# Emerald Hills Urban Village

## FOUNDATION RESEARCH BULLETIN

**Design Centre for Sustainability at UBC**

**No. 8**
**December, 2006**

## WASTE

### 1.0 Why is waste a key theme?

According to a study conducted by the Environmental Protection Agency, the residential construction industry in the United States generates 52 million tonnes of waste per year.[1] Of this waste, 55% is attributed to renovation projects, 34% is accounted for by demolition waste, and new construction makes up the balance at 11%. All of this waste represents a tremendous lost of opportunity. The old saying, waste is only waste when it is wasted, is certainly applicable.

The best way to reduce the amount of waste generated, and subsequently the amount of resources required, is to think of waste as a resource. This requires shifting thinking from a linear cradle to grave approach, into a circular cradle to cradle pathway.

Waste can fall into many different categories including (but not limited to) waste heat, blackwater, construction waste, and municipal solid waste (MSW). Each of these types of waste requires different types of treatment options. This technical bulletin focuses on construction waste, and municipal solid waste. Waste heat is discussed in the Energy bulletin, and strategies for blackwater treatment are covered in the Water technical bulletin.

### 2.0 Why is waste important to Emerald Hills Urban Village?

Emerald Hills is fortunate. The Clover Bar Landfill where Strathcona County's Municipal Solid Waste is sent, is not overburdened. In addition, MSW is processed at the Edmonton Composting Facility, reducing the total amount of garbage sent to landfill by 60%.[2] These achievements are commendable and should be continued.

Maintaining an aggressive stance on waste reduction will increase the lifespan into the future, which will delay costly and contentious landfill upgrades. Increasing opportunities for recycling can create an opportunity for revenue for sale of recyclables for the community. And waste reduction improves the health of ecosystems including water and air quality, while preserving land.

Figure 1 shows the composition breakdown of residential waste in Edmonton.[3] Strathcona County currently offers curbside recycling for newspapers and yard wastes. The remainder MSW is trucked to the Edmonton Composting Facility where it is processed into high quality compost. Recycled materials are then removed, and residual waste is

[1] Baxter, 2006.
[2] City of Edmonton. 2003. p. 1.
[3] Ibid.

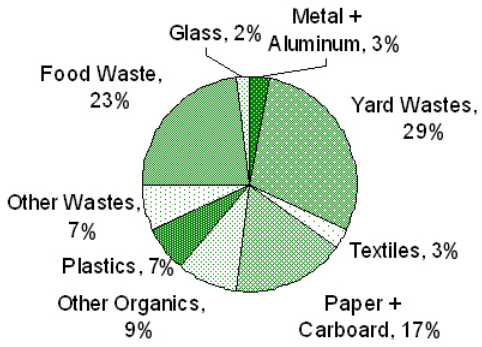


**Figure 1: Composition breakdown of residential waste in Edmonton**

disposed at Cover Bar Landfill.

Waste collected in Strathcona County is sent to the composting facility in Edmonton. This 38,690 $m^2$ (416,500 sq. ft.) facility was built in 2000. It can process 200,000 tonnes of residential waste, 100,000 tonnes of biosolids, and produces 80,000 tonnes of compost a year.[4] This composting facility creating high quality compost, reduces the amount of waste sent to landfill, and reduces the quantity of methane produced.

Albertans have the lowest recycling rates in the country, and only recycle or reuse 17% of their waste.[5] Strathcona County has had success involving the community with curbside recycling programs for yard waste and newspapers. Other waste reduction events include the "Household Hazardous Waste Round-Up" and the "Great Strathcona Exchange" for larger household items. Through these measures and the composting strategy, Strathcona County recently reached a 50% reduction in waste target.[6]

## 3.0 How can EHUV impact on this theme?

Draft two of the Municipal Development Plan for Strathcona County outlines measures that will be investigated to reduce waste. These include:

"16.42 Continue to encourage the reduction, reuse, and recycling of solid wastes and the development of an effective recycling infrastructure;
16.44 Continue to provide accessible waste-management initiatives such as:

a) Clear-bag program;
b) Large item pick-up program;
c) Great Strathcona exchange;
d) Backyard composting program; and
e) Recycling stations.

