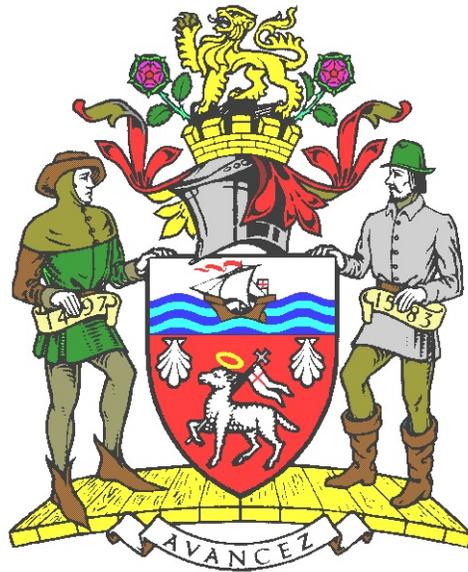


**CITY OF ST. JOHN'S**



**DEPARTMENT OF PUBLIC WORKS & PARKS**

**SALT MANAGEMENT PLAN**

**Original Approved by Council: November 7, 2005**

**Revision 1:**

**Revision 2:**

## **1.0 PURPOSE OF THE SALT MANAGEMENT PLAN**

This Salt Management Plan (SMP) sets out a policy and procedural framework for ensuring that the City of St. John's continuously improves on the effective delivery of winter maintenance services and the management of road salt used in winter maintenance operations, as outlined in Environment Canada's Code of Practice for the Environmental Management of Road Salts.

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.

As specified in the Code of Practice for the Environmental Management of Road Salts, the SMP is endorsed by the City of St. John's Council.

## **2.0 POLICY CONTEXT**

### **2.1 SALT MANAGEMENT - OBJECTIVE**

The City of St. John's is committed to improving winter maintenance operations while continuing to ensure public safety. The City of St. John's will optimize the use of winter maintenance materials containing chlorides on all municipal roads while striving to minimize negative impacts to the environment. The City of St. John's Department of Public Works and Parks staff will strive to provide safe winter road conditions for vehicular and pedestrian traffic as set out in the level of service policies and within the resources established by the City of St. John's Council.

### **2.2 POLICY STATEMENT**

The City of St. John's will provide efficient and effective winter maintenance to ensure the safety of users of the municipal road network in keeping with applicable provincial legislation and accepted standards while striving to minimize adverse impacts to the environment. These commitments will be met by:

- 1) adhering to the procedures contained within the Salt Management Plan;
- 2) reviewing and upgrading the Salt Management Plan on an annual basis to incorporate new technologies and new developments;

- 3) committing to ongoing winter maintenance staff training and education; and,
- 4) monitoring on an annual basis, the present conditions of the winter maintenance program, as well as the effectiveness of the Salt Management Plan.

### 3.0 WINTER MAINTENANCE STANDARD

#### 3.1 MAJOR WINTER ACTIVITIES

The major activities related to winter maintenance are:

- 1) snow plowing
- 2) salt / sand spreading
- 3) salt and sand storage
- 4) snow removal
- 5) snow storage
- 6) sidewalk plowing

#### 3.2 ROAD SYSTEM MAINTAINED

The City of St. John's is responsible for winter maintenance on:

Paved roads	583.4	2 lane km (centre line)
Surface treated roads	0.0	2 lane km (centre line)
Unpaved roads	10.0	2 lane km (centre line)
Sidewalks	96.1	km
Paths and Trails	0.0	km

The road system is made up of the following roads. The table shows lane kilometers.

**Table 3.1: Road System by Surface Type & Priority**

Priority	Paved	Surface Treated	Unpaved	Total
Priority 1	475.6	0.0	0.0	475.6
Priority 2	179.8	0.0	0.5	180.2
Priority 3	509.4	0.0	10.1	519.5
Priority 4	3.4	0.0	6.0	9.4
Total	1,168.1	0.0	16.6	1,184.7

### 3.2.1 Street Priorities

For snow plowing and ice control, streets in the City of St. John's are categorized into four different priorities. They are:

- Priority 1: Major/minor arterials and through streets that have steep hills with a grade of more than 12%;
- Priority 2: Collectors/Metrobus routes/school areas and dead end streets that have steep hills with a grade of more than 12% grade;
- Priority 3: Local streets, including cul-de-sacs;
- Priority 4: City maintained private lanes.

