What is Deltalok System?

- Deltalok is an environmentally friendly GREEN system used to construct soft permanent structures.
- Deltalok Systems applications range from erosion control & slope stability, retaining wall to streambank restoration and protection.
- Deltalok is the only system that can perform in both the soft armored and hard structured applications.
- Deltalok System is based on mechanically stabilized earth (MSE) & bag work technologies.
- Deltalok System uses only soft materials (geotextile and polypropylene) that have been used and tested for over 25 yrs both in the environment and industry for durability & bio-neutrality.
- Deltalok offers 3 dimensionally mechanically interlocking soft vegetated earth scaping system.
- Deltalok System is a bioengineering & ecological engineering solution which allows ecosystems to interface between technology & the environment.
- Deltalok System restores natures natural strength.
Deltalok Geo-Modular Bag

- Deltalok Geo-Modular bag, which is a proven material within the industry, provides a filtering functionality, is water permeable, and root friendly
- The Deltalok bag filled with growing material functions as a soft building block and is used to create vegetated bag work structures
- Deltalok bags keep growing medium intact, ensuring successful vegetation growth
Deltalok System—Interlocking Plate

Deltalok’s interlocking platet, which is made of 100% recycled polypropylene, permanently interlocks the Deltalok bags.
**Deltalok System Vegetation Options**

- Vegetation options include native plants, grasses, bushes, flowers, vines and etc.

- Vegetation is achieved by hydroseeding, brush layering, live staking, or by filling the bags with a soil and seed mixture.

- A vegetation expert should make a selection that meets project requirements and provides complete vegetative coverage.
Vegetation Option: Hydroseeding
Vegetation Option: Brush Layering
Vegetation Option: Live Stacking
Vegetation Option: Live Planting Between Deltalok Bags
Vegetation Option: Live Planting Cutting into Deltalok Bags
What are Deltalok System’s Benefits?

Environmentally friendly - Soft Component System
- System is accepted for use in environmentally sensitive areas
- Soft positive 3D interlocking connection that accommodates seismic activity and differential settlement
- Aesthetically pleasing – blends with nature
- Provides filtration & sedimentation functionalities and is anti-graffiti

Superior Vegetation Outcome
- Offers consistent & contained high quality growing medium in permanent soil bags to 100% of the face – no bulging, seepage or contamination with other soils void of nutrients
- Eco-zones every 5” where rain water accumulates and seeds can germinate
- More vegetation options than hydroseeding – native plants, brush layering, live staking
- Instant slope stability and erosion protection even before vegetation exist

Easy Installation – low impact construction methodology
- Can adapt to any terrain, grade changes & undulations
- Can mechanically interlock with geogrid, soil nails, earth anchors
- No heavy equipment or footing needed – drainage requirement is site specific
- Can accommodate near vertical retaining wall
- System is quick, easy & forgiving to built
Where Would You Use the Deltalok System?

- Environmental Applications
  - Streambank, riverbank, shoreline protection & restoration
  - Wetland restoration
  - Ditch/pond lining
  - Irrigation canals
  - Open pit mining restoration
  - Slope repairs
  - Erosion Control & Steep Slope Stabilization

- Infrastructure Applications
  - Retaining walls (including near vertical)
  - Culvert headwalls
  - Road slip repairs
  - Roadway safety dividers
  - Levees/Dikes/Earth berm
  - Noise Barrier/Protection & Absorption
  - Bridge Abutment
  - Detention pond
  - Weirs (Eco-rap)
  - Offshore reefs (Eco-rap)
Where Would You Use the Deltalok System?

- Commercial & Residential Applications
  - Boundary walls
  - Garden walls
  - Resurfacing existing structure
  - Golf courses (pond bank, tee boxes, bunkers etc)
  - Landscaping
  - LEED projects

- Military & Emergency Applications
  - Blast protection
  - Flood protection
  - Storm protection
  - Underground Bunkers
  - Vegetated safety bollard - Security perimeter walls
  - Firing range alleys

- Deltalok System meets government requirements when dealing with environmentally sensitive issues
- Deltalok is the only system that can fulfill both soft armored and hard armored applications
Deltalok is a soft vegetated permanent structural system whose applications include retaining walls, slope stability, and stream bank protection.

Our product is recognized and used around the world. Contact us at 604-980-6116 and learn how to build it green!

