TOTAL MAXIMUM DAILY LOAD ANALYSIS FOR TRANSYLVANIA BROOK, SOUTHBURY, CT

This document has been established pursuant to the requirements of Section 303(d) of the Federal Clean Water Act

ARTHUR J. ROCQUE for

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Jane Stahl, Deputy Commissioner
Air, Waste and Water Programs

ROBERT L. SMITH **2/22/01**

_____ _____

Robert L. Smith, Chief
Bureau of Water Management

STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION
79 Elm Street
Hartford, CT 06106-5127
(860) 424-3020

Arthur J. Rocque, Jr., Commissioner

INTRODUCTION

The Federal Water Pollution Control Act, commonly referred to as the Clean Water Act (CWA), requires that states adopt water quality standards that support designated uses for each waterbody within its boundary. Examples of designated uses adopted into Connecticut Water Quality Standards (WQS) include drinking water supply, fish and wildlife habitat, recreational use, agricultural use, industrial supply, and others. Section 303(d) of the CWA requires states to develop Total Maximum Daily Loads (TMDLs) for waters where current pollution controls are not stringent enough to attain or maintain compliance with adopted State Water Quality Standards.

The TMDL represents the maximum pollutant loading that a waterbody can receive without exceeding the adopted Water Quality Criteria (WQC) for that pollutant. Federal regulations require that the TMDL analysis identify the portion of the total pollutant loading which is allocated to point source discharges (termed the Wasteload Allocation or WLA) and the portion attributed to nonpoint sources and natural background (termed the Load Allocation or LA). In addition, TMDLs include a Margin of Safety (MOS) to account for uncertainty in establishing the relationship between pollutant loadings and water quality. Seasonal variability in the relationship between pollutant loadings and WQS attainment must also be considered in TMDL analyses.

A TMDL analysis also provides a written report that describes the pollution control actions necessary to achieve acceptable water quality conditions in the impaired waterbody. Public review and comment is strongly encouraged. Following public review and comment, the TMDL established by the State is submitted to the Regional Office of the Federal Environmental Protection Agency (EPA) for review. EPA can either approve the State's TMDL or disapprove the TMDL and act in lieu of the State. TMDL reports also may include an implementation plan and a description of monitoring activities to confirm that the TMDL has been effectively implemented and that WQS have been achieved.

Development of TMDL for Transylvania Brook

The section of Transylvania Brook from the Southbury Training School to the mouth has been listed on the 1998 303(d) list *of Connecticut Waterbodies Not Meeting Water Quality Standards*[1] based on calculations that indicated that water quality based limits were necessary to meet Connecticut Water Quality Criteria for copper. Calculations also indicated the potential need for water quality based limits for ammonia, zinc, and chlorine. In addition, biological surveys have indicated that the fish community downstream of the Southbury Training School Publicly Owned Treatment Works (POTW) was composed of mainly pollution tolerant species whereas the fish community upstream of the POTW was composed of species more typically associated with coldwater streams in Connecticut. However, it is uncertain whether habitat differences, water quality, or some combination of these factors is the reason for the difference in fish communities.

Despite the uncertainty with the fisheries data, the potential for water quality criteria exceedances downstream of the Southbury Training School POTW presented the need for TMDL development in order to protect aquatic life in Transylvania Brook. Therefore, TMDLs were developed for copper, zinc, chlorine, and ammonia for two locations in Transylvania Brook downstream of the Southbury Training School discharge.

The 1998 303(d) list included "nutrients" as a suspected cause of impairments in Transylvania Brook. Nutrients are not known to cause any water quality impairments in Transylvania Brook but have been the cause of historic eutrophication problems much further downstream in the basin in impoundments along the Housatonic River (Lakes Zoar and Lillinonah). Phosphorus reduction in the Housatonic River basin has been a priority for CTDEP since the mid 1970's. Considerable efforts to control nutrients are already in effect on farms in the Transylvania Brook basin. CTDEP, in cooperation with the National Resources Conservation Service, and the University of Connecticut Cooperative Extension System, has been working with farmers in the basin to implement Best Management Practices to control nutrients originating from agricultural practices. In addition, plans for the upgraded Southbury Training School POTW include advanced treatment designs to reduce phosphorus levels to a target level of 1.0 mg/l. Because there are there are no data to suggest that nutrients are contributing to water quality impairments in Transylvania Brook, a TMDL was not developed for nutrients.

Site Description

Transylvania Brook originates in the town of Roxbury, Connecticut and flows for approximately 5.3 miles before its confluence with the Pomperaug River in Southbury (Figure 1). The watershed drains an area of approximately 7.2 square miles [2] of predominantly deciduous forest with a medium density residential area centered around the Southbury Training School campus (Figure 2).

The Southbury Training School was built in the 1930's as a home for individuals with Mental Retardation. The Southbury Training School is situated on the western side of Transylvania Brook on a campus consisting of 100 buildings on approximately 1,600 acres of land and is owned and operated by the State Of Connecticut, Department of Mental Retardation. The facility operates independently from the town of Southbury and provides its own power, heat, sewage treatment, water, laundry, fire, ambulance, public safety, building maintenance, transportation and dietary services.

The Southbury Training School POTW is the only point source discharge in Transylvania Brook. The facility currently has a NPDES permit for discharge of 300,000 gallons per day of treated and seasonally disinfected sanitary wastewater that is generated entirely on campus. The Southbury Training School POTW was built in 1939, later upgraded in 1953, and is considered an outdated facility by today's standards. The current facility provides secondary treatment of wastewater effluent by trickling filter followed by secondary clarification, sand filtration, and chlorination before discharge to Transylvania Brook. There is no industrial wastewater generated on the campus and no septage is accepted at the facility.

Habitat in Transylvania Brook is variable and is a function of local landuse, topography of the surrounding land, and local geology. The habitat differences along the longitudinal gradient is probably an important factor in determining the distribution of aquatic life in the brook [3].

