

AGENCY OF NATURAL RESOURCES
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
WASTEWATER MANAGEMENT DIVISION
103 SOUTH MAIN STREET
WATERBURY, VERMONT 05671-0405

FACT SHEET
(March 2005)

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT TO
DISCHARGE TO WATERS OF THE UNITED STATES

NPDES NO: VT0100153
FILE NO: 04-02
PERMIT NO: 3-1331
PROJECT ID NO: EJ95-0269

NAME AND ADDRESS OF APPLICANT:

City of Burlington
PO Box 878
Burlington, VT 05402

NAME AND ADDRESS OF FACILITY WHERE DISCHARGE OCCURS:

Burlington Main Wastewater Treatment Facility
53 LaValley Lane
Burlington, Vermont

RECEIVING WATER: Lake Champlain

CLASSIFICATION: Class B with a waste management zone. Class B waters are suitable for bathing and recreation, irrigation and agricultural uses; good fish habitat; good aesthetic value; acceptable for public water supply with filtration and disinfection. A waste management zone is a specific reach of Class B waters designated by a permit to accept the discharge of properly treated wastes that prior to treatment contained organisms pathogenic to human beings.

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

The above named applicant applied on December 20, 2005 to the Vermont Department of Environmental Conservation for renewal of the permit to discharge into the designated receiving water. At this time the Department has made a tentative decision to reissue the discharge permit. The facility is engaged in the treatment of municipal wastewater. The discharge is from the offshore diffuser outfall of the City of Burlington Main Wastewater Treatment Facility to Lake Champlain.

II. Description of Discharge

A quantitative description of the discharge in terms of significant effluent parameters is based on state and federal laws and regulations, the discharge permit application, and the recent self-monitoring data.

III. Limitations and Conditions

The effluent limitations of the permit, the monitoring requirements, and any implementation schedule (if required), may be found on the following pages of the permit:

Effluent Limitations:	Pages 2 and 3 of 21
Monitoring Requirements:	Pages 6 through 9 of 21

IV. Permit Basis and Explanation of Effluent Limitation Derivation

Secondary Treatment Process:

The secondary treatment process is the portion of the facility that continuously processes all the sanitary wastewater flows under normal dry weather conditions, and a portion of the combined sewer overflows during storm events and snowmelt periods. The treatment facility has a design and permitted average daily flow of 5.3 mgd. Under wet weather conditions, the facility is designed to provide a secondary level of treatment with phosphorus removal for a flow rate up to 13 mgd, including 11 mgd influent and two mgd of concentrated underflow from the combined sewer overflow treatment system.

Combined Sewer Overflow (CSO) Treatment Process:

The CSO treatment process consists of mechanical screening, vortex separation for solids removal and disinfection using a chlorine activated bromine disinfection process. The CSO treatment process is designed to operate in conjunction with the secondary treatment process in that the secondary treatment process is designed to treat the initial peak flows generated by wet weather events as well as the concentrated underflow waste stream from the vortex separator.

While the secondary treatment process is designed for an average daily flow of 5.3 mgd under dry weather conditions, the secondary treatment process has the hydraulic capacity to treat a total peak flow rate of 13 mgd of combined dry and wet weather wastewaters during storm events (where peak flow rate is an instantaneous rate of flow and is not to be confused with a total volume of water).

Wet weather instantaneous flows greater than 11 mgd up to 86 mgd receive treatment and disinfection by the combined sewer overflow treatment facility. The vortex separation process, combined with the hydraulic capacity of the secondary treatment plan, is designed to provide a relatively high level of treatment for all of the "first flush" flows generated during the early, rising flow stages of storm events. The "first flush" contains the highest pollutant concentrations found during typical storms. Disinfection chemicals are added to the CSO flow immediately before and after the vortex separator.

