

AGENCY OF NATURAL RESOURCES
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
WATERSHED MANAGEMENT DIVISION
ONE NATIONAL LIFE DRIVE, DAVIS BUILDING, 3RD FLOOR
MONTPELIER, VT 05620-3522

**FACT SHEET FOR DRAFT PERMIT
(July 2021)**

Permit Number: **3-1196**

PIN: **RU96-0140**

NPDES Number: **VT0100056**

Facility Name: **Brandon WWTF**
Facility Address: **500 Union Street
Brandon, VT 05733**

Facility Coordinates: Lat: **43.7913** Long: **-73.0886**

Classification: **Grade III Domestic
non-Major**

Receiving Water **Neshobe River**

I. Facility and Proposed Action

Applicant's wastewater treatment facility ("facility" or "WWTF") is engaged in the treatment of municipal wastewater in Brandon, Vermont. A map of facility location, outfalls, and receiving water is provided in Attachment A. This facility is classified as a Grade III Domestic non-Major NPDES WWTF.

On 6/16/2011, the Secretary of the Vermont Agency of Natural Resources (the "Secretary") received Applicant's renewal application for the permit to discharge into the designated receiving water. The facility's previous permit was issued on 9/6/2006.

The previous permit (the "current permit") has been administratively continued, pursuant to 3 V.S.A. § 814, as the applicant filed a complete application for permit reissuance within the prescribed time period per the Vermont Water Pollution Control Permit Regulations (VWPCPR) § 13.5(b).

At this time, the Secretary has made a tentative decision to reissue the discharge permit.

II. Statutory and Regulatory Authority

Congress enacted the Clean Water Act (CWA or Act), “to restore and maintain the chemical, physical, and biological integrity of the Nation's waters.” CWA § 101(a). To achieve this objective, the CWA makes it unlawful for any person to discharge any pollutant into the waters of the United States from any point source, except as authorized by specified permitting sections of the Act, one of which is § 402. CWA §§ 301(a), 402(a). Section 402 establishes one of the CWA's principal permitting programs, the National Pollutant Discharge Elimination System (NPDES). Under this section of the Act, the U.S. Environmental Protection Agency (EPA) may “issue a permit for the discharge of any pollutant, or combination of pollutants” in accordance with certain conditions. CWA § 402(a). The State of Vermont has been approved by the EPA to administer the NPDES Program in Vermont. NPDES permits generally contain discharge limitations and establish related monitoring and reporting requirements. CWA § 402(a)(1) - (2).

Section 301 of the CWA provides for two types of effluent limitations to be included in NPDES permits: “technology-based” limitations and “water quality-based” limitations. CWA §§ 301, 303, 304(b); 40 C.F.R. Parts 122, 125, 131. Technology-based limitations, generally developed on an industry-by-industry basis, reflect a specified level of pollutant-reducing technology available and economically achievable for the type of facility being permitted. CWA § 301(b). As a class, WWTFs must meet performance-based requirements based on available wastewater treatment technology. CWA § 301(b)(1)(B). The performance level for WWTFs is referred to as “secondary treatment.” Secondary treatment is comprised of technology-based requirements expressed in terms of BOD5, TSS, and pH; 40 C.F.R. Part 133.

Water quality-based effluent limits, on the other hand, are designed to ensure that state water quality standards are achieved, irrespective of the technological or economic considerations that inform technology-based limits. Under the CWA, states must develop water quality standards for all water bodies within the state. CWA § 303. These standards have three parts: (1) one or more “designated uses” for each water body or water body segment in the state; (2) water quality “criteria,” consisting of numerical concentration levels and/or narrative statements specifying the amounts of various pollutants that may be present in each water body without impairing the designated uses of that water body; and (3) an antidegradation provision, focused on protecting high quality waters and protecting and maintaining water quality necessary to protect existing uses. CWA § 303(c)(2)(A); 40 C.F.R. § 131.12.

A permit must include limits for any pollutant or pollutant parameter (conventional, non-conventional, toxic, and whole effluent toxicity) that is or may be discharged at a level that causes or has "reasonable potential" to cause or contribute to an excursion above any water quality standard, including narrative water quality criteria. See 40 C.F.R. § 122.44(d)(1). An excursion occurs if the projected or actual instream concentration exceeds the applicable criterion. A NPDES permit must contain effluent limitations and conditions in order to ensure that the discharge does not cause or contribute to water quality standard violations.

Receiving stream requirements are established according to numerical and narrative standards adopted under state law for each stream classification. When using chemical-specific numeric criteria from the State's water quality standards to develop permit limits, both the acute and chronic aquatic life criteria are used and expressed in terms of maximum allowable instream pollutant concentrations. Acute aquatic life criteria are generally implemented through maximum daily limits and chronic aquatic life criteria are generally implemented through average monthly limits.

Where a state has not established a numeric water quality criterion for a specific chemical pollutant that is present in the effluent in a concentration that causes or has a reasonable potential to cause a violation of narrative water quality standards, the permitting authority must establish effluent limits in one of three ways: based on a “calculated numeric criterion for the pollutant which the permitting authority demonstrates will attain and maintain applicable narrative water quality criteria and fully protect the designated use”; on a “case-by-case basis” using CWA § 304(a) recommended water quality criteria, supplemented as necessary by other relevant information; or, in certain circumstances, based on an “indicator parameter.” 40 C.F.R. § 122.44(d)(1)(vi)(A-C).

The state rules governing Vermont’s NPDES permit program are found in the Vermont Water Pollution Control Permit Regulations (Environmental Protection Rule, Chapter 13).

III. Permit Limit and Condition Formulation

A. Reasonable Potential Determination

In determining whether this permit has the reasonable potential to cause or contribute to an impairment, the Secretary has considered:

- 1) Existing controls on point and non-point sources of pollution as evidenced by the Vermont surface water assessment database;
- 2) Pollutant concentration and variability in the effluent as determined from the permit application materials, monthly discharge monitoring reports (DMRs), or other facility reports;
- 3) Receiving water quality based on targeted water quality and biological assessments of receiving waters, as applicable, or other State or Federal water quality reports;
- 4) Toxicity testing results based on the Vermont Toxic Discharge Control Strategy, and compelled as a condition of prior permits;
- 5) Available dilution of the effluent in the receiving water, expressed as the instream waste concentration. In accordance with the applicable Vermont Water Quality Standards (Environmental Protection Rule, Chapter 29A), available dilution for rivers and streams is based on a known or estimated value of the lowest average flow which occurs for seven (7) consecutive days with a recurrence interval of once in ten (10) years (7Q10) for aquatic life and human health criteria for non-carcinogens, or at all flows for human health (carcinogens only) in the receiving water. For nutrients, available dilution for stream and river discharges is assessed using the low median monthly flow computed as the median flow of the month containing the lowest annual flow. Available dilution for lakes is based on mixing zones of no more than 200 feet in diameter, in any direction, from the effluent discharge point, including as applicable the length of a diffuser apparatus; and
- 6) All effluent limitations, monitoring requirements, and other conditions of the draft permit.

The Reasonable Potential Determination for this facility is attached to this Fact Sheet as Attachment A.

B. Anti-Backsliding

Section 402(o) of the CWA provides that certain effluent limitations of a renewed, reissued, or modified permit must be at least as stringent as the comparable effluent limitations in the current permit. EPA has also promulgated anti-backsliding regulations which are found at 40 C.F.R. § 122.44(l). Unless applicable anti-backsliding exemptions are met, the limits and conditions in the reissued permit must be at least as stringent as those in the current permit.

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IV. Facility Information

A. History

The Town of Brandon owns and operates the Brandon Wastewater Treatment Facility, an activated sludge extended aeration process that provides phosphorous removal. The WWTF consists of two oxidation ditches, two secondary clarifiers, and chlorine disinfection with dechlorination prior to discharge. This facility uses liquid hypochlorite solution followed by dechlorination for disinfection. Solids are trucked to the Rutland City WWTF for dewatering. The collection system consists of seven pump stations.

The original facility was constructed in 1960 as a primary treatment facility and was upgraded in the mid 1970's to include secondary treatment. Dechlorination was added 1992. In 2000, sodium aluminate was added to the process for chemical removal of phosphorous. During a 2005 upgrade, several new pumps with variable frequency drives and new peristaltic pumps were installed replacing original equipment. New aeration equipment and a new Onan 100 KW generator was also installed. In 2014 minor upgrades were made to the chemical storage building and to piping associated with the secondary clarifiers.

A major sewer line break in 2018 resulted in a 1272 order requiring an engineering evaluation. Many age-related deficiencies were identified and a schedule for repairs by Town forces was prepared. The need for a Preliminary Engineering Report to design the required repairs and upgrades was also identified and a schedule provided.

B. Pretreaters

The following pretreaters are permitted under the NPDES program to discharge to the facility.

Pretreater	Discharge Activity
McClure - Brandon	Treated Groundwater

C. Receiving Water Classification - Neshobe River

All uses Class B with a waste management zone. Class B waters are suitable for swimming and other primary contact recreation; irrigation and agricultural uses; aquatic biota and aquatic habitat; good aesthetic value; boating, fishing, and other recreational uses; and suitable for public water source with filtration and disinfection or other required treatment. A waste management zone is a specific reach of Class B(1) or B(2) waters designated by a permit to accept the discharge of properly treated wastes that prior to treatment contained organisms pathogenic to human beings.

D. Receiving Water Description

The Neshobe River downstream of the Brandon WWTF discharge is a Class B (2) water and is designated as Cold Water Fish Habitat. At the point of discharge, the river has a contributing drainage area of 20.00 square miles. The existing permitted waste management zone (WMZ) begins at the outfall of the WWTF and extends downstream 1.80 miles pursuant to 10 V.S.A., Section 1252.

E. Waste Management and Mixing Zones

A Waste Management Zone (WMZ) is a specific reach of Class B waters designated by a permit to accept the discharge of properly treated wastes that contained organisms pathogenic to human beings prior to treatment. Throughout the receiving waters, water quality criteria must be achieved but increased health risks exist in a WMZ due to the authorized discharge.

The Secretary may establish a WMZ as part of the issuance of a discharge permit as described in 10 V.S.A. § 1252. The model used to determine the WMZ is based upon three precepts of domestic wastewater treatment facility discharges: 1) the use of coliform bacteria as an indicator of pathogenic organisms; 2) despite proper operation and maintenance disinfection failures may occur; and 3) a reasonably sized waste management segment provides a "buffer zone" downstream of the wastewater discharge in which contact recreation is not recommended. If a disinfection failure should occur at the WWTF, the time of travel through this zone will provide time during which some pathogen die-off will occur and may also allow time for public notification. A WMZ is not a Mixing Zone.

This facility currently has a 1.80 mile WMZ.

