AGENCY OF NATURAL RESOURCES
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
WATERSHED MANAGEMENT DIVISION
ONE NATIONAL LIFE DRIVE, MAIN BUILDING, 2ND FLOOR
MONTPELIER, VT 05620-3522

FACT SHEET FOR DRAFT PERMIT
(November 2017, Amended August 2018)

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT TO DISCHARGE TO WATERS OF THE STATE:

PERMIT NO: 3-1167
PIN: NS99-0009
NPDES NO: VT0100609

NAME AND ADDRESS OF APPLICANT:

Village of Saxtons River
PO Box 243
Saxtons River, VT 05154

NAME AND ADDRESS OF FACILITY WHERE DISCHARGE OCCURS:

Village of Saxtons River
21 Plant Road
Saxtons River, VT 05154

RECEIVING WATER: Saxtons River

CLASSIFICATION OF USES OF RECEIVING WATER: All uses Class B(2) with a waste management zone. Class B(2) 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.

I. Proposed Action, Type of Facility, and Discharge Location

The Secretary of the Vermont Agency of Natural Resources (Secretary) received a renewal application for the permit to discharge into the Saxtons River from the Village of Saxtons River on September 21, 2009. The Village is currently operating under a discharge permit issued on April 1, 2005 (hereafter referred to as the "current 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 as 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.

The Village of Saxtons River (Permittee) owns the Saxtons River Wastewater Treatment Facility (WWTF). The Facility is engaged in secondary treatment of residential, commercial, and industrial wastewater from the Village of Saxtons River using an extended aeration activated sludge process followed by seasonal sodium hypochlorite disinfection and dechlorination. The design flow of the WWTF is 0.105 million gallons per day (MGD). A map showing the location of the WWTF, outfall, and the receiving water is provided in the Reasonable Potential Determination (RPD) (see Attachment A).

The WWTF has received approval to perform an upgrade, which will replace the existing oxidation ditch and chlorine disinfection system with a fine screen, grit removal system, two sequencing batch reactors (SBR), ultraviolet light (UV) disinfection system, and an equalization basin. In addition, the Facility has received approval to abandon the existing outfall pipe associated with the existing treatment infrastructure, and install a new outfall pipe to the Saxtons River. The discharge point within the Saxtons River will be extended toward the opposite bank of the river to accommodate for river channel evolution and migration caused by severe flooding associated with Tropical Storm Irene.

II. Description of Discharge

The WWTF continuously discharges treated wastewater effluent to the Saxtons River through primary WWTF outfall S/N 001.

III. Limitations and Monitoring Requirements

The draft permit contains limitations for effluent flow, biochemical oxygen demand (BOD), total suspended solids (TSS), settleable solids, *Escherichia coli* (*E. coli*), total residual chlorine (TRC), and pH. The permit also contains monitoring requirements for total nitrogen (TN), total phosphorus (TP), and annual constituents in accordance with 40 C.F.R. § 122.21(j). The basis for these limitations and monitoring requirements are explained in Section VI. of this fact sheet.

IV. Statutory and Regulatory Authority

A. Clean Water Act and NPDES Background

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 Section 402. CWA §§ 301(a), 402(a). Section 402 establishes one of the CWA's principal permitting programs, the National Pollutant Discharge Elimination System. 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 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 BOD_5, 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. The applicable water quality standards for this permit are the Vermont Water Quality Standards (Environmental Protection Rule, Chapter 29a).

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 in-stream 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 in stream 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 Section 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).

B. Reasonable Potential Determination

In determining whether this permit has the reasonable potential to cause or contribute to an impairment, Vermont 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 Toxics Control Discharge 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, available dilution for rivers and streams is based on a known or estimated value of the lowest average flow which occurs for seven consecutive days with a recurrence interval of once in 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 proposed draft permit.

The Reasonable Potential Determination for this facility is attached to this fact sheet as Attachment A.

C. 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 previous 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 previous permit.

V. Description of Receiving Water

The receiving water for this discharge is the Saxtons River, a designated Cold Water Fish Habitat. At the point of discharge, the river has a contributing drainage area of 69 square miles. The summer 7Q10 flow of the river is estimated to be 3.73 cubic feet per second (CFS) and the summer Low Median Monthly flow is estimated to be 13.38 CFS. The instream waste concentration at the summer 7Q10 flow is 0.042 (4.2%) and the instream waste concentration at the summer Low Median Monthly flow is 0.012 (1.2%).

