TOTAL MAXIMUM DAILY LOAD ANALYSIS FOR UNNAMED INTERMITTENT TRIBUTARY TO BELDEN HILL BROOK WILTON, CONNECTICUT

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

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COVER SHEET FOR TMDL

1/24/00

I. INTRODUCTION

A. Impaired waterbody segment:
Unnamed intermittent tributary to wetlands adjacent to
Belden Hill Brook, Wilton, CT
Connecticut Basin Designation: 7302 – 13 – 1 – L2 (§305(b) and §303(d) reporting)
Saugatuck USGS Hydrologic Cataloguing Unit: 01100006 (Federal RF3 Basin Code)

B. Classification:
Class A surface water

C. Use(s) not supported:
Aquatic Life Support

D. Cause (pollutant or stressor):
Chlorine

E. Source(s) of pollutant or stressor:
Treated sanitary wastewater discharge from School Sisters of Notre Dame facility

II. **TMDL Analysis**

A. **Chlorine TMDL = WLA + LA + MOS**

1. **TMDL (Loading capacity)**
TMDL or LC = zero
No instream dilution is available during critical low flow periods.

2. **WLA (Wasteload allocations)**
WLA = 0
Chlorine will be eliminated from the discharge as a condition in reissued NPDES permit. Facility will change over to ultraviolet disinfection. Since this is the only point source of chlorine in the Unnamed trib, WLA = 0.

3. **LA (Load allocations)**
LA = 0
No nonpoint source of chlorine is known to exist.

4. **MOS (Margin of Safety)**
MOS = implicit
The TMDL for chlorine uses an implicit MOS. That is, no separate amount is allocated to MOS due to the conservative nature of the TMDL analysis. Elimination of chlorine by requiring

ultraviolet disinfection does not require numerical value.

B. **Seasonality**

The TMDL for chlorine with zero loading capacity will apply all year with no differences with respect to seasonality. Eliminating the use of chlorine will assure WQS are met in the brook year-round. Ultraviolet disinfection will be required year-round.

III. IMPLEMENTATION

The short-term goal is to eliminate chlorine used in the disinfection of wastewater by requiring ultraviolet disinfection as a condition in the reissued NPDES permit (CT 0101419). The longer-term goal is to entirely eliminate the point source discharge. This will be accomplished through the design and construction of a final effluent polishing system that will discharge to an underground level-spreader. Implementation of this TMDL will eliminate chlorine in the brook, and ultimately remove the point source discharge. Successful implementation of this TMDL may provide justification for upgrading surface water classifications in two waterbodies, Belden Hill Brook and Silvermine River.

IV. REASONABLE ASSURANCE

Chlorine will be eliminated from the discharge as a requirement in the reissued NPDES permit. The point source discharge will be discontinued by diverting the discharge to an underground spreader, thus eliminating the surface water discharge. Effluent will be monitored prior to final polishing to assure full compliance with NPDES permit requirements and to confirm that Water Quality Standards are attained.

V. STATUS OF TMDL DEVELOPMENT

Comments from the initial internal review (7/21/1999) and the preliminary external review (2/3/2000) were incorporated into a final draft of this document. The Proposed TMDL and NPDES Permit were distributed for final review (3/14/2000) and public comments were solicited through Public Notice of the Commissioner's intent to establish the TMDL and reissue the permit (published 3/28/2000 in the Norwalk Hour) No additional comments were received on either the permit or the TMDL during the formal period of public comment.

A TMDL Analysis
For Unnamed Intermittent Tributary to Belden Hill Brook, Wilton, CT

Introduction

The Federal Water Pollution Control Act, commonly referred to as the Clean Water Act (CWA), requires that each state adopt water quality standards that support designated uses such as drinking water supply, fish and wildlife habitat, recreation, and others. States must monitor and assess the condition of surface waters within its boundaries. Waterbodies that do not meet water quality standards after technology-based controls have been implemented are identified on a list that is published for public comment. Section 303(d) of CWA requires that each state establish a total maximum daily load (TMDL) for each pollutant causing impairment at levels necessary to achieve water quality standards and support designated uses.

The overall goal of the TMDL process is to achieve the water quality standard that is not currently being met in a particular waterbody. A TMDL achieves this goal by establishing the maximum loading, or load capacity, for a specific pollutant and allocating that capacity or load to the contributors of the pollutant. Any amount of a pollutant above the load capacity risks violating water quality standards. TMDL analyses consider pollution from point sources, nonpoint sources, and natural background levels, and incorporate a margin of safety to reflect the inherent uncertainty about pollutant discharges and water quality. TMDL allocations to point source discharges can be incorporated into the National Pollutant Discharge Elimination System (NPDES) permit requirements. Allocations to nonpoint sources of pollution can be expressed using narrative objectives or by some other appropriate measure. Measurable endpoints are defined so that the effectiveness of the TMDL to achieve the Water Quality Standards (WQS) and support designated uses can be evaluated through results of a monitoring program.

