Town of Windham, NH

Salt Reduction Plan For:

Dinsmore Brook
Northern Tributary to Canobie Lake
Policy-Porcupine Brook

Original Approved by Council:
Revision 1: *1/1/2011*
Revision 2: *3/10/2016*

Legal Notices:

These are General guidelines used by the Windham, NH Public Works Dept. Each decision to mobilize crews, extend operation hours, and to apply de-icing, anti-icing, and pre-treatment materials is made based on particular weather conditions, past experience, and the availability of resources and therefore may not adhere strictly to this policy.

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1.0 Introduction

Dinsmore Brook, Northern Tributary to Canobie Lake, and Policy Porcupine Brook have been identified as impaired by the New Hampshire Department of Environmental Services (NHDES) and the US Environmental Protection Agency (EPA) for chloride concentrations that exceed state water quality standards. NHDES has completed a Total Maximum Daily Load (TMDL) analysis to quantify pollutant reductions needed to meet the state water quality standards for chlorides.

In order to meet water quality standards, significant reductions from current chloride loadings are required. The Town of Windham has agreed to reduce the amount of chlorides applied during snow and ice removal operations while maintaining an acceptable level of service (LOS) on roadways. The purpose of this plan is to provide a framework for Windham to achieve its goal of reducing its salt usage within the Dinsmore & Policy Brook watershed to levels commensurate with those stated in the TMDL, and agreed upon in sector allocation meetings. The Dinsmore Brook TMDL study states that: "The goal is to reduce chloride loads so that water quality standards for all the designated uses affected by chloride pollution are met in all areas of the Dinsmore Brook watershed." See Appendix A for a copy of the approved Municipal Resolution stating Windham's commitment to reducing chloride usage. The town is working towards the goal of a snow and ice removal policy to work in concert with this salt reduction plan. This salt reduction plan will serve as a scope of work for implementation of salt reduction efforts.

Dinsmore Brook is a 1.5 mile stream segment located entirely in Windham NH. The associated watershed is 0.55 square miles (NHDES, 2008) (see figure 1).

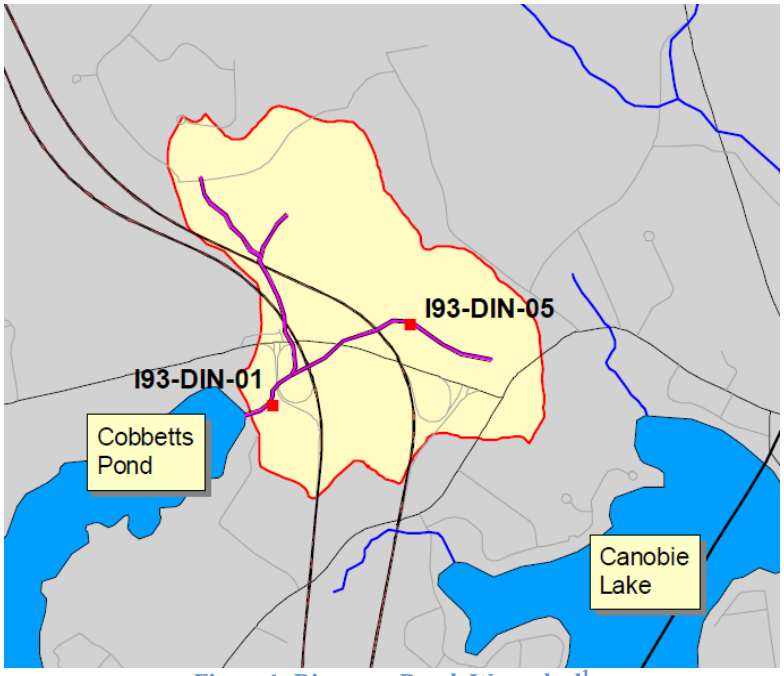


Figure 1: Dinsmore Brook Watershed[1]

[1] Photo Credit: NHDES Dinsmore Brook TMDL Study 2008

Windham is responsible for winter maintenance on 0.978[2] lane miles (0.4892 road miles) of road within the watershed. There are no municipally maintained parking lots within the watershed.