16.45 Investigate curb side pick-up costs for recycling in the Sherwood Park Urban Service Area;
16.46 Work with surrounding municipalities on the planning and development of an integrated regional solid waste management system;
16.47 Promote home composting; and
16.48 Identify ways to improve existing landfills as well as increase their life spans.[7]"

[4] City of Edmonton. 2003. p. 4
[5] One Planet Living. 2006. p. 21.
[6] Strathcona County, Waste Collection and Recycling Department. 2005.
[7] Strathcona County. 2006. p. 16.4

**Figure 2. In reusing the old garage structure and acquiring salvaged wood for construction, over 50% of the wood used in framing Koo's Corner came from recycled sources. In addition to the ecological advantage and the enhanced marketability of a sustainable product, the developer saved approximately 5% in construction material costs.**

**Figure 3. Slavaged materials incorporated at the C.K. Choi Insitute for Asian Studies at UBC include 90-year old wooden beams, bricks, and stair railings.**

## 3.1 What strategies are relevant for EHUV?

Opportunities for waste reduction lie in changing thinking of waste as an end state to waste as a resource. Strategies for waste reduction are discussed below in three main sections: material specification, construction waste management, and strategies to encourage residents to reduce the amount of waste that they produce.

### Specify Building Materials to Reduce Waste

The construction industry is the largest user of natural resources, and the largest producer of waste.[8] Through material selection, design, and specification writing, design teams have a tremendous amount of control on how much waste is associated with the building. Strategies to consider are incorporating salvaged, recycled, recyclable, and prefabricated materials.

Along the same lines, some strategies included in the Materials Technical Bulletin include design strategies that do correspond to a reduction of waste. These include increasing the longevity of materials and reducing the amount of materials used within the project. For more information, please review the Materials Foundation Research Bulletin.

#### *Source Salvaged Materials*

Design Measures:

Incorporating salvaged building materials is a great strategy to reduce resource consumption and associated energy use, eliminate waste from entering landfills and add character to a new development. Salvaged products typically cost less than virgin materials and can be purchased from nonprofit societies such as Habitat for Humanity or local building recyclers such as Architectural Clearing House. Care should be taken when using older window frame systems, toilets, and other structures since they may be lower performance and less efficient from an energy or water use perspective.

Salvaged materials can be used in residential, institutional, and commercial buildings, as well as public infrastructure such as sidewalks, roads, grading subbase, paving curbs, and sewers.

#### *Specify Recycled and Recyclable Materials*

Design Measures:

For recycling initiatives to be a truly viable alternative to conventional disposal methods, it is necessary that there is market demand for products containing recycled material. Specify materials containing recycled content for building components and for common and public infrastructure components such as sidewalks, road, grading, subbase,

[8] Busby, P. 2001. p. 6.1

**Figure 4. The Mountain Equipment Co-op in Ottawa reuses much of the original structure and was designed for deconstruction.**

**Figure 5: The new LEED Gold Edmonton Police Service South East Division Station diverted an impressive 99.67% of construction waste from the landfill.**

paving, curbing, and sewers. To reduce waste created at the end of the lifespan of the building, component, or infrastructure, materials that can be easily recycled should be specified.

### *Specify Pre-fabricated Materials and Modular Sizes*

Design Measures:

Designing the structural system of the building to standard modular dimensions and specifying materials that are compatible with the module can significantly reduce resource consumption and waste. Since this strategy eliminates the need to cut materials on site, it also eliminates the amount of waste produced during construction. Pre-cast concrete, gypsum board and rigid insulation boards are all readily available in standard lengths, as are most lumber and steel products.

### *Design for Deconstruction*

Design Measures:

When the building has finally reached the end of its lifespan, materials can be harvested and reused in another building. To facilitate easy dismantling of components, mechanical fasteners (i.e. screw connections) should be used instead of chemical fasteners.

