

Revegetation for Challenging Sites In Northern Latitudes

Case Studies In Project Delivery



2018 Northern Latitudes
Mining Reclamation Workshop

Whitehorse and Carcross, Yukon
September 10-13, 2018

The Biotic Approach Asks...



Is importing or salvaging topsoil really needed for establishing vegetation?

The Goal:



Not just Germination



Sustainable Revegetation



Why Focus on Vegetation



Mulch is Temporary Vegetation is Permanent

**The Goal:
Establish PERMANENT
Erosion Control**

Living in the soil are plant roots, bacteria, fungi, protozoa, algae, mites, nematodes, worms, ants, maggots, insects and grubs, and larger animals.

science of soil

soil is

made of about **45%** minerals

25% water

5% organic matter **25%** air



what's underneath



Healthy soil has amazing water-retention capacity.

Every

1%

increase in organic matter results in as much as

25,000

gal of available soil water per acre.



One teaspoon of healthy soil contains

100 million-1 billion individual bacteria

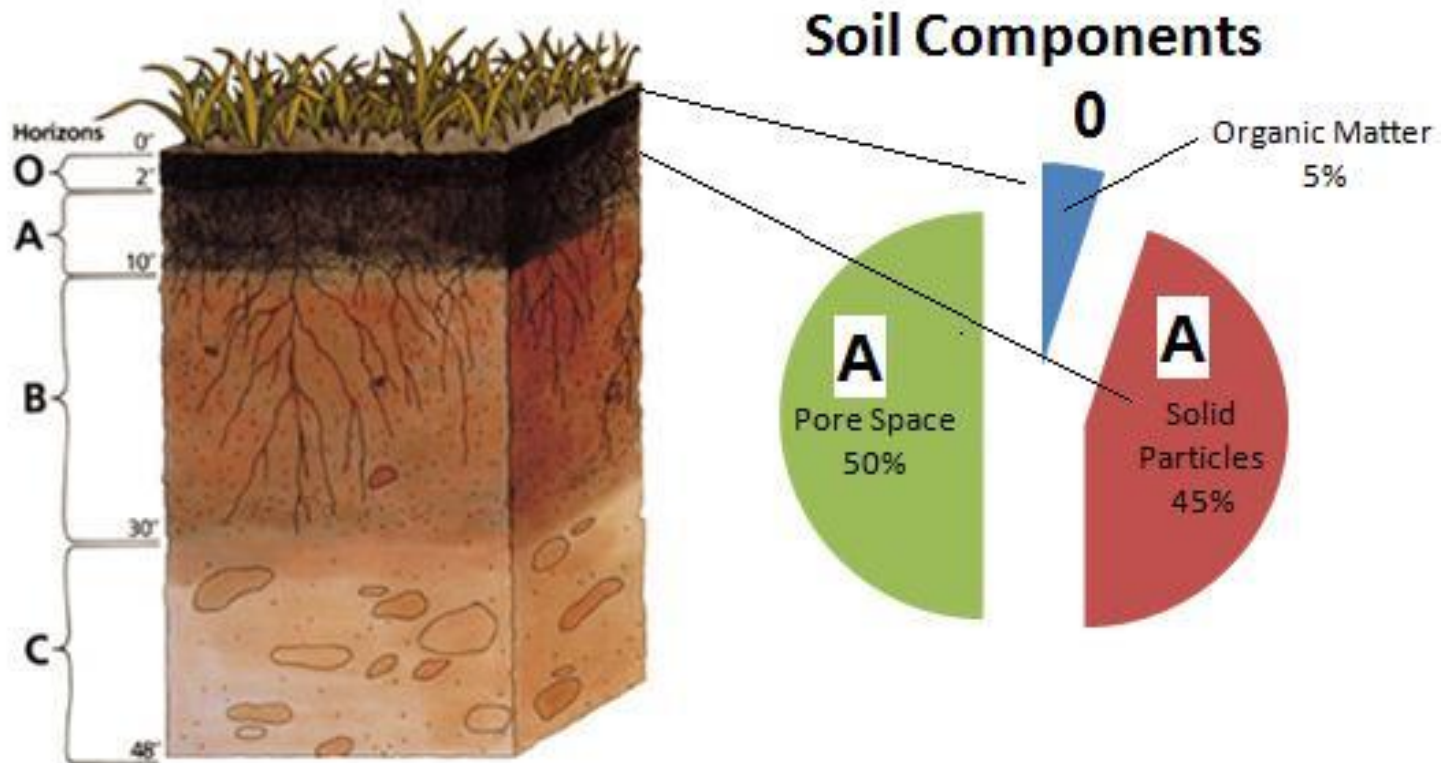


All of the soil microbes in **1 ac/ft** of soil weigh more than **2 cows**

Earthworm populations consume **2 tons** of dry matter per acre per year, partly digesting and mixing it with soil