Mixing Zone. A Mixing Zone is a length or area within Class B waters required for the dispersion and dilution of waste discharges adequately treated to meet federal and state treatment requirements and within which it is recognized that specific water uses or water quality criteria associated with the assigned classification for such waters may not be realized. A mixing zone shall not extend more than 200 feet from the point of discharge and must meet the terms of 10 V.S.A. § 29A-204. For a mixing zone to be applicable to a discharge it must be authorized within the discharge permit. The Secretary has made the determination that conditions due to discharges of waste within any mixing zone shall:

- a. not result in a significant increase in public health risk when evaluated using reasonable assumptions about exposure pathways;
- b. not constitute a barrier to the passage or movement of fish or prevent the full support of aquatic biota, wildlife, and aquatic habitat uses in the receiving waters outside the mixing zone;
- c. not kill organisms passing through;
- d. protect and maintain the existing uses of the waters;
- e. be free from materials in concentrations that settle to form objectionable deposits;
- f. be free from floating debris, oil, scum, and other material in concentrations that form nuisances;
- g. be free from substances in concentrations that produce objectionable color, odor, taste, or turbidity; and
- h. be free from substances in concentrations that produce undesirable aquatic life or result in a dominance of nuisance species. (Vermont Water Quality Standards § 29A-204(a)).

The facility currently does not have a mixing zone

V. Monitoring

A. Flow Monitoring at Discharge Point 001

1. Flow

The draft permit maintains the annual average flow limitation. This facility maintains a constant discharge and continuous flow monitoring is required. The limit is unchanged from the previous permit. Daily maximum and monthly average monitor only conditions have been added for use in computing the annual average and for evaluating the performance of the WWTF against the flows contained in the Basis of Final Design.

B. Conventional Pollutants Monitoring at Discharge Point 001

1. BOD, 5-Day

The effluent limitations for BOD5 remain unchanged from the current permit. The monthly and weekly averages reflect the minimum level of effluent quality specified for secondary treatment in 40 C.F.R. Part 133.102. Those values are a weekly average of 45 mg/l and a monthly average of 30 mg/l. In addition, the draft permit contains a maximum day, BOD5 limitation pursuant to Vermont Water Pollution Control Permit Regulations § 13.4.c. That limitation of 50 mg/l is based upon the previous permit and best professional judgement. The Secretary implements the limitation to supplement the federal technology-based limitations. This is designed to prevent a gross one-day permit effluent violation from being offset by multiple weekly and monthly sampling events, which would enable a discharger to comply with the weekly average and monthly average permit limitations. Mass limits are calculated using the concentration limits outlined above. The BOD5 monitoring requirement is unchanged from the current permit.

2. BOD, 5-Day (% REMOVAL)

The BOD5 monthly average percent removal shall not be less than 85 percent as specified in 40 C.F.R. § 133.102(a)(iii). This limit is a Technology-Based Effluent Limitation (TBEL) established by the Clean Water Act that requires WWTFs to achieve a minimum level of effluent quality. TBELs are based on available technologies to reduce discharges of pollutants into waters of the United States and are developed independently of the potential impact of a discharge on the receiving water. The limit and monitoring requirements are unchanged from the previous permit.

3. Chlorine, Total Residual

The Total Residual Chlorine (TRC) limitation is 0.05 mg/l monthly average and 0.05 mg/l daily maximum. These limitations are changed from the current permit. A daily maximum limit of 0.04 mg/l and a monthly average limitation of 0.02 mg/l will ensure that the instream water quality criteria for chlorine of 0.019 mg/L, (acute) and 0.011 mg/L (chronic) of the Vermont Water Quality Standards is met. These calculated limits are less than the detection limit of the currently approved version of Standard Methods for the Examination of Water and Wastewater (Method 4500 CL-E and G).

The draft permit specifies a compliance level of 0.05 mg/L for TRC. A compliance level is specified because the limitations for TRC are below the minimum level (ML) for analysis of TRC using Method 4500-Cl G, N,

N-diethyl-p-phenylenediamine (DPD) colorimetric, of 0.05 mg/L. This approach is consistent with EPA's Technical Support Document for Water Quality-based Toxics Control (EPA-505-2-90-001, March 1991), page 111, which recommends, "the compliance level be defined in the permit as the minimum level (ML)." See Standard Methods for the Examination of Water and Wastewater for the full text of these test methods.

TRC measurements of 0.05 mg/L and less will be considered in compliance. Monitoring via grab sample is required daily, which is unchanged from the current permit.

4. E. Coli

The instantaneous maximum E. coli limitation remains unchanged and is based upon the limitation in the current permit and the anti-backsliding provisions of Section 402(o) of the CWA. Sampling requirements remain unchanged from the previous permit.

5. pH

The pH limitation remains at 6.5 - 8.5 Standard Units as specified by Vermont Water Quality Standards § 29A-303(6). Monitoring remains at daily.

6. Settleable Solids

The settleable solids limitation of 1.0 mL/L instantaneous maximum and daily monitoring remain unchanged from the current permit. This numeric limit was established in support of the narrative standard in Vermont Water Quality Standards § 29A-303(2).

7. Suspended Solids, Total (% Removal)

As required in the current permit, the TSS monthly average percent removal shall not be less than 85 percent as specified by 40 C.F.R. §133.102(b)(3). This limit is a Technology-Based Effluent Limitation (TBEL) established by the Clean Water Act that requires WWTFs to achieve a minimum level of effluent quality. TBELs are based on available technologies to reduce discharges of pollutants into waters of the United States and are developed independently of the potential impact of a discharge on the receiving water.

8. Suspended Solids, Total

The effluent limitations for TSS remain unchanged from the current permit. The monthly and weekly averages reflect the minimum level of effluent quality specified for secondary treatment in 40 C.F.R. Part 133.102. Those values are a weekly average of 45 mg/l and a monthly average of 30 mg/l. In addition, the draft permit contains a maximum day TSS limitation pursuant to Vermont Water Pollution Control Permit Regulations § 13.4 c. That limitation of 50 mg/l is based upon the previous permit and best professional judgement. The maximum day limitation supplements the federal technology-based limitations to prevent a gross one-day permit effluent violation from being offset by multiple weekly and monthly sampling events to achieve the weekly and monthly averages. The mass limits are calculated using the concentration limits outlined above. The TSS twice monthly monitoring requirement is unchanged from the current permit.

9. Ultimate Oxygen Demand

On the basis of assimilative capacity modeling completed on the receiving water, an effluent UOD limit is included in the draft permit in order to ensure compliance with the dissolved oxygen water quality criteria during critical summertime instream conditions. UOD is dependent on the quantity of Biochemical Oxygen Demand (BOD5) and Total Kjeldahl Nitrogen (TKN) in a discharge, as specified in the following equation:

$$\text{UOD (lbs/day)} = [(\text{BOD5 (lbs/day)} \times 1.43) + (\text{TKN (lbs/day)} \times 4.57)]$$

Calculation of the UOD concentration in the discharge is required twice per month from the period of June 1 through October 31st. The sampling frequency is unchanged from the current permit. The BOD and TKN analyses used to calculate UOD must be conducted on the same effluent sample. Since receiving waters are the most sensitive to oxygen depleting wastes during periods of high water temperature and low flow, the UOD limitation is in effect from June 1 through October 31 of each year. The UOD limitation ensures compliance with the dissolved oxygen criteria during this time period as specified in the Vermont Water Quality Standards. During the other months of the year, the Biological Oxygen Demand limitation is adequate to ensure compliance with the dissolved oxygen criteria.

C. Nutrients Monitoring at Discharge Point 001

1. Nitrite Plus Nitrate Total 1 Det.

Nitrite Plus Nitrate as Nitrogen (NO_x) – Nitrite (NO₂⁻) and Nitrate (NO₃⁻) are oxidized forms of Nitrogen. NO_x is needed to calculate Total Nitrogen (TN). To gather data on the amount of Total Nitrogen in this discharge, Nitrite (NO₂⁻) plus Nitrate (NO₃⁻) monitoring is proposed in the renewed permit. The sum of Nitrite (NO₂⁻) and Nitrate (NO₃⁻) is represented as NO_x to simplify the notation in wastewater chemistry. The x represents the number of Oxygen atoms (2 or 3) and the negative charge notation (-) is dropped. This notation is also used in atmospheric chemistry where other oxidation states are possible.



Test results are reported in terms of Nitrogen (N) because water quality standards are generally expressed in terms of Nitrogen for simplicity and consistency. This constituent (NO_x) is sometimes also shown as (NO₂/NO₃), NO_x, Nitrate/Nitrite Nitrogen, and Nitrite Plus Nitrate Total 1 Det. (As N). To gather data on the amount of NO_x in this discharge and its potential impact on the receiving water, “monitor only” sampling requirements are included in the draft permit. Sampling is required twice a month in the summer (June 1 – October 31) and once a month in the winter (November 1– May 31).

2. Nitrogen, Ammonia Total

Total Ammonia Nitrogen (TAN) (NH₃-N) is the sum of the free ammonia-nitrogen plus the amount of nitrogen from ammonia that has combined with chlorine. To gather data on the amount of TAN in this discharge and its potential impact on the receiving water, a monthly “monitor only” sampling requirement is included in the draft permit.

3. Nitrogen, Kjeldahl Total

TKN is the sum of nitrogen in the forms of ammonia (un-ionized (NH₃) and ionized (NH₄⁺)), soluble organic nitrogen, and particulate organic nitrogen. To gather data on the amount of TKN in this discharge and its potential impact on the receiving water, a “monitor only” sampling requirement is included in the draft permit. The summer (June 1 – October 31) sampling frequency of twice a month has been retained and monthly sampling during the winter (November 1– May 31) has been added.

4. Nitrogen, Total

TN is the sum of nitrate, nitrite, ammonia, soluble organic nitrogen, and particulate organic nitrogen. To gather data on the amount of Total Nitrogen (TN) in this discharge and its potential impact on the receiving water, a “monitor only” requirement for TN has been included in this permit. TN is a calculated value based on the sum of NO_x and TKN, and, shall be reported as pounds, calculated as:

Average TN (mg/L) x Total Daily Flow (MGD) x 8.34 where, TN (mg/L) = TKN (mg/L) + NO_x (mg/L).

Per EPA excess nitrogen (N) and phosphorus (P) are the leading cause of water quality degradation in the United States. Historically, nutrient management focused on limiting a single nutrient—phosphorus or nitrogen—based on assumptions that production is usually phosphorus limited in freshwater and nitrogen limited in marine waters. Scientific research demonstrates this is an overly simplistic model. The evidence clearly indicates management of both phosphorus and nitrogen is necessary to protect water quality. The literature shows that aquatic flora and fauna have differing nutrient needs: some are P dependent, others N dependent and others are co-dependent on these two nutrients. Like P, N promotes noxious aquatic plant and algal growth. High concentrations of P and N together cause greater growth of algae than P alone. The relative abundance of these nutrients also influences the type of species within the community. Furthermore, a high N-to-P ratio may exacerbate the growth of cyanobacteria, while elevated levels of nitrogen increase toxicity in some cyanobacteria species. Given the dynamic nature of all aquatic ecosystems, for the State to fully understand the degradation to water quality it is necessary to limit P and monitor bioavailable N (including nitrate, ammonium, and certain dissolved organic nitrogen compounds). Facilities with design flow greater than 1 MGD will complete monthly monitoring unless more frequent sampling is already required by the current permit. Facilities with design flows less than 1 MGD will complete quarterly monitoring unless more frequent sampling is already required by the current permit. Total Nitrogen monitoring is proposed at a twice a month in the summertime (June 1 – October 31) and monthly wintertime (November 1– May 31) frequency for this facility.