Due to the severity of the grade of many streets in St. John's it has been necessary to increase the priority of these hills for public safety and operational reasons. As well, all streets on the City's bus routes have been categorized as a minimum priority 2.

In addition, the City is responsible for the provision of and service to 64 salt boxes located throughout the City. Salt boxes are provided on selected public right-of-ways which are inaccessible to the City's regular ice control units.

### 3.3 LEVEL OF SERVICE POLICY

The streets of St. John's are maintained to the performance and service objectives developed by the Streets & Parks Division of the Department of Public Works & Parks.

#### 3.3.1 Performance

As outlined in Policy 08-01-03: Ice Control, in areas where the application is of salt alone, the rate and frequency of application shall be sufficient to provide traction upon application, and subsequent melting of accumulated snow and ice, where reasonable.

#### 3.3.2 Frequency of Coverage

- Ice Control: Complete one application of ice control materials on all streets within three (3) hours.
- Snow Plowing: (a) For storms up to 25 centimeters, complete an initial cut on all streets within twelve (12) hours following the end of the storm.

- (b) For storms greater than 25 centimeters, and for extenuating circumstances (such as drifting conditions, extreme snow accumulations), the time to complete the initial cut will increase.

The normal winter maintenance season commences November 1<sup>st</sup> and is completed April 30th.

Policies containing more detail on the various operations are contained in Appendix 1.

### 3.4 SNOW AND ICE CONTROL MATERIALS

#### 3.4.1 Winter Materials Used Annually

**Table 3.2: Materials Used by Season**

Material	2004/2005	5 Year Average
<b>Solids</b>		
Rock Salt (NaCl)	21,733 tonnes	29,350 tonnes
Sand*	643 tonnes	1,278 tonnes
<b>Liquids</b>		
Salt Brine (NaCl)**	268,427 liters	268,427 liters
Calcium Chloride (CaCl <sub>2</sub> )	N/A liters	N/A liters
Magnesium Chloride (MgCl <sub>2</sub> )	N/A liters	N/A liters
<b>Pre-treated material</b>		
Pre-treated sand	N/A tonnes	N/A tonnes
Pre-treated salt	N/A tonnes	N/A tonnes

\* The City of St. John's doesn't use a salt/sand mix.

\*\* These liters represent the volume for January 2005 to the end of the winter. There was no meter on the brine tanks before then.

In the winter of 2003/2004 the City revised its specifications for road salt and imposed penalties on the supplier for failing to meet any of the required specifications.

Table 3-3 gives a further breakdown of salt usage in tonnes by month for each winter season.

**Table 3.3: Tonnes of Salt Used by Winter by Month**

Year	Salt Usage (Tonnes)						
	Nov	Dec	Jan	Feb	Mar	Apr	Total
1999/2000	1,215	2,975	10,858	7,895	3,697	596	27,236
2000/2001	3,039	4,650	15,014	9,655	5,721	3,934	42,012
2001/2002	1,272	2,183	10,470	5,742	4,857	1,557	26,080
2002/2003	2,623	4,517	11,862	5,497	5,028	1,802	31,328
2003/2004	403	3,386	10,716	5,256	5,057	778	25,596
2004/2005	40	3,279	8,975	4,375	4,705	359	21,733
Average	1,432	3,498	11,316	6,403	4,844	1,504	28,997

### 3.4.2 Application Rates

The following tables contains the City of St. John's application rates for salt and sand, pre-wet salt and anti-icing brine. Until 2002, the maximum application rate for salt was set at 500 kg per 2 lane kilometer. Since then this has been halved to a maximum of 250 kg per two lane kilometer. In addition, both pre-wetting and anti-icing have only been introduced in the City over the last few years. As such, the City is in the process of determining what application rates work well under certain weather conditions for all its winter snow and ice control materials.

