

Processed Glass Aggregate

Increasing the Use of Recycled Content in Infrastructure Projects

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Presenters

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Agenda

- Creating PGA
- Specifications for PGA
- Benefits of Using PGA
- PGA Survey Results
- Examples of PGA Use
 - Littleton, NH
 - New London, NH



2019
ONE YEAR

400+
MEMBERS

50,351
TONS OF RECYCLABLES &
MUNICIPAL SOLID WASTE

Recycling non-profit that enables communities to manage their own recycling programs



Cooperative Marketing and Purchasing

- Connect sellers of recyclables to purchasers
- Returned \$1.8 million to members last year



Education

- Meetings, facility tours, annual conference
- Robust Resource Library on website
- Hands on technical assistance
- School recycling programs



Creating PGA





Glass

- Markets for recycling glass are limited
- NRRRA offers two glass management programs



Glass
Recycling

Into fiberglass insulation

Glass Recycling



Glass bottles and jars only



Canadian vendor cleans and crushes



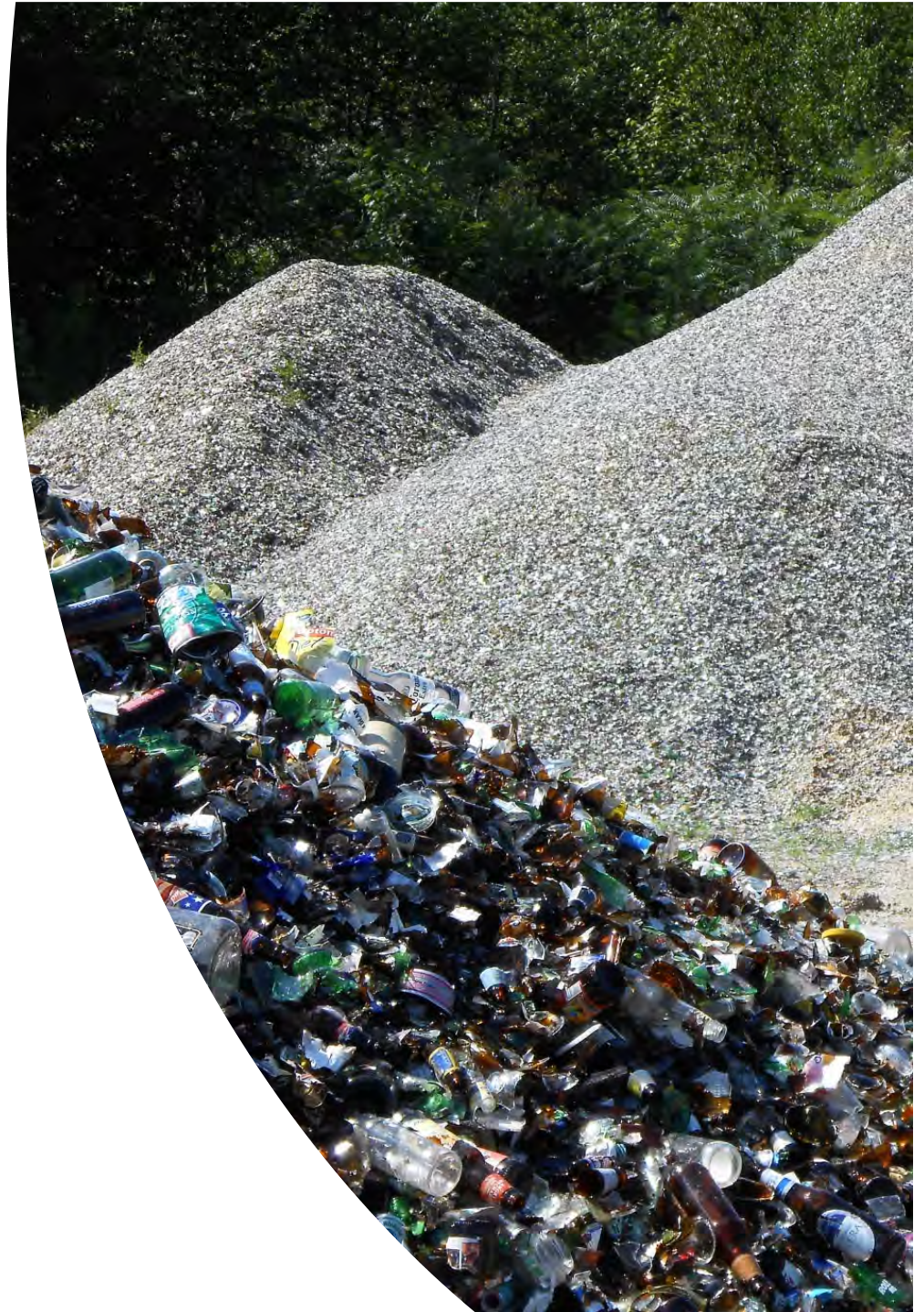
Made into fiberglass insulation back in US



