City of Kitchener Snow Storage and Disposal Facility

Lessons Learned through Siting, Permitting, Operationalization and Monitoring

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PRESENTATION OVERVIEW

1. Site Selection

2. Design and Permitting

3. Operation and Maintenance

4. Monitoring

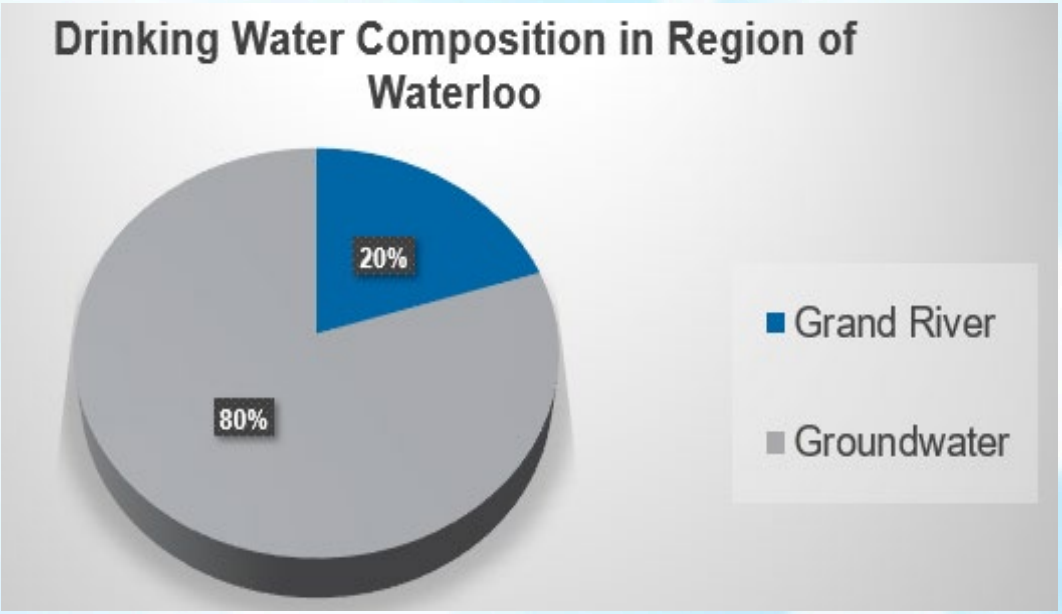
Site Selection

Source Water Protection

Available Area

Accessibility

Noise



Site Selection

Drainage Factors

Cost

Ease of Permitting

Alternative Use of the Site

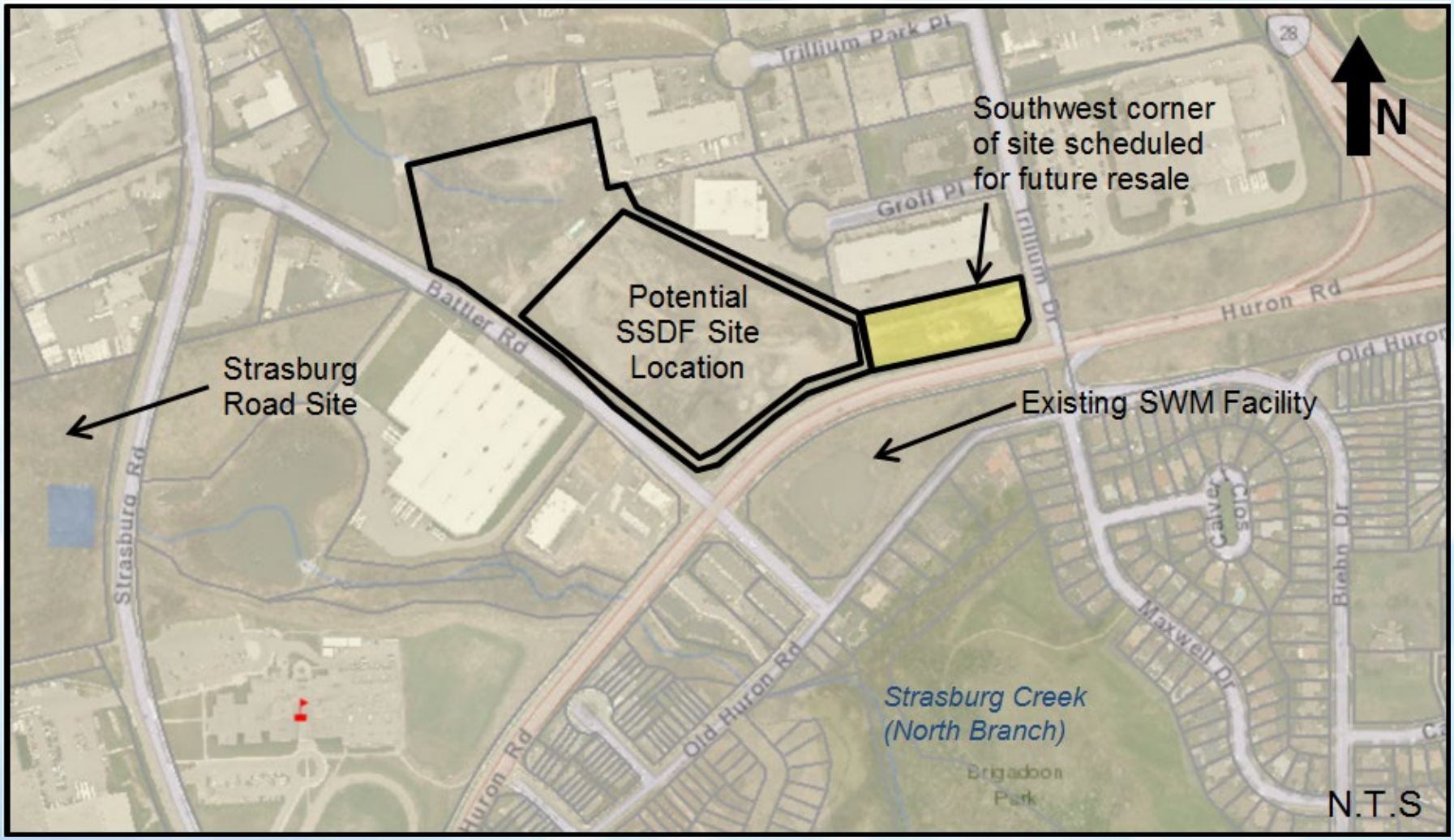
Visual Considerations

Site Selection

Snow Storage Disposal Facility Site Selection	Option 1 *Do Nothing*	Option 2 *131 Goodrich Dr. (KOF)*	Option 3 *1585 Battler Rd*	Option 4 *Strasburg/Huron Rd*	Option 5 *59 Graber Place*	Option 6 *Kitchener Auditorium*
Natural Environment Surface Water Receiver Surface Water Protection Environmentally Sensitive Areas (EPA's and Wetlands) Environmentally Sensitive Areas (Floodplain and GRCA Regulated Areas) Carbon Dioxide Impacts						
Total Category Score	*4*	*15*	*16*	*14.5*	*17.5*	*22*
Overall Natural Environment	**6th**	**4th**	**3rd**	**5th**	**2nd**	**1st**
Social / Cultural Land Use / Resource Designations & Policies Proximity to Residential Potential Land use Impacts Public Acceptance						
Total Category Score	*0.5*	*20*	*17*	*13*	*4*	*7.5*
