

# U of T Trash Team

Formed in 2017:

Science-based community outreach organization (volunteers, students, staff, early-career researchers).

Common Goal:

Increase waste literacy in our **community** while reducing plastic pollution in our **ecosystems**.





# Solutions-based Research

UPSTREAM  
Pollution Prevention Projects



DOWNSTREAM  
Fighting Floatables



# The Toronto Inner Harbour Floatables Strategy



**U of T  
Trash Team**

**PORTS  
TORONTO**



Toronto and Region  
**Conservation  
Authority**



**WATERFRONT  
BIA**

© **Harbourfront centre**



**SWIM  
DRINK  
FISH**

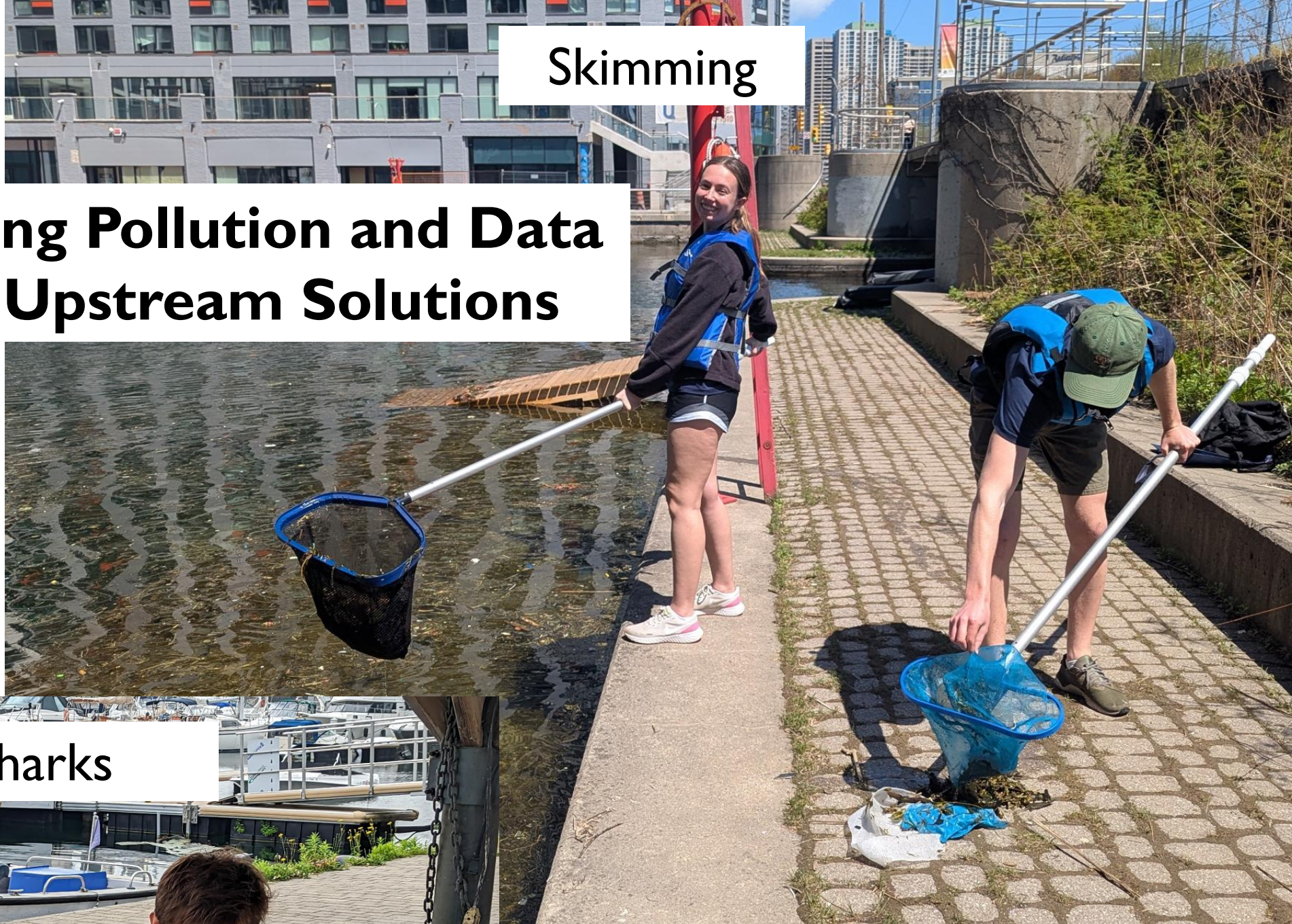


**WATERFRONT**Toronto

Seabins



Skimming



# Trapping Trash: Diverting Pollution and Data Collection to Inform Upstream Solutions



WasteSharks



LittaTraps

## And a New Trash Trap Coming Soon!

## TOTAL WASTE DIVERTED:



# 642 KG

of anthropogenic debris

53,886 large items

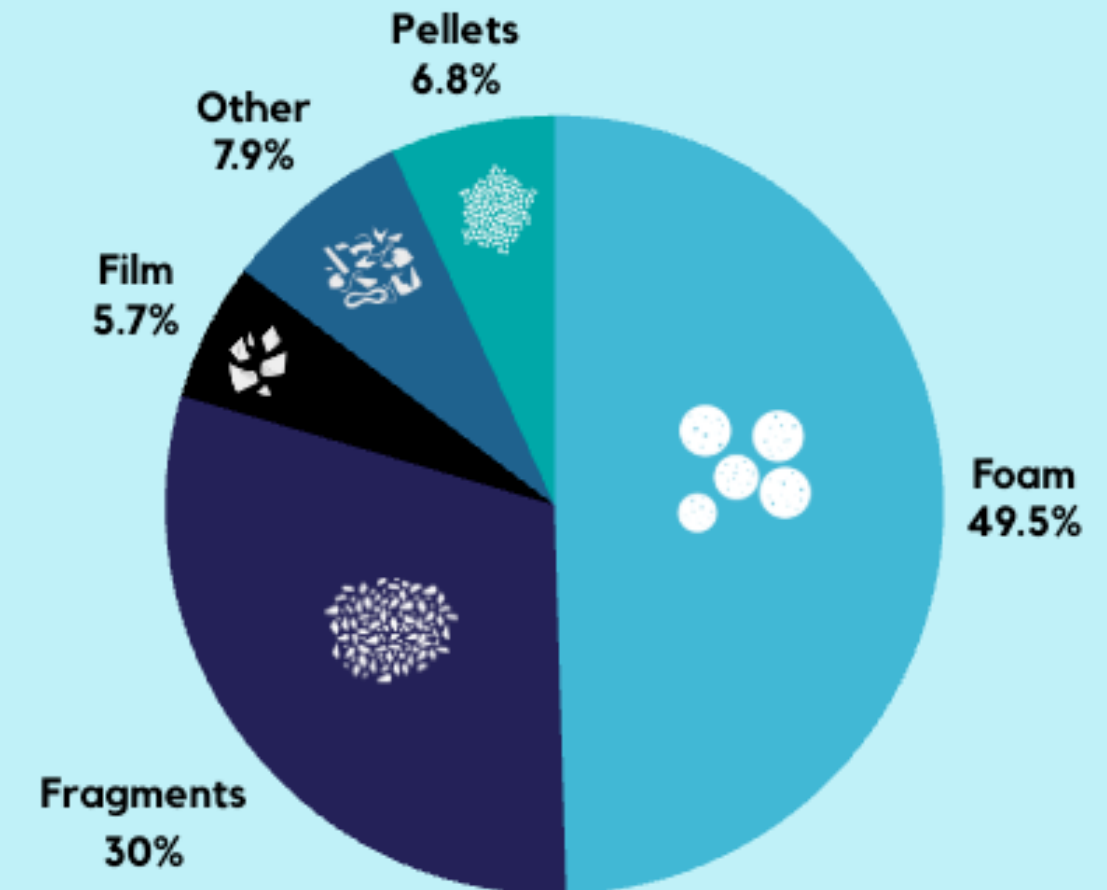
174,251 small items

## TOP 10 LARGE ITEMS

- |   |  |                         |    |  |                                       |
|---|--|-------------------------|----|--|---------------------------------------|
| 1 |  | Foam Packaging          | 6  |  | Tobacco Products<br>(e.g. cigar tips) |
| 2 |  | Cigarette Butts         | 7  |  | Large Plastic Film                    |
| 3 |  | Plastic Bottle Caps     | 8  |  | Straws & Stirrers                     |
| 4 |  | Large Plastic Fragments | 9  |  | Other Plastic Bags                    |
| 5 |  | Food Wrappers           | 10 |  | Plastic Beverage Bottles              |



## SMALL ITEMS COLLECTED



# Pollution Prevention Projects:

**Solutions-based  
research to inform  
the prevention of  
plastic pollution – one  
source at a time!**



**Kicking Plastics Butt!  
(Cigarette Butts)  
2022 - 2023**

[Learn more](#)



**Ditching Disposables  
(Single-use Foodware)  
2021 - present**

[Learn more](#)



**Divert and Capture  
(Microfibers)  
2017 - 2021**

[Learn more](#)

copic plastic particles it sheds when washed. (Lisa Erdie and S



**Operation Sweep the Creek  
(Pre-production Plastic Pellets)  
2019 - present**

[Learn more](#)



**Wipes vs. Pipes  
(Wet Wipes)  
2023 - present**

[Learn more](#)



**Getting into Garbage Bins  
(Garbage Bins)  
2024 - present**

[Learn more](#)



**In Pursuit of Polystyrene  
(Foam)  
2022 - present**

[Learn more](#)

