

# Guam ORDOT Vegetated Landfill Cap with Geocells

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The Guam ORDOT landfill was built in a ravine that slopes steeply to the Lonfit River. It started operations in the 1940's as a disposal area for the Japanese during WWII. After the war, it was used by the U.S. Navy and the local community. The 23 acre unlined dump was placed on the National Priorities List for action under Superfund in 1983.

Site investigations revealed leachate flowing from the site to the Lonfit River. The landfill ceased operations in 2012 and research began on how to close the landfill to prevent further contamination to the area.

Severe site conditions made typical final cover options of an exposed geomembrane or unconfined soil not possible. The objective was to protect the liner system while providing a vegetated solution. Site conditions: highest seismic activity (zone 4), potential winds (175 mph/281 kph), extensive rainfall average 96 inches (241.2 cm) per year and extreme UV exposure.

An HDPE cellular confinement system was chosen as the best option to protect the geomembrane cap as well as the method to confine the soils and create a vegetative layer. It also worked to prevent wind uplift and damage during typhoon season.

A total of 2,100,000 SF (195,096 m<sup>2</sup>) of 6" (15 cm) and 8" (20 cm) HDPE geocell was used for this project. The HDPE cellular confinement was anchored without the need of stakes that would potentially damage the geomembrane liner. The use of polymeric tendons insured veneer stability and eliminated the need for anchoring stakes. The slopes in some places were in excess of 2.5 to 1. The HDPE cellular confinement filled with concrete was also used to construct the storm water channels. The HDPE cellular confinement filled with concrete allowed for velocities in excess of 23 fps (7 m/s). The concrete filled cells also alleviated problems caused by differential settlement that would be present on typical large concrete slabs.

The project location in Guam had severe weather conditions throughout the year. This was critical to the scope of not only the installation but also the durability of the system. The HDPE cellular confinement worked well alongside the other geosynthetic materials used (double-sided geocomposite and LLDPE single sided textured geomembrane) since it was suspended on the slopes with the tendon system. As each phase of the installation was finished, coral and sand was used to fill the panels and the vegetation was added as the final layer.

Since the original installation in 2015, the HDPE cellular confinement system is fully vegetated and has protected the geomembrane liner from the harsh UV conditions as well as flying debris during monsoon season.

The use of geosynthetic materials including the HDPE cellular confinement system were the perfect solution for this complex problem. This unprotected landfill went from being an

environmental disaster to a safe and properly capped site. In 2016, the completed project earned the prestigious Construction Management Association of America's Project Achievement Award.

