
MEMORANDUM

WMPSC-C 15-2021

Subject: Recycled Glass Sand Used for Stormwater Management

Date: Monday, April 19, 2021

To: Waste Management Planning Steering Committee

From: Lucy McGovern, Collection and Diversion Program Manager

Over several years, municipalities across Ontario have been challenged with processing and marketing curbside-collected glass. To meet this challenge, Niagara Recycling embarked on processing curbside collected glass and marketing it into the sandblasting industry. Eco Glass, a fine-sand like product is produced at the Region's Recycling Centre.

Niagara Region and Niagara Recycling continually explore ways to expand markets for the Eco Glass product. In 2018/2019, Niagara Region and Niagara Recycling investigated an innovative idea to use recycled glass in bioretention stormwater systems. Alternative uses for recycled glass were being investigated to create a secondary market for recycled glass and provide a substitute source of the sand component in engineered bio-soil.

Bioretention uses natural features to manage stormwater

Bioretention is a stormwater infiltration practice that treats runoff from paved areas by using the natural properties of soil and vegetation to remove contaminants. Other names commonly used for these types of practices includes rain gardens, bioswales, dry swales, stormwater planters and biofilters.

The ultimate goal of stormwater management is to maintain the health of streams, lakes and aquatic life as well as provide opportunities for human uses of water by mitigating the effects of urban development. To achieve this goal, stormwater management strives to maintain the natural hydrologic cycle, prevent an increased risk of flooding, reduce undesirable stream erosion, and protect water quality.

Tipping fees impact net costs of recycled glass sand

An economic analysis was completed to determine the net cost of producing the recycled glass sand. Three main variables impacted the financial outcomes: tip fees applied for the glass feedstock received; residual waste disposal costs; and the sales price for the glass sand. The cost of processing was constant in all analyzed scenarios. The resulting revenue varied between a net loss of \$40 per tonne, to a positive result of \$10 per tonne. This wide variation of cost is impacted primarily on the tipping fees applied for the glass received. It also illustrates the need to be exceptionally diligent in controlling costs during the manufacturing process of the glass sand.

Current demand for bioremediation media, such as recycled glass sand, is estimated to be as high as nearly 8,000 tonnes per year (based on past demand in the GTA during the construction season between April and December). The potential for the use of recycled glass sand in place of concrete sand is significant, however, concrete sand is inexpensive in comparison. Another factor impacting the economics of this option is the incoming quality of the mixed broken glass. Typical Ontario Material Recovery Facility (MRF) glass contamination rates are up to 20 per cent. If MRFs can reduce the contamination rate by 10 per cent by installing better glass clean-up systems, this could bring the product yield up from the current 60 per cent, to 70 per cent. The residue rate would fall from 40 per cent, to 30 per cent, thereby improving the economic result.

Bioretention systems as an alternative glass market?

Bioretention system installations in Ontario are growing, but implementation is not regulated and therefore use and construction are based on best practice guidance put forward by stakeholders associated with stormwater control. New markets for materials such as recycled glass sand need to be developed and this study has helped to demonstrate innovation in its infancy.

Final Project Findings

1. The cost of production of glass sand is currently more than that of concrete sand:

Currently, the cost of concrete sand used in a bioretention facility is less than the cost of the production of recycled glass sand. This would be of concern to an owner or developer of a project since the least costly components are generally used. For recycled glass sand to gain a foothold in the market, the cost differential must be narrowed. Two of the most significant factors to examine are a reduction in the contamination prior to processing and the tipping fee at the processing plant.

2. Glass fines must be removed:

Glass fines consist of glass that is smaller than 80 mesh (80 mesh screen has 80 openings in one square inch of screen). At the outset of the project, it was anticipated that the glass fines would be usable. As the project developed, however, this was not found to be the case due to the need for the sand to be consistent with the CSA Group standard W200-18, which specifies the need to use particle sizing in the glass sand that meets the requirements of concrete sand. This effectively excludes the glass fines, leaving it to be destined for the landfill unless another useful diversion opportunity is discovered. Niagara Region's contracted operator, Niagara Recycling, is researching alternate uses for this material.

3. Contamination levels affect cost of production:

The amount of contamination found within the feedstock glass needs to be reduced before the best economic picture for the production cost can be achieved. If contamination can be reduced to 5 or 10 per cent, then the economics improve.

4. Green procurement policies encourage a circular economy:

Recommendations moving forward for other municipalities interested in developing a market for the use of recycled glass sand include the development of green procurement policies and amendments to municipal purchasing by-laws to contribute to a sustainable environment and encourage a circular economy. Where feasible and without significantly affecting the intended use or quality of products or services, municipalities can endeavor to include specifications which contain the maximum level of post-consumer recyclable content.

The provincial government is moving forward with the creation of guidelines for better control of urban stormwater runoff. Municipalities can promote this by enacting changes in their standard specifications for works that occur under their control. Niagara Region's Procurement staff, with support from the Keen on Green Committee, are investigating ways to include requirements for green procurement considerations in Regional procurement policies and procedures that can support sustainable choices, while balancing limitations on project budgets.

Costs/Funding

The overall project cost, inclusive of in-kind services was \$92,043. The Resource Productivity and Recovery Authority, along with Stewardship Ontario provided a grant to Niagara Region of \$52,833. This grant covered all project costs incurred by Niagara Region, LGC Professional Consulting Services and Grobark (part of Walker Environmental Services). Niagara Region, Niagara Recycling, LGC Professional Consulting Services, Grobark, and the Toronto Region Conservation Authority also offered in-kind goods and services totalling an estimated \$39,210.

If the net cost of producing the glass sand for engineered bio-soil was favourable, Niagara Region would be able to accept glass from other municipalities for processing. Despite the economics of the project, Niagara Region and Niagara Recycling continue to produce Eco Glass and continue to look for additional alternative glass markets. Currently, Eco Glass is sold in 50 lbs bags and super sacs for \$155 per tonne and \$120 per tonne respectively, however prices may vary slightly based on the volumes purchased.

Respectfully submitted and signed by

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