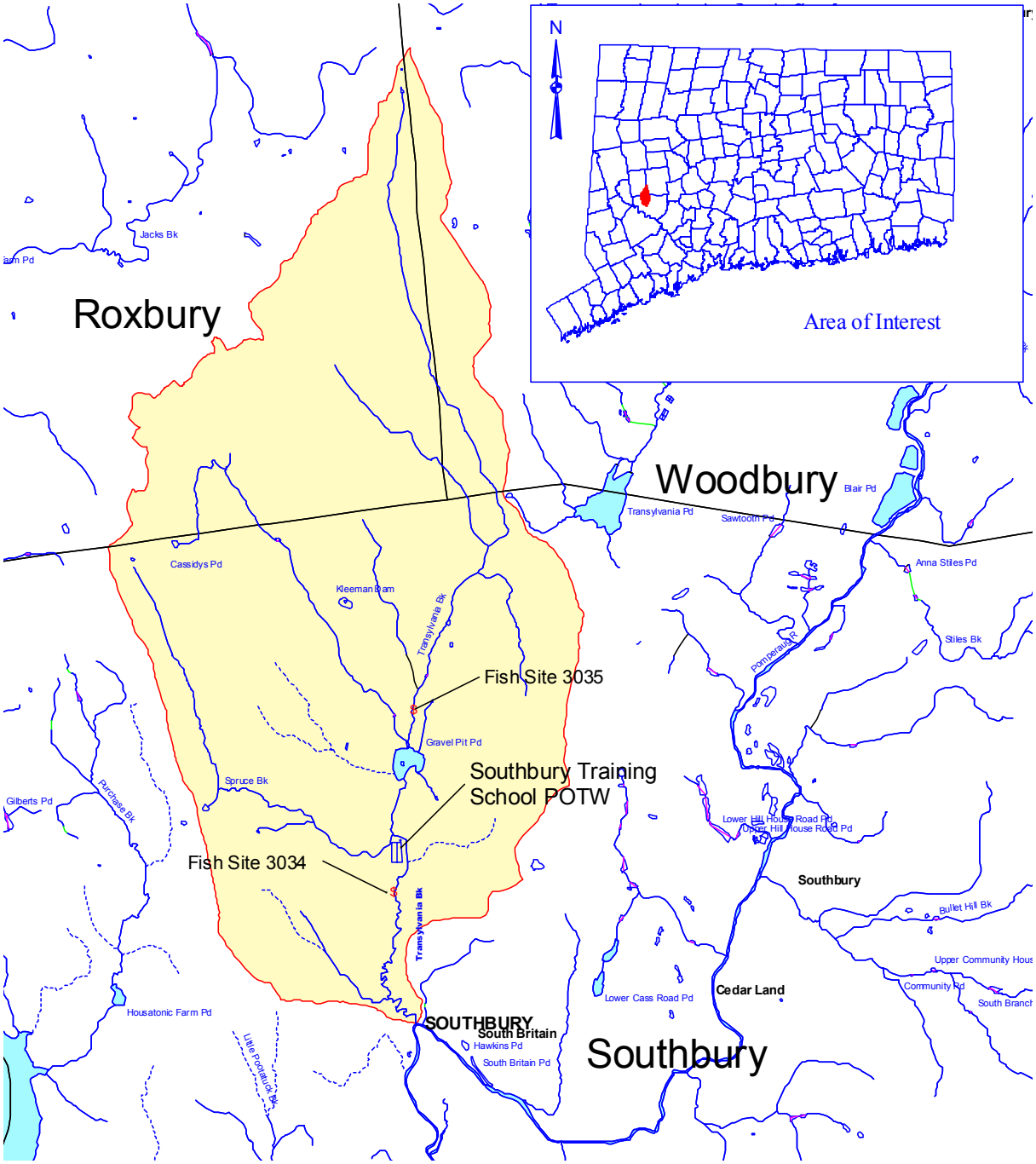


Figure 1. Transylvania Brook Watershed.