A TMDL can be expressed as the mathematical equation: **TMDL = WLA + LA + MOS** where:

TMDL is the Total Maximum Daily Load, or load capacity, of a pollutant that a waterbody can receive without violating water quality standards; and

WLA is Wasteload Allocation, or, the portion of the receiving water's loading capacity that can be allocated to existing or future point sources of the pollutant; and

LA is Load Allocation, or, the portion of the receiving water's loading capacity that can be allocated to natural background, or to existing or future nonpoint sources of the pollutant; and

MOS is Margin Of Safety, to account for the uncertainty of the relationship between pollutant loads and their affect on the receiving waterbody. A MOS can be incorporated into the TMDL implicitly by using conservative estimates to develop WLA and LA, or may be added as a separate allocation.

The process of developing a TMDL for water quality limited waterbodies involves participation from the general public and all levels of government. Public participation is strongly emphasized early in the process of developing plans for implementing the TMDL. Once established by the State, the TMDL is submitted to the United States Environmental Protection Agency (EPA) for review and approval. If EPA cannot approve the TMDL, it is required to act in lieu of State.

Site Description

This TMDL has been developed to protect an unnamed intermittent tributary to wetlands that are adjacent to Belden Hill Brook (Unnamed trib). Unnamed trib is part of the Belden Hill Brook watershed. The Belden Hill Brook watershed is located entirely in the town of Wilton, Connecticut and drains an area of 3.2 square miles (2,048 acres). Land use in the watershed is predominantly deciduous forest and medium density residential areas (Figure 2). Local zoning regulations for the Town of Wilton require a minimum of 2 acres per dwelling for residential areas. The headwaters of the watershed begin north of the TMDL area of concern in an area known as Comstock Knoll, and flow into an 824 acre drinking water impoundment, City Lake (also called South Norwalk Reservoir). Belden Hill Brook is free flowing below Old South Norwalk Reservoir for its entire length until it enters the Silvermine River.

Unnamed trib originates in filled wetlands near property owned by the School Sisters of Notre Dame in Wilton, Connecticut. Flow in Unnamed trib is intermittent into this wetland which is bordered by deciduous forest for its extent from the headwaters approximately 1.5 miles before it joins Belden Hill Brook from the east, below City Lake (Figure 1). Drainage from the School Sisters of Notre Dame facility enters these wetlands during precipitation events and periods of high water table.

Water Quality Impairment and Pollutant of Concern

The School Sisters of Notre Dame operate a retirement home, medical care facility, and childcare facility on their 36-acre parcel of property. Historically, sanitary waste from the School Sisters facility was treated by a septic tank and leaching field system. This system failed in the early 1970's. Poor soils and a high water table precluded upgrading the septic system and a small, wastewater treatment facility was built to replace the failed septic system. The current wastewater treatment facility uses an activated sludge process to treat the wastewater and effluent is chlorinated seasonally for disinfection. The facility applied for reissuance of its NPDES permit to continue discharging 20,000 gallons per day of treated and chlorinated sanitary wastewater to Unnamed trib. Effluent discharge from the School Sisters facility constitutes the majority of surface water flow in Unnamed trib, and comprises the entire flow during periods of dry weather.

The presence of this point source discharge of sanitary wastewater into Unnamed trib is inconsistent with the State of Connecticut Water Quality Standards (WQS). Unnamed trib is classified as a Class A surface water and sanitary wastewater discharges are not allowed in Class A surface waters under Connecticut WQS.

The NPDES wastewater discharge permit that will be reissued to The School Sisters of Notre Dame will specify that this point source discharge is to be eliminated.

However, this TMDL has been developed for chlorine which is presently being used in the disinfection of wastewater. Chlorine is a fast-acting toxicant known to cause impairment to aquatic life at very low concentrations. Developing this TMDL analysis for chlorine will protect the wetland's fish and wildlife habitat until the point source discharge is eliminated.