The New Hampshire Department of Transportation (NHDOT) is responsible for winter maintenance of a segment of I-93 within the watershed. It should be noted that this segment of I-93 is currently under construction and as such the mileage will be varying.
Roadways and parking lots which are not maintained by Windham or NHDOT are classified as private. These paved surfaces are maintained each winter season by a private snow and ice removal company hired by the respective land owner. Within the watershed there are 4.248[3] lane miles (2.124 road miles) of private roads, 7.458[4] acres of parking lots, and 0.3414[4] miles of parking lot driveways.

Northern Tributary To Canobie Lake is a 0.5 mile stream segment located entirely in Windham, NH. The associated watershed is 0.20 square miles (NHDES, Total Maximum Daily Load (TMDL) Study For Waterbodies in the Vicinity of the I-93 Corridor from Massachusetts to Manchester, NH: North Tributary to Canobie Lake in Windham, NH, 2008) (see figure 2). The northern tributary discharges into the western embayment of Canobie Lake.

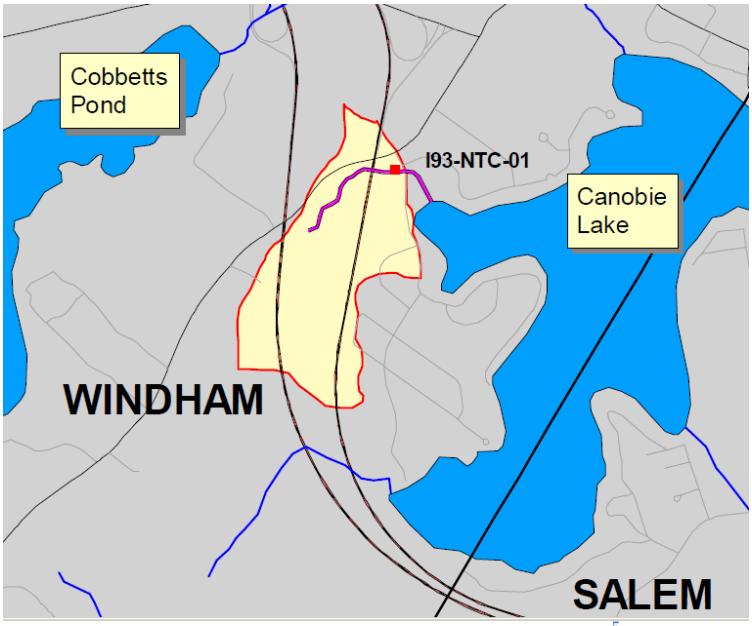


Figure 2: Northern Tributary to Canobie Lake[5]

Windham is responsible for winter maintenance on 1.054 lane miles (0.527 road miles) of road within the watershed. There are no municipal parking lots within the watershed.

NHDOT is responsible for winter maintenance of a segment of I-93 within the watershed. It should be noted that this segment of I-93 is currently under construction and as such the mileage will be varying.

[2] NHDOT 2010 GIS Centerline Road File
[3] NHDOT 2010 GIS Centerline Road File
[4] PSU Parking Lot Study
[5] Photo Credit: NHDES Northern Tributary to Canobie Lake TMDL Study 2008

Roadways and parking lots which are not maintained by Windham or DOT are classified as private. These paved surfaces are maintained each winter season by a private snow and ice removal company hired by the respective land owner. Within the watershed, there are no private roads, 0.3412 acres of parking lots, and 37.45 feet of parking lot driveways. To the town's knowledge, there is only one salt storage area within the watershed, which is on Delahunty's property and is covered.

Policy Porcupine Brook is an 8.3 mile stream segment located in Windham and Salem, NH. The associated watershed is 10.18 square miles (NHDES, Total Maximum Daily Load (TMDL) Study for Waterbodies in the Vicinity of the I-93 Corridor from Massachusetts to Manchester, NH: Policy-Porcupine Brook in Salem and Windham, 2008) (see figure 3).

