

## 4.0 RESULTS AND DISCUSSION: PHYSICAL LANDFILL AUDIT

Results shown in this section are summarized into primary and secondary categories. Detailed tables by material sub-category are available in Appendix A2. Only Inbound material with the purpose of being disposed of within the landfill was sampled and analysed (i.e. materials directed to C&D tipping area or other diversion bins at the landfill were not included).

### 4.1 Inbound Waste Management Facility (Physical Audit) Collection Results

After analyzing annual landfill records provided by Oxford County for 2016, AET developed an inbound sampling plan to target an appropriate number of inbound vehicles by material source type that was closely proportional to each source's actual contribution to inbound material by percentage of inbound source types. However, after consultation with the County, the list of targeted material sources was shortened from 17 to 5. The targeted sources included Mixed Solid Waste (MSW), Non-Hazardous Solid Industrial, Demolition, Residual Domestic Waste, and C&D Residual. During the study period, no C&D Residual or Residual Domestic Waste loads were received.

The following table provides an idea of what the total annual inbound material for 2016 consisted of. The overall annual amount of inbound material by material source is displayed in kg and metric tonnes for 2016 (January 1<sup>st</sup> through December 31<sup>st</sup>). The percentage of the total inbound material by material source has also been provided. Highlighted rows represents inbound material that is typically directed to the landfill's tipping face for disposal. This was the target material for the audits. It should be noted that this table does not include the total inbound weight of material for single family residential curbside.

**Table 4.1 Total Annual Inbound Waste by Material Source for the Oxford County Waste Management Facility (2016)**

Inbound Source	Total Inbound (kg/yr)	Total Inbound (MT/yr)	Percentage of Total Annual Inbound
Mixed Solid Waste (MSW)	11,442,940	11,443	24.67%
Non-Hazardous Solid Industrial	5,742,580	5,743	12.38%
Demolition	6,062,490	6,062	13.07%
Clean Fill	300	0	0.00%
Residual Domestic Waste	170,930	171	0.37%
Large Article Collection	462,560	463	1.00%
Freon Items, Tires, HHW, Electronics	150,360	150	0.32%
Bio-Solids to Landfill	89,540	90	0.19%
Non-Hazardous Soil	664,240	664	1.43%
Mixed C&D	4,380,080	4,380	9.44%
Scrap Metal Segregated Loads	37,730	38	0.08%
Compost Site Material	7,947,260	7,947	17.14%
Brake Linings	1,629,630	1,630	3.51%
Clean Brush	1,548,580	1,549	3.34%
Bio Solids to Storage Building	4,901,700	4,902	10.57%
C&D Residual	718,640	719	1.55%
Blue Box Recyclables	425,410	425	0.92%
<b>Total</b>	<b>46,374,970</b>	<b>46,375</b>	<b>100.00%</b>

Since the overall total annual inbound waste by material source table displayed the percentage of each material source, the sampling weighting for the 5 targeted sources was created. Based on the total annual weight of inbound material by the 5 targeted sources alone, the number of samples from a set of 75 was determined by weighted percentage.

**Table 4.2 Sample Planning by Total Annual Inbound Waste by Material Source for the Oxford County Waste Management Facility (2016) (Physical Audit)**

Inbound Source	Total Inbound (kg/yr)	Total Inbound (MT/yr)	Percentage of Total Annual Inbound	Number of Samples to Taken
Mixed Solid Waste (MSW)	11,442,940	11,443	47.41%	36
Non-Hazardous Solid Industrial	5,742,580	5,743	23.79%	18
Demolition	6,062,490	6,062	25.12%	19
Residual Domestic Waste	170,930	171	0.71%	1
C&D Residual	718,640	719	2.98%	2
<b>Total</b>	<b>24,137,580</b>	<b>24,138</b>	<b>100.00%</b>	<b>75.00</b>

A total of seventy five (75) inbound vehicle samples of approximately 100 kg per sample were audited over the course of a 3-week audit period (15 audit days, 25 samples per week).

The exact number on inbound samples by inbound material source can be seen in the following table.