It should be noted that Belden Hill Brook was identified on the 1998 303(d) list of Connecticut Waterbodies Not Meeting Water Quality Standards (CTDEP 1998) and scheduled to have a TMDL adopted by April 2000. Belden Hill Brook was listed as not meeting designated uses for contact recreation based on the assumption that a point source discharge of treated sanitary wastewater would cause elevated levels of indicator bacteria in the brook. No monitoring data had been used to make this assessment. Upon further background investigation and subsequent site visits, it was recognized that Belden Hill Brook was incorrectly listed as the receiving water for this sanitary discharge. Effluent from this point source discharges to the Unnamed trib, and not to Belden Hill Brook which is a mile and a half away. No impacts to Belden Hill Brook could be expected from this discharge.

Surface Water Quality Classification and Water Quality Standard

The upper part of the Belden Hill Brook watershed is classified as AA. Class AA waters have the highest level of protection and typically support designated uses such as drinking water supply. Below City Lake, Belden Hill Brook is classified as Class B/A for its entire length to the confluence with Silvermine River. The surface water classification for Unnamed trib is undesignated and therefore "defaults" to Class A. Connecticut WQS 29 (CTDEP, 1996) state "Surface waters, including wetlands which are not otherwise designated, shall be Class A…".

The presence of a point source of sanitary wastewater in Unnamed trib is inconsistent with the requirements of Class A surface water, and the School Sisters of Notre Dame will be required to eliminate the point source discharge.

Numerical water quality criteria for the protection of aquatic life have been adopted in Connecticut's WQS (CTDEP 1996). For chlorine, biological integrity is impaired when the four-day average concentration in the water column exceeds the chronic criteria of 11 micrograms per Liter or by an exposure of one hour or longer to a concentration of 19 micrograms per Liter or more.

TMDL for Chlorine

Loading Capacity: TMDL = 0

Because flow in Unnamed trib is intermittent, no instream dilution is available during the critical low flow period. In Connecticut, the critical low flow period occurs during April-October (Cervione et. al., 1982). The volume of the discharge itself, up to 20,000 gallons per day, likely does provide some assimilative capacity, however, the rate of discharge is variable; concentrations of chlorine in sanitary wastewater cannot be measured reliably at levels below 50 micrograms per Liter; and the present chlorine feed system would be very difficult, if not impossible to modify to provide the necessary reliability.

Wasteload allocations: WLA = 0

Chlorine will be eliminated from the discharge as a condition in reissued NPDES permit. Facility will change over to ultraviolet disinfection. Since this is the only point source of chlorine in the Unnamed trib, WLA = 0.

Load allocations: LA = 0

No nonpoint source of chlorine is known to exist.

Margin of Safety: MOS = implicit

The TMDL for chlorine uses an implicit MOS. That is, no separate amount is allocated to MOS as a result of the conservative nature of the TMDL analysis. Elimination of the chlorine from the discharge does not require a numerical value. Any assimilative capacity provided by the volume of discharge itself can be considered to provide additional MOS.

Seasonality

The TMDL for chlorine will apply during all flow conditions. Elimination of chlorine in the discharge will assure that WQS for chlorine are met in the brook year-round. Ultraviolet disinfection will be required year-round.

Implementation Plan

This TMDL will be implemented with two goals in mind. The immediate goal of this analysis is to remove chlorine from the discharge to Unnamed trib and the longer-term goal is to eliminate the surface water discharge. The immediate goal will be accomplished by reissuing the NPDES permit to the School Sisters of Notre Dame facility with current best available technology limits with additional conditions that chlorine will be eliminated as a disinfectant and substituted with ultraviolet disinfection. Monitoring of final effluent will continue as required in the NPDES permit. The long-term goal of eliminating the surface water discharge will be addressed by requiring the School Sisters facility to eliminate the discharge by redirecting the final effluent into an underground spreader as a condition in the NPDES permit. Elimination of the surface water discharge to Unnamed trib will achieve consistency with WQS for Unnamed trib and may provide justification for upgrading the water quality classification from B/A to A for both Belden Hill Brook, from City Lake to its confluence with Silvermine River, and that section of Silvermine River south of Belden Hill Brook to its confluence with Norwalk River.

Reasonable Assurances

A compliance schedule contained within the NPDES permit will provide reasonable assurance that the two goals of this will be met. First, chlorine will be eliminated from the discharge by requiring a change over to ultraviolet disinfection; second, the point source discharge will be discontinued by diverting the discharge to an underground spreader, thus eliminating the surface water discharge.

Monitoring Plan

The NPDES permit will require monitoring of the effluent prior to final polishing. CTDEP will review this monitoring and conduct site inspections during, and following construction of the facility upgrade to assure full compliance with NPDES permit requirements and to confirm that Water Quality Standards are attained.