Approximately 2 mgd of highly concentrated underflow from the vortex separator is diverted to the secondary treatment process. Typically, a storm's instantaneous flow rate above the 75 mgd CSO system treatment capacity bypasses the vortex separator and is treated with screening and is mixed with the disinfected discharge from the vortex separator. This bypass is controlled by gate #1 and gate #2, which open when the water level exceeds a preset level that corresponds to an instantaneous flow rate of 75 mgd. According to the self-monitoring reports for the period 2001 through 2004, the CSO system was activated an average of 28 times per year; 13 times on average during the 'beach season' of June through August. Storm flows bypassed the vortex separator (gate #1 and/or gate #2 opened) an average of 6 times per year. Storm flow bypasses ranged from 1 minute to 116 minutes. During the entire four year period the total amount of time that one or both gates were open was 13 hours.

The proposed permit contains changes to effluent limits and conditions regulating the discharge from the CSO treatment process. The previous permit contained numerical water quality based effluent limits applicable to peak wet weather flows up to 75 mgd and best management practices (BMPs) designed to minimize impacts of the CSO discharge above 75 mgd. Due to changes in the Vermont Water Quality Standards the Department is now proposing to apply the numeric water quality based effluent limits to all discharges from the CSO treatment process including those in excess of 75 mgd. As a result of this proposed change the Department is also proposing to eliminate the majority of BMP conditions (Section I.A.7. of the previous permit) applicable to discharge S/N 002.

Outfall:

All flow components are discharged via a common outfall line terminating offshore in Burlington Bay. The outfall line is 10 feet in diameter and approximately 2400 feet in length including a 995 foot diffuser section at the end. The diffuser section through which effluent exits the outfall is located in an area southwest of the Burlington Harbor breakwater and is designated as a waste management zone. This waste management zone provides a mixing zone within a 200 foot radius around the diffuser, or an area 400 feet wide by 1400 feet long.

The outfall line has a hydraulic capacity of 227 mgd (equivalent to the peak flow of a ten-year storm) when the lake level is at the one-year frequency high elevation of 98.5 feet. The outfall capacity is reduced at higher lake elevations, but even at the ten-year extreme high level of 101.0 feet, the outfall will have capacity for the 115 mgd peak flow of a one-year storm. If the outfall capacity is exceeded, in order to prevent damage to equipment and infrastructure, the excess flow will be discharged through an emergency shoreline relief structure.

An offshore location, rather than the existing near-shore discharge site, was chosen to accommodate a long diffuser which takes advantage of greater effluent dilution opportunities available outside the breakwater. Lake modeling studies showed that larger scale lake current systems in the offshore areas provide much greater dilution within shorter distances from the outfall, compared with alternate discharge locations near the shore. In addition the longer outfall provides the disinfection contact time necessary for

bacterial destruction as flow rates approach system capacity. In other words, with the offshore location, water quality within the breakwater is improved for areas where recreational activities are prevalent.

The 995 foot diffuser section contains 118 individual riser ports evenly spaced along its length through which the effluent will exit. The purpose of the diffuser is to provide rapid initial dilution of the effluent with ambient lake water within the immediate vicinity of the outfall. A dye dilution study and modeling effort performed between November 1995 and December 1997 in accordance with a previous permit showed that the diffuser will provide an initial lake/effluent dilution ratio of 80:1 within the 200 foot radius of the mixing zone established in the discharge permit (see later discussions of effluent limits and mixing zone). During the previous permit renewal process some effluent limits continued to be based on the initial 40:1 dilution ratio, while others were changed to reflect the 80:1 dilution ratio. Those parameters that were changed to be based on the 80:1 dilution ratio (discharge to Combined S/N 001 and S/N 002: Total Suspended Solids, Total Residual Oxidant, and *E. coli*) could not consistently meet the 40:1 ratio even with the proper operation and maintenance of the treatment facility; the other parameters (discharged to S/N 001) were left unchanged.

Effluent Limits:

The discharge permit includes effluent limits for both the secondary treatment facility discharge (S/N 001) and the combined sewer overflow treatment facility (Combined S/N 001 and S/N 002). Discharge from Combined S/N 001 and S/N 002 is permitted at times when the combined sanitary and storm influent flow exceeds a rate of about 13 mgd as a result of storm induced runoff or snow melt.