**Table 3.4: Application Rates by Priority - Road Salt & Sand**

Solids	Spreading Rates per 2 lane km	
	Salt	Sand
Highway Class		
Priority 1	50-250 kg	N/A
Priority 2	50-250 kg	300-500 kg*
Priority 3	50-250 kg	300-500 kg
Priority 4	50-250 kg	300-500 kg

\* There is only one road that is classified as Priority 2 that has sand applied. This is because it is on a bus route and all the houses on it are serviced by wells. During the summer of 2005 this road is having water and sewer installed so it will be removed from the list.

**Table 3.5: Application Rates by Storm Type: Pre-Wet Road Salt**

Storm Type	Spreading Rates per 2 lane km Temperature		
	0 to -5C	-5 to -10C	-10 to -18C
Frost	50-100 kg	50-100 kg	50-100 kg
Light Snow	75-150 kg	75-150 kg	75-150 kg
Heavy Snow	175-200 kg	175-200 kg	175-200 kg
Freezing Rain	175-200 kg	175-200 kg	175-200 kg

**Table 3.6: Application Rates: Anti-Icing**

Liquids – Direct Application	Application Rates liters per lane km
<b>Frost and Black Ice Prevention</b>	
Light Traffic/Low Volume	N/A
Heavy Traffic/High Volume	N/A
<b>Anti Icing – Preventing or Reducing Bond to Road Surface</b>	
Light Traffic/Low Volume	115
Heavy Traffic/High Volume	115
<b>De-icing</b>	
Mild temp/ light precipitation	N/A
Colder temp/moderate precipitation	N/A

### 3.5 YARD FACILITIES

The municipality has two depots from which it operates its winter maintenance. A list of the facilities with storage and drainage used for winter maintenance is found in Appendix 2.

#### 3.5.1 Municipal Depot

The Municipal Depot salt shed has the capability of storing the following:

- 1) 5,000 tonnes of road salt,
- 2) 100 tonnes of pre-wet salt
- 3) 2,000 tonnes of sand
- 4) Two brine tanks that have a total capacity of 37,854 liters (10,000 U.S. gallons).

### **3.5.2 Goulds Satellite Depot**

The Goulds Satellite Depot doesn't have any salt or sand storage capability.

### **3.5.3 Salt Supplier Facility**

The City of St. John's orders 35,000 metric tonnes of road salt on an annual basis. The current supplier for salt to the City (A. Harvey & Co. Ltd.) operates a facility on the St. John's waterfront. Salt is stored by the supplier under tarpaulins on their wharf and trucked to the Municipal Depot by the supplier, on an as required basis, in 500 to 1,000 tonne quantities. The salt is weighed at the suppliers scales and checked at the Municipal Depot's scales.

As well, small amounts of salt are picked up by City trucks and used on City streets directly from the supplier.

## **3.6 EQUIPMENT - WINTER MAINTENANCE FLEET**

An inventory of municipal equipment used for winter maintenance is found in Appendix 3. All trucks used for spreading salt and sand have Dickey-John Control Point System electronic spreader controls. As well, the loader and the backup loader used for the loading of salt into these trucks have the Loadrite electronic onboard weighing system installed. This system is manufactured by Actronic Ltd.

## **3.7 STAFFING AND HOURS OF WORK**

From December 1<sup>st</sup> to March 31<sup>st</sup>, winter operations are maintained 24 hours per day through the use of three shifts. The day shift normally runs from 12:00 PM to 8:00 PM with the exception of Saturday & Sunday when it runs from 12:00 PM to 10:00 PM, and the night shift normally runs from 12:00 AM to 8:00 AM with the exception of Tuesday & Wednesday when it runs from 12:00 AM to 10:00 AM. In the event of a major storm requiring continuous equipment operations, equipment operators work additional hours until such times as the next shift reports to duty.

For each shift, the City of St. John's has a full time employee assigned to each vehicle used for winter operations. Each vehicle is assigned a route for sanding/salting and/or plowing. Each shift is made up of the following personnel:

**Table 3.7: Number of Positions by Shift**

<b>Position</b>	<b>Number</b>
Foreperson	4
Laborers	9
Welders	1
Salt Shed-First Class Equipment Operators	1
First Class Equipment Operators	50
<b>Total</b>	<b>65</b>

As outlined in City of St. John's Policy 03-07-17: Maximum Working Hours, staff involved in City operations are permitted to work a maximum of sixteen (16) hours within a twenty-four (24) hour period, except where the conditions present a hazardous situation as defined in the Newfoundland Labour Standards Act.