In addition, the Saxtons River basin drains into the Long Island Sound via the Connecticut River, which is impaired for total nitrogen and is subject to a Total Maximum Daily Load (TMDL) for nitrogen. This is discussed further in Section VI.C.2. of this fact sheet.

VI. Permit Basis and Explanation of Effluent Limitation Derivation

This permit was evaluated under the 2017 Vermont Water Quality Standards.

A. Flow

The draft permit maintains the annual average flow limitation of 0.105 million gallons per day (MGD). Continuous flow monitoring is required under the draft permit.

B. Conventional Pollutants

1. Biochemical Oxygen Demand (BOD_5)

The effluent limitations for BOD_5 remain unchanged from the current permit. The monthly average (30 mg/L) and weekly average (45 mg/L) reflect the minimum level of effluent quality specified for secondary treatment in 40 C.F.R. § 133.102. In addition, the draft permit contains a 50 mg/L, maximum day, BOD_5 limitation, which is the Agency standard applied to all such discharges pursuant to Section 13.4(c) of the Vermont Water Pollution Control Permit Regulations. The Secretary implements the limit to supplement the federal technology based limitations to prevent a gross one-day permit effluent violation to be 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 (26.3 lbs/day, monthly average and 39.4 lbs/day, weekly average) are calculated using the concentration limits outlined above. The BOD_5 monthly monitoring requirement is unchanged from the current permit.

2. Total Suspended Solids (TSS)

The effluent limitations for TSS remain unchanged from the current permit. The monthly average (30 mg/L) and weekly average (45 mg/L) reflect the minimum level of effluent quality specified for secondary treatment in 40 C.F.R. § 133.102. In addition, the draft permit contains a 50 mg/L, maximum day, TSS limitation, which is the Agency standard applied to all such discharges pursuant to Section 13.4(c) of the Vermont Water Pollution Control Permit Regulations. The Secretary implements the limit to supplement the federal technology based limitations to prevent a gross one-day permit effluent violation to be 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 (26.3 lbs/day, monthly average and 39.4 lbs/day, weekly average) are calculated using the concentration limits outlined above. The TSS monthly monitoring requirement is unchanged from the current permit.

3. Fecal Coliform - *Escherichia coli*

The E. coli limitation is 77/100ml instantaneous maximum, based upon the limitation in the current permit and the anti-backsliding provisions of Section 402(o) of the CWA. As in the current permit, monthly monitoring is required.

4. pH

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

C. Non-Conventional and Toxic Pollutants

1. Total Phosphorus (TP)

To gather data on the amount of Total Phosphorus (TP) in this discharge and its potential impact on the receiving water, a monthly "monitor only" requirement for TP has been included in this permit.

Per EPA excess nitrogen and phosphorus 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 phosphorus dependent, others nitrogen dependent and others are co-dependent on these two nutrients.

In light of the adoption of numeric water quality criteria for phosphorus in the revised Vermont Water Quality Standards (effective October 30, 2014), the Secretary is including monitoring requirements for TP in discharge permits. The Permittee shall monitor the discharge for TP once per month to be consistent with WWTFs of similar size in Vermont.

2. Total Nitrogen (TN)

On November 10, 2011, a letter from the EPA (Region I) to the Secretary indicated that Vermont must establish TN limitations in permits such that the TN load from all facilities in the Connecticut River watershed is consistent with the requirements of the Long Island Sound Total Maximum Daily Load (TMDL).

Section I.C.1. in this permit requires the Permittee have a qualified entity develop and submit a Nitrogen Removal Optimization Plan. The plan shall be provided to the Secretary before implementation. Because the Saxtons River WWTF is undergoing a complete facility upgrade, the deadline to submit the plan is set for six months following the upgrade's completion. This deadline will allow the plan to account for the new treatment infrastructure installed at the Facility.

Implementation of the plan shall occur after construction has been completed. Additionally, an annual report will be due to the Secretary documenting the pounds of TN discharged as well as removal optimization and efficiencies; the first annual report shall be submitted by January 15, 2019, as an attachment to the December 2018 electronic discharge monitoring report submittal.

