

2020 – 2021 SNOW AND ICE RESPONSE PROCESS

RECOMMENDATION:

None.

PREVIOUS COUNCIL/COMMITTEE ACTION

None.

REPORT SUMMARY

The purpose of this report is to present the City's snow and ice response process to Committee and seek feedback on any changes Council wishes to incorporate in advance of the 2020-2021 season. Snow and Ice removal is an essential community service aligning with the City's focus on getting the basics right. The response process is integral to consistent service delivery while mitigating the City's risk and liability throughout winter events.

BACKGROUND

Winter maintenance is one of the most challenging services provided by the Public Works staff due to the unpredictability of complex weather patterns of the Pacific Northwest. As a region that is surrounded by water and elevation fluctuations, municipalities within the region experience micro climates. Fluctuations of these micro climates require constant vigilance and decision making to ensure we are deploying our resources as efficiently as possible.

The foundation of our snow and ice response process is to minimize hazards for emergency services providers and transit operators while providing safe passage for motorists and pedestrians. As expected, winter conditions are variable, however it is unusual for the City to be required to manage snowfall or ice and its impacts for more than a week at a time. In this context, the City has a snow and ice response process which depends on flexibility of equipment and manpower used for other purposes to be repurposed to manage snow or ice events when they occur. Our snow and ice guidelines identify when we respond, how we respond and who our response partners are and identifies priorities across the City.

DISCUSSION

Port Coquitlam's Climate Trends

Forecasting precipitation in Metro Vancouver is particularly complex and determining the probability of snow is problematic for meteorologists due to variations in elevation and the moderating effects of the coast. When analyzing Environment Canada's data over the past decade, Port Coquitlam typically receives some degree of snowfall 12 days a year, with total accumulations over the course of the winter of 43 cm. In addition, the City also averages 55 days

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annually with the temperature below 0° C. While the number of days of below 0° C and of snow and accumulations vary from year to year, with no predictable trend, Port Coquitlam has been historically seeing less snowfall. However, anecdotally, the snow falls we have been experiencing over the past few years have been imbedded in extended cold cycles, further complicating the snow and ice response.

Winter season weather stats over the last 10 years for the City – 2009/10 to 2019/20

	10 year average	Last winter (2019/20)	% difference
Snow Days	11.6	6	-48.3%
Snowfall (cm)	42.84	41	-4.3%
Days below 0c	55.2	45	-18.5%

Forecasting Snow and Ice Events

Prior to the start of each winter season, staff consult with meteorologists, who provide insight into the upcoming season in order to plan accordingly. From mid-November to mid-March of each year, staff monitor winter forecasts 24 hours a day 7 days a week and receive information, via email, from one primary source, Environment Canada. Staff are connected to multiple weather apps to supplement the information provided by Environment Canada. Staff also phone Environment Canada directly or participate in regional phone call updates during problematic situations. To further enhance the information we receive from weather reports, staff monitor 4 road sensors which provide information regarding road and air temperatures at specific locations throughout the City. The sensors are located at:

- Lougheed Highway at the pedestrian overpass
- Broadway Pump Station near the Mary Hill By-Pass
- Penny Place Pump Station, in Mary Hill
- Lions Park

The sensors send alarms to City staff when road or air temperatures fall below a pre-determined threshold. When this occurs, a staff member is immediately deployed to perform a road inspection and identified hazards. For example, special attention will be given to higher elevations, bridge decks, and areas susceptible to icing. The outcome of the inspection determines if further response is warranted.

Snow and Ice Control Service Level Policy

The foundation of the snow and ice response process is the City's Snow and Ice Control Service Level Policy (Attachment 1). This document guides our decision-making process and identifies snow and ice response operations on the Major Road Network (MRN), City streets, lanes, sidewalks, pedestrian bridges, parks, municipal buildings and parking lots. Establishing and following this service level policy is important to minimize liability during events.