Overall Social / Cultural	**6th**	**1st**	**2nd**	**3rd**	**5th**	**4th**
Economic / Financial Capital Costs Maintenance Costs Land Value						
Total Category Score	*5*	*9*	*15*	*10.5*	*1.5*	*5*
Overall Economic / Financial	**6th**	**3rd**	**1st**	**2nd**	**4th**	**5th**
Legal / Jurisdictional Land Requirements Agency Approval (GRCA)						
Total Category Score	*2*	*9*	*8*	*6*	*3*	*8*
Overall Legal / Jurisdictional	**6th**	**1st**	**2nd**	**3rd**	**5th**	**4th**
Technical Size Requirements Site Layout / Topography Servicing Site Access / Ease of Movement Length of Haul Route						
Total Category Score	*8*	*15*	*20*	*20.5*	*15.5*	*9.5*
Overall Technical	**6th**	**3rd**	**2nd**	**1st**	**4th**	**5th**
Overall Score	**19.5**	**68**	**76**	**64.5**	**41.5**	**52**
Overall Category Ranking	**6th**	**2nd**	**1st**	**3rd**	**5th**	**4th**

Site Selection

Final Selection – 1585 Battler Road



Site Selection

LESSON LEARNED

Total Capital Budget

$ 2.6 M

Total Operating Budget

$ 0

Design & Permitting

Battler Road SSDF General Statistics

Total Site Area: 4.5 ha (11 acres) & Snow Storage Area: 2.5 ha (6.2 acres)

Hours of Operation: 24 Hours / 7 Days a Week

Snow Hauling Stats:

Hauling Operations	Average Winter	Severe Winter
Total Volume of Snow	100,000 m^3	240,000 m^3
Snow Hauling Days	20 Days	40 Days
Total Loads/8 Hour Shift	140 – 210	210 – 420
Total Loads/Hour	20 – 30	30 – 60

