Day 2: Problems Associated with Construction Site Erosion Control

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Problems Associated with Erosion of Construction Sites

- Construction site erosion rates in the US range from about 20 to more than 200 tons per acre per year.
- These rates are about 3 to more than 100 times greater than erosion rates from croplands.
- Construction site erosion rates vary depending on local rain energy, soil, and topographic conditions, plus the use of effective erosion controls.

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Increased Construction Site Erosion Causes Many Problems:

- Highly turbid receiving waters adversely affects aquatic life (gill abrasion, decreased light penetration, can't see predators or prey, etc.).
- Stream sedimentation destroys habitat (smothers food sources, destroys spawning areas, etc.).
- Decreased aesthetics along linear parks (highly turbid waters can persist for several days after a rain).
- Damage to construction sites require re-grading.
- Decreases real estate sales opportunities in affected areas.
- Causes ill-will in surrounding areas that are adversely affected.

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Problems Associated with Construction Site Erosion

- Real estate sales adversely affected
- Receiving water sedimentation
  - Destroyed aquatic life habitat
  - Increased turbidity concentrations
  - Decreased conveyance capacity and increased flooding
- Fugitive dust and traffic hazards

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Adversely Affects Real Estate Sales




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Damages Property



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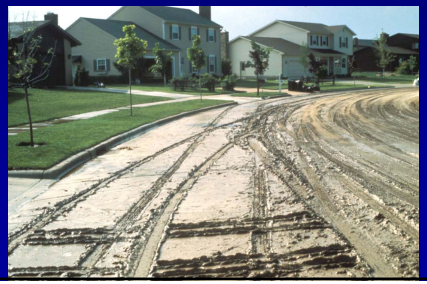
Bad Publicity and Ill-Will of Neighbors





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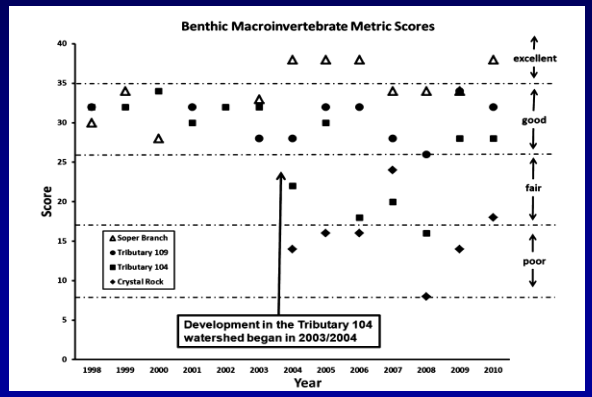
Unfortunately, use of the best available erosion and sediment controls are not suitable to preserve predevelopment landscape and stream conditions (forested area), and produced unexpected effects as altered streamflow, hydrology, and biological conditions (Hogan, *et al.* 2014).



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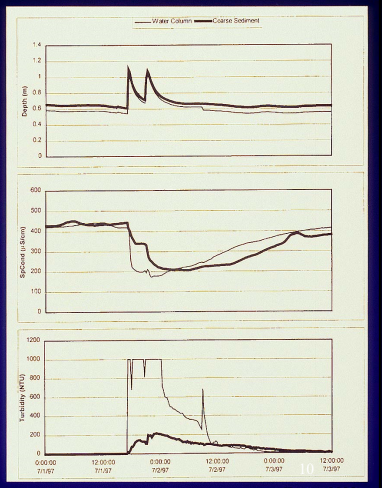
Increased Stream Turbidity

Duration of Wet Weather Effects (Water Column and in Coarse Sediment Interstitial Water)



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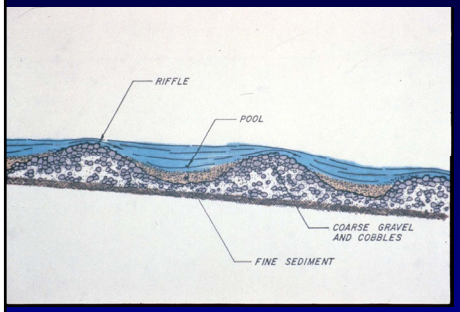
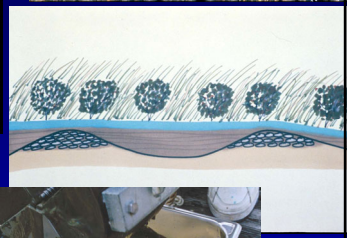
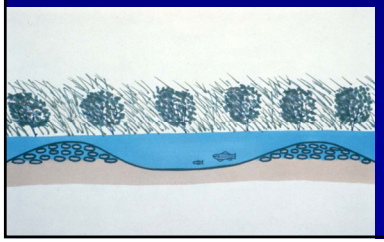
Stream Sedimentation







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Clogged Culverts and Increased Flooding

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Fugitive Dust and Associated Traffic Safety Problems and Regional Air Pollution Sources

The May 15, 2018 edition of the *China Daily* reported that dust kicked up from roads and construction sites to be on the rise, contributing about 16% of the PM2.5 in the Beijing area (2nd largest source, after vehicles at 45%).

