TOTAL MAXIMUM DAILY LOAD for SEDIMENT

STYLES BROOK

Waterbody ID: 11-15

July, 2000

Prepared by:

State of Vermont
Department of Environmental Conservation
Water Quality Division
103 South Main Street
Building 10 North
Waterbury, VT 05671-0408

Submitted to:

U.S. Environmental Protection Agency-Region 1
One Congress Street
Suite 1100 (CVT)
Boston, MA 02114-2023

Table of Contents

Introduction and Waterbody Description

The impaired water for which this TMDL was developed is identified on the 1998 Vermont 303(d) List as Styles Brook and is located by the Waterbody ID VT11-15. This stream is located in the upper reaches of the West River Basin in subbasin 11-15, as defined by the State of Vermont River Basins map. The stream is classified as Class B in the Vermont Water Quality Standards effective April 21, 1997, the Standards to which this TMDL aims to restore the impaired water.

Styles Brook and its associated watershed of 1.07 square miles lies almost entirely within the holdings of a single property owner. The Stratton Corporation, single owner of a ski resort and associated adjacent properties, developed a multi-year development Master Plan which was submitted for review under Vermont's Act 250 land use and development control law. According to the Act 250 review process, one aspect is to review potential effects development may have on adjacent water resources. Since waters listed on the 1998 303(d) list were identified within the area of impact, including Styles Brook, a requirement of permit approval was the development of a remediation plan to restore impaired waters. Stratton Corporation agreed to develop and implement a water quality remediation plan.

One permit requirement of Act 250 was the Stratton Master Plan-Water Quality Remediation Plan (SWQRP), developed by Pioneer Environmental Associates, LLC with review, comment and approval provided by the Vermont Department of Environmental Conservation, Division of Water Quality. This plan provides the basis for the TMDL and is referred to extensively throughout this document and provides the necessary supporting information. The SWQRP is provided as supporting documentation under a separate cover.

A description of the watershed is given in the SWQRP, Section 2.1 including stream descriptions, existing land uses and other detailed information. A site plan of the watershed is given as an Appendix map in the SWQRP where the Styles Brook watershed is identified as the sum of the sub-basins labeled "C."

Problem Assessment and Pollutant Sources

Problem Assessment

Macroinvertebrate sampling and habitat assessment of Styles Brook was conducted by the State of Vermont in 1993, 1994 and 1998. Results of each sampling identified the biologic integrity of the stream to be fair and that it was not meeting the minimum Class B criteria. Indications were that the impairment was based on habitat degradation primarily from excessive sand/silt loading. Habitat evaluation revealed a high substrate embeddedness, consistently in the range of 50- 75%. From these evaluations, Styles Brook was placed on the 1998 303(d) List of Impaired Waters. A more complete description of the history of biological and habitat assessment is given in the SWQRP, Section 2.1.7.

Priority Ranking

According to the 1998 Vermont 303(d) List, TMDL development for Styles Brook was scheduled for 2002, which represents a high priority scheduling for TMDL development. Waters listed on the 1998 303(d) List were prioritized over a period of 15 years, through 2013. Watershed planning efforts in the state in conjunction with the SWQRP allowed this TMDL investigation, and subsequent management plan, to be developed earlier than anticipated.

Pollutant of Concern

The Styles Brook TMDL was developed for sediment. High degrees of substrate embeddedness, primarily from sand, have degraded macroinvertebrate habitat and resulted in an unfavorable shift in the macroinvertebrate community composition.

Pollutant Sources

Field observations were used to document specific areas of nonpoint source sediment loading to Styles Brook which appears to originate from existing disturbed areas within the watershed. The small size of the drainage area and short length of Styles Brook allowed a thorough investigation of sediment sources with a description given in the SWQRP, Section 2.1.3. Specific areas of concern are:

- Mountain work roads
- Obertal and Shatterack developments
- Stratton maintenance facility
- Sand storage area
- Parking lot #5

While the sediment sources listed above are given for specific areas, they fall into several projects prioritized for management actions. Individual restoration projects were given an impact ranking (Table 1) based on field observations and measurements which consider the significance of each of the water quality impact factors identified in Section 2 of the SWQRP. These factors include existing land uses, hydrology, erosion and sediment yield, riparian vegetation, channel processes and water quality.

Table 1. Prioritized areas for management activities based on Impact Ranking.

