

Secutex® Bentofix®

Base sealing system of a sanitary landfill

Project name
Bukit Tagar Sanitary Landfill, Malaysia

Contractor
Geoplus Enviro Sdn Bhd

Supplier
Alpha Pinnacle Sdn Bhd

Products
Secutex® MR 701
Secutex® MR 1001
Bentofix® NSP 4000





Fig. 1: Installation of Secutex® as protection layer above HDPE geomembrane

Challenge

Klang Valley or Greater Kuala Lumpur is an area of approx. 2,800 km² surrounding Malaysia's capital and its adjacent state Selangor. Ten different local councils cover the area beyond the boundary of Kuala Lumpur. To preserve the quality of the environment, which is vital to the city, cleanliness and quality of life must be maintained at the highest possible level.

Every day, approx. thirty thousand metric tons of waste are disposed of to landfills and dumpsites in Malaysia. Out of this, the household sector in Greater Kuala Lumpur alone generates 6,900 metric tons. With continuous growth projection, the Government of Malaysia was committed to ensuring safe, solid waste disposal.

Engineered sanitary landfills are an essential part of safe waste disposal. One major landfill with engineered design in Malaysia is the Bukit Tagar Sanitary Landfill (BTSL). BTSL covers an area of 700 acres with a 1,000 acres buffer zone, making it one of the biggest and most advanced landfills in South East Asia. The landfill designed to cater for a capacity of 120 million tons will be developed in progress over 17 phases. BTSL currently receives 2,500 tons of waste daily from Kuala Lumpur and many local councils. Back in 2016 as the existing landfill cell was filling up, the opening of the phase 3 new landfill cell was addressed.

Solution

To maintain environmental integrity, the lining system of a sanitary landfill has significant importance by preventing the leachate from contaminating the surroundings and groundwater source. BTSL is designed to comply with the USEPA Level IV landfill requirements with full protective liner, leachate collection and treatment facilities.

At the base and slope of the landfill cell, the main liner system consists of an HDPE geomembrane. As the geomembrane is susceptible to puncturing from drainage aggregates, waste or foreign objects in the subgrade, it requires protection. Secutex® nonwoven geotextile was selected for its excellent performance against mechanical damages, high chemical resistance and service lifetime. In addition, the high thickness gives an even stress redistribution augmenting the stress absorption capability – a bedding effect for the drainage aggregates. Secutex® MR 1001 was used at the base, first and second berm. On the third and fourth berms with less critical stresses, Secutex® MR 701 type (with a mass per unit area of 700g/m²) was installed.

In critical areas, a geosynthetic clay liner was used underlying the geomembrane. Bentofix® geosynthetic clay liners (GCLs) with thermal lock – also known as geosynthetic clay barriers (GBR-C) – were selected due to their self-healing capacity based on the high-swelling powder sodium bentonite clay. Thus, the low permeability and low hydraulic conductivity of Bentofix® GCLs ensure the immediate sealing effect in these areas.

The selection of high-quality material provides crucial protection to ensure that the landfill lining system can perform as designed.