



# Essex County Highways

## SALT MANAGEMENT PLAN

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### Prepared By

Document Owner	Project/Organization Role
Essex County Highways	Engineering Department

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## EXECUTIVE SUMMARY

In 2004, Environment Canada released a Code of Practice for the Environmental Management of Road Salts to give Road Authorities the opportunity to improve their salt usage methods. The Code of Practice's purpose was to guide the development of Salt Management Plans to reduce the environmental impacts that the use of road salt may have. The Code applies specifically to organizations using more than 500 tonnes of salt annually or which have vulnerable areas that could be potentially impacted. As a result of this, municipalities have committed to the preparation of a Salt Management Plan, which summarizes their current method of salt utilization and discusses some possible alternatives for reducing environmental impacts, while maintaining road user safety.

The County of Essex through Essex County Highways is responsible for approximately 732 centerline kilometers (1503 lane kilometers) of road network that provides a safe and efficient route of transportation for road users within the region. Citizens rely greatly on these roads on a daily basis in order to travel to and from work, as well as traveling to any other necessary destination of their choice. Therefore, it is extremely important that these roads are maintained in safe driving conditions, especially during winter months when they can become slick or difficult to drive on due to snow or ice storms.

Due to snow and ice accumulations experienced during winter storms that have a significant impact on public safety, Essex County Highways uses road salt as an effective de-icer to maintain safe road conditions. Unlike some other districts to the north who use sand as well as road salt in their winter control program, Essex County Highways uses only road salt as temperatures on average do not fall below -7 degrees Celsius which is approximately the minimum effective operating temperature of sodium chloride, the most common road salt used.

Within the County of Essex's overall best management practices, the following are Essex County Highway's procedures on the use and effective management of road salt:

- To comply with all applicable Federal and Provincial legislations regarding the storage and use of snow and ice control products
- To comply with all Essex County Highways Best Management Practices relevant to the salt management plan
- To use road salt in an environmentally responsible manner, and minimize the negative environmental effects of handling, storage, and application of salt on the environment
- To conserve the use of salt by utilizing the most cost-effective technologies and improve practices in identified salt vulnerable areas

The Salt Management Plan is intended to be a dynamic document to allow the County to evaluate and phase-in any changes, new approaches and technologies. The plan promotes continuous development of practices and procedures to improve winter maintenance activities while striving to reduce the effects of road salt on the environment. With the implementation of the Salt Management Plan improvements and refinements will be evaluated as new salt management techniques become available with the understanding that progress and changing salt management practices may be tempered by the County's ability to invest in capital equipment upgrades and as new technologies become available.

The information provided in Appendix B is intended to measure and report on current practices and initiatives and to track the progress of the salt management plan using selected performance measures. Appendix B will be reviewed annually to explore future improvements and/or changes to the Plan and to be used as an instrument to develop future initiatives that are seen to be beneficial and feasible considering current conditions. A comprehensive review of the Salt Management Plan is recommended every five years.

The Salt Management Plan is intended to support Essex County with the continuous implementation of best management practices for winter maintenance operations. The long term goal of this plan is to protect the environment from excessive concentrations of road salts while at the same time, ensure that winter roads are kept safe.

## 1.0 INTRODUCTION

### 1.1 Background

Road salt usage in Canada is one of the highest in the world, with approximately 5 million tonnes being utilized annually to maintain safe winter roadway conditions. With its relatively low cost, high effectiveness, and ease of handling, road salt is the product of choice for keeping roads clear of the snow and ice that is inevitably received from winter storms each year. Environment Canada has expressed some concerns with regard to the excessive use of road salt, linking it to adverse impacts on the environment.

In 2001, following a 5-year comprehensive assessment, Environment Canada released a report detailing the impacts and outlined consideration of making road salt a “toxic substance,” under the Canadian Environmental Protection Act (CEPA). It must be noted, however, that under this act salt would only be considered as “toxic to the environment” and not “toxic to human health,” as road salt is not found to be detrimental to human health in any way. Environment Canada does not propose to ban salt use or propose any measures that would compromise or reduce road safety rather, are encouraging implementation of safer methods of use in order to protect Canada’s environment.

In 2004, Environment Canada released a Code of Practice for the Environmental Management of Road Salts in order to give Road Authorities the opportunity to improve their salt usage methods. The Code of Practice’s purpose was to guide the development of Salt Management Plans to reduce the environmental impacts that the use of road salt may have. The Code applies specifically to organizations using more than 500 tonnes of salt annually or which have vulnerable areas that could be potentially impacted. Transportation Association of Canada (TAC) has in turn published numerous publications to assist Road Authorities with winter maintenance practices. The *Synthesis of Best Practices for Road Salt Management* is a series of nine documents related to the management of road salts. As suggested in the Code of Practice, the *Synthesis* deals with the following:

- Salt Management Plans;
- Training;
- Road and Bridge Design;
- Drainage and Stormwater Management;
- Pavements and Salt Management;
- Vegetation Management;
- Design and Operation of Road Maintenance Yards;
- Snow and Storage Disposal; and
- Winter Maintenance Equipment and Technologies

As a result of this, municipalities have committed to the preparation of a Salt Management Plan, which summarizes their current method of salt utilization and discusses some possible alternatives for reducing environmental impacts, while maintaining road user safety.

After the implementation of the SMPs, Environment Canada began to monitor the outcomes of the improved salt management procedures through reports that were filed annually, which highlighted important information included in the Salt Management Plan. The annual reports measured progress in road salt management, the implementation of best management practices, and the concentration of road salt in the environment.

Information reported to Environment Canada is intended to be used in combination with additional data to determine the extent and success of implementation of the Code of Practice. If positive outcomes are not achieved, Environment Canada still retains the ability to designate road salts as “toxic” under the Canadian Environmental Protection Act and may proceed to do so. By deeming road salts as “toxic” under the Canadian Environmental Protection Act, the Government of Canada would be potentially exposing municipalities to either face legal liability by making use of a “toxic substance” on public property or by opting not to make use of road salts, hence increasing the potential for human traffic fatalities on poorly maintained and icy winter roadways. It is anticipated through implementation of a Salt Management Plan, that a reduction in the residual from road salts entering the environment can be achieved in Essex County by improving storage and application techniques rather than classifying road salts as “toxic” under the CEPA legislation.

## 1.2 Overview

The County of Essex through Essex County Highways is responsible for approximately 732 centerline kilometers (1503 lane kilometers) of road network that provides a safe and efficient route of transportation for road users within the region. Citizens rely greatly on these roads on a daily basis in order to travel to and from work, as well as traveling to any other necessary destination of their choice. Therefore, it is extremely important that these roads are maintained in safe driving conditions, especially during winter months when they can become slick or difficult to drive on due to snow or ice storms.

Due to snow and ice accumulations experienced during winter storms that have a significant impact on public safety, Essex County Highways uses road salt as an effective de-icer to maintain safe road conditions. Unlike some other districts to the north who use sand as well as road salt in their winter control program, Essex County Highways uses only road salt as temperatures on average do not fall below – 7 degrees Celsius which is approximately the minimum effective operating temperature of sodium chloride, the most common road salt used. Other areas to the north have much lower temperatures which may make the use of salt less effective, warranting the use of sand to maintain safe winter road conditions.

*Over an average winter, Essex County Highways uses approximately 17,500 tonnes of salt on our roads with full winter control operations costing nearly \$2,000,000 for approximately 80 events.*

Road salt acts as a freezing point depressant. When it is added to snow or ice, the salt mixes with it making brine with a lower freezing point. Since the resulting freezing point is lower than that of water, the snow or ice can no longer maintain its solid state and changes to a liquid or in other words melts. There are a number of different salt based road deicing agents used:

- **Sodium Chloride** – this is the most common type used and is sometimes called rock salt. It has limited effectiveness in temperatures lower than -7 degrees Celsius.
- **Salt Brine** – liquid in its natural state, it is used for pre-wetting rock salt in order to accelerate the melting process, reduce bounce on roadways, or simply to apply directly onto road bridges surfaces as a liquid de-icer. Consists of a mixture of sodium chloride, magnesium chloride, calcium chloride, and sulphate, sodium, magnesium, and chloride ions. This product is used by Essex County Highways as a liquid deicer.

## 1.2 Purpose of the Salt Management Plan

The salt management plan is intended to set out a policy and procedural framework for ensuring the County of Essex continuously improves the management of road salt used in its winter operations. The Salt Management Plan demonstrates the County's commitment to reducing environmental effects of excessive salt use and to outline new goals and objectives for the next 5 years.

The format of the SMP includes:

- **Chapter 2: Policy Context** – Outline of policy direction approved by Council and Goals and Objectives of the Salt Management Plan
- **Chapter 3: Winter Maintenance Standards** – Outline of winter maintenance best management practices relevant to the SMP
- **Chapter 4: Operational Practices and Strategies** - Description of Operational Practices and Strategies for snow and ice control as they relate to effective management of road salt. Presented as a series of subsections that can be modified as new policies, procedures and practices are introduced and refined
- **Chapter 5: Monitoring** - outline of the approach to monitoring the implementation and to maintaining and updating the SMP To consider salt management practices in identified vulnerable areas

## 2.0 POLICY CONTEXT

Within the County of Essex's overall best management practices, the following are Essex County Highway's procedures on the use and effective management of road salt:

- To comply with all applicable Federal and Provincial legislations regarding the storage and use of snow and ice control products
- To comply with all Essex County Highways Best Management Practices relevant to the salt management plan
- To use road salt in an environmentally responsible manner, and minimize the negative environmental effects of handling, storage, and application of salt on the environment
- To conserve the use of salt by utilizing the most cost-effective technologies and improve practices in identified salt vulnerable areas

In July, 2005 County Council adopted the Salt Management Plan and various Best Management Practices were developed to form the basis that has guided the winter maintenance operations for the County of Essex. The County was able to provide winter driving conditions consistent with the needs of the road system. At the same time, the County was minimizing the adverse effects of road salt on the environment. The 2005 SMP identified some opportunities for different practices to reduce the environmental impacts of road salts in Essex County that included the purchase of new technology and the introduction of more efficient practices and techniques to our Winter Control Program.

### 2.1 Implementation

The Salt Management Plan is intended to be a dynamic document to allow the County to evaluate and phase-in any changes, new approaches and technologies. The plan promotes continuous development of practices and procedures to improve winter maintenance activities while striving to reduce the effects of road salt on the environment. With the implementation of the Salt Management Plan improvements and refinements will be evaluated as new salt management techniques become available with the understanding that progress and changing salt management practices may be tempered by the County's ability to invest in capital equipment upgrades and as new technologies become available.

The information provided in Appendix B is intended to measure and report on current practices and initiatives and to track the progress of the salt management plan using selected performance measures. Appendix B will be reviewed annually to explore future improvements and/or changes to the Plan and to be used as an instrument to develop future initiatives that are seen to be beneficial and feasible considering current conditions. A comprehensive review of the Salt Management Plan is recommended every five years.

The information provided in Appendix C provides the salt usage and salt management best management practices of the current year as they are submitted to Environment Canada annually, as required by the Environmental Code of Practice.



### 3.0 WINTER MAINTENANCE BEST MANAGEMENT PRACTICES

The major activities related to winter maintenance include the following:

- Salt/Sand Storage;
- Salt/Sand Spreading
- Material Application; and
- Snow Plowing

Maintenance services are delivered county-wide from four (4) active patrol yards (depots), the locations of which are shown on Figure 1. The Maintenance Depot, West End Depot, West Pike Creek Depot, and the Tilbury North Depot and two (2) seasonal patrol yards, the Harrow Yard and Comber Yard. Each patrol yard services a particular area of the County by providing fuel and de-icing agents to the winter maintenance fleet.