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Prioritizing routes is essential to planning snow and ice control to ensure a consistent and focused response. These priorities are further distinguished below and the maps are available in the attachments.

First Priority (road = 188.5 lane km, sidewalks = 23km)

- Busy commuter routes (MRN & arterial roads).
- Emergency Services priority routes.
- Transit priority routes.
- School zones.
- Steep grades (>10%), sharp curves, shaded sections of roadways, bridges and approaches, and railroad crossings.
- Municipal buildings, municipal parking lots and dedicated sidewalk routes.

Second Priority (road = 200 lane km, sidewalks = 5.6km)

- Collector roads
- Local Roads (Primary = routes in elevated areas of the community; Secondary = routes in flat areas of the community)
- Industrial areas
- Dedicated trails

Third Priority (road = 44.5 lane km, sidewalks = 4.7km)

- Laneways
- Municipal parks

During snow and ice events, transportation patterns for pedestrians and vehicles will be impacted as motorists and pedestrians encounter a loss of traction, visibility, and maneuverability. While the City takes all reasonable actions to limit the risks to our road users, it is not the City's service level to remove snow and ice to bare pavement conditions. The travelling public is expected to be properly prepared, equipped and use caution when travelling during winter periods.

Response is dispatched on a priority basis. As expected, our first response is to priority one routes. Crews will maintain priority one routes until storm conditions reduce and/or all priority 1 routes are adequately cleared. Next, crews are dispatched to priority two routes and then finally to priority 3 routes. If at any time, should conditions deteriorate on a higher priority route, resources are re-deployed to the higher priority routes.

For sidewalks, clearing of snow and ice adjacent to parcels of land is the responsibility of that owner or occupier in accordance to the Boulevard Maintenance Bylaw No. 3965. As per the bylaw, snow or ice must be removed from any sidewalk bordering real property within 24 hours of the cessation of the event which resulted in the deposit of snow or ice, regardless of whether the snow or ice was deposited on the sidewalk by natural, human, mechanical or other means. Accordingly,

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sidewalk adjacent to City owned property is the responsibility of the City and sidewalk adjacent to schools is the responsibility of School District 43. This same logic holds true for private businesses and home owners.

Snow and Ice Fleet and Personnel

The City repurposes existing staff in Public Works to carry out snow and ice activities. Fleet vehicles are outfitted with equipment necessary to respond to winter weather events and include:

- 3 Tandem Dump Trucks equipped with plows and salt spreaders
- 2 Single-Axle Dump Trucks equipped with plows and salt spreaders – 1 brine tank available
- 3 One Ton Dumps equipped with plows, salt spreaders and brine tanks
- 2 Backhoes
- 2 Frontend Loaders
- 2 Skid Steers
- 1 pickup with plow
- 3 mowers/ 2 UTV's with plows – 2 brine tanks available
- 1 snow blower

Contractors may also be utilized during a severe and prolonged snow event.

Snow and Ice Treatments

The City's current snow and ice treatments fall into three categories:

Anti-icing Treatments

- Preventative treatments that involve the application of salt brine to roadways, before snow or ice have had an opportunity to settle and bond with the pavement. It serves as a barrier between the pavement surface and snow, reducing the likelihood of icy roads and making plowing activities much easier. The application of brine is most effective on dry pavements, as wet pavements may dilute the concentration. Research has also shown that anti-icing treatments have been found to:
 1. Return pavement surfaces to normal conditions faster, resulting in fewer accidents
 2. Expedite the melting process, as de-icers such as salt, require moisture and agitation to be effective
 3. Remain on the pavement surfaces longer, as they do not bounce off the pavement surface as salt does
 4. Advantage of using salt brine is close to 100% of it is retained on the road surface.
 5. Requires only a single application to be effective and it allows the application of the liquid well in advance of the event
 6. Reduces the use of salt

7. Salt brine is made at the Public Works Yard and is stored in two 11,350 litre tanks and can be made quickly to replenish stock as required.

