



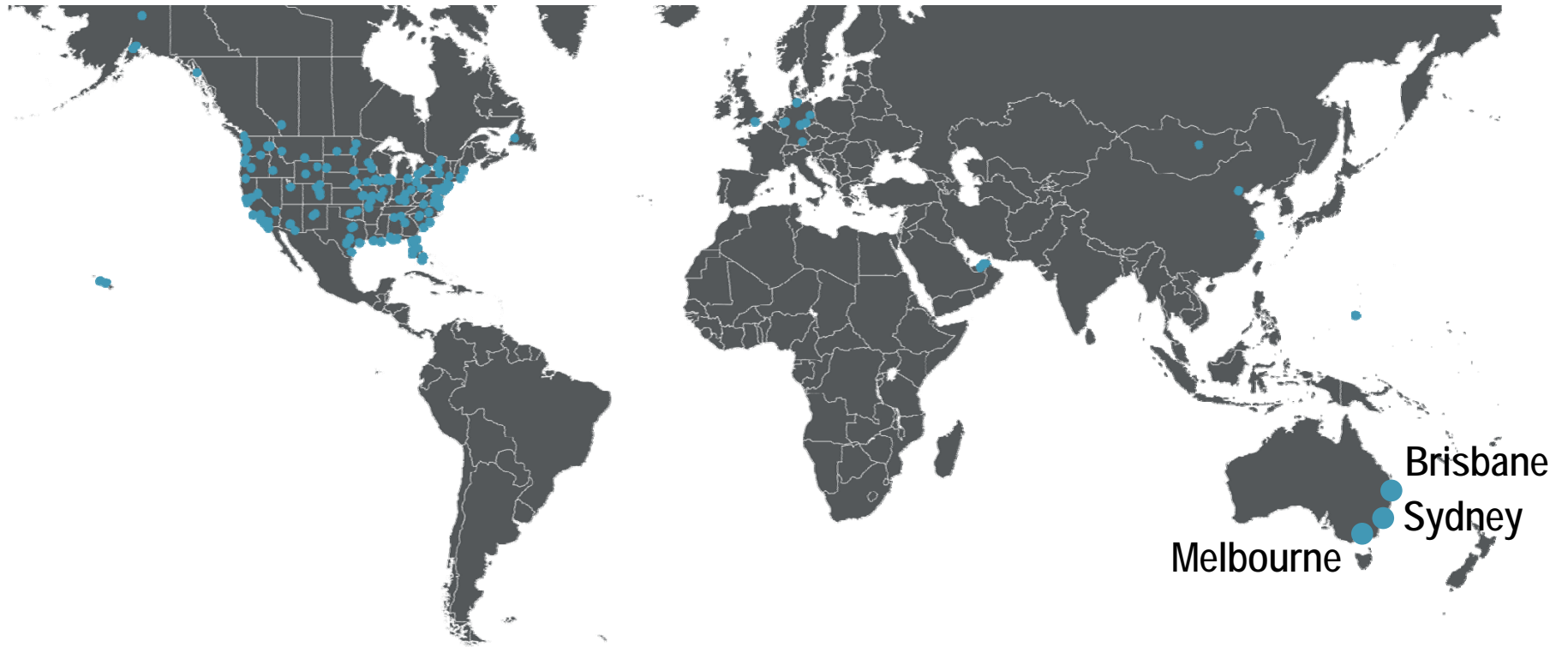
# Binning the Old Landfill Approach Using Global Innovations