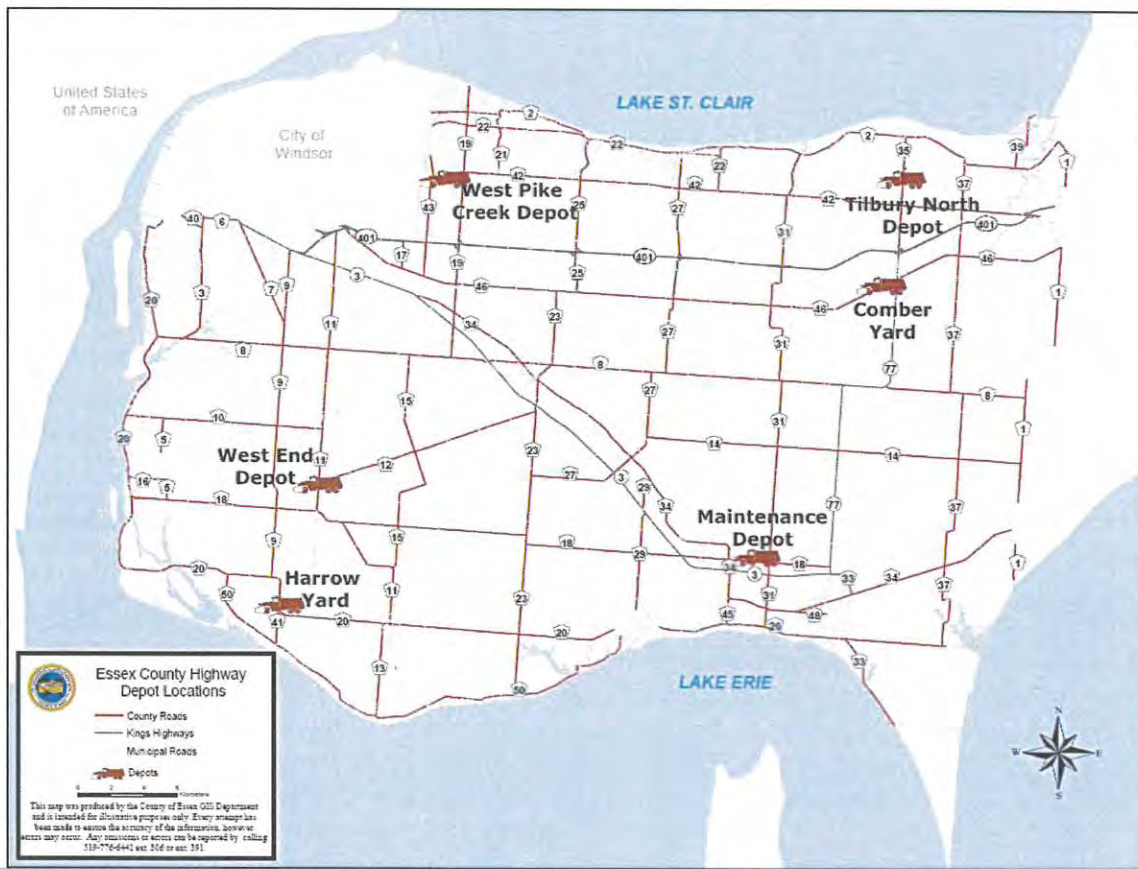


Figure 1: County of Essex Patrol Yard Locations

The County of Essex follows a series of Best Management Practices at the yard facilities in general accordance with the *Code of Practice for the Environmental Management of Road Salts* (Code of Practice) in April 2004. In recognition of the potential adverse effects that inadequate salt storage can have on the environment, the County of Essex continually strives to minimize the amount of salt loss. In this continued effort for improvement, enhancements of existing salt storage practices are being made by constructing a new permanent storage facility adjacent to the existing salt domes to minimize future salt impacts. Salt storage structures alleviate uncontrolled runoff from salt storage facilities. The County of Essex has capacity for the storage of approximately 25,000 tonnes of salt, varying from 1,500 tonnes to 11,500 tonnes at different patrol yards, as described in Table 1.

**Table 1: County of Essex Salt Storage**

Facility	Maintenance Depot	West End Depot	West Pike Creek Depot	Tilbury North Depot
No. of Structures	3	1	2	2
Approximate Total Capacity (tonnes)	11,500	1,500	6,900	5,100

Patrol Yards have been arranged over the years based on their servicing needs predicated on their fleet size and configuration. The introduction of improved plow and spreader fleets, the use of liquids, improved storm response and variable application rates has in some cases increased the service area of each truck. As a result, the 2005 salt management planning process initiated a need to review the number and location of the patrol yards. This gives the road authority an opportunity to optimize the routes and locate in less sensitive areas and to better design their facilities.

A Yard Rationalization Study was completed and adopted by County Council in 2008. This Study was undertaken to consider options available to meet Essex County's existing and future needs as they relate to seasonal maintenance operations. The review allowed for a short and/or long term strategy to be presented for the Yards, options to improve the overall level of service and enhance efficiency of the operations. The County is pursuing the opportunity to relocate the West End Depot patrol yard to optimize the winter operations and to reduce the adverse environmental impacts from road salt.

## 4.0 OPERATIONAL PRACTICES & STRATEGIES

This chapter presents a discussion of each of the key operational practices and strategies related to the effective management of road salt during winter maintenance activities. Each subsection has a summary that presents a discussion of the objectives, best management practices, environmental considerations, goals and performance measures, as presented in Table 4.

### 4.1 Level of Service (LOS)

Essex County Highways is responsible for approximately 1503 lane kilometers of road network of various classes of highway from high volume urban arterials to rural highways that provide a safe and efficient route of transportation for road users within the region. Priority routes are based on Minimum Maintenance Standards (MMS) as defined in *Ontario Regulation 239/02* (as amended by *O.Reg. 239/10*) of the *Municipal Act* and are identified on Figure 2.



Figure 2: County of Essex MMS Road Classifications

The regulation defines criteria to determine road classifications based on Average Annual Daily Traffic (AADT) and posted speed limit. Classifications range between 1 and 5, where 1 is of highest priority and 5 is the lowest priority. The regulation also defines standards for road patrolling, allowable snow accumulation, and treatment for icy roadways for each MMS road classification, among other maintenance operations not related to the winter season.

The County of Essex continuously strives to improve the Level of Service of the County Road Network by utilizing *O.Reg. 239/02* (as amended) and Essex County Highways Best Management Practice (ECH-06-07) as a best management practice for winter maintenance operations. As a result of population growth and the associated increase in our urban structure, as well as planned growth, existing MMS road classifications are expected to change due to an increase in AADT. The addition of new roads and widening of existing roads will further burden our maintenance operations. As a result of the dynamic nature of the MMS classification system, the County of Essex reviews the MMS road classifications on an ongoing basis for the County Road Network.

#### 4.2 Road Patrol

The County of Essex operates from its four (4) active patrol depots for its winter maintenance to cover 18 salt/plow truck routes with 21 pieces of equipment dispatched in 'normal' winter event. Each active patrol yard is currently responsible for 3 to 5 routes with each one being 25 to 60 centre-line kilometers in length as illustrated in Figure 3. It should be noted that existing yards and routes have been designed and located based on historical rationale reflecting a smaller network both in road length and lane kilometers.

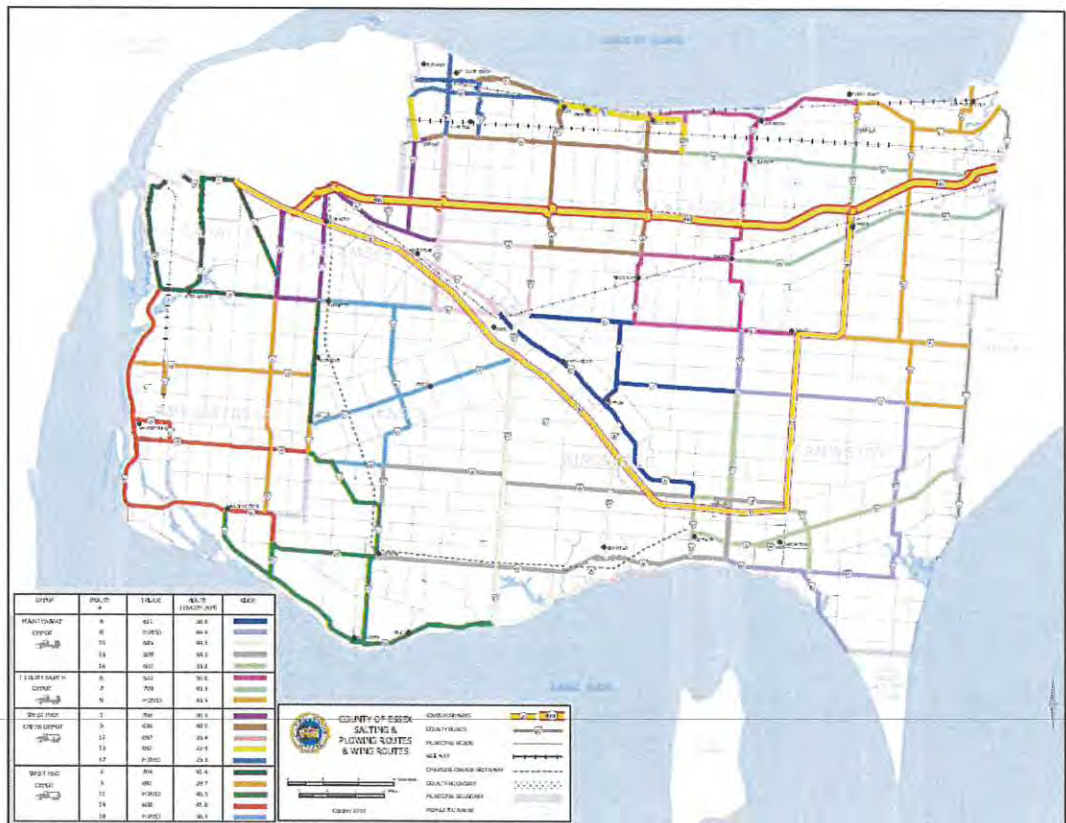


Figure 3: County of Essex Salting and Plow Routes (2010)

ECH strives to continuously improve level of service and decrease operating costs by creating routes that balance cycle times and pavement condition demands. The introduction of AVL / GPS, improved plow and spreader fleets, the use of liquids, improved storm response and variable application rates has in some cases increased the service area of each truck. Also, the approach to winter maintenance in Canada has changed significantly since Environment Canada raised concerns about the environmental effects of excessive salt use. ECH looked at the opportunity to better balance their plowing & salting routes. The intention is to provide an optimal schedule for deployment of winter maintenance vehicles subject to a number of constraints which model LOS requirements, fleet size restrictions, patrol yard locations and route choices.

ECH identified disparity amongst the existing routes in terms of route length, lane kilometers services and time to complete. As a primary objective, route lengths should be balanced in terms of time to complete. This task is made all more difficult by the ever-changing weather conditions, traffic volumes, congestion, additional lane kilometers and environmental concerns. The existing routes were evaluated based on achieving balanced route times and minimizing the number of routes while meeting minimum maintenance requirements. A route optimization model was developed by County staff to provide continuous monitoring of the routes to determine the most cost effective manner to deploy vehicles and to confirm the location of the patrol yards.

Snow & ice management is completed under model time periods for achieving bare pavement following a storm event according to road maintenance classifications provided in the *Minimum Maintenance Standards, Ontario Regulation 239/02 (as amended) of the Municipal Act*. Table 2 displays the salt application guidelines for Essex County Highways based on the Minimum Maintenance Standard for "Icy Roadways". The application rates for Road Classifications 1 to 4 are set at a default value as displayed in the table, but may be increased or decreased depending on the road conditions at the time of salt application.

**Table 2: MMS Level of Service for "Icy Roadways"**

MMS Road Class	Typical Example	Desired Condition of Pavement Surface	De-Icing Agent	Application Rate (kg/lane-km)	Time Frame for De-Icer Application (hrs)
1	County Road 22	Bare Pavement	100 % Rock Salt or Pre-Wet Salt	140	3
2	County Road 11	Bare Pavement	100 % Rock Salt or Pre-Wet Salt	140	4
3	County Road 25	Bare Pavement	100 % Rock Salt or Pre-Wet Salt	140	8
4	County Road 37	Bare Pavement	100 % Rock Salt or Pre-Wet Salt	140	12

During severe winter storms, the County of Essex has developed a plan of action in order to maintain safe and operable conditions on the main roadways with the heaviest traffic volumes. When an abnormal winter storm occurs, a plan has been devised for salt truck routes to change in order to direct all winter maintenance resources to clear Class 1 and Class 2 roads instead of following their usual routes. For the County of Essex, this may even mean delaying deployment of crews to County Roads and salting major highways that are outside of our jurisdiction (i.e. Highway 3 or 401) in joint operations, in an effort to support the movement of Emergency Services throughout the region. Table 3 displays the minimum standard for clearing snow based on the Minimum Maintenance Standard for “Snow Accumulation”. The table describes the maximum accumulation of snow to initiate plowing and the expected time to reach the County’s desired pavement condition.

**Table 3: MMS Level of Service for "Snow Accumulation"**

MMS Road Class	Desired Pavement Condition After Plowing	Snow Accumulation in order to Start Plowing (cm)	Time to Completion of Plowing Following End of Snowfall (hrs)
1	Bare Pavement	2.5	4
2	Bare Pavement	5	6
3	Bare Pavement	8	12
4	Safe and Passable Pavement	8	16

Note that the above table does not specify the exact treatment method to be undertaken for snow and ice. However, common practice in maintenance operations is to utilize a combination of plows/spreaders which plow away the majority of the snow and deposit chemical agents on the road immediately after plowing in order to melt snow and ice. This operational plan is premised on the basis of reacting to storm events. The SMP update reflects changes to this approach and provides opportunities to exploit new information and technology as it becomes available.

The winter maintenance vehicle system consists of snowplow systems including sensors, automated controls, and in-vehicle devices. Environmental sensors are mounted on snowplows to record and display air & pavement temperature. Vehicle status sensors monitor the position of each snowplow (location, direction and speed), plow position (up/down) and material application (salt on/off, application rate). This information is collected and stored on a AVL / GPS system and is used to plan strategies, monitor real-time operations and provides statistics (driver hours, truck miles, material applied) that helps manage costs of future winter maintenance operations.

From a planning perspective, resource allocation of existing fleet of plows & spreaders is the primary consideration. It is intended to allocate these vehicles to sections of road to maximize their effectiveness. Each type of roadway typically presents challenges to snowplow operators. Some generally have higher amounts of traffic, including truck traffic, or are narrow with small shoulders resulting in less room for clearance between the plows and other vehicles.

