2011 Demolition, Land-clearing, and Construction Waste Composition Monitoring

Summary Report

Prepared for:

Greater Vancouver
Sewerage and Drainage
District

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EXECUTIVE SUMMARY

AET Group Inc. was contracted by the Greater Vancouver Sewerage and Drainage District to conduct a visual Demolition, Land-Clearing, and Construction (DLC) waste composition monitoring program over 5 days between the dates of October 11 and October 15, 2011. The program involved selecting 50 inbound DLC truck loads from each of the selected landfills (Ecowaste Industries Landfill in Richmond & Vancouver Landfill in Delta) and conducting visual audits on each of the selected loads to determine the percent composition of material types by volume. Once the data was collected, visual estimates were made of the overall composition by volume. These were translated into weights, and the annual projected tonnages of each material type at each facility were then calculated.

The study was completed to obtain up-to-date DLC composition data which may help identify and expand diversion opportunities. An overall goal can be identified as aiding in lowering the proportion of DLC waste being sent for disposal.

The findings of this study showed that between the two landfills studied, the greatest amount of DLC waste by number of truck loads came from roofing projects for the Ecowaste Landfill and residential demolition for the Vancouver Landfill. The greatest amount of DLC waste by weight for both facilities combined came from residential demolition at approximately 843 out of the 1,523 tonnes of material sampled (55%).

The most prevalent material by weight from the sampled material at the Ecowaste Landfill was wood. The next greatest contributing materials by weight composition were rubble/soil, asphalt products, and plastic. For the Vancouver Landfill, the greatest contributing material was wood. The next greatest contributing materials by weight composition were rubble/soil, asphalt products, and concrete.

The Most Prevalent Material by Weight Composition from the Sampled Material by Landfill

Rank	Ecowaste Landfill		Vancouver Landfill	
	Material Category	Percent Composition	Material Category	Percent Composition
#1	Wood	37%	Wood	61%
#2	Rubble/Soil	20%	Rubble/Soil	18%
#3	Asphalt Products	12%	Asphalt Products	6%
#4	Plastic	10%	Concrete	5%

On an annual basis, it was calculated that approximately 86,318 metric tonnes of DLC waste was disposed at the Ecowaste Landfill between December 2010 and November 2011. During the same time period, it was calculated that an estimated 192,454 tonnes of DLC waste was disposed at the Vancouver Landfill.

Combining the results of the 100 loads sampled representing the total DLC waste disposed in Metro Vancouver, the percentage of material by weight (using the total aggregate net weight and volume of all 100 loads sampled) was determined. The material contributing the greatest overall composition by weight was wood. The next greatest contributing materials by weight were rubble/soil (may include gravel/rocks and some small pieces of crushed concrete, brick and asphalt), asphalt products, and concrete.

The Most Prevalent Material by Weight Composition of the Total DLC Waste Disposed in Metro Vancouver

Rank	Total Metro Vancouver	
	Total Metro Vancouver	Percent Composition
#1	Wood	54%
#2	Rubble/Soil	19%
#3	Asphalt	8%
#4	Concrete	5%

The following report presents the findings of the study in greater detail.

Disclaimer

The samples collected and audited for this study are "snapshots" in time, meaning the reported quantities are estimates and only represent the conditions for the period of time in which they were collected. Seasonal and annual variability, weather, and other factors can affect the amount and composition of waste and recyclables generated by the DLC sector at any given time. Even with combined educational, regulatory and financial initiatives the reader should not assume that it is necessarily easy, practical, or economical to recover a substantial portion of a disposed material from a mixed waste stream or at its source.

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1.0 INTRODUCTION

1.1 Background

The Greater Vancouver Sewerage and Drainage District (GVS&DD) has set a goal of increasing the regional waste diversion rate from 55% to 70% by 2015. In order to contribute to this goal, a demolition, land-clearing, and construction (DLC) waste monitoring program was developed. This program aids in gaining up-to-date estimates of the composition of the DLC waste stream for the Metro Vancouver area. With up-to-date composition data, diversion opportunities can be identified to aid in lowering the proportion of DLC waste being sent for disposal.

AET was contracted by the GVS&DD to conduct a visual DLC waste composition monitoring program over 5 days between the dates of October 11 and October 15, 2011. The program involved selecting 50 inbound DLC truck loads from each of the selected landfills (Ecowaste Industries Landfill in Richmond & Vancouver Landfill in Delta) and conducting visual audits on each of the selected loads to determine the percent composition of material types by volume. Once the data was collected, visual estimates were made of the overall composition by volume. These were translated into weights, and the annual projected tonnages of each material type at each facility were then calculated.

Both landfills serve approximately 2 million people living in and around Metro Vancouver. The region disposes of approximately 86,318 Tonnes of DLC waste at Ecowaste Landfill and 192,454 Tonnes at Vancouver Landfill annually (estimated tonnages are based on monthly data provided between December 2010 and November 2011).

1.2 Objectives

The DLC waste composition monitoring program of inbound material loads at the Ecowaste Landfill and Vancouver Landfill was intended to accomplish the following objectives:

- Observe a minimum of 50 DLC material loads at each of the selected waste disposal facilities for a total of 100 samples;
- Obtain information on each DLC load specific to truck number, licence plate, vehicle type, size, fullness, type of load (demolition, land-clearing, or construction), source, and net weight (provided through scale ticket by scale operator);
- Conduct a visual composition audit on each of the loads selected for sampling and, based on these audits, report all waste composition estimates by volume, weight, and percentage;

- Estimate the annual overall composition of DLC waste disposed of in the region at both facilities based on an extrapolation of the audit's results over the course of a year;
- Project annual tonnages of each material type described in Appendix C of RFP No. 11-132 for each facility;
- Develop a comprehensive summary report which details the estimated annual generation profiles described above for each facility and includes the same categories arranged by DLC uses described in Appendix D of RFP No. 11-132 to allow for comparison of results with those of the previous DLC Waste Composition Study (Gartner Lee, 2005).

