

# Industrial Plastics in Calgary Region Waterways

Alberta Lake Management Society  
September 2019

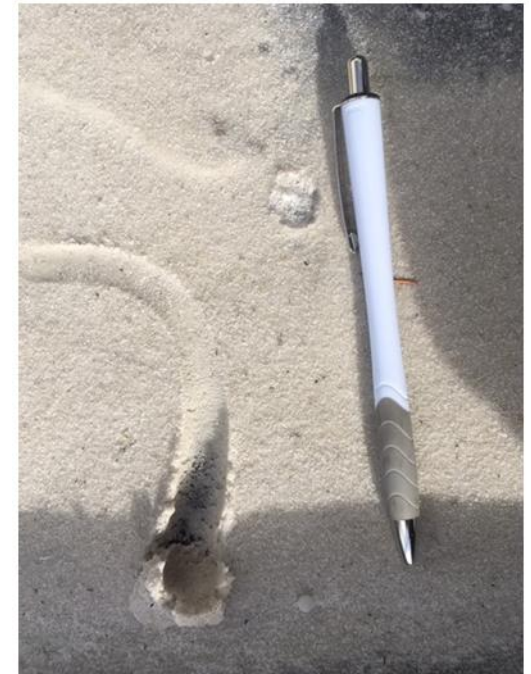
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City of Calgary Water Resources  
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# What Are “Industrial Plastics”?

- Pellets, chips or powder used within the plastics product chain
- Contain pure polymers (PP, PE, etc) or mixed-polymer recycled content
- Sources include manufacturing, recycling and transportation facilities (as opposed to plastic “litter”)
- Ubiquitous: ~100 facilities in Calgary alone