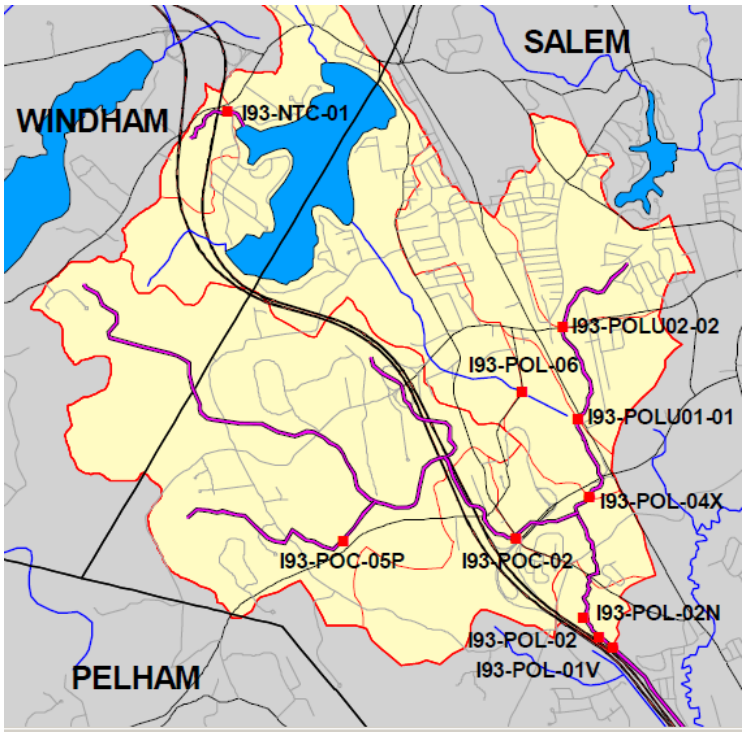


Figure 3: Policy Porcupine Brook[6]

Windham is responsible for winter maintenance on 13.77[7] lane miles (6.88 road miles) of road within the watershed. Windham maintains the Searless Chapel parking lot (0.4637 Acres – 20,199 Sq. Ft.) within the watershed.

NHDOT is responsible for winter maintenance operations on a segment of I-93 within the watershed.

Roadways and parking lots which are not maintained by Windham or DOT are classified as private. These paved surfaces are maintained each winter season by a private snow and ice removal company hired by the respective land owner. Within the watershed there are 7.273[7] lane

[6] Photo Credit: NHDES Policy-Porcupine Brook TMDL Study 2008
[7] NHDOT 2010 GIS Road Centerline File

miles (3.67 road miles) of private roads, 340.2[8] acres of parking lots, and 13.84[8] miles of parking lot driveways. To the town's knowledge, there are no salt storage areas within its portion of the watershed.

2.0 Plan Development

The goal for the Salt Reduction Plan (SRP) is to set a policy and procedural framework to ensure that the Town of Windham continuously improves winter maintenance operations while effectively and efficiently using road salt during snow and ice removal operations. New practices contained within this plan are intended to reduce the amount of road salt applied thus working towards meeting the required TMDL load reductions while continuing to meet town level of service (LOS).

Windham will provide winter maintenance to ensure the designated LOS to roadways, parking lots and sidewalks is maintained according to applicable state and local legislation while striving to minimize adverse impacts to the environment. These commitments will be met by adhering to the procedures contained within this Salt Reduction Plan:

- Committing to ongoing winter maintenance staff training and education
- Reporting fiscal year salt use data to the NHDES
- Re-evaluating the effectiveness of the Salt Reduction Plan as needed to incorporate new technologies or changes in procedures.

The SRP is meant to be dynamic to allow the municipality to evaluate and phase-in any changes, new approaches and technologies in winter maintenance activities in a fiscally sound manner.

To reduce the financial burden on municipal tax payers, the town will participate in the I-93 Watersheds municipal salt reduction program developed in 2008 by the NH Department of Transportation in cooperation with the Federal Highway Administration. The program will administer a reimbursement process to assist towns with implementing TMDL load reductions. This SRP has been prepared in partial fulfillment of program requirements to address TMDL chloride load reductions.

3.0 Winter Maintenance Overview

Documenting the current winter maintenance program in Windham is essential to understanding mechanisms in which actions for chloride reduction can take place. The summary below provides detail on paved surface maintained, material usage, application rates, and level of service policy. The major activities related to winter maintenance are:

Table 1: Winter Maintenance Activities

Snow Plowing	Snow Storage
Salt/Sand Spreading	Sidewalk Plowing & De-icing
Salt & Sand Storage	Install Fire Hydrant Flags
Snow & Ice Removal	Drainage Clearing

[8] PSU Parking Lot Study

The Town of Windham currently maintains approximately 101[9] miles of public roads, and 10.18[10] acres (443,441 sq. ft.) (assuming 0.5 acres for Windham High School[11]) of parking lots. Town maintained parking lots include: All town offices, Windham Library, Windham Fire Dept., Windham Police Dept. Windham Transfer Station, Searless Chapel, Griffin Park, Windham High School, Golden Brook School, Center School, and Middle School. Schools are maintained by Delahunty and may provide different services (Delahunty uses a sand/salt mix) however, the remainder of the municipal lots are serviced by the town DPW and are generally only salted at the end of the storm with the town's standard sand/salt mix.

