
TO: GENERAL COMMITTEE

WARD: ALL WARDS

SUBJECT: SALT OPTIMIZATION STRATEGY

PREPARED BY AND KEY CONTACT: C. MORTON, C.E.T. PMP, MANAGER OF ROADS OPERATIONS, EXTENSION 4910 & K. THOMPSON, P.GEO, RISK MANAGEMENT OFFICIAL, EXTENSION 4796

SUBMITTED BY: D. FRIARY
DIRECTOR OF ROADS, PARKS & FLEET

GENERAL MANAGER APPROVAL: R.J. FORWARD, MBA, M.Sc., P. Eng.
GENERAL MANAGER OF INFRASTRUCTURE & GROWTH MANAGEMENT

CHIEF ADMINISTRATIVE OFFICER APPROVAL: C. LADD,
CHIEF ADMINISTRATIVE OFFICER

RECOMMENDED MOTION

1. That the Salt Optimization Strategy, in Appendix "A" of Staff Report RPF015-16, be approved to support Source Water Protection objectives and current Operational Practices in the Roads, Parks and Fleet Department.

PURPOSE & BACKGROUND

2. The purpose of this report is to request Council approval of the Salt Optimization Strategy. The Salt Optimization Strategy outlines a series of strategic recommendations to optimize the use of road salt in order to maintain safe surfaces for pedestrian and vehicular traffic while minimizing the environmental impacts related to its storage, handling and application. It was developed as a Source Water Protection Initiative to protect our sources of drinking water from rising sodium and chloride concentrations.
3. The City has an obligation to maintain its road network to a safe level of service in winter seasons. To that end, the Roads, Parks and Fleet department of the City of Barrie has been utilising the Province's Minimum Maintenance Standards for Municipal Highways as set under the Municipal Act, 2001 in Ontario Regulation 239/02 as amended at its level of service during the winter season from November 15th to April 15th to maintain the road network.
4. The Winter Operations Plan sets out a policy and procedural framework for ensuring that the City of Barrie continuously improves on the effective delivery of winter maintenance services; and, that service levels are in compliance with the Ontario Regulation 239/02: Minimum Maintenance Standards for Municipal Highways.
5. The Salt Management Plan sets out a policy and procedural framework for ensuring that the City of Barrie continuously improves the management of road salt used in winter maintenance operations. It was based on a comprehensive comparison of past City of Barrie practices against industry best management practices as outlined in Environment Canada's Code of Practice for the Environmental Management of Road Salts. The plan sets out specific goals for improving the City's salt management practices.

6. The Salt Optimization Strategy, Salt Management Plan and the Winter Operations Plan support the City's Source Water Protection plan, Subwatershed Plans and Environment Canada's Code of Practice in formalizing salt reduction policies, techniques and operational procedures.

ANALYSIS

7. The City of Barrie, Roads, Parks and Fleet staff use several tools to balance the risk to the public, the protection of the environment and to optimize the City's winter control budget. Winter operations staff receive email weather forecasts, specifically created for Barrie, have access to two Road Weather Information Systems (RWIS) stations for current conditions and a website with updated forecasts. Road patrol vehicles are equipped with pavement temperature sensors to monitor road temperature. All anti-icing units and salt/sand spreading units are equipped with electronic controlled spreaders that control the amount of material spread on the road. The spreader units are calibrated on a regular basis to ensure accuracy.
8. The City's winter operations plan and salt management plan formalize current activities and practices, allow staff to manage the risk to avoid liability, and prevent damage to the environment.
9. The City strives to minimize the impacts of road salt to the environment by encouraging reductions in the use of road salt in areas where this reduction will not impact pedestrian and vehicular safety. It also strives to optimize current winter maintenance practices to achieve an overall reduction in the application of road salt while delivering the expected level of service to its customers. To achieve these goals, best management practices, education and outreach initiatives and improvements to current technology are considered.

ENVIRONMENTAL MATTERS

10. In 2001, Environment Canada released an assessment report stating that road salts are entering the environment in large amounts and are posing a risk to plants, animals, birds, fish, lake and stream ecosystems and groundwater. Road salts are used in Canada as de-icing and anti-icing chemicals for winter road maintenance, with some use as summer dust suppressant. On average 5 million tonnes of road salt is estimated to be used on Canadian roadways annually.
11. In 2004, Environment Canada produced the Code of Practice for the Environmental Management of Road Salts. The objective was to ensure environmental protection while maintaining roadway safety. Road organizations that adopt the Code develop a salt management plan, establish goals and timelines and implement best management practices for storing and applying salt and for disposing of snow containing salt. The goal was to have most municipalities adopt the Code of Practice and report to Environment Canada annually.
12. Since then, municipalities have adopted practices to minimize salt use, alternatives to salt use and safe handling of salt and snow laden with salt.
13. The City of Barrie carries out all winter maintenance activities as per Environment Canada's Code of Practice. The synthesis of best practices can be viewed at <http://tac-atc.ca/en/bookstore-and-resources/free-resources-and-tools/syntheses-practice>.
14. As a requirement under the Clean Water Act, an evaluation of drinking water issues was completed for the City of Barrie drinking water supply system. It was found that concentrations of sodium and chloride for certain municipal supply wells within the central portion of the City are trending upward and may exceed Ontario Drinking Water Quality Standards. To start addressing

this increasing trend, Risk Management Plans will need to be developed for activities related to the handling, storage and application of road salt as well as the storage of snow within the sodium and chloride Issue Contributing Areas. Staff has developed a Salt Optimization Strategy that meet the requirements of a Risk Management Plan.