5. Phosphorus, Total

Background:

Excess phosphorus entering Lake Champlain from a variety of sources has impaired the lake’s water quality. The Lake Champlain Total Maximum Daily Load (LC TMDL), issued June 17, 2016, places a cap on the maximum amount of phosphorus from point and non- point sources that is allowed to flow into the lake while still meeting Vermont’s water quality standards. The EPA developed phosphorus TMDLs for the twelve

Vermont segments of Lake Champlain in collaboration with the Vermont Agency of Natural Resources, Department of Environmental Conservation and the Vermont Agency of Agriculture, Food, and Markets, and released the document titled “Phosphorus TMDLs for Vermont Segments of Lake Champlain” (June 2016). The 2016 LC TMDL specifies allowable phosphorus loads, or waste load allocations (WLA), expressed as metric tons per year (mt/yr), for each of the 59 WWTFs that discharge to the Lake Champlain watershed. The Secretary will issue discharge (NPDES) permits will be issued by the Secretary in accordance with the permit issuance schedule in the Lake Champlain TMDL Phase 1 Implementation Plan (Chapter 3, page 46). The Secretary will follow this schedule unless special circumstances are raised by the facility that warrant the issuance of the permit sooner (e.g., planned facility upgrades), and the Wastewater Management Program has sufficient staff capacity to handle the request.

Reductions in WLAs are targeted only to WWTFs in those lake segment watersheds where the currently permitted wastewater load represents a 10% or greater portion of the total phosphorus load to that segment from all sources (Main Lake, Shelburne Bay, Burlington Bay, St. Albans Bay) or where wastewater upgrades would meaningfully reduce the phosphorus reduction burden placed on non-wastewater (non-point) sources (Missisquoi Bay). Therefore, WWTFs discharging to the Port Henry, Otter Creek, Mallets Bay, Northeast Arm, Isle LaMotte, and the South Lake A/B lake segments were not assigned a new waste load allocation. The EPA also determined that wastewater facilities with a design flow of < 0.1 million gallons per day (MGD) would be given the same allocations as in the 2002 TMDLs due their minor contribution of phosphorus loading.

The LC TMDL establishes new annual WLAs for WWTFs with a design flow capacity of above 0.1 MGD that discharge to the Main Lake, Shelburne Bay, Burlington Bay, St. Albans Bay, and Missisquoi Bay lake segments. Specifically, WWTFs with a design flow capacity of 0.1 to 0.2 MGD were assigned WLAs based on a 0.8 mg/L effluent phosphorus concentration at permitted flow while WWTFs with design capacity of > 0.2 MGD were assigned WLAs based on a 0.2 mg/L effluent phosphorus concentration at permitted flow.

In the LC TMDL, EPA acknowledged and supported the Secretary’s commitment to employ flexible approaches to implementing the WWTF WLAs including “providing a period of time for optimization to be pursued and the corresponding load reduction results to be realized, and then commencement of the process to upgrade phosphorus treatment facilities will be required when actual phosphorus loads reach 80% of the LC TMDL limits.” The Wastewater Management Program maintains a tracking system for phosphorus loading from Vermont WWTFs so facilities approaching or over the 80% threshold can be identified. The 80% phosphorus load threshold is calculated by comparing the individual WWTF phosphorus WLA established in the LC TMDL to the actual phosphorus discharge load from the WWTF over last 12 months:

WWTF Annual TP Load / LC TMDL WLA x 100

There are currently WWTFs in the Lake Champlain watershed with existing discharged loads of phosphorus already at, or above, 80% of allowable loads. To ensure facilities are operating as efficiently as possible, all reissued wastewater discharge (NPDES) permits under the LC TMDL will specify a period of 12 months for optimization to be pursued and the corresponding load reduction results to be realized, prior to evaluating where a facility ranks relative to the 80% trigger. Discharge permits will specify that after the optimization period, when an existing facility reaches 80% of its WLA for phosphorus (evaluated as a rolling, 12- month load), the Permittee will have to develop and submit a projection of whether the facility will exceed its WLA

during the permit term and if it is projected to do so, then the facility will be required to develop a Phosphorus Elimination/Reduction Plan (PERP) that will ensure the facility continues to comply with its WLA.

Effluent TP limits in permits are expressed as:

- (1) total annual mass loads, and
- (2) for facilities that currently have an existing monthly effluent concentration limit for TP in their NPDES permit, as monthly effluent concentration limits.

Phosphorus Limit in Draft Permit:

The current discharge permit for this facility includes a mass-based, effluent limit of 1278 pounds of TP per year. This annual mass limitation was based on an allocation of 0.580 metric tons established in the 2002 Lake Champlain Phosphorus TMDL. The current permit also contains an effluent TP concentration limit of 0.8 mg/L, monthly average, consistent with the annual load limit.

This proposed draft permit contains a phosphorous effluent concentration limit of 0.8 mg/l, monthly average, and a mass effluent limit of 1278 total pounds, annual limitation. The concentration effluent limitation is based on the requirements of 10 V.S.A. § 1266a. The mass annual effluent limitation is based on the LC TMDL. The LC TMDL allocated 0.580 metric tons per year or 1278 pounds per year to the Brandon WWTF.

This new, annual WLA represents a 0% reduction (-0 pounds) from the current permit and is equivalent to setting the effluent TP limit at 0.6 mg/L at the design capacity of the WWTF (0.7 MGD). To convert units of the WLA from metric tons to pounds for the annual, mass- based TP permit limit, the following equation was used and the resulting WLA rounded down to the nearest pound:

$$(0.580 \text{ mt/yr}) (2204.62 \text{ lbs/mt}) = 1278 \text{ lbs/yr}$$

The LC TMDL includes WLAs for WWTFs expressed as total annual mass loads. Compliance with the annual limit will be calculated each month using the Running Total Annual Pounds Calculation (Condition I.G.2.c. of the permit), rather than once at the end of the calendar year. The LC TMDL does not include monthly average concentration effluent limits for WWTFs. State law (10 V.S.A. 1266a) requires that, “No person directly discharging into the drainage basins of Lake Champlain or Lake Memphremagog shall discharge any waste that contains a phosphorus concentration in excess of 0.80 milligrams per liter on a monthly average basis.” Therefore, in addition to the annual mass load effluent limitation required by the TMDL, the permit must also include a monthly average concentration limit for phosphorus. While the WLA in the TMDL was calculated based on a TP effluent concentration of 0.6 mg/L, the permit does not include 0.6 mg/L as the concentration effluent limitation because a Permittee may not need to achieve 0.6 mg/L to ensure compliance with the WLA established in the TMDL. Rather the permit includes a monthly average concentration limit for phosphorus of 0.80 mg/L to ensure compliance with state law and to recognize seasonal variations in the facility’s discharge. It is important to note that because the annual mass load and average monthly concentration limits are not mathematically consistent in the permit, meeting a 0.80 mg/L concentration limit at design flows will not result in meeting the annual mass limit.

The Permittee must comply with both limitations and, as required by the permit, must operate the facility to meet the more restrictive limitation, which may vary depending upon discharge flows at the facility. If the

facility is operating at design flows, the annual mass load limitation will be the more restrictive limitation. However, if the facility is operating at low flows, the monthly average concentration limit may be the more restrictive limitation.

Sampling for total phosphorus is required twice a month.

Condition I.G.3.c. of this draft permit requires the submission of monitoring reports to the Secretary specific to tracking TP in the discharge. A report that documents the annual TP discharged from the facility, summarizes phosphorus removal optimization and efficiencies, and tracks trends relative to the previous year shall be attached to the applicable WR-43 form. The annual and monthly TP loads discharged from the facility shall also be reported electronically with other required parameters.

Analysis in Support of Phosphorus Limit:

The Secretary is using the WLA from the LC TMDL (https://ofmpub.epa.gov/waters10/attains_impaired_waters.show_tmdl_document?p_tmdl_doc_blobs_id=79000) as the water quality-based effluent limitation (WQBEL) for phosphorus for this permit. Because this is the first permit issued to this facility under the new LC TMDL and the TMDL is less than five years old, an analysis of the assumptions underlying the TMDL is not required. In re Montpelier WWTF Discharge Permit, 2009 WL 4396740, 6, 9-10 (Vt. Env'tl. Ct. June 30, 2009) (stating that it “probably would have been meaningless to engage in further analysis” of the 2002 Lake Champlain TMDL a mere year and a half after its adoption, while also holding that when issuing a permit more than five years after the adoption of a TMDL, ANR must assess whether the past assumptions upon which the WLA was based upon “continue to have a basis of reliability”). Notwithstanding the fact that an analysis is not required, the Agency provides the following.

Using the WLA from the LC TMDL as the phosphorus WQBEL in the permit is appropriate because the State is making significant progress toward meeting the assumptions upon which the WLA is based. For 2016, EPA gave Vermont an “excellent” report card for meeting milestones by December 30, 2016. By 2017, the State had completed a majority of the milestones in the LC TMDL Accountability Framework (pages 54-59 of the LC TMDL) due by December 30, 2017 and was actively working to complete those that were outstanding, as outlined in the 2018 Vermont Lake Champlain Phosphorus Total Maximum Daily Loads Accountability Framework Report (Submitted by the State to EPA on March 7, 2018; available at: <http://dec.vermont.gov/sites/dec/files/wsm/erp/docs/2018VermontLakeChamplainPhosphorusTMDLAccountabilityFrameworkReport.pdf>) With the issuance of the “Developed Lands General Permit” (Stormwater General Permit 3-9050) in late 2020, Vermont has successfully completed all Phase 1 Accountability Framework milestones, as acknowledged in the EPA September 3, 2020 Lake Champlain TMDL Implementation Final Report Card for Phase 1 Milestones (Available at: <https://www.epa.gov/sites/production/files/2020-09/documents/lake-champlain-report-card-ltr-09-3-20.pdf>).

With the State having completed all Phase 1 Accountability Framework milestones, and with EPA’s affirmative reports thus far, there is no reason to believe that the assumptions upon which the WLA was developed – including that discharges in other sectors will be reduced in the future – are no longer valid.

Therefore, it is appropriate to establish the phosphorus WQBEL for this facility based upon its WLA in the LC TMDL.

Phosphorus Elimination and Reduction Plan:

To ensure the facility is operating as efficiently as possible for purposes of phosphorus removal, Condition I.G.3. of the permit requires that within 120 days of the permit effective date, the Permittee shall develop or update (as appropriate), and submit to the Secretary, a Phosphorus Optimization Plan (POP) to increase the WWTF's phosphorus removal efficiency by implementing optimization techniques that achieve phosphorus reductions using primarily existing facilities and equipment. The techniques to be evaluated may include operational process changes to enhance biological and/or chemical phosphorous removal, incorporation of anaerobic/anoxic zones, septage receiving policies and procedures, and side-stream management.

The facility shall have 12 months from the permit effective date to optimize removal of total phosphorus. If, after the 12-month optimization period, the WWTF's actual TP loads reach or exceed 80% of the LC TMDL WLA for the WWTF, based on the WWTF's 12-month running annual load calculated using the Phosphorus Load Calculation (Condition I.G.2.d. of the permit) the Permittee shall, within 90 days of reaching or exceeding 80% of the LC TMDL WLA for the WWTF, develop and submit to the Secretary a projection based on the WWTF's current operations and expected future loadings of whether it will exceed its WLA during the permit term.