If we're adding topsoil to add organic matter, but organic matter is less than 5% of topsoil?



O) **Organic matter**: Litter layer of plant residues in relatively undecomposed form.

A) **Surface soil**: Layer of mineral soil

B) **Subsoil**: This layer accumulates iron, clay, aluminum

Topsoil & Compost

10 trucks per acre loaded with 26 cubic yards of soil in each.



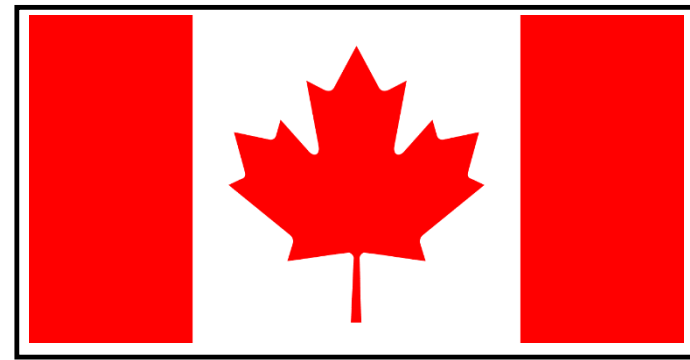
Conventional approach to restoration.

Biotic Approach



Add Only What's Needed!





PROVINCIAL, Weighted Unit Price Averages
Based on 2015, 2016 and 2017 Construction Prices
tendered between August 01, 2015 and Nov 30, 2016

Item	Description	Unit	Avg. 3 low bids for Construction Year		
			2015	2016	2017
G300	Topsoil Placement	m2	\$ 0.72	\$ 0.75	\$ 0.78
G320	Topsoil (Supply and Place)	m2	\$ 9.65	\$ 12.17	\$ 21.14

Topsoil Supplied & Placed Price per Hectare:

2015 = \$96,500

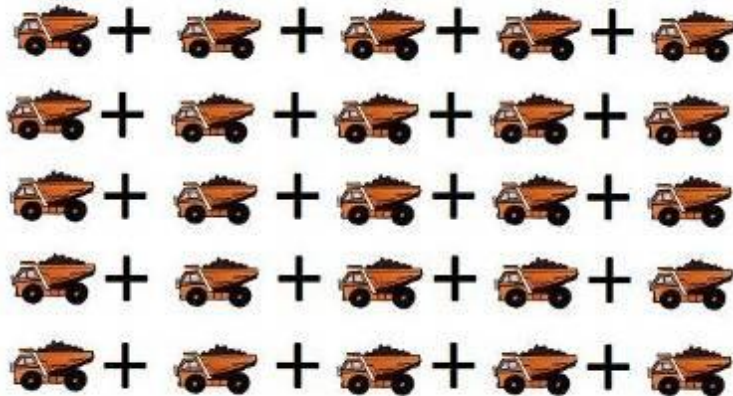
2016 = \$121,700

2017 = \$211,400

*70 mm depth

Less Material = Less Time = Less Money

The Ontario Provincial Standard Specifies a Minimum of 5 cm (2 in) of topsoil. To achieve this requires the transport and management of 25 trucks per hectare (10/Acre) loaded with 20 m³ (26 yd³) of soil.



