

Erosion Control

Coir Erosion Control Blanket Te Atatu Peninsula, New Zealand

Client: Waitakere City Council

Date: October 2001

Due to constant wave action, an enormous wash out occurred on the banks of the Te Atatu Peninsula seashore site. From this major environmental problem, a unique opportunity was presented to reduce damage from erosion and, more importantly, to rapidly rehabilitate and restore the slope for its functional values.

The area was built up with the clayey and organic material locally available on site. Due to the steep slope, high tensile strength Landlok C2 coconut (coir) fibre blankets were selected for slope stabilisation.



Landlok C2 is utilised to establish grassed waterways in low-flow drainage ditches and channels and along stream banks where moderate velocity intermittent flows may occur.

Made from 100 % coir fibre, stitch-bonded between two photodegradable nettings, these degradable blankets also provide erosion protection on demanding slopes and challenging sites where vegetative establishment is expected to be slow.

Rolls of Landlok C2 mat were unrolled down the toe of the slope and pinned in place. The holes were punched into the coir blanket and low level coastal vegetation was planted through the holes.

All the plants were 1m apart and the banks looked aesthetically attractive. Not only are the plants doing their intended erosion control work but they have become increasingly attractive as they burst into bloom during the spring season.

Landlok Natural Erosion Control Blankets (ECBs) are known throughout the world as quality ECBs made from straw and coir fibres. Landlok provides protection from erosion and stimulates healing through rapid growth of vegetation.

For more demanding applications where vegetation needs permanent protection, and in areas of high velocity, Landlok is available in permanent types of turf reinforcement mats (TRM's), including Pyramat high performance (HP-TRM).

Note: Today Permathene has its own high performance coir mat (eek!). Please refer to the Permathene Technical Catalogue for detail.

Erosion Control

Nonwoven Geotextile (Syntex®) Highway embankment, New Zealand

Client: Manukau City Council

Date: March 2000

This contract covered earthworks and some additional works for the new East Tamaki Arterial Route (ETCART) from Cavendish Drive through to Ti Rakau Drive, Manukau.

Syntex GNP A1 nonwoven polypropylene geotextile was used as opposed to the standard woven weed matting on the embankments for the erosion control application.

Grass is commonly used as a low cost means of protecting the soil surface against the erosive forces of flowing water. The major drawback of using vegetation as the sole protection medium is that high flow velocities tend to dislodge both soil and vegetative growth.

By incorporating Syntex GNP A1 as a reinforcing material, soil erosion and vegetative detachment are greatly reduced. The geotextile provides additional shear strength to the vegetative and soil structures, allowing large volumes of water to percolate into the ground.

The vegetation at a later stage generally shades the geotextile and reduces the UV light degradation. Due to the superior puncture and mullen burst strength, Syntex GNP A1 is very resistant to the installation stresses.

Syntex provides an erosion resistant barrier until the vegetation becomes established. In the initial stages of grass growth, an unprotected soil surface is highly susceptible to erosion. The soil, geotextile and vegetation work together to provide a more stable embankment than vegetation alone. Non-reinforced vegetated areas are more likely to have individual plants dislodged due to soil erosion than reinforced vegetated slopes. The vegetation in conjunction with the geotextile function as a single unit instead of individual plants.

The nonwoven acts as a filter to limit soil movement through the geotextile. Since it is known that Polypropylene degrades during extended exposure to sunlight, Syntex is produced with carbon black and other UV inhibitors to protect against degradation. These additives allowed it to be exposed for a period of time until vegetation was established. As per the contractor, this contract covers an area of approximately 22,000 m² and the major advantages of using Syntex nonwoven is the low installation costs and easy handling of the fabric.

Note: This project was presented during the IGS Conference in Nice 2002, and the IECA Conference Orlando Florida 2002 Technical sessions.



Stormwater Channel

Turf Reinforcement Mat (Pyramat® HP-TRM) Auckland, New Zealand

Client: Turner Trust

Date: March 2003

Permathene is a proactive leader in the area of stormwater management practices and has been recognised by the various councils in New Zealand for its innovation, assertiveness and progressively outstanding contributions.