Finally, this Condition contains as clause that allows the Secretary to reopen the permit to include a wasteload allocation for this facility based on the LIS TMDL.

TN is a calculated value based on Total Kjeldahl Nitrogen (TKN) and Nitrate/Nitrite (NOx) Nitrogen. Monthly monitoring will be required for TKN and NOx. The sum of TKN and NOx shall be used to derive TN.

3. 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 Section 29A-303(2) of the Vermont Water Quality Standards.

4. Toxicity Testing

40 C.F.R. § 122.44(d)(1) require 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. In accordance with 40 C.F.R. § 122.44(d)(1**), Condition I.G.1. of the draft permit requires the facility to collect two-species 48-hour acute and 7-day chronic WET tests in August or September of 2019 and January or February 2021**.

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.

5. Annual Constituent Monitoring

For all facilities with a design flow of greater than 0.1 MGD, 40 C.F.R. § 122.21(j) requires the submittal of effluent monitoring data for those parameters identified in Condition I.H.3. of 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. Refer to the "Guidance for Annual Constituent Monitoring" document to determine the season in which samples should be taken each year.

D. Special Conditions

1. WWTF Upgrade

Condition I.B. of the draft permit outlines requirements pertaining to the upgrade of the WWTF. Condition I.B.1. specifies the approved Basis for Final Design, which the upgrade shall comply with. Condition I.B.2. requires the Permittee to submit an engineer's certification to notify the Secretary that the new WWTF is operational.

2. Waste Management Zone (WMZ)

As defined under 10 V.S.A. § 1251(16), a WMZ is "a specific reach of Class B waters designated by a permit to accept the discharge of properly treated wastes that prior to treatment contained organisms pathogenic to human beings. Throughout the receiving waters, water quality criteria must be achieved but increased health risks exist due to the authorized discharge."

The existing waste management zone is representative of the existing discharge point and new discharge point, associated with the new outfall structure to be completed during the forthcoming WWTF upgrade. Therefore, the draft permit retains the existing waste management zone that extends downstream from the outfall for approximately one mile in the Saxtons River.

3. Operation, Management and Emergency Response Plans

As required by the revisions to 10 V.S.A. § 1278, promulgated in the 2006 legislative session, Condition I.J. has been included in the draft permit. This condition requires that the Permittee submit and implement the Operation, Management and Emergency Response Plans for the WWTF, for the treatment facility, sewage pumping stations, sewer line streams crossings, and sewage collection system. The Permittee shall revise these plans upon the Secretary's request or on its own motion to reflect equipment or operational changes.

4. Electric Power Failure Plan

To ensure the WWTF can continue operations even during the event of a power failure, Condition I.K. has been included in this draft permit. Within 6 months of completing the WWTF upgrade, the Permittee must submit to the Secretary updated documentation addressing how the discharge will be handled in the event of an electric power outage.

5. Laboratory 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.

6. Electronic Reporting

The EPA recently promulgated a final rule to modernize the Clean Water Act reporting for municipalities, industries, and other facilities by converting to an electronic data reporting system. The final rule 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 2016. The Secretary has created an electronic reporting system for DMRs and has recently trained facilities in its use. The Secretary has completed a phased roll out of mandatory electronic reporting. As of December 2020, these NPDES facilities will also be expected to submit additional information electronically as specified in Appendix A in 40 C.F.R. Part 127.

7. Noncompliance Notification

As required by the passage of 10 V.S.A. § 1295, promulgated in the 2016 legislative session, Condition II.A.2 has been included in the proposed 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.

8. Reopener

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

E. Reasonable Potential Determination

The Secretary has conducted a Reasonable Potential Determination, which is attached to this fact sheet as Attachment A. Based on this analysis, the Secretary has determined that this discharge does not cause, have a reasonable potential to cause, or contribute to an instream toxic impact or instream excursion above the water quality criteria, and as such, the development of water quality-based effluent limitations is not necessary. The effluent water quality monitoring and chemical and biological assessments conducted above and below the Saxtons River WWTF discharge support this conclusion. The biological monitoring results consistently indicate the Saxtons River attains all thresholds, and complies with the Vermont Water Quality Standards for all identified response variables presented in Section 29A-306(a)(3)(C). The Reasonable Potential Determination supports the effluent monitoring described in the draft permit.

