Response to Request for Expression of Interest

City of Abbotsford

November 19, 2010

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Dear Barry,

RE: Request for Expressions of Interest for an Organic Waste Disposal and Processing Service

Thank you for the opportunity to respond to this request for expressions of interest for an organic waste disposal and processing service for the City of Abbotsford.

Transform Compost Systems is interested in providing this service for the City of Abbotsford, and is well placed to offer this service. Transform has extensive experience in the composting process, designing and building composting facilities, and providing consulting, training and education for all aspects of the composting process. Transform’s local experience includes:

1. Conducted the foodwaste collection and composting pilot program for the Fraser Valley Regional District in 2006.
4. Obtaining a non-farm use exclusion for a commercial composting facility together with Jayendee Farms on Gladwin Rd.

Transform’s vision for this organic waste processing facility includes a:

1. Bioenergy/nutrient recovery facility where the heat from the composting process will be used to heat a greenhouse for year-round organic strawberry production.
2. Organic soil and nutrient center for marketing valuable soils and soil amendment products for local agriculture, horticulture and urban gardeners and landscapers.
3. A training and education center for both the composting process as part of Transform’s compost facility operating training program, and the use of compost using Dr. Paul’s expertise as a soil scientist.

Transform has partnered with local companies including Valley Pulp and Sawdust Carriers (50 years of experience managing woodwaste in Abbotsford), Jayendee Farms (who has the only non-farm use exclusion for composting in Abbotsford), and Catalyst Power (currently building experience on processing and economics of high moisture content wastes). Transform also has a teaming agreement with EBA Consulting Engineers, a visionary consulting firm that can provide valuable expertise on P3 partnerships, waste collection and management, carbon credit opportunities, and life cycle analysis.

Transform looks forward to further discussion on how we can divert organics from landfill and create energy and value added products from the organic waste in an economically sustainable manner.

Sincerely,

John Paul, PhD President
Response to Expression of Interest

City of Abbotsford Organics Disposal and Processing Service

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This document contains confidential commercial and technical information and must not be released in whole, or in part, to any third party without the express written consent of Transform Compost Systems Ltd. and EBA Engineering Consultants Ltd.
City of Abbotsford Organics Disposal and Processing Service

Introduction

Transform Compost Systems is pleased to provide a proposal to work together with the City of Abbotsford to divert organics from landfill, and create valuable soil amendment products that enhance a local sustainable food production system. This vision enhances the City of Abbotsford “City in the Country” image by promoting the interrelationship between urban and rural food production and waste management.

In providing this service, Transform Compost Systems is building on its own knowledge and experience with organic waste, as well as partnering with other local reputable firms that have experience and expertise. For example, Valley Pulp and Sawdust Carriers has 50 years of experience with woodwaste processing and markets, and operate an established and successful soil and wood processing and marketing facility in Abbotsford. Transform also partners with other local firms to provide composting equipment and design for composting facilities worldwide. These partners are also proud to be working on a local project that demonstrates vision and leadership in organic waste processing.

Transform also has a teaming agreement with EBA Engineering Consultants Ltd., a visionary consulting firm that can provide valuable expertise on P3 partnerships, waste collection and management, carbon credit opportunities, and life cycle analysis.

The proposed compost facility operates effectively with the surrounding community dealing with traffic, odour, vector and aesthetic issues. EBA provides design for the external facility and Transform designs the composting process. The composting process is designed by an experienced designer and operated with an experienced operating team.

The composting team has enough experience to design the composting facility to exceed current composting standards in British Columbia.

Transform has already been working on approvals and permitting for a site for a composting facility within the City of Abbotsford.

In the following pages, we will answer the specific questions provided in the Request for Expression of Interest. Additional supporting information on the process and the team is in the Appendices.

Transform’s experience is based on 12 years of experience with designing composting facilities, permitting facilities in various locations, training compost facility operators, and operating and managing compost facilities. Key experiences that demonstrate this include:

1. Designed and provided equipment for a local goat manure processing facility in Abbotsford, and for processing sheep mortalities in Olds College, Alberta in 1999-2000.

2. Provided compost turning equipment for one of the first food waste composting facilities in Canada at the City of Guelph in 2000.


4. Installed a locally designed aeration floor (Airfloor™) at a covered aerated windrow composting facility in Bellingham in 2003.

5. Managed the composting of birds and manure for the Avian Flu epidemic in 2004.

6. Provided composting protocol for Avian Flu response and training national CFIA staff during Avian Flu at Fraser Valley Duck and Goose in 2005.
7. Designed and implemented a residential organic waste collection and composting pilot study with the Fraser Valley Regional District in 2006.

8. Obtained a temporary non-farm use permit from the City of Abbotsford and the Agricultural Land Commission for a new composting technology at 5050 Gladwin Rd. in Abbotsford in 2007.


11. Designed two agitated bed composting facilities for foodwaste and yardwaste in Ontario in 2008. This gave us great experience with working with organic waste contaminated with plastics.

12. Provided mixing equipment for biosolids composting for the City of Kelowna and the City of Edmonton in 2009.

13. Published the Compost Facility Operator Manual, which is sold worldwide through JG Press (Biocycle) in 2009.
14. Provided compost facility reviews for UBC and two compost facilities on Vancouver Island in 2010.

15. Provided Airfloor\textsuperscript{R} and computer control for a covered aerated composting facility in Salt Lake City, Utah in 2010.

16. Obtained a non-farm use exclusion for commercial composting at 5050 Gladwin Rd for Jayendee Farms in 2010.

17. Currently negotiating the organics contract with the District of Mission.

**Demonstrated Experience and Knowledge of End Use Markets for Compost Products**

Transform has been marketing compost products since 1999. Composts initially marketed included a soil conditioner produced from composted dairy manure, and worm castings produced from separated dairy solids.

Transform has developed a number of compost products including:

1. Worm castings produced from spent coffee grounds. The photo on the right demonstrates the growth benefit of these castings (tomato on right amended with worm castings).

2. A topdress compost for lawns. In 2010, Transform received accolades from the Village of Harrison Hot Springs for enhancing their waterfront lawns using compost.

3. Transform has been producing a soil conditioning compost since 1998, which is now accepted and preferred by many customers for its soil enhancing value.
4. Transform has developed an organic fertilizer produced from local composted agricultural waste.

5. Transform has developed and provided enhanced soil products that include compost and worm castings for exceptional growth and value. One example is that Transform has provided the soil blend for the Spuds in Tubs program initiated by the Agriculture in the Classroom Foundation.

Transform has been providing compost products for the lawns and gardens at Granville Island since 2008. In 2010, Transform provided compost products for the District of Whistler.

Transform’s vision for the end use for organic wastes is valuable soil amendment products that will allow our urban and rural agriculture to produce local healthy food with a minimum of fertilizer and pesticides.

Description of the Organic Processing Technology

The composting facility is designed by Dr. John Paul, P.Ag., who has designed composting facilities and equipment for over 20 years. The proposed compost facility comports greenwaste and foodwaste (pre consumer and post consumer), and produces a Class A compost. It has an annual capacity of producing 20,000 tonnes of finished compost annually. The compost facility utilizes aerated and turned windrow composting inside a building for six to eight weeks, followed by curing and storage outdoors using covered windrows.

The compost facility consists of the following components:

1. scale for weighing incoming and outgoing vehicles
2. 50 ft wide by 80 ft long building for receiving and mixing foodwaste and greenwaste,
3. 100’ x 200’ outdoor pad for receiving greenwaste,
4. 180 ft wide by 300 ft long covered aerated windrow composting area,
5. 40 ft wide by 300 ft long biofilter for receiving and active composting buildings
6. 50 ft wide by 100 ft long primary screening building
7. an asphalt pad for covered windrows for curing and storage.
8. storm water retention area, including wetland area

Receiving and Mixing Building

The receiving and storage building is a 50 ft wide by 80 ft long enclosed building, consisting of corrosion-resistant trusses, covered by a tarp. The trusses are placed on concrete walls. The floor of the building is concrete.

The building is enclosed and has two doors at the receiving area of the
building and one door at the other end for loader and truck movement to the compost facility. One of the doors on the receiving area is to receive food waste into a reception area inside the building. This receiving door is constructed in a manner that the waste from the truck will not contaminate the truck tires. The other door is to allow transfer of the bulking agent to the mixer inside the building. The door at the other end of the building is to allow transfer of the blended material to the composting facility. This building has high speed roll up doors and is negatively ventilated to a biofilter for odor control.

Mixing Area and Mixer

The mixing area is inside the receiving and mixing building adjacent to the reception area for food waste.

The mixer, a Supreme EnviroProcessor vertical auger mixer, is powered by a 200 hp electric motor. The food waste and bulking agent is loaded into the mixer using an industrial loader with a 3 to 6 cubic yard bucket. The mix time for the feedstock blend is 5 to 10 minutes. The material is discharged from the mixer using a conveyor. This material is then transferred to the active composting building.

