



City of Kawartha Lakes

SALT

MANAGEMENT

PLAN



NOTICE:

This Plan is modeled on a Salt Management Plan Template and has been prepared for the sole use of the City of Kawartha Lakes



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Commitment to Salt Management Plan

**The undersigned are committed to maintaining and implementing
The City of Kawartha Lakes Salt Management Plan contained within this
document.**

SIGNATURE:

DATE:

Chief Administrator Officer

Director of Public Works

Manager(s), of Roads Operations

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INTRODUCTION

1.0 INTRODUCTION

1.1 Overview

The City of Kawartha Lakes (City) has approximately 2,700 lane kilometers of roads within the framework of a classification and prioritized system, which provide for the safe, efficient and affordable means of surface transportation for road users. People rely on our roadway network throughout the year for uses such as transportation to the workplace, recreation and leisure facilities, transportation of goods and services, and for emergency and security services.

Snow and ice conditions on the road system have a dramatic impact on public safety, roadway capacity, travel time and economic costs. User safety remains the most important priority within winter maintenance operations, practices and strategies contained in this Salt Management Plan.

Although the industry continues research into the use of alternatives to road salt in winter maintenance, road salt continues to be a cost-effective deicer. However, because of the adverse effects that salt may have on the environment, this Salt Management Plan strives to limit the amount of salt entering the environment by including best salt management practices, and using appropriate technologies to ensure its most effective use over the road system. At the same time, the City will continue to consider viable and cost-effective new technologies and chemicals to reduce the environmental impacts of winter maintenance activities.

In 2001, Environment Canada released an assessment report stating that road salts are entering the environment in large amounts and pose a potential risk to plants, animals, birds, fish, lake and stream ecosystems and groundwater. Based on the assessment, Environment Canada is considering declaring road salt to be “toxic” under the Canadian Environment Protection Act (CEPA). The “toxic” designation only means that it is harmful to the environment if used in excessive amounts. Environment Canada has stated that they will not ban road salts, but rather will encourage users to develop their own salt management strategy. ***It must be noted that Health Canada has stated that road salts are not harmful to humans.***

Environment Canada has released a “Code of Practice for the Environmental Management of Road Salts”. Road salt users, that meet the minimum requirements of the Code of Practice, have to prepare a Salt Management Plan to better manage their road salt use and report their progress.

The City has developed this Salt Management Plan in accordance with Environment Canada’s Code of Practice for the Environmental Management of Road Salts. This will address growing concerns about the effect road salt is

having on our natural environment and at the same time continue to provide for road safety by better managing our use of salt.

1.2 Purpose of the Plan

This Plan establishes a Management Directive (MD) and procedural framework for ensuring that the City continuously improves the management of road salt used in its winter maintenance operations. The Plan demonstrates the City's commitment to limit the environmental effects of salt use, consistent with Environment Canada's stated objectives and Kawartha Lakes strategic goals.

Any modifications to winter maintenance activities must be carried out in a way that provides roadway safety and user mobility consistent with the weather conditions experienced during the snow and ice control season.

This Plan is dynamic and fluid, allowing the City to phase in new approaches and technologies in a way that is responsive to fiscal demands and the needs to ensure that roadway safety is not compromised.

1.3 Legislative Authority

The policies presented in this Plan are consistent with fulfilling the City's obligations under provincial and federal legislation.

1.4 Format of the Plan

Chapter 2.0 of this Plan presents the Council Policy Direction approved by City of Kawartha Lakes Council.

Chapter 3.0 of this Plan presents the Winter Maintenance Management Directives that are relevant to salt management.

Chapter 4.0 of this Plan presents the summaries of Operational Practices and Strategies for Snow and Ice Control as they relate to the effective management of road salt. This chapter is presented as a series of sub-sections that can be modified as new policies, procedures and practices are introduced and refined.

Chapter 5.0 of this Plan presents the approach to monitoring the implementation of the Plan and to maintaining and updating the Plan.

1.5 Responsibilities

Chief Administrative Officer – Has corporate responsibility for the City's Salt Management Plan.

Director of Public Works – Shall be responsible for ensuring that the Salt

Management Plan is developed, maintained, and implemented consistently within roads operations.

Manager(s) and Supervisor(s), Roads Operations – Shall be responsible for developing and maintaining the Salt Management Plan and ensuring that it is implemented consistently; for overseeing the maintenance and upgrading of the winter maintenance facilities in compliance with the Salt Management Plan, as well as monitoring the change in environmental impacts associated with the Salt Management Plan.

Manager and Supervisor, Fleet Services – Shall be responsible for purchasing, maintaining and calibrating the winter maintenance fleet in compliance with the Salt Management Plan.

Roads Crew Leads – Shall be responsible for ensuring that winter maintenance activities are carried out in compliance with the Salt Management Plan.

Winter Maintenance Personnel – Shall be responsible for ensuring that winter maintenance duties are completed in accordance with the policies and procedures set out in the Salt Management Plan as directed by their manager/supervisor.

Manager, Water and Wastewater – Shall be responsible for environmental review and for monitoring environmental impacts in the City's municipal drinking water sources.

***Management
Directive***

2.0 MANAGEMENT DIRECTIVE CONTEXT

2.1 Corporate Strategic Plan

The City of Kawartha Lakes' 2024-2027 Corporate Strategic Plan defines one of the key the corporate strategic goals being commitment to "A Healthy Environment". Key priorities within the Strategic Plan relating to a Healthy Environment are to "Protect and preserve natural areas including greenspaces, waterways, parks, trails and farmlands" and to "Support environmental sustainability and resilience in our community".

The Salt Management Plan aligns to these strategies through effective and appropriate application of salt in relation to winter control activities.

2.2 Maintenance and Operations Salt Management Plan Objective

The employees of the City's Roads Operations Division are dedicated to continuous improvement. Through "Winter Maintenance" programs and activities staff work together to improve service delivery and to communicate better with residents of Kawartha Lakes.

2.3 Salt Management Plan Management Directive

Within the City Kawartha Lakes overall policy context, the following is the City's management directive on the use and management of road salt.

- To comply with all applicable federal and provincial legislation regarding the storage and use of snow and ice control products.
- To use road salt in an environmentally responsible manner, and limit the negative environmental effects of handling, storage and application of salt on the environment.
- In providing the approved Level of Service, the City of Kawartha Lakes will conserve the use of salt by utilizing cost-effective technologies and practices whenever and wherever practical.

Salt Management Principles

1. Road safety is a top priority for the City.
2. Road salt is essential to maintaining roadway safety when experiencing winter conditions.
3. The City will strive to control the amount of salt released to the environment through effective salt management practices.
4. This Salt Management Plan will be reviewed and updated as required.

5. The City will provide the necessary training and guidance to its winter maintenance personnel (internal and contracted services) to achieve an environmentally sound and safe winter maintenance program.
6. Performance will be measured and reported through appropriate public reporting vehicles.

Implementation Guidelines

This Salt Management Plan was developed in accordance with the following directions:

General:

- Salt Management Plans will embrace the concepts set out in the Syntheses of Best Practices Road Salt Management (TAC 2013) prepared by the Transportation Association of Canada and subsequent revisions, and Codes of Practice issued by Environment Canada.
- For the purposes of this plan, winter sand is a sand/salt mix that is comprised of 3-5% salt mixed in to the stockpile to reduce the chances of the sand from freezing.

On-roadway Use:

- Operate in accordance with clearly stated, documented, and approved Level of Service standards that promote safety and efficient salt and winter sand use;
- Prioritize environmentally sensitive areas when implementing strategies for reducing salt impacts;
- Apply salt and winter sand at rates that are consistent with best salt management practices; and
- Improve the efficiency of salt and winter sand usage through better use of technology and application equipment.

Winter Sand and Salt Storage:

- Review current storage practices for salt and winter sand, as well as develop and implement strategies for cleaning up existing sites and minimizing salt loss to the environment from future operations

Snow Storage & Disposal:

- Assess snow storage areas to improve site selection and management of practices that impact the environment, including site drainage;
- Manage its snow disposal sites in a way that minimizes impacts to the environment.

Training:

- Implement effective employee training and awareness for supervisors, operators and contracted services when and where applicable;
- Ensure compliance to training and awareness programs for contracted services.

Decision-Support:

- Endeavor to improve snow and ice control decision-making by increasing staff focus on pavement temperatures;
- Endeavor to improve staff's ability to monitor and interpret weather forecasts.

Record Keeping:

- Establish sufficient record keeping processes enable better tracking of salt use and salt-related impacts;
- Develop salt management performance criteria and related monitoring programs. These will be integrated into any national salt management reporting program developed by Environment Canada.

2.4 Application

This Plan was first adopted by City Council on September 4, 2007 and applies to all employees and contractors involved in Winter Maintenance Operations for the City. Staff circulate updates through Council and endeavour to update the plan every 5 years or as major changes occur or are required.