40 communities in NH, VT & MA

Processed Glass Aggregate

- Glass bottles and jars
- Crush into aggregate when have 1,000 tons
- Subbase for road and infrastructure projects
- 60 communities in NH, VT & MA



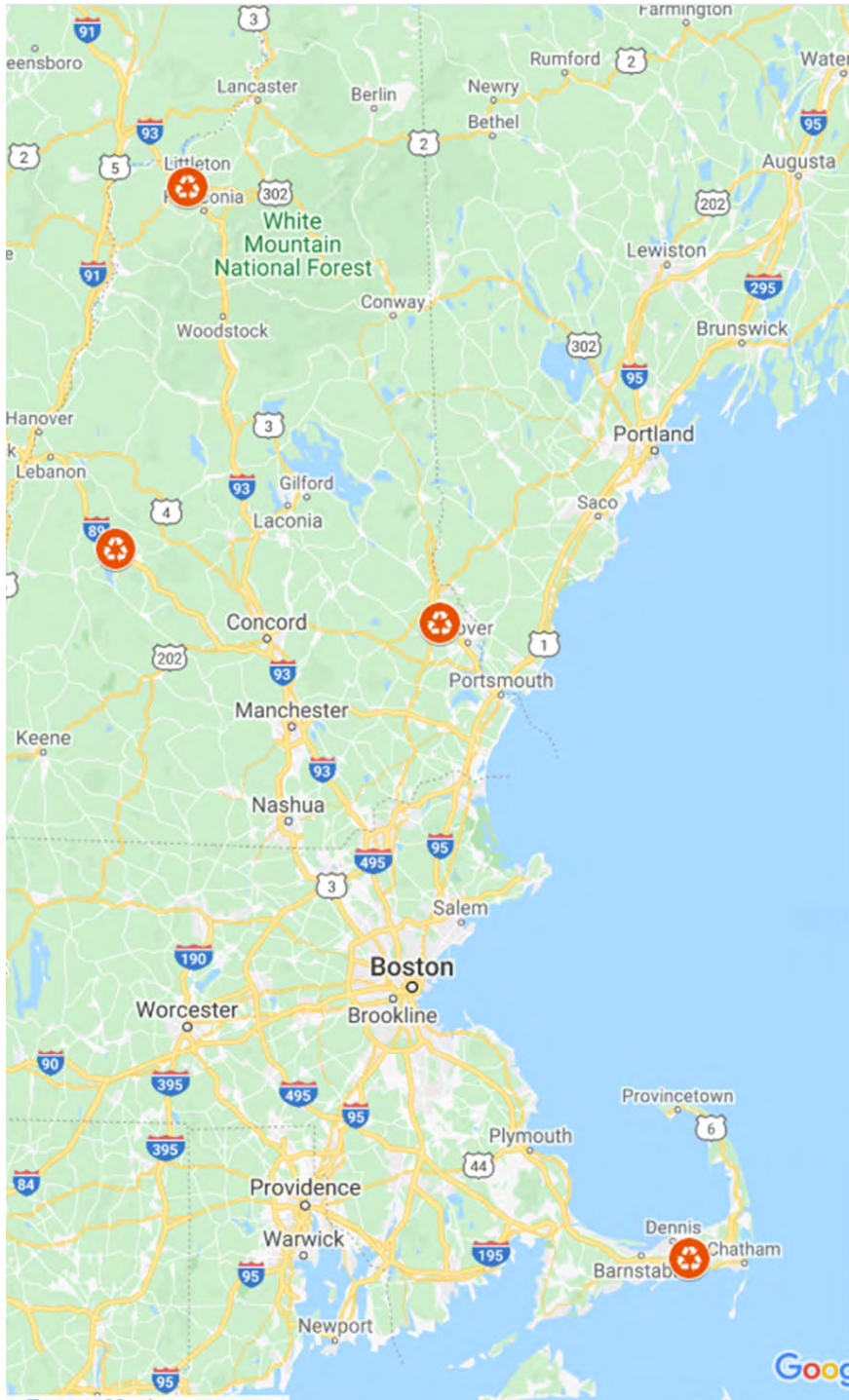


Collecting Glass for PGA



Unacceptable Materials

- Headlights
- Thermometers
- Light bulbs
- Windshield glass
- Plexiglas
- Plus others, depending on state



Processed Glass Aggregate Host Sites

(# communities served)

Littleton, NH (7)

New London, NH (25)

Rochester, NH (23)

Dennis, MA (5)

A large pile of discarded glass bottles and containers, including beer and wine bottles, is shown in an outdoor recycling facility. The bottles are piled high and are being processed. In the background, there are trees and a large, dark, conical pile of material, possibly ash or another type of waste. The sky is overcast.

Ideal Glass Host Site

- Flat one-acre area
- Truck scale
- Staff inspect each incoming load
- Front end loader to maintain pile



Crusher in Action

Municipal Crusher





Who Owns the PGA?

- Host site owns PGA to use, give away, or sell
- Take back provision for contributing communities if host site has excess material

Using PGA

In general (varies by state):

- Construction projects, including under roads, sidewalks, foundations, pipe bedding, landfill cover
- Can be mixed with gravel
- Can use up to 100% in some private and municipal applications