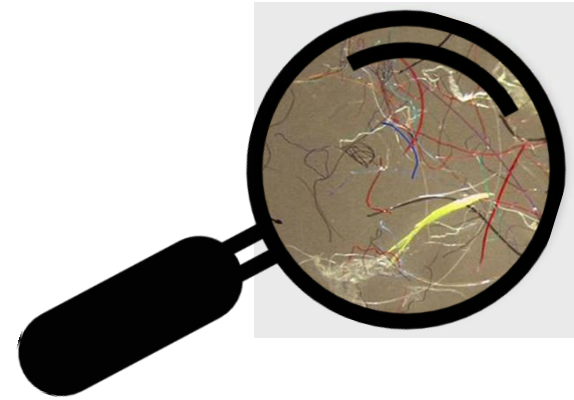


**Brushing Away Microplastics  
(Paint)  
2024 - present**

[Learn more](#)

# Pollution Prevention Projects:

1. Observe a relatively large amount of an item in the environment



2. Do research to better understand its sources, pathways, fate, and effects.



3. Determine feasible solutions and pilot them to measure their effectiveness.



4. Share findings with relevant stakeholders to inform solutions at scale.



# Today's Webinar

- 1. Discuss the problem of foam insulation and other materials from construction sites into our local ecosystems.**
- 2. Share findings from In Pursuit of Polystyrene, including a pilot with local industries to trial solutions and reduce emissions.**
- 3. **PANEL:** Discuss benefits, challenges, and opportunities for turning off the leakages on foam and other materials from construction activities.**

# Panelists



**Elizabeth Stanziano**

Lead Researcher, *In Pursuit of Polystyrene*; U of T Trash Team



**Dean Arsenault**

Environmental Specialist for Toronto Building Division; EllisDon



**Mary-Margaret McMahon**

MPP Ontario; Beaches-East York

# IN PURSUIT OF POLYSTYRENE



A POLLUTION  
PREVENTION  
PROJECT

# Our Research Team



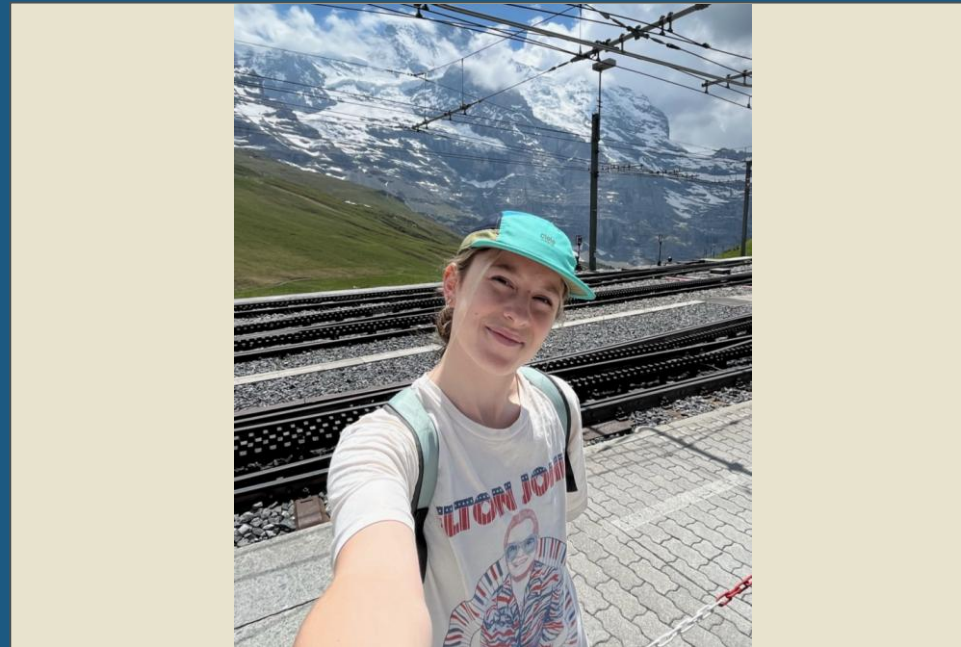
**Gloria Gao**



## **PHASE 1.0**

Led by Gloria Gao. The aim of Phase 1.0 was to determine how much of the foam littering our waterways comes from construction and packaging.

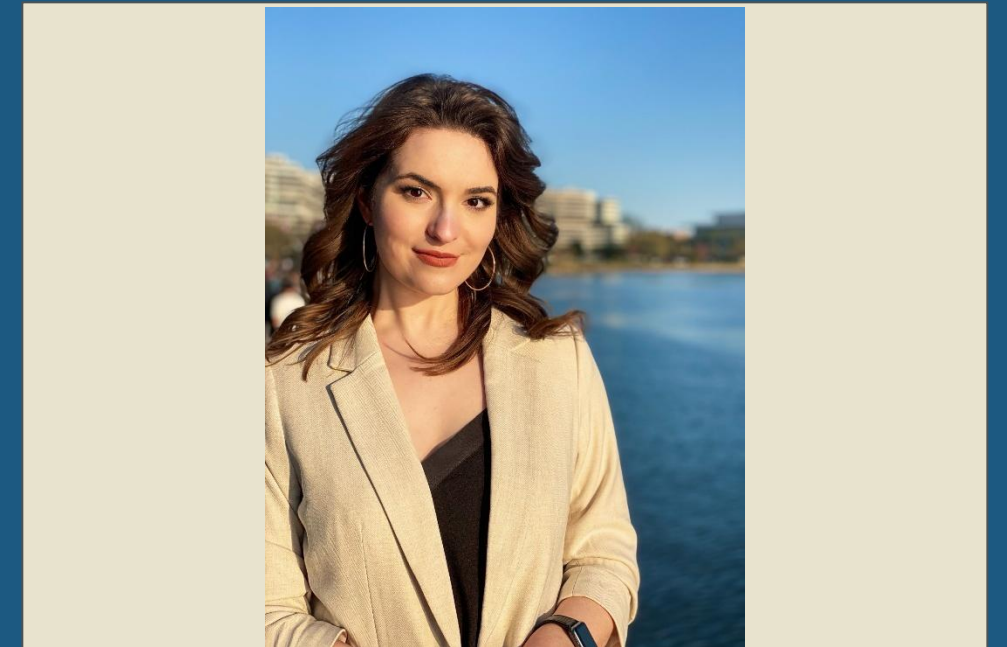
**Ella Bowen**



## **PHASE 2.0**

Led by Ella Bowen. The aim of Phase 2.0 is to increase our understanding of plastic use and loss in the construction industry and to learn from industry their perspective on solutions for reducing plastic leakage from construction activities.

**Elizabeth Stanziano**



## **PHASE 2.0 and 3.0**

Led by Elizabeth Stanziano. The aim of Phase 3.0 is to pilot solutions with construction companies to measure their efficacy and feasibility.



A Seabin with excessive foam (left) and the contents of an emptied Seabin (right).  
(© U of T Trash Team)

# WHY FOAM?

**#1**

Most common macro- and microplastic item collected in our trash traps

**#1**

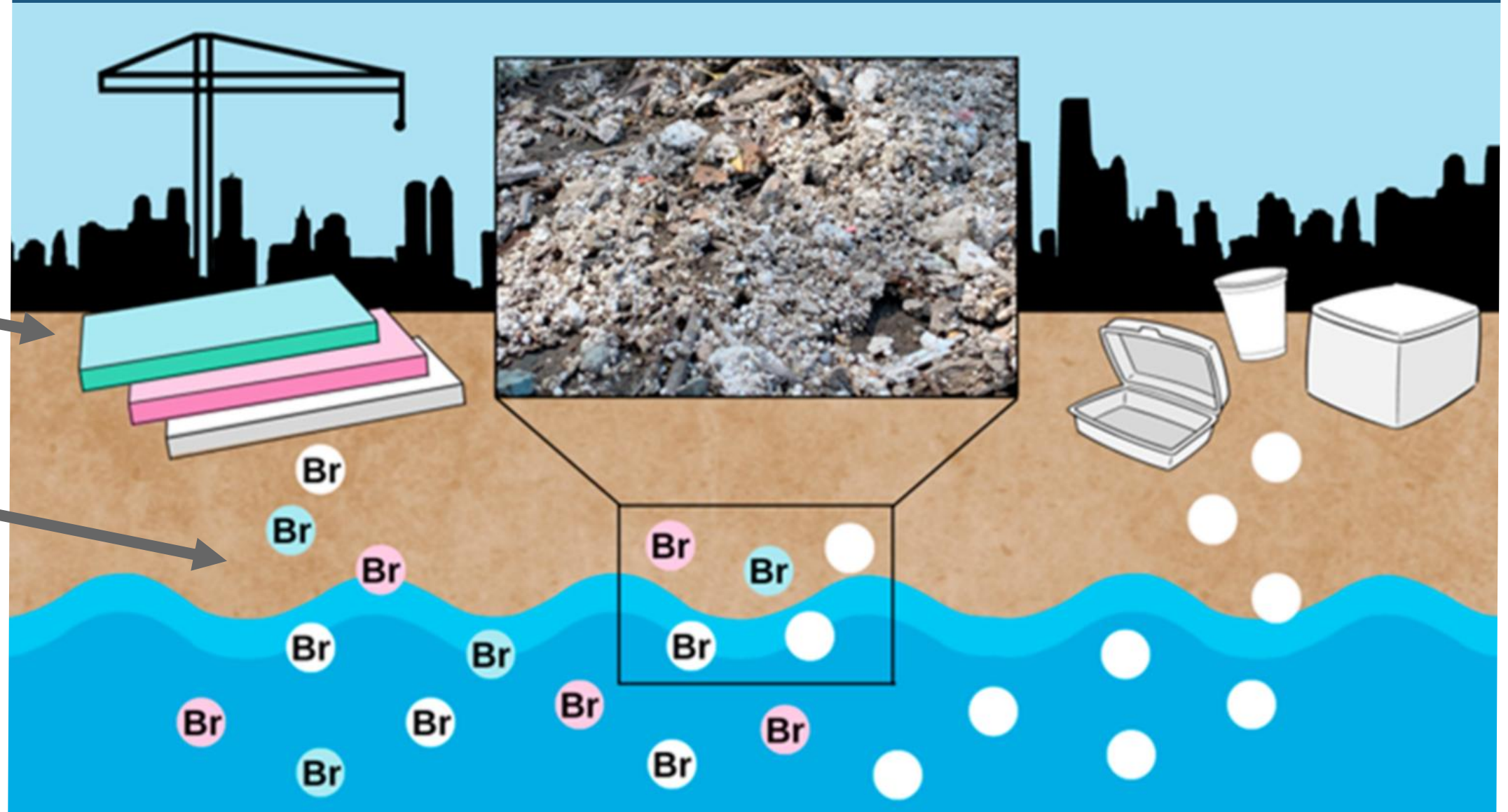
most common **micro-debris waste item** collected by the ITTN from 2021-2023.