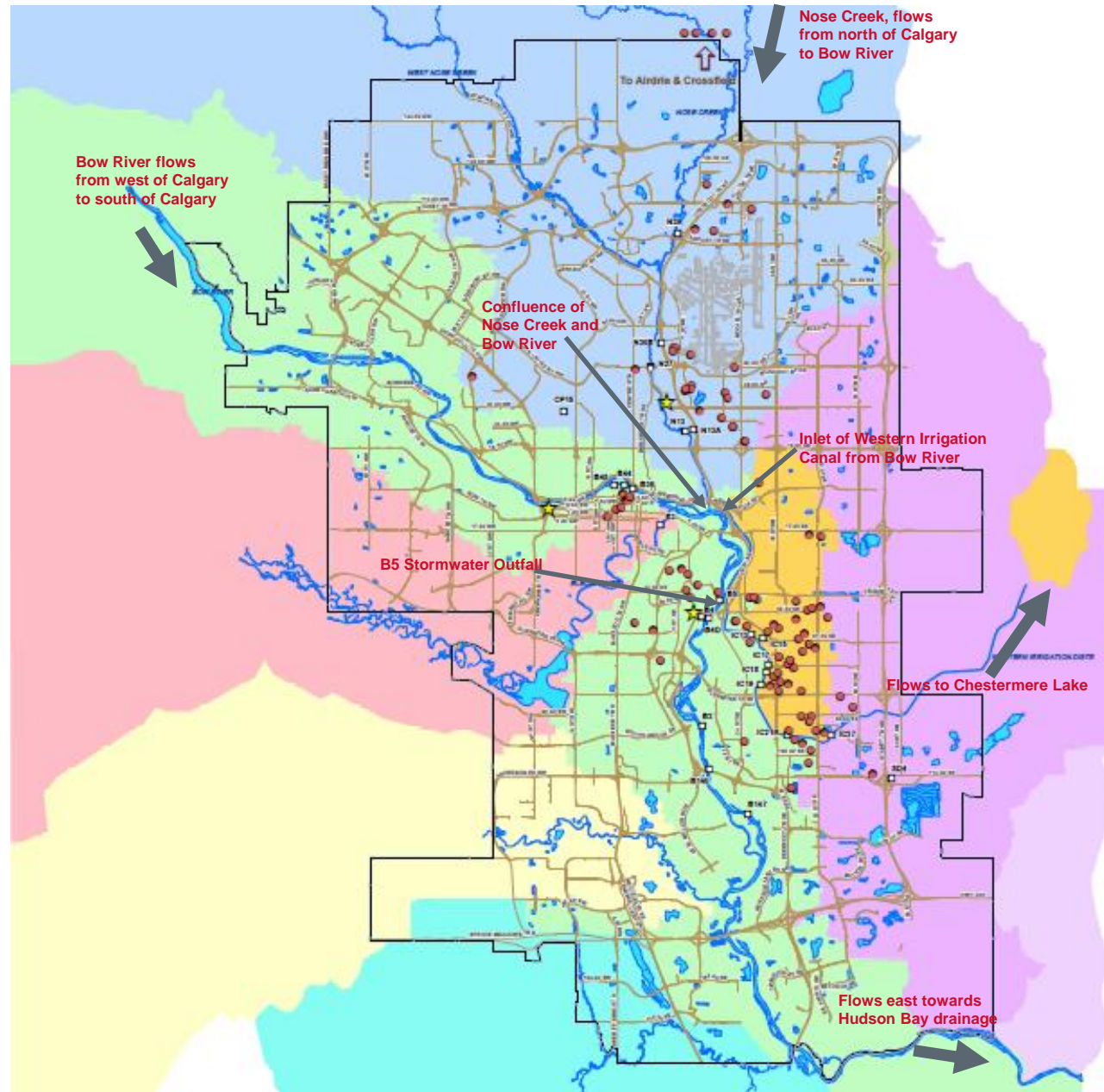


# Locations of:

## Regional Waterways

and

## Industrial Plastics Facilities





## 2016 Bow River d/s of Outfall B5





# 2016 Bow River Plastic Cleanup





## 2017 Bow River d/s of Outfall B5





# Pellets and Chips at Chestermere Lake 2018





# 2019 Chestermere Lake Plastic Cleanup



Industrial plastics and plastic litter occurred along about 450 linear metres of shoreline.