Presented By: Eric Mead



30 March 2017





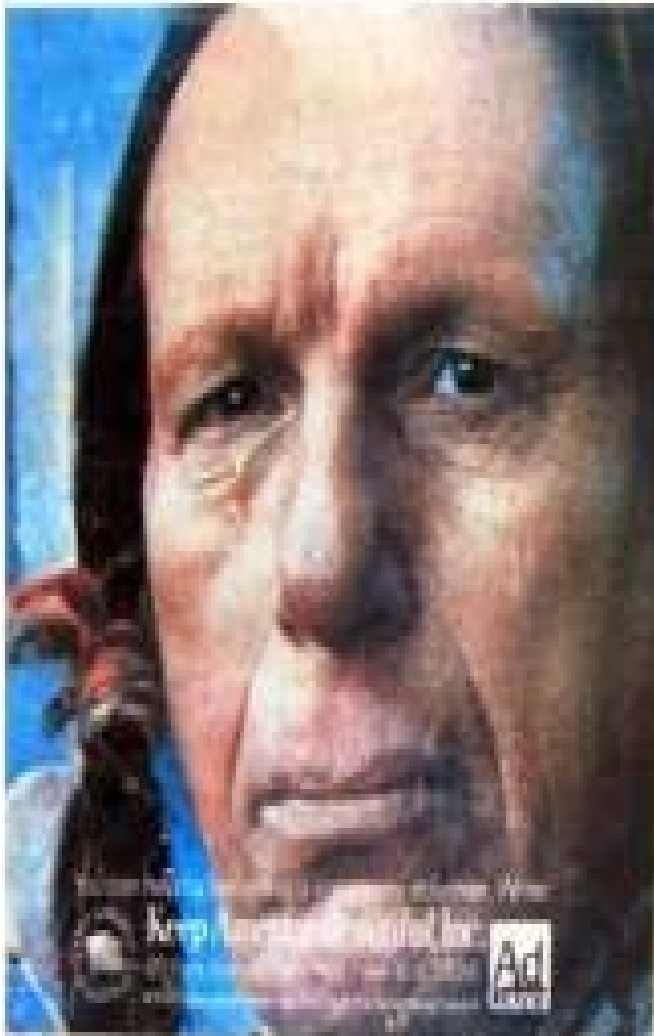
## HDR Overview

~10,000 professionals

+250 offices

3 Australia offices with 150 staff





**IN THE FIGHT  
AGAINST LITTER  
AND POLLUTION,  
WE STILL HAVE  
SO FAR TO GO.**



*People start pollution.  
People can stop it.*

Ad Council  
www.adcouncil.org

**More focus on landfills means greater need to:**

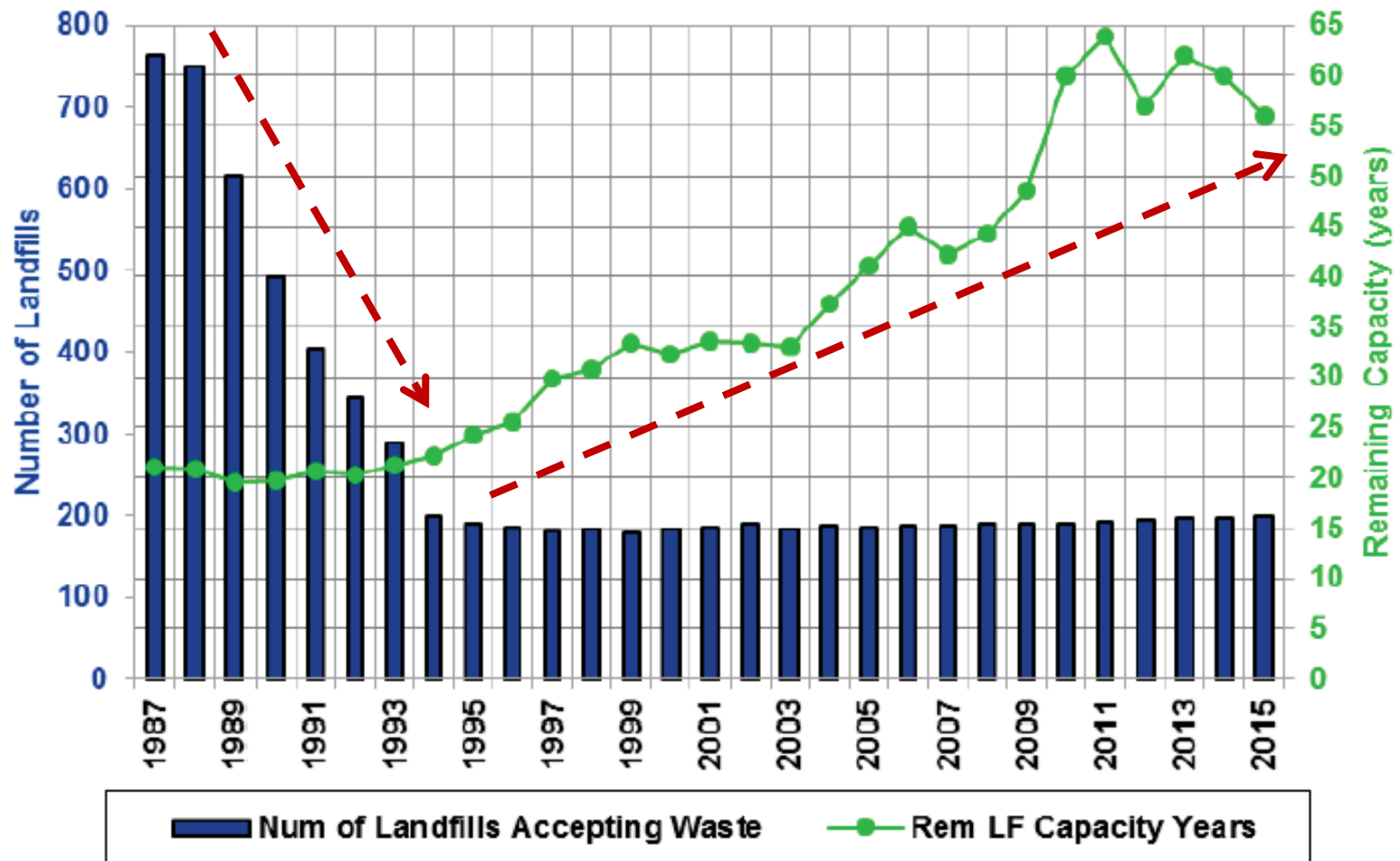