Continuous Aerated Windrow Composting

The active composting system consists of six enclosed buildings that are 30 ft wide and 300 ft long, for a total covered area of 180 ft wide by 300 ft long. Each of the six windrows is 280 ft long, 26 ft wide, and 10 ft high. Access for loading, unloading and compost turner movement will be provided at each end of the building.

The maximum processing capacity per year of the six aerated windrows is approximately 50,000 tonnes of a mix of yard waste and food waste, assuming a bulk density of 650 kg per cubic meter for the feedstock mix and 42 days of active composting. This is the equivalent of a processing capacity of approximately 950 tonnes of waste per week, or 160 tonnes per day (6 day week). This capacity provides at least 25% additional space for peak incoming organic waste flows.

The composting material is placed in the first 25 ft of the aerated composting windrow from the mixing building. The material is turned 12 times during the composting process, which moves the product 25 ft with each turn until it is removed from the far end of the windrow.

The composting windrows are aerated using aeration pipes underneath the center of the windrow. There are four aeration zones along the length of each windrow. The first three aeration zones are 60 ft long, and the fourth aeration zone is 80 ft long. Air is provided to each aeration zone in each windrow using a 1.5 hp centrifugal
blower that delivers a minimum of 500 cfm at 6” of water column pressure. This provides 1-2 CFM per cubic yard of composting material.

The floor of the continuous aerated windrow composting building consists of concrete. Any joints and cracks are sealed using a rubber sealing compound. There is a complete leachate collection system inside this building. The floors slope toward the receiving area, and each of the aeration pipes serve as a leachate collection system. All leachate is directed to a 2000 gallon leachate collection tank outside the building. Condensate from the inside of the roof covers is directed towards another 2000 gallon collection tank.

The aeration blowers are automatically activated by a timer and through feedback from continuous temperature monitoring by temperature probes inserted in the aerated windrows. The aeration blowers are controlled by timers until the pile reaches the set point temperature of 60 C, then is controlled by temperature feedback. Temperatures are also recorded by the computer for environmental compliance requirements.
Biofilter

The biofilter is a 4 ft deep bed of a blend of woodchips and compost that removes odor from the aerated composting windrows and the receiving building. An exhaust plenum removes exhaust air from the front of each of the six windrow buildings, and directs it to a concrete air plenum along the side of the 40 ft wide by 300 ft long biofilter bed. A large stainless steel exhaust blower directs the air through a grid of pipes embedded in a gravel layer underneath the biofilter media. A geomembrane collects any condensation or liquid in the biofilter. The design capacity of the biofilter allows up to five air exchanges per hour inside the composting and receiving buildings, with a retention time of 45 seconds in the biofilter. The exhaust blowers are controlled by VFD, and will automatically run at maximum speed when any of the doors in the buildings are open.

Curing and Product Storage Piles, Curing and Product Storage Area

The curing and storage area is designed to accommodate the curing and storage of the compost. Each of the curing piles will be approximately 15 ft high, 30 ft wide, and up to 425 ft long.

Curing and storage piles are built on an impermeable surface, and covered by Compostex® textile cover material. Compostex® textile covers are made from non-woven synthetic UV-protected fiber that is completely permeable to oxygen, carbon dioxide, and water vapor. The textile cover insulates the piles, and protects them from precipitation. It also provides an additional odor barrier.

The piles will be oriented with the slope so that any precipitation will be directed away from the compost material. A swale at the top of the curing and storage area will redirect any run-on water away from the curing and storage area.

Screening Area and Screener

The material is screened with a 100 yard/hour star screener. Overs from the screener will be redirected back to the receiving area, and the fines will bagged or sold.
Description and Location of the Processing Site

The preferred site for composting Abbotsford’s organic and agricultural waste is at 5050 Gladwin Rd., Abbotsford, BC, where a non-farm use exclusion has already been obtained for this activity. We are also reviewing other potential sites if they may be better suited. Transform already has a facility approved at Cache Creek, but we would prefer to work within the City of Abbotsford if possible.

The site at 5050 Gladwin Rd. is conveniently located close to the James Treatment plant where biosolids are available, close to Valley Pulp and Sawdust Carriers where greenwaste is already being received, woodwaste ground, and composts and soils sold. It is also close to the Valley Road transfer station, and the Abbotsford Mission Recycling Services organic waste drop off.

The above diagram shows the proposed layout of the compost facility at this site. The composting area will be surrounded by an earthen berm that serves for flood protection. Trees are planted around the site to create a buffer and visual barriers.

This site has been used for agricultural waste composting since 2007 and has produced quality products that are being used in Vancouver, Whistler and beyond. Part of this operation also includes a worm production area, where coffee grounds and agricultural materials are transformed into high value plant growth products. Transform also produces all of the worms for the worm bin program for the City of Vancouver and other local communities.
Part of Transform’s vision for this site is to include a demonstration and education center for both the composting process and for the use of compost, including local sustainable food production.

The processing site will also include Valley Pulp and Sawdust Carriers, located approximately 0.5 km south of 5050 Gladwin Rd. This location has been processing and marketing woodwaste for agriculture and community use for almost 50 years.

This site will continue to serve as a receiving area for woodwaste and yardwaste. It will also continue to serve as a retail center for soils, mulches and compost.

**Status of Ownership, Zoning and Permitting of the Processing Site**

The property at 5050 Gladwin is owned by Jayendee Farms Ltd. Transform Compost Systems has assisted Jayendee Farms in obtaining a non-farm use exclusion from the Agricultural Land Commission for this activity on this property. This application received endorsement from both the Abbotsford Agricultural Advisory Committee, and Abbotsford City Council before being sent to the Agricultural Land Commission.

The property at 5050 Gladwin Rd. is the only agricultural property in the City of Abbotsford that has a non-farm use exclusion for commercial composting.

The property is currently zoned agricultural and the owners of Jayendee Farms have already had discussions with the City of Abbotsford Planning Department on the requirements for municipal zoning requirements. This process will also have to be approved through the Fraser Valley Regional District’s Solid Waste Plan.

Transform will assist Valley Pulp and Sawdust Carriers in its applications for non-farm use on this property, as it can be argued that this activity has been accepted by the community, and has been serving agriculture for many years.

Transform’s Composting Site at Cache Creek has all permits and zoning requirements in place already.
Schedule Showing Necessary Steps and Completion Date for Service to be Operable Jan 1, 2012

January 2011 – continue working with City of Abbotsford Planning Department on zoning requirements and changes for 5050 Gladwin Rd. and 4491 Gladwin Rd.

February 2011 – application to the Fraser Valley Regional District to include 5050 Gladwin in the Solid Waste Plan.

March 2011 – complete design of composting site including all buildings.

April 2011 – prepare demonstration area for local sustainable food production

May 2011 -

June 2011 – notification to the Ministry of Environment as part of the OMRR to begin composting

July 2011 – construction of composting facility and pads begin (only requires building permits – zoning change not required to begin construction.

August 2011 – complete Operations Plan including Air Quality Plan, Leachate Management Plan and Closure Plan as required for the Ministry of Environment under OMRR

September 2011 – have all site works complete, including all roadways, outdoor pads, berms and wetlands area

October 2011 -

November 2011 – complete constructing all buildings and installing equipment

December 2011 – system ready to receive materials

Flexibility of Process to Manage Other Organic Waste Streams

This composting process is very flexible to manage other organic waste streams that are approved in Schedule 12 of the BC Ministry of Environment’s Organic Matter Recycling Regulation.

The technology used is very flexible for all types of organic waste because of the combination of turning and aeration. The facility is modular and can very easily be expanded as required.

Additional Information

Energy Recovery

Although many are excited about the potential for energy recovery from organic wastes, particularly through wet or dry anaerobic digestion, the economics of this has not been well established. Transform constructed a small anaerobic digester in 2005, but concluded that recovering the potential energy from heat capture may be a more economically sustainable method of energy recovery from the composting process.

Transform reviewed the economics of the commercial organic wet anaerobic digester at Dufferin, Ontario and concluded the net cost of anaerobic digestion may be more than $200 per tonne of material (after including the value of the methane). Columbia University recently also published a report concluding that although energy
recovery through anaerobic digestion is a great idea, the process requires government subsidies to be economically viable. Given our current economic status, we do not think that it is wise to have to rely on a government subsidized process.

Transform has worked with recovering the potential energy through heat recovery since 2005. Transform is aware of all of the current projects and technology in North America that have or trying to recover heat energy. Transform has come up with a plan to utilize the heat energy in a greenhouse located beside the composting facility.

**Rationale for Current Compost Process Design**

It is well understood in the composting industry that a combination of aeration and turning produces the highest quality compost in the shortest time period. The technology that Transform will be using for the facility in Abbotsford combines the best of the aerated windrow technology, the turned windrow technology, and the agitated bed technology. This process will be contained inside a corrosion resistant building structure which will allow full odor control. Workers are isolated from the composting process as well to maintain a high standard of worker health and safety. We will compare some of the advantages and disadvantages of the various current technologies to provide the rationale for the present technology.

