

**LAKELAND CENTRAL  
SCHOOL DISTRICT  
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**MS4PY5 STORMWATER  
PROGRAM**

**NEWSLETTER # 1  
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**CLIMATE CHANGES AND GREEN  
STORMWATER INFRASTRUCTURE  
PLANNING PRACTICES**

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### **1. Stormwater Management and Climate Changes**

Since the passage of the Clean Water Act in 1977, the US has made great advances to clean up the environment by controlling pollution from industries, sewage and non-point sources of pollution from stormwater runoff. To add to these challenges the US and the world are faced with ongoing climate changes. To adapt to our changing climate conditions, we must re-evaluate approaches to stormwater management planning and incorporate alternative stormwater management practices such as green infrastructure options.

### **2. The Effects of Climate Changes**

Changes in our climate, due the increasing man-made pollution, have led to increased stormwater pollution from:

- **Greater and Unpredictable Rainfall Events:** increased and unpredictable peak rainfall events have led to more intense and severe building and highway flooding, land erosion and mudslides, highway and infrastructure destruction
- **Warm Weather Spring Snowmelts:** even though substantially less than peak rainfall events, warm spring weather and increased solar radiation, can contribute significantly more volume of runoff and increased pollution loading to our water bodies
- **Atmospheric Pollutants:** acid rain released in meltwater continues to pollute stormwater runoff, as snow is a very effective scavenger of atmospheric pollutants

- **Salt and De-Icing Chemicals:** more chemicals used to provide road safety such as sodium chloride and ferro-cyanides (de-icing and anti-caking chemicals) will not only cause significant pollution to our drinking water but also significantly increased water treatment costs
- **Loss of Wetlands:** less snow cover, decreased annual spring flows and less summer rainfall can also lead to loss of wetlands, which act as critical filtration and flooding buffers to our coastal and inland waterways
- **Ongoing Uncontrolled Fracking:** uncontrolled hydro-fracking by pumping massive amounts of water and sand and other chemicals, continue to release benzene, acetone and toluene, and other hazardous chemicals into our atmosphere and into nearby aquifers, with the potential for fires, explosions and spills and even earthquakes triggered by underground injection of fracking waste

### 3. The Adaptation of Green Infrastructure Stormwater Practices

Years of traditional development practices have altered natural hydrological patterns and ecosystems. Mimicking nature and adopting the following green stormwater practices will help reduce stormwater pollution:

- **Trees Reducing the Carbon Footprint:** Trees help to reduce carbon emissions. As they grow, they help in the fight against climate change. Trees remove carbon dioxide from the air, store carbon in the trees and soil, and then release oxygen into the atmosphere. Research indicates, deforestation exacerbates global warming when dying trees release their stored carbon back into the atmosphere. This vicious

cycle could lead to irreversible and dangerous climate changes that would affect all life on the planet. Planting trees is a simple step that anyone can take to help reduce carbon dioxide and makes a proactive stand against global warming

- **Stormwater Green Infrastructure Practices:** we must increase the use of green stormwater management practices such as:
  - **Filtration and Infiltration Basins:** can be used for temporary detention and treatment to remove sediment, nutrients and stormwater pollutants from runoff, especially in areas with a high degree of impervious surfaces
  - **Planting of Wetlands Buffer Strips:** planting of vegetative strips such as grass swales, vegetative bioswales, as well as preserving existing wetlands, especially adjacent to waterways will provide filtration and removal of other stormwater contaminants
  - **Green Retrofit Projects:** Commonly utilized onsite retrofit projects, such as the retrofit of existing parking lots recreational and athletic fields can improve our environment dramatically. All new construction projects should promote the use of bioretention areas, rain gardens, green roofs , rain barrels and cisterns in their building design and landscaping features

### 4. Other BMP Considerations

Other Best management Practices (BMPs) that should be carefully considered include:

- **Winter Cleanups:** conduct salt/sand sweeping, after snow has melted, and before the first rainfall.

