



**City of Richmond**

**Report to Committee**

**To:** Public Works and Transportation Committee *To Public Works & Transportation - Jun 21, 2006* **Date:** May 30, 2006  
**From:** Robert Gonzalez, P.Eng. **File:** 01-0157-20-TRACI-03  
 Director, Engineering  
**Re:** **Biosolids Management**

**Staff Recommendation**

1. That City staff participate in the GVRD's Liquid Waste Management Sub-Committee to provide input and direction regarding the management of treatment plant biosolids in a sustainable manner.
2. That the Council support, in principle, the strategies proposed by the GVRD in managing biosolids as per the attached "Draft Biosolids Management Plan".

Robert Gonzalez, P.Eng.  
Director, Engineering  
(4150)

Att. 1

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ROUTED TO:		CONCURRENCE		CONCURRENCE OF GENERAL MANAGER		
Environmental Programs .....	Y	<input checked="" type="checkbox"/>	N	<input type="checkbox"/>		
Policy Planning .....	Y	<input checked="" type="checkbox"/>	N	<input type="checkbox"/>		
<b>REVIEWED BY TAG</b>		YES	NO	<b>REVIEWED BY CAO</b>		
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## Staff Report

### Origin

The GVRD's Regional Engineers Advisory Committee recently established a Liquid Waste Management Sub-Committee. Richmond has been invited to participate as a Committee member given that the Lulu Island sewage treatment plant is dedicated to Richmond.

The Committee's work program includes providing input and direction towards the development of a new biosolids management plan that meets sustainability principles for the region over the next 50 years. The purpose of this report is to seek Council's support for staff participation in this initiative and support, in principle, for the strategies outlined in the attached Draft Biosolids Management Plan.

### Analysis

Most of the GVRD's treatment plants, including Lulu Island, are capable of secondary treatment of the sewage (wastewater) collected. The sludge and wastewater collected at treatment plants is processed during the secondary treatment process into a biosolid product. Biosolid production is expected to more than double over the next 30 years because of regional population growth and because the Iona Island and Lions Gate treatment plants will be converted to secondary treatment. The current approach to biosolids management includes stockpiling biosolids at Iona and land application at reclaimed mine sites such as the Highland Valley Copper Mine, which is not sustainable in the long term given the anticipated significant increase in biosolid production. As a result, it is timely that a high level review of the Biosolids Management Plan be undertaken in order to work towards the development of long term sustainable strategies to meet local municipal needs.

The intent of the Draft Biosolids Management Plan is to identify strategies that are worthy of further review and investigation. The in depth review of each strategy will include cost implications, long term sustainability, and overall impact.

The strategies identified in the Draft Biosolids Management Plan are:

1. Use biosolids as a fuel to produce energy

There are numerous methods in which biosolids can be utilized to produce energy. As an example, biosolids could be burned in order to produce heat or electricity. This would be a new sustainable approach for biosolids management in the GVRD.

2. Use of biosolids for land application

Currently land application of biosolids is limited due to the high metal content in the biosolid material. In particular, high levels of mercury and lead in the biosolid material prohibit land application in residential areas. Although the GVRD does produce a limited amount of topsoil for public purchase, the energy involved in processing high quality top soil is not sustainable. It is cost prohibitive to produce high quality topsoil from biosolids with the high metal content.

The development of a new strategy for sustainable land application will require amendments to bylaws, education and the introduction of source control measures to reduce contaminants.

### 3. Disposal of biosolids that can not be used

While it is most sustainable to utilize biosolids for energy production or land application, there will be some quantity that will not meet minimum threshold criteria in terms of metal content or simply the overall volume may be too great. Therefore biosolid disposal preferably at a mine reclamation site or, as a last resort, in a land fill should be a guaranteed back up option.

### **Financial Impact**

None at this time. Before the Biosolids Management Plan is adopted along with a long term strategy, a report will be brought to Council for input.

### **Conclusion**

The GVRD has established a Liquid Waste Management Sub-Committee to provide input into a new Biosolids Management Plan. The attached draft report introduces sustainable strategies that staff believe warrant an in depth review. Having staff involvement early in this process will ensure that the strategies developed will be suitable for Richmond and support our vision of being the most appealing, livable, and well managed community in Canada.



