City of Leduc Policy

Policy Title: SNOW AND ICE CONTROL **Policy No: 31.02:03**

Supersedes: 31.02:03
Rev. 9
Revision #: 10

Authority (Council or City Manager): CITY COUNCIL	
Section: INFRASTRUCTURE & PLANNING	**Approval Date: 2-Dec-2024**
Responsible Department: PUBLIC SERVICES	**Effective Date: 5-Dec-2024**
Relevant Legislation: N/A	
Relevant Council Resolution(s) and Date(s): N/A	
Relevant Bylaw and Date(s): RESOLUTION #3/96, 09/97, 10/97, 04/98, 311/98, 287/99, 261/2001, 06/2003, 04/2005, 47/2006	
Authority's Signature:	

Purpose:

To establish consistent and systematic service levels within Council's approved budget parameters for the provision of a safe and reliable transportation network within the City of Leduc.

Policy:

The City's snow and ice control entails six major functions:

1. Snow Plowing
2. Snow Removal
3. Ice Control
4. Parking Lot Clearing
5. Snow Storage Sites
6. Winter Road Patrols
7. Sidewalk, Multiway & Recreational Areas Snow Clearing
8. Residential Dry Sand Boxes

This Policy covers most winter maintenance scenarios. When unusual conditions occur, the Director of Public Services or designate shall use their discretion and judgment and if need be to deviate in the application of this policy to achieve the desired service levels as resources permit.

Process:

1. **Snow Plowing**

There are two service level priorities for snow plowing.

Level 1 Priority
Level 1 Priority snow plowing generally occurs after snow accumulation of 2 to 5 cm.

The following streets are considered a Level 1 Priority:

- Black Gold Drive (Rollyview Road – West of West Haven Drive)
- Bridgeport Crossing (50 Avenue - Bridgeport Blvd.)
- Bridgeport Gate
- Bridgeport Link
- Coady Boulevard (Rollyview Road – Meadowview Boulevard)
- C.W. Gaetz Road (Rollyview Road – Robinson Drive)
- Discovery Way (50 Avenue – Bridgeport Link)
- Grant MacEwan Boulevard (Bridgeport Gate – Blackstone Boulevard)
- Highway 2A (38 Avenue - South Corporate Limits)
- Meadowview Boulevard (Coady Boulevard – C.W. Gaetz Road)
- Pioneer Road
- Rollyview Road (50 Street – East Corporate Limits)
- Sparrow Drive (Airport Road - 65 Avenue)
- 38 Avenue (Grant MacEwan Boulevard – Workun Drive)
- 46 Street / 45 Street / 43 Street (Black Gold Drive – Airport Road)
- 47 Street (50 Avenue - 61 Avenue)
- 50 Avenue (50 Street - West Corporate Limits) except for Hwy 2 R.O.W.
- 50 Street (Hwy 2A - 65 Avenue)
- 64 Avenue (Highway 2 Off-Ramp / Leduc Chamber of Commerce)
- 65 Avenue (50 Street – Range Road 250)
- 69 Street (West Fire Station #2)
- 74 Street (50 Avenue – Boreal Drive)

Normally, streets will be plowed within 12 hours following 2 to 5 cm of snow. Snow plowing may occur on any street, road or lane at any time if the street becomes impassable for emergency response vehicles.

Refer to attached Schedule 1A

Level 2 Priority

Level 2 Priority snow plowing generally occurs after snow accumulation of 5 to 10 cm of snow and after all Priority 1 streets have been plowed.

- Allard Avenue
- C.W. Gaetz Road (Meadowview Boulevard – South Corporate Limits)
- Grant MacEwan Boulevard (Blackstone Boulevard – South Corporate Limits)
- Grant MacEwan Boulevard (Bridgeport Gate – 65 Avenue)
- Lions Park Road
- North Industrial Area
- Range Road 252 – (HWY 2 – West Corporate Limits)
- Rural Boundary Roads
- Sparrow Crescent
- Township Road 494 (HWY 2 – West Corporate Limits)
- W.F. Lede Service Road (48 Avenue – Leduc Recreation Centre North Boundary)
- 39 Street (65 Avenue – Allard Avenue)
- 43 Street (56 Avenue – 65 Avenue)
- 48 Avenue (44 Street – W.F. Lede Service Road)
- 54A Street (65 Avenue – 50 Avenue)

Timing of Priority 2 roads will be as per available City resources.

Level 3 Priority

Level 3 Priority snow plowing generally occurs after snow accumulation of 10 to 15 cm of snow and after all Priority 2 streets have been plowed. Priority 3 consists of back alleys throughout the City to ensure access during seasonal parking ban declaration. Snow will be plowed with the use of an underbelly plow and windrows across driveways will be the responsibility of the resident.

Refer to attached Schedule 1B

2. Snow Removal

There are 4 service level priorities for snow removal operations.

Level 1 Priority

Level 1 Priority will be given to the downtown commercial area of the City. Removal normally occurs after an accumulation of 5 cm of compacted snow.

The following streets are considered Level 1 Priority for snow removal:

- 50 Avenue (50 Street – 47 Street)

- 49 Avenue (50 Street – 47 Street)
- 49 Street (51 Avenue – 49 Avenue)
- 48A Street (51 Avenue – 50 Avenue)
- 48 Street (50 Avenue – 49 Avenue)
- 51 Avenue (50 Street – 47 Street)

Normally snow will be removed within 24 hours after snowfall has stopped or as soon as the majority of businesses have cleared their sidewalks.

Level 2 Priority

Level 2 Priorities are the remaining streets in the downtown core and school zones. Snow will normally be removed after an accumulation of 7 to 10 cm of compacted snow.

The following streets are considered Level 2 Priority for snow removal:

- Remaining downtown core as attached Schedule 3.
- School zones
- Black Gold Drive only where snow is plowed onto center of street.
- Grant MacEwan Boulevard (CP Rail – 50 Avenue) only where snow is plowed onto center of street.
- 50 Avenue (50 Street – Hwy 2) only where snow is plowed onto center of street.
- 50 Street (65 Avenue – Bella Coola Drive) only where snow is plowed onto center of street.
- Grant MacEwan Boulevard (50 Aven – Deer Valley Creek Bridge)
- 46 Street (Black Gold Drive – 56 Avenue)

Level 3 Priority

Level 3 Priorities for snow removal are the collector streets within the various subdivisions. Snow will normally be removed after an accumulation of 7 to 10 cm of compacted snow. A seasonal parking ban will be declared pursuant to the City's Traffic Bylaw to ensure effective removal of snow.

The following streets will be completed on a rotational basis, with the order reversed after each removal process:

- South Park Drive
- 42 Street (South Park Drive – Campbell Road)
- Caledonia Drive
- Meadowview Drive
- Meadowview Way
- Robinson Drive
- Southfork Drive
- Sheppard Boulevard

- Southfork Road
- Corinthia Drive
- Bella Coola Drive
- 52 Street / 57 Avenue (43 Avenue – 50 Street)
- 51 Street (43 Avenue – 49 Avenue)
- 47 Street (Black Gold – 50 Avenue)
- 45 Avenue (50 Street – 51 Street)
- 46 Avenue (46 Street – 44 Street)
- 45 Street (South of 46 Avenue)
- Alton Drive
- Windrose Drive
- Workun Drive
- Suntree Promenade
- Spruce Boulevard
- Sheridan Way (38 Avenue – Spruce Boulevard)
- Alexander Drive
- William Bell Drive
- Bridgeport Boulevard
- Bridgeport Crossing
- Deer Valley Drive
- Ameena Drive
- West Haven Drive
- West Haven Boulevard
- Hawthorne Way
- Boreal Drive
- Black Stone Boulevard
- Black Stone Link (38 Avenue – Berg Place)
- Creekside Drive

Level 4 Priority

Level 4 Priorities are normally identified as residential streets. Snow removal will normally occur after an accumulation of 15 cm of compacted snow, when access by emergency vehicles is severely impaired, or unseasonal weather is expected to cause hazardous conditions. Residential snow removal will be scheduled to accommodate 2 removals per season or as snowfall dictates. A General Residential Parking Ban will be declared pursuant to the City's Traffic Bylaw to ensure effective removal of snow.

The subdivisions will normally be completed in the following order, however changes to the order may be made to accommodate waste collection and operational needs. On the next occurrence, the order will be reversed with the last subdivision completed first.

- Willow Park - Section 1
- Linsford Park - Section 2

- Bridgeport - Section 3
- Deer Valley – Section 4A
- Creekside – Section 4B
- Leduc Estates - Section 5
- Lakeside Estates - Section 6
- Windrose - Section 7
- Suntree – Section 8
- West Haven – Section 9
- Corinthia Park - Section 10
- Southfork – Section 11
- Caledonia Park - Section 12
- Tribute – Section 13
- Meadowview - Section 14
- South Park - Section 15
- North Telford – Section 16A
- South Telford - Section 16B
- Central Business District / Alexandra Park – Section 17
- Blackstone – Section 18
- Robinson – Section 19
- Woodbend – Section 20

Refer to attached Schedule 2

3. <u>Ice Control (Sanding, Rock Chips, & Liquids</u>)

As road conditions become slippery, abrasives and/or melting agents may be applied to hazardous locations such as intersections, curves, hills, railway crossings, school areas and pedestrian crosswalks.

The priority for ice control will be:

1. Streets identified in the Snow Plowing Schedule, downtown area crosswalks & intersections abutting schools, curves or hills.
2. Collectors identified in the Snow Removal Schedule.
3. Residential intersections, and lane entrances and exits only as required.

It is not common practice to sand streets in their entirety unless severe weather conditions warrant such actions. Ice control for residential areas will predominantly consist of rock chips. De-icing agents in residential areas will not be used unless weather conditions deem it necessary.
"Road salts" mean road salts that contain inorganic chloride salts with or without ferrocynaide salts to prevent the formation of ice.

The City of Leduc "Salt Management Plan" contains best management practices that optimizes the strategies relative to snow and ice control

to minimize the amount of road salt entering the environment without compromising road safety.

To meet these objectives, the organization will:

- Manage road salts in accordance with Environment and Climate Change Canada's *Code of Practice for the Environmental Management of Road Salts* (April 3, 2004).
- Keep employees and the public informed about the environmental practices related to road salts.
- Adopt internal standards to meet or exceed local requirements.
- Comply with applicable laws and regulations.
- Conduct regular management reviews and make improvements wherever feasible.

Refer to attached Schedule 3 for the complete contents of the City of Leduc Salt Management Plan.

"Liquids" mean anti-icing and de-icing liquids that contain a mixture of a sodium chloride salt brine with an organic product such as beet juice. The use of these liquids is to proactively treat sections of arterial and collector roads prior to a severe weather event to discourage the formation of ice and reduce the use of road salts.

4. Parking Lot Clearing

The Municipal parking lots will be cleared & initially snow stockpiled within the parking lot. Normally parking lots will be cleared after an accumulation of 5 to 10 cm of snow. Two levels of priorities are given to parking lots.

Level 1 Priority

The following parking lots will normally be cleared within 24 hours following an accumulation of 5 to 10 cm of snow:

- Alexandra Arena
- Alexandra Arena Park and Ride Lot
- Civic Centre
- Leduc Public Library
- Leduc Recreation Centre (East & West Parking Lots)
- Leduc Recreation Center Park and Ride Lot
- Operations Building
- Protective Services Building
- Telford House
- West Fire Station

Level 2 Priority

The following parking lots will normally be cleared within 72 hours following an accumulation of 5 to 10 cm of snow:

- Aileen Faller Parking Lot (Black Gold Drive)
- Alexandra Pool
- Barkly Dog Park
- Boat Club
- Cemetery
- Chamber of Commerce
- Drama Society
- Eco Station
- Fred Johns Park (North & South Sides)
- Grain Elevator
- Ian's Forest
- Kinsmen
- Leduc Golf and Country Club Parking
- Lion's Parking Lot
- LRC Dog Park
- LRC Overflow
- North Reservoir
- Outlook Park
- Robinson Reservoir
- Rugby Club
- South Reservoir
- Stage Works/Stone Barn Garden
- Woodbend Lift Station
- 47 Street Parking and Lane (BMO Lane Parking)
- 49 Avenue Parking Lot (ATB Parking Lot)
- 51 Avenue Parking lot (Luchak Parking Lot)
- West Lift Station

As City resources warrant, stockpiled snow will be removed.

Refer to attached Schedule 4

5. Snow Storage Sites

The City is presently using the following permanent engineered snow storage sites, exclusively for City Operations:

- Site 1 4301 – 56 Avenue (East Site)
- Site 2 65th Avenue and 74th Street (West Site)

Temporary snow storage sites may be utilized if warranted and will be dependent on obtaining permission rights from private property owners. If the sites are City property, they are to be used only by City operations.