# PHASE 1.0

## *methods*

- Visual characteristics
- Presence of bromines

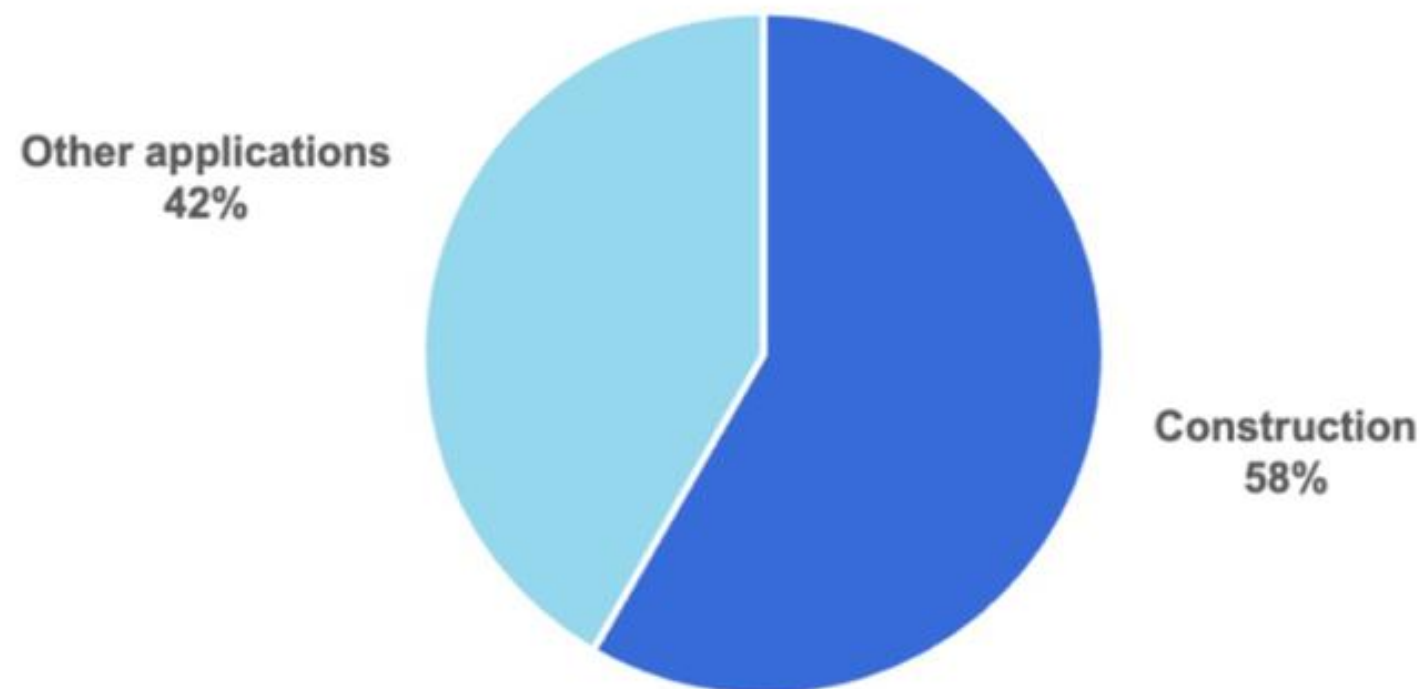
Created a method for quantifying and characterizing foam from construction:



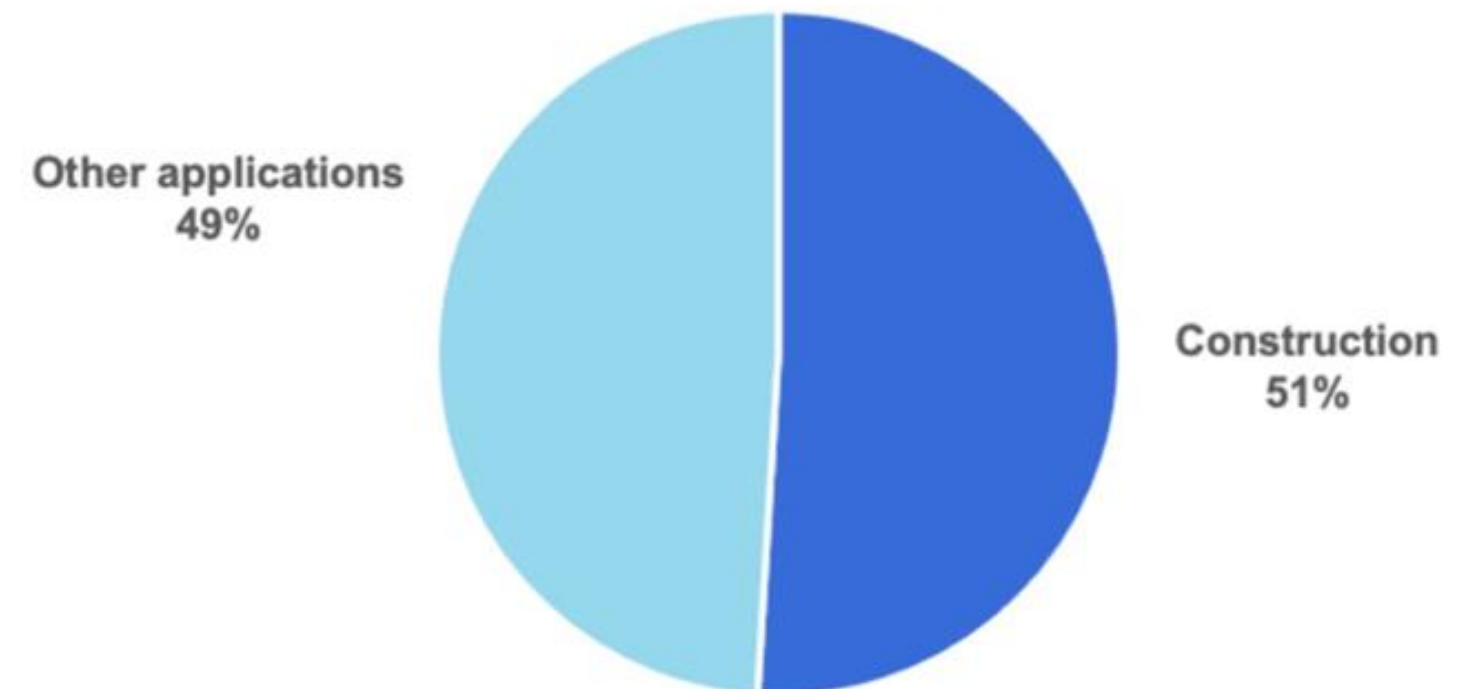
# PHASE 1.0 *results*

Foam from construction makes up majority of plastic foam pollution in our waterways:

Macro-sized Foam from Beaches



Micro-sized Foam from Surface Waters



*Pie chart showing the proportion of foam from construction applications compared to other applications (ie. food and consumer packaging) from beaches bordering Lake Ontario and surface waters in Toronto's tributaries and Lake Ontario*

# Research Objectives

I aimed to further understand how plastic on construction-sites is used and how it may leak into the environment through three main objectives:



1) **Measuring Leakage** from Active Construction Sites.



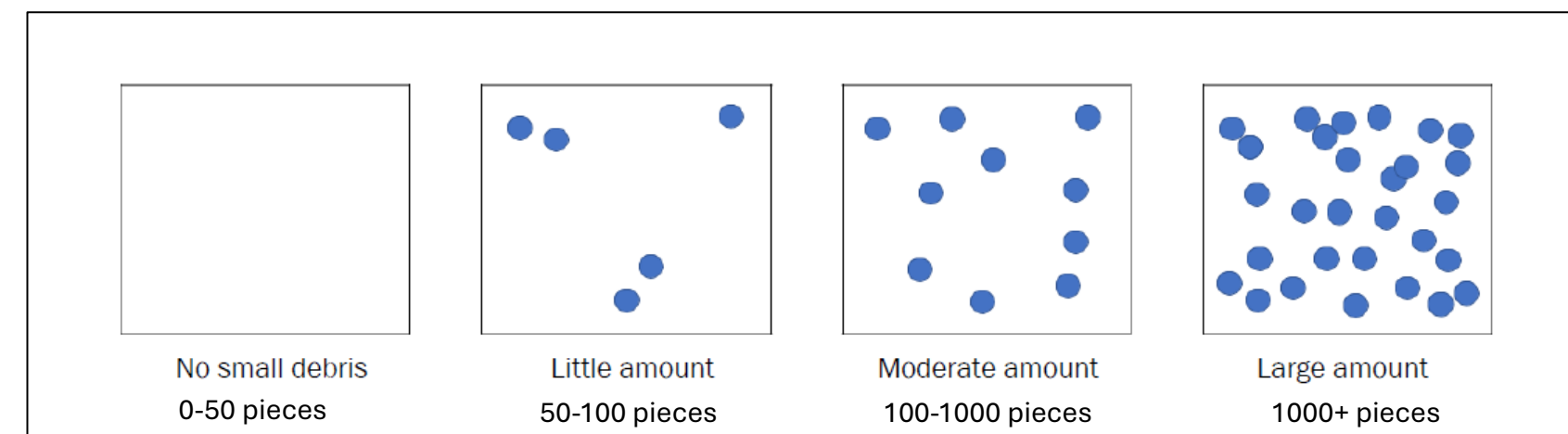
2) **Conducting interviews** with individuals working in construction.