Further, future growth projections will increase total lane kilometers and ultimately present a challenge to meet LOS. Routing priorities are determined based on the class of road but may be altered in the event of a severe winter storm (i.e. / ECH has an established “Severe Storm Protocol” that provides direction to reassign all routes to clear Class 1 and 2 roads first). This may require a delay for deployment to Class 3 and 4 County Roads and/or the engagement of additional contractual services to meet the required level of service.

It should be noted when reading Tables 2 and 3 that snowfall is to be completed before the start of any plowing operations with the exception of heavy snowfalls. In all cases snowfall and salting activities do not take into account wind conditions that cause drifting snow. Time to complete clean-up after a storm will also depend on the amount of drifting. Snow fencing in areas of historic drifting is installed in order to reduce snow drifts onto the roadway.

### 4.3 Winter Maintenance Crew

#### 4.3.1 Crew Assignments

The County of Essex organizes its winter maintenance crews utilizing a “Day” and “Night” crew. The hours of the shifts are as follows: “Days” cover Monday to Friday 7:00 am to 3:30 pm and “Nights” cover Sunday to Thursday from 10:30 pm to 6:30 am. The hours of non-scheduled coverage are addressed by extending shifts or early starts as conditions dictate.

Supervision is provided to the crews at all times and supervisory staff is available in an “on call” status at all times. The crews are assigned equipment and routes to provide winter control activities as required. The crews will also conduct Road Patrols and spot action as conditions dictate. Vehicle and yard maintenance activities are undertaken when roads are in good condition. The availability of the crews particularly during the nighttime hours provides for excellent response times to events and allows us to “get a jump” on storms to minimize the impacts. The operators are very familiar with local conditions within their patrol areas and will complete a patrol log and winter control activity log during their shift.

The County of Essex complies with the Hours of Service requirements established under the Highway Traffic Act (HTA). When situations require, the County of Essex will exercise its authority to utilize the exemptions from Hours of Service provisions of the HTA.

This procedure governs the utilization of the exemption. The County of Essex utilizes the exemption in “Exemptible Situations” that requires support related to emergencies and situations of imminent danger. The exemption is invoked when it is apparent or anticipated that the response will require available staff to remain on duty exceeding the Hours of Service provisions of the HTA. Upon completion of an event, and return to compliance, a file specific to the Exemptible Situation will be created and include copies of all pertinent documents.

#### 4.3.2 Weekend Weather Watcher

A Weekend Weather Watcher is stationed at the Maintenance Depot on Friday and Saturday from 10:30 pm to 6:30 am to provide weather monitoring and Road Patrol during the weekend when no crews are scheduled. The Weekend Weather Watcher is responsible for monitoring weather and road conditions from the Maintenance Depot as well as through road patrol. Other responsibilities include receiving calls from the Answering Service and/or Police agencies related to weather and road conditions. All of the information is relayed to the “on call” supervisor who makes informed decisions on any actions that may be required.

#### 4.4 Snow Removal and Disposal

The County of Essex currently does not provide snow removal and disposal service. Areas that require this activity are generally located within the limits of County Connecting Links and are therefore the responsibility of the local municipalities.

#### 4.5 Snow Fencing

Snow fencing is installed seasonally to prevent the accumulation of snow on the pavement surface as a result of blowing or drifting. Fencing is installed in areas known to be subject to frequent heavy drifting.

#### 4.6 Weather Monitoring

The County of Essex 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 that are updated 2 times/day Accuweather. Staff monitors websites, such as, Environment Canada for weather forecasting and radar. Pavement temperatures are also monitored by means of on-board infrared thermometers that are mounted on the patrol and other trucks. Access is also available to MTO’s RWIS (Roadway Weather Information System) data and pavement temperature forecasts for the provincial highways in the region.

#### 4.7 Communications

All winter maintenance vehicles are equipped with two-way communications, and County staff is responsible for reporting changing winter weather and/or road conditions. The Maintenance Depot serves as the main hub for in/outgoing calls from staff, emergency and Police services as well as the general public. At this location the communication centre is staffed Monday through Friday from 7 am to 3:30 pm and Sunday to Thursday from 10:30 pm to 6:30 am during the winter season. There is also a designated weather watcher and road patroller available to take calls on Friday and Saturday from 10:30 pm to 6:30 am. Supervisors are also provided with pagers for after hours contact in case of an emergency. When the communication centre is not staffed calls are automatically transferred to an answering service and relayed to the “on call” supervisor.



External communication with the general public ranges from media press releases to information posted on the Corporation of the County of Essex website, regarding winter maintenance services and salt management practices. A copy of the adopted Salt Management plan will also be maintained on the website.

#### **4.8 Training**

The County of Essex currently provides staff training for winter maintenance personnel. Staff attends events such as the local Road Supervisors Association meetings to discuss such issues as new equipment, material trends in winter maintenance, regulatory changes and common issues relating to winter storm management. Other opportunities to participate in workshops and trade shows are additionally pursued.

All staff participates in formal training before each winter season to ensure that everyone is kept up to date on new equipment and procedures being put in place as well as any techniques that might have become available over the last year. Staff will also receive training from equipment vendors periodically whenever new techniques or pieces of equipment are implemented. Examples of training include calibration of electronic spreaders, pre-wetting techniques, and AVL/GPS system tracking and documentation.

Operators attend the OGRA Winter Maintenance Training Program for equipment operators, Supervisors and Patrollers attend the OGRA Winter Maintenance Training Program for supervisors/patrollers, and Managers and Supervisors attend the annual Snow and Ice Colloquium to share experiences and information on new technologies and materials.

#### **4.9 Record Keeping**

Progress on implementation of the salt management plan can only be realized by tracking specific indicators and comparing with certain performance measures. The County retains records for the purchase and utilization of salt in winter maintenance activities. Records of data from the GPS/AVL system are also kept which track the salt truck routes and record application rates, speed and location of trucks for reference purposes. Each operator is also required to keep a logbook, showing start and finish times of plowing, the amount of salt used for the route, and the location of the route. Data from electronic spreaders is also collected. The municipality uses a customized version of the OGRA “Winter Patrol Record” for record of winter patrolling.

#### **4.10 Identification of Salt Vulnerable Areas**

A source water protection report entitled “Proposed Assessment Report – Essex Region Source Protection” was completed in May 2010 by the Essex Region Conservation Authority (ERCA). The report was initiated by the Clean Water Act, 2006 and its associated Regulations and Technical Rules. It focuses on the surface water sources for the municipal drinking water systems in the Essex Region, and also addresses some aspects of potentially vulnerable aquifers. The Act provides a framework for the development and implementation of local, watershed-based source protection plans.

The intent of the Clean Water Act is to ensure communities are able to protect their municipal drinking water sources now and in the future from overuse and pollution. It sets out a risk-based process to identify vulnerable areas and associated source water threats and issues.

The Draft Assessment Report will be used as a basis for the development of a locally-developed Source Protection Plan that put policies in place to reduce the risks to protect current and future sources of drinking water. The Source Protection Plan, expected to be completed by 2012, will be a document containing policies regarding actions to protect sources of drinking water against threats identified in the Assessment Report. The Assessment Report identifies the 'vulnerable areas' associated with municipal drinking water intakes (Intake Protection Zones) and potentially Highly Vulnerable Aquifer areas.

The County of Essex has developed an inventory of vulnerable areas based on the findings of the Draft Assessment Report to understand the impacts of the winter maintenance practices on environmentally sensitive areas within Essex County. The Clean Water Act identifies four types of vulnerable areas related to drinking water sources:

- Intake Protection Zones (IPZ)
- Highly Vulnerable Aquifer (HVA) areas
- Significant Groundwater Recharge Areas (SGRA)
- Wellhead Protection Areas (WHPA) – **n/a in the Essex Region**

Various environmental features have been identified such as:

- Locally significant natural areas
- Provincially significant wetlands
- Life science and earth science areas on natural and scientific interest
- Significant aquatic habitats
- Public forests and conservation lands

In order to summarize those areas in the road network where alternative management practices may be considered, the vulnerabilities were combined with the road network as identified in Figure 4: Salt/plow routes intersecting Vulnerable Areas.

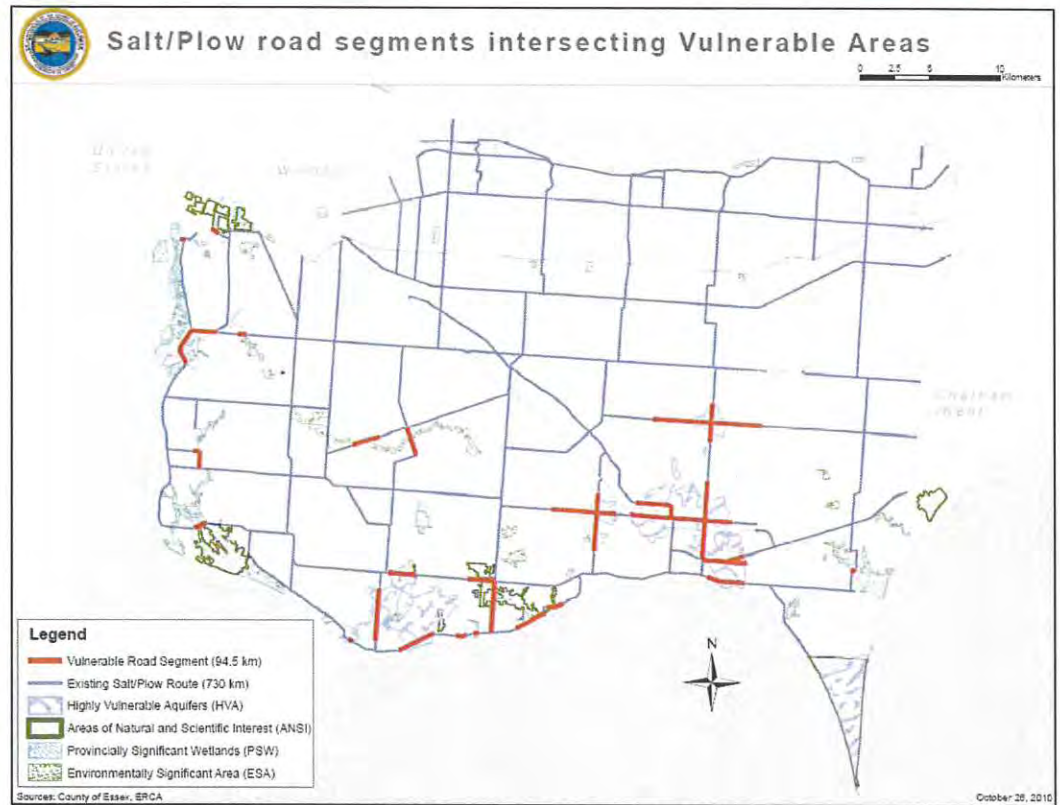


Figure 4: Salt/Plow Segments Intersecting Potentially Vulnerable Areas

Areas of concern include drainage into provincially significant wetlands and adjacent lands used for salt sensitive crops such as corn, soybeans and wheat. Practices such as utilizing direct liquid application of deicers will be developed and implemented in order to reduce potential environmental impacts.

*To date, there has been no information available regarding the impacts of winter maintenance activities on Essex County's environmentally sensitive areas.*

The County of Essex Road Maintenance Operations will make every effort to minimize salt impacts in identified vulnerable areas wherever possible. Opportunities to improve best management practices in salt vulnerable areas will be continuously explored and efforts to reduce salt, where appropriate are recommended.

