WISCONSIN DEPARTMENT OF NATURAL RESOURCES
NOTICE OF FINAL GUIDANCE & CERTIFICATION

Pursuant to ch. 227, Wis. Stats., the Wisconsin Department of Natural Resources has finalized and hereby certifies the following guidance document.

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DOCUMENT TITLE

Managing Container Glass

PROGRAM/BUREAU

Waste and Materials Management

STATUTORY AUTHORITY OR LEGAL CITATION

Ch. 287, Wis. Stats.; chs. 544, 500 and 506 , Wis. Adm. Code

DATE SENT TO LEGISLATIVE REFERENCE BUREAU (FOR PUBLIC COMMENTS)

September 9, 2019

DATE FINALIZED

October 4, 2019

DNR CERTIFICATION

I have reviewed this guidance document or proposed guidance document and I certify that it complies with sections 227.10 and 227.11 of the Wisconsin Statutes. I further certify that the guidance document or proposed guidance document contains no standard, requirement, or threshold that is not explicitly required or explicitly permitted by a statute or a rule that has been lawfully promulgated. I further certify that the guidance document or proposed guidance document contains no standard, requirement, or threshold that is more restrictive than a standard, requirement, or threshold contained in the Wisconsin Statutes.

October 4, 2019

Signature | Date

Managing Container Glass

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Background:

Material Recovery Facility (MRF) operators have been increasingly interested in options for using broken container glass for purposes other than as a feedstock for new glass containers, such as road base, sandblast media, daily cover or other beneficial reuse in landfills. In part this reflects the price of transporting glass, the limited number of outlets for glass recycling, and the very low and often negative price that recipients pay MRFs for the glass.

At a typical single-stream MRF, incoming container glass is crushed with other materials before sending them across an initial screen where the 2-inch minus glass fragments fall out along with anything else that is heavy enough and small enough to fall through the screen – paper shreds, batteries, plastic caps and other fragments, dirt and rocks, etc. This mixture becomes the MRF's glass stream. In this document, definitions are generally used to help the reader with compliance. Those definitions that are specified in law will be noted. The department has generally distinguished between a three-mix crushed glass stream and a residual crushed glass stream:

Three-Mix Crushed Glass: "Three-mix crushed glass," though not defined specifically in code or statute, refers to the container glass received and processed into mixed-color crushed glass by a MRF. Three-mix crushed glass is a marketable material subject to the land disposal ban in s. 287.07(4)(d), Wis. Stats., as a glass container, and cannot be disposed of in a landfill. If a MRF does not sort out a residual crushed glass waste stream, then the entire glass stream is considered three-mix crushed glass.

Residual Crushed Glass: "Residual crushed glass," though not defined specifically in code or statute, may be generated in the process of cleaning or sorting three-mix crushed glass stream[s] from the same feedstock. It is a lower quality glass that cannot be marketed for recycling or beneficial reuse outside of a landfill. It does not require a cost analysis as described below under "Approval Process for Landfill Beneficial Reuse of Crushed Glass" before being beneficially reused within a landfill. Residual crushed glass must be a smaller amount than the three-mix glass generated by the cleaning or sorting and overall should not be more than 30% of the original incoming glass stream. Residual crushed glass is not subject to the container

glass land disposal ban and may be disposed of in a licensed landfill as a solid waste without additional approvals, waivers or exemptions from the department.

The distinction between the two types of glass is the quality of glass after processing. Both residual crushed glass and three-mix crushed glass may contain varying proportions of glass fragments, paper, plastic and non-recyclable items. MRFs determine how to categorize the crushed glass they each produce, but they must do so in accordance with self-certification requirements under s. NR 544.16, Wis. Adm. Code. As part of an effective recycling program, MRFs are required to, among other items, "maintain recyclables in a marketable condition,"[1] provide to the department the "procedures used to minimize residual material," and certify "that the material recovery facility produces recovered recyclable materials in accordance with market quality specifications." Code dictates that MRFs cannot design their process to increase the amount of residual crushed glass they create. Rather, they must do their best to process glass in a manner that creates the smallest amount of residual material possible relative to their production of marketable materials, and they are required to create a product that meets standards for the markets they serve. (See Appendix A for example market standards.)