VII. Procedures for Formulation of Final Determinations

The public comment period for receiving comments on this draft permit is from **November 8, 2017 through December 8, 2017**. The Agency received no comments from the public concerning this draft permit.

ATTACHMENT A – REASONABLE POTENTIAL DETERMINATION

Agency of Natural Resources
Department of Environmental Conservation

Watershed Management Division
1 National Life Drive 2 Main
802-828-1535

MEMORANDUM

To: Nick Giannetti, Wastewater Program (WWP)

From: Rick Levey, Monitoring, Assessment and Planning Program (MAPP) Rick Levey 10/26/17

Cc: Pete LaFlamme, Director, WSMD
Jessica Bulova, Manager, Wastewater Program

Date: October 26, 2017

Subject: MAPP Reasonable Potential Determination for the Saxtons River Wastewater Treatment Facility (WWTF).

MAPP has evaluated the draft permit limits for the Saxtons WWTF in Saxtons River, Vermont pursuant to the 2012 procedure outlining WWM-WSMD roles and responsibilities. This memo provides MAPP's concurrence with the permit limits set forth by the draft permit for Saxtons River WWTF prepared by the WWP.

Facility:
Saxtons River Wastewater Treatment Facility
Permit No. 3-1167
NPDES No. VT0100609

Hydrology for Saxtons River WWTF used in this evaluation:
Design Flow: 0.105 MGD = 0.162 CFS
7Q10 = 3.73 CFS
LMM = 13.38 CFS
IWC-7Q10 = 0.042 (IWC > 1%)
IWC-LMM= 0.012 (IWC > 1%)

Receiving Water:
Saxtons River, Saxtons River, VT
Facility Location: Lat. 43.13750 Long. 72.50479 (NAD 83)

The Saxtons River downstream of the Saxtons River WWTF is classified as Class B and is designated a Cold-Water Fish Habitat. At the point of discharge, the river has a contributing drainage area of 69 square miles. The proposed permit waste management zone (WMZ) in the Saxtons River begins at the outfall of this WWTF and extends downstream approximately 1.0 mile (Figure 1). There are no permitted discharges upstream of this discharge.

General Assessment – VTDEC Assessment Database:
MAPP 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 Saxtons River segment to which this facility discharges, the database indicates the Saxtons River from mouth to River Mile (RM) 5.0 below the Saxtons River WWTF is stressed due to enrichment from phosphorus and incomplete stream canopy. Stressed waters are in compliance with the Water Quality Standards, though stressors are present that impede the water from attaining the highest water quality.

Ambient Chemistry Data for the Stevens Branch above and below the Williamstown WWTF:
There is ambient chemistry data available from VTDEC sampling that occurred in 2008, 2012, and 2015 bracketing the facility outfall with sites at RM 5.0 and RM 4.5. Additionally, Southeastern Vermont Watershed Alliance's (SeVWA's) water quality program made possible by the VTDEC LaRosa Partnership Program has collected water chemistry data (TP, TN, Turbidity) above and below the WWTF. For this evaluation, the VTDEC data will be used, as this sampling targeted the low flow conditions needed.

Water chemistry measures for the following parameters are available: pH, hardness, dissolved oxygen, turbidity, total phosphorus (TP), total nitrogen (TN), total ammonia (TAN) and water temperature are summarized in Table 1. Priority metals were analyzed below the WWTF at RM 4.5 and were all below detection limits (Table 4).

Data repesentiveness was assessed by evaluating the flow conditions at which samples were collected from field sheets and from the most proximally-located USGS gauge for which data were available, and in consideration of possible downstream sensitive reaches. The location of the upstream and downstream sampling locations RM 5.0 and RM 4.5 effectively bracket the WWTF outfall (Figure 1). The downstream sampling location is the most sensitive location, and the sampling results are representative of low flows based on the actual flows shown from the USGS gauge, and field notes collected by DEC technical staff. Thus, the data presented below are relevant for inclusion in this analysis.