Flow

S/N 001: The effluent flow limitation remains at 5.3 MGD, annual average, representing the facility's design flow. The facility maintains a continuous discharge.

Combined S/N 001 and S/N 002: A discharge from the combined sewer overflow treatment process is permitted only at times when the combined sanitary and storm influent flow exceeds a rate of 13 mgd as a result of storm induced runoff or snow melt. Although an average or maximum flow rate is not included, the CSO treatment process was designed for a maximum instantaneous flow rate of 75 mgd (the maximum instantaneous flow rate from the 24-hour, 2.5-inch rain event).

Biochemical Oxygen Demand (BOD₅)

S/N 001: The effluent limitations for biochemical oxygen demand remain unchanged from the previous permit. The monthly average (30 mg/l) and weekly average (45 mg/l) reflect the minimum level of effluent quality specified for secondary treatment in 40 CFR Part 133.102. In addition, the permit contains a 50 mg/l, maximum day, BOD limitation. This is the Department standard applied to all such discharges pursuant to 13.4 c. of the Vermont Water Pollution Control Permit Regulations. The Agency implements the limit to supplement the federal technology based limitations to prevent a gross one-day permit effluent violation to be offset by multiple weekly and monthly sampling events which would enable a discharger to comply with the weekly average and monthly average permit limitations. Mass limits (1000 lbs/day, monthly average and 1500 lbs/day, weekly

average) are derived by multiplying the concentration limits by a previously permitted flow of 4.0 mgd. The BOD weekly monitoring requirement is unchanged from the previous permit.

Combined S/N 001 and S/N 002: The federal BOD treatment standards (40 CFR Part 133) do not apply to CSO treatment facilities although the Department may, where appropriate, establish specific limits to meet the water quality standards. In the proposed permit, the Department will continue to require effluent BOD monitoring for storm events to determine potential impact on water quality standards (i.e. dissolved oxygen). A composite sample from each storm event is required to be analyzed for BOD.

Total Suspended Solids (TSS)

S/N 001: The effluent limitations for total suspended solids remain unchanged from the previous permit. The monthly average (30 mg/l) and weekly average (45 mg/l) reflect the minimum level of effluent quality specified for secondary treatment in 40 CFR Part 133.102. In addition, the permit contains a 50 mg/l, maximum day, TSS limitation. This is the Department standard applied to all such discharges pursuant to 13.4 c. of the Vermont Water Pollution Control Permit Regulations. The Agency implements the limit to supplement the federal technology based limitations to prevent a gross one-day permit effluent violation to be offset by multiple weekly and monthly sampling events which would enable a discharger to comply with the weekly average and monthly average permit limitations. Mass limits (1000 lbs/day, monthly average and 1500 lbs/day, weekly average) are derived by multiplying the concentration limits by a previously permitted flow of 4.0 mgd. The TSS weekly monitoring requirement is unchanged from the previous permit.

Combined S/N 001 and S/N 002: The federal TSS treatment standards (40 CFR Part 133) do not apply to CSO treatment facilities although the Department may, where appropriate, establish specific limits to meet the water quality standards.

Vermont Water Quality Standards, Section 3-04 B., contains a turbidity criterion of "not to exceed 10 NTU" for cold water fish habitat in Class B waters. Information previously submitted by the applicant indicates that for the range of values found in the lake and the wastewater effluent, TSS concentrations can be equated with turbidity values on approximately a 1:1 basis (i.e. 1 mg/l TSS = 1 NTU). Thus, Vermont Water Quality Standards for turbidity should be attained for all effluent TSS levels up to the maximum permitted concentration of 800 mg/l in the combined sewer overflow effluent, following the expected 80:1 dilution within the mixing zone around the outfall. This limit is unchanged from the previous permit. Because the 'limited duration' language in the Water Quality Standards has been modified and no longer applies in this case, the effluent limitation exemption for flows in excess of 75 mgd (corresponding with the 2.5", 24 hour storm event) has been removed from the permit. A composite sample from each storm event is required to be analyzed for TSS.

pH

S/N 001: As requested by the permittee, the pH limitation is proposed to remain at 6.0 - 8.5 Standard Units. Although Section 3-01 B.9. in the Vermont Water Quality Standards, effective July 2, 2000 specifies a limitation of 6.5 - 8.5 Standard Units, a mixing zone has

been established under Section 2-04. The mixing zone is necessary in order to prevent the addition of more chemicals (for pH adjustment) to the effluent. Given the dilution ratio, the discharge will meet the water quality standard at the edge of the mixing zone. Monitoring remains at daily.