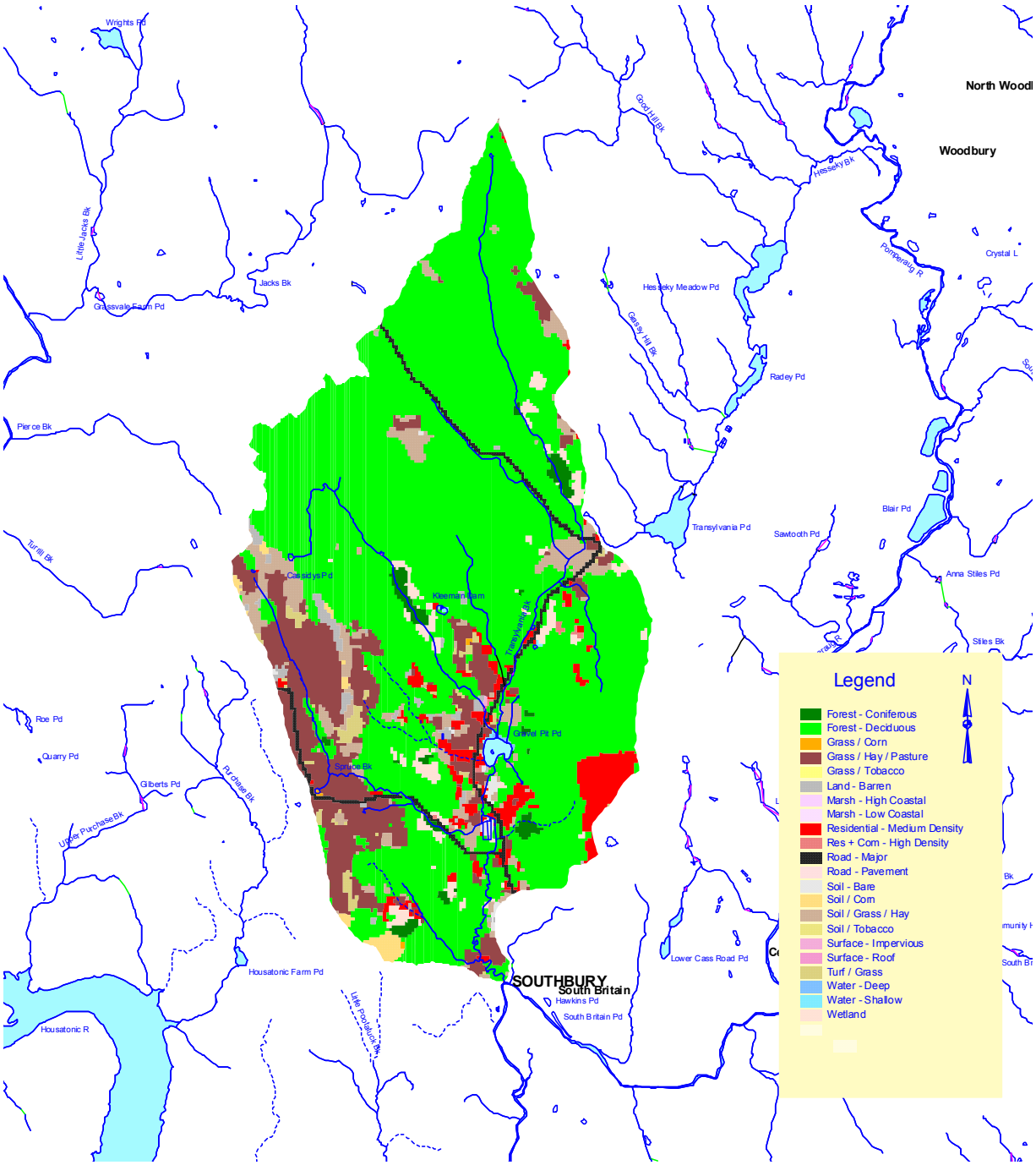


Figure 2. Landuse in Transylvania Brook Watershed.

The watershed above Gravel Pit Pond (aka Stibbs Lake) is steep and undeveloped and can be characterized as a typical cold water stream in Connecticut. Surficial materials within the watershed consist of glacial till, gravel, and a mixture of sand and gravel (Figure 3).

The watershed below Gravel Pit Pond is low gradient, drains the Southbury Training School campus, and is atypical of coldwater streams in Connecticut. Instream habitat in this section of Transylvania Brook is more typical of a wetland marsh system. Surficial materials below Gravel Pit Pond consists of alluvium overlying fine sediments. As a result, instream substrate in this area of Transylvania Brook is composed primarily of fine sand and stream bank erosion is a common occurrence in this stretch of brook.

There is currently great local interest in improving the instream habitat in the lower section of Transylvania Brook. The Naugatuck Valley Chapter of Trout Unlimited, the Town of Southbury, local residents and CTDEP are developing a plan to improve the instream habitat in the lower section of the brook. The project proposal includes instream habitat structures to increase protective cover for fish, bank stabilization, and riparian buffer zones [4]. A local Eagle Scout, has initiated a river cleanup day which will utilize local volunteers remove debris along the river.

Biological Monitoring

Transylvania Brook is classified as a smaller stocked stream by the CTDEP Fisheries Division and receives an annual stocking of approximately 300 yearling brook trout. In addition, 500 adult trout are stocked into Gravel Pit Pond annually.

In 1991, the CTDEP Fisheries Division collected physical, chemical, and fish population data from two sites along Transylvania Brook - one located upstream and one downstream of the Southbury Training School POTW [5]. Site 3035, Transylvania Brook at Southbury Training School, was located approximately 3/4 mile upstream of the Southbury Training School POTW outfall. Habitat within this stream reach was characterized as typical of cold water streams in Connecticut. Average width and depth at the upper site was 9 feet and 3 inches during summer low flow conditions. A total of six fish species were collected including brook trout, brown trout, white sucker, and three minnow species. Growth rates and population structure

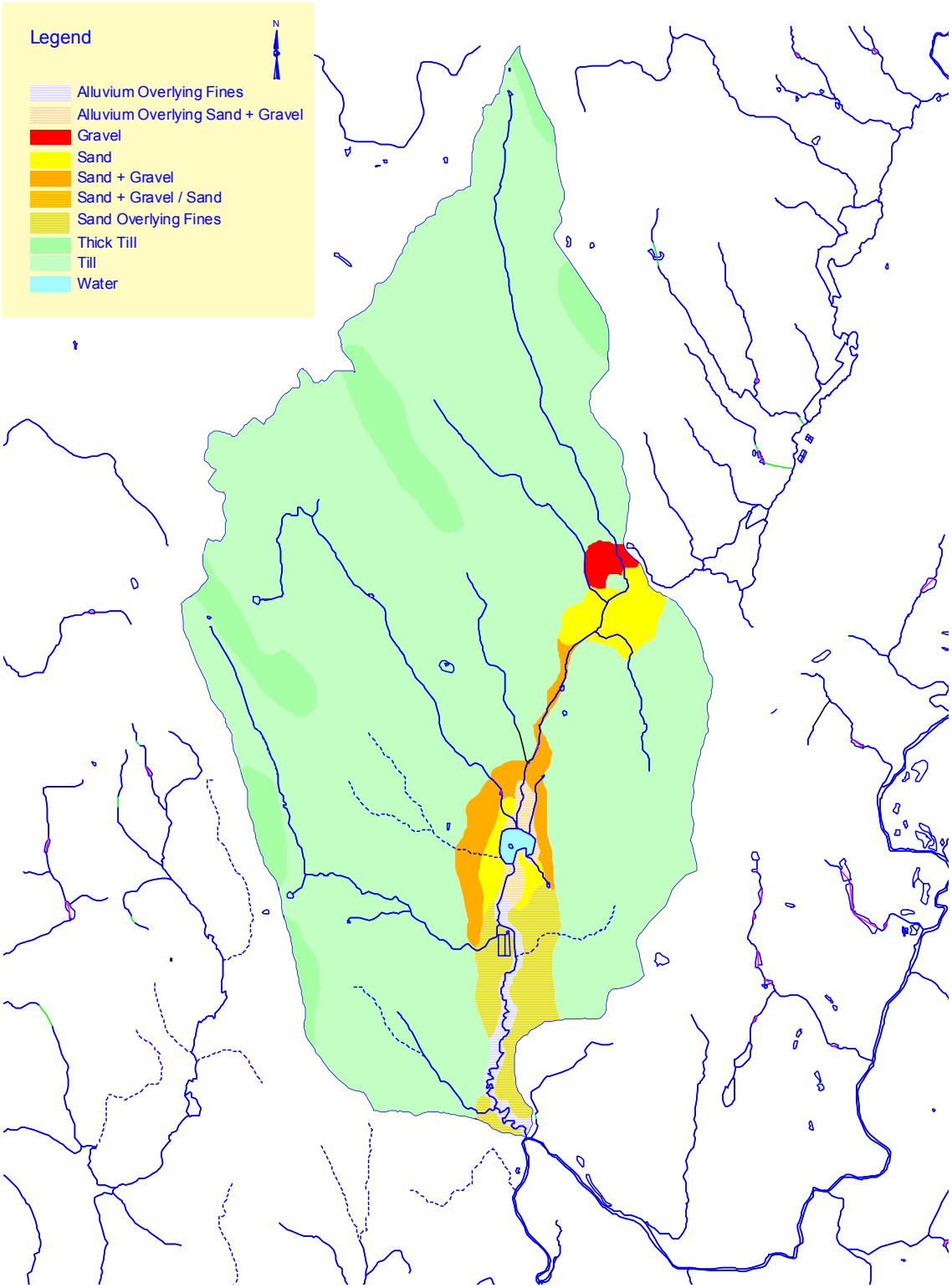


Figure 3. Surficial geology in Transylvania Brook Basin.

