

City of Yellowknife Waste Composition Study & Waste Reduction Recommendations

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September 2007



Solid Waste Composition Study

Objectives:

To determine the composition of Yellowknife's solid waste stream by:

- Material Type
- Waste Sector
- Overall Composition

Waste Sectors studied:

- Multi-Family & Small Commercial (14 samples)
- Large Commercial (6 samples)
- Single Family Residential (5 samples)

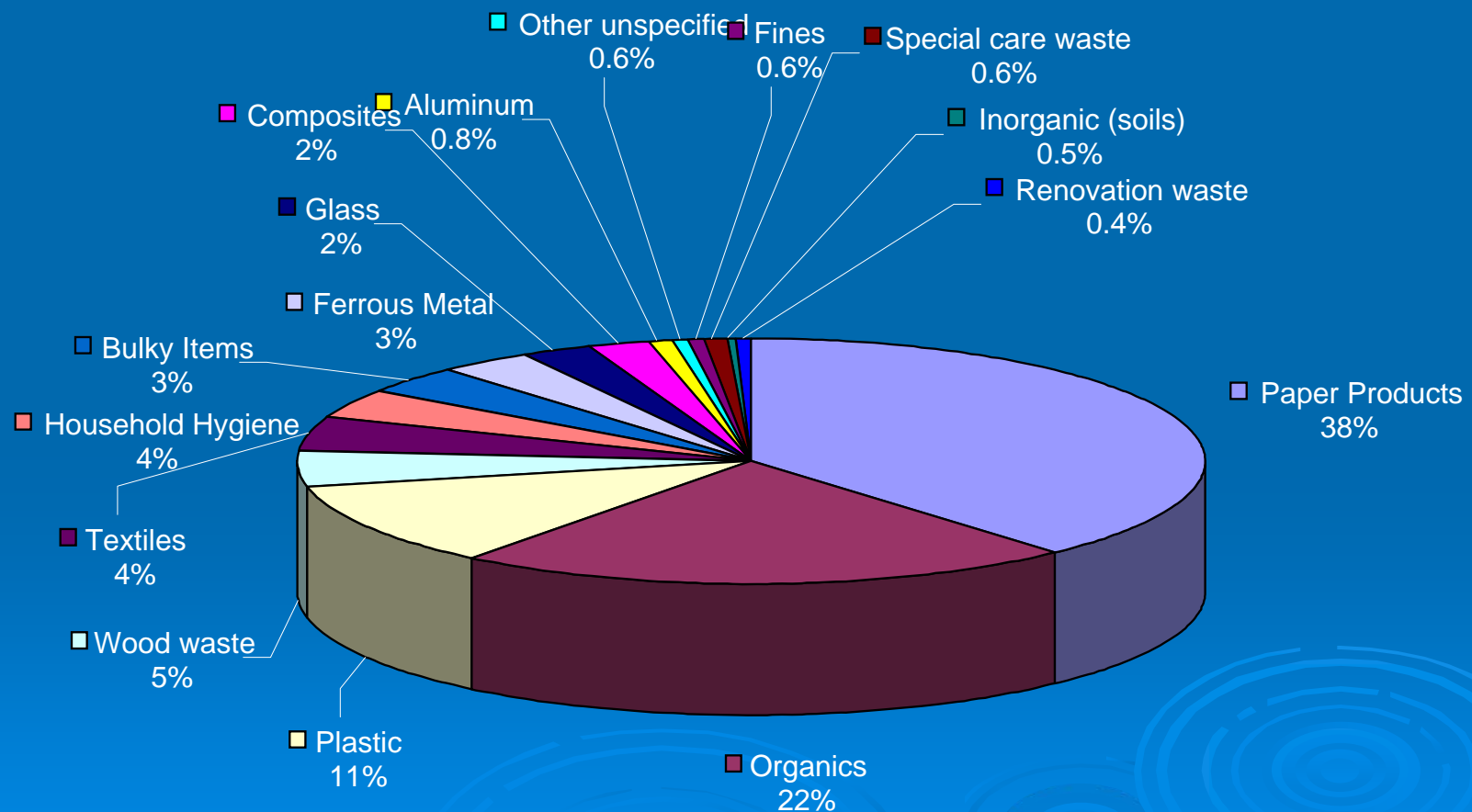


Waste Sorting Crew

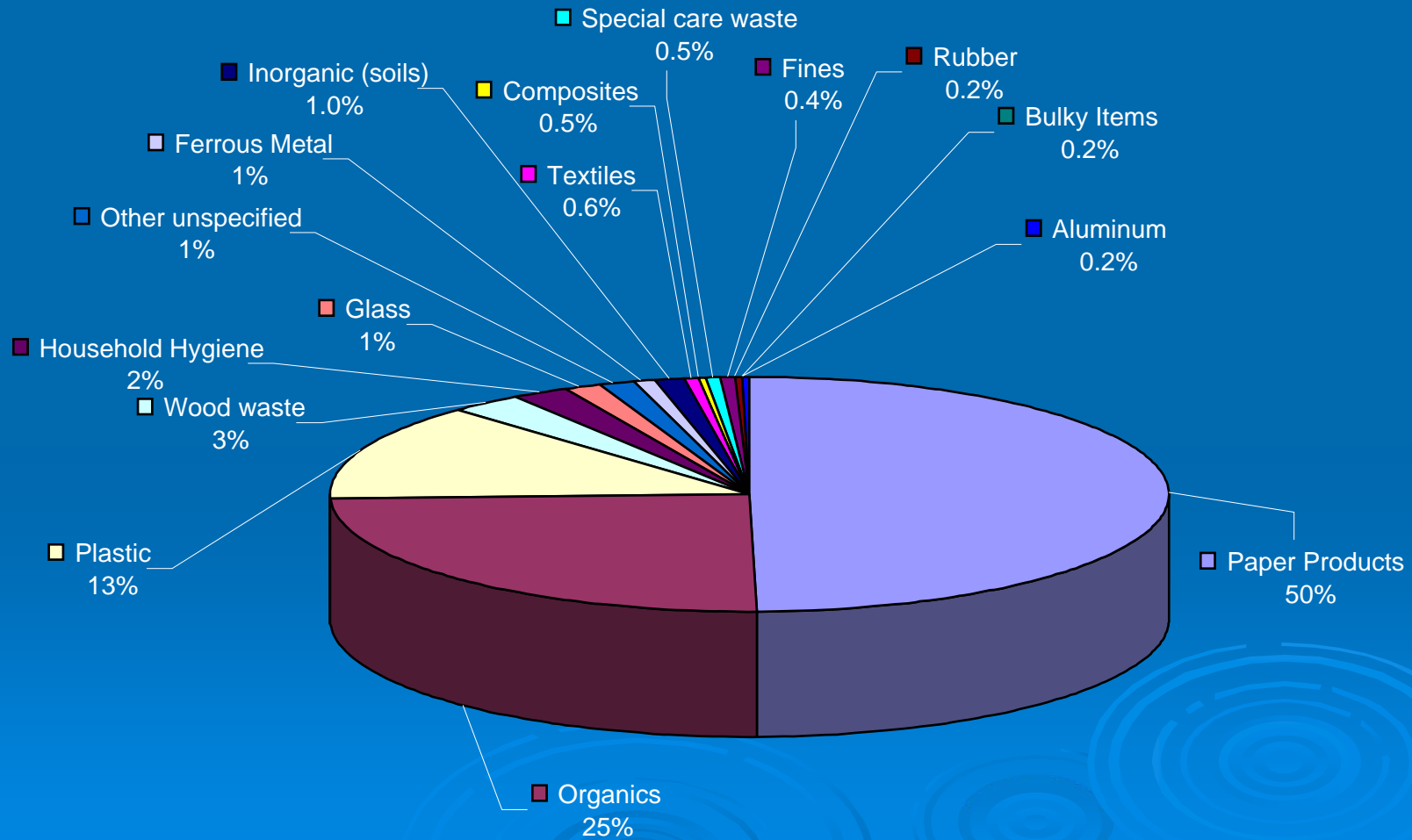
Waste Composition Study Findings



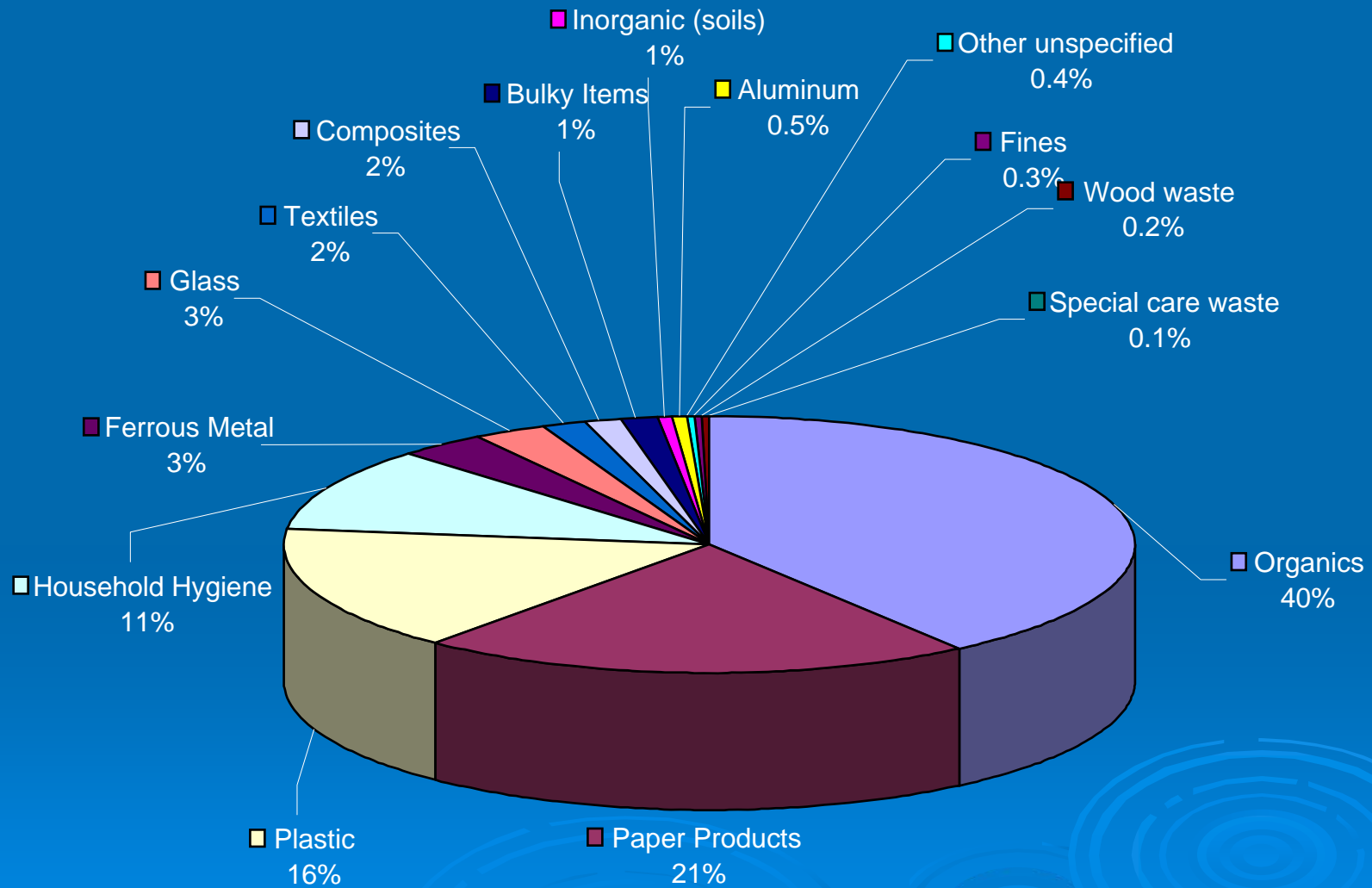
Multi-Family and Small Commercial Waste Composition



