

# **CITY OF VAUGHAN**

## **PUBLIC WORKS DEPARTMENT Road Maintenance Services**

# **Salt Management Plan**

*Original Approved by Council: April 11, 2005*

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## **1.0 INTRODUCTION**

### **1.1 Overview**

The City of Vaughan currently has a framework of road system that is composed of approximately 790 kilometres (total lane of 1,518 kilometers) -of which 347 kilometers are considered primary roads and 440 kilometers secondary roads - a total of 79 kilometers of sidewalks, 40 kilometers of Park Walkways, and 12 kilometers of Walkways, and 514 cul-de-sacs and dead ends. This road system provides safe, efficient, and affordable means of surface transportation for road users. People rely on the roadway network all year round for transport to workplaces, to recreational and leisure facilities, for transport 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 is considered as the most important priority for the winter maintenance operations, practices, and strategies expressed in this Salt Management Plan. The City, like other road authorities, must use road salt to maintain safe roads and sidewalks for the people during the winter.

In 2001, Environment Canada released an assessment report stating that road salts are entering the environment in large amounts and are posing a risk to plants, animals, birds, fish, lake and stream ecosystems and groundwater. The report recommended that salt be designated toxic under the Canadian Environment Protection Act (CEPA). **It should be noted that Health Canada stated that road salts are not harmful to humans.** Environment Canada has stated that they will not ban road salts, but rather they will encourage users in developing a management strategy.

On April 3, 2004, Environment Canada published the Code of Practice for the Environmental Management of Road Salts. Its purpose is to guide road authorities in developing salt management plans to reduce environmental harm caused by road salt. The Code applies to organizations using more than 500 tonnes of road salt annually (based on a 5 year average) or those having vulnerable areas that could be potentially impacted by road salts. Municipalities using fewer than 500 tonnes of road salt annually are encouraged to follow best practices in the management of road salt. The Code of Practice can be accessed on [www.publicworks.ca](http://www.publicworks.ca) website.

While the development of salt management plans remains non-regulatory, Environment Canada strongly urges municipalities using 500 tonnes of road salt or more annually to submit a Letter of Intent by October 3, 2004. This letter will state the municipality's intention to develop a salt management plan. Municipalities that do not submit a Letter of Intent will be contacted by Environment Canada's nearest Regional Office to discuss their intentions. If the municipality has already developed a salt management plan, you should still send a Letter of Intent to Environment Canada indicating that the plan exists.

Municipalities have been asked by Environment Canada to prepare a Salt Management Plan by April 3, 2005 (i.e. one year after the publication date of the Code of Practice).

“It is recommended that implementation of the salt management plan begin in the fiscal year following the preparation of the salt management plan.”

Each June 30th, following the implementation of the salt management plan within the municipality, a report is required to be sent to Environment Canada encompassing the following:

1. Salt Management Plan (initial approval date and/or latest date of revision)
2. Materials used (quantities of all products used in winter maintenance)
3. Material storage
4. Road salt application practices
5. Snow disposal
6. Winter maintenance training
7. Areas vulnerable to road salt
8. Environmental monitoring

Considering the environmental concerns regarding road salt the City of Vaughan's Public Works Department has developed a Salt Management Plan in 2005, which has been endorsed by the City's Council on April 11, 2005. The plan addresses 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 the City's use of salt.

While we look for ways to reduce salt use, users' safety - both pedestrians and drivers - remain the most important priority within winter maintenance operations, practices and strategies contained in the Salt Management Plan.

Although there is ongoing research into the use of alternatives to road salt (sodium chloride) in winter maintenance, salt continues to be the most cost-effective de-icer across Canada. However, because of the adverse effects that salt has on the environment, the Salt Management Plan tries to minimize the amount of salt entering the environment by including best salt handling practices, and using new technologies to ensure its most effective use over the road system.

The review strategy in the Salt Management Plan requires new technologies to be investigated and trials conducted on promising developments and discussed in annual assessments. This document presents an overview of the Salt Management Plan.

## **1.2 Purpose of the Salt Management Plan**

The intend of the Salt Management Plan is to set out a policy and procedural framework for ensuring that the City of Vaughan continuously improves the management of road salt used in winter maintenance operations. It was based on a comprehensive comparison of past practices against best management practices. The plan sets out specific goals for improving the City's salt management practices.

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Any modifications to the City's winter maintenance activities must be done in a way that they provide safety to the roadway and mobility to the user during the snow and ice season.