**Table 4.3 Number of Samples by Inbound Material Source Sampled by AET (Physical Audit)**

	Sample Source			Total Samples Taken
	Mixed Solid Waste (MSW)	Non-Hazardous Solid Industrial	Demolition	
Number of Samples Taken	42	14	19	75
Percentage of Total Samples Taken	56.00%	18.67%	25.33%	100.00%

Not all 5 of the targeted inbound waste sources were sampled from during the auditing period. AET was not able to obtain any samples from Residual Domestic Waste or C&D Residual sources. This may have been due to the length of the auditing period or the season in which the study took place. Neither of these types of inbound material sources entered the County’s waste management facility during the sampling period.

AET and landfill staff worked together to coordinate sample collection. As material entered the waste management facility’s inbound scale, the scale house operator determined the source of the material in the vehicle (i.e., Demolition, Mixed Solid Waste, etc.). If the material in the vehicle met the desired material source that was to be sampled from that day, the scale house operator notified AET’s onsite Team Leader via radio and the inbound material was delivered to the designated tipping area for sampling.

The inbound vehicles were selected randomly on a next available basis. For example, at the beginning of the day once the first sample had been obtained that met the sample criteria and sub-sampling had been completed to the desired weight, AET randomly selected from the next available vehicle load that met the sample criteria.

As samples were collected for sampling, Vehicle and material information was acquired and logged. The log sheet included such information as sample number, date, time, material source, license plate number, hauling company, vehicle type, and net weight of load (obtained from scale house operator at end of each sampling day) and any additional observations about the sample.

The following table displays a breakdown of the number of samples that were taken by vehicle type during the sampling period. It should be noted that the “Drop Depot” vehicle type refers to

40 cubic yard roll-off bins brought up to the tipping face from the passenger vehicle drop off area of the landfill. Each of these loads would contain material from many smaller passenger vehicles.

**Table 4.4 Number of Samples by Vehicle Type (Physical Audit)**

	Inbound Sample Vehicle Types									Total
	Roll Off - Uncompacted	Cube Van	Front End - Tandem Axle	Pickup Truck	Single Axle	Pickup Truck and Trailer	Roll Off - Compacted	Tandem Axle Truck	Drop Depot	
Number of Samples Taken	35	1	10	3	1	8	10	5	2	75
Total Weight of Loads (kg)	68,940	1,690	82,900	479	3,850	4,570	55,740	15,460	3,588	237,217

## 4.2 Inbound Waste Management Facility Landfill (Physical Audit) Composition Results

### Mixed Solid Waste

During the sampling period, 42 loads of MSW were selected for the audit, representing approximately 162,707 kg (163 MT) of total material. This represented 68.59% of the total inbound sampled material by weight and 56% of the total number of samples taken during the sampling period.

Overall composition of the 42 audited MSW loads was extrapolated to the total annual MSW weight received at the landfill (based on 2016 scale records, excluding weekly residential curbside waste) to provide an annual estimate of waste composition by material type.

The following table provides a breakdown of such but also displays the results by common source separated Recyclables (blue box, HHW & electronics), Leaf & Yard Waste, and Garbage as well as the total of each disposed annually combined.

Approximately 20.23% of MSW consists of disposed Recyclables which represents approximately 2,315,373 kg (2,315 MT) annually. The three greatest disposed Recyclables are Mixed Recyclable Paper, Corrugated Cardboard, and Other Recyclable Plastics at 620,972 kg (621 MT), 541,688 kg (542 MT), and 270,171 kg (270 MT) respectively.

Disposed Leaf & Yard Waste represents approximately 0.60% or 69,093 kg (69 MT) of this total inbound source.

In addition to the common recyclables noted above, approximately 9,058,475 kg (9,058 MT) of other materials are disposed of annually from this material source representing 79.16% of the total annual inbound weight from the Mixed Solid Waste material source. The three greatest disposed Garbage items are Other Waste, Backyard Compostable Food Waste, and Non-

Backyard Compostable Food Waste at 2,714,238 kg (2,714 MT), 1,255,564 kg (1,256 MT), and 776,758 kg (777 MT) respectively.