6. **Winter Road Patrols**

A winter road patrol consists of inspecting portions of the City's plow route and collector road network when weather or conditions change. During the patrol, the inspector will note all adverse road conditions including but not limited to icy surfaces, drifting snow, windrow height and road temperatures. These observations will then be used to determine/prioritize what action is required by Public Services with regards to winter road maintenance operations.

The following schedule is to be utilized by Public Services staff when conducting winter road patrols:

- Monday – Friday (6:00 am – 4:30 pm): The Infrastructure Maintenance Manager and/or the Lead will conduct at least one winter road patrol per day.
- Sunday – Friday (9:00 pm – 5:00 am): If there is a Night Shift Operator(s), they will conduct one winter road patrol per night.
- Weekend (3:30 pm Friday – 4:00 am Monday) and Statutory Holidays: The Standby Operator will conduct one winter road patrol per day.
- Additional winter road patrols other than the ones listed above may be conducted depending on weather conditions.

7. **Sidewalk, Multiway and Recreational Area Snow Clearing**

There are 2 service level priorities for various multiways, municipal bus stops and recreational facilities.

Definitions

Sidewalk – 1.5 m wide concrete pathway

Multiway – a combination of 2.5–3.0m asphalt trails and sidewalk (specific to those identified to connect the multiway system where no multiway is provided) that comprises the City of Leduc's multiway system.

Level 1 Priority

Level 1 Priorities are defined as sidewalks, multiways and bus stops which are pedestrian corridors used to channel pedestrians to business areas, service providers, recreation facilities and education facilities. Priority 1

includes municipal bus stops within the City's corporate limits, sidewalks located adjacent to arterial roadways, where the back of residential lots face the arterial. In situations where sidewalks and multiways run parallel on one side of the roadway or close proximity only one surface will be cleared.

In addition to providing pedestrian corridors, Level 1 priorities will also provide some recreational opportunities for residents.

Multiways and municipal bus stops will be cleared to a "snow free surface" after the accumulation of 2 cm of snow.

The following boarded rinks will be cleared after the snow event stops, when staff and equipment are available.

- Kinsmen Rink
- Lions Rink (Aileen Faller Park)
- Robinson Rink
- Black Stone rink
- South Fork

Sidewalks/multiways will be monitored for hazards due to freezing rain or other such weather-related conditions. These areas will be monitored and treated on an individual basis.

Under normal circumstances the sidewalks & multiways will be cleared within 48 hours following the weather event or snow accumulation of 2 cm.

Level 2 Priority

Level 2 Priorities are defined as the City's sidewalks, outdoor ice surfaces and will generally be cleared snow free once all Level 1 priority multiways, bus stops, and boarded rinks are completed.

The following ice surfaces are included for Priority 2 clearing:

- Telford Park Skate Path
- Golf course skate path
- Neighborhood Ice Surfaces
- Christ The King School Oval

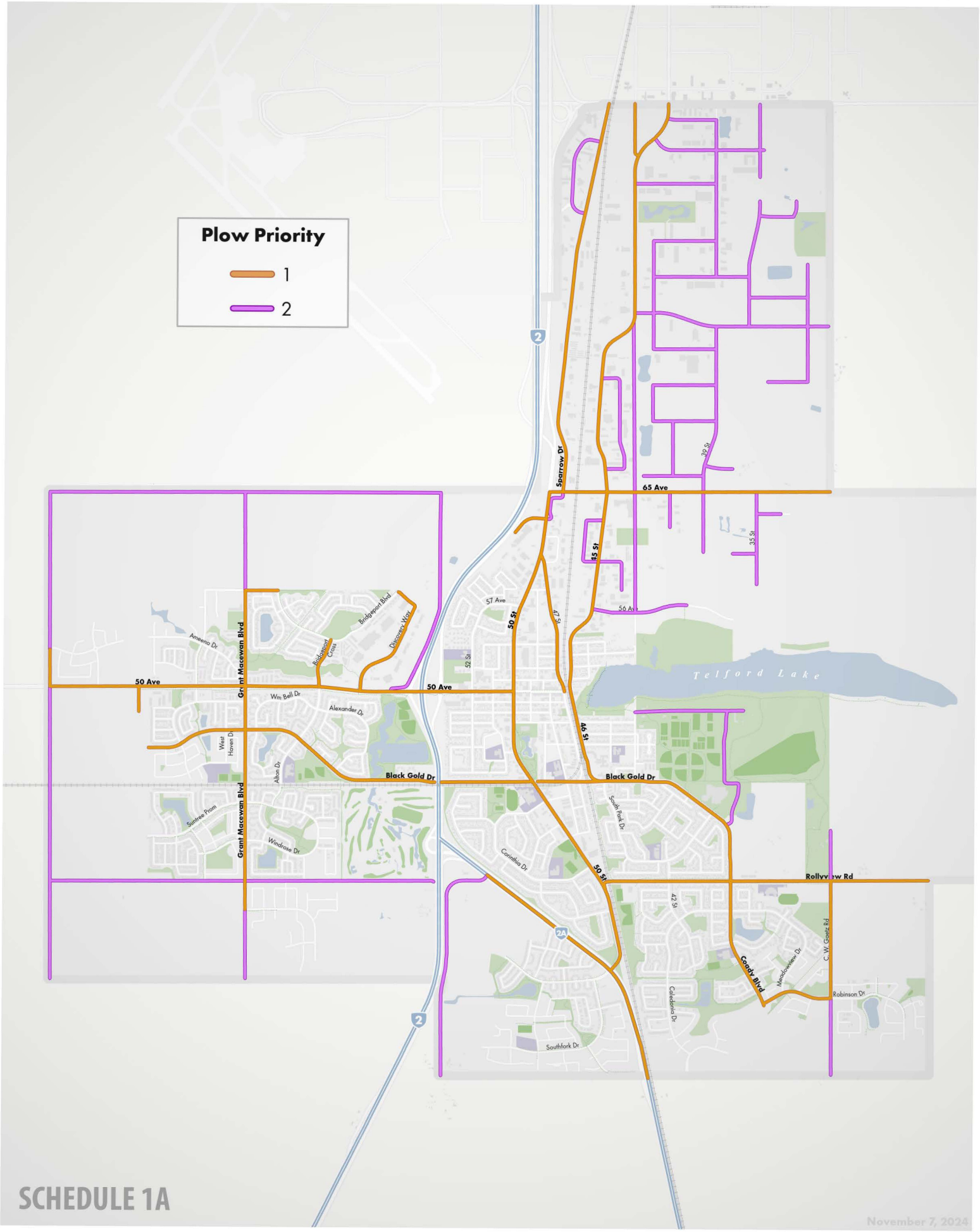
Refer to attachment Schedule 5

8. Residential Dry Sand Boxes

To assist the public with neutralizing ice on sidewalks fronting private property, Public Services will make dry sand and chips (fractured rock) available in storage boxes located throughout out the City.