Beneficial Reuse:

Three-mix crushed glass can be beneficially reused in several ways outside of landfills and may be able to be beneficially reused within landfill footprints in some cases. For residual crushed glass, facilities also have the option to pursue beneficial reuse within a landfill. The various options and the necessary approvals and exemptions are described below. Appendix D puts the same information in a table and Appendix E puts the information in a flow chart for clarity.

All residual crushed glass, whether it is disposed of as a solid waste or beneficially reused in a landfill (without the cost analysis described below under "Approval Process for Landfill Beneficial Reuse of Crushed Glass"), is considered residual material and must be included in a MRF's calculation of residual material generated for the MRF annual self-certification. Residual crushed glass that goes to the landfill for disposal is eligible for landfill fee exemptions as a Category 30 waste. (See WA1755, Guidance for Landfill Tonnage Fee Exemptions Under 2013 Wisconsin Act 301 for more information).

Approval Process for Non-Landfill Beneficial Reuse of Three-Mix Crushed Glass:

Three-mix crushed glass has the potential to be beneficially reused in many ways outside of landfill applications. In some beneficial reuse cases, no department-granted exemption or approval is needed. For example, using glass as sandblast media without further processing the glass once it leaves the MRF, does not require any approval or exemption from the department. This type of beneficial reuse is different from other glass beneficial reuse because the reuse does not result in glass being placed in or on the ground semi-permanently. Instead the glass is reused as a product and then once it is no longer usable, the new waste is properly disposed of.

[1] RUs and haulers are required to maintain materials in marketable condition for delivery to the MRF in accordance with s. 544.05(1)(a)3., Wis. Adm. Code, and s. NR 502.06(4)(f), Wis. Adm. Code, respectively.

In most cases, the beneficial reuse requires a low hazard exemption (LHE). A LHE is an exemption from regulations issued by the department when a facility will be using material that has a low potential for hazard to public health or the environment. Examples of non-landfill beneficial reuses requiring a LHE include: drainage medium for utility trenches or drain tile, aggregate under buildings, decorative landscaping material, use in septic tank treatment systems, glass sand, flowable fill medium, and waste and waste water filter medium. The department has an application for low hazard exemption requests to beneficially reuse glass in these ways. The application can be found here: https://dnr.wi.gov/files/pdf/pubs/wa/wa1540.pdf.

Another type of exemption from other solid waste code requirements for beneficial reuse is in s. NR 500.08(2)(f), Wis. Adm. Code, which exempts facilities where glass is used as an aggregate replacement in asphalt pavement or subbase material under roadways as long as certain conditions are met. These conditions are:

1. Glass may not be used in areas where the glass will be exposed and may pose a safety threat or in areas that will be frequently disturbed.
2. The amount of contaminants present within the glass such as labels, caps and metal rings shall be minimized to the extent necessary to prevent interference with the performance of the asphalt or roadbed aggregate. Asphalt and roadbed aggregate containing glass shall be designed and used in accordance with generally accepted engineering practices. The glass shall have sufficient properties to perform the function of the aggregate it replaces. The use of glass particles greater than 1/2 inch in size requires written department approval.
3. Glass shall be collected and stored in a nuisance free manner. Glass stockpiles shall have controlled access to prevent the general public from coming in contact with the glass piles. The number of stockpiles shall be kept to a minimum and may not be spread over a large area. Stockpiles shall be placed on a hard, all weather surface such as asphalt or concrete.

Approval Process for Landfill Beneficial Reuse of Three-Mix and Residual Crushed Glass:

Both three-mix crushed glass and residual crushed glass may be beneficially reused in landfills, but requirements differ for the two types of glass.

Residual crushed glass can be reused beneficially if the landfill has received approval from the department for that use. The glass must be of proper size and must be a high enough percent glass to be effective in its intended use without creating a litter or odor problem. For example, glass for use as daily cover must “control disease vectors, fires, odors, blowing litter and scavenging without presenting a threat to human health and the environment” under s. NR 506.055(3), Wis. Adm. Code. The requirements for proposing an alternative daily cover can be found in s. NR 506.055, Wis. Adm. Code.