If the facility is not projected to exceed its WLA within the permit term, the WWTF shall reassess when it is projected to reach its WLA prior to permit renewal and submit that information with its next permit application. If the facility is projected to exceed its WLA during the permit term, the Permittee shall submit a Phosphorus Elimination/Reduction Plan (PERP) within 6 months to the Secretary to ensure the WWTF continues to comply with its WLA. The PERP shall be treated as an application to amend the permit, and therefore, shall be subject to all public notice, hearing, and comment provisions, in place at the time the plan is submitted, that are applicable to permit amendments. The WWTF shall revise the PERP, if required by the Secretary.

3. Discharge Special Conditions

Permit Schedule Items

A. Annual Constituent Monitoring

For all facilities with a design flow greater than 0.1 MGD, 40 CFR § 122.21(j) requires the submittal of effluent monitoring data for those parameters identified in the draft permit. Samples must be collected once annually such that by the end of the term of the permit, all quarters have been sampled at least once, and the results will be submitted by December 31 of each year.

B. Emergency Power Failure Plan

To ensure the facility can continue operations during the event of a power failure, Permittees are required to have Emergency Power Failure Plans on file. Within 90 days of the effective date of the permit, the Permittee must ensure this plan is up-to-date by submitting to the Secretary updated documentation addressing how the discharge will be handled in the event of an electric power outage.

C. Metals Analysis

Due to the lack of monitoring data for metals, it was not possible to assess RP for Metals (Al, Sb, As, Be, Cd, Cr, Cu, Pb, Hg, Ni, Se, Ag, Tl, and Zn). The reasonable potential determination attached to this Fact Sheet suggests the draft permit include a requirement for priority pollutant metals sampling due to the high Instream Waste Concentration of this facility of 37% at 7Q10. Priority pollutant metals monitoring is required three times in the draft permit to support future assessments. This monitoring is required to be concurrent with WET tests.

D. Operation Management Emergency Response Plan (OMERP)

As required by the revisions to 10 V.S.A. Section 1278 the Permittee shall implement the Operation, Management, and Emergency Response Plan on file. To ensure this plan remains up-to-date, the Permittee shall prepare and submit to the Agency for review and approval an Operation, Management, and Emergency Response Plan for the WWTF, sewage pump/ejector stations, stream crossings, and sewage collection system.

E. Phosphorus Optimization Plan

The Permittee shall prepare and implement a plan to optimize phosphorus removal at the facility.

F. Quality Assurance Report / Proficiency Testing

To ensure there are adequate laboratory controls and appropriate quality assurance procedures, the Permittee shall conduct an annual laboratory proficiency test for the analysis of all pollutant parameters performed within their facility laboratory and reported as required by their NPDES permit. Proficiency Test samples must be obtained from an accredited laboratory or as part of an EPA DMR-QA study. Results shall be submitted to the Secretary by December 31, annually beginning in 2021.

G. Whole Effluent Toxicity (WET) Testing Acute/Chronic

40 C.F.R. Part 122.44(d)(1) requires the Secretary to assess whether the discharge causes or has the reasonable potential to cause or contribute to an excursion above any narrative or numeric water quality criteria. Per these federal requirements, the Permittee shall conduct WET testing and toxic pollutant analyses according to the schedule outlined in the draft permit. If the results of these tests indicate a reasonable potential to cause an instream toxic impact, the Secretary may require additional WET testing, establish a WET limit, or require a Toxicity Reduction Evaluation.

H. Preventive Maintenance Requirements – Spare Bearings and Seals

The existing permit contains a requirement that the Permittee implement a preventative maintenance program for the canal rotor shaft bearings, that the bearings be repaired or replaced before they wear out and become non-functional, and that as part of the program the permittee shall maintain a complete extra set of bearings and seals for *each* rotor shaft. A similar requirement has been included in the Brandon WWTF permit since 1990 and has been revised to require more spare parts over that time period. A failure to comply with this condition resulted in the discharge of untreated sewage in December 1999. A 20 year Engineering Evaluation compelled by the issuance of a 1272 order in 2019 indicates that the North Ditch rotor was in Poor condition and only had 2-5 years of useful life remaining. The same evaluation indicated that the South Ditch Rotor was in fair condition with 10+ years remaining. Condition II.B.1. of the draft permit requires that the WWTF be properly operated and maintained. The requirement for the facility to prepare an OMERP plan provides an opportunity for the permittee to include the necessary preventive maintenance and determine the necessary number of spare parts to keep on hand. This document (OMERP) will be reviewed, and if satisfactory, may allow the specific requirement to keep bearings and seals on hand to be removed from future permits. However, at this point in time, the condition of the existing equipment and the history of untreated discharges requires the continued inclusion of this requirement.

VIII. General Conditions

A. Electronic Reporting

The National Pollution Discharge Elimination System (NPDES) Electronic Reporting Rule (eRule) modernized Clean Water Act reporting for municipalities, industries, and other facilities by converting to an electronic data reporting system. The eRule requires the inclusion of electronic reporting requirements in NPDES permits that become effective after December 21, 2015. The rule requires that NPDES regulated entities that are required to submit discharge monitoring reports (DMRs), including majors and nonmajors, individually permitted or covered by a general permit, must do so electronically after December 21, 2016. The Secretary has created an electronic reporting system for DMRs and has trained facilities in its use. As of December 21, 2020, these NPDES facilities must also submit additional information electronically as specified in Appendix A in 40 C.F.R. Part 127.

B. Noncompliance Notification -

As required by 10 V.S.A. § 1295, a Noncompliance Notification has been included in the draft permit. Section 1295 requires the Permittee to provide public notification of untreated discharges from wastewater facilities. The Permittee is required to post a public alert within one hour of discovery and submit to the Secretary specified information regarding the discharge within 12 hours of discovery.

C. Reopener - The draft permit includes a reopener clause whereby the Secretary reserves the right to reopen and amend the permit to implement an integrated plan to address multiple Clean Water Act obligations.

V. Final Determinations

The public comment period for receiving comments on this draft permit is from **July 7, 2021 through August 6, 2021**, during which time interested persons may submit their written views on the draft permit. All written comments received by 4:30 PM on August 6, 2021, will be retained by the Secretary and considered in the formulation of the final determination to issue, deny or modify the draft permit. The period of comment may be extended at the discretion of the Secretary.

A public meeting request was received on July 21, 2021. **The Secretary will hold a public meeting on September 2, 2021 and the comment period will be extended to September 10, 2021.** All written comments received by 4:30 PM on September 10, 2021, will be retained by the Secretary and considered in the formulation of the final determination to issue, deny or modify the draft permit.

Written comments should be sent to:

Agency of Natural Resources
Department of Environmental Conservation
Watershed Management Division
One National Life Drive, Davis Building, 3rd Floor
Montpelier, VT 05620-3522

Comments may be submitted by e-mail to ANR.WSMDWastewaterComments@vermont.gov

For additional information, contact Amy Polaczyk at 802-490-6185.

Any interested person or groups of persons may request or petition for a public meeting with respect to this draft permit. Any such request or petition for a public meeting shall be filed within the public comment period described above and shall indicate the interest of the party filing such request and the reasons why a meeting is warranted.

The Agency will hold a meeting if there is significant public interest in holding such a meeting. Any public meeting brought in response to such a request or petition will be held in the geographical area of the proposed discharge or other appropriate area, at the discretion of the Agency and may, as appropriate, consider related groups of draft permits. Any person may submit oral or written statements and data concerning the draft permit at the public meeting. The Agency may establish reasonable limits on the time allowed for oral ~~statements and may require the submission of statements in writing.~~ All statements, comments, and data presented at the public meeting will be retained by the Agency and considered in the formulation of the final determination to issue, deny, or modify the draft permit.

The complete application, draft permit, and other information are on file and may be inspected by appointment on the 3rd floor of the Davis Building at One National Life Drive, Montpelier, Vermont. Copies may be obtained by calling 802-828-1115 from 7:45 AM to 4:30 PM Monday through Friday and will be made at a cost based upon the current Secretary of State Official Fee Schedule for Copying Public Records. The draft permit and fact sheet may also be viewed on the Watershed Management Division's website at <https://anrweb.vt.gov/DEC/IWIS/ReportViewer2.aspx?Report=WWPublicNotices&ViewParms=False>

Vermont Agency of Natural Resources
Department of Environmental Conservation
Watershed Management Division
1 National Life Drive, Davis 3
802-828-1535

MEMORANDUM



Prepared by: John Merrifield, Wastewater Program (WWP)
Cc: Pete LaFlamme, Director, WSMD
Rick Levey, Monitoring and Assessment Program (MAP)
Amy Polaczyk, Manager, WWP
Bethany Sargent, Manager, MAP

Date: **June 3, 2021**

Subject: Reasonable Potential Determination for the Brandon Wastewater Treatment Facility

I. Facility Information:

Brandon Wastewater Treatment Facility (WWTF)
Brandon, VT
Permit No. 3-1196
NPDES No. VT0100056
Facility Location: 43.79138, -73.0886 (NAD 83)
Approximate Outfall Location: 43.7904, -73.0880 (NAD 83)

II. Hydrology:

Receiving water: Neshobe River
Facility Design Flow: 0.700 MGD = 1.083 CFS
Estimated 7Q10¹ = 1.844 CFS
Estimated LMM² = 6.570 CFS
Instream Waste Concentration at 7Q10 Flow (IWC-7Q10) = 0.370 (>10%)
Instream Waste Concentration at Low Median Monthly Flow (IWC-LMM) = 0.142 (>10%)