**Maximise** permitted airspace

**Optimise** day-to-day operations

**Minimise** expenditures



**MOM**



Source: MSW in Texas 2015 Annual Review October 2016

# Maximise Permitted Airspace

MSE Walls

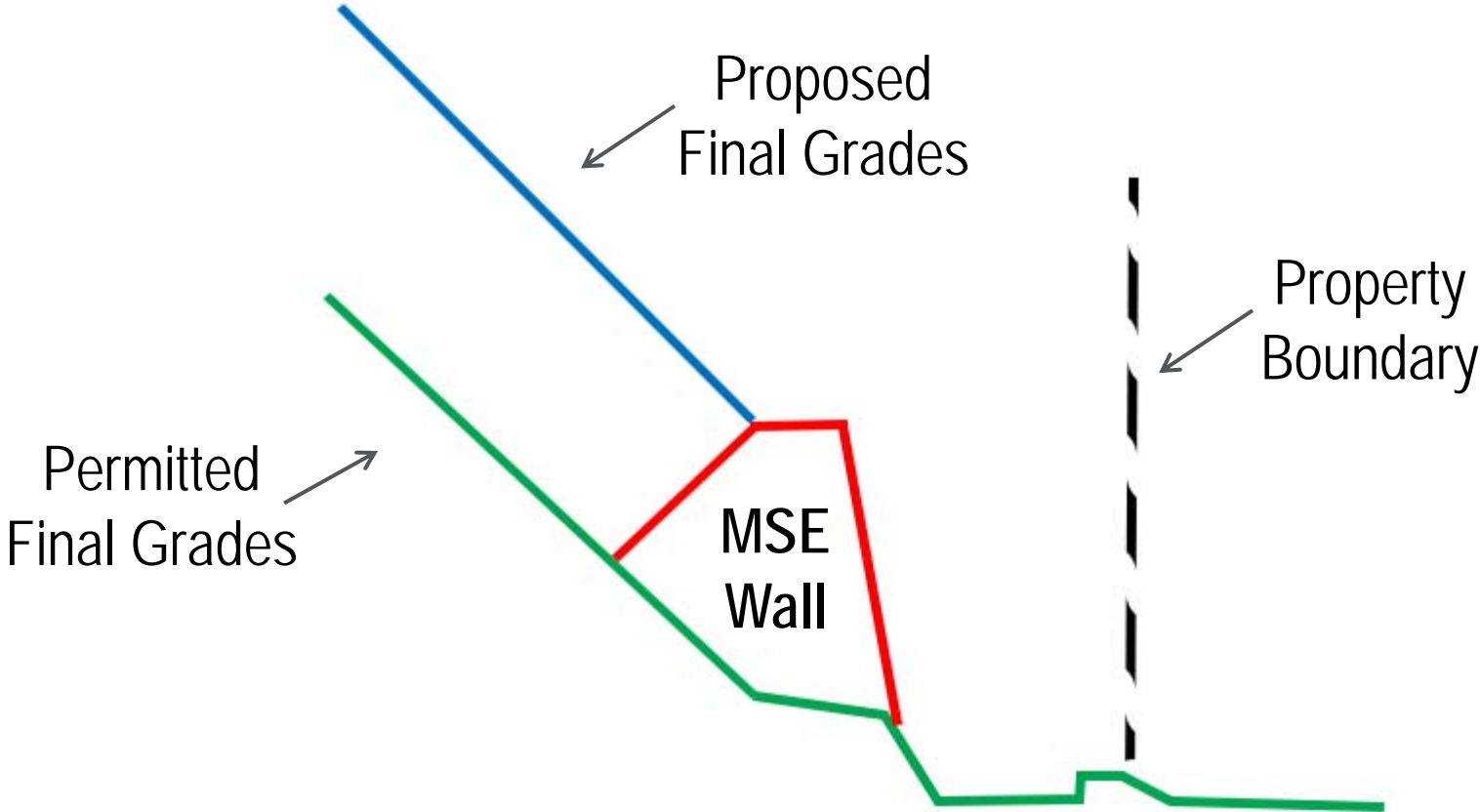
Waffle Top Design

Bioreactor

Landfill Mining

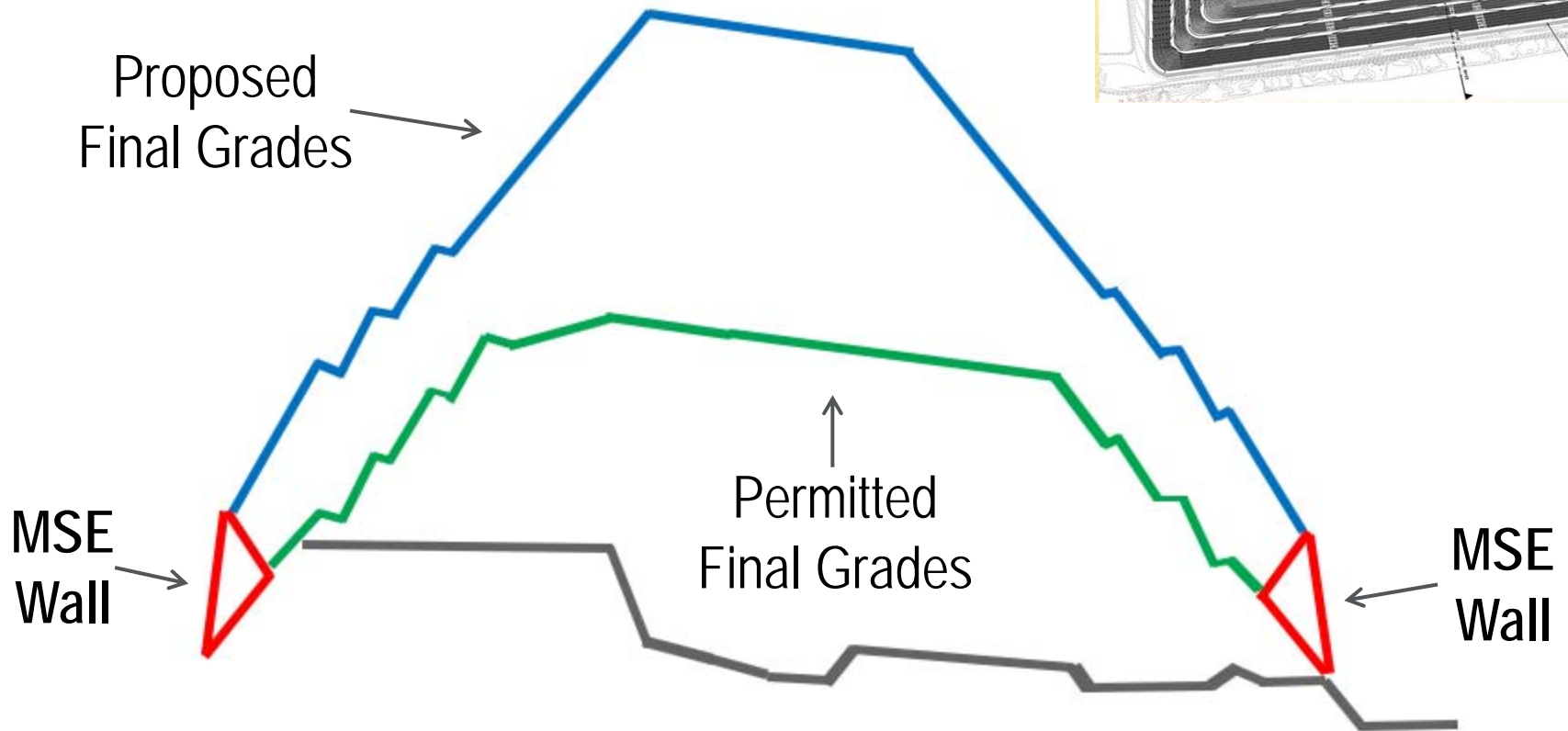
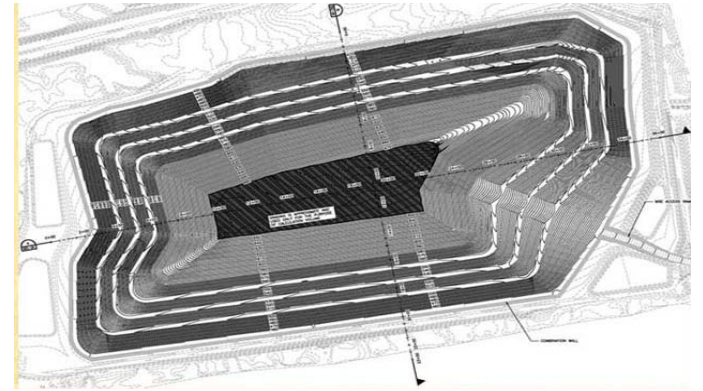