(biomass and density) of brook trout from this section of Transylvania Brook were above the statewide average [6].

CTDEP Fisheries Site 3034 was located below the Southbury Training School POTW outfall in McMillen Park, Southbury. This section of brook was characterized as low gradient with several meanders and substrate composition was composed of predominately coarse sand. Average width and depth was 12 feet and 8 inches during summer low flow conditions. Fish species collected in this section of Transylvania Brook included blacknose dace, creek chub, common shiner, fallfish, tessellated darter, white sucker, and American eel. Several species such as bluegill, pumpkinseed, yellow perch, largemouth bass, and golden shiner were probably transient individuals associated with spill-overs from Gravel Pit Pond located upstream of the sampling segment and not likely to establish a stable population in Transylvania Brook.

CONNECTICUT WATER QUALITY STANDARDS AND NUMERIC WATER QUALITY CRITERIA

The surface water classification of Transylvania Brook from the headwaters in Roxbury to the Southbury Training School POTW in Southbury is Class A. Below the POTW, Transylvania Brook is classified as Class B for its entire length to its confluence with Pomperaug River. Designated uses of Class B surface waters include recreational use;fish and wildlife habitat; agriculture and industrial supply and other legitimate uses, including navigation.

The Connecticut WQS have established the maximum concentration, averaging period, and acceptable frequency of exceedance for several pollutants in order to protect aquatic life from acute exposure and chronic exposure to pollutants [7]. Adopted numeric criteria for the pollutants applicable to this TMDL analysis are outlined in Table 1.

Table 1. Connecticut Freshwater Water Quality Criteria applicable to the Transylvania Brook TMDL.		
Pollutant	**Acute Criterion**	**Chronic Criterion**
Ammonia Summer	13.2 mg/l	1.43 mg/l
Ammonia Winter	23.1 mg/l	2.47 mg/l
Chlorine	19.0 *u*g/l	11.0 *u*g/l
Copper	14.3 *u*g/l	4.8 *u*g/l
Zinc	63.6 *u*g/l	58.2 *u*g/l

The frequency of acceptable exceedances for the copper criteria adopted in the Connecticut Water Quality Standards are: for acute exposure, the biological integrity of Connecticut surface waters is impaired when ambient concentrations exceed 14.3 *u*g/l on more than 5% of the days in any year; for chronic exposure, biological integrity is impaired when ambient concentrations exceeds 4.8 *u*g/l on more than 50% of the days in any year [8].

The frequency of acceptable exceedances for zinc and chlorine adopted in the Connecticut Water Quality Standards are: for acute exposure, biological integrity is impaired when the acute criteria is exceeded for 1 hour more than once every three years on average; for chronic exposure, biological integrity is impaired when 4-day average exceeds the chronic criteria more than once every three years on average.

The freshwater ammonia criteria adopted into Connecticut Water Quality Standards may be adjusted to account for variations in temperature and include a "general" category and a "salmon spawning" category. For this TMDL analysis, the freshwater general criteria at 25 C (13.2 mg/l acute:1.43 mg/l chronic) were applied to the summer months of June-October and the freshwater general criteria at 0 C (23.1 mg/l acute:2.47 mg/l chronic) were applied to all other months of the year.

Connecticut Water Quality Standards designate the minimum daily flow for seven consecutive days that can be expected to occur once in ten years under natural conditions (7Q10) as the minimum flow to which surface water standards apply. Therefore, TMDL load calculations were performed under 7Q10 streamflow using a steady-state model. Since there is no streamflow monitoring gauge on Transylvania Brook, 7Q10 streamflow was calculated using the statistical

method developed by Cervione et al. [9]. The Cervione Method estimates 7Q10 based on the geology of the upstream drainage area and its effect on groundwater discharge during periods of low streamflow. The best predictors of 7Q10 in Connecticut streams were determined to be the area of coarse-grained stratified drift (SD) and till-mantled bedrock (till) in upstream drainage areas. The equation to estimate 7Q10 in cubic feet per second is 7Q10 (cfs) = (0.67*SD) + (0.01*till) where SD and till are area expressed in square miles.

The Cervione 7Q10 accounts only for "natural flow" and does not consider any additions (e.g. POTW discharge) or withdrawals (e.g. diversion) of flow. Any significant additions or removal of water from the basin requires an adjustment to the Cervione 7Q10 estimate. For this TMDL analysis, flow from the Southbury Training School POTW was added to the Cervione 7Q10 at each model point. The Southbury Training School POTW flow was estimated from discharge data submitted to CTDEP. POTW flow was estimated separately for summer months (June-October) and winter months (November- May) from discharge data for a ten year averaging period (1991-1999) [10] . The lowest monthly average flow for the summer months and winter months for the ten-year period was used as conservative estimates of seasonal flow. These values of 0.39 cfs (summer flow) and 0.56 cfs (winter flow) were added to the Cervione 7Q10 estimate at each model location to represent the critical summer streamflow and critical winter streamflow.

The only registered diversions in the Transylvania Brook watershed are located on the Southbury Training School campus. The Southbury Training School has three Diversion Registrations with CTDEP Inland Water Resources for potable water supply wells that supply the campus which result in 0.39 cfs diverted from the aquifer based on the latest Water Supply Plan[11]. The average daily flow value of 0.39 cfs was subtracted from the Cervione 7Q10 to estimate the quantity of water available upstream of the Southbury Training School POTW.

TMDL

A steady-state model was used to simulate the loading capacity of each pollutant at two points in Transylvania Brook:

1) Transylvania Brook below the Southbury Training School POTW discharge, and

2) Transylvania Brook at mouth.

The critical conditions (Table 2) were determined for both model points. Critical conditions were defined as the "worst case" scenario of environmental conditions in Transylvania Brook in which the pollutant load capacity expressed in a TMDL will not exceed Water Quality Criteria adopted by the State of Connecticut [7]. The ammonia TMDL was developed using a separate critical flow condition for summer and winter because Water Quality Criteria for ammonia vary seasonally. For all other pollutants, TMDLs were developed using critical summer flows and applied during all seasons.