Table 1: Concentrations of surface-water chemistry above and below the Saxtons River Wastewater Treatment Facility (River Mile 5.0 and RM 4.5 refer to stations above and below the outfall respectively).

Sample Date	River Mile	pH	Hardness	DO (%)	DO (mg/l)	Turbidity (NTU)	Total Phosphorus (ug/l)	Total Nitrogen (mg/l)	Total Ammonia Nitrogen (mg/l)	Water Temp (deg C)
9/25/2008	5.0	7.85	30.6	89.2	8.74	0.33	5.65	<0.1	-	16.0
9/25/2008	4.5	7.8	32	112	12.1	0.32	20.4	0.22	-	13.6
9/21/2012	5.0	7.84	36	112	10.75	0.61	6.82	<0.1	<0.05	13.8
9/21/2012	4.5	7.82	37	-	-	0.56	11.9	0.11	<0.05	13.5
8/10/2015	5.0	8.32	38	-	-	0.48	8.46	0.18	<0.05	23.4
8/10/2015	4.5	-	40.5	-	-	0.35	26.5	0.34	<0.05	23.6

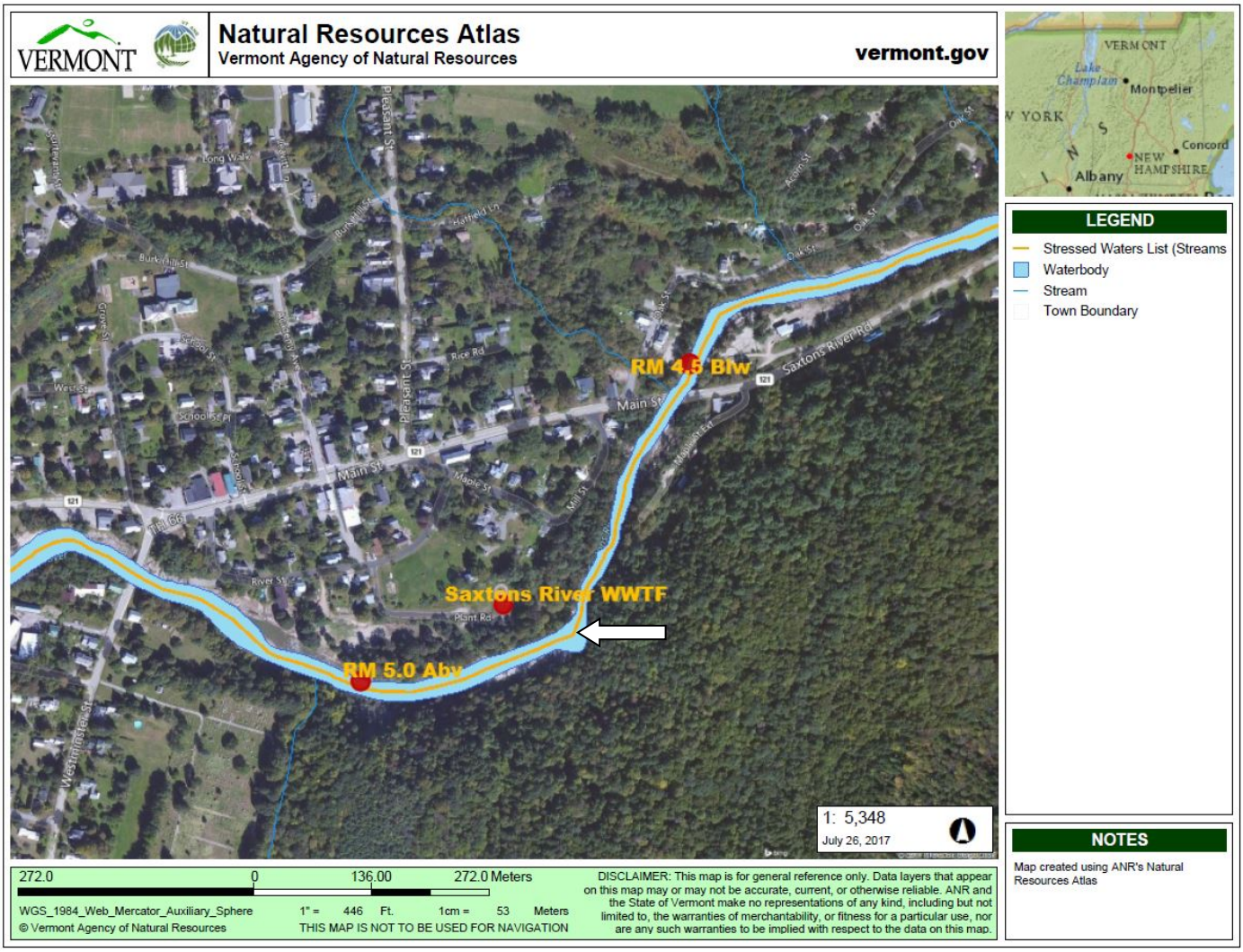


Figure 1. Saxtons River near the Saxtons River WWTF, showing up and downstream sampling locations (RM 5.0 & 4.5). Outfall location shown by arrow. Figure taken from the Vermont Integrated Watershed Assessment System on the VTANR Atlas (https://anrweb.vt.gov/DEC/IWIS/).

Total Phosphorus (TP) values above the outfall (RM 5.0) from 2008 - 2012 ranged from 5.65 – 8.45 µg/L. Below the outfall (RM 4.5) for the same period TP values ranged from 11.9 – 26.5 µg/L, illustrating a downstream increase below the WWTF of 5.0 – 18.0 µ g/L-TP.

Total Nitrogen (TN) values above the outfall (RM 5.0) from 2008 - 2012 ranged from <0.1 – 0.18 mg/L. Below the outfall (RM 4.5) for the same period TN values ranged from 0.11 – 0.34 mg/L, illustrating a minor increase.

Turbidity, Dissolved Oxygen, pH:

Turbidity values above the outfall (RM 5.0) ranged from 0.33 – 0.61 Nephelometric Turbidity (NTU). Turbidity below the outfall (RM 4.5) were 0.32 – 0.56 NTU, illustrating a slight decrease in turbidity below the WWTF. Dissolved oxygen and percent saturation above ranged from 8.7 – 10.7 mg/L and 89.2 - 112 percent respectively. Below the outfall (RM 4.5) dissolved oxygen and percent saturation were 12.1 mg/L and 112 percent saturation respectively. All pH values were within the range of VWQS, at RM 5.0 the pH ranged from 7.84 - 8.32, below at RM 4.5 the pH ranged from 7.8 – 7.82.

Biological Assessments:
Biological assessments were conducted below the Saxtons River WWTF at RM 4.5 (Table 2) most recently in 2008 & 2012. The bioassessments conducted at RM 4.5 have met water quality standards for all years sampled for Medium High Gradient Stream Type. Biological assessments have not been conducted above the WWTF since 1995, as such the upstream data has not been used for this evaluation.

Table 2. Results of the Biological Monitoring for Macroinvertebrates on the Saxtons River, downstream (RM 4.5) of the Saxtons River WWTF outfall.

Macroinvertebrate Site Summary

Location:	Saxtons River	**Location ID:**	501283
Town:	Rockingham	**Bio Site ID:**	060000000045
Description:	Located below WWTF (1/4mi below bridge). Aprox. 0.4 miles below Saxton	**WBID:**	VT11-05
Stream Type:	Medium High Gradient		

Date	Density	Richness	EPT Richness	PMA-O	B.I.	Oligo.	EPT/EPT + Chiro	PPCS-F	Community Assessment
10/4/1993	2100	44.0	22.0	78.4	4.42	0.00	0.71	0.56	Meets WQS
9/25/2008	3640	51.0	29.0	78.0	4.50	1.10	0.97	0.46	Meets WQS
9/21/2012	1006	41.0	18.0	66.7	4.78	0.00	0.93	0.49	Meets WQS
Full Support	≥ 350	≥ 32	≥ 20	≥ 50	≤ 4.85	≤ 9.5	≥ 0.47	≥ 0.45	
Meets Threshold	≥ 300	≥ 30	≥ 18	≥ 45	≤ 5	≤ 12	≥ 0.45	≥ 0.4	
Near Threshold	≥ 250	≥ 28	≥ 16	≥ 40	≤ 5.15	≤ 14.5	≥ 0.43	≥ 0.35	
Non-Support	< 250	< 28	< 16	< 40	> 5.15	> 14.5	< 0.43	< 0.35	

*Scoring Guidelines for Stream Type MHG and WQ Class B.