Challenges & Mitigation

Stakeholder Concerns:

1. Increase Traffic
2. Aesthetics
3. Noise

Mitigation Approaches:

1. Increased Traffic
   - Designed trucking routes
2. Aesthetics
   - Landscaped berm with noise walls provides visual barrier from snow and facility operations
3. Noise
   - No tailgate slamming
   - Noise barriers+

Site Selection-Challenges & Mitigation

Stakeholder Concerns:

Environmental Impacts

1. Groundwater Quality Impacts
2. Strasburg Creek Impacts
3. Existing SWM Facility Capacity

Mitigation Approaches:

1. Environmental Impacts
    1. Pad designed to protect groundwater;
        1. Impermeable geosynthetic clay liner (GCL)
        2. Strategic orientation & grading of the Storage/Melt Pad to optimize solar melting of snow such that meltwater flow under the pile leaving sediment on storage pad
    2. Meltwater > 640 mg/l diverted to sanitary sewer for dilution at the WWTP.
    3. Site outlet through a stormseptor for pretreatment.

Design & Permitting

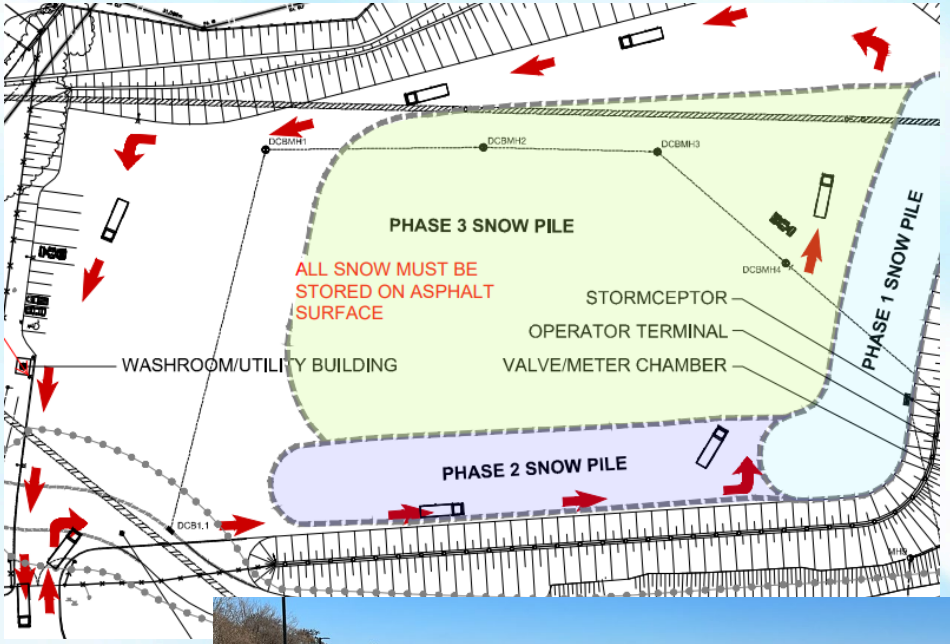
Other Design Considerations

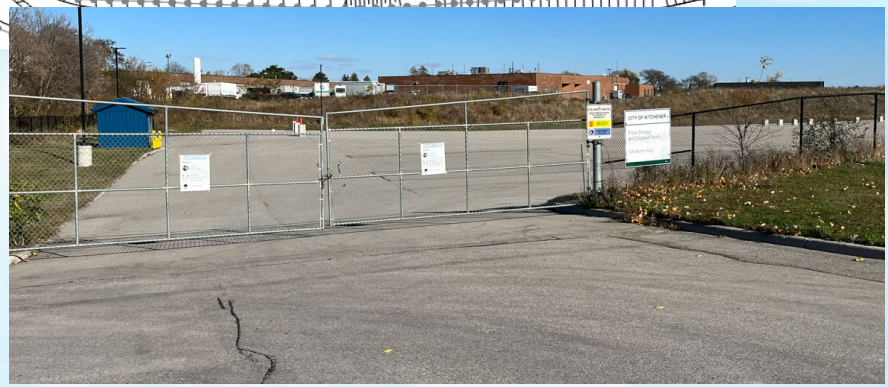
Site Traffic Flow

Site Security

Lighting

Location of infrastructure on the storage pad





Design & Permitting

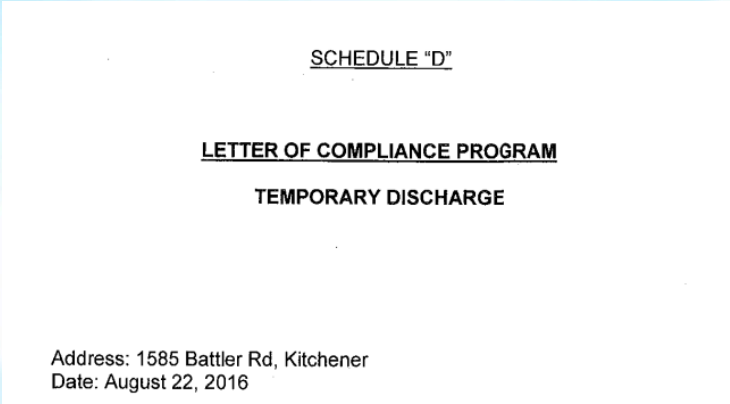
Municipal Class EA

Environmental Compliance Approval (ECA) for sewage works