Combined S/N 001 and S/N 002: Monitoring for pH once during each event is required. This is unchanged from the previous permit.

Settleable Solids

S/N 001: The limitation of 1.0 ml/l instantaneous maximum and daily monitoring remain unchanged from the previous permit. This numeric limit was established in support of the narrative standard in Section 3-01 B.5. of the Vermont Water Quality Standards, effective July 2, 2000.

Combined S/N 001 and S/N 002: Monitoring is required once per storm event and is unchanged from the previous permit.

Total Phosphorus

S/N 001: The concentration limitation of 0.8 mg/l, monthly average, remains unchanged from the previous permit. The concentration limit is based on requirements in Title 10, Chapter 47 §1266a. Winter monitoring is proposed to be changed from monthly to weekly consistent with similarly sized facilities. Weekly summer monitoring is unchanged from the previous permit.

In addition, The "Lake Champlain Phosphorus Total Maximum Daily Load" established a phosphorus mass loading allocation for the Burlington Main WWTF utilizing an effluent concentration of 0.6 mg/l at the design flow of the facility (5.3 mgd). That allocation (4.392 metric tons per year or 9682 pounds per year) is being incorporated into this permit.

The annual total pounds is the sum of the twelve monthly totals, which are calculated by multiplying the total monthly flow by the monthly average phosphorus concentration and by the conversion factor 8.34 lbs/gallon. The annual total must be submitted with the December monthly monitoring report and the running total pounds for each calendar year shall be included with each month's self-monitoring report.

Combined S/N 001 and S/N 002: As with the previous permit, no phosphorus limits are specified. As stated above, the overall treatment facility provides secondary treatment with phosphorus removal for the first 11 mgd of flow plus 2 mgd of the CSO treatment facility underflow in addition to the primary treatment provided for the remainder of the combined flow. As in the previous permit, a composite sample from each storm event is required to be analyzed for total phosphorus.

***E. coli* Bacteria**

S/N 001: The *E. coli* limitation is 77/100 ml as specified in Section 3-04 B.3., Vermont Water Quality Standards, effective July 2, 2000. Weekly monitoring remains the same as in the previous permit.

Combined S/N 001 and S/N 002: In the case of the combined sewer overflow discharge a limit of 6160/100 ml had been established in the previous permit. After an initial 80:1 dilution at the diffuser and within the mixing zone, the water quality criterion of 77/100 ml will be attained in the lake during combined sewer overflow events. The effluent limitation exemption for flows in excess of 75 mgd (corresponding with the 2.5", 24 hour storm event) has been removed from the permit in compliance with Water Quality Standards

Total Residual Chlorine (TRC)

S/N 001: The TRC limits of 0.44 mg/l, weekly average, and 0.76 mg/l, instantaneous maximum, are based on meeting the instream water quality acute and chronic chlorine criteria (0.019 mg/l and 0.011 mg/l respectively, considering a 40:1 dilution) in the Vermont Water Quality Standards, effective July 2, 2000 for the protection of aquatic biota. Daily monitoring is required.

Total Residual Oxidant (TRO)

Combined S/N 001 and S/N 002: The TRO limit is 0.97 mg/l for the non-winter period (April 1 to December 31) and 0.83 for the winter period (January 1 to March 31). As discussed in the **Outfall** section above, the dilution ratio at the edge of the mixing zone was determined to be 80:1. The seasons were established to account for differences in lake temperatures. In addition, oxidant decay rates for the two seasons were established by using a conservatively low demand value (the 10th percentile from the operational data) for each season. Using this method, the winter demand value in the mixing zone is 0.05 mg/l and the non-winter demand value is 0.19 mg/l. Therefore, the TRO effluent limitations permit are 0.97 mg/l for the non-winter season and 0.83 mg/l for the winter season. This is unchanged from the previous permit. Monitoring during each event is required.

