# 7.0 IC&I MODEL RESULTS

Kelleher Environmental's Waste Allocation Model (the KE WAM Model) was used to estimate the composition of the IC&I waste disposed from Oxford County businesses and identify those business groups that produce large amounts of IC&I waste. The model is an Excel spreadsheet based model that allocates a known quantity of disposed IC&I waste from a community such as Oxford County, to different IC&I Generator Sectors based on relative employment and relative waste disposed per employee (in kg/employee/year found in the literature).

The waste allocation approach takes the nature of the business activities in the community into account. For instance, a community such as Oxford County with a lot of manufacturing and agricultural activity produces different IC&I waste composition to a city like Ottawa which has a lot of offices and government buildings.

The advantage of the modeling approach is that it not only estimates the composition of the overall IC&I waste stream disposed, it also identifies the IC&I generator sectors that produce the largest amounts of IC&I wastes, and provides an estimate of the IC&I waste disposed by 17 separate IC&I generator sectors.

The KE WAM, which has been constructed over a 20-year period, consists of a database of waste composition results from IC&I waste audits undertaken all over North America (Canada and the US).

The employment mix of a community is used in the KE WAM as a measure to characterize the IC&I waste disposed. IC&I generator sector employment (i.e. by 2-digit NAICS code) is combined with the relative production of waste (measured as kg/employee/year) by each IC&I Generator Sector (i.e. by 2-digit NAICS code), and composition data from audits and studies. This results in an estimate of overall and per IC&I Generator Sector waste generation and waste composition.

The KE WAM has been calibrated to Oxford County using the following model inputs:

- The total annual tonnage of IC&I waste disposed from Oxford County sources, estimated at 42,000 tonnes per year as discussed in Section 4 of this report;
- The relative number of employees in different 17 ICI Generator Sectors presented in Section 3 of this report;
- The average tonnes/employee/year calculated from data submitted by 92 respondents to the IC&I survey described in Section 5, which were combined with other sources.

C&D waste is not addressed in the model as employment is not a reliable indicator of the amount of C&D waste produced, which is highly variable from one year to another depending on economic activity.

## 7.1 Oxford County Disposed IC&I Waste Composition

The overall composition of IC&I waste disposed by Oxford County businesses is presented in Table 7.1 and Figure 7.1. The table and figure show that Food (22%), Paper (21%), and Plastic (13%) make up a significant proportion of the disposed IC&I waste stream. The Other category at 16% represents a reasonably large % of the total, but this category contains a wide range of materials, and likely also contains some paper, food, plastic and wood. The food waste percentage is particularly significant as the Province of Ontario has announced that it plans to implement a disposal ban on food waste by around 2022. The Province has also stated its intention to implement disposal bans on materials which are designated under EPR (extended producer responsibility) regulations. OCC, paper and some plastics are likely to be banned from disposal within the foreseeable future.

### Table 7.1 Estimated Composition of Disposed IC&I Waste from Oxford County

| Material | Tonnes (2016) | Percentage of Disposed IC&I Waste Stream |
|---|---|---|
| **OCC (Old corrugated cardboard)** | 2,211 | 5.3% |
| **ONP (Old Newsprint)** | 1,252 | 3.0% |
| **Paper** | 8,619 | 20.7% |
| **Glass** | 945 | 2.3% |
| **Ferrous metal (containing steel)** | 832 | 2.0% |
| **Non-ferrous metal (e.g. aluminum, copper, etc)** | 871 | 2.1% |
| **HDPE (High Density Polyethylene) Plastic** | 333 | 0.8% |
| **PET (Polyethylene Terephthalate) Plastic** | 231 | 0.6% |
| **Plastic** | 5,343 | 12.8% |
| **Food Waste** | 9,077 | 21.8% |
| **Yard Waste** | 1,098 | 2.6% |
| **Wood Waste (e.g. pallets, etc.)** | 4,186 | 10.1% |
| **Other Waste (not classified)** | 6,617 | 15.9% |
| **Total** | 42,000 | 100% |

