Salt Management Plan



November 2026

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Preface

This Salt Management Plan for the City of Richmond Hill replaces the Council approved 2016 plan, and aligns with Council's commitment to environmental sustainability, as well as the federal Code of Practice for the Environmental Management of Road Salts.

Management Statement

The City of Richmond Hill is committed to providing a safe and accessible transportation network for all residents, businesses, and emergency services throughout the winter season. This Salt Management Plan (SMP) establishes a framework to balance the essential requirement for public safety on our roads, sidewalks, City parking lots, and entrances to City facilities, with the responsibility to protect the local environment. This includes the kettle lakes in Richmond Hill, as well as the sensitive watersheds that include the Rouge River, Don River, and Humber River systems draining south to Lake Ontario.

Richmond Hill recognizes that while road salt is an effective tool for snow and ice control on roads, sidewalks/walkways, City parking lots, and facility entrances, its over application poses risks to groundwater, vegetation, local watercourses and associated aquatic life. This plan outlines the strategies, technologies, and best practices the City and its contracted partners will employ to manage salt usage without compromising the associated regulatory requirements and the prescribed Council approved Levels of Service.

The purpose of this Salt Management Plan is to:

- **Ensure Public Safety:** Maintain roads, sidewalks, walkways and City parking lots in a safe condition in accordance with the Council approved Levels of Service and, where applicable, the Province of Ontario's Minimum Maintenance Standards (MMS).
- **Protect the Natural Environment:** Reduce the chloride loading to Richmond Hill's surface waters, groundwater and the Oak Ridges Moraine.
- **Achieve Operational Excellence:** Implement "Smart About Salt" principles, salt management technologies, application of anti-icing liquids, and GPS-tracked applications.

- **Drive Continuous Improvement:** Monitor and report annual salt usage to Environment and Climate Change Canada (ECCC) to benchmark progress and refine winter maintenance operations.

The City of Richmond Hill, through the Public Works Operations Division, manages its winter maintenance operations in an environmentally conscious manner. All City staff and third-party contractors are required to adhere to the protocols for material storage as per the federal Code of Practice for the Environmental Management of Road Salts, as well as application, and record-keeping defined within this document. Using weather monitoring tools and calibrated equipment, the City aims to apply the **right material, in the right amount, at the right time.**

Related Actions

The City's Environment Strategy aims to combat rising salt levels in local water bodies, particularly Lake Wilcox, as highlighted in the 2020-2024 Environmental Scorecard. Key corporate actions, beyond this Salt Management Plan, include enhancing stormwater infrastructure, promoting community education and improving water quality monitoring.

The strategy is integrated into the Greening the Hill: Our Community Our Future framework to protect local water resources, infrastructure, and ecological integrity. More information about the City's Environment Strategy can be found at RichmondHill.ca/Greening.

1.0 Introduction & Governance

On April 3, 2004, under the Canadian Environmental Protection Act, 1999, the Government of Canada published a Code of Practice for the Environmental Management of Road Salts. The Code was designed to help municipalities and other road authorities better manage their use of road salts in a way that reduces their impact on the environment while maintaining road safety.

In 2005, Richmond Hill prepared its first Salt Management Plan (SMP), which was updated in 2011. A subsequent 2016 revision updated the road inventory, eliminated the use of winter sand, reduced material application rates, and changed the material of choice.

In 2020, the City completed an internal Salt Vulnerability Analysis & Salt Reduction Plan. The objective of the plan was to help the City minimize adverse impacts of salt application practices on the most vulnerable receptors of the receiving environment, while balancing the need to maintain safe roads, sidewalks, parking lots, parks and trails for public use.

This 2026 Salt Management Plan update incorporates all current practices and new information and recognizes the use of new equipment and technologies that were not in use by the City at the time of the last update.

This section provides the strategic and legal foundation for the 2026 Salt Management Plan (SMP) that balances road safety and environmental stewardship.

1.1 Richmond Hill Winter Maintenance

The City of Richmond Hill has some 1,200 lane kilometers of paved roads and 750 kilometers of sidewalks that require attentive winter maintenance. In addition, the City maintains parking lots, entrances and pathways at City facilities and properties, as well as select trails and walkways through park areas and near schools.

Winter maintenance is based on Council approved Levels of Service (LOS) and the City’s Public Works Operations (PWO) Division implements procedures involving plowing, salting, brining and sanding to maintain the roads in a safe state of repair. Plowing is the primary method of removing snow from the road surface; however,

plowing alone cannot remove ice that has become bonded to the pavement. Salt is the de-icing agent of choice to deal with this bond.

1.2 Purpose and Objectives

The City recognizes that the application of road salt is a vital component of winter maintenance, ensuring the safe movement of emergency services, transit, and the public. However, the environmental and infrastructure costs associated with chloride (from road salt) loading need to be considered within an overall impact mitigation and risk management approach.

The primary objectives of this plan are therefore to ensure:

- **Public Safety:** Maintain road and travelled surface conditions in compliance with provincial standards.
- **Environmental Protection:** Minimize the negative impacts of chloride on local waterways, groundwater, aquatic ecosystems and vegetation.
- **Asset Management:** Reduce the rate of salt-induced corrosion on municipal infrastructure.
- **Operational Efficiency:** Optimize material usage through technology and staff training to ensure fiscal responsibility.

1.3 Policy Statement

The City of Richmond Hill is committed to a Continuous Improvement model regarding salt management and implements "Best Management Practices" as defined by the Environment and Climate Change Canada (ECCC) Code of Practice to reduce the negative environmental effects of salt handling, storage and application on the environment without compromising the safety of the travelling public.

1.4 Legal and Regulatory Framework

This plan operates within a complex landscape of provincial and federal legislation. Regulatory compliance is not optional, as failure to meet these standards carries both legal and environmental liability.

- **O. Reg. 239/02: Minimum Maintenance Standards (MMS):** This Ontario regulation dictates the maximum allowable time to clear snow and ice based on road classification. The SMP provides some of the technical tools to meet these timelines efficiently.
- **Municipal Act, 2001:** Provides the municipality with the authority to manage its road network and outlines the "Duty of Care" owed to residents.
- **The Clean Water Act (Source Water Protection):** Requires the municipality to mitigate significant drinking water threats, specifically focusing on salt application and storage in communal Wellhead Protection Areas (WHPAs).
- **Fisheries Act (Federal):** Prohibits the deposit of "deleterious substances" (such as salt-laden runoff) into water frequented by fish.