2.0 METHODOLOGY

2.1 On-site Facility Orientation

Prior to commencement of any field work, AET staff members participated in on-site facility tours and safety meetings. This aided in gaining a familiarity with the facilities as well as understanding health and safety protocols.

2.2 Inbound Truck Sampling

A minimum of 50 DLC loads were to be sampled from each facility for a total of 100 samples during the monitoring period. Each truck was sampled on a next available basis. AET and/or landfill staff did not introduce any bias into the load selection process other than ensuring that the waste was originating from DLC activities (i.e. trucks were not selected or rejected for the audit based on hauler, size, origin, observed contents, etc.).

As trucks were sampled, information was gathered from each of the drivers by one of the AET auditors. Specifics such as truck number, licence plate, vehicle type, size, fullness, type of load, and source were collected via a driver interview. A photograph was taken of each truck during off loading. The net weight of each truck sampled was collected through a scale ticket printout provided by the scale operator at each of the facilities.

Figure 2.1 AET Auditor Collecting Information from Truck Driver

2.3 Composition Auditing

After each qualifying truck unloaded their material at the tipping face, an AET auditor did a walk around of the material pile and took photographs. During this time, a visual volumetric assessment of the material composition was completed. A list of material categories (Appendix A) was provided by Metro Vancouver before sampling and was utilized for both facilities. As inbound loads were visually audited, the percentage of materials by volume was recorded. The estimated volumes were later converted into weights based on truck size and

fullness, standard material bulk density conversion factors, and the net weight of each individual truck load.

Figure 2.2 AET Auditor Visually Auditing Truck Material

2.4 Data Analysis and Statistical Evaluation

Following the completion of the field work, all collected data was entered electronically into spreadsheets which converted truck loads from volumetric composition to weight equivalents. This was completed using the net weights of each load, the size and fullness of each truck, and bulk density conversion factors (found in Appendix B) for each material type. The annual quantity of each material type received at the facilities was also calculated based on the results of the converted volume to weight equivalents and the provided annual total weight of DLC waste disposed at each facility. This monitoring program uses the same material categories and conversion factors used in the previous DLC Waste Composition Study (Gartner Lee, 2005) to allow for comparison of results.

The accuracy of each sample's bulk density conversion was calculated relative to the actual net weight of the load, as reported on the scale ticket. For example, if the bulk density conversion resulted in an estimated total weight of 9,500 kg for a particular sample, and the scale ticket indicated the load was 10,000 kg, then the accuracy for that sample was -5%. The aggregate bulk density accuracy of all loads for each landfill was also calculated, and was found to be within 6.8% for the Ecowaste Landfill, within 0.5% for the Vancouver Landfill and within 2.5% for both facilities combined. The accuracy results are presented with the detailed audit results in Appendix C.

Confidence intervals (90%) were calculated for each primary and secondary waste category for each facility, by volume and by weight. Confidence intervals were found to be relatively wide for most waste categories. This is not unexpected, and supports the observation of significant variance in material composition between loads. This was more prominent at the Ecowaste Landfill where variability between loads was particularly noteworthy (e.g., a roofing load followed by a load of telephone poles). The confidence intervals are presented with the detailed audit results in Appendix C.

2.5 General Observations & Limitations

Employee Behaviour:

Ecowaste Landfill - After AET staff had completed the visual audit of an inbound truck load, Ecowaste Landfill staff would have it removed from the immediate area in order to dispose of it and provide a clean space for another sample to be audited. In some cases, before removal, Ecowaste Landfill staff were observed picking scrap metal out of the loads. The picked scrap metal was transferred to a dedicated recycling pile. This was not a standard practice as it was only completed on select loads and/or where manpower was available. Due to this, the reported proportion and estimated annual weight of metal disposed at Ecowaste Landfill may be off.

Vancouver Landfill – During the sampling period at the Vancouver Landfill, some inbound DLC loads were observed being rejected at the tipping face by landfill staff due to presence of banned materials (e.g., drywall). Because of this, the reported proportion and estimated annual weight of drywall disposed at Vancouver Landfill may be off.

Condition of Inbound Materials:

It is worth noting that the tipping fee structure at the Vancouver Landfill for the “Demolition” tipping area is a flat rate per load, regardless of weight. As a result of this, AET observed that haulers would generally try to maximize the value of their trip by ensuring every load was as full as possible. This translated into most loads being heavily shredded and/or compacted (see figure. 3. 2). This condition of materials reduces the auditors’ abilities to uniquely identify all materials to the degree possible in an un-processed/compacted state (e.g., distinguishing between sub-categories of wood).

Landfill Weight Records:

It was observed that not all trucks weigh-out of the landfills after unloading. This is because many trucks have established accounts with the landfills, whereby a set vehicle tare weight is stored in the system. As a result, reported load net

weights from landfill scale tickets may not be the exact weights of loads deposited, considering the potential fluctuating tare weights of trucks (e.g., fuel load) or use of different equipment (e.g., different trailer/truck combinations).