Total Ammonia -N

S/N 001: Ammonia toxicity to freshwater life is dependent on pH and temperature. During review of a previous permit EPA's 1984 Ambient Water Quality Criteria for Ammonia was used to derive the secondary treatment process seasonal effluent limits of 20 mg/l (June - September) and 40 mg/l (October - May) ammonia-N expressed on a weekly average basis. During the current application review ammonia was revisited utilizing the 1999 Update of Ambient Water Quality Criteria for Ammonia. A pH of 8.0 standard units and seasonal temperatures of 18° C (summer) and 0-14° C (winter) were used. Based on this pH, the seasonal temperatures, assuming sensitive coldwater species are present, and using the 4-day average toxicity value, ambient toxicity criteria of 1.94 mg/l and 2.43 mg/l ammonia-N were calculated. The results yield a summer effluent limit of 77.6 mg/l and a winter limit of 97.2 mg/l diluted 40:1 by initial mixing at the diffuser.

Because these results are actually higher than could be expected in the facility's *influent* the proposed permit includes a 'monitor only' provision instead of effluent limitations. Monthly, rather than the current weekly, monitoring is proposed.

Combined S/N 001 and S/N 002: The permit proposes no specific limitations for Ammonia. During a previous application review the Department determined that the CSO

discharges do not have a reasonable potential to cause or contribute to exceedances of the ambient ammonia criteria. Monitoring will be required once per storm event.

Whole Effluent Toxicity (WET) Testing - 40 CFR Part 122.44(d)(1) requires the Department to assess whether the discharge causes, has the reasonable potential to cause, or contribute to an excursion above any narrative or numeric water quality criteria. Whole Effluent Toxicity testing is being required in accordance with the 1994 Vermont Toxic Discharge Control Strategy. In addition, Part 122.21 requires all publicly owned treatment works (POTW) with flows greater than or equal to one mgd to complete a minimum of four WET tests. Annual (at least) WET testing has been conducted by the City during the past two permit terms; also, toxicity scans were completed in October 2003, January 2004, and May 2004. Results indicated that this discharge did not have a toxic impact.

The proposed permit (Condition I.A.3.) retains the annual two-species acute WET testing requirement and a NOEL-A (No Observed Effect Level- Acute) of 15% or greater, where NOEL-A is the concentration of effluent in a sample that causes No Observed (acute) Effect (i.e. mortality not to exceed 10% of the test organisms) to the test population at the 48 hour exposure interval of observation.

Additional Monitoring - For all facilities with a design flow of greater than 0.1 mgd, 40 CFR § 122.21(j), Application for a permit, requires the submittal of effluent monitoring data for those parameters identified in Condition I.E.3. of the permit.

Samples must be collected once annually during various seasons (i.e. include each of the four quarters during the permit period) and the results submitted by December 31 of each year.

V. Other Permit Requirements, Conditions and Considerations

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

The proposed permit retains the existing waste management zone (WMZ) located in an area southwest of the Burlington Harbor breakwater in a 200 foot radius around the diffuser, or an area 400 feet wide by 1400 feet long.

Mixing Zone – Vermont's Water Pollution Control Statute (10 V.S.A. §1251 and 1252) recognizes that even adequately treated wastes may require an area around a discharge for dispersion and dilution before water quality standards can be attained. Such mixing zones are limited to a distance of 200 feet from the point of discharge. Vermont Water Quality Standards (Section 2-04) allow certain water quality criteria to be waived within a mixing zone provided that certain conditions are met (Section 2-04 A.2.).

