APPENDIX A

NPDES Permit (excerpts),
Administrative Order on Consent and
Groundwater Discharge Permit
For October 2014 Prelim. Draft

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 1
5 Post Office Square, Suite 100
Boston, MA 02109-3912

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

JUN 24 2013

Mr. Russell Dean
Town Manager
10 Front Street
Exeter, NH 03833

Re: NPDES Permit No. NH0100871
Administrative Order on Consent Docket No. 13-010

Dear Mr. Dean:

Enclosed is the executed Administrative Order on Consent in the matter of the Town of Exeter, New Hampshire.

Sincerely,

Susan Studlien

Susan Studlien, Director
Office of Environmental Stewardship

Enclosure

cc: Attorney Dana Bisbee
Tracy Wood, NHDES

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I

IN THE MATTER OF:	)	DOCKET NO. 13-010
	)	
Town of Exeter, New Hampshire	)	FINDINGS OF VIOLATION
NPDES Permit No. NH0100871	)	
	)	AND
Proceedings under Sections 308 and	)	
309(a)(3) of the Clean Water Act,	)	ADMINISTRATIVE ORDER ON
as amended, 33 U.S.C. §§ 1318 and	)	CONSENT
1319(a)(3)	)	

I. STATUTORY AUTHORITY

The following FINDINGS are made and ORDER on CONSENT ("Order") issued pursuant to Sections 308(a) and 309(a)(3) of the Clean Water Act, as amended (the "Act"), 33 U.S.C. §§ 1318 and 1319(a)(3). Section 309(a)(3) of the Act grants to the Administrator of the U.S. Environmental Protection Agency ("EPA") the authority to issue orders requiring persons to comply with Sections 301, 302, 306, 307, 308, 318, and 405 of the Act and any permit condition or limitation implementing any of such sections in a National Pollutant Discharge Elimination System ("NPDES") permit issued under Section 402 of the Act, 33 U.S.C. § 1342. Section 308(a) of the Act, 33 U.S.C. § 1318(a), authorizes EPA to require the submission of any information required to carry out the objectives of the Act. These authorities have been delegated to the EPA, Region I Administrator, and in turn, to the Director of the EPA, Region I Office of Environmental Stewardship ("Director").

The Order herein is based on findings of violation of Section 301 of the Act, 33 U.S.C. § 1311, and the conditions of NPDES Permit No. NH0100871 and is issued with the consent of the Town of Exeter, New Hampshire. Pursuant to Section 309(a)(5)(A) of the Act, 33 U.S.C. § 1319(a)(5)(A), the Order provides a schedule for compliance that the Director has determined to be reasonable.

II. DEFINITIONS

Unless otherwise defined herein, terms used in this Order shall have the meaning given to those terms in the Act, 33 U.S.C. § 1251 *et seq.*, the regulations promulgated thereunder, and any applicable NPDES permit. For the purposes of this Order, "NPDES Permit" means the Town of Exeter's NPDES Permit, No. NH0100871, and all amendments or modifications thereto and renewals thereof as are applicable and in effect at the time.

III. FINDINGS

The Director makes the following findings of fact:

1. The Town of Exeter, New Hampshire ("Exeter" or "Town") is a municipality, as defined in Section 502(4) of the Act, 33 U.S.C. § 1362(4), established under the laws of the State of New Hampshire.
2. The Town is a person under Section 502(5) of the Act, 33 U.S.C. § 1362(5). The Town is the owner and operator of a Publicly Owned Treatment Works ("POTW"), which includes a wastewater collection system ("Collection System") and a wastewater treatment facility ("WWTF"), from which pollutants, as defined in Section 502(6) and (12) of the Act, 33 U.S.C. §§ 1362(6) and (12), are discharged to the Squamscott River.
3. The WWTF is a 3.0 million gallons per day ("MGD") secondary treatment facility that serves a population of approximately 10,000.
4. Section 301(a) of the Act, 33 U.S.C. § 1311(a), makes unlawful the discharge of pollutants to waters of the United States except, among other things, in compliance with the terms and conditions of an NPDES permit issued pursuant to Section 402 of the Act, 33 U.S.C. § 1342.
5. On December 12, 2012, the Town was issued the NPDES Permit by EPA under the authority of Section 402 of the Act, 33 U.S.C. § 1342. The NPDES Permit became effective on March 1, 2013 and superseded a permit issued on July 5, 2000. The NPDES Permit expires on March 1, 2018.
6. The NPDES Permit authorizes the Town to discharge pollutants from WWTF Outfall 001, a point source as defined in Section 502(14) of the Act, 33 U.S.C. § 1362(14), to the Squamscott River subject to the effluent limitations, monitoring requirements and other conditions specified in the NPDES Permit.
7. The Squamscott River flows into Great Bay, which drains into the Piscataqua River, which flows into to the Atlantic Ocean. All are waters of the United States under Section 502(7) of the Act, 33 U.S.C. § 1362(7), and the regulations promulgated thereunder.
8. Part I.A.1.a. of the NPDES Permit requires that total nitrogen in the discharges from WWTF Outfall 001 not exceed 3.0 milligrams per liter (mg/l).
9. Nitrogen is a pollutant as defined in Sections 502(6) and (12) of the Act, 33 U.S.C. §§ 1362(6) and (12).
10. The Town routinely discharges effluent from WWTF Outfall 001 containing total nitrogen in excess of 3.0 mg/l.

11. The Town's routine discharges of effluent from WWTF Outfall 001 containing total nitrogen in excess of 3 mg/l occur in violation of the NPDES Permit and Section 301(a) of the Act, 33 U.S.C. § 1311(a).

12. In accordance with Exeter's town charter, the funding for the new wastewater treatment facilities referenced in Section IV.A below must be approved by the Exeter Town Meeting. The Exeter Board of Selectmen will pursue that approval at the earliest possible date.

IV. ORDER

Accordingly, pursuant to Sections 308 and 309(a)(3) of the Act, it is hereby ordered that the Town shall:

A. WASTEWATER TREATMENT FACILITIES

1. By June 30, 2016, in accordance with New Hampshire Department of Environmental Services (NHDES) approval, the Town shall initiate construction of the wastewater treatment facilities necessary to achieve interim effluent limits set forth in Attachment 1.a of this Order.

2. By June 30, 2018, achieve substantial completion of construction of the WWTF in accordance with NHDES approval.

B. INTERIM EFFLUENT LIMITATIONS

1. From the effective date of this Order until the total nitrogen concentration limit included in Attachment 1.a of this Order becomes effective pursuant to Paragraph IV.B.2., below, the Town shall comply with the interim total nitrogen effluent limitations and monitoring requirements contained in Attachment 1 of this Order.

2. By June 30, 2019 or until 12 months after substantial completion of construction pursuant to Paragraph IV.A.2., above, whichever is sooner, the Town shall comply with the interim total nitrogen effluent limit and monitoring requirements contained in Attachment 1.a of this Order.

3. The interim limits in Attachment 1.a shall be in effect unless and until EPA determines that the Town has not complied with the milestones set forth in this Order. If and when EPA determines that the interim limits shall no longer remain in effect, the Town shall fund, design, construct and

operate additional treatment facilities to meet the NPDES Permit limit of 3.0 mg/l as soon as possible, and no later than 5 years from EPA's determination.

4. The Town shall operate the WWTF in a manner so as to maximize removal efficiencies and effluent quality, using all necessary treatment equipment available at the facility for optimization at the flow and load received but not requiring methanol or other carbon addition.

C. REPORTING (WASTEWATER TREATMENT FACILITIES)

1. Until July 15, 2018, the Town shall submit quarterly reports to EPA and the NHDES summarizing its compliance with the provisions of Paragraphs IV.A and IV.B of this Order. Progress reports shall be submitted on, or before, April 15th, July 15th, October 15th, and January 15th of each year. Each progress report submitted pursuant to this paragraph shall: a) describe activities undertaken during the reporting period directed at achieving compliance with this Order; b) identify all plans, reports, and other deliverables required by this Order that have been completed and submitted during the reporting period; and c) describe the expected activities to be taken during the next reporting period in order to achieve compliance with this Order.

D. NON-POINT SOURCE AND STORMWATER POINT SOURCE ACTIVITIES

1. Upon the effective date of this Order, the Town shall begin tracking all activities[1] within the Town that affect the total nitrogen load to the Great Bay Estuary. This includes, but is not limited to, new/modified septic systems, decentralized wastewater treatment facilities, changes to the amount of effective impervious cover, changes to the amount of disconnected impervious cover[2], conversion of existing landscape to lawns/turf and any new or modified Best Management Practices.

2. Upon the effective date of this Order, the Town shall begin coordination with the NHDES, other Great Bay communities, and watershed organizations in NHDES's efforts to develop and utilize a comprehensive subwatershed-based tracking/accounting system for quantifying the total nitrogen

[1] Pertains to activities that the Town should reasonably be aware of, e.g., activities that involve a Town review/approval process or otherwise require a notification to the Town.
[2] Impervious cover includes pavement and buildings.

loading changes associated with all activities within the Town that affect the total nitrogen load to the Great Bay Estuary.

3. Upon the effective date of this Order, the Town shall begin coordination with the NHDES to develop a subwatershed community-based total nitrogen allocation.

4. By September 30, 2018, submit to EPA and the NHDES a total nitrogen non-point source and point source stormwater control plan ("Nitrogen Control Plan"), including a schedule of at least five years for implementing specific control measures as allowed by state law to address identified non-point source and stormwater Nitrogen loadings in the Town of Exeter that contribute total nitrogen to the Great Bay estuary, including the Squamscott River. If any category of de-minimis non-point source loadings identified in the tracking and accounting program are not included in the Nitrogen Control Plan, the Town shall include in the Plan an explanation of any such exclusions. The Nitrogen Control Plan shall be implemented in accordance with the schedules contained therein.

E. REPORTING

1. Beginning January 31, 2014 and annually thereafter, the Town shall submit Total Nitrogen Control Plan Progress Reports to EPA and the NHDES that address the following:
   a. The pounds of total nitrogen discharged from the WWTF during the previous calendar year;
   b. A description of the WWTF operational changes that were implemented during the previous calendar year;
   c. The status of the development of a total nitrogen non-point source and storm water point source accounting system;
   d. The status of the development of the non-point source and storm water point source Nitrogen Control Plan,
   e. A description and accounting of the activities conducted by the Town as part of its Nitrogen Control Plan; and
   f. A description of all activities within the Town during the previous year that affect the total nitrogen load to the Great Bay Estuary. The annual report shall include sufficient information such that the nitrogen loading change to the watershed associated with these

activities can be quantified upon development of the non-point source/point source storm water accounting system.

2. By December 31, 2023, the Town shall submit an engineering evaluation that includes recommendations for the implementation of any additional measures necessary to achieve compliance with the NPDES Permit, or a justification for leaving the interim discharge limit set forth in Attachment 1.a in place (or lower the interim limit to a level below 8.0 mg/l but still above 3.0 mg/l) beyond that date. Such justification shall analyze whether:
   a. Total nitrogen concentrations in the Squamscott River and downstream waters are trending towards nitrogen targets;[3]
   b. Significant improvements in dissolved oxygen, chlorophyll a, and macroalgae levels have been documented; and
   c. Non-point source and storm water point source reductions achieved are trending towards allocation targets and appropriate mechanisms are in place to ensure continued progress.

V. NOTIFICATION PROCEDURES

1. Where this Order requires a specific action to be performed within a certain time frame, the Town shall submit a written notice of compliance or noncompliance with each deadline. Notification must be mailed within fourteen (14) calendar days after each required deadline. The timely submission of a required report shall satisfy the requirement that a notice of compliance be submitted.
2. If noncompliance is reported, notification shall include the following information:
   a. A description of the noncompliance.
   b. A description of any actions taken or proposed by the Town to comply with the lapsed schedule requirements.
   c. A description of any factors that explain or mitigate the noncompliance.
   d. An approximate date by which the Town will perform the required action.
3. After a notification of noncompliance has been filed, compliance with the past-due requirement shall be reported by submitting any required documents or providing EPA and NHDES with a written report indicating that the required action has been achieved.

[3] The Town shall account for precipitation in the trend analysis and baseline measurement.

4. Submissions required by this Order shall be in writing and shall be mailed to the following addresses:

United States Environmental Protection Agency
Region I – New England
5 Post Office Square - Suite 100
Boston, MA 02109-3912
Attn: Joy Hilton, Water Technical Unit (Mail Code: OES04-3)

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

VI. GENERAL PROVISIONS

1. The Town may, if it desires, assert a business confidentiality claim covering part or all of the information requested, in the manner described by 40 C.F.R. § 2.203(b). Information covered by such a claim will be disclosed by EPA only to the extent set forth in 40 C.F.R. Part 2, Subpart B. If no such claim accompanies the information when it is received by EPA, the information may be made available to the public by EPA without further notice to the Town. The Town should carefully read the above-cited regulations before asserting a business confidentiality claim since certain categories of information are not properly the subject of such a claim. For example, the Act provides that "effluent data" shall in all cases be made available to the public. See Section 308(b) of the Act, 33 U.S.C. § 1318(b).
2. This Order does not constitute a waiver or a modification of the terms and conditions of the NPDES Permit. The NPDES Permit remains in full force and effect. EPA reserves the right to seek any and all remedies available under Section 309 of the Act, 33 U.S.C. § 1319, as amended, for any violation cited in this Order.
3. The Town waives any and all claims for relief and otherwise available rights or remedies to judicial or administrative review which the Town may have with respect to any issue of fact or law set forth in this Order on Consent, including, but not limited to, any right of judicial review of the Section 309(a)(3) Compliance Order on Consent under the Administrative Procedure Act, 5 U.S.C. §§ 701-708.

4. This Order shall become effective upon receipt by the Town.

06/20/13
Date

Susan Studlien
Susan Studlien, Director
Office of Environmental Stewardship
U.S. Environmental Protection Agency, Region I

6/17/13
Date

Russell Dean, Town Manager
Town of Exeter, New Hampshire

ATTACHMENT 1

Interim Effluent Limits and Monitoring Requirements

	Mass		Concentration			
	Average Monthly (lbs/day)	Daily Maximum (lbs/day)	Average Monthly (mg/l)	Daily Maximum (mg/l)	Frequency	Type
Total Nitrogen[1]	Report	Report	Report	Report	1/Week	24-hour composite

[1] Total Nitrogen shall be calculated by adding the total kjeldahl nitrogen (TKN) to the total nitrate (NO_3-N) and nitrite (NO_2-N).

ATTACHMENT 1.a.

Interim Effluent Limits and Monitoring Requirements

	Mass		Concentration			
	Average Monthly (lbs/day)	Daily Maximum (lbs/day)	Average Monthly (mg/l)	Daily Maximum (mg/l)	Frequency	Type
Total Nitrogen[1] November 1st through March 31st	Report	Report	Report	Report	1/Week	24-hour composite
Total Nitrogen[1] April 1st through October 31st	Report	Report	8 mg/l[2]	Report	1/Week	24-hour composite

[1] Total Nitrogen shall be calculated by adding the total kjeldahl nitrogen (TKN) to the total nitrate (NO_3-N) and nitrite (NO_2-N). The permittee shall optimize the operation of the treatment facility for the removal of total nitrogen during the period but not requiring methanol or other carbon addition.

[2] Calculated on a 214 day seasonal rolling average.

AUTHORIZATION TO DISCHARGE UNDER THE NATIONAL POLLUTANT DISCAHRGE ELIMINATION SYSTEM

In compliance with the provisions of the Federal Clean Water Act, as amended, (33 U.S.C. §1251 et seq.; the "CWA"),

The Town of Exeter, New Hampshire

is authorized to discharge from the Town of Exeter Wastewater Treatment Plant located at

13 Newfields Road
Exeter, New Hampshire 03833

to the receiving water named:

Squamscott River (Hydrologic Basin Code: 01060003)

in accordance with the effluent limitations, monitoring requirements, and other conditions set forth herein.

The permit will become effective on the first day of the calendar month immediately following sixty days after signature.

This permit and the authorization to discharge expire at midnight, five (5) years from the effective date.

This permit supersedes the permit issued on July 5, 2000.

This permit consists of 18 pages in Part I including effluent limitations, monitoring requirements, etc., Attachments A (Marine Acute Toxicity Test Procedure and Protocol dated July 2012), Attachment B (List of Combined Sewer Overflows), Sludge Compliance Guidance, and Part II including General Conditions and Definitions.

Signed this 12th day of December, 2012.

/S/ SIGNATURE ON FILE

_____

Stephen S. Perkins, Director
Office of Ecosystem Protection
U.S. Environmental Protection Agency
Region I
Boston, Massachusetts

PART I.A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning on the effective date and lasting through the expiration date, the permittee is authorized to discharge treated domestic and industrial wastewater from Outfall Serial Number 001 to the Squamscott River. Such discharges shall be limited and monitored by the permittee as specified below. Samples taken in compliance with the monitoring requirements specified below shall be taken at the end of all processes, including disinfection, or at an alternative representative location approved by the EPA and NHDES-WD.