Impact Ranking	Management area
1	Existing Parking Lot #5
2	Maintenance Facility/Sand Storage
3	Ski trails/work roads
4	Condominium projects
5	Golf School stream buffer
	Roads (private/public) [1]

[1] areas/activities to be field-evaluated during 1999

Most of the prioritized actions above deal primarily with sediment reductions, however, actions proposed for the Golf School stream buffer include reestablishment of the riparian buffer. Lost portions of the riparian buffer were identified as negatively impacting the stream, although were not considered contributing to the primary impairment of Styles Brook.

Natural Background

A distinction was not made between natural background loadings of sediment and the total sediment load to Styles Brook. The assumption was made that because of the small size of the watershed, the problem areas could be identified and treated to minimize sediment loading to the stream. These problem areas were observed to be major contributing factors to impairment. Any natural loading that occurred was considered to be minimal and did not contribute significantly to the impairment.

Applicable Water Quality Standards and Numeric Water Quality Target

State Water Quality Standard

There is no applicable numeric standard for the sediment load carried in streams in the Vermont Water Quality Standards, but Styles Brook is listed as impaired based on narrative criteria. The excessive sedimentation to Styles Brook (as measured through various biometrics) has resulted in a violation of the Vermont Water Quality Standard's § 3-01(B)(5) which states that there shall be:

> No change from background conditions that would have an undue adverse effect on the composition of the aquatic biota, the physical or chemical nature of the substrate or the species composition or propagation of fishes.

Designated Uses

Since Styles Brook is rated as a Class B waterbody, the Vermont Water Quality Standards state in § 3-03(A) and that:

> Class B waters shall be managed to achieve and maintain a high level of quality, that is compatible with the following beneficial values and uses:

including § 3-03(A)(1):

> Water of a quality that consistently exhibits good aesthetic value and provides high quality habitat for aquatic biota, fish and wildlife.

Since macroinvertebrate biomonitoring data did not meet the criteria for Class B standards, Styles Brook does not support the designated uses for Class B waters.

Antidegradation Policy

In addition to the above standards, the Vermont Water Quality Standards contain, in part, the following antidegradation policy in § 1-03(A):

> The waters of the State shall be managed in accordance with the Water Quality Standards to protect, maintain and improve water quality in such a manner that the beneficial values and uses associated with their classification are attained. All waters, except mixing zones, shall be managed so that, at a minimum, a level of water quality compatible with all beneficial values and uses associated with the assigned classification are obtained and maintained.

Numeric Water Quality Target

Section 303(d)(1)(C) of the Clean Water Act states that TMDLs "shall be expressed at a level necessary to implement the applicable water quality standards..." Without specific numeric targets defining "undue adverse effect" stated in the Vermont Water Quality Standards, a set of numeric biological community criteria were established to identify when conditions were not fully supporting the standards. The VT DEC uses a variety of biological indicators to identify when conditions exist that are not fully supportive of the expected aquatic community for a particular stream type. Table 2 lists the specific macroinvertebrate biometric values used to determine compliance with the Class B Water Quality Standards. These values were adopted as the numeric targets for the Styles Brook TMDL. The latest results describing the condition of Styles Brook are also include in Table 2.

Table 2. Aquatic invertebrate biometrics, water quality targets and Styles Brook results-1998.

Biometric	Description	Styles Brook Results[1]	Class B Criterion (WQ Targets)
Density	Relative abundance of organisms in a sample	397	> 500
Species Richness	Number of different taxa in a sample unit	38	≥ 30
EPT	Number of water quality sensitive taxa from the insect orders Ephemeroptera, Plecoptera and Trichoptera.	15	≥ 18
EPT/Richness	Ratio of water quality sensitive EPT taxa to all taxa found in Community	0.39	> 0.45
Biotic Index	The community tolerance to organic/nutrient loading, based on the tolerances of the species found in the community	2.21	< 2.75
EPT/EPT & Chironomid	Ratio of density of EPT taxa to EPT and tolerant Chironomidae	0.84	> 0.45
% Dominant Genera	Percent of dominant genera in the community	25	< 40%

[1] As assessed on September 14, 1998 by VTDEC personnel.

Sediment targets were also developed as restoration goals for Styles Brook and are given below in Table 3. While the biological criteria given in Table 2 are the ultimate measure for attainment of water quality standards, the sediment targets act as another means of tracking the effectiveness of the phased implementation measures. A further description of the sediment targets is given in section 5.3.2 of the SWQRP.