Public Participation

CTDEP has been working with the School Sisters of Notre Dame to develop a cost-effective solution to this problem. Implementation of this TMDL requires the issuance of NPDES permit. The notice of the Commissioner's intent to reissue the permit will be published in a newspaper with general circulation. Public comments on the permit and the proposed TMDL will be solicited through this notice.

References

CTDEP 1998. *Connecticut Waterbodies not Meeting Water Quality Standards*. State of Connecticut, Department of Environmental Protection, Bureau of Water Management, 79 Elm Street, Hartford, CT 06106-5127. 32 pp.

CTDEP 1996. *Water Quality Standards*. State of Connecticut, Department of Environmental Protection, Bureau of Water Management, 79 Elm Street, Hartford, CT 06106-5127. 39 pp.

Cervione, M.A., Jr., R.L. Melvin, and K.A. Cyr. 1982 *A method for estimating the 7-day, 10-year low flow of streams in Connecticut*. Connecticut Department of Environmental Protection. Connecticut Water Resources Bulletin No. 34.17 pp.

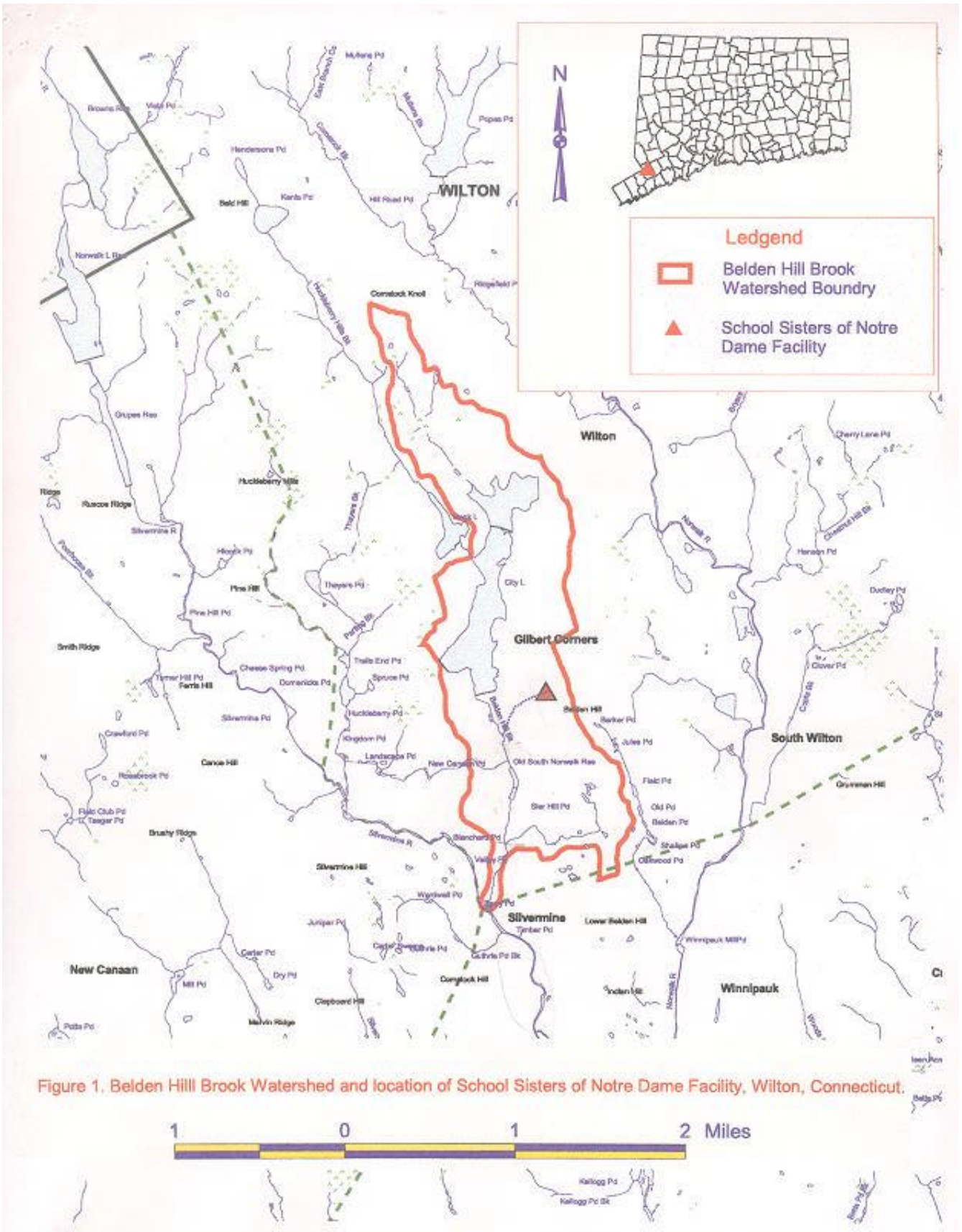

Figure 1. Belden Hilll Brook Watershed and location of School Sisters of Notre Dame Facility, Wilton, Connecticut.