The discharge permit establishes a mixing zone 200 feet in radius along the length of the

diffuser in accordance with the conditions contained in the Water Quality Standards, or an area 400 feet wide by 1400 feet long. The specific sections of the Standards that are waived within the zone include Section 3-04 B.1. and 3. (Turbidity, *E coli*) and Section 3-01 B.1. and 9. (Temperature, pH).

Combined Sewer Overflows - Two CSOs remain in the collection system: S/N 003 – Manhattan Drive/Park Street and S/N 004 – Manhattan Drive/North Champlain Street. These two CSOs were the subject of extensive sewer separation projects designed to eliminate the overflows. Subsequent modeling efforts predicted a substantial reduction in CSO volume as a result of the sewer separation projects. However, no definitive CSO monitoring data exists which indicates the degree to which the CSOs are still active. The Department has therefore included a requirement to implement an operation and maintenance program for the collection system and to monitor these overflow points until November 30, 2007. In addition, a report documenting the results of the monitoring including whether overflow events comply with the Agency's 1990 CSO Control Policy is due by December 31, 2007.

Disinfection System Failure Notification – The Burlington Main Wastewater Treatment Facility discharges into Burlington Bay, an area with a number of public bathing beaches, public water supply intakes, and other direct water contact activities. The treatment facility provides greatly enhanced protection from the poorly treated wastewater discharges that occurred before the upgrade in the early 1990's, particularly during wet weather. However, these lake uses would remain vulnerable should unexpected disinfection system failures occur at the treatment facility. For this reason, the renewed discharge permit continues to include a special condition requiring public notification of disinfection failure evidenced by elevated effluent bacteria counts. If a disinfection system failure occurs, the public will be informed of the possible health hazard through newspaper and radio announcements and by direct notification of appropriate officials in Burlington and adjoining municipalities.

Electric Power Failure - Within 30 days of the effective date of the permit, the permittee must submit to the Department, updated documentation addressing how the discharge will be handled in the event of an electric power outage. The effluent must receive a minimum of primary treatment plus disinfection.

Sewer Use Ordinance - The existing permit condition prohibiting connection of roof, cellar, or area surface drains, and enabling the permittee to require the replacement of services that are shown to have excessive infiltration has been relocated to Condition I. **Sewer Ordinance.**

V. Procedures for Formulation of Final Determinations

The public comment period for receiving comments on this draft permit is from March 28 through April 27, 2005 during which time interested persons may submit their written views on the draft permit. All written comments received by 4:30 PM on April 27, 2005 will be retained by the Department and considered in the formulation of the final determination to issue, deny or modify the draft permit. The period of comment may be extended at the discretion of the Department.

Written comments should be sent to:

Vermont Agency of Natural Resources
Department of Environmental Conservation
Wastewater Management Division - Sewing Building
103 South Main Street
Waterbury, VT 05671-0405

Comments may also be faxed to: 802-241-2596.