De-Icing Treatments

- Salt is an effective and efficient de-icing treatment applied after snow and ice has bonded to the pavement. Salt, in its solid form, has proven most effective when it is applied after snow starts to accumulate on roads and when surface temperatures are above -6°C. The application of salt on snow reduces the amount of salt that would otherwise be lost if it was applied onto dry pavements, and vehicles driving on salt assist in breaking down low volumes of snow and ice. Salt has also been found effective for snowfalls of up to 15cm, provided that temperatures are between 0°C and -6°C, and traffic is heavy enough to keep the snow-salt mixture agitated.

Abrasive Treatments

- Abrasives are snow and ice treatments that are used in colder temperatures when anti-icing and de-icing treatments are not effective. Abrasives do not melt snow or ice, but are used to improve traction. The most common abrasive is sand. Sand crystals increase friction and help prevent vehicle tires from slipping on slick roads. Sand can also help prevent new ice from forming on roads. The City uses a sand-salt mix for spot treating icy stretches of pavements, especially on hills and bridge decks, and is most effective when surface temperatures are below -6°C.

Once an event starts, crews generally begin by applying an anti-icing treatment to the pavement surface. If the incident changes from icy conditions to snow, adjustments are made. Once snowfall begins crews will start applying a de-icing treatment, and plow when there is at least 5cm of snow accumulation on roads, as at these depths snowplow blades are effective at clearing snow. This strategy may change depending on factors such as snow accumulations, temperatures and the longer term forecast. Much consideration is given to the decision to plow. Snow plowing creates windrows, may cover sidewalks or driveways that were previously cleared and can make it difficult to access parked cars.

In responding to snow and ice events, the City has developed a series of response levels based on forecast and reported winter conditions of roadways and parameters throughout the City. These response levels are provided in attachment 4 for reference.

Communication

Over the past several years, the City has assumed a proactive role in communicating key messages to the public during winter related events. Currently, key messages provided to the public include:

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- Be on alert for extreme weather forecasts, particularly snow and ice;
- Have snow shovels and de-icing materials available;
- If transit is not your usual mode of transportation, take time to look up schedules and plan your route ahead of time;
- If you must drive, be prepared with snow tires, leave earlier, allow more time for travel and take care;
- Help family members who are elderly or have mobility issues make their preparations.
- Port Coquitlam bylaws require all properties (including homes and businesses) to clear the public sidewalks next to their property as soon as possible after a snowfall.

In addition to key messages, the City provides the public with information regarding priority routes which is found in the Snow Removal and Ice Control webpage.

Projections for the 2020 – 2021 Winter Season

OCTOBER TO DECEMBER (2020)

Precipitation Probability (Vancouver, BC)	
Below Normal	27%
Normal	33%
Above Normal	40%

Temperature (Vancouver, BC)	
Below Normal	4%
Normal	16%
Above Normal	80%

Conclusion: As discussed during the beginning of this report, predicting weather is very difficult, however the modelling indicates that we will have an average to wetter but warmer October to December. Low probability of snow and ice event to occur during this period of winter.

JANUARY TO MARCH (2021)

Precipitation Probability (Vancouver, BC)	
Below Normal	29%
Normal	33%
Above Normal	37%

Temperature (Vancouver, BC)	
Below Normal	50%
Normal	33%
Above Normal	17%

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Conclusion: Modelling indicates an average to slightly wetter but cooler January to March. High probability of snow and ice event to occur during this period of winter.

The City will receive Environment Canada's latest projection December 1, 2020 for our winter 2020/21 season.

At this point, staff are not recommending any changes to the snow and ice response process. Overall, we believe the policy is effective and serves our road users well during snow events. When compared to other Metro Vancouver municipalities, we believe the City of Port Coquitlam's snow removal efforts meet or exceed the industry standards.

FINANCIAL IMPLICATIONS

None identified.