### **3.8 WINTER PATROL**

The City is divided into four distinct areas for winter road maintenance.

#### **3.8.1 Non-Shift Period: November 1<sup>st</sup> - November 30<sup>th</sup>, April 1<sup>st</sup> -April 30<sup>th</sup>**

For the period before the winter shift starts on December 1<sup>st</sup> and after it ends on March 31<sup>st</sup>, the foreperson assigned to each of the four designated areas is responsible for providing road condition inspection during normal working hours from 8:00 am to 4:00 pm, Monday to Friday. After normal working hours the responsibility for the whole City switches to one of the three Utility forepersons who cover the remaining weekly hours on shift.

Personnel are called in on an as-required basis during this time frame.

#### **3.8.2 Shift Period: December 1<sup>st</sup> - March 31<sup>st</sup>**

Once the winter shift starts, the foreperson assigned to each of the four designated areas is responsible for providing road condition inspection. The shift covers 16 to 18 hours per day, 7 days a week. They report to a lead foreperson who 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.

During the off hours of this shift, the Operations Assistant is responsible for providing road condition inspection during the day for the whole City while the Utility foreperson performs this duty during the night.

### 3.9 SNOW REMOVAL AND DISPOSAL

Currently, municipal staff removes and hauls snow to 3 sites (see accompanying table) when the resultant accumulation of piled snow impedes traffic within the business districts or residential areas of the City of St. John's.

**Table 3.8: Snow Disposal Sites**

Location	Surface		Drainage/Run Off		Surrounding Land Use			
	Paved	Unpaved	Controlled	Uncontrolled	West	East	North	South
St. John's Harbour*				Y	Road	Road	Road	Road
Municipal Depot Yard	Y		Y		Comm	Road	Comm	Road
Robin Hood Bay Landfill		Y		Y	Ind	Ocean	Road	Ocean

#### 3.9.1 St. John's Harbour

The City of St. John's dumps the majority of the snow removed from city streets directly into St. John's Harbour (Atlantic Ocean) at the marginal wharf, Berth 10 or as directed by the Port Authority.

#### 3.9.2 Municipal Depot Yard

The Municipal Depot is used for a minimal amount of snow storage. The yard is located at the intersection of Blackmarsh Rd and Blackler Ave. The yard and its parking lots are paved. To the west of the Depot is a Dominion supermarket that is on an elevated lot. To the north also on an elevated lot is Twin Rinks which contains two hockey rinks. There is also one residential building on the northeast boundary. On the south of the property is Blackmarsh Rd which separates the Depot from commercial sites and residential apartment complexes. On the east of the Depot is Blackler Ave. On the other side of Blackler Ave are residential houses which are on the border of Mundy Pond Park.

Run-off from this site goes into the City of St. John's storm sewer system which then flows into Mundy Pond.

### **3.9.3 Robin Hood Bay Sanitary Landfill**

The Robin Hood Bay Sanitary Landfill is also used for a minimal amount of snow storage. The RHB Landfill is located in the northeastern end of the City of St. John's and is situated in a natural bedrock valley that drains east to the Atlantic Ocean. The site occupies about 204 ha. The active landfill area is approximately 67 ha. There is a low-lying wetland/bog area to the southeast of the site. Landfill leachate currently discharges into the wetland between the landfill and the ocean. There is one stream that passes through this wetland and flows east toward the ocean. Usually only snow removed from residential areas in the north east end of St. John's is brought down there.

### **3.10 WEATHER MONITORING**

In the fall of 2002, the implementation of two RWIS (Road Weather Information System) stations for the City of St. John's was completed. The RWIS was installed, and is owned and operated by AMEC Earth & Environmental Ltd. The two RWIS stations transmit real-time weather data and pavement and ground temperatures plus other information which is available to City management through a dedicated website. In addition to providing twice daily general weather forecasts for the City for the full year, AMEC analyses data from these RWIS sites and during the winter, provides customized road weather forecasts for both sites which are updated a minimum of 2 times/day. Staff at AMEC are also available for consultation 7 days a week, 24 hours per day.