Refer to attachment Schedule 6

Leduc Snow Plow Service | MAIN ROUTES 2024

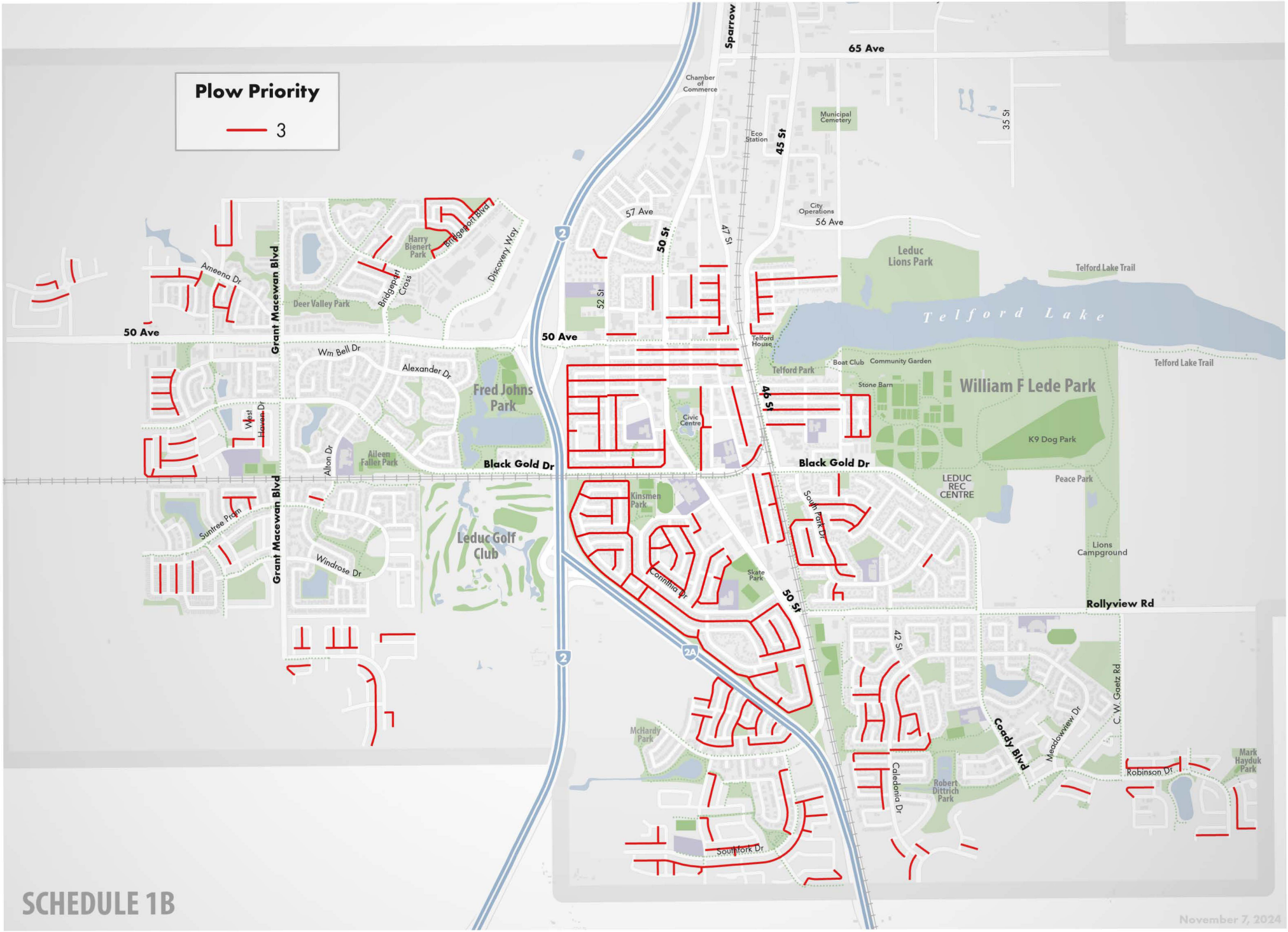


SCHEDULE 1A

November 7, 2024

Leduc Snow Plow Service

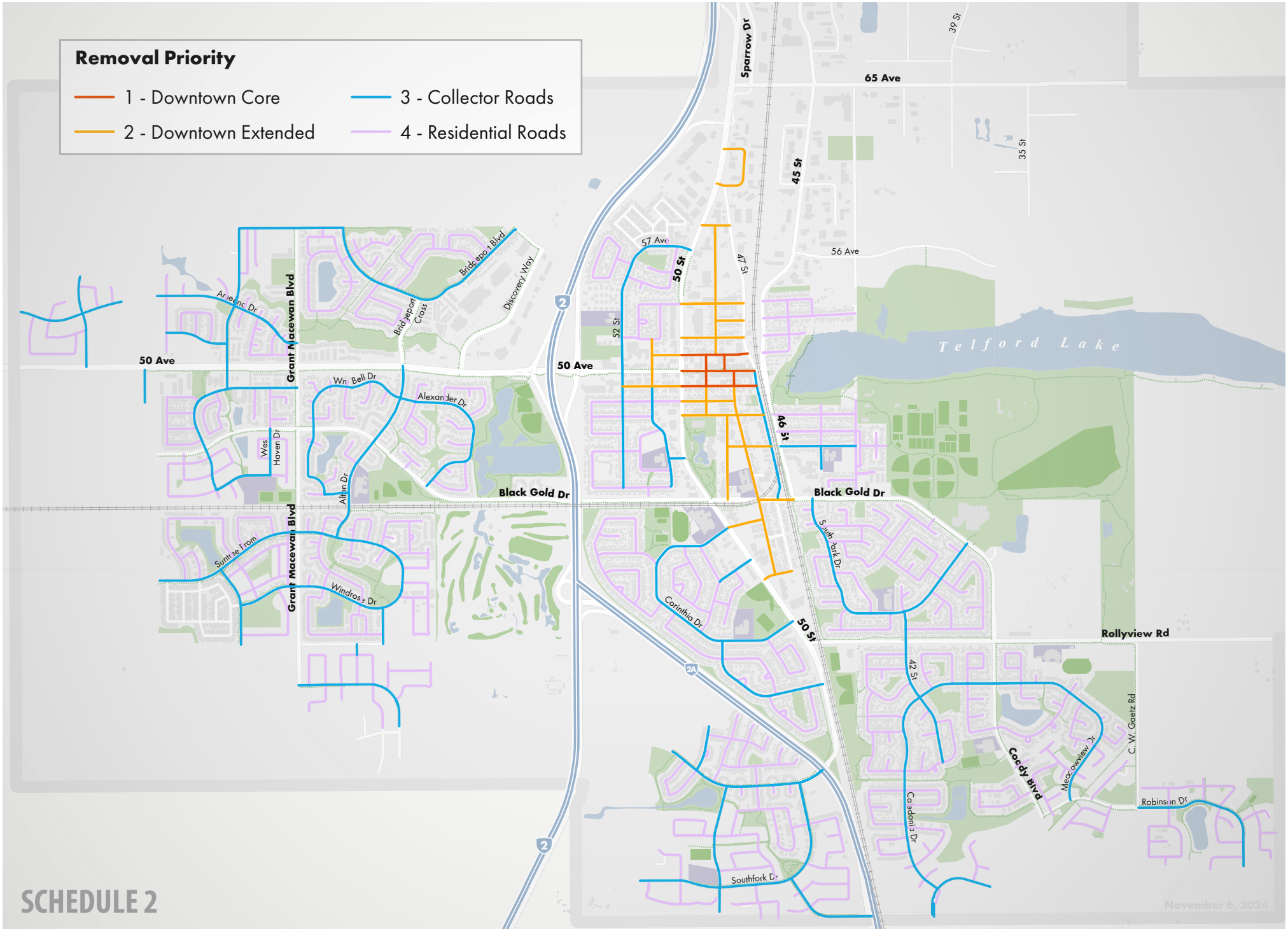
Residential Area Laneways 2024



SCHEDULE 1B

Leduc Snow Removal Service

2024



2017

City of Leduc Salt Management Plan

City of Leduc

12/4/2017

SCHEDULE 3

Table of Contents

1.0 General Information

Table 1. General Information

Organization	The City of Leduc
Address	1 Alexandra Park, Leduc, AB T9E 4C4
Technical Contact	Rick Sereda
Telephone Number	780-980-7193
Fax Number	780-980-7127
Email Address	rsereda@leduc.ca
Population	30,498
Road Length Serviced (total length of road which salt is applied in organizations jurisdiction)	452 km
Winter Severity/Total Number of Events Requiring Salt Application During Winter	38
Salt Management Plan Date of Approval	TBD
Date Plan will be Fully Implemented	TBD

*See **Appendix A** for further information on Winter Severity/Event Criteria

1.1 Overview

A comprehensive five-year scientific assessment on road salts by Environment Canada determined that, in sufficient concentrations, road salts pose a risk to freshwater ecosystems, soil, vegetation and wildlife. Under the *Canadian Environmental Protection Act*, 1999, the Government of Canada published a *Code of Practice for the Environmental Management of Road Salts* on April 3, 2004. The *Code* is designed to help municipalities and other road authorities better manage their use of road salts in a way that reduces their impacts on the environment while maintaining road safety.

The Transportation Association of Canada (TAC) published a *Salt Management Guide* (1999) and a series of *Syntheses of Best Practices* (2013) to assist organizations as they find ways to more effectively manage their salt use and provide the public with the safe and efficient transportation systems they expect, while minimizing effects on the environment. The TAC *Syntheses of Best Practices* supplement the recommendations made within the *Code*.

Road Authorities that use more than 500 tonnes of road salt in a winter season (five year rolling average) and/or have salt vulnerable areas in their territory, such as natural water bodies or salt vulnerable vegetation, are subject to the *Code* with the particular requirement to prepare, implement and file a Salt Management Plan. The Salt Management Plan shall cover all activities which may result in the release of salts to the environment, such as salt storage, application of salts on roads, and the disposal of snow containing road salts; the salt management plan should also include proof of implementation of best management practices to protect the environment from the negative impacts of road salts. Currently the City of Leduc utilizes over 500 tonnes of road salts per year (five year rolling average) and has salt vulnerable areas in it's boundaries.

In consideration of the requirement to file a Salt Management Plan, this document has been prepared to permit the City of Leduc to comply with the *Code*. It must be recognized that this plan is subject to change, updating and continuous improvement to reflect organizational changes, technological changes and new operational procedures and best management practices as they become available. Once the

plan is developed road authorities will be required to undertake formal annual reviews with the goal of continually improving their winter maintenance operations.

1.2 Objective

The objective of the City of Leduc's Salt Management Plan is to set a procedural framework to ensure safe, efficient and cost effective roadway systems, in recognition of the adverse effects that excessive use of road salt can have on the environment. The Salt Management Plan contains best management practices that will optimize strategies relative to snow and ice control and strive to minimize the amount of road salts entering the environment.

As specified in the *Code of Practice for the Environmental Management of Road Salts*, the Salt Management Plan is to be endorsed by the "highest level of government"; therefore, the Council of the City of Leduc will be requested to endorse this plan.

1.3 Organization of the Plan

This plan is organized to provide a review of existing City of Leduc winter maintenance policies, operating practices and strategies including:

- General Salt Use
- Salt and Sand Storage
- Snow Disposal
- Street Sweeping
- Identification and Protection of Salt Vulnerable Areas
- Communication and Weather Monitoring
- Training
- Spill Response Procedures
- Record Keeping
- Monitoring

Current best management practices used by the City are compared to those recommended by the *TAC Salt Management Guid*e and *Syntheses of Best Practices* to identify opportunities for improvement. Salt Management goals will be identified to address potential gaps and further protect the environment from the negative impacts of road salt, while maintaining road safety.

3.0 City of Leduc's Winter Maintenance Policies

3.1 Snow and Ice Control Policy

The City of Leduc has a *Snow and Ice Control Policy* (*Policy # 31.02:03*). Leduc's *Snow and Ice Control Policy* has six major functions:

1. Snowplowing
2. Sidewalk, Multiway and Recreational Area Snow Clearing
3. Ice Control
4. Snow Removal
5. Parking Lot Clearing
6. Snow Storage Sites
7. Winter Road Patrols

8. Residential Dry Sand Boxes

This Policy covers most winter maintenance scenarios. When unusual conditions occur, the Director of Public Services or designate shall use their discretion and judgment and if need be to deviate in the application of this policy to achieve the desired service levels as resources permit.

3.1.1 Level of Service

As per the City of Leduc's *Snow and Ice Control Policy*, as road conditions become slippery, abrasives and/or melting agents may be applied to hazardous locations such as intersections, curves, hills, railway crossings, school areas and pedestrian crosswalks. Residential intersections, lane entrances and exits may be sanded only as required. It is not common practice to sand streets in their entirety unless severe weather conditions warrant such actions.

In accordance with the *Snow and Ice Control Policy* the City of Leduc provides a level of service for clearing snow accumulation and treating icy roadways as illustrated in the table below.

Table 2. Level of Service

Snow Accumulation			
Priority Ranking	**Class of Highway**	**Depth**	**Time**
Snow Plowing			
Priority 1	Highways and Arterials	2-5 cm	Within 12 hrs
Priority 2	Rural boundary roads and north industrial areas	5-10 cm	As City resources will allow
Sidewalk, Multiway and Recreational Area Snow Clearing			
Priority 1	Sidewalks, Multiways and Bus Stops which are pedestrian corridors used to channel pedestrians to main business areas and recreation facilities	2 cm	Within 48 hrs
Priority 2	Outdoor ice surfaces		After priority no. 1 and normally within 72 hrs following a snow fall.
Snow Removal			
Priority No. 1	Downtown, Commercial	5 cm	
Priority No. 2	Remaining Downtown, Commercial	7 – 10 cm	
Priority No. 3	Collector Streets within various subdivisions	7-10 cm	Completed on a rotational basis with the order reversed after each removal process
Priority No. 4	Residential streets	15 cm	Completed on a rotational basis with the order reversed after each removal process

Parking Lot Clearing			
Priority No. 1	City owned parking lots	5 – 10 cm	Within 24 hours
Priority No. 2	City owned parking lots	5 – 10 cm	Within 72 hours

3.1.2 Salt Management

The City of Leduc *Snow and Ice Control Policy* references the Salt Management Plan as follows:

"Road salts" mean road salts that contain inorganic chloride salts with or without ferrocynaide salts to prevent the formation of ice.

The City of Leduc Salt Management Plan contains best management practices that optimize the strategies relative to snow and ice control to minimize the amount of road salt entering the environment without compromising road safety.

To meet these objectives, the organization will:

- Manage road salts in accordance with Environment and Climate Change Canada's *Code of Practice for the Environmental Management of Road Salts* (April 3, 2004).
- Keep employees and the public informed about the environmental practices related to road salts.
- Adopt internal standards to meet or exceed local requirements.
- Comply with applicable laws and regulations.
- Conduct regular management reviews and make improvements wherever feasible.

4.0 Operational Practices and Strategies

4.1 General Salt Use

Application of the 4-R's of Salt Management: right material, right amount, right place and right time, is governed by pavement temperatures, which can fluctuate depending upon time of day, degree of cloud cover and sub-surface conditions.

Currently the City does not have designated application rates for sand and salt use. Investigation into the amount of sand/salt released per km will be conducted to further understand application rates. The City already has plans in place to implement an Automatic Vehicle Location Program; this program will provide data on vehicle travel, including distances for which sand/salt mixtures were released and distances for which the track plow was up versus down.

City of Leduc operators are familiar with the *Snow and Ice Control Policy* and priority areas for ice control which assists in generating consistent decision making.

4.1.1 Material Used

Table 3. Total Quantity of Road Salts and Non-Chloride Materials Used for Winter Road Maintenance

	Year					5 Year Average
Material	**2016**	**2015**	**2014**	**2013**	**2012**	
Solids (Tonnes)						
Road Salt	482	342	778	817	690	**622 Tonnes**
Sand	2,550	2,794	3,490	2,735	2,035	**2,721 Tonnes**
Buckshot/Chips	388	844	413	883	342	**574 Tonnes**
Liquids (Litres)						
$CaCl_2$ for pre-wetting sand	28,000					**28,000 Litres**

The City of Leduc pre-treats sand stockpiles with 19% calcium chloride ($CaCl_2$) to help the sand stick to the pavement and accelerate the melting process. Pre-treatment in the stockpile has the advantage over treatment on the spreader during the application process, of not requiring the same level of investment in infrastructure (i.e. chemical storage tanks) and equipment (i.e. on board tanks and pumps). It provides an excellent way for any contractor to obtain the benefits of liquid enhanced solid de-icers without having to change their equipment.

The City uses salt and pre-treated sand on arterial and collector roads.

De-icing agents in residential areas and parking lots will not be used unless weather conditions deem it necessary. Ice control for residential areas and City owned parking lots will predominantly consist of non-treated rock chips. This reduces the potential for contamination of residential storm ponds and is more environmentally friendly to lawns, trees and sidewalks. In addition, rock chips provide far superior traction than sand for both cars and pedestrians.

The quality of snow and ice control materials can influence their effectiveness. The City of Leduc re-tenders for sand and rock chips each year and inspects the quality of the materials being offered.

Potash salt is ordered from Saskatchewan annually; the contract includes a requirement to ensure salt is tarped during transport.

4.1.2 Sandbox Container Program

To assist the Public with neutralizing ice on sidewalks fronting private property, Public Services makes dry sand available in storage boxes at 35 locations throughout the City, through the Sandbox Container Program.

See Schedule 5 of the City of Leduc *Snow and Ice Control Policy* for a list of locations.

4.1.3 Winter Maintenance Equipment

Table 4. Inventory of Municipal Equipment Used for Winter Maintenance

Description	Unit No.	Function
2012 Ford350 4x4 Reg Cab	346	Multiway Sander – Light Duty
2015 Ford F350 4x4 Ext Cab	355	Sander/Plow – Light Duty
2009 International Truck	408	Plow/Sander
2012 International Truck	409	Plow/Sander
2013 International 7400 6x4 Truck	411	Plow
2014 Freightliner Truck	412	Plow/Sander
2017 Freightliner Truck	415	Plow/Sander
2002 CAT938G	502	Wheel Loader
2004 JCB 214	503	Backhoe/Wheel Loader
2004 CAT 262B	504	Skidsteer
2006 CAT 140H	505	Motor Grader
2016 Artic Shark	506	Ice Breaker – Loader Attachment
2007 RPM Tech 217	512	Snow Blower – Loader Attachment
2010 Cat 938H	521	Wheel Loader
2011 John Deere 410JU	526	Backhoe/Wheel Loader
2011 Volvo G940B	529	Motor Grader
2011 RPM 217	530	Snow Blower – Loader Attachment
2014 John Deere 624K	532	Wheel Loader
2014 John Deere 870G	533	Motor Grader
2015 RPM 220	534	Snow Blower – Loader Attachment
2016 S650 Bobcat	535	Skidsteer
2005 Toro 4000D	603	Mower/Multiway Sweeper
2008 Toro 4500D	605	Mower/Multiway Sweeper
2011 Toro 4500D	609	Mower/Multiway Sweeper
2013 Toro GM 4000D	611	Mower/Multiway Sweeper
2013 Toro GM 4000D	612	Mower/Multiway Sweeper
2013 Toro GM 4000D	613	Mower/Multiway Sweeper
1993 Kubota	803	Tractor
2009 Kubota	804	Tractor
2011 Bobcat 5600 Tool Cat	914	Multipurpose
2016 Bobcat 5600 Tool Cat	920	Multipurpose

The City also contracts out tandem trucks with snow boards for snow hauling and a bulldozer for pile grooming at temporary snow storage sites.

