



# Landfills 101

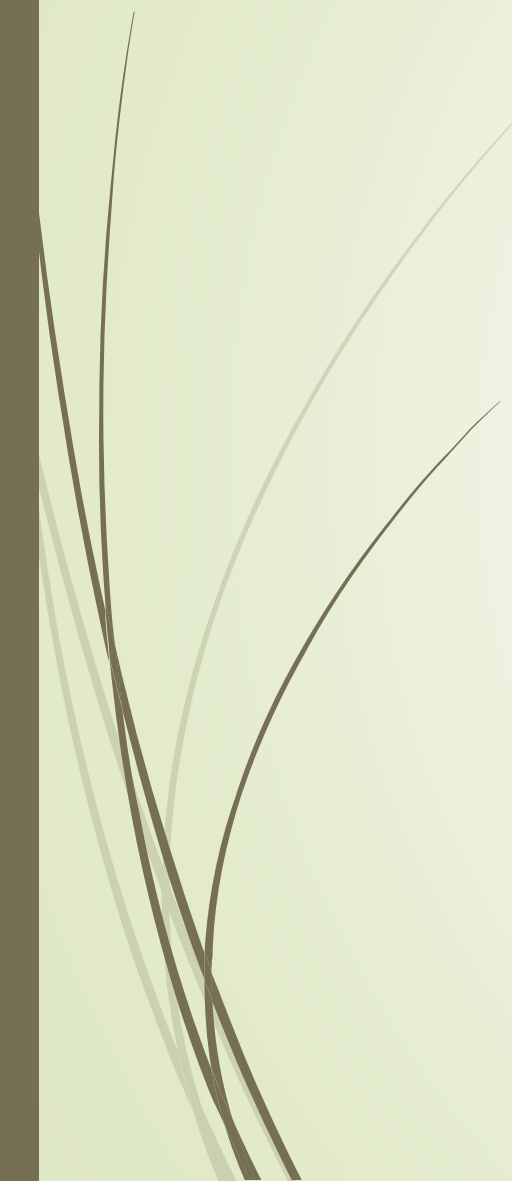
Marc Morgan

City of Lebanon

Solid Waste Manager



# Overview

- 50,000-foot view
  - This may be a “no duh” kind of overview for some
  - Important to understand the fate of our waste
- 



# Recent History

- ▶ In the early 1990's the majority of small town landfills closed due to subtitle D regulations requiring lined disposal facilities.
- ▶ In the early 2000's a number of New York County owned landfills leased to the private sector to obtain cash to help finance health care costs that filtered down from state programs.
- ▶ The last decade we saw vertical integration among the larger haulers and the ability to control their disposal costs via ownership or leasing existing disposal sites.



# NH's Disposal History

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- In the early 2000's a number of New York County owned landfills leased to the private sector to obtain cash to help finance health care costs that filtered down from state programs.
- The last decade we saw vertical integration among the larger haulers and the ability to control their disposal costs via ownership or leasing existing disposal sites.
- The closure of the Moretown Landfill and the Wheelabrator Incinerator put about a quarter of a million tons of garbage per year on the street looking for a new home in 2013.