Seasonal Variability:

AET received and reviewed historical tonnage reports for each landfill representing several years. The most recent 12-month period (December 2010 through November 2011) was selected from each landfill to use as the total annual estimated generation rates by weight. This method takes into account the actual annual weight of material landfilled, including any seasonal fluctuations in weight disposed. What is not represented here, however, is the relative proportion of load types/sources over time. For example, it was not possible to determine the seasonal shifts in number/weight of construction or demolition loads versus land-clearing loads over the course of a year. Anecdotal evidence given by staff at both landfills indicated that although there are general fluctuations in number of loads disposed over time, they did not suspect that there was much fluctuation in breakdowns of materials received. It was noted, however, that on a smaller time scale (day-to-day or week-to-week), weather conditions have a greater impact than general overall seasonal patterns. For example, roofing contractors are able to work through any seasonal temperature variations, but are not likely to work during rain or snow events.

3.0 RESULTS

The following tables and charts display the results of the DLC waste monitoring program completed by AET. Each individual facility where sampling had taken place has its own section with corresponding results including estimated annual material composition weights. As well, a section follows displaying results of both facilities combined. Results here are summarized by primary material categories for each landfill. Detailed results by individual sample and secondary material categories can be found in Appendix C.

3.1 Truck Collection Summary

A summary of the total 100 samples collected from both the Ecowaste landfill and the Vancouver Landfill is displayed in table 3.1.

Table 3.1 Summary of Inbound DLC Truck Loads During Study

Waste Category	Ecowaste Landfill	Vancouver Landfill	Total Loads	Net Weight of Loads (Tonnes)
Transfer Station Reload	9	5	14	301
Demolition Commercial	8	7	15	253
Demolition Residential	6	37	43	843
Renovation Residential	1	0	1	8
Construction Commercial	2	0	2	2
Construction Residential	1	0	1	4
Land-Clearing	6	1	7	30
Manufacturing	0	0	0	0
Roofing	12	0	12	49
Self-Haul	1	0	1	9
Hydro Poles	4	0	4	25
Total	**50**	**50**	**100**	**1,523**

"Self-Haul" as a waste source in the table above refers to the self-haul bunker that was visually audited in place of the 50th truck sample that was unacquirable at the Ecowaste Landfill. The Self-Haul bunker at the time of the audit contained waste from many small loads accumulated over several days. The scale house was not able to determine at which point the bunker had last been emptied, therefore, the exact number of loads and weight of material in the bunker at the time of the audit was unknown. Information was provided to AET that of the total inbound disposed DLC waste at Ecowaste, 2% is contributed from Self-Haul. Using this information, the total net weight of the material audited in the Self-Haul bunker estimated by multiplying the total net weight of all 49 inbound samples to Ecowaste by 2%.

Over the sampling period, AET sampled a total net weight of approximately 1,523 tonnes of material between the two facilities. The greatest amount of DLC waste by number of truck loads came from roofing projects for the Ecowaste Landfill and residential demolition for the Vancouver Landfill. The greatest amount of DLC waste by weight for both facilities combined came from residential demolition at approximately 843 out of 1,523 tonnes (55%).

It is important to note that even though both of the facilities receive DLC waste from the Metro Vancouver area, both have a very different composition of materials being disposed of (both by volume and weight). The Vancouver Landfill site has material specifications for demolition and construction waste as follows:

> Loads must be a minimum of 80% wood. Soft construction materials such as plastic, carpet, insulation etc. must be removed prior to delivery of the load; residual quantities of soft construction wastes shall not exceed 2% of the load by volume. Roofing materials are acceptable in the loads as long as the other load requirements are met. Recyclables such as concrete, metal (white goods are prohibited), corrugated cardboard and tires shall be removed to the extent practical. Yard trimmings and land clearing waste (unless shredded) are only acceptable in small quantities. Any soil mixed in with the Demolition Material must meet all requirements for Urban Park use. Any wood, which contains chemical preservatives, pentachlorophenols, creosote or the like, is prohibited. Hazardous Wastes as defined in the Environmental Management Act, household garbage, buckets, drums (or any other liquid container) and gypsum are prohibited. Loads must also not contain any of the materials described in the Landfill's Prohibited Materials list.[1]

The sources of waste materials also differ between the two facilities. For example, from the sampling conducted by AET, results showed that 74% of the DLC waste material loads received at the Vancouver Landfill came from residential demolition waste sources. The remaining 26% of the inbound DLC waste material loads came mostly from commercial demolition (14%), transfer station reloads (10%), and land-clearing (2%). This means the majority of the inbound waste to the Vancouver Landfill is very characteristic of demolition type materials. As for the Ecowaste Landfill, inbound DLC waste material came from a greater variety of sources. The greatest percentage of inbound material loads for this facility came from roofing waste sources at 24%. The remaining inbound material loads came mostly from transfer station reloads (18%), commercial demolition (16%), residential demolition and land-clearing at 12% each, and hydro/telephone pole loads at 8%. Construction, residential renovation, and the self-haul load made up the remaining 10% of the sampled loads.

[1] Demolition and Construction Waste. 2008. City of Vancouver. 20 December 2011 <http://vancouver.ca/engsvcs/solidwaste/landfill/demoWaste.htm>.

Figures 3.1 and 3.2 give an example of a roofing load sampled at the Ecowaste Landfill and a residential demolition load sampled at the Vancouver Landfill. These photos were selected as they were representative of the composition that each of these waste sources commonly displayed.

Figure 3.1 Inbound Ecowaste Landfill Load #7 – Roofing

Figure 3.1 displays a photo of roofing waste with common waste materials consisting of dimensional lumber, asphalt shingles and tar paper.

Figure 3.2 Inbound Vancouver Landfill Load # 23 – Residential Demolition

Figure 3.2 displays a photo of residential demolition waste inbound to the Vancouver Landfill. A common characteristic of this type of waste included a high volume of dimensional lumber (shredded/non, treated/non).