Effluent Parameter	Effluent Limit			Monitoring Requirement	
	Average Monthly	Average Weekly	Maximum Daily	Frequency	Sample Type
Flow, MGD	Report	---	Report	Continuous	Recorder[1]
BOD_5; mg/l (lb/d)	30 (751)	45 (1126)	50 (1251)	2/Week[2]	Grab[13]
TSS; mg/l (lb/d)	30 (751)	45 (1126)	50 (1251)	2/Week[2]	Grab[13]
pH Range[3]; Standard Units	6.0 to 9.0 (See Section I.H.5.)			1/Day	Grab[13]
Fecal Coliform[3,4]; Colonies/100 ml	14	---	Report	1/Day	Grab
Fecal Coliform[3,4]; percent	---	---	Report	1/Day	Grab
Enterococci Bacteria[3,5]; Colonies/100ml	Report	---	Report	2/Week	Grab
Total Residual Chlorine[6]; mg/l	0.19	---	0.33	2/Day	Grab
Total Nitrogen[7] mg/l (lb/d) Applicable November 1 – March 31	Report	---	---	1/Week	Grab[13]
Total Nitrogen[7,8], mg/l (lb/d) Applicable April 1 – October 31	3.0 (75)	---	---	1/Week	Grab[13]
Whole Effluent Toxicity					
LC50[9,10,12]; Percent Effluent	---	---	100	2/Year	Grab[13]
Ammonia Nitrogen as N[11]; mg/l	---	---	Report	2/Year	Grab[13]
Total Recoverable Aluminum[11]; mg/l	---	---	Report	2/Year	Grab[13]
Total Recoverable Cadmium[11]; mg/l	---	---	Report	2/Year	Grab[13]
Total Recoverable Chromium[11]; mg/l	---	---	Report	2/Year	Grab[13]
Total Recoverable Copper[11]; mg/l	---	---	Report	2/Year	Grab[13]
Total Recoverable Lead[11]; mg/l	---	---	Report	2/Year	Grab[13]
Total Recoverable Nickel[11]; mg/l	---	---	Report	2/Year	Grab[13]
Total Recoverable Zinc[11]; mg/l	---	---	Report	2/Year	Grab[13]

* **SEE PAGES 4 AND 5 FOR FOOTNOTES.**

PART I.A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

2. During the period beginning on the effective date of this permit and lasting through the expiration date, the permittee is authorized to discharge stormwater and wastewaters from Combined Sewer Outfall Number 003 into Clemson Pond. These discharges are authorized only during wet weather. Such discharges shall be limited to the outfall listed, and shall be monitored by the permittee as specified below. Samples specified below shall be taken at a location that provides a representative analysis of the effluent.

Effluent Characteristic	Discharge Limitation	Monitoring Requirement	
	Wet Weather Event Maximum	Measurement Frequency	Sample Type
Escherichia coli Bacteria[3, 5, 14] (colonies/100 ml)	1000	1/Year	Grab

EXPLANATION OF FOOTNOTES APPLICABLE TO PART I.A.1 on page 2

1. The effluent flow shall be continuously measured and recorded using a flow meter and totalizer.

2. Influent concentrations of both BOD_5 and TSS shall be monitored two (2) days per month.

3. State certification requirement.

4. Fecal coliform shall be tested using an EPA approved test method (see 40 C.F.R. Part 136).

   The average monthly value for fecal coliform shall be determined by calculating the geometric mean using the daily sample results. Not more than 10 percent of the collected samples shall exceed a most probable number (MPN) of 43 per 100 ml for a 5-tube decimal dilution test. Furthermore, all fecal coliform data collected must be submitted with the monthly discharge monitoring reports (DMRs).

   The permittee is required to report two (2) statistics each month. One is the geometric mean fecal coliform value expressed in terms of "MPN per 100 ml" (reported as average monthly), and the second is the percentage of collected samples each month that exceeds an MPN of 43 per 100 ml for the 5-tube decimal dilution test referenced above. The latter statistic will be used to judge compliance with that part of the limit that reads "Not more than 10 percent of the collected samples shall exceed a most probably number (MPN) of 43 per 100 ml for a 5-tube decimal dilution test."

5. Enterococci and Escherichia coli bacteria shall be tested using an EPA approved test method (see 40 C.F.R. Part 136).

6. Total Residual Chlorine shall be tested using an EPA approved test method (see 40 C.F.R. Part 136). The method chosen to test total residual chlorine shall have a minimum level of detection of at least the total chlorine residual permit limit specified on page 2 of the permit.

7. Total nitrogen shall be calculated by adding the total kjeldahl nitrogen (TKN) to the total nitrate (NO_3) and nitrite (NO_2).

   The permittee shall report the monthly average mass and concentration each month.

8. The nitrogen limit is a rolling seasonal average limit, which is effective from April 1 – October 31 of each year. The first value for the seasonal average will be reported after an entire April through October period has elapsed following the effective date of the permit (results do not have to be from the same year). For example, if the permit becomes effective on May 1, 2013, the permittee will calculate the first seasonal average from samples collected during the months of May through October 2013 and April 2014, and report this average on the April 2014 DMR. For each subsequent month that the seasonal limit is in effect, the seasonal average shall be calculated using samples from that month and the previous six months that the limit was in effect.

The permittee shall optimize the operation of the treatment facility for the removal of total nitrogen during the period November 1 through March 31. All available treatment equipment in place at the facility shall be operated unless equal or better performance can be achieved in a reduced operational mode. The addition of a carbon source that may be necessary in order to meet the total nitrogen limit from April 1 through October 31 is not required during the period November 1 through March 31.

9. The permittee shall conduct acute toxicity tests on effluent samples using two species, mysid shrimp (*Mysidopsis bahia*) and inland silverside (*Menidia beryllina*), following the protocol in Attachment A (Marine Acute Toxicity Test Procedure and Protocol dated July 2012). Toxicity testing shall be performed two (2) times each year during the first quarter (January 1 – March 31) and third quarter (July 1 – September 30) of each year. Toxicity test results are to be submitted by the 15th day of the month following the end of the quarter sampled.

10. LC50 is defined as the percent of effluent (treated wastewater) that causes mortality to 50 percent of the test organisms. The permit limit of 100 percent is defined as a sample composed of 100 percent effluent.

11. For each whole effluent toxicity test the permittee shall report on the appropriate discharge monitoring report (DMR) the concentrations of ammonia nitrogen as nitrogen and total recoverable aluminum, cadmium, copper, chromium, lead, nickel, and zinc found in the 100 percent effluent sample. All these aforementioned chemical parameters shall be determined to at least the minimum quantification level (ML) show in Attachment A or as amended.

12. The permit shall be modified, or alternatively revoked and reissued, to incorporate additional toxicity testing requirements, including chemical specific limits, if the results of the toxicity tests indicate the discharge causes an exceedance of any State water quality criterion. Results from these toxicity tests are considered "New Information" and the permit may be modified as provided in 40 C.F.R. § 122.62(a)(2).

13. If the treatment plant is upgraded during the life of this permit to a treatment process that does not utilize lagoon treatment as the primary treatment technology, the effluent sample type shall change to a 24 hour composite sample upon completion of the upgrade.

14. The permittee shall sample the discharge from the combined sewer outfall listed in Attachment B at least once per year. All attempts must be made to begin sampling during the first one half hour after the outfall starts discharging. When this is not possible, a sample shall be collected as soon as possible after the beginning of the outfall starting to discharge. The "event maximum" value for Escherichia coli shall be reported on the appropriate DMR for the month sampled. Report a no discharge code of "E" (analysis not conducted) on the DMR for <u>all other months</u>.

    The permittee shall also perform CSO and receiving water sampling as described in Part I.F.3. below.

A. EFFLUENT LIMITATIONS AND MONITORING REQUIRMENTS (Continued)

3. The discharge shall not cause a violation of the water quality standards of the receiving water.

4. The discharge shall be adequately treated to ensure that the surface water remains free from pollutants in concentrations or combinations that settle to form harmful deposits, float as foam, debris, scum, or other visible pollutants. It shall be adequately treated to ensure that the surface waters remain free from pollutants which produce odor, color, taste, or turbidity in the receiving waters which is not naturally occurring and would render it unsuitable for its designated uses.

5. The permittee's treatment facility shall maintain a minimum of 70 percent removal for BOD_5 and 65 percent for TSS. The percent removal shall be calculated based on average monthly influent and effluent concentrations. If the treatment plant is upgraded during the life of this permit to treatment process that does not utilize lagoon treatment as the primary treatment technology, the facility shall maintain a minimum of 85 percent removal for BOD_5 and TSS upon completion of the upgrade.

6. When the effluent discharged for a period of three consecutive months exceeds 80 percent of the 3.0 mgd design flow, 2.4 mgd, the permittee shall submit to the permitting authorities a projection of loadings up to the time when the design capacity of the treatment facility will be reached and a program for maintaining satisfactory treatment levels consistent with approved water quality management plans. Before the design flow will be reached, or whenever the treatment necessary to achieve permit limits cannot be assured, the permittee may be required to submit plans for facility improvements.

7. All publicly owned treatment works (POTWs) must provide adequate notice to both EPA-New England and the New Hampshire Department of Environmental Services – Water Division (NHDES-WD) of the following:

    a. Any new introduction of pollutants into the POTW from an indirect discharger in a primary industrial category (see 40 C.F.R. §122 Appendix A as amended) discharging process water;

    b. Any substantial change in the volume or character of pollutants being introduced into the POTW by a source introducing pollutants into the POTW at the time of issuance of the permit; and

    c. For the purpose of this paragraph, adequate notice shall include information on:

        i. The quantity and quality of effluent introduced into the POTW; and

        ii. Any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW

8. The permittee shall not discharge into the receiving waters any pollutant or combination of pollutants in toxic amounts.

B. UNAUTHORIZED DISCHARGES

The permit only authorizes discharges in accordance with the terms and conditions of this permit and only from the outfalls listed in Part 1.A.1 and Part 1.A.2 (see Attachment B) of this permit. Discharges of wastewater from any other point source are not authorized under this permit. Dry weather overflows are prohibited. All dry weather sanitary and/or industrial discharges from any CSO must be reported to EPA-New England and the State within 24 hours in accordance with the reporting requirements for plant bypass (see Paragraph D.1.e. of Part II of this permit).

C. OPERATION AND MAINTENANCE OF THE SEWER SYSTEM

Operation and maintenance of the sewer system shall be in compliance with the General Requirements of Part II and the following terms and conditions. The permittee is required to complete the following activities on its collection system:

1. Maintenance Staff

   The permittee shall provide an adequate staff to carry out the operation, maintenance, repair, and testing functions required to ensure compliance with the terms and conditions of this permit.

2. Preventative Maintenance Program

   The permittee shall maintain an ongoing preventative maintenance program to prevent overflows and bypasses caused by malfunctions or failures of the sewer system infrastructure. The program shall include an inspection program designed to identify all potential and actual unauthorized discharges.

3. Infiltration/Inflow

   The permittee shall control infiltration and inflow (I/I) into the sewer system as necessary to prevent high flow related unauthorized discharges from their collection systems and high flow related violations of the wastewater treatment plant's effluent limitations.

4. Collection System Mapping

Within 30 months of the effective date of the permit, the permittee shall prepare a map of the sewer collection system it owns. The map shall be on a street map of the community, with sufficient detail and at a scale to allow easy interpretation. The collection system information shown on the map shall be based on current conditions. Such map(s) shall include, but not be limited to the following:

   a. All sanitary sewer lines and related manholes;

b. All combined sewer lines and related manholes;
c. All combined sewer regulators and any known or suspected connections between the sanitary sewer and storm drain system (e.g. combined manholes);
d. All outfalls, including the treatment plant outfall(s), CSOs, combined manholes, and any known or suspected SSOs;
e. All pump stations and force mains;
f. The wastewater treatment facility(ies);
g. All surface waters (labeled);
h. Other major appurtenances such as inverted siphons and air release valves;
i. A numbering system which uniquely identifies overflow points, regulators and outfalls;
j. The scale and a north arrow; and
k. The pipe diameter, age and type of pipe, the length of pipe between manholes, the direction of flow, and the pipe rim and invert elevations.

5. Collection System O&M Plan

The permittee shall develop and implement a collection system operation and maintenance plan. The plan shall be submitted to EPA and NHDES **within six months of the effective date of this permit** (see page 1 of this permit for the effective date). The plan shall describe the permittee's programs for preventing I/I related effluent limit violations and all unauthorized discharges of wastewater, including overflows and by-passes.

The plan shall include:

a. A description of the overall condition of the collection system including a list of recent studies and construction activities;
b. A preventative maintenance and monitoring program for the collection system;
c. Recommended staffing to properly operate and maintain the sanitary sewer collection system;
d. The necessary funding level and the source(s) of funding for implementing the plan;
e. Identification of known and suspected overflows, including combined manholes. A description of the cause of the identified overflows, and a plan for addressing the overflows consistent with the requirements of this permit;
f. An ongoing program to identify and remove sources of I/I. The program shall include an inflow identification and control program that focuses on the disconnection and redirection of illegal sump pumps and roof down spouts; and
g. An educational public outreach program for all aspects of I/I control, particularly private inflow.

For each of the above activities that are not completed and implemented as of the submittal date, the plan shall provide a schedule for its completion.

D. ALTERNATE POWER SOURCE

In order to maintain compliance with the terms and conditions of this permit, the permittee shall provide an alternate power source with which to sufficiently operate the publicly owned treatment works, as defined at 40 C.F.R. § 122.2, which references the definition at 40 C.F.R. § 403.3(o).

E. SLUDGE CONDITIONS

1. The permittee shall comply with all existing Federal and State laws and regulations that apply to sewage sludge use and disposal practices and with the Clean Water Act (CWA) Section 405(d) technical standards.

2. The permittee shall comply with the more stringent of either State (Env-Wq 800) or Federal (40 C.F.R. Part 503) requirements.

3. The technical standards (Part 503 regulations) apply to facilities which perform one or more of the following use or disposal practices.

    a. Land Application – The use of sewage sludge to condition or fertilize the soil.
    b. Surface Disposal – The placement of sewage sludge in a sludge only landfill.
    c. Fired in a sewage sludge incinerator.

4. The 40 C.F.R. Part 503 conditions do not apply to facilities that place sludge within a municipal solid waste landfill (MSWLF). Part 503 relies on 40 C.F.R. Part 258 criteria, which regulates landfill disposal, for sewage sludge disposed of in a MSWLF. These conditions also do not apply to facilities which do not dispose of sewage sludge during the life of the permit, but rather treat the sludge (lagoon, reed beds), or are otherwise excluded under 40 C.F.R. Part 503.6.

5. The permittee shall use and comply with the attached Sludge Compliance Guidance document to determine appropriate conditions. Appropriate conditions contain the following items:

    a. General Requirements
    b. Pollutant Limitations
    c. Operational Standards (pathogen reduction and vector attraction reductions requirements)
    d. Management Practices
    e. Record Keeping
    f. Monitoring
    g. Reporting

    Depending on the quality of material produced by a facility all conditions may not apply to the facility.

6. If the sludge disposal method requires monitoring, the permittee shall monitor the pollutant concentrations, pathogen reduction, and vector attraction reduction at the following frequency. The frequency is based upon the volume of sewage sludge generated at the facility in dry metric tons per year.

    a. Less than 290.....1/Year
    b. 290 to less than 1,500.....1/Quarter
    c. 1,500 to less than 15,000.....6/Year
    d. 15,000 plus.....1/Month

7. The permittee shall perform all required sewage sludge sampling using the procedures detailed in 40 C.F.R. Part 503.8.

8. When the permittee is responsible for an annual report containing the information specified in the regulations, the report shall be submitted by February 19th of each year. Reports shall be submitted to the address contained in the reporting section of the permit.

9. Sludge monitoring is not required by the permittee when the permittee is not responsible for the ultimate sludge use or disposal or when the sludge is disposed of in a MSWLF. The permittee must be assured that any third party contractor is in compliance with appropriate regulatory requirements. In such cases, the permittee is required only to submit an annual report by February 19th of each year containing the following information:

    a. Name and address of the contractor responsible for sludge use and disposal.
    b. Quantity of sludge in dry metric tons removed from the facility.

    Reports shall be submitted to the address contained in the reporting section of the permit.