Three-mix crushed glass can be reused beneficially within the landfill if the landfill has received department approval for that use. In addition, because three-mix crushed glass is banned from landfill disposal, landfills that want to beneficially reuse three-mix crushed glass in their landfill must also demonstrate that landfill beneficial reuse is the best option for this material.

The department can consider proposals for the beneficial reuse of three-mix crushed glass within a landfill under the authority of s. 287.07(7)(f), Wis. Stats., which allows materials banned from land disposal to be placed in a landfill if those materials are being beneficially reused and if that use has been approved as part of the disposal facility's plan of operation. Like residual crushed glass, the glass must be of proper size and must be a high enough percent glass to be effective in its intended use without creating a litter or odor problem. Because three-mix crushed glass is banned from landfill disposal, the department will review the marketability of the three-mix crushed glass for other uses in addition to reviewing the effectiveness of glass for the proposed beneficial reuse. Landfills must obtain information to justify the beneficial reuse of three-mix crushed glass from a MRF and submit it as part of the plan of operation modification request. The required information is described below. A template of the information that can be obtained from the MRF and submitted with the landfill plan of operation or plan modification request can be seen in Appendix B.

- An analysis of the cost of providing the glass to two known non-landfill markets compared with the cost of the proposed landfill beneficial reuse. This analysis must be specific to the MRF that would be generating the glass in the plan modification proposal. This cost analysis should include transportation costs and the cost/value of supplying the three-mix crushed glass to the end user compared to the transportation costs and the cost/value of supplying the three-mix crushed glass to the landfill. The cost analysis may also include any costs that a MRF may spend processing the glass to marketable conditions and the cost that a MRF may spend processing the glass to the specifications for the proposed landfill beneficial reuse, but these costs must be distinguishable from other costs.
  And
- Detail showing that the cost estimate provided to the MRF from the next user was based on glass that met market standards (see Appendix A). If a facility is struggling to receive responses from next users, evidence of two attempts to receive pricing information is also acceptable.
  Or
- Detail showing that the beneficial reuse of glass is used to replace a product that requires higher energy and greenhouse gas use per ton than the beneficial reuse.

All plan modification reviews for landfill beneficial reuse of three-mix crushed glass will consider the availability of markets and glass market values. Because markets may change over time, approvals will be limited to three-year sunset dates. It is the facility's responsibility to request an extension of the approval.

Disposal:

For rare cases where glass cannot be processed to market standards or to the specifications of the beneficial reuse, the department has authority to grant a written waiver allowing three-mix crushed glass to be disposed of in a landfill as waste. Waivers would only be allowed for specific instances where the glass became unusable due to unforeseen circumstances and would not be issued for routine management. Waiver requests for the glass must meet the requirements of s. 287.07(7)(g), Wis. Stats.

Section 287.11(2m)(b), Wis. Stats., and s. NR 544.14(2), Wis. Adm. Code, require the department to grant variances for land disposal banned items, including container glass, if requested by the responsible unit (RU) and if the cost of selling the processed material is greater than $40/ton adjusted for inflation since 1989 ($81.87/ton in 2018 using the US Bureau of Labor Statistics' Consumer Price Index inflation factor) or if the cost of selling the processed material exceeds the cost of disposal. The cost comparisons for a variance are for transportation as well as sale/disposal as specified in s. 287.11(2m), Wis. Stats. The variance is issued to an RU and allows the RU to stop requiring separation of the material from trash and to dispose of collected material in a landfill, even if separated for recycling, without jeopardizing its effective program status. The department has not seen glass prices reach this level to date.

Contact DNRWasteMaterials@wisconsin.gov for further information.