3) **Co-developing pilot projects** with partner companies to test solutions on-site and evaluate effectiveness.

# Methods for Quantifying Litter Leakage

- Quantified & characterized litter on 17 active sites around Toronto.
- Counted litter suspected to be from construction, (>2mm).
- Foam distinguished by color and morphology.
- Visual audits were conducted when there was too much litter to count by-hand (ITTN, 2021).



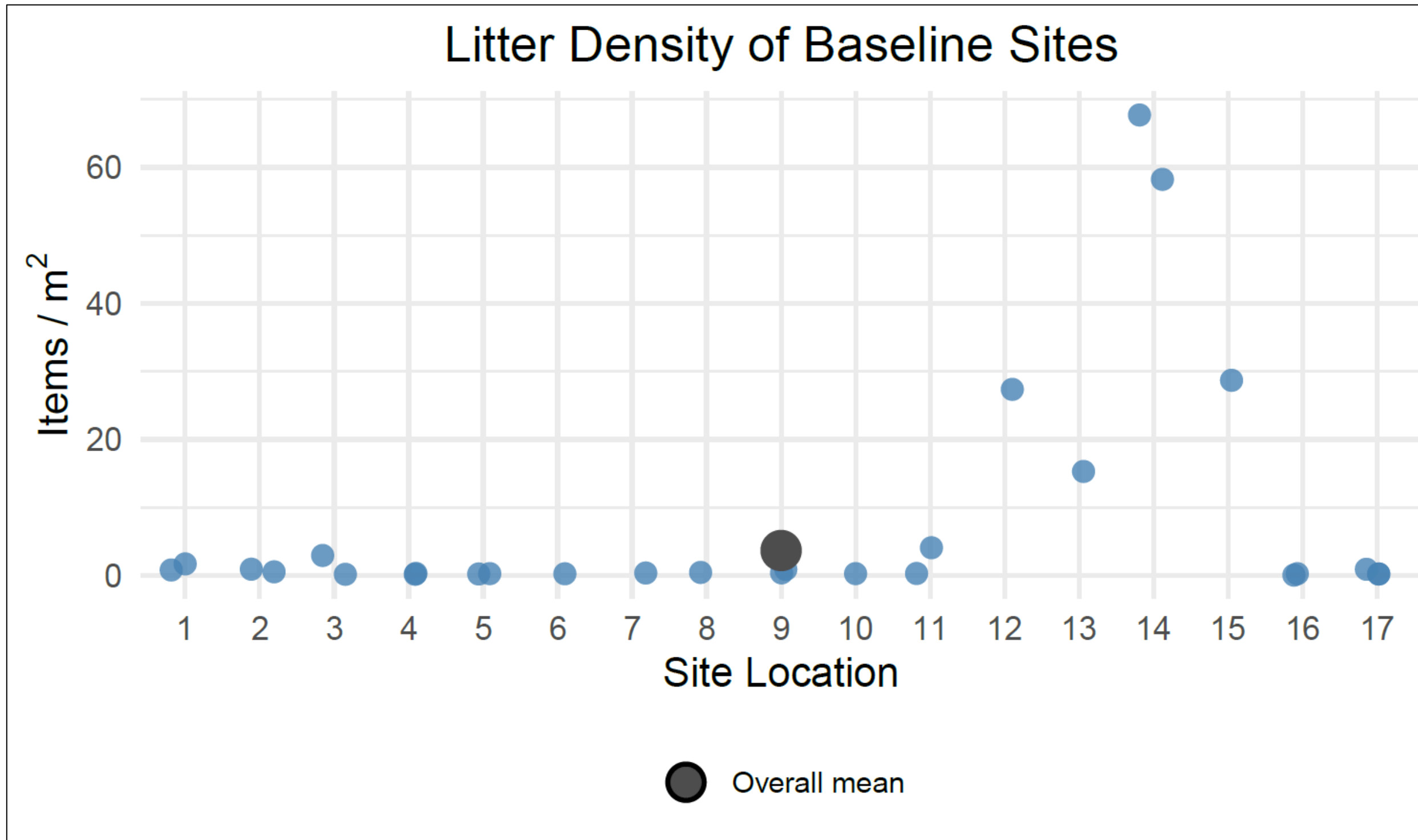
(ITTN, 2021)

# Pathways for Pollution to Escape the Site

- Storm Drains
- Insufficient or Non-Existent Fencing
- Waste Receptacles
- Waste Transport On and Off-Site
- Natural Drainage Systems (i.e., ditches, waterbodies, etc.)
- Wind, Water, Precipitation, and Severe Weather



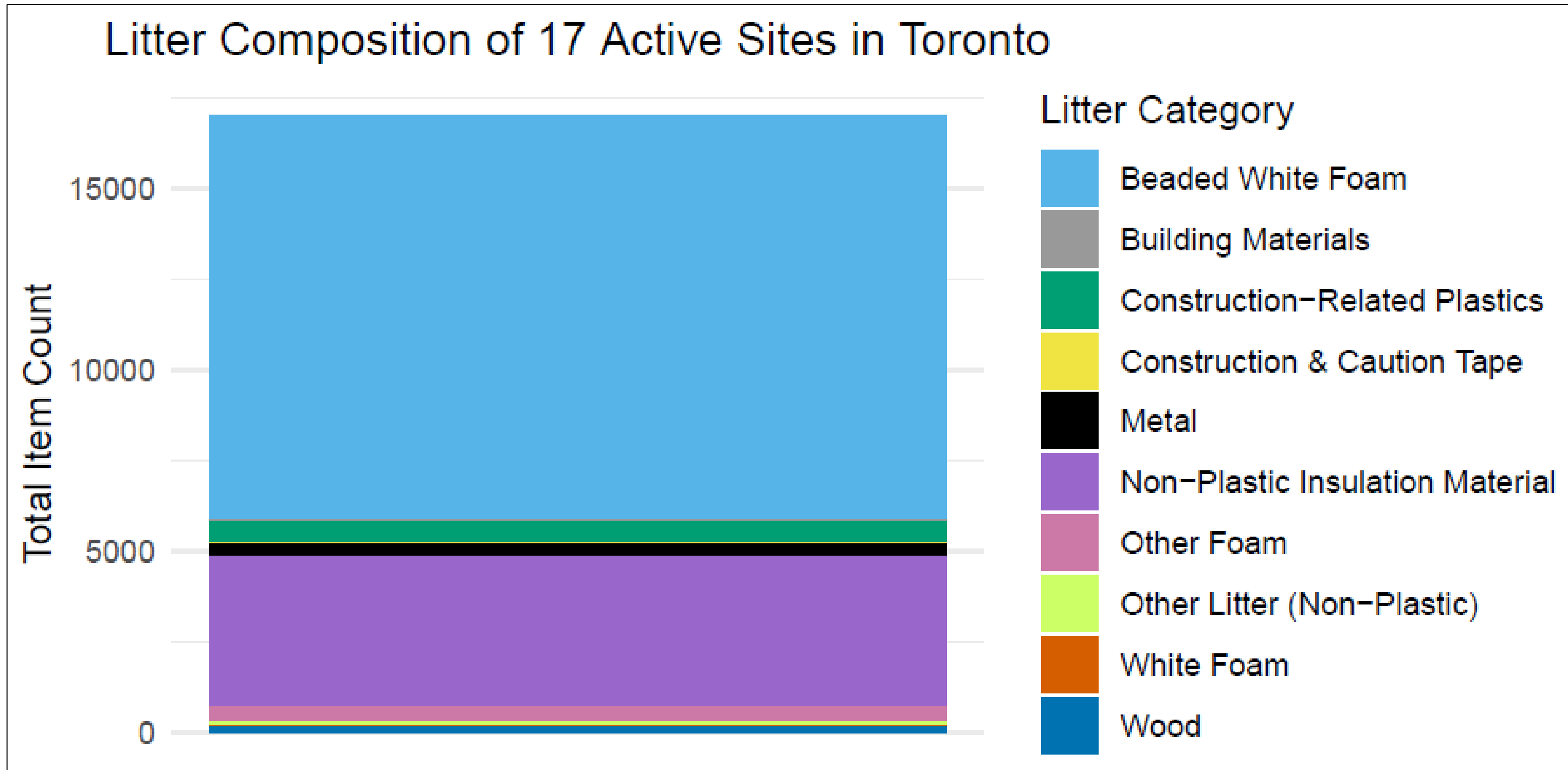
# Litter Leakage Was Common Across All Surveyed Sites



A total of 17,026 pieces of litter were collected.