ATTACHMENTS

Att#1: Snow and Ice Control Service Level

Att#2: Snow Clearing Priority Map (Roads)

Att#3: Snow Clearing Priority Map (Sidewalks and Trails)

Att#4: Snow and Ice Response Levels

Lead author(s): Tom Madigan

Contributing author(s): Bob Bell, Dave Kidd

POLICY MANUAL

Subject Area:	Engineering & Operations / Parks and Recreation			Policy #	10.25
Policy Title:	Snow and Ice Control Service Level Policy				
Authority:	Legislative	<input checked="" type="checkbox"/>	Effective Date:	2010-12-13	
	Administrative	<input type="checkbox"/>	Review Date:	2015-10-13	
Issued By:	B. Becker Director of Parks and Recreation I. Zahynacz Director of Engineering and Operations	Parks and Recreation Department Engineering and Operations Department	Issue Date:	2010-12-23	
			Distributed By:	Internal E-mail Website	

Purpose:

The City's objective is to reduce snow and ice hazards for emergency services providers, transit operations, motorists and pedestrians within available budgets and resources. When necessary, priority over other maintenance services will be provided to improve mobility.

Policy:

This policy recognizes snow and ice control as an essential community service and sets out the parameters for the City to undertake snow and ice control operations on the Major Road Network (MRN), City streets, lanes, sidewalks, pedestrian bridges, parks, municipal buildings and parking lots, as follows:

Roads, Streets and Lanes:

Prioritizing routes is essential to planning snow and ice control. Snow and ice control priority routes are set out in the City's Snow and Ice Control Map – 2010, based on the following:

First Priority

- MRN and arterial roads
- Steep hills
- Selected bus routes and school zones

Second Priority

- Collector roads
- Residential streets
- Industrial streets

Third Priority

- Lanes

First priority routes are maintained to reduce snow and ice hazards subject to operational requirements and prevailing weather conditions. Second priority routes are maintained after conditions improve on first priority routes. Should conditions deteriorate on any higher priority routes, resources will be re-deployed to those routes.

Snow and ice control shall be undertaken as operationally required between the hours of 3:30 am to 11:00 pm. The Director of Engineering & Operations may authorize additional hours of operation during extraordinary weather conditions.

The City does not remove snow and ice to bare pavement conditions. The traveling public is expected to be properly prepared, equipped and uses caution when traveling during winter periods.

Emergencies

In the event that the City receives notification that an emergency situation exists, resources may be diverted from work on priority routes to respond appropriately. The City cannot guarantee response times.

Parameters: Municipal Buildings, Municipal Parking Lots and Municipal Parks

Walkways, stairs, ramps, landings, sidewalks, pedestrian bridges, parks, trails, municipal buildings and parking lots that are owned by the City will be sanded and/or salted, and/or snow removed, within the resources available. City employees and members of the public are cautioned that slips, falls and motor vehicle accidents are a risk at all times and a high risk when poor weather conditions exist.

First Priority

- Municipal Buildings
- Municipal Parking Lots
- Dedicated Sidewalk routes

Second Priority

- Dedicated Trails

Third Priority

- Municipal Parks

Sidewalk Salting, Sanding and/or Snow Removal

Clearing of hazardous snow and ice situated on City sidewalks adjacent to parcels of land is the responsibility of that owner or occupier in accordance to the Highway Use Bylaw No. 2011.

Responsibility:

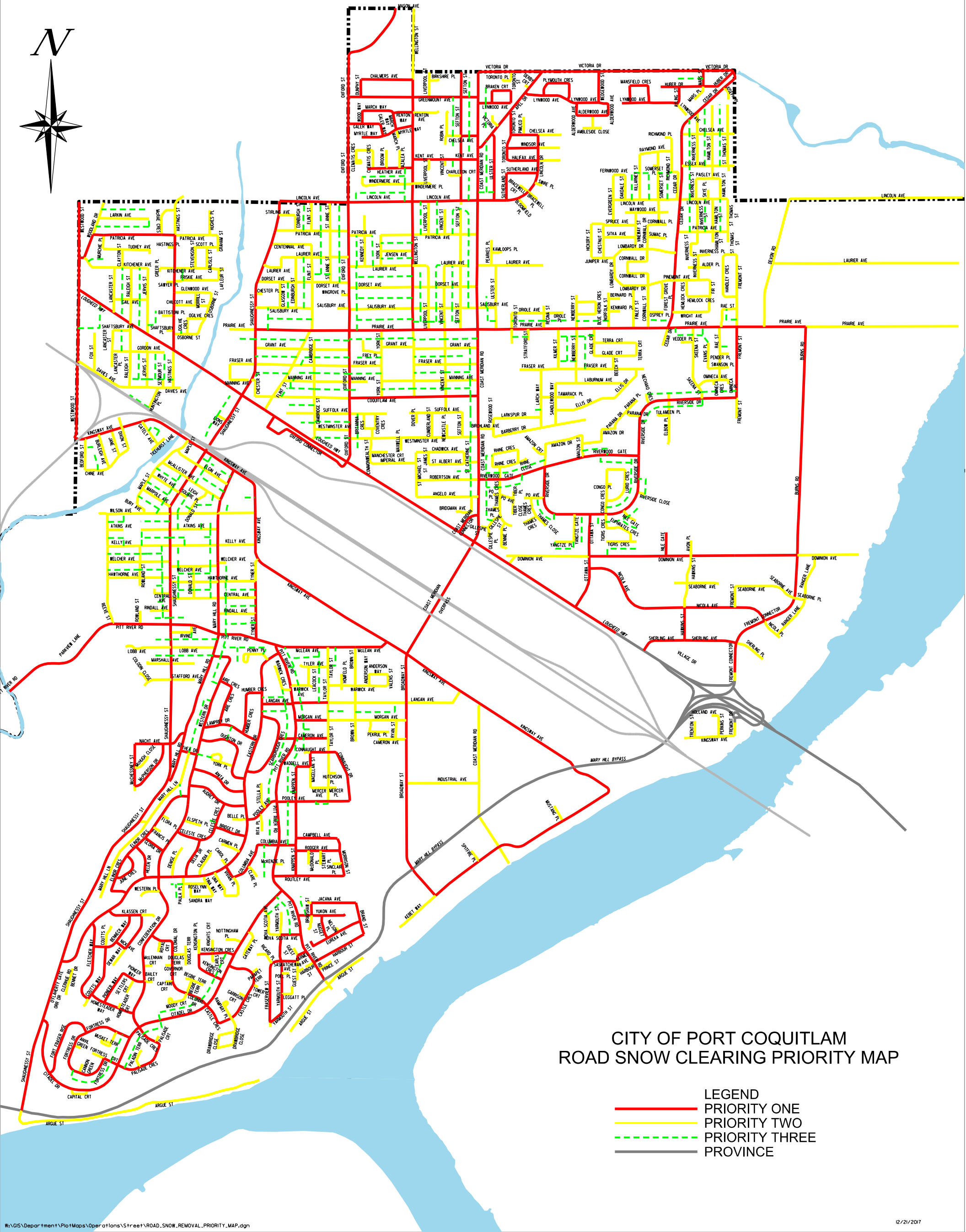
The Director of Engineering & Operations or designate(s) as assigned shall have the authority to administer this Policy related to MRN roads, City streets, bridges and lanes.

The Manager of Parks and Service or designate(s) as assigned shall have the authority to administer this Policy related to walkways, stairs, ramps, landings, sidewalks, pedestrian bridges, parks, trails, municipal buildings and parking lots.