Table 2: Municipal Parking Lot Summary

Lot Name	**Approximate Area (Acres)**
Center School	2.33
Golden Brook /Middle School	1.984
Griffin Park	1.038
Transfer Station	1.001
Library	0.961
Town Hall 3	0.734
Police Station	0.354
Fire Station 2	0.289
Fire Station 3	0.274
Town Hall	0.217
Fire Station	0.214
Police Station 2	0.191
Town Hall 2	0.052

Table 3: Road Mileage Summary

Road Classification	Average Daily Traffic	Typical Road Width	Road Miles
Arterial	3,000 +	24’ – 36’	12 miles
Collector	1,000 – 3,000	22’ – 24’	80 miles
Access Street	< 500	18’ – 20’	9 miles

Note: Road classifications per NHOEP (http://www.nh.gov/oep/resourcelibrary/documents/12-roads.pdf)

Windham roads have been classified based on the average daily traffic and maintained in order that Level of Service (LOS) can be set for each classification of road. See LOS, defined by Windham as a general guideline in table 4. It should be noted that the LOS policy has remained consistent throughout the TMDL process.

[9] Source: Windham Records
[10] Source 2005 NHDOT Ortho Photography
[11] Windham High School is not depicted on any Ortho photos at this there and as such was not included in this summary. The parking lot area of the High School was assumed as 0.5 acres

Table 4: Summarized Level of Service Policy

Arterial Roads	1/3 width bare pavement as soon as practical after storm event terminates
Collector Streets	1/3 width bare pavement as soon as practical after storm event terminates
Access Streets	Bare pavement at intersections and steep grades as soon as practical after storm event terminates

Chemical de-icer is not applied during every plow pass. Arterial roads and bus routes are treated prior to the onset of a storm. At the conclusion of the storm, chemical de-icer is applied to all town roads. This practice is subject to change in severe conditions (e.g. ice storms, wet snow with hard pack, etc.) where additional applications may be required either only on steep grades and intersections or throughout the entire town. It is policy to continue to plow without de-icer until it becomes ineffective and chemical de-icer is required.

Materials used in winter maintenance vary annually and are a function of winter weather severity. The table below provides an overview of average material usage. A detailed 10 year average is provided within Appendix B. The 10 year average is used to evaluate salt usage to normalize the effects of more and less severe winters. NHDOT analysis has found that a 10 year average is approximately equal to the Weather Severity Index (WSI) normalized average

Table 5: Annual Town Wide Material Usage Summary

Material	**2014/2015**	**2015/2016**	**10 Year Average**
Solids			
Rock Salt (NaCl)	831 Tons	532 Tons	743.68 Tons
Sand	3,629.89 Tons	1476.27 Tons	

Current application rates town wide are set at approximately 300 lb/lane mile (±50lb) of a 75/25 Sand/Salt Mix. In the low salt area (along west shore road in the Northern Tributary to Canobie Lake) salt usage has been reduced by approximately 1/3. This has been accomplished by utilizing smaller trucks. The result is that the same route is salted with 8 tons instead of 12 tons (33.3% reduction). Route Maps for these smaller trucks are shown in Appendix C. It should also be noted that even with an increase in lane mileage since 2007 the town has maintained consistent salt usage through the use of prewetting sand/salt mixes with the proprietary liquid chemical.

4.0 Proposed Best Management Practices (BMPs)

4.1 Previous (Rounds 1-3) Best Management Practices Summary

Equipment: Windham has procured two (2) new 5 ton dump trucks equipped with spreaders with integrated groundspeed controllers and temperature sensors. At its own expense Windham also purchased a new 5-ton international dump truck in 2010. This vehicle was equipped with ground speed controlled spreader, and controls through round 1 funding. The units are capable of adjusting application rate based on

vehicle speed and application rate. Windham also purchased new spreader equipment for its existing 5-ton Kodiak unit via round 1 funding.

As part of round 1 Windham also instituted a calibration program to calibrate each piece of equipment annually.