F. COMBINED SEWER OVERFLOW CONDITIONS

1. Effluent Limitations

    a. During wet-weather periods, the permittee is authorized to discharge stormwater/wastewater from combined sewer overflows (CSOs) to receiving water (see Attachment B), subject to the following effluent limitations

        i. The discharges may not cause or contribute to violations of Federal or State water quality standards.

        ii. The discharges shall receive treatment at a level providing Best Practicable Control Technology Currently Available (BPT), Best Conventional Pollutant Control Technology (BCT) to control and abate conventional pollutants and Best Available Technology Economically Achievable (BAT) to control and abate non-conventional and toxic pollutants. EPA-New England has made a Best Professional Judgment

(BPJ) determination that BPT, BCT, and BAT for CSOs include the implementation of the nine Minimum Technology Based Limitations (MTBLs) specified below otherwise known as Nine Minimum Controls (NMC):

1. Proper operation and regular maintenance programs for the sewer system and the combined sewer overflow points;

2. Maximum use of the collection system for storage;

3. Review and modification of industrial pretreatment program requirements to assure CSO impacts are minimized;

4. Maximization of flow to the POTW for treatment;

5. Prohibition of dry weather overflows from CSOs;

6. Control of solid and floatable materials in CSO discharges;

7. Pollution prevention programs that focus on contaminant reduction activities;

8. Public notification to ensure that the public receives adequate notification of CSO occurrences and CSO impacts; and

9. Monitoring to effectively characterize CSO impacts and the efficacy of CSO controls.

iii. Implementation of these nine minimum controls is required by the effective date of this permit. The permittee shall implement these controls in accordance with Part I.F.2 of this permit. Within one year from permit issuance, the permittee shall submit to EPA and NHDES-WD a report titled "Report on Nine Minimum Control Measures". This document must include a detailed analysis of specific activities the permittee has undertaken and will undertake to implement the nine minimum controls and additional controls beyond the nine minimum controls the permittee can feasibly implement. The specific activities included in the documentation must include the minimum requirements set forth in Part I.F.2 of the permit and additional activities the permittee can reasonably undertake.

2. Nine Minimum Controls – Minimum Implementation Levels

a. The Permittee must implement the nine minimum controls in accordance with their nine minimum controls documentation and with any revisions to that documentation that

may be required. This implementation must include the following controls plus other controls the permittee can feasibly implement as set forth in the documentation.

b. Each CSO structure/regulator, pumping station and/or tidegate shall be routinely inspected, at a minimum of once per month, to insure that they are in good working condition and adjusted to minimize combined sewer discharges and tidal surcharging (Nine Minimum Control Numbers 1, 2, and 4). The following inspection results shall be recorded: date and time of the inspection, the general condition of the facility, and whether the facility is operating satisfactorily. If maintenance is necessary, the permittee shall record: the description of the necessary maintenance, the date the necessary maintenance was performed, and whether the observed problem was corrected. The permittee shall maintain all records of inspections for at least three years.

   Annually, not later than January 15th, the permittee shall submit a certification to EPA and the NHDES-WD which states that the previous calendar year's monthly inspections were conducted, results recorded, and records maintained.

   EPA and the NHDES-WD have the right to inspect any CSO related structure or outfall at any time without prior notification to the permittee

c. Discharges to the combined system of septage, holding tank wastes, or other material which may cause a visible sheen or containing floatable material are prohibited during wet weather when CSO discharge may be active (Nine Minimum Control Numbers 3, 6, and 7).

d. Dry weather overflows are prohibited (Nine Minimum Control Number 5). All dry weather sanitary and/or industrial discharges from CSOs must be reported to EPA and the NHDES-WD within 24 hours in accordance with the reporting requirements for plant bypass (paragraph D.1.e of Part II of this permit).

e. The permittee shall quantify and record all discharges from combined sewer outfalls (Nine Minimum Control Number 9). Quantification may be through direct measurement or estimation. When estimating, the permittee shall make reasonable efforts (i.e. gaging, measurement) to verify the validity of the estimation technique. The following information must be recorded for each combined sewer outfall for each discharge event:

   - Estimated duration (hours) of discharge;
   - Estimated volume (gallons) of discharge: and
   - National Weather Service precipitation data from the nearest gage where precipitation is available at daily (24-hour) intervals and the nearest gage where precipitation is available at one-hour intervals. Cumulative precipitation per discharge event shall be calculated.

The permittee shall maintain all records of discharges for at least six years after the effective date of this permit.

Annually, no later than January 15th, and in conjunction with the requirement in Part I.F.2.b. of this permit, the permittee shall submit a certification to EPA and the NHDES-WD which states that all discharges were recorded and records maintained for the previous calendar year.

f. The permittee shall install and maintain identification signs for all combined sewer outfall structures (Nine Minimum Control Number 8). The signs must be located at or near the combined sewer outfall structures and easily readable by the public. These signs shall be a minimum of 12 x 18 inches in size, with white lettering against a green background, and shall contain the following information:

TOWN OF EXETER
WET WEATHER
SEWAGE DISCHARGE
OUTFALL #

g. The permittee shall provide immediate notification to the NHDES-WD in the event of a CSO discharge.

h. The permittee shall provide notification to the public of CSO discharges and impacts on recreational uses of Clemson Pond and, if necessary, the Squamscott River.

3. CSO and Clemson Pond Monitoring

During the first full calendar year of the permit, the permittee shall perform sampling on the CSO inflow to Clemson Pond and at the outlet of Clemson Pond once per quarter. The permittee shall use NHDES Shellfish Monitoring Program stations to perform these samples. Influent samples to Clemson Pond shall be collected at Shellfish Monitoring Station SQMPS009 (42° 59' 4.92" N, 70° 56' 55.2" W). Samples at the outlet of Clemson Pond shall be collected just inside the tide gate and Shellfish Monitoring Station SQMPS010 (42° 59' 12.9" N, 70° 57' 1.98" W).

This sampling shall be performed once per quarter for a CSO event of at least 40,000 gallons. Samples shall be taken at each sampling station, SQMPS009 and SQMPS010 twice per day (2/day) for three (3) consecutive days. The first samples shall be collected as soon as practicable after the start of the CSO discharge.

Each sample collected shall be tested for Fecal Coliform Bacteria (MPN – 5 tube test), Enterococci Bacteria, salinity, and temperature.

At the end of the one year sampling period, the permittee shall submit the monitoring results to EPA and the NHDES by January 15th of the following year. If the monitoring data reveals the

need to add additional limits or conditions the permit may be modified or alternatively revoked and reissued.

G. MONITORING AND REPORTING

Monitoring results shall be summarized for each calendar month and reported on separate Discharge Monitoring Report Form(s) (DMRs) postmarked no later than the 15th day of the month following the completed reporting period.

Signed and dated original DMRs and all other reports or notifications required herein or in Part II shall be submitted to the Director at the following address:

U.S. Environmental Protection Agency
Water Technical Unit (SMR-04)
5 Post Office Square - Suite 100
Boston, MA 02109-3912

Duplicate signed copies (original signature) of all written reports or notifications required herein or in Part II shall be submitted to the State at:

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

All verbal reports or notifications shall be made to both EPA and NHDES.

H. STATE PERMIT CONDITIONS

1. The permittee shall not at any time, either alone or in conjunction with any person or persons, cause directly or indirectly the discharge of waste into the said receiving water unless it has been treated in such a manner as will not lower the legislated water quality classification or interfere with the uses assigned to said water by the New Hampshire Legislature (RSA 485-A:12).

2. This NPDES Discharge Permit is issued by EPA under Federal and State law. Upon final issuance by EPA, the New Hampshire Department of Environmental Services-Water Division (NHDES-WD) may adopt this permit, including all terms and conditions, as a State permit pursuant to RSA 485-A:13.

3. EPA shall have the right to enforce the terms and conditions of this Permit pursuant to federal law and NHDES-WD shall have the right to enforce the Permit pursuant to state law, if the Permit is adopted. Any modification, suspension or revocation of this Permit shall be effective only with respect to the Agency taking such action, and shall not affect the validity or status of the Permit as issued by the other Agency.

4. Pursuant to New Hampshire Statute RSA 485-A:13,I(c), any person responsible for a bypass or upset at a wastewater treatment facility shall give immediate notice of a bypass or upset to all public or privately owned water systems drawing water from the same receiving water and located within 20 miles downstream of the point of discharge regardless of whether or not it is on the same receiving water or on another surface water to which the receiving water is a tributary. The permittee shall maintain a list of persons, and their telephone numbers, who are to be notified immediately by telephone. In addition, written notification, which shall be postmarked within 3 days of the bypass or upset, shall be sent to such persons.

5. The pH range of 6.5 to 8.0 Standard Units (S.U.) must be achieved in the final effluent unless the permittee can demonstrate to NHDES-WD: (1) that the range should be widened due to naturally occurring conditions in the receiving water or (2) that the naturally occurring receiving water pH is not significantly altered by the permittee's discharge. The scope of any demonstration project must receive prior approval from NHDES-WD. In no case, shall the above procedure result in pH limits outside the range of 6.0 – 9.0 S.U., which is the federal effluent limitation guideline regulation for pH for secondary treatment and is found in 40 CFR 133.102(c).

6. Pursuant to New Hampshire Code of Administrative Rules, Env-Wq 703.07(a):

   (a) Any person proposing to construct or modify any of the following shall submit an application for a sewer connection permit to the department:

   (1) Any extension of a collector or interceptor, whether public or private, regardless of flow;

   (2) Any wastewater connection or other discharge in excess of 5,000 gpd;

   (3) Any wastewater connection or other discharge to a WWTP operating in excess of 80 percent design flow capacity based on actual average flow for 3 consecutive months;

   (4) Any industrial wastewater connection or change in existing discharge of industrial wastewater, regardless of quality or quantity; and

   (5) Any sewage pumping station greater than 50 gpm or serving more than one building.

7. For each new or increased discharge of industrial waste to the POTW, the permittee shall submit, in accordance with Env-Ws 904.14(e) an "Industrial Wastewater Discharge Request Application" approved by the permittee in accordance with 904.13(a). The "Industrial Wastewater Discharge Request Application" shall be prepared in accordance with Env-Ws 904.10.

8. Pursuant to Env-Ws 904.17, at a frequency no less than every five years, permittees are required to submit:

a. A copy of its current sewer use ordinance. The sewer use ordinance shall include local limits pursuant to Env-Ws 904.04 (a).

b. A current list of all significant indirect discharges to the POTW. As a minimum, the list shall include for each industry, its name and address, the name and daytime telephone number of a contact person, products manufactured, industrial processes used, existing pretreatment processes, and discharge permit status.

c. A list of all permitted indirect dischargers; and

d. A certification that the municipality is strictly enforcing its sewer use ordinance and all discharge permits it has issued.

9. If chlorine is used for disinfection, a recorder which continuously records the chlorine residual prior to dechlorination shall be provided. The minimum, maximum and average daily residual chlorine values, measured prior to dechlorination, shall be submitted with monthly Discharge Monitoring Reports. Charts from the recorder, showing the continuous chlorine residual shall be maintained by the permittee for a period no less than (5) years.

10. The Exeter Public Works Department/Wastewater Treatment Facility is responsible for immediately notifying the New Hampshire Department of Environmental Services, Watershed Management Bureau, Shellfish Section of possible high bacteria/virus loading events from the facility or its sewage collection infrastructure. Such events include:

    a. Any lapse or interruption of normal operation of the Wastewater Treatment Plant's disinfection system, or other event that results in the discharge of sewage from the Wastewater Treatment Plant or sewer infrastructure (pump stations, manholes, combined sewer overflows, etc.) that has not undergone full treatment as specified in the NPDES permit, or

    b. Daily flows in excess of the 3.0 MGD design flow for the facility, or

    c. Daily post-disinfection effluent sample result of 43 fecal coliform/100ml or greater. Notification shall also be made for instances where NPDES-related bacteria sampling is not completed, or where the results of such sampling are invalid.

    "Immediate" notification with respect to reporting daily post-disinfection effluent sample results shall mean "as soon as the laboratory tests are completed".

    The notification requirement also applies to all incidents of combined sewer overflow discharges. Notification to the NHDES Shellfish Program shall be made using the program's 24-hour pager. Upon initial notification of a possible high bacteria/virus loading event, NHDES Shellfish Program staff will determine the most suitable interval for continued notification and updates on an event-by-event basis.

11. In addition to submitting DMRs, monitoring results shall also be summarized for each calendar month and reported on separate Monthly Operating Report Form(s) (MORs) postmarked no later than the 15th day of the month following the completed reporting period. Signed and dated MORs shall be submitted to:

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

I. SPECIAL CONDITIONS

1. pH Limit Adjustment

The Permittee may submit a written request to the EPA requesting a change in the permitted pH limit range to be not less restrictive than 6.0 to 9.0 Standard Units found in the applicable National Effluent Limitation Guideline (Secondary Treatment Regulations in 40 C.F.R. Part 133) for this facility. The Permittee's written request must include the State's letter containing an original signature (no copies). The State's approval letter shall state that the Permittee has demonstrated to the State's satisfaction that as long as discharges to the receiving water from a specific outfall are within a specific numeric pH range, the naturally occurring receiving water pH will be unaltered. The letter must specify for each outfall the associated numeric pH limit range. Until written notice is received by certified mail from the EPA indicating the pH limit range has been changed, the Permittee is required to meet the permitted pH limit range in the respective permit.

2. Requirements for POTWs with Effluent Diffusers

a) Effluent diffusers shall be maintained when necessary to ensure proper operation. Proper operation means that the plumes from each port will be balanced relative to each other and that they all have unobstructed flow. Maintenance may include dredging in the vicinity of the diffuser, cleaning out of solids in the diffuser header pipe, removal of debris and repair/replacement of riser ports and pinch valves.

b) Any necessary maintenance dredging must be performed only during the marine construction season authorized by the New Hampshire Fish and Game Department and only after receiving all necessary permits including those from the NHDES Wetlands Bureau, U.S. Coast Guard, and the U.S. Army Corps of Engineers.

c) To determine if maintenance will be required, the permittee shall have a licensed diver or licensed marine contractor inspect and videotape the operation of the diffuser. The inspections and videotaping shall be performed once every two years with the first inspection required during the first calendar year following final permit issuance.

d) Copies of a report summarizing the results of each diffuser inspection shall be submitted to EPA and NHDES-WD by December 31st of the year the inspection occurred. Where it is determined that maintenance will be necessary, the permittee shall also provide the proposed schedule for the maintenance.

3. Nonpoint Source Nitrogen Reductions

In order to achieve water quality standards in the Squamscott River significant reductions in non-point sources of total nitrogen are necessary in conjunction with achieving the total nitrogen limitations in this discharge permit. Achieving the necessary nonpoint source reductions will require collaboration between the State of New Hampshire and public, private, and commercial stakeholders within the watershed to: (1) complete nonpoint source loading analyses; (2) complete analyses of the costs for controlling sources; and (3) developing control plans that include:

a. A description of appropriate financing and regulatory mechanisms to implement the necessary reductions;

b. An implementation schedule to achieve reductions (this schedule may extend beyond the term of this permit); and

c. A monitoring plan to assess the extent to which the reductions are achieved.

Following issuance of the final permit, EPA will review the status of the activities described above in items (1), (2), and (3) at 12 month intervals from the date of issuance. In the event the activities described above are not carried out within the timeframe of this permit (5 years), EPA will reopen the permit and incorporate any more stringent total nitrogen limit required to assure compliance with applicable water quality standards.

The State of New Hampshire
Department of Environmental Services

Thomas S. Burack, Commissioner

January 23, 2012

MR. MICHAEL JEFFERS
EXETER WATER AND SEWER DEPT
13 NEWFIELDS ROAD
EXETER, NH 03833

GROUNDWATER DISCHARGE PERMIT

SUBJECT: **EXETER** – Exeter Wastewater Treatment Facility, Newfields Road, Groundwater Discharge Permit
Site# 198401079 / RSN# 25/ Activity# 179360

Dear Mr. Jeffers:

Please find enclosed the Groundwater Discharge Permit Number GWP-198401079-E-001, approved by the Water Division of the Department of Environmental Services (Department), for the discharge of treated domestic wastewater from the existing unlined lagoons.

Please note in Condition #12 that arsenic and boron are included in the regular groundwater sampling and volatile organic compound (VOC) sampling now includes analysis for 1,4-Dioxane performed with a detection limit of 0.25 micrograms per liter (ug/l) or less. The Department suggests you contact your laboratory to inform them of this requirement to ensure they use the appropriate analytical procedure.

Also note that if groundwater sampling has not been conducted the permittee is require to conduct a complete round of sampling and analysis within 60 days of the date of permit issuance.

Should you have any questions, please contact me at the Water Division at (603) 271-2858 or by e-mail at *Mitchell.locker@des.nh.gov*.