Table 4: Operational Procedures & Performance Measures

ACTIVITY/DESCRIPTION	ENVIRONMENTAL CONCERN	PERFORMANCE MEASURE
<b>4.1 WINTER MAINTENANCE POLICIES</b>		
<b>4.1.1 Winter Maintenance Policy (ECH-R04-07)</b>		
<p>Outlines the strategies used for safe storage and effective use of snow and ice control products and Level of Service (LOS) for snow and ice on County Roads.</p>	<p>Winter maintenance policies form the basis for program delivery and can have significant impact on the environment.</p>	<p>Review the winter maintenance program on an annual basis to determine whether revisions are required or warranted. The program is designed to meet or exceed the Minimum Maintenance Standards, O. Reg. 239/02 (as amended).</p>
<b>4.1.2 MMS Road Classifications &amp; Level of Service (ECH-R06-07)</b>		
<p>Outlines the minimum maintenance standards and the level of service on all roads within the jurisdiction of the County of Essex.</p>	<p>Prescribed LOS is the foundation of winter maintenance activities and has a significant impact on salt usage. There is also a need to demonstrate due diligence in the event of a claim against Essex County Highways.</p>	<p>A documented and approved Level of Service policy (ECH-R06-07) exists and is followed by all snow and ice control personnel. The policy includes; response time, cycle times, end of storm conditions, etc.</p>
<b>4.2 EQUIPMENT UPGRADING, CALIBRATION &amp; WASHING</b>		
<b>4.2.1 Equipment Upgrading</b>		
<b>4.2.1.1 Pre-Wetting and Anti-Icing Equipment</b>		
<p>Pre-wetting is the process of spraying de-icing salt with a solution of liquid chemical (brine) before spreading the salt on the roadway. This process allows for better adhesion between the road salt and the road surface. It also ensures enough moisture is present to facilitate the snow melting process. As a result, pre-wetted road salt has the potential function faster and at lower temperatures than dry road salt.</p>	<p>Equipment upgrades such as “pre-wetting” has the potential to reduce the amount of rock salt applied to a road surface due to increased adhesion and efficiency in the snow melting process.</p>	<p>Anti-icing is carried out when and where warranted. Staff is knowledgeable in the use and handling of solid and liquid anti-icing chemicals. Staff is trained and knowledgeable in the use and handling of liquid fuels.</p>

ACTIVITY/DESCRIPTION	ENVIRONMENTAL CONCERN	BEST MANAGEMENT PROCEDURE
<p><b>4.2.1.2 Electronic Spreader Controls</b></p>		
<p>Electronic spreader controls can be accurately calibrated, regulated to speed, and generate pertinent salt-use data.</p>	<p>Electronic controllers ensure that chosen and prescribed amount of salt is being placed on the roadway consistently, regardless of speed and provides data that permits salt use to be tracked.</p>	<p>Material application data from each event, at the truck or route level, is logged. Data can be reviewed and archived.</p>
<p><b>4.2.2 Spreader Calibration</b></p>		
<p>Calibrated equipment is important for the effective placement of de-icer material on Essex County roadways.</p>	<p>Effective quantity and placement of salt depends on accurate calibration of spreaders</p>	<p>All spreaders are calibrated before the start of each winter season  Spreaders are checked and recalibrated when required</p>
<p><b>4.2.3 Equipment Washing</b></p>		
<p>Washing is intended to minimize oil and grease discharges to the environment.</p>	<p>Washwater contains salt, oil, grease, which have an adverse effect when discharged to soil and/or groundwater.</p>	<p>All washwater is collected and sent for proper disposal where possible.</p>
<p><b>4.3 MATERIALS</b></p>		
<p><b>4.3.1 Ordering</b></p>		
<p>The quality of the snow and ice control materials should be sufficient for all winter maintenance needs.</p>	<p>Improper handling and storage of salt can increase loss to the environment. Excessive moisture creates salt clumps that are difficult to spread, and also interfere with the success of the pre-wetting operations.</p>	<p>Materials are ordered, delivered, and stored in covered salt domes or sheds immediately upon delivery to reduce loss to the environment.</p>
<p><b>4.3.2 Storage &amp; Handling</b></p>		
<p>Proper chemical storage is essential to the prevention and control of releases from existing and new storage sites.</p>	<p>Improper housekeeping practices relating to the delivery and handling of salt can increase loss to the environment.</p>	<p>All snow and ice control chemicals are stored and handled inside proper storage structures to minimize loss of salt to the environment.</p>

ACTIVITY/DESCRIPTION	ENVIRONMENTAL CONCERN	BEST MANAGEMENT PROCEDURE
<p><b>4.3.3 Record Keeping</b> Record keeping for quantity of material and the location of its use is necessary for effective salt management.</p>	<p>Effective salt management requires accurate knowledge of how much salt is being used and where. It is not sufficient to measure gross totals, which vary widely from year-to-year due to weather conditions.</p>	<p>Material usage data is collected from the electronic spreader controllers to assess salt management practices.</p>
<p><b>4.4 WEATHER FORECASTING</b> The intent is to provide timely and accurate weather information to assist in snow and ice control decision-making</p>	<p>Effective use of de-icing chemicals is dependent upon good snow and ice control decision-making, which in turn depends on consistently accurate and timely weather information. Snow &amp; Ice Control decisions that are not consistent with weather and road conditions will lead to material loss.</p>	<p>Decision-making staff makes appropriate Snow &amp; Ice Control decisions based on accurate and timely weather forecasts.  Decision-making staff is knowledgeable in current weather forecasting technology [i.e. Road Weather Information System (RWIS)].</p>
<p><b>4.5 STORM RESPONSE APPROACH</b></p>		<p>Create the “Storm Response Plan” and review the plan annually.</p>
<p><b>4.6 WINTER PATROL</b> <b>4.6.1 Level of Service</b></p>	<p>Accurate monitoring of winter maintenance activities will support appropriate and effective snow and ice control decisions, leading to efficient use of salt.</p>	<p>Roads are patrolled regularly during the snow and ice control season and patrol logs are maintained.  MMS outlined in Ontario Regulation 239/02 (as amended) are met or exceeded, and reviewed annually.  Review LOS policy</p>

ACTIVITY/DESCRIPTION	ENVIRONMENTAL CONCERN	BEST MANAGEMENT PROCEDURE
<p><b>4.6.2 Drift Control</b></p> <p>To reduce snow accumulation on roadways and problems associated with drifting or blowing snow.</p>	<p>A significant amount of winter maintenance activity is devoted to controlling drifting snow. IF a roadway has a lower potential for snow and ice accumulation, then the winter maintenance demands will be correspondingly lower and the need for chemical application will be reduced</p>	<p>Controlled with snow fencing in areas known to be subject to frequent heavy snow drifting.</p>
<p><b>4.7 SNOW &amp; ICE CONTROL TRAINING</b></p> <p>Incorporate Salt Management Principles into training programs in accordance with TAC's Salt Management Synthesis of Best Management Practices for Training.</p>	<p>Through understanding of good housekeeping practices, the measures of snow &amp; ice control and the expectations of program delivery will result in a greater probability of success with the Salt Management Plan.</p>	<p>Annual training for winter maintenance staff, which includes a combination of in-house training and Ontario Good Roads Association (OGRA) training materials.</p>
<p><b>4.8 TECHNOLOGY REVIEW</b></p> <p>To make Winter Maintenance Staff aware of current and emerging best practices that help provide more efficient use of snow control chemicals.</p>	<p>New techniques, procedure and technologies may provide more effective methods of monitoring and/or reducing the salt usage.</p>	<p>Continually review existing &amp; new technologies to determine their applicability in altering current practices Pilot studies incorporating relevant winter maintenance methodologies will be recommended when appropriate.</p>
<p><b>4.9 COMMUNICATIONS</b></p> <p>An overall communications strategy with respect to Essex County's winter maintenance program be effectively communicated to staff &amp; public sector</p>	<p>An informed public and media are more likely to become effective partners in achieving the goals of the Salt Management Plan.</p>	<p>Communicate with County Council annually on the Winter Control program including Fast Facts Sheets.</p> <p>Complete annual reporting to Environment Canada on salt usage.</p>

ACTIVITY/DESCRIPTION	ENVIRONMENTAL CONCERN	BEST MANAGEMENT PROCEDURE
<p><b>4.10 ENVIRONMENTALLY SENSITIVE (VULNERABLE) AREAS</b> To determine if any salt vulnerable areas are potentially impacted by the use salt.</p>	<p>Environmentally sensitive areas that are impacted by winter maintenance practices may require unique solutions and specific action plans to mitigate the impacts</p>	<p>Salt Vulnerable Areas are identified and factored into salt-management decision-making.</p>



## 5.0 MEASUREMENT AND MONITORING

This chapter of the Salt Management Plan includes the procedure for reporting to Environment Canada and table summaries of current practices to allow tracking of the salt management plan.

### 5.1 Reporting to Environment Canada

The Code of Practice for the Environmental Management of Road Salts requires that Road Authorities provide information annually to Environment Canada. The information to be provided is detailed in Annex C of the Code of Practice and the current year is included in Appendix C.

### 5.2 Salt Management Plan Annual Review

An annual management review will be completed to update the salt management plan to include any changes in policies, procedures and/or best management practices. Each area listed in Table 4 will be evaluated based on the following elements:

- Activity intent and current situation;
- Best Management Practice / Goals;
- Timetable for achieving the stated goals;
- Environmental impacts;
- Performance measures; and
- Fiscal Year results

The County will measure and report on the progress towards the established goals and objectives outlines in the salt management plan and the information will be summarized in an annual report (included in Appendix B).

### 5.3 Investigation of TAC Winter Severity Index

The Transportation Association of Canada and others developed the Winter Severity Index (WSI) to evaluate the relative harshness of a winter over a specified period of time (Stugget et. al, 2006). The indicator measures the relative impact the harshness of a winter has on the application of road salt for winter maintenance operations. The model, made available to the public in October 2007, uses various meteorological inputs to determine a WSI, which in turn is used to predict a total quantity of salt usage for the specified length of road network. Winter Severity Indices range between 1 and 100, where 1 indicates a predicted salt usage below the model's chosen minimum salt usage threshold, and 100 indicates a predicted salt usage above the model's chosen maximum salt usage threshold.

The County of Essex is currently investigating the merits of using the WSI to monitor past winter harshness and respective salt usage, as well the WSI's ability to predict winter severity and expected salt usage.

## 6.0 CONCLUSION

The Salt Management Plan is intended to support Essex County with the continuous implementation of best management practices for winter maintenance operations. The long term goal of this plan is to protect the environment from excessive concentrations of road salts while at the same time, ensure that winter roads are kept safe.

There are many benefits of de-icing roadways during winter storms including reduced accident rates, reduced road delays, and making roads accessible that would normally be impossible to drive on. The County of Essex is committed to ensuring that County Roads are safe and properly maintained in accordance with the level of service policies. While doing so, the County is committed to reducing the impacts that de-icing chemicals, such as salt have on the environment.

## 7.0 REFERENCES

Environment Canada. (2004). Code of Practice for the Environmental Management of Road Salts.

Suggett, J., Hadayeghi, A., Mills, B., & Leach, G. (2006). Development of a winter severity indicator models for Canadian winter road maintenance. *2006 Annual Conference of the Transportation Association of Canada*. Charlottetown, Prince Edward Island.

Transportation Association of Canada. (2003). TAC Synthesis of Best Practices.