Training: Windham staff have been trained in the Green Snow Pro Program offered by the UNH Technology Transfer Center. Windham encourages all of its contract drivers to attend the course as well.

Public Outreach: On multiple occasions Windham has, with the assistance of the UNH T2 Center, sent public informational packets encouraging land owners within the town to contract with only Green Snow Pro certified contractors. Additionally Windham has approached key parking lot owners and contractors and recommended they attend training.

Table 6: Round 1-3 Estimated Reduction Summary

Watershed	Existing Imports	Estimated Total (Round 1 & 2) Reduction	Estimated Reduction	Estimated Reduced Imports	TMDL Allocation
	Tons/Year	*Percent*	*Tons/Year*	*Tons/Year*	*Tons/Year*
Dinsmore Brook	4.56	17%	**0.78**	**3.79**	3.0
Policy Brook	64.15	17%	**10.91**	**53.25**	46.2
N. Tributary to Canobie Lake	4.91	17%	**.83**	**4.08**	2.5
Totals:	73.62	17%	**12.52**	**61.11**	51.7

4.2 Equipment Upgrade (Round 4 Proposed)

Windham proposes to procure an additional 5 Ton dump truck to be outfitted with integrated reduce salt use spreader and accessories as follows:

- **Spreader Control Unit:** Controller with the ability to calibrate and accurately dispense material regardless of vehicle speed. The controller includes the ability to control pre-wetting equipment, and integrate GPS and temperature sensor data. The unit allows management, at their discretion, to set application rates which automatically change with vehicle speed and ground temperature.

Prescribed application rates may only be changed with an administrative password.

- **In-Cab Air/Pavement Temperature Sensor:** Unit provides air and pavement temperature readings on an in-cab display and integrates into the spreader control unit.
- **Electronically Controllable Hydraulic Valves:** Necessary to allow the controller to adjust auger and spinner speeds .

Total estimated reductions from the equipment purchase are conservatively estimated at 4% as detailed below:

Table 7: Estimated Round 4 Reductions

Watershed	**Existing Imports**	**Estimated Total) Reduction**	**Estimated Reduction**	**Estimated Reduced Imports**	**TMDL Allocation**
	Tons/Year	*Percent*	*Tons/Year*	*Tons/Year*	*Tons/Year*
Dinsmore Brook	3.48	6%	**.21**	**3.27**	3.0
Policy Brook	50.1	6%	**3.01**	**47.09**	46.2
N. Tributary to Canobie Lake	3.75	6%	**.22**	**3.53**	2.5
Totals:	57.33	6%	**2.44**	**53.88**	51.7

5.0 Implementation Cost & Timeline

Equipment costs reflect Windham's best estimate at this time. Costs may change due to factors beyond the town's control. The table below summarizes BMP and the associated estimated costs. It should be noted that matching funds will be compliant with 49 CFR18.24 and 49 CFR19.23.

Table 8: Estimated Cost Table

BMP	Equipment	Estimated Cost
4.2 Equipment Upgrade	***New 5-Ton Diesel Dump Truck***	$115,000.00
	Spreader & Advanced Controls	$60,000.00
	Total Project:	**$175,000.00**
	Total Federal:	**$140,000.00**
	Total Municipal Match (20%):	**$35,000.00**
	Municipal Match Due:	**$35,000.00**

Table 9: Project Timeline

Time Period	Action
March 2016	Town Meeting (Budget Approval)
April 2016-June 2016	Bid document Prep & Bidding
July-September 2015	Procurement
November	Delivery
Note: Procurement may be delayed and extend into 2017.	

6.0 Salt Usage Evaluation & Monitoring

Windham continues to monitor its salt usage with respect to TMDL compliance. Windham is committed to a multi-year program of salt reduction with the eventual goal of meeting TMDL load requirements. Windham will continue to track its annual usage and average annual application rate in tons per road mile. Application rates will be substantiated with invoices/cancelled checks/po's and be provided in total annual usage format on town letterhead.

TMDL compliance will be measured using a 10 year average and confidence intervals per DES document "TMDL IMPLEMENTATION PLAN CONSIDERATIONS" included in Appendix C for completeness.

7.0 Summary

In an effort to meet TMDL requirements Windham is proposing to: Procure advanced new 5 ton dump truck with advanced spreader and controls. The town further commits to providing a written report and oral presentation to the salt reduction workgroup following the implementation of the proposed reduction efforts.