In keeping with the Auckland City's strict focus on sediment reduction and environmentally friendly products, the City Council is moving from the conventional hard armour channel lining systems such as concrete or rip-rap to a more environmentally conscious, cost-effective and aesthetically pleasing alternative such as Erosion Control Blankets (ECBs) and Turf Reinforcement Mats (TRMs) for channel lining works.

Jackson Clapperton, a registered engineer specified Pyramat HP-TRM to line storm water drainage channel for True North Trust Management Ltd's project in West Auckland.

Pyramat is a patented, three dimensional woven geotextile matrix composed of UV stabilised polypropylene monofilament yarns. This environmentally superior soft armour solution combines long-term strength, durability, dimensional stability and the functional longevity of a high performance geotextile. The unique three dimensional geometry of Pyramat, in conjunction with vegetation, reduces the velocity of waters, thereby controlling erosion and reducing pollution.

After applying the seed to the soil surface, Pyramat was installed on the channel sides. The excess soil and vegetation was stripped off from the slopes. Pyramat installation eliminated the need for significant excavation and site disturbance associated with the traditional rip-rap design. Once emerging roots of the developing vegetation reached the zone of reinforcement, the resulting "revegetation platform" provided increased slope stability and erosion control on this critical sites.

The contractor had to build a temporary dam to redirect the flow of water during construction. This material proved worthy of their selection and presented a cost effective stable solution that is working well and has satisfied the Council's engineers, clients and the contractor.

Pyramat is designed to withstand prolonged exposure in the challenging conditions of demanding jobsites or inhospitable climates. Ultraviolet stabilisers assure functional longevity when vegetative establishment is delayed or the matrix is otherwise exposed to extended periods of sunlight.



Stormwater Channel

Turf Reinforcement Mat (Landlok® TRM) Bay of Islands, New Zealand

Client: Watea Developments

Date: December 1999

Watea Developments Ltd., property developers in the Bay of Islands, are developing the area alongside the magnificent Waitangi River at Haruru Falls. The site is three minutes drive from Paihia on the road to Kerikeri.

An existing channel, having clayey side slopes with approximately 100 cm of top soil, runs through the project site. The primary function of this channel is to collect rainwater and runoff from the surrounding areas, carrying it through the site.

It was decided by the Watea Development engineers to use the flexible, permanent turf reinforcement mat, Landlok TRM 450. This material provides an aesthetically pleasing, cost effective and natural solution to erosion control. Landlok TRM 450 is designed to induce vegetation and enhance long term performance. The product consists of a dense web of polypropylene fibres positioned between two high strength nets, and mechanically bound by parallel stitching.

After preparation of the subgrade, Landlok TRM 450 was installed and seeded with different mixes. The fine topsoil was spread and slightly raked into the mat apertures to completely fill the mat thickness (a depth of approximately 20 - 25 mm). Additional seed and mulch were placed above the soil filled matrix, where required.

According to Gary Hawke, a Director of Watea Developments Ltd, the Landlok TRM 450 has solved the problem and satisfied aesthetic concerns.

Approximately 1000 m² area was covered with Landlok TRM 450.



Sediment

Turf Reinforcement Mat (Landlok® TRM)

Artificial wetlands created for sawmill, Katikati, New Zealand

Client: Claymark Sawmills

Date: November 2001

The economic implications of treating water for sediment and pollution from an 3500 m² urban sawmill was cited as primary considerations in the design and construction of three storm water ponds. All the storm water from the log yards, processing plants, etc. was designed to go into these ponds.

The artificial wetland was designed and constructed by Claymark Group Ltd with assistance from Permathene Ltd. The wetland will function as a natural bio-filtration system to remove sediment and pollutants from runoff flowing into the neighbouring areas.



From the onset of the project there was a need for immediate erosion control, reduction of both on and off-site runoff velocities, sediment control and rapid vegetation establishment in the development of a bio-filtration system. Immediate and permanent sediment and erosion control was vital for this site in sustaining its functional longevity and the subsequent reduction in pollution for the neighbouring communities. The reduction in runoff velocities would allow the sediment and attached pollutants to settle from the slower moving water.

