Jordan Cove Watershed, Waterford, Connecticut

Runoff quantity and quality from driveways were monitored from water exiting slot drains.

Runoff and pollution monitoring has demonstrated the benefits of permeable interlocking concrete pavements in the U.S. EPA funded Jordan Cove Urban Watershed National Monitoring Project. Driveways and a municipal street were paved in this low-impact, environmentally sensitive residential development.

This watershed that drains to an estuary in Long Island Sound is participating in a 10-year monitoring project of runoff from a traditional subdivision, a single-family home development built with conventional pavements and stormwater management system, and a low-impact development built with runoff and pollutant-reducing BMPs. These include grass swales, bio-retention areas and PICP. The U.S. EPA Section 319 National Monitoring Program supports the monitoring project conducted by the University of Connecticut.

Built in 2001, the Glen Brook Green

Rather than being paved, the center of the cul-de-sac in Glen Brook Green subdivision provides a bioswale to absorb runoff and overflow from the permeable pavement.

Table 1. Average infiltration rates during 2002 to 2003 into pavements in the Glen Brook Green subdivision.

Test and Year	Asphalt	Permeable Pavement in./hr (cm/hr)	Crushed Stone in./hr (cm/hr)
Single Ring Infiltrometer test 2002	0	7.7 (19.6)	7.3 (18.5)
Single Ring Infiltrometer test 2002	0	6 (15.3)	5 (12.7)
Flowing infiltration test 2003	0	8.1 (20.7)	2.4 (6)

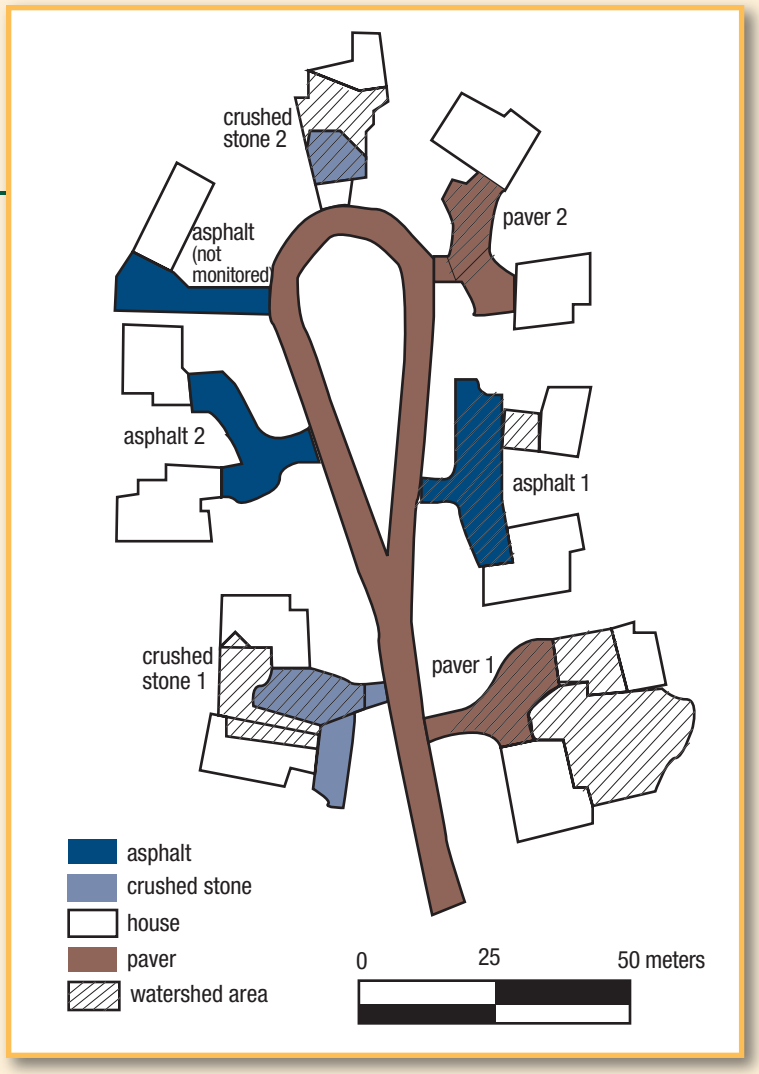
Table 2. Average weekly concentration of pollutants in stormwater during 2002 to 2003 from pavements in the Glen Brook Green subdivision. Within each variable, means followed by the same letter are not significantly different at σ=0.05.

Variable	Asphalt		Permeable Pavement		Crushed Stone	
Runoff depth, mm	1.8	a	0.5	b	0.04	c
Total suspended solids, mg/l	47.8	a	15.8	b	33.7	a
Nitrate nitrogen, mg/l	0.6	a	0.2	b	0.3	ab
Ammonia nitrogen, mg/l	0.18	a	0.05	b	0.11	a
Total Kjeldahl nitrogen, mg/l	8.0	a	0.7	b	1.6	ab
Total Phosphorous, mg/l	0.244	a	0.162	b	0.155	b
Copper, ug/l	18	a	6	b	16	a
Lead, ug/l	6	a	2	b	3	b
Zinc, ug/l	87	a	25	b	57	ab

subdivision within the watershed features over 15,000 sf (1,400 m^2) of PICP in a street and residential driveways that recharge the local aquifer, slow runoff velocities, oxidizes and filters some pollutants, filters suspended solids and cools water before it enters the estuary. Maintenance includes periodic sweeping and vacuuming with the same equipment used on other streets. An annual inspection ensures no ponding and aggregate is replaced in the pavement openings as needed.

The 2003 annual report of the multi-year monitoring project demonstrates the effectiveness of PICP in reducing runoff and pollutants (1). Runoff quantity and quality from asphalt, PICP (with a dense-graded base) and crushed stone driveways entering single family homes were studied for 12 months in 2002 and 2003. A plan of the neighborhood and driveway types is shown below.

Besides lower infiltration rates than asphalt, PICP demonstrated lower concentrations of pollutants in runoff and similar concentrations to that from driveways with crushed stone. Table 1 shows the average infiltration rates from the surfaces in 2002 and 2003. Table 2 shows the average weekly concentration of pollutants in stormwater runoff for various pollutants. Concentrations are statistically significantly lower for all pollutants from PICP compared to asphalt. Pollutant levels in PICP are similar to that from the driveways with crushed stone.



Runoff from various types of pavements are being monitored in the Glen Brook Green Subdivision in Waterford, Connecticut.

Typical cross-section:
3 1/8 in. (80 mm) thick permeable pavers
8 to 10 in. (200 to 250 mm) dense-graded base
Geotextile

Subgrade:
Sandy gravel

Developer:
Lombardi Inside/Out L.L.C.
Waterford, CT

Project Manager:
Aqua Solutions
East Hartford, CT

Engineering:
D.W. Gerrick Engineering
Waterford, CT

Landscape Architect:
John Alexopoulus
University of Connecticut

Water Quality Monitoring:
Dr. John Clausen
University of Connecticut