Disclaimer: *This document is intended solely as guidance and does not contain any mandatory requirements except where requirements found in statute or administrative rule are referenced. Any regulatory decisions made by the Department of Natural Resources in any matter addressed by this guidance will be made by applying the governing statutes and administrative rules to the relevant facts.*

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Appendix A: Glass Market Standards 2017[2]

Spec	Strategic Materials – Glass Cullet (WI, MN, IL)	Mid America – Glass Cullet (IA)	Sandblast Media	Fiberglass
Max % contamination	30%	10%	15%	15%
Size requirements	Max of 12% below 3/8”	3/4" - 1/2” with minimal fines	Course: 20 to 40 mesh Medium: 40 to 70 mesh Fine: 70 to 100 mesh	Below 12 mesh
Max % ceramic glass	2%	1%	Not set	Not set
Max percent “tramp metal” (aluminum cans, siding, window frames, and household utensils)	Not set	1%	0%	0%
Max % moisture	5%	Not set	0.5%	0.5%
Max % organics	Not set	Not set	0.25%	0.25%

WI DOT – Base, Subbase and Subgrade Aggregate[3] use up to 12% of total aggregate
Must be substantially free of deleterious materials.
Must be uniform material conforming to the predominant material (crushed gravel, crushed concrete or crushed stone). The predominant materials must sit on a No. 10 sieve.
Must meet standards for gradation, wear, soundness, liquid limit, plasticity and fracture the same as the predominant material.

[2] A list of glass processors in North America is maintained by the Glass Packaging Institute and can be found here: https://www.gpi.org/glass-resource-locator. ISRI, the Institute for Scrap Recycling Industries, has also published specifications for glass recycling. They have acknowledged there is a sliding scale of acceptable material and published the absolute limits that crushed glass can be recycled at. These limits are not the industry standards currently found in the upper Midwest. Their analysis can be found here: https://www.isri.org/docs/defaultsource/random/mrf-glass-specifications-11-7-16-(002).pdf?status=Temp&sfvrsn=0.7635963139323592.

[3] Additional detail can be found in Wisconsin DOT Roadway Standards, 2017 Standard Specifications, Section 301.

Appendix B: Template for cost comparison information for a landfill proposing beneficial reuse of three-mix crushed glass (likely completed by the MRF it wants to work with)

Name of the MRF:
Facility Identification number:
Responsible person and title:

Responsible person contact information

Phone: **E-mail:**

What is the mileage from the MRF to each end market?
Non-landfill end market 1

Non-landfill end Market 2

Landfill proposing beneficial reuse

What is the estimated transportation cost per ton from the MRF to each end market?
Non-landfill end market 1

Non-landfill end market 2

Landfill proposing beneficial reuse

What is the per ton price offered by each end market?
Non-landfill end market 1

Non-landfill end market 2

Landfill proposing beneficial reuse

What is the combined transportation and tipping rate per ton for each end market?
Non-landfill end market 1

Non-landfill end market 2

Landfill proposing beneficial reuse

What is the contamination rate (including off-size) of the glass that price was quoted for?

Non-landfill end market 1

Non-landfill end market 2

Landfill proposing beneficial reuse (max acceptable contamination rate)

What is the cost difference between processing three-mix glass to the contamination rate provided above for the non-landfill end markets compared to the max contamination rate acceptable at the landfill proposing beneficial reuse?
Non-landfill end market 1 processing cost – landfill proposing beneficial reuse processing cost

Non-landfill end market 2 processing cost – landfill proposing beneficial reuse processing cost

What is the combined transportation, tipping fee and processing cost difference the non-landfill end markets compared to the landfill proposing beneficial reuse?
Non-landfill end market 1 total cost – landfill proposing beneficial reuse total cost

Non-landfill end market 2 total cost – landfill proposing beneficial reuse total cost

Appendix C: Relevant Statute and Code References

Disposal Bans:
S. 287.07(4)(d), Stats., bans glass containers from disposal in a landfill.
S. 287.07(7)(f), Stats., allows container glass to be placed in landfills if it is being beneficially reused in the landfill and its use is approved in the landfill's plan of operation approval.
S. 287.07(7)(g), Stats., provides an exemption for glass containers to be disposed of in a landfill under very specific circumstances with a written waiver from the department.
S. 287.11(2m)(b), Stats., allows the department to grant variances to the glass container recycling requirements under certain cost situations.

Alternative Uses in Landfills:
S. 287.07(7)(f), Stats., allows container glass to be placed in landfills if it is being beneficially reused in the landfill and its use is approved in the landfill's Plan of Operation Approval.
S. NR 504.06(5)(e), Wis. Adm. Code, describes the specifications required for leachate trench backfill in landfills.
S. NR 506.05, Wis. Adm. Code, describes the purpose of daily cover.
S. NR 506.055, Wis. Adm. Code, lists the information that is required to be submitted when proposing an alternate daily cover.