**Aerated Windrow Technology**

Aerated windrow technology is a static aerated process, where the composting material is placed in windrows up to 30 ft wide and 10 ft high on an aerated floor. A loader is required to build the piles, move the material onto another aerated floor after several weeks, and remove the material for curing or screening. It is important to mix the material at least once during the composting process to meet potential pathogen kill requirements and break preferential air pathways. A benefit to this technology is the aeration that provides oxygen to the composting material, speeding up the process. With covered aerated windrow technology, a cover winder is also required to place and remove the covers.

Transform has provided an aerated floor for a covered aerated windrow system in Lynden, WA in 2003, and for a large biosolids composting facility in Salt Lake City, UT in 2010.

<table>
<thead>
<tr>
<th><strong>Advantages</strong></th>
<th><strong>Disadvantages</strong></th>
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<tbody>
<tr>
<td>Oxygen is provided to speed up process</td>
<td>Extensive loader work required to move product</td>
</tr>
<tr>
<td>Material is mixed only once</td>
<td>Preferential air pathways develop – slowing process</td>
</tr>
<tr>
<td>Simple process – air, floor and cover</td>
<td>Cover and floor expensive</td>
</tr>
<tr>
<td>Cover protects compost from precipitation</td>
<td>Cover winder required to move covers</td>
</tr>
<tr>
<td>Cover provides odor control</td>
<td>Cover life expectancy 5 years</td>
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**Turned Windrow Technology**

Turned windrow composting is the most common composting technology available. It is simple because it requires only a windrow compost turner and a pad on which to process. It is most commonly used for yard waste composting. Turned windrow composting requires that the windrows be made using a truck or loader, then turned as required to blend the material and provide oxygen. An operator is required to operate the compost turner.

Windrow sizes had been limited by the size of the turning equipment. Turners capable of turning windrows up to 30 ft wide and 10 ft high are available. There is a challenge when utilizing this technology inside a building because of limited operator visibility.

Transform has been involved in a number of facilities using a turned windrow process including Dr. Paul’s first compost facility design in 1991 for Agriculture and Agri-Food Canada.

<table>
<thead>
<tr>
<th><strong>Advantages</strong></th>
<th><strong>Disadvantages</strong></th>
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<tbody>
<tr>
<td>Simple process – only pad and turner required</td>
<td>Large pad and leachate control required</td>
</tr>
<tr>
<td>Turner action reduces particle size</td>
<td>Limited oxygen in composting material</td>
</tr>
<tr>
<td>Produces high quality compost</td>
<td>Limited odor control potential</td>
</tr>
<tr>
<td></td>
<td>Does not lend itself to an indoor process</td>
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**Agitated Bed Composting**

Agitated bed composting was the most common type of composting that is contained within a building. It is characterized by long aerated concrete channels that contain the material. A specialized compost turner rides on the walls and moves the material along the channel. It is a flow through process, where raw material enters one end of the channel, and the composted material is removed from the other end. It is a turned and aerated composting process, which creates the highest quality compost in the shortest time period.

Transform has designed several of these facilities including two in Ontario, one in China and one in Alberta.

<table>
<thead>
<tr>
<th><strong>Advantages</strong></th>
<th><strong>Disadvantages</strong></th>
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<tbody>
<tr>
<td>Continuous flow process – less labor</td>
<td>Costly concrete walls required</td>
</tr>
<tr>
<td>Aeration and turning – quality compost</td>
<td>Specialized compost turner required</td>
</tr>
<tr>
<td>Odor control capability</td>
<td>External biofilter required for odor control</td>
</tr>
<tr>
<td>Small footprint</td>
<td></td>
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<tr>
<td>No operators in composting space</td>
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</table>
Continuous Aerated Bed Composting

Continuous aerated bed composting combines the benefits of turned windrow technology with aerated pile technology in a continuous flow process. With this technology, composting material is placed along one side of the composting area, and a specialized compost turner moves the product either to the right or to the left. The compost turner requires an operator which is a limitation for visibility when utilized inside a building. It makes very efficient use of space, as the piles can be up to 10 ft high. An aerated windrow that is moved to the right or to the left using a cross conveyor behind the turners is a variation of this technology.

**Advantages**
- Continuous flow process – less labor
- Aeration and turning – quality compost
- Odor control capability
- Small footprint

**Disadvantages**
- Specialized compost turner required
- External biofilter required for odor control
- Visibility limitations for operator indoors
- Wide free span building required for indoors

The Technology for Abbotsford - Continuous Aerated Windrow Composting

The technology proposed for Abbotsford combines the best of all of the previously described processes in a cost effective and environmentally sound design. The windrows are aerated similar to the covered aerated windrow technology which maintains sufficient oxygen in the windrows to prevent anaerobic conditions and speed up the composting process. The windrows are actively turned similar to a turned windrow technology, which breaks preferential air pathways and mixes the material to produce a more consistent end product. The system is configured as a continuous flow process similar to an agitated bed system which reduces operations cost and provides more control over the process.

**Advantages**
- Continuous flow process – less labor
- Aeration and turning – quality compost
- Odor control capability
- Lower cost corrosion resistant buildings
- High capacity – small footprint
- No operators in composting space

**Disadvantages**
- Specialized compost turner required
- External biofilter for odor control
APPENDIX 1

EBA Engineering Consultants Ltd
Brochure
Your Trusted Advisors

Waste management has been a core competency for over 20 years at EBA Engineering Consultants Ltd. (EBA). We are proud of our ability to serve our waste management clients and equally proud of our record in providing value-added services.

Throughout our history in waste management, we have been involved in a number of diverse and challenging projects in a variety of areas, including:

- Waste Management Planning;
- Regulatory Understanding & Approvals;
- Facility Siting, Design, Construction & Operation;
- Environmental Compliance;
- Closure & Post-Closure Planning; and
- Innovative Technology Development.

EBA has extensive experience in all aspects of waste management planning, including metropolitan regions, cities, towns, villages, rural areas, and Aboriginal communities. Our services also extend into the private sector for commercial businesses and companies within the waste management, oil and gas, mining, transportation, and development sectors.

Waste Management Planning

- Solid waste management plans
- Landfill gas collection systems
- Zero Waste
- Organics management
- Transfer station design
- Greenhouse gas emissions
- Waste stream analyses and waste audits
- Life cycle analyses
- Extended Producer Responsibility (EPR) program development and implementation
- Disaster debris management planning
- Decision analysis (triple bottom line processes)
- Bylaw and contract development
- Communications – public and Aboriginal Peoples engagement, stakeholder consultation, workshop facilitation, promotional materials

Regulatory Understanding & Approvals

- Strong working relationship with regulatory agencies
- Active involvement in development of new regulations
- Review of regulatory applications on behalf of government agencies
- Regulatory permitting for waste facilities

Facility Siting, Design, Construction & Operation

- Landfills, transfer stations, Material Recovery Facilities (MRFs), and compost facilities
- Life cycle costing
- Logistical impact studies (traffic impact)
- Contract management and tendering
- Construction Quality Assurance (CQA)
- Operational planning
- Geotechnical, geophysical, hydrogeological, and environmental investigations

Environmental Compliance

- Environmental Site Assessments (ESAs), including contaminant assessments
- Development of monitoring and contingency plans
- Compliance monitoring for groundwater, surface water, landfill gas, and soils
- Compliance auditing, including Waste Facility Environmental Reviews (WFERs) under Western Canadian Auditing Roundtable (WCAR) criteria

Closure & Post-Closure Planning

- Landfill cap design
- Proposed future use
- Environmental monitoring
- Financial security

Innovative Technology Development

- Transportation projects – Cold In-Place Asphalt Recycling
- EBA employee sits on the National Research Council to review environmental regulations
- ISO certification
- Concrete re-use in reefs

We walk the talk...

At EBA, we are committed to reducing waste in our own offices through various recycling, composting, and re-using programs. In addition, several offices participate in waste clean-up events such as shoreline and river valley clean-up and Adopt-a-Highway programs.
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- Development of monitoring and contingency plans
- Compliance monitoring for groundwater, surface water, landfill gas, and soils
- Compliance auditing, including Waste Facility Environmental Reviews (WFERs) under Western Canadian Auditing Roundtable (WCAR) criteria

Closure & Post-Closure Planning

- Landfill cap design
- Proposed future use
- Environmental monitoring
- Financial security

Innovative Technology Development

- Transportation projects – Cold In-Place Asphalt Recycling
- EBA employee sits on the National Research Council to review environmental regulations
- ISO certification
- Concrete re-use in reefs...understanding your business needs

eba.ca
APPENDIX 2

EBA Supply of Services for a Composting Facility for the City of Abbotsford
November 18, 2010

Transform Compost Systems Ltd.
3911 Mt Lehman Rd.
Abbotsford, BC V4X 2N1

Attention: John Paul, PhD

Subject: Expressions of Interest for an Organic Waste Disposal and Processing Service

1.0 BACKGROUND

EBA Engineering Consultants Ltd. (EBA), a Tetra Tech company, is pleased to submit the following information to Transform Compost Systems Ltd. (Transform) for inclusion into the Expression of Interest (E of I) for an Organic Waste Disposal and Processing Service being submitted to the City of Abbotsford. This letter contains information about EBA’s waste management team and experience relating to organic waste collection and management, greenhouse gas services, life cycle analysis, and P3 partnerships.