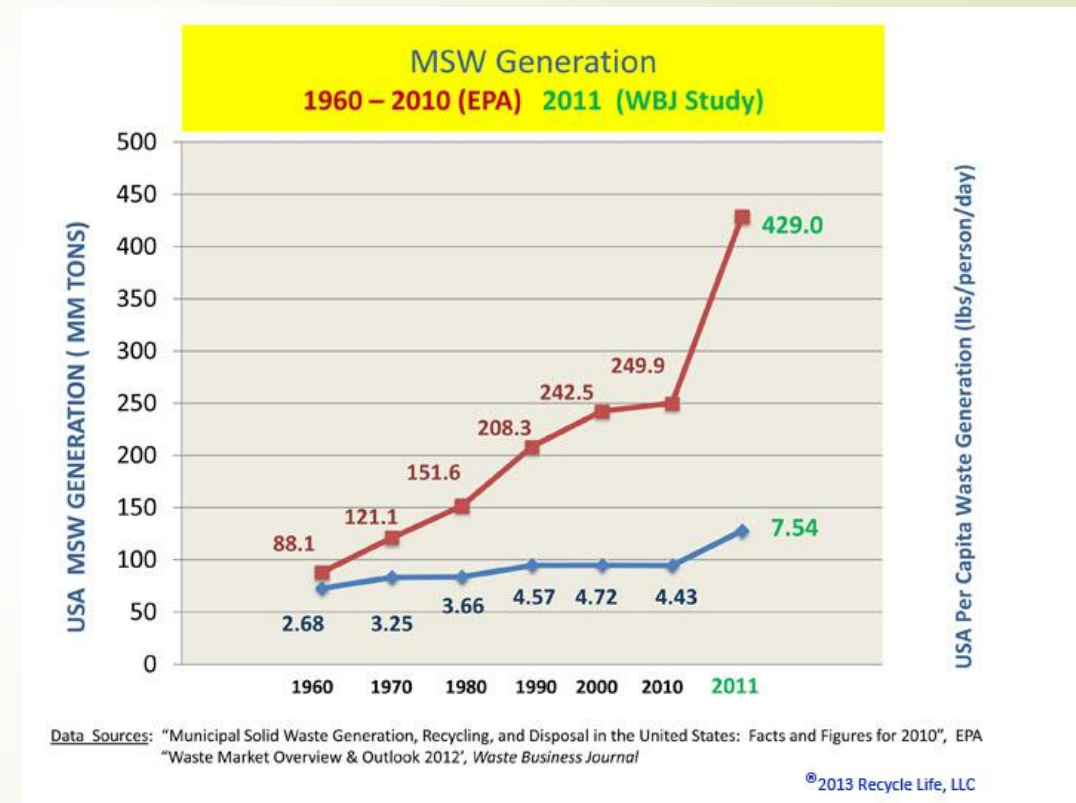
# What has changed?

- ▶ Our waste has changed....
  - ▶ Items we throw away
    - ▶ Single-use disposable
    - ▶ Toxicity of waste
  - ▶ Where we generate waste
    - ▶ Away from home
    - ▶ Impacts access to recycling
  - ▶ How we dispose of waste
    - ▶ Single-stream Recycling