END OF POLICY

Record of Amendments:

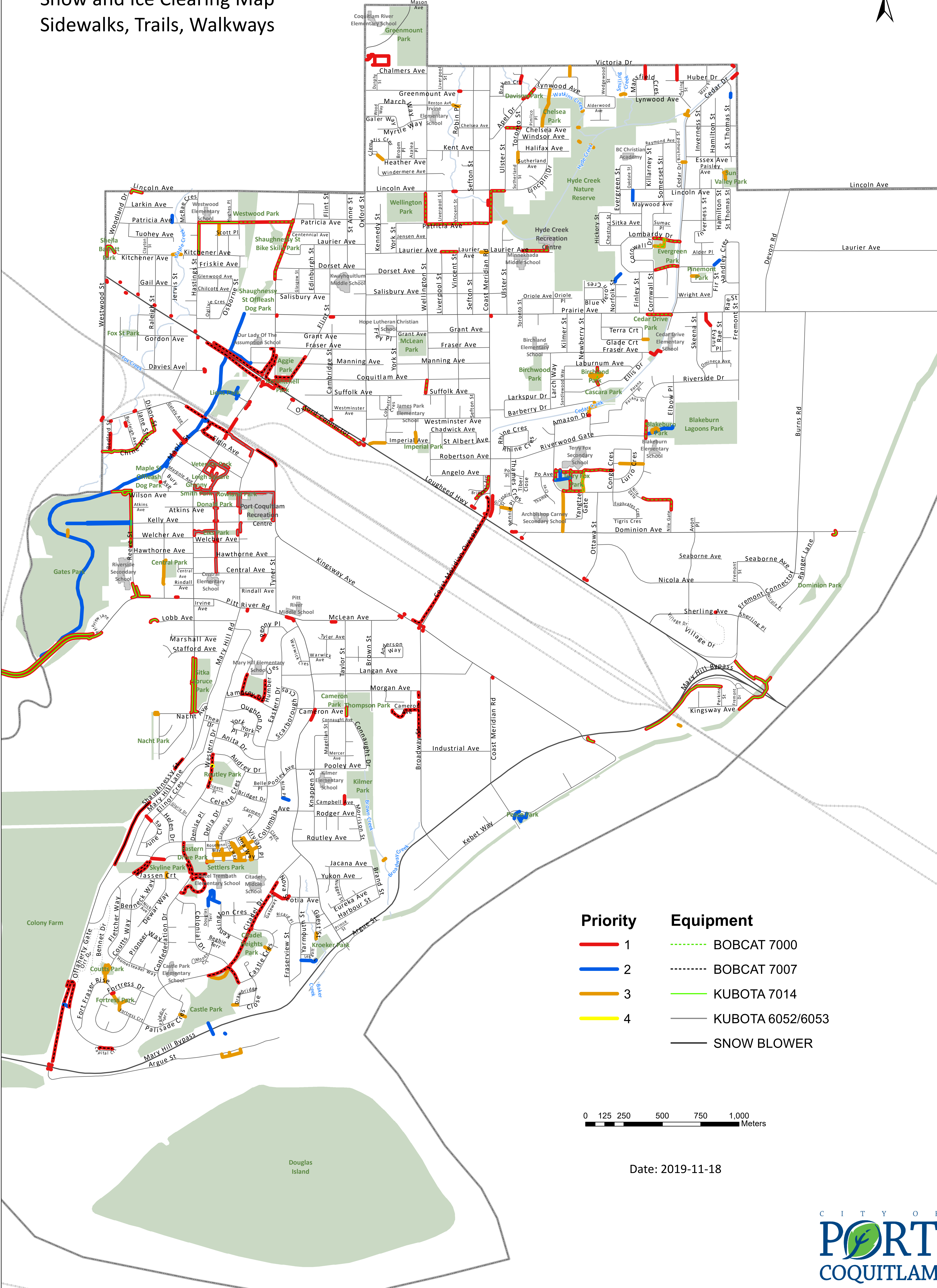
<u>Policy</u>	<u>Issue date</u>	<u>Reviewed</u>	<u>Replaced</u>	<u>Re-issue Date</u>
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CITY OF PORT COQUITLAM
ROAD SNOW CLEARING PRIORITY MAP

- LEGEND
- PRIORITY ONE
 - PRIORITY TWO
 - PRIORITY THREE
 - PROVINCE

Snow and Ice Clearing Map
Sidewalks, Trails, Walkways



Attachment 4 - Snow and Ice Response Levels

In responding to snow and ice events, the City has developed a series of response levels based on forecast and reported winter conditions of roadways and parameters throughout the City.