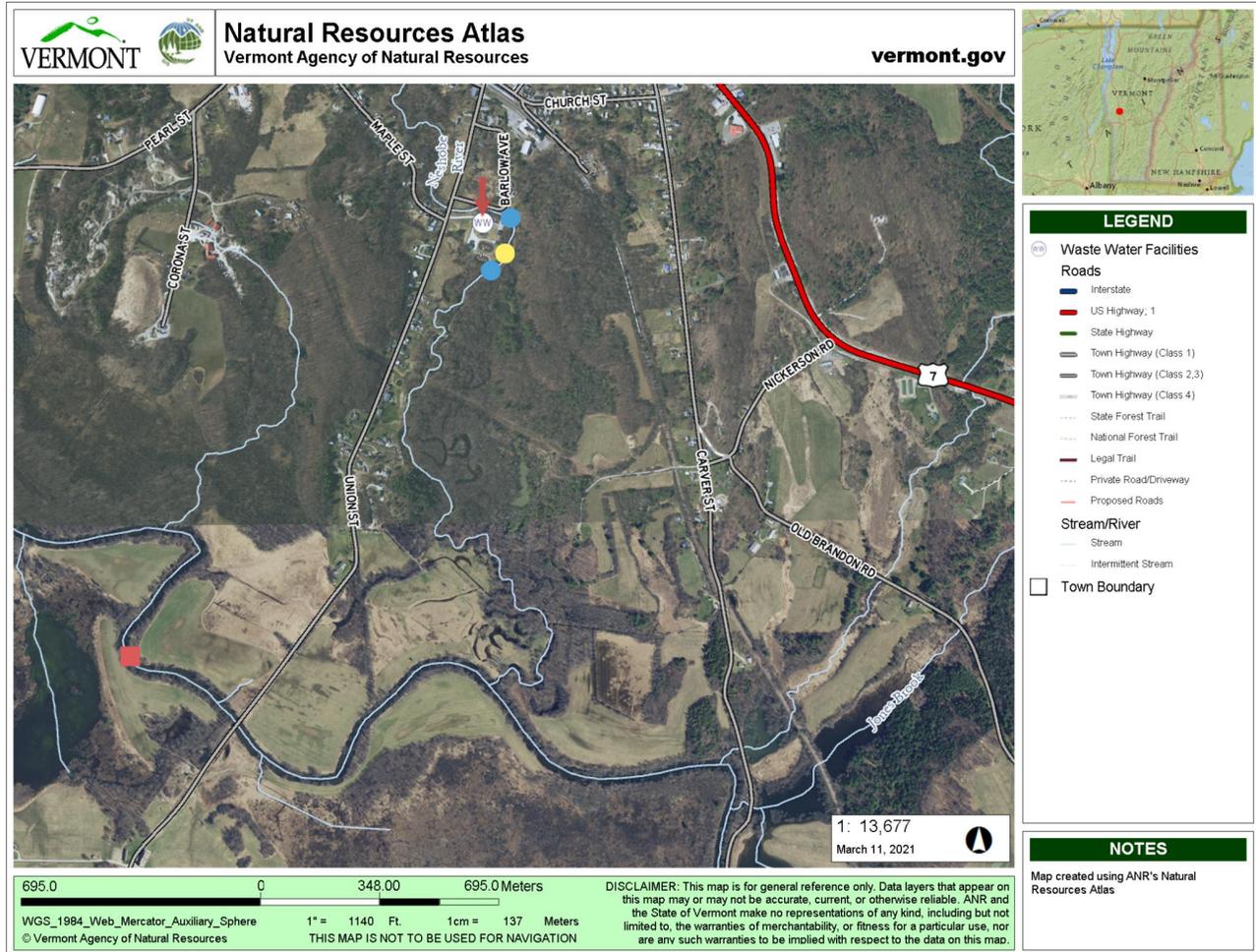
The Town of Brandon owns and operates the Brandon Wastewater Treatment Facility (WWTF) which is an extended aeration plant with 2 oxidation ditches, 2 secondary clarifiers and chlorine disinfection with dechlorination and an aerobic digester.

¹ Using daily mean streamflows, the flow of the receiving water equal to the minimum mean flow for seven consecutive days, that has a 10% probability of occurring in any given year.

² “Low Median Monthly Flow”. Using daily mean streamflows, the median monthly flow of the receiving water for that month having the lowest median monthly flow.

The Neshobe River downstream of the Brandon WWTF discharge is a Class B (2) water and is designated as Cold Water Fish Habitat. At the point of discharge, the river has a contributing drainage area of 20.00 square miles. The existing permitted waste management zone (WMZ) begins at the outfall of the WWTF and extends downstream 1.80 mile (Figure 1) pursuant to 10 V.S.A., Section 1252.

Figure 1. Neshobe River near the Brandon WWTF. Facility location represented by white dot containing "WW" and red arrow. The outfall location is indicated by a yellow dot. Upstream sampling location at RM 1.0 and downstream monitoring location at RM 0.9 are shown by blue dots. A red square indicates the approximate end of the 1.80 mile long waste management zone. Figure produced with the Vermont Integrated Watershed Assessment System on the VT Agency of Natural Resources Atlas (<https://anrweb.vt.gov/DEC/IWIS/>).



This memo is organized into the following sections:

- Summary of Effluent Data for the Brandon WWTF
- Summary of Instream Ambient Chemistry Data for the Neshobe River
- Biological Assessments upstream and downstream of the Brandon WWTF
- Assessment of Reasonable Potential of the Brandon WWTF discharge to exceed Vermont Water Quality Standards (VWQSS)

III. Effluent Data for the Brandon WWTF

Table 1a. Effluent Data for the Brandon WWTF from 2/29/2016 to 11/30/2020.

Parameter Name	Limit	Units	Min	Average	Max	Count
BOD, 5-DAY (20 DEG. C) - Weekly Average	45	mg/l	3	4.6	10	58
BOD, 5-DAY (20 DEG. C) - Daily Maximum	50	mg/l	3	4.8	12	58
BOD, 5-DAY (20 DEG. C) - Monthly Average	30	mg/l	2.75	4.3	9	58
BOD, 5-DAY (20 DEG. C) - Monthly Average	175	lbs/day	2.4	13.2	36.6	58
BOD, 5-DAY (20 DEG. C) - Weekly Average	263	lbs/day	3	15.5	50.6	58
BOD, 5-DAY (20 DEG. C) - Influent Monthly Average	MO	mg/l	57	130.4	340	58
BOD, 5-DAY Percent Removal Monthly Minimum	85	%	93.3	96.7	98.8	58
SOLIDS, SUSPENDED Percent Removal Monthly Minimum	85	%	89.6	96.8	99.6	58
TOTAL SUSPENDED SOLIDS (TSS) - Weekly Average	45	mg/l	2	3.5	17	58
TOTAL SUSPENDED SOLIDS (TSS) - Daily Maximum	50	mg/l	2	3.8	17	58
TOTAL SUSPENDED SOLIDS (TSS) - Monthly Average	30	mg/l	2	3.1	10	58
TOTAL SUSPENDED SOLIDS (TSS) - Monthly Average	175	lbs/day	0.61	11.2	50.8	58
TOTAL SUSPENDED SOLIDS (TSS) - Weekly Average	263	lbs/day	1.2	13.2	86	58
TOTAL SUSPENDED SOLIDS (TSS) - Influent Monthly Average	MO	mg/l	57	118.6	520	58

Table 1b. Effluent Data for the Brandon WWTF from 2/29/2016 to 11/30/2020.

Parameter Name	Limit	Units	Min	Average	Max	Count
pH - Maximum	8.5	SU	7	7.5	8.7	58
pH - Minimum	6.5	SU	6.5	6.9	7.3	58
SETTLABLE SOLIDS - Instant Maximum	1	mg/l	0	0.0	0	58
NITROGEN, KJELDAHL TOTAL (AS N) - Weekly Average	MO	mg/l	0.5	0.9	1.35	10
NITROGEN, KJELDAHL TOTAL (AS N) - Daily Maximum	MO	mg/l	0.5	0.9	1.7	25
NITROGEN, KJELDAHL TOTAL (AS N) - Monthly Average	MO	mg/l	0.5	0.7	1.35	25
ULTIMATE OXYGEN DEMAND (UOD) - Daily Maximum	200	lbs/day	6.6	25.1	57	25
PHOSPHORUS, TOTAL (AS P) - Monthly Average	0.8	mg/l	0.06	0.2	0.33	58
PHOSPHORUS, TOTAL (AS P) - See Comments (annual total, prev #) Annual Average	1278	lbs/day	197.641	214.9	256.6	4
E. COLI, THERMOTOL, MF, M-TEC - Monthly Maximum	77	cfu/100ml	1	15.8	220	58
FLOW, IN CONDUIT OR THRU TREATMENT PLANT - Annual Average	0.7	MGD	0.084	0.4	1.475	58
CHLORINE, TOTAL RESIDUAL - Instant Maximum	0.1	mg/l	0.01	0.05	0.23	58

Whole Effluent Toxicity Data Summary:**A. Whole Effluent Toxicity (WET) Data Summary:**

Whole Effluent Toxicity (WET) data for this facility is presented below in Table 1c. No WET limits were included in the previous permit.

Table 1c Whole Effluent Toxicity Test Results for the Brandon WWTF.

Test Start Date	<i>Pimephales promelas</i>				<i>Ceriodaphnia dubia</i>			
	Acute		Chronic		Acute		Chronic	
	NOEC %	LC50 %	NOEC %	LC50 %	NOEC %	LC50 %	NOEC %	LC50 %
9/2/2010	100	>100			25	>100		
1/16/2007	100	>100	100	>100	100	>100	100	>100

Analysis of the acute WET test data indicates that this facility's effluent does not contain toxic substances that cause acute or chronic toxicity in the receiving water for *Pimephales promelas* at the time the samples were collected. The IWC for this facility is 0.370 at 7Q10. The lowest observed acute No Observable Effect Concentration (NOEC) for *Ceriodaphnia dubia* is 25% which is lower than the IWC at 7Q10 which implies that toxic substances could be present in the effluent in quantities that would be toxic in the receiving water. However, there is insufficient data to establish reasonable potential or a numeric limit for WET toxicity.

This facility has a 7Q10 IWC of 0.370 (>10%). This value exceeds the IWC described in the RPD Decision Trees for facilities to have potential RP for Total Ammonia Nitrogen (TAN) toxicity and for Priority Pollutant Metals toxicity.

40 CFR Part 122.44(d)(1) requires the Secretary to assess whether the discharge causes or has the reasonable potential to cause or contribute to an excursion above any narrative or numeric water quality criteria. This facility has a high instream waste concentration and therefore has the potential to contribute significant toxicity to the receiving water. However, insufficient WET testing data or toxicological pollutant scans are available

To provide additional data for future assessments of WET reasonable potential, it is recommended that four 2-species (*Ceriodaphnia dubia* and *Pimephales promelas*) 48 hour acute/ 96 hour chronic tests be included in the draft permit, two during the summer (August/October 2022 and 2024) and two during the winter (January/February 2023 and 2025). It is also suggested that concurrent sampling for TAN, TRC and the priority metals be conducted with each of these tests.

B. Biological Assessments and Ambient Chemistry Data for the Neshobe River upstream and downstream of the Brandon WWTF

MAP maintains the VTDEC assessment database, an EPA-required database which describes the conditions of Vermont's surface waters with respect to their attainment of VWQS. For the Neshobe River segment to which this facility discharges, the database indicates the receiving water fully supports all designated uses.

Biological Assessments:

Biological assessments were conducted downstream of the facility at RM 0.9 on 9/26/2016. The biological assessment meets VWQS for aquatic biota and aquatic habitat uses for the Class B(2) Hybrid Low Gradient stream type. Macroinvertebrate monitoring data is summarized below in Table 2.

Table 2. Results of the Biological Monitoring for Macroinvertebrates on the Neshobe River, (RM 0.9), near the Brandon WWTF outfall.

Macroinvertebrate Site Summary - Neshobe River 0.9														
Date	Location	RM	Density	EOT Richness	BCG Intolerant Richness	PMA-O	B.I.	Amphipod + Isopod - Hyallela	EOT/EOT+ C	PPCS-F	Sensitive COTE%	Shredders / Collector	IBI Score	Community Assessment
10/6/2006	Below	0.9	1032	20.0	24.0	82.0	4.28	0.0	0.411	0.666	18.864	0.263	44	Meets VWQS
9/26/2016	Below	0.9	3045	19.0	17.0	48.8	5.11	0.0	0.183	0.377	14.680	0.037	28	Meets VWQS
IBI 5			≥ 500	≥ 15	≥ 14	≥ 75	≤ 4	0	≥ 0.5	≥ 0.57	≥ 28	≥ 0.5		
IBI 4			≥ 400	≥ 13	≥ 11	≥ 65	≤ 5	≤ 1	≥ 0.38	≥ 0.49	≥ 20	≥ 0.35		
IBI 3			≥ 300	≥ 11	≥ 9	≥ 55	≤ 6	≤ 5	≥ 0.26	≥ 0.41	≥ 13	≥ 0.2		
IBI 2			≥ 200	≥ 7	≥ 5	≥ 45	≤ 6.5	≤ 25	≥ 0.13	≥ 0.36	≥ 5	≥ 0.1		
IBI 1			≥ 0	≥ 0	≥ 0	≥ 0	>6.5	>25	≥ 0	≥ 0	≥ 0	≥ 0		

Scoring Guidelines for Stream Type HLG and WQ Class B(2)

C. Ambient Chemistry Data:

The most recent ambient chemistry data available from VT DEC sampling is from 7/8/2020, when surface waters were sampled upstream of the outfall at River Mile (RM) 1.0 and downstream of the outfall at RM 0.9. The upstream sampling location is 0.05 miles upstream and the downstream sampling location is 0.05 miles downstream from the WWTF outfall (Figure 1).