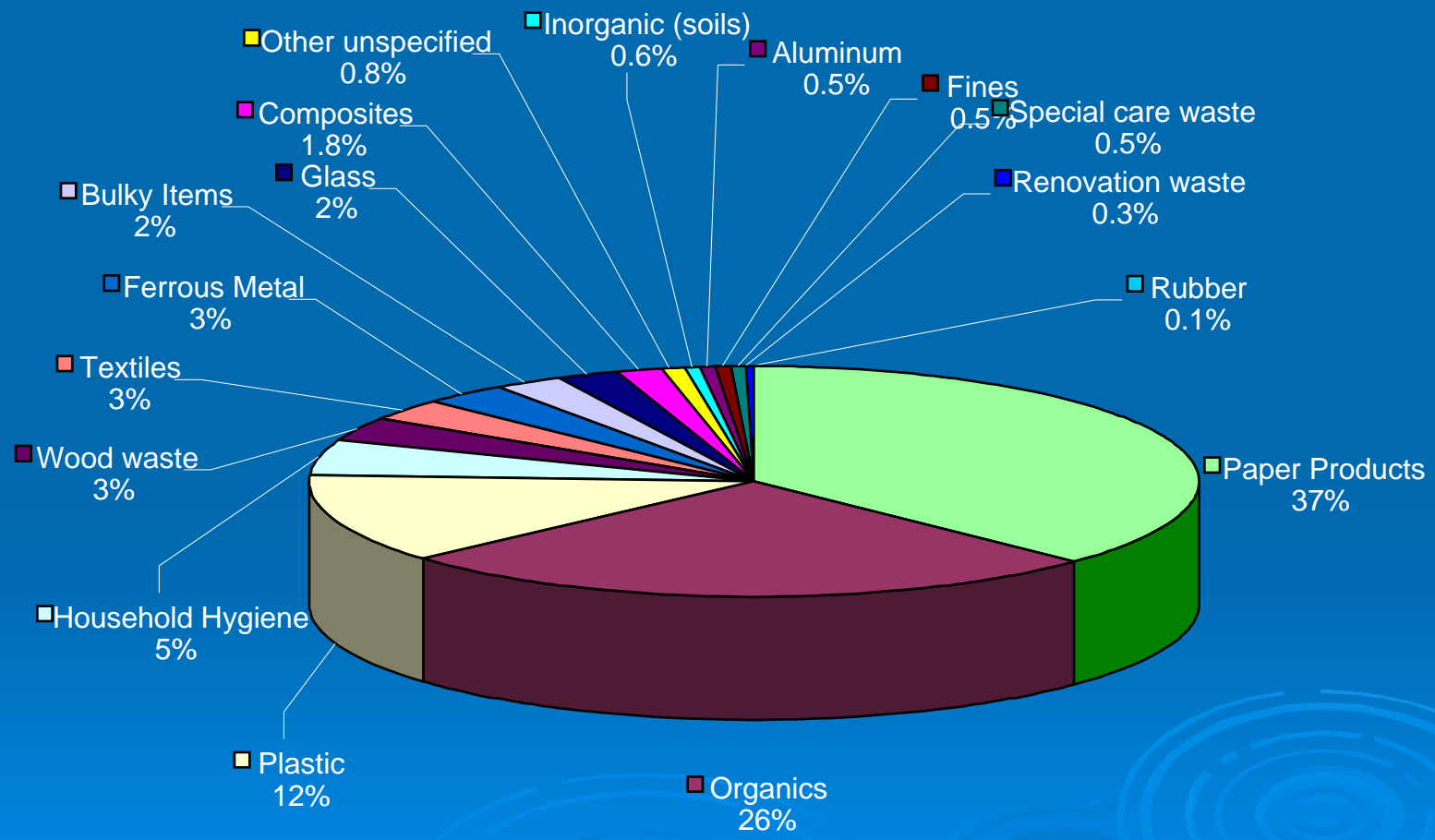
Large Commercial Waste Composition



Single Family Waste Composition




City of Yellowknife Waste Composition Summary




Waste Composition Summary

Material Category	Small Commercial / MFU	Large Commercial	SFU	Total Estimated Disposal (Tonnes)	Waste Stream Composition (%)
Paper Products	2,132	841	367	3,341	37%
Organics	1,233	419	702	2,353	26%
Plastic	616	224	280	1,120	12%
Household Hygiene	230	40	186	455	5%
Wood Waste	256	47	3	306	3.4%
Textiles	244	9	30	284	3.2%
Ferrous Metal	188	17	56	261	2.9%
Bulky Items	193	4	23	220	2.4%