Landfill Daily Cover:
S. NR 506.055, Wis. Adm. Code, explains the requirements for alternative daily cover.

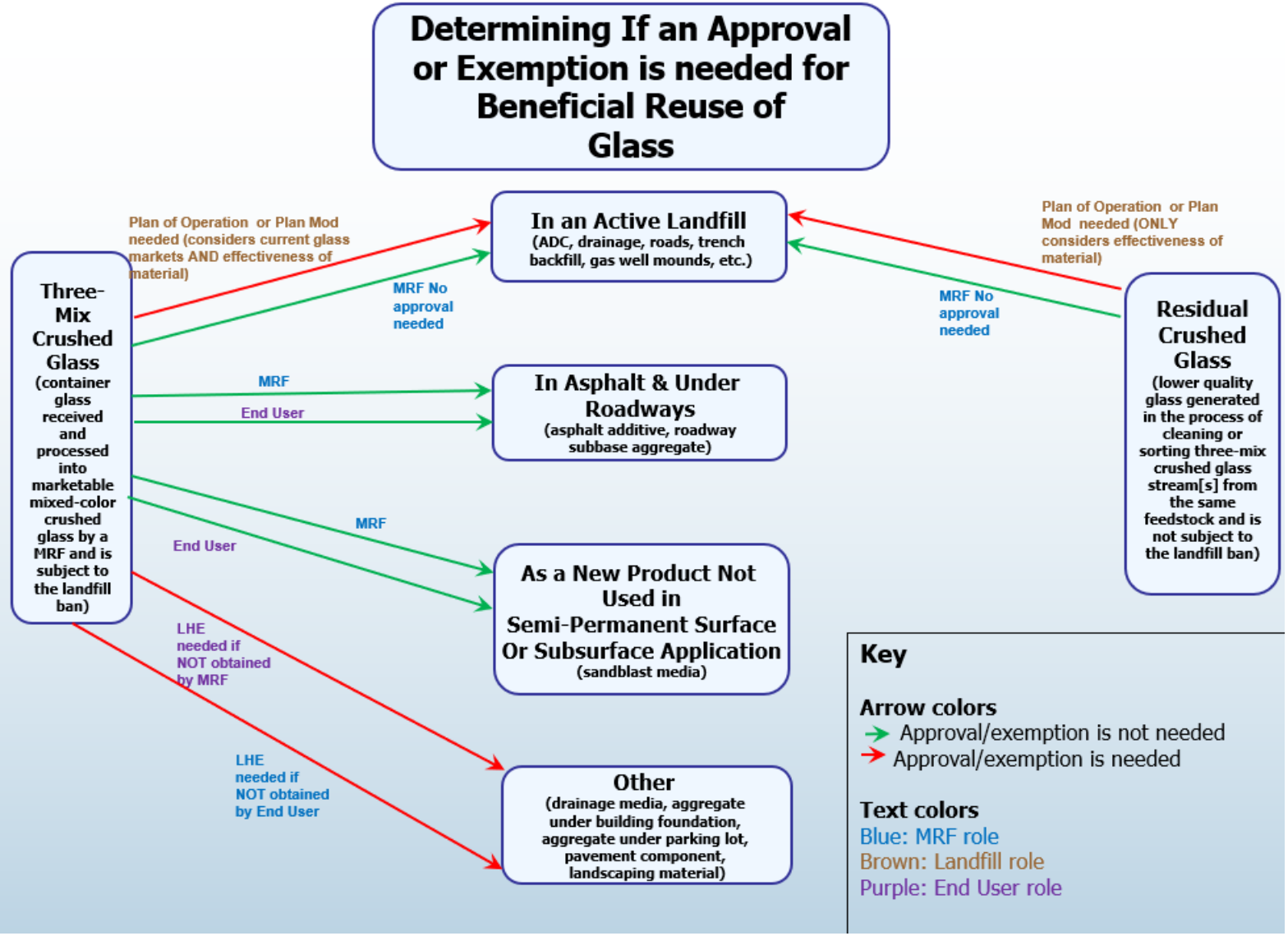
Alternative Uses Outside of Landfills:
S. 289.43(8), Stats. and s. NR 500.08(5)(a), Wis. Adm. Code, cover the department's authority to issue low hazard waste exemptions.
S. NR 500.08(2)(f), Wis. Adm. Code, allows glass to be used as an aggregate in asphalt pavement or as a subbase material under roadways without a low hazard waste exemption from the department under certain circumstances.