All of the City's sanders and trucks have spreader controls, which regulate the amount of salt spread based on the speed of the vehicle. The spreader controls are manual and therefore not calibrated at this time.

The City has one truck capable of pre-wetting however the City has not utilized it to date.

Prior to the winter season the fleet undergoes a pre-season mechanical review to determine road-worthiness.

Three of the City's trucks are equip with vehicle mounted surface temperature measuring devices (infrared thermometers), and one hand-held device is available as needed. The surface temperature measuring devices assist in making decisions on when to apply salt and what type of technique to use (i.e. plowing, sanding, de-icing).

The City does not currently utilize road weather information systems (RWIs).

4.2 Salt and Sand Storage

The goal of salt and sand storage best management practices are to reduce the potential for a release.

The City of Leduc currently operates one maintenance yard at 4300 56 Ave, Leduc, Alberta. A multi-functional 2,183 m^2 facility was constructed to store salt and blends of sand and salt. The building is covered by a 100 percent metal roof with solar panel covering and materials are kept inside on an impermeable concrete pad. The facility can hold approximately 190 m^3 of salt, 4,600 m^3 of sand and 310 m^3 of rock chips; salt and salt containing sand are stored in concrete bunkers separate from the non-chloride materials.

The facility is designed to facilitate deliveries, stock piling and loading of sanders inside the facility, which assists in preventing uncontrolled releases.

Good house keeping practices include regular sweeping of the facility.

Drainage and runoff within the storage facility is contained with a built in sump and catchbasin. As runoff quantities are typically minimal the sump is vacuumed out as needed and does not drain to the sanitary.

The City of Leduc ensures that sanders are only washed in a designated wash bay where the wash water is contained and passes through an oil and grit separator before entering the sanitary system.

Runoff from the surrounding maintenance yard is directed to an on-site storm sewer which drains to a stormceptor at the nearby engineered snow storage facility, for further treatment.

4.3 Snow Disposal

The City of Leduc has three temporary snow storage sites and one engineered snow storage site (Alberta ESRD Registration No. 265496-00-07, Application No. 009-265496- Snow Storage Sites).

Temporary snow storage sites will be utilized if warranted and will be dependent on obtaining permission rights from private property owners. If the sites are City property, they are to be used only by City operations.

Table 5. Snow Storage Sites

Location	Ground Conditions		Run Off		Surrounding Land Use			
	Paved	Unpaved	Controlled	Uncontrolled	North	East	South	West
SE ½ 35-49-W4M Engineered Site		Clay Base	Entire site bermed – stormceptor to storm sewer		City Operations building	Industrial	Residential/ Parkland	Industrial
NE ¼ 24-49-25 W4M on RR 250 Temporary Site		Native Soil		Uncontrolled	Commercial	Agricultural	Residential	Residential
W ¼ 28-49-25-W4M access from TWP Rd. 494 Temporary Site		Native Soil		Uncontrolled	Agricultural	Residential	Agricultural	Agricultural
NW ¼ 28-49-25-W4M access via 74th Street/RR 254 Temporary Site		Native Soil		Uncontrolled	Residential	Residential	Residential	Agricultural/ Deer Creek

The City hauls all salt contaminated snow to the Engineered Snow Storage Facility (Permanent site SE ½ 35-49-W4M). Only snow from residential areas and parking lots, where salt use is not used, is hauled to the temporary snow storage sites.

The City keeps annual records of the volume of snow dumped and where it was dumped.

The goal of snow disposal best management practices is to reduce the potential for a release through the management of drainage and meltwater. The Engineered Snow Storage Facility is surrounded by clay berms and contains a 1,400 m^3 settling pond which overflows into a stormceptor separator as per As-built Drawings 5 and 6 of 6 dated October 27, 2008. The stormceptor discharges via a 450 mm diameter storm sewer to an off-site stormwater system located near the southwest corner of the site. This storm sewer eventually discharges into Telford Lake.

The accumulated sediment in the stormceptor is cleaned out annually with a vacuum truck.

The Engineered Snow Storage Facility was constructed with a clay base to reduce the potential for salt infiltration into the soil and groundwater.

Sediment left behind after snow melt is sampled for landfill disposal. The City is also looking into washing the sediment and drying it for re-use in winter maintenance activities.

4.4 Street Sweeping

Street sweeping removes pollutants deposited on roads and parking lots, thereby reducing pollutant runoff to stormwater management facilities. The *Stormwater Management Guidelines for the Province of Alberta* indicate that street sweeping is most effective in the early spring to remove accumulated winter sediment.; this will help prevent excess sand/salt mixtures from entering the environment.

The City of Leduc currently conducts street sweeping consistently throughout the spring, summer and fall. During these seasons the City spends approximately 30 hours of street sweeping per week; main roads are prioritized followed by outlying roads and residential subdivisions.

Rock chips collected from areas in the City where salt is not used are stored for re-use in the following winter season.

Remaining street sweepings are stored at the Operations Building and sampled for contaminants before landfilling. Disposal of sediment collected during street sweeping depends on the analysis of the material.

4.5 Identification and Protection of Vulnerable Areas

Salt vulnerable areas are localized areas particularly sensitive to road salts such as wetlands, lakes, ponds, riparian areas, and salt vulnerable vegetation along roadways. The location of vulnerable areas should be considered in the location of maintenance yards, snow disposal sites and the design of new roads or upgrading of existing roads.

The Draft Environmentally Significant Areas Study for the City of Leduc identified 86 natural areas in the City including wetlands, streams, ponds, lakes, woodlands, fish, wildlife and plant habitat (Fiera Biological Consulting, 2017). Key natural areas that are likely to be sensitive to roads salts are listed in the table below.

Table 6. Vulnerable Areas in the City of Leduc

Habitat Type	Location
1. Lake	Telford Lake
2. Native grassland, forest and wetlands	E-25-49-25-4
3. Creek	Deer Creek
4. Tree Stand	NW-19-49-24-4
5. Wetland Complex	30-49-24-4
6. Creek	Whitemud Tributary Creek
7. Tree Stand	North of Telford Lake
8. Forest and wetland complex	East of Telford Lake
9. Tree Stand	SW-19-49-24-4
10. Tree Stand	SW-23-49-25-4

A sand/salt mixture is only used on arterial roads, and some collector roads, at stop signs. Rock chips are used as an alternative for residential areas and the majority of collector roads. A map showing the Location of Salt Vulnerable Areas and Road Salt/Sand Application is available in **Appendix B**.

The City does not plow snow in the vicinity of salt vulnerable areas; snow is removed to avoid salt laden snow runoff in the area.

Reducing salt exposure to these areas will be the result of successfully implementing the 4-R's of Salt Management: right material, right amount, right time, right place.

4.6 Communications and Weather Monitoring

4.6.1 Internal Communications

Staff access the Environment Canada website and other media outlets for current and forecasted weather information.

All winter maintenance vehicles are equipped with two way communications (mobile radios, cell, etc.), and Public Services staff are responsible for reporting changing weather and/or road conditions.

4.6.2 External Communications

The City of Leduc Operations Building Administrative Assistants take Customer Service Opportunity requests from the public including winter road maintenance concerns.

Winter road maintenance activities are communicated with the public through the following:

- City of Leduc website:
    - Snow and Ice Control Policy and FAQs
    - Plow Route Map
    - Snow Removal Map
    - Parking Lot Snow Removal Map
    - Sidewalk and Multi-Way Snow Removal
    - Approved Budget and Operational Plans
- Periodic announcements (emails sent to residents and staff)

4.6.3 Winter Patrol

Winter road patrol consists of driving the entire length of the City's plow route and collector road network. During the patrol, the inspector will note all adverse road conditions including but not limited to icy surfaces, drifting snow, snow windrow height and road temperatures. These observations will then be used to determine/prioritize what action is required by Public Services with regards to winter road maintenance operations.

The following schedule is utilized by Public Service staff when conducting winter road patrols:

- Monday – Friday (7:00 am – 3:30 pm): The Infrastructure Maintenance Manager and/or the Lead will conduct at least one winter road patrol per day.
- Monday – Friday (3:30 pm – 11:00 pm): The Standby Operator will conduct one winter road patrol per day.
- Sunday – Thursday (11:00 pm – 7:00 am): The Night Shift Operator(s) will conduct one winter road patrol per night.
- Weekend (3:30 pm Friday – 11:00 pm Sunday): The Standby Operator will conduct one winter road patrol per day.
- Additional winter road patrols other than the ones listed above may be conducted depending on weather conditions.

4.7 Training

The City currently provides staff training for winter maintenance personnel, including training through the Alberta Municipal Health and Safety Association (AMHSA).

Staff also attend conferences to discuss issues such as new equipment, material trends in winter maintenance, regulatory changes and common issues relating to winter storm management.

Records of employee training are kept in Intelex, a web-based management system, as of 2017.

Table 7. Staff Winter Training Schedule

Job Class	Training	Frequency
Director, Public Services	APWA North American Snow Conference	Annual
Manager, Infrastructure Maintenance	APWA North American Snow Conference	Bi-Annual
	APWA Western Snow and Ice Conference	Annual
Lead, Infrastructure Maintenance	APWA North American Snow Conference	Bi-Annual
	APWA Western Snow and Ice Conference	Annual
Operator	AMHSA Defensive Driving	Bi-Annual
	AMSHA Backhoe/Loader	Bi-Annual
	AMHSA Front End Loader	Bi-Annual
	AMHSA Plow Truck Sander	Bi-Annual
	AMHSA Road Grader	Bi-Annual
	AMHSA Skid Steer	Bi-Annual

In addition, prior to the winter season, staff meet to discuss the strategy for winter maintenance, go over the spreading/plow responsibilities, and to review the safety issues. In the spring following the winter season, staff typically meet to discuss the successes and failures of the past winter maintenance campaign and to provide input and suggestions for improvement.

4.8 Spill Response Procedures

The *Environmental Protection and Enhancement Act* (EPEA) (2000) requires any release of substances that could cause an adverse effect to the environment be reported to Alberta Environment and Parks.

The *Release Reporting Regulation* (1993) sets out what must be reported, when and to who the reports must be made.

In the case of a salt spill or extra heavy application the City would refer to the Alberta Environment *Reporting Spills and Releases* (2016) guidelines.

The release of road salts into the environment should be reported to Alberta Environment and Parks when:

- The release has caused, is causing, or may cause an adverse effect;

- The release is into a watercourse or into the groundwater or surface water in any quantity;
- If the amount released exceeds the quantities set out in the *Code of Practice*;
- If there is uncertainty whether the amount exceeds the quantities set out in the *Code of Practice*.

4.9 Record Keeping

The City maintains a winter maintenance spreadsheet that contains total quantities of materials used and keeps records of annual weather data reports from Environment Canada.

Pending the implementation of the City's asset management program the City will strive to track the following information within the program:

- Areas maintained;
- Material used (sand and/or salt, and/or rock chips);
- Specified operator;
- Shift hours; and
- Pavement and air temperature.

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

Currently no formal records are kept for application rates/route/storm.

4.10 Monitoring

The City currently conducts quarterly Formal Work Place Inspections on operations to identify areas for corrective action or improvement and/or positive actions/initiatives noted.

On a three-year rotation the City also conducts external Environmental Audits on City facilities. The Environmental Audit identifies best management practices and items of non-compliance for follow-up action.

The City does not currently have chloride monitoring results associated with current salt management operations.

5.0 Salt Management Goals

5.1 Overview

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

The City of Leduc has prepared a multi year work plan, to improve management of road salt and its winter maintenance policies, practices and procedures, though comparing current best management practices against the *TAC Salt Management Guide* and *Syntheses of Best Practices*; salt management goals are identified to address potential gaps and further protect the environment from the negative impacts of road salt, while maintaining road safety.

Key operational practices and strategies related to the effective management of road salt during winter maintenance activities are presented as goals, with a discussion of the objective, environmental

conditions, current situation, plan goal, responsibilities, performance measures and the approximate cost and timeline for implementation. These goals are not meant to be a comprehensive consideration of every possible best management practice, but rather a listing of improvements that are seen to be beneficial and feasible considering current conditions.