Table 3. Sediment Indices, Targets and Status of Styles Brook.

Sediment Index	Styles Brook Results[1]	Target Value
% Embeddedness	50-75 %	< 25%
% *Oligocheata*	28.5	< 5%
Pebble Count	not determined	to be determined

[1] As assessed on September 14, 1998 by VTDEC personnel.

Perhaps the best measure for quantification of sediment loading for this TMDL is percent embeddedness. This index allows both the quantification of sediment loading and provides a measure of macroinvertebrate habitat condition. The pre-remediation percent embeddedness was consistently measured to be 50 - 75 % and a target goal of < 25% was developed. The target goal of 25% embeddedness was selected because it represents an "excellent" substrate condition for benthic macroinvertebrates.[1]

Linkage Analysis

The linkage analysis is a required element for a TMDL that establishes the cause-and-effect relationship between measurable water quality targets and identified sources. This can be accomplished through a number of methods from qualitative assumptions based on sound scientific judgement to the use of sophisticated predictive models. The method chosen should be supported by monitoring data that associate waterbody responses to specific loading conditions.

The cause of the impairment in Styles Brook was determined to be excessive sedimentation due to sediment loading as identified by macroinvertebrate community sampling and habitat assessment. This lead to an extensive visual watershed assessment directed at locating specific sediment sources. During the qualitative assessment, sediment sources were quite clear in this small watershed and determined to be the primary cause of impairment. Best professional judgement dictated that effective control of all or most observed sediment sources contributing to the impairment would ultimately return the stream to compliance with Class B water quality standards.

This qualitative method to link the desired water quality targets to the observed sources was deemed appropriate in this watershed primarily because of its small area. A thorough survey identified significant pollutant sources that could be addressed by implementing remediation measures. Under the phased TMDL approach, incremental water quality gains are tracked by

---

[1] USEPA. 1989. Rapid Bioassessment Protocols for Use in Streams and Rivers: Benthic Macroinvertebrates and Fish (EPA440/4-89/001). United States Environmental Protection Agency. Office of Water. Washington, DC.

monitoring as implementation measures are undertaken. The required level of sediment loading reductions are realized when biocriteria standards and numeric targets are met (see Tables 2 & 3).

In addition to the above qualitative linkage, a quantitative assessment of sediment loading was also developed. By using the instream sedimentation target of 25 % embeddedness as the desired endpoint, the required instream load reduction could be calculated. In other words, the current or pre-remediation condition resulted in an instream embeddedness ranging from 50 % to 75 %, so the necessary instream sediment reductions are those that result in an embeddedness rating of 25% or less. It is expected that over time, with reduced sediment loading occurring, the existing instream sediment will move through the stream and a more stable equilibrium between sediment loading and the instream embeddedness will be established. The discussion below describes these calculations.

First, the pre-remediation instream sediment load producing the 50-75 % embeddedness needs to be calculated. By knowing the median size of the dominant natural substrate, the depth of what 50-75 % embeddedness represents, the relative area between the dominant particles where the fines settle, and the physical properties of the sediment fines, in this case sand, this value can be obtained. The values used for the sediment loading calculations are given below in Table 4 and are described in the following discussion.

Field observations reveal that the dominant natural substrate particle size is cobble (64 - 128 mm diameter). While there are other natural particles both larger and smaller than cobble present, namely boulders and gravel respectively, the cobble size class dominates. For the sake of simplification, the median cobble diameter in the size class, 96 mm, is used for the calculations of sediment volumes and loadings. By using the median cobble diameter, the depth of sediment fines can be calculated for both pre-remediation and target conditions of embeddedness. The embeddedness of the pre-remediation condition of 50 - 75 % represents a sediment depth of 48 - 72 mm. The remediation target of 25% embeddedness represents a sediment depth of 24 mm.

Next, by using the observed percentage of sand coverage of stream bottom, the volume of the interstitial spaces between the larger natural particles can be determined for the sediment depths of interest. Sand was observed to cover approximately 10 % of the stream bottom in the areas sampled. On a per square meter basis, this represents 0.1 square meters of sand for every square meter of stream bottom. The pre-remediation volume of fine sediment ranges from 0.0048 to 0.0072 cubic meters and the target volume for 25 % embeddedness equals 0.0024 cubic meters.