Appendix A: Municipal Resolution

TOWN OF WINDHAM, NH

SALT REDUCTION RESOLUTION

We, the Board of Selectmen for the Town of Windham, New Hampshire, commit to reduce salt (chloride) loading to impaired watersheds in the Interstate 93 corridor and within the urbanized area of Windham, New Hampshire; and

WHEREAS a portion of Dinsmore Brook watershed and a designated unnamed tributary to the western embayment of Canobie Lake located within the urbanized area of Windham, NH exceed water quality standards for chloride under the US Clean Water Act; and

WHEREAS municipal road salt application contributes to the total salt loading to these water bodies; and

WHEREAS the Total Maximum Daily Load studies conducted by NH DES indicate that the reduction of municipal road salt must be part of a regional salt reduction program to ensure compliance with water quality standards for chloride; and

WHEREAS the public, private, and State sectors are working together as a coalition to collectively reduce salt contributions in impaired watersheds; and

WHEREAS the Town of Windham will continue to team with all parties associated with salt reduction efforts in the I-93 corridor and the protection of New Hampshire water resources.

The foregoing resolution was dully passed and adopted by the Windham Board of Selectmen 4/6 ,2009.

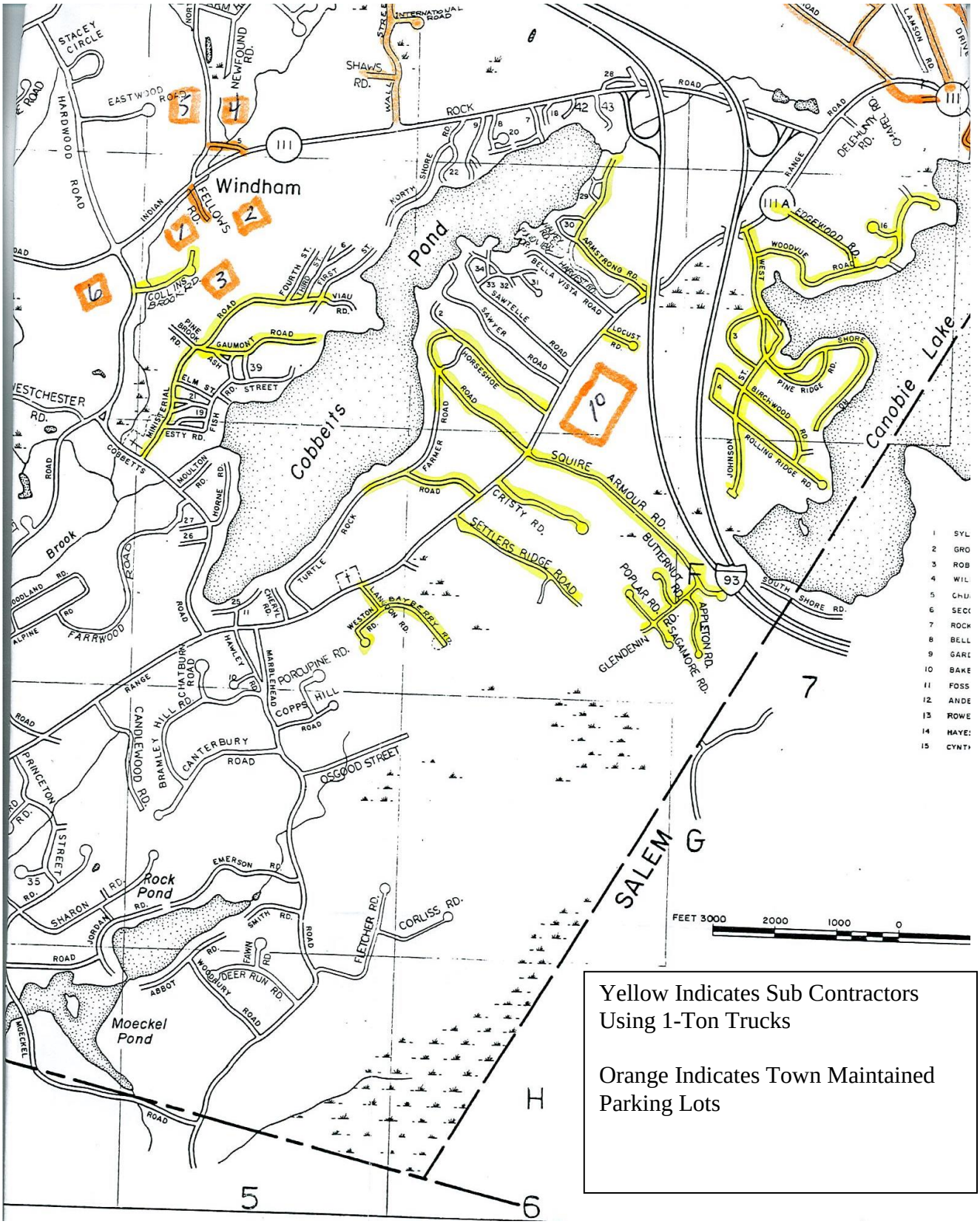
4/6/09

Chair Board of Selectmen

Appendix B: Annual Salt Usage

Windham Salt Usage by Fiscal Year	
Fiscal Year	**Tons of Salt**
2001-2002	706.17
2002-2003	1198.26
2003-2004	928.97
2004-2005	1138.05
2005-2006	902.35
2006-2007	860.14
2007-2008	900.00
2008-2009	684.45
2009-2010	642.43
2011-2012	617.85
2012-2013	844.05
2013-2014	622.43
2014-2015	831.05
2015-2016	532.05

Appendix C: Small Truck Route Summary


Windham
Cobbetts Pond
Canobie Lake
Rock Pond
Moeckel Pond
SALEM
Yellow Indicates Sub Contractors Using 1-Ton Trucks
Orange Indicates Town Maintained Parking Lots

Appendix D: "TMDL IMPLEMENTATION PLAN CONSIDERATIONS"

TMDL IMPLEMENTATION PLAN CONSIDERATIONS
Paul M. Currier, DES Watershed Management Bureau April 15, 2010

I. There are Four TMDL watersheds for which salt reduction implementation plans are needed. For DOT, I-93 should get a separate allocation from other DOT roads that includes the planned expansion. There would be a separate allocation for municipal and private salt use for each town in a TMDL watershed

Table 1

DINSMORE BK.	N. TRIB. CANOBIE LAKE	BEAVER BK	POLICY – PORCUPINE BK
DOT I-93	DOT I-93	DOT I-93	DOT I-93
DOT other roads	DOT other roads	DOT other roads	DOT other roads