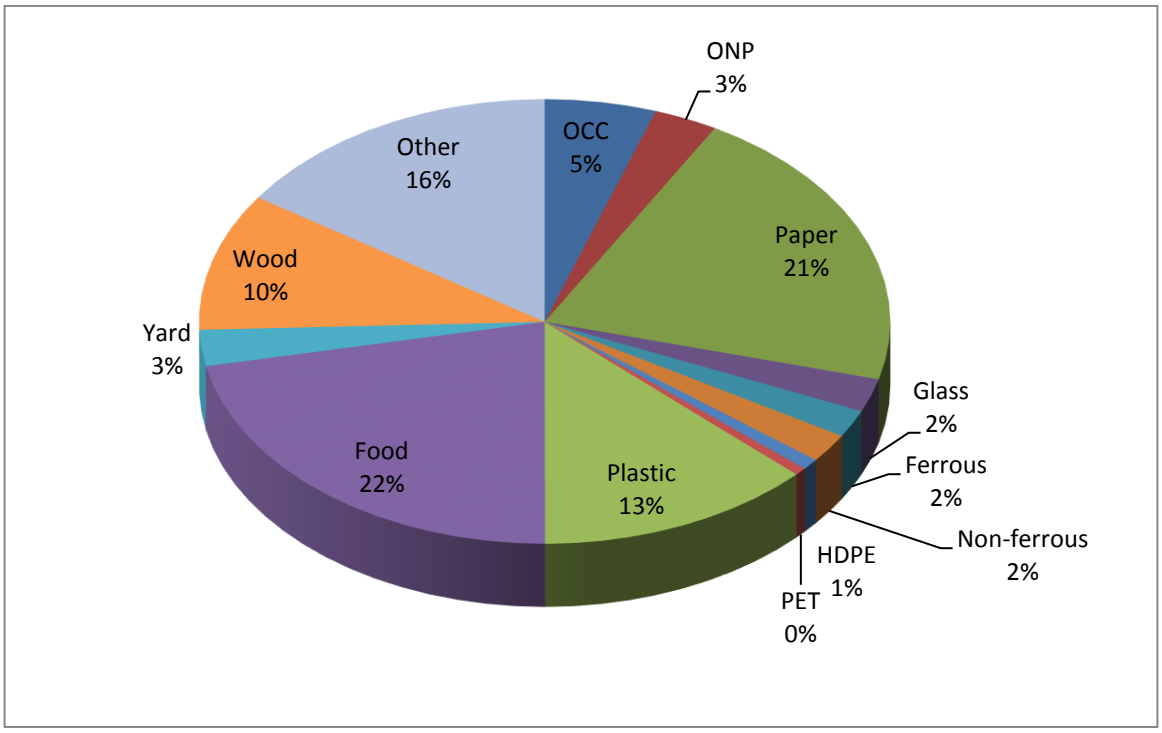


**Figure 7.1 Disposed IC&I Waste Composition, Oxford County, Ontario, 2016**

Low OCC (cardboard) amounts in the disposed waste indicate high recycling rates for this material which is valuable and has good recycling options.

## 7.2 Most Significant IC&I Waste Generators in Oxford County

Table 7.2 and Figure 7.2 presents the estimated relative contribution of different businesses in Oxford County to the IC&I waste stream. The table and figure show that manufacturing is a large contributor to the waste stream, at about 22% of the total, followed by retail at over 16%, health care at 10% and accommodation and food services (mostly hotels and restaurants) at an estimated 9% of the total.

## Table 7.2 Estimated Contribution to Disposed IC&I Waste from Oxford County by Major IC&I Sectors, 2016

| NAICS Code | Sector | Oxford County Employees (2016) Excluding construction | WASTE tonnes per year | % of IC&I Waste Disposed |
|---|---|---|---|---|
| **11** | Agriculture, Forestry, Fishing & Hunting | 3,945 | **2,795** | 6.7% |
| **21** | Mining, Oil & Gas Extraction | 125 | **104** | 0.2% |
| **221** | Utilities | 285 | **128** | 0.3% |
| **31-33** | Manufacturing | 11,225 | **9,176** | 21.8% |
| **41** | Wholesale Trade | 2,175 | **1,935** | 4.6% |
| **44-45** | Retail Trade | 5,295 | **6,875** | 16.4% |
| **48-49** | Transportation & Warehousing | 2,980 | **2,650** | 6.3% |
| **51** | Information & Cultural Industries | 530 | **450** | 1.1% |
| **52** | Finance, Insur, Real Estate, Rent/Lease | 2,515 | **729** | 1.7% |
| **54** | Professional, Scientific & Technical Services | 1,820 | **1,610** | 3.8% |
| **56** | Administration & Support, Waste Mgmt & Remediation | 2,280 | **1,352** | 3.2% |
| **61** | Education Services | 3,030 | **1,488** | 3.5% |
| **62** | Health Care & Social Assistance | 5,220 | **4,265** | 10.2% |
| **71** | Arts, Entertainment & Recreation | 980 | **1,367** | 3.3% |
| **72** | Accommodation & Food Services | 3,285 | **3,799** | 9.0% |
| **81** | Other Services (except public admin) | 2,420 | **2,500** | 6.0% |
| **91** | Public Administration | 1,980 | **777** | 1.9% |
| | **TOTALS** | **50,090** | **42,000** | 100.0% |