3.2 Ecowaste Landfill Composition

Materials were classified into one of 16 primary categories and 36 sub-categories during the audits. For clarity, the composition results sections below summarize results by the primary categories only. For example, the "wood" category contains the combined weights of 6 wood sub-categories, including dimensional lumber (treated/painted), dimensional lumber (unpainted), pallets, wood flooring, wood shakes/shingles, and composite. Refer to Appendix A for a full list of primary and secondary categories. Appendix C can be referenced for the complete breakdown of results by primary and secondary material categories, as well as the same results with material categories reorganized by DLC use.

The figure below (figure 3.3) displays the material composition by weight as determined through calculations using the net weight of each inbound load, the estimated load volume, and standardized bulk density conversion factors.

The most prevalent material by weight from the sampled material at the Ecowaste Landfill was wood at 37%. The next greatest contributing materials by weight composition were rubble/soil, asphalt products, and plastic at 20%, 12%, and 10%, respectively.

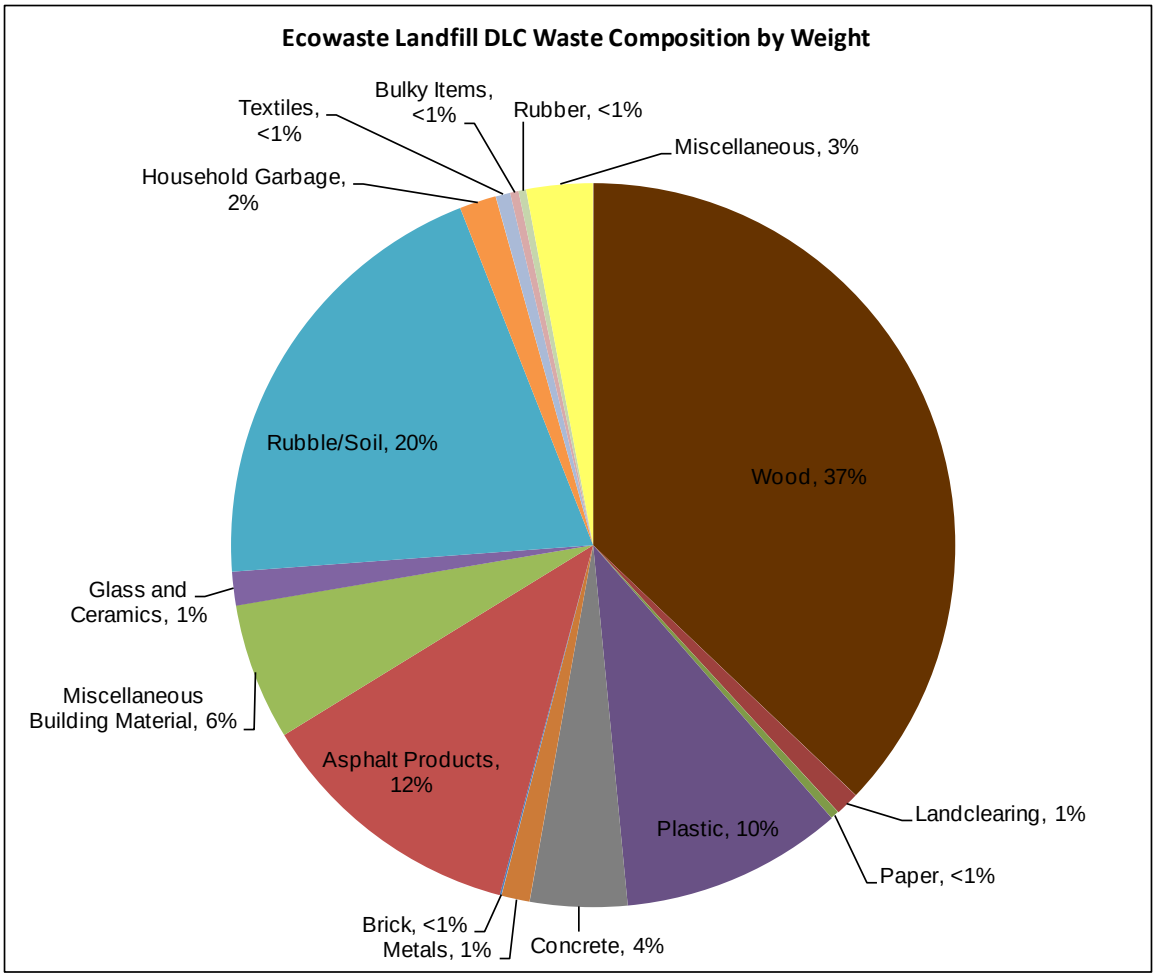

Figure 3.3 Ecowaste Landfill – DLC Waste Composition by Weight

Table 3.2 displays a summary of each primary material category with the corresponding volume and weight composition percentage. Also included is each material category's total estimated annual weight (metric tonnes). The overall total estimated annual weight disposed for the Ecowaste Landfill was determined through historical data which included monthly disposal weights for the facility from December 2010 through to November 2011. It was determined that approximately 86,318 metric tonnes of DLC waste is disposed annually at the Ecowaste Landfill.