- Must be covered and not left on surface



Specifications for PGA



AASHTO Designation M 318-02

-
- Broken food and beverage containers
 - China dishes, ceramics or plate glass limited to max 5% by mass
 - Crushed so 100% passes 9.5-mm (3/8") sieve
 - Container tops, paper, labels, food residue, etc. limited to max 1% by mass
 - Up to 20% by mass of composite blend (20% PGA/80% natural aggregates)



PGA Specifications

Vary considerably by state

Glass food or beverage containers

In some states, other glass-like materials also allowed (ex. Pyrex, ceramic)

Crush to 1" or less or 3/8" or less

Various subgrade construction applications

Gradation Requirements

State & Agency	Gradation Requirement
MA DEP	3/8" or less
MA DOT	3/8" or less
NH DES	1" or less
NH DOT	3/8" or less
VT DES	1" or less
VT DOT	1" or less
CT DEEP	3/8" or less
CT DOT	3/8" or less (as reclaimed waste) or 1" or less (in bituminous concrete)
ME & RI	No PGA specifications



Additional Equipment Needed to
Crush to 3/8"



Benefits of Using PGA



Environmental Benefits of PGA



Alternative to landfilling
valuable material



Local use reduces
transportation emissions



World is facing shortage of
sand and PGA reduces sand
and gravel extraction



Glass is inert, so won't
erode or leach
contaminants

Physical Benefits of PGA



- Not frost susceptible – US Army Corps Study
- Ease of compaction
- Can store uncovered outdoors and won't freeze