**Table 4.5 Landfilled Mixed Solid Waste (excluding weekly curbside residential waste) Composition (Physical Audit)**

Material Type	R - Recyclables O - Leaf & Yard Waste W - Garbage	Inbound Disposed Annually (kg/yr)	Inbound Disposed Annually (MT/yr)	Percentage (%)
Newsprint	R	120,129	120	1.05%
Corrugated Cardboard	R	541,688	542	4.73%
Mixed Recyclable Paper	R	620,972	621	5.43%
Polycoat/Composite Containers	R	37,361	37	0.33%
Paper Cups	R	127,260	127	1.11%
#1 PET Bottles & Jars	R	82,515	83	0.72%
Other Recyclable Plastics	R	270,171	270	2.36%
Plastic Film or Sheet Film	R	159,361	159	1.39%
Recyclable Metal Containers	R	130,200	130	1.14%
Recyclable Glass Containers	R	79,599	80	0.70%
Household Hazardous Waste (HHW)	R	47,562	48	0.42%
Electronics	R	98,556	99	0.86%
<b>Disposed Inbound Annually (Recyclables)</b>		<b>2,315,373</b>	<b>2,315</b>	<b>20.23%</b>
Leaf & Yard Waste	O	69,093	69	0.60%
<b>Disposed Inbound Annually (Leaf &amp; Yard Waste)</b>		<b>69,093</b>	<b>69</b>	<b>0.60%</b>
Non-Recyclable Paper	W	69,477	69	0.61%
Stand-up Pouches	W	4,451	4	0.04%
Non-Recyclable Plastic Packaging	W	618,913	619	5.41%
Miscellaneous plastic (rigid plastics, pipes, vinyl siding)	W	557,785	558	4.87%
Ferrous Metal	W	221,625	222	1.94%
Non-Ferrous Metal	W	17,478	17	0.15%
Mixed Metals	W	7,312	7	0.06%
Other Non-Recyclable Glass	W	36,756	37	0.32%
Backyard Compostable Food Waste	W	1,255,564	1,256	10.97%
Non-Backyard Compostable Food Waste	W	776,758	777	6.79%
Pet Waste	W	185,572	186	1.62%
Concrete	W	3,111	3	0.03%
Clean Wood	W	395,556	396	3.46%
Treated Wood	W	653,443	653	5.71%
Rubber	W	22,188	22	0.19%
Ceramics & Porcelain	W	234,154	234	2.05%
Textiles	W	129,679	130	1.13%
Rubble/Soil	W	188,167	188	1.64%
Bulky Items	W	652,547	653	5.70%
Diapers & Sanitary Waste	W	313,702	314	2.74%
Other Waste	W	2,714,238	2,714	23.72%
<b>Disposed Inbound Annually (Garbage)</b>		<b>9,058,475</b>	<b>9,058</b>	<b>79.16%</b>
<b>Total</b>		<b>11,442,940</b>	<b>11,443</b>	<b>100.00%</b>

### **Non-Hazardous Solid Industrial**

During the sampling period, 14 loads of Non-Hazardous Solid Industrial waste were selected for the audit, representing approximately 37,570 kg (38 MT) of total material. This represented 15.84% of the total inbound sampled material by weight and 18.67% of the total number of samples taken during the sampling period.

Overall composition of the 14 audited Non-Hazardous Solid Industrial loads was extrapolated to the total annual Non-Hazardous Solid Industrial waste weight received at the landfill (based on 2016 scale records) to provide an annual estimate of waste composition by material type.

The following table provides a breakdown of such but also displays the results by common source separated Recyclables (blue box, HHW & electronics), Leaf & Yard Waste, and Garbage as well as the total of each disposed annually combined.

Approximately 18.01% of landfilled Non-Hazardous Solid Industrial waste consists of disposed common Recyclables which represents approximately 1,092,058 kg (1,092 MT) annually. The three greatest disposed Recyclables are Mixed Recyclable Paper, Corrugated Cardboard, and Other Recyclable Plastics at 578,209 kg (578 MT), 181,241 kg (181 MT), and 103,653 kg (104 MT) respectively.

In addition to the common recyclables listed above, approximately 4,969,833 kg (4,970 MT) of other materials are disposed of annually from this material source representing 81.98% of the total annual landfilled weight from the Non-Hazardous Solid Industrial material source. The three greatest disposed other categories are Other Waste, Miscellaneous Plastic, and Non-Recyclable Paper at 2,724,553 kg (2,725 MT), 689,929 kg (690 MT), and 341,642 kg (342 MT) respectively. The “other waste” category of materials for Non-Hazardous Solid Industrial waste loads was quite variable and includes materials such as fiberglass (e.g. from Siemen’s factory), foam, foam molds, rubber/hoses, filters, and gloves.