The following sections have been designed to be included in the Additional Information section (page 22) of the E of I provided for review to EBA by Transform. EBA’s Waste Management brochure and resumes for key team members are attached to this letter.

2.0 ORGANIC WASTE COLLECTION AND MANAGEMENT

EBA routinely provides comprehensive planning, design and permitting services for public and private organics waste management facilities including siting, design, permitting, construction, environment monitoring, and ongoing operation controls. Our scope of services includes:

- Organics diversion strategies and policy development,
- Facility planning,
- Development of criteria for evaluation of alternatives and facility siting exercises,
- Geological, geotechnical and hydrogeological investigations, engineering analysis and performance predictions / modeling,
- Environmental monitoring to determine background site conditions and to provide ongoing monitoring of air, soil, groundwater, and surface water,
- Conceptual to final facility design,
– Air emission predictions and controls,
– Leachate and sludge management and treatment,
– Facility development, operations and closure planning,
– Facility performance monitoring and regulatory compliance assessment,
– Obtaining regulator approvals, including public consultation programs and expert witness testimony,
– Social based community planning, and,
– Communications: public and Aboriginal Peoples engagement, stakeholder consultation, workshop facilitation, and promotion materials.

It is vital that customized organic waste strategies are developed to meet stakeholders concerns. EBA provides clients with a variety of engineering and planning services that meet the every increasing need to handle their organic waste. Our strategic approach to providing solutions to complex organics waste concerns involves researching and addressing regulatory issues, environmental concerns and public perceptions to develop innovative and cost effective solutions.

3.0 GREENHOUSE GAS SERVICES

EBA has been providing greenhouse gas (GHG) validation / verification related advisory services since 2006 to leading industry and public sector entities such as Newalta, Canfor Pulp, West Fraser, Cameco, City of Leduc, City of Lethbridge, Calgary International Airport, and Transport Canada.

EBA has quantified the GHG emissions from over 85 facilities across Canada and the United States for the purposes of corporate social responsibility and sustainability reporting for Newalta, a publically traded company, for the calendar year 2009 and will also do this for 2010. This work has included conducting life cycle assessments based on GHG emissions for oil and gas production, used oil recycling, and lead-acid battery recycling. Our scope of services includes:

– Quantification of GHG inventories and verification of GHG reports,
– Validation / verification of GHG emission reduction and / or removal enhancement,
– Review of project plans and project reports for improvement to be compliant with ISO 14064.2,
– Preparation of compliant plans and reports, and,
- Quantification of GHG emissions for the purposes of Corporate Social Responsibility and sustainability reporting.

4.0 LIFE CYCLE ANALYSIS

EBA’s experience with industry, recycling businesses, and developing innovative solutions provides a detailed understanding of the life cycle analysis process. EBA uses the International Organization for Standardization (ISO) protocols for conducting life cycle analyses. The following figure shows a general outline of the ISO LCA process:

Our scope of services includes:

- Compilation of an inventory of energy and material inputs and environmental releases,
- Evaluation of potential environmental impacts related to the identified inputs and releases, and,
- Interpretation and presentation of the results for the use of informed decision making relating to planning and policy.
5.0 P3 PARTNERSHIPS

Through their experience in government administration, contract design and negotiating on behalf of local government, Mark Rowlands and Gordon Mohs of EBA (EBA Core Team members) have experience and training in the development and management of administrative elements in the development of private public partnerships. Gordon has specific knowledge in his capacity as CAO with the Chelhalis First Nation in the development of First Nations agreements and contracts which in the longer term could encourage local First Nations to participate in this project. Past projects include:

- The development of a waste management infrastructure and operations private-public partnership on behalf of the SLRD involving a major U.S.-based waste disposal company, a local hauling company and the SLRD,
- Development and management of small sole-proprietorship contracts to delegate operational management services for a variety of small public utilities on behalf of the SLRD,
- Design and management of a design/build contract for the Hope Airpark as well as a management contract to operate the facility,
- Management of the design/build contract to construct the North Fraser Firehall #1, and,
- Co-chair for the Squamish Woodwaste Committee in the mid-90’s which was facilitated by the Province to explore private-public cooperation on dealing with industry and local government woodwaste. The Committee included industry and government representatives and conducted a study of wood waste feedstocks leading to a Committee led RFP that attracted proposals including cogeneration and bio-oil solutions.

6.0 EBA CORE TEAM MEMBERS

**Mr. Bert Monesmith** — Mr. Bert Monesmith has been involved in waste management in Canada and the US for over 30 years. He has significant experience in waste diversion program design and development as well as project management and curbside collection within the residential and IC&I sectors on behalf of BFI. As senior marketing director and past RCBC President after 4 years as President, he is responsible for the development of new markets for EBA, client contact building, and project analysis. Mr. Monesmith has proven track record of working with innovative organics technologies and securing corporate sponsorships and donations.

**Mr. Mark Rowlands, B.A.Sc., P.Eng.** — Mark has 20 years of solid waste management experience both in government and in consulting. Over the last few years Mark has been Project Manager and Technical lead on 3 major Solid Waste Management Plans – The
Columbia Shuswap Regional District (CSRD), the Regional District of North Okanagan (RDNO) and the Municipal District of Rockyview, Alberta. The former two included Organics Diversion Strategies and the design of programs using CBSM techniques. Working closely with Product Stewards and other leaders in the field ensures that he remains current in latest developments within the BC Waste Management sector.

Mark has been involved in the evaluation of neighbourhood composting programs, including the system at the University of British Columbia, and instituted a subsidized backyard composter system and designed and implemented a backyard composter education garden on behalf of the Fraser Valley Regional District. He voluntarily designed and managed an office composting system for 4 years for over 110 people which included backyard composting combined with vermicomposting. He is very knowledgeable about small and neighbourhood composting systems and includes organics management as a central component of waste reduction for solid waste management planning.

**John A. Foster, PhD, RPBio, QEP, CEA, EMS(LA) — Principal Consultant** — Dr. Foster is a Principal Consultant with EBA’s Environmental Practice in Vancouver, BC. He is a Registered Professional Biologist, a Certified Environmental Auditor, a Certified Environmental Management System Lead Auditor and a Qualified Environmental Professional (Institute of Professional Environmental Practice). John is also a certified Electronics Recycling Standard auditor, a greenhouse gas (GHG) auditor, an occupational health and safety auditor (OHSAS 18001), a certified Certificate of Recognition (COR) Health and Safety auditor, and is trained in AA1000 sustainability auditing. For the last 19 years, John has focused his efforts on environmental management system consulting, assisting industrial and government clients to assess and implement EMS, including preparation for registration to the ISO 14001 standard. John’s experience in waste management includes review of waste management practices in over 250 EMS gap analyses and compliance audits, specific waste management system audits and opportunity analyses of Cameco’s Saskatchewan mines and recently, development of EMS and operational procedures for Kelowna’s landfill and composting facilities.

**Nelson Lee, M.A.Sc., P.Eng. — is a Lead GHG Verifier with experience in managing the GHG verification work, including the conduct of on-site visits. Nelson has recently verified 8 GHG offset projects and 1 GHG report that are publically available, in accordance with ISO 14064:2006 parts 1, 2 and 3. He also led the review of GHG reporting methodologies, making recommendations for improvement for 3 pulp mills in accordance with ISO 14064:2006 part 1. Nelson has also taught public courses on ISO 14064:2006 part 1 and is developing courses on parts 2 and 3 for internal delivery in 2010. Nelson is a CSA certified GHG Verifier with over 25 years of experience. He is a professional engineer in the Provinces of BC and Alberta and leads EBA’s GHG and Climate Change Practice.**
Gordon Mohs M.A. — Gordon is EBA Engineering Consultants Ltd.’s Principal Aboriginal Relations Specialist with the responsibility of developing EBA’s mutual business relations with Aboriginal Peoples. In this role, he undertakes public engagement and First Nations Consultation on behalf of Project Proponents and on behalf of Aboriginal Peoples. He is also responsible for the development of EBA’s Aboriginal Relations policy.

Stephen Gardner, M.Sc. — Stephen is a Senior Transportation Planner and Project Director for the Ward Consulting Group division of EBA’s British Columbia Transportation Practice. He is the lead for travel demand forecasting and transportation planning and oversees all work undertaken for the group. His expertise is in the area of transportation planning, traffic analyses and parking analyses. He specializes in travel demand forecasting for all modes of transportation and preparation of traffic projections for complex urban corridors. He is also experienced in the assessment of parking requirements for new development projects and preparation of Transportation Management Plans.

Mr. Gardner is the lead transportation modeller with the Ward Consulting Group covering model development and applications for road and transit studies. He holds a Masters of Science degree (Transportation Engineering) from the University of Newcastle-upon-Tyne, UK and has made presentations to municipal staff and EMME user groups. He has led training sessions in the EMME model for staff in the City of Vancouver and BC Transit and is experienced in presentations to public agencies and community groups.