Total Nitrogen:
Total Nitrogen - EPA, in a November 10, 2011 letter to the Agency, indicated that Vermont must establish total nitrogen limitations in permits such that the total nitrogen load from all facilities in the Connecticut River watershed is consistent with the requirements of the Long Island Sound Total Maximum Daily Load (TMDL). We note and support the requirement for an optimization study to address controllable nitrogen discharges, and further note the requirement for a renewed engineering analysis, which will indicate options for the facility compliance with the Long Island Sound TMDL Wasteload Allocation. These beneficial provisions will ensure that receiving waters remain fully compliant with Vermont Water Quality Standards. Further, weekly monitoring will be required for Total Kjeldahl Nitrogen and Nitrate/Nitrite (NOx) Nitrogen. The sum of TKN and NOx shall be calculated to determine Total Nitrogen (TN).

Total Phosphorus:
Instream Phosphorus Concentrations were calculated using the low monthly median flow (LMM) of 13.38 CFS at design flow of 0.162 CFS (0.105 MGD) and using the effluent phosphorus concentration of 3.3 mg/L which is the average monthly effluent concentration observed during 2012 – 2016, from facility monitoring records; effluent TP values ranged from 0.91 – 5.5 mg/L-TP (n=5). The calculated phosphorus concentration at these conditions attributable to discharge is 0.039 mg/L (39 µg/L).

The instream TP observed below the outfall at RM 4.5 (Table 1) showed an increase below the outfall of 5.0 – 18.0 µg/L, significantly less than the 39 µg/L-TP shown above.

Review of the Saxtons River WWTF flow records indicate that average flow for 2012- 2017 is about 1/3rd (0.037 MGD) of the design flow (0.105 MGD). Instream TP concentrations at these flow rates would be 13.65 µg/L-TP using the average effluent concentration observed, and are in alignment with instream TP monitoring results when considering the variable effluent TP concentrations observed.

The Saxtons River WWTF has received approval to perform an upgrade, which will replace the oxidation ditch and chlorine disinfection system with a fine screen, grit removal system, two sequencing batch reactors (SBR), ultraviolet light (UV) disinfection system, and an equalization basin. These upgrades anticipated to begin in 2017 will significantly decrease the instream phosphorus concentrations. It is anticipated that once these upgrades are in place, the improved effluent quality will be reflected in subsequent bioassessments attaining higher water quality below the facility.

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, MAPP typically 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 Water Quality Standards, for streams that can be assessed using macroinvertebrate biocriteria. Under this framework, MAPP can make a positive finding of compliance with the narrative standard 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.

The total phosphorus concentrations in receiving waters are presently moderately elevated when comparing the above and below chemistry results, and this finding, coupled with the mass balance calculation presented above, indicated that increases in phosphorus attributable to the facility are occurring, which exceed the numeric nutrient criterion of 15 ug/L TP for streams of this type. However, aquatic life use is shown to be fully supported immediately downstream of the facility, and the stream complies with VWQS for all identified response variables. Therefore, the narrative standard presented in the VWQS is supported (Table 3), as are the combined numeric nutrient criteria in §29A-306(a)(3)(c). As described below, for facilities where there are increases in phosphorus attributable to the discharge and biological monitoring results consistently indicate attainment of all thresholds, MAPP supports the effluent monitoring, which includes TP, required by the permit; this will help to better assess compliance with the 2014 nutrient criteria at the next permit issuance.

Table 3. Assessment of phosphorus response variables for Saxtons River WWTF. The relevant target values are referenced to the appropriate section of the VWQS.