Robert Gonzalez, P.Eng.  
Director, Engineering  
(4150)

# Draft Biosolids Management Plan for the Greater Vancouver Regional District (GVRD)

## 1. SUSTAINABILITY

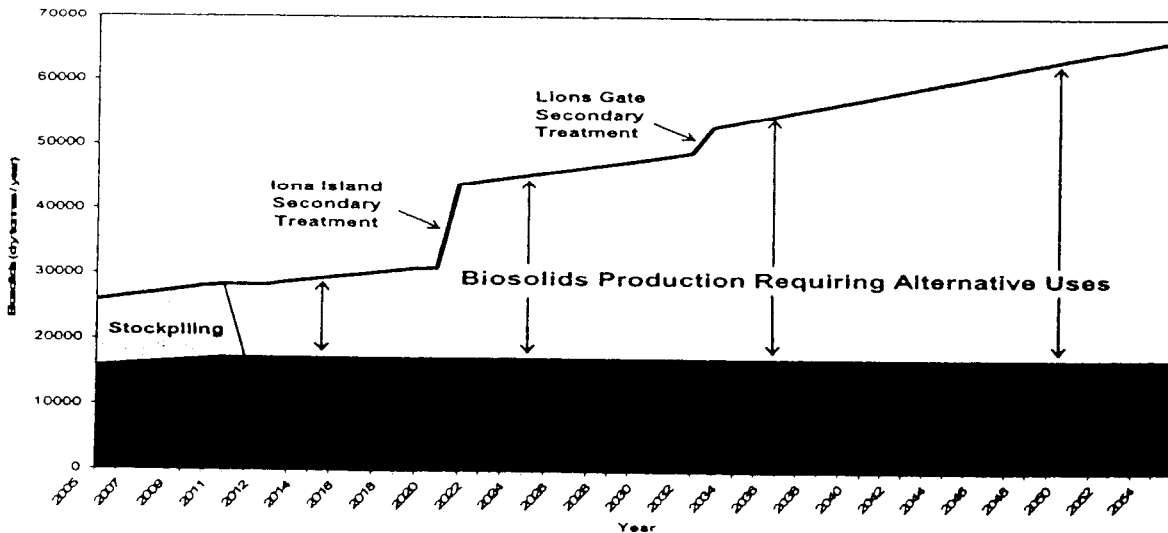
Sustainability encompasses economic prosperity, community well-being and environmental integrity for current and future generations. It is the core vision of the GVRD. Through its Sustainable Region Initiative, the GVRD has identified the need for plans to address delivery of regional services according to the principles of sustainability. The plans set strategic direction and formalize policies and actions that provide health and economic benefits, and that take a long-term view to ensure that current resources remain available to future generations.

### Sustainability and the Biosolids Management Plan

The Biosolids Management Plan (BMP) provides direction for managing the region's wastewater treatment plant sludge and biosolids in a sustainable manner. Sludge is a byproduct of wastewater treatment. It can be used as a fuel for energy production or digested to produce a biosolids product suitable for land application as a fertilizer or soil amendment. (For simplicity, only the term biosolids will be used throughout the rest of this plan.) Both land application and energy production are beneficial uses of biosolids that support sustainability. The BMP contributes to creating a more sustainable region by maximizing the beneficial use of biosolids and by securing a disposal method as contingency when beneficial uses are not available.

Biosolids are constantly produced and the quantity is always increasing. Over the next 50 years, the region's biosolids production is expected to more than double due to population growth and increasing levels of wastewater treatment. The following figure illustrates that, by 2012, current land application customers will not be able to use all of the supply of biosolids. To address this challenge, the BMP calls for a facility that uses biosolids as a fuel to create energy. This would provide a renewable source of energy for the region and ensure that there is no gap between biosolids supply and use.