# Mechanically Stabilised Earth (MSE) Walls





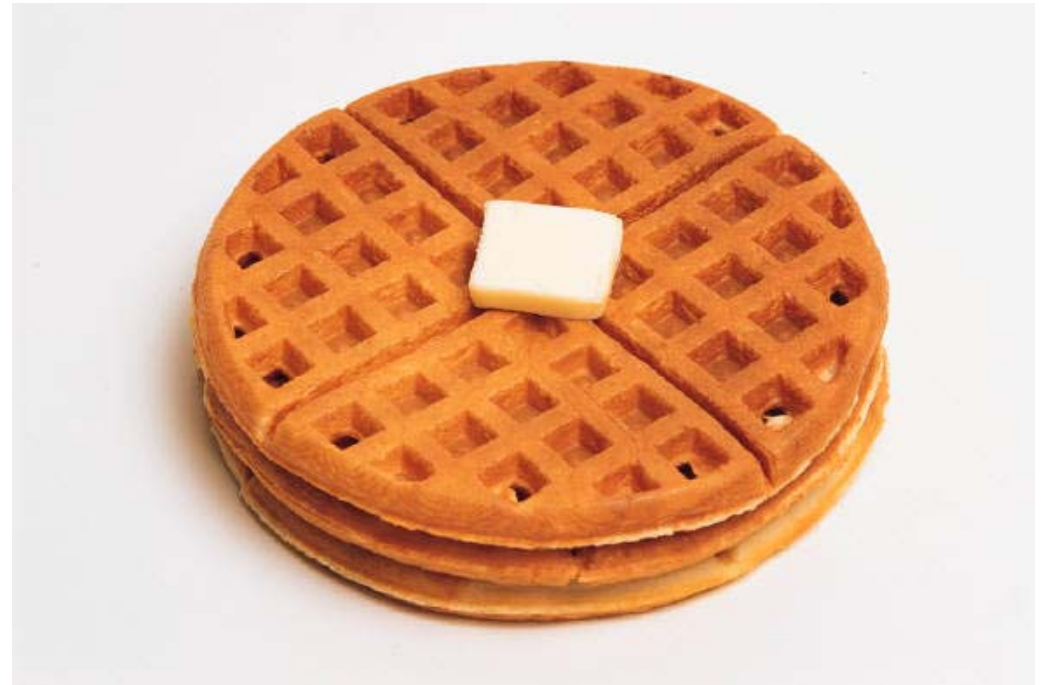
# MSE Walls



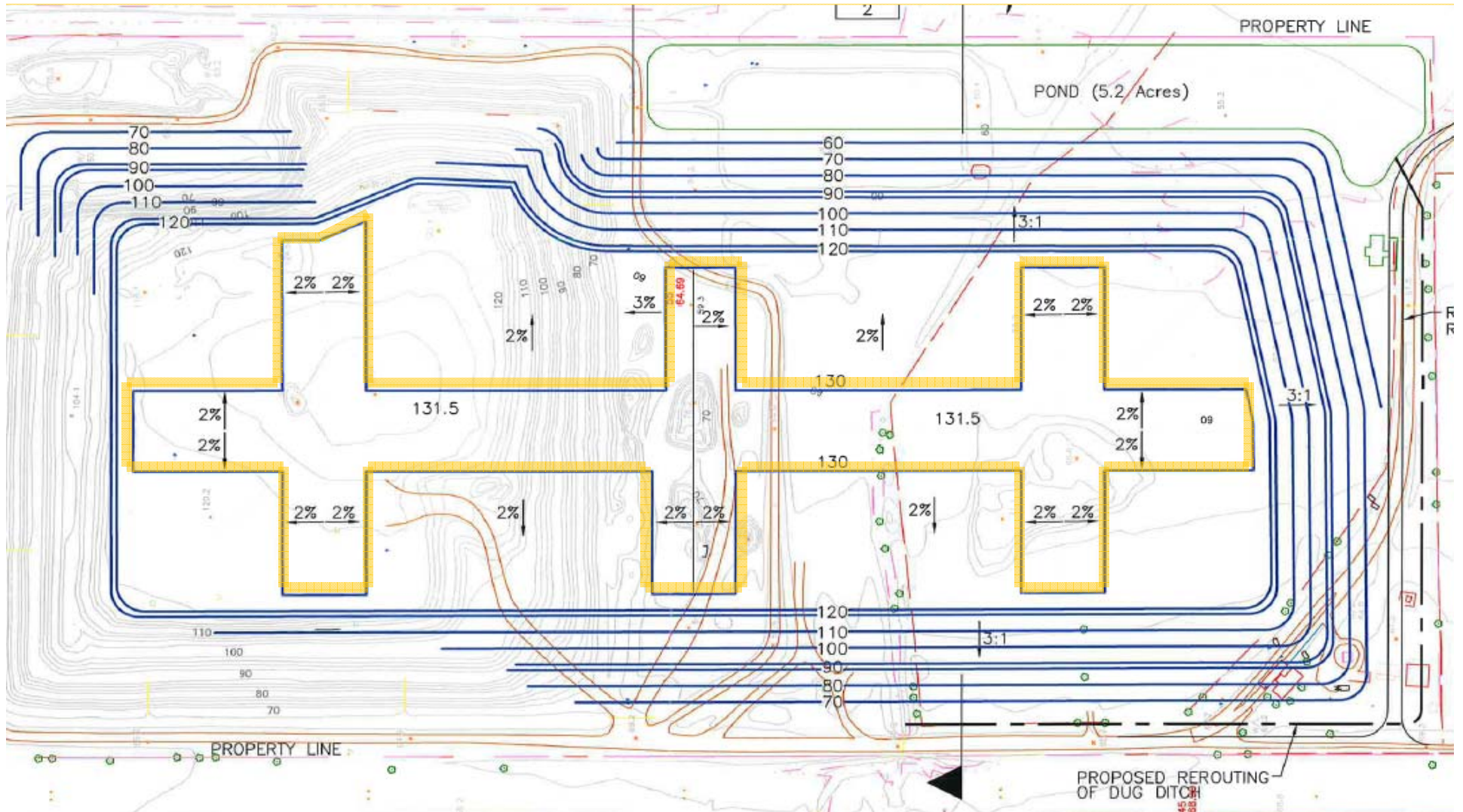


## Waffle Top Design

- Hilltop vs ridges
- Maintain highest elevation







# Bioreactor

- Goal is to accelerate decomposition
- Select waste
- Control moisture
- Renewable airspace



# Landfill Mining

- Benefits
  - Cost reductions
  - Revenues
  - Increased property value
  - Additional disposal capacity
- Risks
  - Unknown waste materials
  - LFG and odours
  - Water management
  - Dust and litter



# Landfill Mining

Landfill	Years Closed	Benefit of Source Removal	Est. Waste Volume (Million M <sup>3</sup> )	Est. Waste Relocation Cost (USD)	Property Value Gained (USD)
Duvall	36	Medium	1.11	\$25M	\$2M
Houghton	50	Medium	0.93	\$17M	\$31M
Cedar Falls	31	High	1.22	\$32M	\$2M
Hobart	23	Low	1.30	\$20M	\$2M
Vashon	18	High	0.74	\$24M	\$2M
Puyallup	50	Medium	1.48	\$27M	\$6M
Enumclaw	24	Low	1.33	\$24M	\$0M
CHRLF	26	Medium	14.0	\$146M	\$0M