## FIGURES



FIGURE 1: County of Essex Patrol Yard Locations

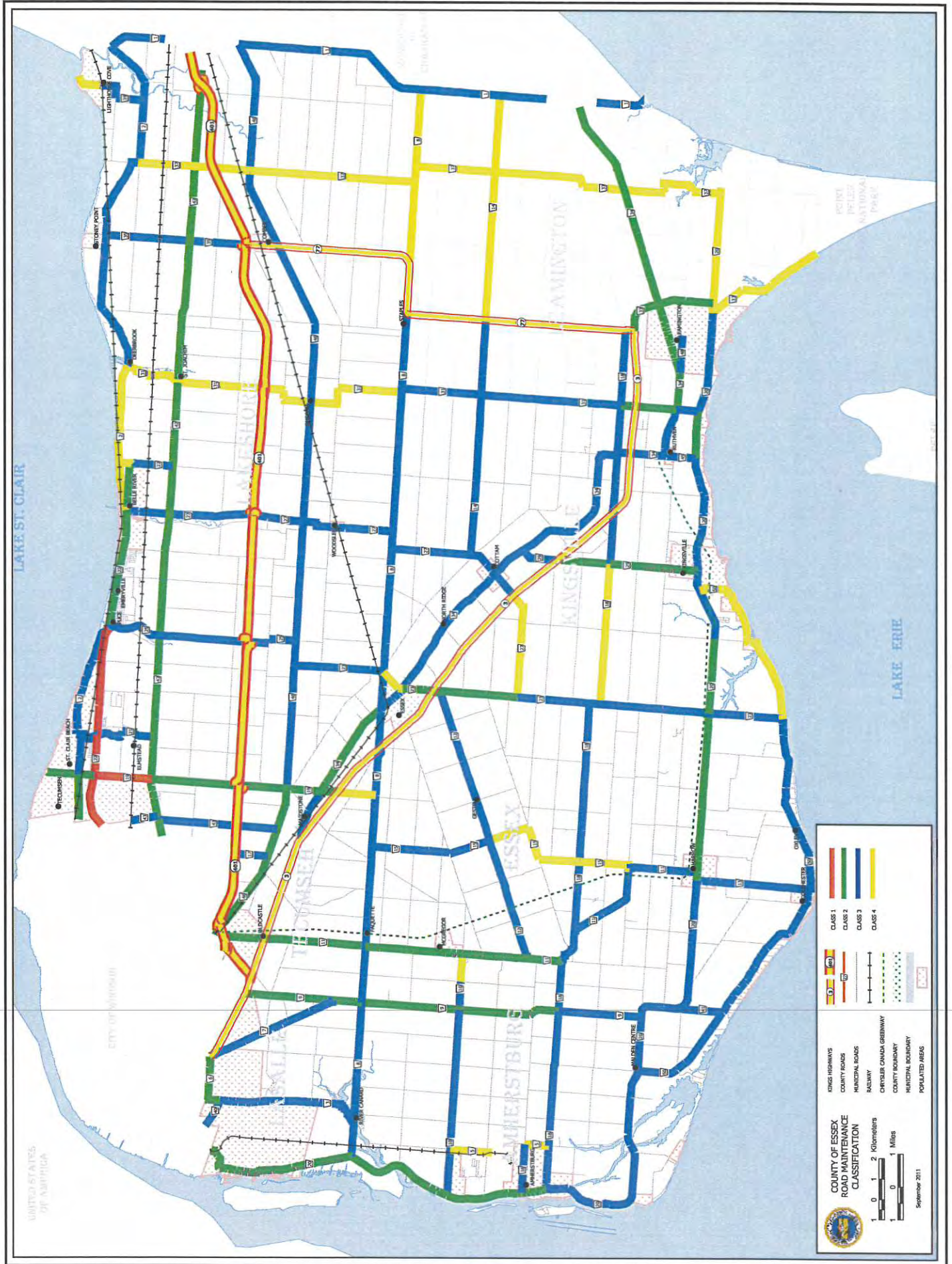
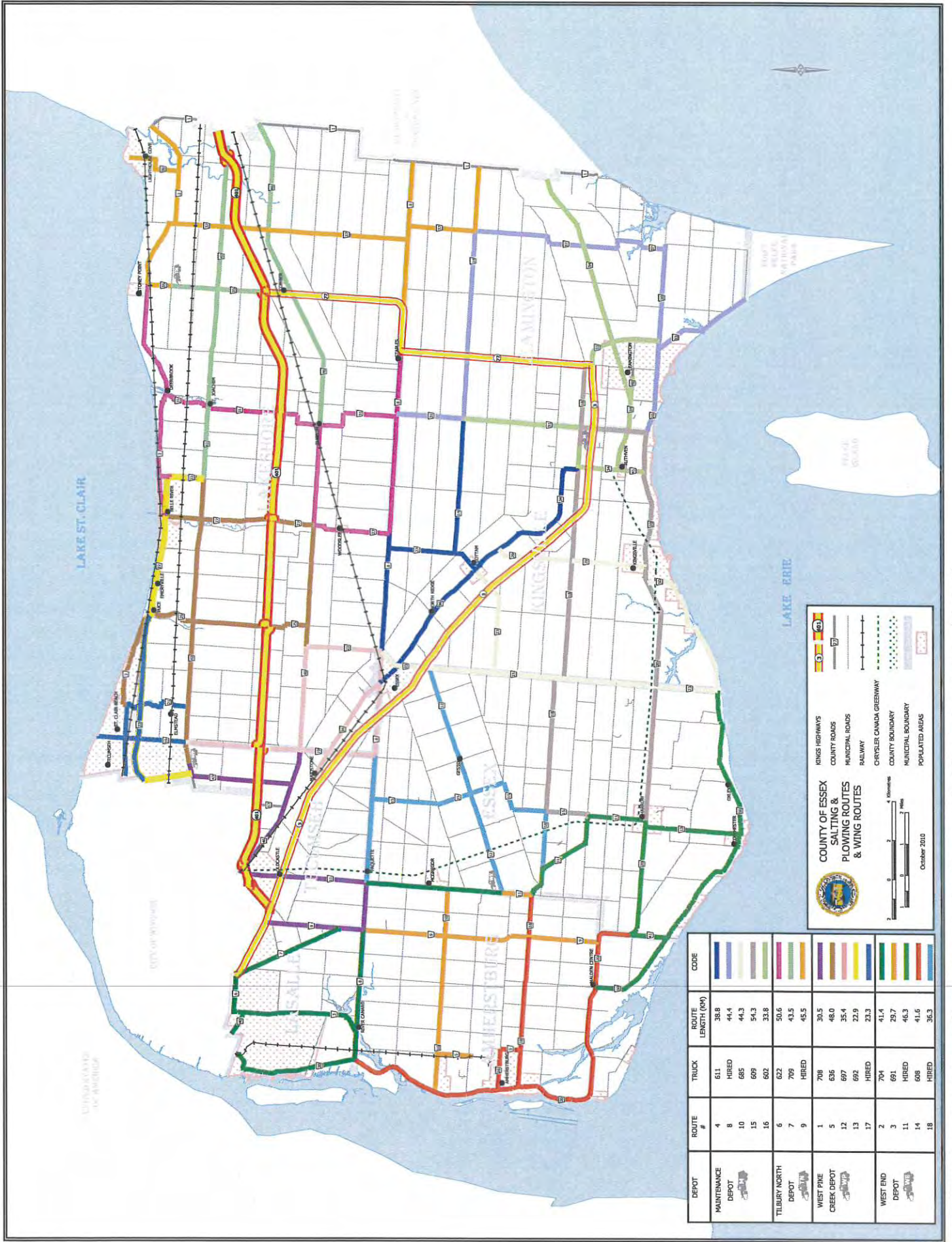


FIGURE 2: County of Essex MMS Road Classifications

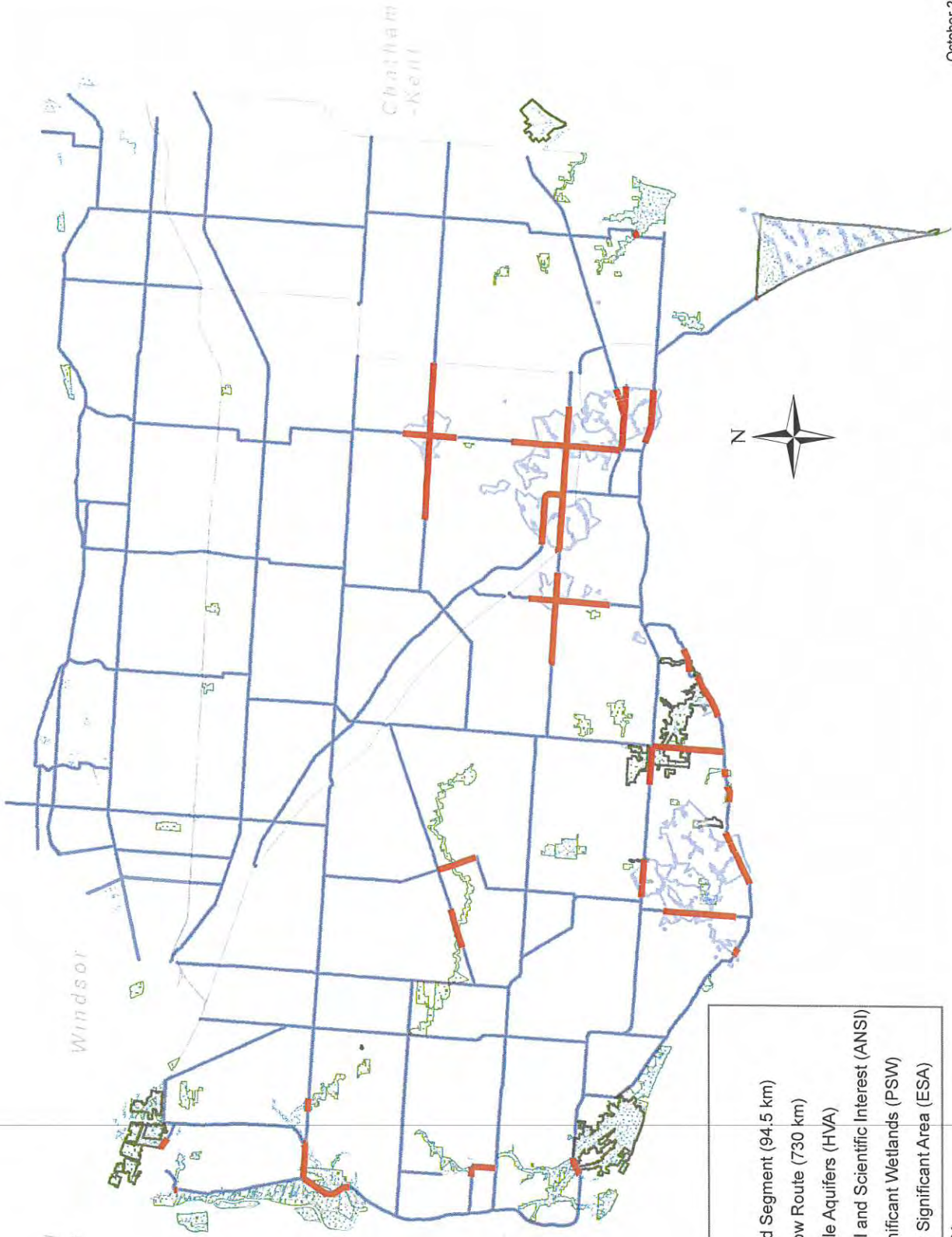


DEPOT	ROUTE #	TRUCK	ROUTE LENGTH (KM)	CODE
MAINTENANCE DEPOT	4	611	38.8	[Blue]
	8	HIRE	44.4	[Light Blue]
	10	685	44.3	[Light Green]
	15	609	54.3	[Light Yellow]
	16	602	33.8	[Light Orange]
	6	622	50.6	[Light Purple]
TILBURY NORTH DEPOT	7	709	43.5	[Light Blue]
	9	HIRE	45.5	[Light Green]
WEST PINE CREEK DEPOT	1	708	30.5	[Light Blue]
	5	636	48.0	[Light Green]
	12	697	35.4	[Light Yellow]
	13	692	22.9	[Light Orange]
	17	HIRE	23.3	[Light Purple]
	2	704	41.4	[Light Blue]
	3	691	29.7	[Light Green]
WEST END DEPOT	11	HIRE	46.3	[Light Blue]
	14	608	41.6	[Light Green]
	18	HIRE	36.3	[Light Yellow]







FIGURE 3: County of Essex Salting and Plow Routes (2010)



# Salt/Plow road segments intersecting Vulnerable Areas



**Legend**

-  Vulnerable Road Segment (94.5 km)
-  Existing Salt/Plow Route (730 km)
-  Highly Vulnerable Aquifers (HVA)
-  Areas of Natural and Scientific Interest (ANSI)
-  Provincially Significant Wetlands (PSW)
-  Environmentally Significant Area (ESA)

Sources: County of Essex, ERCA

October 26, 2010

FIGURE 4: Salt/Plow Segments Intersecting Potentially Vulnerable Areas



## **APPENDIX A**

### Best Management Practices



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<b>CHAPTER:</b> Operational	<b>Procedure No.</b> ECH-R04-07	<b>Page Number</b> 1 of 4
<b>SECTION:</b> Winter Maintenance	<b>EFFECTIVE DATE:</b> May 9, 2009	

**1.0 PURPOSE**

To outline the strategies used for the safe storage and effective use of snow and ice control products, and the level of service for snow and ice on County Roads.

**2.0 REFERENCE**

- 2.1 Ontario Regulation 239/10 of the Municipal Act
- 2.2 Essex County Highways Salt Management Plan

**3.0 DEFINITIONS**

**3.1** *Bare Pavement*

All travelled lanes are effectively clear of snow build-up ice or ice conditions that might impair the safe travel on the road below the posted speed under ambient conditions.

**3.2** *Safe & Passable Pavement*

A road condition during a continuous storm where the County of Essex performs plowing and salting operations on the roads to allow the user to negotiate travel at a reduced speed.

**3.3** *Snow & Ice Control Products*

Includes rock salt (sodium chloride) and liquid salt brine (sodium chloride, magnesium chloride, calcium chloride, and sodium, sulfate, magnesium, and chloride ions).

**3.4** *Snow & Ice Management*

Includes de-icing plowing of County Roads and shoulders.

**3.5** *Snow Removal*

The physical removal of snow off County Roads and shoulders and disposing of it at approved disposal sites to remove large snow drifts.



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## **4.0 POLICY**

### **4.1 General**

- 4.1.1 The County of Essex complies with all applicable Federal and Provincial legislations relating to the storage and use of snow and ice control products and Hours of Work.
- 4.1.2 Snow and ice control products are used in an environmentally responsible manner as defined by the Essex County Highways Salt Management Plan (SMP).
- 4.1.3 The SMP is continuously reviewed and updated as new winter control management techniques are developed.
- 4.1.4 An annual report is sent to Environment Canada in order to monitor the use of snow and ice control products.
- 4.1.5 All winter road maintenance personnel are trained to maintain appropriate winter road condition while protecting the environment.
- 4.1.6 The County of Essex typically does not provide snow removal and disposal services, except for extreme situations such as snow drift removal.
- 4.1.7 The County of Essex does not provide winter maintenance for sidewalks. This responsibility falls within the jurisdiction of the Lower Tier Municipality.

## **5.0 PROTOCOL**

### **5.1 Maintenance Standards**

- 5.1.1 Snow and ice management is completed according to the road maintenance classifications shown in Table 4.7A and 4.7B. Refer to Ontario Regulation 239/02 of the Municipal Act or policy number ECH-R06-06 for the road maintenance classification system.
- 5.1.2 Table 4.7A describes displays the minimum standard for clearing snow based on the Minimum Maintenance Standard for “Snow Accumulation”. The table describes the maximum accumulation of snow to initiate plowing and the expected time to reach the County’s desired pavement condition



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**Table 4.7A: MMS Level of Service for “Snow Accumulation”**

Road Class	Pavement Condition After Salting	Snow Accumulation in order to Start Plowing (cm)	Time to Completion of Plowing Following end of Snowfall (hrs)
1	Bare Pavement	2.5	4
2	Bare Pavement	5	6
3	Bare Pavement	8	12
4	Safe and Passable Pavement	8	16

5.1.3 The salting of roads is completed according to the road maintenance classifications shown in Table 4.7B. The 140 kg/lane-km application rate is the default setting that may be increased or decreased depending on the road conditions at the time of application.

