

Stormwater Utility Feasibility Report City of Newark, Del.

“Stormwater is drinking water in Newark”.

August 18, 2009

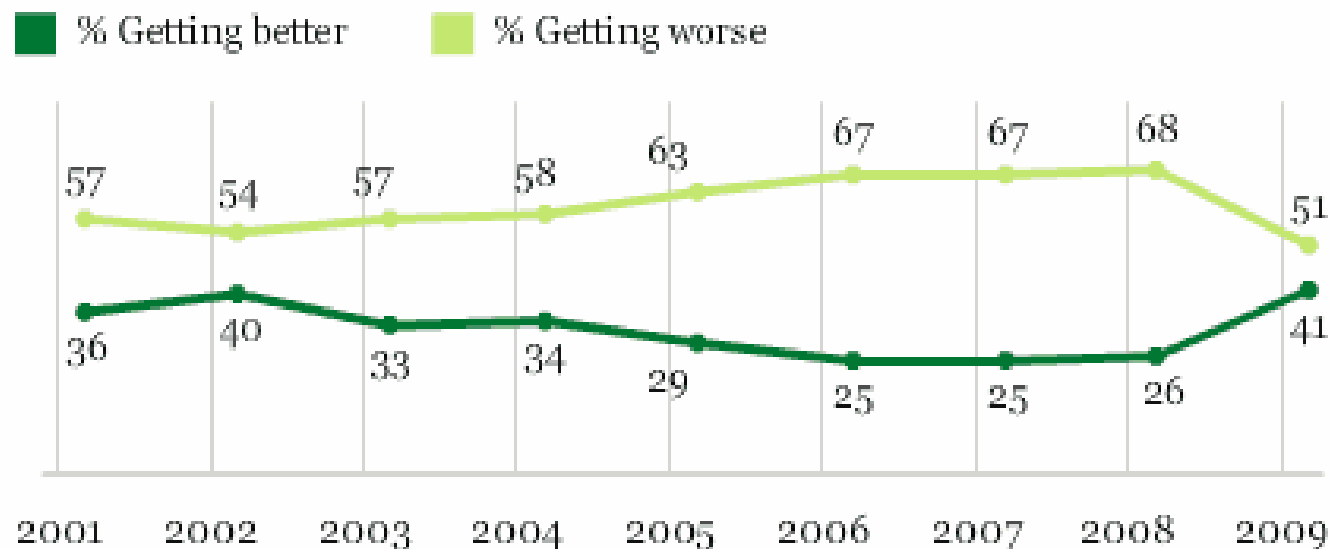
In U.S., Outlook for Environmental Quality Improving

Forty-one percent say it is getting better, up from 26% last year

by Jeffrey M. Jones

PRINCETON, NJ -- With Earth Day approaching, Americans still on balance believe the quality of the environment in the U.S. is getting worse rather than better; however, their outlook is significantly brighter now than a year ago.

Right now, do you think the quality of the environment in the country as a whole is getting better or getting worse?



GALLUP POLL

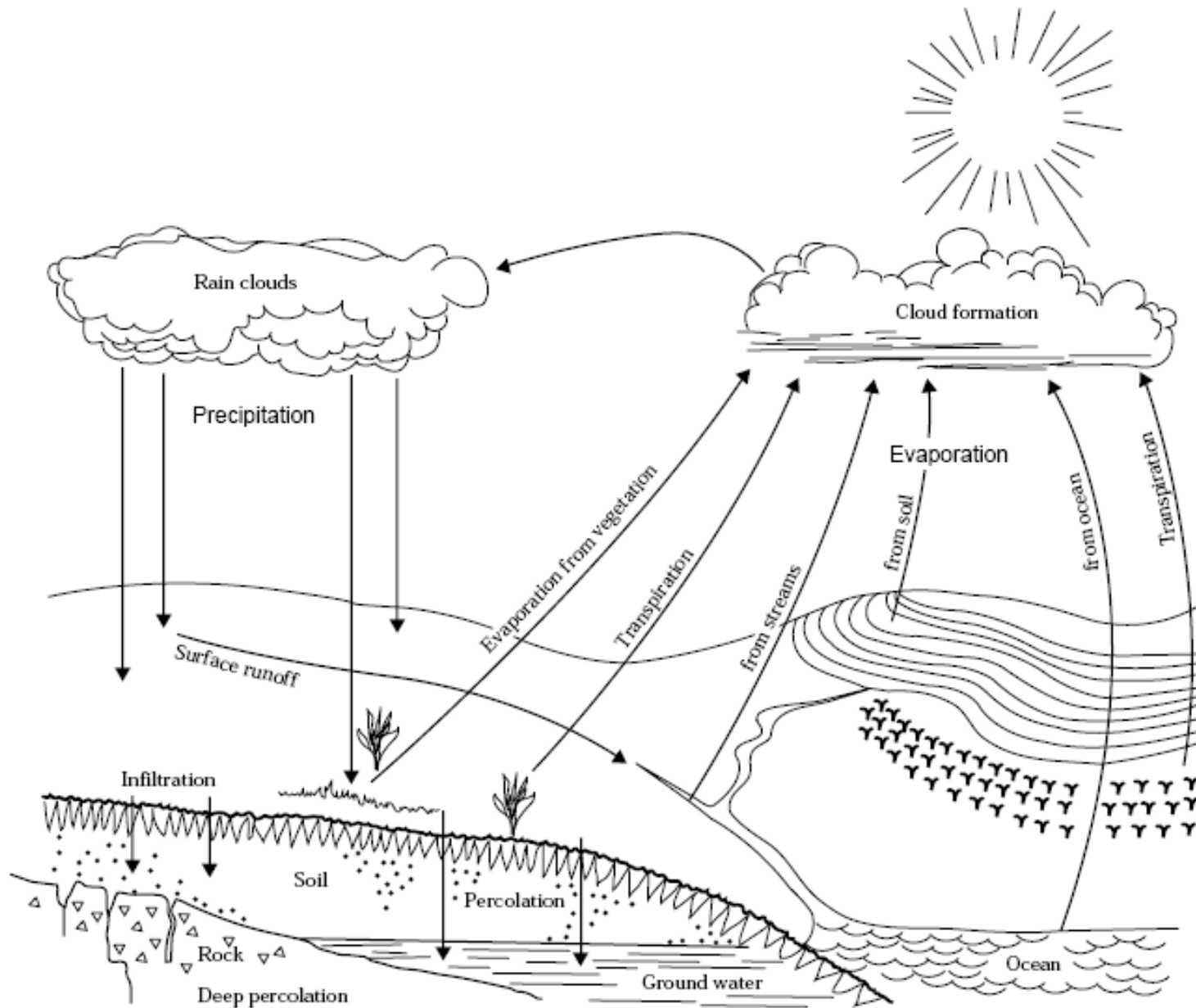
I'm going to read you a list of environmental problems. As I read each one, please tell me if you personally worry about this problem a great deal, a fair amount, only a little, or not at all. First, how much do you personally worry about ... ?