Conventional
approach to
site restoration



**Biotic Soil Amendment
Approach to Restoration**
Add just what is needed



What Happens to Soil During Construction?

- Organic matter, the soil's food bank, is lost.
- Porosity, crucial for air and water exchange, is reduced.
- Microbes essential for nutrient cycling are absent.

Use existing equipment,
Simpler mobilization,
\$\$\$ Saved \$\$\$





- ✓ Standard Equipment
- ✓ Lower Operating Costs
- ✓ Contractor Profitability



Unique Mobilizations



Complicated Site Access

Use existing equipment for dual purpose



Hydraulic options for remote access



Cannon Application

Dillingham, AK



Pop. 2,143



- Poor Soils
- Low Organics
- Low Fertility
- Topsoil alternative

07.14.2013

- Surface Prep
- Biotic Soil Amendments





Erosion Control: Bonded Fiber Matrix



MATERIALS	REASONS/BENEFIT	APPLICATION
Verdyol Biotic Earth Black	To build a complete soil structure / Obtain vegetative growth	3,000 pounds per acre
Custom grass seed blend	A combination of native seeds suited to environment / Obtain vegetative growth	2 pounds per thousand square feet
Fertilizer – 10-10-10-8.5	Matching a fertilizer to enhance deficient soil conditions / Obtain vegetative growth	500 pounds per acre



To Whom It May Concern;

My name is Troy Gray. I was the superintendent on the Dillingham Airport project. At the end of June 2014, my hydro seed crew applied Verdyol Biotic Black Earth for the first time. Application was slightly different than the mulch we normally use, but adjustments were minimal. Because of the small hydroseed applicator equipment we have, we had to make multiple loads to cover the area. That made us experts on the application. Based on the training by Alaska Garden & Pet, ease of use, lower cost of the Verdyol program compared to top soil, and results we obtained, I would suggest this product to anyone.