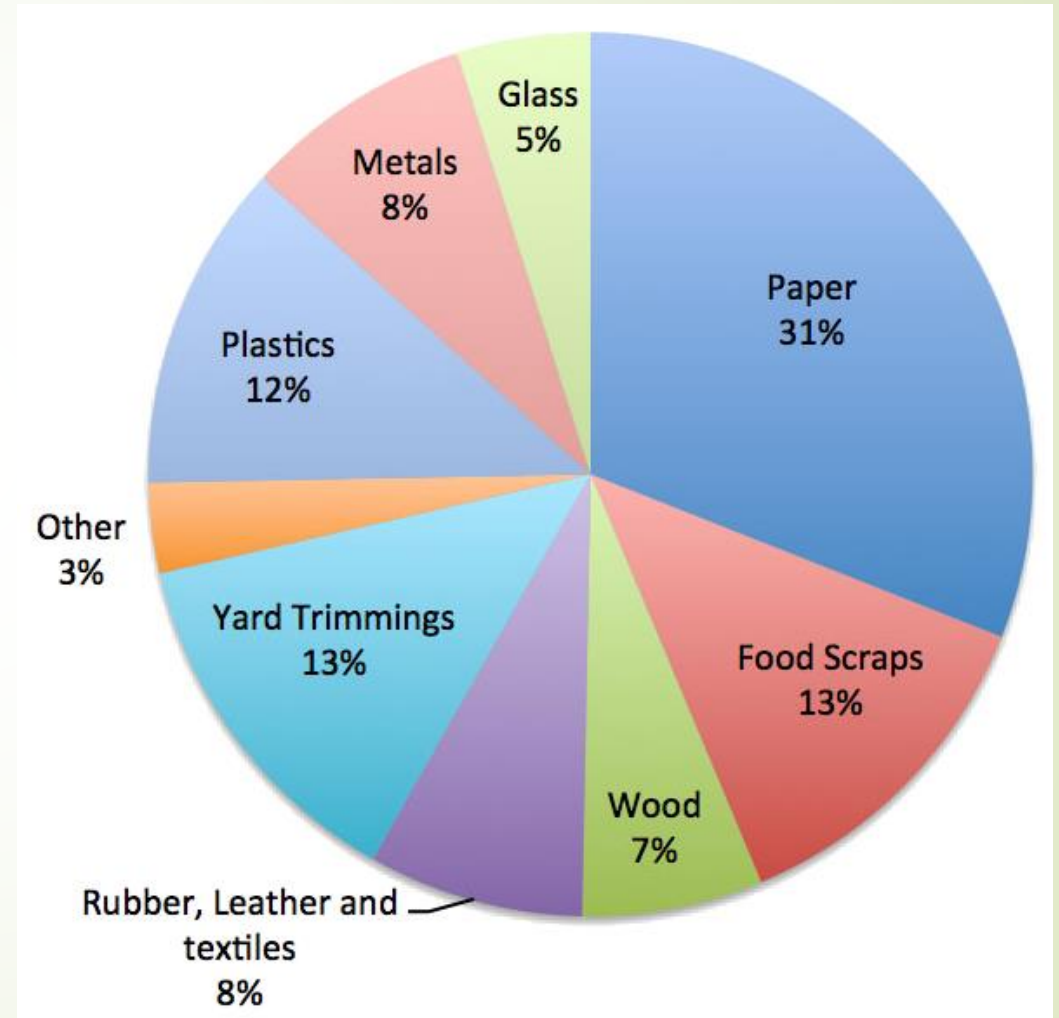
# Waste by the Numbers

- 292.4 million tons in 2018 (EPA)
- Nearly twice what it was in 1960
- National Recycling Rate is about 35%
- In 1960, Recycling rate was almost 3%
- The World Bank estimates “high-income” countries will increase waste disposal by 19% by 2050