The SMP is meant to be dynamic to allow the municipality to evaluate and phase-in any changes, new approaches and technologies in winter maintenance activities in a fiscally sound manner. At the same time, any modifications to municipal winter maintenance activities must ensure that roadway safety is not compromised.

### **1.3 Format of the Plan**

The Salt Management Plan information has been organized into the following sections:

#### ***Section 2.0***

This section presents the policy direction approved by the City of Vaughan Council. These policies are summarized in Section 2.

#### ***Section 3.0***

This section presents the Winter Maintenance Policies relevant to Salt Management. It focuses on Levels of Service, Spreader Settings and Snow Removal and Disposal Policies.

#### ***Section 4.0***

This section shows the summaries of operational practices and strategies for snow and ice control related to the road salt management. This section contains a series of sub-sections that can be modified as new policies, procedures and practices are introduced and refined.

#### ***Chapter 5.0***

This section introduces the approach for monitoring the implementation of the plan and how to maintain & update it with the focus on continuous improvement.

### **1.4 Responsibilities**

Everyone in the City of Vaughan involved in winter road maintenance has some responsibility for developing, implementing and reviewing the success of the Salt Management Plan. It is through the cooperation and effort of these people that the City will achieve the goal of reducing the environmental effects of its road salt while maintaining safe roads.

## **2.0 SALT MANAGEMENT POLICY**

### **2.1 Vision and Goals**

In the City of Vaughan planning decisions, reflected in the official Plans, are made based on a balance among the following factors: protecting the natural environment, enhancing economic competitiveness, and fostering a healthy and equitable society. The ultimate goal is to enhance the quality of life for all

residents of Vaughan.

This Salt Management Plan is in support of the Official plans, visions, and goals of the City of Vaughan.

The Public Works Department will be the lead in de-icer usage in an environmentally sensitive manner, while providing for safe road and sidewalk conditions during the winter. Optimizing the use of de-icers on the roads and sidewalks and minimizing the salt impacts to the environment will be the Public Works Department's responsibility. The Public Works Department will also provide safe winter conditions for vehicular and pedestrian movements as required by level of service policies.

## **2.2 Policy Statement**

The City of Vaughan will provide efficient and effective winter maintenance to ensure the safety of users of its road networks, in conjunction with Provincial Legislation and accepted standards. At the same time, the City will try to minimize the adverse effects of road salt on our environment. In order to achieve this commitment, the City will:

- Meet and comply with the guidelines contained within the Salt Management Plan;
- Review and upgrade (if needed) the standards in the Salt Management Plan annually to consider new technologies, approaches, and developments;
- Work with Environment Canada, other transportation agencies, and environmental groups to upgrade best winter maintenance practices, and
- Commit to continuous training and education for the staff.

## **2.3 Application**

This policy is adopted by the Public Works Department and is applicable to all Winter Maintenance Operations staff.

## **2.4 Conditions**

There are a number of activities that will guide the ongoing process of upgrading the Salt Management Plan. The plan is based on activities and continuous improvement on an on-going basis. It includes the following activity items:

- Review and Analysis of Industry Approaches and Practices
- Implementation and Documentation of the Plan
- Staff Education and Training

- Monitoring and Analysis
- Management Review
- Environmental Review and
- Practices and Policy Revision.

## **3.0 WINTER MAINTENANCE POLICIES**

### **3.1 Introduction**

This section documents the snow and ice control standards of the City of Vaughan. The major activities related to winter maintenance are as follows:

- Snow ploughing (roads, sidewalks, laneways)
- Salt/sand spreading
- Salt and sand storage
- Snow removal and disposal from City streets
- Snow storage
- Snow ploughing at driveway entrances, bus stops, and municipality owned/operated parking lots

The City of Vaughan is responsible for winter maintenance on:

#### Roads

Hot Mixed Asphalt: 860 centre line km

Unpaved Roads: 26 centre line km

#### Sidewalks

Concrete or Asphalt Sidewalks: 824 km

The City of Vaughan has jurisdiction over all City owned municipal highways in its boundaries. However, the Region of York maintains all Region roads contained within the City's boundaries. The City's roads fall under the following classification of highways: Class 2, 3, 4, 5, and 6 per Ontario Reg. 239/02 made under the Municipal Act 2001.

### 3.2 Level of Service Policies – Road De-Icing and Ploughing

For the purpose of snow ploughing, salting, snow & ice control, and snow removal & disposal operations, the City’s roads have been classified into three classes. The roads de-icing and ploughing is shown in Table 1 (Existing Level of Service). The Level of Service (LOS) for winter operation is shown in Table 2. The LOS standards are driven by the technical requirements of the winter operations.