Conservation Authorities Act

Municipal Approvals

Downstream receiver of stormwater

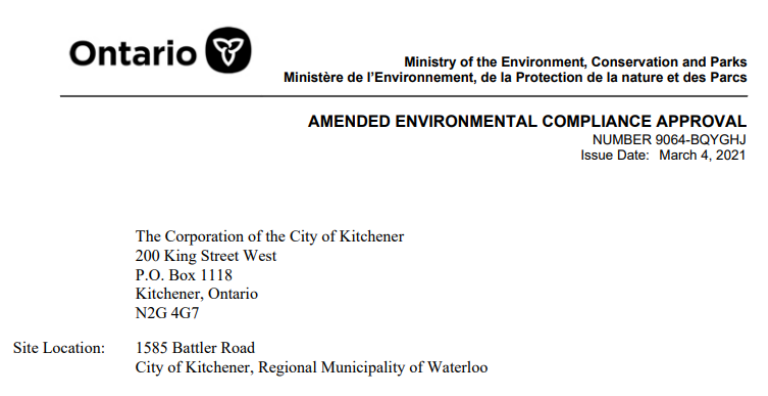


SCHEDULE "D"

LETTER OF COMPLIANCE PROGRAM

TEMPORARY DISCHARGE

Address: 1585 Battler Rd, Kitchener
Date: August 22, 2016



Ontario

Ministry of the Environment, Conservation and Parks
Ministère de l'Environnement, de la Protection de la nature et des Parcs

AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER 9064-BQYGHJ
Issue Date: March 4, 2021

The Corporation of the City of Kitchener
200 King Street West
P.O. Box 1118
Kitchener, Ontario
N2G 4G7

Site Location: 1585 Battler Road
City of Kitchener, Regional Municipality of Waterloo

Design & Permitting

1st Design CHALLENGE

1. During the period covered by this compliance program only, the quality of the stormwater discharged by the City of Kitchener from the said premises to the sanitary sewer system or land drainage works may exceed the limits set by By-Law Number 1-90 with respect to the parameters listed below provided that they shall not exceed the following limits at any time:

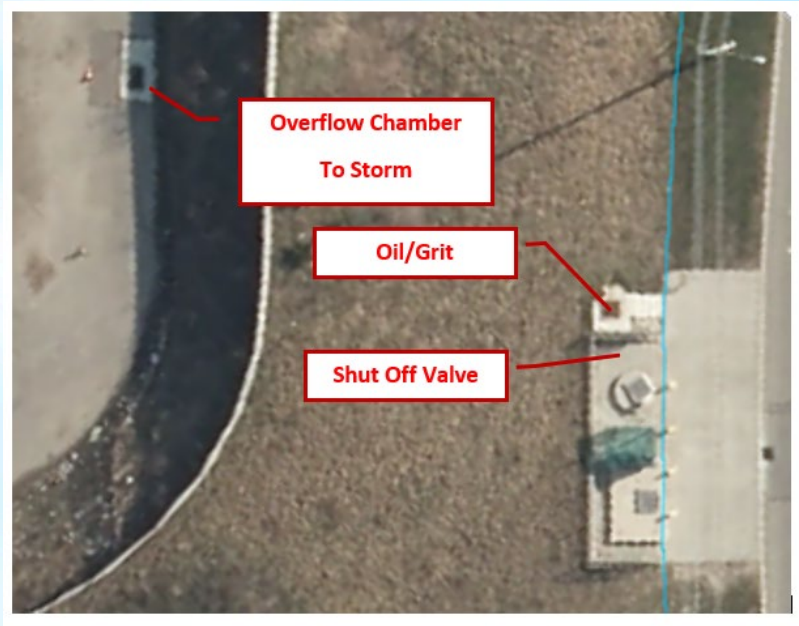
	parameter	limit
(a)	Chlorides	10,000 mg/L
(b)	Flow	432 m^3/day /18 m^3/hr

All other parameters must comply with the limits set out in s.6 of the Region of Waterloo Sewer Use By-Law Number 1-90.