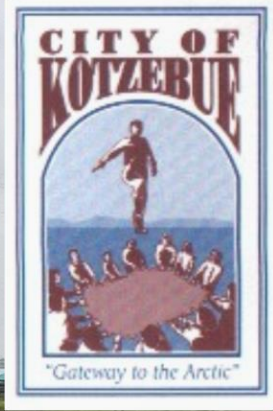
Troy Grey – Knik Construction





- Faster Establishment
- Project Closeout
- Permit termination
- No Maintenance

City Park Construction



Installed September

New Technologies: Biotic Soil Amendments





Mid October

3 years later



Biotic Benefits

Deeper Roots

Taller Plants

Greater Density



3.5 years



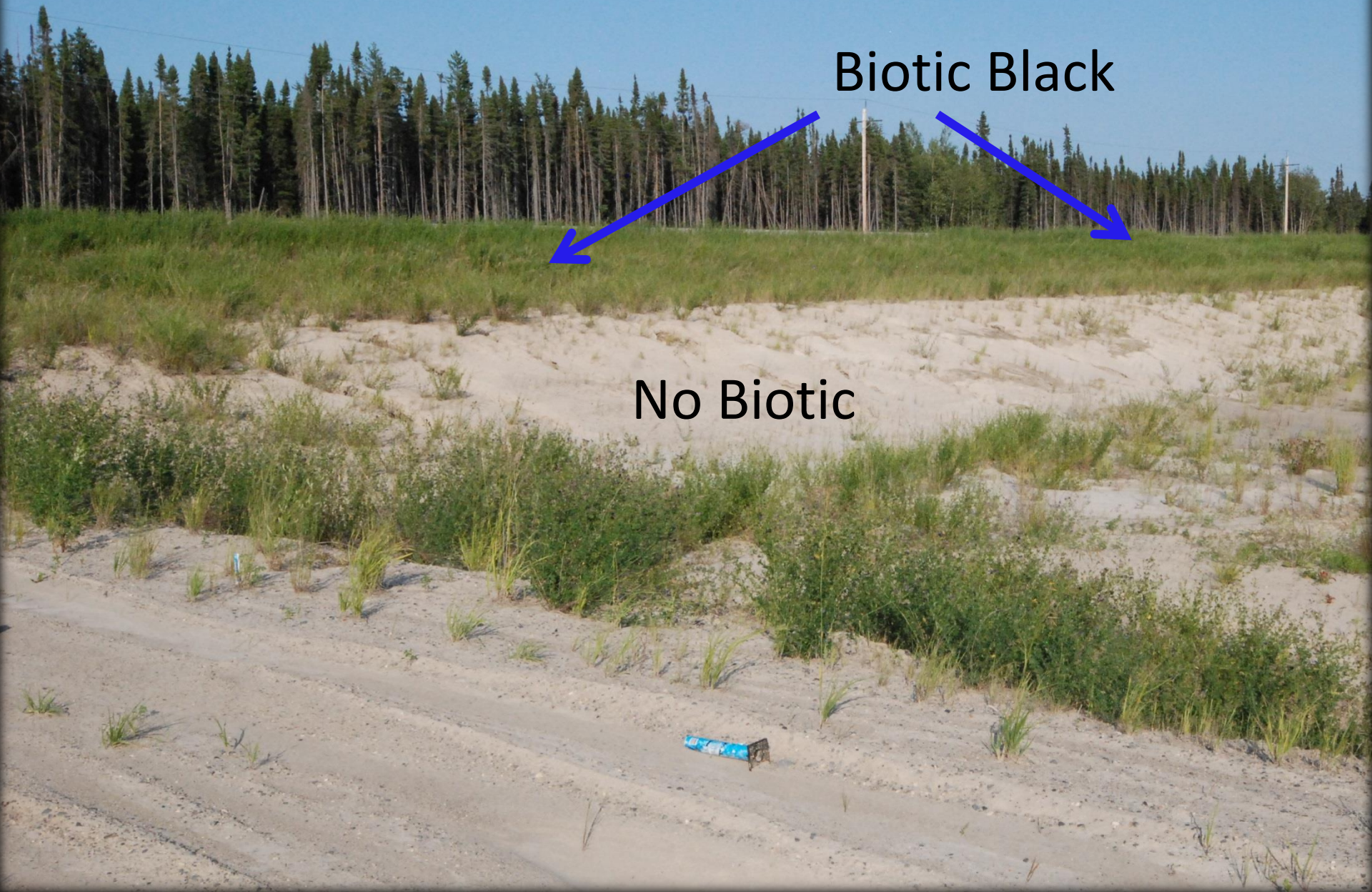
Treated vs Untreated



Northern Manitoba

Biotic Black

No Biotic



What does success look like?





Milner Ridge Project



2 weeks later



3 weeks later



7 weeks later



13 Weeks later



14 Months later





8+ year case study

8+ year case study



Microbial Community Analysis of Milner Ridge A and B Turf Grass Samples Using TRFLP

Prepared for Mark Myrowich (CEO) and Natalie Pienkowski

mark@erosioncontrolblanket.com

MM - 204-797-3797, NP - 204-292-1221



December 22, 2014

Jae Min Park, Andrew Wojcik, and George Lazarovits



Table 1: Enumeration of bacteria, yeast, and mold in the turf samples.