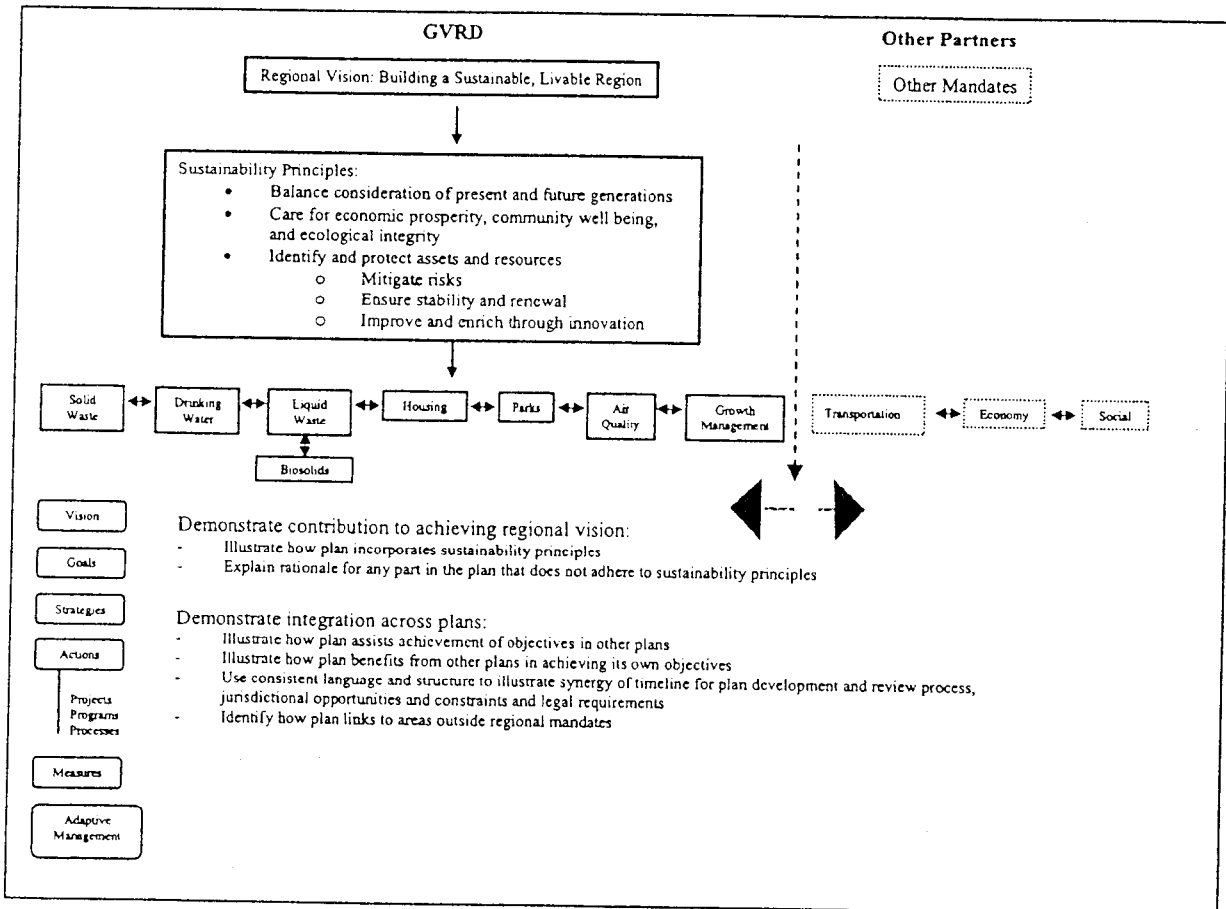
Biosolids Production vs Current Land Application



## Links between the BMP and Other Regional Plans

The GVRD is moving towards an integrated approach to biosolids management. This means considering the relationships between the biosolids production system and other regional systems such as drinking water, liquid waste, solid waste and parks and greenways which traditionally have been treated separately. For example, the BMP, which is part of the Liquid Waste Management Plan (LWMP), includes a strategy to produce energy using both biosolids and municipal solid waste as fuels.

The Sustainable Region Initiative provides the framework for linking the LWMP with other regional plans such as the Solid Waste Management Plan (SWMP), Air Quality Management Plan (AQMP), the Drinking Water Management Plan (DWMP) and the Regional Parks and Greenways Plan (RPGP). The framework links the regional vision, sustainability principles, and the execution of individual plans (chart below).



Sustainable Region Initiative - Framework for Regional Mandates

The following tables identify the specific links between the Biosolids Management Plan and other regionally mandated plans.

