



WWC's Helena, Montana office

Urban Stormwater Pollution and Prevention

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Overview of Urban Storm Water Concerns

In a review of biennial reports submitted by the States under the Clean Water Act, it was found that storm water discharges were a major cause of water quality impairment. How is this possible? As an area becomes more developed, natural cover is replaced by more impervious cover (roads, houses, parking lots, etc.). Impervious cover reduces the amount of water that soaks into the soil and evaporates. Comparing the two: natural ground cover typically has 40% evapo-transpiration (water evaporated directly into the air and released from plants), 10% runoff, 25% shallow infiltration, and 25% deep infiltration; impervious cover (75% to 100% coverage) has 30% evapo-transpiration, 55% runoff, 10% shallow infiltration, and 5% deep infiltration. Impervious cover increases runoff during runoff events. Further, smoother surfaces channel water, allowing it to flow through more quickly, picking up sediments along the way from construction areas and parking lots, metals from roofing, chemicals from lawns, and pollutants/oils from road surfaces. The water has nothing to slow it down so it not only increases in speed but in temperature. As the water speeds up and enters natural channels it erodes banks, puts increased pollutants into the water, and raises the temperature of existing waters above the survival threshold of some aquatic life. Impervious cover may not only increase flooding during and after water events, but also causes lower stream flow during dry periods due to less aquifer recharge by infiltration. In comparison, natural cover allows water to be absorbed and filtered before it enters into waterways, and allows recharging of the aquifer.

What is being done?

In 1972, amendments to the Federal Water Pollution Control Act (FWPCA) also known as the Clean Water Act (CWA), prohibited the discharge of any pollutant to the waters of the United States from a point source unless the discharge was authorized by a National Pollutant Discharge Elimination System (NPDES) permit. In 1987, Congress amended the CWA to require the Environmental Protection Agency (EPA) to establish phased NPDES requirements for storm water discharge. Phase I required permit applications for

storm water discharges to be acquired by medium (populations of 100,000-250,000) and large (populations greater than 250,000) municipal separate storm sewer systems (MS4's). Phase I looks at reducing pollutants from major contributors to storm water discharges by requiring applicants to develop a seven (7) part water management program.

What about smaller urban areas?

In 1995, the EPA established application regulations for Phase II of the NPDES Storm Water Program. Phase II uses the Bureau of Census designation of "Urbanized Areas" (UA) to determine a small MS4's coverage under the Rule. UA's have a population of 50,000 or more and an overall population density of 1,000 or more per square mile. An UA may include within its boundaries incorporated places, portions of Federal Indian Reservations, all or part of minor civil divisions (towns & townships), and portions of two or more counties. Billings, Great Falls, and Missoula, Montana are designated as regulated MS4's by inclusion in a UA, as are Casper and Cheyenne, Wyoming.

Small MS4's outside of UA's can also become regulated by serving a jurisdiction with a population of 10,000 or more and a minimum density of 1,000 people per square mile, if the MS4 meets certain NPDES Designation Criteria. Criteria include: Discharging to sensitive waters, high growth, and making significant contributions of pollutants to US Waters'. In Montana, Helena, Bozeman, and Kalispell are regulated MS4's outside of UAs, as are Evanston, Gillette, Laramie, Rock Springs, and Sheridan, Wyoming. Small MS4 operators are required to put together a "tool box" or Best Management Program (BMP) for stormwater management and are required to address *six minimum control measures*:

- Public Education and Outreach
- Public Participation and Involvement
- Illicit Discharge Detection and Elimination
- Construction Site Runoff Control
- Post-Construction Runoff Control

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WWC Engineering (WWC) is a full service corporation that has been serving the Rocky Mountain region since 1980. WWC's range of consulting services is broad and our corporate experience is extensive. With over 85 employees and offices in Sheridan, Laramie, and Casper, Wyoming and Helena, Montana, we have an exceptional staff of professionally licensed engineers, hydrologists, surveyors, and geologists with a full complement of highly skilled field technicians, CADD specialists, and clerical staff. WWC prides itself on producing the highest quality of work for our clients in a time-and-cost-efficient manner.

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- Pollution Prevention/Good Housekeeping

MS4 operators have the option to work with other MS4s to help reduce and control costs, making their program successful.

Control Methods

By controlling the amount of water, where it flows and how (via pipe, natural channel, constructed wetlands, etc.) we are able to reduce pollutants and keep waters clean. One way to control water is by channeling to treatment facilities, giving water more opportunities to slow down, allowing impurities to settle along the way. Some examples of treatment facilities are Infiltration Systems, Filtration Systems, and Retention or Detention Ponds. These facilities channel water in, filter it—depending on the type of system—and release it in a controlled manner so as to prevent damage to our waterways.

Other possibilities include the new “Green Infrastructure” which uses natural or engineered systems that mimic natural landscape to collect, clean, and reduce storm water runoff using plants, soils and microbes. On a wide scale “Green Infrastructure” consist of connected open spaces and natural areas. On a smaller scale “Green Infrastructure” consist of site-specific management practices such as rain gardens, porous pavement, and green roofs. These “Green Infrastructures” can not only be cost effective but also cost efficient.

Methods for Success

The best way to ensure success of your storm water program is to increase public understanding of the issues and how they relate to them. For a complete list of public education ideas please see the EPA's website @ www.epa.gov under “stormwater program”. A few ideas are: Encourage homeowners' to develop alternatives to ar-

eas traditionally covered by impervious surfaces by using porous pavements or natural vegetation and mulch; when walking your pets be sure to pick up after them; use car wash facilities which treat or recycle water before releasing it into stormwater systems, and; if you have septic systems it is advised that they are inspected every three years. Developers and city planners are encouraged to use low impact development measures (including those that conserve natural areas), and to use structural controls and pollution prevention strategies. Minimize site runoff rates by maximizing surface roughness, infiltration opportunities, and flow paths. Implementing post-development stormwater programs may be a little more costly. However, there is still much that can be done to improve water quality and keep costs down. For instance, look at economic efficiencies by targeting hot spots of pollution runoff or look at items that would have multiple benefits from implementation, such as, high efficiency street sweeping. By seeking priority pollutant reduction you can make a big impact on water quality. It is also advisable to share costs with neighbors. For example, some cities agree to share costs for a minimal program and then independently pursue more advanced options.

In Conclusion

Everyone benefits from stormwater programs as they not only give us better places to recreate but also give us better water quality. One thing to keep in mind is that all water programs need continuous evaluation to evolve as the need arises. For further information or questions please see the EPA's website @ www.epa.gov and look under storm water program or feel free to give our office a call.