Average litter per m<sup>2</sup> =  
**7.64 items / m<sup>2</sup>**

# 65% of Total Litter On Sites was EPS (Beaded White) Foam



# Interview Methods

- Subjects were selected based on experience in construction.
- Qualitative, semi-structured interviews.
- Likert-scale (1-5) and open-ended questions.
- Aimed to develop an understanding of subjects':
  - a) Awareness of plastic pollution, generally.
  - b) Knowledge of construction-sourced plastic pollution.
  - c) Attitude toward implementing solutions on-site.



# Interviews Indicate Workers are Aware of Plastic Pollution and Willing to Implement Solutions

- Subjects were **more familiar with construction-sourced litter** than general plastic pollution.
- Workers recognized **foam products** (highlighting stucco) and **lightweight plastics**, such as water bottles as items with a high likelihood of leaking off-site.
- **Wind and water** transportation, **insufficient fencing**, and **storm drain escape** were highlighted as leakage pathways.
- 100% of workers identified at least one pollution prevention solution that could be feasible to implement on-site.
- The most selected solution was **storm drain filters** (73% of respondents).

# MEET OUR PILOT PARTNERS

## EllisDon



- One of the largest construction companies in Canada.
- Over 4,300 employees.
- Specializes in large-scale projects.
- Provides cradle-to-grave services for a project.
- **Hospital renovation in downtown Toronto.**

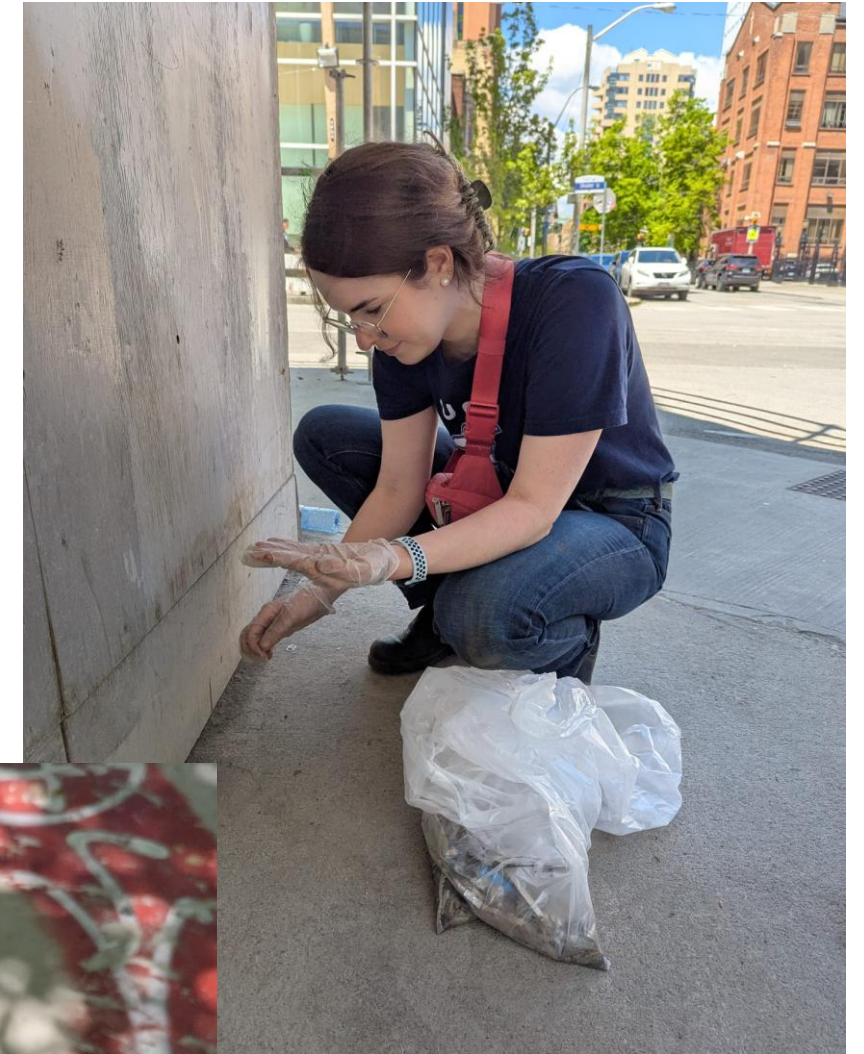
## Carick Home Improvements



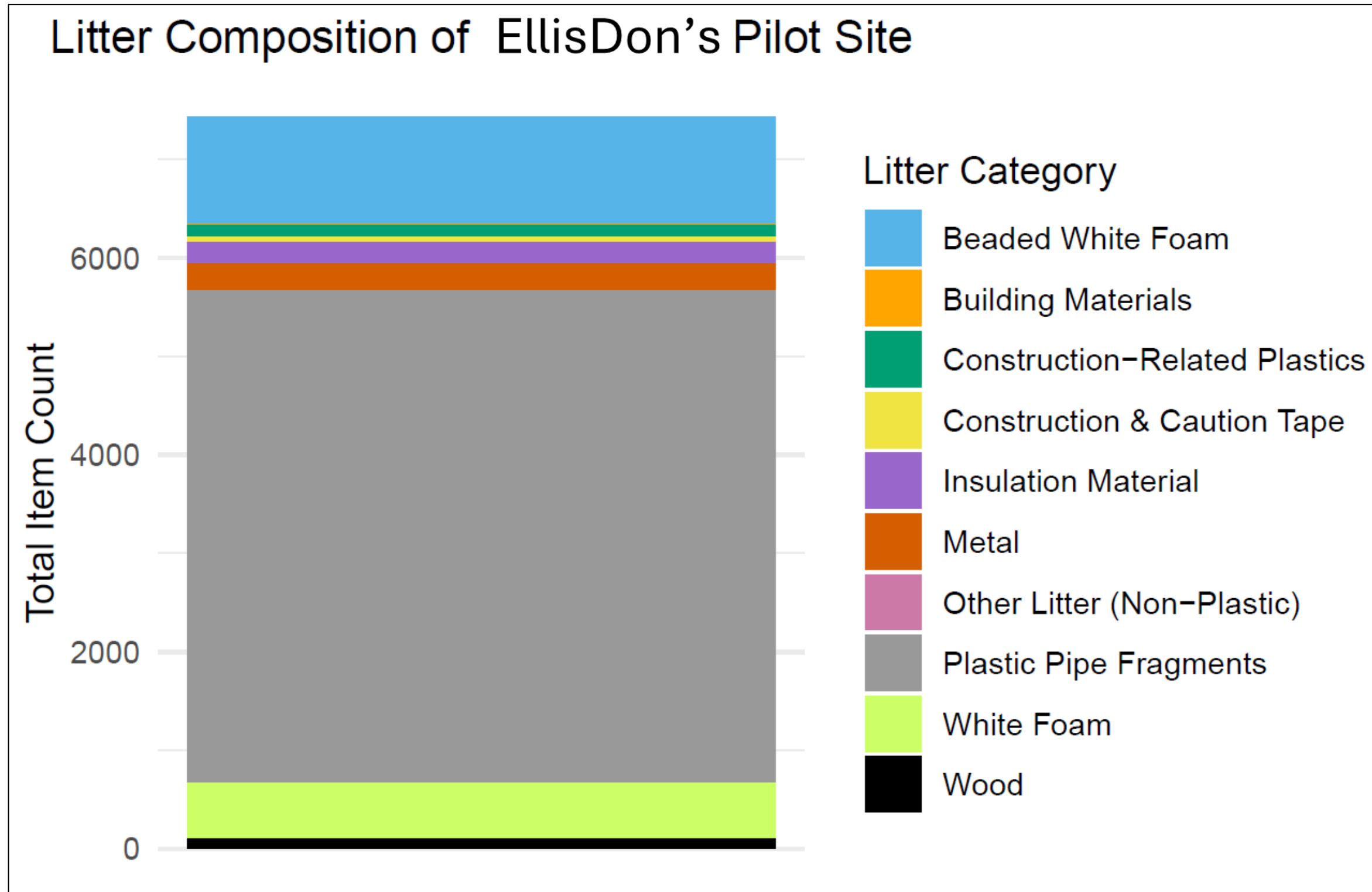
- A family-owned renovation company.
- Core team of 2.
- Specializes in bathroom, kitchen, condo, as well as interior and exterior renovations.
- **Residential garage apartment renovation in Markham, ON.**

# Methods for Quantifying Litter Leakage at EllisDon's Pilot Site

- Utilized same method as in Objective 1.
- Three transects selected for surveys.
- Surveys conducted every week.