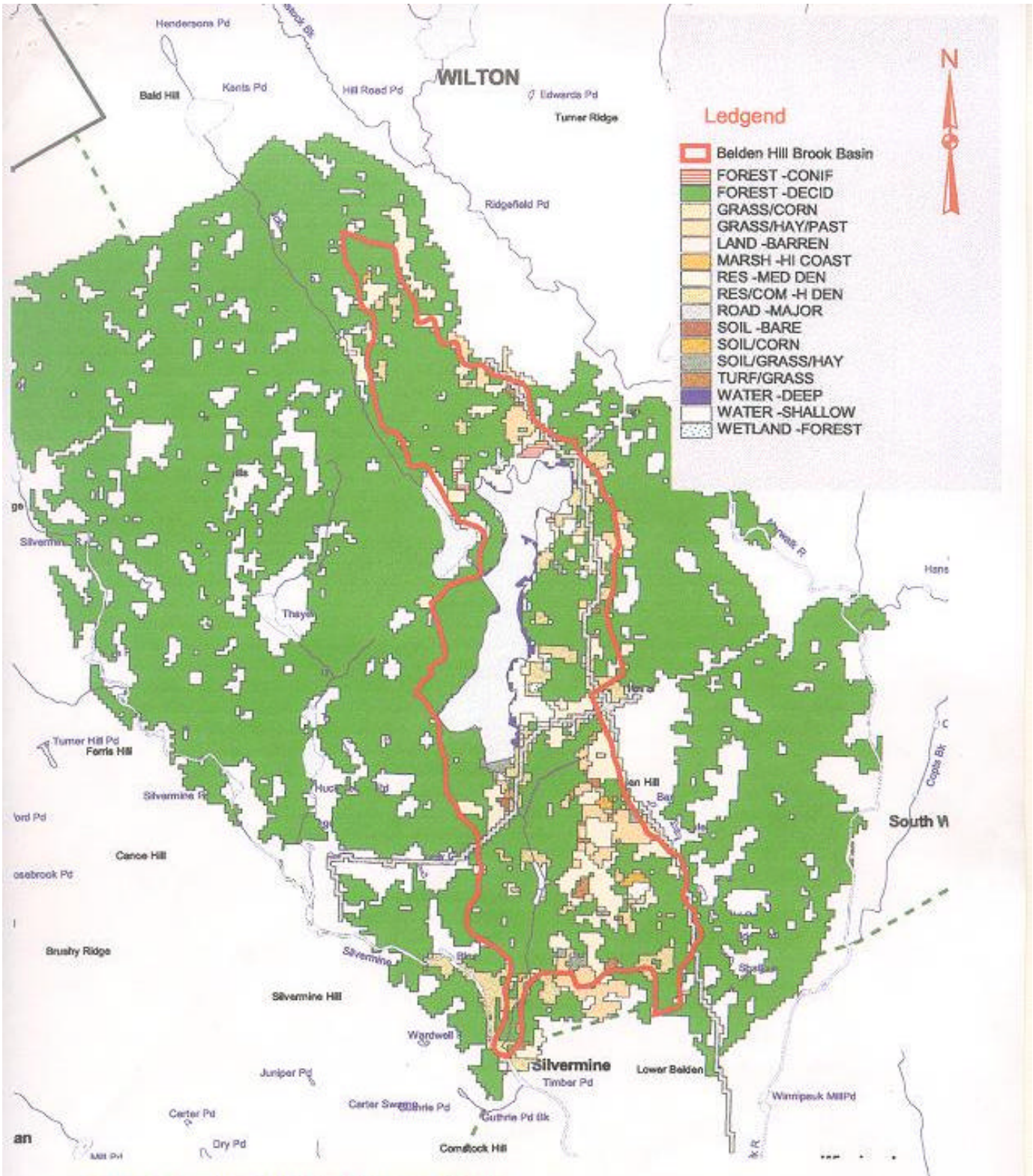

Figure 2. Landuse in Belden Hill Brook Basin.