**Table 4.6 Landfilled Non-Hazardous Solid Industrial Waste Composition (Physical Audit)**

Material Type	R - Recyclables O - Leaf & Yard Waste W - Garbage	Inbound Disposed Annually (kg/yr)	Inbound Disposed Annually (MT/yr)	Percentage (%)
Newsprint	R	1,298	1	0.02%
Corrugated Cardboard	R	181,241	181	2.99%
Mixed Recyclable Paper	R	578,209	578	9.54%
Polycoat/Composite Containers	R	6,737	7	0.11%
Paper Cups	R	51,911	52	0.86%
#1 PET Bottles & Jars	R	21,209	21	0.35%
Other Recyclable Plastics	R	103,653	104	1.71%
Plastic Film or Sheet Film	R	88,130	88	1.45%
Recyclable Metal Containers	R	23,049	23	0.38%
Recyclable Glass Containers	R	254	0	0.00%
Household Hazardous Waste (HHW)	R	33,284	33	0.55%
Electronics	R	3,084	3	0.05%
<b>Disposed Inbound Annually (Recyclables)</b>		<b>1,092,058</b>	<b>1,092</b>	<b>18.01%</b>
Leaf & Yard Waste	O	600	1	0.01%
<b>Disposed Inbound Annually (Leaf &amp; Yard Waste)</b>		<b>600</b>	<b>1</b>	<b>0.01%</b>
Non-Recyclable Paper	W	341,642	342	5.64%
Stand-up Pouches	W	389	0	0.01%
Non-Recyclable Plastic Packaging	W	214,371	214	3.54%
Miscellaneous plastic (rigid plastics, pipes, vinyl siding)	W	689,829	690	11.38%
Ferrous Metal	W	22,831	23	0.38%
Non-Ferrous Metal	W	1,525	2	0.03%
Mixed Metals	W	38	0	0.00%
Other Non-Recyclable Glass	W	1,331	1	0.02%
Backyard Compostable Food Waste	W	217,948	218	3.60%
Non-Backyard Compostable Food Waste	W	42,983	43	0.71%
Pet Waste	W	8,325	8	0.14%
Concrete	W	0	0	0.00%
Clean Wood	W	211,420	211	3.49%
Treated Wood	W	17,639	18	0.29%
Rubber	W	112,268	112	1.85%
Ceramics & Porcelain	W	0	0	0.00%
Textiles	W	174,032	174	2.87%
Rubble/Soil	W	0	0	0.00%
Bulky Items	W	163,459	163	2.70%
Diapers & Sanitary Waste	W	25,250	25	0.42%
Other Waste	W	2,724,553	2,725	44.94%
<b>Disposed Inbound Annually (Garbage)</b>		<b>4,969,833</b>	<b>4,970</b>	<b>81.98%</b>
<b>Total</b>		<b>6,062,490</b>	<b>6,062</b>	<b>100.00%</b>

## Demolition

During the sampling period, 19 loads of Demolition waste were selected for the audit, representing approximately 36,940 kg (37 MT) of total material. This represented 15.57% of the total inbound sampled material by weight and 25.33% of the total number of samples taken during the sampling period.

Overall composition of the 19 audited Demolition waste loads was extrapolated to the total annual Demolition waste weight received at the landfill (based on 2016 scale records) to provide an annual estimate of waste composition by material type.

The following table provides a breakdown of such but also displays the results by common source separated Recyclables (blue box, HHW & electronics), Leaf & Yard Waste, and Garbage as well as the total of each disposed annually combined.

Not surprisingly, only 2.2% of demolition waste consists of common Recyclables which represents approximately 126,212 kg (126 MT) annually. The three greatest disposed Recyclables are Corrugated Cardboard, Plastic Film or Sheet Film, and Other Recyclable Plastics at 53,721 kg (54 MT), 35,907 kg (36 MT), and 12,074 kg (12 MT) respectively.

Disposed Leaf & Yard Waste represents approximately 1.97% or 113,042 kg (113 MT) of this total inbound source.