Data representativeness are assessed by evaluating the observed flow conditions from field sheets, whether measured or qualitatively described, at which samples were collected. Other contemporaneous streamflow data, such as the U.S. Geological Survey stream gage network, are also taken into consideration where proximal and representative of the hydrologic conditions at the time (e.g., unimpacted by artificial flow regulation). The downstream sampling location at this site is the most sensitive location, and the sampling results are determined to be representative of low flow based on a review of available streamflow observations. Thus, the data presented below are relevant for inclusion in this analysis.

Water chemistry measures of relevant parameters for this assessment are summarized in Tables 3a and 3b.

Data used to evaluate in-stream chemistry is collected under low flow conditions (typically August or September) when turbidity is low, and no precipitation has been observed for 3 days.

Table 3a. Surface-water quality upstream and downstream of the Brandon Wastewater Treatment Facility collected by VTDEC.

Visit Date	Location ID	RM	Location Name	Flow Level	Total Aluminum (ug/l)	Total Antimony (ug/l)	Total Arsenic (ug/l)	Total Barium (ug/l)	Total Beryllium (ug/l)	Total Cadmium (ug/l)	Total Calcium (mg/l)	Total Chromium (ug/l)	Total Cobalt (ug/l)	Total Copper (ug/l)	Total Iron (ug/l)	Total Lead (ug/l)	Total Magnesium (mg/l)	Total Manganese (ug/l)	Total Molybdenum (ug/l)	Total Nickel (ug/l)	Total Potassium (mg/l)	Total Selenium (ug/l)	Total Silver (ug/l)	Total Sodium (mg/l)	Total Strontium (ug/l)	Total Thallium (ug/l)	Total Uranium (ug/L)	Total Vanadium (ug/l)	Total Zinc (ug/l)
9/26/2016	502272	1.0	Neshobe River	Low	<20		<1			<1	26.48	<5		<10	239.4	<1	10.89	27.97		<5	1.093	<5		12.37					<50
7/8/2020	502272	1.0	Neshobe River	Low	<20	<5	<1	10.7	<1	<1	26.5	<1	<1	<5	114	<1	11.1	30.9	<5	<1	1.13	<1	<1	13.2	50.7	<1	<1	<1	<10
9/26/2016	502271	0.9	Neshobe River	Low	<20		<1			<1	27.19	<5		<10	255.9	<1	11.11	29.79		<5	1.17	<5		12.99				<50	
7/8/2020	502271	0.9	Neshobe River	Low	<20	<5	<1	11.2	<1	<1	27.1	<1	<1	<5	129	<1	11.4	32.8	<5	<1	1.23	<1	<1	14.6	53	<1	<1	<1	<10

Table 3b. Surface-water quality upstream and downstream of the Brandon Wastewater Treatment Facility collected by VTDEC.

Visit Date	Location ID	RM	Location Name	Flow Level	Alkalinity (mg/l)	Conductivity (umho/cm)	Dissolved Inorganic Carbon (mg/l)	Dissolved Organic Carbon (mg/l)	Dissolved Oxygen (mg/l)	Dissolved Oxygen Saturation (%)	pH (None)	Temperature (deg C)	Total Ammonia Nitrogen (mg/l)	Total Chloride (mg/l)	Total Color measured using the visual method (PCU)	Total Hardness (mg/l)	Total Nitrate/Nitrite Nitrogen (mg/l)	Total Nitrogen (mg/l)	Total Phosphorus (ug/l)	Total Sulfate (mg/l)	Turbidity (NTU)
9/26/2016	502272	1.0	Neshobe River	Low	106	312			10.8	99.7	8.23	11.5	<0.05	20.5	5	110.966	0.66	0.68		6.82	0.5
7/8/2020	502272	1.0	Neshobe River	Low	103	279.6	24	2	8.97	102.8	8.15	19.2	0.071	21.8	7.5	112	0.746	0.87	9.5	5.22	
9/26/2016	502271	0.9	Neshobe River	Low	106	315.7			10.9	101.7	8.23	11.51	<0.05	20.5	7.5	113.644	0.78	0.77		7.11	0.7
7/8/2020	502271	0.9	Neshobe River	Low	104	302.5	23.6	2.7	9.03	103.9	8.03	19.5	0.051	24.3	7.5	115	0.827	1.11	10.9	5.5	

IV. Assessment of Reasonable Potential of the Brandon WWTF discharge to exceed Vermont Water Quality Standards

A. Methodology:

A steady-state mass balance approach was used to assess reasonable potential for the potential pollutants of concern based on the methods described in the Technical Support Document for Water Quality-based Toxics Control (TSD; EPA/505/2-90-001). The expected receiving water concentrations (RWC; C_r) of pollutants were calculated according to Equation 1 at critical conditions. If the expected receiving water concentration determined exceeds the applicable Vermont Water Quality Standard, limits must be included in the permit. Tables 4 and 5 present this analysis for the Brandon.

$$\text{Equation 1. } C_r = \frac{(Q_e)(C_e) + (Q_s)(C_s)}{Q_r}$$

Where:

C_r = resultant expected receiving water pollutant concentration (mg/L or ug/L)

Q_e = maximum permitted effluent flow (cfs).

C_e = critical effluent pollutant concentration (mg/L or ug/L)

Q_s = stream flow upstream of the point of discharge (cfs). Low Median Monthly flow for nutrients, 7Q10 for applying toxics criteria. When applicable, 30Q10 is used for chronic Total Ammonia Nitrogen assessments.

C_s = critical background in-stream pollutant concentration (units dependent on parameter, typically mg/L or ug/L).

$Q_r = (Q_s + Q_e)$ = resultant in-stream flow, after discharge (cfs)

NPDES regulations at §122.44(d)(1)(ii) require that permit writers consider the variability of the pollutant in the effluent when determining the need for Water Quality-Based Effluent Limits (WQBELs). EPA guidance for permit writers on how to characterize effluent concentrations of certain types of pollutants using a limited data set and accounting for variability is detailed in the TSD. The current analysis uses the TSD procedure to project a critical effluent concentration (C_{etsd}) of the 95th percentile of a lognormal distribution of observed effluent concentrations over 5 years. The 95th percentile is calculated from the effluent data set using the number of available effluent data points (n) for the measured concentration of the pollutant and the coefficient of variation (CV) of the data set to predict the critical pollutant concentration in the effluent. When less than 10 data points are available, the CV is set to 0.6. For less than 10 items of data, the uncertainty in the CV is too large to calculate a standard deviation or mean with sufficient confidence (TSD). The CV and n are used to determine the factor (TSD pg 54) that is multiplied by the maximum observed effluent concentration (C_e) to determine C_{etsd} .

$$\text{Equation 2. } C_{etsd} = \text{TSD}_{\text{factor}} \times C_e$$

Where:

C_{etsd} = Effluent concentration adjusted to 95th percentile value (mg/L or ug/L)

$\text{TSD}_{\text{factor}}$ = Factor based upon EPA TSD Table 3-2, pg 54

C_e = critical (maximum observed) effluent pollutant concentration (mg/L or ug/L)

The Instream Waste Concentration (IWC) is a measure of the effluent dilution and is also used as an estimate of the facility's potential to cause or contribute to an excursion of the VWQS. The IWC equation is the simplification of the flow portion of the mass balance equation (Equation 1) and is shown below in Equation 3:

$$\text{Equation 3. } IWC = \frac{(Q_e)}{(Q_r)}$$

The critical effluent pollutant concentration (C_e) can be multiplied by the IWC to approximate the resultant receiving water concentrations (C_r).

This analysis of reasonable potential used the following data and assumptions:

- Average values of observed upstream and downstream chemical data were used for most calculations; exceptions are described below.
- Upstream pollutant concentrations (C_s) and effluent concentrations (C_e) were set equal to one half the method detection limit when data were censored at the detection limit.
- Effluent pollutant concentrations (C_{etsd}) were set to the maximum observed effluent concentrations * TSD 95th percentile multiplier over the last 5 years of data collected.
- TAN analyses were divided into summer (June 1- October 31) and winter (November 1 – May 31). 7 data points were used to characterize the effluent under winter conditions and 5 during summer (see Table 4). Summer defaults of 20 °C for coldwater fish habitat streams and 25 °C for warmwater fish habitat streams were used in summer months while winter water temperature was assumed to be 5 °C. The highest observed downstream values were used for both winter and summer pH. *Oncorhynchus* spp are assumed to be present.
- Hardness for determining hardness-dependent metal criteria is based upon the lowest observed downstream concentration.

The spreadsheet used for these calculations is part of the permit record and available upon request.

D. Total Residual Chlorine (TRC)

Table 4. Mass Balance for TRC and TAN around the Brandon WWTF

	TRC	TAN - Summer (mg/L)	TAN - Winter (mg/L)	Notes
Qs (cfs)		1.84		Estimated 7Q10 flow
Qe (cfs)		1.083		permitted effluent discharge
Qr = Qs + Qe (cfs)		2.93		Qs+Qe
7Q10 IWC		0.370		Qe/(Qs+Qe)
Cs	0	0.05	0.05	upstream pollutant concentration
Max Observed Ce	0.230	0.250	7.110	effluent pollutant concentration without adjustment by TSD factor
Cetsd	0.32	0.58	14.22	effluent pollutant concentration adjusted by TSD factor
Number of Observatons	58.00	5.00	7.00	
Min. No. of Observations for RP	10.00	10.00	10.00	
Cr = (CsQs+CeQe)/Qr	0.09	0.12	2.66	resultant pollutant concentration in receiving water without TSD adjustment
Cr = (CsQs+CetsdQe)/Qr	0.12	0.24	5.29	resultant pollutant concentration in receiving water with TSD method
VWQS Criteria (2017)				
Protection of Aquatic Biota - Acute	0.019	2.51	3.61	
Protection of Aquatic Biota - Chronic	0.011	1.36	3.15	
Exceedance Calculated?				
Protection of Aquatic Biota - Acute without TSD adjustment	YES	NO	NO	
Protection of Aquatic Biota - Chronic without TSD adjustment	YES	NO	NO	
Protection of Aquatic Biota - Acute with TSD adjustment	YES	NO	YES	
Protection of Aquatic Biota - Chronic with TSD adjustment	YES	NO	YES	
Sufficient Data to Determine RP?	YES	NO	NO	

Table 4 presents the mass balance for chlorine and ammonia around the Brandon WWTF. TAN is discussed below in the Total Nitrogen section of this document.