LWMP	Fulfill the requirement to complete a BMP as a condition of the Minister of Environment's approval of the LMWP and become part of the LWMP.
SWMP	Continue to find beneficial uses for biosolids and thereby reduce the amount of material going to landfills for disposal.
AQMP	Implement biosolids transportation and use options that minimize greenhouse gas, odour and particulate emissions.
RPGP	Continue to make biosolids available for landscaping in parks.

LWMP	Help to improve biosolids quality by implementing source management commitments that will reduce introduction of contaminants into the wastewater system.
SWMP	Provide a cost-effective energy production facility that uses both biosolids and solid waste as a fuel. Provide sites for disposal of biosolids when beneficial uses are not available.
DWMP	Reduce the copper level in biosolids by adjusting the pH in the drinking water supply.
AQMP	Reduce deposition of air contaminants into water. Contaminants in water can end up in biosolids.
RPGP	Provide an additional market for biosolids and a showcase for the benefits of biosolids as a soil amendment.

### Building a Sustainable, Livable Region

Building a sustainable, livable region is the overarching regional vision. Consequently, social, environmental and economic sustainability is a fundamental objective in all GVRD activities, from the corporate level through to the service delivery mandates, and from management plans to partnerships with external agencies for actions beyond the GVRD mandates. The BMP will contribute to a healthy, sustainable region by maximizing beneficial uses of biosolids and ensuring that a contingency plan is in place to dispose of biosolids when beneficial use options are not available.

### Goal of the BMP

The Biosolids Management Plan has one goal: *maximize environmentally sound, cost-effective, beneficial uses of biosolids*. Biosolids can be applied to land as a plant nutrient or soil amendment or used as a fuel for energy production. Systems that maximize the net environmental and social benefits while minimizing costs will ensure that the region can continue to grow and prosper while sustaining our quality of life and the environment. The strategies and actions to achieve the goal are set out in Section 3.

## 2. BIOSOLIDS MANAGEMENT IN GREATER VANCOUVER

Currently, all sludge at the region's five wastewater treatment plants is digested to produce biosolids. A sewer-use bylaw that controls liquid waste discharges from industry into the wastewater collection system and regular testing of nutrient, metal and pathogen levels helps to ensure that biosolids quality is consistently high.

Since 1990, the primary method to beneficially use the region's biosolids has been land application. Approximately 74 per cent (14,300 dry tonnes) of GVRD biosolids produced in 2005 were land-applied and 26 per cent (5,000 dry tonnes) were stored at wastewater treatment plant sites. Of the amount land-applied, 90 per cent was used to reclaim disturbed land at mines, landfills and gravel pits and 10 per cent was used to fertilize ranches and tree farms.

## 3. GOAL, STRATEGIES AND ACTIONS OF THE BMP

**Goal: Maximize environmentally sound, cost-effective, beneficial uses of biosolids**

There are three strategies to achieve the goal: Use biosolids as a fuel to produce energy, use biosolids for land application and secure alternate uses or disposal sites for biosolids that cannot be used as a fuel or nutrient.

**Strategy #1: Use biosolids as a fuel to produce energy.** Biosolids can be burned to produce electricity and heat, providing a renewable and sustainable source of energy. Using biosolids to produce energy will ensure that there is no gap between biosolids supply and use. This strategy has the following actions shown in bold text:

### Actions:

- **The GVRD will work with the governments of British Columbia and Canada to establish a facility to produce energy using a multitude of renewable fuels, including biosolids.** Greater Vancouver's population is growing. This is increasing demand for new sources of heat and electricity. It is also increasing the amount of biosolids that need to be managed in an environmentally and economically sustainable manner. Facilities that burn biosolids and other suitable materials to produce energy provide a renewable and sustainable source of energy.
- **The GVRD will establish metals limits for biosolids used as fuel for energy production.** Along with state-of-the-art air emission controls, it is important to limit the amount of metals in fuels to ensure that air emissions do not adversely impact human health and the environment. Limiting the metals levels also allows safe use of bottom ash and cost-effective disposal of flyash.