## Management of Waste on the Construction Site

The construction industry is the largest user of natural resources and a large producer of waste.

### *Construction Waste Management Plan*

Design Measures:

Through jobsite recycling initiatives, it is possible to divert almost 100% of construction waste sent to landfills. For example, by Not only is recycling prudent from a resource conservation standpoint, but it can also save the contractor money through the reduction of landfill tipping fees.

## Encourage Residents to Reduce Waste

The design and construction phase of the development is one contribution to waste generated, however, there are a different set of strategies to reduce the amount of waste generated by the residents themselves.

### *Include a recycling station within the design of buildings*

Design Measure:

Providing a location where residents and building occupants can sort their waste, will encourage recycling.

**Figure 6: The gates to City Farmer's Compost Demonstration Garden in Vancouver, BC**

### *Include a Compost Demonstration Garden in the Development*

Design Measure:

Sherwood Park residents have embraced curbside pick up of yard waste for composting, and all municipal solid waste is sent to the Edmonton Compost Facility for processing. Even with centralized composting, there are many reasons to encourage residents to do backyard composting. First of all, it encourages residents to think about the amount of waste they are generating and how to reduce that at source. Second, it creates a high-quality soil additive that can be incorporated into gardens. The construction process for subdivisions usually results in poor soil quality, since existing high quality topsoil is typically removed before construction, and heavy construction machinery results in soil compaction.[9] Compost can help to increase the quality – and quantity – of the topsoil, and aid in the establishment of plant growth. Third, organic waste accounts for 25-40% of MSW. As organic waste breaks down, it produces methane which is a significant greenhouse gas. Composting organic waste can reduce methane production.[10] Backyard composting reduces the quantities of waste to be picked up for processing, increasing the capacity of the system and reducing on transportation requirements.

Emerald Hills should situate a Compost Education Centre in the area, much like the John Janzen Composting Education Centre in Edmonton or City Farmer's Compost Demonstration Garden in Vancouver. These centres help to demystify the composting process by offering workshops and showcasing the process. They serve a multiplicity of functions: resource hub, workshop centre, and a community gathering place.

Compost Demonstration Gardens have been situated in every municipality in the Greater Vancouver Regional District. The City Farmer's Compost Demonstration Garden has been educating the community on sustainable urban agriculture techniques since 1978. The 370 $m^2$ (3,982.64 sq.ft.) garden features a cob shed with green roof, cob oven, organic food garden, composting toilet, natural lawn, water wise garden, and backyard and worm composting bins. The building onsite is used for composting workshops, as a centre for research on environmental conservation, as a meeting space for environmentally focused community groups, and as a drop off centre for waste materials such as used batteries. Visitors to the garden can learn how to harvest rainwater for reuse, how to compost their garden waste and kitchen scraps, and how to minimize their ecological footprint.

### *Include a recycling station and household hazardous waste depot within the development*

Design Measure:

Similar to other recycling stations in Strathcona County, a

[9] Kidd, K. May 7, 2006.
[10] Recycling Council of BC, Organics Working Group. April 2000.

**Figure 7: The In-Vessel Composter at UBC**

recycling station should be included within the development. This station would be a drop off point for community members to bring their used paper, plastics, glass, metals, yard waste, and household hazardous waste.

***Include a composting facility on site***

Design Measure:

It is also possible to include a neighbourhood composting facility in the development. One precedent is the In-Vessel Composter at UBC that is capable of composting 5 tonnes of food waste per day in two weeks (Figure 7). This system is fully enclosed which eliminates odours, leachates, and rodents.

## 4.0 What policies and/or programs will add value?

**Figure 8. Each year the Great Glebe Garage Sale in Ottawa attracts hundreds of bargain hunters.**

**Increase the frequency of the Great Strathcona Exchange**

The Great Strathcona Exchange is a one day event where residents bring unwanted yet usable items to the Strathcona Public Services Yard for exchange. The event is free, and encourages residents to get rid of unwanted items, or to find items that may be of use to them. The exchange event has been very successful, however, it is only one day a year. The success on this event can be built upon by running the event on more than one day throughout the year.