2.5 Implementation

This Salt Management Plan is activity based and follows an Environmental Management System framework. It includes the following elements:

- Periodic review and analysis of Legislative requirements and industry practices
- Implementation and documentation of the Salt Management Plan
- Education and training of staff
- Monitoring and analysis of operations
- Management review and revisions
- Environmental review
- Management Directive and practices revision

The implementation and improvement of this Salt Management Plan will promote the continuous development of practices and procedures to improve winter maintenance activities and procedures while striving to reduce the effects of road salt on our environment. The Plan is a dynamic document. It will be reviewed and refined on an on-going basis and will function at all levels of the organization.

All personnel related to winter maintenance have a role ensuring that this Plan is implemented, monitored, improved and updated.

Adoption of the policies and procedures in this Plan by other parties involved in snow and ice control activities on behalf of the City shall include outsourced agencies that are monitored by senior competent City staff.

***WINTER
MAINTENANCE
STANDARDS***

3.0 WINTER MAINTENANCE STANDARDS

3.1 Introduction

This chapter documents the City's snow and ice control standards.

The major activities related to winter maintenance are:

- Salt and winter sand storage;
- Salt spreading;
- Winter sand spreading;
- Snow plowing;
- Snow removal, storage and disposal.

3.2 Level of Service (LOS)

For the purposes of road patrolling, snow plowing, salting, winter sanding, ice control and snow removal, municipal roads have been classified as per O. Reg. 239/02 - Minimum Maintenance Standards for Municipal Highways (MMS) and as amended - based on posted speed limits and traffic volumes. Winter maintenance commitments are also outlined in the City's LOS Policies for winter maintenance operations.

The Council Policies CP2021-045 and CP2021-046 (Roadway and Sidewalk Winter Level of Service Policies) are regularly reviewed to ensure the City continues to provide a LOS that meets and may exceed the MMS as set out in O. Reg. 239/02, as amended.

The LOS for winter operations standard is designed to meet the needs of the community from the perspective of driver safety and the provision for emergency services. The LOS standards are driven by both the technical requirements of winter operations and the need to address the socio-economic and environmental concerns of a large rural and urban municipality.

3.3 Material Application Rates

Salt

The City typically applies salt at a rate of approximately 130kg / two lane km to designated asphalt roads. Table B.1 in Appendix "B" provides a summary of the current application rates for dry salt for various conditions requiring snow or ice control that occur within the City. Salt is not applied to gravel or high float (tar and chip) roads.

The Managers, Roads Operations, Supervisors, Roads Operations and/or Road Crew Leaders have the flexibility to adjust the settings to accommodate specific conditions. For example, applications rates may be reduced for road (black) ice and/or frost conditions and increased on steep grades and intersections. In environmentally sensitive areas, the City will review and apply the appropriate

resources, methods and utilize applicable spreading rates of de-icing materials to ensure a consistent experience for drivers.

Abrasives / Winter sand / Winter Mix

A mixture of winter sand and road salt to prevent freezing of the winter sand when it is stored is used as an abrasive to improve traction and provide some ice and snow control on City roads. Winter sand is purchased, delivered and mixed with road salt at the City's Operations Works Depots . Winter sand is currently blended with road salt at a rate of approximately 3% to 5% by volume.

The City typically applies abrasives at a rate of approximately 570 kg / two lane km. Table B.2 in Appendix "B" provides a summary of the current application rates for abrasives for various conditions requiring snow or ice control that occur within the City.

Due to the variety of road conditions that may be encountered during regular operations, within this Plan, the Managers, Roads Operations, Supervisors, Roads Operations and/or Road Crew Leaders have authority to determine frequency and timing of applications. Forecasted and existing weather and road conditions shall be referenced and used in the decision making process.

Snow Removal, Storage and Disposal

As a result of snow plowing operations, snow accumulates at the side of roads as "windrows". In most cases this is not a safety, operational, or environmental concern. However, in some locations where snow storage is a problem or as directed in Council approved LOS policy, the accumulated snow must be removed. Snow removal operations are initiated when windrows reach volumes that create a nuisance or hazard to pedestrians and motorists, or to maintain storage capacity for subsequent snowfalls. Snow removal, storage and disposal must be performed properly to ensure that the operations do not cause adverse effects to the environment.

Occasionally the City has had to remove and dispose of snow from assumed roads. The snow is blown or loaded into dump trucks and disposed of at a site controlled and owned by the City.

Sidewalk Snow Maintenance

The City, with the use of contracted and internal staff services, will maintain sidewalks along City road allowances in accordance with the approved LOS policy. With each winter weather event being unique, the decision in regards to response, timing and materials shall be at the discretion of the Managers, Roads Operations, Supervisors, Roads Operations and/or Road Crew Leaders according to the most recent approved LOS for sidewalk winter maintenance.

***OPERATIONAL
PRACTICES &
STRATEGIES***

4.0 OPERATIONAL PRACTICES AND STRATEGIES

4.1 Overview

This chapter of the Plan provides a discussion of each of the key operational practices and strategies related to the effective management of road salt during winter maintenance activities.

Each subsection has a summary that provides a discussion of the objectives, environmental considerations, current situation, framework objectives, responsibilities, performance measures and references (documents or tables). Table 4.1.1 (below) demonstrates the format and explains the intent of each category.

It is important to recognize that the Plan is intended to be fluid and dynamic. Therefore, the purpose of this section is to establish the goals of the Plan and a strategy for achieving these goals.

TABLE 4.1.1

SUBJECT	
OBJECTIVE	This section states the salt management objective that is to be achieved.
ENVIRONMENTAL CONSIDERATION	It is important that people understand the rationale behind the need to make changes. This section identifies briefly the environmental considerations that make it important to address the subject area.
CURRENT SITUATION	This section identifies the status of the subject area at the time of initial implementation of the Plan or following any update of the Plan.
OBJECTIVES & RESPONSIBILITIES	The Plan must have clearly stated objectives and timetables. This section identifies the objectives and timetable for each subject area.
IMPLEMENTATION CONSIDERATIONS	Explanation of reasoning behind the objectives and timetable factoring in resource issues and also includes opportunities such as partnerships.
STAFF RESPONSIBILITIES	The Plan must have staffing resources assigned the responsibility to implement the elements of the Plan. This section assigns those responsibilities for each goal.
PERFORMANCE MEASURE	It is important to monitor and measure the progress of implementing each element of the Salt Management Plan. This section establishes the criteria for measuring performance and monitoring. There should be a performance criteria for each goal.

REFERENCES	This section identifies any reference documents or tables related to this subject area or that provide more detailed direction regarding implementation of the salt management strategy.
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4.2 Management Practices

Table 4.2.1

LEVEL OF SERVICE (LOS)	
OBJECTIVE	<p>To ensure that the LOS is reviewed and that any revisions are approved by the Director of Public Works and Council, and communicated to winter maintenance personnel. The defined LOS must be clear, functional and understandable to operations personnel and other stakeholders (e.g. public and politicians). It should make it clear what is to be achieved and what will not be achieved (e.g. there may not be continuous bare-like pavement conditions throughout a storm).</p> <p>Typically the LOS will explain the intended:</p> <ul style="list-style-type: none"> ▪ Initial response time; and ▪ Response activity.
ENVIRONMENTAL CONSIDERATION	<p>The prescribed LOS is the foundation for the winter maintenance program and has a significant impact on salt / winter sand used to achieve the standard. It is also very important in being able to demonstrate due diligence in the event of a claim against the City.</p>
CURRENT SITUATION	<ul style="list-style-type: none"> • Each road in the City network is classified into a road class based on Council Policy CP2021-044, as amended. • The City's two Level of Service Policies for winter operations detail the LOS for the snow accumulation and icy condition component of the City's winter operations program for both roadways and sidewalks.
GOAL	<ul style="list-style-type: none"> • Review the LOS and the minimum maintenance standard (O.Reg.239/02, as amended) annually and revise if required. • Consider the potential impacts of introducing new technologies. • Obtain management and Council endorsement of the revised LOS. • Implement the revised LOS. • Review routes after changing LOS. • Train and inform staff, management and the public on the intentions and expectations in service delivery.

IMPLEMENTATION CONSIDERATIONS	Changes in LOS expectations could impact the cost of service, driver safety and resource need amongst other potential impacts.
RESPONSIBILITIES	<p>Managers, Roads Operations</p> <ul style="list-style-type: none"> Responsible for leading the development and approval of LOS revisions. <p>Supervisors, Roads Operations and Road Crew Leaders</p> <ul style="list-style-type: none"> Responsible for ensuring compliance with the LOS and providing input during revisions. <p>Winter Maintenance Personnel</p> <ul style="list-style-type: none"> Responsible for complying with the LOS.
PERFORMANCE MEASURE	<ul style="list-style-type: none"> Levels of Service(LOS) Policies Reviewed Annually. Compliance with the LOS throughout the organization.
REFERENCE	CP2021-045 CP2021-046 Ontario Regulation 239/02, as amended

4.3 Equipment

Good salt management is dependent upon having equipment that permits operators to place:

- the **right material**;
- at the **right time**;
- at the **right amount**;
- in the **right place**; and
- for the **right duration**, to keep it there long enough to do the job.