15. The Salt Optimization Strategy provides a series of recommendations in the following categories: baseline understanding, level of service, material tracking and monitoring, technology and control techniques, pilot projects, education and outreach and big picture objectives. Some key recommendations are highlighted below, some of which have been implemented for the 2016/2017 winter control season.
16. **Baseline Understanding:** A baseline understanding of the City's current road and sidewalk network is important to ensure winter maintenance practices are designed for existing conditions. Recommendations in the Strategy are targeted towards maintaining accurate and up to date data of the City's network as a means to understand the extent of the winter maintenance activities and the factors that influence salt application. Knowledge of existing salt vulnerable areas is also leveraged to outline areas most susceptible to contamination from winter maintenance activities and will help in making directed decision-making for salt reduction initiatives.
17. **Level of Service:** The City provides a level of winter control service that meets or exceeds the Provincial Minimum Maintenance Standards for Municipal Highways Ontario Regulation 239/02. All roads located in salt vulnerable areas were assessed to confirm if they still met the qualifying criteria for salt application based on revised bus routing that has occurred and recently established road gradient data. As a result, 6.4 lane km of roads were re-designated to residential routes while 17.6 lane km were re-designated to a new type of route called priority-plus that is plowed like a priority but not salted like a priority. The Level of Service recommendations included in the Strategy have been initiated for the 2016/2017 season. The practice of reviewing roads to identify areas that can be removed from priority salt routes will continue on an annual basis. The Strategy includes the need to develop a level of service for municipal parking facilities in the future.
18. **Technology & Control Techniques:** Various technologies are currently employed by the City to ensure that the right amount of material is applied at the right time and in the right place. The recommendations provided highlight the currently employed methods requiring that these techniques are maintained going forward and suggest new techniques be adopted. Some of the Strategy recommendations include having an additional Road Weather Information System (RWIS) be installed in the southwest area of the City to improve the accuracy of predicting road and weather conditions in this area, that the Global Positioning System (GPS) be updated to include mapping of salt vulnerable areas to track salt application in these areas, adopting a corporate policy for mandatory snow tires on corporate vehicles including City buses and the purchase of more specialized equipment to remove hard packed snow and ice.
19. **Pilot Projects:** The City is currently involved in many pilot projects aimed at reducing salt usage. Examples of these include the increased use of organic de-icing materials in various types of road conditions, the use of loaders equipped with plow and wing to clear packed on ice and snow and to plow cul-de-sacs more efficiently, the installation of additional cameras at strategic locations to determine traffic and road conditions, and the installation of snow fencing to reduce the effect of drifting conditions. Recommendations for continued participation in pilot projects include continued endorsement of projects by Council, the streamlining of the purchasing process for pilot materials and engaging with post-secondary institutions.
20. **Material Tracking & Monitoring:** The City has investigated several types of de-icing materials to reduce of the amount of salt required to meet Provincial service levels. Ongoing testing and monitoring of these materials is also being carried out at various application rates to further

enhance salt reduction. Programs have been also established to sample and measure chloride concentrations in all stormwater maintenance ponds and oil and grit separators (OGSs) to follow up on areas of concern and make adjustments as required.

21. **Education & Outreach:** Education and outreach initiatives recommended include having more learning opportunities for staff involved in winter maintenance activities through professional development. Having the Source Water Protection program presented at the annual Snow School allows for the knowledge of the Strategy and the program to be continually passed to operators and contractors. An internal collaboration meeting has been held for the Engineering Department to offer operational knowledge and design point-of-view to help to design the roads to minimize salt usage and its impact to the environment. Finally general public outreach initiatives are recommended prior to the beginning of the winter season to educate community members about salt application best management practices and the City's winter maintenance program.
22. **Big Picture Objectives:** The Salt Optimization Strategy formalizes the City's objectives to reduce the use of salt to protect Lake Simcoe and the environment while maintaining the road network to meet or exceed Provincial service levels. The strategy establishes future initiatives and includes a continuous improvement approach that sets out objectives, reviews progress regularly, and makes adjustments to meet goals. The Salt Optimization Strategy balances the need to mitigate risk to the environment and to provide safe and efficient transportation of goods, services and the travelling public to contribute to the City's economy.

ALTERNATIVES

23. There is one Alternative available for consideration by General Committee

Alternative #1

General Committee could choose to not adopt the Salt Optimization Strategy.

This Alternative is not recommended as there is a need to formally establish these practices and processes to mitigate risk of liability and risk to the environment.

FINANCIAL

24. The total winter maintenance budget proposed for 2017 is \$ 6,092,844.00. The cost of new and ongoing salt optimization initiatives will be offset by the cost in salt savings. Therefore, the adoption of these strategies will have no effect on the budget.

LINKAGE TO 2014-2018 STRATEGIC PLAN

25. **The recommendation(s) included in this Staff Report support the following goals identified in the 2014-2018 Strategic Plan:**

- Vibrant Business Environment**
- Responsible Spending**
- Well Planned Transportation**
- Inclusive Community**

26. Adopting these recommendations will assist with facilitating transportation of goods, services and the general public during the winter season in a safe and efficient manner, thereby contributing to the economic environment of the City.

APPENDIX A

2016 Salt Optimization Strategy