Alternatively, Strathcona County can encourage a neighbourhood wide garage sale event. For example, 2007 will be the 18th year for the Great Glebe Garage Sale (Figure 8). Held on the Saturday of the May long weekend, this event is a community wide garage sale held in Ottawa's Glebe neighbourhood. The sale promotes community, encourages waste reduction, and raises money for the Ottawa Food Bank. The event attracts hundreds of visitors from around the community, other areas of Ottawa, and other cities. The success for individual sellers is much greater with the community wide garage sale since the event attracts so much foot traffic.

**Institute a curbside recycling (blue box) program**

Currently, Strathcona County only picks up newspapers for recycling at curbside. To increase materials diverted from the waste stream, Strathcona County should consider expanding on its curbside recycling program. A recent study looked at participation rates of various recycling schemes, and it found that participation rates were higher for programs that collected more types of materials.[11]

There are many different variables that affect participation rates in residential curbside recycling programs. Designing the right program depends on the culture of the community, the goals for the program, and the budget. Out of the different variables involved, it appears as if higher participation rates are achieved with mandatory programs, however, well designed voluntary

[11] Woodard et al, 2006. p. 914.

programs can also achieve high levels of participation. Other factors that appear to increase participation rates include whether free collection bins are provided to residents, how often recycling is picked up, and whether there is commingled or segregated collection.[12]

**Promote material exchange websites**
Strathcona County can help promote waste reduction by encouraging residents to post unwanted items on an online exchange website such as Freecycle or Craigslist. These user populated databases act like a year round yard sale, enabling residents to purchase items that might otherwise have ended up in the landfill.

**Investigate the potential of a waste-to-fuel facility**
One opportunity for managing municipal solid waste is to investigate the potential of a waste-to-fuel facility. Gasification process in which MSW is converted into an energy rich fuel that can be burned to create electricity or heat using a district energy system. The process is highly efficient, resulting in a gas without the production of pollutants. A gasification demonstration project is under construction at Ottawa's Trail Road Landfill site.[13]

## 5.0 What other resources are available?

Foundation Research Bulletins:
#3 Water, for information on blackwater management.
#4 Carbon, for information on utilizing waste heat, pyrolysis, and gasification.
#6 Food, for more information on composting.
#7 Materials, for information on reducing waste through material selection.

Architectural Clearing House
5920 Gateway Blvd. (103 Street) Edmonton (780) 436-1222, http://architecturalclearinghou.supersites.ca/
Accepts reusable building supplies for resale - including (but not limited to) toilets, sinks, doors, kitchen cabinets, windows and light fixtures.

The Great Glebe Garage Sale
http://www.theglebeonline.com/garagesale/

GVRD's BuildSmart
Offers several resources on construction waste reduction, including guides and master specifications for deconstruction, salvage, and construction waste recycling.
http://www.gvrd.bc.ca/buildsmart/tools.htm

Habitat for Humanity Edmonton ReStore
8210 Yellowhead Trail North West Edmonton Tel: (780) 471-4909 Fax: (780) 471-0762 http://www.edmonton.hfh.org

McDonough, W., and Braungart, M. (2002). *Cradle to Cradle: Remaking the way we make things.* New York: North Point Press.

Sherwood Park's Freecycle Group
http://groups.yahoo.com/group/SherwoodPark-freecycle/

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[13] Plasco Energy Group, 2006.

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## Photo Credits

Figure 1: City of Edmonton

Figure 2: Design Centre for Sustainability

Figure 3: Ibid

Figure 4: Radagast. http://commons.wikimedia.org/wiki/Image:MEC_Ottawa.jpg

Figure 5: IBI Group. http://www.ibigroup.com/NewsDetails.do?id=48

Figure 6: Design Centre for Sustainability

Figure 7: Ibid

Figure 8: Jevy. http://www.flickr.com/photos/jevy/16484554/

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