The Director of Public Services is responsible for overseeing all of the goals outlined in this plan; staff specific to implementation have been identified for each goal.

Example - Subject	
Objective	This section states the salt management objective that is to be achieved.
Environmental Consideration	It is important to understand the rationale behind the need to make changes. This section briefly identifies the environmental considerations that make it important to address the subject area.
Current Situation	This section identifies the status of the subject area upon initial implementation of the plan.
Goal	The plan must have clearly stated goals and timetables.
Responsibility	The Director of Public Services is responsible for overseeing all of the goals outlined in this plan; staff specific to implementation have been identified for each goal.
Performance Measure	It is important to monitor and measure the progress implementing each element of the Salt Management Plan. This section will establish the criteria for measuring performance.
Expected Costs	Range from Low, Medium and High
Timeline	Range from Already In Place, Immediate, Short Term, Medium Term, and Long Term

5.2 Management Practices

5.2.1 Winter Maintenance Policy

Snow and Ice Control Policy (Level of Service)	
Objective	To ensure that the City's *Snow and Ice Control Policy* is reviewed and that any revisions are approved by Council as needed, and communicated to winter maintenance personnel.
Environmental Consideration	The prescribed level of service in the *Snow and Ice Control Policy* is the foundation for winter maintenance programs and has significant impact on salt use.
Current Situation	The City's *Snow and Ice Control Policy* is presented in Section 3.1
Goal	The *Snow and Ice Control Policy* will be reviewed annually and updated as needed. The *Snow and Ice Control Policy* will be updated to include: • Salt and Sand Storage • Winter Patrol
Responsibilities	Director of Public Services
Performance Measure	Presence of written *Snow and Ice Control Policy* that has been approved by Council.
Expected Costs	Low
Timeline	Immediate

5.3 Equipment

5.3.1 Equipment Upgrading

Equipment Upgrading	
Objective	It is intended that the winter maintenance fleet be capable of delivering appropriate levels of de-icing materials within a full range of climatic conditions.
Environmental Consideration	Equipment upgrades will improve the capability of placing the right amount of de-icing materials in the right place at the right time, and will allow for an increased level of data collection which, in turn, leads to more effective use of salt.
Current Situation	Currently City spreaders have manual spreader controls. Three city vehicles are equipped with vehicle mounted surface temperature measuring devices. The placement of infrared thermometers (IRTs) on spreaders would also enhance decision making capabilities. Currently City staff do not use pre-wetting in their winter operations toolbox, although the City has one truck with the capability. Sand stockpiles are pre-treated with $CaCl_2$.
Goal	As the spreader fleet comes up for replacement within the City's vehicle replacement program the following should be considered for addition to the specification list, as justified: • electronic spreader controls • IRTs • pre-wet capabilities
Responsibilities	Director of Public Services, Infrastructure and Maintenance Manager
Performance Measure	% of equipment with electronic spreader controls, IRTs and pre wet capabilities.
Expected Costs	High
Timeline	Long Term

5.3.2 Equipment Calibration

Equipment Calibration	
Objective	To ensure that equipment is properly calibrated at the beginning of the winter maintenance season and that calibration is maintained during the winter.
Environmental Consideration	Effective placement of material is dependent upon accurate calibration of distribution equipment, and equipment that assists in decision making.
Current Situation	All spreaders are manual and therefore can not be calibrated. Surface temperature measuring devices are not currently calibrated.
Goal	• Surface temperature measuring devices are calibrated annually by November, and re-calibrated as needed. • As electronic spreaders are acquired they will be calibrated by November of each year. • Develop a policy for equipment calibration.
References	TAC *Syntheses of Best Practices Road Salt Management for Salt Management Plans* (1.0)
Responsibilities	Fleet Supervisor
Performance Measure	• % of equipment calibrated by November. • Existence of policy for equipment calibration.
Expected Costs	Medium
Timeline	Long Term

5.4 Materials

5.4.1 Material Ordering and Delivery

Material Ordering and Delivery	
Objective	To maintain best practices and procedures in the ordering and delivery of de-icer materials.
Environmental Consideration	Improper housekeeping practices relating to the delivery and handling of salt can increase loss to the environment. Excessive moisture in the de-icing material may make the material unusable for use during the winter season.
Current Situation	Salt and winter sand is delivered and stockpiled inside the covered storage building. The City retenders for abrasive materials, including sand and rock chips, annually to ensure quality. Potash salt is consistently ordered from a supplier in Saskatchewan; the requirement for salt to be tarped during delivery is included in the contract.
Goal	Take the following measures with respect to material ordering and deliveries: • ensure that deliveries of salt and sand are covered with waterproof tarpaulin and occur in good weather; and • ensure that the loading pads are kept clean of material. All deliveries are to be recorded on approved forms to summarize: • weather conditions • required tarping • transfer of material indoors • loading pad cleaned; and • weigh ticket with truck number and net weight
References	*TAC Syntheses of Best Practices Road Salt Management for Salt Management Plans* (1.0)
Responsibilities	Infrastructure and Maintenance Manager
Performance Measure	• % of deliveries tarped/ordered in good weather. • Audit compliance of housekeeping practices through periodic yard inspections.
Expected Costs	Low
Timeline	Short Term

5.4.2 Salt Use Record Keeping

Salt Use Record Keeping	
Objective	To provide an accurate record of salt and sand usage by route and vehicle to be able to fine tune the amount of material to be spread for varying climatic and pavement conditions.
Environmental Consideration	Effective salt management requires an accurate understanding of how much is being used, and where. It is not sufficient to measure yearly or seasonal gross totals since these can very widely year-to-year due to weather fluctuations.
Current Situation	Current usage data is variable. Salt use is rationalized at the end of each season by comparing the amount of salt ordered to residual and usage data.
Goal	• Pending the implementation of the City's asset management program the City will strive to track salt use through the program. • Provide all vehicles with Automatic Vehicle Locating (AVL) to assist with tracking of service provided. AVL would also assist with the analysis of complaints and for use against any claims against the City. • Weigh trucks as they enter and leave the maintenance yard to confirm how much was spread on the serviced route. • Download data from electronic spreaders as they become available.
Responsibilities	Director of Public Works, Infrastructure and Maintenance Manager, Infrastructure and Maintenance Lead, Infrastructure and Maintenance Operator
Performance Measure	Completion of year end salt records and benchmarked routes.
Expected Costs	Medium
Timeline	Short Term – Long Term

5.4.3 Salt Application Rates

Salt and Sand Application Rates	
Objective	Develop documented standard application rates for each type of material and pavement condition to generate consistent decision making.
Environmental Consideration	Effective salt management requires an accurate understanding of how much is being used, and where.
Current Situation	The Roads foreman and Operators are allowed latitude in salt application depending upon road and weather conditions. Consistent application rates have not yet been established.
Goal	Application rates for salt and/or sand/salt will be investigated and tested under different conditions to determine an effective program that contributes to a reduction in salt use. Once developed, corresponding salt application rates will be consistently applied based on type of precipitation, temperature and pavement condition.
Responsibilities	Infrastructure and Maintenance Manager, Infrastructure and Maintenance Lead
Performance Measure	Documented application rates
Expected Costs	Low
Timeline	Long Term

5.5 Sand and Salt Storage

Salt and Sand Storage	
Objective	All de-icing chemicals shall be stored inside proper storage structures as to minimize loss of salt to the environment.
Environmental Consideration	If not properly stored, de-icing chemicals can be lost to the environment in large quantities because of exposure to precipitation and wind. This loss can be costly due to actual loss of salt and potential environmental damage. Loading of salt/mix spreading equipment inside a storage facility is preferred to outside loading to reduce loss of salt to the environment.
Current Situation	100% of sites where mix/salt is stored has the mix/salt placed inside structures. 100% of sites storage is on impermeable pads. 100% of the sites have drainage controls in place. All loading and dumping is conducted inside of the storage structure.
Goal	Continue with current salt storage practices.
References	*TAC Syntheses of Best Practices Road Salt Management for Design and Operation of Maintenance Yards* (7.0)
Responsibilities	Manager of Infrastructure and Maintenance
Performance Measure	% of sites where mix/salt is stored inside, % of sites with storage on impermeable pads and % of sites with drainage controls in place.
Expected Costs	Low
Timeline	Already in Place.

5.6 Storm Response

5.6.1 Winter Patrol

Winter Patrol	
Objective	Winter road conditions are monitored in an appropriate fashion to be able to react to changing weather and road conditions and ensure that levels of service for the public are maintained.
Environmental Consideration	Accurate interpretation of conditions and appropriate levels of action to provide safe road conditions will result in timely and efficient application of winter de-icing materials.
Current Situation	Winter patrol is conducted by day shift and night shift, Monday to Friday, as required, based on weather conditions. On the weekend a standby operator also conducts winter patrol at the same time as checking the reservoir and as required according to weather conditions
Goal	Update the *Snow and Ice Control Policy* with information on winter patrol procedures – or develop winter patrol policy
Responsibilities	Director of Public Services, Manager of Infrastructure and Maintenance, Infrastructure and Maintenance Lead
Performance Measure	• The existence of documented winter patrol procedures. • Documentation of road and weather conditions and appropriate responses to situations.
Expected Costs	Low
Timeline	Short Term

5.6.2 Weather Monitoring

Weather Monitoring	
Objective	To provide timely and accurate weather information to assist in snow and ice control decision making.
Environmental Consideration	Effective use of salt is dependent upon good snow and ice control decision making, which in turn depends on good weather information. Salt can be wasted if information is inaccurate or not timely.
Current Situation	The City of Leduc currently monitors websites such as Environment Canada for weather forecasting and radar and uses municipal staff observations, and communications from the general public to monitor weather. Staff also monitor pavement temperatures by use of on-board infra-red thermometers.
Goal	To gather additional information by implementing a Road Weather Information System (RWIS) to transmit real-time weather data and pavement and ground temperatures through a dedicated website.
Responsibilities	Infrastructure Analyst, Manager of Infrastructure and Maintenance, Infrastructure and Maintenance Lead
Performance Measure	• RWIS weather data • % of decision-making staff trained to interpret data
Expected Costs	Medium
Timeline	Long Term

5.6.3 Storm Response Record Keeping

Storm Response Record Keeping	
Objective	To improve overall storm monitoring and response capabilities
Environmental Consideration	Accurate record keeping and reporting during snow and ice control activities will allow a review of storm response and ultimately result in the most effective response in similar situations. This will optimize the use of salt. It will also provide information for due diligence defence.
Current Situation	Environment Canada weather reports are kept on file annually. Quantity of material used per shift or weather event is not currently recorded.
Goal	Record keeping will be formalized • Pending the implementation of the City's asset management program the City will strive to track salt use through the program; the program should allow the City to reference response actions specific to storm events by date • As vehicles with AVL become available track and record distance and routes • As electronic spreaders become available record quantity of material used per shift/route • As RWIS information becomes available track applicable data
Responsibilities	Infrastructure Analyst, Infrastructure and Maintenance Lead
Performance Measure	• % completed Winter Roadway Maintenance Service Records. • A documented storm response plan. • Meeting the City's service level indicated in the *Snow and Ice Control Policy*.
Expected Costs	Medium
Timeline	Short – Long Term

5.7 Snow Removal and Disposal

Snow Storage Facilities	
Objective	To ensure snow removal and disposal operations are done efficiently and in an environmentally friendly manner to reduce or eliminate potential impacts at snow disposal sites.
Environmental Consideration	Management of snow disposal sites and disposal operations can assist in leading to a reduction of environmental impacts. Review of disposal operations can lead to adopting methods that are less harmful to the environment.
Current Situation	Currently salt impacted snow removed from City roadways is stored at the Engineered Snow Storage Facility, which has a clay base but is unpaved. There has been no benchmark established to determine the levels of salt, oil/grease and heavy metals at this site or at the point where the melt water discharges to the storm sewer. Snow from unsalted areas is stored at 1 of 3 unpaved temporary snow storage sites. Sediment left behind after snow melt is sampled for landfill disposal. The City is also looking into washing the sediment and drying it for re-use.
Goal	• Monitor the levels of chloride and hydrocarbons at snow storage sites prior to the winter season and after. Sample snow storage effluent in early spring. • Implement drainage controls at temporary snow storage sites, particularly sites within proximity of salt vulnerable areas (i.e. west side temp. site where effluent has potential to impact Deer Creek)
References	*TAC Syntheses of Best Practices Road Salt Management for Snow Storage and Disposal* (8.0)
Responsibilities	Manager of Infrastructure Maintenance
Performance Measure	• Monitoring results for soil and melt water effluent. • Number of snow storage sites with drainage controls.
Expected Costs	Medium
Timeline	Long Term