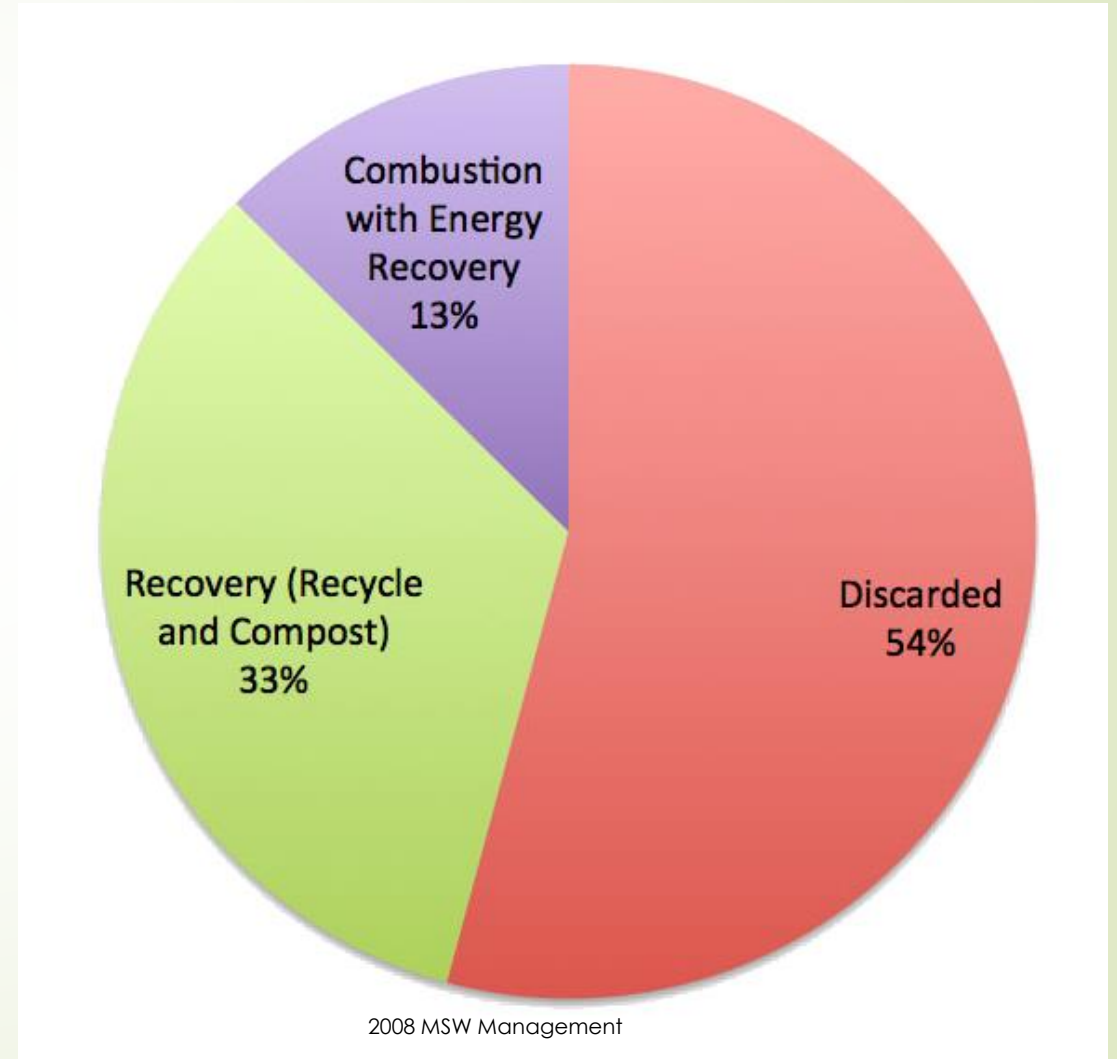
# What we throw away has changed

- In the past 10 years, plastic has increased tremendously
- Plastic waste has nearly tripled since 1980
- There are MANY grades of plastic leading to confusion
- Few stable recycling options for all plastics
- Paper waste has declined since 2000 but has leveled off
  - Overseas markets have been unstable
- Waste toxicity has increased
  - Cell phones
  - Electronic Devices have increased
  - Improper disposal
  - PFAS



# How we dispose of our waste.....

- ▶ Americans generate about 4.9 lbs/person/day of waste
- ▶ Landfill – More than half of all waste is landfilled
- ▶ Incineration- Nearly 15% of our waste is incinerated with energy recovery
- ▶ Recovered – Almost 35% of all waste is either composted or recycled



