Alternative Final Closure System Using SyntheticTurf a 2-Year Update

*Berkeley County Class 3 Landfill*
*Moncks Corner, SC*

Presented by
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SCS Engineers
Alternate Design - Closure Turf

- Integral spikes to ensure high friction to subgrade
- UV resistant blades with interlocking infill
- Geotextile for dimensional stability
- Integral studs for high capacity drainage

Figure 2a – Closure Turf Synthetic Ground Cover System
Alternate Design - Closure Turf

Figure 2b – Installation of Closure Turf
The primary reasons for closure include:

- Increased landfill gas collection.
- Reduce odors.
- Improved stormwater quality.
- Reduced cover maintenance.
Alternate Design - Closure Turf

Questions/Concerns from Regulators

1. Durability
2. Longevity of Material
3. Management of Excess Gas Pressures
4. Placement & Maintenance of Wells
5. Accessibility to areas of the cap
6. Replacement of Closure Turf
7. Condition of Closure Turf during 30-year post closure period
8. Weather conditions (effects of freeze-thaw conditions & UV)
9. Effectiveness of sand broadcast over the Closure Turf
10. Run-off conditions and adequacy of storm water management system at the landfill
11. Settlement and ponding
12. Other biological concerns such as mold & mildew of the material due to moisture
13. Slope stability
Engineering

- Stormwater Management
- Stability
- Landfill Gas Management
Stability

• Wind uplift
• Sand ballast
• Veneer failure
LFG Controls

Installed directly beneath the 50-mil LLDPE geomembrane liner.

LFG controls include:

- A 1-foot wide Advanedge® pipe (gas strip)
- 30-ft wide geocomposite/geotextile layer.
- Horizontal spacing - 100 to 200 feet.
- Existing LFG extraction wells
- Toe Drain
Installing Geomembrane
Installing Turf
Applying Sand
Brushing in Sand
Permitting

• Permitted as an alternate long-term cover system
• Inspections for 2 years and then, if all requirements are met, approved as a cap
  – 6 inspection events: end of 3rd month; end of 6th month; end of 12th month; end of 18th month & end of 24th month. Inspections will be completed by Watershed/AGRU
## Sand thickness

<table>
<thead>
<tr>
<th>Grid Area</th>
<th>Event - Baseline</th>
<th>Event 1</th>
<th>Event 2</th>
<th>Event 3</th>
<th>Event 4</th>
<th>Event 5</th>
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<tbody>
<tr>
<td>1</td>
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<td>0.60</td>
<td>0.54</td>
<td>0.57</td>
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<td>0.51</td>
<td>0.64</td>
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<td>0.57</td>
<td>0.67</td>
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<tr>
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<td>0.58</td>
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<tr>
<td>6</td>
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<td>0.50</td>
<td>0.54</td>
<td>0.52</td>
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<tr>
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<td>0.56</td>
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<td>0.61</td>
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<tr>
<td>9</td>
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<td>0.53</td>
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<td>0.56</td>
<td>0.63</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>0.55</strong></td>
<td><strong>0.58</strong></td>
<td><strong>0.56</strong></td>
<td><strong>0.57</strong></td>
<td><strong>0.61</strong></td>
<td><strong>0.61</strong></td>
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## Lab Testing

<table>
<thead>
<tr>
<th></th>
<th>Geotextile Backing</th>
<th>Artificial Grass</th>
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<tbody>
<tr>
<td>Wide Width Tensile</td>
<td>Ultimate Strength</td>
<td>Tensile Strength at Break</td>
</tr>
<tr>
<td>(ASTM D 4595)</td>
<td></td>
<td>(ASTM D 2256)</td>
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<tr>
<td>MD lbs./ft</td>
<td>XD lbs./ft</td>
<td>lbs.</td>
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<tr>
<td>Event 3</td>
<td>2,014</td>
<td>1,724</td>
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<td>Event 5</td>
<td>2,006</td>
<td>1,708</td>
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<tr>
<td>Required Value after 2 Years</td>
<td>900</td>
<td>900</td>
</tr>
</tbody>
</table>
What would we do differently next time?

- Modify mid-slope anchor trench
- Try to avoid stormwater pipes
- Install FML panels lengthwise in channel inlet to avoid birdbaths
- Steeper slopes for ditches, 5%
The Storm

- October 2016 – 20+ inches of rain.