Sincerely,

Mitchell Locker, P.G.
Drinking Water & Groundwater Bureau

MDL/mdl/h:\Hydrology & Conservation\Programs\uic\2012mdl\permits\198401079-E-001 uwwlag
Enclosure
e-copy: Stephen Roy, DWGB
File # 198401079
Copy: Russ Dean, Administrator, Town of Exeter

NEW HAMPSHIRE DEPARTMENT OF
Environmental Services

The

NEW HAMPSHIRE DEPARTMENT OF ENVIRONMENTAL SERVICES

hereby issues

GROUNDWATER DISCHARGE PERMIT

NO. GWP-198401079-E-001

to the permittee

TOWN OF EXETER

for the discharge of domestic wastewater

in EXETER, NH

to the groundwater via unlined lagoon exfiltration

as depicted on the drawings titled "Groundwater Permit Application Plan"

TO: TOWN OF EXETER
10 FRONT STREET
EXETER, NH 03833
ATTN: MICHAEL JEFFERS

Date of Issuance: January 23, 2012
Date of Expiration: January 22, 2017

(continued)

Pursuant to authority in N.H. RSA 485-A:13, I(a), the New Hampshire Department of Environmental Services (Department), hereby grants this permit to discharge treated wastewater to the groundwater at the above described site, subject to the following conditions:

STANDARD DISCHARGE PERMIT CONDITIONS

1. The permittee shall not violate Ambient Groundwater Quality Standards adopted by the Department (N.H. Admin. Rules, Env-Wq 402) in the groundwater, at the boundary of the Groundwater Discharge Zone, as shown on the referenced site plan.

2. The permittee shall not cause groundwater degradation, which results in a violation of the surface water quality standards (N.H. Admin. Rules, Env-Wq 1700), in any surface water body at the boundary of the Groundwater Discharge Zone.

3. The permittee shall allow an authorized member of the Department staff, or its agent, to enter the property covered by this permit for the purpose of collecting information, examining records, collecting samples, or undertaking other action associated with the permit.

4. The permittee shall apply for renewal of this permit at least 90 days prior to its expiration date. The permittee shall continue to comply with all conditions in this permit until the permit is renewed or the facility is closed in accordance with all applicable requirements, regardless of whether a renewal application is filed.

5. This permit is transferable only upon written request to, and approval of, the Department. Compliance with the existing permit shall be established prior to ownership transfer. Transfer requests shall include the name and address of the person to whom the permit transfer is requested, signature of the current permittee, and a summary of all monitoring results to date.

6. The Department reserves the right, under N.H. Admin. Rules, Env-Wq 402, to require additional hydrogeologic studies and/or remedial measures if the Department receives information indicating a need for such work.

7. Issuance of this permit does not exempt the permittee from any other applicable or requisite local approvals that are stipulated by the municipality in which it is located.

8. The permittee shall submit as-built plans subsequent to additional monitoring well installation, system improvements or expansions, or any other construction activity associated with the treatment and disposal system.

9. Issuance of this permit is based on the groundwater discharge permit application package dated January 4, 2012.

10. All grit, oil, sludge, or other wastes which result from the operation of the treatment system shall be disposed of only in a facility approved by the Department for such disposal.

11. The permittee shall submit detailed design plans to the Department's Wastewater Engineering Bureau for review and approval for any proposed improvements and/or expansions prior to any construction activity. No discharge to expanded facilities shall be allowed without the written approval from the Department.

12. The permittee shall maintain a water quality monitoring program and submit monitoring results to the Department's Groundwater Discharge Permits Coordinator no later than 45 days after sampling. Samples shall be taken from on-site monitoring wells, listed on the following table in accordance with the schedule outlined therein.

Monitoring Locations	*Sampling Frequency	Parameters
MW- 2, 3, & 4	May and November Of each year	Arsenic, Boron, Chloride, Nitrate, pH, TKN, Total Phosphorus, Static Water Elevation, E*scherichia coli*, and Temp.
MW-2, 3, & 4	November 2014 and May 2017	**VOCs using EPA Method 8260B Drinking Water Metals
Effluent	Weekly	Continuous flow

** if groundwater sampling has not been conducted the permittee is require to conduct a complete round of sampling and analysis within 60 days of the date of permit issuance*
*** VOCs analysis shall include 1,4-Dioxane results with detection levels at 0.25 micrograms/liter (ug/l) or less*

Samples shall be obtained using sampling procedures and protocol described in "Practical Guide for Ground-Water Sampling," USEPA current edition, and "RCRA Ground-Water Monitoring Enforcement Guidance," USEPA current edition. Samples shall be analyzed by a laboratory certified by the U.S. Environmental Protection Agency or the New Hampshire Department of Environmental Services. Metals shall be analyzed for dissolved metals and must be field-filtered (with a 0.45-micron filter) and acidified at the time of sample collection. As referred to herein, the term "Drinking Water Metals" refers to: arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver.

13. The permittee shall notify the Department's Groundwater Discharge Permits Coordinator, in writing of alteration to, or abandonment of the lagoons.

14. An annual summary of groundwater quality data shall be submitted to the Department's Groundwater Discharge Permits Coordinator in the month of January using a format acceptable to the Department.

15. The wastewater treatment facility shall be operated and maintained by qualified operators, licensed by the Department if required in N.H. Admin. Rules, Env-Ws 901.

16. The permittee shall submit completed monthly operations reports (MORs) to the Department's Wastewater Engineering Bureau, Operations Section.

17. If a regulated contaminant is detected in a monitoring well at a concentration that violates ambient groundwater quality standards, the permittee shall notify the Department's Groundwater Discharge Permits Coordinator within 10 days and prepare a response plan (in accordance with N.H. Admin. Rules, Env-Ws 1500) within 60 days of notifying the Department to ensure that groundwater quality criteria are not violated at the boundary of the Groundwater Discharge Zone. The permittee shall implement the response plan within 30 days of Department approval.

18. The property boundaries are considered the limits of the groundwater discharge zone for this permit.

Rene Pelletier, Assistant Director
Water Division

Under RSA 21-0:14 and 21-0:7-IV, any person aggrieved by any terms or conditions of this permit may appeal to the Water Council in accordance with RSA 541-A and N.H. Admin. Rules, Env-WC 200. Such appeal must be made to the Council within 30 days and must be addressed to the Chairman, Water Council, 29 Hazen Drive, PO Box 95, Concord, NH 03302-0095.

APPENDIX B

Technical Memoranda

For October 2014 Prelim. Draft

WRIGHT-PIERCE
Engineering a Better Environment

MEMORANDUM

TO: EJL, DAM, JRM

DATE: June 10, 2014

FROM: DLS, MPS, WDH

PROJECT No.: 12883A

SUBJECT: Exeter, New Hampshire
Wastewater Treatment Facility
Preliminary Nutrient Removal Analysis for Facilities Plan

1 INTRODUCTION

The purpose of this memorandum is to develop and analyze process alternatives for nitrogen removal at the Exeter Wastewater Treatment Facility. Process alternatives were evaluated in anticipation of seasonal (April through October) effluent total nitrogen (TN) limits of 8 and 3 mg/L.

2 FLOWS AND LOADS

Design flows and loads for the facility were projected in an earlier memo (Wright-Pierce, April 2014). A summary of the flows and loads data is presented in Table 1.

TABLE 1

PRELIMINARY FLOWS AND LOADS SUMMARY

	FLOW	BOD		TSS		TKN		TP	
PARAMETER	MGD	mg/L	lb/day	mg/L	lb/day	mg/L	lb/day	mg/L	lb/day
Annual Average	3.0	200	5,000	216	5,400	44.0	1100	6.0	150
Maximum Month	5.0	187	7,800	187	7,800	38	1600	5.4	225
Maximum Day	6.6	173	9,500	187	10,310	38	2100	3.1	290
Peak Instantaneous*	6.6*	-	-	-	-	-	-	-	-

*Peak instantaneous flow managed via influent equalization.

3 PRELIMINARY TECHNOLOGY SCREENING

Due to uncertainty in future permitting, a major criterion for technology selection will be its ability for phased expansion to ultimately meet the limit of technology for total nitrogen (TN), which is considered as 3 mg/L. The Town has negotiated an Administrative Order on Consent (AOC) that requires achieving a limit of 8 mg/L TN within five years. Therefore, the technologies evaluated are:

1. Modified Ludzack-Ettinger (to meet effluent TN of 8 mg/L)
2. 4-Stage Bardenpho (to meet effluent TN of 3.5 mg/L)
3. Tertiary denitrification filter for either process (to meet effluent TN of 3 mg/L)

These are described further below.

3.1 Modified Ludzack-Ettinger Process

The Modified Ludzack-Ettinger (MLE) process is configured with anoxic reactors preceding the aerated reactors of an activated sludge system. Influent wastewater and return activated sludge (RAS) are fed into the anoxic reactor. This configuration of the reactors uses the organic carbon present in the influent wastewater for denitrification. The process flow diagram is shown in Figure 1.

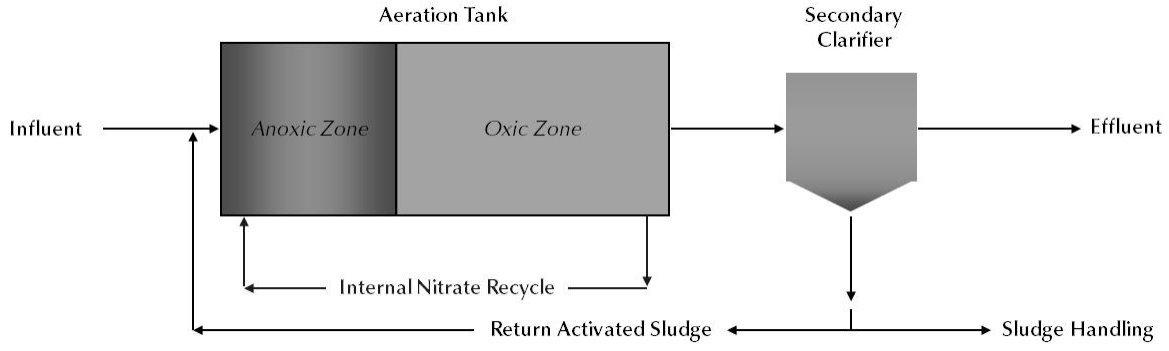

FIGURE 1

MLE PROCESS FLOW DIAGRAM

To achieve biological nitrogen removal, ammonia must first be completely transformed to nitrate (nitrification) in the oxic zone of the activated sludge system. Nitrates produced in the aerobic zone are then recycled back to the anoxic zone through a pumped internal recycle system, allowing them to come in contact with the raw soluble BOD_5, thus creating anoxic conditions within the zone conducive for denitrification.

The limit of technology for the MLE process is typically considered between 6 to 10 mg/l of effluent total nitrogen. The effluent total nitrogen level achieved is highly dependent on the amount of influent substrate carbon available for the denitrification process. Increasing the influent carbon to nitrogen ratio typically results in improved performance.

3.2 Four-Stage Bardenpho Process

The Bardenpho process has been used successfully to meet a total nitrogen limit of 3.0 mg/l. New England installations include Glastonbury, CT; Fairfield, CT; Stratford, CT; and Waterbury, CT. The 4-stage Bardenpho process, shown in Figure 2 includes a primary anoxic zone, primary oxic zone, secondary anoxic zone, and reaeration zone in series through the aeration tank. The first anoxic zone and oxic zone work essentially the same as the MLE process. Nitrates are recycled from the effluent end of the first oxic stage to the first anoxic stage. However, a secondary anoxic zone is also provided for additional denitrification to further reduce the effluent total nitrogen from this process. The re-aeration zone at the end is provided to add dissolved oxygen to the mixed liquor prior to the secondary clarifiers. To provide sufficient substrate (carbon) to complete the denitrification reactions, a supplemental carbon source is typically utilized in the secondary anoxic zone. This reduces the necessary size of the second anoxic zone compared to relying on endogenous decay.

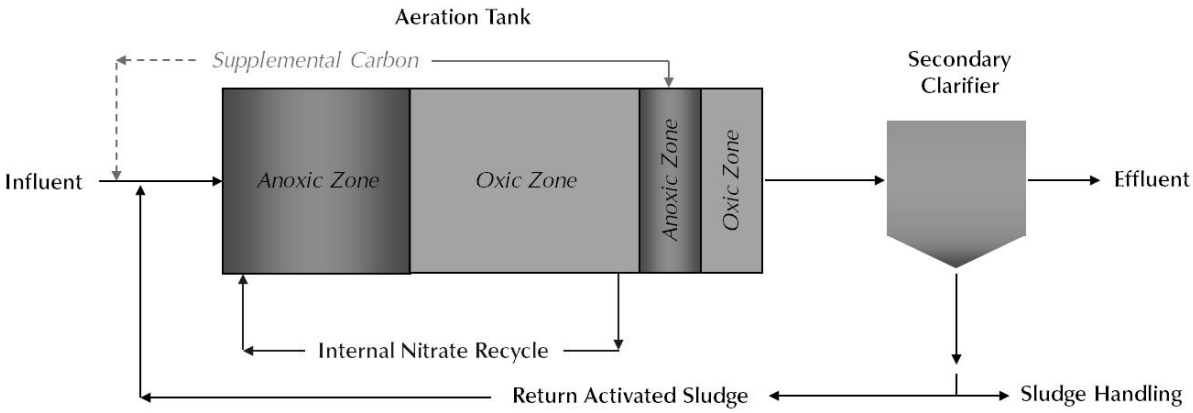

FIGURE 2

4-STAGE BARDENPHO PROCESS FLOW DIAGRAM

The limit of technology for the 4-stage Bardenpho process is considered to be 3.5 mg/L of effluent total nitrogen, depending on recalcitrant organic nitrogen in the wastewater as well as effluent particulate nitrogen levels. Effluent total nitrogen will consist of the following components: ammonia, nitrate/nitrate, and particulate and dissolved organic nitrogen. Ammonia reduction is achieved via nitrification which can occur in the existing secondary treatment process. The effluent ammonia level achievable via nitrification is a function of the sludge retention time and the process operating characteristics (i.e., temperature, pH, dissolved oxygen level, etc.). A well designed and operated system should routinely achieve an effluent ammonia level of less than 1.0 mg/l.

Nitrate/nitrite levels consistently below 0.5 mg/l should be achievable with an established nutrient removal process such as the 4-Stage Bardenpho process. Supplemental carbon should be included in the design (whether used or not) to provide some assurance that the process can reliably achieve the proposed limits under varying conditions.

The level of organic nitrogen in the effluent is difficult to predict, particularly because there is little information on recalcitrant dissolved organic nitrogen (rDON) quantities in the plant

influent. rDON is an untreatable form of nitrogen characterized primarily as free amino acids and high molecular weight humic substances. Recalcitrant effluent dissolved organic nitrogen (rEDON) includes rDON and substances that are produced by treatment processes, such as biopolymers. rEDON typically ranges from 0.5 to 2 mg/l in municipal wastewater influent. Since a well-functioning nitrogen removal process consistently produces a total inorganic nitrogen concentration of up to 1.5 mg/l, a high influent rEDON value on a regular basis will prevent a wastewater treatment plant from achieving a 3 mg/l effluent TN limit.

Currently there is no consensus on a testing method to measure rEDON levels from a biological treatment process. It can be approximated by measuring dissolved organic nitrogen from the effluent of a pilot or full-scale plant, which is done by testing dissolved kjehldahl nitrogen and subtracting ammonia. Thus the ability of treatment processes to meet 3 mg/L effluent TN limits consistently at Exeter can only be determined by pilot or full-scale testing.

3.3 Tertiary Denitrification Filter

Tertiary technologies are installed downstream of secondary systems to provide additional nitrogen removal. These systems do not take advantage of influent carbon energy, so they require supplemental carbon to drive denitrification.

Denitrification filters represent a group of technologies that include the traditional sand-bed denitrification filters(such as Tetra denite® or Leopold elimi-NITE®), continuously-backwashed filters (such as Parkson Dynasand®), and filters with plastic media (Kruger Biostyr® or IDI BioFOR®). All use filter media for two primary functions: 1) act as a carrier material that supports biomass growth for denitrification and 2) as a filtration medium to remove a portion of solids from the liquid stream.

For the purpose of this evaluation, it is assumed that the activated sludge system will be used to reduce TN to less than 8 mg/L (MLE process) or 3.5 mg/L (Bardenpho process), and a tertiary denitrification filter will be used to meet future permit requirements of 3 mg/L or less.

4 DETAILED ALTERNATIVES ANALYSIS

The alternatives selected for further investigation were analyzed for their capability to meet the potential effluent TN limits of 8 and 3 mg/L. The alternatives were evaluated based on BioWin 4.0 process modeling results. In order to account for flexibility provided by the seasonal rolling average of the TN limit, the MLE alternative was developed to provide an effluent TN of 9.5 during maximum month loadings and 8 mg/L during average annual loadings. Likewise the 4-Stage Bardenpho alternative was developed to provide an effluent TN of 4 mg/L during maximum month loadings and 3.5 mg/L during average annual loadings. The process models were not calibrated due to limited data and therefore used Biowin default wastewater characterization, kinetic, and stoichiometric parameters.