Tamara Shulman — Tamara has over 15 years of experience in education, community engagement, social marketing, and planning, with a specialty in waste reduction and organics management. She planned and implemented the Master Composter Training Program at StopWaste.Org for 5 years, taught sustainable gardening courses to train teachers and the general public. Through education and community organizing efforts, Tamara has successfully engaged culturally diverse audiences to incorporate home composting as a way to reduce waste and add value to gardening practices. She also attended the Maine Composting School certification program for compost operators and has reviewed neighbourhood composting systems throughout the Bay Area.

In West Vancouver, as part of a District-wide waste reduction effort, Tamara partnered with high school environmental clubs and Metro Vancouver staff to conduct waste audits for municipal and school buildings, and convened local leaders to review the results and reinforce support for the region’s Zero Waste Challenge. She consulted with secondary schools in areas with significant wildlife populations, including bears, on options for onsite composting options to process the school’s organics material. She coordinated a food scraps collection pilot that incorporated community-based social marketing to encourage interaction among residents and foster participation. As Chair of the Recycling Council of BC’s Organics Working Group, where she is currently reviewing policies and programs for organics management in multi-family and ICI sectors. In 2009, the OWG published
Recommendations for Residential Collection, which reviewed best management practices for food scrap collection programs.

Neil Allen, B.Sc., M.Sc., PGDipEnvMngt, P.Ag. — Mr. Allen is an Environmental Management Systems Auditor and member of EBA’s Environmental Practice. He has over 12 years of consulting experience in Canada, New Zealand, Australia and Southeast Asia. His GHG experience relevant to the project includes preparation of a GHG Inventory and Action Plan for a large (>600) Canadian engineering firm, review of GHG emissions for the Government of Yukon’s Comprehensive Solid Waste Study, member of a three-person team responsible for the development of Transport Canada’s GHG Protocol for small, medium and large (Tier 1, 2, and 3) airports. Mr Allen has also received training as a GHG Auditor, having successfully competed the Canadian Standards Association (CSA) 3-day training course in GHG Verification, Los Angeles using ISO 14064 (50029594-50036724).

Mr. Mauricio Herrera, Ph.D. - Drainage - Dr. Herrera is a Water Resource Engineer with EBA in the Vancouver office with a background in hydraulic/hydrologic modelling, water quality modelling, and watershed monitoring. Mr. Herrera is also an advanced SWMM user (i.e. EPA SWMM 5.0, PCSWMM.NET, and XP-SWMM-2D), capable of providing advanced and innovative drainage and water quality solutions for a variety of applications including, urban, rural, industrial and mining.

Duncan Lo., M.Eng, P.Eng, PTOE - Senior Traffic Engineer - Duncan has over 15 years experience in the fields of traffic operations and traffic engineering covering capacity analysis, demand forecasting, conceptual design and traffic signal analysis and has undertaken traffic impact assessments throughout the MV area covering industrial, commercial, residential and institutional uses ranging in scale from small lots to multi-block projects. Duncan will review the proposed traffic operations on site and at the site access, identifying any safety deficiencies that require attention.

7.0 CLOSURE

We trust this information meets your present requirements. Should you have any questions or comments, please contact the undersigned at your convenience.

EBA Engineering Consultants Ltd.

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Team Leader Waste Management
Environment Practice
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APPENDIX 3

Transform Compost Systems Brochure
Transform Compost Systems provides complete organic waste processing solutions

From Design to Commissioning of Turn-key Facilities

Transform Compost Systems provides environmentally and economically sustainable solutions that meet your demands and complies with the strictest environmental and safety regulations.

Compost Turners, Mixers, Screeners, Odor Control and Aeration Systems

Transform Compost Systems offers a full line of composting equipment required for your composting facility.

Our alliance with leading suppliers of top quality compost technology is based on more than 20 years of experience.

Design and Commissioning Services

From raw organic waste to final marketable product, Transform Compost Systems provides all support, training and commissioning you need to ensure that your project is successful.
Transform Compost Systems (TCS) provides complete solutions for economically viable and environmentally sustainable organic waste management systems. From facility design and equipment to expert know-how: We offer all technology and services to make sure that your project is a success.

Transform Compost Systems integrates the science of composting with material flow, using cost effective and corrosion resistant building structures and equipment where applicable, in order to improve the process efficiency and reduce costs.

Transform Compost Systems provides technology that does not pollute the air, soil or water, and produces a stable compost that meets environmental compliance regulations. The composting technology is a climate change friendly technology and can be used for carbon offsets where applicable.

Transform Compost Systems provides technology that focuses on the health and safety of the workers.

Transform Compost Systems has strategic alliances with other leading Canadian companies that provide high quality building and equipment components for organic waste management facilities. This linkage and expertise allows Transform Compost Systems to be also a leader in cost effective and reliable solutions.

Transform Compost Systems was incorporated in 1998. Dr. John Paul, the president of the company, is a professional agrologist with more than 20 years of practical experience in composting and waste management. He is internationally recognized for his work on composting and environmental impacts of waste management.

Transform Compost Systems has provided expertise, design, and equipment to compost facilities around the world. Projects include a 40,000 tonne/year enclosed greenwaste/foodwaste compost facility in Ontario, design and equipment for a 200 tonne/day municipal organic waste facility in China, a 10,000 tonne/year facility in New York, compost mixing equipment for many compost facilities including the City of Edmonton, City of Kelowna, City of Santa Rosa.

Transform Compost Systems is an active member of the Composting Council of Canada and the US Composting Council.

Dr. John Paul, President, co-authored the Compost Facility Operator Training Manual, and has provided training for compost facility operators from around the globe.
Transform Compost Systems provides complete organic waste processing solutions

Design and equipment for aerated windrow, aerated bunker or in-vessel composting systems

Top-quality equipment from leading suppliers

Consulting, training, commissioning: waste management from raw material to final product

More than 20 years of experience

Numerous projects worldwide

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APPENDIX 4

Transform’s Quality Control Exceeds Current Regulations
Transform’s Quality Control Exceeds Current Regulations

This compost facility adheres to the following process and quality requirements in order to produce the highest quality compost with minimal environmental and social impact.

1. The receiving process for organic waste includes the following:
   a. All potentially odorous waste is received in a covered building with an impervious floor
   b. Waste is received in a manner that does not contaminate the tires of the vehicles delivering the waste.
   c. All potentially odorous waste is processed within four hours after receiving
   d. Any storage of received odorous waste occurs in an enclosed building that has an active biofilter for the exhaust air with a minimum of three air exchanges per hour

2. The mixing process for organic waste includes the following:
   a. Organic waste is thoroughly blended to optimize the composting process
   b. Potentially odorous waste is blended with woodwaste or other approved bulking agent to produce a blend with a maximum moisture content of 65% and a maximum bulk density of 700 kg per cubic meter

3. The composting process for potential pathogen kill for all organic waste:
   a. consists of an actively turned and aerated process
   b. is a minimum of 21 days
   c. includes a minimum of three days at temperatures exceeding 55 C after a minimum of two mix cycles
   d. includes daily temperature recording with time vs temperature records for each batch
   e. occurs inside a building or under an approved cover system
   f. occurs on a maintained asphalt or concrete floor
   g. includes one or more levels of odor control which include the following as required
      i. aerated piles that are covered with screened compost “overs” to absorb odor from the composting process
      ii. aerated piles that are covered with a breathable cover with demonstrated odor reduction capability
      iii. completely enclosed composting facility that includes a biofilter with the capability of a minimum of five air exchanges per hour.

4. The curing process includes:
   a. a minimum of 65 days of active composting and curing
   b. the curing process begins after a minimum of 21 days of active composting as per requirement 3 above
   c. all curing material is stored on an impervious floor
   d. all curing material is inside a building or covered with a breathable cover

5. All completed compost that is marketed meets the following requirements:
   a. Achieves a Solvita Maturity Index of 7 or greater
   b. Contains non-detectable Salmonella
   c. Contains a fecal coliform of less than 1000 MPN/1000 grams dry weight.

6. The compost facility is inspected annually by an approved Transform representative in a random and unannounced visit

7. The compost facility allows itself to be audited and inspected by any authorized party including local government or a major compost purchaser at the expense of the requesting party

8. The compost facility meets all applicable municipal, provincial and federal regulations.
Transform’s Quality Control Rationale and Further Explanation

Transform’s Compost Facilities adheres to the following process and quality requirements in order to produce the highest quality compost with minimal environmental and social impact.

Certified Process Requirements have been requested by municipalities that wish to ensure that compost facilities are properly designed built and operated in a manner that does not cause water pollution or produce nuisance odors, waste producers that need to ensure regulatory and environmental compliance, and purchasers of compost that wish to understand the compost meets minimum quality standards and has not polluted the environment in any way in its production.