	Great deal	Fair amount	Only a little/Not at all
	%	%	%
Pollution of drinking water	59	25	16
Pollution of rivers, lakes, and reservoirs	52	31	17
Contamination of soil and water by toxic waste	52	28	19
Maintenance of the nation's supply of fresh water for household needs	49	31	19
Air pollution	45	31	24
The loss of tropical rain forests	42	26	32
Extinction of plant and animal species	37	28	34
The "greenhouse effect" or global warming/ Global warming	34	26	40

March 5-8, 2009

GALLUP POLL

The Hydrologic Cycle

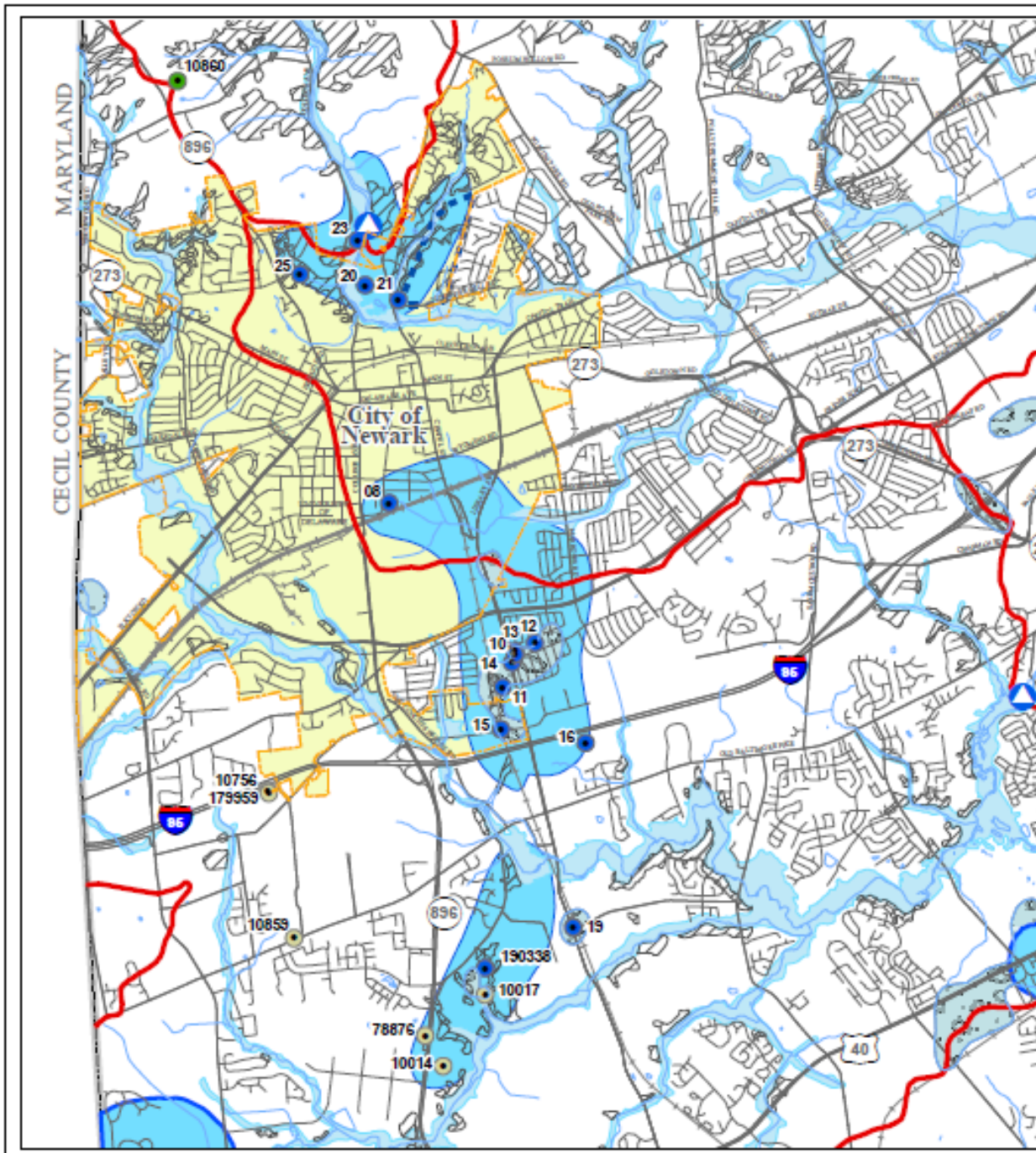


Hydrologic Basis

$$P = R + I + ET - \Delta S$$

Precipitation + Impervious Cover
= Stormwater Runoff





DEFINITIONS

WELLHEAD WATER RESOURCE PROTECTION AREAS
Wellhead Water Resource Protection Areas are surface and sub-surface areas surrounding public water supply wells or wellfields where the quantity or quality of groundwater moving toward such wells or wellfields may be adversely affected by land use activity. Such activity may result in a reduction of recharge or may lead to introduction of contaminants to groundwater used for public supply. These classes of Wellhead Water Resource Protection Areas are shown on the map.

Class A - (Map 1,2 and 3) The areas within a 300 foot radius circle around all public water supply wells which are classified as water systems, as defined by Section 22.146 (Public Water Systems) in the State of Delaware Regulations Governing Public Drinking Water Systems. Class A wells are community, treatment non-community, and non-treatment non-community.

Class B - (Map 2 only) The Otisdale and Eastern State Wellfields. These Wellhead Protection Areas have been delineated through the use of hydrogeologic mapping, analytical methods, and application of U.S. EPA modular well analytical models using a five year time of travel by the Delaware Geological Survey as discussed in a report prepared by the Delaware Geological Survey entitled "Application of the EPA WSPA Models for Delineation of Wellhead Protection Areas in the Otisdale and Eastern State Wellfields, New Castle County, Delaware" dated January 1995.

Class C - (Map 1 and 2 only) Wellhead Protection Areas delineated by the Delaware Geological Survey and the Delaware Department of Natural Resources and Environmental Control through the interpretation of geologic and hydrologic reports and maps, water table maps, and professional judgment. Such areas are considered preliminary designations.