Financial Benefits of PGA



Glass is heavy, so expensive to transport and throw away



Valuable cost avoidance strategy



Save money by not buying gravel and sand



PGA Survey Results

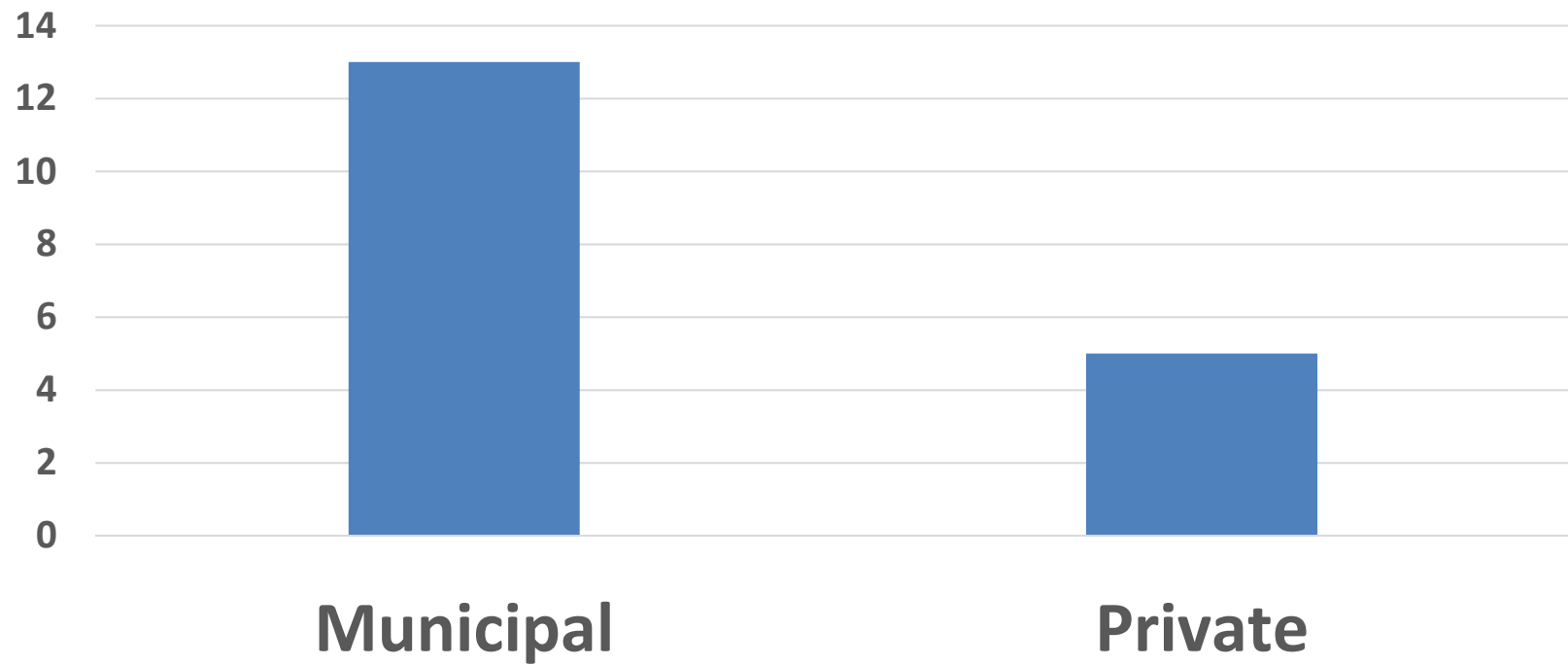


Processed Glass Aggregate Survey

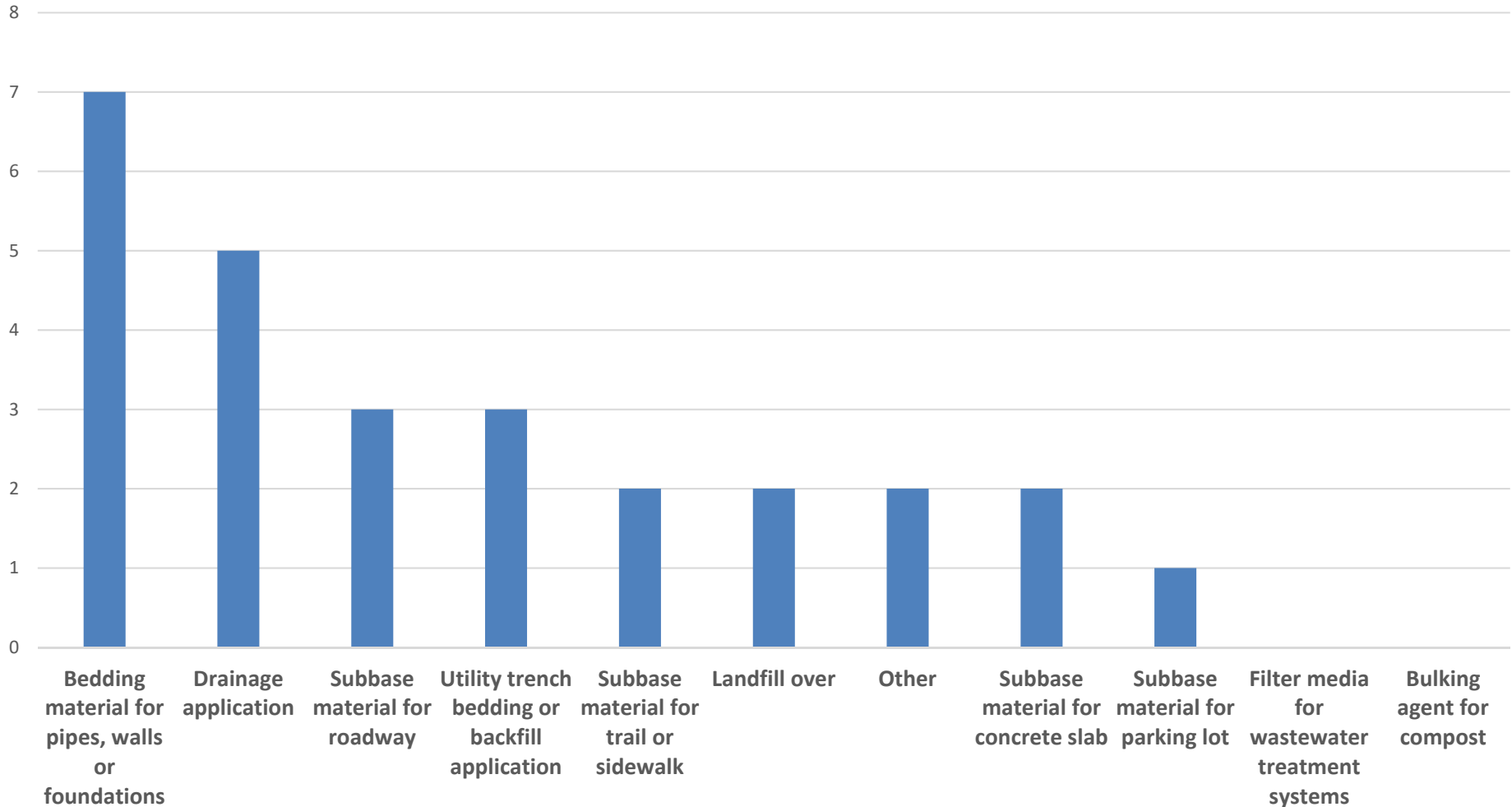
- Completed July 2020
- 16 participants from NH, VT, MA, CT, NJ
- Public works as well as private applications