1.5 Level of Service (LOS) Policy

Richmond Hill's Level of Service for Winter Operations (LOS) standards are driven by the technical requirements of winter operations and the socio-economic, environmental, and safety concerns of a large urban municipality.

Richmond Hill's LOS standards:

- meet, and where possible, exceed provincial requirements as defined in 0. Reg. 239/02 - Minimum Maintenance Standards for Municipal Highways (MMS); and
- are reviewed by staff annually to ensure compliance with the MMS and compatibility with the Salt Management Plan (SMP) and are updated as needed.

The Richmond Hill Levels of Service for Winter Operations was approved by City Council in 2014 and expanded in 2019.

1.6 Plan Administration & Oversight

To ensure the SMP remains a living document, the following governance structure is established:

Role	Responsibility
City Council	Accountability for budget availability and the Council Approved Levels of Service.
Commissioner Community Services	Corporate responsibility for the SMP. Accountability for divisional (Public Works Operations) resourcing.
Director of Public Works Operations	Responsible for ensuring an SMP is developed, maintained and implemented consistently across the City. Accountability for plan implementation and budget allocation.
Manager, Roads Operations	Responsible for implementing the SMP consistently across the City. Oversight of City winter maintenance plan for roads, deployment of resources and response strategies including conformance to the SMP.
Manager, Public Works Support Services (Fleet)	Responsible for purchasing, maintaining and calibrating the winter maintenance fleet in compliance with the SMP.
Manager, Parks Services and Infrastructure	Oversight of City winter maintenance plan for sidewalks and pathways, deployment of related resources including conformance to the SMP.
Manager, Urban Forestry, Natural Environment and Horticulture	Oversight of City winter maintenance plan for City-owned parking lots and entrances to City facilities, deployment of related resources, including conformance to the SMP.
Supervisors (Roads, Sidewalks, Parking Lots, Entranceways)	Responsible for ensuring that winter maintenance activities are carried out in conformance with the SMP. Includes deployment of daily resources, equipment calibration, salt inventory and conformance to the SMP.
Forepersons, Lead Hands, Patrollers, Front-line Operators	Responsible for ensuring they carry out winter maintenance duties in accordance with the policies and procedures set out in the SMP and as directed by their supervisor. Execution of application rates, record keeping, and reporting of road conditions.

The SMP shall be reviewed annually following the submission of the annual salt usage report to Environment & Climate Change Canada (ECCC). Where necessary, revisions will be made based on new technology, changes in road inventory, or updated environmental data.

2.0 Environmental Impact & Risk Assessment

The City of Richmond Hill recognizes that road salt (sodium chloride) is a persistent pollutant. Once dissolved in meltwater, it cannot be easily removed through natural filtration or standard wastewater treatment.

2.1 Chloride Toxicity and Aquatic Health

High chloride concentrations in local waterbodies create the following acute and chronic lethal environments for aquatic life.

- **Acute Toxicity:** Sudden spikes in chloride during spring thaws or heavy rain-on-snow events can kill fish and amphibians in local streams and rivers, as well as watercourses downstream from Richmond Hill – Vaughan, Markham, Toronto and ultimately Lake Ontario.
- **Chronic Toxicity:** Long-term elevated levels disrupt the reproductive cycles of macroinvertebrates, which form the base of the food chain.
- **Density Stratification:** In ponds or local kettle lakes such as Lake Wilcox, Bond Lake and Philip's Lake, salt-heavy water sinks to the bottom, preventing the natural "turnover" of the lake. This leads to anoxia (oxygen depletion) in deep water, suffocating bottom-dwelling species. Lake Wilcox in particular has nutrients contained within the bottom sediment that are released slowly over time. A lack of turnover and increased anoxic conditions can accelerate the release of the nutrients and cause greater algae blooms.

2.2 Terrestrial Impacts & Soil Health

Richmond Hill invests heavily and prides itself in its extensive, and growing, tree canopy. Salt poses the following local threat to trees and vegetation along road right of ways and park pathways.

- **Vegetation "Burn":** Salt spray from high-speed arterial roads can cause physical damage to trees and other vegetation within the municipal right of way.
- **Soil Structure:** Sodium displaces essential nutrients (calcium, magnesium) in the soil, causing soil particles to disperse. This leads to soil compaction, reduced drainage, and increased erosion.

2.3 Groundwater / Drinking Water Protection

The Source Protection Plan for the Credit Valley, Toronto and Region, and Central Lake Ontario (CTC) Protection Region confirms the presence of no Wellhead Protection Areas A, B or C in Richmond Hill. Wells in Aurora and Newmarket have a Wellhead Protection Areas Zone D (WHPA-D) that extends to the north-west corner of Richmond Hill near the intersection of Bathurst Street and Bloomington Road West**.** This area captures groundwater that potentially feeds municipal wells in the neighbouring towns of Aurora and Newmarket.

For WHPA-D, groundwater and any potential contaminants can take between 5 and 25 years to travel to the wellhead. This designation allows authorities to monitor and manage land-use activities that could pose a "significant drinking water threat" over several decades. Under the Source Protection Plan, road salt in the WHPA-D zone is not identified as a significant drinking water threat and therefore carries the lowest vulnerability score.