Proper equipment is also important for tracking salt and winter sand usage and being able to measure progress in reducing excessive and improper material use. Technologies such as ground-speed oriented electronic spreader controllers with dataloggers and variable spreader settings can improve salt and winter sand use. These systems require effective annual calibration along with ongoing monitoring and recalibration to ensure proper functionality.

The following action plans relate to fleet allocation, upgrading and maintenance.

Table 4.3.1

Fleet Allocation/Optimization	
OBJECTIVE	To optimize the use of spreaders and plows by efficient routing in accordance with the LOS expectations.

ENVIRONMENTAL CONSIDERATION	Duplication of service due to inefficient routes leads to redundant material use and premature plowing of previously salted roads.
CURRENT SITUATION	<ul style="list-style-type: none"> Route optimization continues on an annual basis, as needed to ensure compliance with the LOS. Staff shall continue to review routes and manually optimize them. Equipment shall then be allocated on the most efficient routes.
GOAL	<ul style="list-style-type: none"> As new technologies are implemented or Levels of Service (LOS) is changed, affected spreader and plow routes will be reviewed.
IMPLEMENTATION CONSIDERATIONS	<ul style="list-style-type: none"> The timing of implementing route optimization is contingent upon the availability of equipment. There could be costs associated with acquiring new equipment. There could be facility implications. There is an ongoing need for route refinements.
RESPONSIBILITIES	<p>Managers and Supervisors, Roads Operations</p> <ul style="list-style-type: none"> Responsible for periodically reviewing and optimizing plow routes, validating the practicality of routes and ensuring equipment is used effectively. <p>Manager and Supervisor, Fleet Services</p> <ul style="list-style-type: none"> Responsible for developing a replacement strategy for removing old equipment from service and acquiring new equipment, as per the City's Non-Emergency Fleet Policy.
PERFORMANCE MEASURE	<ul style="list-style-type: none"> Completion of reviews of routes. Achievement of the LOS.

Table 4.3.2

ELECTRONIC SPREADER CONTROLS	
OBJECTIVE	To equip all spreaders with electronic spreader controls that can be accurately calibrated, regulated to ground speed and will generate salt and winter sand use data.
ENVIRONMENTAL CONSIDERATION	Electronic controllers ensure that the chosen and prescribed amount of material is being placed on the roadway consistently, regardless of speed and provides data that permits salt use to be tracked.

<p>CURRENT SITUATION</p>	<ul style="list-style-type: none"> • 100% of the City's fleet of combination units have electronic controls that are able to communicate with AVL/GPS units. • 100% of the contracted units on high volume arterial roads have electronic controls that are able to communicate with AVL/GPS units. • 100% of the contracted units on low volume secondary roads have active GPS logging, but not material speeding capability. • The data is retrieved from the electronic controllers. • Developed and implemented a record-keeping and monitoring program that uses the data supplied from the electronic controllers.
<p>GOAL</p>	<ul style="list-style-type: none"> • All equipment used to spread winter sand and salt on City roads shall have ground speed regulated electronic controllers with printout or download capabilities and be integrated with an AVL/GPS system. • Staff will monitor to improve accuracy of applicable technology used for salt and winter sand use tracking.
<p>IMPLEMENTATION CONSIDERATIONS</p>	<ul style="list-style-type: none"> • Where possible move towards consistency within the fleet. It is recognized that some variability will always exist between new and older equipment and future technological improvements. • Budget constraints and delivery schedules for new equipment will affect the pace of the fleet upgrades.
<p>RESPONSIBILITIES</p>	<p>Manager and Supervisor, Fleet Services</p> <ul style="list-style-type: none"> • Responsible for ensuring all equipment used to spread winter sand and salt has ground speed regulated electronic controllers where possible. • Responsible for maintaining an AVL/GPS system. <p>Manager-Roads Operations</p> <ul style="list-style-type: none"> • Responsible for maintaining a record-keeping program that uses the data supplied from the electronic controllers. <p>Supervisors of Roads Operations</p> <ul style="list-style-type: none"> • Responsible for following the record-keeping program that uses the data supplied from the electronic controllers. • Responsible for identifying and reporting issues or inconsistencies with AVL/GPS reporting of units assigned to them. <p>Winter Maintenance Personnel</p>

	<ul style="list-style-type: none"> Responsible for reporting issues with their spreader controls to their Supervisor.
PERFORMANCE MEASURE	<ul style="list-style-type: none"> Receiving accurate salt and winter sand use data from the spreaders with electronic spreader controls that can be accurately calibrated and regulated to ground speed to reduce material inconsistencies. Percentage of units with electronic spreader control units.
REFERENCE	<ul style="list-style-type: none"> CP2021-002 – Non Emergency Fleet Policy MD 2016-015 Non-Emergency Fleet Services Management Directive SOP2019-108 – Salt and Sand Application Calibration for Plows

Table 4.3.3

SPREADER CALIBRATION	
OBJECTIVE	To ensure that equipment is properly calibrated at the beginning of the snow and ice control season and that the calibration is checked and maintained during the winter.
ENVIRONMENTAL CONSIDERATION	Effective placement of salt and winter sand depend on accurate calibration of spreaders.
CURRENT SITUATION	<ul style="list-style-type: none"> The Fleet Services Division is responsible for equipment calibration. Calibration of City spreaders is completed prior to each winter season and monitored throughout the season. The City has written calibration procedures and records are kept. Contractors are responsible for their own calibration but are offered to be included in the City's program. The Fleet Services Division confirms calibration of Contractor (private) equipment prior to each season and verifies calibration of all units as required. Identified concerns with calibration during the winter season are assessed and addressed to by the Fleet Services Division.
GOAL	<ul style="list-style-type: none"> Calibration and /or verification procedures for City equipment will be reviewed annually and updated as required. Contractor (private) calibrations shall be verified by the Fleet Division to ensure calibration is adequate and standard procedures have been followed by the start of each season. All spreaders will be properly calibrated prior to each winter season. All routes will be benchmarked (determine the quantity of

	<p>material applied at a given calibration) to ensure that the correct amount of material is being applied. Information directly from the electronic controllers will be compared to the benchmark to check unit calibrations as methods become available. Equipment will be recalibrated as required.</p> <ul style="list-style-type: none"> • Equipment will be recalibrated after any repair that affects the material delivery system or irregular results are recorded in the material delivery system or at the request of the Manager or Supervisor, Roads Operations • A calibration history for all spreaders will be maintained and reviewed as required.
IMPLEMENTATION CONSIDERATIONS	<ul style="list-style-type: none"> • There are limitations to the calibration process, which introduce minor errors. • The calibration procedure should identify when a calibration review will occur. • It is important to acknowledge that a degree of tolerance is acceptable. • Staff availability, weather and seasonal changeovers can affect calibration schedules.
RESPONSIBILITIES	<p>Manager and Supervisor, Fleet Services</p> <ul style="list-style-type: none"> • Responsible for verifying that Contractor calibrations are adequate and standard procedures have been followed. • Responsible for reviewing calibration procedures for City equipment and ensuring they are followed. <p>Managers and Supervisors, Roads Operations</p> <ul style="list-style-type: none"> • Responsible for benchmarking usage for all routes and comparing actual usage against the benchmark. • Responsible for investigating any discrepancies and ensuring corrections and recalibrations are done.
PERFORMANCE MEASURE	<ul style="list-style-type: none"> • Percentage of spreaders calibrated prior to each winter season • Number of re-calibrations carried out during each winter
REFERENCE	<ul style="list-style-type: none"> • SOP2019-108 – Salt and Sand Application Calibration for Plows

Table 4.3.4

EQUIPMENT WASHING	
OBJECTIVE	To ensure that equipment wash water is managed in a way that minimizes discharges to the environment.

ENVIRONMENTAL CONSIDERATION	It is not possible to contain the chlorides unless collected in a tank. Vehicle wash water contains de-icing chemicals, oil, grease and grit. If allowed to discharge to ditches or within the yards, these contaminants can have adverse effects on the environment.
CURRENT SITUATION	<ul style="list-style-type: none"> • Spreaders and vehicle undercarriages are generally washed after each storm. • Vehicle washing is done primarily inside on pads at the depot. The wash water is directed through an oil-grit separator, collected and disposed of, where these systems exist.
GOAL	<ul style="list-style-type: none"> • Integrate options for managing wash water as depots are upgraded or built.
IMPLEMENTATION CONSIDERATIONS	<ul style="list-style-type: none"> • Containment and disposal cost.
RESPONSIBILITIES	<p>Managers, Roads Operations</p> <ul style="list-style-type: none"> • Responsible for reviewing washing procedures by location and incorporating containment options at new roads facilities. <p>Supervisors, Roads Operations</p> <ul style="list-style-type: none"> • Responsible for ensuring that equipment washing is done in a manner that minimizes discharge into the environment. <p>Winter Maintenance Personnel</p> <ul style="list-style-type: none"> • Responsible for following washing procedures.
PERFORMANCE MEASURE	<ul style="list-style-type: none"> • Facility construction or upgrade projects with wash water systems into them incorporated into them. • Audit on equipment washing to ensure vehicles and attachments are washed as per the procedure.
REFERENCE	<ul style="list-style-type: none"> • SOP 2018-006, Cleaning of Municipal Vehicles & Equipment

4.4 Materials

Table 4.4.1

MATERIAL ORDERING AND DELIVERY	
OBJECTIVE	To ensure that the quality of the snow and ice control materials delivered is sufficient for winter maintenance needs.
ENVIRONMENTAL CONSIDERATION	Improper handling and storage of salt and blended winter sand can increase loss to the environment. Excessive moisture creates clumping of the salt and can cause inconsistent application to roads.
CURRENT SITUATION	<ul style="list-style-type: none"> • The Supervisors, Roads Operations estimate remaining material quantities and orders material before stocks are depleted. • The City has specifications for salt and winter sand. • Winter sand is generally tested for quality when delivered.

