

## High Performance Green Surfaced Geomembranes

High Performance GSE Green is a green surfaced geomembrane that is designed to improve the aesthetics of exposed geomembrane cover systems (EGCS) for the community. By incorporating a UV stabilized green upper surface, the need for cover soil and a vegetative layer is eliminated.

### BACKGROUND

Historically, landfill cover systems have consisted of at least three components: a geomembrane, a cover soil, and a vegetative cover (grass). By covering the geomembrane with soil, it is protected from UV exposure from the sun. The geomembrane beneath the soil provides containment for the system; it keeps water out while not allowing gases to escape into the environment.

A landfill cover with no cover soil has been an option since they were first tested in 1992 for the Delaware Solid Waste Authority. Data from these first projects has helped to improve the design of EGCSs. These improvements along with the cost savings of omitting a cover soil have made an EGCS a more popular and technically viable option for landfill cover systems.



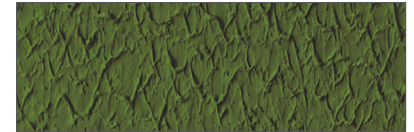
[20 Acre Landfill Cover]

### HIGH PERFORMANCE GSE GREEN

A black surfaced geomembrane can be used as the cover for EGCSs; however, a black geomembrane cover can be unsightly for the surrounding community. High Performance GSE Green provides a high quality geomembrane with a green surface for improved aesthetics in landfill cover systems. The surface can be textured on one or both sides of the geomembrane. High Performance GSE Green is more than just a green surfaced geomembrane—it is specifically engineered to have excellent elongation properties, UV resistance, and extended lifetime; well above the industry standard<sup>1</sup>.

The green surface of High Performance GSE Green includes a UV stabilizer package designed to maintain its appearance color and prevent surface cracking during its service life. Below the green surface, the geomembrane core utilizes a well-dispersed premium grade of carbon black in addition to a custom engineered UV stabilizer package to provide excellent UV resistance.

### GSE Green Smooth



### GSE Green Textured

### GREEN SURFACED GEOMEMBRANES

A geomembrane with a UV stabilized green upper surface designed to improve the aesthetics of exposed geomembrane cover systems (EGCS).

### OMITTING A COVER SOIL AVOIDS THE COSTS OF:

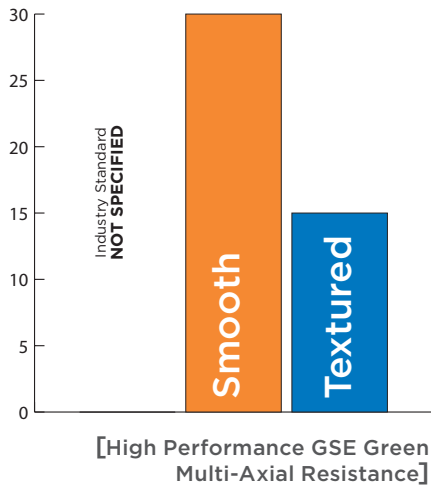
- Design
- Materials
- Construction
- Operation
- Maintenance

### AN EGCS IS ADVANTAGEOUS WHERE:

- Steep side slopes are required
- Available cover soil is cost prohibitive
- Future vertical expansion is possible
- Future removal of the cover may be required
- Differential settlement is a concern

### MULTI-AXIAL PERFORMANCE

The multi-axial performance of High Performance GSE products is especially important in cover systems where differential settlement is a concern. Differential settlement can cause a geomembrane to elongate multi-axially up to 20% or more<sup>2</sup>. Table 1 illustrates the multi-axial and elongation performance of the industry standard compared to High Performance GSE products.



### ADVANTAGES OF AN EGCS

The cost advantages of using an EGCS are abundant because no cover soil is required. The following costs associated with a cover soil can be omitted when using an EGCS: Design, materials, construction, operation, and maintenance.

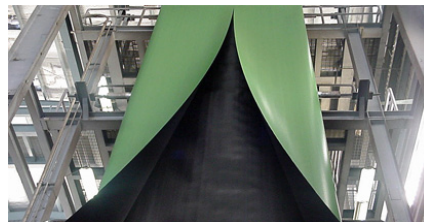
Additionally, the typical hassles associated with a cover soil such as slope stability are avoided. The absence of a cover soil allows for steeper slopes to be used which increases the allowable landfill volume.

When using an EGCS in place of a cover soil system, the estimated realized costs savings from construction alone range from \$24,000 to \$56,500 per acre<sup>2</sup>. This

does not include the additional savings ensued over the lifetime of the cover system due to the reduced maintenance and operation costs.

### WHY INSTALL AN EGCS?

Aside from installing an EGCS to close a landfill, they are also used as temporary covers to be used until the landfill is expanded, the waste degrades (such as in bioreactors), or they are covered with soil. Temporary covers are utilized as part of the closure plan to reduce odors, contain gaseous emissions, and prevent the intrusion of rainwater into the waste mass.



[High Performance GSE Green Geomembrane]

Slope failure is a serious concern with traditional cover soil systems. These failures are caused primarily by poor design, heavy rainfall events, or differential settlement. An EGCS eliminates the need for cover soil thereby also eliminating the risk of a slope failure.

### ADDITIONAL CONSIDERATIONS

Although an EGCS offers many benefits, there are special considerations when using an EGCS. Because the geomembrane is completely exposed, wind uplift becomes a concern. A properly designed soil nail system or vertical anchor trench can be used to mitigate any wind uplift. With the absence of cover soil, rain runoff occurs at a



[High Performance GSE Green Landfill Cap]

much higher velocity. An aggressive drainage system can easily handle large amounts of rain over a short period of time. And finally to avoid any gas build up below the cover, proper design and installation of a gas ventilation layer below the cover can quickly direct any gases to a collection site.

### ENGINEERING SUPPORT

The GSE engineering support staff is available to help solve any issues you have with your project. It is comprised of a multidisciplinary group of professionals with knowledge across a wide range of products and their applications. This includes geomembranes, geosynthetic clay liners, geonets, geocomposites, and woven and nonwoven geotextiles.

<sup>1</sup>Refer to the application sheets for High Performance GSE Geomembranes for more information.

<sup>2</sup>Gleason, Houlihan, Palutis, Exposed Geomembrane Cover Systems: Technology Summary

GSE is a leading manufacturer and marketer of geosynthetic lining products and services. We've built a reputation of reliability through our dedication to providing consistency of product, price and protection to our global customers.

Our commitment to innovation, our focus on quality and our industry expertise allow us the flexibility to collaborate with our clients to develop a custom, purpose-fit solution.

**[ DURABILITY RUNS DEEP ]** For more information on this product and others, please visit us at [GSEworld.com](http://GSEworld.com), call 800.435.2008 or contact your local sales office.