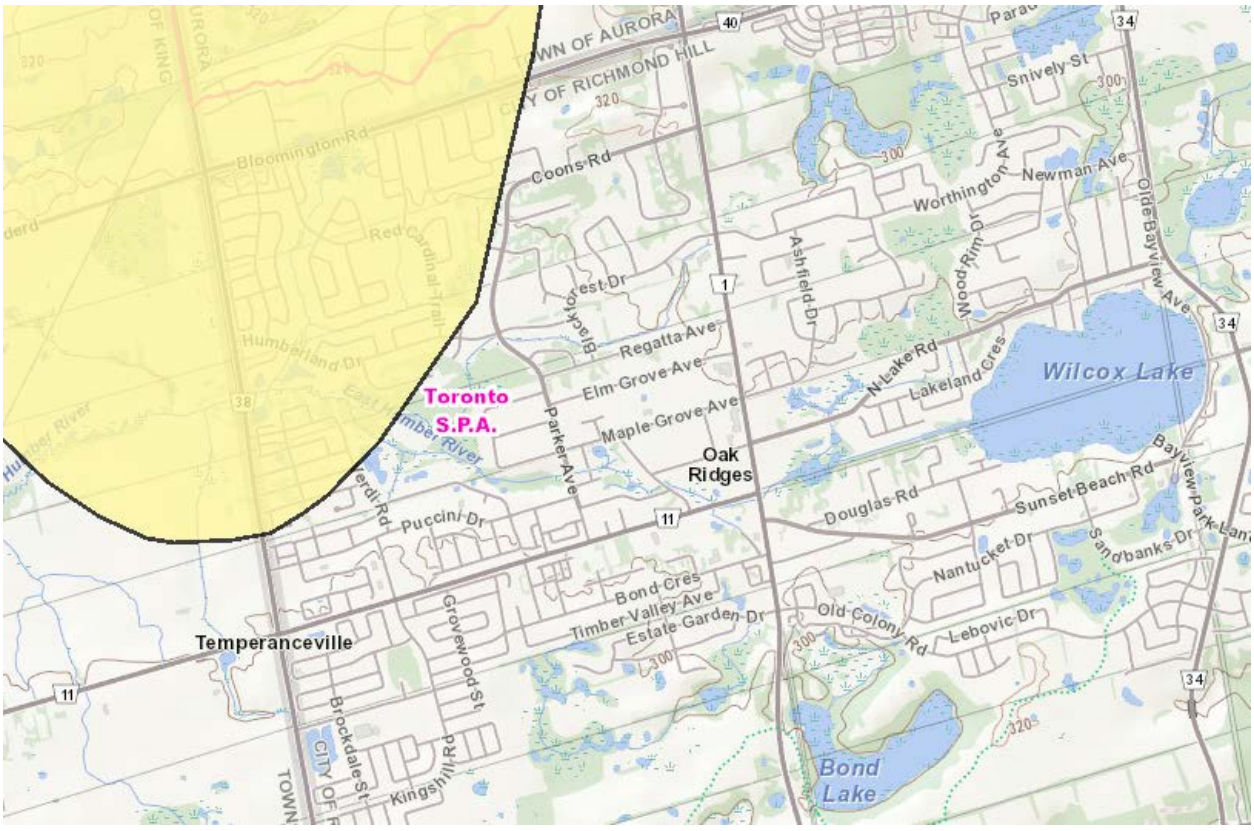


Figure 1: WHPA-D Area in Richmond Hill *(Source: Source Protection Information Atlas – Ministry of Environment, Conservation and Parks)*

There are a small number of remote subdivisions comprised primarily of estate-sized lots that are on private well systems. The road drainage patterns, location of the wells, and the topography of the lots can provide protection from salt contamination. There is no known contamination of private wells in these areas.

2.4 Identification of Salt Vulnerable Areas and Risk Mitigation Strategy

One of the goals identified in the City's 2016 Salt Management Plan was to explore how salt application in the Lake Wilcox watershed could be reduced. The Lake Wilcox watershed has been a long-recognized vulnerable natural area in the City, with monitoring showing the waterbody being adversely impacted by high chloride concentrations. To better understand the hazards, risks and vulnerability thresholds of Lake Wilcox in addition to other natural areas across the City, a City-wide Salt Vulnerability Assessment (SVA) was completed in 2020. This was a high-level study that uses a data-driven and science-based approach for identifying salt vulnerable areas which could potentially benefit from road salt reduction strategies.

The SVA & Salt Reduction Plan examined specific "environmental receptors" for the risk of adverse impacts from chloride exposure. The environmental receptors were categorized and mapped across the City. The strategy included key objectives and findings that are considered in this SMP. These include:

- **Environmental Risk:** The SVA highlights that chloride ions from road salt are toxic to aquatic and terrestrial species and do not degrade in the environment.
- **Vulnerability Mapping:** Using a risk-based GIS methodology, the study identifies salt vulnerable areas where chloride concentrations can exceed the threshold limits of sensitive species, such as the Redside Dace.
- **Lake Wilcox Focus:** A detailed assessment of the Lake Wilcox watershed—a known vulnerable area—found it to be at moderate to high risk, with residential road**s** identified as the largest source of chloride contamination.
- **Future Growth:** With the City's population growth projections, the report emphasizes the need to implement reduction strategies to mitigate the impact of expanded winter maintenance.