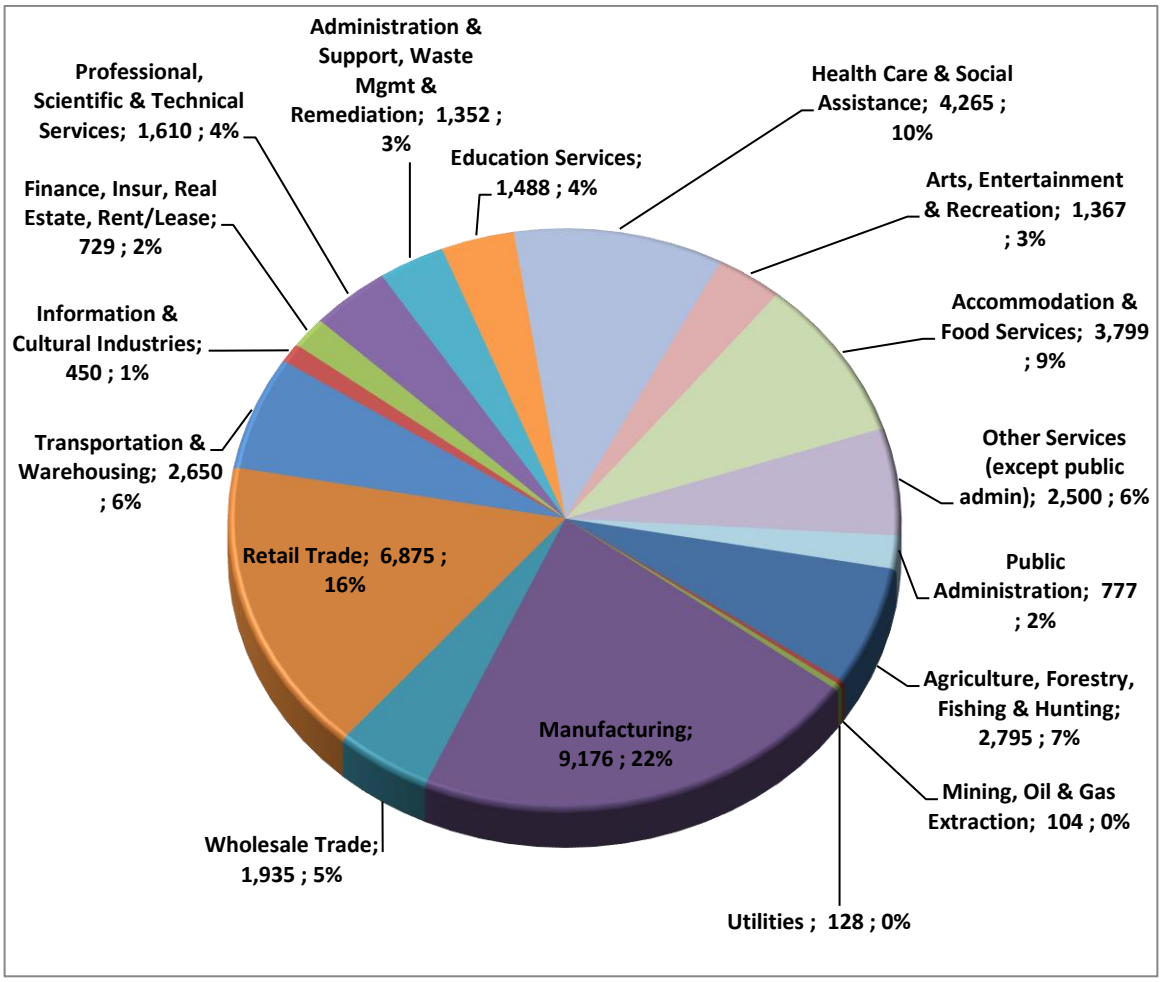


**Figure 7.2 Contribution of Different IC&I Sectors to the Disposed IC&I Waste Stream in Oxford County, Ontario, 2016 (tonnes and % of total IC&I Waste Stream)**

## 7.3 IC&I Sectors Which Produce Most Food and Paper Waste

The model results indicate that over 40% of the IC&I waste disposed by the IC&I sector in Oxford County is estimated to be either food or paper waste. Both materials are easily diverted. There are many markets for recycled paper, and food waste can be composted or digested to produce renewable natural gas. In addition, food waste is of particular interest given the Province of Ontario's announced plan to implement a food waste disposal ban potentially in 2022.