Note that the modeling assumed no primary clarification in order to provide a basis of comparison of the MLE and 4-stage Bardenpho processes to alternative technologies.

4.1 Process Modeling Results

4.1.1 Modified Ludzack-Ettinger (MLE)

The MLE process was modeled at future design annual average and maximum month conditions to determine process requirements for treatment at future conditions to 8 mg/L TN. Preliminary loadings for future design annual average and maximum month loadings as listed in Table 1 forecast very high design influent TN concentrations. Influent TN should be verified with further sampling. If forecasted loadings remain unchanged, model results indicate that the MLE process will not be capable of achieving 8 mg/L and a 4-stage Bardenpho process will be needed.

In order to establish the maximum capacity of the MLE process to meet a TN limit of 8 mg/L without supplemental carbon addition, the model was used to simulate reduced influent TKN concentrations. Results are shown in Table 2.

The model results indicate that maximum design TKN concentrations of 37 mg/L (compared with preliminary design concentration of 44 mg/L) during average annual conditions and 36 mg/L (compared with preliminary design concentration of 38 mg/L) during maximum month conditions would be capable of being treated using the MLE process.

Wastewater temperature was assumed to be 10°C for modeling the maximum month scenario to account for the possibility of maximum month conditions occurring in April, when wastewater temperatures tend to be below average. Since the permit requirements are based on a 214-day rolling average (April 1 to October 31), 16°C was assumed for annual average conditions.

Influent VSS was assumed to be 90% of TSS, based on recent sampling results from the facility. Influent pH was assumed to be 7.0. Sampling indicated that influent alkalinity ranged from 100 to 150 mg/L $CaCO_3$. Therefore the alkalinity was assumed to be 150 mg/L $CaCO_3$. In order to foster optimal nitrification, the alkalinity should be sufficient to maintain pH for secondary treatment above 6.5.

TABLE 2
MLE PROCESS MODELING RESULTS – FUTURE DESIGN CONDITIONS

	Annual Average (2 Trains)	Annual Average (3 Trains)	Max Month (3 Trains)
Plant Influent			
Flow rate, mgd	3.00	3.00	5.00
Peak Day Flow Rate, mgd	6.60	6.60	6.60
Peak Inst. Flow Rate, mgd	9.50	9.50	9.50
Peak Inst. Flow Rate to Secondary Process, mgd	6.60	6.60	6.60
BOD5, mg/L	200	200	187
TSS, mg/L	216	216	187
VSS, mg/L	194	194	168
TKN, mg/L	37.0	37.0	36.0
NH3, mg/L	33.0	33.0	28.5
NOx, mg/l	0.0	0.0	0.0
P, mg/L	6.0	6.0	5.0
Ortho P, mg/l	3.4	3.4	2.8
Temp, C	16	16	10
Aeration Tanks			
No. of Tanks per Train	2	2	2
Total No. of Tanks	4	6	6
Total Volume, Mgal	1.47	2.20	2.20
HRT, Anoxic Zone, hr	2.94	4.40	2.64
MLVSS, Oxic Zone, mg/L	2329	1556	3313
MLSS, Oxic Zone, mg/L	2918	1950	4140
HRT, Oxic Zone, hr	8.81	13.20	7.92
HRT, Total, hr	11.74	17.60	10.56
Aerobic SRT, days	8.00	12.00	12.00
Actual Oxygen Requirement, lb/d	7,234	7,226	11,743
Standard Oxygen Requirement, lb/d	21,111	21,087	34,090
Total estimated airflow, scfm	2,710	2,710	4,450
Internal Recyle, mgd	12.00	12.00	20.00
Supplemental Alkalinity, lb/d $CaCO_3$	1,500	1,500	2,500
Supplemental Carbon, methanol gpd	0	0	0
Secondary Clarifiers			
No. of Tanks Online	2	3	3

	Annual Average (2 Trains)	Annual Average (3 Trains)	Max Month (3 Trains)
Diameter, ft	75	75	75
Depth, ft	16	16	16
SOR, average day, gal/sf/d	442	295	495
SLR, peak day, lb/sf/d	31.4	14.8	31.4
Effluent Quality			
Effluent BOD5, mg/l	3.5	3.2	3.8
Effluent COD, mg/l	31.6	30.9	32.0
Effluent TKN, mg/l	2.6	2.6	3.0
Effluent NH3, mg/l	1.0	1.0	1.0
Effluent NOx, mg/l	5.4	5.4	6.3
Effluent TN, mg/l	8.0	8.0	9.3
Effluent TN, lbs/day	197	197	384
Effluent P, mg/l	3.1	3.1	2.6
Effluent TSS, mg/l	7.7	7.2	9.5
Waste Activated Sludge			
Flow rate, mgd	0.06	0.07	0.0501
TSS, mg/L	7,061	5,817	12,383
VSS, mg/L	5,632	4,639	9,906
WAS, lb/d	3,352	3,360	4,753

Aeration tank volumes were designed to meet an effluent TN limit of 8 mg/L at an approximate MLSS concentration of 4,000 mg/L with 2 trains online for average annual loadings and 3 trains online for maximum month loadings.

The results from the analysis indicate that an MLE process could be used to meet an effluent TN permit limit of 8 mg/L under design annual average flow conditions. At maximum month conditions, the MLE process is able to achieve a TN concentration of 9.3 mg/L with three trains online.

As shown in Table 2, in order to provide sufficient aerobic solids retention time of 12 days at maximum month conditions to ensure nitrification at the low temperature of 10°C, a mixed liquor suspended solids (MLSS) concentration in the secondary system of 4,140 mg/L was maintained. State-point analysis was used to size the secondary clarifiers for this loading condition at peak daily flows. The graph in Figure 3 shows the state point assuming three 75-foot clarifiers on-line. In addition, state point analysis (not shown) indicated that sufficient clarification capacity for future average loadings could be provided with only two 75-foot clarifiers on-line. Surface Overflow Rates (SOR) and Solids Loading Rates (SLR) for this secondary clarifier area are shown in Table 2 and are well within TR-16 recommendations.

Aeration and mixing requirements for the MLE process are shown in Table 3.

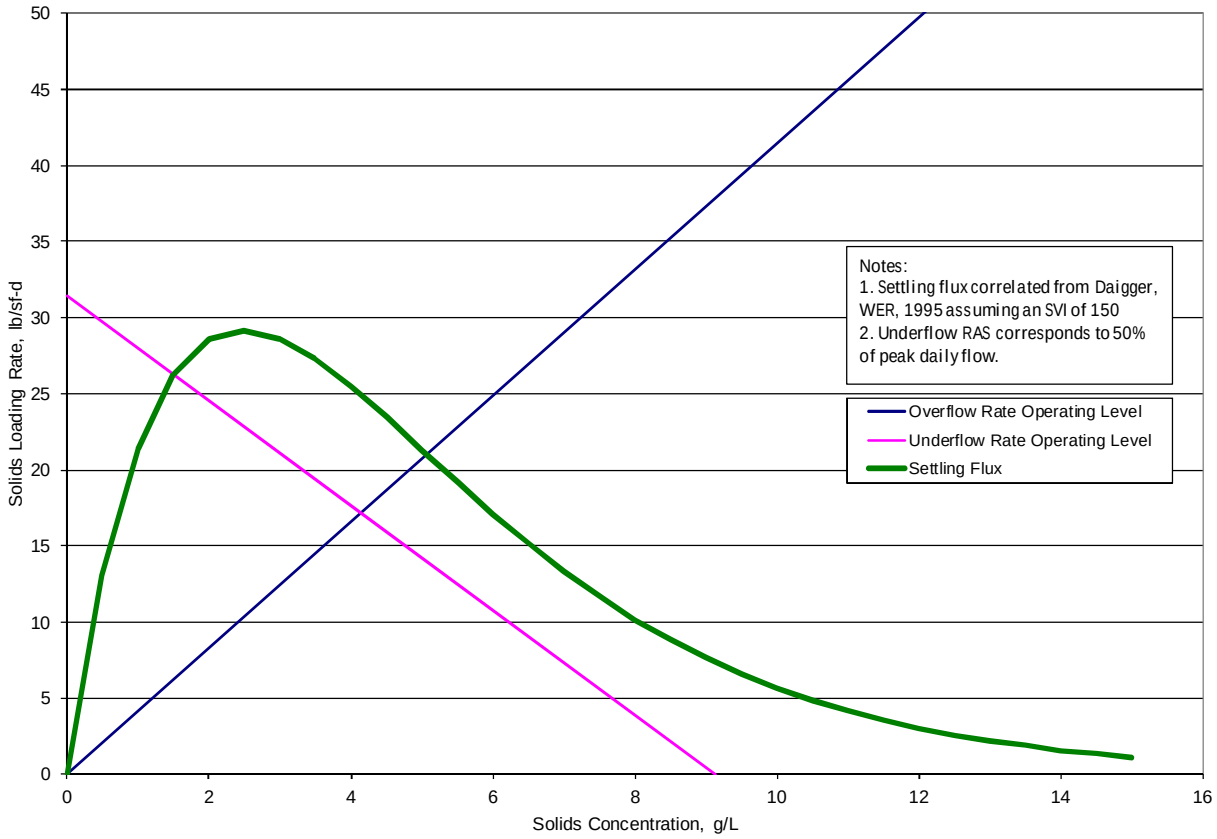

FIGURE 3

STATE POINT ANALYSIS FOR MLE PROCESS – FUTURE DESIGN CONDITIONS

TABLE 3

FUTURE AERATION AND MIXING REQUIREMENTS FOR MLE PROCESS

	Aeration Energy		Peak Day	
Mixing Energy	**Average Winter**	**Average Summer**	**Total Capacity Required**	**Air Demand**
(HP)	(HP)	(HP)	(HP)	
19	100	150	300	5,000 scfm @ 9.1 psi

Modeling indicated that an influent alkalinity of 150 mg/L CaCO3 would not be sufficient to maintain a secondary system pH greater than 6.5. Chemical addition requirements to maintain sufficient alkalinity are shown in Table 4.

TABLE 4

CHEMICAL ADDITION REQUIREMENTS FOR MLE PROCESS

	Alkalinity (lb/d $CaCO_3$)	Supplemental Carbon (gpd methanol)
Annual Average	1,500	0
Maximum Month	2,500	0

4.1.2 4-Stage Bardenpho

The 4-stage Bardenpho process was modeled at design annual average and maximum month conditions to determine the ability to meet TN concentration of 3.5 mg/L through the secondary process. Aeration tank volumes were designed to meet the effluent TN limit at an approximate MLSS concentration of 4,000 mg/L with 2 trains online for average annual loadings and 3 trains online for maximum month loadings. Results are shown in Table 5.

Pre-anoxic and pre-aerobic zone volumes were held to the same volumes as the MLE aeration tanks. Sizes were established to allow each system to meet its target effluent TN concentrations. This would allow future expansion of the MLE process to convert to a 4-stage Bardenpho through addition of post-anoxic and re-aeration zones to meet more stringent TN permit requirements.

Wastewater temperature was held at 10°C for both annual average and maximum month modeling to assume the worst-case temperature for design at all conditions.

Influent VSS was assumed to be 90% of TSS, based on recent sampling results from the facility. Influent pH was assumed to be 7.0. Influent alkalinity was assumed to be 150 mg/L CaCO3 based on sampling results.

TABLE 5
4-STAGE BARDENPHO PROCESS MODELING RESULTS –
FUTURE DESIGN CONDITIONS

	Annual Average (2 Trains)	Annual Average (3 Trains)	Max Month (3 Trains)
Plant Influent			
Flow rate, mgd	3.00	3.00	5.00
Peak Day Flow Rate, mgd	6.60	6.60	6.60
Peak Inst. Flow Rate, mgd	9.50	9.50	9.50
Peak Inst. Flow Rate to Secondary Process, mgd	6.60	6.60	6.60
BOD5, mg/L	200	200	187
TSS, mg/L	216	216	187
VSS, mg/L	194	194	168
TKN, mg/L	44.0	44.0	38.0
NH3, mg/L	33.0	33.0	28.5
NOx, mg/l	0.0	0.0	0.0
P, mg/L	6.0	6.0	5.0
Ortho P, mg/l	3.4	3.4	2.8
Temp, C	10	10	10
Aeration Tanks			
No. of Tanks per Train	4	4	4
Total No. of Tanks	8	12	12
Total Volume, Mgal	1.86	2.78	2.78
Volume, Pre-Anoxic, Mgal	0.37	0.55	0.55
Volume, Post-Anoxic, Mgal	0.37	0.56	0.56
HRT, Total Anoxic, hr	5.92	8.88	5.30
Volume, Pre-Aerobic Mgal	1.10	1.65	1.65
Volume, Re-Aeration, Mgal	0.02	0.02	0.02
HRT, Pre-Aerobic, hr	8.80	13.20	7.92
HRT, Total Aerobic, hr	8.92	13.38	8.03
SRT, Aerobic, days	8.00	8.00	12.00
MLVSS, Oxic Zone, mg/L	2667	1631	3286
MLSS, Oxic Zone, mg/L	3310	2018	4109
HRT, Total, hr	14.84	22.26	13.33
Actual Oxygen Requirement, lb/d	8,136	8,004	11,820
Standard Oxygen Requirement, lb/d	23,743	23,358	34,310
Total estimated airflow, scfm	3,097	3,046	4,475
Internal Recyle, mgd	12.00	12.00	20.00
Supplemental Alkalinity Addition, lb/d $CaCO_3$	1,750	1,750	2,550
Supplemental Carbon Addition,	100	100	25

	Annual Average (2 Trains)	Annual Average (3 Trains)	Max Month (3 Trains)
methanol gpd			
Supplemental Carbon Addition, lbsCOD/day	991	991	248
Secondary Clarifier			
No. of Tanks Online	2	3	3
Diameter, ft	75	75	75
Depth, ft	16	16	16
SOR, average day, gal/sf/d	445	296	495
SLR, peak day, lb/sf/d	33.4	13.6	31.1
Effluent Quality			
Effluent BOD5, mg/l	3.4	2.4	3.0
Effluent COD, mg/l	32.4	28.4	32.3
Effluent TKN, mg/l	1.5	1.5	3.1
Effluent NH3, mg/l	1.0	1.0	1.0
Effluent NOx, mg/l	1.0	1.0	1.2
Effluent TN, mg/l	3.5	3.5	3.8
Effluent TN, lbs/day	74	74	155
Effluent P, mg/l	3.3	2.9	2.6
Effluent TSS, mg/l	8.1	4.5	9.4
Waste Activated Sludge			
Flow rate, mgd	0.0332	0.07	0.0459
TSS, mg/L	9,892	6,028	12,274
VSS, mg/L	7,967	4,868	9,807
WAS, lb/d	3,380	3,538	4,699

As shown in Table 3, expanding the MLE process presented in Section 4.1.1 to a 4-stage Bardenpho process with carbon addition will allow treatment to 3.5 mg/L TN. The model shows the Bardenpho process achieving TN concentrations 3.8 mg/L at maximum month conditions. As discussed previously, it is assumed that a tertiary denitrification filter will be used to achieve treatment to below 3 mg/L TN.

As shown in the Table 3, in order to provide sufficient aerobic solids retention time of 12 days at maximum month conditions to ensure nitrification at the low temperature of 10°C, a mixed liquor suspended solids (MLSS) concentration in the secondary system of 4,109 mg/L was

maintained. State-point analysis was used to size the secondary clarifiers for this loading condition at peak daily flows. The graph in Figure 4 shows the state point assuming three 75-foot clarifiers on-line. In addition, state point analysis (not shown) indicated that sufficient clarification capacity for future average loadings could be provided with only two 75-foot clarifiers on-line. Surface Overflow Rates (SOR) and Solids Loading Rates (SLR) for this secondary clarifier area are shown in Table 5 and are well within TR-16 recommendations.