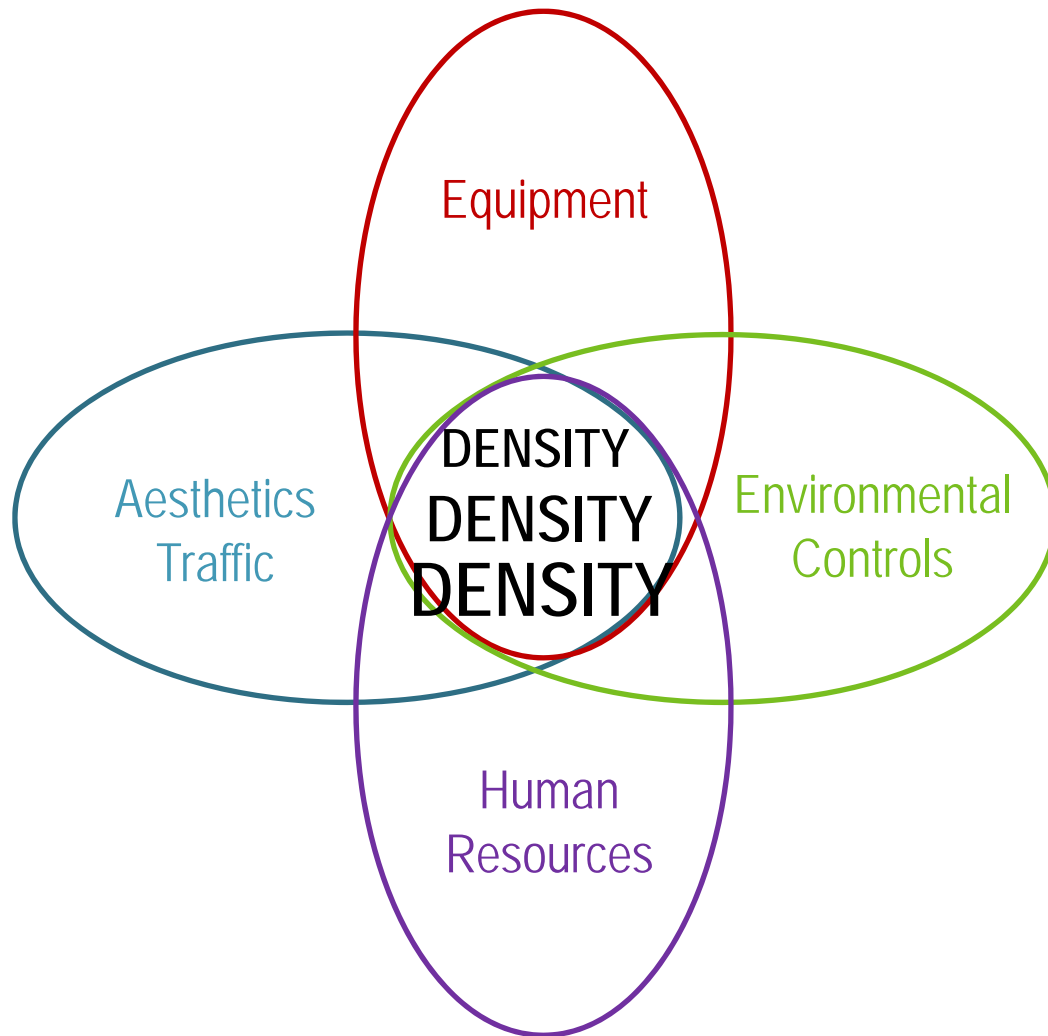
# Optimise Day-to-Day Operations



Intelligent Compaction

Drones

Fill Plans



# Intelligent Compaction



# Drones

- Surveying
- Bird control
- Landfill fire detection/assessment
- Closed landfill inspection