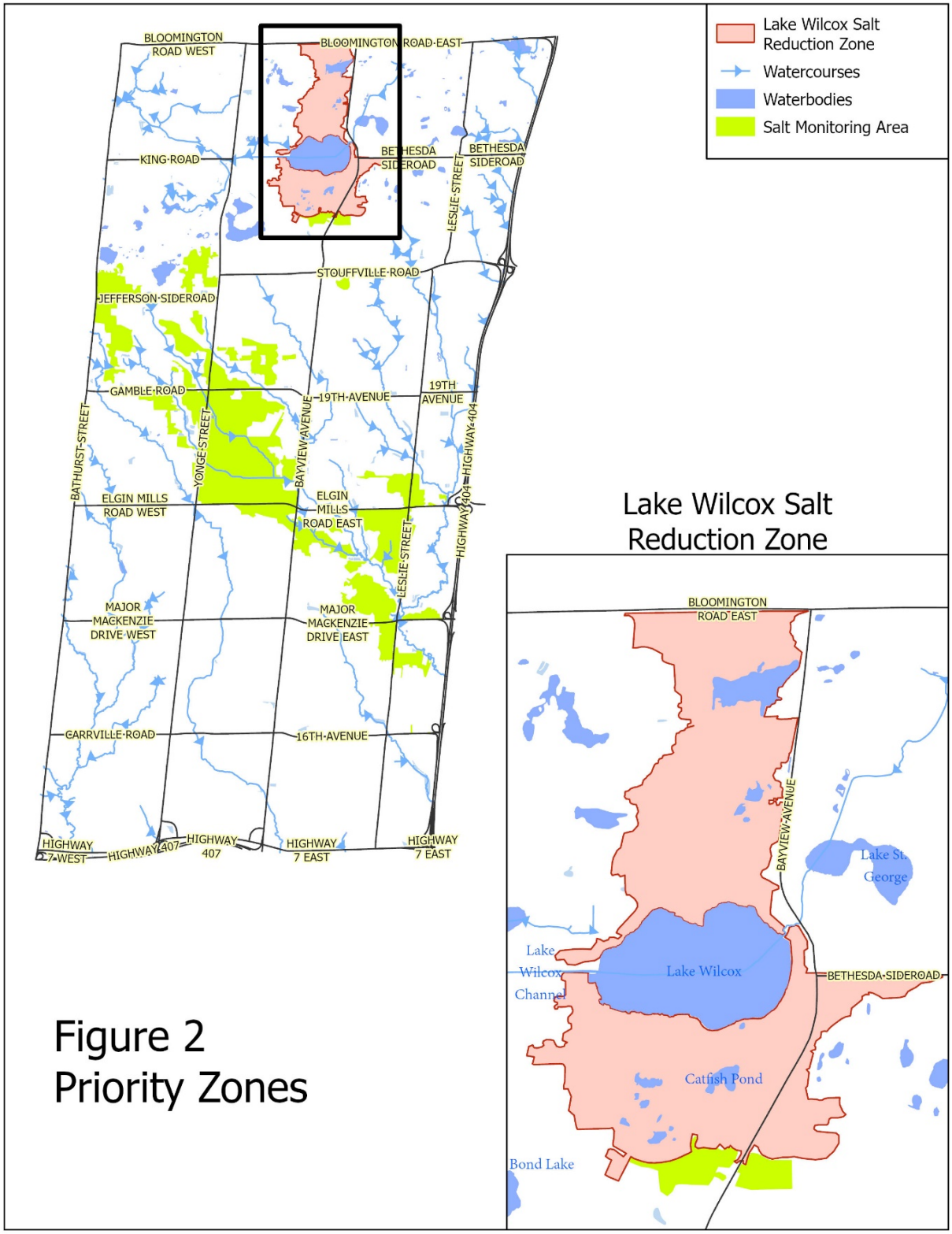
The SVA utilized a GIS-based, risk-assessment approach to evaluate best management

practices for reducing salt usage. By mapping the intersection of chloride hazards and biological vulnerability across the city, this work identified two priority zones (see figure 2, next page): the Lake Wilcox stormwater drainage area, which requires a lower salt application rate, and a section along the Rouge River designated by this Salt Management Plan for active monitoring.

To manage the identified risks, the City continues to implement the following measures:

- **SVA Mapping for the Lake Wilcox area:** Develop and maintain mapping for supervisors to ensure plow operators are aware of the vulnerable areas and receive accurate, site-specific instructions.
- **Enhanced Salt Management:** Adopt tiered response practices, including "Reduced Salt" zones in highly sensitive areas.
- **Stormwater Infrastructure Expansion:** Regularly update the Stormwater Management Rate Program and Capital Plan to fund improvements that reduce erosion, enhance water quality, and build climate resiliency.
- **Community Education:** Promote public awareness to reduce private salt use and encourage residential stormwater management.
- **Runoff Management:** Ensure the snow disposal and salt storage site is suitably located (outside of SVAs) and equipped with proper grading and runoff capture systems.
- **Continuous Monitoring:** Utilize the City’s Watershed Monitoring Program to periodically assess natural asset health and provide evidence for future water protection decisions.

Figure 2: Reduced salt usage priority zones



3.0 Salt and Snow Storage & Handling Facilities

This section outlines the engineering and operational standards for salt storage, ensuring that the salt inventory does not become a point-source for environmental contamination. For Richmond Hill, centralized salt storage is located at 1200 Elgin Mills East, known as the Operations Centre. Salt storage is designed, constructed and managed to mitigate environmental impact risks.

The City currently has one (1) salt storage dome (building) capable of storing approximately 10,000 tonnes of material under cover at the Operations Centre. Having the material under cover limits the amount of salt exposed to the environment caused by wind and stormwater runoff.



3.1 Salt Storage Facility Standards

The Richmond Hill salt storage facility adheres to the following structural requirements:

- **100% Indoor Storage:** All bulk road salt is stored under roofed structures.

- **Impermeable Flooring:** Storage pads are constructed of reinforced concrete, free of cracks, to prevent salt from leaching into the subsoil.
- **Curbing:** Storage pads are curbed to direct internal meltwater and "sweat" toward a controlled collection point rather than allowing it to sheet-flow off-site.

3.2 Salt Material Handling and Housekeeping

The highest risk of environmental contamination occurs during the loading and unloading process. As such, the following measures are adhered to:

- **Loading Protocols:** All loading occurs on the impermeable pad. Overfilling is prohibited.
- **Immediate Cleanup:** Any salt spilled outside the storage structure during loading is swept back into the dome immediately after the vehicle departs.
- **Delivery Management:** During salt deliveries, City staff inspect the area for spills and ensure the "tarping" of trucks occurs only within designated areas.

3.3 Brine Storage

Liquid storage of brine requires the following specific minimum safeguards:

- **Secondary Containment:** All brine and liquid chemical tanks must be placed within a "double-walled" tank or a bermed area capable of holding 110% of the largest tank's volume.
- **Backflow Prevention:** At present, the Brine system is isolated from the plumbing. If the Brine system were to be connected to facility plumbing in the future, it will be equipped with certified backflow prevention devices to ensure chemicals do not migrate into the municipal potable water supply.

At present, Richmond Hill does not produce its own salt brine and depends on outside sources to produce and deliver the material to the storage area at the Operations Centre. The City has seven (7) poly vinyl 15,000-liter salt brine tanks. The tanks are encircled by a one-metre-high concrete wall which acts as a containment vessel in the event of a tank rupture.

3.4 Inspection & Maintenance Schedule

To ensure the integrity of the Operations Centre salt storage facility, the following audit schedule is maintained:

- **Weekly:** Site walk-through the salt storage area by City staff to check for spills and pad cracks.
- **Monthly:** Visual inspection of brine tanks, valves, and secondary containment structures.
- **Annually (Pre-Season):** Inspection of the dome roof, pad sealing, and containment area.