SURFACE WATER RESOURCE PROTECTION AREAS
Surface Water Resource Protection Areas consist of: (1) the areas which drain on the surface or underground to existing public water supply reservoirs; (2) the land surface in the Flood Plain systems of an approved public water supply intake; (Map 1 and 2 only) The Flood Plain is comprised of the 100-year Flood Plain as defined in Article 61 of New Castle County Unified Development Code and the following flood based soils - Codorus S11 Loam, Cross S11 Loam, Harlow S11 Loam, Irburn S11 Loam, Mixed Alluvial Land and Tidal Marsh as mapped by the Soil Survey of New Castle County (1970); and (3) Erosion Prone Slopes susceptible to soil sliding toward a Flood Plain as defined above or a water course upstream of an approved public water supply intake. Erosion Prone Slopes consist of land with soils of United States Department of Agriculture Soil Conservation Service capability classifications IVa, VIa, VIb, and VIIIa as mapped by the Soil Survey of New Castle County (1970).

Surface water courses are susceptible to pollutants released in proximity to and upstream of intakes or storage facilities. Currently, these courses provide approximately 70% of the daily public water supply and most of the emergency water supply for New Castle County. The drainage areas, flood plains, and erosion prone slopes were derived from the following maps and reports: (1) U. S. Geological Survey Topographic Quadrangle maps; (2) WATSR 2000, Volume VI, 1994, Water Resources Agency for New Castle County (1994); (3) Digital Flood Plain Mapping, Federal Emergency Management Agency, 1997; and (4) Soil Survey of New Castle County, U. S. Department of Agriculture, 1970.

RECHARGE WATER RESOURCE PROTECTION AREAS
Recharge Water Resource Protection Areas are designated as having excellent potential for groundwater recharge. (Map 1,2 and 3) They were delineated using methodology described in a report prepared by the Delaware Geological Survey entitled "Delineation of Ground Water Recharge Resource Protection Areas in the Coastal Plain of New Castle County, Delaware (1993)".

Source Watersheds

- Waterheds upstream from Public Surface Water Intakes

Water Resource Protection Areas (WRPAs)

Wellhead WSPA

- Class A WSPA
- Transient, Non-Community Wells (Restaurants, Stores, Hotels, Parks, etc.)
- Non-Transient, Non-Community Wells (Schools, Daycare Centers, Office, Factory, etc.)
- Class C WSPA

Surface Water WSPA

- Surface Water Intakes
- Reservoir Watershed
- Flood Plains
- Erosion Prone Slopes

Recharge WSPA

- Recharge Areas

Locator Map

Water Resource Protection Areas for the City of Newark, Delaware

1987 Revised 1990, May 2001, February 2006, April 2007

Newark Stormwater System

- Upper Christina & White Clay Cr. watersheds
- 60 miles of storm sewers,
- 200 miles of roadway curb and gutter,
- 3000 stormwater inlets or catch basins,
- 34 stormwater detention ponds,
- 500 acres of floodplain along 10 stream miles.

Stormwater Laws and Regulations

- Delaware Stormwater and Sediment Regulations,
- Delaware Source Water Protection Law of 2001,
- Federal Clean Water Act, NPDES MS4 Part 2 Permit and Total Maximum Daily Loads (TMDL),
- FEMA Flood Insurance Program,
- Safe Drinking Water Act Amendments of 1996.

Stormwater Management Goals

- Prevent and reduce flood damage,
- Prevent/solve stormwater drainage problems,
- Improve water quality,
- Decrease pollutant loads,
- Reduce soil erosion and sediment problems.

Top 5 Newark Floods

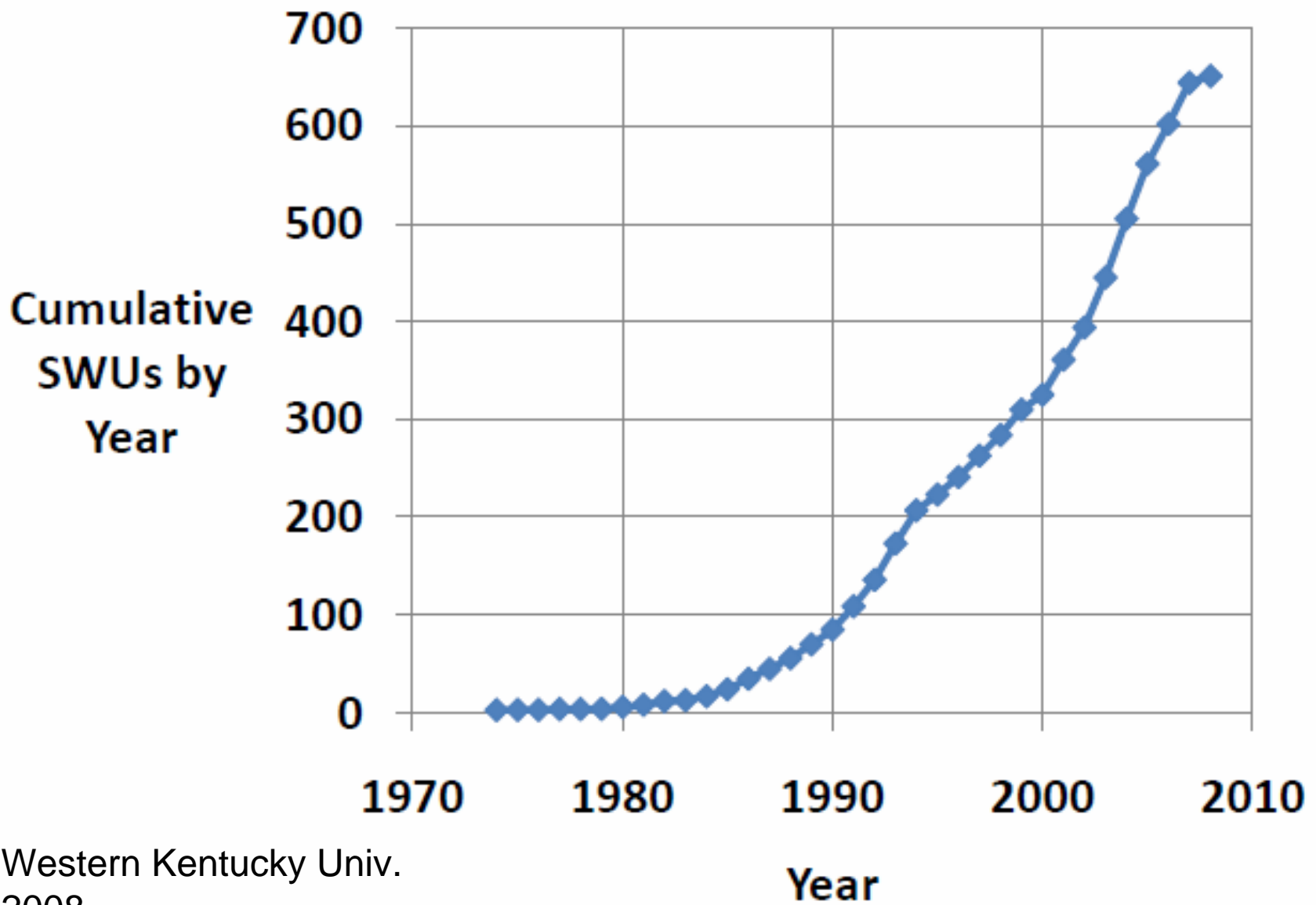
Flow (cfs)	Date	Storm	Frequency
19,500	9/16/99	Hurricane Floyd	100 yr
13,900	9/15/03	Tropical Storm Henri	50 yr
11,600	7/5/89	4 th Of July Storm of '89	10 yr
9,150	1/19/06	Snowmelt Storm of '06	10 yr
9,080	6/22/72	Solstice Storm of '72	10 yr