	<ul style="list-style-type: none"> • Salt is delivered indoors when possible and outdoors and moved inside within 12 hours. • All winter materials are stored under cover. • The Supervisor tracks material deliveries. Information is sent to the appropriate staff. • End of season reconciliation is done.
GOAL	<ul style="list-style-type: none"> • Review material specifications and update as needed. Ensure the specifications include minimum moisture content standards for winter sand and salt. • Work with industry and other road authorities to investigate options for a reduction in salt usage. • QA testing of salt.
IMPLEMENTATION CONSIDERATIONS	<ul style="list-style-type: none"> • Have a contingency plan for when salt cannot be placed under cover immediately.
RESPONSIBILITIES	<p>Manager Roads Operations</p> <ul style="list-style-type: none"> • Responsible for reviewing and updating the material quality specifications as required. <p>Supervisor Roads Operations</p> <ul style="list-style-type: none"> • Responsible for ensuring materials are stored indoors as soon as possible following delivery. • Responsible for monitoring material deliveries to determine compliance with the material specifications. • Responsible for end of season reconciliation of material usage.
PERFORMANCE MEASURE	<ul style="list-style-type: none"> • Summary of quality tests for materials. • Reduced percentage of material deliveries that do not meet specifications. • Eliminate need to share materials between depots due to insufficient quantities in stock.
REFERENCE	<ul style="list-style-type: none"> • Ontario Provincial Standard Specification Prov. 1004 • Ontario Provincial Standard Specification Muni. 2502

Table 4.4.2

MATERIAL APPLICATION RATES	
OBJECTIVE	To optimize the amount of salt and winter sand used in winter maintenance operations.
ENVIRONMENTAL CONSIDERATION	Any opportunity to reduce the amount of salt and winter sand used will reduce the amount of salt entering the environment, provided that road safety is not compromised.

CURRENT SITUATION	<ul style="list-style-type: none"> • The material application rate for road salt is typically 130 kg per 2 lane km. A range of application rates are available pending conditions. • The material application rate for winter sand is typically 570 kg per 2 lane km. • Winter sand and road salt are applied dry.
GOAL	<ul style="list-style-type: none"> • Review and update the application rates, as required, for road salt and winter sand. Include a range of rates (e.g. light, normal & heavy) to accommodate various road conditions.
IMPLEMENTATION CONSIDERATIONS	<ul style="list-style-type: none"> • Specifying a range of application rates allows operators to apply less road salt when conditions allow (such as black ice and/or frosting).
RESPONSIBILITIES	<p>Managers, Roads Operations</p> <ul style="list-style-type: none"> • Responsible for reviewing and updating material application rates. • Responsible for developing an approach to adjust application rates for various pavement temperature ranges and winter conditions. <p>Supervisors, Roads Operations and Roads Crew Leaders</p> <ul style="list-style-type: none"> • Responsible for providing winter maintenance personnel direction on which application rate to use and ensuring application rates are followed. <p>Winter Maintenance Personnel</p> <ul style="list-style-type: none"> • Responsible for following the directed application rate.
PERFORMANCE MEASURE	<ul style="list-style-type: none"> • Material application rates reviewed or updated. • Consistent application rates used for winter maintenance operations across the City.
REFERENCE	<ul style="list-style-type: none"> • SOP2019-108 – Salt and Sand Application Calibration for Plows

Table 4.4.3

BLENDING WINTER SAND	
OBJECTIVE	To optimize the amount of salt in winter sand blends required to ensure the abrasives function effectively in snow and ice control.
ENVIRONMENTAL CONSIDERATION	Only enough salt should be added to abrasives to keep the abrasives free flowing under freezing conditions. In some cases, higher winter sand/salt blends are used to address special circumstances. High amounts of salt in winter sand/salt blends can result in excessive salt entering the environment for the task.

CURRENT SITUATION	<ul style="list-style-type: none"> • Winter sand blends are used to provide both traction and some ice and snow control on many of the roads in the City's network. • Winter sand blends are not used to achieve bare-pavement conditions. • Winter sand is sand blended with road salt at a rate of approximately 3% to 5% by volume. • Winter sand is blended at each Depot prior to stockpiling.
GOAL	<ul style="list-style-type: none"> • To limit the use of winter sand for providing traction. • Review where winter sand vs. salt is being used. • To limit the amount of salt in winter sand/salt blends to approximately 3% by volume where deemed appropriate. • To investigate the merits of alternatives to salt for preventing winter sand from freezing.
IMPLEMENTATION CONSIDERATIONS	<ul style="list-style-type: none"> • Current market rates and availability of winter maintenance materials. • Consistent approach and method of blending.
RESPONSIBILITIES	<p>Manager Roads Operations</p> <ul style="list-style-type: none"> • Responsible for investigating alternatives for winter sand blends. <p>Supervisor, Roads Operations</p> <ul style="list-style-type: none"> • Responsible for ensuring the amount of salt in winter sand blends is kept to a maximum of 3% to 5%.
PERFORMANCE MEASURE	<ul style="list-style-type: none"> • Percentage of salt in winter sand/salt blends. • Tonnes of winter sand used.
REFERENCE	CKL Winter Maintenance Guidelines

Table 4.4.4

SALT STORAGE / HANDLING	
OBJECTIVE	All snow and ice control chemicals shall be stored and handled inside proper covered storage structures so as to minimize loss of salt to the environment.
ENVIRONMENTAL CONSIDERATION	If not properly stored, salt can be lost to the environment because of exposure to precipitation and wind which dissolves it out of the exposed pile. This loss can be costly due to the actual loss of salt, and can lead to negative environmental impacts.
CURRENT SITUATION	<ul style="list-style-type: none"> • 100% of the road salt is stored indoors in domes or small sheds with asphalt or concrete pads. • Winter maintenance vehicles are loaded outside. • Drainage from the salt storages is overland. Except one facility, all other facilities do not have a drainage management system.

GOAL	<ul style="list-style-type: none"> • All salt shall be stored inside structures on impermeable floors. • All new storage facilities will be designed with regard to the principles set out in TAC's Syntheses of Best Practices Road Salt Management – Design and Operation of Road Maintenance Yards. • All salt storage facilities shall have drainage water management systems as facilities are upgraded or built.
IMPLEMENTATION CONSIDERATIONS	<ul style="list-style-type: none"> • Staff must be conscientious in keeping the salt pile pushed back from the structures' doorway as well preventing piles from exceeding on the top of the concrete foundation wall. • The timing for the installation of the drainage water management systems is tied to the timing of material storage upgrades. • The Depot Master Plan is symbiotic with Depot upgrades and may impact the phase-in timing.
RESPONSIBILITIES	<p>Manager Roads Operations</p> <ul style="list-style-type: none"> • Responsible for ensuring that all new salt storage facilities have drainage water management systems. • Responsible for ensuring all new salt storage facilities are designed with regard to the principles set out in TAC's Syntheses of Best Practices Road Salt Management – Design and Operation of Road Maintenance Yards. <p>Supervisor, Roads Operations</p> <ul style="list-style-type: none"> • Responsible for ensuring that all salt is stored indoors on impermeable pads. <p>Winter Maintenance Personnel</p> <ul style="list-style-type: none"> • Responsible for ensuring any material left in their plow truck at the end of their assigned duties is put back in the covered dome or shed.
PERFORMANCE MEASURE	<ul style="list-style-type: none"> • 100% of salt stored indoors on asphalt or concrete pads. • Number of new storage facilities designed with regard to the principles set out in TAC's Syntheses of Best Practices Road Salt Management – Design and Operation of Road Maintenance Yards. • Percentage of salt storage facilities that have drainage water management systems.
REFERENCE	<ul style="list-style-type: none"> • TAC's Syntheses of Best Practices Road Salt Management – Design and Operation of Road Maintenance Yards

Table 4.4.5

WINTER SAND STORAGE / HANDLING	
OBJECTIVE	All blended winter sand shall be stored in covered facilities and handled so as to minimize loss to the environment.