- **Judicious Use of De-icing and Anti-Skid Chemicals:** alternative chemicals such as calcium magnesium acetate and urea and other newly introduced biodegradable chemicals, even though more costly than salt, in the long run may be environmentally more suitable and economically affordable. For areas near drinking water sources, signs should be posted warning drivers to reduce the use of salt in these areas
- **Onsite Designated Snow Disposal Areas:** Research indicates that up to 90% of pollution from snow removal occurs next to roadsides, when snow is deposited next to water bodies. Onsite designated pervious areas, such as grassed areas, should be selected so that snow can be piled easily and stored until it melts. Pervious grassed areas will provide filtration and pollutant removal before the meltwater discharges into a storm sewer
- **Covered Salt/Sand Stockpile Storage:** Utilize a covered storage facility to store sand, salt and de-icing chemicals. Always recycle street and parking lot sweepings to the covered salt/sand stockpile storage facility
- **Controlled Fracking:** Contact your congress representative and request that strict environmental laws be enacted to control:
  - **Fracking Site Permit Approval:** fracking should not be allowed where fracking chemicals can enter nearby aquifers. Site location permits should be procured from the appropriate state agency, before proceeding with fracking process

- **Disclosure of Full List of Chemicals:** fracking companies should disclose a list of chemicals they plan on utilizing
- **Issuing of Environmental Permit:** Companies should be required to procure environmental agency written approvals, before proceeding with fracking process

### 5. Onsite Stormwater Pollution Reduction

There are many potential benefits from the onsite planting of trees, shrubs and vegetation. These benefits vary from site to site, but typically include:

- **Stormwater Volume Reduction:** Studies indicate a large deciduous tree can remove up to 760 gallons of water per tree per year (CUFR, 2001) and up to 100 gallons through evapotranspiration (EPA, 1998)
- **Nutrient Uptakes:** Uptake by poplar trees have shown nutrient uptakes of up to 0.05 pounds of nitrogen per tree per year (Licht, 1990)
- **Pollutant Removals:** Plants have been known to remove metals, pesticides and other organic compounds
- **Phytoremediation:** This is the process of using plants to control the migration of contaminants (EPA 1998) in soil and groundwater. It has been cited that a sugar maple (1 foot in diameter) can retain 60 mg of cadmium, 140 mg of chromium, 820 mg of nickel and 5,200 mg of lead from the environment in one growing season (Coder, 1996)

### 6. Other Environmental Benefits

Other benefits from the new approaches to stormwater management include:

- **Air Temperatures:** Air temperatures can be 4 to 8 degrees cooler in well-shaded (McPherson, 1998) parking lots than in unshaded parking lots
- **Trees:** can reduce asphalt temperatures by up to 36 degrees (CUFR, 2001) and vehicle cabin temperatures by 47 degrees
- **Solar Radiation, Wind Speeds and Noise:** Trees can also block up to 95% of incoming radiation, reduce wind speeds by 15% to 35% and reduce highway noise by 6 to 10 decibels, at a rate of almost 50% (Akbari and others, 1992)
- **Erosion and Wildlife Habitat:** Trees prevent water bank inundation and protect bird and wildlife habitat (Shaw and Schmidt, 2003).
- **Community Benefits:** Trees provide privacy, esthetic and psychological benefits and increase the overall livability of a community
- **Economic Benefits:** Trees reduce heating and cooling costs by 10% to 20% (Heat Island Group, 1996). Trees properly planted next to buildings can reduce summer air conditioning costs by 40% (Parker, 1983) and energy use in the house by 20% to 25% per year (Heisler, 1986)

### 7. The Current UN Summit

As reported in recent press release at the UN Summit in Paris:

- Nations have agreed to set goals to widen the use of renewable energy and raise billions of dollars in aid for developing countries, in an effort to slow global warming
- Nations have also agreed to halt losses of tropical forests by 2030, improve food production and increase the share of electric

vehicles in cities to 30 percent of new vehicle sales by 2030.

- The non-binding initiatives were set by various coalitions of governments, multinational companies, cities, financial groups, investors, environmental organizations and other groups.

The targets are meant to help prepare a 200-nation summit in Paris in late 2015 to finalize a deal to slow global warming.

### 8. Changes To Traditional Stormwater Practices to Slow Global Warming

Traditional stormwater development practices have basically consisted of collecting the stormwater from impervious surfaces such as streets and rooftops and discharging this contaminated stormwater into the nearest storm drain, drainage ditch and ultimately to the nearest river or stream corridor. Through industrial development, we have altered the natural hydrologic patterns and ecosystems. However, we are continuously exploring innovative ways to tackle current climate changes. We are now learning we can work with nature to make positive changes to climate, through the adoption of green stormwater practices.

### 9. How Can Make a Difference!

- Understand how planting trees can help reduce carbon dioxide and help against global warming
- Improve the greening of your school community by promoting the use of bioretention areas, rain gardens and planting of vegetative strips
- Volunteer in your school conservation/environmental groups