- The facility was operationalized in February of 2016. By December of 2017 the parameters agreed to with the Region were exceeded when temperatures were below -15°C.
- The Chloride sensor had readings in excess of 25,000 mg/L during the first melt.
- The orifice plate in place only limits flow to 25 l/sec.

Design & Permitting

OPTION 1



The identified procedure in the case of high chlorides is to stop flow from the pad, allow ponding and additional melt to dilute and lower the chloride levels. We were unable to do this due to design challenges.

1. The overflow chamber on the pad goes directly to storm which would prevent ponding on the pad.
2. The valve placement between Oil/grid separator and Diversion Chamber will not allow the cessation of flow from the pad for any period.
3. There is no designed ponding area so if we blocked the overflow, the pad would flood.

Design & Permitting

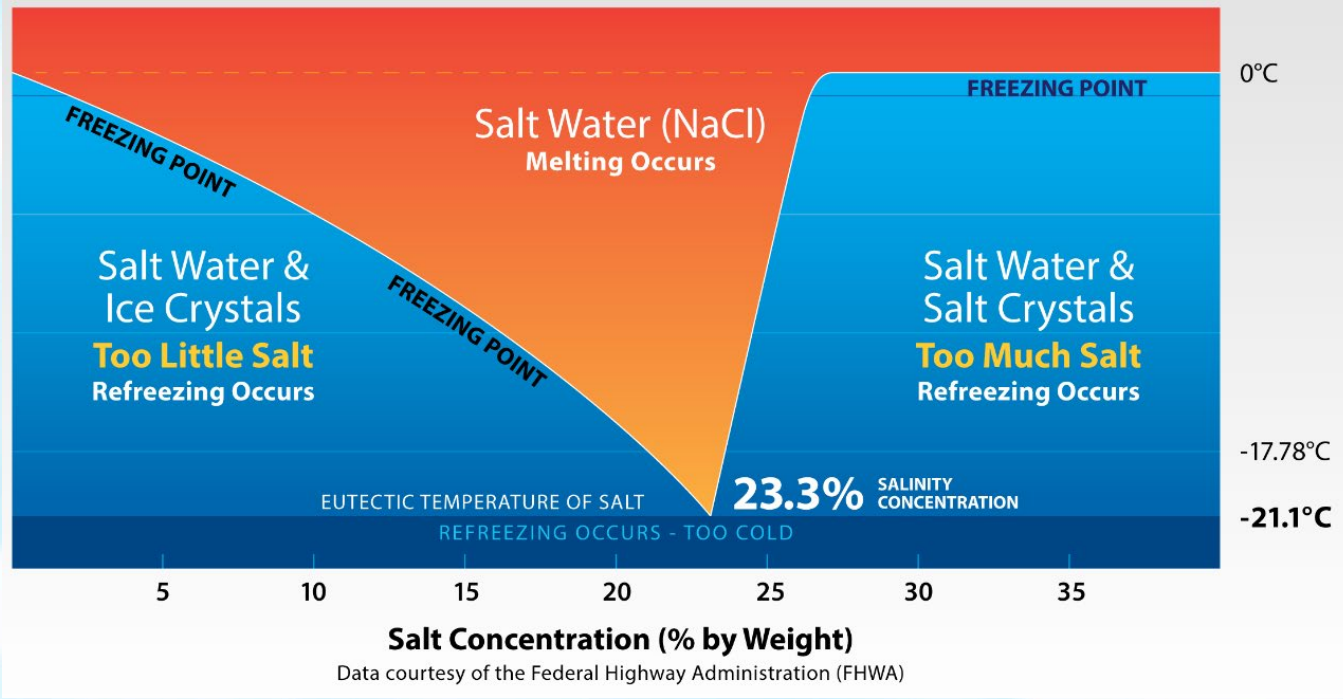
OPTION 2

Assuming the high chlorides were a result of the sediment remaining from the previous season. The system would need to be cleaned out.

1. Using emergency on call vac trucks the OGS and diversion chamber were emptied, washed down using a tanker truck and emptied again.
2. The diversion chamber was then filled with potable water to submerge the sonde.
3. To verify the levels, we also took grab samples from both chambers.