**Table 4.7B: MMS Level of Service for “Icy Roadways”**

Road Class	Desired Pavement Condition	De-icer	Application Rate (kg/lane-km)	Timeframe Until Deicer Application (hrs)
1	Bare Pavement	100% Rock Salt or Pre Wet Salt	140	3
2	Bare Pavement	100% Rock Salt or Pre Wet Salt	140	4
3	Bare Pavement	100% Rock Salt or Pre Wet Salt	140	8
4	Safe and Passable Pavement	100% Rock Salt or Pre Wet Salt	140	12



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- 5.1.4 Two (2) seasonal facilities and four (4) active depots are utilized for snow and ice control product storage and the deployment of winter roadway maintenance vehicles. Each patrol yard is responsible for three (3) to five (5) winter road maintenance routes.
- 5.1.5 In the event of an abnormal storm, all winter maintenance resources may be redirected to clear Class 1 and Class 2 roads instead of their usual routes. This may mean the delayed deployment of crews to County Roads in order to salt major highways outside the County of Essex jurisdiction in joint operations, in an effort to support the movement of Emergency Services throughout the region.
- 5.1.6 Snow and slush are plowed off County Roads first, followed by the shoulders in order to reduce snow drifting back onto the road.
- 5.1.7 Road maintenance crews perform road patrolling as winter conditions dictate. The minimum standard for the frequency of patrolling of highways to check for conditions described in Minimum Maintenance Standards for Municipal Highways.
- 5.1.8 During the season in which a municipality performs winter highway maintenance, in addition to the patrolling frequency set out in Table 4.7C, the minimum standard for patrolling a highway is to patrol highways that the municipality selects as representative of its highways, as necessary.

**Table 4.7C: Routine Patrolling**

Road Class	Minimum Patrol Frequency
1	3 times every 7 days
2	2 times every 7 days
3	once every 7 days
4	once every 14 days
5	once every 30 days

- 5.1.8 Patrolling a highway consists of observing the highway, either by driving on or by electronically monitoring the highway, and may be performed by persons responsible for patrolling highways or by persons responsible for or performing highway maintenance activities.



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<b>CHAPTER:</b> Traffic	<b>Procedure No.</b> ECH-R06-07	<b>Page Number</b> 1 of 5
<b>SECTION:</b> MMS Road Classification and Level of Service (LOS)	<b>EFFECTIVE DATE:</b> August 17, 2006	

**1.0 PURPOSE**

To outline the minimum maintenance standards and the level of service on all roads within the jurisdiction of the County of Essex.

**2.0 REFERENCE**

2.1 Ontario Regulation 239/02 (as amended) of the Municipal Act.

**3.0 DEFINITIONS**

3.1 *AADT*

Average Annual Daily Traffic. A measurement of traffic volume on a road in both directions.

3.2 *Bridge Deck Spalls*

A cavity left by one or more fragments detaching from the paved surface of the roadway or shoulder of the bridge.

3.3 *Clearance*

The zone measured horizontally and vertically from the centre line of the road in which no obstructions should be permitted, except those that improve the safety of the roadway user.

3.4 *Flooding*

Where water, either flowing or standing, covers more than half of a lane width.

3.5 *Hardtop Driving Surface*

Any road surface that is relatively hard in nature, by treatment with either a bonding agent or cement, which effectively prevents reshaping by conventional motor grader.

3.6 *Loosetop Driving Surface*

Any road surface that is of a granular manufactured product, which can reasonably be shaped by a motor grader, and includes road surfaces that are under construction.

3.7 *MMS*

Minimum Maintenance Standards.



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**3.8** *Regulatory Signs*

A range of signs that are used to indicate or reinforce traffic laws, regulations, or requirements that apply either at all times, at specific times, or places upon a street or highway, the disregard of which may constitute a violation.

**3.9** *Shoulder*

The surface immediately adjacent to the travelled surface of the road. The shoulder may be partially or fully hardtop, loosetop, grassed, or earth. It is not considered as part of the road for any of these standards.

**3.10** *Storm Conditions*

When natural or external effects are acting upon the roadway to reduce the condition as defined by one or more roadway service standards. It does not refer to weather conditions that do not impact on the infrastructure. Storm conditions could include wind, rising and moving water, precipitation, cold temperatures (below -15 degrees centigrade), snowfall, freezing rain, hail, blowing snow, etc.

**3.11** *Surface Discontinuities*

A vertical discontinuity at joints or cracks in the paved surface of the roadway creating a step formation.

**4.0** **POLICY**

**4.1** **Road Classifications**

4.1.1 The County of Essex uses four (4) road classifications to designate maintenance priority on all Essex County Highways (Refer to Table 6.7A). The road classifications are: Class 1, Class 2, Class 3, Class 4, where Class 1 is the highest priority and Class 4 is the lowest priority

4.1.2 Any new road, or new part of a road may be classified or any existing road, or part of an existing road may be reclassified as per Table 6.7A.

4.1.3 The County of Essex will adhere to the Minimum Maintenance Standards identified in Ontario Regulation 239/02 (as amended), which is summarized in Table 6.7A.



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**SECTION:** MMS Road Classification and  
Level of Service (LOS)

**EFFECTIVE DATE:**  
August 17, 2006

Table 6.7A: Highway Classifications & MMS for Essex County Highways

Classification of Highways						
Traffic Volume (AADT)	Posted Speed Limit (km/h)					
	100	90	80	70	60	50
≥ 15,000	1	1	1	2	2	2
12,000 – 14,999	1	1	1	2	2	3
10,000 – 11,999	1	1	2	2	3	3
8,000 – 9,999	1	1	2	3	3	3
6,000 – 7,999	1	2	2	3	3	3
5,000 – 5,999	1	2	2	3	3	3
4,000 – 4,999	1	2	3	3	3	3
3,000 – 3,999	1	2	3	3	3	4
2,000 – 2,999	1	2	3	3	4	4
1,000 – 1,999	1	3	3	3	4	4
500 – 999	1	3	4	4	4	4
200 – 499	1	3	4	4		

Corporation  
of the County of Essex



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<b>Minimum Maintenance Standards for Municipal Highways</b>				
	<b>CLASS 1</b>	<b>CLASS 2</b>	<b>CLASS 3</b>	<b>CLASS 4</b>
Bridge Deck Spalls	SA: 600 cm <sup>2</sup> Depth: 8 cm Time: 4 days	SA: 800 cm <sup>2</sup> Depth: 8 cm Time 4 days	SA: 1000 cm <sup>2</sup> Depth: 8 cm Time: 7 days	SA: 1000 cm <sup>2</sup> Depth: 8 cm Time: 7 days
Clearances	Vertical: 5 m Grass/Bush: 0.3 m Horizontal: 5.5	Vertical: 5 m Grass/Bush: 0.3 m Horizontal: 5.5 m	Vertical: 4.5 m Grass/Bush: 0.3 m Horizontal: 5 m	Vertical: 4.5 m Grass/Bush: 0.5 m Horizontal: 5 m
Cracks on hardtop surfaces	Width: 5 cm Depth: 5 cm Time: 30 days	Width: 5 cm Depth: 5 cm Time: 30 days	Width: 5 cm Depth: 5 cm Time: 60 days	Width: 5 cm Depth: 5 cm Time: 180 days
Flooding	Depth: 10 cm Frequency: 5 years Time: 4 hours	Depth: 10 cm Frequency: 5 years Time: 4 hours	Depth: 10 cm Frequency: 1 year Time: 12 hours	Depth: 10 cm Frequency: 1 year Time: 12 hours
Icy Roadways	Time: 3 hours	Time: 4 hours	Time: 8 hours	Time: 12 hours
Inspection of Traffic Signal Sub-Systems	Time: 12 months Conflict Monitors to be tested every 6 months			
Litter & Other Roadside Debris	Rating: 3 Time: 1 year	Rating: 3 Time: 1 year	Rating: 3 Time: 1 year	Rating: 3 Time: 1 year
Illumination	Time: 7 days Lighting: Zone	Time: 7 days Lighting: Zone	Time: 14 days Lighting: Zone	Time: 14 days Lighting: No Lighting
<i>Conventional Illumination</i>	<i>If 3 or more consecutive luminaires on a highway are not functioning.</i>		<i>If 3 or more consecutive luminaires on a highway are not functioning, with a posted speed limit of 80 km/h or more.</i>	
<i>Conventional &amp; High Mast Illumination</i>	<i>If 30% or more of the luminaires on a kilometer of a highway are not functioning.</i>		<i>If 30% or more of the luminaires on a kilometer of a highway are not functioning, with a posted speed limit of 80 km/h or more.</i>	



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Minimum Maintenance Standards for Municipal Highways				
	CLASS 1	CLASS 2	CLASS 3	CLASS 4
Other Safety Devices	Time: Annual This section applies to: delineator, chevron, flashers, pavement markings, vehicle attenuation devices such as guide rail or inertia barrier and other such safety devices.			
Potholes on Paved or Non-Paved Surface of Shoulder	SA: 1500 cm <sup>2</sup> Depth: 8 cm Time: 7 days	SA: 1500 cm <sup>2</sup> Depth: 8 cm Time: 7 days	SA: 1500 cm <sup>2</sup> Depth: 8 cm Time: 14 days	SA: 1500 cm <sup>2</sup> Depth: 10 cm Time: 30 days
Potholes on Paved Surface of Roadway	SA: 600 cm <sup>2</sup> Depth: 8 cm Time: 4 days	SA: 800 cm <sup>2</sup> Depth: 8 cm Time: 4 days	SA: 1000 cm <sup>2</sup> Depth: 8 cm Time: 7 days	SA: 1000 cm <sup>2</sup> Depth: 8 cm Time: 14 days
Routine Patrolling Frequency	3 x every 7 days	2 x every 7 days	1 x every 7 days	1 x every 14 days
Regulatory & Warning Signs	Condition: 1 Time: 7 days	Condition: 1 Time: 14 days	Condition: 2 Time: 21 days	Condition: 2 Time: 30 days
Other Signs	Condition: 2      Time: As soon as practicable This section applies to: Checkerboard, Curve sign with speed advisory, Do Not Enter, One Way, School Zone Speed Limit, Stop Ahead, Stop Ahead New, Traffic Signal Ahead New, Two-Way Traffic Ahead, Wrong Way, Yield, Yield Ahead, Yield Ahead New.			
Shoulder Drop-Off <i>(for a continuous distance of 20 m or more)</i>	Height: 8 cm Time: 4 days	Height: 8 cm Time: 4 days	Height: 8 cm Time: 7 days	Height: 8 cm Time: 14 days
Snow Accumulation	Depth: 2.5 cm Time: 4 hours	Depth: 5 cm Time: 6 hours	Depth: 8 cm Time: 12 hours	Depth: 8 cm Time: 16 hours
Surface Discontinuity	Height: 5 cm Time: 2 days	Height: 5 cm Time: 2 days	Height: 5 cm Time: 7 days	Height: 5 cm Time: 21 days
Treefall	Time: 6 months	Time: 6 months	Time: 6 months	Time: Annual

Note: This chart is for reference use only. Consult Ontario Regulation 239/02 (as amended) of the Municipal Act for complete MMS and LOS requirements.

## **APPENDIX B**

### Salt Management Plan Monitoring Report



# Essex County Highways

## Salt Management Plan

# MONITORING REPORT

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### Prepared By

Document Owner	Project/Organization Role
Essex County Highways	Engineering Department

### SMP Monitoring and Updating Annual Report Version Control

Version	Date	Author
1.0	December 2011	ECH

Salt Management Plan  
**MONITORING AND UPDATING  
ANNUAL REPORT**

**1.0 Introduction**

The County of Essex has prepared this report to provide an annual update on the Salt Management Plan and associated Winter Control activities. This report is updated annually to record and monitor the County's Best Management Practices.

**2.0 Environment Canada Annual Reporting**

The County of Essex has actively participated in the annual reporting of road salt usage to Environment Canada since the program's implementation in 2004. As part of the program, Essex County Highways annually reports the quantity of de-icing chemicals used for each winter, along with various other best management practices such as the percentage of road salt stored indoors, the number of sites with water collection systems, etc. All of the reported information is included in Appendix C of the Essex County Highways Salt Management Plan. This report compares the submitted data against previous years in order to monitor the County's ability to effectively manage the use of road salt. The report also establishes time-oriented objectives, along with an update on new technologies and strategies that have the potential to be implemented for our winter maintenance program.

**3.0 Winter Severity and Salt Usage**

The Transportation Association of Canada and others developed the Winter Severity Index (wsi) to evaluate the relative harshness of a winter over a specified period of time (Stugget et al, 2006). The indicator measures the relative impact the harshness of a winter has on the application of road salt for winter maintenance operations. The model made available to the public in October 2007 uses various meteorological inputs to determine a wsi, which in turn is used to predict a total quantity of salt usage for the specified length of road network. Winter Severity Indices range between 1 and 100, where 1 indicates a predicted salt usage below the model's chosen minimum salt usage threshold, and 100 indicates a predicted salt usage above the model's chosen maximum salt usage threshold.

Initially, the County calculated a wsi for the entire winter period; however, the predicted total road salt usage was abnormally low. The low quantity predictions were the direct result of one of the meteorological variables, namely the average temperature. Due to Essex County's geographical location, our average temperature between the months of November and April is typically a few degrees above 0°C, resulting in low model returns for the predicted road salt usage. The prediction did not reflect the harsh winter months normally experienced between December and February, therefore an alternative approach was considered for calculating the wsi. A wsi was calculated for each individual winter month from November to April along with predicted salt usage for each corresponding month. The predicted salt usage for each month was totaled to provide a predicted value for the entire winter. Table B1 and Figure B1 show the average calculated wsi, total predicted salt usage and the actual reported total salt usage for each winter from 2005 to 2011.