In addition to the common recyclables listed above, approximately 5,503,326 kg (5,503 MT) of other materials are disposed of annually from this source representing 95.83% of the total annual weight landfilled from Demolition loads. The three greatest disposed other categories are Clean Wood, Other Waste, and Treated Wood at 2,065,801 kg (2,066 MT), 1,564,211 kg (1,564 MT), and 1,057,714 kg (1,058 MT) respectively. The most commonly found “Other Waste” materials included drywall, insulation, carpet, and shingles.



**Table 4.7 Landfilled Demolition Waste Composition (Physical Audit)**

Material Type	R - Recyclables O - Leaf & Yard Waste W - Garbage	Inbound Disposed Annually (kg/yr)	Inbound Disposed Annually (MT/yr)	Percentage (%)
Newsprint	R	3,765	4	0.07%
Corrugated Cardboard	R	53,721	54	0.94%
Mixed Recyclable Paper	R	8,623	9	0.15%
Polycoat/Composite Containers	R	320	0	0.01%
Paper Cups	R	1,588	2	0.03%
#1 PET Bottles & Jars	R	956	1	0.02%
Other Recyclable Plastics	R	12,074	12	0.21%
Plastic Film or Sheet Film	R	35,907	36	0.63%
Recyclable Metal Containers	R	2,933	3	0.05%
Recyclable Glass Containers	R	264	0	0.00%
Household Hazardous Waste (HHW)	R	44	0	0.00%
Electronics	R	6,018	6	0.10%
<b>Disposed Inbound Annually (Recyclables)</b>		<b>126,212</b>	<b>126</b>	<b>2.20%</b>
Leaf & Yard Waste	O	113,042	113	1.97%
<b>Disposed Inbound Annually (Leaf &amp; Yard Waste)</b>		<b>113,042</b>	<b>113</b>	<b>1.97%</b>
Non-Recyclable Paper	W	720	1	0.01%
Stand-up Pouches	W	107	0	0.00%
Non-Recyclable Plastic Packaging	W	43,660	44	0.76%
Miscellaneous plastic (rigid plastics, pipes, vinyl siding)	W	38,537	39	0.67%
Ferrous Metal	W	63,380	63	1.10%
Non-Ferrous Metal	W	10,333	10	0.18%
Mixed Metals	W	16,323	16	0.28%
Other Non-Recyclable Glass	W	819	1	0.01%
Backyard Compostable Food Waste	W	10,768	11	0.19%
Non-Backyard Compostable Food Waste	W	7,935	8	0.14%
Pet Waste	W	0	0	0.00%
Concrete	W	26,084	26	0.45%
Clean Wood	W	2,065,801	2,066	35.97%
Treated Wood	W	1,057,714	1,058	18.42%
Rubber	W	130	0	0.00%
Ceramics & Porcelain	W	33,920	34	0.59%
Textiles	W	8,522	9	0.15%
Rubble/Soil	W	536,111	536	9.34%
Bulky Items	W	16,090	16	0.28%
Diapers & Sanitary Waste	W	2,162	2	0.04%
Other Waste	W	1,564,211	1,564	27.24%
<b>Disposed Inbound Annually (Garbage)</b>		<b>5,503,326</b>	<b>5,503</b>	<b>95.83%</b>
<b>Total</b>		<b>5,742,580</b>	<b>5,743</b>	<b>100.00%</b>

**All Sources Combined (Mixed Solid Waste, Non-Hazardous Solid Industrial, Demolition)**

The following table summarizes the combined audit results of the aforementioned 3 sources of landfilled waste sampled (MSW, Non-Hazardous Solid Industrial & Demolition). The 75 loads audited totalled approximately 237,217 kg (237 MT) of landfilled material.

Approximately 15.20% of the total landfilled waste audited consists of disposed common Recyclables which represents approximately 3,533,643 kg (3,534 MT) annually. The three greatest disposed Recyclables are Mixed Recyclable Paper, Corrugated Cardboard, and Other Recyclable Plastics at 1,207,803 kg (1,208 MT), 776,650 kg 777 MT), and 385,897 kg 386 MT) respectively.