1. The receiving process for organic waste includes the following:
   a. All potentially odorous waste is received in a covered building with an impervious floor
      A compost facility operator does not always have control over the nature and odor of the incoming material. Incoming material may be one of the greatest potential sources of odor in a compost facility. The moisture content of the incoming material may also vary, and any leachate in this received material may contain potential pollutants and must be received in a manner where no leachate can escape into the environment. Most regulations simply require receiving on an impervious floor with a requirement for leachate collection.
   b. Waste is received in a manner that does not contaminate the tires of the vehicles delivering the waste.
      The receiving area is designed in such a way as to minimize the risk of contaminating the tires of the trucks delivering the waste. This is done using an elevation drop or another physical block whereby the waste material cannot come in contact with the truck tires. This is also achieved by locating the receiving area so that incoming trucks do not come in contact with received or blended compost material.
   c. All potentially odor causing organic waste needs to be processed as quickly as possible as this material may already be anaerobic and may be producing odors during storage. Immediate blending of the received material with bulking agent will absorb some of the odor causing compounds and minimize further production of these compounds.
   d. Any storage of received odorous waste occurs in an enclosed building that has an active biofilter for the exhaust air with a minimum of three air exchanges per hour
      For various reasons, some compost facilities are not able to process all of the received material within four hours of receiving. In this case, the receiving building must be enclosed, must have high speed roll up doors, and must have an approved biofilter that allows a minimum of three air exchanges per hour or as required by applicable law. Most regulations specify odor management but may not be specific as to how this may be implemented.

2. The mixing process for organic waste includes the following:
   a. Organic waste is thoroughly blended to optimize the composting process
      The composting process is enhanced and the potential odor is minimized if any potentially odorous material is thoroughly blended with woodwaste. This is performed using mixing equipment that can do this efficiently.
   b. Potentially odorous waste is blended with woodwaste or other approved bulking agent to produce a blend with a maximum moisture content of 65% and a maximum bulk density of 700 kg per cubic meter
      A blended organic waste having a moisture content higher than 65% will likely produce a significant volume of leachate, and produce odor because of a lack of air-filled pore space to allow aerobic bacteria to flourish. The goal is to produce a blend of organic waste that will produce minimal volumes of leachate during the composting process. It is understood that the desired moisture content is between 50 and 65% moisture content and depends on the nature of the organic waste and the bulking agent being composted.

3. The composting process for potential pathogen kill for all organic waste:
   a. consists of an actively turned and aerated process
The composting material must be actively aerated. This can be achieved by frequent turnings (more than 5 turns in the first 15 days) but is preferably achieved by forced aeration through air pipes in the floor. An aerated static pile or aerated bin must be mixed at least once during the composting process in order to ensure that all of the composting material reaches the temperatures required for potential pathogen kill. It is understood that the “edge effect” has to be eliminated by at least one mix, which is where the composting material on the outside of the pile or bin may not reach the temperatures required for potential pathogen kill. This requirement is also reflected in the draft greenwaste composting rule for the Southcoastal Air Quality Management District (AQMD PR133.3a August 20, 2010 – Passively aerated windrow or static pile shall not be used for greenwaste composting).

b. is a minimum of 21 days

There are three important requirements for the composting process. The first is to ensure that all potential pathogenic organisms are killed through achieving minimum temperature requirements as per regulations. The second is to ensure the decomposition of readily available carbon compounds such as proteins and carbohydrates, which are the primary energy sources for potentially pathogenic organisms. The third is that the odor potential of the composting waste is significantly minimized after 21 days of actively turned and aerated composting.

c. includes a minimum of three days at temperatures exceeding 55 C after a minimum of two mix cycles

A batch of composting material will unlikely achieve temperatures for potential pathogen kill in 100% of the mass. The locations where the temperatures will not achieve these temperatures are along the edges of the mass, including the sides, the floor, and the top surface. One complete mix after meeting the temperature requirements for pathogen kill followed by an additional three days at temperatures above 55 C will provide a significantly greater likelihood of potential pathogen kill. Most regulations require a minimum of three days at 55 C for an in-vessel composting process, or 15 days and five turnings for a windrow composting process. Most “in-vessel” composting processes will exhibit the “edge effects” as described above, therefore should implement at least one mix during the composting process.

d. includes daily temperature recording with time vs temperature records for each batch

Each batch of composting material must have a recorded volume or weight, and must have a complete temperature record throughout the entire composting process. Each batch will have its location identified as well to allow audit of the system as may be required. All of the data must be available in hard copy at the composting facility.

e. occurs inside a building or under an approved cover system

It is understood that the composting process is best protected from the environment, and that the environment must be protected from the composting process. The type of building or cover depends somewhat on the climate in the area of the composting facility, but it is also understood that there is risk of high precipitation events in many geographical areas. The composting process cannot proceed efficiently if there is risk of the composting material becoming saturated with precipitation and becoming anaerobic. The risk of environmental pollution from leachate is also great in many geographical areas, therefore processing inside a building or under a cover minimizes the environmental risk as well as optimizes the composting process.

f. occurs on a maintained asphalt or concrete floor

Composting organic material may produce leachate, which must be collected and reused or processed in an approved manner. A well maintained asphalt or concrete floor will minimize the risk of environmental contamination from leachate escaping the composting area. A well maintained asphalt or concrete floor will also allow much more efficient composting of organic waste by allowing an improved surface for loaders or other equipment. Most regulations will require that active composting occur on an impervious surface with collection and treatment of leachate.

g. includes one or more levels of odor control which include the following as required

i. aerated piles that are covered with screened compost “overs” to absorb odor from the composting process

The active composting process is another potential source of odor from a composting facility. Covering the active composting piles with “overs” from the screening process has been shown to be 95% or more effective in absorbing potential odor causing compounds and hence reducing odor from the composting process. This is an accepted odor control method, and is also reflected
in the draft southcoastal air quality management district rule for greenwaste composting (AQMD PR1133.3a August 20, 2010 – “Every active greenwaste composting windrow shall be covered with at least six inches of screened compost after construction of the initial windrow and with at least six inches of screened or unscreened finished compost within one hour after each turning during the active phase of composting”).

ii. aerated piles that are covered with a breathable cover with demonstrated odor reduction capability

There are breathable covers that have a demonstrated odor reducing potential. This is achieved by potential odor causing compounds becoming absorbed in the water layer that develops under the cover. It is understood that breathable covers may not be 100% effective and may be combined with other odor mitigation strategies such as enclosed building with a biofilter.

iii. completely enclosed composting facility that includes a biofilter with the capability of a minimum of five air exchanges per hour.

In composting facilities where the material is being actively turned, or with facilities where the above two odor control strategies are not sufficient, the composting facility must be completely enclosed, have negative ventilation and an approved biofilter that can process a minimum of five air exchanges per hour, or as required by applicable regulation.

4. The curing process includes:
   a. a minimum of 65 days of active composting and curing

This requirement recognizes that composting is a biological process that requires time, and also recognizes that the value of compost increases with age. This time requirement recognizes that the maturity level requirement as per section 5 (a) will require an actively managed composting and curing process. This requirement is also reflected in the draft greenwaste composting rule for the Southcoastal Air Quality Management District (AQMD PR1133.3a August 20, 2010 – “Curing means the phase of the greenwaste composting that begins immediately after the end of the active phase of composting and lasts a minimum of 40 consecutive days or until the compost has a Solvita Maturity Index of seven or the product respiration rate is below ten milligrams of oxygen consumed per gram of volatile solids per day as measured by direct respirometry”)

b. the curing process begins after a minimum of 21 days of active composting as per requirement 3 above

Composting is a continuum, where the boundary between active composting and curing depends primarily on definition. It is understood that a minimum of 21 days of active composting is required to stabilize the composting material to obtain potential pathogen reduction, vector attraction reduction, and reduce the potential for further odor emission.

c. all curing material is stored on an impervious floor

This requirement is primarily for the benefit of compost quality, where the risk of contamination with soil or rocks is minimized, and loader operations are optimized on an asphalt or concrete floor.

d. all curing material is inside a building or covered with a breathable cover

This requirement is primarily for the benefit of the compost quality, to manage moisture contents in the compost and to minimize the risk of weed seeds entering into the compost. The compost product is much easier to screen and becomes much more marketable if the moisture content is controlled during the curing process. It is understood that in some geographical areas, precipitation is minimal, but the benefit of covering the piles to reduce the amount of weed seeds entering the compost increases the quality of the compost.

5. All completed compost that is marketed meets the following requirements:
   a. Achieves a Solvita Maturity Index of 7 or greater

The Solvita Maturity Index is a respiration based maturity test for measuring compost maturity. It is a fast test that can be performed by the compost facility operators and easily verified by regulators or clients. This requirement for a Solvita Maturity Index value of 7 or greater is also found in the draft greenwaste composting regulations for South Coastal Air Quality Management District in California (AQMD PR1133.3a August 20, 2010).
b. Contains non-detectable Salmonella

There are several regulations that specify non-detectable Salmonella. The Canadian Food Inspection Agency Trade Memorandum T-4-120 (Regulation of Compost under the Fertilizers Act and Regulations) specifies non-detectable for Salmonella sp. The Organic Matter Review Institute (http://www.omri.org/simple-gml-search/results/compost) allows up to 3 MPN Salmonella per 4 grams of compost sampled.

c. Contains a fecal coliform of less than 1000 MPN/1000 grams dry weight.