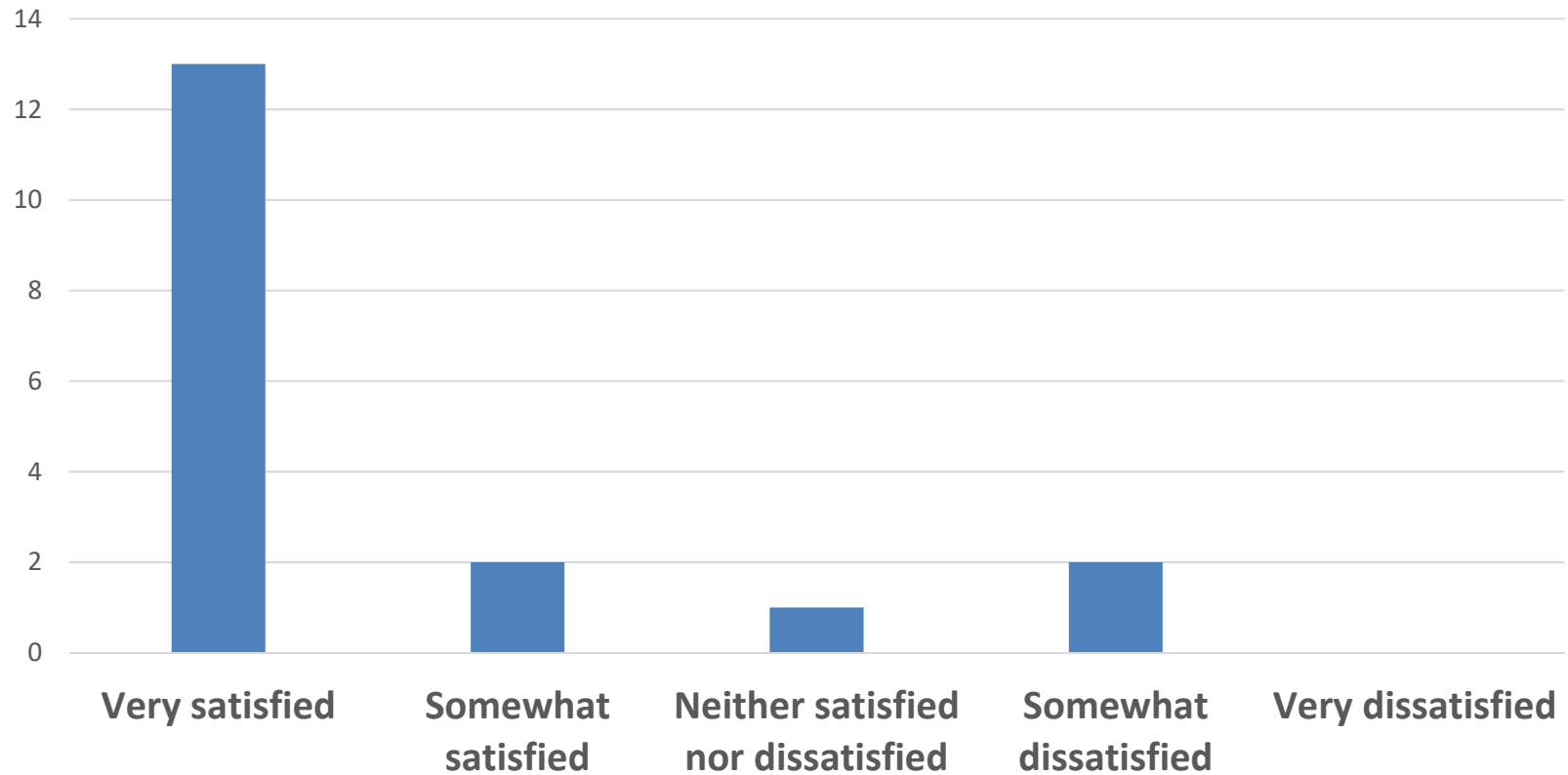
Was the processed glass aggregate used for a municipal project, a state project or for private use?



What was the application of the processed glass aggregate? (Survey)



How satisfied were you with the result after using this material?



A close-up photograph of two hands held palm-up, filled with a large quantity of crushed, multi-colored glass fragments. The fragments are in various shades of clear, green, blue, and brown. The background is blurred, showing what appears to be a person's legs in dark pants and a light-colored shoe.

Through the Looking Glass

A transparent look at glass recycling in New England

Northeast Resource Recovery Association

Glass Recycling Story Map & Video

www.nrrarecycles.org

The image shows a screenshot of the Northeast Resource Recovery Association (NRRA) website. The top navigation bar includes the NRRA logo and the text "NORTHEAST RESOURCE RECOVERY ASSOCIATION". To the right of the logo are buttons for "MY ACCOUNT", "LOG OUT", a Facebook icon, and "SUBSCRIBE TO E-NEWS". Below the navigation bar, there are menu items: "About NRRA", "Resource Library", "Member Programs & Services", and "Schools". The "Resource Library" dropdown menu is open, listing several categories: "COVID-19", "Food Waste & Composting", "Glass Recycling", "Glass Recycling Story Map", "NHDES Credit", "Recycling Markets", and "Summer Webinar Series". The "Glass Recycling Story Map" item is highlighted with a red circle. Below the menu, there is a large image of a worker in a blue shirt and yellow safety vest standing in front of a large pile of brown material. A white arrow points to the left on the image. To the right of the image, there is a news article snippet titled "Releases Glass Recyclin" with a "Read More" button.

NRRA NORTHEAST RESOURCE RECOVERY ASSOCIATION

MY ACCOUNT LOG OUT SUBSCRIBE TO E-NEWS

About NRRA Resource Library Member Programs & Services Schools

COVID-19
Food Waste & Composting
Glass Recycling
Glass Recycling Story Map
NHDES Credit
Recycling Markets
Summer Webinar Series

Releases Glass Recyclin
2020) – The Northeast Resou
(NRRA), a recycling nonprofit that enables communities to
recycling programs, has released an ArcGIS story map and
transparent look at glass recycling. At a time when deprese