**Table 1 – De-icing & Ploughing Chart**

<b>Road Classification</b>	<b>Type of Winter Service♣</b>	<b>De-Icer</b>	<b>Application Rates* (kg/lane km)</b>	<b>Duration to Complete the De-Icer Operation</b>
Primary Roads	Bare Pavement	100% Rock Salt	170 kg	5 cm of snow & within 4 hrs after snowfall stops
Primary Roads	Bare pavement	100% Rock Salt	130 kg	2-4 cm of snow and within 4 hrs after snowfall stops
Primary Roads	Bare pavement	100% Rock Salt	85 kg	Less than 2 cm of snow and within 4 hrs after snowfall stops
Secondary Roads	Limited Bare Pavement	100% Rock Salt	170 kg	5 cm of snow & stopped 12 hrs after snowfall stops
Secondary Roads	Limited Bare Pavement	100% Rock Salt	130 kg	2-4 cm of snow & stopped 12 hrs after snowfall stops
Secondary Roads	Limited Bare Pavement	100% Rock Salt	85 kg	Less than 2 cm of snow & stopped 12 hrs after snowfall stops
Rear Laneways♣	Safe & Passable Pavement	100% Rock Salt	130 kg	2+ cm of snow & stopped 24 hrs

♣This is the desired condition of the pavement surface. However, it is necessary to have sufficient traffic volumes to activate and improve the characteristics of the de-icer, the time to achieve this condition will vary with the time, duration and intensity of each storm event.

\* The City is also experimenting with a modified salt product called “ClearLane”. This product is being used in the west portion of the City, and is applied at 80% of the rates indicated for rock salt.

#### Special Cases

If any one or more of the following cases present, the winter service level should be bumped-up according to the next highest road classification:

- Slope >4%
- Presence of emergency services (i.e. police, fire or ambulance station, hospital)
- Public Transit bus route including turnaround loops

In the worst-case scenario, the highest application rate could be increased to 255 kg/lane km.

**Table 2 – (Level of Service Policy)**

Road Classifications	Pavement Condition after Salt/Sand Application	Ploughing Starts After Accumulation of (cm) of Snow	Ploughing Completion Time (hr) After the End of Snowfall			
			5 cm of Snow	5-15 cm of Snow	15-25 cm of Snow	25+ cm of Snow
Primary Roads	Bare Pavement	5 and continues	4 ♣♣	4 ♣♣	4 ♣♣	4 ♣♣
Primary Roads	Centre Bare	5	4	4	4	4+
Primary Roads (Gravel)	Limited Bare / Snow Covered	5	4	4	4	4+
Secondary Roads	Limited Bare	5	16	16	16	16+
Secondary Roads (Gravel)	Limited Bare / Snow Covered	5	16	16	16	16+
Laneways	De-Icer required to Maintain Passable Conditions	5 cm Removal based on the local condition and 15 cm	24	24	24	24+

Notes:

♣♣Ploughing on primary roads is continuous for bare pavement conditions

The Level of Service policy for the City of Vaughan currently meets or exceeds the Minimum Maintenance Standards (MMS) specified in the Ontario Regulation 239/02, *Municipal Act, 2001*, for snow accumulation and icy roads. Winter maintenance season commences November 15 and is completed April 15.

The Code of Practice for the Environmental Management of Road Salts, under the Canadian Environmental Protection Act, 1999 recommends that the Salt Management Plan follows the Transportation Association of Canada, Syntheses of Best Practices for Road Salt Management.

The current policy is to apply a solid de-icer once the snow starts to accumulate or “stick” on the road surface. This is a proactive strategy that reduces the amount of salt that would be lost if solid de-icer was applied to dry pavement prior to a storm, and ensures timely applications on major expressways and arterials (i.e. within the first hour of any significant snow or ice accumulations). Early application of chemical is critical in preventing ice forming and ice binding to the pavement surface. Without this chemical, the snow would bond to the road and would be very difficult to plough off. The chemical is allowed to work before ploughing occurs. As the snow accumulates, it is ploughed to maintain safe driving conditions.

### 3.2.1 Winter Patrol

The City of Vaughan carries out winter patrol using a split shift. Patrollers are available 7 days a week from 8:00am to 5:00pm and 8:00pm to 5:00am to provide road condition inspection during the winter season. Should storm conditions warrant the patroller remains on duty until relieved by the next shift. The patroller is responsible for mobilizing winter maintenance operators to ensure that the roads are cleared in a timely fashion while remaining in compliance with established service standards.