Table 2. Critical conditions used in the development of Transylvania Brook TMDL.

Location	Drainage Area (mi^2)	Till (mi^2)	Stratified Drift (mi^2)	Natural 7Q10 (cfs)[1]	Critical Summer Flow Condition (cfs)[2]	Critical Winter Flow Condition (cfs)[3]
Transylvania Brook above POTW outfall	6.94	6.15	0.79	0.59	0.20	0.20
Transylvania Brook below Southbury Training School POTW outfall	6.94	6.15	0.79	0.59	0.59	0.76
Transylvania Brook at mouth	7.51	6.59	0.92	0.68	0.68	0.85

[1] Natural 7Q10 (cfs) = (0.67 * square miles stratified drift) + (0.01 * square miles till)
[2] Critical Summer Flow Condition (cfs) = Natural 7Q10 + POTW Summer Flow- Diverted Flow. The value of 0.39 cfs added is the critical summer flow value from the Southbury Training School POTW and the value of 0.39 subtracted is the average daily flow lost due to the registered diversions on the Southbury Training School Campus.
[3] Critical Winter Flow Condition (cfs) = Natural 7Q10 + POTW Critical Winter Flow- Diverted Flow. The value of 0.56 cfs added is the critical winter flow value from the Southbury Training School POTW and the value of 0.39 subtracted is the average daily flow lost due to the registered diversions on the Southbury Training School Campus.

Total Maximum Daily Load (TMDL)

The Total Maximum Daily Load at each model point was calculated by multiplying the adopted WQC for each pollutant (Table 1) by the critical condition in the Transylvania Brook at each model point (Table 2). A summary of load calculations is provided in Table 3 and attachments 1-5. The maximum load capacity for copper was established using only the rare exceedance criterion for copper (14.3 *u*g/l) because it is inappropriate to apply the median copper criterion during critical low flow conditions. Application of the rare copper criterion at low flow will also be protective of the median criterion within the acceptable frequency stated in the Connecticut Water Quality Standards [12]. For all other pollutants, TMDLs were developed using both the acute and chronic water quality criteria.

Table 3. Summary of TMDL for all model points in Transylvania Brook. Values are g/day except for ammonia which are kg/day.

TMDL at Transylvania Brook below Southbury Training School POTW point of discharge					
Pollutant	Condition	TMDL	WLA	LA	MOS
Summer Ammonia	Acute	19.11	19.01	0.10	0.0
	Chronic	2.07	1.97	0.10	0.0
Winter Ammonia	Acute	43.06	42.96	0.10	0.0
	Chronic	4.60	4.51	0.10	0.0
Chlorine	Acute	27.50	27.50	0.0	0.0
	Chronic	15.92	15.92	0.0	0.0
Copper	Rare	20.70	20.21	0.49	0.0
Zinc	Acute	92.06	89.50	2.56	0.0
	Chronic	84.24	81.68	2.56	0.0
TMDL at mouth of Transylvania Brook.					
Pollutant	Condition	TMDL	WLA	LA	MOS
Summer Ammonia	Acute	22.07	19.01	0.14	2.91
	Chronic	2.39	1.97	0.14	0.28
Winter Ammonia	Acute	48.24	42.96	0.14	5.13
	Chronic	5.16	4.51	0.14	0.51
Chlorine	Acute	31.76	27.50	0.00	4.26
	Chronic	18.39	15.92	0.00	2.47
Copper	Rare	23.90	20.21	0.72	2.98
Zinc	Acute	106.32	89.50	3.72	13.09
	Chronic	97.29	81.68	3.72	11.88

Load Allocations (LA)

The contribution of anthropogenic nonpoint sources and natural background levels of pollutants in Transylvania Brook is unknown. Therefore, the portion of the TMDL allocated to the Load Allocation, or nonpoint sources plus natural background, was calculated by multiplying an estimated concentration of each pollutant by the critical streamflow condition. Estimated concentrations for ammonia, copper, and zinc represent target levels that were measured in Burlington Brook, a stream in Connecticut that exhibits land use patterns that are very similar to Transylvania Brook (Figure 4). Data were obtained for Burlington Brook near Burlington, Connecticut from USGS monitoring station for water years 1994-1999. Estimated pollutant concentrations were estimated as follows:

Ammonia:

The estimated background concentration of ammonia is 0.2 mg/l under all flow conditions. The value of 0.2 mg/l is the 95th percentile from Burlington Brook USGS monitoring reports for water years 1994-1999 and was chosen as a conservative estimated concentration for this TMDL.

Chlorine:

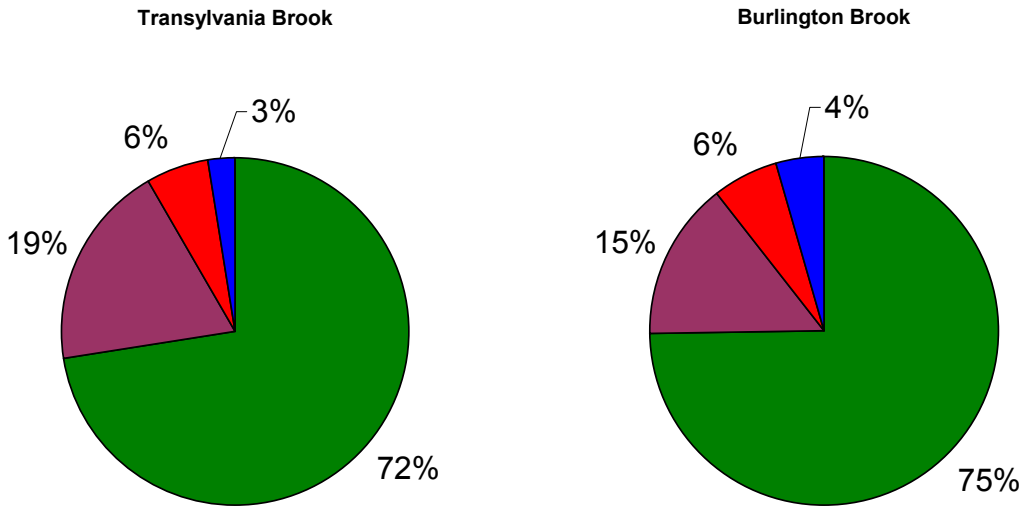
The estimated concentration of chlorine was assumed to be zero under all conditions since chlorine does not occur naturally in the aquatic environment and there is no known nonpoint source of chlorine to Transylvania Brook.