When calculating the volume of the sand in the streambed alone, consideration must be given to the porosity of sand. A loose sand mixture has a porosity value of approximately 0.4, that is, approximately 40 % of a given volume is empty space. So in calculating the volume of sand in the stream for any given embeddedness condition, as done above, the volume of the interstitial space between cobbles must be multiplied by 0.6. This product gives the actual volume of sand between the cobbles and disregards the empty spaces between the particles.

Finally, in order to convert the fine sediment volume to a mass per unit area in-stream loading, the physical characteristics of the fine sediment must be considered. Sand has a density of approximately 2.65 grams per cubic centimeter. Multiplying the density by the actual volume of sand in the interstitial spaces gives the resulting in-stream loading for any given depth of embeddedness.

Table 4. Data used to calculate pre-remediation and target sediment loading rates.

Calculation Parameter	Pre-remediation	Target
% Embeddedness	50 -75 %	25 %
Dominant Natural Substrate	cobble	cobble
Median diameter of natural substrate	96 mm	96 mm
Depth of fine sediment	48 - 72 mm	24 mm
Interstitial area between cobbles	0.1 m^2	0.1 m^2
Dominant fine sediment type	sand	sand
Porosity of fine sediment - estimated	0.40	0.40
Density of fine sediment - estimated	2.65 g/cm^3	2.65 g/cm^3

The loading ranges for both the pre-remediation and target values for Styles Brook are given in Table 5. Based on the methodology for determining sediment loading described above, an estimated reduction of solids loading between 50 and 67% will be necessary to meet the instream sediment target of 25 % embeddedness.

Table 5. Estimated instream sediment loading condition.

	Fine sediment (sand) loading (kg/m^2)	% reductions necessary to meet instream target
Pre-remediation	7.6 - 11.4	50 - 67%
Target	3.8	

The strength of this quantitative approach is that it estimates the actual loading to the streambed (the cause of impairment) based on observations and eliminates many of the uncertainties and complexities involved with monitoring water column suspended solids and predicting the fate and transport of sediments originating from the watershed. This method does not attach expected load reductions associated with the various remediation measures, however, as discussed above in the qualitative linkage approach, the size of the watershed allowed extensive visual

investigations of sediment sources and utilized professional judgement to prioritize appropriate remediation measures to attain standards.

TMDL Allocations

The TMDL is considered the loading capacity of a waterbody for a particular pollutant and EPA regulations require that a TMDL include a wasteload allocation (point sources), a load allocation (nonpoint sources) and a margin of safety. The margin of safety accounts for any lack of knowledge concerning the relationship between effluent limitations and water quality. Regulations also require that seasonal variations be considered when determining allocations.

As specified in the regulations, TMDLs may be expressed in terms of either "mass per unit time, toxicity, or other appropriate terms." Because of the nature of sediment loading and deposition in small mountain streams, this TMDL bases its allocations on "other appropriate terms."

Because sediment loading is largely a function of runoff characteristics related to rainfall and snowmelt events, expressing it as daily loading is clearly not appropriate. Annual loading may give a better overall indication of the magnitude of reductions needed, but it is not perfect either, because of the dynamics involved with sediment generation and transport in mountain streams and the role that large infrequent storms have on moving sediment. Annual loadings can fluctuate dramatically.

Instead, the sediment allocation for Styles Brook is given as the percent reduction in sediment loading necessary to achieve an instream condition believed to provide optimal macroinvertebrate habitat conditions. As the calculations from the previous section indicate, the reduction in fine sediment loading to reduce embeddedness from the pre-remediation range of 50-75 % to the target of 25 % is approximately 50-67 %.

Wasteload Allocations

There are no sediment point sources in the watershed discharging to Styles Brook. Therefore, the TMDL recommends a Wasteload Allocation of zero.

Percent reductions of fine sediment loading needed from Point Sources	**0 % - there are no point sources present**

Load Allocations

Nonpoint sources of sediment are considered the sole contributing category of pollutant to the impairment of Styles Brook and, therefore, all reductions required in this TMDL are allocated to those sources.

Percent reductions of fine sediment loading needed from Nonpoint Sources	**50 - 67 %**

The SWQRP, Section 4.0, establishes a water quality impact ranking for each of the identified contributing sources of impairment. For each identified problem, an associated remediation measure has been scheduled for implementation. By scheduling remediation projects according to their relative beneficial impacts, rapid improvements are be expected earlier in the remediation phase rather than later. This adaptive management approach creates an initial expectation for improvement but also allows modification as monitoring results may require.