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Sediment Sources

WI DNR photos

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Soil Delivery to Streams

- Agricultural Field
  10 tons/yr x 4% = 0.4 tons/ac/yr
- Construction Site
  20 tons/yr x 100% = 20 tons/ac/yr

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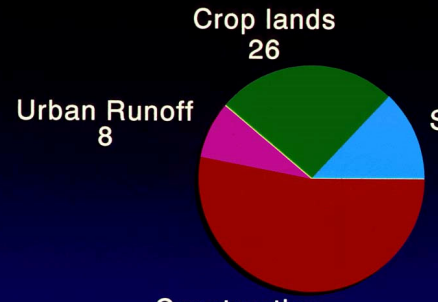
Susp. Sediment - Milwaukee River

Percent Contribution by Landuse - 1985



Total Sediment Load = 12,500 lbs/yr

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Major Sediment Sources at Construction Sites

- Eroded slopes and channels
- Long-term exposed/bare soil
- Improper site activities and waste disposal practices
- Unprotected storage piles
- Construction activity near roadways
- Construction in streams

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Birmingham Construction Site Erosion Runoff Characteristics (Nelson 1996)

	Low intensity rains (<0.25 in/hr)	Moderate intensity rains (about 0.25 in/hr)	High intensity rains (>1 in/hr)
Suspended solids, mg/L	400	2,000	25,000
Particle size (median), μm	3.5	5	8.5

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Eroded Slopes and Channels

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WI DNR photo
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Heavy Sediment Loadings on Streets in Construction Areas
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Working Near Streets
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Storage Piles
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Improper Site Activities
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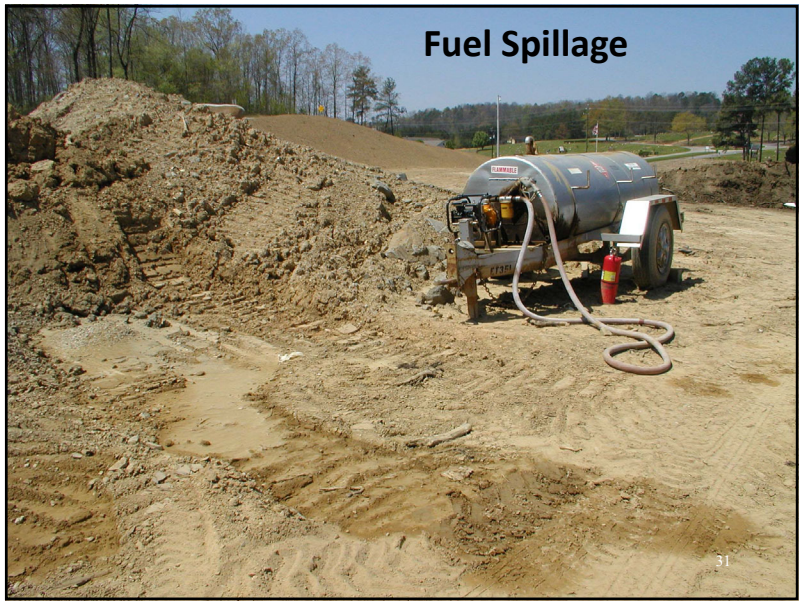
Fuel Spillage
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Improper On-Site Waste Disposal
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Working Near Streams and in Channels

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Stream erosion first season after new outfall for subdivision expansion

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Characteristics that cause Very High Erosion Rates

- Rainfall energy (high rain intensities).
- Soil erodibility (fine-grained, highly erosive soils).
- Site topography (many areas have steep hills undergoing development).
- Surface cover (prior forested cover usually totally removed during initial site grading on hilly construction sites).

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Basic Approach to Reduce Construction Site Erosion

1) divert upslope water around disturbed areas, or pass it through the site along a protected channel,
2) expose disturbed areas for the shortest possible time (typically 14 day limit), either through better scheduling or by using temporary or permanent mulching or other cover,
3) treat any runoff before it leaves the site (perimeter filter fencing and downslope fencing or sediment pond, depending on size of site).

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Other Necessary Erosion Control Elements:

- Construction wastes must be properly stored and disposed.
- Sediment tracking controlled using graveled driveways, roads, and construction entrances.
- Protect storm drain inlets.
- Storage piles properly located and protected from erosion.
- Have an effective inspection and repair program.

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The problem is lack of resources (and will) to enforce regulations, improper sizing and design of controls (let alone maintenance), and application of inappropriate controls for local conditions.

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