Table 3.2 Ecowaste Landfill – Summary DLC Composition

	Ecowaste Landfill		
Material Category	**% by Volume**	**% by Weight**	**Total Estimated Annual Weight (Tonnes)***
Wood	37%	37%	32,038
Rubble/Soil	11%	20%	17,442
Asphalt Products	8%	12%	10,423
Plastic	16%	10%	8,554
Miscellaneous Building Material	13%	6%	5,266
Concrete	4%	4%	3,744
Miscellaneous	3%	3%	2,565
Household Garbage	2%	2%	1,415
Glass and Ceramics	1%	1%	1,280
Metals	2%	1%	1,093
Landclearing	2%	1%	924
Textiles	<1%	<1%	561
Paper	<1%	<1%	330
Bulky Items	<1%	<1%	325
Rubber	<1%	<1%	291
Brick	<1%	<1%	67
Total	**100%**	**100%**	**86,318**

* "Total Estimated Annual Weight" is based on tonnage data provided by Metro Vancouver from Dec 2010 through to Nov 2011 for a full year.

It should be noted that several loads received at the Ecowaste Landfill were fully composed of a particular material category (e.g., load of polystyrene blocks). In these cases, the net weight of the load, as reported by the scale ticket, was used to convert the volume to weight, rather than using the general bulk density conversion factors.

3.3 Vancouver Landfill Composition

The figure below (figure 3.4) displays the percentage of material by weight as determined through calculations using the net weight of each inbound truck, the fullness volume, and standardized bulk density conversion factors.

The material contributing the greatest weight from the sampled inbound DLC truck waste to the Vancouver Landfill was wood at 61%. The next greatest contributing materials by weight composition were rubble/soil, asphalt products, and concrete at 18%, 6%, and 5%, respectively.

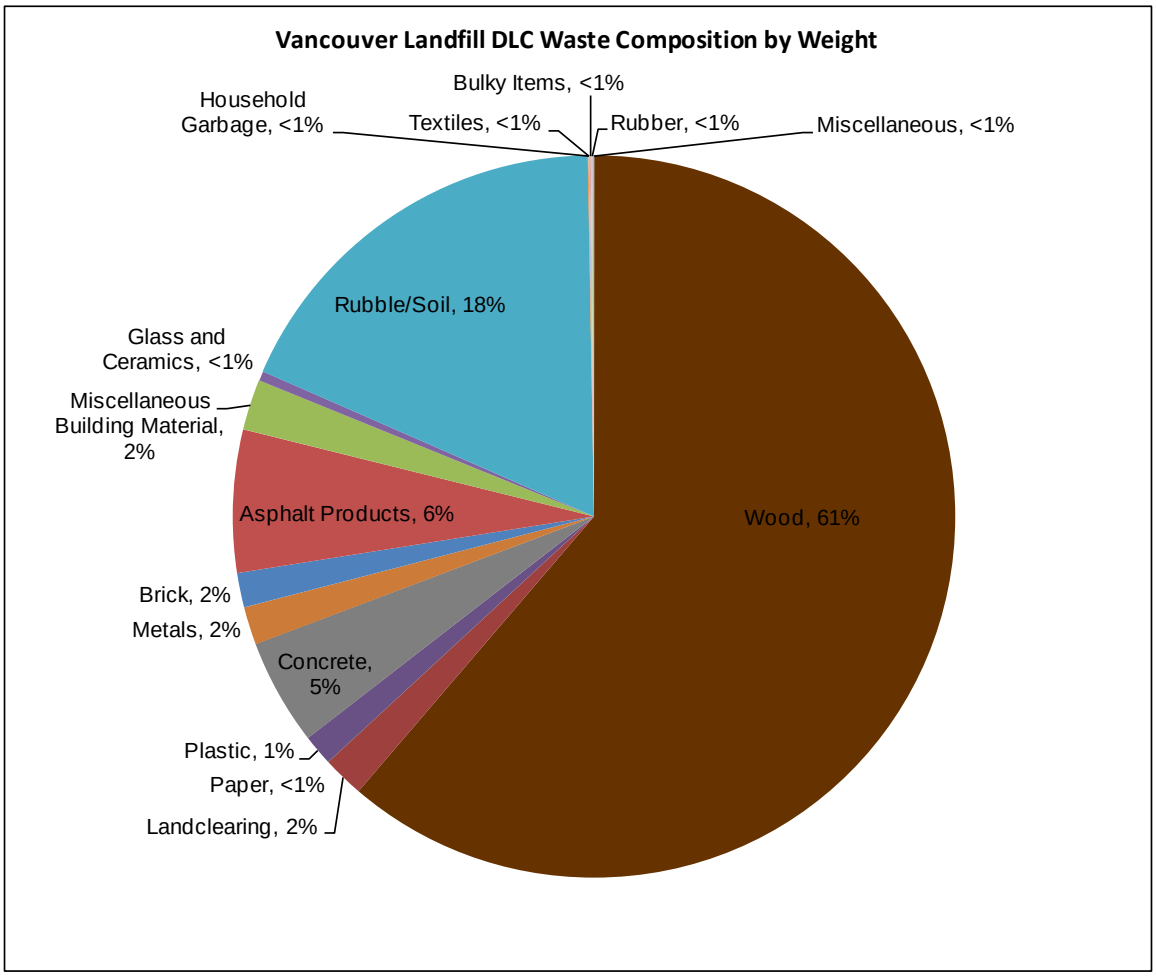

Figure 3.4 Vancouver Landfill – DLC Waste Composition by Weight

Table 3.3 displays a summary of each primary waste material category with the corresponding volume and weight composition percentage. Also included is each material category's total estimated annual weight (metric tonnes). The overall total estimated annual weight disposed for the Vancouver Landfill was determined from provided data which included monthly disposal weights for the facility from December 2010 through to November 2011. It was determined that

an estimated 192,454 tonnes of DLC waste was disposed at the Vancouver Landfill between December 2010 and November 2011.