Margin of Safety

The statute and regulations require a TMDL to include a margin of safety to account for any lack of knowledge concerning the relationship between effluent limitations (or in this case nonpoint source remediation measures) and water quality. This margin of safety can be either implicit in the analysis by using conservative assumptions or explicit as a separate loading allocation. In the case of Styles Brook, an implicit margin of safety was used.

There is an inherent margin of safety established for the Styles Brook TMDL with the selection of a conservative percent embeddedness target of <25 %. A "good" embeddedness rating covers a wide range of values from 25% to 50% and in most instances provides adequate habitat for the expected macroinvertebrate community based on stream type. A percent embeddedness rating of less than 25 % is considered "excellent" as interpreted both by the Vermont DEC and EPA's rapid bioassessment protocols and has been selected as the target for this TMDL. With such a conservative target as the goal of the implementation measures, compliance with the Vermont water quality standards should be assured.

Also, since this phased TMDL relies on followup monitoring and adaptive management, an added level of assurance is gained. The adaptive approach being applied in Styles brook ensures water quality standards will ultimately be met through continued monitoring and remediation actions. If monitoring indicates that implemented projects are not enough to sufficiently improve water quality, then remediation measures continue. Also, as part of the Act 250 permit process, future development in the impaired watershed outside the scope of the remediation plan is not allowed until the water quality standards are met.

Seasonal Variation

A TMDL is also required to consider seasonal variation in the loading analysis and resulting allocations to ensure water quality standards will be met throughout the year under various environmental conditions. Seasonal variation was inherently incorporated in the consideration of this TMDL for Styles Brook and will be protective of water quality throughout the year.

The selected numeric water quality endpoints represent water quality conditions that are a result of the cumulative impacts of both dry and wet weather conditions that occur over extended periods. Because of this, the allocations and resulting implementation measures are directed primarily at reducing sediment sources and not at the sediment delivery mechanisms. By utilizing this approach, seasonal variations have little effect on sediment loading if the sources

are no longer present. Examples include elimination of gravel parking lots and stabilization of eroding soils. The implementation measures selected will be engineered to function under all climatic conditions to sufficiently treat stormwater runoff throughout the year.

Monitoring Plan for TMDL Development Under the Phased Approach

A plan for continued monitoring is essential and required for any phased TMDL. An extensive monitoring plan has been developed and is explained in detail in the SWQRP, Section 5.4. The section below gives the overall monitoring approach and the rationale used for its development. The monitoring of Styles Brook is only a part of an overall monitoring plan provided in the SWQRP. The described monitoring plan provides a holistic monitoring approach including not only the 303(d) listed waters of Styles Brook, but also adjacent impacted watersheds.

Since the implementation of this TMDL and water quality management plan is to be a phased process, a long-term monitoring plan was developed. The overall approach of the monitoring plan is to develop a reliable baseline documenting existing conditions, and to track future changes in water quality resulting from discrete and incremental remediation measures. A five year data collection program was established beginning in 1999. The Stratton Corporation is primarily responsible for data collection, however, all results are submitted to Vermont Agency of Natural Resources in the form of an annual performance report.

Specific to Styles Brook, four sampling locations have been established for which sediment parameters and macroinvertebrates are to be monitored. Not every sampling location is monitored for all parameters, but each site is monitored for parameters specific for tracking progress of implementation measures.

In-stream measures of sediment load include the Pebble Count Procedure and Percent Embeddedness. Targets for each of these have been developed and annual monitoring results will track the progress of habitat improvement over the course of the implementation plan. Combined with the biomonitoring portion of the plan, compliance status with the Vermont Water Quality Standards will be tracked until conditions exist that can perpetuate continued compliance.

Implementation Plan

<u>Strategies to Remediate Impairments</u>
Several remediation measures were identified for water quality improvement primarily intended to reduce sedimentation to Styles Brook. All potential measures were ranked according to their overall impact for improving water quality and habitat condition. The ranking is based on field observations and measurements that consider relative benefit potential. A list of all proposed implementation measures is provided in the SWQRP, section 4.0.

Implementation Schedule

A complete schedule for implementation of remedial measures is given in the SWQRP, Section 5.0. Remediation measures for Styles Brook are expected to be completed by the end of 2000 and biocriteria standards for Class B waters are expected to be attained by 2005.

Reasonable Assurances

In waters impaired solely by nonpoint sources, reasonable assurances that implementation measures will be carried out are not required for a TMDL to be approved. However, EPA encourages states to provide reasonable assurances whenever possible that may include regulatory, non-regulatory, and or incentive-based measures. The TMDL for Styles Brook includes an extensive implementation plan aimed at restoring the stream to the acceptable numeric targets.