The disposed IC&I waste from Oxford County (disposed both at the OCWMF Landfill and exported) is estimated to contain over 9,000 tonnes of food waste. Figure 7.3 shows that this amount is evenly distributed among many generators, with accommodation and food services

(restaurants and hotels) producing about 20% of the total, with retail producing 18% (likely grocery stores) and manufacturing producing 15% of the total.

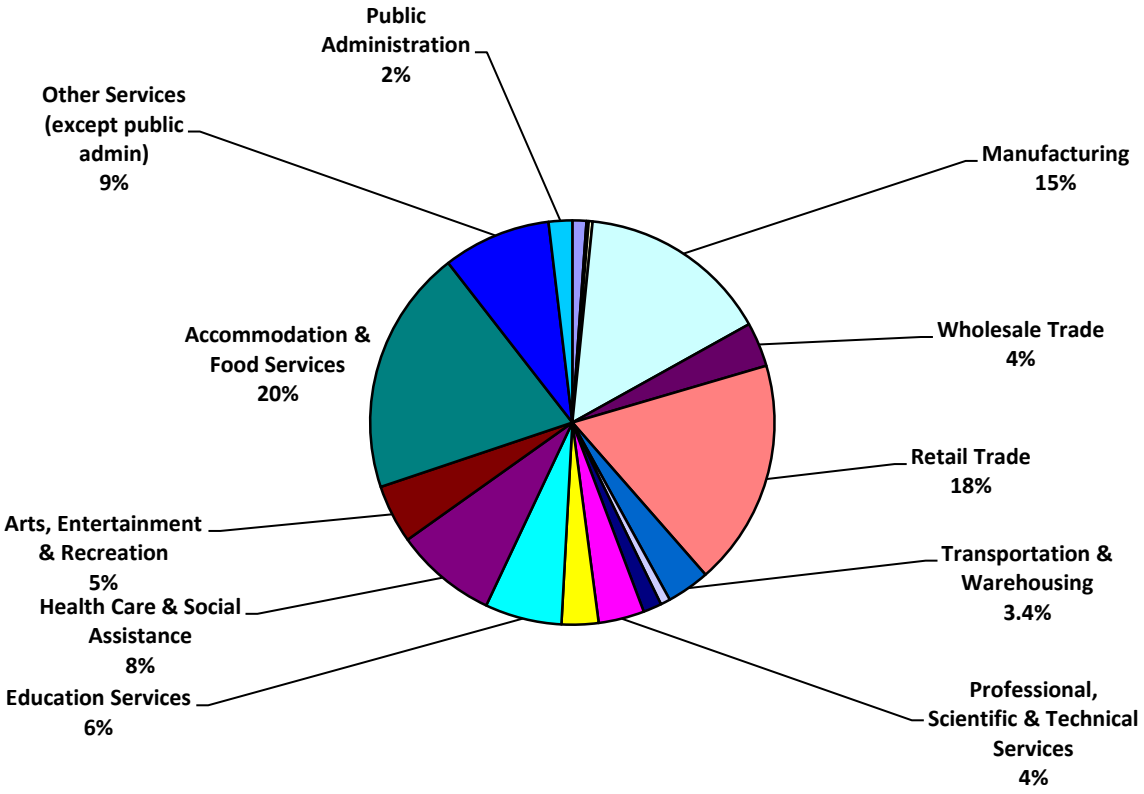


**Figure 7.3 Contribution of Different IC&I Sectors to the Food Waste Disposed in the IC&I Waste Stream in Oxford County, Ontario, 2016 (% of total food waste production)**

Figure 7.4 shows the contribution of various IC&I generator sectors in the County to disposal of the estimated 8,600 tonnes of paper. An additional 2,200 tonnes of OCC (cardboard) and 1,252 tonnes of ONP (newspaper) are also in the IC&I waste stream, meaning that about 12,000 tonnes of paper is disposed in the IC&I waste stream from Oxford County which is disposed both at the OCWMF Landfill and exported out of the County for disposal. This is a significant waste of resources, as much of this paper could be recycled, and the paper that is not recycled could be digested to produce biogas and renewable energy if a suitable processing option were available.