Stormwater Utility Advantages

- Treats stormwater as utility resource (like drinking water).
- Equitable - stormwater from roof/pavement impervious cover.
- Hydrologic relationship - impervious and stormwater runoff.
- Impervious cover measured on a parcel by basis by GIS.
- Dedicated/sustainable funding - total life cycle cost accounting.
- Accrued to tax paying and tax exempt properties.
- Improves the overall equity of the municipal financing mix
- Billing system in place for water, sewer, property assessment.

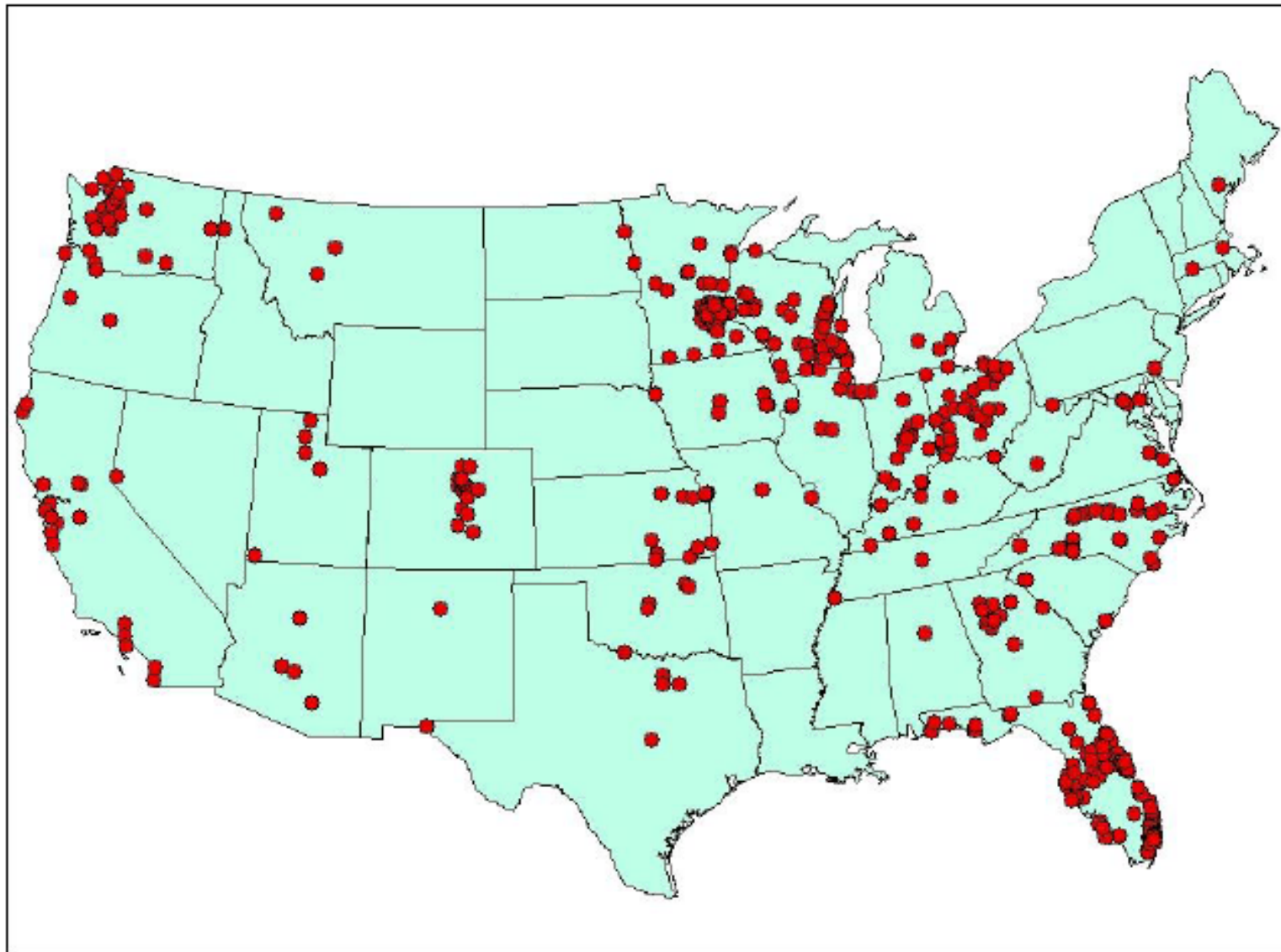
Municipal Stormwater Utilities

- More than 500 stormwater utilities in USA.
- Avg.stormwater fee single family \$3.67/month
- College town monthly residential fees:
\$1.50 (Burlington, VT), \$3.43 (Orono, ME),
\$14.26 (Ft. Collins, CO).
- USEPA: resid. stormwater fees \$2 - \$40/ qtr.
- Wilmington/Phila. monthly fees: \$2.71/\$10.80.