Design & Permitting

LESSON LEARNED

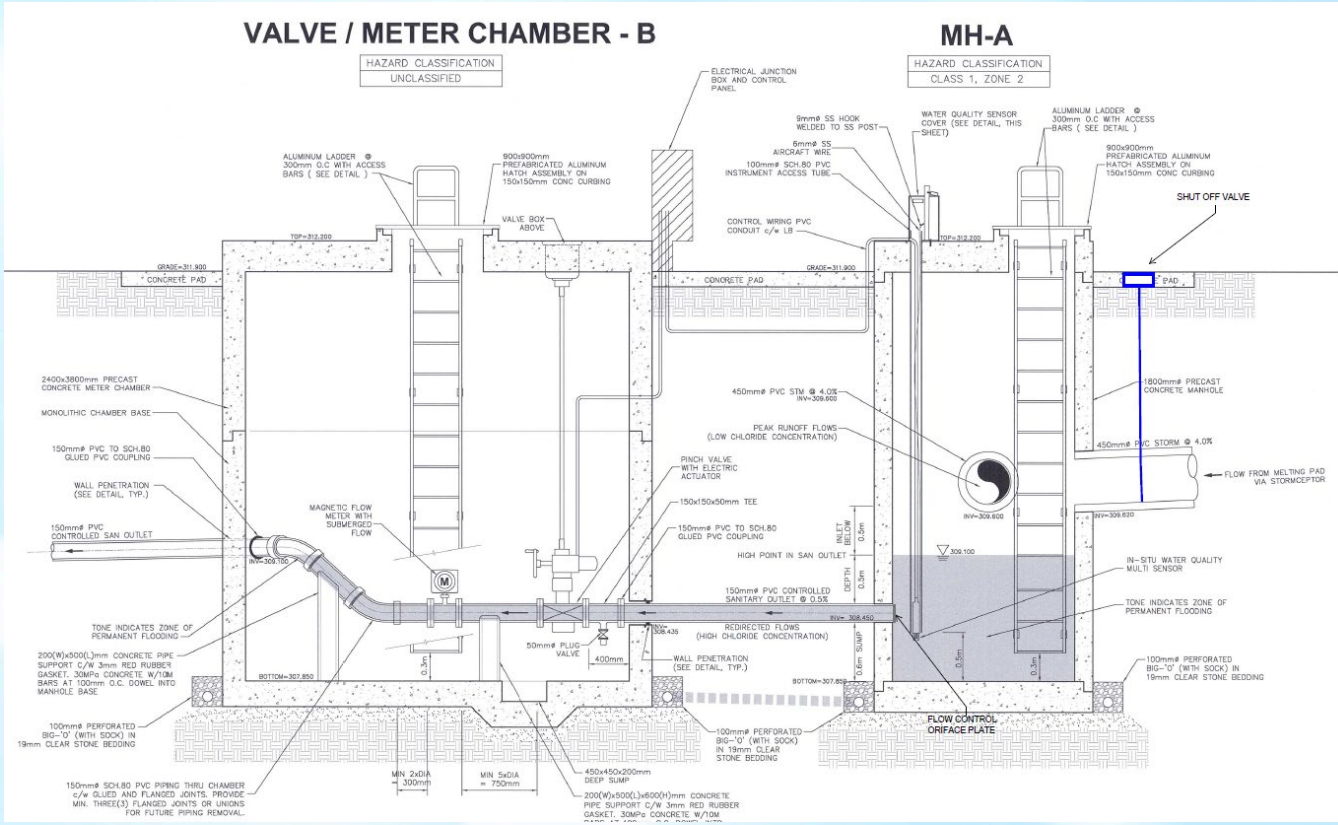


The grab samples were within the 10,000 mg/L threshold and flow rates were nominal.

1. As temperatures fall beyond -10 °C the chlorides increase but the flow rate drops.
2. The working temperature for salt usage on our roadways is -10° to -14° Celsius.