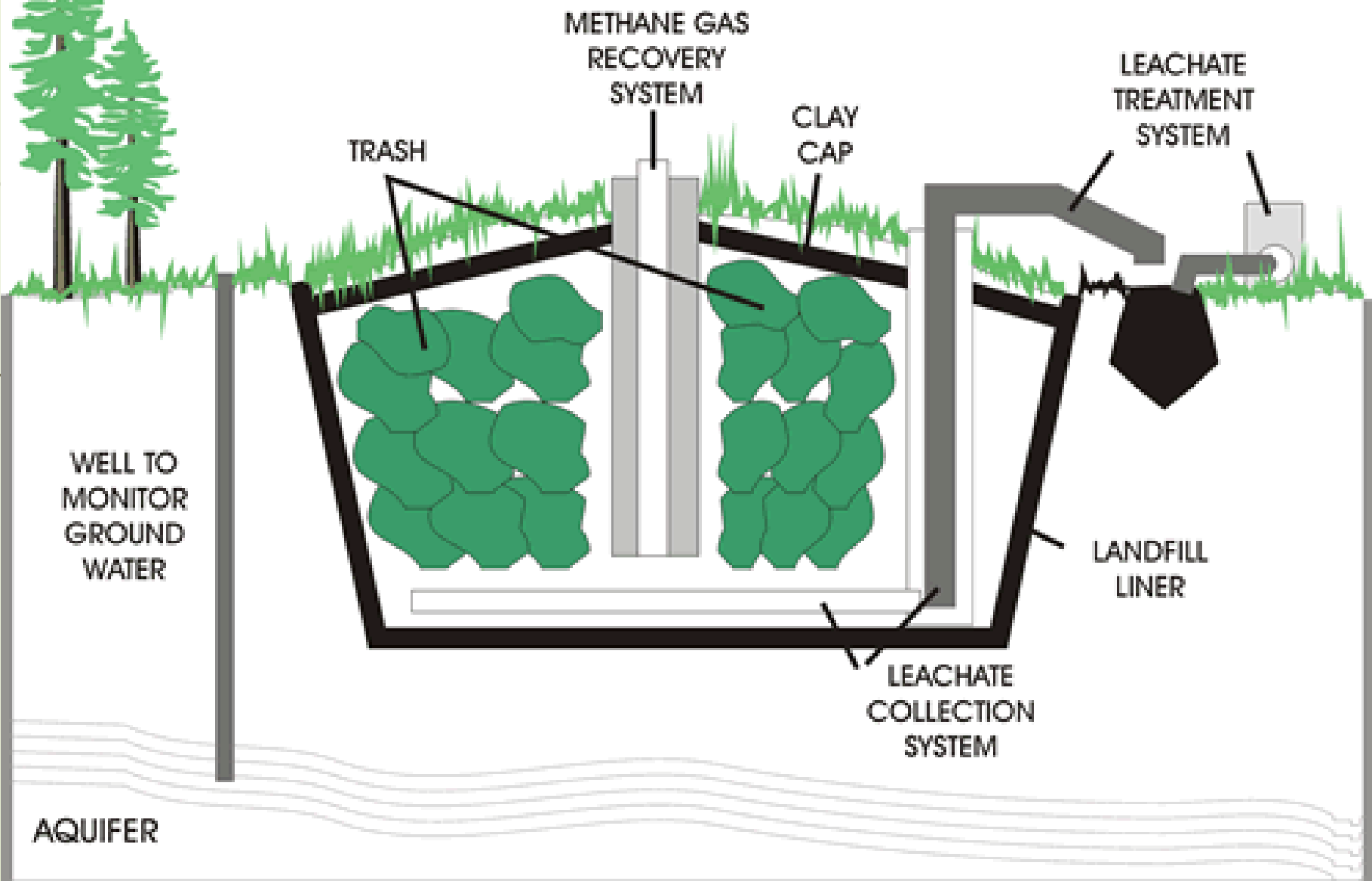


# What is a landfill?

- ▶ In NH,
  - ▶ Primary method of Disposal
  - ▶ Least preferred option
  - ▶ Double-liner System
  - ▶ Leachate Collection
  - ▶ Fill Sequence
  - ▶ Cover Material
  - ▶ Other
    - ▶ Gas Collection
    - ▶ Leachate Recirculation
  - ▶ Closure (landfills do fill up)



# MODERN LANDFILL



# Landfill Construction

- Construction costs are approximately \$500,000/acre
- Liner system is many feet thick
- Requires specific technique for filling (bagged waste)





# Operations

- Landfill operations are costly
- Multiple pieces of equipment
- Diesel fuel
- Staffing
- Moving material