# EllisDon Transect Data Results



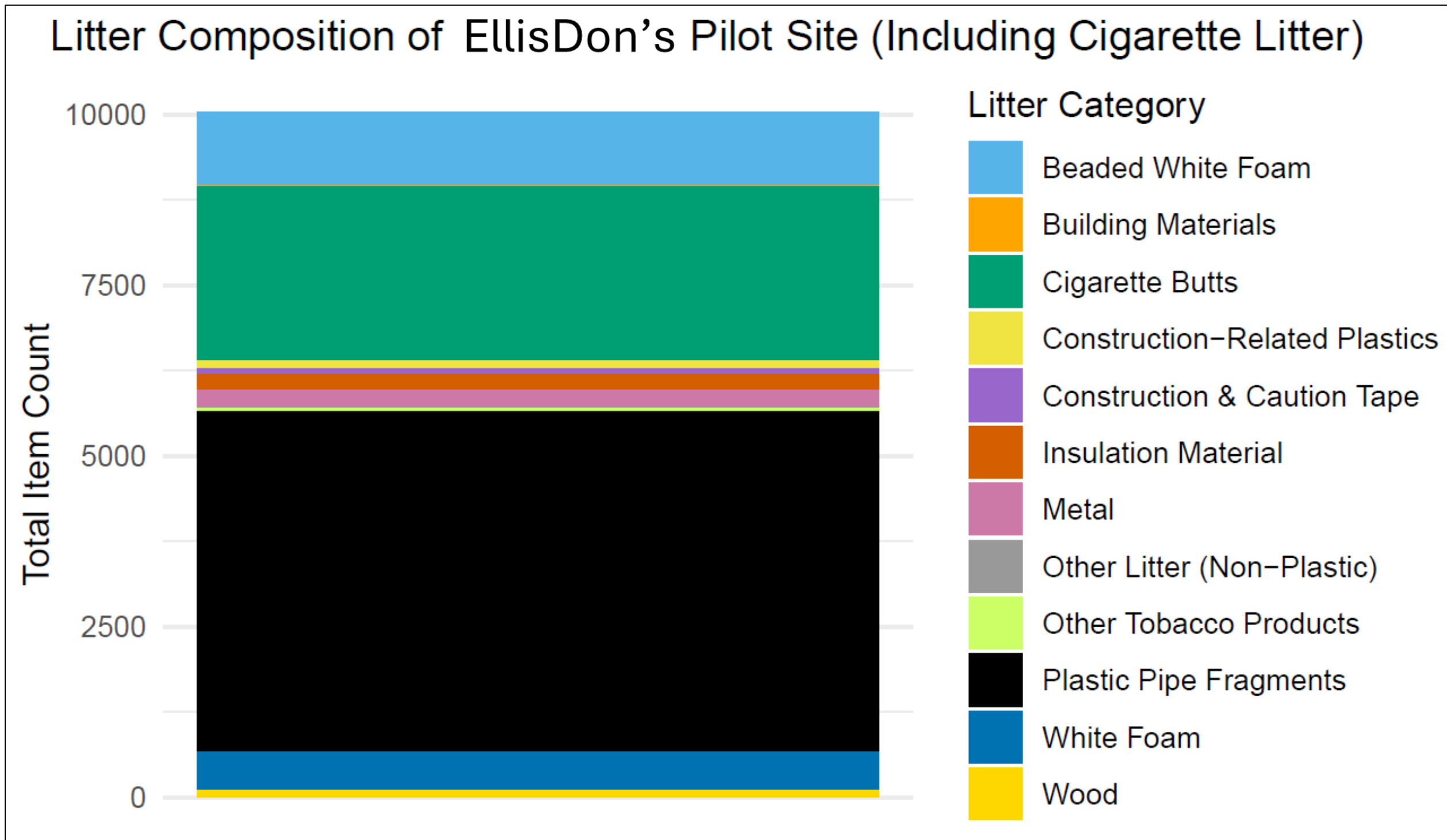
**Total of 7,429 pieces were quantified during the pilot.**

Company A's Average litter amount = **4.2 items / m<sup>2</sup>**

## TOP 3 ITEMS

- 1) PLASTIC PIPE FRAGMENTS
- 2) BEADED WHITE FOAM
- 3) WHITE FOAM (Likely PIR, based on morphology)

# EllisDon Transect Data Results



## TOP 3 ITEMS

- 1) PLASTIC PIPE FRAGMENTS
- 2) CIGARETTE BUTTS
- 3) BEADED WHITE FOAM

# EllisDon Pilot Methods: Interventions



**STORM DRAIN FILTERS**  
**“Witch Hats”**



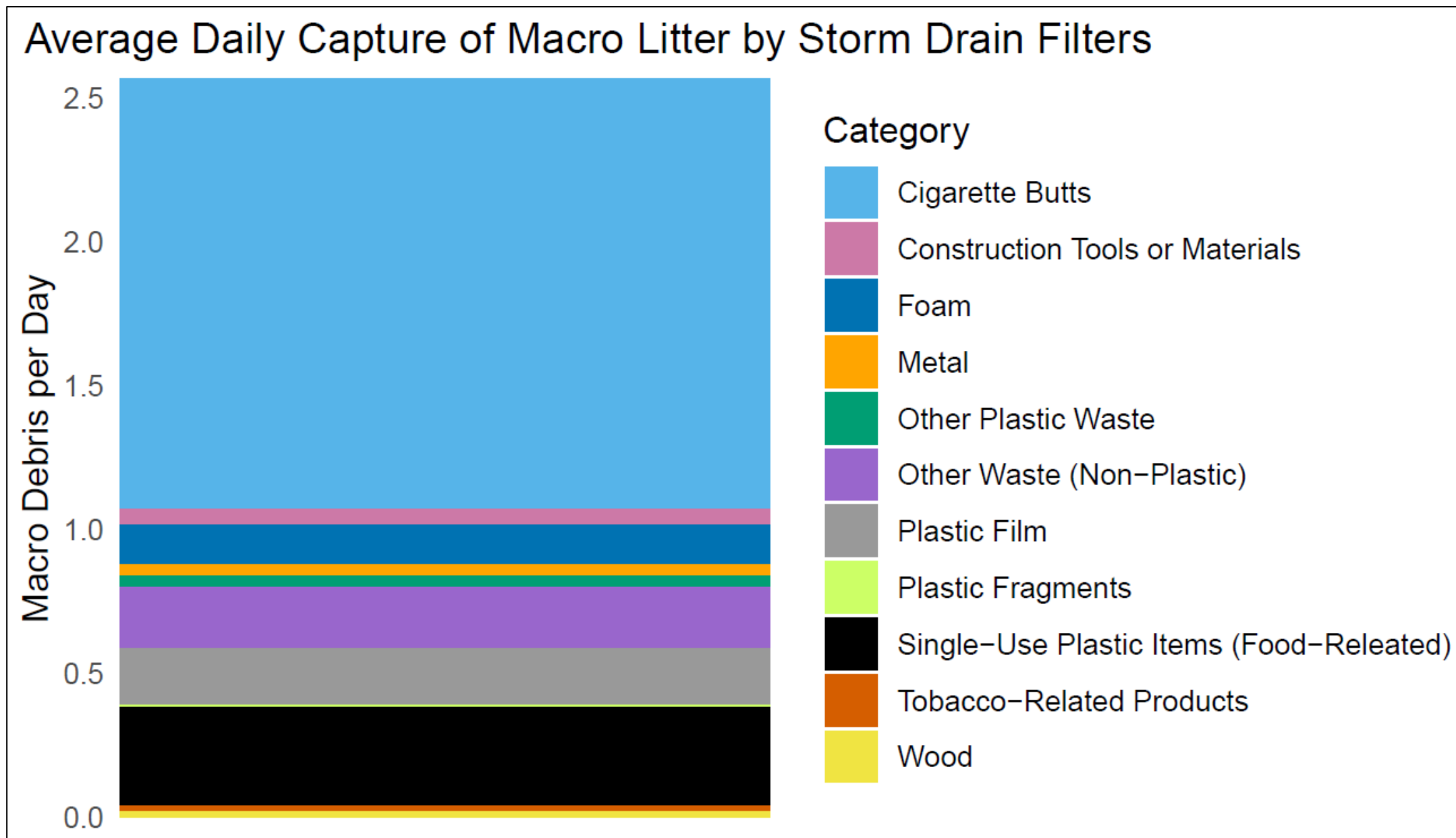
**CIGARETTE BUTT**  
**RECEPTACLES**

# Methods for Estimating Litter Diversion by Storm Drain Filters

- Filter contents were laid out on a table. Macro-sized litter (>2.5cm) was quantified.
- Extracted micro-sized (2mm – 2.5 cm) floating debris in a 5-gallon bucket.
- Microplastic debris was categorized by morphology: fragment, foam, pellet, or film (Rochman et al., 2019).
- Microplastic foam particles were distinguished by color and morphology, as on transects.