The patrollers are familiar with local conditions in their patrol area, and prepare a condition log of road and weather conditions as well as any actions taken during the shift. The winter patrol schedule parallels the designated winter season.

### 3.2.2 Staffing and Hours of Work

The City of Vaughan uses contractor people assigned to each vehicle used for winter operations. Each vehicle is assigned a route for sanding/salting and/or ploughing. The City of Vaughan adheres to the hours of work as set out in the Highway Traffic Act, Reg.4/93. When the driver has completed his 13 hours driving time in his/her 15 hour on-duty time, he/she then is sent home for the 8 hour off-duty period before driving the next shift.

### 3.2.3 Winter Material Used Annually

<b>Material</b>	<b>2006/2007</b>	<b>5 Year Average</b>
<b>Solids</b>		
Rock Salt (NaCl)	21,014.59 tonnes	21,929 tonnes
Sand ♣	465 tonnes	1525tonnes
<b>Liquids</b>		
Salt Brine (NaCl)	N/A	N/A
Calcuim Chloride (CaCl <sub>2</sub> )	N/A	N/A
Magesium Chloride (MgCl <sub>2</sub> )	N/A	N/A
Proprietary Product 1	N/A	N/A
Proprietary Product 2	N/A	N/A
<b>Pre-treated material</b>		
Pre-treated sand	N/A	N/A
Pre-treated salt	N/A	N/A
<b>Other</b>		
ClearLane by Cargill De-Icing Technologies	2,048.61 tonnes	13,025

♣ Sand is applied on sidewalks, and on rural (gravel), roads only

### **3.3 Equipment – Fleet Size**

The City of Vaughan uses a variety of equipment including ploughs, spreaders, and combined units. The total size of the fleet is 113. An inventory of municipal equipment **and contract equipment** used for winter maintenance is found in **Appendix 1**.

### **3.4 Snow and Ice Control Material**

#### **3.4.1 Salt / Sand Storage**

The City of Vaughan uses straight salt on roads in the urban areas. However, a sand / salt mixture is used in the rural areas on gravel roads, and by Parks Department staff on some sidewalks and parks trails. Four years ago, the Public Works department started using a new product called “ClearLane Treated Salt” on a trial basis on road network located in Woodbridge area and West of Weston Road. The composition of the new product is Sodium Chloride (93.6%-96.3% concentration), Magnesium Chloride Hexahydrate (0.5%- 1.5% concentration), Magnesium Sulfate (0.02% - 0.12% concentration), Molasses Solids (0.45% - 2.40% concentration), and Water (2% - 3% concentration). All de-icing materials are stored under cover in permanent storage structures.

##### **3.4.1.1 Yard Facilities**

The City of Vaughan uses the provincial standard grade of road salt. All salt is stored in indoor facilities on impermeable floors. Currently, the City has three salt storage facilities. The winter maintenance is operated from these three patrol yards. A list of the Yard facilities with storage and drainage used for winter maintenance is shown in **Appendix 2**.

### **3.5 Training**

The Public Works Department, through a combination of in-house and contracted services, provides winter maintenance related training to its Roads Division staff during fall of the year. The training includes: Pre-season preparation, weather basics, snow and ice control, equipment operations, RWIS, and salt management.

### **3.6 Snow Removal and Disposal**

Snow ploughing operations causes snow accumulations at the roadside known as windrows or mounds. In addition, when ploughing the cul-de-sacs, snow is piled into the middle of the court. The snow removal operation starts when these windrows reach volumes that create a nuisance or hazard to pedestrians and motorists. Removal of snow from the cul-de-sacs commences when the height of the pile creates a potential for children to tunnel into or slide down the pile.

Experience over the years has shown that the City must have the capability and capacity to remove and dispose of this snow in a two-week period. Snow removal involves the use of front-end loaders and trucks in conjunction with contracted trucks and front-end loaders.

Over the years the City has used various different land disposal locations to disposal of snow. Many of the snow disposal sites had environmental and operational constraints. Currently, the municipal staff removes and hauls snow to the City-owned properties on McLeary Court and at the Dufferin Street when the resultant accumulation of piled snow impedes traffic within the business districts or residential areas. In the spring, litter and debris are collected for disposal from all snow disposal sites.

The McCleary Court site consists of two industrial sized lots. The lots have been graded towards ditches located at northeast site on CNR lands. Berms were constructed in 2001 to direct the snowmelt to the outlet and to confine the drainage to the property. The property is grass covered and is not fenced.