## Removal of about (dry weight)

Plastic litter: 3,800 kg

Plastic chips/flakes: 1,400 kg

Plastic pellets: 3,900 kg

## Hard Costs

Disposal to landfill: \$2,400

Hydrovac: \$15,000

## In-kind and financial support

Anonymous Plastics Industry Members

APRA

Western Irrigation District

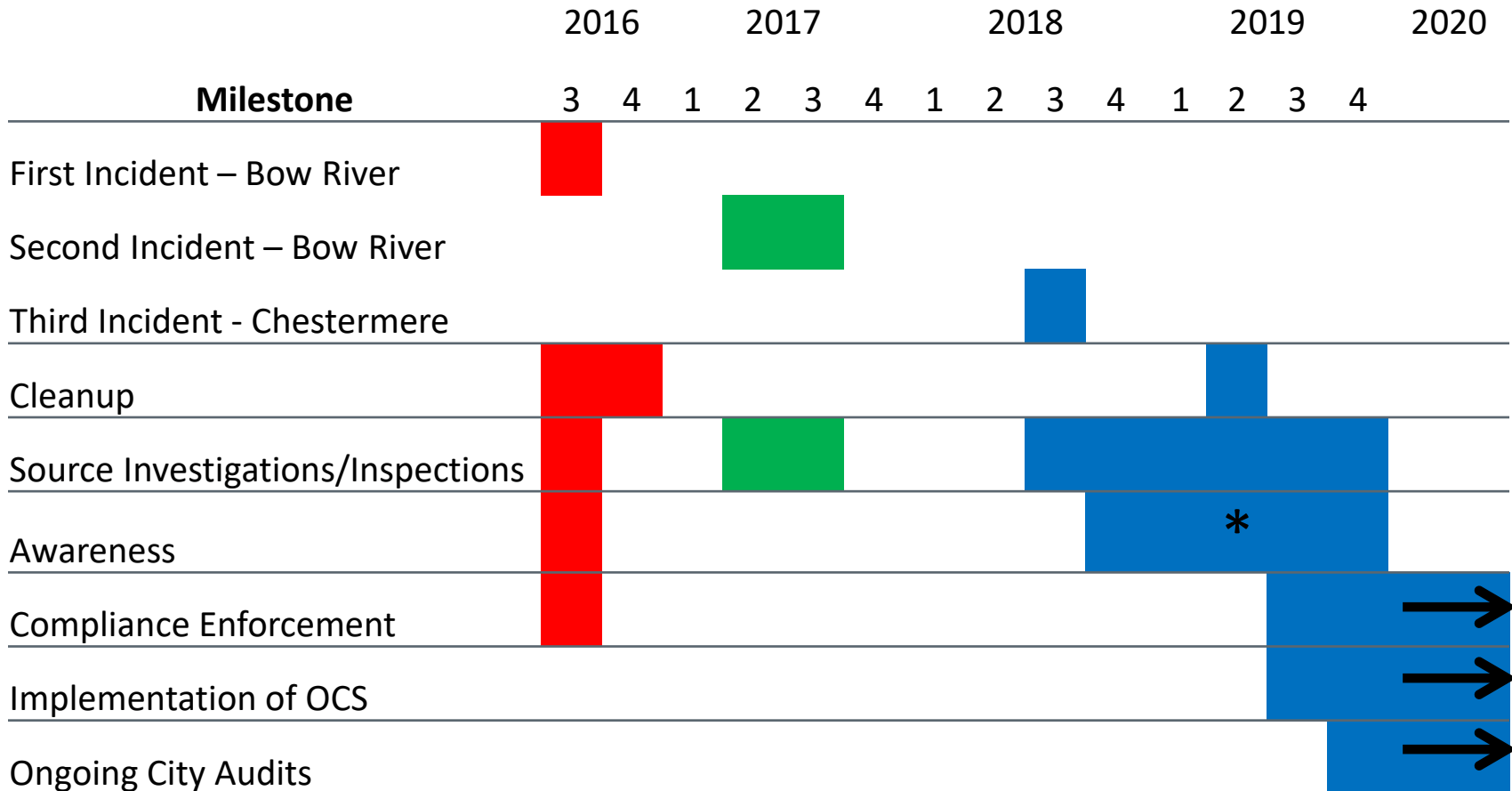
City of Chestermere

City of Calgary



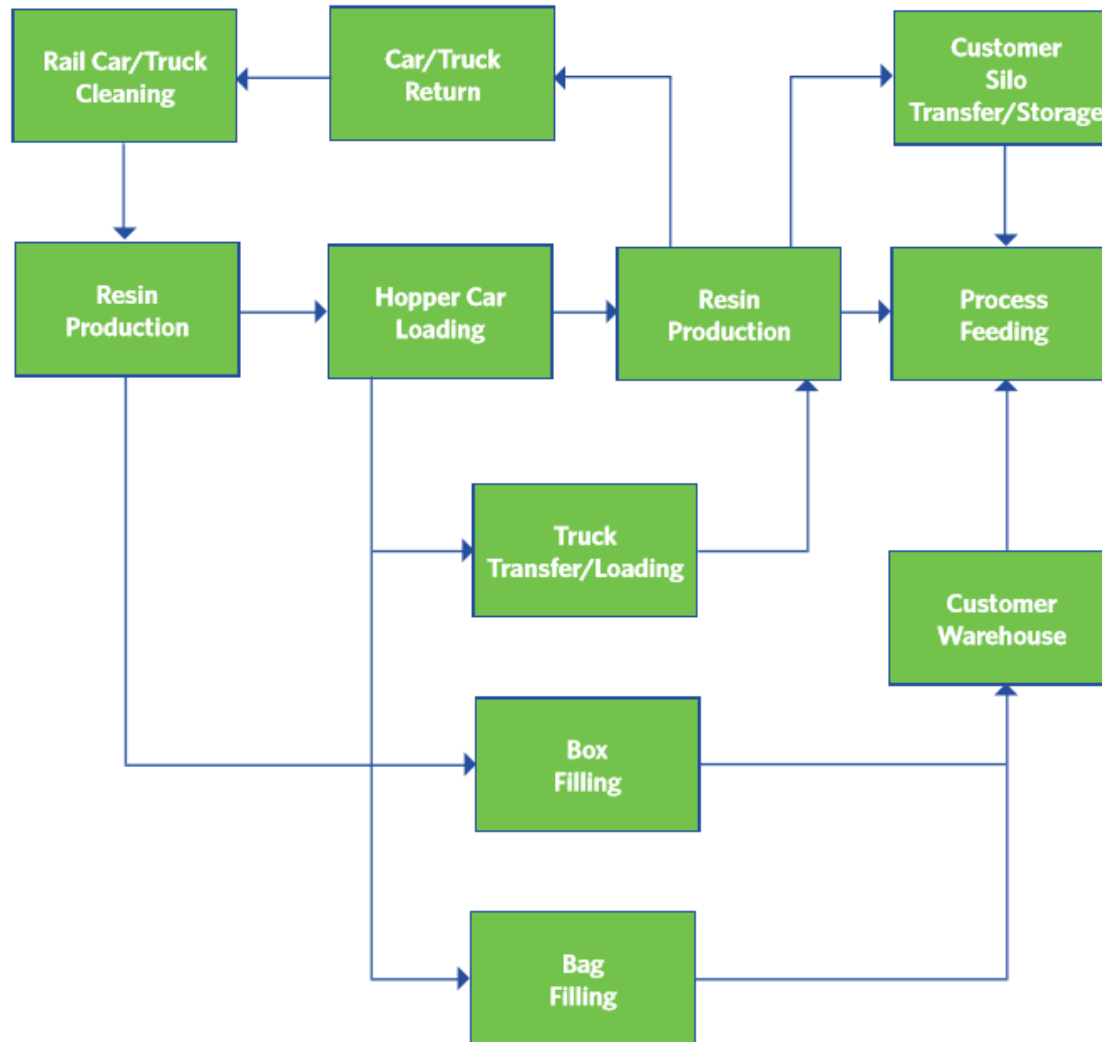


# Chronology of the Problem and Solutions





# Potential Plastics Loss Points



<https://www.opcleansweep.org/wp-content/uploads/OCS-Manual.pdf>



# Plastics in Facility Yards

Aged Plastic Pellets



Plastic Powder





# Shipping And Receiving Areas – Rail





## Shipping And Receiving Areas – Truck





# Storage Areas





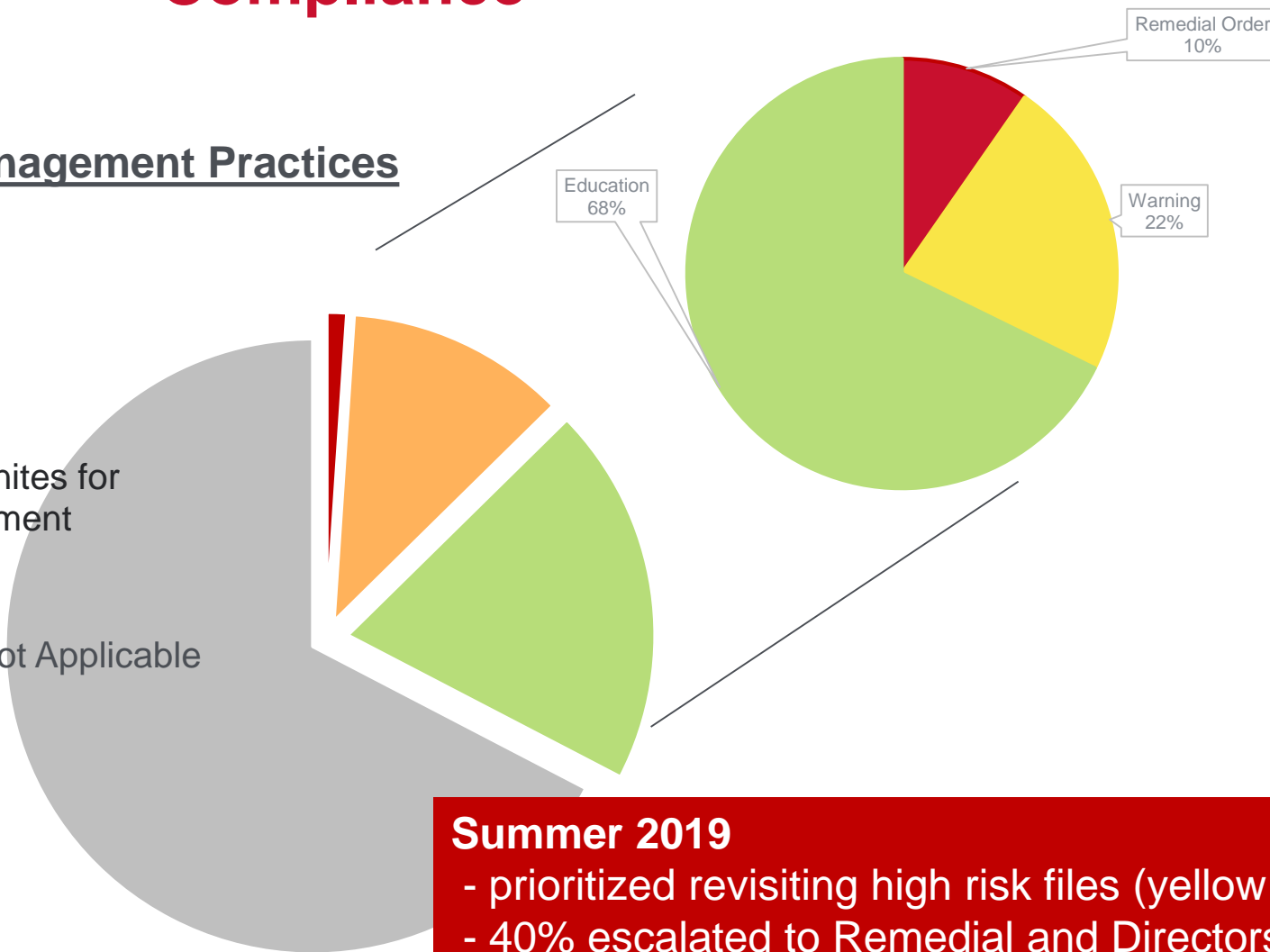




# 2018-2019 Plastics Industry State Of Compliance

## Best Management Practices

- Poor
- Opportunities for Improvement
- Good
- Other /Not Applicable



### Summer 2019

- prioritized revisiting high risk files (yellow and red)
- 40% escalated to Remedial and Directors Orders
- 60% in compliance/minor education





# Risk-Based Use of Regulatory Orders



The personal information on this form is collected under the authority of purpose of law enforcement. If you have any questions about the collection of this information, please contact the City of Calgary at 403-243-1100.

Date	MM	DD	Time
2017	10	26	12:54
Name			
Address			