Western Kentucky Univ.
2008

Figure 7. Number of stormwater utilities by year



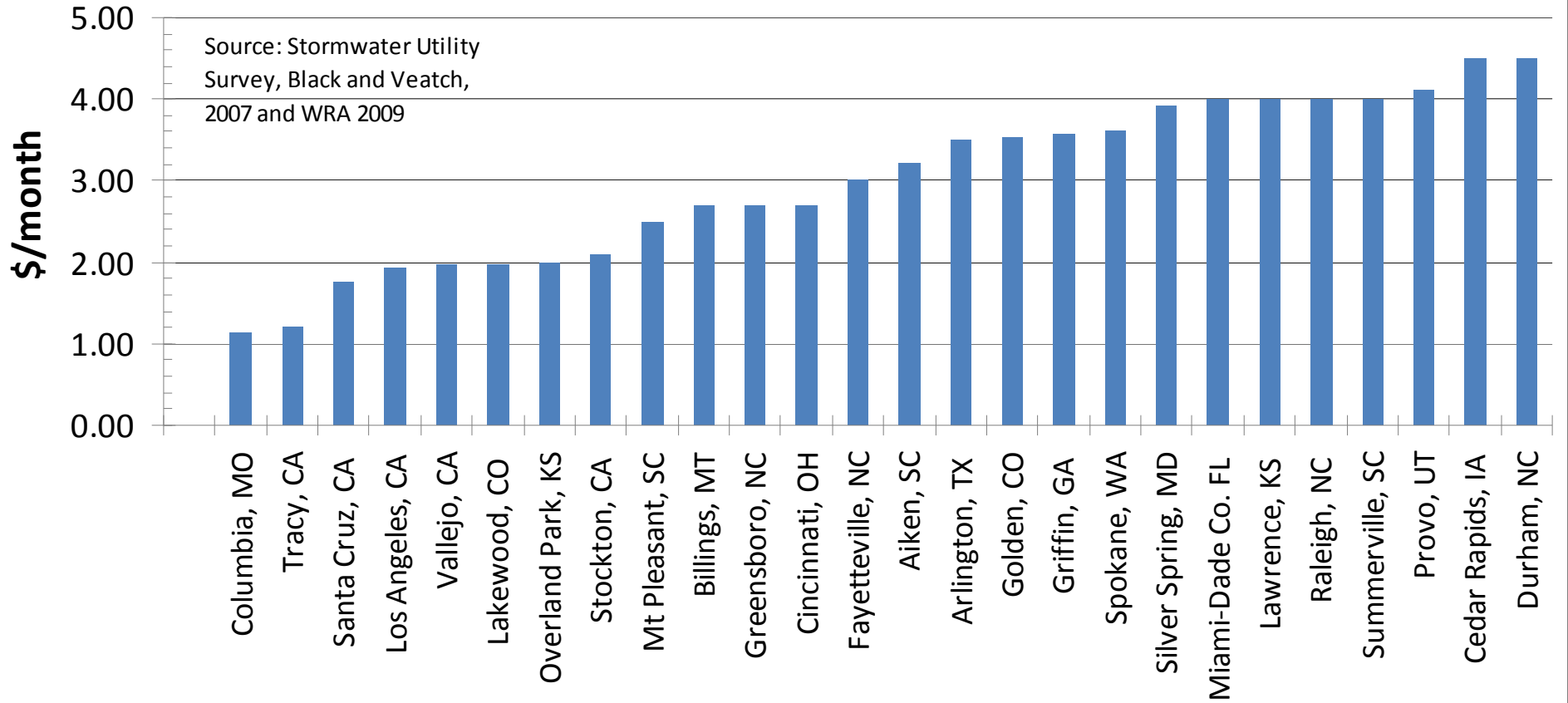
Western Kentucky Univ.
2008

Figure 1. U.S. stormwater utilities (SWUs)

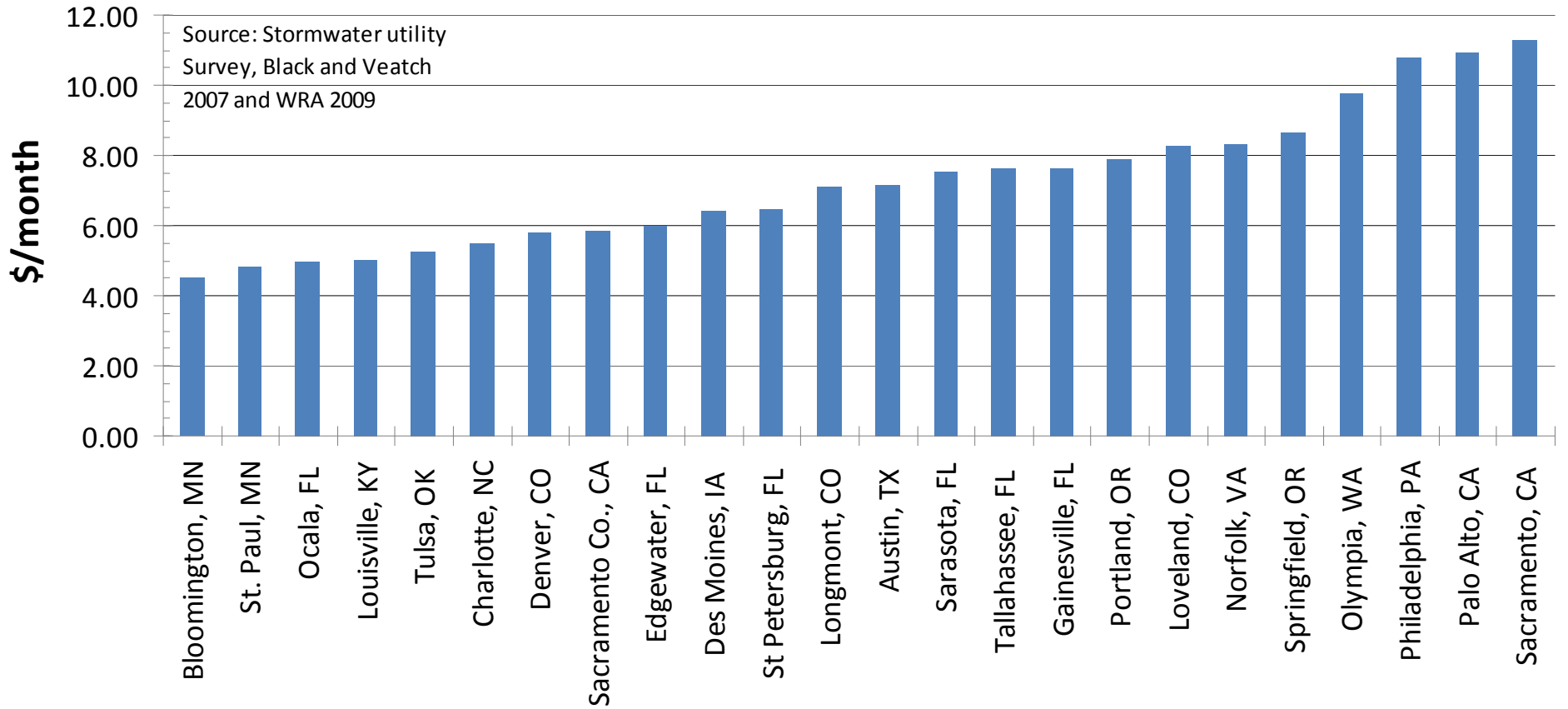
Table 3. Stormwater utilities in college towns