The Dufferin Street site is located at north end of the Dufferin Yard and has an area of half hectare. The property is graded southerly to direct the runoff water resulted from snowmelt towards the west side of the paved area adjacent to Highway 407. Berms have been installed along the perimeter of the property.

### **3.7 Weather Monitoring**

The City of Vaughan supplements road patrol information to determine an effective winter storm response and allocation of resources with observations from municipal staff, communication with staff of adjacent municipalities and MTO contractors, and customized weather forecasts which are updated 4 times/day from The Weather Network. Staff monitors websites, such as, Environment Canada's for weather forecasting and radar, and staff also monitors pavement temperatures by means of on-board infra red thermometers which are mounted on the patrol trucks. They also access MTO's RWIS data and pavement temperature forecasts for the provincial highways.

In 2005, the City also partnered with The Weatehr Network with the installation of the City's first RWIS/Weather station. The station is located on Martin Grove Road, just south of Highway 7. Staff attended a full-day training session on its use, and use it not only to monitor existing weather conditions, but to check on pavement temperature and de-icing chemical presence on the pavement.

### **3.8 Communications**

All winter maintenance vehicles are equipped with two way communications (radios, cell, etc.), and municipal staff is responsible for reporting changing winter weather and/or road conditions. The municipal Public Works facility serves as the main hub for in/outgoing calls from staff, emergency services and the general public. At this location the communication centre is staffed *24 hours/7 days* a week during the declared winter season.

External communications with the general public regarding winter maintenance services and salt management practices - ranges from media press releases to information – are posted on the City of Vaughan web site to response to individual inquiries.

### **3.9 Sidewalk Snow Clearing**

Sidewalk snow ploughing is the removal of snow and ice on sidewalks on both City and Regional road allowances and on some predetermined park pathways using specialized equipment.

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Primary sidewalks are usually defined as: sidewalks that front City owned facilities, parks and other properties; sidewalks that are located on a public transit route; and/or, sidewalks that have been identified as being Primary by staff due to exceptional circumstances.

Secondary sidewalks are usually defined as: all other sidewalks and walkways and are usually located in residential neighbourhoods where the abutting private property owner is responsible for snow clearing responsibilities, as per By-law 300-93.

**Sidewalk Snow Ploughing** Operations will commence when approval has been given to commence a snow ploughing operation by the Manager of Parks Services or the designated representative in consultation with the Manager of Road Maintenance Services or designated representative.

When determining whether or not to clear snow from sidewalks when snow accumulation is less than 5 cm, the following other factors shall be taken into consideration:

1. Drifting snow, where it is likely to create hazardous conditions.
2. Windrows at intersections from road plowing operations that are likely to create an obstruction to the safe passage of pedestrians or may obstruct the view of drivers.

Circumstances permitting, one complete pass of primary sidewalk routes shall be done within 4 hours of commencing operations when snow accumulation has reached 5cm or more/that secondary routes will be done only after all primary routes are complete/ if circumstances permit all secondary routes will be completed with 16 hours after starting secondary sidewalk plowing/ that with snowfalls of less than 5cm action will be directed by the supervisor.

**Sidewalk Salting / Sanding** Operations will commence when approval has been given to commence a snow ploughing operation by the Manager of Parks Services or the designated representative in consultation with the Manager of Road Maintenance Services or designated representative.

When determining whether to apply de-icing and/or abrasive materials, the following factors shall be taken into account:

1. The temperature is forecasted to remain below 0 degrees Celsius
2. Sleet or freezing rain has fallen and the ambient temperature is not likely to exceed 0 degrees Celsius, or
3. The ambient temperature following a snowstorm will remain below 0 degrees Celsius.

Under normal circumstances, sand/salt shall be applied to Primary sidewalks only. However, should sleet or freezing rain as described in #2 above be a factor, materials shall be applied to all sidewalks.

### **3.10 Record Keeping**

The municipality retains records for the purchase of salt and sand for use in winter maintenance. The City

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also requires its contractors to produce print outs from the spreader units in the trucks. Records are also kept for the number of storm events. The City keeps the forms and records of leased equipment and contract personnel for the number of hours spent on salting or ploughing per received invoices. The forms are used to reconcile activities to submitted invoices, and are compiled to give a cumulative picture for each winter season.

