

# Plastics (synthetic fibers) in Erosion Prevention & Sediment Control Practices

## Have we reached a point of the bandage being worse than the wound?

*Sediment is commonly considered a pollutant. Yet it is also a very important component of natural geomorphic processes of our streams and rivers. Deciphering which is what, and when, is a dilemma for project designers and regulators. Determining products to best prevent erosion or control sediment is an essential component on a construction project. Are the consequences of those products being considered? 'Good' for erosion prevention may be 'bad' for animals in the area. It is a similar dilemma to deciding whether a piece of art is beautiful or not – it depends on whom you ask. However, synthetic fibers are not a natural component of stream ecology. Despite this, we are commonly accepting / requiring the addition of plastics in to the environment in order to prevent movement of sediment.*

### Plastics\*

#### in Rolled Cover

- **Erosion control blanket** netting weighs 0.24oz/yd<sup>2</sup> (5.7g/m<sup>2</sup>)
- **Polyethylene sheeting** 6 mil weighs 4.13oz/yd<sup>2</sup> (98g/m<sup>2</sup>)
- **Geogrid** minimum of 7.0 oz/ yd<sup>2</sup> (165g/ m<sup>2</sup>)
- **Turf Reinforcement Mats** contain 8.9 to 14.7oz/yd<sup>2</sup> (210 to 348 g/m<sup>2</sup>)

#### in Perimeter Control

- **Control Log (bio roll)** 6-8" Tubing contain up to 1oz/ft (93g/m)
- **Silt fence (3ft tall)** weighs 1.28oz/ft (119g/m)
- **Silt Curtain** fabric weighs 12oz or 15oz/ft (1100 – 1400g/m)

#### in Hydraulic applications

- **Synthetic Fiber** content up to 0.07oz/yd<sup>2</sup> (2.4 g/m<sup>2</sup>)

### Plastic Equivalent \*\*

#### per 100 square yards

70 bottles or 150 shopping bags  
 1,200 bottles or 2,500 shopping bags  
 2,000 bottles or 4,300 shopping bags  
 2,300 - 6,000 bottles or 5,000 - 13,300 shopping bags

#### per 100 feet

290 bottles or 630 shopping bags  
 370 bottles or 800 shopping bags  
 3,400 - 4,200 bottles or 7,500 - 9,200 shopping bags

#### per 100 square yards

19 bottles or 41 shopping bags

### Plastic Equivalent \*\*

#### per 100 square meters

80 bottles or 180 shopping bags  
 1,400 bottles or 3,000 shopping bags  
 2,400 bottles or 5,100 shopping bags  
 2,750 - 7,200 bottles or 6,000 - 15,900 shopping bags

#### per 100 meters

950 bottles or 2,000 shopping bags  
 1,200 bottles or 2,600 shopping bags  
 11,100 – 13,800 bottles or 24,600 – 30,100 shopping bags

#### per 100 square meters

23 bottles or 50 shopping bags

***These products are all permanently placed on site or if removed, enter the garbage stream (zero percent recycling is expected)***

***MnDOT is estimated to apply 31 tons of these plastics (synthetic fiber) per year (three year average 2016-2018)***

### Other Biototoxicity Issues?

- **Malachite Green**\*\*\* (Colorant): Mayfly LC50 0.079 mg/L, Smallmouth Bass LC50 0.04 mg/L, Rainbow Trout LC50 0.267mg/L, Toad (larvae) LC50 0.068mg/L) \*\*\*\*
- **Methyl Acrylate** (Acrylate polymer degradate): Green Algae EC50 15mg/L, Water Flea LC50 1.2-9.6mg/L, Bony Fish LC50 5-7.5mg/L) \*\*\*\*
- **Ethyl Acrylate** (Acrylate polymer degradate): Scud LC50 1.86mg/L, Fathead Minnow LC50 2.5mg/L) \*\*\*\*
- **Diethylhexyl phthalate** (Plasticizer): Green Algae EC50 0.96mg/L, Water Flea EC50 0.133mg/L, Fathead Minnow LC50 71.5mg/L, Redear Sunfish LC50 6.18mg/L, Leopard Frog LC50 4.44mg/L) \*\*\*\*
- **Dibutyl phthalate** (Plasticizer): Green Algae LC50 0.21mg/L, Water Flea LC50 4.3mg/L, Opossum Shrimp LC50 0.5mg/L, Bluegill LC50 1.23mg/L, Channel Catfish LC50 3.72mg/L, Rainbow Trout LC50 1.6mg/L) \*\*\*\*

***We must balance erosion prevention & sediment control products from doing more ecological harm than the pollutant they are designed to prevent.***

\* Average plastic (synthetic fiber) weight equivalents per survey of manufacturer's product specifications and application recommendations

\*\* Rounding based on: 0.5 liter water bottle = 0.35oz (9.9 gram), Typical shopping bag being 12 microns thick & 11.5" x 6.5" x 21" (29.2cm x 16.5cm x 53.3cm) = 0.16oz (4.54 gram)

\*\*\* A common dye used in hydromulch/hydroseeding applications. MnDOT has removed Malachite Green from its approved products list due to Biototoxicity concerns.

\*\*\*\* EPA ECOTOX Database, <https://cfpub.epa.gov/ecotox/> LC50: Concentration of toxicant for 50% test population mortality. EC50: Concentration of toxicant at which 50% of test population shows an impaired biological function.

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Plastic components intentionally or unintentionally remain long after their intended purpose.

Is this adding to the buildup of plastic pollutants in the local and global environment?

Plastic in blanket products remains long after the need



Plastic remnants from shoreline restoration project



One plastic shopping bag



One plastic bottle and decaying bioroll



Discarded Poly sheets, buried or hauled to garbage?



Silt curtain in garbage stream



Plastic in bioroll products remains long after the need



Turf Reinforcement Mat, intended for long term placement



Plastic in blanket products remains long after the need



Fibers in hydraulic applications



Hydraulic applications and Malachite Green



Silt fence products remains long after the need