Table 3.3 Vancouver Landfill – Summary DLC Composition

	Vancouver Landfill		
Material Category	**% by Volume**	**% by Weight**	**Total Estimated Annual Weight (Tonnes)***
Wood	66%	61%	117,915
Rubble/Soil	11%	18%	34,921
Asphalt Products	5%	6%	12,300
Concrete	4%	5%	9,147
Miscellaneous Building Material	5%	2%	4,360
Landclearing	3%	2%	3,567
Metals	2%	2%	3,268
Brick	2%	2%	2,962
Plastic	2%	1%	2,625
Glass and Ceramics	<1%	<1%	821
Miscellaneous	<1%	<1%	141
Rubber	<1%	<1%	127
Textiles	<1%	<1%	98
Bulky Items	<1%	<1%	98
Household Garbage	<1%	<1%	80
Paper	<1%	<1%	24
Total	**100.0%**	**100.0%**	**192,454**

* "Total Estimated Annual Weight" is based on tonnage data provided by Metro Vancouver from December 2010 through to November 2011

3.4 Metro Vancouver DLC Composition

This section reports on the two facilities combined to represent the total DLC waste disposed in Metro Vancouver. The figures displayed include composition by volume and weight for both facilities (Ecowaste Landfill and Vancouver Landfill).

The figure below (figure 3.5) displays the percentage of material by weight as determined through calculations using the total aggregate net weight and volume of all 100 loads sampled.

The material contributing the greatest overall composition by weight was wood at 54%. The next greatest contributing materials by weight were rubble/soil (may include gravel/rocks and some small pieces of crushed concrete, brick and asphalt), asphalt products, and concrete at 19%, 8%, and 5%, respectively.

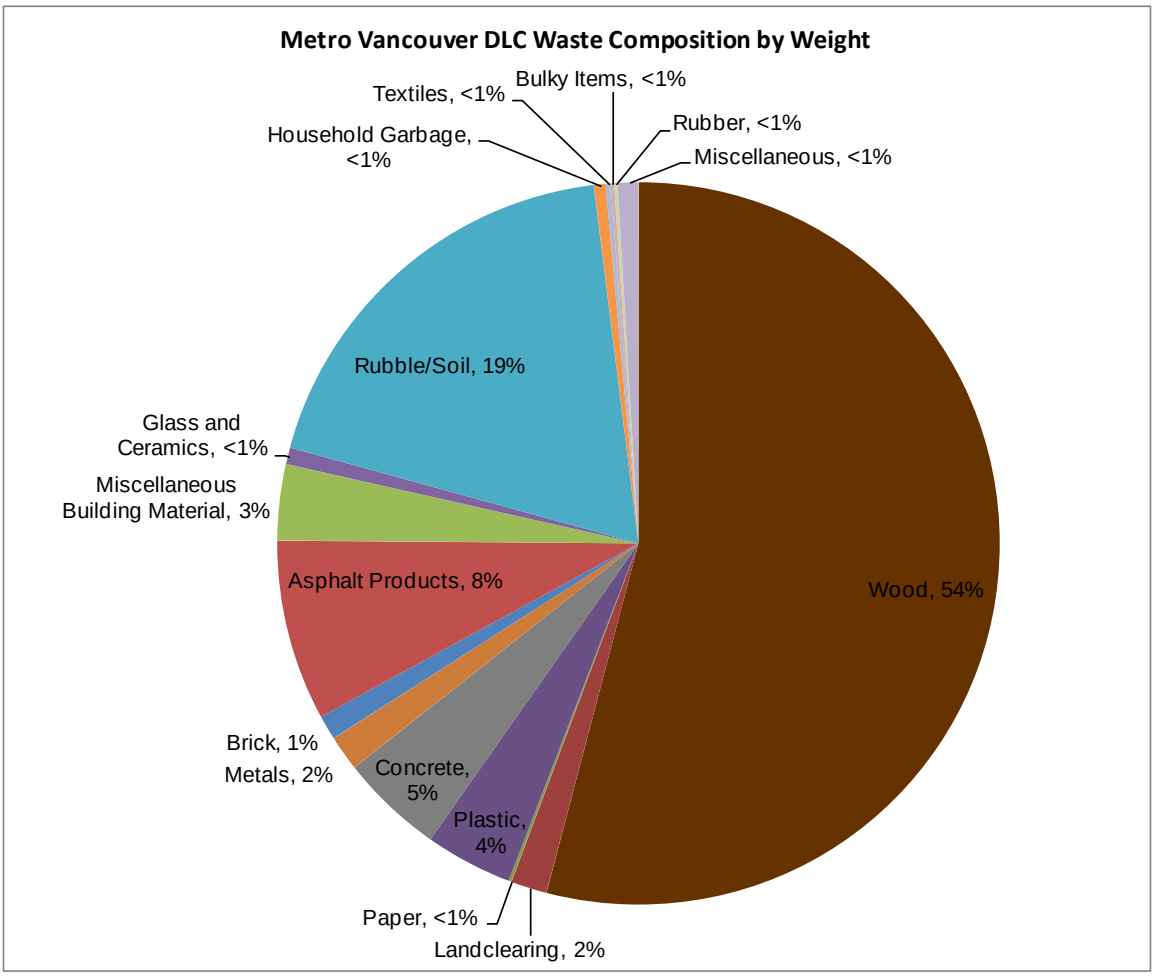

Figure 3.5 Metro Vancouver – DLC Waste Composition by Weight (Categorized by Material Type)

Table 3.4 displays a summary of each primary and secondary waste material category with the corresponding composition by volume and weight for Metro Vancouver (Ecowaste and Vancouver Landfill). Also included is each material category's total estimated annual weight (tonnes). Each material composition percentage by weight was multiplied by the total annual disposed weight of DLC material in Metro Vancouver. The overall total estimated combined annual weight disposed for both the Ecowaste Landfill and the Vancouver Landfill was determined through the addition of each of the provided data sets which included monthly disposal weights for each facility for a full year (December 2010 to November 2011).

