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Best Management Practices and Salt-Use Minimization Efforts In Chloride-Impaired Watersheds of New Hampshire A Guidance Document for Private Developers and Contractors

Scientific studies in the southern part of New Hampshire determined over 40 streams have elevated levels of chloride. The elevated levels were high enough to be harmful to aquatic life, such as fish. Elevated levels can also be a drinking water health concern for people and animals, can lead to plant death, particularly along roadsides, and can cause damage to infrastructure and automobiles. The primary source of these chlorides is salt used for winter snow and ice management. The New Hampshire Department of Environmental Services (NHDES) calculated that a reduction of 25 percent to 45 percent salt use was needed in order to meet water quality standards. The studies also revealed that up to 50 percent of the salt load was coming from parking lots, driveways and private roads from salt that is used for de-icing.

NHDES encourages private developers and contractors, particularly those working within chloride-impaired watersheds, to adopt best management practices (BMPs) and salt-use reduction methods that will help improve water quality. NHDES also encourages private developers and contractors to consider winter maintenance during project design. Salt-use reduction can lead to long-term cost-savings as a result of purchasing less salt and reduced impacts on vegetation (e.g., landscaping) and corrosion of infrastructure and vehicles. This guidance document is designed to help guide developers and contractors in ways to reduce the use of salt, plan for BMPs and salt reduction methods, include design considerations, and document their snow and ice management plans. Taken together, these are the basic elements of a Salt Minimization Plan.

A REDUCTION IN SALT-USE DOES NOT MEAN A REDUCTION IN SAFETY

Liability for damage or personal injury as a result of snow or ice is one of the main reasons that over-salting occurs and many contractors are reluctant to implement salt reduction practices for fear of increased liability. However, recent studies have found there are BMPs that can be used that optimize salt use, reduce the application frequency and amounts applied and, at the same time, achieve safe levels of service. In addition, as of November 2013, Commercial Salt Applicators certified by NHDES under RSA 489-C, and property owners or managers who hire them, are granted limited liability protection against damages arising from snow and ice conditions.

WHAT DOES ALL THIS MEAN FOR PRIVATE DEVELOPERS AND CONTRACTORS?

Implementation plans for chloride reduction have been developed for a number of places in New Hampshire. Some of these plans are required by permits or other regulatory requirements. The NHDOT, towns, and private contractors who maintain parking lots, sidewalks, and roadways will be required to follow the implementation plans through certain federal and state permits. In other places, watershed-wide implementation plans have not yet been developed. In those areas, especially places that drain to chloride impaired waters, requirements to minimize salt usage are likely to be required of many new commercial and residential developments. Even in places with implementation plans, the need to reduce salt may be so extreme that it will require the concerted efforts of the state, municipalities and private landowners to restore water quality.

HOW CAN PRIVATE DEVELOPERS AND CONTRACTORS MINIMIZE SALT LOADING IN THE WATERSHED?

One of the most effective ways for private developers and contractors to reduce their portion of salt loading in the watershed is to learn more about winter maintenance BMPs and ways to be more effective at winter maintenance activities and to apply what is learned to current practices and future projects. There are three important ways for that to happen.

- **GET TRAINED AS A GREEN SNOWPRO**

The University of New Hampshire Technology Transfer Center (UNH T²) offers a full day Green SnowPro Training course focused on efficient, more environmentally friendly winter maintenance practices that do not compromise road, parking lot and sidewalk safety. The course covers the basics of salt reduction methods including equipment calibration and rate applications, pre-treatment methods, effective plowing and planning, salt accounting management and environmental impacts of salting. The course is offered several times a year. For more information, visit the UNH T² webpage at: <http://t2.unh.edu/green-snowpro-training-and-nhdes-certification>.