5.8 Salt Vulnerable Areas

Salt Vulnerable Areas	
Objective	To identify, monitor and protect salt vulnerable areas within the City.
Environmental Consideration	Environmentally sensitive areas that are impacted by salt use may require unique solutions, including the use of other strategies or alternatives to typical de-icers to sustain the unique features and functions of the area. The *Code of Practice for Environmental Management of Road Salts* identifies concentrations of chloride in the environment at which negative environmental impacts are likely to occur, and furthermore suggests a program to assess the levels of impact due to winter maintenance in these areas.
Current Situation	A Draft Environmentally Significant Areas Study for the City identifies key natural areas.
Goal	• To map vulnerable areas for operator reference during salt applications and develop guidelines to reduce potential impacts in the vicinity (i.e. use rock chips instead of treated sand). • Initiation of monitoring to explore the level of impact resulting from the City's winter maintenance practices (i.e. Telford Lake, Deer Creek).
References	*TAC Synthesis of Best Practices for: Drainage and Stormwater Management* (4.0) and *Vegetation Management* (6.0).
Responsibilities	Manager of Infrastructure Maintenance, Environmental Sustainability Coordinator
Performance Measure	• Guidelines for winter road maintenance in the vicinity of these areas. ○ Number of operators aware of salt vulnerable areas • Reporting on chloride concentrations in natural areas.
Expected Costs	Low – Medium
Timeline	Short – Long Term

5.9 Communications

Communications	
Objective	To inform staff and the public about the City's winter maintenance program and Salt Management Plan and inform the public that road salt is not toxic to humans.
Environmental Consideration	Increased awareness of the role of road salt in winter maintenance and opportunities for managing road salt will improve everyone's understanding of the importance of proper salt management.
Current Situation	The *Snow and Ice Control Policy*, as well as information about salt use is on the City website.
Goal	Provide annual information updates to the public on the policies and practices of the operations during the winter months, including information on salt toxicity, through various mediums such as press releases, handouts, websites etc.
Responsibilities	Manager of Infrastructure Maintenance, Infrastructure and Maintenance Lead, Communications
Performance Measure	The City's webpage is updated annually
Expected Costs	Medium
Timeline	Short Term

5.10 Training

Snow and Ice Control Training	
Objective	To ensure that all management staff and operators are trained in snow and ice control, including salt management practices.
Environmental Consideration	To achieve effective implementation of a salt management program, staff must understand the rationale behind the measures being implemented as well as what is expected of them.
Current Situation	The City currently provides staff training for winter maintenance personnel, including courses taken through the Alberta Municipal Health and Safety Association (AMHSA) as required. Staff attend conferences to discuss issues such as new equipment, material trends in winter maintenance, regulatory changes and common issues relating to winter storm management. Completion of training courses is recorded in Intelex.
Goal	Training schedules will be formalized. To continue with current training programs, evaluate/provide new training opportunities as they become available. Training modules in the following areas should be considered: • Good housekeeping practices • Interpretation of weather and pavement conditions • Proper use of infra red thermometers • When and how to apply chemicals • Health and safety requirements; and • Proper record keeping and review
Reference	*TAC Syntheses of Best Practices Road Salt Management for Training* (2.0) Appendix B. Examples of Staff Training Program
Responsibilities	Director of Public Services
Performance Measure	Number of supervisory staff receiving training. Number of operators receiving training.
Expected Costs	Medium
Timeline	Medium Term

5.11 Technology Review

Technology Review	
Objective	To keep informed and up to date on new innovations in snow and ice control.
Environmental Consideration	New techniques, procedures, and technologies may provide new methods for reducing salt entering the environment.
Current Situation	Pre-wetting of sand with $CaCl_2$. City attend staff conferences to stay up to date on new technologies.
Goal	On an annual basis new technologies and proven alternative methods to combat winter storms will be reviewed to determine their applicability in altering current practices.
Responsibilities	Director of Public Services, Infrastructure Analyst, Manager of Infrastructure and Maintenance, Infrastructure and Maintenance Lead
Performance Measure	• Report on new developments. • Number of people attending conferences annually.
Expected Costs	Low
Timeline	Short Term

5.12 Spill Response

Spill Response	
Objective	To have standard spill response procedures in place to ensure spills are appropriately managed.
Environmental Consideration	As per the *Canadian Environmental Protection Act* salt may have an immediate or long term harmful effect on the environment – spill procedures will reduce the potential for adverse environmental impacts due to excessive salt exposure.
Current Situation	In the case of a salt spill or extra heavy application the City would refer to the *Alberta Environment Reporting Spills and Releases* (2016) guidelines.
Goal	The development of a Spill Response Policy and Procedure for when salt spills while spreading or, when controls have become misadjusted to cause an overabundance of salt being placed. The procedure should include information on who to notify, how and when to respond, and what resources may be required. An Environmental Release Report form should also be developed for tracking information.
Responsibilities	Manager of Infrastructure Maintenance, Environmental Sustainability Coordinator
Performance Measure	Development of Spill Response Policy and Procedure, the number of employees trained in spill response guidelines and the number of spill response report forms filled out.
Expected Costs	Low
Timeline	Immediate

5.13 Annual Review

The Salt Management Plan is a continual improvement document and recognizes that change will be incremental and ongoing. The Plan is intended as a starting point for the City to proceed with the implementation and continuance 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.

Within the *Code of Practice for the Environmental Management of Road Salts*, *Annex C: Monitoring and Measuring Progress*, is included in order to establish a common approach to monitoring and measuring the progress of an organization in the use of road salt, implementation of best management practices and the concentration of road salt in the environment.

Environment Canada has developed a template Annual Report Form of the basic information to be collected and reported. The City of Leduc will utilize this template form for the purpose of providing consistency of information reporting to the federal agency. The report is required to be submitted annually by June 30th. See **Appendix D** for Environment Canada, Road Salts Annual Report Form (2004).

This review should be integrated into the City's budgetary process to permit timely acquisitions of new equipment and to identify other funding needs as required.

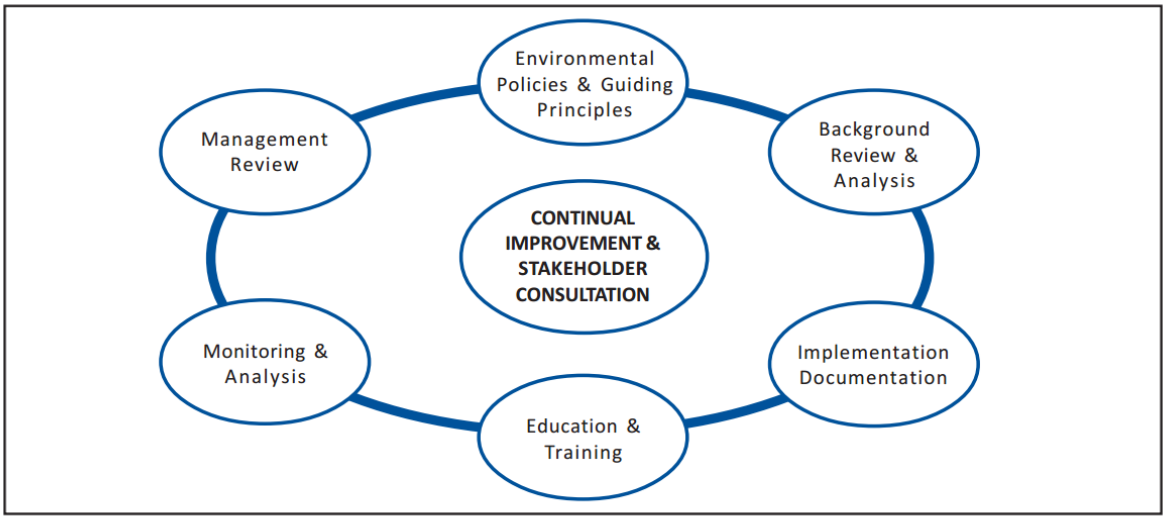


Figure 1 – Salt Management Process

6.0 Conclusion

Effective road salt management requires dedication to adopting, implementing and refining best management practices. Public safety must be maintained as best management practices are implemented. Personnel at all levels of the organization will need to be trained and educated so that maximum benefits are realized.

Appendix A. Winter Severity/Event Criteria

Winter Severity/Total Number of Events

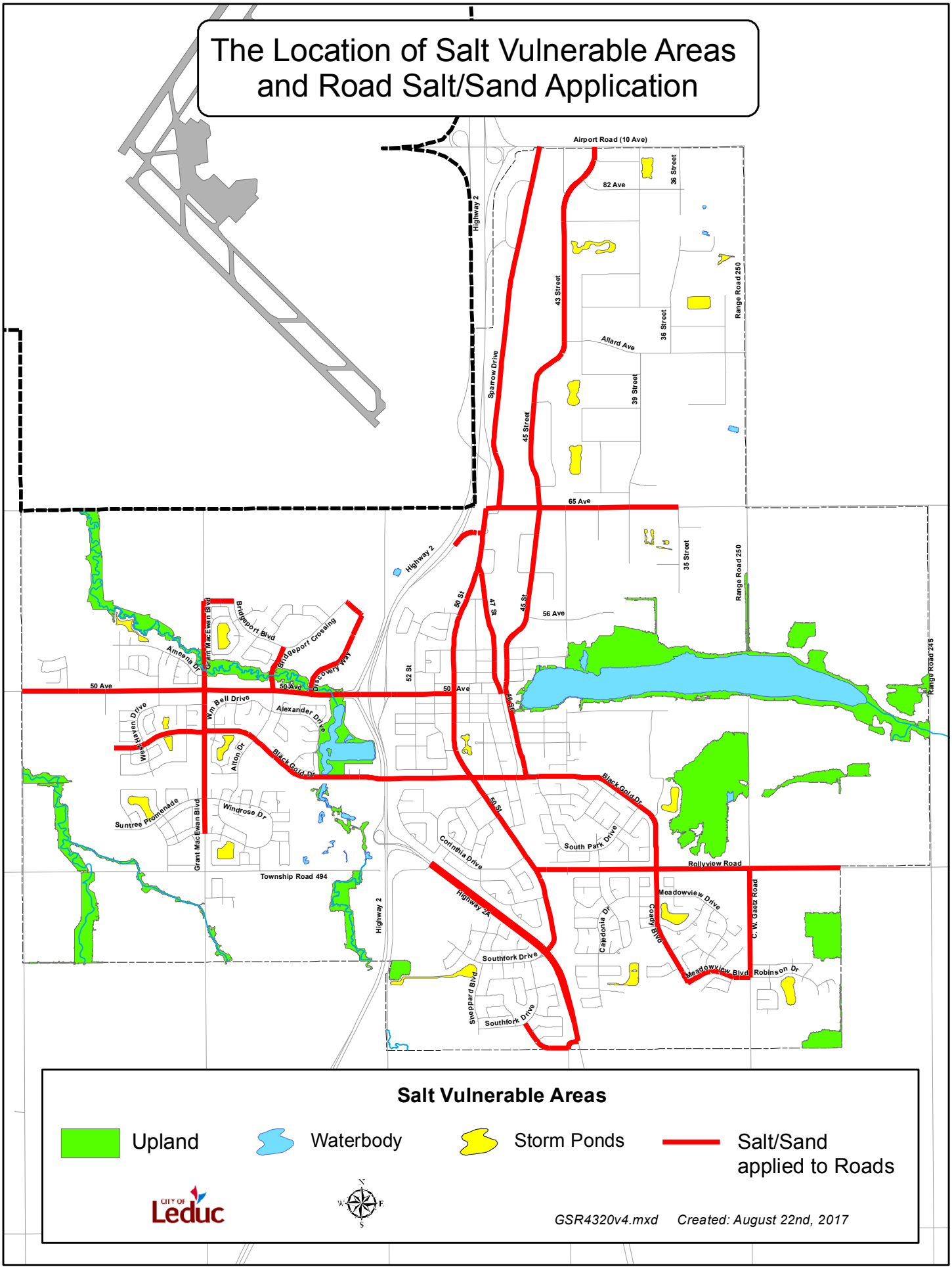
Month	Year	
	2016	**2017**
January	7	6
February	11	5
March	2	12
April	2	9
May	-	-
June	-	-
July	-	-
August	-	-
September	-	-
October	5	-
November	7	-
December	11	-
Total	**45**	**32**

Event Criteria: One or more of the following conditions must be met:

- Total Snow > 2 cm
- Total Rain > 1 mm and Minimum Temp < 0°C
- Speed of Maximum Wind Gust > 40 km/hr and Snow on the Ground

Appendix B. The Location of Salt Vulnerable Areas and Arterial Road Salt/Sand Application

The Location of Salt Vulnerable Areas and Road Salt/Sand Application



Appendix C. Current Maintenance Practices as Measured Against Best Management Practices

As per the Transportation Association of Canada Synthesis of Best Practices Road Salt Management 1.0 – Salt Management Plans, an inventory of current practices must be established to form a benchmark against which progress can be measured. The following elements may be considered in an overall situational analysis:

Spreading

Current Application Rate for each type of material and pavement condition:	No set application rates
Percentage of fleet with pre-wetting?	1 truck
Percentage of fleet with liquid only applications?	0%
Use of alternative freeze point depressants	$CaCl_2$ (28,000 L used annually)
Number of Road Weather Information systems	0%
Number of other surface temperature measuring devices (hand-held or vehicle mounted)	3 vehicle mounted, 1 hand-held
Use of dedicated pavement and/or atmospheric forecasting	0

Salt Vulnerable Areas

Location of salt vulnerable areas	Identified in Environmentally Significant Areas Study
Description of winter maintenance practices in the vicinity of vulnerable areas (i.e. alternate treatment)	N/A

Sand and Salt Storage

Number and Capacity of Storage Sites	1 storage site - 2,183 m^2 The facility can hold approximately 190 m^3 of salt, 4,600 m^3 of sand and 310 m^3 of rock chips
Percentage of salt and sand/salt stored under cover on impermeable pads	100%
Percentage of facilities with indoor loading	100%
Percentage of sites with management of salt impacted drainage and vehicle wash water	100%
Levels of environmental indicators (e.g. chloride levels)	N/A
Percentage of salt in winter sand	19%
Existence of a good housekeeping policy, and adherence to this policy	Good housekeeping practices but no formal policy

Snow Disposal Sites

Number and capacity of snow disposal sites	1 permanent engineered site, three temporary sites; capacity unknown
Levels of environmental indicators (e.g. chloride levels)	N/A
Percentage of disposal sites with water management systems	25% (The Engineered Snow Storage Facility)
Conformance with existing environmental standards for snow disposal sites	Yes – all registered with Alberta ESRD
Existence of a good housekeeping policy and adherence to the policy	Good house keeping practices but no formal policy

Training

Percentage and frequency of staff receiving training in salt best management practices broken down into categories (e.g. managers, supervisors and operators) and topics covered	See Table 7. Staff Winter Training Schedule

Research and Testing

In the interest of continual improvement, organizations should have a program to identify, test, adapt and adopt new approaches	No formal program in place.

Documented Policies

Level of service for each facility/roadway segment	City of Leduc Snow and Ice Policy
Salt and sand application rates	Currently no formal application rates
Managed sand and salt storage	Good housekeeping practices in place but no formal policy
Good housekeeping practices for maintenance yards consistent with TAC's Design and Operation of Road Maintenance Yards Synthesis of Best Practices	Good housekeeping practices in place but no formal policy
Equipment calibration and re-calibration	Currently no policy
Training	Currently no policy
Snow Disposal	Good housekeeping practices in place but no formal policy
Incorporation of salt management consideration into facility design and construction	Currently no policy
Salt Vulnerable Areas	Currently no policy

Appendix D. Environment Canada, Road Salts Annual Report Form (2004)

D – Annual Report Form

Road Salts
Annual Report Form

Reporting information for the period of September 1st to May 31st.
Year: 20_____

Purpose:

The purpose of this form is to provide information required in Annex C of the Code of Practice for the Environmental Management of Road Salts. It will be used to help monitor and measure progress in road salt management, the implementation of best management practices with respect to road salt, and the concentration of road salt in the environment. Information reported will be used in conjunction with additional data (winter severity weather data, environmental monitoring data, cases studies, water quality monitoring programs, and road safety data) to determine the extent and success of implementation of the Code of Practice.

You may submit the report:

1- on-line at: www.ec.gc.ca/nopp/roadsalt
2- via mail:
   Minister of the Environment
   c/o Director, Chemicals Control Branch
   Environment Canada
   Place Vincent Massey
   351 St. Joseph Blvd., 12th Floor
   Gatineau QC K1A 0H3

3- via fax: 1-(888)-391-3695
4- via e-mail: roadsalt@ec.gc.ca

Assistance in filling out the report may also be obtained at the mailing and e-mail address listed above.

Due date: June 30th, 2005 and every following year.

Annual Report Form

Year: 20_____

1. Background Information

Organization
Name:
Street Address:
Mailing Address (if different from street address):
Population (municipality only):
Technical Contact (name and title):
Phone Number (including area code):
Fax (if available):
E-mail (if available):

Salt Management Plan

Does your organization have a salt management plan: ☐ Yes ☐ No

Date salt management plan was approved by Council:_____

Most recent date salt management plan was revised (if applicable): _____

Additional information:

Road Length Serviced

Total length of road on which salt is applied in your jurisdiction, reported in two-lane equivalent: _____ two-lane-kilometres.

Describe any additional information on your total length of road on which your organization applies salt (i.e. sidewalk length):

Winter Severity

Rate the severity of the winter compared with "normal" conditions for your area, according to your perspective (check one):

Below Average ☐ Average ☐ Above Average ☐

Municipal Organizations Only: Total number of events averaged over all districts within the organization's jurisdiction requiring salt application for winter road maintenance for the period from September 1st to May 31st: _____

Note: Information on the snowfall, number of days with freezing rain and average temperature may be collected by Environment Canada from the Meteorological Services of Canada to further assess the severity of the winter in various geographical areas across Canada.

Additional information:

2. Materials Used

Provide the total quantity and concentration of road salts found in all materials used (including abrasives) for winter road maintenance, for the period of September 1st to May 31.

Quantity and Concentration			
Material	**Solids**	**Liquids**	
	Tonnes	**Litres**	**Concentration (average % wt)**
NaCl			
$CaCl_2$			
$MgCl_2$	N/A		
Other chloride materials (e.g.sand/salt mix ratio and range)			

Describe any non-chloride materials used (e.g. corn residue, CMA, etc.) for winter road maintenance:

3. Material Storage

Does your organization have a "good housekeeping"[2] policy: ☐ Yes ☐ No

[2] « good housekeeping » means the prevention or control of releases from existing and new sites. In pursuing this objective, the following practices should be considered: coverage of salt piles and blended salt-sand piles, handling practices that avoid uncontrolled releases, drainage management, wash water collection and treatment, training of personnel, and monitoring of the effectiveness of the facility.

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 state of implementation as of May 31.

Practice	Current	Long term objective
Quantity of salt covered by a permanent roof	%	%
Quantity of salt stored on an impermeable surface	%	%
Quantity of abrasives covered	%	%
Sites with run-off collection and/or management system(s)	%	%
Other (specify):	%	%

Add any additional practices and related objectives identified in the organization's salt management plan, as required.

4. Winter Road Maintenance Equipment and Road Salt Application Practices

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 state of implementation as of May 31.

Practice	Current	Long term objective
Fleet equipped with* - electronic spreader controllers	%	%
- pre-wetting equipment	%	%
- direct liquid application	%	%
- infrared thermometers * a piece of equipment could be listed more than once	%	%
Number of Road Weather Information System (RWIS) installations (owned)		
Other (i.e. sidewalk equipment with de-icing capability)		
Other (specify):		

Add any additional practices and related objectives identified in the organization's salt management plan, as required.

Does the organization regularly calibrate its equipment: ☐ Yes ☐ No

Number of times the organization calibrates its equipment last year: _____

Describe any additional practices related to the calibration of your organization's equipment.

5. Snow Disposal

Does your organization have snow disposal guideline: ☐ Yes ☐ No

Provide your 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 31. Add any additional practices and related objectives identified in the organization's salt management plan, as required.

Practice	Current	Long term objective
Sites with runoff collection and/or management system(s)	%	%
Methods of disposal (i.e. snow melters)		
Other (specify):		
Other (specify):		

6. Winter Road Maintenance Training

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

☐ Yes Specify: _____ ☐ No

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

Provide the total number of winter road maintenance personnel trained as of May 31 :

_____

Provide the percentage of winter road maintenance personnel trained in the last year:
_____%

7. Areas Vulnerable to Road Salts

Has your organization completed an inventory of areas vulnerable[3] to road salt :

☐ Yes ☐ No

Has your organization identified/designated areas vulnerable to road salts:

☐ Yes How many? _____ ☐ No

Describe any additional salt management practices taken in identified vulnerable areas:

8. Environmental Monitoring

Does your organization have an environmental monitoring program :

☐ Yes ☐ No

Describe any environmental monitoring done related to road salts (i.e. water analysis, impact on vegetation or soil testing).

[3] See Annex B of the Code of Practice for more information

9. Comments

Provide any additional comments:

_____
(print name)

_____
(date)

_____
(signature)

Environment Canada thanks you for submitting your annual report.
Your collaboration is appreciated.

Appendix E. Other Salt Management Plans Reviewed in the Development of this Plan

https://www.ec.gc.ca/sels-salts/default.asp?lang=En&n=E68EE1F4-1&offset=5&toc=hide

Other resources:

https://www.ajax.ca/en/exploreoutdoors/resources/TownofAjax-SaltMgmtPlan_1.pdf **- Town of Ajax**

http://city.brockville.on.ca/UploadedFiles/slatman.pdf **- City of Brockville**

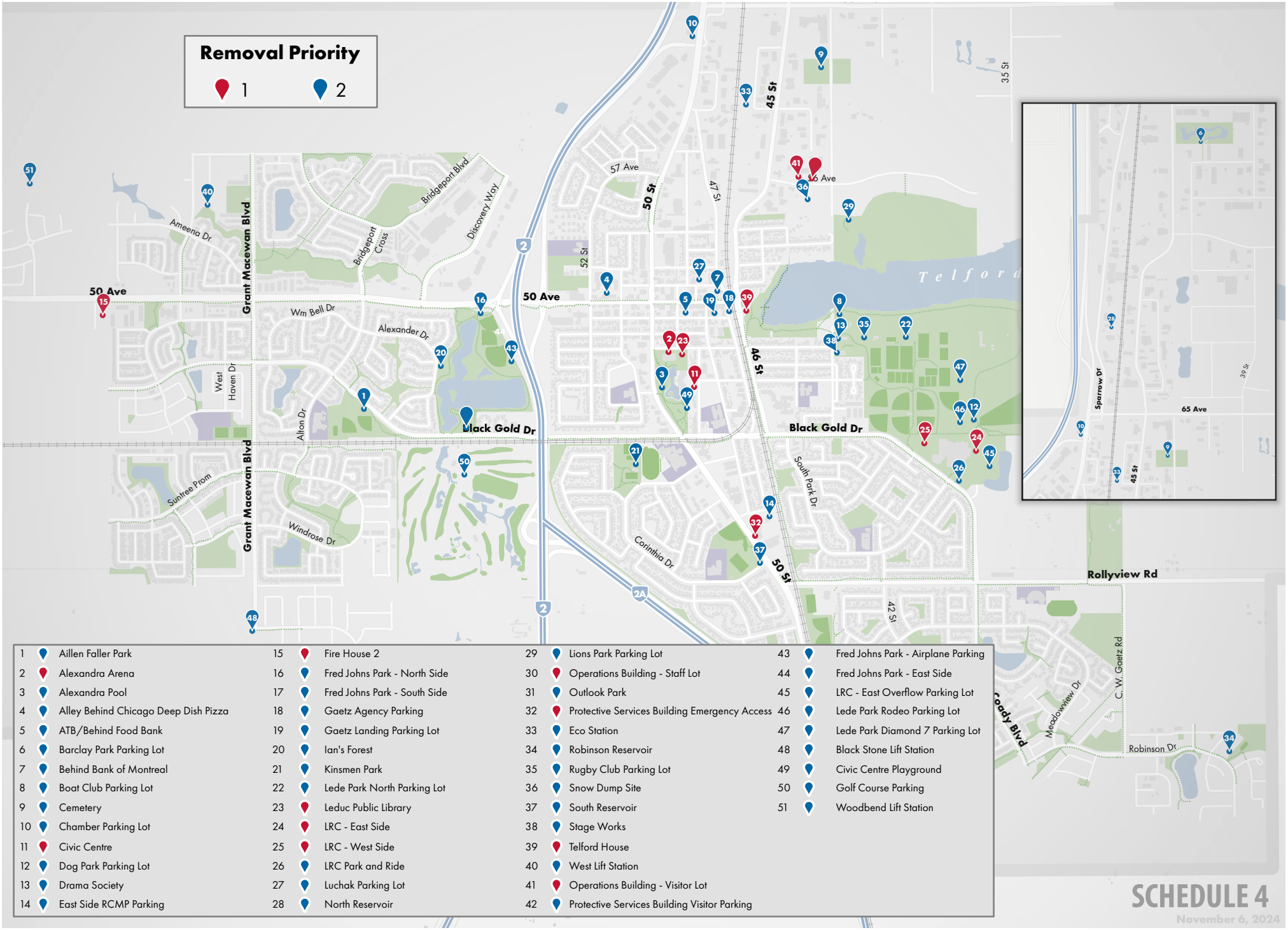
http://www.stjohns.ca/sites/default/files/files/publication/Salt%20Management%20Plan%20Winter%202005-2006%20_0.pdf **– City of St. John's**

http://www.northumberlandcounty.ca/en/departments_publicworks/resources/2015_salt_management/Salt_Management_Plan_2015.pdf **- County of Northumberland**

http://wellington-north.com/content/government/departments/public-works/roads/salt_management_plan.pdf **- Municipalities of North Wellington County**