ENVIRONMENTAL CONSIDERATION	If not properly stored, salt in winter sand can be lost to the environment because of exposure to precipitation which dissolves it out of the exposed pile. This loss can be costly due to the actual loss of salt, and can lead to negative environmental impacts.
CURRENT SITUATION	<ul style="list-style-type: none"> • All winter sand is stored in domes or sheds with asphalt or concrete pads. • Delivered sand is unloaded outdoors, mixed outdoors and loaded into the covered storage facilities. • All except one of the facilities do not have a drainage management system.
GOAL	<ul style="list-style-type: none"> • 100% of winter sand shall be stored inside structures on impermeable floors. • All new storage facilities will be designed with regard to the principles set out in TAC's Syntheses of Best Practices Road Salt Management – Design and Operation of Road Maintenance Yards. • All winter sand storage facilities shall have drainage water management systems as the facilities are upgraded or built.
IMPLEMENTATION CONSIDERATIONS	<ul style="list-style-type: none"> • Staff needs to be conscientious in keeping the winter sand pile pushed back from the structures' doorway as well as on top of the bullring.
RESPONSIBILITIES	<p>Manager Roads Operations</p> <ul style="list-style-type: none"> • Responsible for ensuring all dome storage facilities are kept in a good state of repair • Responsible for ensuring all new storage facilities are designed with regard to the principles set out in TAC's Syntheses of Best Practices Road Salt Management – Design and Operation of Road Maintenance Yards. <p>Supervisor, Roads Operations</p> <ul style="list-style-type: none"> • Responsible for ensuring that all materials are stored indoors on impermeable pads and are not overfilled. <p>Winter Maintenance Personnel</p> <ul style="list-style-type: none"> • Responsible for ensuring any material left in their plow truck at the end of their assigned duties is put back in the covered dome or shed.
PERFORMANCE MEASURE	<ul style="list-style-type: none"> • 100% of materials stored indoors on impermeable pads. • Number of new storage facilities designed with regard to the principles set out in TAC's Syntheses of Best Practices Road Salt Management – Design and Operation of Road Maintenance Yards. • Percentage of blended winter sand storage facilities that have drainage water management systems.

REFERENCE	<ul style="list-style-type: none"> TAC's Syntheses of Best Practices Road Salt Management –Design and Operation of Road Maintenance Yards
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Table 4.4.6

INDUSTRY BEST PRACTICES FOR MAINTENANCE YARDS	
OBJECTIVE	To ensure that practices at salt storage and handling facilities are geared toward reducing salt loss to the environment.
ENVIRONMENTAL CONSIDERATION	Improper handling of salt at maintenance facilities can result in salt being lost to the environment. Good housekeeping practices can help to reduce this loss.
CURRENT SITUATION	<ul style="list-style-type: none"> The City does not have a written Good Housekeeping Practices Procedure for their depots. Good Housekeeping Practices are managed by the Depot Supervisor. Facility inspections and repairs are the responsibility of the Supervisors, Road Operations with the assistance of the Managers, Roads Operations. A consultant is hired to inspect facilities and recommend repairs.
GOAL	<ul style="list-style-type: none"> Ensure City staff are knowledgeable about the City's Salt Management Practices. Facility inspections are conducted to ensure good salt management. Conduct periodic audits of yards to ensure the Good Housekeeping Practices are followed.
IMPLEMENTATION CONSIDERATIONS	<ul style="list-style-type: none"> Without a guideline to follow, past practices may not meet expectations.
RESPONSIBILITIES	<p>Manager Roads Operations</p> <ul style="list-style-type: none"> Responsible for ensuring the facilities are periodically inspected. <p>Supervisor, Roads Operations</p> <ul style="list-style-type: none"> Responsible for implementing and maintaining good housekeeping practices. <p>Winter Maintenance Personnel</p> <ul style="list-style-type: none"> Responsible for following good house keeping practices established by their Supervisor.
PERFORMANCE MEASURE	<ul style="list-style-type: none"> All maintenance repairs recommended by the Consultant are completed in a timely manner. Deficiencies found during inspections are addressed. Development of Good Housekeeping Practices
REFERENCE	<ul style="list-style-type: none"> TAC's Syntheses of Best Practices Road Salt Management – Design and Operation of Road Maintenance Yards

4.5 Storm Response

Table 4.5.1

WEATHER FORECASTING	
OBJECTIVE	To provide timely and accurate weather information to assist in snow and ice control decision-making.
ENVIRONMENTAL CONSIDERATION	Effective use of materials is dependent upon good snow and ice control decision-making, which in turn depends on consistently accurate and timely weather information. Materials can be wasted if information is incorrect or suspect.
CURRENT SITUATION	<ul style="list-style-type: none"> • Presently the City relies on Internet based public weather forecasts by Environment Canada and a Contracted service that provides detailed weather forecasts. • The City does not have ownership of Road Weather Information Systems (RWIS) stations forecasts and information.
GOAL	<ul style="list-style-type: none"> • Ensure appropriate weather forecasts are available to decision making staff before the start of each season. • Ensure staff is knowledgeable in the use of weather forecasts and information. • Consider alternative sources of weather information to improve staff's pro-active decision-making abilities. • Investigate the use of technology to improve delivery of weather information to the decision makers.
IMPLEMENTATION CONSIDERATIONS	<ul style="list-style-type: none"> • Proactive material use is dependent on anticipating a "salt applicable event". • Inaccuracies are inherent in weather forecasting and we respond based on the information we have available to us at the time.
RESPONSIBILITIES	<p>Manager, Supervisor Roads Operations</p> <ul style="list-style-type: none"> • Responsible for ensuring appropriate weather forecasts are available to decision making staff. • Responsible for ensuring staff are knowledgeable in the use of weather forecasts and information. • Responsible for investigating additional and alternative sources of weather information and technology. <p>Road Crew Leaders</p> <ul style="list-style-type: none"> • Responsible for reviewing weather forecasts and determining the applicable response.
PERFORMANCE MEASURE	<ul style="list-style-type: none"> • Delivery of clearly formatted weather forecasts to those that need them. • Accuracy of the forecasts received.
REFERENCE	

Table 4.5.2

INFRARED THERMOMETERS (IRT's)	
OBJECTIVE	To provide real-time pavement temperature trends from truck mounted pavement temperature sensors to assist with snow and ice control decisions.
ENVIRONMENTAL CONSIDERATION	Snow and ice control decisions that are based on road temperature information, result in better salt use. Real-time information on pavement temperature trends produces more timely decisions on when to deploy and not deploy certain materials.
CURRENT SITUATION	<ul style="list-style-type: none"> • The City has truck mounted IRT's on the patrol vehicles. • Patrol vehicle IRT's are calibrated annually. • All other IRT's are checked for accuracy upon request. • Training in the use of IRT's has been provided.
GOAL	<ul style="list-style-type: none"> • Every patrol and Road Supervisor vehicle shall be outfitted with an IRT. • Verify accuracy of every IRT annually as required.
IMPLEMENTATION CONSIDERATIONS	<ul style="list-style-type: none"> • IRT's are to track trends and not absolute temperatures. • Cheaper IRT's have higher failure rates and lower accuracy than more expensive units. • IRT's must be properly mounted to prevent erroneous readings.
RESPONSIBILITIES	<p>Manager, Supervisor Roads Operations</p> <ul style="list-style-type: none"> • Responsible for ensuring that all patrol and Road Supervisor vehicles are outfitted with IRT's. <p>Manager, Fleet Services</p> <ul style="list-style-type: none"> • Responsible for ensuring the IRT's are properly mounted, and providing accurate information.
PERFORMANCE MEASURE	<ul style="list-style-type: none"> • Percentage of winter patrol and Road Supervisor vehicles with IRT's.
REFERENCE	

Table 4.5.3

STORM RESPONSE APPROACHES	
OBJECTIVE	To understand and document storm response approaches for different storm scenarios and improve upon practices.
ENVIRONMENTAL CONSIDERATION	Snow and ice control decisions that vary across the organization may lead to inefficiencies in responses and eventually results in loss of effectiveness of salt use.
CURRENT SITUATION	<ul style="list-style-type: none"> • Public Works is currently utilizing Standard Operating Guidelines and industry best practices. • Managers/Supervisors/Road Crew Leaders will continue to

	retain the decision making processes for a response to winter events.
GOAL	<ul style="list-style-type: none"> • Develop and maintain Standard Operating Guidelines at regular intervals. Ensure that it includes typical and atypical storm responses. • As new technologies are introduced, review and update the Standard Operating Guidelines.
IMPLEMENTATION CONSIDERATIONS	<ul style="list-style-type: none"> • Local field experience is valuable and should be incorporated into the training process as much as possible.
RESPONSIBILITIES	<p>Manager, Supervisor Roads Operations</p> <ul style="list-style-type: none"> • Responsible for reviewing and updating the Standard Operating Guidelines. <p>Road Crew Leaders</p> <ul style="list-style-type: none"> • Responsible for reviewing and adhering to the Standard Operating Guidelines unless approval from Supervisor or Manager is provided to respond otherwise.
PERFORMANCE MEASURE	<ul style="list-style-type: none"> • Continuous development and updating of the Standard Operating Guidelines.
REFERENCE	<ul style="list-style-type: none"> • Ontario Regulation 239/02, as amended

Table 4.5.4

WINTER ROAD PATROL	
OBJECTIVE	To assess winter road conditions, mobilize appropriate snow and ice control operations, and monitor the storm response.
ENVIRONMENTAL CONSIDERATION	Accurate monitoring of winter maintenance activities will support appropriate and effective snow and ice control decisions, leading to efficient use of salt.
CURRENT SITUATION	<ul style="list-style-type: none"> • Road Crew Leaders perform winter road patrolling. • Winter Road Patrol follows a representative route and may veer off the route to check localized areas depending on forecasts and weather radar information.
GOAL	<ul style="list-style-type: none"> • Complete Winter Road Patrol in accordance with Ontario Regulation 239/02, as amended. • All Road Crew Leaders trained on winter road patrolling.
IMPLEMENTATION CONSIDERATIONS	<ul style="list-style-type: none"> • Cycle frequency relates the level of observations to the required resources. This can govern efficient salt decisions. • Road Crew Leader training and experience are key success factors.