- **BECOME A NEW HAMPSHIRE CERTIFIED SALT APPLICATOR**

Individuals who attend the Green SnowPro Training and pass the exam are eligible to apply for voluntary NHDES Salt Applicator Certification. The NHDES Salt Applicator Certification program aims to improve efficiency in salt use and reduce the amount of salt used by commercial applicators. The NHDES salt applicator certificate carries the responsibility of annually reporting salt use to NHDES and attending a refresher training course every two years. The Salt Applicator Certificate has proven valuable to the private contractors as well as to their clients and their insurance carriers. To date, 800 individuals have become Certified Salt Applicators. For more information on how to become a NH Certified Salt Applicator or to find a list of Certified Salt Applicators refer to the NHDES webpage at: <http://des.nh.gov/organization/divisions/water/wmb/was/salt-reduction-initiative/salt-applicator-certification.htm>

THE ANNUAL NEW HAMPSHIRE SALT SYMPOSIUM

Every year the NHDES hosts an annual NH Salt Symposium. Attendees are updated with the latest snow industry technologies and BMPs. The event counts toward continuing education credits for the NH Certified Green SnowPro Certificate, the New Hampshire Salt Applicator Certificate and T2 Roads Scholar Program Contact Hours. People interested in attending can learn more about the event or register online at <http://www.sima.org/new-hampshire-salt-symposium>.

- **DEVELOP A SALT MINIMIZATION PLAN(s)**

NHDES encourages developers and contractors to develop a Salt Minimization Plan as part of, or in addition to, their Winter Maintenance Plan or Winter Snow and Ice Control Policy to help reduce and manage the use of salt. Also referred to as Chloride Reduction Plans or Salt Reduction Plans, these plans vary from large, metropolitan city plans to single development plans. Where they exist, the plan should align with the objectives outlined in the town's or watershed's chloride reduction implementation plan. A general outline and description of what information goes into a Salt Minimization Plan is included as an attachment to this guidance document.

OTHER WAYS TO REDUCE SALT-LOADING IN THE WATERSHED

(See Attachment B for a checklist of smart salting practices.)

- Be aware. Find out what the salt loading reduction goals are within the watershed and town where work generally occurs or where the specific project is located.
- Re-evaluate current practices. Source reduction is identified as the most effective method for reducing chloride loading.
- Consider alternative de-icing materials such as calcium magnesium acetate (CMA) and limited use of abrasives (sand, sawdust, cat litter).
- Pre-wet salt with brine to reduce the loss of salt from bounce and scatter (up to a 30% reduction in loss) and increase melting times.
- Be proactive for storm events and anti-ice by applying a small amount of liquid chemical to pavements and overpasses *before* a storm to prevent ice from bonding with the surface.
- If applicable, keep pavement free of potholes and cracks which both minimize the ability for water to pond and/or infiltrate into the ground where ultimately they could end up in groundwater resources. In addition, pavement that is in good condition allows for snow and or ice to be mechanically removed.
- Consider future maintenance needs in project planning.
 - Include development amenities/features such as heated sidewalks or parking garages.
 - Limit the amount of impervious surfaces that require winter maintenance activities. Some options to achieve this are only including sidewalks on one side of the street, the use of porous paving materials and limited use of curb cuts.
 - Properly design parking lots or designated parking areas with appropriate winter maintenance and snow storage practices. This includes considering where plowed snow will be piled, avoiding melt drainage to flow back across cleared areas (freeze/thaw cycle).
 - Consider landscape vegetation that is more salt tolerant and that doesn't shade out sidewalks or parking areas from the sun during the winter.
- Share information with the town and other landowners in the watershed to help track where salt is being applied, what quantity, and how often or the level of service based on the winter management plan. Track what BMPs are being applied to help determine effectiveness.
- Spread the word and encourage co-workers and colleagues to become a New Hampshire Certified Green SnowPro. Educate clients about the benefits of hiring a New Hampshire Certified Green SnowPro. The NHDES has developed a flyer for businesses to share with their colleagues

or clients available on the NHDES website. A link for this flyer and other helpful information is included below.

- Attend the annual New Hampshire Salt Symposium. The event counts toward the continuing education requirement of the New Hampshire Salt Applicator Certificate and as T2 Road Scholar Program contact hours.

OTHER RESOURCES AND REFERENCES:

For the complete list of NHDES resources including links to training and certification application materials available, please visit our website.