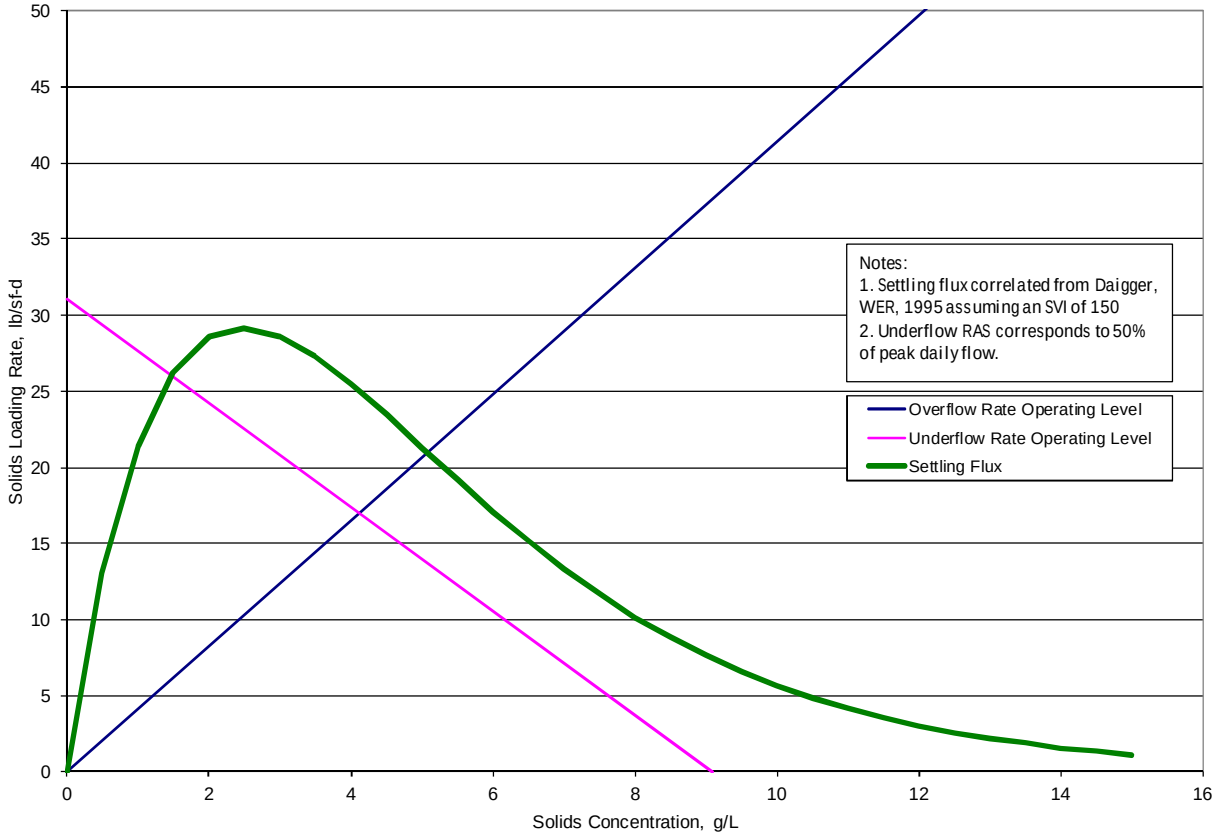

FIGURE 4

STATE POINT ANALYSIS FOR 4-STAGE BARDENPHO PROCESS – FUTURE DESIGN CONDITIONS

Aeration and mixing requirements for the 4-stage Bardenpho process are shown in Table 6. Chemical addition requirements to maintain sufficient alkalinity and for supplemental carbon are shown in Table 7. It should be noted that more supplemental carbon is estimated to be required for annual average conditions than maximum month conditions because the BOD:N ratio is greater and therefore the process is less carbon-limited during maximum month conditions. In addition, greater supplemental alkalinity is required for the 4-Stage Bardenpho than the MLE process due to the greater influent TKN treatment capacity, although the 4-Stage Bardenpho process has greater alkalinity recovery due to denitrification.

TABLE 6

FUTURE AERATION AND MIXING REQUIREMENTS FOR 4-STAGE BARDENPHO PROCESS

	Aeration Energy		**Peak Day**	
Mixing Energy	**Average Winter**	**Average Summer**	**Total Capacity Required**	**Air Demand**
(HP)	(HP)	(HP)	(HP)	
37	100	150	300	5,000 scfm @ 9.1 psi

TABLE 7

CHEMICAL ADDITION REQUIREMENTS FOR 4-STAGE BARDENPHO PROCESS

	Alkalinity (lb/d $CaCO_3$)	Supplemental Carbon (gpd methanol)
Annual Average	1,750	100
Maximum Month	2,550	60

5 ANALYSIS, EVALUATION, AND DISCUSSION

The following strategy was identified for plant modification to provide a phased approach to nitrogen removal:

1. Installation of an MLE process to meet AOC requirements of 8 mg/L TN
2. Future expansion to 4-Stage Bardenpho process with tertiary denitrification filters to meet future permit requirements of 3 mg/L TN, as required

5.1 Installation of MLE Process

Modeling was used to determine total aeration tank volumes. Three trains would be required to treat maximum month flows. A preliminary tank layout, assuming a sidewater depth of 18 feet, is shown in Figure 5.

To achieve proper settling conditions, each secondary clarifier was modeled with a 16-foot sidewater depth and 75-foot diameter.

The model was run using current flows and loads data (2011-2013) to determine the ability of the design MLE process to meet current conditions. Treatment of current annual average and maximum month wastewater flows and loads to 8 mg/L TN could be achieved with only one train online and with no chemical addition.

5.2 Expansion to 4-stage Bardenpho

Modeling was used to expand on the MLE aeration tank volumes by adding post-anoxic and re-aeration zones to each train. Additional tanks would need to be added to each train of the MLE process discussed above. A preliminary layout is shown in Figure 6.

With the addition of a post-anoxic zone, supplemental carbon will be required for denitrification, since most of the exogenous carbon in the wastewater influent is used up in the pre-anoxic zone. Therefore, storage and feed systems for supplemental carbon will be required. For modeling

purposes, methanol was assumed as the carbon source. Carbon addition will vary depending on desired level of treatment. Various alternative sources for supplemental carbon are available and should be evaluated during preliminary design.

Secondary clarifier requirements for the 4-stage Bardenpho process are the same as for the MLE process.

5.3 Installation of a tertiary denitification filter

Additional denitrification to achieve an effluent TN limit of 3 mg/L could be achieved by adding a tertiary denitrification filter to treat secondary clarifier effluent from the 4-stage Bardenpho process. Installation of a tertiary system will require the additional construction of additional tanks, supplemental carbon storage and feed system, and equipment building.

APPENDIX C

Supporting Information for Planning-Level Cost Estimate *For October 2014 Prelim. Draft*

TOWN OF EXETER, NEW HAMPSHIRE
WASTEWATER FACILITIES PLAN
W-P PROJECT NO. 12883A
RECOMENDED PLAN COST ESTIMATE
ENR INDEX 9846 (August 2014)

TABLE 6-2
ESTIMATED CAPITAL COSTS FOR WWTF UPGRADES

PROJECT COMPONENT		**EST. COST** WWTF TN 3 mg/l	**EST. COST** WWTF TN 5 mg/l	**EST. COST** Main Pump Station FM & WM	**EST. COST** Lagoon Decommissioning	**NOTES**
CONSTRUCTION		$36,200,000	$31,400,000	$4,000,000	$4,600,000	1
CONSTRUCTION CONTINGENCY	5%	$1,810,000	$1,570,000	$200,000	$230,000	2
TECHNICAL SERVICES	20%	$7,240,000	$6,280,000	$800,000	$920,000	3
VALUE ENGINEERING		$100,000	$100,000	$0	$0	4
MATERIALS TESTING	0.25%	$90,000	$80,000	$10,000	$10,000	5
ASBESTOS AND LEAD PAINT ABATEMENT		$0	$0	$0	$0	6
DIRECT EQUIPMENT PURCHASE		$0	$0	$0	$0	7
LAND ACQUISITION/ EASEMENTS		$0	$0	$0	$0	7
LEGAL/ ADMINISTRATIVE		$10,000	$10,000	$10,000	$10,000	8
FINANCING	1%	$450,000	$390,000	$50,000	$60,000	9
ENGINEER'S ESTIMATE		$45,900,000	$39,830,000	$5,070,000	$5,830,000	10

Notes

1.) Construction cost estimate details provided in Appendices. Costs based on ENR CCI 9846.
2.) Construction contingency is an allowance at 5% of construction cost.
3.) Technical services is an allowance at 20% of construction cost.
4.) Value engineering is an allowance assuming two sessions.
5.) Materials testing is an allowance based on similar sized projects.
6.) Asbestos and lead paint is not anticipated at the WWTF site, but should be evaluated at the Main Pump Station site.
7.) None anticipated
8.) Legal/administrative costs are for bond counsel and project advertisements.
9.) Financing is an allowance based on assumed interim financing costs at 1%.
10.) DES estimate for 5 mg/l effluent TN for Exeter was $44M ("Analysis of Nitrogen Loading Reductions for WWTF and NPS in the Great Bay Estuary Watershed", Dec 2010, ENR 8660).

TOWN OF EXETER, NEW HAMPSHIRE
WASTEWATER FACILITIES PLAN
W-P PROJECT NO. 12883A
RECOMENDED PLAN COST ESTIMATE
ENR INDEX 9846 (August 2014)

DESCRIPTION	ESTIMATED COST WWTF TN<3	ESTIMATED COST WWTF TN<8	ESTIMATED COST MPS & FM	ESTIMATED COST Lagoon Decom.
CIVIL				
MPS FORCEMAINS (5000 LF at $150/lf new and $100/lf slipline)			$1,250,000	
WWTF WATER MAIN (5000 lf at $150/LF)			$750,000	
WWTF SITE STRUCTURE EXCAVATION (includes 25% as ledge)	$770,000	$770,000		
WWTF SITE PIPING	$750,000	$750,000		
WWTF SITE WORK	$690,000	$690,000		
WWTF SITE FILL FOR SLUDGE STORAGE LAGOON AREA	$440,000	$440,000		$440,000
ARCHITECTURAL				
MAIN PUMP STATION MODIFICATIONS			$230,000	
CONTROL BUILDING MODIFICATIONS	$390,000	$390,000		
GRIT BUILDING MODIFICATIONS (SEPTAGE RECEIVING)	$160,000	$160,000		
HEADWORKS BUILDING (NEW)	$940,000	$940,000		
CHEMICAL BUILDING MODIFICATIONS	$45,000	$45,000		
DISINFECTION BUILDING (NEW)	$230,000	$230,000		
SOLIDS PROCESSING BUILDING (NEW)	$2,185,000	$2,185,000		
PROCESS EQUIPMENT & PIPING FINISHES	$110,000	$110,000		
STRUCTURAL				
INFLUENT EQUALIZATION	$625,000	$625,000		
AERATION TANKS / BNR (NEW)	$2,814,000	$2,814,000		
SECONDARY CLARIFICATION & SCUM SYSTEM (NEW)	$1,780,000	$1,780,000		
DISINFECTION MODIFICATIONS	$106,000	$106,000		
SLUDGE STORAGE TANKS (NEW)	$555,000	$555,000		
JUNCTION STRUCTURES (NEW)	$500,000	$500,000		
PROCESS				
MAIN PUMP STATION UPGRADE			$186,000	
WWTF PROCESS DEMOLITION	$39,000	$39,000		
SEPTAGE RECEIVING	$229,000	$229,000		
SCREENINGS AND GRIT REMOVAL	$676,000	$676,000		
INFLUENT EQUALIZATION BASINS	$153,000	$153,000		
PRIMARY TREATMENT	Future phase	Future phase		
AERATION TANKS / BNR	$1,205,000	$1,205,000		
SECONDARY CLARIFICATION	$776,000	$776,000		
SUPPLEMENTAL ALKALINITY SYSTEM	$66,000	$66,000		
SUPPLEMENTAL CARBON SYSTEM	$270,000	Future phase		
TERTIARY TREATMENT	$3,100,000	Future phase		
DISINFECTION	$528,000	$528,000		
OUTFALL	$0	$0		
SLUDGE STORAGE TANKS	$276,000	$276,000		
SOLIDS PROCESSING SYSTEMS	$1,557,000	$1,557,000		
PLANT WATER SYSTEM	$80,000	$80,000		
ODOR CONTROL SYSTEMS (None)	$0	$0		
JUNCTION STRUCTURES/GATES	$100,000	$100,000		
HVAC/ PLUMBING	in Arch.	in Arch.	in Arch.	
INSTRUMENTATION				
INSTRUMENTS	$259,000	$259,000	$40,000	
CONTROL PANELS AND NETWORK	$270,000	$270,000	$50,000	
SCADA SYSTEM HARDWARE / SOFTWARE	$138,000	$138,000		
MOTOR OPERATORS	$95,000	$95,000		
ELECTRICAL				
MAIN PUMP STATION			$270,000	
WWTF STANDBY POWER	$225,000	$225,000		
WWTF ELECTRICAL DISTRIBUTION	$550,000	$550,000		
WWTF ELECTRICAL SITE WORK	$250,000	$250,000		
WWTF POWER & CONTROL CONDUIT & WIRING	$800,000	$800,000		
WWTF FIRE-SECURITY-TELEPHONE	$100,000	$100,000		
WWTF ELECTRICAL DEMOLITION	$75,000	$75,000		

TOWN OF EXETER, NEW HAMPSHIRE
WASTEWATER FACILITIES PLAN
W-P PROJECT NO. 12883A
RECOMENDED PLAN COST ESTIMATE
ENR INDEX 9846 (August 2014)

DESCRIPTION		ESTIMATED COST WWTF TN<3	ESTIMATED COST WWTF TN<8	ESTIMATED COST MPS & FM	ESTIMATED COST Lagoon Decom.
SPECIALS					
MOBILIZATION/DEMOBILIZATION		$250,000	$250,000	$50,000	
SHEETING		$600,000	$600,000	none	
PILES		none	none	none	
LEDGE REMOVAL		in Civil	in Civil	in Civil	
GROUNDWATER DEWATERING		$150,000	$150,000	in Civil	
LAGOON DECOMMISSIONING - SLUDGE REMOVAL & DISPOSAL				none	$1,780,000
LAGOON DECOMMISSIONING - RESTORATION				none	$1,000,000
SUBTOTAL, CONSTRUCTION		$23,145,000	$19,775,000	$2,466,000	$3,220,000
GENERAL CONTRACTOR OH&P, GENERAL CONDITIONS	15.0%	$3,472,000	$2,966,000	$370,000	$483,000
SUBTOTAL, SUBCONTRACTORS		$2,762,000	$2,762,000	$360,000	$0
GENERAL CONTRACTOR MARKUP	5.0%	$138,000	$138,000	$18,000	$0
ELECTRICAL/ TELEPHONE ALLOWANCES		$50,000	$50,000	$20,000	$20,000
BONDS AND INSURANCE	1.5%	$390,000	$340,000	$40,000	$50,000
SUBTOTAL, CONSTRUCTION COSTS		$29,957,000	$26,031,000	$3,274,000	$3,773,000
PROJECT MULTIPLIER, DESIGN CONTINGENCY	1.15				
PROJECT MULTIPLIER, INFLATION TO MIDPT CONST.	1.05				
ENGINEERS ESTIMATE OF CONSTRUCTION COST		**$36,200,000**	**$31,400,000**	**$4,000,000**	**$4,600,000**

Project Name: **WWTF Upgrade**
Location: **Exeter NH**
Design Level: **Study - Site/Civil Estimate**