Glass	134	24	47	206	2.3%
Composites	130	9	26	165	1.8%
Other Unspecified	45	20	6	71	0.8%
Inorganic (soils)	29	16	11	57	0.6%
Aluminum	35	3	8	46	0.5%
Fines	32	8	4	44	0.5%
Special Care Waste	31	8	1	41	0.5%
Renovation Waste	25	-	1	25	0.3%
Rubber	3	4	-	7	0.1%
Tires	-	-	-	-	0.0%
Totals	5,556	1,693	1,752	9,001	100.0%

Waste Reduction Assessment

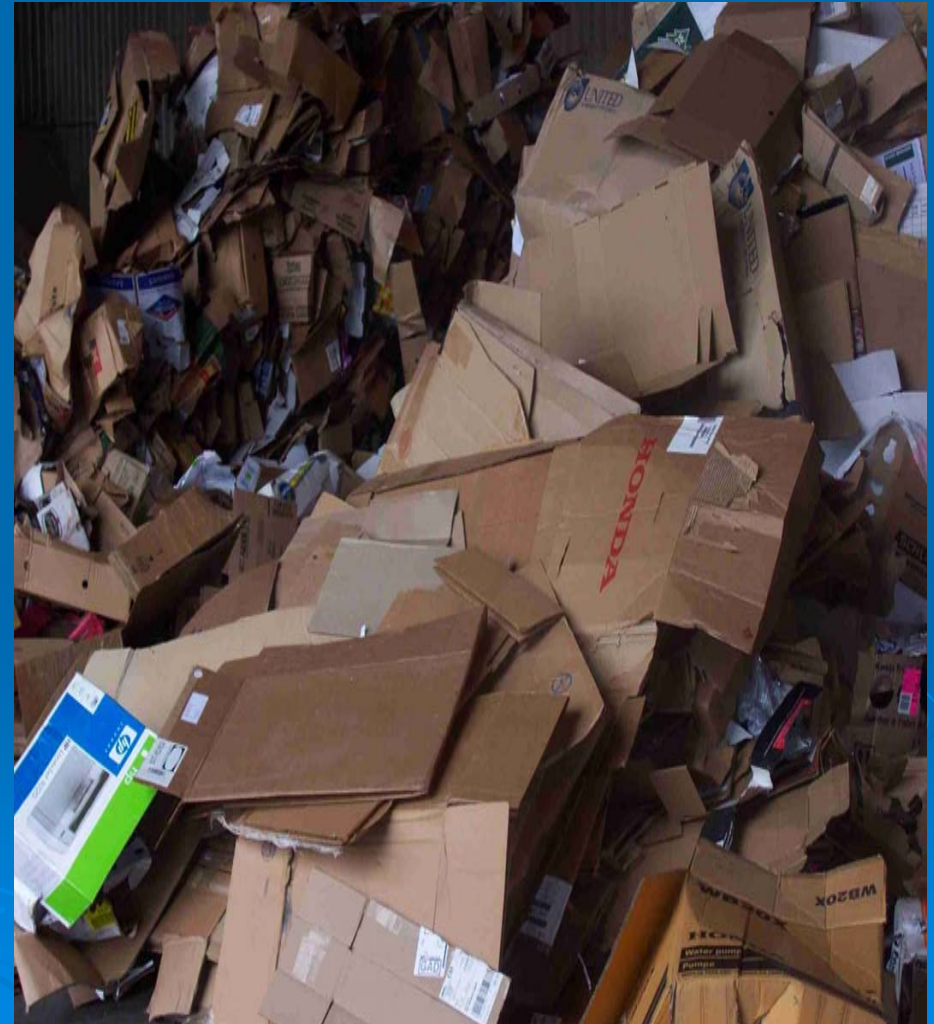
- Situation Analysis
 - Identify & Prioritize Waste Reduction Objectives
 - Determine Program Options to Enhance Waste Diversion
 - Develop Waste Reduction Recommendations
- 