Approximately 19,531,633 kg (19,532 MT) of other materials are disposed of annually from these sources, representing 84.01% of the total by weight. The three greatest are Other Waste, Clean Wood, and Treated Wood at 7,003,001 kg (7,003 MT), 2,672,778 kg (2,673 MT), and 1,728,795 kg (1,729 MT) respectively. Backyard Compostable Food Waste and Miscellaneous Plastic also make notable contributions to the overall total annual inbound waste disposed (combined 3 sources) at 1,484,280 kg (1,484 MT) and 1,286,151 kg (1,286 MT) respectively. Common constituents of the “Other Waste” category are noted in the sections above, describing waste from each source individually.

**Table 4.8 Combined Landfilled MSW, Non-Haz Industrial & Demolition Waste (Physical Audit)**

Material Type	R - Recyclables O - Leaf & Yard Waste W - Garbage	Inbound Disposed Annually (kg/yr)	Inbound Disposed Annually (MT/yr)	Percentage (%)
Newsprint	R	125,192	125	0.54%
Corrugated Cardboard	R	776,650	777	3.34%
Mixed Recyclable Paper	R	1,207,803	1,208	5.20%
Polycoat/Composite Containers	R	44,417	44	0.19%
Paper Cups	R	180,759	181	0.78%
#1 PET Bottles & Jars	R	104,680	105	0.45%
Other Recyclable Plastics	R	385,897	386	1.66%
Plastic Film or Sheet Film	R	283,398	283	1.22%
Recyclable Metal Containers	R	156,182	156	0.67%
Recyclable Glass Containers	R	80,116	80	0.34%
Household Hazardous Waste (HHW)	R	80,891	81	0.35%
Electronics	R	107,658	108	0.46%
<b>Disposed Inbound Annually (Recyclables)</b>		<b>3,533,643</b>	<b>3,534</b>	<b>15.20%</b>
Leaf & Yard Waste	O	182,734	183	0.79%
<b>Disposed Inbound Annually (Leaf &amp; Yard Waste)</b>		<b>182,734</b>	<b>183</b>	<b>0.79%</b>
Non-Recyclable Paper	W	411,839	412	1.77%
Stand-up Pouches	W	4,947	5	0.02%
Non-Recyclable Plastic Packaging	W	876,944	877	3.77%
Miscellaneous plastic (rigid plastics, pipes, vinyl siding)	W	1,286,151	1,286	5.53%
Ferrous Metal	W	307,836	308	1.32%
Non-Ferrous Metal	W	29,336	29	0.13%
Mixed Metals	W	23,673	24	0.10%
Other Non-Recyclable Glass	W	38,907	39	0.17%
Backyard Compostable Food Waste	W	1,484,280	1,484	6.38%
Non-Backyard Compostable Food Waste	W	827,677	828	3.56%
Pet Waste	W	193,896	194	0.83%
Concrete	W	29,195	29	0.13%
Clean Wood	W	2,672,778	2,673	11.50%
Treated Wood	W	1,728,795	1,729	7.44%
Rubber	W	134,586	135	0.58%
Ceramics & Porcelain	W	268,074	268	1.15%
Textiles	W	312,233	312	1.34%
Rubble/Soil	W	724,278	724	3.12%
Bulky Items	W	832,095	832	3.58%
Diapers & Sanitary Waste	W	341,114	341	1.47%
Other Waste	W	7,003,001	7,003	30.12%
<b>Disposed Inbound Annually (Garbage)</b>		<b>19,531,633</b>	<b>19,532</b>	<b>84.01%</b>
<b>Total</b>		<b>23,248,010</b>	<b>23,248</b>	<b>100.00%</b>

Visual representations of the previously discussed are provided below for not only each of the 3 inbound material sources sampled from, but a combined 3 source overall as well.

Each figure displays a pie graph breakdown of the amount of inbound material by chosen category in metric tonnes and the corresponding percentage each represents.