<http://des.nh.gov/organization/divisions/water/wmb/was/salt-reduction-initiative/index.htm>

Assessing the Efficacy of Current Road Salt Management Programs, University of Waterloo (2010)
<http://www.saltinstitute.org/wp-content/uploads/2014/01/Road-Using-Best-Road-Salt-Management-Practices-Waterloo-2010-1.pdf>

Environment and Climate Change Canada – technical documents, BMPs and general information.
<http://www.ec.gc.ca/sels-salts/default.asp?lang=En&n=DECEDD7C-1>

Finding Outstanding Resource Waters & Impaired Surface Waters with a 1-Mile Buffer for Development Projects, Quick Reference Guide, NHDES (2008)
http://des.nh.gov/organization/divisions/water/wmb/tmdl/documents/onestop_gis_wgc_ref_guide.pdf

Green SnowPro Business Flyer, NHDES
<http://des.nh.gov/organization/divisions/water/wmb/was/salt-reduction-initiative/documents/green-snowpro-business-flyer.pdf>

Pre-wetting and Anti-icing – Techniques for Winter Road Maintenance, a Wisconsin Transportation Bulletin - No. 22.
http://epdfiles.engr.wisc.edu/pdf_web_files/tic/bulletins/Bltn_022_prewetting_antiicing.pdf

Salt Reduction Best Management Practices (several Fact Sheet links available)
<http://des.nh.gov/organization/divisions/water/wmb/was/salt-reduction-initiative/tech-assist-bmp-practices.htm>

Snow and Ice Removal for the Business Owner – Clean Water and Safe Parking Lots, NHDES (2014)
<http://des.nh.gov/organization/commissioner/pip/factsheets/wmb/documents/wmb-24.pdf>

Snow Disposal Guidelines, NHDES (2015)
<http://des.nh.gov/organization/commissioner/pip/factsheets/wmb/documents/wmb-3.pdf>

Road Salt and Water Quality, NHDES (2016)
<http://des.nh.gov/organization/commissioner/pip/factsheets/wmb/documents/wmb-4.pdf>

Sensible Salting Strategy of Parking Lots and Sidewalks, The Salt Institute (2015)
<http://www.saltinstitute.org/research/sensible-salting-strategy-of-parking-lots-and-sidewalks/>

Winter Parking Lot and Sidewalk Maintenance Manual, Minnesota Pollution Control Agency (2015)
<https://www.pca.state.mn.us/sites/default/files/p-tr1-10.pdf>

ATTACHMENT A - DEVELOPING A SALT MINIMIZATION PLAN

Developing a Salt Minimization Plan will go a long way towards reducing salt-use, i.e., salt loading within the watershed. The development of this plan will help private developers and contractors to hone in on how much salt is needed, when it should be applied, where it needs to be applied, etc. with the ultimate goal of reducing salt-use without compromising safety. Salt-use reduction also leads to long-term cost-savings as a result of purchasing less salt and reduced impacts on vegetation (e.g., landscaping) and corrosion of infrastructure and vehicles, and a reduction in well replacements. Reduction in the use of salt does not mean a reduction in level of service or public safety; in fact many contractors who complete the Green SnowPro training course have been able to provide the same level of service while reducing their salt use by 30%.

It is important to anticipate that this will be a living document that will likely need to be updated at some point. Reduction goals may fluctuate from year to year due to improvements in technology and BMPs, a town's requirements, or state and federal permit conditions that result in private developers or contractors to alter practices, particularly as more development occurs. It is good practice to review and update the plan(s) annually, early in advance of the winter season so that there is time to make any necessary adjustments.

In general NHDES recommends that the plan include:

- **Introduction/Background** – Identify the purpose and need for the plan. This section should describe any current chloride impairments and salt reduction goals within the watershed and town. If there is a Winter Maintenance Plan or Winter Snow and Ice Control Policy already in place, this section should briefly describe how this salt minimization plan fits in with the more general winter maintenance approach and BMP practices. It may be that many of the items below are already adequately covered in the broader Winter Maintenance Plan.
- **Development or Project Area Description** – Describe the development. How many linear feet roadways or sidewalks are there? Discuss the main features and layout of the site including stormwater runoff /topography, as well as vegetation and shaded areas. Including a general map of the development that identifies these features is helpful.
- **Operational Guidelines** – Identify who the responsible party is for the maintenance activities and lists out contracting requirements and minimum specifications for de-icing, anti-icing and pretreatment practices and equipment. This guideline should describe the level of service required by the development which directly impacts maintenance operation plans.
 - **Winter Operator Certification Requirements** – This section outlines employed or contracted contractors training and certification requirements. (Green SnowPro Training is recommended).
 - **Weather Monitoring** – Outline where weather information will be gathered from and how it is used to ensure that winter operators are making informed decisions as to when and to what extent materials are applied to private roadways, sidewalks and parking lots. An important part of this will be developing a good communication plan that identified key personal responsible for weather monitoring.
 - **Equipment Calibration Requirements** – Outline all winter equipment calibration requirements. Typically a 25% reduction in salt use can be achieved simply by calibrating equipment, and is the single most important aspect to achieving salt use reductions.
 - **Mechanical Removal** – Describe mechanical removal practices such as where snow should be stored and how often plowing should occur as well as goals, such as