**Strategy #2: Use biosolids for land application.** Biosolids can be used as a nutrient to increase plant productivity or as a soil amendment for land reclamation and urban landscaping. This strategy has the following actions shown in bold text:

**Actions:**

- **The GVRD will improve customer and public confidence in using biosolids for land application.** Current biosolids customers have identified education and liaison, which includes communicating results of biosolids-related research studies, as important to improving customer and public confidence in GVRD's biosolids land application program.
- **The GVRD will review, and amend where necessary, its Sewer-use Bylaw and related policies and procedures to ensure that they effectively and efficiently achieve GVRD's objectives with respect to biosolids quality.**
- **The GVRD will continue to maintain, operate and, where cost-effective, improve the wastewater treatment systems to produce biosolids that meet land application criteria.**

**Strategy #3: Secure alternate uses or disposal for biosolids that cannot be used for land application or as a fuel.** Since wastewater treatment is an essential and continuous service to safeguard public health and the environment, biosolids production is continuous. Securing a cost-effective disposal option is necessary to guarantee that there is a place to take biosolids when land application or energy production uses are not available. This strategy has the following action shown in bold text:

**Actions**

- **When land application or energy production options are not available, the GVRD will pursue alternative beneficial uses for biosolids.** Biosolids not suitable for land application or energy production may be used for structural fill or as additives in construction products.
- **The GVRD will negotiate an agreement with a landfill operator for disposal of biosolids that cannot be beneficially used.**



#### **4. IMPLICATIONS OF THE BMP**

The BMP will affect decisions related to both the liquid waste and solid waste management infrastructure. Implementation of energy production options under Strategy 1 will significantly influence decisions regarding whether to construct new digesters at the wastewater treatment plants. As well, solid waste system upgrades will need to consider co-management of municipal solid waste with biosolids.

In 2005, the cost to manage GVRD's biosolids was \$5 Million. Over the next 20 years, the annual cost for managing the increasing production of biosolids will likely more than double, regardless of whether biosolids are used for land application or for energy production. As well, significant capital investments will be required either for new digesters as required under Strategy 2 or for new energy production facilities as required under Strategy 1.

#### **5. PERFORMANCE MEASURES**

The following performance measures will monitor progress in achieving the goal of the Biosolids Management Plan.

Goal: Maximize environmentally sound, cost-effective, beneficial uses of biosolids

- Number of times that metals in biosolids exceed OMRR Class A land application criteria (want zero)
- Total amount in inventory and landfilled (want zero)
- Net energy production per tonne of biosolids managed (want to maximize)
- Cost per tonne of biosolids managed (want to minimize)

#### **6. ADAPTIVE MANAGEMENT**

As Greater Vancouver grows and changes, as the science of biosolids management improves and new technologies develop and regulations and public values evolve, the BMP will be reviewed and revised. For example, the amount of biosolids used for land application and for energy production will be evaluated as options for using biosolids to produce energy are implemented.

The plan's progress will be reported in the biennial LWMP report. As well, the plan will be reviewed in conjunction with the review of the LWMP, which occurs every five years.

## GLOSSARY OF TERMS

**Biosolids:** nutrient-rich solid organic matter recovered from the treatment of municipal wastewater following a process of wastewater sludge stabilization.

**OMRR:** British Columbia Organic Matter Recycling Regulation

**Primary Treatment:** A physical treatment process that removes solids from wastewater. Wastewater is held in a tank allowing suspended solids to settle to the bottom and greases to float to the top. Solids drawn off the bottom and greases skimmed off the top are called primary sludge.

**Secondary Treatment:** The biological treatment of primary effluent using micro-organisms to remove suspended and dissolved inorganic and organic matter. The secondary treatment process is usually performed using two process units; a bioreactor and secondary clarifier. Solids drawn off the bottom of a secondary clarifier are called waste activated sludge or secondary sludge.

**Sludge:** Untreated solids and micro-organisms from the primary and secondary wastewater treatment processes.

**Wastewater Treatment Plant:** A facility that removes contaminants from wastewater and produces both a liquid effluent suitable for discharge to the natural environment and sludge or biosolids suitable for energy production and/or land application.

**Wastewater Treatment System:** The entire system used to collect and treat wastewater; includes both the wastewater collection system(s) and wastewater treatment plant(s).