The City of St. John's also supplements road patrol information with observations from municipal staff, and communication from the general public. Staff also monitors websites, such as, Environment Canada's for weather forecasting and radar and has 24/7 contact with Environment Canada forecasters.

As of the winter of 2004/05, staff also monitors pavement temperatures by means of on-board infra-red thermometers which are mounted on the anti-icing truck and the vehicles of the Director of Public Works, all managers, forepersons and streets inspectors involved in snow clearing and ice control.

## **3.11 TRAINING**

### **3.11.1 Management**

There is no annual formal winter training provided for management of the Streets Division. Each year some of the individuals on a rotating basis attend a 3 day Snow Clearing seminar put off by the Newfoundland government's Department of Works, Services & Transportation. As well, on an alternating basis, it has been the plan to send management, including forepersons, to the American Public Works Association Snow Conference to share experiences and information on new technologies and materials. This is being funded through a plan where savings from salt usage is reinvested into salt reduction initiatives.

The City also provides AVL training to management as required.

In addition, prior to the winter season, management meet to discuss the strategy for the upcoming winter maintenance, and to see if issues brought up from the previous winter have been addressed. In the spring following the winter season, staff typically meet to discuss the successes and failures of the past winter maintenance campaign and to provide input and suggestions for improvement.

### **3.11.2 Operator Training**

The City of St. John's currently provides annual formal operator training for winter maintenance personnel. This training is performed by an Equipment Trainer hired in 2002 especially for this purpose.

The City provides a one day refresher training for all operators on winter operations. The following is some of what is addressed at this session:

- 1) RWIS presentation & video;
- 2) Salt application presentation & video;
- 3) Use of the dickey-john (portable training unit);
- 4) Snow clearing procedures & techniques;
- 5) Vehicle inspection & maintenance.

During the winter season, at the request of supervisory management, the Equipment Trainer also does one on one spot checks of different operators and provides an assessment of their individual skills.

The City also has purchased training CDs that cover Anti-Icing, RWIS, Effective Use of Chemicals & Abrasives for Winter Road Maintenance, Salt Management Guide, Salt Brine-Breaking Snow & Ice Bonds on Your Pavement. Management and operators have been encouraged to review these CDs, however, there is no formal training or test on this information.

In addition to winter operations, the following training is provided for all operators:

- 1) Cold water rescue;
- 2) Power line hazards;
- 3) Traffic Control Person .

### **3.12 COMMUNICATIONS**

All winter maintenance vehicles are equipped with two way communications (mobile radios, cell, etc.), and municipal staff is responsible for reporting changing winter weather and/or road conditions. The Call Centre of the City of St. John's Citizen Service Center in City Hall 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.

External communication with the general public are provided through various mechanisms:

- 1) Radio and TV interviews;
- 2) Public City council meetings which are televised by a local cable station;
- 3) Information posted on City of St. John's web site regarding winter maintenance services;
- 4) Every year before the winter season, the City of St. John's mails a Snow Clearing Information Brochure to each household and business detailing the snow clearing operations, parking restrictions and frequently asked questions and answers;
- 5) Downtown snow removal operation information is provided through a recorded telephone system message, as well as through an e-mail subscriber service;
- 6) Periodic announcements on radio and in the newspapers.

### **3.13 ENVIRONMENTALLY SENSITIVE AREAS**

Presently, the City has a list of streets defined as "sand only" due to concerns of well contamination by salt. Signs have been placed on utility poles reminding operators that these areas are sand application only. As well, these streets are separately listed on their route maps. This is the extent of the City's present identification of vulnerable areas that can be affected by salt.

Water analysis monitoring is only performed when there are concerns by a citizen that their well might be contaminated by road salt.

