

Combining Engineered Earth Armoring Solutions with Onsite Wastewater/Greywater Treatment Systems

The increasing need for sustainable design coupled with droughts and water shortages resulted in increased implementation of onsite wastewater treatment systems among residential and commercial developments. Even non-arid regions, such as the Southeast, are not exempt from water shortages. Population growth also is driving water demand in many of the nation's most water-scarce

generally safe to handle and reuse for landscape or crop irrigation.

Reusing greywater as irrigation can be done using drip systems and/or spray distribution. Such systems are designed to work in areas that are difficult to access or where steep slopes exist. Reusing greywater to establish vegetation on steep slopes can reduce erosion and sediment impacts, promote groundwater recharge, increase

water quality, improve aesthetics and increase property value. One study commissioned by the City of Santa Rosa, Calif., found that a "laundry-to-landscape" greywater system could save 15 gallons of water per person, per day (bit.ly/37eLtgm).

Propex's Capitalize Engineered Earth Armoring Solutions can be used in conjunction with greywater irrigation systems to provide optimal slope stabilization and/or prevent erosion. Combining these two systems has been successfully used on residential and commercial properties.

Erosion Control in Malibu

In 2019, a developer purchased two homes adjacent to one another near Coral Beach in Malibu, Calif., with the intent to renovate and resell both structures. A 1:1 unvegetated slope was located behind the homes, and Pacific Coast Highway 1 runs along the top of the slope. Due to runoff from the highway, the slope

was experiencing severe erosion.

The erosion was depositing sediments onto the driveway utilized by both residences. Ultimately, the sediment would eventually enter the closed stormwater system during precipitation events. If this continued, these sediments would impact the hydraulic capacity of the sewer system, reduce water quality and increase maintenance costs to the City of Malibu.

regions, including Arizona, California, Florida, Nevada and Texas. As an innovative way to save water, some state and local governments are incentivizing the use of onsite wastewater treatment systems to recycle greywater.

Greywater is lightly used water from bathroom sinks, showers, bathtubs and clothes washers. It does not include wastewater from toilets, and it's





An image shows the vegetated reinforced section of the slope behind the renovated homes as compared to the bare, unprotected section of slope behind the neighboring homes.

To incorporate sustainability into the renovation, improve aesthetics, prevent further erosion and ultimately increase property values, the developer installed a drip and spray irrigation system using greywater to provide irrigation on the steep slope. To further protect the slope and the investment of the irrigation system, the developer used ARMORMAX® to protect the slope from further erosion.

ARMORMAX is a solution for severe erosion and/or surficial slope stabilization that provides vegetated reinforcement, improves the factor of safety and significantly reduces the probability of failure. The system is composed of Engineered Earth Anchors designed and tested for compatibility and performance with our PYRAMAT® 75 High-Performance Turf Reinforcement Mat (HPTRM) to increase slope stability for up to 75 years. The system also uses metal securing pins to temporarily hold the HPTRM in place.

The PYRAMAT 75 component is a homogenous woven HPTRM that provides erosion protection from overland flows while promoting the establishment of vegetation. The homogeneous construction of PYRAMAT 75 allows for the material to be easily cut to accommodate landscape plantings, drip lines, spray irrigation heads and other protrusions. Although the HPTRM component can be cut, it's

suggested that the irrigation piping, drip lines and spray irrigation heads be installed prior to placement. Landscape plantings can be installed post installation of the ARMORMAX system.

Since installation of this project, the City of Malibu and other local municipalities are encouraging developers and builders to install onsite wastewater treatment systems along with the ARMORMAX system. The combination of these technologies offers a sustainable way to save water while simultaneously reducing operating and maintenance costs to the city by eliminating sediment deposition into the stormwater system.

Additionally, ARMORMAX is more cost-effective and has a significantly lower carbon output than traditional hard armoring solutions such as rock riprap. Vegetation quickly established and continues to flourish two years later. The slope is stabilized, and there's no longer erosion or sediment deposition.

Combining ARMORMAX with an onsite wastewater treatment system that recycles greywater into irrigation has resulted in the establishment of vegetation, groundwater recharge, improved water quality, and lower operating and maintenance costs through reduction of sediment loss. Ultimately, this has also improved aesthetics and increased home property values for the developer and homeowners.

