above, the proposed 100 Kg TN loading rate is arbitrary and capricious because (1) the EPA entirely failed to consider background TN and has selected a loading threshold that is unachievable; (2) the EPA failed to consider an important aspect of the problem by failing to consider significant Nitrogen sources in the GBE watershed that should be considered in addition to other background components; (3) the Draft GP and Fact Sheet are devoid of any objective water quality standards and a timeframe for achieving same; (4) the load limit is inconsistent with sound science and was determined without the application of *any* actual measurements of the nitrogen levels or the health of the eelgrass in Great Bay; (5) the TN load limit ignores the evidence before the EPA that eelgrass beds are actually increasing at current TN loading in excess of 200 kg/ha/yr; (6) the methodology to derive the proposed loading rate is contrary to EPA's own guidance and practice documents; and (7) the methodology is inconsistent with how EPA has established load limits in other systems.

The imposition of the 100 Kg Load Limit will have severe economic impacts to Rochester and all of the GBE communities, with no beneficial improvement of eelgrass health. The NPS load reductions are simply unachievable, and EPA has provided no documentation to the communities to demonstrate otherwise. Furthermore the "Adaptive Management" approach relied upon by EPA is, in reality, nothing more than a prescriptive and severe nitrogen reduction plan with expensive obligations imposed on the communities.

Arbitrary and capricious activity sufficient to block agency decisions comes in many forms. While EPA is entitled to deference by the Courts, it is not given a license to ignore sound science, to act irrationally and arbitrarily to impose unachievable TN reduction goals based on a lack of understanding of the ecology of eelgrass in the GBE. This document has highlighted many decisions made by the EPA in this matter that fail to consider important aspects of the problem, illustrate clear errors of judgment, demonstrate a pervasive unwillingness by EPA to brings its own expertise to bear on the problems of the Great Bay, and dismiss factors clearly vital to rational and logical decision making. Not only does every decision highlighted in these comments rise to the level of arbitrary and capricious, but viewed *cumulatively* the decisions made by EPA as reflected in the draft GP and Fact Sheet are so tainted by flawed judgment and illogical, irrational assertions, assumptions, and decisions that the draft GP cannot be sustained.

With this knowledge, it is imperative that the EPA understands that the City of Rochester appreciates the absolute need to strive to improve and sustain the health of the Great Bay Estuary ecosystem. Our city and its residents count on a healthy and resilient Great Bay Estuary. The City is very aware that it often must make decisions that affect the human activities that impact the Great Bay. Rochester has worked with EPA and DES in the past and taken strong, effective measures to improve water quality in the estuary. The City will continue to strive to work with regulators to improve the environment of the GBE.

Given the above, Rochester respectfully requests that the EPA withdraw the pending Draft General Permit and Fact Sheet in this matter and replace it with a scientifically defensible NPDES permit that sets forth rational, achievable goals, numerically defensible water quality criteria for total nitrogen, and offers municipalities the technical and financial assistance to implement a true adaptive management approach to the issues confronting the Great Bay Estuary ecosystem. Rochester understands the very real need to work toward a sustainable and resilient Great Bay Estuary. The City welcomes any opportunity to work with and assist the EPA and NH DES to develop a workable NPDES permit approach that would provide accountability and be protective of marine life, including eelgrass, in the Great Bay Estuary.

Finally, Rochester requests that EPA reconsider its earlier denial of the request for a Peer Review of the selection of the 100 kg $ha^{-1}$ $yr^{-1}$ TN load threshold, and allow an independent panel of experts to review EPA's decision. The economic burden imposed on the communities by this Draft GP is extreme, and the lack of a rational basis for its decision is manifest.

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# ATTACHMENTS

| Page | Attachment Number |
|---|---|
| 6 | **Attachment 1**. Gradient, Comments on the Draft National Pollutant Discharge Elimination System (NPDES) Great Bay Total Nitrogen General Permit for Wastewater Treatment Facilities in New Hampshire (May 8, 2020) (with Appendices). |
| 9 | **Attachment 2**. Kenneth Moraff, EPA correspondence (Mar. 16, 2020). |
| 9 | **Attachment 3**. HDR, Memorandum: *Development of Great Bay Estuary System Total Nitrogen Model* (Dec. 2, 2019) |
| 9 | **Attachment 4**. Casey, Michael, and Andrew Selsky, *Scientists struggle to save seagrass from coastal pollution*, Associated Press (Dec. 22, 2019). |
| 10 | **Attachment 5**. Barker, Seth, *Eelgrass Distribution in the Great Bay Estuary and the Piscataqua River in 2019: Final Project Report submitted to the Piscataqua Region Estuaries Partnership*, PREP Reports & Publications (Feb. 28, 2020). |
| 12 | **Attachment 6**. Letter from Dr. Brian L. Howes, Professor, Univ. of Mass., to Dean Peschel, Consultant, Great Bay Municipal Coalition (Jan. 27, 2020). |
| 13 | **Attachment 7**. Letter from Steven C. Chapra, Professor, Tufts University, to Dean Peschel, Consultant, Great Bay Municipal Coalition (Mar. 22, 2019). |
| 13 | **Attachment 8**. Letter from Dr. Brian L. Howes, Professor, Univ. of Mass., to Dean Peschel, Consultant, Great Bay Municipal Coalition (Jan. 20, 2020). |
| 14 | **Attachment 9**. Letter from Dr. Brian L. Howes, Professor, Univ. of Mass., to Dean Peschel, Consultant, Great Bay Municipal Coalition (Oct. 7, 2019). |
| 14 | **Attachment 10**. HydroAnalysis, Inc., Summary Report: *Technical Review of Select Memorandums Supporting the Development of Nitrogen Endpoints for Three Long Island Sound Watershed Groupings: 23 Embayments, 3 Large Riverine Systems, and Western Long Island Sound Open Water*, prepared for U.S. EPA Region 1 (Jan. 29, 2019). |
| 19 | **Attachment 11**. Letter from Brian Kavanah, Director, Division of Water Quality Management, Maine Dept. of Entvl. Prot. (Apr. 23, 2015). |
| 19 | **Attachment 12**. Maine Dep't Entvl. Prot., Approval of MEPDES ME0100218 & WDL W002650-6D-I-R (Town of Falmouth) (Dec. 4, 2018). |
| 24 | **Attachment 13**. Bierman, Victor J., Robert J. Diaz, W. Judson Kenworthy, and Kenneth H. Reckhow, *Joint Report of Peer Review* (Feb. 13, 2014). |

26 **Attachment 14**. Brown & Caldwell, Technical Memorandum: *Total Nitrogen Cost Updates* (Jan. 30, 2020).

26 **Attachment 15**. Brown & Caldwell, Technical Memorandum: *Total Phosphorus Treatment Cost Updates* (Jan. 30, 2020).

27 **Attachment 16**. City of Rochester, PowerPoint: *EPA Sewer Financial Impacts Debt Service & User Rates* (Feb. 20, 2020).

28 **Attachment 17**. GeoSyntec & VHB, Memorandum: *Preliminary Response to Environmental Protection Agency Region 1 Draft Great Bay Total Nitrogen General Permit (NPDES Permit No. NHG58A000)* (Apr. 15, 2020).

34 **Attachment 18**. Brown & Caldwell, Technical Memorandum: *Great Bay Ambient Monitoring Program Comments and Recommendations* (Apr. 14, 2020).