Method of Service	<input checked="" type="checkbox"/> Delivered Personally		

Pursuant to the provisions of

- ☐ The Com
- ☒ The Dra
- ☐ The W
- ☐ Other

the property located at:

is in contravention of Section(s)

You are hereby ordered to remedy

Section 4(1) - have

removed

acc

- du

Section 5(4)a -

yard

Section 2(1) - maintain storm

storm drain

Photograph Disk

Inspector's Signature

**REMEDIAL ORDER**  
WATER RESOURCES & WATER SERVICES 311  
calgary.ca  
E 2034 (R2016-07)

Re: Direction to Control Potential Off-site Release of Industrial Plastics

I am writing to you regarding the use, transportation and storage of industrial plastic (including, but not limited to plastic film, resin, flakes and powder) on the property located at [redacted] Calgary, Alberta.

In 2018, The City of Calgary's Industrial Monitoring Group identified this facility to be at high risk for a release of industrial plastic off the property, particularly a release to the City's storm system. Evidence collected at a recent inspection of your facility on 2019 March 22 suggests the potential of a release continues to be a risk.

The City of Calgary (The City) has made significant efforts to make facility owners and operators aware of the problem with the help of Alberta Plastics Recycling Association (APRA) and the Canadian Plastic Industry Association (CPIA). As a regulator, The City is focused on the following objectives:

- Compliance with the Drainage Bylaw
- Zero loss of industrial plastics from a property
- Implementing long term and sustainable release prevention compliance mechanisms

Please be advised that pursuant to this letter, and in accordance with section 5(3)(b) of the City of Calgary Drainage Bylaw 37M2005, you are hereby required to complete the following actions:

- Submit a plan to implement an Environmental Management System designed to mitigate the risk of future releases of industrial plastic from this site to the City of Calgary Storm Drainage System.

Please provide details with respect to your proposed timelines and planned course of action to the undersigned no later than June 30<sup>th</sup>, 2019. If required, your proposal will be forwarded to the Director, Water Resources for approval, at which point any further conditions of approval required by the City will be specified.

Inspector's Signature



By design, Calgary has entirely separate storm and wastewater collection systems.

This means stormwater does not go to wastewater treatment plants!

Actions in our yards  
and on our streets  
directly  
river



**Stormwater in much of Calgary goes straight to rivers – without treatment!**

## Calgary's Stormwater System

- 55,000 catch basins
- 4,500 km of pipe
- 800 river outfalls

[Bow is Below](#) (1:10)



# Stormwater Catch Basins

- Stormwater and drainage enters the stormwater system through catch basins.
- Found along curbs, in parking lots and industrial yards.
- Characteristic “grate” structure.