### **3.14 RECORD KEEPING**

The City of St. John's maintains the following records:

- 1) Salt and sand are treated as inventory items therefore, all receipts from the supplier, all issues to a vehicle and driver and all returns by a vehicle and driver are recorded. In addition, any direct purchases at the supplier's yard are invoiced.
- 2) Detailed maps of all ice control and snow clearing routes are kept on Arcview and are handed out to all operators and managers.
- 3) Data generated by AVL units installed on all heavy equipment (loaders, graders) and salt/sand trucks is archived in the City's AVL system.
- 4) Detailed records of the initial annual calibration of spreader units.
- 5) Storm reports for events greater than 10 cm.
- 6) Daily inspection of all mobile equipment.

Currently, no formal records are kept for application rates, storm events < 10 cm, records of road conditions or daily use of brine.

## **4.0 SALT MANAGEMENT PLAN GOALS**

### **4.1 INTRODUCTION**

The current winter maintenance policies and practices form the baseline or benchmark upon which improvements can be made to manage the use of road salt more effectively and in turn its impact on the environment.

### **4.2 CONTINUOUS IMPROVEMENT PRACTICES & STRATEGIES**

The City of St. John's has prepared a multi-year work plan to improve the management of road salt and its winter maintenance policies, practices, and procedures. The following table includes a list of the goals broken down by activity. The status and expected implementation time is also included.

This is reflective of the status of the City of St. John's winter maintenance program as of July 2005. A timetable for these continuous improvement practices and strategies can be found in Appendix 4.

**Table 4.1: Continuous Improvement Practices and Strategies**

Item	Activity	Goal	Status/ Implementation Timing
1	Level of Service	a) The Level of Service Policy will be reviewed and updated as needed.	Implemented
2	Electronic Spreader Controls	a) Presently, all equipment used to spread salt have ground speed regulated electronic spreader controls. b) All newly acquired truck/plows will have spreader controls.	Implemented  Ongoing
3	Pre-Wetting and Anti-Icing Equipment	a) All newly acquired salt trucks will be fitted with pre-wet equipment. b) New anti-icing truck scheduled to go into service for 2005/06. c) Third and fourth bulk brine tanks scheduled to be installed for 2005/06.	Ongoing  2005/06  2005/06
4	Automatic Vehicle Locator	a) All trucks, front end loaders and graders will have their modems checked and replaced, if necessary. b) Enhancements are being made to the City's AVL system.	2005/06  2005/06
5	Spreader Calibration	a) Standard spreader calibration procedures have been developed. b) All spreaders will be properly calibrated each fall by Streets forepersons. c) Fleet mechanics will be trained to recalibrate units if their repairs affect calibration and record changes. d) 2 <sup>nd</sup> full calibration will be performed during the first week of February. e) All routes will be benchmarked against the spreader settings.	Implemented  Implemented  2005/06  2005/06  2005/06

Item	Activity	Goal	Status/ Implementation Timing
6	Application Rates	a) Salt, anti-icing and pre-wet application rates will be tested under different conditions to determine an effective program that contributes to a reduction in salt usage.	Ongoing
7	Equipment Washing	a) By the winter of 2006/07, all City vehicle washing shall be carried out indoors in the new remote building and wash water shall pass through oil/water separators before being discharged.	2006/07
8	Salt Ordering and Delivery	a) Presently, all supplier trucks are weighed again at the City's scales, however, they are cross checked only at the beginning of the year. The City plans to increase the frequency of this cross checking.	2005/06
9	Salt/Sand/Brine Record Keeping	a) The City will record salt and sand use by each vehicle, route and storm and periodically compare the usage to benchmarked rates to confirm the spreader calibration. b) On a daily basis the City will record the amount of brine that is pumped into its trucks.	2005/06
10	Sand/Salt Blends	a) The City doesn't use any salt/sand blends.	N/A