College Town	College	Monthly Residential Stormwater Fee (\$)
Burlington, VT	University of Vermont	1.50
Santa Cruz, CA	University of California, Santa Cruz	1.77
Fayetteville, NC	Fayetteville State University	3.00
Golden, CO	Colorado School of Mines	3.20
Chapel Hill, NC	University of North Carolina	3.25
Orono, ME	University of Maine	3.43
Golden, CO	Colorado School of Mines	3.52
Spokane, WA	Washington State University	3.60
Raleigh, NC	North Carolina State University	4.00
Lawrence, KS	University of Kansas	4.00
Provo, UT	Brigham Young University	4.10
Durham, NC	Duke University	4.50
Wilmington, NC	University of North Carolina, Wilmington	5.00
Louisville, KY	University of Louisville	5.02
Morgantown, WV	West Virginia University	5.30
Austin, TX	University of Texas	7.15
Tallahassee, FL	Florida State University	7.61
Gainesville, FL	University of Florida	7.65
Portland, OR	Portland State University	7.91
Palo Alto, CA	Stanford University	10.95
Ft. Collins, CO	Colorado State University	14.26

Average Monthly Residential Stormwater Fees

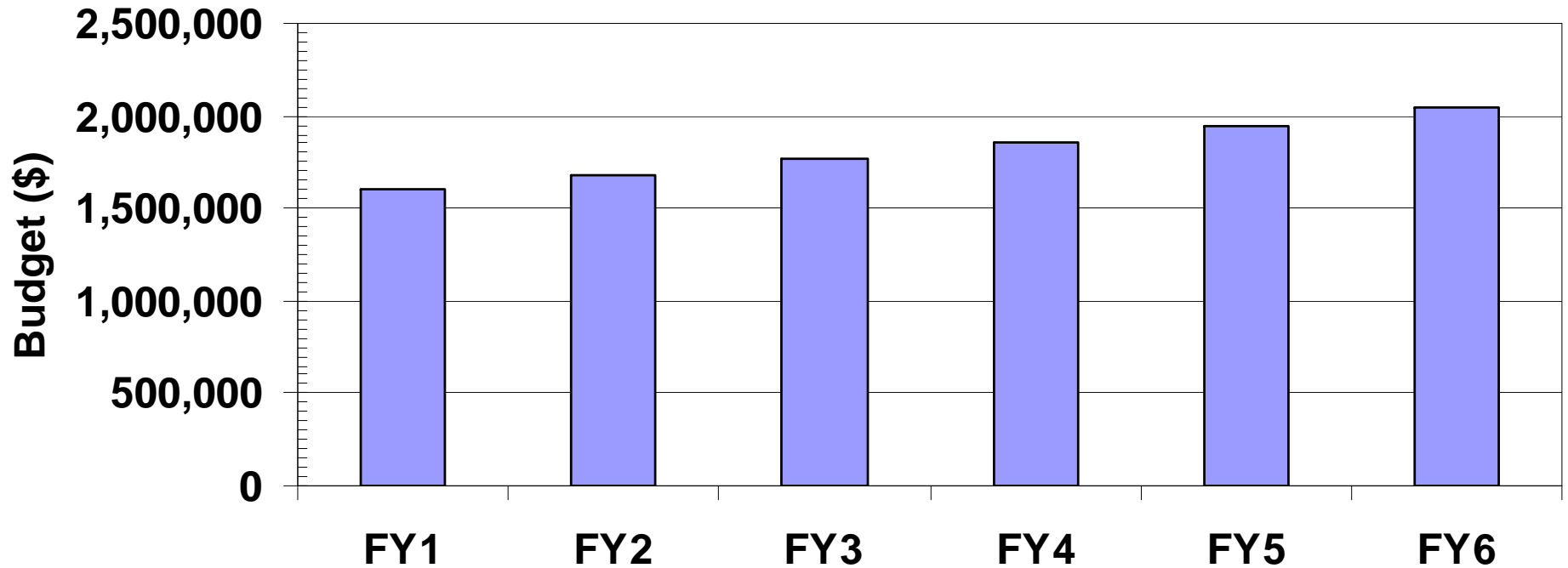


Average Monthly Residential Stormwater Fees



Annual Newark Stormwater Budget = \$1.6 million

Annual Stormwater Budget City of Newark (sample)



<p>Administration General Administration Prog Planning and Development Interagency Coordination</p> <p>Public Involvement & Education Public Awareness & Education Public Involvement Standing Citizen's Group</p> <p>Billing and Finance Billing Operations Database Management Customer Service Financial Management Capital Outlay Overhead Costs Cost Control Support Services</p> <p>Stormwater Quality Mgmt Quality Master Planning Retrofitting Program Monitoring Program Struc and Non-Struc BMP Progs Pest, Herb and Fertilizer Used Oil & Toxic Materials Street Maint Prog Spill Response and Clean Up Prog for Pub Ed and Reporting Leakage and Cross Connections Industrial Program Gen Com and Residential Program Illicit Con and Illegal Dumping Landfills and Other Waste Facilities Combined Sewer Overflow Program Groundwater & Wellhead Protection Drinking Water Protection Watershed Assessment & TMDL Septic and I&I Program</p>	<p>Engineering & Planning Des Criteria, Stds and Guidance Field Data Collection Master Planning Design, Field and Ops Engineering Hazard Mitigation Zoning support Multi-objective Planning Support GIS and Database Management Mapping Land Use Planning & Controls</p> <p>Operations General Maintenance Management General Routine Maintenance General Remedial Maintenance Emergency Response Maintenance Infrastructure Management Public Assistance</p> <p>Regulation and Enforcement Code Dev and Enforcement General Permit Administration Drainage Sys Insp & Reg Zoning and Land Use Reg Special Inspection Programs Flood Insurance Program Multi-Obj Floodplain Management Erosion Control Program</p> <p>Capital Improvements Major Capital Improvements Minor Capital Improvements Land, Easement, and Right-of-Way</p>
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¹ Table 1-1 provided by Hector Cyre, Water Resource Associates, Inc., Friday Harbor, Washington, 2005