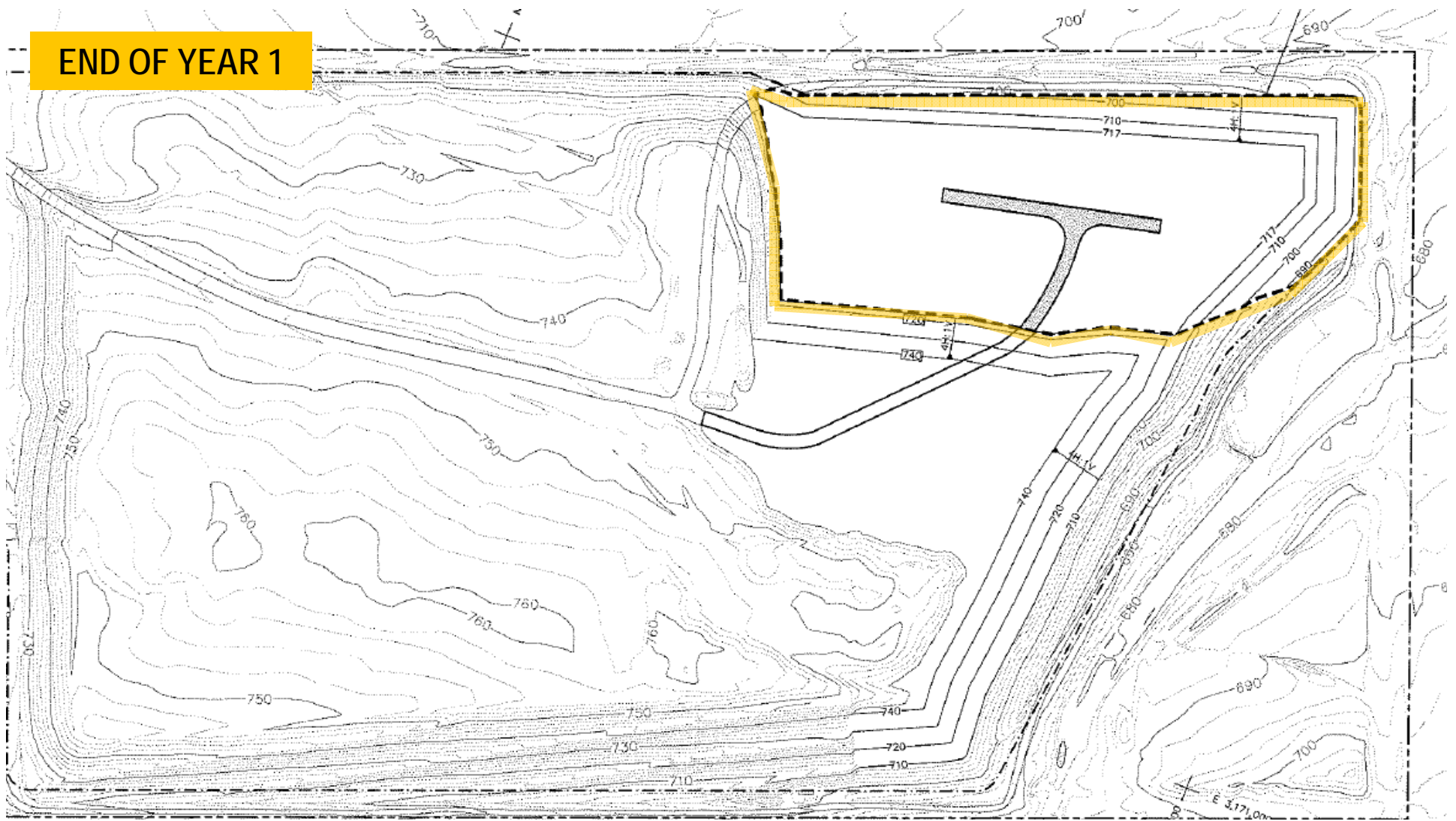


# Fill Plans

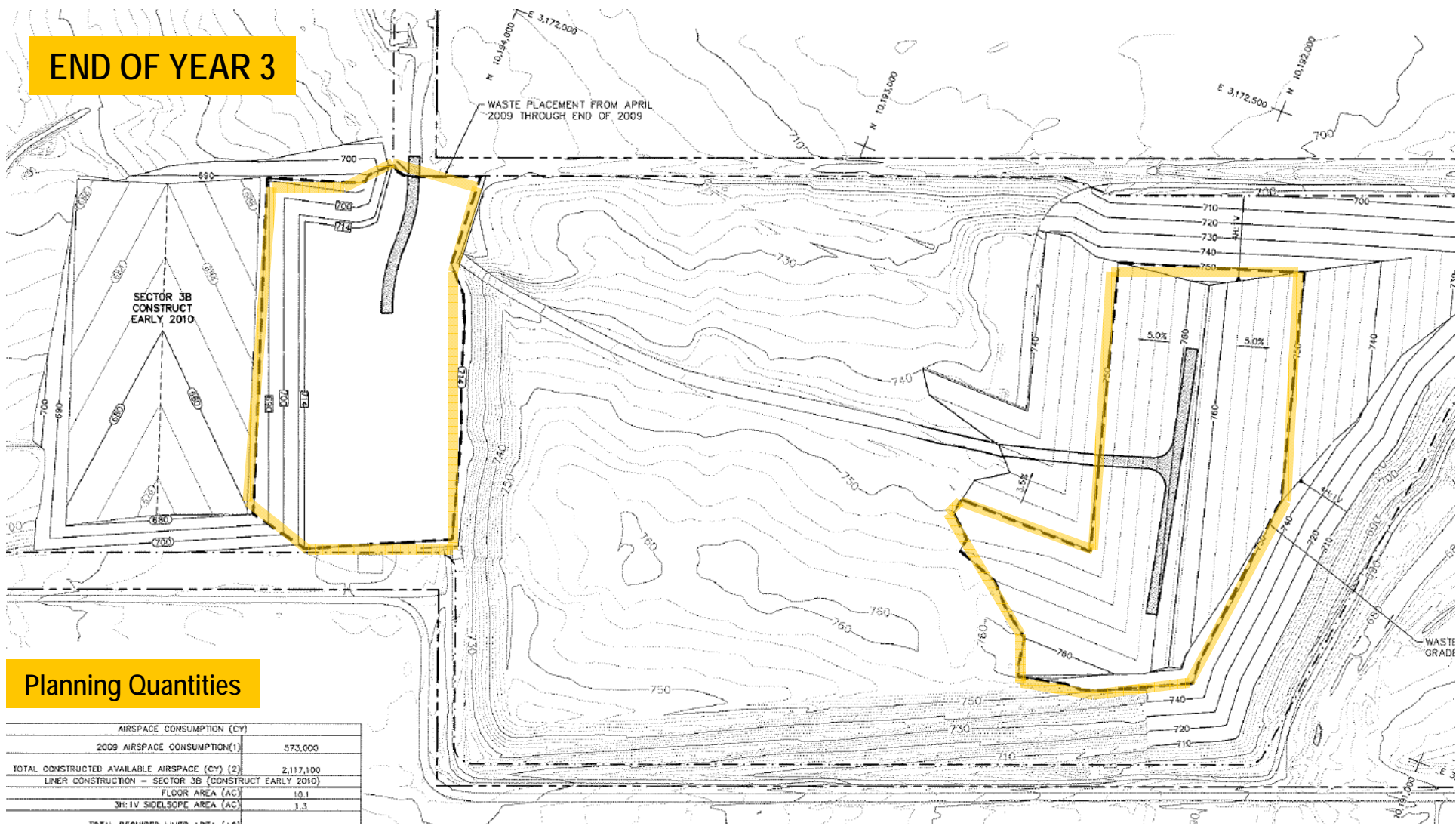
- Benefits
  - Planning for Expenditures
  - Complete filling of areas
  - Stormwater management
  - Reducing corrective measures
- Typically multi-year (5 years)



END OF YEAR 1



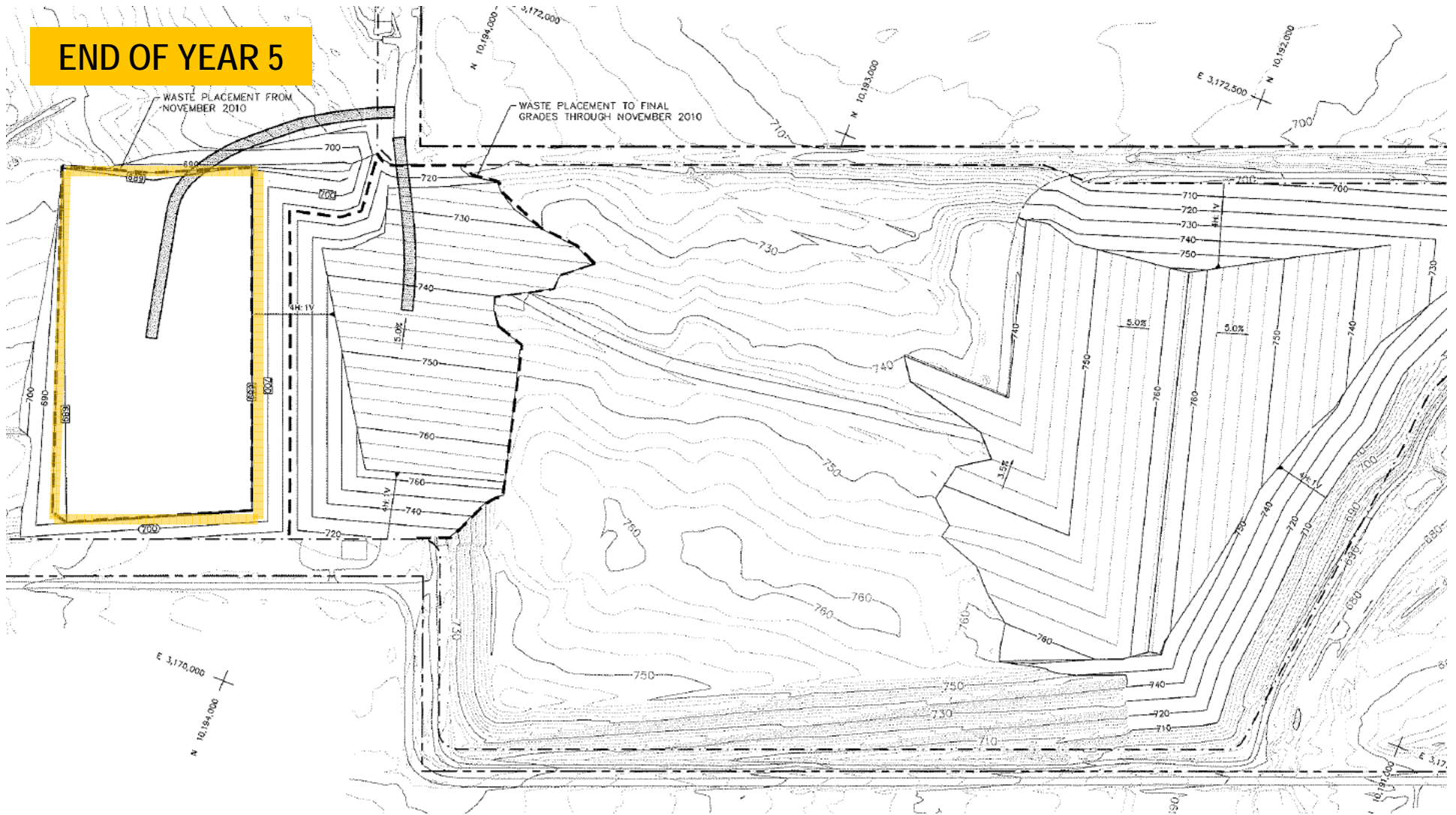
# END OF YEAR 3



## Planning Quantities

AIRSPACE CONSUMPTION (CY)	
2009 AIRSPACE CONSUMPTION(1)	573,000
TOTAL CONSTRUCTED AVAILABLE AIRSPACE (CY) (2)	2,117,100
LINER CONSTRUCTION - SECTOR 3B (CONSTRUCT EARLY 2010)	
FLOOR AREA (AC)	10.1
3H-IV SIDESLOPE AREA (AC)	1.3
TOTAL REQUIRED LINER (AC) (3)	