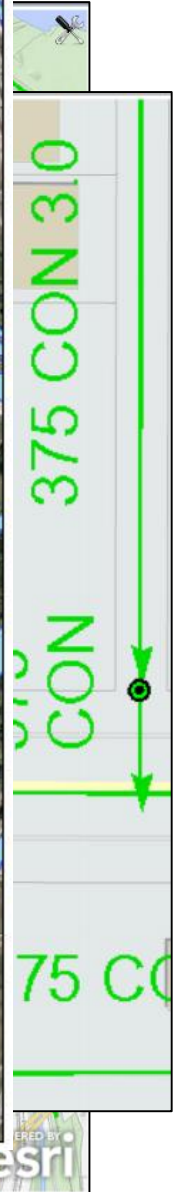
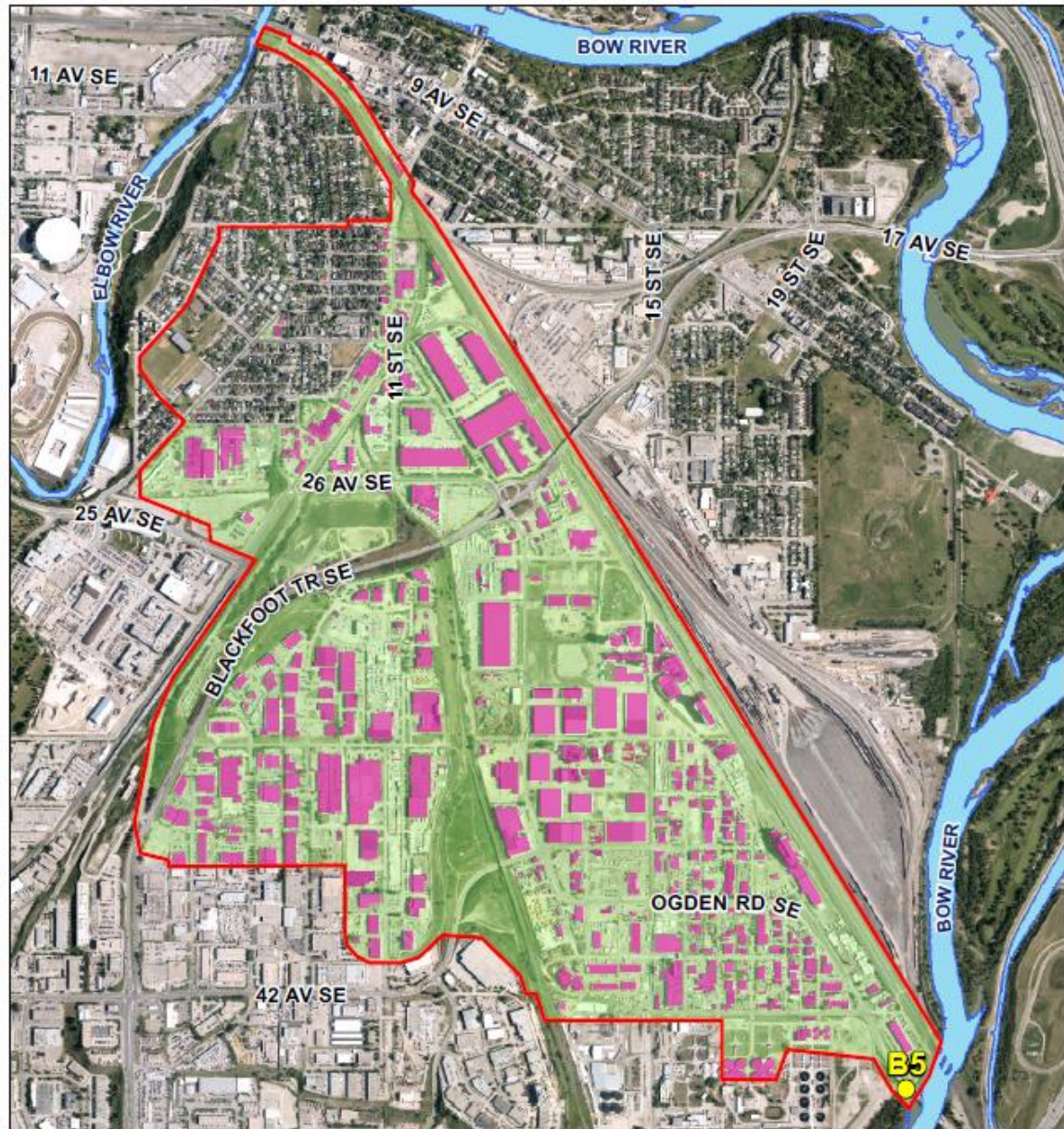
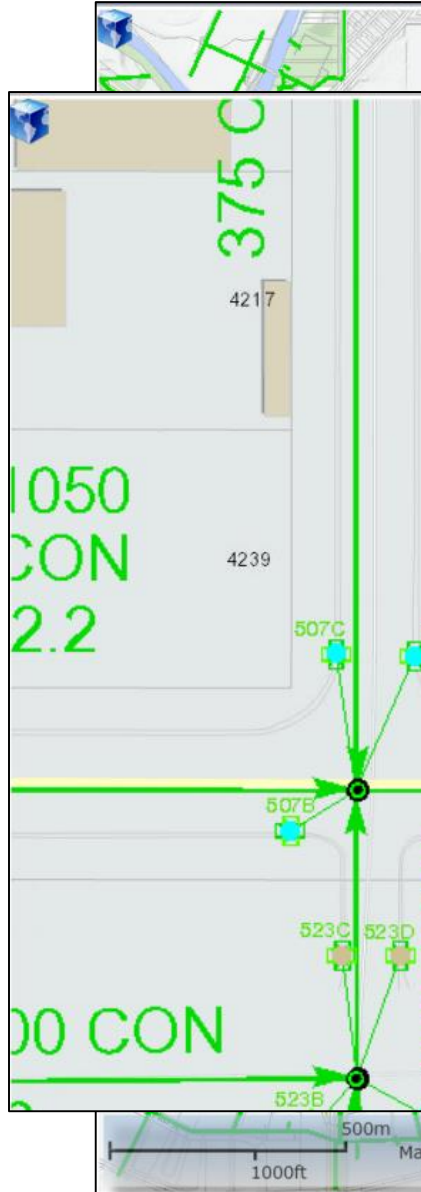