Response variable (VWQS reference)	Target Value	River-mile 5.0 (Upstream)	River-mile 4.5 (Downstream)
pH (§3-01.B.9), range	<8.5 s.u.	8.32	7.82
Turbidity (§3-04.B.1), range	< 10 NTU at low mean annual flow	0.48	0.35
Dissolved Oxygen (§3-04.B.2), min	>6 mg/L and 70% saturation	10.75 (112%)	12.1 (112%)
Aquatic biota, based on macroinvertebrates, (§3-04-B.4), also see Table 2.	Attaining an assessment of good, or better.	NA	Meets WQS (2012)

Whole Effluent Toxicity (WET) and Priority Pollutant Testing:
40 C.F.R. § 122.44(d)(1) requires the Agency 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. The goal of the Vermont Toxic Discharge Control Strategy is to assure that the state water quality standards and receiving water classification criteria are maintained. The 2005 permit required a two-species WET acute test be conducted in August or September 2008. There was no toxicity observed in the WET test, which was conducted in August 2009; the A-NOEC was 100% and A-LC50 was 100%.

The draft permit requires a two-species 48-hour acute WET test and a two-species 96-hour chronic WET test be conducted in August or September 2018 and January or February 2020. If the results of this test indicate a reasonable potential to cause an instream toxic impact, the Department may require additional WET testing, establish a WET limit, or require a Toxicity Reduction Evaluation.

Ammonia Monitoring:
Review of the Saxtons River WWTF effluent ammonia records from 2012 - 2016, indicate effluent ammonia concentrations ranged from 0.5 mg – 2 mg TAN/L. Using the highest effluent ammonia concentration of 2.0 mg/L TAN observed in 2014, the receiving water concentration (RWC) at 7Q10 instream waste concentration (IWC) of 4.2% used for implementing the acute criteria would be 0.084 mg TAN/L (7Q10 IWC .042 X 2.0 mg TAN/L). This value is below both the chronic and acute ammonia criteria, illustrating that there is not a reasonable potential for VWQS excursion. MAPP supports the ammonia monitoring be continued to provide additional data for evaluation.

Sediment, Hardness, and Metals:
Instream total suspended solids were calculated using the 7Q10 of 3.73 CFS at design flow of 0.162 CFS (0.105 MGD), assuming the maximum permitted daily concentration of 50 mg/L. The calculated suspended sediment concentration at these conditions was 2.1 mg/l, indicating a modest increase of instream ambient suspended sediment concentrations in receiving waters.

The hardness of the Saxtons River below the Saxtons River WWTF (RM 4.5) was recorded to be 40.5 mg/l CaCO3 on 8/10/2015 (Table 1). Hardness data is utilized to determine compliance with Vermont's aquatic biota based metals criteria as specified in § 29A-303(7) and Appendix C of the Vermont Water Quality Standards. Vermont DEC priority metal chemistry data below the outfall (Table 4) did not detect any exceedances and were below detection for all priority metals.

Table 4. Saxtons River Metals Water Chemistry – below the Saxtons River WWTF outfall at RM 4.5.

Date	8/10/2015
Site	**Saxtons River (RM 4.5)**
Total Aluminum (ug/l)	< 50
Total Antimony (ug/l)	< 10
Total Arsenic (ug/l)	< 1
Total Beryllium (ug/l)	< 1
Total Cadmium (ug/l)	< 1
Total Chromium (ug/l)	< 5
Total Cobalt (ug/l)	< 1
Total Copper (ug/l)	< 10
Total Iron (ug/l)	68.5
Total Lead (ug/l)	< 1
Total Manganese (ug/l)	12.2
Total Molybdenum (ug/l)	< 5
Total Nickel (ug/l)	< 5
Total Selenium (ug/l)	< 5
Total Silver (ug/l)	< 1
Total Thallium (ug/l)	< 1
Total Zinc (ug/l)	< 50

Recommended Biological and Water Quality Monitoring:
In light of the fact that biological monitoring results consistently indicate attainment of all thresholds, and the stream complies with VWQS for all identified response variables, and that the narrative standard presented in §29A-302(2)(A) of the VWQS is supported (Table 3), MAPP does not recommend biomonitoring be included in the permit. To better assess compliance with the 2014 nutrient criteria at the next permit issuance, MAPP does support the effluent monitoring required by the permit which includes monthly effluent monitoring for TP.

Conclusion:
The available data indicate that this discharge does not cause, have a reasonable potential to cause, or contribute to an instream toxic impact or instream excursion above the water quality criteria. As such, the development of WQBELs will not be necessary. Additionally, as discussed in the "*Phosphorus Section*" above, facility upgrades including sequencing batch reactors (SBR) will result in phosphorus reductions that will be reflected in higher water quality below the facility.