# END OF YEAR 5





A photograph of a large building under construction. The roof is covered with a grid of blue solar panels. Two construction workers wearing white hard hats are walking on the roof. The background shows the building's facade with many windows. A blue banner at the top right contains the text 'Minimise Expenditures'. Three green banners on the left side contain the text 'Alternative Caps', 'Smart Ditch', and 'Draintube'.

# Minimise Expenditures

Alternative Caps

Smart Ditch

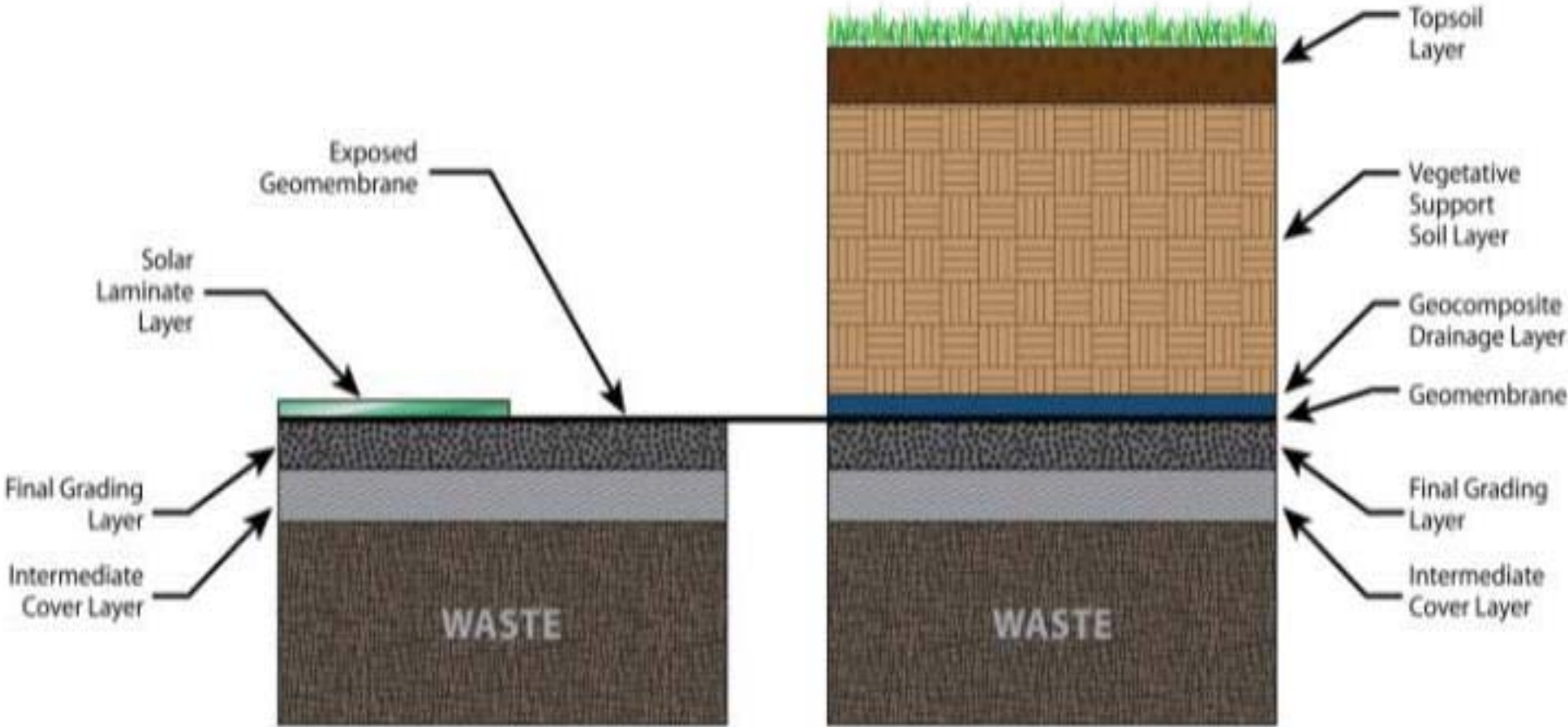
Draintube

## Alternative Caps

- Increasing acceptability
- Up to 1 m less thickness
- Demonstrate comparable hydraulic equivalency