Design & Permitting

LESSON LEARNED

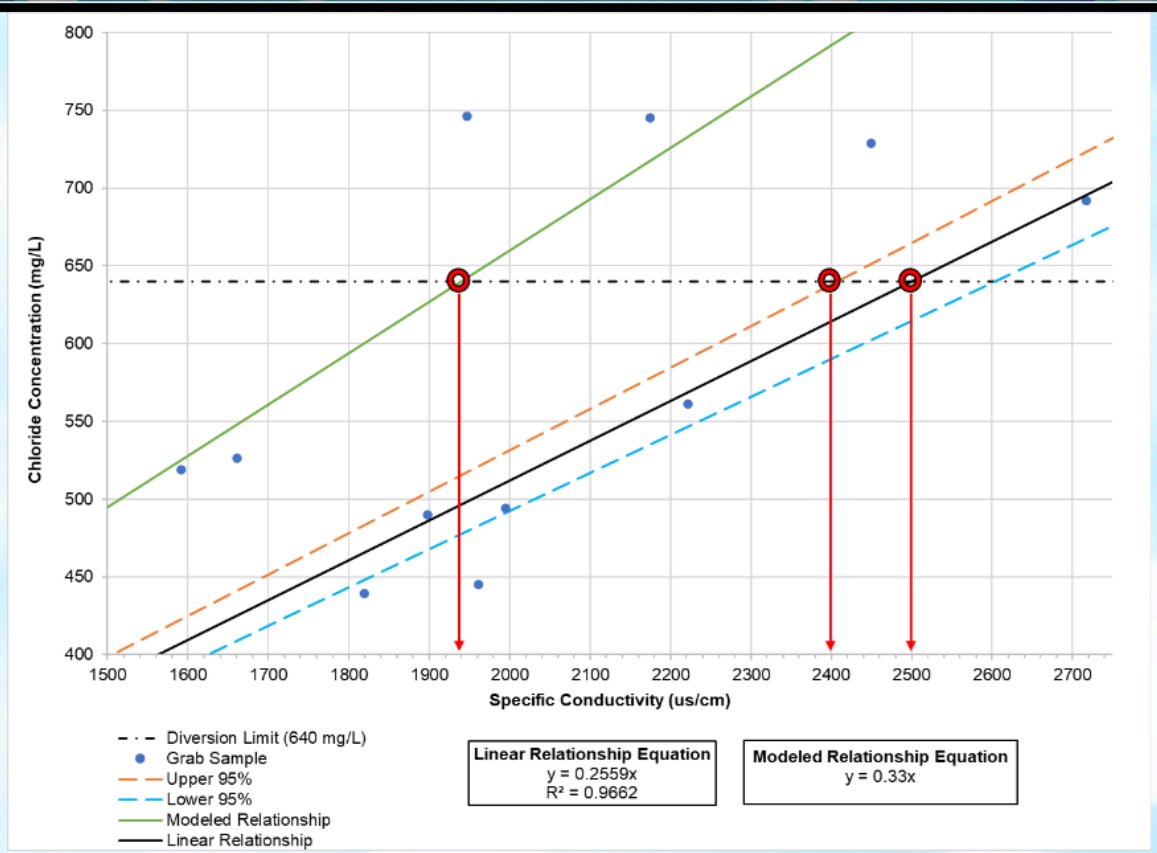


The grab samples were within the 10,000 mg/L threshold and flow rates were nominal.

1. The EX01 Sonde chloride sensor is calibrated to between 0 and 1,000 mg/l. The sensor range is 0 to 18,000 mg/L with an accuracy of +/- 5%.
2. Conductivity is a much more stable and accurate reading.
3. The flow meter in sanitary line is submerged and will have readings of up to 0.9 l/s when the valve allowing flow is closed.

Design & Permitting

Next Steps



Moving to the conductivity sensor;