Date: **September 26, 2014**
By: **ejl**

	Items	Quantity	Unit	Unit Price	Total Price Current Project Costs
Item No.	General				
1	Traffic Control	0	LS	$2,500.00	$0
2	Contractor Mobilization & Staging	0	LS	$2,000.00	$0
3	Test Pits	10	EA	$500.00	$5,000
	Subtotal				$5,000.00
Item No.	Demolition				
4	Clear & Grub	9	AC	$6,000.00	$54,000
5	Tree Removal	0	EA	$1,000.00	$0
6	Stump Removal	0	EA	$600.00	$0
7	Strip and Stockpile Topsoil	0	CY	$12.00	$0
8	Remove Site Signage	0	EA	$250.00	$0
9	Misc Site Demo (INCLUDING LAGOON SPLITTER STRUCTURES)	1	LS	$20,000.00	$20,000
10	Pavement Removal & Disposal	1000	SY	$8.00	$8,000
11	Remove & Dispose Existing Catch Basin	0	EA	$750.00	$0
12	Remove Existing Chain Link Fence/Gates	250	LF	$10.00	$2,500
13	Remove Granite Curbing & Stockpile	0	LF	$10.00	$0
14	Remove & Dispose Bit Lip Curbing	0	LF	$15.00	$0
15	Remove & Dispose Wood Guard Rail	0	LF	$5.00	$0
16	Remove & Dispose Existing Light Poles	0	EA	$1,500.00	$0
	Subtotal				$84,500
	Sitework				
17	Site Grading	3630	CY	$5.00	$18,150
18	Aggregate Base Course (4")	385	CY	$20.00	$7,700
19	Aggregate Sub Base Course (12")	1167	CY	$18.00	$21,000
20	Bituminous Pavement Heavy Duty Wearing Surface Course	3500	SY	$30.00	$105,000
21	Temporary Trench Pavement	0	SY	$120.00	$0
22	Temporary Gravel Access Road	500	LF	$10.00	$5,000
23	Paved Walkways (2")	133	SY	$125.00	$16,667
24	Stone Dust Walkway	200	LF	$25.00	$5,000
25	Pavement Markings	1	LS	$2,000.00	$2,000
26	Handicap Warning Plate	1	EA	$750.00	$750
27	Reset Granite Curb	0	LF	$30.00	$0
28	New Granite Curb	0	LF	$40.00	$0
29	New Bit Lip Curb	900	LF	$5.00	$4,500
30	Miscellaneous Site Signage	1	LS	$2,000.00	$2,000
31	Bollards	30	EA	$600.00	$18,000
32	Landscaping	1	LS	$20,000.00	$20,000
33	Chain Link Fence	4000	LF	$30.00	$120,000
34	Fence Single Swing Gate	4	EA	$1,000.00	$4,000
35	Fence Double Swing Gate	2	EA	$3,000.00	$6,000
36	Timber Guard Rail	0	LF	$20.00	$0
37	Erosion & Sedmentation Controls	1	LS	$15,000.00	$15,000
38	Loam & Low Maint Seed	14520	SY	$3.00	$43,560
	Subtotal				$414,327
	Storm Drainage				
39	Paved Leak off	1	EA	$500.00	$500
40	Rain Gardens	2	EA	$10,000.00	$20,000
41	Catch Basins	10	EA	$2,000.00	$20,000
42	Drain Manholes	4	EA	$3,000.00	$12,000
43	18" - 24" RCP SD Piping	500	LF	$50.00	$25,000
44	Riprap Swale	30	LF	$20.00	$600
	Subtotal				$78,100
	Electrical				
45	Conduit Excavation, Sand Bedding, Backfill & Warning Tape	800	LF	$25.00	$20,000
46	Duct Bank Excavation, Sand Bedding, Backfill & Warning Tape	400	LF	$20.00	$8,000
47	Concrete Duct Banks	400	LF	$75.00	$30,000
48	Concrete Light Pole Base - PreCast	10	EA	$1,250.00	$12,500
49	Electric Manholes	8	EA	$4,000.00	$32,000
50	Electric Handhole	8	EA	$1,000.00	$8,000
	Subtotal				$110,500

Site Work and Utilities Construction $692,427
$690,000

TOWN OF EXETER, NEW HAMPSHIRE
WASTEWATER FACILITIES PLAN
W-P PROJECT NO. 12883A
RECCOMENDED PLAN COST ESTIMATE
PROCESS ITEMS

EQUIP. NAME	TAG	QUAN.	UNIT	DESIGN BASIS	Unit Cost	Installation Cost 20% / 30%	Extended System Subtotal	Misc. Unaccounted For Items 0.0%	System Extended Cost, Total
MAIN PUMP STATION									
DEMOLITION		1	EA		$10,000		$10,000	$10,000	
INFLUENT SLUICE GATE		1	EA		$7,000	$2,100	$9,100	$9,100	
DRYPIT SUBM PUMPS		3	EA		$30,000	$9,000	$117,000	$117,000	
PIPING		1	EA		$50,000		$50,000	$50,000	
									$186,000
WWTF DEMOLITION									
CONTROL BUILDING		1	EA		$11,000		$11,000	$11,000	
GRIT BUILDING		1	EA		$11,000		$11,000	$11,000	
DISINFECTION BUILDING		1	EA		$6,000		$6,000	$6,000	
AERATED LAGOONS		1	EA		$11,000		$11,000	$11,000	
									$39,000
HEADWORKS BUILDING									
MECHANICAL SCREEN		1	EA	CLIMBER	$175,000	$35,000	$210,000	$210,000	
WASH PRESS		1	EA		$75,000	$15,000	$90,000	$90,000	
MANUAL BAR RACK & RAKE		1	EA	ALUMINUM	$6,000	$1,800	$7,800	$7,800	
STOP GATES		8	EA		$4,000	$1,200	$41,600	$41,600	
GRIT PADDLE WHEEL		2	EA	VORTEX	$30,000	$9,000	$78,000	$78,000	
GRIT WASHER		1	EA		$120,000	$24,000	$144,000	$144,000	
GRIT PUMP		2	EA	RECESSED IMPELLER	$25,000	$7,500	$65,000	$65,000	
PIPING - HEADWORKS		1	EA		$40,000		$40,000	$40,000	
									$676,000
PLANT WATER SYSTEM									
PW PUMPS		3	EA		$10,000	$3,000	$39,000	$39,000	
HYDROPNEUMATIC TANK		0	EA	USE EXISTING	$10,000	$3,000	$0	$0	
DUPLEX BASKET STRAINER		1	EA		$6,000	$1,800	$7,800	$7,800	
PIPING - PLANT WATER		1	LS		$15,000		$15,000	$15,000	

EQUIP. NAME	TAG	QUAN.	UNIT	DESIGN BASIS	Unit Cost	Installation Cost	Extended System Subtotal	Misc. Unaccounted For Items	System Extended Cost, Total
						20%			
						30%		0.0%	
SEAL WATER SYSTEMS		1	EA		$10,000	$3,000	$13,000	$13,000	
PIPING - SEAL WATER		1	LS	1"	$5,000		$5,000	$5,000	
									$80,000
SLUDGE PROCESSING BUILDING									
SLUDGE FEED PUMPS/GRINDER		2	EA		$40,000	$12,000	$104,000	$104,000	
SCREW PRESS AND CONTROLS		2	EA		$350,000	$70,000	$840,000	$840,000	
CONVEYORS		75	LF		$1,750	$350	$157,500	$157,500	
PIPING - SL		1	LS		$30,000		$30,000	$30,000	
POLYMER MAKEUP SYSTEM		2	EA		$30,000	$9,000	$78,000	$78,000	
PIPING - DPOL		1	LS		$5,000		$5,000	$5,000	
SST DECANT SYSTEM		3	EA		$20,000	$6,000	$78,000	$78,000	
SST PD BLOWERS		3	EA		$40,000	$12,000	$156,000	$156,000	
SST AERATION DIFFUSERS		3	EA		$20,000	$6,000	$78,000	$78,000	
PIPING - AIR		1	LS		$25,000		$25,000	$25,000	
PIPING - PW		1	LS		$5,000		$5,000	$5,000	
									$1,556,500
SEPTAGE RECEIVING									
DEMOLISH EQUIPMENT		1	LS		$5,000	$1,500	$6,500	$6,500	
SEPTAGE RECEIVING MACHINE		1	EA		$150,000	$30,000	$180,000	$180,000	
SEPTAGE PUMP		1	EA		$15,000	$4,500	$19,500	$19,500	
SEPTAGE GRINDER		1	EA		$10,000	$3,000	$13,000	$13,000	
PIPING - SEPTAGE		1	LS		$10,000		$10,000	$10,000	
									$229,000
SUPPLEMENTAL ALKALINITY SYSTEM									
MAG HYDROX TANK & STAND	ALKT-1,2	1	LS	2550-GAL	$10,000	$3,000	$13,000	$13,000	
MAG HYDROX MIXER	ALKM-1,2	1	LS		$10,000	$3,000	$13,000	$13,000	
MAG HYDROX PUMPS	ALK-1,2	2	EA	PERISTALTIC	$5,800	$1,740	$15,080	$15,080	
PIPING - MAG HYDROX		500	LF	1.5"	$50		$25,000	$25,000	
									$66,080
EQUIP. AND PIPING FINISH PAINTING				IN DIVISION 9	2.0%	$5,254,000	$105,100	$105,100	
				RANGE: 2.0-3.0% OF EQUIP COST					$105,100
				TOTAL, EXCLUDING EQUIP. AND PIPING FINISH PAINT					

TOWN OF EXETER, NEW HAMPSHIRE
WASTEWATER FACILITIES PLAN
W-P PROJECT NO. 12883A
RECOMENDED PLAN COST ESTIMATE
ENR INDEX 9846 (August 2014)

NOTE
PROCESS ITEMS SHOWN BELOW ARE EXAMPLES. EDIT ALL ITEMS, INCLUDING UNIT COSTS TO SUIT PROJECT.

INSTRUMENTATION

NOTE: 1. THIS ESTIMATE EXCLUDES ALL STRUCTURAL, HVAC/PLUMBING, INSTRUM, ELECTRICAL COSTS, UNLESS SPECIFICALLY NOTED.

EQUIP. NAME		TAG	QUAN.	UNIT	DESIGN BASIS	Unit Cost	Installation Cost 20%	Extended System Subtotal	Misc. Unaccounted For Items 0%	System Extended Cost, Total	Installation Extended Cost	Source (Do not print for Client)	Date of Budget Quote
INSTRUMENTS													
MPS	LEVEL		2	EA		$3,000	$600	$7,200	$7,200		$1,200		
	FLOAT		4	EA		$500	$100	$2,400	$2,400		$400		
	FLOW METER		1	EA		$5,000	$1,000	$6,000	$6,000		$1,000		
	COMB GAS DETECTOR		1	EA		$25,000	$5,000	$30,000	$30,000		$5,000		
SEP	LEVEL ELEMENT		2	EA		$3,000	$600	$7,200	$7,200		$1,200		
	FLOATS		4	EA		$500	$100	$2,400	$2,400		$400		
	FLOW METER		2	EA		$5,000	$1,000	$12,000	$12,000		$2,000		
HDW	LEVEL ELEMENTS		2	EA		$3,000	$600	$7,200	$7,200		$1,200		
	CHANNEL HIGH LEVEL		1	EA		$500	$100	$600	$600		$100		
	COMB GAS DETECTOR		1	EA		$25,000	$5,000	$30,000	$30,000		$5,000		
BPH	DO		3	EA		$5,000	$1,000	$18,000	$18,000		$3,000		
	ORP		3	EA		$3,000	$600	$10,800	$10,800		$1,800		
	NITRATE OR AMMONIA		3	EA		$10,000	$2,000	$36,000	$36,000		$6,000		
	TSS		1	EA		$10,000	$2,000	$12,000	$12,000		$2,000		
	SCUM FLOATS		3	EA		$500	$100	$1,800	$1,800		$300		
							$0	$0	$0		$0		
PF	PARSHALL FLUME FLOW ELEMENTS		2	EA	DUAL LE-FE (ULT)	$5,000	$1,000	$12,000	$12,000		$2,000		
DIS	CHLORINE RES. ANALYZER		0	EA		$10,000	$2,000	$0	$0		$0		
	HYP - LEVEL ELEMENT		1	EA		$3,000	$600	$3,600	$3,600		$600		
	HYP - CONTAIN FLOAT		1	EA		$500	$100	$600	$600		$100		
DEW	POL - LEVEL ELEMENT		2	EA		$3,000	$600	$7,200	$7,200		$1,200		
	POL - CONTAIN FLOAT		2	EA		$500	$100	$1,200	$1,200		$200		
	ALK - LEVEL ELEMENT		1	EA		$3,000	$600	$3,600	$3,600		$600		
	ALK - CONTAIN FLOAT		1	EA		$500	$100	$600	$600		$100		
	SLUDGE TANK LEVEL ELEMENTS		3	EA		$3,000	$600	$10,800	$10,800		$1,800		

EQUIP. NAME	TAG	QUAN.	UNIT	DESIGN BASIS	Unit Cost	Installation Cost 20%	Extended System Subtotal	Misc. Unaccounted For Items 0%	System Extended Cost, Total	Installation Extended Cost	Source (Do not print for Client)	Date of Budget Quote
SLUDGE TANK FLOATS		6	EA		$500	$100	$3,600	$3,600		$600		
DEWATERING FLOW METERS		2	EA	4" MAG	$3,000	$600	$7,200	$7,200		$1,200		
MISC. DEWATERING		1	LS		$10,000	$2,000	$12,000	$12,000		$2,000		
						$0	$0	$0		$0		
CB PLANT WATER SUCT VACUUM		1	EA		$3,000	$600	$3,600	$3,600		$600		
PLANT WATER DISCH PRESS		1	EA		$3,000	$600	$3,600	$3,600		$600		
PLANT WATER FLOW		1	EA	6" MAG	$5,000	$1,000	$6,000	$6,000		$1,000		
									$259,200			
CONTROL PANELS & NETWORK GEAR												
MAIN PUMP STATION		1	EA		$25,000	$5,000	$30,000	$30,000		$5,000		
HEADWORKS		1	EA		$25,000	$5,000	$30,000	$30,000		$5,000		
SEPTAGE		0	EA	OEM	$25,000	$5,000	$0	$0		$0		
SOLIDS PROCESS		1	EA		$25,000	$5,000	$30,000	$30,000		$5,000		
DEWATERING		0	EA	OEM	$25,000	$5,000	$0	$0		$0		
DISINFECTION BLDG		1	EA		$25,000	$5,000	$30,000	$30,000		$5,000		
CONTROL BLDG		1	EA		$25,000	$5,000	$30,000	$30,000		$5,000		
COM PANELS		2	EA		$15,000	$3,000	$36,000	$36,000		$6,000		
FIBER OPTIC		1	EA		$50,000	$10,000	$60,000	$60,000		$10,000		
MISSION CONNECTIONS		1	EA		$20,000	$4,000	$24,000	$24,000		$4,000		
									$270,000			
SCADA & NETWORK GEAR												
DEVELOPMENT NODE 1		1	EA		$10,000	$2,000	$12,000	$12,000		$2,000		
DEVELOPMENT NODE 2		1	EA		$10,000	$2,000	$12,000	$12,000		$2,000		
VIEW NODE 1		1	EA		$5,000	$1,000	$6,000	$6,000		$1,000		
PROCESS PROGRAMMING		1	EA		$50,000	$10,000	$60,000	$60,000		$10,000		
REPORTING & MAINTENANCE		1	EA		$10,000	$2,000	$12,000	$12,000		$2,000		
TESTING - PHASE 1		1	EA		$20,000	$4,000	$24,000	$24,000		$4,000		
TRAINING - PHASE 1		1	EA		$10,000	$2,000	$12,000	$12,000		$2,000		
									$138,000			
MOTOR OPERATORS												
MISC		6	EA		$13,200	$2,640	$95,040	$95,040		$15,840		
									$95,040			
				TOTAL, EXCLUDING EQUIP. AND PIPING FINISH PAINT					**$762,240**			

EXETER, NH - WASTEWATER FACILITIES PLAN
COMPARISON OF NITROGEN REMOVAL ALTERNATIVES

INCREMENTAL PROJECT COSTS -INFLUENT EQUALIZATION

DISCIPLINE	QUAN	UNIT	Unit Cost	Install Cost	Extended System Subtotal	Misc. Unacct'd For Items	System Extended Cost, Total
				25%		0%	
Structural							
Liner	46,510	SF	$5		$232,550		$233,000
Sheeting (Walls)	10,120	SF	$35		$354,200		$354,000
Concrete		CY	$1,500		$0		$0
Railing and Walkway	1	LS	$30,000	$7,500	$37,500		$38,000
Site/Civil							
Excavation - EARTH	0	CY	$15		$0		$0
Excavation - LEDGE (ALLOWANCE)	0	CY	$70		$0		$0
Backfill	0	CY	$25		$0		$0
Site Work	0	LS	$125,000		$0		$0
Buried Piping	0	LS	$25,000		$0		$0
Fence Around Structure	830	LF	$30	$8	$31,125		$31,000
Gates	4	EA	$10,000	$2,500	$50,000		$50,000
EQ EFFLUENT PUMPING							
Equipment/Vendor Quote							
Pumps	3	EA	$30,000	$7,500	$112,500		$113,000
Piping, Valves, equipment pads, etc.	1	LS	$40,000		$40,000		$40,000
Instrumentation			$0				$0
Electrical			$0				$0
CONSTRUCTION COST ESTIMATE							**$153,000**