Copper:

The estimated background concentration of copper is 1.0 *u*g/l under all flow conditions. All values of dissolved copper in Burlington Brook over the 5-year monitoring period were non-detectable (< 1.0 *u*g/l). The value of 1.0 *u*g/ was chosen as a conservative estimated concentration estimate for this TMDL analysis.

Zinc:

The estimated background concentration of zinc is 5.19 *u*g/l under all flow conditions. The value of 5.19 *u*g/l is the 95th percentile from Burlington Brook USGS monitoring reports for water years 1994-1999 and was chosen as a conservative estimated concentration for this TMDL analysis.



Legend Color	Land Use Category	Transylvania Brook Percentage	Burlington Brook Percentage
	Forested	72	75
	Open Space	19	15
	Developed	6	6
	Water/Wetland	3	4
	Total	100	101

Figure 4. Comparison of landuse between Transylvania Brook subregional basin and Burlington Brook subregional basin.
Data were generated from a statewide data layer comprised of a polygon shapefile of landuse and landcover data in Connecticut.
The Connecticut Landuse Landcover Data Layer is a representation of LANDSTAT Thematic Mapper Satellite Imagery Information.

The contribution of the Load Allocation during the critical conditions defined in this TMDL (i.e. 7Q10 low flow) is suspected to be minor in comparison to the contribution from the sole point source, Southbury Training School POTW. That is because the storm events necessary to transport anthropogenic nonpoint sources generally do not occur during low flow conditions and background levels of pollutants are expected to be low in Transylvania Brook. When storm events occur, there is an added dilution effect that would reduce the impact of any additional loadings contributed by an increase in the Load Allocation.

Wasteload Allocations (WLA)

The Southbury Training School POTW is the only point source in Transylvania Brook for this TMDL analysis. Therefore, 100% of the Waste Load Allocation to the Southbury Training School POTW at the point of discharge was calculated by subtracting the Load Allocation from the Load Capacity.

Margin of Safety (MOS)

A numerical MOS was calculated by subtracting the sum of the Load Allocation and Wasteload Allocation from the Load Capacity at each model point. Under the critical condition identified in this TMDL, the numerical MOS is zero at the Southbury Training School POTW point of discharge. The numerical MOS becomes larger downstream of the Southbury Training School POTW as streamflow increases.

This TMDL analysis also has an implicit MOS built into the analysis. The TMDL was developed using a steady-state model under critical, or worst-case, conditions in the Transylvania Brook. The modeled critical conditions, by definition, represent flow conditions that have a low probability of occurrence. The combination of 7Q10 flow in Transylvania Brook and low flow estimate from the Southbury Training School POTW during the low flow months of July-October represent a conservative approach to protecting aquatic life in Transylvania Brook downstream of the discharge.

To further support an implicit MOS, the TMDL for copper and zinc assumes that all of the available heavy metals will be in the dissolved form. This is a conservative approach because some portion of the total metal concentration will be adsorbed to particulate material in stream

and therefore will not be available to cause toxicity to aquatic organisms.

Seasonal Analysis

TMDLs for copper, zinc, chlorine, and summer ammonia were developed under the assumption that the critical period in Transylvania Brook occurs during low flow months of July-October. Streamflow during the low flow months July-October was represented by estimates of 7Q10 in the Transylvania Brook minus diversions from the Southbury Training School campus. The flow estimate from the Southbury Training School POTW was averaged from monthly operating reports submitted to CTDEP for the low flow months July-October.

The TMDLs for Transylvania have been modeled using worst case low flow conditions which has been defined in Connecticut's Water Quality Standards as 7Q10. TMDLs were calculated using a steady-state simple dilution model assuming constant 7Q10 conditions. A steady-state model, by definition, assumes that the controlling imput parameters such as flow and concentration of pollutants remain constant. During higher flows, the added dilution will increase the assimilative capacity of the brook and will therefore buffer the added pollutant load contributed by stormwater runoff and nonpoint sources. Steady state model calculations at flows higher than 7Q10 confirm this fact (i.e. TMDL is greater under higher flow conditions). Therefore, TMDLs calculated under the critical conditions will be protective of all seasons.

Water Quality Criteria for ammonia were varied to account for seasonal temperature variations in Transylvania Brook. Separate TMDLs were developed under average summer and winter conditions. The general freshwater ammonia criterion at 0^{o} C was applied to the winter ammonia TMDL calculations using critical winter flows. The general freshwater ammonia criterion at 25^{o} C was applied for the summer ammonia TMDL calculations using critical summer flows.

No seasonal variation was applied to the Water Quality Criteria concentration for copper, zinc, and chlorine in this analysis since criteria adopted by the State of Connecticut do not vary seasonally for these pollutants.

IMPLEMENTATION

The TMDL will be implemented in accordance with a schedule that will be incorporated into the reissued NPDES permit for the Southbury Training School POTW. The Wasteload Allocation for copper, zinc, and ammonia in this TMDL will be implemented through the NPDES permitting process. It is expected that the permit limits derived from the Wasteload allocations will be met when upgrades to the Southbury Training School POTW have been completed. This project is in the late design phase with expectations of completing the project by Fall 2003 (Table 4).

MONITORING

The goal of this TMDL is to improve the water quality in Transylvania Brook so that all aquatic life will be fully supporting applicable designated uses downstream of the Southbury Training School POTW. Biological and chemical monitoring will ultimately determine if Water Quality Standards are attained in Transylvania Brook.

Water quality monitoring and assessment will be conducted as described in the CTDEP Rotating Basin Ambient Monitoring Strategy [13]. Fisheries surveys will provide the primary metric to measure the progress of meeting Aquatic Life Support uses in Transylvania Brook. CTDEP Water Management Bureau will continue to work with CTDEP Fisheries Division to monitor fish community structure in Transylvania Brook. In addition, the NPDES permit issued to the Southbury Training School POTW will include monitoring requirements for copper, lead, ammonia, and chlorine.

Consistent with the antidegradation policy adopted by the State Of Connecticut [7], it is expected that the current biological community structure will be maintained at sites that are currently meeting Water Quality Standards and the biological community downstream of the POTW can potentially be enhanced by implementation of this TMDL.