# Underground Storm Pipes

Ca

er





## Outfall B5 on the Bow River (Bonnybrook/Ogden)

Date & Time: Tue Nov 8 16:59:13 MST 2016  
Position: 11 N 709465 5655534  
Altitude: 1028m  
Datum: WGS-84  
Azimuth/Bearing: 355° N05W 6311mils (True)  
Elevation Angle: -24.0°  
Horizon Angle: -00.0°  
Zoom: 1X



Date & Time: Thu Dec 14 08:45:38 MST 2017  
Position: 11 N 709476 5655552  
Altitude: 1029m  
Datum: WGS-84  
Azimuth/Bearing: 297° N63W 5280mils (True)  
Elevation Angle: -18.7°  
Horizon Angle: -00.2°  
Zoom: 1X





## IMPLEMENTATION

### Operation Clean Sweep®

#### PROGRAM MANUAL



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#### 1. Commit to making zero pellet, flake and powder loss a priority.

- Sign the "Pledge to Prevent Resin Pellet, Flake and Powder Loss."

#### 2. Assess your company's situation and needs.

- Comply with all environmental laws and regulations that address pellet, flake and powder containment.
- Conduct a site audit.
- Determine if you have appropriate facilities and equipment.
- Determine if employees have and are following appropriate procedures.
- Identify problem areas and develop new procedures to address them.
- Communicate your experiences to peers in the industry.

#### 3. Make necessary upgrades in facilities and equipment as appropriate.

#### 4. Raise employee awareness and create accountability.

- Establish written procedures (The procedures and checklists in this manual may be modified to suit your needs. They are available in the checklists section.
- Make certain the procedures are readily available to employees.
- Conduct regular employee training and awareness campaigns on OCS.
- Assign employees the responsibility to monitor and manage pellet, flake and powder containment.
- Encourage each worker to sign the employee commitment pledge.
- Solicit employee feedback on your program.
- Use workplace reminders such as stickers, posters, etc.

#### 5. Follow up and enforce procedures - when management cares, employees will too.

- Conduct routine inspections of the facility grounds - production areas and parking lots, drainage areas, driveways, etc.
- Continuously look for ways to improve the program. Share best practices through the OCS Website

### YOUR GUIDE TO OPERATION CLEAN SWEEP®

manual contain guidelines to help plastics industry operations managers reduce the accidental loss of pellets from the processing facility into the environment.