Table 3.4 Metro Vancouver – Total Estimated Annual Weights and Material Composition (Categorized by Material Type)

	Ecowaste and Vancouver Landfill Combined		
Material Categories	**% by Volume**	**% by Weight**	**Total Estimated Annual Weight (Tonnes)**
Wood	**57%**	**54%**	**150,823**
Dimensional Lumber (unpainted)	30%	26%	71,380
Dimensional Lumber (painted/treated)	9%	8%	22,797
Pallets	<1%	<1%	315
Wood Flooring (e.g. Hardwood, Laminate)	<1%	<1%	1,347
Wood Shakes and Shingles	1.1%	<1%	2,194
Composite	16%	19%	52,790
Landclearing	**2%**	**2%**	**4,518**
Large yard waste (branches > 15 cm diam. Or 1m long	2%	1%	3,639
Small yard waste, green waste	<1%	<1%	879
Paper	**<1%**	**<1%**	**341**
Cardboard	<1%	<1%	64
Miscellaneous paper (office, kraft, etc.)	<1%	<1%	277
Plastic	**6%**	**4%**	**10,871**
Sheet or film plastic	1%	<1%	141
Styrofoam packaging	2%	<1%	396
Miscellaneous plastic (rigid plastics, pipes, vinyl siding)	3%	4%	10,334
Concrete	**4%**	**5%**	**12,906**
Poured with rebar	<1%	<1%	1,486
Poured without rebar	2%	2%	6,112
Preformed blocks	2%	2%	5,307
Metals	**2%**	**2%**	**4,377**
Ferrous	<1%	<1%	2,283
Non-Ferrous	<1%	<1%	301
Mixed metals (plumbing, electrical, flashing, siding, furniture)	1%	<1%	1,793
Brick	**1%**	**1%**	**3,081**
Asphalt Products	**6%**	**8%**	**22,519**
Pavement	<1%	<1%	337
Asphalt shingles and tarpaper	5%	7%	19,923
Tar and gravel roofing	<1%	<1%	2,258
Miscellaneous Building Material	**7%**	**3%**	**9,488**
Carpet	2%	1%	3,051
Underlay	1%	<1%	1,901
Linoleum Flooring	<1%	<1%	1,015
Drywall	<1%	<1%	1,573
Lath and Plaster	<1%	<1%	328
Stucco wall finishing	<1%	<1%	867
Ceiling tiles	<1%	<1%	371
Insulation (i.e. fiberglass, cellulose, foam)	<1%	<1%	381
Glass and Ceramics	**<1%**	**<1%**	**2,063**
Glass	<1%	<1%	64
Porcelain (i.e., bathroom fixtures)	<1%	<1%	126
Indoor tile (i.e., wall finishing, flooring)	<1%	<1%	1,024
Outdoor tile (i.e., roofing)	<1%	<1%	848
Rubble/Soil	**11%**	**19%**	**52,289**
Household Garbage	**<1%**	**<1%**	**1,438**
Textiles	**<1%**	**<1%**	**638**
Bulky Items	**<1%**	**<1%**	**411**
Rubber	**<1%**	**<1%**	**409**
Tires, tubing	<1%	<1%	96
Rubber roofing	<1%	<1%	312
Miscellaneous	**1%**	**<1%**	**2,601**
Total	**100%**	**100%**	**278,772**

Figure 3.6 and Table 3.5 summarize the same results with categories rearranged by material use (e.g. flooring materials, roofing materials, etc.), rather than by material type.

