



¹See report CO01253 for the full list of environmental regulations, guidelines and Regulators. Existing snow sites have these assessments in place, and have identified improvements to decrease residual risk.

²In addition to potentially creating a contaminated site, snow storage on bare ground and existing vegetation can damage vegetation, impact vegetation health, affect parkland assets and public trees.

This table highlights features, operations and monitoring considerations, as well as benefits and risks of other types of areas that have been previously proposed for use as snow storage areas.

Location and Structural Features				
	Site Control, Location	Size	Surface	Drainage Control
Existing Snow Storage Sites	Site control (eg, area is fenced). Located away from residential and environmentally sensitive areas.	Large surface to ensure sufficient melting between winter seasons	Ideally hard paved surfaces (part of planned upgrades for all current sites)	Engineered, lined settling ponds to control flow of meltwater and contaminants
Sites with Vegetation Cover (eg, school/sports fields, parks)	May have no or limited site access control Proximity to residential and public areas may be health/safety concern	May be limited in size and capacity for storage	Unpaved surface means increased contaminant seepage/percolation into ground ¹ Impacts to vegetation for any sites with grass or plants.	Likely no or limited drainage control features, such as settlement ponds to control meltwater sediment load ² Limited or no erosion control especially for bare ground areas, would need additional containment design features
Sites with Bare Ground (eg, vacant lot)				
Hard Surfaced Areas with Sewer Drainage (eg, parking lot)			Hard paved surface.	Engineered drainage features (assessment needed to determine volume capacity.)
Portable Snow Melter at Site with Sanitary Drainage (eg, at community league or parking lot)	May have no or limited site access control Proximity to residential and public use areas may be health/safety concern (requiring additional safety controls when melter is in operation)	Snow melter would reduce the need for a large area. Costs and fuel requirements might be prohibitive, emissions would need to be assessed.		Discharge to sanitary sewer is preferable but Regulator(s) would need to approve.

Operating and Monitoring Considerations				
	Owner/Operator and Site Registration	Regulations and Monitoring	Assessments and Risk Management	Infrastructure and Costs
Existing Snow Storage Sites	<p>City owns the sites and is responsible for operations, monitoring, management and liability.</p> <p>Sites are registered and managed according to regulations.</p>	<p>Designated sites, drainage pathways and discharge water are managed, monitored and regulated.</p> <p>Reporting requirements met under EPCOR, Alberta Environment and Protected Areas (AEPA), Environment Canada (EC)</p>	<p>Risk management plans are in place. Risks are mitigated through engineered controls and operational procedures.</p>	<p>Infrastructure upgrades require capital funding.</p> <p>Operating and monitoring costs are covered within Snow and Ice budget.</p>
Sites with Vegetation Cover (e.g. school/sports fields, parks)	<p>Who owns the site? Are they willing to:</p> <ul style="list-style-type: none"> Assume liability and risks? Conduct risk assessment? Have it used for snow storage? Manage environmental and safety impacts? <p>Who would manage operations, monitoring and reporting?</p>	<p>Meltwater discharge needs to be regulated and managed. Monitoring and regulations are dependent on discharge pathway.</p> <p>Parkland Asset Management and Public Tree Bylaw may also apply (depending on location)</p> <p>Additional sediment, erosion control² and contaminant management and monitoring likely needed for bare ground.</p>	<p>Case by case impact and risk assessments for:</p> <ul style="list-style-type: none"> site suitability environmental impacts, public health and safety drainage and design requirements <p>Risks and suitability of the site may be affected by:</p> <ul style="list-style-type: none"> what was previously located on the site if the site may be used for public/recreation in future 	<p>Depending on assessment results:</p> <p>Infrastructure, control and containment features will be needed to ensure site use will comply with regulations</p> <p>Additional considerations for:</p> <ul style="list-style-type: none"> Erosion and sediment control and drainage control² for bare ground. Drainage capacity and discharge path for use of snow melter Load bearing surface capacity and infrastructure needed to support heavy equipment.
Sites with Bare Ground (e.g. vacant lot)				
Hard Surfaced Areas with Sewer Drainage (e.g. parking lot)	<p>Is site registration required? (if used for more than 12 months or more than one season)</p>	<p>Lots with sanitary drainage: discharge is regulated by EPCOR (holds the permit with AEPA for outfall water quality)</p>	<p>Less Contaminated Sites risk for paved surfaces.</p> <p>In addition to assessment types for vegetated and bare ground:</p> <ul style="list-style-type: none"> Drainage type, volume capacity and design requirements (sanitary drain is likely the only option for snow melters) Risk and environmental assessments (fuel use, emissions) as well as higher capacity drainage sites for snow melters 	<p>Costs and infrastructure requirements, including initial purchasing costs of snow melters, could be significant.</p>
Portable Snow Melter at Site with Sanitary Drainage (e.g. at community league or parking lot)	<p>Lots with storm drainage: discharge is regulated by EPCOR, AEPA, EC</p> <p>Monitoring and control of discharge quality and volume to ensure these do not exceed levels and capacity during peak melt/use.</p>			

