# Natural Pedogenesis and Revegetation Using Microbes at a Former Wood Waste Site

A BioNorth Solutions Case Study

**Introduction:** The closure of wood waste sites is a regulated process that requires capping with a suitable, low-permeability material and a top layer of soil to support vegetation. This is performed to attenuate the decomposition of wood and resultant leaching of phenols and other contaminants from the site.

**Problem:** An inactive wood waste site in Northwestern Ontario is in the process of site closure. It requires 15 inches of top soil on top of the clay cap to be considered officially closed. Given the nature of the site, growing vegetation could be difficult due to the low nutrient availability in clay and wood waste, and particularly, the fresh wood waste that has not decomposed.

**Solution and Treatment:** Rather than applying a 15-inch layer of topsoil to the site, it was projected that the necessary topsoil could be established gradually through natural soil formation processes, known as pedogenesis.

To initiate pedogenesis, the use of BioNorth's Microbiate™ RX - an advanced biologic formulation for soil revitalization - was recommended in combination with a standard seed and fertilizer mix (MTO Mix and Green Winter Organic Builder).

This approach aimed to support site revegetation and foster the development of sufficient topsoil biomass over multiple consecutive growing seasons. Following encouraging results from bench-scale trials conducted with site-specific soil, a full-scale site trial was launched in Spring 2024.

### *Seed and Fertilizer Mix 1: MTO Mix*

A specially formulated seed mixture developed for the Ministry of Transportation of Ontario, Canada. It is designed to establish durable vegetative cover along roadsides, providing effective erosion control, salt tolerance, and low-maintenance ground cover. The mix is suitable for a variety of soil conditions and is widely used in highway and infrastructure projects across Ontario. More specifically, the contents of the seed mix include (by percentage of mass):

| Species | Common Name | Percentage of Mix |
|---|---|---|
| *Festuca rubra* | Creeping Red Fescue | 52% |
| *Lolium perenne* | Perennial Ryegrass | 35% |
| *Poa pratensis* | Kentucky Bluegrass | 10% |
| *Trifolium repens* | White Clover | 3% |

### *Seed and Fertilizer Mix 2: Green Winter Organic Builder*

A blend of cold-hardy cover crop species, including cereals like winter rye or oats, legumes such as clover or vetch, and brassicas. This mix establishes quickly in the fall, protects soil over winter, and resumes growth in spring. It’s valuable because it prevents erosion, suppresses weeds, adds organic matter, improves soil structure, and can fix nitrogen depending on its legume content. Overall, it builds healthier, more resilient soil heading into the next growing season. The contents of the seed mix include (by percentage of mass):

| Species | Common Name | Percentage of Mix |
|---|---|---|
| *Secale cereale* | Fall Rye | 70% |
| *Vicia villosa* | TNT Brand Hairy Vetch | 8% |
| *Trifolium incarnatum* | Crimson Clover | 7% |
| *Pisum sativum* | Austrian Winter Peas | 15% |

## *Wood Waste Site Revegetation: 1 Year Results*

**Before Application**

**Untreated, 1 Year Later**

**Treated, 1 Year Later**

*Photos were taken to demonstrate revegetation at the site over 1 year. Before the application of seeds treated with Microbiate™ RX, the site was quite barren with little viable vegetation. One year later, there is a noticeable difference between areas of the site left untreated (seeds planted but not treated with Microbiate™ RX) and treated (planted seeds treated with Microbiate™ RX).*

**Results:** Pedogenesis is ongoing, creating a rich, organic soil layer to bring the wood waste site closer to complete closure. With seed selection based on plants native to the area and their ability to promote biomass accumulation, plant growth and development is accelerated with the treatment of Microbiate™ RX.

After just one year, plant revegetation at this clay-capped wood waste site is noticeably improved, bringing back thick, green grass to a once barren landfill.

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**Conclusion:** Viable, sustainable revegetation and pedogenesis of sites can be accomplished with Microbiate™ RX at lower cost than conventional top soil application and site revegetation.

Additional environmental benefits include carbon sequestering, reduced carbon footprint by eliminated hauling and spreading of topsoil, and reduced environmental disturbance (i.e. no need to source and remove topsoil from existing ecosystems).

Even on sites that are difficult to revegetate, Microbiate™ RX is well positioned to be an innovative alternative solution to the current means of landfill closure and land reclamation, providing both economical and environmental benefits.