# Managing our own “waste”



- Leachate
- Landfill Gas

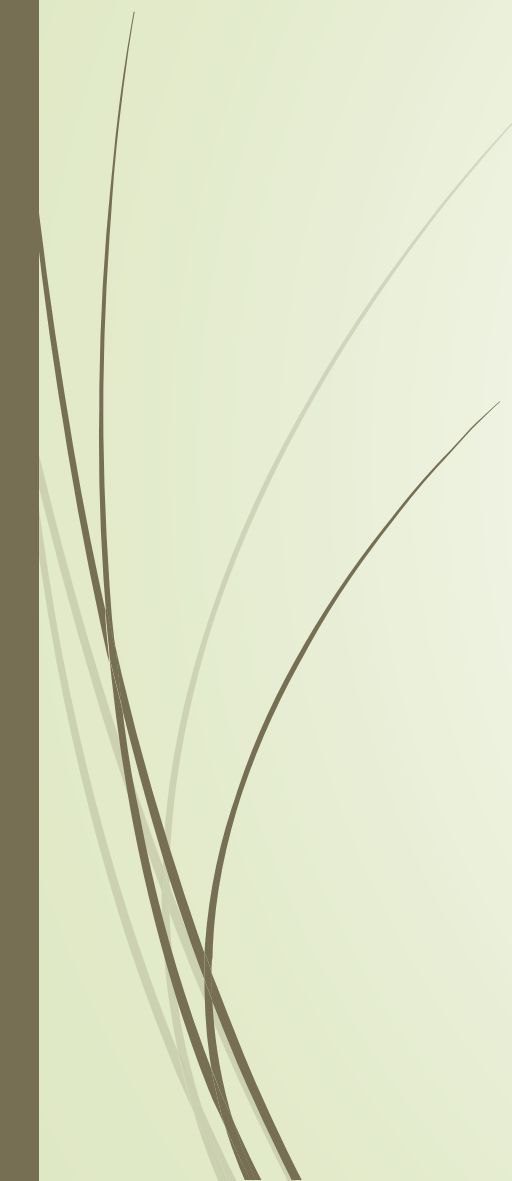
# Landfill Closure



- ▶ By nature, landfills FILL
- ▶ They consume space
- ▶ Although there is some decomposition, Landfills are forever



# Cha, cha, cha, changes...

- ▶ Equipment used has changed
  - ▶ Fill methods have changed
  - ▶ Use of cover materials
  - ▶ Engineering has changed
  - ▶ Regulations have certainly changed
- 





# Lebanon Solid Waste Management



- ▶ Serves 22 communities in NH and VT (approx. 80,000 people)
- ▶ The Lebanon site is both an active lined and closed unlined landfills
- ▶ Lebanon Landfill- 35,000 tons of MSW (VERY small landfill)
- ▶ Composting – 5,000 tons of yard waste and food waste
- ▶ Recycling – Nearly 2,000 tons of source separated recyclables
- ▶ Other – 15,000 tons of clean and “dirty” soils/cover material
- ▶ Permitted Disposal Capacity for another 9 years
- ▶ Planning for disposal capacity for 75+ years
- ▶ Also...
  - ▶ Household Hazardous Waste, Universal Wastes, Automotive Wastes, vegetable oil, tires, freon containing devices and more.

Figure 2

### Site and Groundwater Management Zone Plan

Annual Water Quality Summary Report

Lebanon Landfill  
Lebanon, New Hampshire

Drawn By: H. Pothier  
Designed By: P. Troy  
Reviewed By: B. Green  
Project No: 3354.11  
Date: September 2019

### Figure Narrative

This figure shows prominent site features including the phases of landfill development at the site. In addition, this figure shows the location of the Groundwater Management Zone (GMZ) and property ownership information.