Situation Analysis

- Yellowknife Overview
(climate, population, industry, role in NWT)
 - Solid Waste Management System
 - Recycling Systems and Programs
 - Waste Diversion Plans Under Consideration
 - Issues and Drivers
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Enhance Programs for Marketable Materials

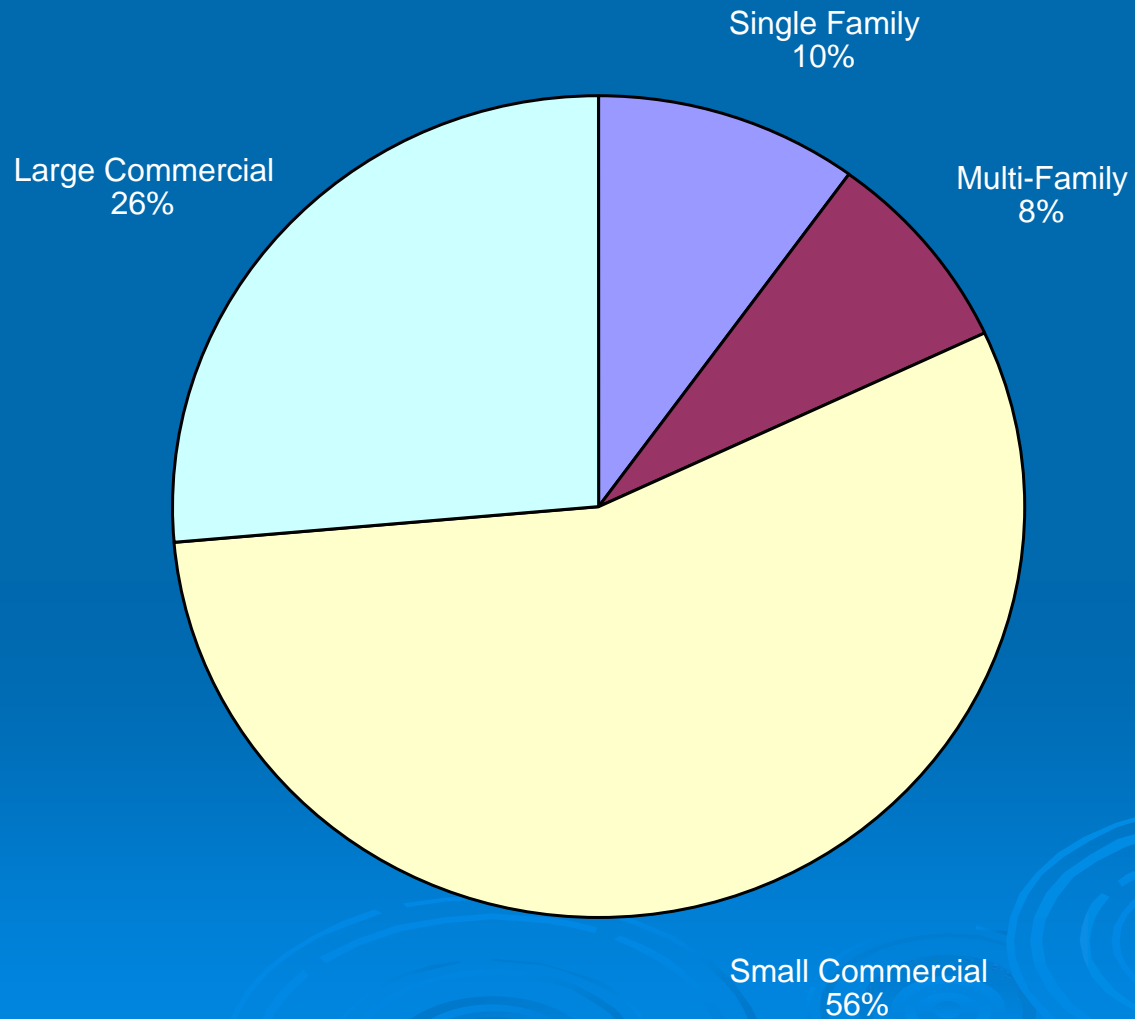
- Currently Recyclable Materials represent 31% of solid waste disposed.
- The Commercial Sector disposes of >80% of those materials.