3.5 Snow Storage Facility Standards

The City has a snow disposal site located behind (north of) the Operation's Centre on Elgin Mills Road East. When snow accumulation is excessive and haulage from laneways, narrow courts, and dead ends is required, the four-acre site, specifically designed for the disposal of snow, is utilized. As the snow will contain road salt and sediment, the risk mitigation measures are as follows:

- **Impervious Asphalt Surface:** Protects ground water from the melt water. It is cleaned at the end of every winter season and inspected for asphalt cracks and deterioration.
- **Stormwater/Meltwater Collection System:** Captures melted salt-laden water and directs it to an on-site stormwater system which discharges to a nearby stormwater pond.
- **Stormceptor:** Installed as part of the storm sewer system, these specialized technologies separate oil and grit (sediment) from the meltwater and are cleaned after each winter season.
- **Water Quality Stormwater (Polishing) Pond:** Provides an opportunity for sand and grit in the collected meltwater to settle out and be retained in the pond. The polishing pond also provides an opportunity for BOD (biological strength) reduction, grit separation, dilution, and temperature adjustment of the melt water. This pond is dredged once a threshold of retained sediment volume is reached.

- **Stormwater Discharge System:** The treated water from the stormwater pond flows into a closed storm sewer system which provides secondary cooling of meltwater prior to entry into a tributary of the Rouge River.



3.6 On-Site Stormwater & Runoff Management

Further to the above risk mitigation measures, the Operations Centre stormwater system that services the Snow Storage Facility and wash bays benefits from the following:

- **Collection Systems:** The Operations Yard is paved and graded so that all runoff from the "active" loading zone is captured and directed to on-site stormwater management facilities.
- **Oil/Grit Separators:** Mandatory installation in select on-site catch basins to remove grit/sediment, heavy metals and hydrocarbons from haulage and maintenance vehicles.

4.0 Winter Maintenance Material, Equipment & Technology

This section focuses on the "hardware" of salt management. For Richmond Hill, a data-driven salt application practice is the most effective way to reduce salt usage while maintaining O. Reg. 239/02 safety standards.

The City is committed to investing in technology that removes guesswork from material application. By ensuring equipment is precisely calibrated and tracked, this helps ensure that the right amount of salt is applied at the right time.

4.1 Weather Monitoring

The City currently has a RWIS (Road Weather Integration System) system with two (2) stations. One is in the south end of the city on High Tech Road and the other at the north end on Old Colony Road. The RWIS stations provide real time information on road conditions to the Patrollers over the internet. The Patrol vehicles also have mobile road temperature sensors that read the surface temperatures of the road they are travelling over. This information enables staff to make informed decisions as to when and where winter operations should begin or end, including what material application rates will work best for the forecasted or actual conditions present.

RWIS technology provides Supervisors and front-line staff with specific road condition and precipitation forecasts that include:

- Pavement temperature
- Pavement condition
- Wind speed and direction
- Atmospheric temperature and humidity

The RWIS system provides internet access to current weather radar information and forecasting specific to Richmond Hill.

4.2 Road Salt

In Richmond Hill, Rock Salt is the most widely used type of road salt because it is inexpensive and effective, usually down to approximately -7°C. It is commonly used on all classes of roads in Ontario and in large-scale applications.

The City also utilizes Thawrox® (for roads only), which is a premium treated rock salt coated with magnesium chloride and a viscosity modifier. Known for faster ice-melting action and lower working temperatures than traditional road salt, it significantly reduces material "bounce and scatter," lowering overall salt usage and equipment corrosion.

The Thawrox® is a high-performance treated salt that can melt ice at -15°C and provides some environmental benefits compared to traditional rock salt. Although more expensive, its primary environmental advantage stems from its increased efficiency, which allows for a 30% to 50% reduction in the product application rate. The product uses a bio-based, food-grade additive that is biodegradable and safe for the environment, and that helps it stick to the pavement. The product tends to stay in the targeted application area, compared to untreated salt which can bounce into roadside vegetation and ditches. It also tends to be less corrosive than rock salt and is commonly referred to as Blue Salt.

4.3 Anti-icing Program – Brine

Anti-icing is the application of a chemical solution (salt brine) to the pavement before a storm to proactively prevent the bonding of ice or snow to the road surface. To accomplish this, salt brine is sprayed on the road surface, the water component of the brine then evaporates or is dried up by traffic, and only the salt component remains on the road surface. A pre-treatment can be made well in advance of a storm (up to 48 hours) provided that the storm does not start with above-freezing temperatures and rain, which will wash the chemical away. Anti-icing reduces the overall application of salt.

The City utilizes dedicated tanker trucks equipped with spray bars for anti-icing**.**

4.4 Fleet Inventory and Spreader Standards

The municipal fleet consists of a variety of vehicles tailored to the specific road, sidewalk and pathway characteristics that exist in Richmond Hill. The current fleet is effective and in good condition with replacements scheduled in accordance with a robust Asset Management Plan.

The City is assessing the viability and effectiveness of added new technologies to be considered for future equipment purchases. These may include the following minimum specifications:

- **Electronic Spreader Controls:** To be considered mandatory for all road salting vehicles. Controllers would be capable of "ground speed orientation," meaning the application rate adjusts automatically based on the vehicle’s speed.
- **Multi-Material Capabilities:** Spreaders would be able to accommodate dry salt, treated/pre-wetted salt, and sand/salt blends. (Single material vs multiple material types)
- **Side-Cast Controls:** Equipment would allow operators to control the "spread pattern" to prevent salt from being thrown into ditches or onto private lawns, particularly in Salt Vulnerable Areas.



Sidewalk and parking lot salting remain manual operations that utilize the judgement of the operators to assess the ground conditions. Electronic spreader control is less effective in these instances as the walking and ground conditions are generally more

variable. As such, dedicated annual operator training and refreshers related to salt usage are provided to manage salt usage and mitigate risks.