Sample	Total Bacteria Count	Total Yeast Count	Total Mold Count
Milner Ridge A	17,975,000	4,825,000	112,500
Milner Ridge B	1,655,000	190,000	15,500

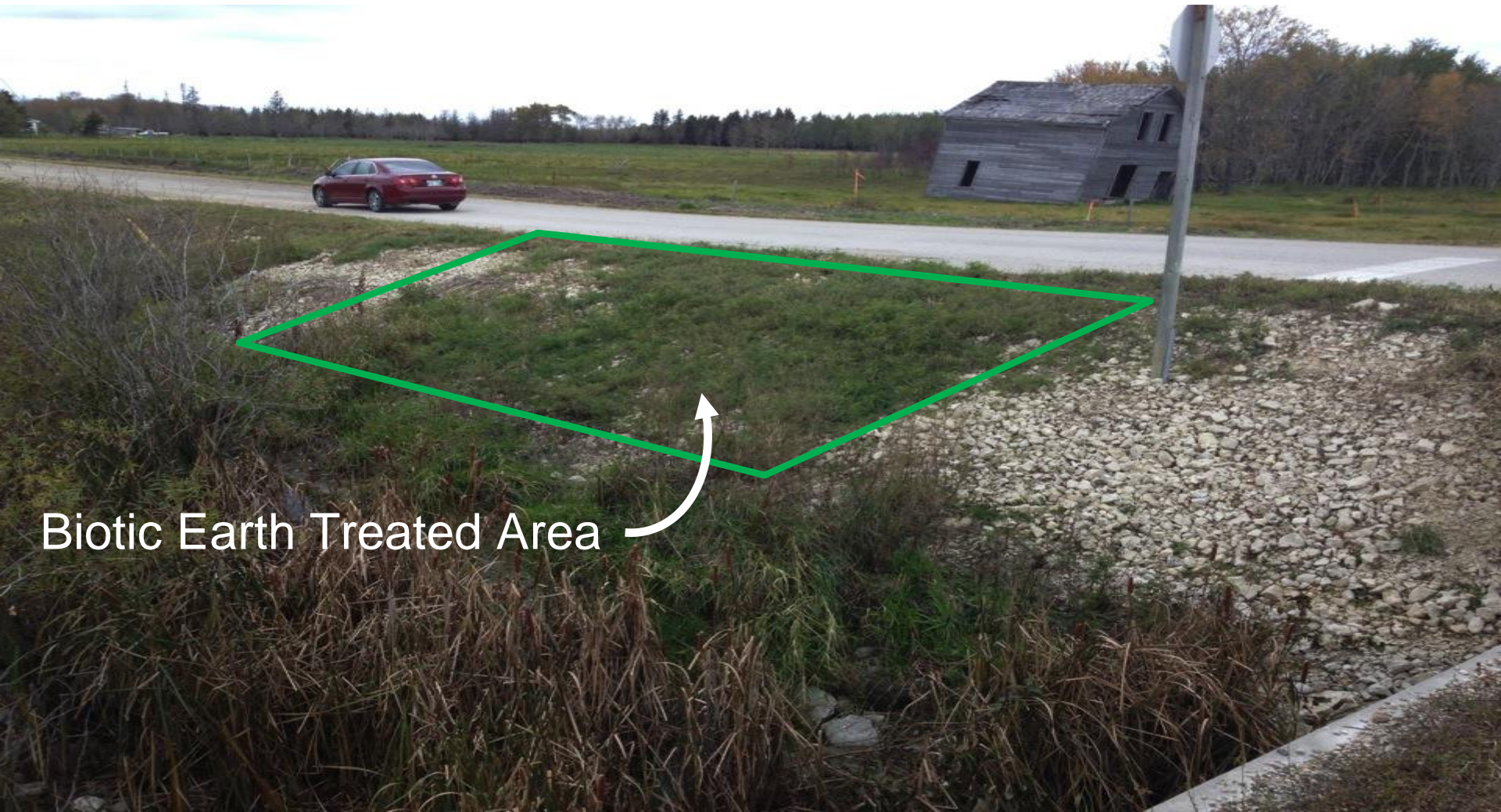
Establish Vegetation in Hard Armor



Hand Application Directly Onto Riprap



Vegetation Establishment



Biotic Earth Treated Area

Waskwtim Dam, MB





1 growing season

Can you tell where the Biotic is?



VERDYOL
Biotic EarthTM
AN ORGANIC APPROACH TO SOIL BUILDING

Any Questions?