### Notes

1. The base plan was from a drawing file prepared by Aerodata Digital Mapping of Cesipee, NH using photogrammetry performed on April 15, 2017. The horizontal grid is based on the New Hampshire State Plane coordinate system (NAD83). The vertical datum is NGVD29 based on USGST-2 disc on a railroad bridge abutment in West Lebanon.
2. Property boundaries and ownership information were obtained from the City of Lebanon web GIS system on July 21, 2016.
3. This figure depicts the current GMZ with property ownership information and the approximate location of water wells located within 500 feet of the GMZ boundary that are listed in the NHDES online database (OneStop).

### Legend

-  Groundwater Monitoring Well
-  Groundwater Monitoring Well Decommissioned / Destroyed
-  Limit of Waste Containment
-  Property Line
-  Groundwater Management Zone (GMZ)



PROPERTY ID	OWNER	PARCEL ADDRESS
157-3-100	CITY OF LEBANON * (GMZ)	0 PLAINFIELD RD
128-11	PIKE INDUSTRIES, INC.	0 PLAINFIELD RD
128-3-70100	KORPELA FAMILY TRUST	296 PLAINFIELD RD
157-4	CARROLL CONCRETE CO. INC.	301 PLAINFIELD RD
157-5	PIKE INDUSTRIES, INC.	335 PLAINFIELD RD
157-6	PIKE INDUSTRIES, INC.	365 PLAINFIELD RD
157-3	CITY OF LEBANON (GMZ)	370 PLAINFIELD RD
157-2	UPPER VALLEY SAND AND GRAVEL, LLC	384 PLAINFIELD RD
157-1	UPPER VALLEY SAND AND GRAVEL, LLC	386 PLAINFIELD RD

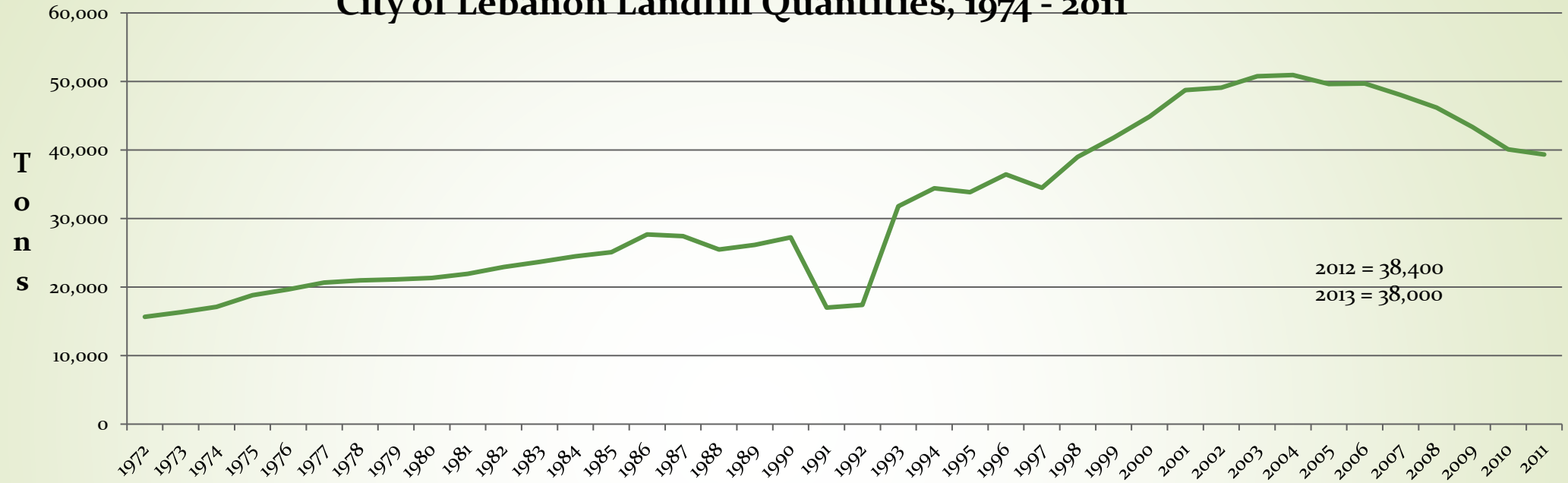
\* THE CITY OF LEBANON LEASES THIS PORTION OF PARCEL 157-3 TO FORE-UGOLF CENTER, LLC.