Item	Activity	Goal	Status/ Implementation Timing
11	Salt and Sand Storage	a) The existing storage facility will be evaluated to determine the potential extent of contamination from salt infiltration to assess impacts on the grounds and environment surrounding the storage facility. b) Upon completion of the evaluation, a plan to address all areas of concern is to be developed.	Completion within a year  Completion within 2-5 years
12	Good Housekeeping Practices	a) The City will develop a Good Housekeeping Code of Practice that improves salt management practices at the storage facility.	Completion within one year.
13	Weather Forecasting	a) The City currently has good access to weather information from both a private company and Environment Canada and provides training to all staff on interpreting weather information when making snow and ice decisions.	Implemented
14	Advanced Road Weather Information Systems	a) In 2002, the City had 2 turn key RWIS stations installed and the owner/contractor of the stations provides pavement temperature forecast for these sites b) 3 <sup>rd</sup> station will be added within two years. c) 4 <sup>th</sup> station will be added within five years.	Implemented  Nov 2007  Nov 2010
15	Storm Response	a) Storm response information will be kept to help in fighting future icing conditions and storms.	2005/06
16	Winter Patrol	a) Record keeping will be formalized.	2005/06

Item	Activity	Goal	Status/ Implementation Timing
17	Training	a) Training and records of training provided shall be maintained in the Human Resources Department. b) Human Resources will develop a module on the concepts and merits of the use of liquid chemicals for pre-wetting and anti-icing. c) Human Resources will develop a session on the proper use of infra-red thermometers. d) Human Resources will develop a session on When and How to apply chemicals.	Implemented  2006/07  2006/07  2006/07
18	Snow Removal Procedure	a) Guidelines developed in 2004/05. Will be updated as necessary.	Implemented
19	Snow Disposal Procedure	a) Guidelines developed in 2004/05. Will be updated as necessary.	Implemented
20	Snow Disposal Sites	a) Snow Disposal Management Program will be established. b) Proper sites will be identified and Snow Disposal Upgrade Plan will be established. c) Enhancements will be implemented. d) A program for monitoring the quality of runoff from the disposal sites will be developed.	Within 5 years

Item	Activity	Goal	Status/ Implementation Timing
21	Technology Review	a) A minimum of four personnel will be sent to the APWA Snow Conference each year to keep abreast of changing technology. This is being funded by savings from salt usage. b) The City is in the process of reviewing and purchasing routing software to better layout the City's ice control and snow clearing routes.	Implemented  2006/07
22	Communications	a) The City already distributes information to the public on the City's approach to winter maintenance. b) Enhancements will be made to include: <ul style="list-style-type: none"> <li>i) the City's approach to salt management;</li> <li>ii) the use of anti-icing.</li> </ul> This education dissemination will be done through the use of the City's existing brochure and through TV outlets.	Implemented  2005/06
23	Environmentally Sensitive Areas	a) The City will work to identify any environmentally sensitive areas that need to be addressed in the future upgrades of this plan.	Within 2 to 5 years
24	Water Quality Monitoring Program	a) The City will institute an ongoing winter monitoring program to track the successful implementation of all elements of the Salt Management Plan. This will include water sampling stations in representative areas.	Within 2 to 5 years

### **4.3 MONITORING AND UPDATING**

An annual review of the salt management plan by management and staff will occur at the end of each winter season. As a result of this review the plan will be updated to include any changes in department policy, strategies and new techniques or equipment to be used in the upcoming winter season.

## **APPENDIX 1 - POLICIES**

## **APPENDIX 2 - FACILITIES**

## WINTER MAINTENANCE FACILITIES

Site	Site Drainage				Material Storage										
	Washing On-site	Washing Inside	Oil/Grit Separator	Discharge Drainage	Sand	Salt	Liquids	Structure Type	Structure Floor Paved	Salt Sand Loading	Door Overhang	Lighting	Mechanical Ventilation	Paved Loading Area	Liquid Containment
Municipal Depot	Y	N*	Y	Storm Sewer	Y	Y	Y	Concrete Block, Steel Building	Concrete	Inside	N	Y	Y	Concrete	N
Goulds Satellite Depot	N	N	N	Open Space	N	N	N								

\* *The City is in the process of constructing an inside wash bay.*

## SNOW DISPOSAL SITES

Location	Surface		Drainage/Run Off		Surrounding Land Use			
	Paved	Unpaved	Controlled	Uncontrolled	West	East	North	South
St. John's Harbour*				Y	Road	Road	Road	Road
Municipal Depot Yard	Y		Y		Comm	Road	Comm	Road
Robin Hood Bay Landfill		Y		Y	Ind	Ind	Road	Ocean