Since the SWQRP was developed as a permit requirement of the Vermont Act 250 land use and development control law, there is a strong incentive, and reasonable assurance, that the plan will be implemented. The primary land owner, Stratton Corporation, will be ineligible for future development permits outside of the scope of the remediation plan until the impaired waters, including Styles Brook, attain the Vermont Water Quality Standards. Implementation of remediation measures has begun in coordination with the VT-DEC.

Public Participation

As described previously, the SWQRP was developed through the Vermont Act 250 land use and development control permit process. As a part of that process, an extensive public participation process was involved. In EPA's initial comment letter of March 15, 2000 for the associated draft Tributary #1 TMDL, EPA stated that "EPA policy is that there must be full and meaningful public participation in the TMDL process." Vermont DEC believes that the public participation in the development of the Styles Brook TMDL as part of the Stratton Water Quality Remediation Plan more than satisfies this policy and meets all legal requirements.

The Stratton Water Quality Remediation plan was an outgrowth of the proceedings considering an application by the Stratton Corporation (Stratton) for a master plan permit for major development plans under Act 250. Vermont's Act 250 law is nationally acclaimed for its comprehensive and integrated approach to reviewing regional, economic, social and environmental impacts of major development projects. In effect for three decades, the law and its procedures are now an institution well known by all Vermonters with more than a passing interest in environmental issues. A surprising number of the state's residents can rattle off the Act's "10 Criteria" for reviewing projects. (See Appendix A for a description of the Act 250 Process and the 10 criteria).

Act 250 addresses the broader impacts from large scale development projects that are not covered by Department of Environmental Conservation's (DEC) discharge permit programs. For

example, the Act 250 Commission found that Stratton must address all the nonpoint source pollution associated with the proposed master plan, whether a DEC permit for a discharge is required or not. The Stratton Water Quality Remediation Plan was the mechanism adopted by the Commission for addressing nonpoint source pollution at Stratton. In addition, Act 250 regulators can supplement DEC requirements by imposing stricter conditions on discharges than those included in DEC discharge permits.

The Act 250 process is quasi-judicial in nature. Public notice of a permit application includes an invitation to become a party to the proceedings. As explained in the description (Appendix A), the applicant; the municipal planning commission; the municipality, represented by either the selectman, alderman, or trustees; the regional planning commission; and affected State agencies are, by law, parties to the proceedings. Adjoining property owners who have requested a hearing or appeared at the first hearing and other persons or groups found to be appropriate parties under Environmental Board's "Rule 14(B)" may also be admitted as parties. The criteria for gaining party status are broad. To become a party an individual or group must demonstrate that their interests are affected under any of the 10 criteria or show that their participation will materially assist Act 250 regulators by providing testimony, cross-examining witnesses, or offering argument or other evidence relevant to the 10 criteria.

The initial Act 250 public notice regarding Stratton's application for a master plan permit dated February 26, 1997 is also found in Appendix A. As a result of that notice the Stratton Area Citizen Committee (SAC), a local and vocal citizen group with long standing interest in water quality, and the Vermont Natural Resources Council (VRC), a statewide environmental organization with a special interest in water quality were both admitted as parties to the proceedings. Unlike citizens in the typical informational public hearing, parties in Act 250 proceedings may introduce evidence, present expert testimony, cross examine witnesses of other parties, file legal memorandum and proposed findings of fact, and seek administrative and judicial appeals of regulatory rulings.

To abbreviate a long story, as a result of water quality concerns raised by SAC, VRC and DEC the Act 250 district commission requested comments from DEC on how the commission should respond to Stratton's expansion plans in light of the fact that its existing developments were contributing to nonpoint source violations of state water quality standards. DEC's response was to suggest that Stratton be required to prepare and implement a water quality remediation plan with specific water quality improvement targets as a condition of going forward with new development projects.

On April 9, 1999 the district commission issued notice of a public hearing (Appendix A) "to review a specific plan for correcting impaired stream segments and achieving compliance with the Vermont Water Quality Standards." The commission also requested that DEC approve the plan and "set quantifiable benchmarks by which to judge the effectiveness of the remediation strategy." The development of the water quality remediation plan was a collaborative process involving DEC and Stratton and review by VNRC. The plan was presented for approval at a