Stormwater User Fees

- 80% of stormwater utilities use equivalent residential unit (ERU) to calculate user fees.
- Total parcel area
- Impervious cover (roof/pavement) area and %
- Zoning district

Table 2. City of Newark zoning districts

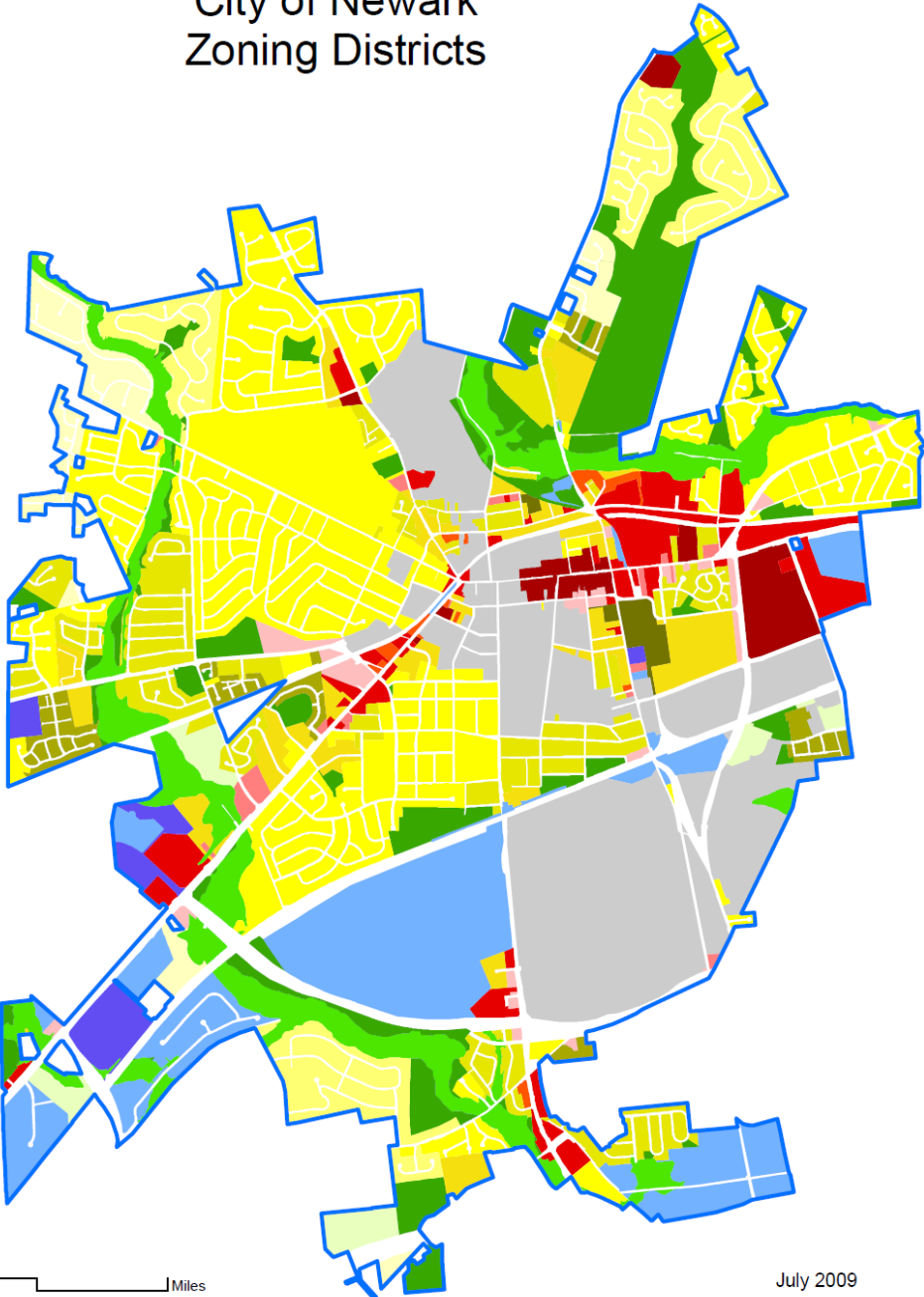
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District	Designation	Minimum Lot Area
RH	Residential, One-family, detached	21,780 sf (1/2 ac)
RT	Residential, One-family, detached	15,000 sf (1/3 ac)
RS	Residential, One-family, detached	9,000 sf (1/4 ac)
RD	Residential, detached, semidetached	6,250 sf (1/8 ac)
RM	Residential, Garden Apartments	One acre, 2725 sf per family
RA	Residential, High rise apartments	2 acres, 1,200 sf per family
RR	Residential, Row house, townhouse	One acre, 2,725 sf per DU
AC	Residential, Adult community	One acre, 4,840 sf per DU
UN	University, college and university	
BL	Business, limited	3,000 sf
BLR	Business, limited business residential	3,000 sf
BN	Business, Neighborhood shopping	5,000 sf
BB	Central Business District	3,000 sf
BC	General Business	5,000 sf
ML	Limited Manufacturing	One acre
MI	General Industrial	5,000 sf
MOR	Manufacturing Office Research	Two acres
OFD	Open floodway district	No building permitted
PL	Public parkland	No building permitted

City of Newark Zoning Districts

Zoning Category

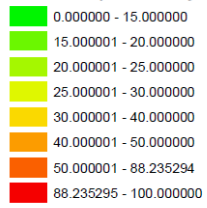
- RH
- RT
- RS
- RD
- RM
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- RA
- AC
- UN
- BL
- BLR
- BN
- BB
- BC
- ML
- MI
- MOR
- PL
- OFD