\* *The City of St. John's dumps the majority of it's removed snow into St. John's Harbour (Atlantic Ocean).*

## **APPENDIX 3 - EQUIPMENT**









**APPENDIX 4 - CONTINUOUS IMPROVEMENT PRACTICES & STRATEGIES TIMETABLE**

Continuous Improvement Options	Winter Season							
	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
<b>Level of Service Policy</b>								
Annually review and update	Y	Y	Y	Y	Y	Y	Y	Y
<b>Electronic Spreader Controls</b>								
Purchase electronic spreader controls on all new trucks	Y	Y	Y	Y	Y	Y	Y	Y
<b>Pre-Wetting and Anti-Icing Equipment</b>								
Purchase pre-wet equipment on all new trucks	Y	Y	Y	Y	Y	Y	Y	Y
Purchase new anti-icing truck	Y							
Purchase two 5,000 US gallon brine tanks	Y							
<b>Automatic Vehicle Locator</b>								
Check and replace, if necessary, modems for all trucks and loaders.	Y							
Enhance City developed AVL system.	Y	Y	Y	Y	Y	Y	Y	Y
<b>Spreader Calibration</b>								
Train Fleet mechanics to recalibrate spreader units	Y							
Perform 2 <sup>nd</sup> full calibration in February.	Y	Y	Y	Y	Y	Y	Y	Y
Benchmark all routes.	Y							
<b>Application Rates</b>								
Test salt, anti-icing and pre-wet application rates under different conditions.	Y	Y	Y					
<b>Equipment Washing</b>								
Build new vehicle wash.		Y						

Continuous Improvement Options	Winter Season							
	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
<b>Salt Ordering and Delivery</b>								
Increase the frequency of the cross checking of supplier weights.	Y							
<b>Salt/Sand Record Keeping</b>								
Record salt and sand use by each vehicle, route and storm and periodically compare the usage to benchmarked rates to confirm the spreader calibration.	Y	Y						
On a daily basis, record the amount of brine that is pumped into all trucks.	Y							
<b>Salt and Sand Storage</b>								
Evaluate the potential extent of contamination from salt infiltration.		Y						
Develop a plan to address all areas of concern.				Y	Y			
<b>Good Housekeeping Practices</b>								
Develop a Good Housekeeping Code of Practice for the storage facility.		Y						
<b>Advanced Road Weather Information Systems</b>								
Add a 3 <sup>rd</sup> RWIS station.			Y					
Add a 4 <sup>th</sup> RWIS station.						Y		
<b>Storm Response</b>								
Improve storm response record information.	Y							

Continuous Improvement Options	Winter Season							
	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
<b>Winter Patrol</b>								
Formalize patrol record keeping.	Y							
<b>Training</b>								
Develop a module on the concepts and merits of the use of liquid chemicals for pre-wetting and anti-icing.		Y						
Develop a session on the proper use of infra-red thermometers.		Y						
Develop a session on When and How to apply chemicals.		Y						
<b>Snow Removal Procedure</b>								
Update guidelines as necessary.	Y	Y	Y	Y	Y	Y	Y	Y
<b>Snow Disposal Procedure</b>								
Update guidelines as necessary.	Y	Y	Y	Y	Y	Y	Y	Y
<b>Snow Disposal Sites</b>								
Establish Snow Disposal Management Program.					Y			
Identify sites. Establish Snow Disposal Upgrade Plan.					Y			
Implement enhancements.						Y		
Develop a program for monitoring the quality of runoff.							Y	
<b>Technology Review</b>								
Personnel attend the APWA Snow Conference.	Y	Y	Y	Y	Y	Y	Y	Y
Review and purchasing routing software.		Y						

Continuous Improvement Options	Winter Season							
	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
<b>Communications</b>								
Enhance to include the City's approach to salt management and the use of anti-icing.	Y							
<b>Environmentally Sensitive Areas</b>								
Identify any environmentally sensitive areas.			Y	Y				
<b>Water Quality Monitoring Program</b>								
Institute an ongoing winter monitoring program.				Y	Y			