Benefits and Risks			
Benefits		Challenges	Risks and Liabilities
Existing Snow Storage Sites	Location and existing environmental controls help reduce impacts on the environment, public health and safety.	Some upgrades required to reduce sediment and contaminant risk. Distance away from areas of snow removal means additional time needed to haul snow.	Risks are mitigated/low with designated sites, operating procedures, and agreements with regulators. Increased risks if unable to upgrade surfaces and ponds.
Sites with Vegetation Cover (e.g, school/sports fields, parks)	Locations closer to areas of snow removal means reduced time needed to haul snow. Vacant lots: Availability of sites may be high, but private landowners may not be willing to have a site used for snow storage if it could negatively affect future site use.	Concerns include: <ul style="list-style-type: none"> • Public safety (eg, kids playing on snow piles) and noise (large, heavy vehicles) • Public and contractor dumping with lack of site access control Operational challenges: <ul style="list-style-type: none"> • Cost and resource requirements to operate may outweigh time savings • May only be approved for temporary use • Will likely result in a contaminated site with remediation and site management costs for the owner 	<ul style="list-style-type: none"> • Negative impacts on vegetation, soil and water due to contaminants, debris and physical damage from snow and heavy equipment • Would require remediation and may affect future recreation and public use of the site Liability without meltwater capture/treatment: <ul style="list-style-type: none"> • Direct environmental release to surface soil/water is guaranteed, resulting in mandatory reporting and remediation responsibilities and potential charges/fines (AEPA) • Site would not be given registration approval under disposal guidelines • Public health and safety risks
Sites with Bare Ground (e.g, vacant lot)			
Hard Surfaced Areas with Sewer Drainage (e.g, parking lot)	Locations closer to areas of snow removal means reduced time needed to haul snow. Melter would reduce site size required. Hard paved surfaces are preferred for erosion and contaminant control, while existing drainage infrastructure (if suitable) would reduce the cost of any upgrades that might be needed to ensure proper drainage control.	In addition to concerns and challenges for vegetated and bare ground, conversations with EPCOR would be required. Snow melter use concerns and challenges: <ul style="list-style-type: none"> • Greater operating, environmental controls • costs, resources and site safety protocols to operate may be significant • Safety, odor and carbon emissions with use of diesel or jet fuel-powered melters • Traps can be clogged with residue, may not be suitable for heavily contaminated snow • May not align with Carbon Budget/Net Zero direction under The City Plan 	Paved surfaces: less risk but seepage through cracks into ground/environment could occur <ul style="list-style-type: none"> • Public health and safety, further pavement or site damage due to heavy equipment • Risk of heat damage, explosion with fuel (Transportation of Dangerous Goods) Liability without meltwater capture/treatment or special disposal: <ul style="list-style-type: none"> • Guaranteed environmental release to drains, surface water, resulting in mandatory reporting and remediation responsibilities and potential charges/fines (AEPA, EPCOR, EC). • May need air emission notification/permit
Portable Snow Melter at Site with Sanitary Drainage (e.g, at community league or parking lot)	Sites may be readily available, but private landowners may not be willing to give up parking space or permit snow storage if it could negatively affect current/future site use.		

Notes:

¹Soil type and related guidelines could impact options and site selection. AEPA may have issues with site approvals, even if there is a hard surface, if constructed over sandy soil or adjacent to a sensitive site.

²Need to determine if a settling pond would be required to be constructed on these sites. Drainage may be challenging to control. Potential for off site impacts from runoff could exist and the severity may depend on what is adjacent.

Abbreviations:

AEPA - Alberta Environment and Protected Areas; EC - Environment Canada; TDG - Transportation of Dangerous Goods