RESPONSIBILITIES	<p>Manager, Supervisor Roads Operations</p> <ul style="list-style-type: none"> Responsible for developing and updating the Road Patrol SOP. Responsible for ensuring the Road Crew Leaders have the appropriate knowledge to monitor road conditions and make snow and ice control decisions. <p>Supervisors, Roads Operations and Road Crew Leaders</p> <ul style="list-style-type: none"> Responsible for monitoring roadway conditions and weather information and making timely decisions on snow and ice control in accordance with the Winter Road Patrol SOP.
PERFORMANCE MEASURE	<ul style="list-style-type: none"> Review of the Road Patrol SOP. Documentation of roads patrolled during winter conditions.
REFERENCE	<ul style="list-style-type: none"> Ontario Regulation 239/02, as amended

Table 4.5.5

DRIFT CONTROL	
OBJECTIVE	To reduce snow accumulation on roadways and problems associated with drifting and blowing snow.
ENVIRONMENTAL CONSIDERATION	A portion amount of winter maintenance activity is devoted to controlling drifting snow. During drifting events, material can be blown off of the roadway resulting in an ineffective use of material and excess material entering the environment.
CURRENT SITUATION	<ul style="list-style-type: none"> Presently the City does not place snow fencing annually but is piloting its effect in certain areas. The City has an informal inventory of snowdrift problem areas.
GOAL	<ul style="list-style-type: none"> Formalize the snow drift problem area inventory and keep it up to date as changes are observed. Continue piloting snow fence to review the impact it has. Consider tree planting projects to create 'living' snow fence. Create a snow fencing SOP based on the pilot project.
IMPLEMENTATION CONSIDERATIONS	<ul style="list-style-type: none"> There is a cost associated with installing, or arranging for, and maintaining natural or structural snow fencing. There may be restoration requirements seasonally installed snow fence debris being left in fields. Snow fencing needs to be placed far away from the roadway which requires discussion with property owners adjacent to the roadway in these areas.
RESPONSIBILITIES	<p>Managers and Supervisors, Roads Operations</p> <ul style="list-style-type: none"> Responsible for formalizing and maintaining the snowdrift problem area inventory. Responsible for implementing drift control strategies as needed and monitoring them.

PERFORMANCE MEASURE	<ul style="list-style-type: none"> • Inventory of stretches of road with drifting snow problems. • Development and updating of the snow fence SOP.
REFERENCE	

4.6 Snow and Ice Control Training

Table 4.6.1

TRAINING	
OBJECTIVE	To ensure that all in-house and contracted staff, including management, supervisors, road crew leaders and operators, are trained in salt management practices.
ENVIRONMENTAL CONSIDERATION	To achieve effective implementation of a salt management program, those people responsible for delivering the snow and ice control program must understand the rationale behind the measures being implemented as well as what is expected of them. This can only come through a thorough education /training program, including annual refreshers.
CURRENT SITUATION	<ul style="list-style-type: none"> • The City has a mandatory fall review and training session that covers winter maintenance. • Returning and experienced staff review operating procedures, routes. • New staff also receive winter maintenance specific driver training. • In-house developed and outsourced material is presented and delivered to staff. Presently there is “in house” training and outsourced training in the fall of each year to all operators, supervisors and managers. • Contractors are responsible for their own training.
GOAL	<ul style="list-style-type: none"> • Develop updated training for the Salt Management Plan that includes subject areas set out in TAC’s Syntheses of Best Practices Road Salt Management (TAC 2013). • Annually review and update the training program to include additional subject areas as they become needed or technology changes. • Ensure that contractors are fulfilling their responsibility for training and adequately addressing salt management.
IMPLEMENTATION CONSIDERATIONS	<ul style="list-style-type: none"> • Trainers must be experienced in adult training principles and be able to adjust their instructional techniques to reach a variety of learners.
RESPONSIBILITIES	<p><i>Managers and Supervisors, Roads Operations</i></p> <ul style="list-style-type: none"> • Responsible for developing the training program to address the subject areas set out in TAC’s Syntheses of Best Practices Road Salt Management - Training.

	<ul style="list-style-type: none"> Responsible for reviewing and updating the training program to include new subject areas and technologies as they are introduced. Responsible for delivering or coordinating the delivery of the City's training program each fall. Responsible for ensuring that the winter maintenance contractors have an adequate training program. <p>All Winter Maintenance Personnel</p> <ul style="list-style-type: none"> Responsible for participating in the training program.
PERFORMANCE MEASURE	<ul style="list-style-type: none"> All supervisors receiving training each year. All road crew leaders receive training each year. All operators receive training each year. Confirm all contractor staff receive training each year. Total annual attendance at training sessions.
REFERENCE	<ul style="list-style-type: none"> MTO training materials. OGRA training materials. TAC's Syntheses of Best Practices Road Salt Management 2013.

4.7 Snow Removal and Disposal Guideline

Table 4.7.1

SNOW REMOVAL, STORAGE AND DISPOSAL GUIDELINE	
OBJECTIVE	To ensure snow removal, storage and disposal operations are done efficiently and in an environmentally responsible manner.
ENVIRONMENTAL CONSIDERATION	A review of disposal operations can lead to adopting methods that are the least harmful to the environment. Environmental issues associated with snow disposal sites include: melt-water quality, litter, dust, aesthetics, and noise.
CURRENT SITUATION	<ul style="list-style-type: none"> The City uses local City owned property for snow storage/disposal. The City will occasionally remove, store and dispose of snow as required. The City has, contained within its LOS, Snow Removal criteria.
GOAL	<ul style="list-style-type: none"> Meet Council approved LOS. Develop snow removal guideline.
IMPLEMENTATION CONSIDERATIONS	<ul style="list-style-type: none"> Distance of snow removal dump site to where snow removal is required. Ability to efficiently remove snow from downtown cores is hindered due to obstructions. Staffing levels and Contracted service availability to complete snow removal during sustained/concurrent winter

	events.
RESPONSIBILITIES	<p>Managers, Roads Operations</p> <ul style="list-style-type: none"> Responsible for updating the Snow Removal LOS. <p>Supervisors, Roads Operations</p> <ul style="list-style-type: none"> Responsible for meeting the Snow removal LOS.
PERFORMANCE MEASURE	<ul style="list-style-type: none"> Updating of the Snow Removal LOS as required. Meeting the Snow Removal LOS consistently. Snow Removal Guideline Developed.
REFERENCE	<ul style="list-style-type: none"> TAC's Syntheses of Best Practices Road Salt Management 2013.

4.8 Technology Transfer Review

Table 4.8.1

TECHNOLOGY TRANSFER REVIEW	
OBJECTIVE	To monitor existing available and new approaches and technologies on a continual basis and to recommend pilot studies on the preferred technologies and winter maintenance methodologies.
ENVIRONMENTAL CONSIDERATION	New techniques, procedures, and technologies may provide new methods of reducing salt entering the environment.
CURRENT SITUATION	<ul style="list-style-type: none"> The City is an active member on Municipal and Provincial committees such as the Ontario Good Roads Association, and Ontario Public Works Association. Staff attends technology transfer conferences when able and appropriate.
GOAL	<ul style="list-style-type: none"> To ensure the latest technologies are, reviewed, evaluated and adopted where appropriate. To continue to participate in conferences and forums geared to the development of salt best management practices.
IMPLEMENTATION CONSIDERATIONS	<ul style="list-style-type: none"> Often, individual technologies will not provide the degree of improvement as compared to the synergies of a broader systems approach. The results of trials should be documented with proper assessment methodologies. New technologies should first be introduced and proven in one area of the municipality and then expanded to the rest of the municipality.
RESPONSIBILITIES	<p>Director of Public Works</p> <ul style="list-style-type: none"> Responsible for ensuring staff are attending and participating in appropriate conferences and forums. <p>Managers and Supervisors, Roads Operations</p> <ul style="list-style-type: none"> Responsible for attending and participating in appropriate

	conferences and forums.
PERFORMANCE MEASURE	<ul style="list-style-type: none"> • New technologies tested or piloted. • New technologies implemented across the City after successful trials.
REFERENCE	