Read More

Resource Documents

New England PGA Chart by State Specifications

https://www.nrrarecycles.org/sites/default/files/uploads/resource-documents/pga_by_state_new_england_7.27.20.pdf

PGA Survey Report

<https://www.nrrarecycles.org/resource-library/processed-glass-aggregate-survey-report>



Examples of PGA Use



Processed Glass Aggregate

ABOUT ME:



- ▶ Town of Littleton Solid Waste Manager... 7 Years
- ▶ 20+ Years in field... since freshman year in HS

MY PERSONAL THOUGHTS:

- ▶ Not for all jobs
- ▶ Good for Small Jobs... **Sidewalks, Parking Lots, Concrete Pads, etc**
- ▶ For Large Jobs... **Mix**
- ▶ Great for areas where no major water issues... **Water lines, Major Runoff, etc**
- ▶ What do you want for its purpose
 - ▶ Best Areas of use... **LESS FROST HEAVES**
 - ▶ Just to use it up... **SAVE MONEY**
 - ▶ Bragging... **"SAVE THE ENVIRONMENT"**
- ▶ Be Creative, Can use for a lot of things... **Conduit, Piping, Water, Sewer, Septic, Driveways, De/Re-tension Ponds, Where you want water to seep**

LITTLETON'S USE

- ▶ Small Jobs
- ▶ Boynton Lane (short, goes to PD, Highway Dept)
- ▶ Carlton Street (Short Dead End)
- ▶ Under some sidewalks
- ▶ Around Culverts
- ▶ Around TS
- ▶ **SOME PLACES FAILED, SOME SUCCESSFUL**
 - ▶ Misused!!!
- ▶ Given a lot to Casella for use around piping at Landfill

BE CAREFUL WHEN USING...

- ▶ A lot around water mains
 - ▶ Leaks powerful and blows glass away causing more damage
 - ▶ If do use, make sure separate from sewer
 - ▶ Can use but just **MIX WELL**
- ▶ Culverts
 - ▶ Great to use but don't put too much as winter will raise around and cause massive frost heaves... **like any road project try to use same material throughout**

FINAL THOUGHTS ON USES

- ▶ IF use consistent on road may create less frost heaves
 - ▶ But hard to tell if really is a big difference... **EVERY ROAD IS DIFFERENT**
- ▶ Around conduit
 - ▶ Less frost but also if digging up can know when getting close... **PROTECTS**
- ▶ If use just under loam, don't expect grass to grow good



BUDGET

- ▶ Different Budgets But Look at Whole Picture.. **Transfer Station/Highway**
- ▶ \$40/Ton **COST** to Crush
- ▶ **SAVE** \$70/Ton if not Trashed
- ▶ $TS = \$70 - \$40 = \$30/\text{Ton Savings}$
- ▶ Highway Dept: \$8.75/Ton **COST** (3/4" Crushed Gravel)
- ▶ Town Savings = $\$30 + \$8.75 = \$38.75/\text{Ton}$
- ▶ \$40/Ton = 4.5 Tons Crushed Gravel... **Not volume equal though**

FUTURE HOPES

- ▶ State Regulations Changes... **Set Plans For Certain Projects**
 - ▶ Eliminate Engineer if follow the plans
 - ▶ Driveways, septic, foundations, etc
- ▶ Give to Gravel Yards - **They have tools to mix... Big Issue for Towns**
 - ▶ 3:1 Ratio of gravel:PGA would work amazing
- ▶ More Than Just Roads!

Town of New London

Projects thus far

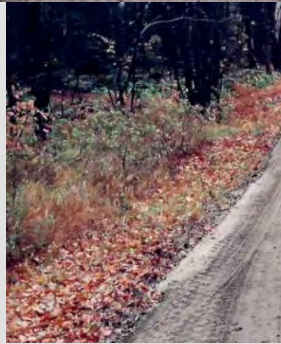
- Sidewalks
- Flooring under slab
- Backfill water line for a sprinkler system
- Road sub base
- Parking lot base

Upcoming project

- New building complex base



Bog Rd New London subbase when laying roads



New London Public Works Dept Garage floor base

Laying it



Compacting



Parking Lot Base – New London





Northeast Resource Recovery Association

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STAY CONNECTED

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 www.nrrarecycles.org |  [/NRRAreycles](https://www.facebook.com/NRRAreycles)

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