### Sustainable Sites

<table>
<thead>
<tr>
<th>Credit</th>
<th>Description</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1</td>
<td>Reduced Site Disturbance: Protect or Restore Open Space</td>
<td>1</td>
</tr>
<tr>
<td>5.2</td>
<td>Reduced Site Disturbance: Development Footprint</td>
<td>1</td>
</tr>
<tr>
<td>6.1</td>
<td>Stormwater Management: Rate and Quality</td>
<td>1</td>
</tr>
<tr>
<td>6.2</td>
<td>Stormwater Management: Treatment</td>
<td>1</td>
</tr>
<tr>
<td>7.1</td>
<td>Heat Island Effect: Non-Roof</td>
<td>1</td>
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</tbody>
</table>

### Water Efficiency

<table>
<thead>
<tr>
<th>Credit</th>
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<tbody>
<tr>
<td>1</td>
<td>Water Efficient Landscaping</td>
<td>1-2</td>
</tr>
<tr>
<td>2</td>
<td>Innovative Wastewater Technologies</td>
<td>1</td>
</tr>
</tbody>
</table>
### Materials & Resources  
**9 Points**

<table>
<thead>
<tr>
<th>Credit</th>
<th>Description</th>
<th>Points</th>
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</table>
| 2      | Construction Waste Management  
Divert construction, demolition, and land clearing debris from landfill disposal. | 1-2    |
| 3      | Resource Reuse  
Reuse building materials and products to reduce demand for virgin material and reduce waste. | 1-2    |
| 4      | Recycled Content  
Increase demand for building materials that incorporate recycled content materials. | 1-2    |
| 5      | Regional Materials  
Increase demand for regional building materials/products, reducing impact for transportation | 1-2    |
| 6      | Rapidly Renewable Materials  
Reduce the depletion of finite raw materials and long cycle renewable materials | 1      |

### Innovation & Design  
**4 Points**

<table>
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<tr>
<th>Credit</th>
<th>Description</th>
<th>Points</th>
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</table>
| 1      | Innovation in Design  
Up to four bonus credit for exceptional performance above the LEED Green Building Rating System | 4      |

LEED is a points-based rating system that evaluates the overall design and construction of high-performance green buildings and assigns a rating: certified, silver, gold, or platinum. For more information: [www.cagbc.org](http://www.cagbc.org)

The left chart illustrates possible LEED credits available through the Deltalok system.
**Greenhouse Gas Analysis and Equivalencies**

An independent Greenhouse Gas (GHG) Analysis concluded 97% of emissions were reduced by using Deltalok instead of traditional concrete to build a retaining wall.

Emissions from both products were measured during various stages of construction, including manufacturing, transport, and site restoration.

The GHG analysis concluded per m² concrete releases 73.2kg of CO²e compared to Deltalok’s 2.5 kg, eliminating over 70 kg of greenhouse gasses per m².

Average retaining wall is 500 m²—using Deltalok eliminates about 35 250 kg of unnecessary greenhouse gasses from the environment per project.

<table>
<thead>
<tr>
<th>A gas equivalency calculator, located on US Clean Energy website, estimates 35 250 kg of CO²e are equal to emissions from:</th>
</tr>
</thead>
<tbody>
<tr>
<td> 23.7 passenger vehicle cars annually</td>
</tr>
<tr>
<td> 17.9 homes annually (from electricity use)</td>
</tr>
<tr>
<td> 5358 barbecue propane cylinders</td>
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</tbody>
</table>

<table>
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<tr>
<th>Removing the equivalent amount of CO²e takes:</th>
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<tbody>
<tr>
<td> 3314 tree seedlings 10 years</td>
</tr>
<tr>
<td> 29.4 acres of pine or fir forest 1 year</td>
</tr>
</tbody>
</table>
SFU Wall to Protect Slope – Burnaby, BC
Slope Protection on Golf Course – W. Vancouver, BC
Reinforcing Slope and Widening Road – Surrey, BC
Slope Stability Mahon Park – North Vancouver, BC
Steep Slope Stabilization – Wisconsin, USA
Steep Slope Erosion Protection - Singapore
Stabilization Devries Slope – Minnesota, USA
Trail Repair-Capilano Canyon - North Vancouver, BC
Erosion Control on Steep Slope - Korea
Fraser Riverbank Protection – McMillan Island, BC
Streambank on Sudden Valley Golf Course – WA, USA
Lakeside Erosion Protection – WA, USA
Shoreline Erosion Protection – Newcastle Island, BC
Shoreline and Habitat Remediation – Burnaby, BC
Wetlands Protection on Whistler Hwy – Whistler, BC
Streambank Tree Protection – North Vancouver, BC
Landscaping Walls – Robert’s Creek Park, Sechelt
Residential Terraced Retaining Walls – W. Vancouver
Terraced Garden Walls – Hawaii, USA
Green Wall – heat reduction
Green Retaining Wall, Singapore
Cub Creek side Land Widening – Surrey, BC
Green Retaining Wall – Alaska, USA
Roadside Retaining Wall - Golden Ear Bridge, BC
HW Retaining Wall by Condos - Singapore
Road Widening – Langley, BC
Roadside Retaining Wall Cedar Street – Coquitlam, BC
Bridge Abutment, Netherlands
Bridge Abutment – Korean Temple – Langley, BC
Culvert Headwall – Abbotsford, BC
Resurfacing Steep Stony Slope, China
Installation
Installing Bags & Geogrid
Deltalok System Field Testing

- One wall, half with Deltalok Standard Units, half without
- Chains attached to bags and connected to bobcat
- Crane scale used to quantify pullout forces
Deltalok System Field Testing

- Wall without Deltalok – **130 pounds** – One bag fell out
- Wall with Deltalok – **480 pounds** – Bags interconnected

480 pounds!
Thank you!

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