Waste Reduction Objectives

1. Enhance Programs for Currently Marketable Recyclables
2. Focus on Food Waste

Recyclables Disposed by Sector



Commercial Diversion Options


Options to Enhance Commercial Sector Waste Diversion:

1. Implement Education and Outreach to Support the User Fee System
2. Phase in Disposal Bans

Education and Outreach

- Adopt a Zero Waste Goal
- Workplace Recycling Toolkit
- Business Recycling Page on YK Website
- Call-in Technical Support
- Consider further reduction of OCC tip fee

Disposal Bans

- Extensive pre-ban education, promotion and outreach
 - Call-in technical support
 - Meaningful enforcement including a significant surcharge on tipping fees
 - Consistent application of enforcement
- 

Commercial Diversion Potential

- Education and Promotion
10% additional diversion for each paper product stream.
- Estimated Additional Diversion
100 tonnes of cardboard only or
200 tonnes of all recyclable materials,
annually.

Commercial Diversion Potential

- Disposal Ban
50% additional diversion of each paper product stream.
- Estimated Additional Diversion
480 tonnes of cardboard only or
1,000 tonnes of all recyclable material streams.

Commercial Diversion Potential

The additional diversion potential for the commercial sector is between 2% and 10% of solid waste disposed.

- Education and Outreach = 200 tonnes
- Disposal Ban = 1,000 tonnes
- Total Disposed = 9,001 tonnes
 - Education and Outreach: $200 / 9,001 = 2\%$
 - Disposal Ban: $1,000 / 9,001 = 10\%$


Residential Diversion Options

Option 1: Enhanced Depot Recycling

- Establish additional Drop-off Depots
- Reduce Bag Limit to 2 / week
- Ban Disposal of Recyclables
- Enhance Education and Outreach

Residential Diversion Options

Option 2: Curbside Recycling

- Weekly or Bi-weekly Curbside Collection of Recyclables
 - Reduce Bag Limit to 2 / week
 - Ban Disposal of Recyclables
 - Enhance Education and Outreach
- 

Single Family Diversion Potential

- Enhanced Depot Option
15% additional diversion of each material stream or 38 tonnes annually.
- Curbside Option
65% additional diversion of each material stream or 166 tonnes annually.

SFU Diversion Potential

The additional diversion potential for the SFU sector is 0.4% to 2% of solid waste disposed.

- Enhanced Depot = 38 tonnes
- Curbside = 166 tonnes
- Total Disposed = 9,001 tonnes
 - Option 1: $38 / 9,001 = 0.4\%$
 - Option 2: $166 / 9,001 = 2\%$

Multi-Family Diversion Potential

- Enhanced Depot
10% additional diversion of each material stream or 20 tonnes annually.
- On-Site Collection
55% additional diversion of each material stream or 110 tonnes annually.

MFU Diversion Potential

The additional diversion potential for the MFU sector is 0.2% to 1.1% of solid waste disposed.

- Enhanced Depot = 20 additional tonnes
- On-Site Collection = 110 additional tonnes
- Total Disposed = 9,001 tonnes
 - Option 1: $20 / 9,001 = 0.2\%$
 - Option 2: $110 / 9,001 = 1.1\%$

Focus on Food Waste

- Food Waste is the second largest component of the waste stream.
- Food Waste represents 23% of solid waste disposed



Food Waste Considerations

- Determine whether to develop a Source Separated Organics (SSO) System or a Mixed Organic Waste (MOW) System.
- Facility Size and Location
- Type of Composting System
- Cost Analysis – typically \$150/MT
- Select Waste Sectors to Target
- Identify Carbon Sources

Prioritized Recommendations – Enhanced Recycling

1. Adopt a City of Yellowknife Zero Waste Goal.
2. Design and Implement a Cardboard Disposal Ban for the Large Commercial Sector.
3. Expand the Cardboard Ban to Small Commercial.
4. Expand the Ban to include Newspaper, Fine Paper and other Recyclable Materials.
5. Assess the Costs and Benefits of Enhancing the Residential Depot Recycling Program compared with Curbside Collection.