4.9 Communications

Table 4.9.1

COMMUNICATIONS	
OBJECTIVE	To communicate effectively internally and externally about the importance of road salt and winter sand to maintaining safe roadways during the winter season as well as what the City is doing to improve spreading material management. To inform the public about the current LOS.
ENVIRONMENTAL CONSIDERATION	Informed stakeholders are more likely to become effective partners in achieving the goals of the Salt Management Plan.
CURRENT SITUATION	<ul style="list-style-type: none"> • The City has a communications program to inform various stakeholders when the City has commenced full scale winter operations. • The City has an internal specific communications program to communicate when both partial or full winter operations have commenced for Customer Service purposes. • The Public has access to the current Level of Service Policy for Roadway and Sidewalk Winter Maintenance through the City's website.
GOAL	<ul style="list-style-type: none"> • Maintain a Communications Plan for Winter Maintenance. • Inform the Council, public and local regulatory agencies about the actions being taken by the City to manage road salt use, and the City's winter maintenance programs needed. • Notify Environment Canada upon completion of the Salt Management Plan and update them annually about the status of Salt Management activities (as per Annex C of the Code of Practice for the Environmental Management of Road Salts).
IMPLEMENTATION CONSIDERATIONS	<ul style="list-style-type: none"> • Repetition may be necessary to ensure the message is heard. Safety-first must continually be reinforced.
RESPONSIBILITIES	<p>Communications Officer and Manager, Roads Operations</p> <ul style="list-style-type: none"> • Responsible for developing and implementing a Communications Plan. <p>Road Crew Leaders</p> <ul style="list-style-type: none"> • Responsible for sending communications an end of shift report when commencing a full call out.

PERFORMANCE MEASURE	<ul style="list-style-type: none"> • Communications Plan developed. • Report required salt management information to Environment Canada.
REFERENCE	

4.10 Salt Vulnerable Areas

Table 4.10.1

SALT VULNERABLE AREAS	
OBJECTIVE	To determine if any salt vulnerable areas are potentially impacted by the use of salt.
ENVIRONMENTAL CONSIDERATION	Salt vulnerable areas may require unique solutions that may require the use of other strategies/methods or more expensive de-icers to maintain sensitive areas.
CURRENT SITUATION	<ul style="list-style-type: none"> • The City has many unique environmental features including lakeshores, environmentally significant sensitive areas and significant agricultural land. • The City formally acknowledges the “Environmentally Sensitive areas” as identified salt vulnerable areas and is making an effort correlating these features to the maintenance of roadways and existing salt and winter sand storage sites. • The City has a partial list of salt vulnerable areas
GOAL	<ul style="list-style-type: none"> • Monitor Environment Canada’s and the Province’s approach to addressing salt vulnerable areas. • Develop a full list of salt vulnerable areas.
IMPLEMENTATION CONSIDERATIONS	<ul style="list-style-type: none"> • There is no clear consensus on how to reasonably monitor the impacts to vulnerable areas. • Other agencies may provide assistance to help identify salt vulnerable areas. • Applying different materials in different areas creates operational inefficiency.
RESPONSIBILITIES	<p><i>Managers and Supervisors Roads Operations</i></p> <ul style="list-style-type: none"> • Responsible for identifying strategies to reduce salt impacts to salt vulnerable areas.
PERFORMANCE MEASURE	<ul style="list-style-type: none"> • Number of salt vulnerable areas identified. • No observed increase of impacts to salt vulnerable areas. • Winter maintenance plan for salt vulnerable areas developed.
REFERENCE	<ul style="list-style-type: none"> • Trent Source Protection Plan, Policies R-1 to R-6, and G-5

4.11 Record Keeping

Table 4.11.1

MATERIAL USAGE RECORD KEEPING	
OBJECTIVE	To provide an accurate record of how much material was used, where it was used and the reason it was used.
ENVIRONMENTAL CONSIDERATION	Effective salt management requires an accurate understanding of how much salt and winter sand is being used, and where. It is not sufficient to measure gross totals since these can vary widely from year-to-year due to weather fluctuations.
CURRENT SITUATION	<ul style="list-style-type: none"> • The City has electronic controls on all of its spreaders which is collected via the City's GPS tracking system and subsequently digitally archived. The delivery and restocking of solid bulk materials (winter sand and salt) is tracked and recorded by the Supervisors and technical staff. • Salt and winter sand usage by storm and season is reviewed at years end. • Operators and Supervisors manually track salt and winter sand usage using operator provided totals as well as digital winter operations reports from the City's GPS system provider. • Material is reconciled at the end of the season.
GOAL	<ul style="list-style-type: none"> • To optimize the use of all materials. • Maintain records that integrates the manual and electronic data. • Increase periodic comparisons of usage by route to identify and address any inconsistencies.
IMPLEMENTATION CONSIDERATIONS	<ul style="list-style-type: none"> • Material use is dependent upon the severity of the winter and therefore record analysis needs to normalize for the type of winter. • Material usage records in conjunction with the overall winter maintenance program can serve as a surrogate for a winter severity index. • High winter sand usage has cleanup and dust implications and environmental logistics.
RESPONSIBILITIES	<p>Manager, Roads Operations</p> <ul style="list-style-type: none"> • Responsible for ensuring Record Keeping Procedure is followed. • Responsible for investigating opportunities to optimize the use of all materials. <p>Supervisor, Roads Operations</p> <ul style="list-style-type: none"> • Responsible for reviewing, updating and implementing the logs used to track material usage. • Responsible for regularly summarizing the data retrieved

	<p>from the electronic controllers.</p> <ul style="list-style-type: none"> Responsible for ensuring that the necessary equipment is available and operating to measure the amount of material placed into the spreaders and spread on the road. <p>Winter Maintenance Personnel</p> <ul style="list-style-type: none"> Responsible for completing the appropriate logs at the end of each day and retaining them with the yard records.
PERFORMANCE MEASURE	<ul style="list-style-type: none"> Completion of a Record Keeping Guideline. Tonnes of salt applied through spreading operations. Tonnes of winter sand applied through spreading operations. Material reconciliation and summary at the end of the season.(amount at start of season + purchases/production - actualusage = amount at end of season) Daily records checked for completeness.
REFERENCE	

Table 4.11.2

STORM RESPONSE RECORD KEEPING	
OBJECTIVE	To provide accurate documentation of changing road and weather conditions, and actions taken during storm response.
ENVIRONMENTAL CONSIDERATION	Accurate record keeping and reporting during snow and ice control activities will facilitate a review of storm response and ultimately result in the most effective response in similar situations. This can help to optimize the use of salt. It will also provide information for due diligence defense in the event of a lawsuit by demonstrating prudent judgement with regard to safety and environmental stewardship.
CURRENT SITUATION	<ul style="list-style-type: none"> The City currently keeps winter road patrol log sheets. The City retains, and has digitally archived, GPS/AVL logs for all City winter maintenance equipment and contracted units. The City currently produces a winter event record sheet for each winter event for each depot operating area which forms part of historical record retention. The City currently retains 'beat sheets' for each contracted unit for each day service is performed. Commercially supplied forecasts are retained. A review of storm responses and the season is done each spring.
GOAL	<ul style="list-style-type: none"> Continue to maintain a complete record of road conditions and treatment strategies. The patrol logs used to record road conditions and storm responses will be reviewed, and updated as needed.

IMPLEMENTATION CONSIDERATIONS	<ul style="list-style-type: none"> Record keeping can be observation and action-oriented. It can document what was known and the rationale for decisions including what was not done (by choice).
RESPONSIBILITIES	<p>Manager, Roads Operations</p> <ul style="list-style-type: none"> Responsible for reviewing, updating and implementing the logs used to record road conditions and storm responses. <p>Supervisor, Roads Operations & Road Crew Leaders</p> <ul style="list-style-type: none"> Responsible for maintaining logs showing the actions taken and the rationale for those actions.
PERFORMANCE MEASURE	<ul style="list-style-type: none"> Accurate and complete record of storm response.
REFERENCE	

4.12 Source Water Monitoring Program

Table 4.12.1

MONITORING PROGRAM	
OBJECTIVE	To monitor the concentrations at salt vulnerable areas to determine the effectiveness of winter salt reduction strategies.
ENVIRONMENTAL CONSIDERATION	By monitoring the effectiveness of the Salt Management Plan mitigation strategies, this may demonstrate improvements to the amount of salt entering the environment.
CURRENT SITUATION	<ul style="list-style-type: none"> The City currently has not implemented a program to monitor chloride levels in the environment and relate those levels to winter maintenance activities. The City has carried out contaminant assessments at some of its facilities.
GOAL	<ul style="list-style-type: none"> Monitor developments on the Federal and Provincial levels with respect to monitoring requirements for salt management plans.
IMPLEMENTATION CONSIDERATIONS	<ul style="list-style-type: none"> Other parameters may affect interpretation of the data, such as traffic volumes, winter severity index, climate variations, etc.
RESPONSIBILITIES	<p>Director of Public Works & Manager, Roads Operations</p> <ul style="list-style-type: none"> Responsible for monitoring developments at the Federal and Provincial levels with respect to monitoring requirements.
PERFORMANCE MEASURE	<ul style="list-style-type: none"> Continue to monitor and take action when necessary at salt vulnerable areas.
REFERENCE	