Table 4. Proposed Implementation Schedule for Southbury Training School POTW modified from *Southbury Training School Facilities Plan* [14].		
Project Task	***Anticipated Completion Date***	***Status***
DESIGN PHASE		
Approval of facilities plan by CTDEP and DPW	November 1995	Completed
Submit Design Grant Application	November 1995	
Design Grant Award	November 1995	
Start Facilities Design	December 1995	Completed
Submit Plans and Specifications to DEP and DPW for approval	July 1996	Completed
BIDDING AND CONSTRUCTION		
Submit Construction Grant Application	October 2000	On Schedule
DEP and DPW approval of Plans and Specifications	November 2000	
Advertise Construction Grants	November 2000	On Schedule
Construction Grant Award and Grant Signing	December 2000	On Schedule
Begin Construction	Summer 2001	On Schedule
Start up of Facilities	Summer 2003	On Schedule
Begin Compliance with TMDL WLA and Final NPDES Permit Effluent Limitations	Fall 2003	On Schedule

REASONABLE ASSURANCES

The NPDES permit provides a legally enforceable control document and offers reasonable assurances that WQS will be met in Transylvania Brook. The upgrade to the Southbury Training School POTW is in the late design phase (Table 4). A facilities plan [14] to modify and upgrade the Southbury Training School POTW has been completed and reviewed by CTDEP. A separate report detailing the plans and specifications of the DEP preferred treatment alternatives has been received in Spring 2000 [15] and is currently being reviewed by DEP facilities planning staff. At this point, all plans to modify the existing Southbury Training School Facility are on schedule with an anticipated completion date of Summer 2003. Full compliance with the Wasteload Allocations proposed in this TMDL is expected upon completion of the modifications and upgrades to the Southbury Training School POTW.

The Southbury Training School POTW will be required to comply with the proposed General Permit for Total Nitrogen as part of the implementation for Long Island Sound TMDL[16]. The reductions in total nitrogen will not only benefit Long Island Sound, but will provide additional reductions in ammonia in Transylvania Brook.

PROVISIONS FOR REVISING THE TMDL

CTDEP will review information collected during implementation of the TMDL including that required by the monitoring provisions in this TMDL and the NPDES permit following reissuance. If necessary, the TMDL will be modified to reflect the new information that becomes available during the implementation phase of this TMDL. Any modification to the TMDL will include a public participation process and will be subject to approval by EPA.

PUBLIC PARTICIPATION

This TMDL analysis has been modified from an earlier draft version to reflect comments received from reviewers. A Public Notice soliciting comments from the public on the TMDL was published in the Danbury News-Times on 1/12/01 [17]. No comments were received on the TMDL during the 30-day public notice period.

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[12] CTDEP. 2000. *Transylvania Brook TMDL Support Document: Application of the rare copper criterion for the Transylvania Brook TMDL*. State of Connecticut, Department of Environmental Protection, Bureau of Water Management, 79 Elm Street, Hartford, CT 06106-5127.

[13] CTDEP 1999. *Final Draft Ambient monitoring strategy for rivers and streams rotating basin approach*. State of Connecticut, Department of Environmental Protection, Bureau of Water Management, 79 Elm Street, Hartford, CT 06106-5127.

[14] State of Connecticut, Departments of Public Works and Department of Mental Retardation. 1995. *Southbury Training School Facilities Plan* prepared by Genovese, P.W. and Associates, Inc.

[15] State Of Connecticut, Department of Public Works and Department of Environmental Protection. 2000. *Specifications: Southbury Training School Water Pollution Control Facility Project No. BI-B-332* prepared by Goodkind and O'Dea, Inc. Consulting and Design Engineers.

[16] CTDEP and NY DEC 1999. *A total maximum daily load analysis to achieve water quality standards for dissolved oxygen in Long Island Sound*. October 1999 Draft for Public Comment. State of Connecticut, Department of Environmental Protection, Bureau of Water Management, 79 Elm Street, Hartford, CT 06106-5127.

[17] Public Notice. Danbury News-Times 1/12/01.

Attatchment 1.

Transylvania Brook TMDL Copper

Hydrology

Location	Drainage Area (sq. mi)	Till (sq. mi)	SD (sq. mi)	Natural 7Q10 (cfs)	Critical Condition (cfs)
Transylvania Brook above POTW Outfall	6.94	6.15	0.79	0.59	0.20
Transylvania Brook below POTW Outfall	6.94	6.15	0.79	0.59	0.59
Transylvania Brook @ Mouth	7.51	6.59	0.92	0.68	0.68

TMDL

Location	Critical Condition (cfs)	"Rare" WQC (ug/l)	"Rare" TMDL (g/day)
Transylvania Brook @ POTW	0.59	14.3	20.70
Transylvania Brook @ Mouth	0.68	14.3	23.90

Load Allocation

Location	Natural 7Q10 (cfs)	Est Conc. (ug/l)	LA (g/day)
Transylvania Brook @ POTW	0.20	1.0	0.49
Transylvania Brook @ Mouth	0.29	1.0	0.72

"Rare" Load Calculations

Location	Critical Condition (cfs)	"Rare" TMDL (g/day)	WLA (g/day)	LA (g/day)	MOS (g/day)
Transylvania Brook @ POTW	0.59	20.70	20.21	0.49	0.00
Transylvania Brook @ Mouth	0.68	23.90	20.21	0.72	2.98

Attatchment 2.

Transylvania Brook TMDL Zinc

Hydrology

Location	Drainage Area (sq. mi)	Till (sq. mi)	SD (sq. mi)	Natural 7Q10 (cfs)	Critical Condition (cfs)
Transylvania Brook above POTW Outfall	6.94	6.15	0.79	0.59	0.20
Transylvania Brook below POTW Outfall	6.94	6.15	0.79	0.59	0.59
Transylvania Brook @ Mouth	7.51	6.59	0.92	0.68	0.68

TMDL

Location	Critical Condition (cfs)	Acute WQC (ug/l)	Acute TMDL (g/day)	Chronic WQC (ug/l)	Chronic TMDL (g/day)
Transylvania Brook @ POTW	0.59	63.6	92.06	58.2	84.24
Transylvania Brook @ Mouth	0.68	63.6	106.32	58.2	97.29

Load Allocation

	Location	Natural 7Q10 (cfs)	Est Conc. (ug/l)	LA (g/day)
1	Transylvania Brook @ POTW	0.20	5.2	2.56
2	Transylvania Brook @ Mouth	0.29	5.2	3.72

Acute Load Calculations

	Location	Critical Condition (cfs)	Acute TMDL (g/day)	WLA (g/day)	LA (g/day)	MOS (g/day)
1	Transylvania Brook @ POTW	0.59	92.06	89.50	2.56	0.00
2	Transylvania Brook @ Mouth	0.68	106.32	89.50	3.72	13.09

Chronic Load Calculations

	Location	Critical Condition (cfs)	Chronic TMDL (g/day)	WLA (g/day)	LA (g/day)	MOS (g/day)
1	Transylvania Brook @ POTW	0.59	84.24	81.68	2.56	0.00
2	Transylvania Brook @ Mouth	0.68	97.29	81.68	3.72	11.88

Attatchment 3.