[opcleansweep.org](http://opcleansweep.org)

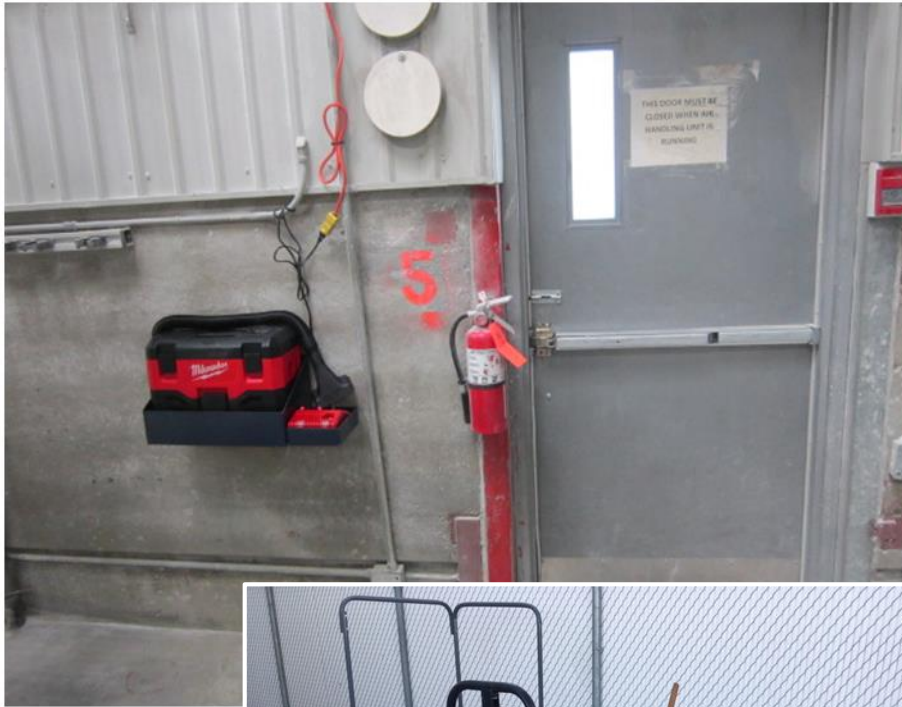


# Pollution Prevention: *Spill Avoidance*





# Pollution Prevention: *Spill Cleanup*



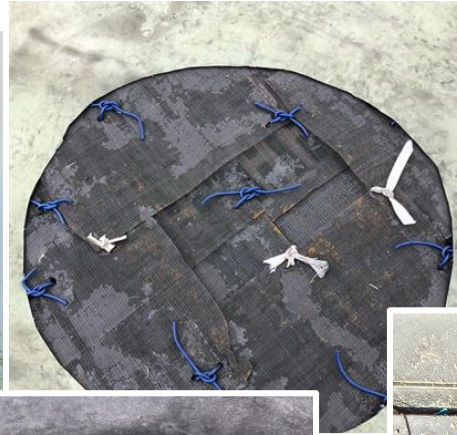


# Pollution Prevention: *Spill Containment*





# Pollution Prevention: *Stormwater Protection*





Before



After



Before/after photos of the same yard, showing the same storm drain in both photos



# Pollution Prevention: *Site Housekeeping*

Before



After





# Keys to Success

1. Industrial plastics are ubiquitous
2. Transfer points between transport/storage/waste disposal modes are primary loss points.
3. Lack of awareness of the connection: on-site activities, stormwater systems and waterbodies.
4. Collaborative partnerships are important: gov't, industry, associations
5. Multi-faceted approach: site inspections, awareness, escalation to compliance enforcement
6. Long-term solution: adoption of OCS and a cultural shift within industry





Government  
of Canada

Gouvernement  
du Canada

Members of the  
Calgary Area  
Plastics Industry







# Are Industrial Plastics Harmful?

1. Short answer is, maybe...
2. No one, to our knowledge, has done a study regionally specifically on the possible environmental impacts of industrial plastics in the Bow River watershed. It does make sense that larger fish and some birds might eat pellets, as they resemble common foods (e.g., fish eggs) in appearance and behavior.
3. On a broader scale, there is growing evidence (some of which has been sensationalized, unfortunately) that various animals (from zooplankton to whales) ingest plastics, and be harmed through physical blockage of their digest systems.
4. There is at least one UK study that specifically implicated plastic pellets similar to those we've seen in the Bow River in the death of puffins, a colonial seabird.
5. There is also growing evidence that persistent organic pollutants (hydrocarbons, PAHs, PCBs, pesticides, etc) can adsorb to plastics (as plastics are organic and non-polar), and that these pollutants will be absorbed in animals' digestive systems. We have observed this locally with pellets exposed to creosote (mainly PAHs) on railroad ties.
6. What we do know is that these plastics are incredibly persistent in the environment – once in the Bow River, they are likely transported downstream and a portion join the ever-increasing accumulation of plastics in our oceans. Although we've been successful at cleaning the densest accumulations in local locations, the reality is the bulk is simply not feasible to collect. Prevention of loss is a far better solution.