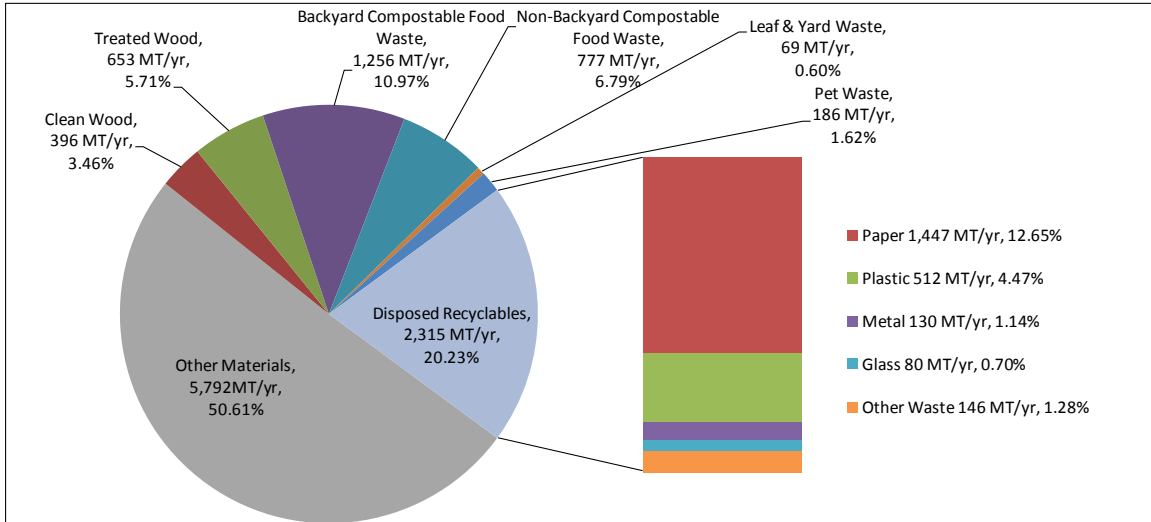


Figure 4.1 Breakdown MSW Waste (excluding weekly curbside residential waste)

