

A Practical Solution to Slope Stabilization

Project Background

The LRCA is responsible for a 30 m high slope subject to landslides in Thunder Bay along the Kaministiquia River. Over the past 25 years, DST Consulting Engineers has developed an innovative cost effective approach to hazard management for 1.5 km of riverbank where homes and infrastructure are at risk.



The Kaministiquia River in Thunder Bay, Ontario

River erosion was stopped with a layer of rockfill at the bottom of the slope. The slope continues to flatten with periodic landslides, shallow in nature. As a practical alternative to conventional stabilization of the entire riverbank, a hazard management approach was developed based on observations and engineering assessment which defer the costs for decades:

- A cautionary zone (the size dependant on risk) is designated next to all facilities to be protected.
- When the top of the slope encroaches on the cautionary zone, action is taken for the specific area affected.

This has led to the following actions over the past 20 years:

- A few houses were purchased and demolished in 1984.
- 350 m of street and watermain were protected with a 12 m deep retaining wall at the top of the slope in 1985.

- A new soil nail technology is now being applied to 5 new areas at risk in 2004. This was found to be less cost with more benefits than all other available solutions.

The Technology

An engineered soil nail solution for riverbanks involves inserting steel bars, typically 30 to 50 mm in diameter, into a slope on a 1 to 2 m grid. Soil nails can be installed from the slope by driving, screwing or vibrating. The near surface soil between the nails is stabilized with a special nail head and vegetation roots.

The system is patented by DST Consulting Engineers who developed this solution in 1999 for railway track on steep slopes. The solution avoided the environmental impacts of slope flattening, the high cost of retaining walls and the disruption of traffic. New engineering methods were developed with full scale tests. Since then several slopes have been successfully stabilized and the technology is now being applied to riverbank stabilization.



Soil nail stabilization near St. Catherines, Ontario.

Soil Nailing



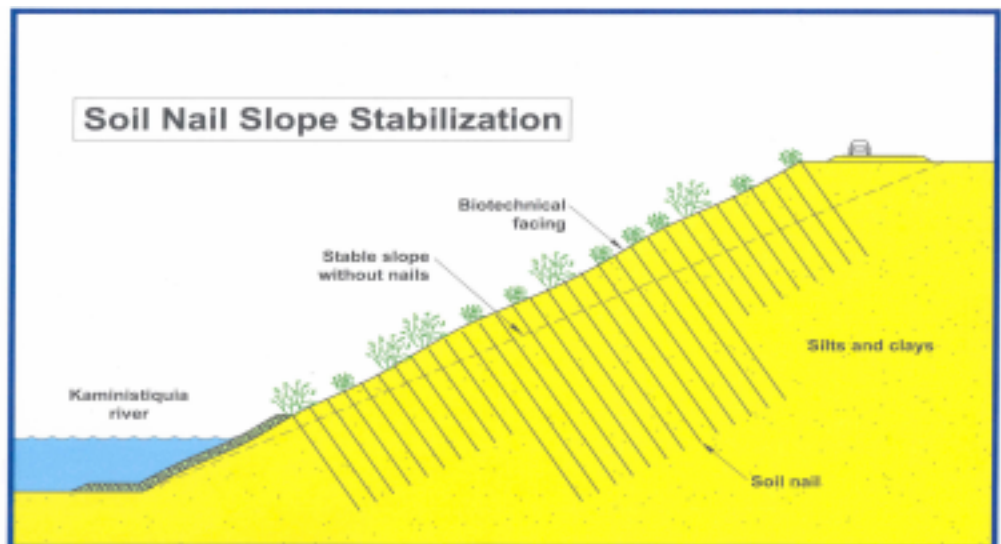
Soil nail stabilization for CN Rail near Hornpayne, Ontario.

Features

- A green engineered solution – steel bars integrated with a biotechnical facing.
- No disruption to land use at either the top or bottom of the slope.

Features

- Minimal disruption to natural vegetation on the slope.
- No impact on rivers or streams.
- Maintenance-free for any specified design life.
- Immediate improvement is obtained.
- Applied only to areas in the most need as and when required.
- A flexible system that adapts to fit your desired budget and degree of risk by adjusting nail size, spacing and length.
- Integrates well with the Cautionary Zone Approach to management of slope hazards.
- Available as a design-build solution



DST is a firm of engineers, scientists and contractors that has developed and patented the soil nail solution. They provide a complete turnkey service including engineering design, installation of nails with biotechnical facing, as-built reporting and performance monitoring. Contact: Michael Fabius, P. Eng., at (800) 668-4201. Website: www.dstgroup.com.