mechanical removal, that minimize snow- and ice-pack that reduce the need for abrasives, salt and or brine applicants.

- **Salt Usage Evaluation and Monitoring** – Describe how salt usage will be documented and how salt use will be monitored and evaluated in conjunction with the town’s salt reduction plan (if applicable). Monitoring salt usage as well as winter maintenance actions is key to determining what works, how much salt and other winter maintenance materials were used and estimating what is needed for the next winter season, and if salt minimization plan goals contributed to salt load reductions in the watershed. It is recommended that a report be developed annually shortly following the winter season, and provided to the town in which the development or work is occurring in for use in documenting private contractor use and allocations in the watershed. A schedule for how often the Salt Minimization Plan is updated should be included and tracked within this section as well.

Salt Evaluation and Monitoring Elements:

- ✓ Where the maintenance is occurring.
- ✓ What the activity being performed is and/or what equipment is being used.
- ✓ What the weather conditions are - include:
 - Event timing (pre-storm, during, post-weather event)
 - Air and ground temperatures
- ✓ Time of activity
- ✓ Application rates
- ✓ Results
- ✓ Other info – BMPs in practice for consideration, etc.

- **Analysis of Alternative De-icing Materials, Site Design Considerations and Watershed Offsets** – Describe alternative de-icing materials that could be used for winter maintenance activities, such as calcium magnesium acetate, and discuss what was considered, incorporated, and/or eliminated and why. Discuss what site design features or amenities were incorporated or considered, such as parking garages, heated sidewalks, vegetation, etc., to minimize salt use. Include a discussion on other options for offsets within the watershed such as educating others and applying good salt application strategies to other facilities.

Not all items above need to be included within the plan, generally the more complex the project, the more detailed the plan. In addition, some of these items may already be thoroughly covered in the broader Winter Maintenance Plan. NHDES staff are available to discuss and help identify what level of detail is necessary to achieve salt-minimization for any type or size of project.

ATTACHMENT B – SMART SALTING PRACTICES

A checklist for snow and ice maintenance contractors.

Recommended practice	Check which response applies to current practices and anticipated site maintenance activities for job site.				
	Already do	Will do	Might do	Will not do	If "will not do"....why not?
Use an application rate chart.					
Calibrate equipment each year.					
Learn about the deicer ingredients and use the appropriate one for the condition.					
Look for reasons if and why materials are leaking or spilling from vehicles and fix them (e.g. gaps, overfilling, etc).					
Develop a comprehensive winter maintenance policy. Follow your policy.					
Measure and use pavement temperatures.					
Use anti-icing appropriately prior to the storm.					
Plow before applying deicers.					
Use wet materials (pre-wet or pre-treated).					
Don't apply sodium chloride (road salt) for pavement temperatures below 15°F.					
Don't apply deicers for pavement temps under -10° F. It's too cold.					
Separate salt and sand. Use salt for melting. Use sand for traction.					
Apply deicers in the center of the road or on the high side of the curve.					
Store the salt in a building or under secure cover.					
Store salt away from water flow and direct the water away from storage area.					
Store snow away from lakes, ponds and wetlands.					
Sweep up sand, dispose of properly.					
For each event, document what you did and how well it worked. Use this information to make improvements.					

Checklist is adapted from worksheet created by Fortin Consulting as a part of the Minnesota Pollution Control Agency Smart Salting Voluntary Certification Program.