Level 1

- Forecast: no snow forecasted, clear conditions, but colder temperatures (below 2°C) that can create icy conditions
- Actions: Staff monitoring weather reports and apps and respond to road sensor alarms when temperatures are measured below 1.5°C. Staff perform an inspection of road conditions is undertaken on identified hazards higher elevations, bridge decks, and areas susceptible to icing. The outcome of the inspection determines the response of staff. If required brine units are deployed to priority routes including collectors, arterials, emergency and bus routes, school zones and sub zones that contain high percentage of local roads with grades in excess of 10%. Monitoring of City owned sidewalks, high pedestrian areas, priority bus stops. If required brine units deployed.
- Resources: Single-Axle Dump Trucks equipped with brine tank, One Ton Dumps equipped brine tank, Two UTV's with brine tanks
- Staffing Requirements: 1 – 6 employees

Level 2

- Forecast: temperatures near 0°C, moisture in the air or recent precipitation with clearing then temperature drop – cold road surface with icy conditions
- Actions: 4 brine units are deployed to priority routes including collectors, arterials, emergency and bus routes, school zones and sub zones that contain high percentage of local roads with grades in excess of 10%. Additionally a pick up with salt deployed to known water leak areas and hot spot locations where application of brine does not suffice. Monitoring of City owned sidewalks, high pedestrian areas, priority bus stops. If required brine units deployed.
- Resources: Single-Axle Dump Trucks equipped with brine tank, three One Ton Dumps equipped brine tank, Two UTV's with brine tanks, Pick-up Truck with load of salt.
- Staffing Requirements: 6 – 10 employees

Level 3

- Forecast: temperatures <0°C, precipitation with snow, road surface slippery/sticky/accumulation 2 cm to 10 cm
- Actions: Up to 25 Salting and plow units are deployed to priority routes including collectors, arterials, emergency and bus routes, school zones and sub zones that contain high percentage of local roads with grades in excess of 10% and City owned sidewalks, high pedestrian areas, priority bus stops. Up to 10 staff deployed with pick-ups and salt to clear let downs and bus stops.
- Priority 2 and 3 route response may be advanced, or delayed, or not required due to event intensity, severity or duration.
- Resources: three Tandem Dump Trucks equipped with plows and salt spreaders, two Single-Axle Dump Trucks equipped with plows and salt spreaders, three One Ton Dumps equipped with plows, salt spreaders, one Backhoe, one Front End Loader, one Skid Steer, one Pick-up with plow, ten Pick-ups, 2 UTV's with plows and salt spreaders and one Snow blower.

- Staffing Requirements: 16 – 30 employees

Level 4

- Forecast: temperatures $<0^{\circ}\text{C}$, snow, road surface accumulation 10 cm and over
- Actions: Up to 41 Salting and plow units are deployed to priority routes including collectors, arterials, emergency and bus routes, school zones and sub zones that contain high percentage of local roads with grades in excess of 10% and City owned sidewalks, high pedestrian areas, priority bus stops. Up to 20 staff deployed with pick-ups and salt to clear let downs and bus stops.
- Priority 2 and 3 route response may be advanced, or delayed, or not required due to event intensity, severity or duration.
- Resources: three Tandem Dump Trucks equipped with plows and salt spreaders, two Single-Axle Dump Trucks equipped with plows and salt spreaders, three One Ton Dumps equipped with plows, salt spreaders, two Backhoes, two Front End Loaders, two Skid Steers, one Pick-up with plow, twenty Pick-ups, three mowers with plows, two UTV's with plows and salt spreaders and one Snow blower.
- Staffing Requirements – 28 – 54 employees