Windham municipal	Windham municipal	Londonderry muni.	Salem municipal
Windham Private	Windham Private	Derry municipal	Windham municipal
Windham Future	Windham Future	*Chester&Auburn	Salem private
		Londonderry private	Windham private
		Derry private	Salem future
		Londonderry future	Windham future
		Derry future	
123.1 tons salt/yr	26.9 tons salt/yr	5863.4 tons salt/yr	3,449 tons salt/yr

II. The measure of salt reduction success should be a rolling 10-year average of salt use. An interim measure of success for any given year would be the year's salt use weighted by the Winter Severity Index for I-93.

II. The starting point for all implementation plans is the "equally shared reduction" scenario presented in the approved TMDLs. The final implementation plans may contain different allocations for sectors, and a future growth allocation. These must be negotiated among DOT and municipalities.

A. Municipalities MAY negotiate on behalf of private sector salt users. Private sector allocations should be different from the initial TMDL allocation ONLY if there is a municipally-based plan for how private salt use will be tracked and a municipal commitment to help implement it.

III. In the absence of negotiated agreement among municipalities and DOT, sector allocations for municipalities and DOT should remain as in the TMDLs.

IV. In the absence of a municipally-based plan for how private salt use will be tracked and a municipal commitment to help implement it, private sector salt allocations should remain as in the TMDLs.

V. In the event that municipal salt reduction plans, DOT salt reduction plans, and discussions and negotiations among DOT, municipalities, and private sector salt users do not result in consensus-based sector allocations and plans for each sector that are expected to meet the overall watershed allocation, DES may either:

A. Prepare and publish an implementation plan, and use state law authorities to implement it as necessary; OR

B. Defer to EPA to implement the needed salt use reductions by using their NPDES permit authority. This might involve NPDES small MS4 stormwater general permits, issuing individual permits, and issuing general stormwater permits to categories of salt users (property owners and municipalities) under residual designation authority.

VI. The best scenario is one in which DOT, DES, and municipalities work together, leverage the FHWA earmark $$, and develop a long-term (probably a decade or more) strategic plan for overall salt use reduction.

DRAFT