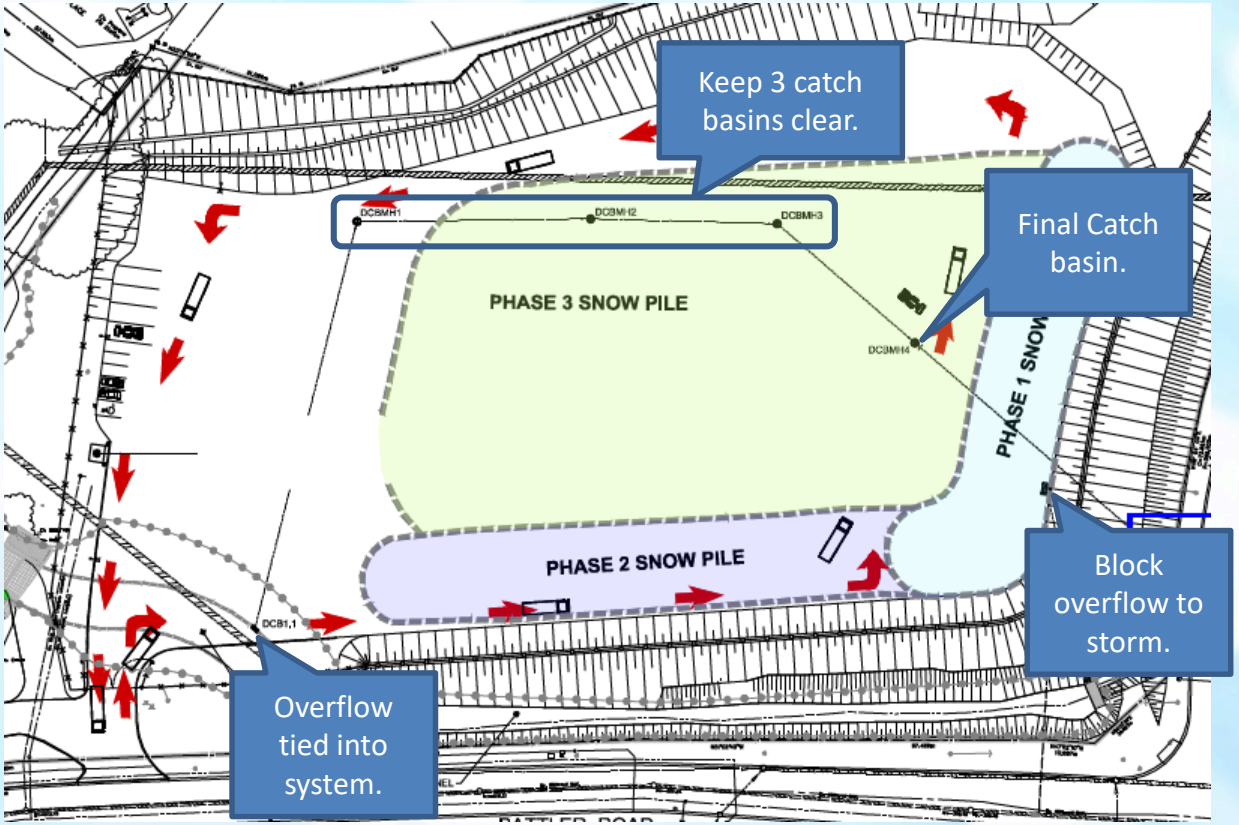
1. Additional grab samples are taken throughout the melt periods to develop a relationship between chloride and conductivity for the next 5 years.
2. The developed relationship is submitted to the Region of Waterloo and MECP for approval.
3. An Amendment to the existing ECA is under review to change the valve triggers to be based on conductivity instead of chloride readings.
4. Grab samples will continue as required to verify the relationship developed.

Design & Permitting

2nd Design Challenge

Design & Permitting

Lesson Learned



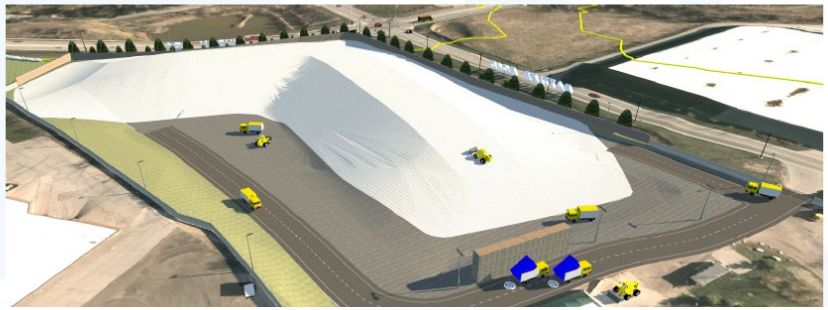
Design & Permitting

3rd Design Challenge

Our Approach – 239,000 m³

The original design model identified a maximum capacity of 239,000 m³.

Our Approach – 100,000 m³



Our capacity is reduced to stay within the perimeter of the paved area. We will also need to keep catch basins clear.

Monitoring

Background data (water quality and quantity) - pre-construction data in the receiver becomes important when understanding impact of the snow disposal facility on downstream receivers (data collected during the winter months is critical)

What could you be monitoring for?

- Groundwater and Surface Water
- Continuous and discrete measurements

What water quality parameters may be of interest?

- Chloride
- Total Suspended Solids (TSS)
- pH
- Heavy Metals

Monitoring

Multi-parameter Water Quality Sonde – Chloride, Conductivity, Temperature

- Continuous data set
- High frequency of calibrations required for accurate chloride data
- Data drift over time without high calibrations

Non-vented Datalogger – Level, Temperature, Conductivity

- Continuous data set
- Low frequency of calibrations required

Cannot continuously measure Total Suspended Solids (TSS). Literature suggest a linear relationship exists between Conductivity and TSS. Recommended to collect data over multiple years if interested in developing a relationship.

Monitoring

On multiple occasions we were seeing large amounts of foam in the diversion chamber.

Lesson Learned

Agitation + Chloride = Foam

Questions ???


Mar 31, 2022 at 12:54:33 PM
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Canada