4.5 Automated Vehicle Location (AVL) & Telematics

Richmond Hill uses an integrated AVL/GPS system to provide real-time oversight of winter operations. The system received a major upgrade in 2025, and further enhancements are planned in future years. The system provides the following capabilities:

- **Data Capture:** The system records and transmits:
    - Vehicle location, speed, route(s) travelled, and date/time.
    - Plow position (up/down).
    - Material being applied.
    - Application rate (kg/km) in real-time.
    - Video capture capability.
- **Reporting:** This data is used to inform supervisors of progress and effectiveness of the winter maintenance operation. It also informs regarding salt usage and helps identify areas of over or under application. The reporting provides a legal audit trail for Minimum Maintenance Standards (MMS) compliance.

4.6 Equipment Calibration Protocols

The road plows (and dump trucks) used for salt applications on the road network and on parking lots have automatic spreader control that is based on vehicle speed.

Calibration of salt application mechanisms is an important step in ensuring the **Application Rate Matrix** is accurately applied. The City Fleet Manager retains a third party to perform the calibration at the following intervals.

- **Mandatory Calibration Windows:**
    1. **Pre-Season:** Every spreader must be calibrated before the first snowfall of the year.

2. **Post-Repair:** Any time a controller, hydraulic pump, or auger is repaired or replaced.

- **Documentation:** Calibration records for each salting vehicle (identified by VIN/Unit Number) are kept through the City's Maximo work order system for a minimum of seven years to support legal defense against slip-and-fall claims.

For brine application, equipment is calibrated to 90 liters per lane kilometer. The calibration is performed by Fleet staff at the start of the winter season and after any repairs.

The City sidewalk plows do not have automatic adjustment but have a push button in the cab with a dial setting that controls the speed of the application and a level control outside the cab near the hopper. The City will assess the viability of adding enhanced application rate controls in future equipment purchases. Options, however, may be limited by market availability of viable options.

4.7 Infrared Pavement Temperature Sensors

Air temperature is a poor indicator of salt effectiveness. All patrol vehicles are equipped with Infrared Pavement Sensors plus handheld units

- Supervisors and Operators consider real-time pavement temperature, in addition to the weather forecast, to select the appropriate rate from the Application Rate Matrix.
- Data from these sensors may be integrated into the AVL system to build a municipal-wide "Thermal Map" of road surfaces. This capability will be assessed as the new AVL system is fully integrated in day-to-day activities.

5.0 Salt Application Strategies

Richmond Hill aims to keep roads and sidewalks safe and passable, but does not necessarily aim for bare pavement. This approach helps manage salt usage while letting road usage activate the salt to achieve bare pavement on high-volume roads. Low traffic volume smaller courts and dead ends are allowed to retain some snow cover provided they are still safe and passable. This approach helps minimize the total chloride load on the environment.

5.1 Application Rate Matrix

Operators follow routes and the programmed application rates determined by the supervisors. During normal winter operations, these rates are based on pavement temperature and storm type, not air temperature.

The following table is a summary of Richmond Hill's current application rates under normal winter weather conditions in accordance with the City's Standard Operating Procedure and Levels of Service for Winter Maintenance Operations standards.

TABLE 1 – APPLICATION RATES – SALT (kg / L km)			
Snow Conditions->	**Light**	**Normal**	**Heavy**
Condition	Frost or Black ice	Typical storm with snow accumulation	Curves, steep grades, extreme conditions
Dry Salt	130	130-150	150
Thawrox	110	110-130	Not Used if Plowing Needed.
Special Circumstances: "Pickled Sand" 50/50 Mix Sand & Dry Salt	130	130-150	150

During Significant Weather Events as defined under O. Reg. 239/02: Minimum Maintenance Standards (MMS), public safety is prioritized, and application rates can be adjusted by the supervisors to account for actual road, sidewalk, and weather conditions, as well as the weather forecast for the coming hours and days. Under these circumstances, the supervisors may adjust application rates, switch salt types, and adjust sand/salt blends as necessary. Application rates and strategies acceptable during a Significant Weather Event are addressed in section 5.2 below.

Application rates within the most significant Salt Vulnerable Area, surrounding Lake Wilcox, are maintained as per Table 2 below. Every effort is made to ensure rates are not increased during a Significant Weather Event, and necessary adjustments to maintain road safety are managed as per section 5.2:

TABLE 2 – APPLICATION RATES – LAKE WILCOX SVA - SALT (kg / L km)			
Snow Conditions ->	**Light**	**Normal**	**Heavy**
Condition	Frost or Black ice	Typical storm with snow accumulation	Curves, steep grades, extreme conditions
Dry Salt	110	110-130	130
Thawrox	110	110	Not Used if Plowing Needed
Special Circumstances: 50/50 Blend Sand & Dry Salt	110	110-130	130

Specific areas across the middle of the city, generally following the Rouge River tributary, are identified as potentially salt-vulnerable and are included in staff awareness training and monitoring. While no reduced-salt application rates are mandated for these locations, staff and contractors are briefed on potential environmental impacts to prevent over-application, and stricter casting controls are exercised on these roads.

5.2 Application Rates - Significant Weather Events (SWE)

When a Significant Weather Event is declared under the Municipal Act, the focus shifts to maintaining "Safe and Passable" pavement. During a SWE:

- Application rates on roads outside the Lake Wilcox Salt Vulnerable Area are assessed by the supervisors. Any decision to exceed the Table 1 rates is discussed with the manager and implemented based on the priority to maintain public safety. The application rate and the interval time between consecutive salting operations is determined based on road and weather conditions. Particular attention is paid to primary roads and emergency routes, and these will usually dictate the need for subsequent salting operations.
- Application rates in the Salt Vulnerable Areas of Lake Wilcox are maintained as per Table 2, and public safety is addressed by adjusting the frequency and interval between applications.

- Application rates on sidewalks, parking lots, pathways, and trails will remain unchanged. Isolated (localized) increase in application rates will be considered and snow clearing will be prioritized based on pedestrian volume to ensure transit accessibility. Special attention is paid to school zones and walkways used by residents/students to access the schools.

5.3 Brine Applications Strategy

As mentioned earlier, a proactive operational strategy is the application of liquid brine (23.3% NaCl) to dry pavement before a storm event. An average application rate of 90 litres per lane kilometre, and a maximum of 100 litres per lane kilometre on curves, grades and extreme conditions, is targeted in response to the following:

- **Objective:** To prevent the bond between snow/ice and the pavement, making mechanical plowing significantly more effective.
- **Trigger:** Forecasted frost, black ice, or snow events with pavement temperatures above -10°C.
- **Benefit:** Reduces total salt usage compared to reactive de-icing.