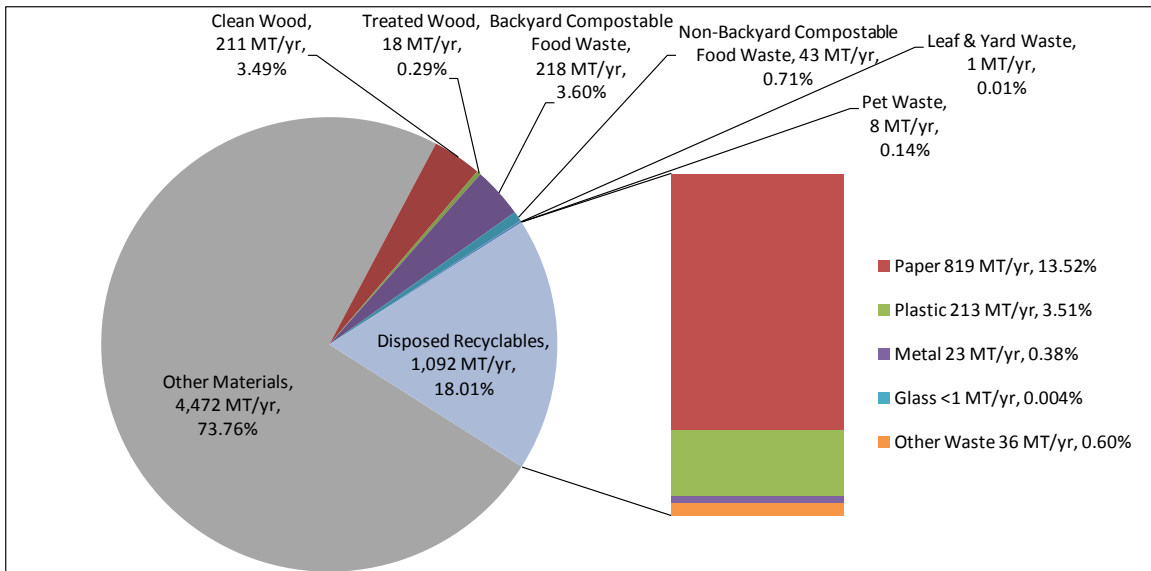


Figure 4.2 Non-Hazardous Solid Industrial Waste

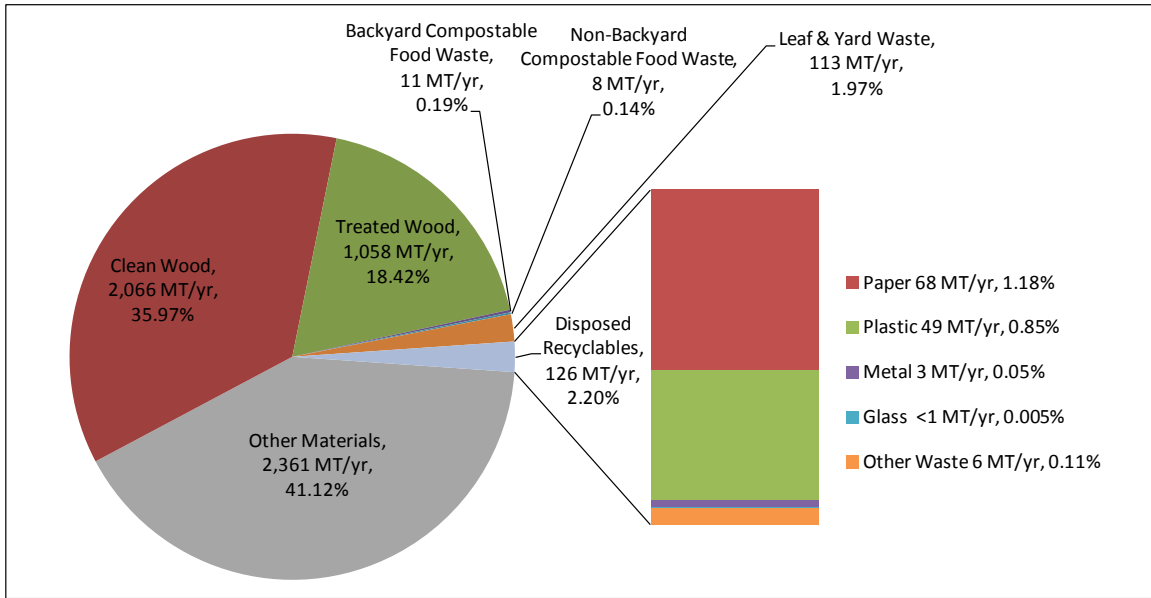


Figure 4.3 Breakdown of Demolition Waste

All Sources Combined (Mixed Solid Waste, Non-Hazardous Solid Industrial, Demolition)

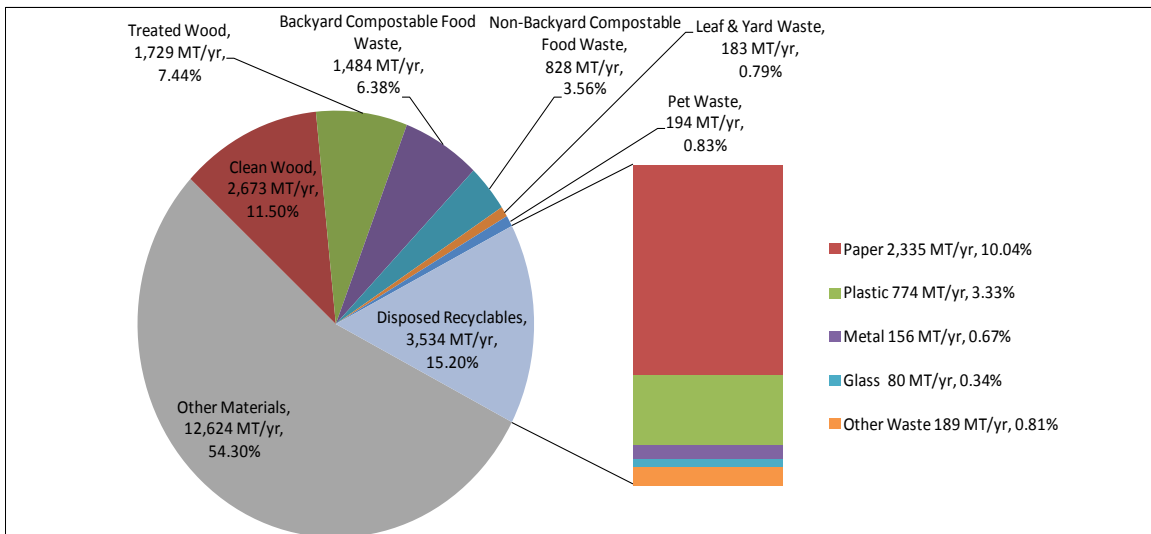


Figure 4.4 Breakdown of Combined (MSW, Non-Haz Industrial, Demolition) Waste