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

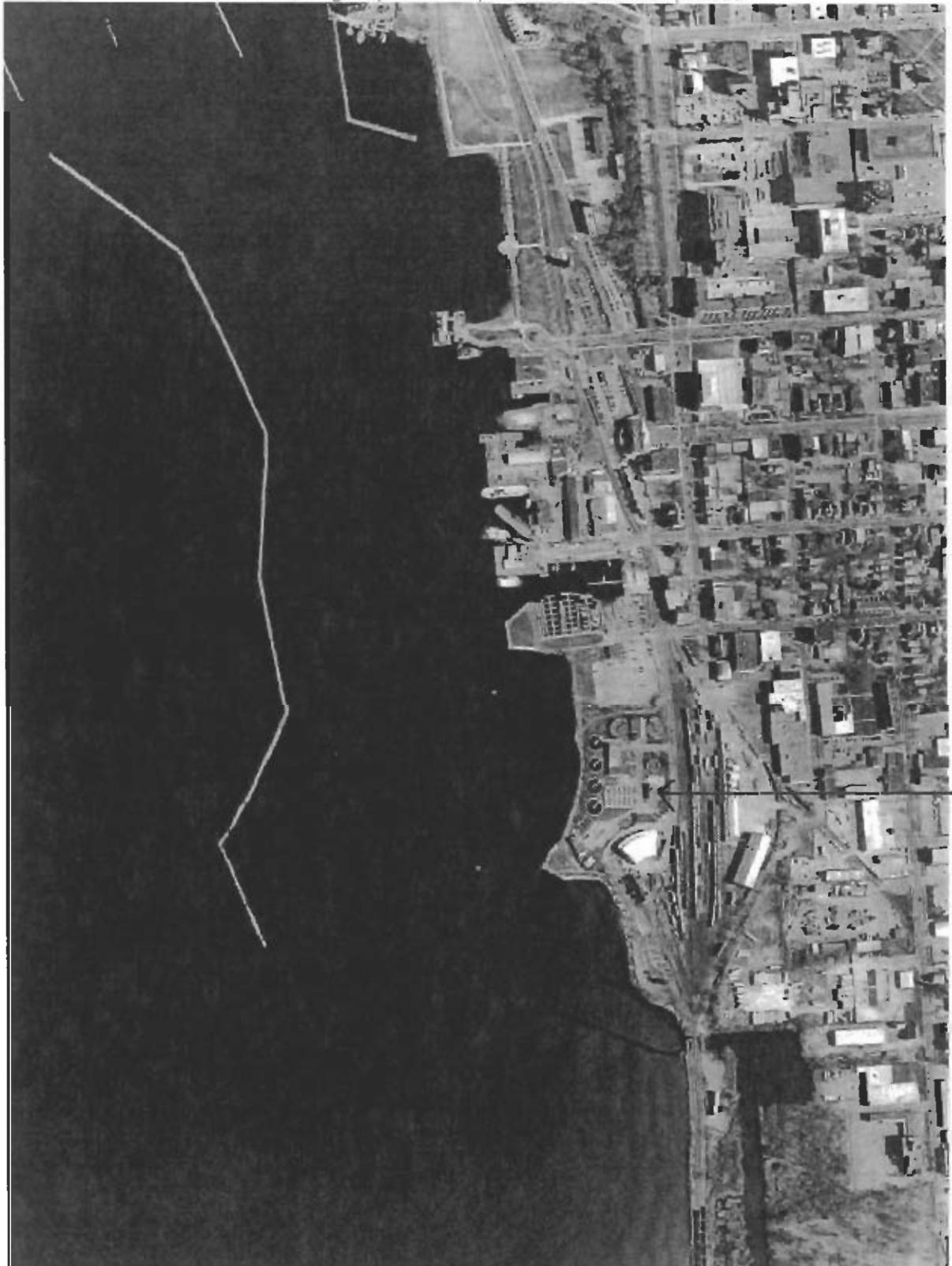
The Department will hold a hearing if there is significant public interest in holding such a hearing. Any public hearing brought in response to such a request or petition will be held in the geographical area of the proposed discharge or other appropriate area, at the discretion of the Department and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

The complete application, draft permit, and other information are on file and may be inspected at the VTDEC, Wastewater Management Division, Waterbury Office. Copies will be made at a cost based on the current Secretary of State Official Fee Schedule for Copying Public Records from 8:00 AM to 4:30 PM, Monday through Friday. The draft permit and fact sheet may also be viewed on the Division's website at www.anr.state.vt.us/dec/ww/wwmd.cfm.

Comments were received from the City of Burlington during the public notice period.

Send To Printer Back To TerraServer Change to 11x17 Print Size Show Grid Lines Change to Landscape