Reasonable potential exists for this facility to violate VWQS for TRC and the existing permit limit should be checked to verify that it is protective of VWQS. Daily sampling should continue.

E. Metals

This facility does not have any priority metals data available for the effluent. Calculations are not performed in the absence of effluent data.

This facility has an IWC of 0.370 at 7Q10. This value exceeds the IWC described in the Reasonable Potential Determination Decisions Trees prepared by the VT DEC Wastewater Program in conjunction with the MAPP program for facilities to have potential RP for Metals toxicity.

It is suggested the draft permit include a requirement for 3 priority metals scans. These scans should be conducted concurrently with any WET testing.

F. Nutrients

The results of mass balance calculations for Total Nitrogen and Total Phosphorus were calculated using Equation 1 are presented in Table 5.

Table 5. Mass Balance of Nutrients of Concern around the Brandon WWTF.

	Total Phosphorus (ug/l)	Total Nitrogen (mg/l)	Notes
Qs (cfs)	6.57		<i>Estimated LMM flow</i>
Qe (cfs)	1.083		<i>permitted effluent discharge</i>
Qr = Qs + Qe (cfs)	7.65		<i>Qs+Qe</i>
IWC	0.1415		<i>Qe/(Qs+Qe)</i>
Cs	9.50	0.78	<i>upstream pollutant concentration (average)</i>
Ce	330	18.5	<i>maximum effluent pollutant concentration observed</i>
Cetsd	462	26.0	<i>effluent pollutant concentration adjusted by TSD method.</i>
Cr = (CsQs+CeQe)/Qr	54.9	2.6	<i>calculated resultant downstream pollutant concentration without TSD factor of safety</i>
Cr = (CsQs+CetsdQe)/Qr	73.5	4.3	<i>calculated resultant downstream pollutant concentration</i>
Stream Type	B(2) Hybrid Low Gradient		
Calculated Instream Contribution from Effluent without TSD method	45	2.6	<i>difference between observed upstream concentration and calculated resultant downstream concentration. Without TSD method</i>
Calculated Instream Contribution from Effluent with TSD method	64	3.6	<i>difference between observed upstream concentration and calculated resultant downstream concentration. With TSD Method</i>
VWQS Criteria (2017)		None for Streams	
Threshold Criteria	N/A		<i>No value for this stream type.</i>
Threshold Exceeded without TSD method?	N/A		
Threshold Exceeded with TSD method?	N/A		

G. Total Nitrogen:

TN is the sum of nitrate, nitrite, ammonia, soluble organic nitrogen, and particulate organic nitrogen. To gather data on the amount of Total Nitrogen (TN) in this discharge and its potential impact on the receiving water, twice a month summer and monthly winter “monitor only” requirements for Total Nitrogen (TN), Nitrate/Nitrite (NO_x), and Total Kjeldahl Nitrogen (TKN) are suggested for inclusion in this permit. The summer (June 1- October 31) monitoring requirements remain unchanged from the current permit. The summer monitoring frequency has been set to match the existing Ultimate Oxygen Demand monitoring in the current permit, and the monthly winter monitoring frequency was chosen based upon the high IWC.

TN is a calculated value based on the sum of NO_x and TKN, and, shall be reported as pounds, calculated as:

Average TN (mg/L) x Total Daily Flow (MGD) x 8.34 = Pounds TN/day

where, TN (mg/L) = TKN (mg/L) + NO_x (mg/L)

Per EPA excess nitrogen (N) and phosphorus (P) are the leading cause of water quality degradation in the United States. Historically nutrient management focused on limiting a single nutrient—phosphorus or nitrogen—based on assumptions that production is usually phosphorus limited in freshwater and nitrogen limited in marine waters. Scientific research demonstrates this is an overly simplistic model. The evidence clearly indicates management of both phosphorus and nitrogen is necessary to protect water quality. The literature shows that aquatic flora and fauna have differing nutrient needs, some are P dependent, others N dependent and others are co-dependent on these two nutrients.

Like P, N promotes noxious aquatic plant and algal growth. High concentrations of P and N together cause greater growth of algae than P alone. The relative abundance of these nutrients also influences the type of species within the community. Furthermore, a high N-to-P ratio may exacerbate the growth of cyanobacteria, while elevated levels of nitrogen increase toxicity in some cyanobacteria species. Given the dynamic nature of all aquatic ecosystems, for the State to fully understand the degradation to water quality it is necessary to limit P and monitor bioavailable N (including nitrate, ammonium, and certain dissolved organic nitrogen compounds).

The mass balance of Total Nitrogen around the facility is presented in Table 5 above. The calculated change in the in-stream Total Nitrogen concentration attributable to the Brandon WWTF effluent is 3.56 mg/L using the TSD method.

Total Ammonia Nitrogen (TAN):

The mass balance for summer and winter TAN around the Brandon WWTF is presented above in Table 4.

This facility has a 7Q10 IWC of 0.370 (>10%). This value exceeds the IWC described in the RPD Decision Trees for facilities to have potential RP for TAN toxicity.

Insufficient data is available to determine RP for either summer (June 1 to October 31 or winter (November 1 to May 30) TAN. The available data suggests that winter TAN may be a problem, but a minimum of 10 data points is needed to determine RP for this parameter.

40 CFR Part 122.44(d)(1) requires the Secretary to assess whether the discharge causes or has the reasonable potential to cause or contribute to an excursion above any narrative or numeric water quality criteria.

To provide additional data for future assessments of TAN reasonable potential, it is recommended that monthly monitoring with a monitor only condition be included in the next permit. This analysis should be conducted concurrently with any WET testing included in the permit.

H. Total Phosphorus:

The potential impacts of phosphorus discharges from this facility to the receiving water have been assessed in relation to the narrative criteria in §29A-302(2)(A) of the 2017 VWQS, which states:

In all waters, total phosphorous loadings shall be limited so that they will not contribute to the acceleration of eutrophication or the stimulation of the growth of aquatic biota in a manner that prevents the full support of uses.

To interpret this standard, the Secretary relies on a framework which examines TP concentrations in relation to existing numeric phosphorus criteria and response criteria in §29A-306(a)(3)(c) of the VWQS, for streams that can be assessed using macroinvertebrate biocriteria. Under this framework, a positive finding of compliance with the narrative standard can be made when nutrient criteria are attained, or when specific nutrient response variables; pH, Turbidity, Dissolved Oxygen, and aquatic life use, all display compliance with their respective criteria in the Water Quality Standards.

However, as the receiving water is a Hybrid Low Gradient (HLG) stream type and numeric phosphorus criteria have not been developed for this stream type, it is not possible to evaluate and apply specific TP concentrations. The HLG stream type is a wadeable low gradient stream, amendable to assessment using the VTDEC biocriteria for macroinvertebrates. Although the standard assessment framework with respect to phosphorus discharge should not be applied, this Determination relies instead on calculated instream concentrations, nutrient response conditions, and compliance with HLG stream type biocriteria.

Total Phosphorus Numeric Analysis:

The Hybrid Low Gradient stream type does not have numeric TP thresholds defined. The average concentration in the Neshobe River above the WWTF is 9.5 ug/l and the average observed concentration below the WWTF is 10.5 ug/l. The calculated change in the in-stream TP concentration attributable to the Brandon WWTF is 65 ug/L using the TSD method adjusted effluent data and is 45.4 ug/L without the adjustment. This calculation is presented above in Table 5.

Total Phosphorus Nutrient Response Conditions Analysis:

The Combined Nutrient Response Conditions for Aquatic Biota and Wildlife in Rivers and Streams at RM 0.9 on 7/8/2020 meets VWQS for pH, does not meet VWQS for Turbidity, meets VWQS for Dissolved Oxygen and meets VWQS for Aquatic Biota as shown below in Table 6.

Table 6. Assessment of Phosphorus Response Variables around the Brandon WWTF

Response variable (VWQS reference)	Target Value for Cold Water Fish Habitat	River-mile: 1.0 7/8/2020	River-mile: 0.9 7/8/2020
pH (§3-01.B.9)	6.5-8.5 s.u.	8.15	8.03
Turbidity (§3-04.B.1)	< 10 NTU at low mean annual flow	<i>Not collected</i>	<i>Not collected</i>
Dissolved Oxygen (min) (§3-04.B.2)	>6 mg/L and 70% saturation	8.97 (102.8%)	9.03 (103.9%)
Aquatic biota, based on macroinvertebrates.	Attaining an assessment of good, or better.	<i>N/A</i>	<i>Meets VWQS (9/26/2016)</i>

Total Phosphorus Reasonable Potential Determination:

The nutrient response criteria for TP are only partially satisfied, but the lack of turbidity data is overridden by the acceptable macroinvertebrate assessment and therefore this facility does not have reasonable potential to violate VWQS.

This facility is subject to 10 V.S.A. 1266a, which reads “No person directly discharging into the drainage basins of Lake Champlain or Lake Memphremagog shall discharge any waste that contains a phosphorus concentration in excess of 0.80 milligrams per liter on a monthly average basis. Discharges of less than 200,000 gallons per day, permitted on or before July 1, 1991, shall not be subject to the requirements of this subsection.” Therefore, the permit must include a Total Phosphorus limit of 0.8 mg/L.

This facility is subject to the 2016 Lake Champlain Phosphorus TMDL. That document maintains the facility’s Annual Waste Load Allocation of 0.580 mt/year or 1278 lbs/year.

Twice a month sampling of TP should be continued, and the existing monthly average concentration limit of 0.8 mg/l should be maintained.

V. Summary of Reasonable Potential Determinations

Reasonable potential exists for this facility to violate VWQS for TRC. The existing permit limits have been checked and are not protective of VWQS. A memo with new permit limits is attached. Daily sampling should continue.

A. Recommended Biological and Water Quality Monitoring:

As biological monitoring results indicate attainment of all aquatic biota thresholds, the stream complies with VWQS for all identified response variables, and the narrative standard presented in §29A-302(2)(A) of the VWQS is supported (as shown in *Table 6*), it is not necessary to include biomonitoring in the draft permit.

B. Recommended Effluent Monitoring:

In addition to the monitoring required in the current permit, the following monitoring is suggested for inclusion in the renewed permit to provide additional data to support future Reasonable Potential Determinations:

- To provide additional data for future assessments of WET reasonable potential, it is recommended that four 2-species (*Ceriodaphnia dubia* and *Pimephales promelas*) 48 hour acute/ 96 hour chronic tests be included in the draft permit, two during the summer (August/October 2022 and 2024) and two during the winter (January/February 2023 and 2025). It is also suggested that concurrent sampling for TAN, TRC and the priority metals be conducted with each of these tests.
- Reasonable potential exists for this facility to violate VWQS for TRC. The existing permit limits have been checked and are not protective of VWQS. A memo describing new permit limits is attached. The new Daily Maximum Concentration limit should be 0.04 mg/l. The new Monthly Average Concentration limit should be 0.02 mg/l. A compliance limit of 0.05 mg/l should be used if necessary. Daily sampling should continue.
- It is suggested the draft permit include a requirement for 3 priority metals effluent scans. These scans should be conducted concurrently with any WET testing.
- To gather data on the amount of Total Nitrogen (TN) in this discharge and its potential impact on the receiving water, twice a month summer and monthly winter “monitor only” requirements for Total Nitrogen (TN), Nitrate/Nitrite (NO_x), and Total Kjeldahl Nitrogen (TKN) are suggested for inclusion in this permit.
- To provide additional data for future assessments of TAN reasonable potential, it is recommended that monthly monitoring with a monitor only condition be included in the next permit. This analysis should be conducted concurrently with any WET testing included in the permit.
- The facility’s Annual Waste Load Allocation of 0.580 mt/year or 1278 lbs/year and monthly average concentration limit of 0.8 mg/l for Total Phosphorus should be maintained along with monthly sampling. Sampling should remain at twice a month.