# Plastic Accounts for Majority of Items Diverted from Lake Ontario by Storm Drain Filters on Construction Sites

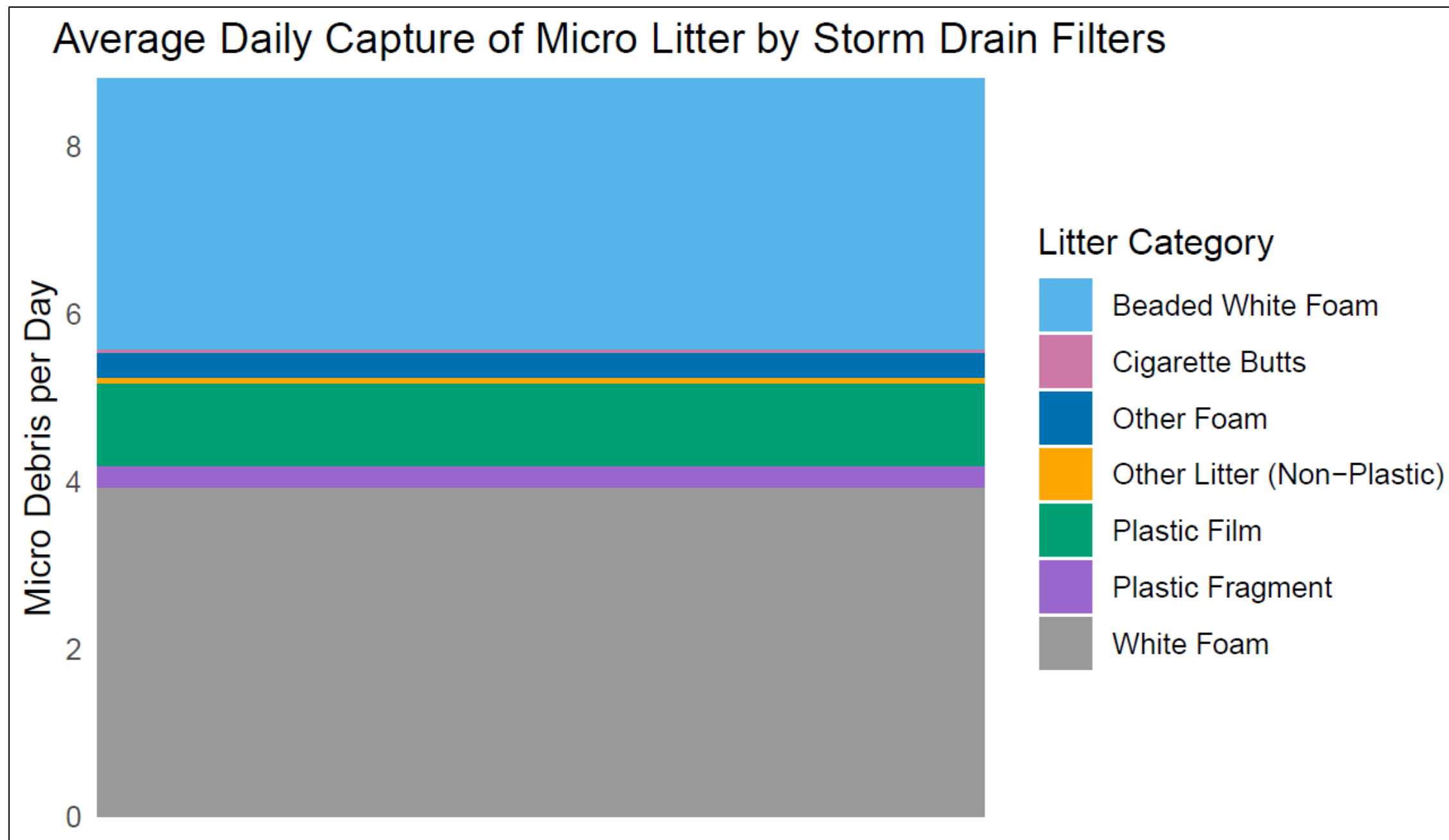


**4,320 pieces of litter were diverted in total.**

906 items were macro-sized (>2.5 cm).

Cigarette butts accounted for 52% of all macro litter captured.

# Plastic Accounts for Majority of Micro-Sized Items Diverted from Lake Ontario by Storm Drain Filters on Construction Sites.



3,414 litter items diverted were micro-sized (2 mm-2.5 cm).

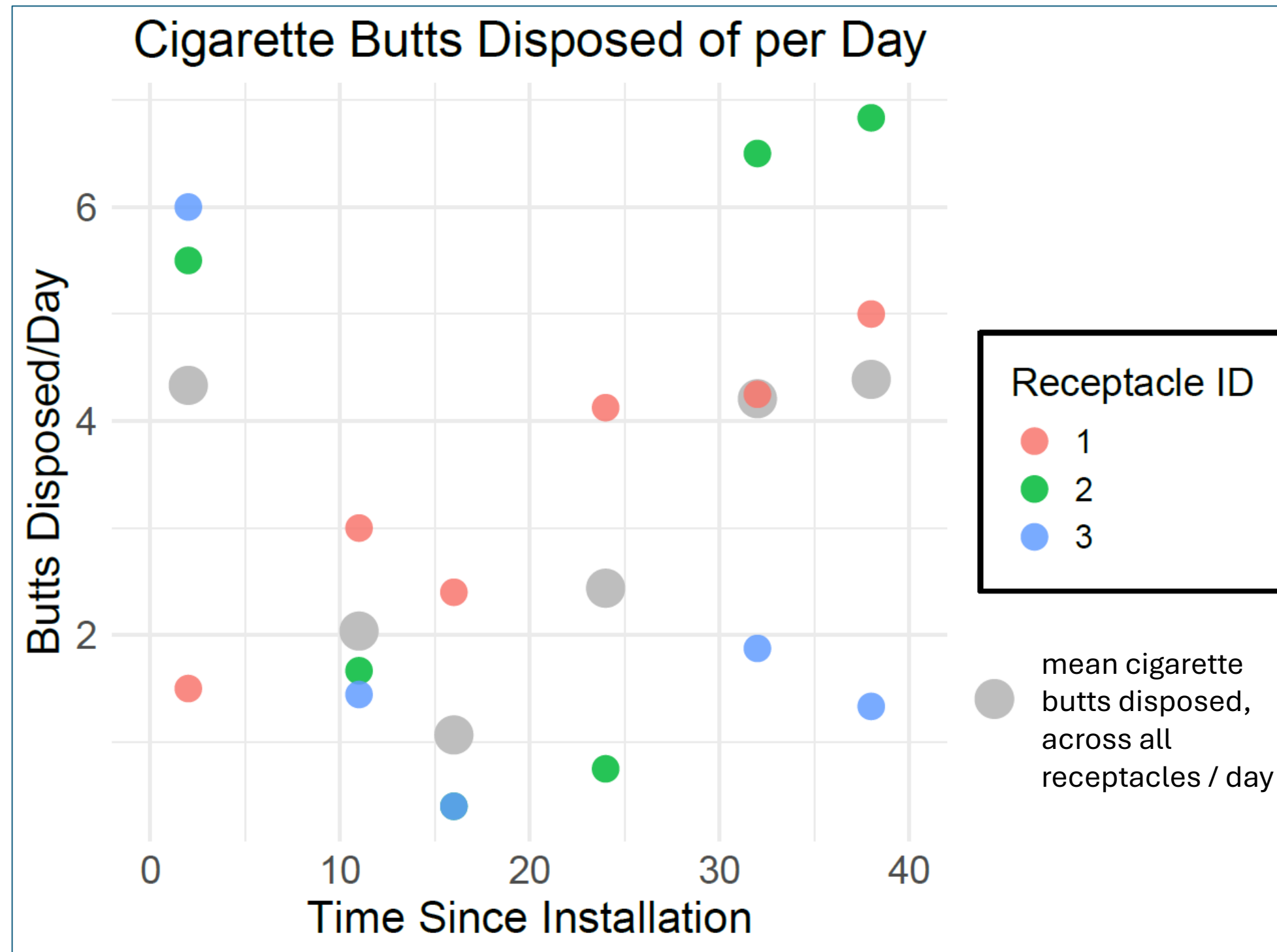
Foam accounted for 85% of all micro debris captured.

# Methods for Characterizing and Quantifying Cigarette Receptacle Contents

- Cigarette butt litter was quantified on transects.
- Three cigarette butt receptacles installed.
  - Two inside site fence
  - One in common area just across the street from the main gate.
- Receptacle contents were emptied weekly.
- All materials were quantified.

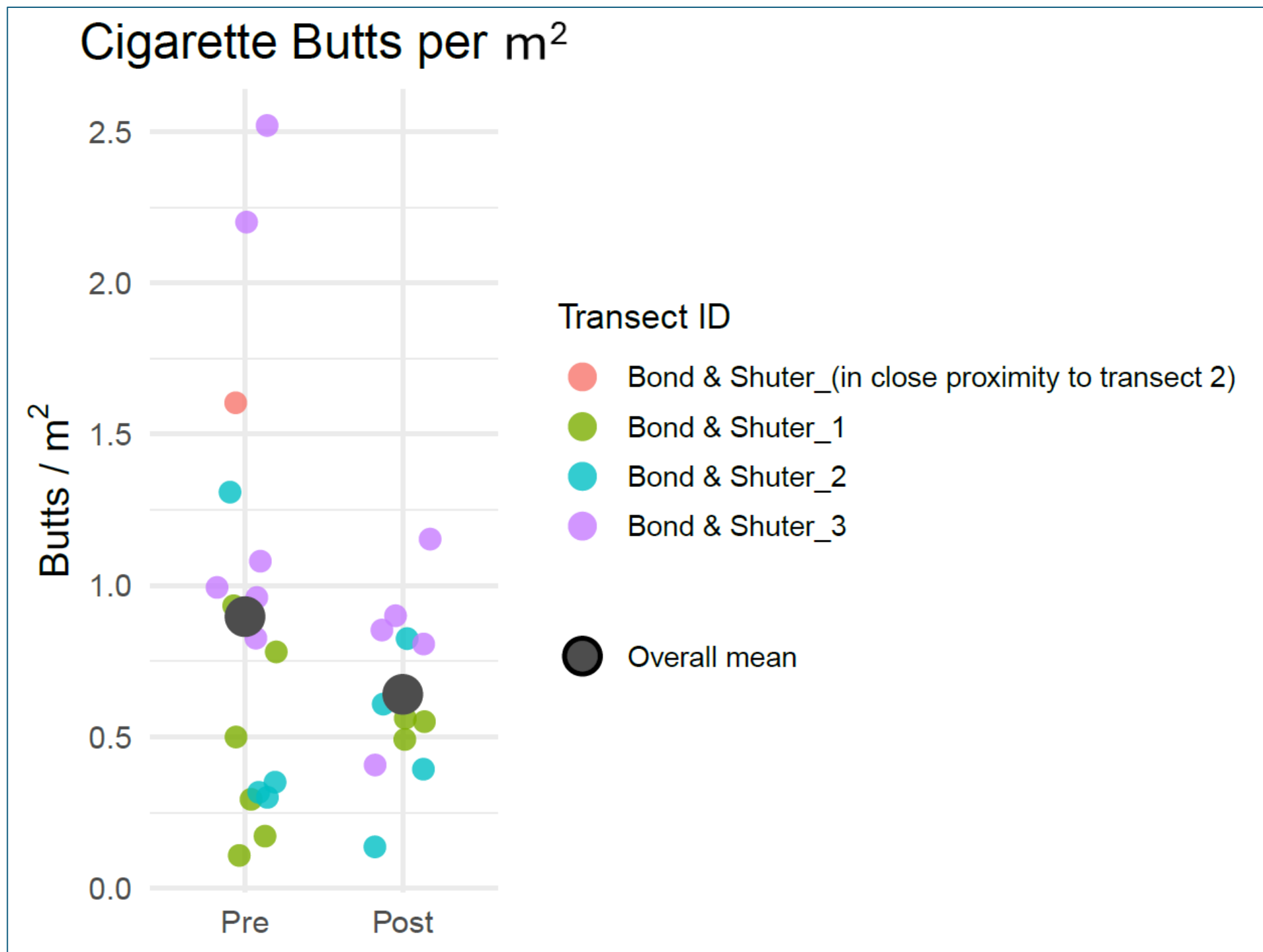


# Receptacle Usage Increased Over Time



A total of **331** cigarettes were diverted from the ground over 5 weeks.