Table B1: Average wsi and salt usage per year

Winter Season	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011
Reporting Year	2005	2006	2007	2008	2009	2010	2011
Calculated wsi (avg. for Nov.-Apr.)	61	59	60	59	63	56	60
No. of Events	66	52	80	81	52	56	84
Predicted Total Road Salt Usage (tonnes)	13,746	13,257	13,002	12,623	16,897	14,002	14,265
Reported Total Road Salt Usage (tonnes) <sup>1</sup>	14,909	13,201	11,424	23,879	17,520	18,181	23,655
% Difference between Reported and Predicted	8.1%	-0.4%	-12.9%	61.7%	3.6%	-52.5%	49.5%

<sup>1</sup>Includes salt mass from brine used for liquid application.

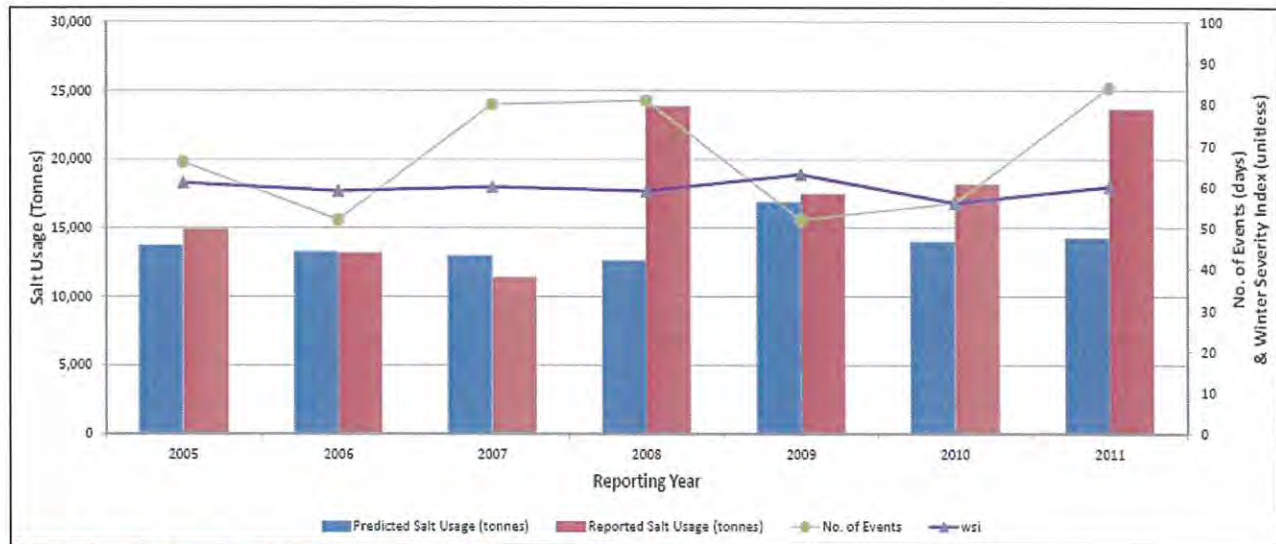


Figure B1: Salt Usage vs. No. of Events and Winter Severity Index

As shown above, the winter severity was relatively constant from 2005 to 2011. Although the use of the wsi is encouraged from Environment Canada and Transportation Association of Canada, it should be noted that the model has a relatively low “goodness of fit” ranging from 0.54 to 0.66; the latter being the result of a relatively small sample size which provides a false sense of accuracy. Currently, the model does not include meteorological inputs such as wind speed and potential for snow drifts. Due to the inherent rural nature of the County Road Network, snow drifts can become problematic in certain areas, which are resolved by our Winter Maintenance personnel. Other factors such as Minimum Maintenance Standards (MMS) Road Classification are not incorporated into the model. Such standards have a profound impact on our winter maintenance operations, especially when considering higher MMS classifications. These factors may have resulted in significantly higher or lower salt usage predictions, specifically for the years 2008, 2010, and 2011.

It can be seen from Figure B1 that the “Number of Events” correlates with the reported salt usage in all cases except for the year 2007. As defined by Environment Canada, an event constitutes a precipitation event that requires deployment of winter maintenance crews; however, a single event may last for several days depending on the severity the precipitation. One potential explanation for the anomaly in 2007 may be that the events were less severe than normal and may have only required plowing as opposed to the application road salt.

#### 4.0 Winter Maintenance Management Review

Essex County Highways reviews winter best management practices annually. Table B2 describes performance measures and also reflects the County's targets for 2012 and achievements for 2011 relating to all winter maintenance activities.

Table B2: Operational Procedures & Performance Measures

4.1 WINTER MAINTENANCE POLICIES	
4.1.1 Winter Maintenance Policy (ECH-R04-07)	
<b>Purpose/Description</b>	<p>Outlines the strategies used for safe storage and effective use of snow and ice control products and Level of Service (LOS) for snow and ice on County Roads.</p> <p>Best Management Practice</p> <ul style="list-style-type: none"> <li>Review the winter maintenance program on an annual basis to determine whether revisions are required or warranted. The program is designed to meet or exceed the Minimum Maintenance Standards, O. Reg. 239/02 (as amended).</li> </ul>
<b>Environmental Consideration</b>	<p>Prescribed LOS is the foundation of winter maintenance activities and has a significant impact on salt usage. There is also a need to demonstrate due diligence in the event of a claim against Essex County Highways.</p> <p><b>SMP Target</b> 100% <b>FY 2012 Target</b> 100% <b>FY 2011 Status</b> 100%</p>
<b>Performance Measure</b>	
4.1.2 MMS Road Classification and Level of Service Policy (ECH-R06-07)	
<b>Purpose/Description</b>	<p>Outlines the minimum maintenance standards and the level of service on all roads within the jurisdiction of the County of Essex</p> <p>Best Management Practice</p> <ul style="list-style-type: none"> <li>A documented and approved Level of Service policy (ECH-R06-07) exists and is followed by all snow and ice control personnel. The policy includes; response time, cycle times, end of storm conditions, etc</li> </ul>
<b>Environmental Consideration</b>	<p>Prescribed LOS is the foundation of winter maintenance activities and has a significant impact on salt usage. There is also a need to demonstrate due diligence in the event of a claim against Essex County Highways.</p> <p><b>SMP Target</b> 100% <b>FY 2012 Target</b> 100% <b>FY 2011 Status</b> 100%</p>
<b>Performance Measure</b>	<p>• Policy reviewed when traffic count data is available</p>

**4.2 EQUIPMENT UPGRADING, CALIBRATION & WASHING**

**4.2.1 Pre-Wetting and Anti-Icing Equipment**

Pre-wetting is the process of spraying de-icing salt with a solution of liquid chemical (brine) before spreading the salt on the roadway. This process allows for better adhesion between the road salt and the road surface. It also ensures enough moisture is present to facilitate the snow melting process. As a result, pre-wetted road salt has the potential function faster and at lower temperatures than dry road salt. Equipment upgrades such as “pre-wetting” has the potential to reduce the amount of rock salt applied to a road surface due to increased adhesion and efficiency in the snow melting process.

**Purpose/Description**

- Anti-icing is carried out when and where warranted.
- Staff is knowledgeable in the use and handling of solid and liquid anti-icing chemicals.
- Staff is knowledgeable in the use and handling of liquid fuels

**Best Management Practice**

**Environmental Consideration**

	<u>SMP Target</u>	<u>FY 2012 Target</u>	<u>FY 2011 Status</u>
	85%	50%	35%

**Performance Measure**

- Percentage of fleet vehicles with pre-wetting capabilities

**4.2.2 Electronic Spreader Controls**

**Electronic Spreader Controls**

Electronic spreader controls can be accurately calibrated, regulated to ground speed, and generate pertinent salt-use data.

**Environmental Consideration**

- Material application data from each event, at the truck or route level, is logged. Data can be reviewed and archived.

**Best Management Practice**

**Performance Measure**

- Percentage of fleet vehicles with electronic spreader control

	<u>SMP Target</u>	<u>FY 2012 Target</u>	<u>FY 2011 Status</u>
	100%	100%	100%



**4.3 EQUIPMENT MAINTENANCE**

**4.3.1 Spreader Calibration**

<b>Purpose/Description</b>	Calibrated equipment is important for the effective placement of de-icer material on Essex County roadways.	<b>Best Management Practice</b>	<ul style="list-style-type: none"> <li>All spreaders are calibrated before the start of each winter season</li> <li>Spreaders are checked and recalibrated when required</li> </ul>
<b>Environmental Consideration</b>	Effective quantity and placement of salt depends on accurate calibration of spreaders	<b>SMP Target</b>	<b>FY 2012 Target</b> <b>FY 2011 Status</b>
<b>Performance Measures</b>	<ul style="list-style-type: none"> <li>Spreaders are calibrated annually</li> <li>Verify contractor calibrations</li> <li>Maintain calibration history</li> <li>Review standardized application rates, which are related to precipitation and pavement temperature</li> <li>Benchmark all routes to ensure the appropriate quantity of salt is being applied to the road</li> </ul>	100%	100%   100%
		100%	100%   100%
		100%	100%   100%
		100%	100%   100%
		100%	0%   0%

**4.3.2 Equipment Washing**

<b>Equipment Washing</b>	Washing is intended to minimize chloride and oil and grease discharges to the environment.	<b>Best Management Practice</b>	<ul style="list-style-type: none"> <li>All washwater is collected and sent for proper disposal where possible.</li> </ul>
<b>Environmental Consideration</b>	Washwater contains salt, oil, grease, which have an adverse effect when discharged to soil and/or groundwater.	<b>SMP Target</b>	<b>FY 2012 Target</b> <b>FY 2011 Status</b>
<b>Performance Measures</b>	<ul style="list-style-type: none"> <li>Percentage of oil/water separators installed at existing active Patrol Yards</li> <li>Investigate options for managing washwater at existing Patrol Yards</li> </ul>	50%	50%   50%
		100%	25%   0%

**4.4 MATERIALS**

**4.4.1 Ordering**

<p><b>Purpose/Description</b></p>	<p>The quality of the snow and ice control materials should be sufficient for all winter maintenance needs.</p>		
<p><b>Environmental Consideration</b></p>	<p>Improper handling and storage of salt can increase loss to the environment. Excessive moisture creates salt clumps that are difficult to spread, and also interfere with the success of the pre-wetting operations.</p>	<p><b>Best Management Practice</b></p>	<ul style="list-style-type: none"> <li>Materials are ordered, delivered, and stored in covered salt domes or sheds immediately upon delivery to reduce loss to the environment.</li> </ul>
<p><b>Best Management Practice</b></p>	<ul style="list-style-type: none"> <li>Percentage of orders covered / placed inside storage</li> </ul>	<p><b>SMP Target</b></p>	<p><b>FY 2012 Target</b> 100% <b>FY 2011 Status</b> 100%</p>

**4.4.2 Storage & Handling**

<p><b>Purpose/Description</b></p>	<p>Appropriately sized storage facilities with large entrance ways can minimize salt handling upon delivery.</p>		
<p><b>Environmental Consideration</b></p>	<p>Improper handling and storage of salt can increase loss to the environment. Excessive moisture creates salt clumps that are difficult to spread, and also interfere with the success of the pre-wetting operations.</p>	<p><b>Best Management Practice</b></p>	<ul style="list-style-type: none"> <li>Materials are ordered, delivered, and stored in covered salt domes or sheds immediately upon delivery to reduce loss to the environment.</li> </ul>
<p><b>Performance Measures</b></p>	<ul style="list-style-type: none"> <li>Percentage of salt stored indoors on an impermeable surface</li> <li>Percentage of salt storage facilities with drainage water management systems</li> </ul>	<p><b>SMP Target</b></p>	<p><b>FY 2012 Target</b> 100% <b>FY 2011 Status</b> 100%</p>

<b>4.4.3 Record Keeping</b>		<b>SMP Target</b>	<b>FY 2012 Target</b>	<b>FY 2011 Status</b>
<b>Purpose/Description</b>	Record keeping for quantity of material and the location of its use is necessary for effective salt management.			
<b>Environmental Consideration</b>	Effective salt management requires accurate knowledge of how much salt is being used and where. It is not sufficient to measure gross totals, which vary widely from year-to-year due to weather conditions.	<b>Best Management Practice</b>		
	<ul style="list-style-type: none"> <li>Internally retrieve, review and archive spreader data from the electronic controllers</li> <li>Implement material tracking system by vehicle, route, and storm and compare to benchmarks</li> <li>Material usage data used to reconcile with material deliveries and end-of-season residual</li> </ul>		100%	0%
<b>Performance Measures</b>			100%	0%
			100%	0%
<b>4.5 STORM RESPONSE</b>				
<b>4.5.1 Weather Forecasting</b>				
<b>Purpose/Description</b>	The intent is to provide timely and accurate weather information to assist in snow and ice control decision-making.			
<b>Environmental Consideration</b>	Effective use of de-icing chemicals is dependent upon good snow and ice control decision-making, which in turn depends on consistently accurate and timely weather information. Snow & Ice Control decisions that are not consistent with weather and road conditions will lead to material loss	<b>Best Management Practice</b>		
<b>Performance Measures</b>	<ul style="list-style-type: none"> <li>Percentage of Operations staff knowledgeable in interpreting weather forecasts</li> <li>Percentage of fleet vehicles with infrared temperature sensors</li> </ul>		100%	100%
			100%	100%
			100%	100%