Prioritized Recommendations – Focus on Food Waste

1. Continue to promote backyard composting and use of the drop-off depot at the landfill.
2. Initiate preliminary, technical and economic assessment for centralized composting
 - a) feedstock
 - b) technology options and costs
 - c) facility siting options
 - d) end use markets/options
 - e) regulatory considerations
 - f) collection/hauling options



Questions / Discussion



Separation of MFU & Small Commercial Waste Data

- Quantity of waste disposed per household is the same for MFU and SFU
(474 kg / household)
- $474 \text{ kg} \times 2,900 \text{ MFU} = 1,375 \text{ MT per year.}$
- $5,556 - 1,375 = 4,181 \text{ metric tonnes}$
disposed by Small Commercial in 2006.

2006 Waste Diversion Rate

Material Category	Total Waste Disposed		Waste Diversion		
	Waste Stream Composition (%)	Estimated Annual Disposal (Tonnes)	2006 Recycling (Bales)	2006 Recycling (Tonnes)	Waste Diversion by Material Stream
Newspaper (including flyers)	4.7%	421	91	69	14%
Corrugated Cardboard	13.3%	1,198	663	333	22%
Boxboard	2.6%	230	9	28	11%
Fine Paper	9.6%	865	-	-	-
Beverage Containers (dairy)	0.3%	26	16	4	13%
Metal Food Containers	0.8%	74	10	10	12%
Composite Aluminum (White Goods)	0.0%	2	137	137	99%
Batteries	0.0%	2	44	90	97%
Totals	100%	9,001	970	671	7%

Multi-Family and Small Commercial Waste Composition

Material Category	Waste Stream Composition (%)	Estimated Annual Disposal (Tonnes)
Paper Products	38%	2,132
Organics	22%	1,233
Other Wastes	16%	865
Plastic	11%	616
Textiles	4.4%	244
Ferrous Metal	3.4%	188
Glass	2.4%	134
Aluminum	0.8%	45
Other Unspecified	0.6%	35
Fines	0.6%	32
Special Care Waste	0.6%	31
Totals	100%	5,556

Large Commercial Waste Composition

Material Category	Waste Stream Composition (%)	Estimated Annual Disposal (Tonnes)
Paper Products	50%	841
Organics	25%	419
Plastic	13 %	224
Other Wastes	7%	119
Glass	1.4%	24
Other Unspecified	1.2%	20
Ferrous Metal	1.0%	17
Textiles	0.6%	9
Special Care Waste	0.5%	8
Fines	0.4%	8
Aluminum	0.2%	3
Totals	100.0%	1,693

Single Family Waste Composition

Material Category	Waste Stream Composition (%)	Estimated Annual Disposal (Tonnes)
Organics	40 %	702
Paper Products	21%	367
Plastic	16%	280
Other Wastes	14%	250
Ferrous Metal	3.2%	56
Glass	2.7%	47
Textiles	1.7%	30
Aluminum	0.5%	8
Other Unspecified	0.4%	6
Fines	0.3%	4
Special Care Waste	0.1%	1
Totals	100.0%	1,752

Issues and Drivers

- The existing landfill is nearing capacity.
- Baling Facility is too small to bale waste and manage materials received from multi-compartment recycling vehicles.
- Maintain Baling Facility “as is” – no planned expansion.

Solid Waste Mgmt Advisory Committee Workplan

- Ban Commercial Cardboard from Disposal
- Investigate Curbside Recycling for SFU
- Food Waste Composting Pilot Project
- Three Cell Approach for Public Salvaging