Leduc Snow Removal Service | PARKING LOTS 2024

CITY OF Leduc

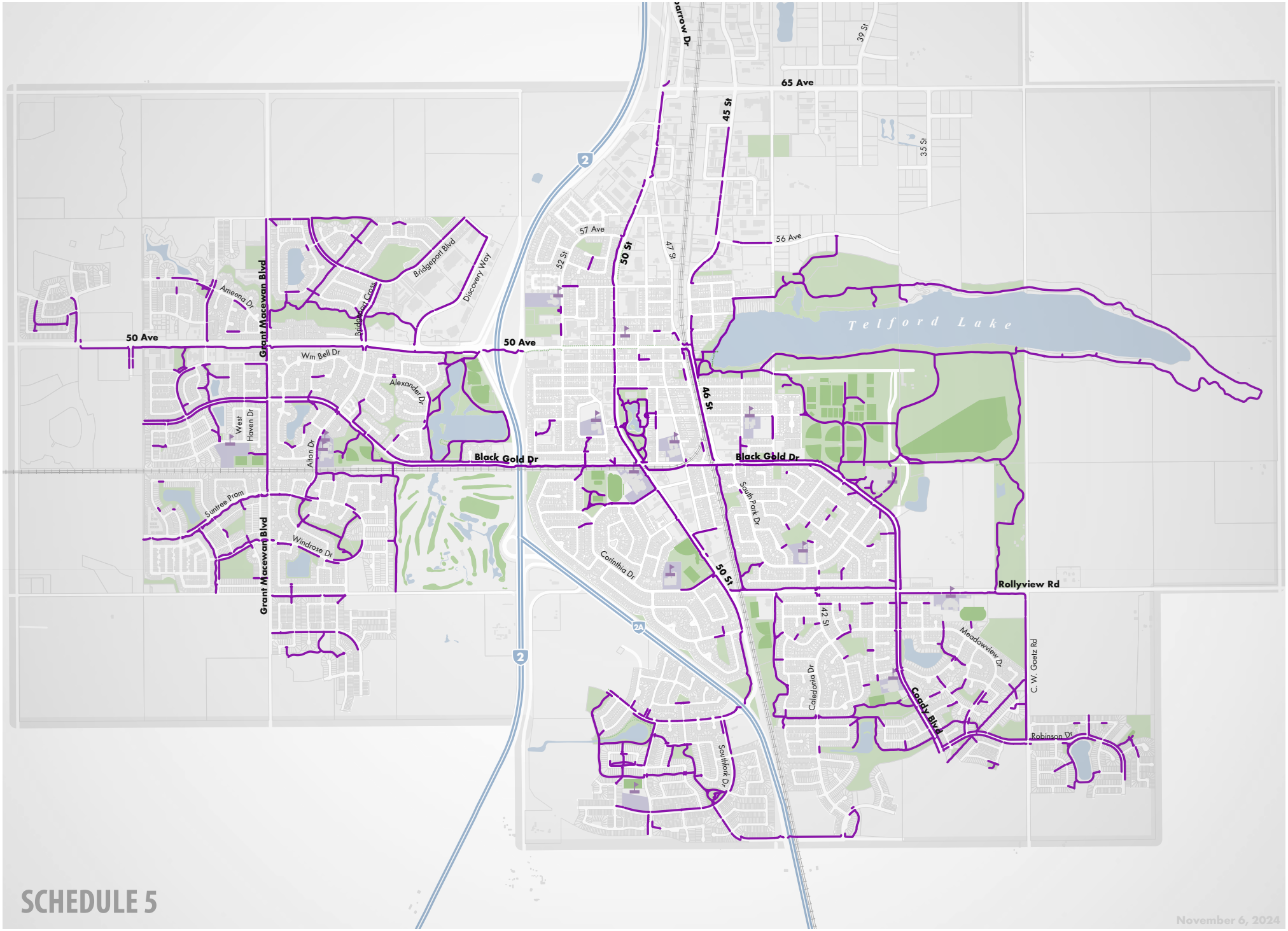


1	Ailen Faller Park	15	Fire House 2	29	Lions Park Parking Lot	43	Fred Johns Park - Airplane Parking
2	Alexandra Arena	16	Fred Johns Park - North Side	30	Operations Building - Staff Lot	44	Fred Johns Park - East Side
3	Alexandra Pool	17	Fred Johns Park - South Side	31	Outlook Park	45	LRC - East Overflow Parking Lot
4	Alley Behind Chicago Deep Dish Pizza	18	Gaetz Agency Parking	32	Protective Services Building Emergency Access	46	Lede Park Rodeo Parking Lot
5	ATB/Behind Food Bank	19	Gaetz Landing Parking Lot	33	Eco Station	47	Lede Park Diamond 7 Parking Lot
6	Barclay Park Parking Lot	20	Ian's Forest	34	Robinson Reservoir	48	Black Stone Lift Station
7	Behind Bank of Montreal	21	Kinsmen Park	35	Rugby Club Parking Lot	49	Civic Centre Playground
8	Boat Club Parking Lot	22	Lede Park North Parking Lot	36	Snow Dump Site	50	Golf Course Parking
9	Cemetery	23	Leduc Public Library	37	South Reservoir	51	Woodbend Lift Station
10	Chamber Parking Lot	24	LRC - East Side	38	Stage Works		
11	Civic Centre	25	LRC - West Side	39	Telford House		
12	Dog Park Parking Lot	26	LRC Park and Ride	40	West Lift Station		
13	Drama Society	27	Luchak Parking Lot	41	Operations Building - Visitor Lot		
14	East Side RCMP Parking	28	North Reservoir	42	Protective Services Building Visitor Parking		

SCHEDULE 4

November 6, 2024

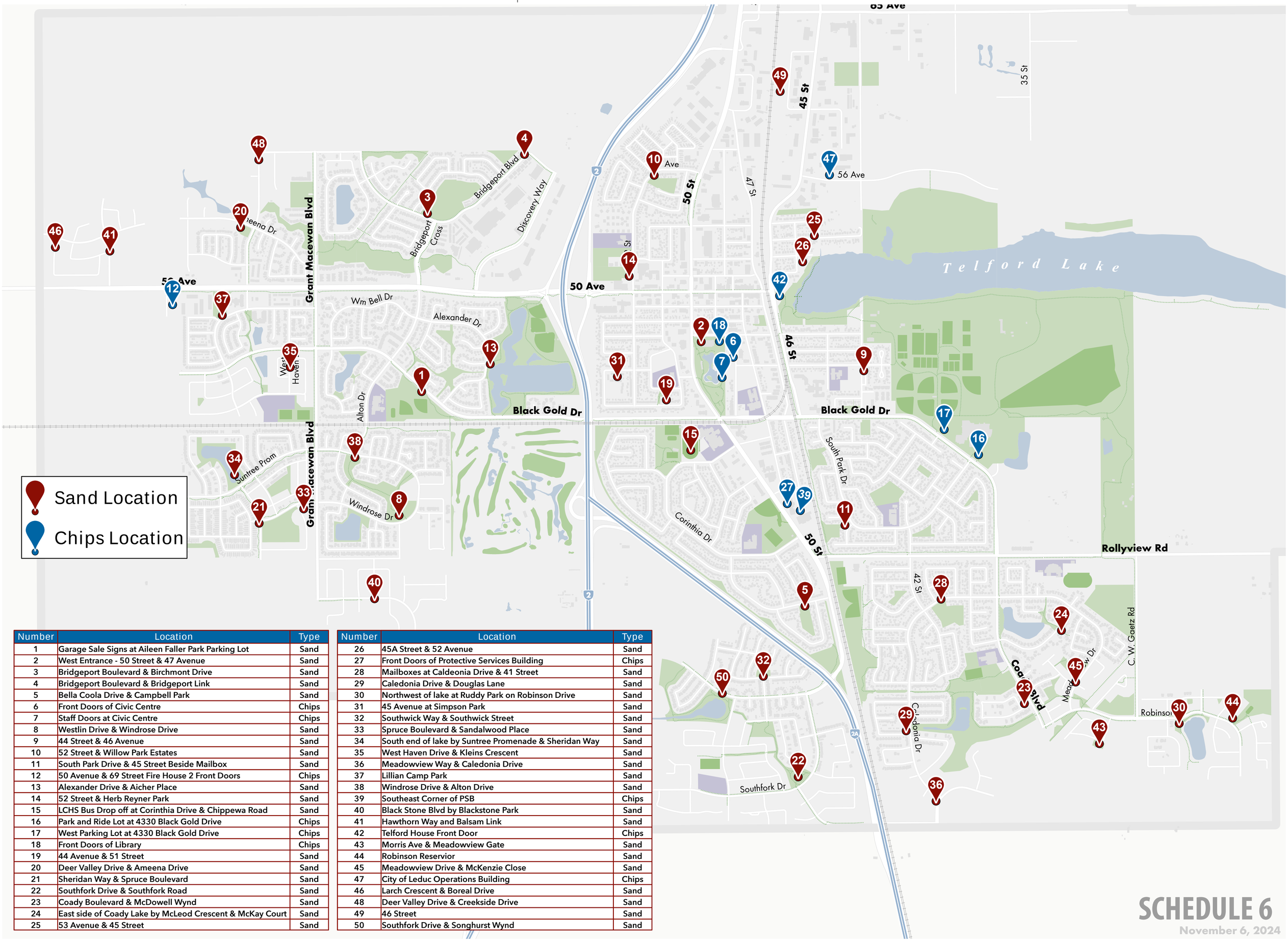
Leduc Snow Removal Service | SIDEWALKS & MULTIWAY 2024



SCHEDULE 5

November 6, 2024

Leduc Snow Removal Service | DRY SAND & CHIPS LOCATIONS 2024



Number	Location	Type
1	Garage Sale Signs at Aileen Faller Park Parking Lot	Sand
2	West Entrance - 50 Street & 47 Avenue	Sand
3	Bridgeport Boulevard & Birchmont Drive	Sand
4	Bridgeport Boulevard & Bridgeport Link	Sand
5	Bella Coola Drive & Campbell Park	Sand
6	Front Doors of Civic Centre	Chips
7	Staff Doors at Civic Centre	Chips
8	Westlin Drive & Windrose Drive	Sand
9	44 Street & 46 Avenue	Sand
10	52 Street & Willow Park Estates	Sand
11	South Park Drive & 45 Street Beside Mailbox	Sand
12	50 Avenue & 69 Street Fire House 2 Front Doors	Chips
13	Alexander Drive & Aicher Place	Sand
14	52 Street & Herb Reyner Park	Sand
15	LCHS Bus Drop off at Corinthia Drive & Chippewa Road	Sand
16	Park and Ride Lot at 4330 Black Gold Drive	Chips
17	West Parking Lot at 4330 Black Gold Drive	Chips
18	Front Doors of Library	Chips
19	44 Avenue & 51 Street	Sand
20	Deer Valley Drive & Ameena Drive	Sand
21	Sheridan Way & Spruce Boulevard	Sand
22	Southfork Drive & Southfork Road	Sand
23	Coady Boulevard & McDowell Wynd	Sand
24	East side of Coady Lake by McLeod Crescent & McKay Court	Sand
25	53 Avenue & 45 Street	Sand

Number	Location	Type
26	45A Street & 52 Avenue	Sand
27	Front Doors of Protective Services Building	Chips
28	Mailboxes at Caldeonia Drive & 41 Street	Sand
29	Caledonia Drive & Douglas Lane	Sand
30	Northwest of lake at Ruddy Park on Robinson Drive	Sand
31	45 Avenue at Simpson Park	Sand
32	Southwick Way & Southwick Street	Sand
33	Spruce Boulevard & Sandalwood Place	Sand
34	South end of lake by Suntree Promenade & Sheridan Way	Sand
35	West Haven Drive & Kleins Crescent	Sand
36	Meadowview Way & Caledonia Drive	Sand
37	Lillian Camp Park	Sand
38	Windrose Drive & Alton Drive	Sand
39	Southeast Corner of PSB	Chips
40	Black Stone Blvd by Blackstone Park	Sand
41	Hawthorn Way and Balsam Link	Sand
42	Telford House Front Door	Chips
43	Morris Ave & Meadowview Gate	Sand
44	Robinson Reservior	Sand
45	Meadowview Drive & McKenzie Close	Sand
47	City of Leduc Operations Building	Chips
46	Larch Crescent & Boreal Drive	Sand
48	Deer Valley Drive & Creekside Drive	Sand
49	46 Street	Sand
50	Southfork Drive & Songhurst Wynd	Sand

SCHEDULE 6

November 6, 2024