MRF Requirements:
S. NR 544.16(1)(c), Wis. Adm. Code, requires a MRF to maintain materials in a marketable condition.
S NR 544.16(3)(a)13., Wis. Adm. Code, requires information on the total quantity and percentage of residuals created in the previous year when self-certifying.
S. NR 544.16(3)(a)14., Wis. Adm. Code, requires a MRF to describe the procedures they will use to reduce residuals when self-certifying.
S. NR 544.16(3)(a)15., Wis. Adm. Code, requires a MRF to certify that they will produce recyclables in accordance with market quality specification when self-certifying.
S. NR 544.16(4)(a), Wis. Adm. Code, requires a MRF to certify that they are operating in accordance with their original self-certification.
S. NR 544.16(4)(d), Wis. Adm. Code, requires a MRF to report the tons and percent of residuals generated over the course of the year.
S. NR 544.16(5), Wis. Adm. Code, allows the department to invalidate the self-certification of a MRF not operating in accordance with their original or yearly self-certification.

MRF Residuals Calculations:
S. 289.63(6)(d), 289.64(4)(d), 289.645(4)(h), and 289.67(1)(fj), Stats., exempt MRFs from paying certain landfill tipping fees for residuals up to 10% of the weight of materials accepted by the MRF.
S. NR 544.16(4)(d), Wis. Adm. Code, requires a MRF to report the tons and percent of residuals generated over the course of the year.

RU Requirements:
S. NR 544.05(2)(b), Wis. Adm. Code, requires RUs to use a self-certified MRF as a part of their effective recycling program.
S. NR 544.14(2), Wis. Adm. Code, allows RUs to request variances to the glass container recycling requirements under certain cost situations.
S. NR 544.14(3)(a), Wis. Adm. Code, allows the department to grant variances to the glass container recycling requirements under certain cost circumstances.

Appendix D: Beneficial Reuse Options Table

Glass Stream	Beneficial Reuse Location	Approval/Exemption Needed	Potential Uses
Three-Mix Crushed Glass (banned from landfill *disposal* under s. 287.07(4)(d), Stats.)	In an Active Landfill	Landfill: Plan of Operation Approval or Plan Modification Approval that considers current glass markets and effectiveness of material for proposed use	Alternative daily cover, drainage liner media, interior/exterior haul roads, leachate recirculation trench backfill, mounds for gas wells, stabilization fill beneath the liner
		MRF: Not needed (exempt under 287.07(7)(f), Stats.)	
	In Asphalt and Under Roadway	End User: Not needed (exempt under s. NR 500.08(2)(f), Wis. Adm. Code)	Asphalt additive, roadway subbase aggregate
		MRF: Not needed (exempt under s. NR 500.08(2)(f), Wis. Adm. Code)	
	As a New Product not used in a Semi-Permanent Surface or Subsurface Application	End User: Not needed, material is a new product not going to a semi-permanent surface or subsurface application	Sandblast media
		MRF: Not needed, material is a new product not going to a semi-permanent surface or subsurface application	
	Other	End User: LHE needed if not obtained by MRF	Drainage media, aggregate under a building foundation, aggregate under a parking lot, pavement component, landscaping material
		MRF: LHE needed if not obtained by end user	
Residual Crushed Glass (not banned from landfill disposal under s. 287.07(4)(d), Stats.)	In an Active Landfill	Landfill: Plan of Operation Approval or Plan Modification Approval that only considers effectiveness of material for proposed use	Alternative daily cover, drainage liner media, interior/exterior haul roads, leachate recirculation trench backfill, mounds for gas wells, stabilization fill beneath the liner
		MRF: Not needed because material is not subject to land disposal	

Appendix E: Beneficial Reuse Options Chart