EXETER, NH - WASTEWATER FACILITIES PLAN
COMPARISON OF NITROGEN REMOVAL ALTERNATIVES

ALTERNATIVE 2
INCREMENTAL PROJECT COSTS - 4-STAGE BARDENPHO

DISCIPLINE	QUAN	UNIT	Unit Cost	Install Cost	Extended System Subtotal	Misc. Unacct'd For Items	System Extended Cost, Total
				25%		0%	
AERATION TANKS							
Equipment/Vendor Quote							
Influent Piping Modifications	2	EA	$15,000	$3,750	$37,500		$38,000
Screw Blowers - Main Duty AT	4	EA	$50,000	$12,500	$250,000		$250,000
Fine Bubble Diffusers	1	LS	$125,000	$31,250	$156,250		$156,000
S.S. Aeration Piping Fittings, Valves & Supports	1	LS	$90,000	$22,500	$112,500		$113,000
Submersible Mixers	12	EA	$30,000	$7,500	$450,000		$450,000
Internal Recycle Pumps	3	EA	$30,000	$7,500	$112,500		$113,000
X-inch Internal Recycle Piping	3	EA	$7,500	$1,875	$28,125		$28,000
Slide Gates	6	EA	$5,000	$1,250	$37,500		$38,000
Weirs - AT	3	EA	$5,000	$1,250	$18,750		$19,000
Structural							
Concrete Slab	2,000	CY	$500		$1,000,000		$1,000,000
Concrete Walls	2,137	CY	$750		$1,602,750		$1,603,000
Concrete Elevated slab	136	CY	$1,000		$136,000		$136,000
Handrails, Access platforms, etc.	3	EA	$25,000		$75,000		$75,000
Site/Civil					$0		
Excavation - EARTH (Total=15090)	11,318	CY	$15		$169,763		$170,000
Excavation - LEDGE (ALLOWANCE)	3,773	CY	$70		$264,075		$264,000
Backfill	3,400	CY	$25		$85,000		$85,000
Site Work	0	LS	$150,000		$0		$0
Buried Piping	0	LS	$100,000		$0		$0
Architectural		SF	$0				$0
Instrumentation			$0				$0
Electrical			$0				$0
FLOW SPLITTING							
Aeration Tank Influent	1	LS	$200,000		$200,000		$200,000
Secondary Clarifier Influent	1	LS	$200,000		$200,000		$200,000
OTHER							
Lagoon Decommissioning	0	EA	$2,000,000		$0		$0
Biosolids Processing	0	EA	$2,000,000		$0		$0
CONSTRUCTION COST ESTIMATE							**$1,205,000**

EXETER, NH - WASTEWATER FACILITIES PLAN
COMPARISON OF NITROGEN REMOVAL ALTERNATIVES

INCREMENTAL PROJECT COSTS - NEW 75-FOOT SECONDARY CLARIFIERS

DISCIPLINE	QUAN	UNIT	Unit Cost	Install Cost	Extended System Subtotal	System Extended Cost, Total
			25%			
SECONDARY CLARIFIERS						
Equipment/Vendor Quote (mechanism, density current baffles); OVIVO Dec 2013	3	EA	$150,000	$37,500	$562,500	$563,000
Concrete						
Concrete Slab	1,685	CY	$500		$842,500	$843,000
Concrete Walls	942	CY	$750		$706,500	$707,000
Launders/Elevated Slab	200	CY	$1,000		$200,000	$200,000
Handrails, Access platforms, etc.	3	EA	$10,000		$30,000	$30,000
Site/Civil						
Excavation - EARTH (5,200 CY)	3,900	CY	$15		$58,500	$59,000
Excavation - LEDGE (ALLOWANCE)	1,300	CY	$70		$91,000	$91,000
Backfill	2,725	CY	$25		$68,125	$68,000
Site Work	0	LS	$100,000		$0	$0
Buried Piping	0	LS	$75,000		$0	$0
Instrumentation			$0			$0
Electrical			$0			$0
SECONDARY SLUDGE PUMPING						
Equipment/Vendor Quote						
RAS PUMPS	4	EA	$20,000	$5,000	$100,000	$100,000
WAS PUMPS	2	EA	$15,000	$3,750	$37,500	$38,000
Piping, Valves, equipment pads, etc.	1	LS	$75,000		$75,000	$75,000
Instrumentation			$0			$0
Electrical			$0			$0
CONSTRUCTION COST ESTIMATE						**$776,000**

EXETER, NH - WASTEWATER FACILITIES PLAN
COMPARISON OF NITROGEN REMOVAL ALTERNATIVES

INCREMENTAL PROJECT COSTS - METHANOL SYSTEM

DISCIPLINE	QUAN	UNIT	Unit Cost	Total Cost	Install Cost	Extended System Subtotal	System Extended Cost, Total
					25%		
Methanol Equipment							
2,000 gal tank	1	EA	$30,379	$30,379	$7,595	$37,974	$38,000
1" Piping	500	LF	$27	$13,500	$3,375	$16,875	$17,000
3" Containment Pipe	500	LF	$52	$26,000	$6,500	$32,500	$33,000
Pumps	3	EA	$15,000	$45,000	$11,250	$56,250	$56,000
Pump Enclosures	1	EA	$5,000	$5,000	$1,250	$6,250	$6,000
Site/Civil							
Excavation - EARTH	52	CY	$15	$780		$780	$1,000
Excavation - LEDGE (ALLOWANCE)	22	CY	$70	$1,540		$1,540	$2,000
Backfill	15	CY	$25	$375		$375	$0
Site Work	1	LS	$50,000	$50,000		$50,000	$50,000
Struc Slab	40	CY	$500	$20,000		$20,000	$20,000
Architectural (Roof Structure Only)	375	SF	$100	$37,500			$38,000
Instrumentation	5%		$11,150	$558			$600
Electrical	20%		$44,600	$8,920			$8,900
SUBTOTAL, GENERAL CONTRACTOR							$271,000

EXETER, NH - WASTEWATER FACILITIES PLAN
COMPARISON OF NITROGEN REMOVAL ALTERNATIVES

INCREMENTAL PROJECT COSTS - NON-BIOLOGICALLY ACTIVE FILTER

DISCIPLINE	QUAN	UNIT	Unit Cost	Install Cost	Extended System Subtotal	System Extended Cost, Total
				25%		
NON-BIOLOGICALLY ACTIVE FILTER						
Equipment/Vendor Quote (discs and pumps) [Aqua Aerobics, June 2014]	1	EA	$700,000	$175,000	$875,000	$875,000
Concrete						
Concrete Slab	162	CY	$500		$80,889	$81,000
Concrete Walls	100	CY	$1,000		$100,000	$100,000
Elevated Slab	20	CY	$1,200		$24,000	$24,000
Handrails, Access platforms, Bypass, etc.	2	EA	$35,000		$70,000	$70,000
Site/Civil						
Excavation - EARTH	584	CY	$25		$14,595	$15,000
Excavation - LEDGE (ALLOWANCE)	250	CY	$100		$25,020	$25,000
Backfill	353	CY	$20		$7,060	$7,000
Site Work	1	LS	$50,000		$50,000	$50,000
Buried Piping	1	LS	$75,000		$75,000	$75,000
Architectural	1800	SF	$250		$450,000	$450,000
Instrumentation	5%		$66,100			$66,000
Electrical	25%		$330,500			$331,000
SUBTOTAL, GENERAL CONTRACTOR						$2,169,000
GENERAL CONTRACTOR OH&P AND GENERAL CONDITIONS	15.0%					$325,000
ELECTRICAL/ TELEPHONE ALLOWANCE						$0
BONDS & INSURANCES	2.0%					$50,000
UNIT PRICE ITEMS	0.0%					$0
PROJECT LOCATION MULTIPLIER	0%					$0
SUBTOTAL, CONSTRUCTION COSTS						$2,544,000
DESIGN CONTINGENCY	15%					$382,000
PROJECT MULTIPLIER, INFLATION TO MIDPT CONST.	6%	2 years				$153,000
ENGINEERS ESTIMATE OF CONSTRUCTION COST (2015, to midpoint)						**$3,079,000**

TOWN OF EXETER, NEW HAMPSHIRE
W-P PROJECT #12283A
WASTEWATER FACILITIES PLAN
JUN 2014 (ENR INDEX 9800)
CONSTRUCTION COST ESTIMATE - UV DISINFECTION OPTION

DESCRIPTION	QTY	UNITS	UNIT COST	SUBTOTAL COST	INSTALLATION COST 20%	TOTAL COST
CIVIL						
SITE WORK	0	EA	$5,000	$0		$0
ARCHITECTURAL						
DEMOLITION OF EXISTING CHEMICAL STORAGE SPACES	0	LS	$20,000	$0		$0
UV DISINFECTION BUILDING	0	SF	$250	$0		$0
STRUCTURAL						
STRUCTURAL DEMOLITION	1	LS	$5,000	$5,000		$5,000
UV DISINFECTION SLAB	20	CY	$500	$10,000		$10,000
CCT CONCRETE MODIFICATIONS	15	CY	$700	$10,500		$10,500
CRUSHED STONE	20	CY	$25	$500		$500
MISCELLANEOUS STRUCTURAL	1	LS	$60,000	$60,000		$60,000
JIB CRANE	1	EA	$20,000	$20,000		$20,000
PROCESS						
UV DISINFECTION SYSTEM	1	EA	$440,000	$440,000	$88,000	$528,000
HVAC/ PLUMBING	0		$0	$0		
INSTRUMENTATION						
INSTRUMENTATION - GENERAL		LS	$30,000	$0		$0
SCADA SYSTEM HARDWARE/ SOFTWARE		LS	$15,000	$0		$0
ELECTRICAL						
POWER & LIGHTING - GENERAL		LS	$125,000	$0		$0
CONSTRUCTION COST ESTIMATE						**$528,000**

EXETER - WASTEWATER FACILITIES
ESTIMATE OF FIRST YEAR O&M (ON-SITE ALTERNATIVE 2 - BARDENPHO TO TN 5)

	EXISTING			2014	Unit Cost	Use	UPGRADE AT FIRST YEAR (2018)										2018
	Quantity	Units	Unit Cost	Cost	Change	Change	Hdwks	Lagoons	Secondary	Tertiary	Disinf	Dewater	Misc	Quantity	Units	Unit Cost	Cost	Cost
Salaries		3		$124,000	10%										5		$227,333	$227,000
Benefits		3		$68,000	10%										5		$124,667	$125,000
Buildings and System Maintenance				$49,000	10%	75%											$94,325	$94,000
Chemicals, Licenses, Software																		
Licenses, Software, etc				$54,000	10%												$59,400	$59,000
Hypochlorite	17,500	gal	$1.00	$18,000	10%	-90%	-	-	-	-	-	-	-	1,800	gal	$ 1.10	$1,980	$2,000
Bisulfite	3,250	gal	$1.75	$6,000	10%	-100%	-	-	-	-	-	-	-	0	gal	$ 1.93	$0	$0
Supp Alkalinity	0	gal	$1.00		10%		-	-	16,000	-	-	-	-	16,000	gal	$ 1.10	$17,600	$18,000
Supp Carbon	0	gal	$2.50		10%		-	-	10,000	0	-	-	-	7,500	gal	$ 2.75	$20,625	$21,000
Polymer	0	gal	$5.00		10%		-	-	-	-	-	8,000	-	8,000	gal	$ 5.50	$44,000	$44,000
Utilities																		
Natural Gas				$11,000	10%	75%											$21,175	$21,000
Electricity	1,120,000	kwh	$0.12	$134,000	10%		120,000	0	1,500,000	0	118,000	180,000	50,000	1,968,000	kwh	$ 0.13	$259,776	$260,000
Fuel				$2,000	10%	50%											$3,300	$3,000
Gas Monitoring				$1,000	10%												$1,100	$1,000
Biosolids	0	wt tons	$100.00	$0	10%		-	-	-	-	-	2,500	-	2,500	wt tons	$ 110.00	$275,000	$275,000
SUM				$467,000													$1,150,281	$1,150,000
ACTUAL BUDGET VALUE				$453,000														

25000 kw-hrs for chem disinf.

	Number	HP	%FL	kwh/yr
Lagoon 1	14	15	50%	689,850
Lagoon 2	8	10	50%	262,800
Lagoon 3	5	7.5	50%	123,188
SUM				1,075,838

Project Name: Exeter Wastewater Facilities Plan **Date:** 25-Aug-14
Design Flow (mgd): 3.00
Hours/Day of Sludge Dewatering Operation 6.00
Productive Hours/Worker/Year 1,500

Table of Adjustment for Local Conditions

CATEGORY	LOCAL CONDITION	ADJUSTMENT					
		Operation	Maintenance	Supervisory	Clerical	Laboratory	Yardwork
PLANT LAYOUT	Average	0%	0%				0%
UNIT PROCESSES	Non-Std Equipt	10%	10%				
LEVEL OF TREATMENT	Advanced	10%	-20%	2%	2%	2%	10%
TYPE OF WASTE REMOVAL REQUIREMENT	Effluent Concentration	5%				10%	
INDUSTRIAL WASTE	Erratic	10%				10%	
PRODUCTIVITY OF LABOR	Average	0%	0%				
CLIMATE	Moderate Winters		0%				
TRAINING	Certification & No Continuing Ed.	0%		0%			
AUTOMATIC MONITORING	Monitoring With Feedback	-5%	5%				
AUTOMATIC SAMPLING	Influent & Effluent	-5%				-5%	
OFF-PLANT LABORATORY WORK	None					0%	
OFF-PLANT MAINTENANCE	None		0%				
AGE AND CONDITION OF EQUIPMENT	Relatively new & well cared for		0%				
TOTAL		25%	-5%	2%	2%	17%	10%

Annual Manhours

Unit Process/Category	Exists at Plant?	Operation	Maintenance	Supervisory	Clerical	Laboratory	Yardwork
Supervisory & Administrative				1,060			
Clerical					0		
Laboratory						1,130	
Yardwork							960
Raw Sewage Pumping at Plant	No		0				
Screening & Grinding	Yes	200	30				
Grit Removal	Yes	370	40				
Primary Clarification	No	0	0				
Aeration	Yes	940	880				
Secondary Clarification for Activated Sludge	Yes	530	300				
Chlorination	Yes	210	270				
Mixed Media Filtration	No	0	0				
Anaerobic Digestion	No	0	0				
Aerobic Digestion	No	0	0				
Gravity Thickening	No	0	0				
Flotation Thickening	No	0	0				
Sludge Drying Beds	No	0					
Sludge Dewatering	Yes	660	440				
Sludge Lagoons	No	0					
SUBTOTAL		2,910	1,960	1,060	0	1,130	960
SUBTOTAL ADJUSTED FOR LOCAL CONDITIONS		3,640	1,860	1,080	0	1,320	1,060
Number of Workers		2.4	1.2	0.7	0.0	0.9	0.7

Total Labor Hours/Year 8,960
Total Number of Workers 6.00 all
Total Number of Workers 5.28 excluding Supervisory and Clerical

NHDES Plant Grade per Env-WS 901.18 III for TN = 8mg/l

Project Name: Exeter Wastewater Facilities Plan **Date:** 25-Aug-14
Design Flow (mgd): 3.00
Hours/Day of Sludge Dewatering Operation 6.00
Productive Hours/Worker/Year 1,500

Table of Adjustment for Local Conditions

CATEGORY	LOCAL CONDITION	ADJUSTMENT					
		Operation	Maintenance	Supervisory	Clerical	Laboratory	Yardwork
PLANT LAYOUT	Average	0%	0%				0%
UNIT PROCESSES	Non-Std Equipt	10%	10%				
LEVEL OF TREATMENT	Advanced	10%	-20%	2%	2%	2%	10%
TYPE OF WASTE REMOVAL REQUIREMENT	Effluent Concentration	5%				10%	
INDUSTRIAL WASTE	Erratic	10%				10%	
PRODUCTIVITY OF LABOR	Average	0%	0%				
CLIMATE	Moderate Winters		0%				
TRAINING	Certification & No Continuing Ed.	0%		0%			
AUTOMATIC MONITORING	Monitoring With Feedback	-5%	5%				
AUTOMATIC SAMPLING	Influent & Effluent	-5%				-5%	
OFF-PLANT LABORATORY WORK	None					0%	
OFF-PLANT MAINTENANCE	None		0%				
AGE AND CONDITION OF EQUIPMENT	Relatively new & well cared for		0%				
TOTAL		25%	-5%	2%	2%	17%	10%

Annual Manhours

Unit Process/Category	Exists at Plant?	Operation	Maintenance	Supervisory	Clerical	Laboratory	Yardwork
Supervisory & Administrative				1,060			
Clerical					0		
Laboratory						1,130	
Yardwork							960
Raw Sewage Pumping at Plant	No		0				
Screening & Grinding	Yes	200	30				
Grit Removal	Yes	370	40				
Primary Clarification	No	0	0				
Aeration	Yes	940	880				
Secondary Clarification for Activated Sludge	Yes	530	300				
Chlorination	Yes	210	270				
Mixed Media Filtration	Yes	690	470				
Anaerobic Digestion	No	0	0				
Aerobic Digestion	No	0	0				
Gravity Thickening	No	0	0				
Flotation Thickening	No	0	0				
Sludge Drying Beds	No	0					
Sludge Dewatering	Yes	660	440				
Sludge Lagoons	No	0					
SUBTOTAL		3,600	2,430	1,060	0	1,130	960
SUBTOTAL ADJUSTED FOR LOCAL CONDITIONS		4,500	2,310	1,080	0	1,320	1,060
Number of Workers		3.0	1.5	0.7	0.0	0.9	0.7

Total Labor Hours/Year 10,270
Total Number of Workers 6.80 all
Total Number of Workers 6.08 excluding Supervisory and Clerical

NHDES Plant Grade per Env-WS 901.18 IV for TN = 3mg/l