# Exposed Geomembrane Cover (EGC) vs. Traditional Cap



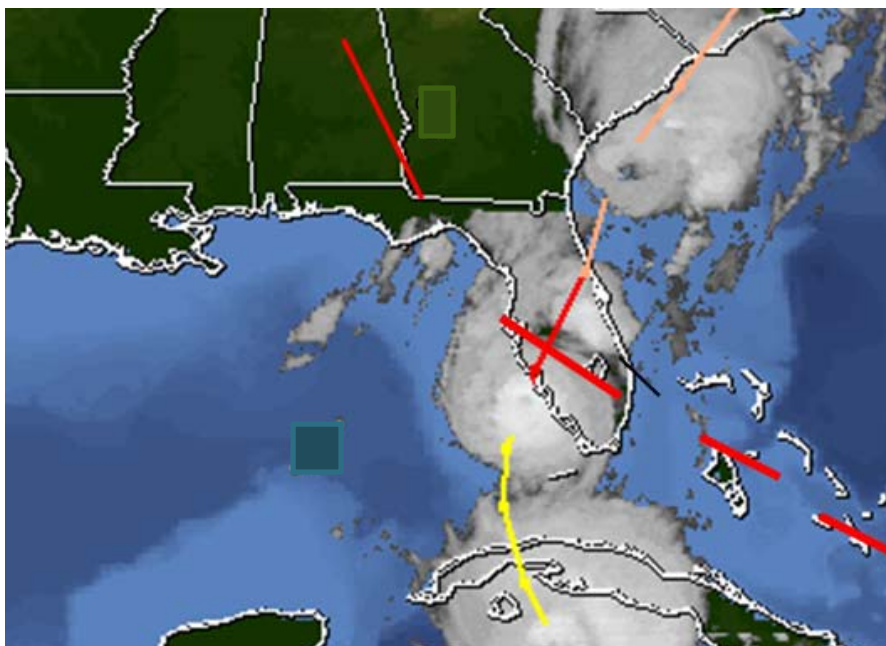


Traditional  
Cap

EGC

# EGC vs. Traditional Cap

Hurricane Case Study



# EGC vs. Traditional Cap

Stormwater

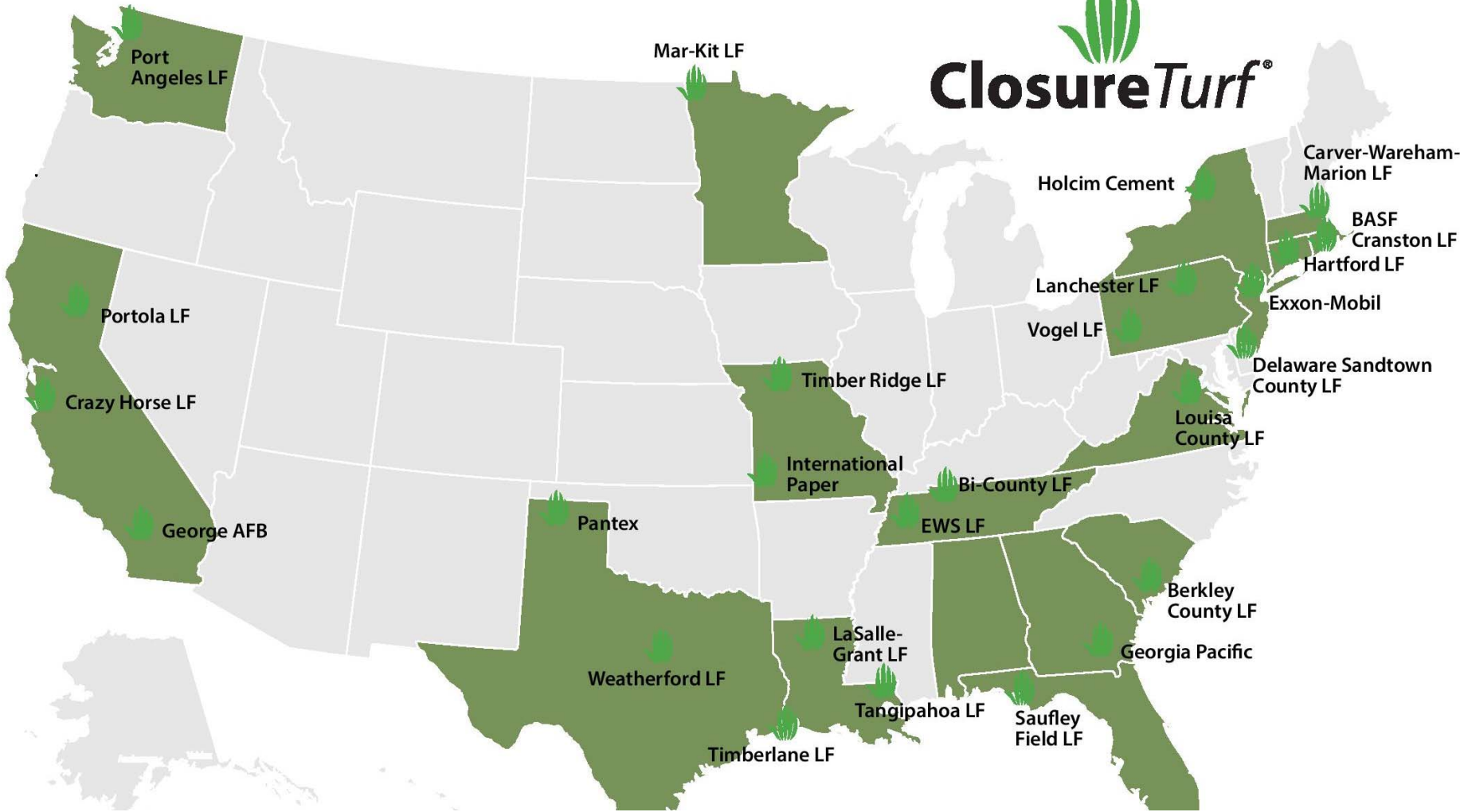


# Closure Turf





# ClosureTurf®





# Solar Energy Panels



# Rochedale Landfill Solar Cover



MiaSolé  
FLEX SERIES—03W

CIGS Flexible Modules:  
High Power Density in a Flexible Form Factor

**KEY FEATURES**

- Special advantage peak in a flexible form factor
- Low thermal weight in flexible form factor (13.8kg/m<sup>2</sup> (30.4lb/ft<sup>2</sup>))
- High performance substrate for recycling required
- Applications for high wind load and high pressure (Point 100)
- Special studies advised for specific loading scenarios
- Flexible form factor for more supported surfaces

**RELIABILITY AND SAFETY**

- 15 Year Power Output
- 15 Year Life
- 100% Class A over 15 Year (class 0.00112)

**WARRANTY**

- 10 Year workmanship
- 100% year warranty against power loss

MiaSolé

RY1

## Phyto Covers

- Higher design costs than traditional
- Lower construction & maintenance costs
- Potential income stream



**Slide 35**

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**RY1**

Eric, Veolia wants to wait until the vegetation has been established on Cell 1 before advertising its success.

Richard Yeates, 3/9/2017

# Smart Ditch



# DrainTube



# Future

- More alternative designs
- Leachate as a resource
- Use of robots
- Driverless garbage trucks and landfill equip



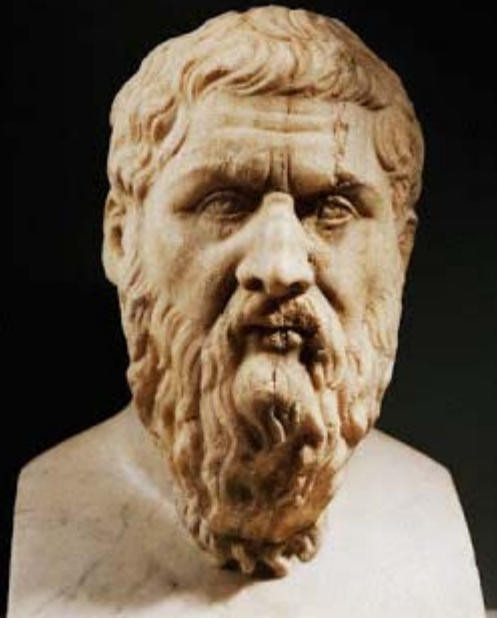
Feed      Permeate      Concentrate



## MOM's Rule

$$\frac{\text{Revenue}}{\text{Tonnes}} > \frac{\text{Costs}}{\text{Tonnes}}$$





Necessity, who is the  
MOM of invention.

*Plato*

## Thank You!

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