C. Conclusion:

After review of all available information, it has been determined that there is not a reasonable potential for the discharge to cause or contribute to a water quality violation, with the exception of Total Residual Chlorine (TRC). New WQBELs for TRC that are protective of VWQS have been developed for inclusion in the new permit. With the exception of TRC, this discharge does not appear to cause, have a reasonable potential to cause, or contribute to an instream toxic impact or instream excursion above the water quality criteria.

Agency of Natural Resources
Department of Environmental Conservation
Watershed Management Division
1 National Life Drive Davis 3
802-828-1535

MEMORANDUM



Prepared by: John Merrifield, Wastewater Program (WWP)

Cc: Amy Polaczyk, Manager, WWP
Bethany Sargent, Manager, Monitoring and Assessment Program (MAP)
Rick Levey, MAP

Date: May 14, 2021

Subject: WQBEL Permit Limit Review and Calculations for the Brandon WWTF Facility (3-1196)

I. Introduction

This memo serves as a record of the review and calculation of Water Quality Based Effluent Limits (WQBEL) and is intended to supplement the Reasonable Potential Determination memo prepared for the subject facility. The memo is broken into the following parts:

- An introduction
- A description of new or revised permit limit requirements.
- A description of the methodology used to develop WQBEL permit limits
- Narrative justifications for any new permit limits

The spreadsheet used to perform these calculations is available upon request.

II. New Permit Limits

Effluent Characteristics (Constituents)	WQBEL Discharge Limitations									
	Annual Average	Annual Limit	Monthly Average	Weekly Average	Maximum Day	Monthly Average	Weekly Average	Maximum Day	Instantaneous Maximum	Sampling Frequency
		lbs/year	Mass (lbs/day)			Concentration (mg/L)			(per month)	
Total Phosphorus		1278				0.8				Twice a month
Total Residual Chlorine						0.02		0.04		Daily (30)
Total Nitrogen			MO			MO				Monthly (Nov. 1 - May 31) Twice a month June 1 - Oct.
Total Kjeldahl Nitrogen			MO			MO				
Nitrate/Nitrite Nitrogen			MO			MO				
Total Ammonia Nitrogen			MO			MO				Monthly (1)

The constituents shown above in Table 1 were developed in order to ensure that the proposed discharge is protective of Vermont Water Quality Standards (VWQS) in the receiving water.

The following constituents were not analyzed as WQBELs: Flow, Ultimate Oxygen Demand, BOD, TSS, Settleable Solids, E. coli and pH. These constituents are either subject to TBELs or the data and analytical capacity to model as WQBELs is unavailable.

III. WQBEL calculation methodology

The Water-Quality Based Effluent Limitations (WQBELs) for pollutants of concern were assessed via the mass balance steady state model method outlined in the Chapter 4 of the EPA's Technical Support Document for Water Quality-Based Toxics Control (TSD) (page 86). Results were then compared to the current permit limit. The recommended permit limit was selected by comparing applicable Technology-Based Effluent Limits (TBELs), current WQBELs, and WQBELs calculated based on 2017 VWQS acute and chronic criteria.

The steady-state mass balance method produces a Waste Load Allocation (WLA), the critical effluent pollutant concentration based on the VWQS acute and chronic critical thresholds for the constituent(s) of concern. The method assumes complete mixing of the pollutant within the receiving water. The resulting WLA is the WQBEL for each acute and chronic VWQS criteria dilution assessed.

Per the TSD method, WLA results were used to calculate the Long-Term Average (LTA) for each criteria type using methods provided in Table 5-1 (TSD page 102). WLA multipliers are picked from the 99th percentile column. The most conservative LTA is then used to determine the Maximum Daily Limit (MDL) or Average Monthly Limit (AML) using the calculation shown in Table 5-2 (TSD page 103). The 99th percentile column is used for the MDL calculation and the 95th percentile columns are used for the AML calculation.

In this process data for the facility and receiving waters is used. When necessary values for VWQS were calculated based upon the methods described in their appendices and footnotes. Monitoring frequency are taken from the existing permit or assigned for new pollutants based upon similar facilities. In the absence of ambient receiving water data a value of 5% of the VWQS has been generally assumed for the upstream concentration. Please see the individual calculation tabs for specific analyses.

The resulting MDL and AML are compared with the existing permit limits, any applicable TBELs including TMDLs, and any legislated limits to determine the final effluent limits that are protective of quality standards. The proposed limits are entered into the spreadsheet and Table 1 (above) and a short narrative is prepared justifying the limits. Those narratives are presented in the next section.

IV. Justification of Proposed WQBELs

1. Total Residual Chlorine

A new Maximum Day limit of 0.04 mg/l and new Monthly Average limit of 0.02 mg/l has been added to the permit. For the purposes of this permit, TRC analysis must be completed using a test method in 40 C.F.R. § 136 that achieves a minimum level no greater than 0.05 mg/L. The previous permit limits were not protective of VWQS. Daily monitoring is required.

2. Total Phosphorus

This facility has been assigned an Annual Limit of 1278 lbs of Total Phosphorus in the 2016 Lake Champlain Phosphorus TMDL. This facility is subject to VSA 1266a and therefore a monthly average concentration limit of 0.8 mg/l is necessary. Sampling should be conducted twice a month. These limits are unchanged and should be retained.

3. Total Ammonia Nitrogen

This facility has an IWC great enough to have potential Total Ammonia Nitrogen toxic effects in the receiving water. In order to collect data to calculate the reasonable potential for this facility to violate VWQS for Total Ammonia Nitrogen a monthly monitor only requirement has been added to the permit.

4. Total Nitrogen, Kjeldahl Nitrogen and Nitrate/Nitrite Nitrogen

Total Nitrogen monitoring should be conducted in support of the 2016 Lake Champlain Total Phosphorus TMDL. Total Nitrogen (TN), Total Kjeldahl Nitrogen (TKN) and Nitrate/Nitrite Nitrogen (NO_x) should each be reported using an appropriate combination of CWA approved methods and arithmetic. $TN = TKN + NO_x$ The current twice a month summer (June 1-October 31) monitor only conditions should be retained, and a monthly monitor only condition should be added to the winter months (November 1- May 30). Both concentrations and loads should be monitored.

AGENCY OF NATURAL RESOURCES
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
WATERSHED MANAGEMENT DIVISION
1 NATIONAL LIFE DRIVE – DAVIS 3
MONTPELIER, VERMONT 05620-3522

REVISED NOTICE: DRAFT DISCHARGE PERMIT
PUBLIC NOTICE NUMBER: 3-1196
PUBLIC COMMENT PERIOD: **REVISED July 7, 2021 to September 10, 2021**

PERMITTEE INFORMATION

PERMITTEE NAME: **Brandon WWTF**
PERMITTEE ADDRESS: **500 Union Street
Brandon, VT 05733**
PERMIT NUMBER: **3-1196**
PROJECT ID NUMBER: **RU96-0140**

DISCHARGE INFORMATION

NATURE: Municipal wastewater including domestic and commercial wastewaters.
VOLUME: 0.7 MGD
RECEIVING WATER: Neshobe River
EXPIRATION DATE: **June 30, 2026**
DESCRIPTION: This is a draft discharge permit proposed for issuance to the Brandon WWTF for the direct discharge of municipal wastewater, including domestic, and commercial wastewaters to the Neshobe River.

TENTATIVE DETERMINATIONS

Tentative determinations regarding effluent limitations and other conditions to be imposed on the pending Vermont permit have been made by the State of Vermont Agency of Natural Resources (VANR). The limitations imposed will assure that the Vermont Water Quality Standards and applicable provisions of the Federal Clean Water Act, PL 92-500, as amended, will be met.

FURTHER INFORMATION

The complete application, proposed permit, and other information are on file and may be inspected by appointment on the 3rd floor of the Davis Building at 1 National Life Drive, Montpelier, Vermont. Copies, obtained by calling 802-828-1115 from 7:45 AM to 4:30 PM Monday through Friday, will be made at a cost based upon the current Secretary of State Official Fee Schedule for Copying Public Records. The draft permit and fact sheet may also be viewed on the Division's website:

<https://anrweb.vt.gov/DEC/IWIS/ReportViewer2.aspx?Report=WWPublicNotices&ViewParms=False>.

PUBLIC COMMENTS/PUBLIC HEARINGS

Written public comments on the proposed permit are invited and must be received on or before the close of the business day (4:30 pm) on **September 10, 2021** to the Agency of Natural Resources, Department of Environmental Conservation, Watershed Management Division, 1 National Life Drive – Davis 3, Vermont 05620-3522. Comments may also be submitted by e-mail using the e-mail comment provisions included at

<https://anrweb.vt.gov/DEC/IWIS/ReportViewer2.aspx?Report=WWPublicNotices&ViewParms=False>.

All comments received by the above date will be considered in formulation of the final determinations.

The Secretary will hold a public meeting on Thursday, September 2, 2021, at 6pm in the Asa Bloomer State Building, located at 88 Merchants Row and 92 State Street Rutland, VT 05702, Conference Room 266. A virtual option for attending the meeting will also be available. For information on attending the meeting, go to the WSMD website at:

<https://anrweb.vt.gov/DEC/IWIS/ReportViewer2.aspx?Report=WWPublicNotices&ViewParms=False>

FINAL ACTION/RIGHTS TO APPEAL TO THE ENVIRONMENTAL COURT

At the conclusion of the public notice period and after consideration of additional information received during the public notice period, VANR will make a final determination to issue or to deny the permit. Pursuant to 10 V.S.A. Chapter 220, any appeal of this decision must be filed with the clerk of the Environmental Court within 30 days of the date of the decision. The appellant must submit the Notice of Appeal and include the applicable filing fee, payable to the state of Vermont.

The Notice of Appeal must specify the parties taking the appeal and the statutory provision under which each party claims party status; must designate the act or decision appealed from; must name the Environmental Court; and must be signed by the appellant or their attorney. In addition, the appeal must give the address or location and the description of the property, project or facility with which the appeal is concerned and the name of the applicant or any permit involved in the appeal.

The appellant must also serve a copy of the Notice of Appeal in accordance with Rule 5(b)(4)(B) of the Vermont Rules for Environmental Court Proceedings.

The address for the Vermont Environmental Court is: Vermont Superior Court, Environmental Division, 32 Cherry Street, 2nd Floor, Suite 303, Burlington VT 05401 (Tel. (802) 951-1740. For further information, see the Vermont Rules for Environmental Court Proceedings, available online at www.vermontjudiciary.org.

Peter Walke, Commissioner
Department of Environmental Conservation