



Case Study

application | Landfill
location | Cumberland County, Shippensburg, PA
product | Miragrid® 12XT

job owner
engineer

Cumberland County
Martin & Martin, Inc.

TenCate™ develops and produces materials that function to increase performance, reduce costs and deliver measurable results by working with our customers to provide advanced solutions.

THE CHALLENGE

The Cumberland County Landfill required expansion both vertically and laterally, so that additional waste could be placed over the existing area. A liner system first needed to be placed over the existing waste to separate the expanded area from the waste and to capture any possible leachate generated from the new waste.

THE DESIGN

Differential settlement may occur as new waste is placed over the existing cell area, imposing tensile stresses on the geosynthetic components. Structural support is required beneath the proposed new lining system to limit the stresses and resulting strains in the

various geosynthetic components and to minimize the potential for creep failure and/or rupture of the geomembrane liner.

Design of the structural reinforcement incorporates tensioned membrane theory and soil arching to determine the tensile strength required to span a potential depression¹. It was assumed that potential subsidence of the existing waste could cause a six foot diameter circular void to appear just beneath the liner of the new cell. The maximum allowable lifetime strain in the lining system was limited to 5.0%, which would provide a factor-of-safety against geomembrane yield of 2.0. The geosynthetic reinforcement analysis and design for liner support resulted in a required isotropic long-term design strength of 1300 lb/ft while yielding only 5% total strain.

THE CONSTRUCTION

The structural liner reinforcement installed was a woven geogrid mat of high tenacity polyester

and coated with PVC. Miragrid® 12XT was chosen because it has a high sustained strength at 5% total strain. Two layers of Miragrid® 12XT were placed in mutually perpendicular directions to ensure isotropic tensile strength properties were provided to the liner system.

To facilitate installation, each geogrid roll was dimensioned to extend the full length of the proposed reinforced area, thereby eliminating the need for filed seaming/connecting in the main reinforcement direction. Each pre-fabricated roll was labeled before shipment according to its intended installed position.

Miragrid®12XT exceeded the design requirements by approximately 30% and was used as a value engineered proposal which ultimately saved the Cumberland County Landfill approximately \$150,000.



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365 South Holland Drive Tel 800 685 9990 Fax 706 693 4400
Pendergrass, GA 30567 Tel 706 693 2226 www.mirafi.com



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