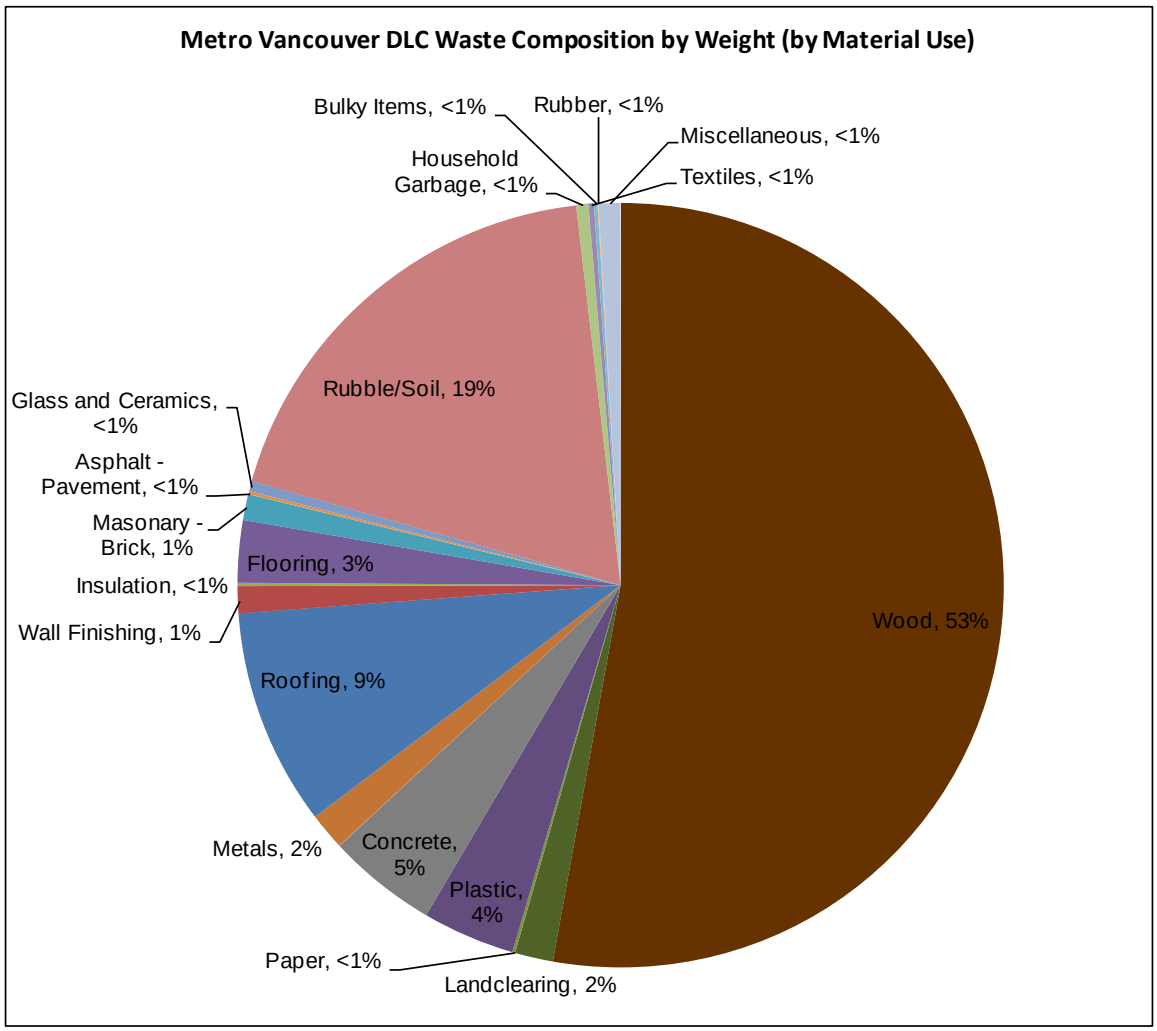

Figure 3.6 Metro Vancouver – DLC Waste Composition by Weight (Categorized by Material Use)

Table 3.5 Metro Vancouver – Total Estimated Annual Weights and Material (Categorized by Material Use)

	Ecowaste and Vancouver Landfill Combined		
Material Categories - By Use	**% by Volume**	**% by Weight**	**Total Estimated Annual Weight (Tonnes)**
Wood	**55%**	**53%**	**147,282**
Dimensional Lumber (unpainted)	30%	26%	71,380
Dimensional Lumber (painted/treated)	9%	8%	22,797
Pallets	<1%	<1%	315
Composite	16%	19%	52,790
Landclearing	**2%**	**2%**	**4,518**
Large yard waste (branches > 15 cm diam. Or 1m long	2%	1%	3,639
Small yard waste, green waste	<1%	<1%	879
Paper	**<1%**	**<1%**	**341**
Cardboard	<1%	<1%	64
Miscellaneous paper (office, kraft, etc.)	<1%	<1%	277
Plastic	**6%**	**4%**	**10,871**
Sheet or film plastic	1%	<1%	141
Styrofoam packaging	2%	<1%	396
Miscellaneous plastic (rigid plastics, pipes, vinyl siding)	3%	4%	10,334
Concrete	**4%**	**5%**	**12,906**
Poured with rebar	<1%	<1%	1,486
Poured without rebar	2%	2%	6,112
Preformed blocks	2%	2%	5,307
Metals	**2%**	**2%**	**4,377**
Ferrous	<1%	<1%	2,283
Non-Ferrous	<1%	<1%	301
Mixed metals (plumbing, electrical, flashing, siding, furniture)	1%	<1%	1,793
Roofing	**7%**	**9%**	**25,536**
Asphalt shingles and tarpaper	5%	7%	19,923
Tar and gravel roofing	<1%	<1%	2,258
Wood Shakes and Shingles	1%	<1%	2,194
Rubber roofing	<1%	<1%	312
Outdoor tile (i.e., roofing)	<1%	<1%	848
Wall Finishing	**2%**	**1%**	**3,139**
Drywall	<1%	<1%	1,573
Lath and Plaster	<1%	<1%	328
Stucco wall finishing	<1%	<1%	867
Ceiling tiles	<1%	<1%	371
Insulation (i.e. fiberglass, cellulose, foam)	**3%**	**<1%**	**381**
Flooring	**4%**	**3%**	**7,314**
Carpet	2%	1%	3,051
Underlay	1%	<1%	1,901
Linoleum Flooring	<1%	<1%	1,015
Wood Flooring (e.g. Hardwood, Laminate)	<1%	<1%	1,347
Masonary - Brick	**1%**	**1%**	**3,081**
Asphalt - Pavement	**<1%**	**<1%**	**337**
Glass and Ceramics	**<1%**	**<1%**	**1,215**
Glass	<1%	<1%	64
Porcelain (i.e., bathroom fixtures)	<1%	<1%	126
Indoor tile (i.e., wall finishing, flooring)	<1%	<1%	1,024
Rubble/Soil	**11%**	**19%**	**52,289**
Household Garbage	**<1%**	**<1%**	**1,438**
Textiles	**<1%**	**<1%**	**638**
Bulky Items	**<1%**	**<1%**	**411**
Rubber - Tires, tubing	**<1%**	**<1%**	**96**
Miscellaneous	**1%**	**<1%**	**2,601**
Total	**100%**	**100%**	**278,772**

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