PROJECT PROFILE:
Port Angeles Landfill

ClosureTurf®

Location
Port Angeles, WA

Owner
City of Port Angeles

Engineer
Herrera Environmental Consultants

Project Type
Municipal Solid Waste Landfill

Year Completed
2016

Size
19 acres

In 2014, the city of Port Angeles, Washington, underwent a $20+ million project to relocate their landfill from a giant hole on the side of a 135-foot high bluff overlooking the Strait of Juan de Fuca. Small landslides, erosion and fear of coastal water contamination drove the city to proactively address the possibility of a failure.

As part of their Landfill Cell Stabilization Project, the city had 400,000 cubic yards of trash relocated to an area behind the bluff. A massive hole remains but the remaining refuse is now stabilized with an MSE retaining wall that has special targets installed to measure for movement of the area. Both the remaining slope and relocated landfill have been permanently closed with the ClosureTurf® system. Even with heavy rainfall and major storms, no erosion has occurred to date.

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The relocated landfill behind the bluff measures approximately 19 acres. It was permanently closed in 2016 with the ClosureTurf® system. Slopes are 2.5:1 with the longest slope length at an impressive 285 feet. The Agru Super Gripnet® geomembrane used as the foundation of the system provides greater stability on steeper grades and reduces the need to rebuild slopes.

Port Angeles receives 29 inches of rain per year on average and the 25-year storm event is 3.9 inches of rainfall in 24-hours. The 25-year flow in the perimeter ditches is over 6 cubic feet per second and the flow velocity is over 5 feet per second. The ditches were quarry spall lined to help increase roughness and attenuate flow velocities. The engineered synthetic turf and sand infill effectively filters surface water, providing clean runoff with very low turbidity. In addition, the system significantly reduces sediment loading to the surrounding channel and sedimentation/detention basins.

The ClosureTurf system also protects against other weather events such as hurricanes, typhoons and earthquakes. The area can experience high wind gusts annually from heavy windstorms and pacific typhoons. In 2016, Super Typhoon Songda hit the Pacific area with wind gusts over 60 mph. The site survived as designed with no erosion or maintenance required. Located in a seismically active area, it is prone to seismic hazards such as amplified seismic response and seismically induced landslide activity. The site lies approximately 4.5 miles north of the recently discovered Little River Fault, a shallow crustal tectonic structure that is considered active and is capable of producing earthquakes of magnitude 6.5 or greater. ClosureTurf protects against erosion that may occur with these events.

The system is designed for and proven to have a design life over 100 years of the infilled geosynthetic protective layer (engineered turf) with the underlying geomembrane lasting many more years beyond the long life of the engineered turf component. SWANA recently reported 200+ years of design life.

The City's Solid Waste Division now services 7,000 residents and 850 commercial businesses and all refuse is collected at the onsite transfer station and transported to nearby landfills. The closed site serves as a natural habitat and is occupied by many different species of insects and animals, including bees, butterflies, bobcats, otters, elk and deer.

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Port Angeles was easily able to integrate ClosureTurf® into their conventional gas collection system.

Deer play daily on the top deck and side slopes of the landfill.

Refuse still remains in one of the slide slopes on the bluff but is stabilized by a large MSE wall embedded with survey targets to track any kind of movement.

ClosureTurf® can be driven on without damage to the system. On slopes, vehicles with ground pressures less than 60 psi is recommended and on designed access roads and top decks, vehicles should have tire pressures less than 100psi.