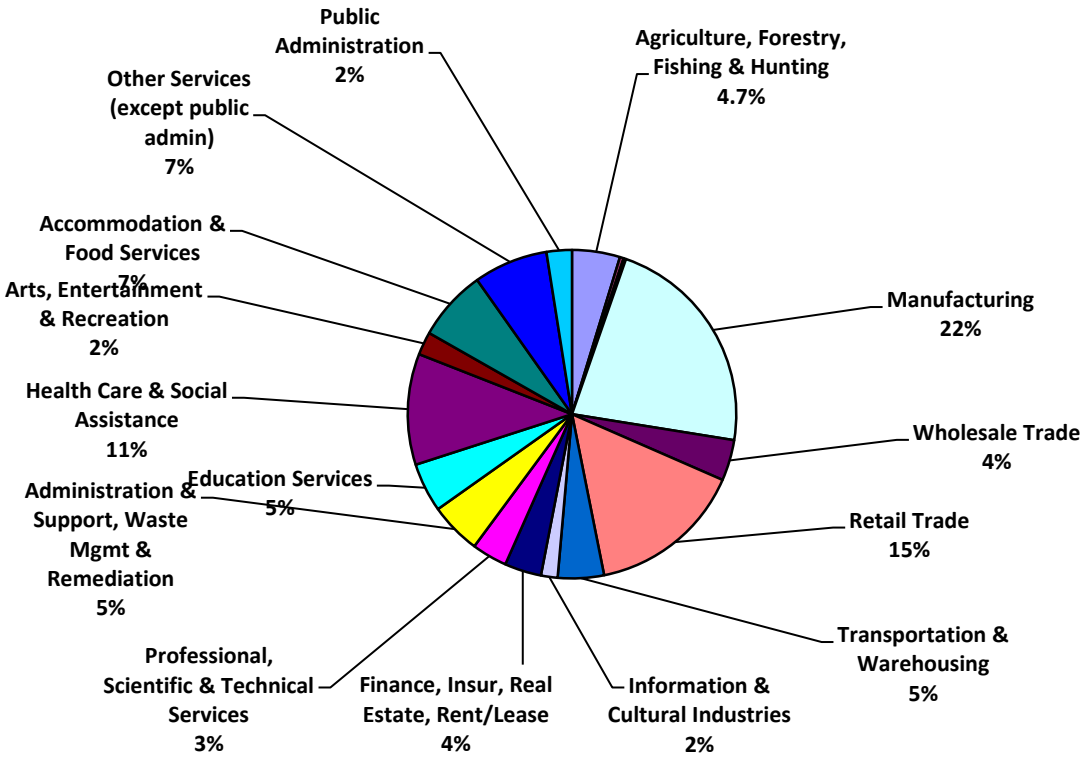


**Figure 7.4 Contribution of Different IC&I Sectors to the Paper Disposed in the IC&I Waste Stream in Oxford County, Ontario, 2016 (% of total food waste production)**

# 8.0 CONCLUSIONS & RECOMMENDATIONS

Conclusions and recommendations from the study are presented in this section.

## 8.1 Conclusions

- An estimated 42,000 tonnes of IC&I waste are likely to be disposed by IC&I generators in Oxford County.
- Based on available data, at least 21,000 tonnes of IC&I waste are exported from the County to transfer stations and landfills outside of the County.
- Cost is a significant reason for IC&I waste export. Cheap landfill (in single digits) is available in the US in Michigan and New York State. All Ontario landfills compete with this low disposal price.
- Oxford County could get more IC&I waste by lowering tipping fees. However, this is not recommended as the landfill would fill up more quickly and require expansion or replacement sooner than planned.
- There is no mechanism available in Ontario currently to force IC&I businesses in Oxford County to dispose of waste in the County landfill. A mechanism referred to as "flow

control" (forcing waste to be disposed at a particular facility) has been tried in Vancouver, Halifax and many US states (generally with EFw facilities). The mechanism is problematic and always subject to court challenges, and is not recommended.

## 8.2 Recommendations

- The Province of Ontario is planning a food waste disposal ban around 2022. The County needs to be involved in consultations on the nature of the ban to ensure that it does not disrupt their operations;
- There is no good source of data currently on IC&I waste flow in Ontario. The County should encourage the Ministry of Environment and Climate Change to consider regulating a reporting requirement through the newly formed Resource Productivity and Recovery Authority (RPRA), so that this information becomes available over time. Then the actual amount of IC&I waste exported from Oxford County would be known with more certainty.
- The export estimate presented in this report is the best that can be produced with the data available. None of the haulers would provide tonnage values exported for confidentiality and business reasons. To explore this issue further, County staff would need to hold meetings with each hauler to explore the extent to which they are willing to share tonnage information with the County.

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## Disclaimer

AET Group makes no warranty and assumes no liability for the information contained in this report outlining the Industrial, Commercial and Institutional (ICI) waste flow in Oxford County. These results reflect estimates based on inputs from various sources, including surveys, landfill records, Statistics Canada data, and data from other jurisdictions as described in the methodology.