# Surveys Indicated Reduced Cigarette Litter on Transects Post-Receptacle Installation



Wilcoxon Test

$p=0.415$



## EllisDon Employees are **Aware of the Problem** and **Willing to Implement Solutions**



- **75%** of workers identified “**Styrofoam**” as a potential litter item that could escape from sites.



- **100%** of respondents thought **there were no barriers** to using the receptacles and **75%** thought **there should be more** in additional locations.



- **100%** of respondents were **aware of the effectiveness of storm drain filters** and **100%** said they’d be **willing to use more durable filters** to divert litter.



- **100%** of workers thought **additional solutions would be feasible** to pilot on-site, **75%** suggested **adding mesh-covers** to waste receptacles.

# Conclusions

- **Plastic pollution leakage is common on construction sites**
- **Interviews indicate construction workers are aware of plastic pollution problem and willing to implement solutions on-site.**
- **On-site solutions are effective at mitigating construction-sourced litter from entering the environment.**

## Pilot - EllisDon



- Plastic items accounted for the majority of items diverted by storm drain filters.
- Cigarette litter was reduced in areas next to sites, post-intervention.
- 100% of workers willing to utilize additional solutions on-site.

## Pilot – Carick Home Improvements



- Plastic items accounted for the majority items diverted by LittaTrap™.
- 100% of workers favored continued use of storm drain filters on-site.
- 100% of workers identified additional solutions feasible to implement on-site.

# Next Steps

- Share **policy brief** with stakeholders.
- Continue to refine **Best Management Practices Guide** with industry collaborators.
  - Develop an outreach strategy to spread awareness across the sector.
- Develop a **peer-reviewed manuscript**.

## New Policies are Needed to Reduce Plastic Pollution Leaking from Construction Sites



Polystyrene (PS) foam, commonly called “Styrofoam”, is one of the most common types of plastic pollution found in trash traps globally and here in Lake Ontario<sup>1,2</sup>; the majority of this foam originates from insulation material used in construction<sup>3</sup>. Construction-sourced plastic leaks into the environment through cutting or drilling insulation boards, escape from uncovered waste bins, improper disposal, and littering. Findings from our multi-phase research project, [In Pursuit of Polystyrene](#), indicate that construction workers are aware of this problem and willing to implement solutions. Our results underscore the urgent need for companies to adopt scalable, cost-effective strategies on-site to reduce plastic pollution at the source and for policy



**BEST  
MANAGEMENT  
PRACTICES**  
FOR PREVENTING  
CONSTRUCTION-SOURCED  
PLASTIC POLLUTION

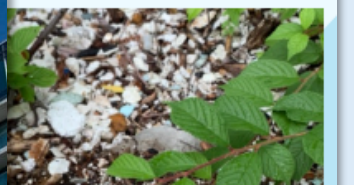
Best Management Practices Guide

### FINDINGS

**Plastic leaking from construction sites.**  
From 17 construction sites in Toronto, the average density of plastic litter was 7.6 items per m<sup>2</sup>. 65.5% of litter was plastic. We identified feasible solutions that to reduce litter (73% of respondents). Alternative solutions:

#### CIGARETTE RECEPTACLES

- 313 cigarettes were diverted over five weeks.
- We observed a reduction in cigarette butt litter on-site, reducing from 0.9 to 0.6 butts/m<sup>2</sup> after receptacle installation.



Policy Brief

# Let's meet our panel!



**Elizabeth Stanziano**

Lead Researcher, *In Pursuit of Polystyrene*; U of T Trash Team



**Dean Arsenault**

Environmental Specialist for Toronto Building Division; EllisDon



**Mary-Margaret McMahon**

MPP Ontario; Beaches-East York

# Q&A – let's hear from you!

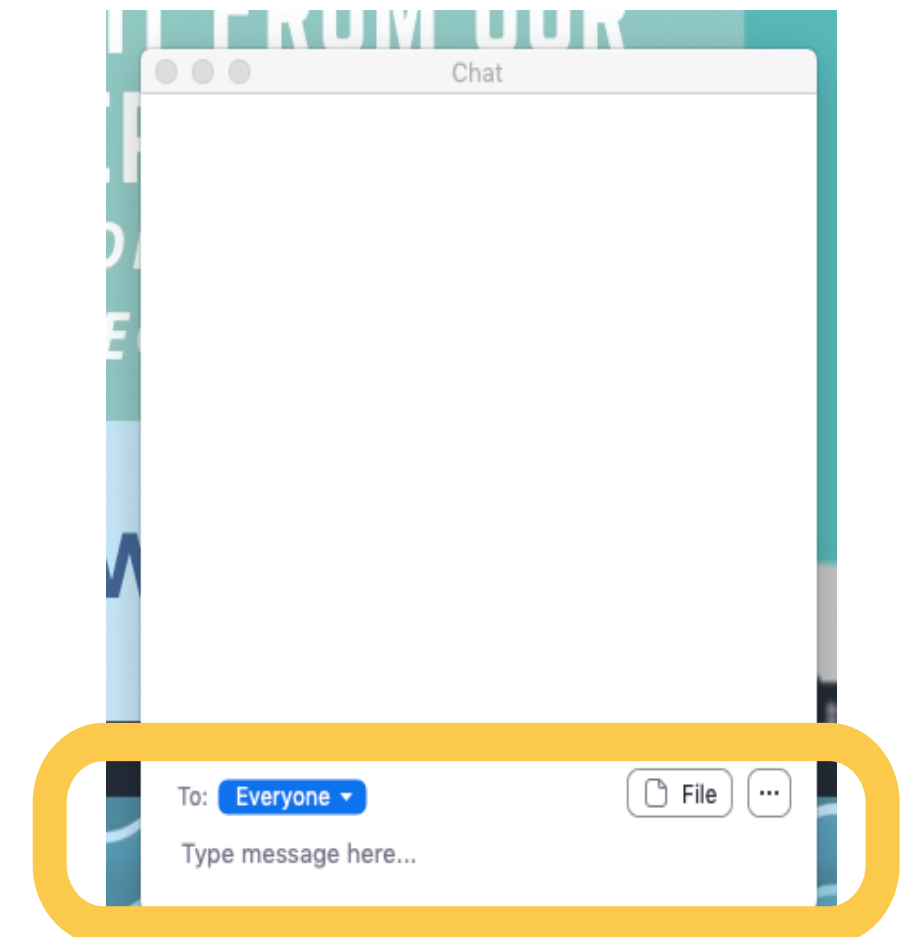
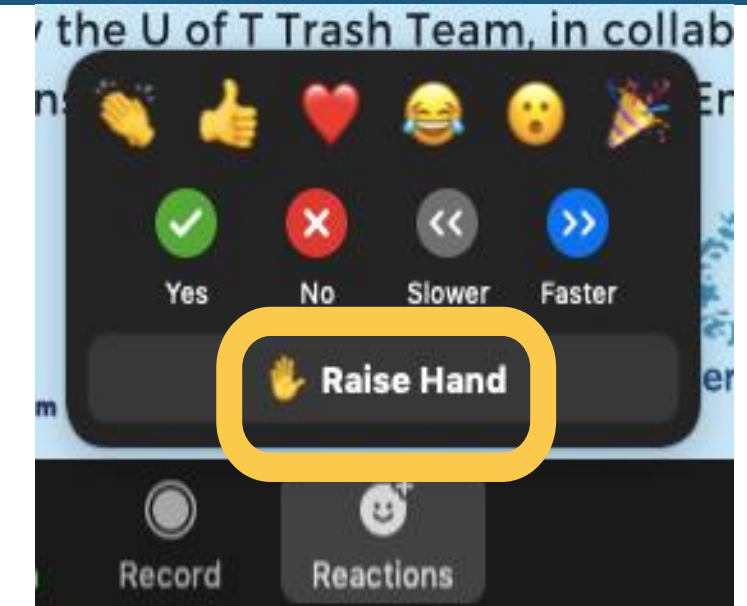
## Option 1:

- Type question in the chat window

## Option 2:

- “Raise hand” and we'll unmute you

We'll alternate between audio and chat.



# Thank you

## Pollution Prevention Projects:

- [uofttrashteam.ca/preventionprojects](https://uofttrashteam.ca/preventionprojects)
- [uofttrashteam.ca/foam](https://uofttrashteam.ca/foam)

## Past webinar recordings:

- [youtube.com/@uofttrashteam](https://youtube.com/@uofttrashteam)
- [Partnersinprojectgreen.com/resources](https://Partnersinprojectgreen.com/resources)

## Upcoming events:

- [uofttrashteam.ca/events](https://uofttrashteam.ca/events)
- [Partnersinprojectgreen.com/events](https://Partnersinprojectgreen.com/events)

## Contact us:

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