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Last Edited By: hpotier

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City of Lebanon Landfill Quantities, 1974 - 2011



Lebanon tonnage over the years



# Some of my thoughts.....

- ▶ Landfill is the least preferred method, but is most used disposal option
- ▶ The waste industry has changed: labor issues, global markets, international regulations (Plastic a Hazardous Waste?), equipment, the waste stream, and lots of new regulations
- ▶ Solutions to today's problems will need to consider future possibilities. For example, AI/robotics, electrified (not diesel) vehicles, less human powered labor, waste conversion technologies and the ever-changing waste stream
- ▶ Thinking about how to extend landfill capacity is not enough
- ▶ There are techniques used today in landfilling we hadn't done in the past (textured liner, larger trash compactors, waste shredders, alternative daily cover systems). Are regulations ready for tomorrow's waste changes?

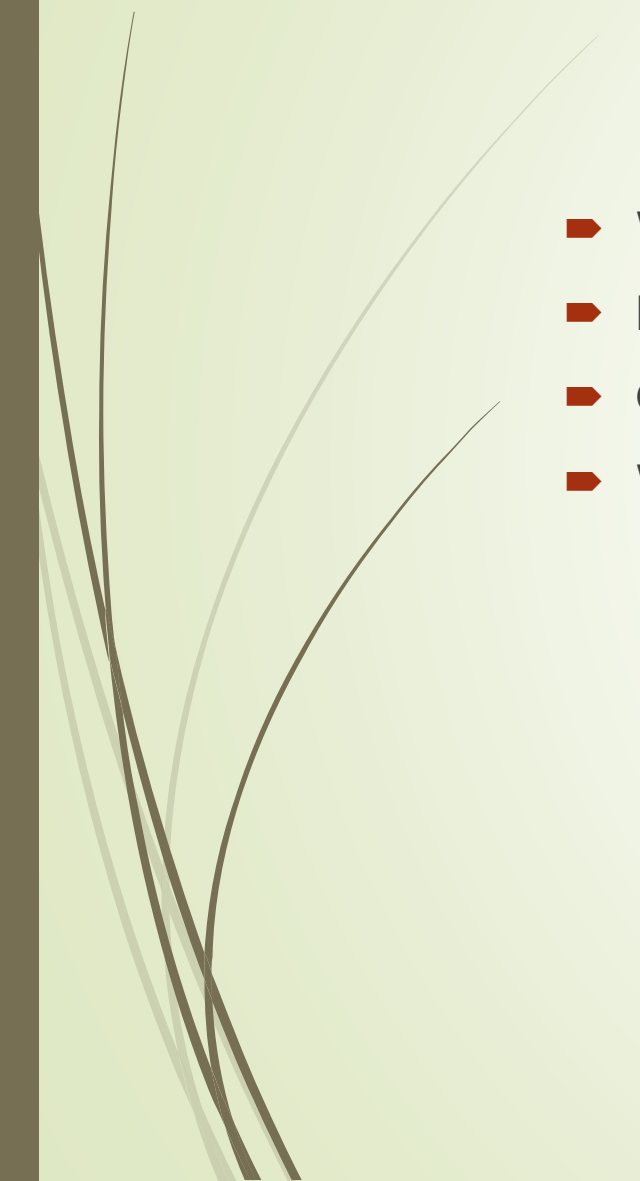
# Mobro 2.0?

- Late 1980's capacity crisis
- Our attitude about waste hasn't changed
- Still very political





# Stewards of the Garbage – A Challenge

- ▶ We are the stewards of the garbage
  - ▶ How you will you impact today's waste for tomorrow?
  - ▶ Can you reduce your community's waste?
  - ▶ We can all do something
- 

# Questions?????