Most compost regulations include this requirement. It must be noted that some laboratory testing methodology does not appear to distinguish between coliform bacteria and certain Bacillus sp., therefore some high readings for coliform bacteria have been observed, when in fact the actual coliform count is negligible. In some instances, specific testing for E. coli may be recommended.

6. The compost facility is inspected annually by an approved Transform representative in a random and unannounced visit

An unannounced inspection as part of the Transform certification process is an important part of maintaining accountability in a composting facility. The inspector may be accompanied by other concerned parties including municipal governments involved with the regulation, local citizens’ groups that may have interest and questions about the compost facility operation, or potential purchasers of compost. This visit and inspection may occur on any day that the composting facility is open for business.

7. The compost facility allows itself to be audited and inspected by any authorized party including local government or a major compost purchaser at the expense of the requesting party

The compost facility will allow itself to be audited or inspected by other relevant and authorized parties who are involved with the regulation of the facility or who may be involved with major compost purchases from the facility. The costs of these audits or inspections are borne by the parties who initiate the inspection.

8. The compost facility meets all applicable municipal, provincial and federal regulations.

It is understood that this certification in no way supersedes municipal, provincial and federal regulations. This certification is intended to improve upon or clarify certain regulations, create a greater transparency of process and accountability, and ensure that the compost produced at this facility meets or exceeds current standards, and is produced in a manner that does not cause pollution or odor concerns in the community.
APPENDIX 5

Transform’s
Composting Proposal
Matches Abbotsford’s Sustainability Goals
Transform’s Organics Processing Facility is Integral for Developing Healthy Community in the City of Abbotsford

John Paul, Ph.D., Professional Agrologist

Summary
Transform’s proposed organics processing facility helps meet goals of the City of Abbotsford’s Charter of Sustainability, where balancing economic, environmental and social needs are important for a healthy community. It becomes part of an integration of the urban and agricultural areas where both residential and agricultural landowners are important stewards of the land. It recognizes that local food production is a vital part of a healthy community.

The organics processing facility also meets objectives in the City of Abbotsford’s City in the Country Plan (2004), which encourages an environmentally sustainable agricultural sector, promotes development of agricultural related business, and promotes a local sustainable food supply.

Transform’s proposed organics processing facility will benefit the City of Abbotsford in the following ways:

1. provides a solution for agricultural waste that is currently underutilized
2. produces valuable organic fertilizers and soil conditioners that:
   a. allow for healthy and nourishing local food production on our agricultural land
   b. allow for safe and sustainable urban agriculture – lawns and gardens
   c. increase the ability of our urban soil to hold water and buffer against flooding
3. provides worms for composting programs for our residential and apartment stewards
4. includes an educational area that allows both urban and rural stewards of the land to learn the benefit and importance of a healthy soil
5. provides a sustainable solution for green waste and other organic waste produced by our urban stewards of the land
6. provides a sustainable solution for our residential and industrial food waste, so that the nutrients in this material can be recycled for local nourishing food production.
7. encourages local agricultural and agri-processing technologies
8. provides additional local employment initiatives
9. reduces our collective carbon footprint in the City of Abbotsford
10. provides alternative products which support a ban on cosmetic use of pesticides
The City of Abbotsford Contains Agricultural and Non Agricultural Land

The City of Abbotsford has a population of 137,000 people and a land base of 39,000 hectares. With 75% of its land base in the Agricultural Land Reserve, the urban population is increasing. The agricultural community is very important for the local economy, as total gross farm receipts in Abbotsford are more than $ 450 million annually (City in the Country Plan 2004)

“The challenge confronting Abbotsford is to ensure that community policies and initiatives that support a balanced economy also encourage expansion of agricultural production. Abbotsford’s future prosperity demands that both occur.” Executive Summary, City in the Country Plan 2004

Healthy Communities Integrate Urban and Agricultural Activities

The City of Abbotsford recognizes that the residential, industrial and agricultural activities in our city are integrally connected, and that all of these sectors must be healthy for a healthy community that is economically strong and environmentally sustainable.

“The City of Abbotsford, in order to protect and enhance the unique and spectacular beauty of our city, recognizes that sustainable development requires a constant and equitable balancing of three major areas: economic, environmental and social. A strong and vibrant economy is one of the core elements of a sustainable community. The citizens of Abbotsford must be able to provide for the basic necessities of adequate food and shelter for themselves and their families. Each member of our community must share the stewardship of our numerous environmental treasures. Clean air, pure water and uncontaminated soil are crucial to the well being of the City’s entire economy and the health and quality of life of its citizens.” Abbotsford Charter of Sustainability.

There are other communities in Canada that include both urban and agricultural areas. Kitchener, Ontario is one such community who defines healthy communities in the following way:

“Healthy community is clean air and water, healthy food, good jobs and safe homes in caring neighbourhoods. It's schools with good teachers and fun playgrounds, parks, bike trails, sports fields and theatres. It is a place where people care about each other, are interested in what is going on, and get involved because they feel responsible for giving something back. And it is a place where social, cultural and spiritual differences are welcomed, a place of peace and social justice, a place where everyone belongs. The quality of our community life is important because we derive physical, mental, spiritual and emotional sustenance - vitality and well-being – from our involvement in community. A community that provides for these basic needs for all of its members, and maintains strong and positive relationships both within and outside the community, is a healthy one.” (Kitchener Community Strategic Plan 2007).

Healthy community model (Hancock 2005)
A Healthy Community Food System is an Integral Part of a Healthy Community

Our food production system is part of a healthy community because it includes living, eating and working together. It is about food safety, food quality, environmental sustainability, enjoying our green space, and appreciating our diversity.

Many of our physical and mental health problems are related to diet and exercise. Our food production system is as least as important our medical system, as far as our individual health is concerned. Are we choosing healthy foods? Do we even know what healthy foods are?

The Region of Waterloo, Ontario has been promoting healthy communities, and has prepared a document “Towards a Healthy Community Food System for Waterloo Region” (Region of Waterloo Public Health, Nov 2005).

Their goal is as follows:

“The goal is to create a system in which all residents have access to, and can afford to buy safe, nutritious, and culturally-acceptable food that has been produced in an environmentally sustainable way and that sustains our rural communities….a region with a diverse agricultural economy, linked with local food needs and markets, will be more sustainable in the long term, with lower environmental costs, reduced demands on transportation infrastructure, and potentially higher food quality that helps serve nutritional objectives. As well, a vibrant local food economy will help sustain our rural communities and the viability of our local farms.”

The City of Abbotsford could have the following objectives for a healthy community food system plan (based on those of Region of Waterloo):

1. Ensure that all residents can afford to buy the food they need to sustain health
2. Preserve and protect the city of Abbotsford’s agricultural lands
3. Strengthen food related knowledge and skills among consumers
4. Increase the availability of healthy food so that healthy choices are easier to make
5. Increase the viability of farms that sell food to local markets to preserve rural communities and culture
6. Strengthen the local food economy

The Region of Waterloo has further integrated sustainable food system goals into Dr. Trevor Hancock’s healthy community model (Region of Waterloo Public Health 2005)
A healthy community food system relies on a sustainable agriculture. The US Department of Agriculture includes it in its definition of sustainable agriculture as a system:

“that will, over the long-term: (1) satisfy human food and fiber needs; (2) enhance environmental quality and the natural resource base upon which the agricultural economy depends; (3) make the most efficient use of non-renewable resources and integrate, where appropriate, natural biological cycles and controls; (4) sustain the economic viability of farm operations; and (5) enhance the quality of life for farmers and society as a whole.” (USDA, 1990).

We have to consider that one of our goals as a healthy community is to be part of a larger healthy food producing community.

“The overall goal of the Global Strategy on Diet, Physical Activity and Health is to promote and protect health by guiding the development of an enabling environment for sustainable actions at individual, community, national and global levels that, when taken together, will lead to reduced disease and death rates related to unhealthy diet and physical inactivity. These actions support the United Nations Millennium Development Goals and have immense potential for public health gains worldwide.” (World Health Organization 2004).

City of Abbotsford’s City in the Country Plan Promotes a Healthy Food Supply

In 2004, the City of Abbotsford initiated a growth strategy for our community called the City in the Country Plan. As outlined in the executive summary, the key motive behind the development of the plan “is to generate sufficient jobs to meet future employment requirements”. The objectives of the plan are:

1. Address the shortage of industrial and business park lands
2. Preserve, protect and enhance our most important industry – agriculture. “ensure that community policies and initiatives that support a balanced economy and encourages expansion of agricultural production”

In the City of the Country Plan, we find the following statements that address the preservation, protection and enhancement of agriculture in the City of Abbotsford.