USGS Burlington, Vermont, United States 25 Apr 1999



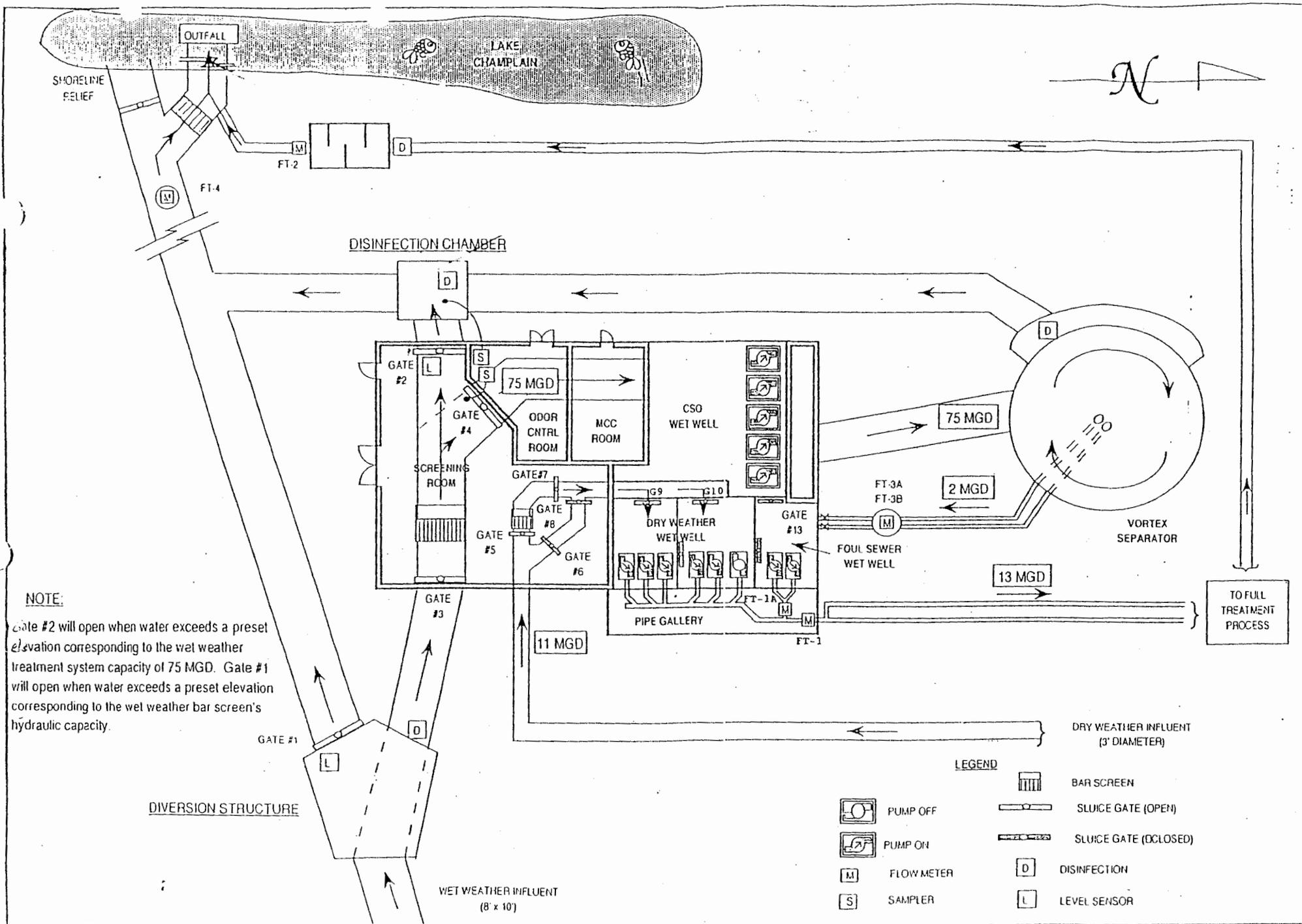
BURLINGO
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Image courtesy of the U.S. Geological Survey

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NOTE:
 Gate #2 will open when water exceeds a preset elevation corresponding to the wet weather treatment system capacity of 75 MGD. Gate #1 will open when water exceeds a preset elevation corresponding to the wet weather bar screen's hydraulic capacity.

LEGEND

-  PUMP OFF
-  PUMP ON
-  FLOW METER
-  SAMPLER
-  BAR SCREEN
-  SLUICE GATE (OPEN)
-  SLUICE GATE (CLOSED)
-  DISINFECTION
-  LEVEL SENSOR