Landlok TRM 450 turf reinforcement mat was determined to meet the long-term erosion control needs for this artificial wetland. Witty Bindra, Manager Asia Pacific Region for Permathene Ltd and Jim Black, Construction Manager of Claymark Industries Ltd worked together to select the most suitable erosion control material for this site.

Numerous environmental advantages were afforded to this site by the Landlok TRM 450 mats. These mats were selected to permanently reinforce vegetation in those areas where runoff flows concentrated. The matting's permanent three-dimensional net structure promotes stem and root entanglement and would ultimately provide permanent vegetation reinforcement. In consideration of these factors, the Landlok TRM 450 would provide an economic savings for this project through reduced installation costs and water treatment as compared to hard armour alternatives (ripraps), while increasing the functional longevity of the wetlands.

In this project, Landlok TRM 450 worked because of their unique three-dimensional construction that creates a thick matrix with numerous void spaces. Through soil filling, sediment retention and proper seeding, vegetation develops within the complex matrix and into seed beneath, anchoring the entire structure firmly to the ground.

This use of Landlok TRM 450 in wetlands remediation has demonstrated the environmental and economic importance of geosynthetic erosion control measures. This product has effectively reduced the amount of sediment impacting the artificial wetlands, avoiding immediate failure of this system and extending its functional longevity.

Erosion Control

Turf Reinforcement Mat (Landlok® TRM) Regional Park, Waikato, New Zealand

Client: Waikato Raupatu Lands Trust
Date: July 1999

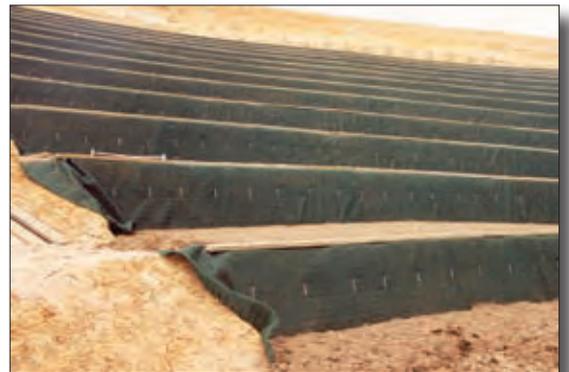
Landlok TRM 450 Turf Reinforcement Mat was used in this project to enhance the natural ability of plants to protect soil from erosion and improve the total outlook of the regional park.

By using a flexible three-dimensional turf reinforcement system on a slope or a bank, it retains seed and soil, stimulates seed germination, accelerates seedling development and mesh with developing plant roots and shoots to permanently anchor to the soil surface.

A TRM is designed to resist high velocity water flows and protect the root system of vegetation permanently.

In this project, Landlok TRM 450 worked because of the unique three dimensional construction that creates a thick matrix with numerous void spaces. Through soil filling, sediment retention and proper seeding, vegetation develops within the complex matrix and into seed beneath, anchoring the entire structure firmly to the ground.

The reinforced vegetation Landlok TRM provides is essential to withstand high velocity runoff.



Sediment Control

Silt Fence (Syntex[®]) Highway construction, New Zealand

Client: Downer Works
Date: 1998-1999

The northern extension of State Highway 1 (ALPURT) is progressing at an impressive pace. Permathene has provided Syntex Silt Fence for the country's largest roading project on Sector A2.

One of the largest sources of water pollution in New Zealand is runoff. In order to ensure sedimentation control at the Alpur site, Syntex silt fence was used. Downer Works installed a series of silt fence barriers around the perimeter of the earthworks to prevent sediment-carrying sheet runoff from entering into downstream areas. The bottom of the silt fence was embedded in an anchoring trench.



Ultra Violet stability is an important property of the Syntex silt fence used in this high exposure application. The high tensile strength of the fabric also ensures the continued performance of the fabric as sediment accumulates.

One of the main sources of water pollution is sediment runoff from stormwater and other non-point sources.

Under the Auckland Regional Council "Erosion and Sediment Control Guidelines for Earthworks" sediment control measures including the use of silt fences and sedimentation ponds are mandatory.

Syntex Silt Fence is designed to retain silt and allow water to pass through. Available in several grades, the product used for this project was Syntex style Type 2, an engineered premium grade with silt tape and monofilament yarns for optimum tensile, flow and filtration characteristics.

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