Transylvania Brook TMDL Summer Ammonia

Hydrology

Location	Drainage Area (sq. mi)	Till (sq. mi)	SD (sq. mi)	Natural 7Q10 (cfs)	Critical Condition (cfs)
Transylvania Brook above POTW Outfall	6.94	6.15	0.79	0.59	0.20
Transylvania Brook below POTW Outfall	6.94	6.15	0.79	0.59	0.59
Transylvania Brook @ Mouth	7.51	6.59	0.92	0.68	0.68

TMDL

	Location	Critical Condition (cfs)	Acute WQC (mg/l)	Acute TMDL (Kg/day)	Chronic WQC (mg/l)	Chronic TMDL (Kg/day)
1	Transylvania Brook @ POTW	0.59	13.2	19.11	1.43	2.07
2	Transylvania Brook @ Mouth	0.68	13.2	22.07	1.43	2.39

Load Allocation

	Location	Natural 7Q10 (cfs)	Est Conc. (mg/l)	LA (Kg/day)
1	Transylvania Brook @ POTW	0.20	0.2	0.10
2	Transylvania Brook @ Mouth	0.29	0.2	0.14

Acute Load Calculations

	Location	Critical Condition (cfs)	Acute TMDL (Kg/day)	WLA (Kg/day)	LA (Kg/day)	MOS (Kg/day)
1	Transylvania Brook @ POTW	0.59	19.11	19.01	0.10	0.00
2	Transylvania Brook @ Mouth	0.68	22.07	19.01	0.14	2.91

Chronic Load Calculations

	Location	Critical Condition (cfs)	Chronic TMDL (Kg/day)	WLA (Kg/day)	LA (Kg/day)	MOS (Kg/day)
1	Transylvania Brook @ POTW	0.59	2.07	1.97	0.10	0.00
2	Transylvania Brook @ Mouth	0.68	2.39	1.97	0.14	0.28

Attatchment 4.

Transylvania Brook TMDL Winter Ammonia

Hydrology

Location	Drainage Area (sq. mi)	Till (sq. mi)	SD (sq. mi)	Natural 7Q10 (cfs)	Critical Condition (cfs)
Transylvania Brook above POTW Outfall	6.94	6.15	0.79	0.59	0.20
Transylvania Brook below POTW Outfall	6.94	6.15	0.79	0.59	0.76
Transylvania Brook @ Mouth	7.51	6.59	0.92	0.68	0.85

TMDL

	Location	Critical Condition (cfs)	Acute WQC (mg/l)	Acute TMDL (Kg/day)	Chronic WQC (mg/l)	Chronic TMDL (Kg/day)
1	Transylvania Brook @ POTW	0.76	23.1	43.06	2.47	4.60
2	Transylvania Brook @ Mouth	0.85	23.1	48.24	2.47	5.16

Load Allocation

	Location	Natural 7Q10 (cfs)	Est Conc. (mg/l)	LA (Kg/day)
1	Transylvania Brook @ POTW	0.20	0.2	0.10
2	Transylvania Brook @ Mouth	0.29	0.2	0.14

Acute Load Calculations

	Location	Critical Condition (cfs)	Acute TMDL (Kg/day)	WLA (Kg/day)	LA (Kg/day)	MOS (Kg/day)
1	Transylvania Brook @ POTW	0.76	43.06	42.96	0.10	0.00
2	Transylvania Brook @ Mouth	0.85	48.24	42.96	0.14	5.13

Chronic Load Calculations

	Location	Critical Condition (cfs)	Chronic TMDL (Kg/day)	WLA (Kg/day)	LA (Kg/day)	MOS (Kg/day)
1	Transylvania Brook @ POTW	0.76	4.60	4.51	0.10	0.00
2	Transylvania Brook @ Mouth	0.85	5.16	4.51	0.14	0.51

Attatchment 5.

Transylvania Brook TMDL Chlorine

Hydrology

Location	Drainage Area (sq. mi)	Till (sq. mi)	SD (sq. mi)	Natural 7Q10 (cfs)	Critical Condition (cfs)
Transylvania Brook above POTW Outfall	6.94	6.15	0.79	0.59	0.20
Transylvania Brook below POTW Outfall	6.94	6.15	0.79	0.59	0.59
Transylvania Brook @ Mouth	7.51	6.59	0.92	0.68	0.68

TMDL

	Location	Critical Condition (cfs)	Acute WQC (ug/l)	Acute TMDL (g/day)	Chronic WQC (ug/l)	Chronic TMDL (g/day)
1	Transylvania Brook @ POTW	0.59	19	27.50	11	15.92
2	Transylvania Brook @ Mouth	0.68	19	31.76	11	18.39

Load Allocation

	Location	Natural 7Q10 (cfs)	Est Conc. (ug/l)	LA (g/day)
1	Transylvania Brook @ POTW	0.20	0	0.00
2	Transylvania Brook @ Mouth	0.29	0	0.00

Acute Load Calculations

	Location	Critical Condition (cfs)	Acute TMDL (g/day)	WLA (g/day)	LA (g/day)	MOS (g/day)
1	Transylvania Brook @ POTW	0.59	27.50	27.50	0.00	0.00
2	Transylvania Brook @ Mouth	0.68	31.76	27.50	0.00	4.26

Chronic Load Calculations

	Location	Critical Condition (cfs)	Chronic TMDL (g/day)	WLA (g/day)	LA (g/day)	MOS (g/day)
1	Transylvania Brook @ POTW	0.59	15.92	15.92	0.00	0.00
2	Transylvania Brook @ Mouth	0.68	18.39	15.92	0.00	2.47