**Salt Management Plan (SMP)  
Appendix B**

<b>4.5.2 Storm Response Approach</b>			
<b>Purpose/Description</b>	To provide criteria and guidelines to standardize staff response for various combinations of precipitation events.		
<b>Environmental Consideration</b>	Snow & Ice Control decisions that are not consistent with weather and road conditions will lead to material loss		
<b>Performance Measures</b>	<ul style="list-style-type: none"> <li>A documented "Storm Response Plan"</li> </ul>	<b>SMP Target</b> 100%	<b>FY 2012 Target</b> 100%
			<b>FY 2011 Status</b> 0%
<b>4.6 WINTER PATROL</b>			
<b>4.6.1 Level of Service</b>			
<b>Purpose/Description</b>	It is intended that winter road conditions are monitored in an appropriate fashion to be able to react to changing weather and road conditions and to ensure that the levels of service (LOS) are maintained.		
<b>Environmental Consideration</b>	<p>Accurate monitoring of winter maintenance activities will support appropriate and effective snow and ice control decisions, leading to efficient use of salt.</p> <p><b>Best Management Practice</b></p> <ul style="list-style-type: none"> <li>MMS outlined in Ontario Regulation 239/02 (as amended) are met or exceeded, and reviewed annually.</li> <li>Review LOS policy</li> </ul>		
<b>Performance Measures</b>	<ul style="list-style-type: none"> <li>Review MMS outlined in Ontario Regulation 239/02 (as amended) &amp; Essex County Highways Best Management Practice (ECH-R06-07)</li> <li>Train and inform staff, management and the public on the intentions and expectations in service delivery</li> </ul>	<b>SMP Target</b> 100%	<b>FY 2012 Target</b> 100%
			<b>FY 2011 Status</b> 100%

**4.6.2 Drift Control**

**Purpose/Description**  
To reduce snow accumulation on roadways and problems associated with drifting or blowing snow.

**Environmental Consideration**  
A significant amount of winter maintenance activity is devoted to controlling drifting snow. If a roadway has a lower potential for snow and ice accumulation, then the winter maintenance demands will be correspondingly lower and the need for chemical application will be reduced

**Best Management Practice**

- Controlled with snow fencing in areas known to be subject to frequent heavy snow drifting.

**Performance Measures**

SMP Target

- Percentage of staff knowledgeable in proper drift control strategies

100%

FY 2012 Target

100%

FY 2011 Status

100%

**4.7 SNOW & ICE CONTROL TRAINING**

**Purpose/Description**  
Incorporate Salt Management Principles into training programs in accordance with TAC's Salt Management Synthesis of Best Management Practices for Training.

**Environmental Consideration**  
Through understanding of good housekeeping practices, the measures of snow & ice control and the expectations of program delivery will result in a greater probability of success with the Salt Management Plan.

**Best Management Practice**

- Annual training for winter maintenance staff, which includes a combination of in-house training and Ontario Good Roads Association (OGRA) training materials.

**Performance Measures**

SMP Target

- Percentage of winter maintenance staff trained

100%

FY 2012 Target

100%

FY 2011 Status

100%

**4.8 TECHNOLOGY REVIEW**

**Purpose/Description** To make Winter Maintenance Staff aware of current and emerging best practices that help provide more efficient use of snow control chemicals.

**Environmental Consideration** New techniques, procedure and technologies may provide more effective methods of monitoring and/or reducing the salt usage.

**Best Management Practice**

- Continually review existing & new technologies to determine their applicability in altering current practices Pilot studies incorporating relevant winter maintenance methodologies will be recommended when appropriate.

	<u>SMP Target</u>	<u>FY 2012 Target</u>	<u>FY 2011 Status</u>
<b>Performance Measures</b>	100%	100%	100%

**4.9 COMMUNICATIONS**

**Purpose/Description** An overall communications strategy with respect to Essex County's winter maintenance program be effectively communicated to staff & public sector

**Environmental Consideration** An informed public and media are more likely to become effective partners in achieving the goals of the Salt Management Plan.

**Best Management Practice**

- Communicate with County Council annually on the Winter Control program including Fast Facts Sheets.
- Complete annual reporting to Environment Canada on salt usage

	<u>SMP Target</u>	<u>FY 2012 Target</u>	<u>FY 2011 Status</u>
<b>Performance Measures</b>	100%	100%	100%
	100%	100%	100%
	100%	100%	100%

- Report annual usage to Environment Canada of SMP update and annual usage
- Release a media package annually to include Fast Facts of the program
- Post a copy of the most recent Salt Management Plan on County website ([www.countyofessex.on.ca](http://www.countyofessex.on.ca))

**4.10 ENVIRONMENTALLY SENSITIVE (VULNERABLE) AREAS**

Purpose/Description	Best Management Practice	SMP Target	FY 2012 Target	FY 2011 Status
To determine if any salt vulnerable areas are potentially impacted by the use salt	• Salt Vulnerable Areas are identified and factored into salt-management decision-making			
Environmentally sensitive areas that are impacted by winter maintenance practices may require unique solutions and specific action plans to mitigate the impacts				
<b>Environmental Consideration</b>				
<b>Performance Measures</b>	<ul style="list-style-type: none"> <li>• Identification and ranking of environmentally sensitive areas</li> <li>• Identify strategies to reduce salt impacts to salt vulnerable areas</li> </ul>	100%	100%	100%
		100%	25%	0%

**5.0 Future Initiatives**

Essex County Highways has reviewed the performance measures identified in the table above and have identified actions to improve Best Management Practice in the area of salt management. The following areas for potential improvement for the year 2012 are being explored:

- Increase anti-icing capabilities by purchasing additional pre-wetting devices (provided sufficient funds are available)
- Pursue the opportunity to redevelop the West End Depot Patrol Yard to optimize winter operations and to improve salt storage and handling practices
- Develop and implement a “Storm Response Plan”
- Investigate options for managing wash water at existing and/or new Patrol Yards
- Proactively identify Salt Vulnerable Areas and explore opportunities for salt reduction

The County of Essex promotes continuous development of practices and procedures to improve winter maintenance activities while striving to reduce the effects of road salt on the environment. Improvements and refinements will be evaluated as new salt management techniques become available with the understanding that progress and changing salt management practices may be tempered by the County’s ability to invest in capital equipment upgrades and as new technologies become available.

**6.0 References**

Suggest, J., Hadayeghi, A., Mills, B., & Leach, G. (2006). Development of a winter severity indicator models for Canadian winter road maintenance. *2006 Annual Conference of the Transportation Association of Canada*. Charlottetown, Prince Edward Island.

## **APPENDIX C**

Environment Canada  
Annual Report





Environment  
Canada

Environnement  
Canada



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## Road Salts Annex C Annual Report from Essex County Highways for 2011

Population (for Municipalities Only): 176000

### 1. Salt Management Plan

1.1 Has your organization prepared and started to implement a salt management plan that covers elements described in the Code of Practice?

- Yes -

1.2 Additional information. If your organization does not have a salt management plan, please provide details on status and plans for the future. If your organization has prepared a salt management plan but has *not* started to implement it, please provide date for future implementation.

### 2. Road Length Serviced

2.1 Total length of road on which salt is applied in your jurisdiction:

732.0 Kilometers of two-lane equivalent (centre line)

Another reporting unit, specify:

2.2 Total length of sidewalks on which salt is applied:

- *not applicable* -

2.3 Additional information:

### 3. Winter Severity

***Provincial ministries of transportation are not requested to complete this section.***

3.1 Rate the severity of this year's winter compared to the "normal" conditions for your area in relation to salt use (i.e number of snowfall

events, snowfall accumulation, number of freezing rain events, magnitude of these events) according to your perspective.

- above average -

3.2 Total number of *days* requiring salt application for winter road maintenance. If your organization covers large areas, report an average over all districts within the organization's jurisdiction, if possible.

Number of *days* = 84

3.3 Additional Information:

**4. Materials Used**

4.1 Provide the total quantity and concentration of salts found in all materials used for winter road maintenance (including parking lots) as of May 31st.

<i>Material (by category)</i>	<i>Quantity</i>		
	<i>Solid (Tonnes)</i>	<i>Liquid (Litres)</i>	<i>Concentration of salt in liquid (% by weight)</i>
<b>1) Straight application of salt only</b>			
NaCl	23626.29	101400.0	23.0
CaCl <sub>2</sub>			
MgCl <sub>2</sub>	N/A		
<b>2) Salts mixed with abrasives</b>			
Total Sand/Salt blend		N/A	N/A
<i>Specify type and quantity of salt in the blend</i>			
NaCl			
CaCl <sub>2</sub>			
MgCl <sub>2</sub>	N/A		
<b>3) Non-chloride</b>			
Total Non-Chloride			
<i>If mixed with chloride salts, specify type and quantity</i>			
NaCl			
CaCl <sub>2</sub>			
MgCl <sub>2</sub>	N/A		

4.2 Additional Information:

**5. Material Storage**

5.1 How many salt storage sites were managed by your organization?

Total number of sites (existing): 4

5.2 Does your organization apply "good housekeeping" practices at material storage sites?

- Yes -

5.3 Provide the organization's long term objectives, as indicated in your salt management plan, for implementing best management practices related to material storage, as well as the current state of implementation as of May 31st.

<i>Practice</i>	<i>Current</i>	<i>Long term objective</i>
Quantity of salt covered by a permanent roof	100 (%)	100 (%)
Quantity of salt stored on an impermeable surface	100 (%)	100 (%)
Quantity of sand/salt blends covered	0 (%)	0 (%)
Sites with run-off collection systems and/or management of salt impacted drainage	100 (%)	100 (%)

5.4 Additional information on practices and related objectives, if applicable.

## 6. Winter Road Maintenance Equipment and Road Salt Application Practices

6.1 Provide the size of your fleet.<sup>11</sup>

Size of the fleet : 17

6.2 Provide the organization's long term objective, as indicated in your salt management plan, for implementing best management practices related to winter road maintenance equipment and application practices, as well as the current state of implementation as of May 31<sup>st</sup>.

<i>Practice</i>	<i>Current</i>	<i>Long term objective</i>
Fleet equipped with electronic spreader controllers	100 (%)	100 (%)
Fleet equipped with pre-wetting	35 (%)	100 (%)
Fleet equipped with direct liquid application	5 (%)	100 (%)
Number of Road Weather Information System (RWIS) installations that your organization owned	0	0
Number of Road Weather Information System (RWIS) installations to which you have access but you do not own	2	2

6.3 Is your organization monitoring the road surface temperature with infrared thermometers (IRT) (either hand-held or truck mounted)?

- Yes -

6.4 Additional information on practices and related objectives identified in the organization's salt management plan, if applicable.

6.5 Does your organization regularly calibrate its equipment?\*  
(Mandatory)

- Yes -

**7. Snow Disposal**

7.1 Does your organization perform snow disposal at a designated site?

- No - Total number of sites:

If yes, does your organization apply good housekeeping practices at snow disposal sites?

7.2 Provide the organization's objective, as indicated in the salt management plan, for implementing best management practices related to snow disposal, as well as the state of implementation as of May 31st.

<i>Practice</i>	<i>Current</i>	<i>Objective</i>
Engineered snow disposal sites with collection of runoff and meltwater	%	%
Sites with meltwater collection pond	%	%

7.3 Additional information on practices of snow disposal and related objectives identified in the organization's salt management plan, if applicable.

**8. Winter Road Maintenance Training**

8.1 Does your organization have an internal winter road maintenance training program or utilize an outside training program (e.g. TAC, OGRA)?

- Yes - Specify: *Combination of internal training and OGRA training*

8.2 Provide your organization's objective, as indicated in the salt management plan, for percentage of winter road maintenance personnel trained with regard to *best management practices* on road

salts, as well as the current state of training as of May 31st (training provided over the entire year, including summer).

<i>Practice</i>	<i>Current</i>	<i>Objective</i>
Personnel trained on salt management	100 %	100 %

8.3 Additional information on training, if applicable:

**9. Areas Vulnerable to Road Salts**

9.1 Has your organization completed an inventory of areas vulnerable to road salts?

- No -

If no, does your organization plan to complete an inventory of areas vulnerable to road salts in the future?

- No - when:

9.2 Has your organization designated areas vulnerable to road salts?

- No - Specify how many areas?

If yes, has your organization used specific best management practices in or near any of these areas?

9.3 Additional information on areas vulnerable to road salts and related objectives identified in the organization's salt management plan, if applicable:

**10. Environmental Monitoring**

10.1 Does your organization have a road salts environmental monitoring program?

- No -

If no, does your organization plan to introduce or implement an environmental monitoring program in the future?

- No - when

10.2 Specify the environmental compartment tested (or to be tested):

10.3 Describe additional information on environmental monitoring work that has been done or is being planned and is related to road salts. Specify the source of impact that the monitoring program assessed or will assess (e.g. application of salts on roads, storage sites and/or

snow disposal sites). Provide the frequency of sampling, duration of sampling period (for how long or when it begins and ends) and the number of stations.

## 11. Comments

Provide any additional information.

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