4.13 Emergency Response Program

Table 4.13.1

EMERGENCY RESPONSE PROGRAM	
OBJECTIVE	To be prepared to respond to emergencies or hazardous situations involving winter maintenance operations and contain and clean-up the situation as required without compromising the Health & Safety of workers.
ENVIRONMENTAL CONSIDERATION	Environment Canada has done an assessment of road salt and has concluded that the excessive use of road salts can be harmful to the environment. A spill or release involving snow and ice control chemicals may involve the release of a significant amount of salt into the environment.
CURRENT SITUATION	<ul style="list-style-type: none"> The City currently has an Emergency Response Plan for roadway spills, which also includes the release of excess salt onto the roadway during an accidental release.
GOAL	<ul style="list-style-type: none"> Ensure staff are aware of the potential hazards and the Response Plan as part of the City's overall Health & Safety program.
IMPLEMENTATION CONSIDERATIONS	<ul style="list-style-type: none"> Communication and coordination with other agencies responsible for Emergency Response will be required.
RESPONSIBILITIES	<p>Director of Public Works and Manager, Roads Operations</p> <ul style="list-style-type: none"> Responsible for maintaining the Spills Response SOP. <p>Supervisors, Roads Operations</p> <ul style="list-style-type: none"> Responsible for reporting spills and mitigating the risks associated with a spill. <p>Winter Maintenance Personnel</p> <ul style="list-style-type: none"> Responsible for reporting spills to their Supervisor.
PERFORMANCE MEASURE	<ul style="list-style-type: none"> Maintain the Spills Response SOP. Staff are aware/trained on the Spills Response SOP
REFERENCE	

***MONITORING
AND
UPDATING***

5.0 MONITORING

5.1 Overview

This section of the plan includes table summaries of current practices to allow tracking of the Salt Management Plan Reviews and the implementation of the Plan.

Salt Management Plan Review

An annual management review will take place as part of the plan. During this review the Salt Management Plan will be updated to include changes in departmental procedure, as well as to summarize new strategies and techniques deployed. It will also allow the City to measure and report upon progress towards established goals and standards outlined in the previous chapter dealing with operational practices and strategies. A follow up report will be generated / prepared and submitted to Environment Canada (EC) during the month of June every year for EC's annual National Salt Management report.

Salt Management Plan Review					
Progress	Year				
	1	2	3	4	5
Salt Management Plan reviewed.					
Salt Management Plan updated.					
Salt Management information sent <i>(According to Environment Canada's Code of Practice for the Environmental Management of Road Salts).</i>					

The following summaries can contribute to future management reviews of the implementation of the Salt Management Plan.

For the purposes of using the measuring matrices below, the charts are designed to review practices on a five year rolling average. As such year one will be assumed to be starting from 2025 (as identified in 5.2.1, 5.3.1, and 5.3.2) and ending at column 5 as 2029. The following column will be 2030 with 2025 dropping from the matrix.

5.2 Management Practices

Level of Service					
Progress	Year				
	1	2	3	4	5
LOS Reviewed					
Compliance with the LOS throughout the organization.					

5.3 Equipment

Fleet Allocation/Optimization					
Progress	Year				
	1	2	3	4	5
Route reviews completed.					
Achieved the stipulated LOS for each class of road.					

Electronic Spreader Controls					
Progress	Year				
	1	2	3	4	5
Percentage of spreaders with electronic ground-speed controllers with a feedback system.					
Percentage of salt placed by spreaders with electronic controllers.					

Spreader Calibration					
Progress	Year				
	1	2	3	4	5
Percentage of units calibrated.					
Number of in-season re-calibrations.					

Equipment Washing					
Progress	Year				
	1	2	3	4	5
Facility construction or upgrade projects with wash water systems incorporated into them.					
Percentage of audits where equipment washing is in line with SOP.					

5.4 Materials

Material Ordering and Delivery					
Progress	Year				
	1	2	3	4	5
Summary of quality tests received.					
Percentage of deliveries and production that did not meet specifications.					

Number of salt deliveries that were stored outside for more than 12 hours.					
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Material Application Rates					
Progress	Year				
	1	2	3	4	5
Material application rates reviewed or updated.					
Percentage of audits where material application is consistent across the City.					

Winter Sand/Salt Blends					
Progress	Year				
	1	2	3	4	5
Percentage of salt in winter sand/salt blends.					
Tonnes of winter sand placed.					

Salt Storage / Handling					
Progress	Year				
	1	2	3	4	5
Percentage of salt stored undercover.					

Number of new storage facilities designed in accordance with TAC's Syntheses of Best Practices.					
Percentage of salt storages with drainage water management systems.					

Blended Winter sand Storage / Handling					
Progress	Year				
	1	2	3	4	5
Percentage of winter sand/salt blends stored indoors.					
Number of new storage facilities designed in accordance with TAC's Syntheses of Best Practices.					
Percentage of blended winter sand/saltstorages with drainage water management systems.					

Good Housekeeping Practices					
Progress	Year				
	1	2	3	4	5
A Good Housekeeping guideline developed or updated.					
Number of sites to be audited for compliance with housekeeping guideline					

5.5 Storm Response

Weather Forecasting					
Progress	Year				
	1	2	3	4	5
Weather forecast delivered in a timely manner.					
Accuracy of weather forecasts.					

Infrared Thermometers (IRT's)					
Progress	Year				
	1	2	3	4	5
Percentage of patrol vehicles with IRT's.					
Percentage of Supervisor Vehicles with IRT's.					

Storm Response Approaches					
Progress	Year				
	1	2	3	4	5
Standard Operating Guidelines Reviewed/Updated					

Winter Road Patrol					
Progress	Year				
	1	2	3	4	5
Winter Road Patrol SOP reviewed or updated.					
Documented road patrolling during winter conditions.					

Drift Control					
Progress	Year				
	1	2	3	4	5
An inventory of drifting snow problem areas developed or updated.					
Drift Control Guidelines developed or updated.					

5.6 Snow and Ice Control Training

Training					
Progress	Year				
	1	2	3	4	5
Percentage of Union Exempt staff trained.					
Percentage of Road Crew Leaders trained.					

Percentage of , operators trained.					
Percentage of contractor staff trained.					

5.7 Snow Removal and Disposal Guideline

Snow Removal and Disposal Guideline					
Progress	Year				
	1	2	3	4	5
Snow Removal and Disposal Guidelines developed or updated.					
Snow removal LOS achieved.					

5.8 Technology Transfer Review

Technology Transfer Review					
Progress	Year				
	1	2	3	4	5
New winter maintenance or salt management technologies trialed or implemented.					

5.9 Communications

Communications					
Progress	Year				
	1	2	3	4	5

Communication plan developed or updated.					
Appropriate stakeholders informed.					

5.10 Salt Vulnerable Areas

Salt Vulnerable Areas					
Progress	Year				
	1	2	3	4	5
Number of salt vulnerable areas identified.					
Number of winter maintenance plans developed in response to salt vulnerable areas.					
Relative change in impact indicators.					

5.11 Record Keeping

Material Usage Record Keeping					
Progress	Year				
	1	2	3	4	5
Record Keeping Guideline developed or updated.					
Tonnes of salt applied through spreading operations (Jan 1 – Apr 30)					

Tonnes of salt applied through spreading operations (Nov 1 – Dec 31)					
Tonnes of salt used per lane km (urban/arterial routes)					
Tonnes of winter sand used (Jan 1 – Apr 30)					
Tonnes of winter sand used (Nov 1 – Dec 31)					
Tonnes of winter sand used per lane km (rural routes)					
End of season material reconciliation completed.					

Storm Response Record Keeping					
Progress	Year				
	1	2	3	4	5
Accurate and complete record of storm responses.					

5.12 Source Water Monitoring Program

Monitoring Program					
Surface Water Intake Protection Zones	Year				
	1	2	3	4	5
Site 1– Lindsay Intake					
Site 2- Bobcaygeon Intake					

Site 3– Norland Intake					
Site 4– Fenelon Falls Intake					
Site 5- Kinmount Intake					
Site 6- Southview Estates Intake					

5.13 Emergency Response Program

Emergency Response Program					
Progress	Year				
	1	2	3	4	5
Spills response SOP reviewed or updated.					
Staff are aware of potential hazards and the Response Plan.					

Appendix A

Application Rate Tables

The following tables are a summary of The City's snow and ice control material application rates and are used in conjunction with the City's Levels of Service for Winter Maintenance Operations.

TABLE B.1 – TYPICAL APPLICATION RATES – SALT (kilogram per two lane kilometer)			
	Light	Normal	Heavy
Condition	Frost or Road (Black) ice	Typical storm with snow accumulation	Non-typical storm or extreme conditions
Dry Salt	130	130	150

TABLE B.2 – TYPICAL APPLICATION RATES – WINTER SAND (kilogram per two lane kilometer)			
	Light	Normal	Heavy
Condition	Frost or Black ice	Typical storm with snow accumulation	Non-typical storm or extreme conditions
Winter Sand	570	570	750