“One clear trend in Abbotsford’s agricultural sector is the intensification of farming operations. The reason for this intensification is clear, it is the way that farmers can remain economically viable…it would take more than 100 acres under conventional farming practices to equal the pepper production in ten acres of greenhouses…Farming in Abbotsford is big business, conducted in a highly sophisticated manner and requiring a substantial capital investment” City in the Country Plan, 2004

“The City of Abbotsford recognizes the importance of steering development, whenever possible, away from Agriculture Land Reserve lands and onto the hillsides”

“proactive measures must be taken to address long standing issues that include addressing issues relating to agricultural waste, including composting operations”

“The role of ensuring the sustainability and viability of a safe and affordable food supply includes accommodating changing trends in farming practices. The City must ensure that these more intensive farming operations grow and expand in the community.”

“encourage the development of new employment opportunities in agriculture and agriculture related industries, ensure that home-grown enterprises, especially those related to agriculture or food processing, have space to grow without leaving the community, encourage local industries that support the agricultural sector, supporting the expansion of the agri-industrial sector in the City.”
“having the ability to provide a realistic proportion of its food resources within or adjacent to the urban community”

“equal consideration of the long term economic, environmental and social consequences and benefits in decision making”

**Position Paper on Enhancing the Agricultural Economy Recognizes the Importance of Composting to Move Nutrients from Agricultural Properties**

The City of Abbotsford prepared a position paper on enhancing the agricultural economy in 2003. This paper recognizes that managing agricultural waste is a major concern for farmers, and that marketable end products produced through composting as an important strategy to manage agricultural waste.

“Managing agricultural waste is a major concern for farmers. Current information suggests that composting, with marketable end products, will contribute greatly to a resolution of this issue. It is expected that the City will take the necessary steps to develop appropriate regulations to ensure composting operations do not negatively impact the community. However, appropriate composting solutions must still be developed. The City has the opportunity to provide leadership in this area through proactive strategic initiatives that expedite these solutions. This should be done in collaboration with industry, as well as research and scientific institutions” City of Abbotsford Position Paper on Enhancing the Agricultural Economy, April 16, 2003.

**Transform is an Important Part of a Sustainable Abbotsford**

Transform Compost Systems’ Organic Waste Initiative meets many of the goals of the City of Abbotsford’s Sustainability Charter, including promoting nourishing and healthy local food production on both urban and agricultural land, providing sustainable organic waste management, and encouraging the interaction between our rural and urban communities. It recognizes that the City of Abbotsford’s residents are important stewards of the land, whether they have small or large properties.

*Transform provides a solution for agricultural waste that is currently underutilized*

Transform will be providing an environmentally sustainable solution for up to 40,000 tonnes of local agricultural wastes, including horse manure and greenhouse wastes. Both the greenhouse industries and horse owners often export their wastes from their farms. This waste needs to be processed in an environmentally sustainable manner.

The trend to a more intensive agriculture means that more of the inputs are coming from off the farm, more likely from outside of the City of Abbotsford. With a nutrient efficiency as low as 50% in some of the agricultural production, intensification of the agriculture industry leads to increased agricultural waste that needs to be managed in an environmentally sustainable manner.

Much of the waste from the mushroom and greenhouse production systems are underutilized in that there is significant potential energy available in this waste, and the waste is an excellent ingredient for organic fertilizer production.
“One clear trend in Abbotsford’s agricultural sector is the intensification of farming operations. The reason for this intensification is clear, it is the way that farmers can remain economically viable…it would take more than 100 acres under conventional farming practices to equal the pepper production in ten acres of greenhouses… Farming in Abbotsford is big business, conducted in a highly sophisticated manner and requiring a substantial capital investment” City in the Country Plan, 2004

“The range of farming activity is impressive. It includes not only soil bound agriculture, such as raspberries and blueberries, but dairy, poultry, mushroom, and greenhouse production. Agriculture should be a key priority in efforts to grow the economy of the City. Position Paper on Enhancing the Agricultural Economy, April 16, 2003

Transform has been producing valuable organic fertilizers and soil conditioners that move nutrients the sites of production to our urban and rural plant growers.

Transform has also been harvesting some of the heat from the composting process to heat other buildings, and will be utilizing heat in the organic fertilizer drying process.

Transform produces valuable organic fertilizers and soil conditioners for local food production on agricultural land

Transform is producing a valuable soil conditioner that will provide nutrients, increase soil organic matter, and will promote increased disease resistance for field and greenhouse crops. Currently, agricultural production utilizes primarily chemical fertilizers and pesticides to produce valuable crops for local food production. Much of the nutrients supplied by chemical fertilizers can be replaced by the nutrients in compost.
Transform produces valuable organic fertilizers and soil conditioners for a safe and sustainable urban agriculture

Transform is producing composites that can be used for sustainable urban agriculture. Products will include topdress compost that can be used as an organic fertilizer for lawns and turf, a garden blend that can be used for planting beds and vegetable gardens, container growing mixes for container gardening, and nutri-mulch products for annual and perennial gardening.

Transform produces soil conditioners that increase the organic matter of our soil

Transform will be producing composites that increase the water holding capacity of the soil. This is important in minimizing flooding risk by building in a water holding buffer into the soils. Other communities are already implementing soil guidelines that require a minimum amount of organic matter in new developments for the purposes of water retention. This practice reduces the risk of flooding during our rainy season, and reduces water requirements during the dry summers.

Transform provides worms for composting programs for our residential and apartment stewards

Transform has been providing worms and worm bins for residential and apartment composting for more than five years. Transform provides the City of Vancouver with their composting bins, a program that has been in place for more than 10 years, and has delivered more than 2500 worm composting kits to apartment dwellers in the City of Vancouver.

Transform grows the worms on a blend of various products from the agricultural sector.

Transform Compost Systems Ltd.
3911 Mt. Lehman Rd. Abbotsford, BC V4X 2N1
Visit us on the web at: www.transformcompostsystems.com

Ph. 604-856-2722 FAX 604-856-8444
Email: info@transformcompost.com
Transform includes an educational area that allows both urban and rural stewards of the land to learn the benefit and importance of a healthy soil.

Transform recognizes that some education is required to understand the benefits of a healthy soil that contains slow release nutrients, enhanced organic matter, and increased disease resistance. This farm will include demonstration areas for urban agriculture, vegetable and fruit production, and greenhouse crop production. This educational area can also be integrated with educational objectives of local schools.

Transform provides a sustainable solution for green waste and other organic waste produced by our urban stewards of the land.

Transform will be providing a composting solution for up to 20,000 tonnes of greenwaste produced by the local community. This green material will be used to produce some of the high quality soil conditioners which will enhance our local urban and rural agriculture.

Transform provides a sustainable solution for our residential and industrial food waste, so that the nutrients in this material can be recycled for local nourishing food production.

Transform will be providing a composting solution for up to 20,000 tonnes of food waste. Our urban residents are very proud of our current recycling programs, and recognize that source separation of food waste is the next logical step in reducing the amount of waste to land fill. This food waste makes an excellent ingredient for high quality composts that can provide nutrients for lawns and turf. This becomes an important part of our local recycling initiatives.

One aspect of the Transform project will also include heat recovery from the organic material, which is one
strategy for waste to energy. This energy will then be used for heating greenhouses, for drying the organic fertilizer product, or for drying locally produced food.

Transform encourages local agricultural and agri-processing technologies

Transform is providing a technology and a service that makes the agricultural community more sustainable. Finding environmentally sustainable waste management solutions from intensive agriculture production is one of the key strategies for our agricultural communities. The cost of our agricultural land requires intensification of agricultural production, which usually means that more inputs are required from off the farm. When we understand that up to 50% of the incoming nutrients into intensive agricultural operations are exported as waste, it is important to find environmentally sustainable solutions and opportunities for this material.

Transform provides additional local employment initiatives

Transform provides additional local employment in a number of ways. It provides a local business that utilizes and value adds locally produced organic waste instead of shipping it out of our community. It provides new products that can be used in our local urban and rural agriculture, fostering new employment for local food production. It utilizes technology that is locally designed and manufactured, providing increased employment for local manufacturing. Transform is also a model for sustainable waste management, which will be profiled around the world, bringing additional employment to the City of Abbotsford.

Transform reduces the collective carbon footprint in the City of Abbotsford

Transform will reduce the City of Abbotsford’s carbon footprint in a number of ways. Organic waste will be diverted from landfill, generating carbon tax credits that are currently valued at $300,000 annually. The soil conditioners produced by Transform will be increasing our local soil organic matter, which has been recognized
as a significant carbon sink. The local recycling of nutrients and the production of high value products that reduce the need for pesticides also reduces the carbon footprint resulting from the purchase of fossil fuel based fertilizers and pesticides.

*Transform provides alternative products which support a ban on cosmetic use of pesticides*

Transform will be producing high value organic fertilizers and soil conditioners that provide alternatives to support a ban on cosmetic use of pesticides and fertilizers. Long term research on grass at Rothamsted in the UK has shown that properly fertilized and managed grass production will outcompete weed production. Organic fertilizers can provide the nutrient requirements of our lawns and turf.

**References**


Kitchener Community Strategic Plan  2007  A Plan for a Healthy Kitchener (2007 to 2027)