Supervisors conduct brine application operations based on the following Table 3:

TABLE 3 – APPLICATION RATES – LIQUIDS[4]			
	Light	**Normal**	**Heavy**
Condition ->	Frost or Black ice	Typical storm with snow accumulation	Curves, steep grades, Pending extreme conditions
Liters / lane km (anti-icing)	90 Lt / LKm	90 Lt / LKm	100 Lt / LKm
*Apply to dry pavement **before** the storm starts. Do not apply during active rain.*			

5.4 Pre-Wetting (Liquid-on-Dry)

Since Regional roads in Richmond Hill are maintained by York Region, Richmond Hill has few higher speed limit roads within its network that can benefit from pre-wetting. The process of **pre-wetting** involves spraying liquid brine onto dry salt as it is discharged from the spreader. This capability is not available in the current Richmond Hill fleet of vehicles used in the winter maintenance program but may be considered as the winter fleet is replaced in the future.

An alternative involves pre-wetting at the source, which is possible but time-consuming, and of limited value given the characteristics of the current road network maintained by the City. The strategy may be considered as the road network grows and evolves and as the winter maintenance fleet is renewed in the future. The possible benefit of this strategy on higher speed primary roads is as follows:

- **Reduced Bounce:** Pre-wetted salt "sticks" to the crown of the road, reducing material loss to the shoulder or ditch by 30%.
- **Faster Activation:** The liquid brine starts the melting process immediately, whereas dry salt requires moisture from the snow to begin working.

5.5 Special Management - Salt Vulnerable Areas (SVAs)

As per **Section 2.4,** areas identified as ecologically sensitive receive extra attention and as such the following modifications may apply:

- **Application Rates:** Prescribed salt application rates are strictly enforced and reduced in the predefined SVA area of Lake Wilcox.
- **Sand/Salt Blends:** Use of 50/50 blend to provide traction rather than attempting full melting is considered and applied when and where feasible in the most sensitive areas.
- **Manual Applications:** Trails and pathways near watercourses or surface waters are not generally salted. If they are, in cases of school access requirements or as directed by Council, they are manually maintained to ensure no migration of salt or salty runoff (and/or sand), so it does not enter the natural environment.

Supervisor instructions to Operators in SVAs are as follows:

- **SVA Areas:** Be aware of Salt Vulnerable Area (SVA), maintain application rates detailed to the prescribed setting or switch to sand/salt blends.
- **Check the Pavement:** Use the infrared sensor to check pavement temperature.
- **The "Bounce" Rule:** Be aware that at higher speeds, dry salt bounces up to 30% off the road. Keep material on the pavement and out of the ditches.
- **Speed Matters:** Keep spreading speeds below 40 km/h to ensure uniform coverage and reduce scatter, and to keep material on the pavement and out of the ditches.

6.0 Snow Disposal Management

When mechanical plowing reaches its storage capacity on City boulevards, laneways and narrow streets, snow must be hauled to the snow storage facility at 1200 Elgin Mills East. This site concentrates a significant amount of salt and other contaminants.

This section addresses the environmental risk associated with large volumes of salt-laden snow removed from the road network. Richmond Hill is required to manage meltwater and debris that results from snow storage.

6.1 Snow Disposal Site Selection & Design

The Ministry of Environment, Conservation, and Parks (MECP) regulates snow disposal sites through specific environmental guidelines and approval processes to prevent contaminants like road salt, oil, and heavy metals from entering watercourses. Dumping snow directly into a watercourse is prohibited. It requires specific approval from the MECP, and it is only considered if land sites are unavailable and the snow is "fresh fall" from low-traffic areas.

The existing Snow Disposal Site meets the MECP Guidelines for Snow Disposal. Criteria include:

- **Location:** The site is outside of any Wellhead Protection Areas (WHPAs) and more than 100m from any natural watercourse.
- **Impermeable Base:** The site has an asphalt base to prevent chloride-rich meltwater from infiltrating the groundwater.

- **Meltwater Management:** The site is graded to ensure control of all runoffs towards catch basins and a stormwater collection system that redirects the runoff to a Settling Pond. This allows suspended solids (sand, litter) to settle before water is discharged.



6.2 Environmental Mitigation & Monitoring

Because chloride cannot be "settled out" of water, the City manages its release through timing and dilution:

- **Controlled Discharge:** Meltwater release from Snow Disposal Site occurs in the spring and coincides with high-flow periods in the stormwater system and receiving streams. This has the benefit of maximizing dilution and mitigating the frequency and duration of acute toxicity threshold exceedances for sodium chloride concentrations (shock) to the affected ecosystems.
- **Water Quality Monitoring:** The City monitors watercourses in Richmond Hill throughout the year, as well as sediment volume surveys of stormwater ponds

every five years; monitoring of select stormwater pond outlet discharges; annual Oil and Grit Separators unit inspections upstream of the stormwater ponds.

- **Vegetated Buffers:** The Snow Disposal Site, as well as the polishing pond are surrounded with salt-tolerant vegetation (e.g., specific grasses or shrubs) to provide a final biological filter for runoff.

6.3 Operational Practices for Snow Disposal Site

To ensure efficiency and environmental safety during hauling operations, the City undertakes the following:

- **Debris Removal:** Once the snow has completely melted in late spring, the Snow Disposal Site pad is swept and all remaining debris (sand, trash, metal) disposed of at a licensed landfill.
- **Capacity Tracking:** The Snow Disposal Site has a calculated maximum volume. Once reached, hauling ceases at this location to avoid uncontrolled runoff. If necessary, the City may seek out alternate sites.

6.4 Significant Weather Event (SWE) Temporary Storage

During a declared Significant Weather Event, the City may utilize "Emergency Snow Storage" locations such as closed parking lots and other similar paved City lands. These temporary sites are to be used for short-term snow storage only (max 72 hours). Snow must be moved to a permanent SDS as soon as resources allow, followed by a thorough cleaning of the temporary site to remove residual salt and sand. Such operations are reserved only for emergency haulage where no other options exist to resolve road safety issues. These operations entail costly double handing of the snow, as well as added cleanup, and as such do not form a core part of the Richmond Hill winter maintenance operations program.