## **4.0 OPERATIONAL PRACTICES AND STRATEGIES**

### **4.1 Overview**

This Section 4.0 discusses 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 presents a discussion of the objective, environmental considerations, current situation, plan goal, responsibilities, performance measures and references (documents or tables). The important character of the plan is that it is dynamic and obviously takes time to implement.

### **4.2 Key Objectives**

Table 4 summarizes the key objectives of the Salt Management Plan.

**Table 4**

<i>Activity</i>	<i>Objectives</i>
Level of Service	Update the Level of Service Policy as required. Define more detailed description of road classifications.
Alternative De-icing Materials	Continuing the usage of ClearLane and other modified salt products or additives, and monitor the performance and effects of the products.
Electronic Controls for Spreaders	Continue to require ground speed regulated electronic controllers in all of the City-owned and contracted salt spreaders.
Spreader Calibration	Develop standardized salter calibration procedures. Continue to require calibration of all spreaders each fall. Check calibration on a regular basis and recalibrate as needed.
Equipment Washing	Ensure the equipment washing is done at the JOC yard where the wastewater will pass through the oil/water separators before discharging into the sewer system.

<i>Activity</i>	<i>Objectives</i>
De-Icer Record Keeping	Develop record keeping for each vehicle and each storm event and comparing periodically to set benchmarked rates for the particular year to confirm the calibrations.
Housekeeping Practices	Develop a housekeeping code of practice to improve the salt management practices at storage facilities (yards).
Weather Forecasting	Provide additional training to staff on interpreting weather information for making snow and ice control decisions.
Road Weather Information System (RWIS)	Implement additional RWIS stations. Provide additional training to staff in using RWIS.
Winter Patrolling	Develop patrol guidelines to ensure that the Level of Service Policy is met.
Training	Provide continuing training to staff in the following areas: <ul style="list-style-type: none"> <li>• Weather interpretation</li> <li>• Pavement conditions to make snow and ice control decisions</li> <li>• Infra-Red thermometers</li> <li>• Record keeping and review</li> </ul>
Snow Removal & Disposal Guidelines	Develop snow removal & disposal guidelines.
Reviewing New Technology	Conduct pilot studies using new technology and products.
Communications	Maintain and update the City's web site by providing information to the public on the City's approach to winter maintenance and salt management
Monitoring Program and Sensitive Areas	Identify environmentally sensitive areas in conjunction with TRCA for monitoring and using the results to upgrade the salt management plan
Monitoring of Salter Operations	Reinstate the use of GPS technology in all City-owned and contracted equipment.

## **5.0 CLOSING**

The City of Vaughan is committed to provide properly maintained roads in accordance with its level of service policy. At the same time, the City is committed to reducing the impact that de-icing chemicals, such as salt, have on the environment.

The City has developed a comprehensive Salt Management Plan that it is committed to implementing over the next 5 years. The City will also continue to improve the plan as more salt management techniques become available.

**APPENDIX 1**

**“Equipment – Fleet Size”**

The following chart shows the type of equipment, number of equipment, rental or owned for winter operation.

**Equipment – Fleet Size Chart**

<i>Equipment Type</i>	<i>Number</i>	<i>Rental / Owned</i>	<i>Remarks</i>
Plowing Units	42	Rental	Dale Farren and Gazzola Paving
Plowing Units	3	Owned	
Salting Units	24	Rental	Dale Farren and Gazzola Paving
Salting Units	5	Owned	
F E Loader	3	Leased	Caterpillar 950 G 4 yd bucket
F E Loader	1	Owned	Case
Backhoe	1	Owned	Ford
Grader	1	Owned	Champion 740A
Mobile Conveyor Belt	1	Owned	McCloskey 85'
Backhoe for Windrow Clearing	34	Rental	Windrow Enterprises and Crupi Construction
Dump Trucks (Tandem and Tri-axle)	As required	Rental	Hired as needed for snow removal
4 x 4 Truck Ploughs	18	Rental	For laneway, and cul-de-sac ploughing

**APPENDIX 2**

**“Yard Facilities”**

The yard facilities are located at No. 2800 Rutherford Road (known as the JOC), No. 4630 Langstaff Road (known as the Woodbridge yard), and No. 8000 Dufferin Street (known as the Dufferin yard).

The following chart shows the Yard Facilities in the City of Vaughan:

**Yard Facility Chart**

<i>No</i>	<i>Name</i>	<i>Dome Capacity (tonnes)</i>	<i>No. of Domes</i>	<i>Drainage</i>
1	JOC Yard	6,000	2	
2	Woodbridge Yard	4,000	1	
3	Dufferin Yard	6,000	1	