7.0 Monitoring, Training, Research & Continuous Improvement

The success of this plan relies on the competency of City staff and the accuracy of the data collected. The City commits to ongoing research on industry best practices and technologies as well as maintaining a "Plan-Do-Check-Act" cycle to ensure long-term responsible salt management.

7.1 Staff Training & Certification

All personnel involved in winter maintenance, including management, operators, and mechanics, must receive annual training.

- **Smart About Salt (SAS) Training:** The City aims for 100% of operators to receive Smart About Salt training or approved alternate equivalent training.
- **Calibration Workshops:** Hands-on training every October to ensure all staff can recognize accuracy.
- **SVA Awareness:** Tailored training on identifying Salt Vulnerable Areas and the specific application protocols required within them.
- **Salt Management Plan** review and refresher.

7.2 Record Keeping & Regulatory Reporting

Accurate record-keeping is the City’s primary defense against MMS (O. Reg. 239/02) non-compliance claims. As such, the City undertakes the following:

- **Daily Activity Logs:** Automated AVL/GPS data is backed up daily, documenting:
    - Route completion times.
    - Material application rates (kg/km).
    - Pavement temperatures.
    - Weather monitoring.

- **Annual ECCC Reporting:** By June 30 each year, the Municipality must submit its Annual Salt Usage Report to Environment and Climate Change Canada.

7.3 Public Education & Outreach

Reducing salt on municipal roads is only half the battle; private contractors and residents also contribute to chloride loading. As such the City promotes and encourages:

- **"Be Salt Smart"** Outreach through the annual Waste Calander to residents regarding the environmental impact of over-salting private driveways. The communications program will be reviewed and enhanced in future years and may include greater use of other tactics, such as social media.
- **Contractor Liaison:** Encouraging local commercial property owners to hire Smart About Salt certified contractors to reduce liability and salt runoff into the municipal storm system.

7.4 Annual Plan Review

Every spring, the Director of Public Works shall convene a review committee to:

1. Analyze the previous season's salt usage.
2. Update SVA maps based on new environmental data as available.
3. Identify equipment upgrades or training gaps for the upcoming season.

8.0 Current and Future Actions

The City is committed to the following actions over the next five years to support the objectives of this Salt Management Plan.

8.1 Research - Pilot Project (Salt Phytoremediation)

Toronto and Region Conservation Authority (TRCA) and York Region in collaboration with the City of Richmond Hill, are implementing a multi-year pilot project testing the effectiveness of certain plants along a section of Bayview Avenue to clean up road ditch salt contamination. The technique is referred to as salt phytoremediation. A specialized seed mix is to be applied along the east and west sides of Bayview Avenue to intercept salt before it reaches the Lake Wilcox watershed.

This pilot follows successful regional trials by the TRCA, proving these special grass mixes can successfully pull heavy salt loads out of the soil.

Implementation and performance of the pilot will be monitored and if successful will be considered in the next update of the SMP.

8.2 Monitoring - Relaunch the 2018 Pilot GIS Analysis

A GIS-based analysis was conducted in 2018 using the City's monitoring equipment installed on road salt applicators of trucks operating on City roads, with a focus on the Lake Wilcox watershed.

City staff completed a high-level analysis on the salt application activities by City and contractor staff. This pilot allowed the City to collect data regarding material application activities during winter events such as applied amount, location and truck ID; and the information was considered in the 2020 SVA study.

The pilot study confirmed that the information collected has the potential to provide useful insight into the salt application activities and help optimize the salt application program while reducing environmental degradation due to chlorides.

The functionality of the current City vehicle GIS monitoring technology will be assessed to determine the viability of reviving this 2018 pilot initiative using current technology.

8.3 Provincial Advocacy

In 2026, City of Richmond Hill Council passed a motion supporting Provincial action to help address the environmental damage caused by road salt contamination in Ontario's

waterways. Similar motions were passed by several other York Region and Ontario municipalities, and the motions have been endorsed by several conservation authorities including Toronto Region Conservation Authority. The motion highlights that the fear of slip-and-fall lawsuits drives private contractors to excessively over-apply salt, while high insurance costs due to unlimited liability put severe economic pressure on these businesses.

To resolve this issue, Richmond Hill Council formally requests that the Ontario government enact limited liability legislation paired with mandatory contractor certification and standardized best practices. Additionally, the motion calls for the creation of a provincially funded expert advisory committee on salt pollution, commits the City to minimizing its own salt use, and directs that the resolution be circulated to key provincial ministers, local MPPs, and municipal partners.

The City will continue to advocate for these measures.

8.4 Potential Contractor Licensing

In support of 8.3., the City will also be assessing the feasibility of licensing private snow removal contractors who service private residential and commercial properties in Richmond Hill.

The objective will be to ensure that these contractors are aware of the potential impact their plowing, salting and snow removal activities can have on the public right of way, the water bodies in Richmond Hill, and the environment. If feasible, licensing could be used to regulate private snow removal contractors, with Smart About Salt Certification required as a condition of obtaining the license.

This measure will be assessed in 2027 and if feasible, recommendations to Richmond Hill Council will follow.

9.0 Conclusion

In conclusion, this Salt Management Plan provides a balanced framework for maintaining safe roadways while fulfilling Richmond Hill’s commitment to environmental stewardship.

An important focus of Richmond Hill winter maintenance operations remains the protection of the City’s salt vulnerable areas as identified in the 2020 Salt Vulnerability Analysis & Salt Reduction Plan. By integrating technologies, physical assets, best

practices, and staff training, the City aims to reduce chloride loading particularly within the sensitive zones such as the Lake Wilcox area.

This plan remains an adaptive, living document. The City will continue to monitor usage data and water quality to ensure a resilient transportation network that protects the environment and natural landscapes for generations to come.

The next formal update to this plan is expected in 2031.

City of Richmond Hill Version Control	Version	Prepared by: Director Public Works Operations Approved by: Commissioner Community Services
Salt Management Plan (2026)	1	Revision #0 – November 1, 2026