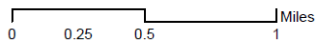
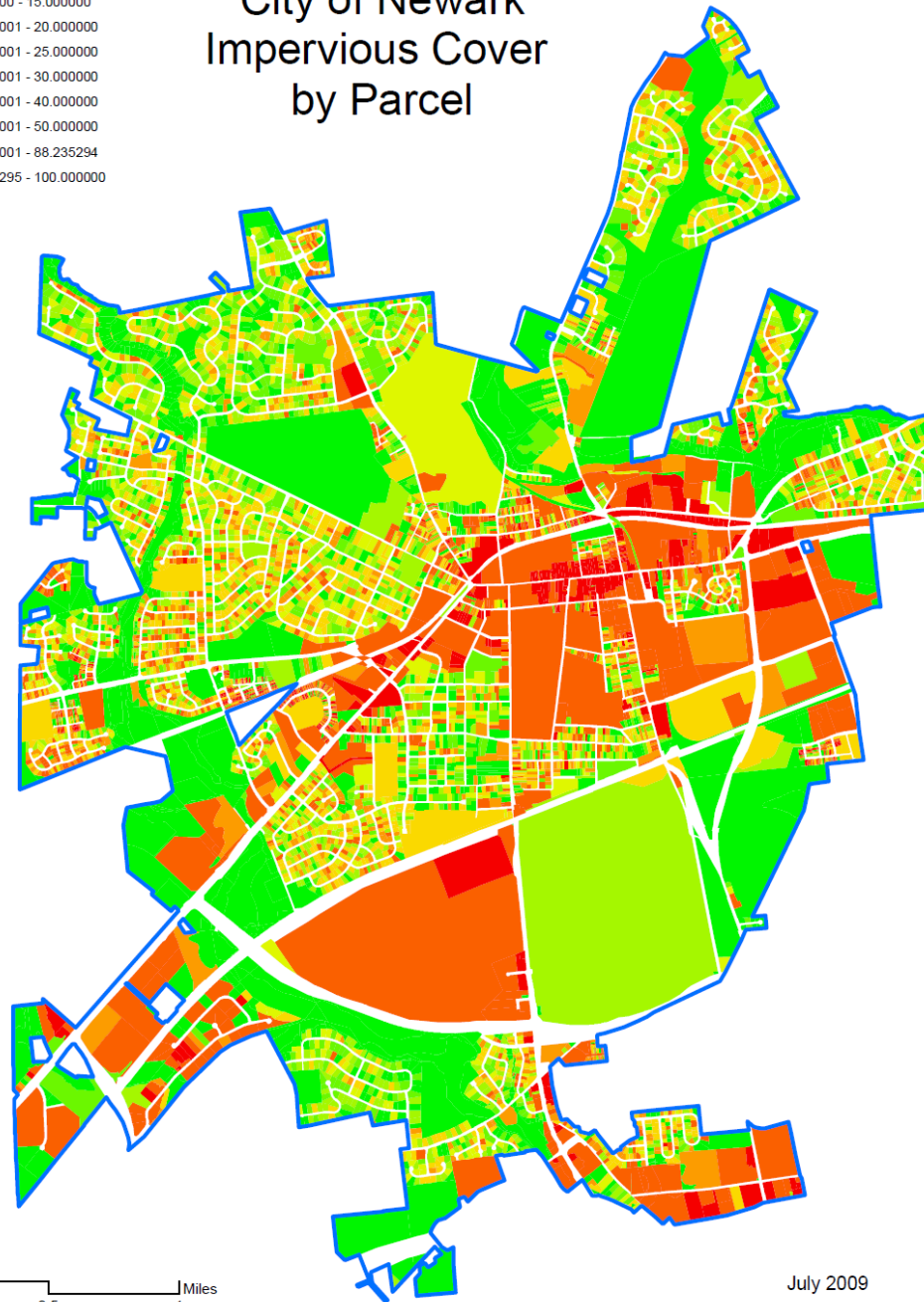
0 0.25 0.5 1 Miles

July 2009

Percent Impervious by Parcel



City of Newark Impervious Cover by Parcel



July 2009

Table 6.												
Zone	Zoning District	Area (sf)	Imp. (%)	Imperv (sf)	No. of Parcels	Imperv sf/parcel	(1) Imp. (\$/sf)	(1) Revenue (\$)	(1) Fee/parcel/yr	(2) Imp. (\$/sf)	(2) Revenue (\$)	(2) Fee/parcel/yr
	Other	671,858	24%	159,182	25		0.010	\$1,592	\$64	0.020	\$3,184	\$127
AC	Residential, Adult 4,840 sf per DU	3,282,504	17%	552,650	6		0.010	\$461	\$77	0.020	\$921	\$154
RH	Residential, One-family, detached, 21,780 sf	5,793,244	22%	1,257,716	204	6,165	0.010	\$8,242	\$40	0.020	\$16,484	\$81
RT	Residential, One-family, detached 15,000 sf	13,174,995	24%	3,177,391	671	4,735	0.010	\$27,110	\$40	0.020	\$54,220	\$81
RS	Residential, One-family, detached 9,000 sf	48,780,230	24%	11,711,952	2877	4,071	0.010	\$116,237	\$40	0.020	\$232,473	\$81
RD	Residential, detached, semidetached 6,250 sf	15,460,702	32%	4,987,254	1479	3,372	0.010	\$59,755	\$40	0.020	\$119,509	\$81
RM	Residential, Apartments 1 ac, 2,725 sf	9,484,058	51%	4,819,943	377		0.010	\$48,199	\$128	0.020	\$96,399	\$256
RR	Residential, townhouse 1 ac, 2,725 sf/DU	3,503,806	45%	1,586,182	695		0.010	\$15,862	\$23	0.020	\$31,724	\$46
RA	Residential, High rise 2 ac, 1,200 sf	1,148,070	67%	774,355	3		0.010	\$7,744	\$2,581	0.020	\$15,487	\$5,162
UN	University and college	38,316,646	31%	11,875,630	124		0.010	\$118,756	\$958	0.020	\$237,513	\$1,915
BL	Business limited 3,000 sf	2,158,132	52%	1,127,286	63		0.010	\$11,273	\$179	0.020	\$22,546	\$358
BLR	Business, business residential 3,000 sf	1,064,992	53%	569,497	42		0.010	\$5,695	\$136	0.020	\$11,390	\$271
BN	Business, shopping Neighborhood	751,130	65%	487,858	26		0.010	\$4,879	\$188	0.020	\$9,757	\$375
BB	Central Business District 3,000 sf	4,533,007	83%	3,781,270	115		0.010	\$37,813	\$329	0.020	\$75,625	\$658
BC	General Business 5,000 sf	8,892,740	79%	6,987,076	168		0.010	\$69,871	\$416	0.020	\$139,742	\$832
MI	General Industrial 5,000 sf	24,050,210	69%	16,707,785	113		0.010	\$167,078	\$1,479	0.020	\$334,156	\$2,957
MOR	Manufacturing Office Research	3,393,576	46%	1,560,980	11		0.010	\$15,610	\$1,419	0.020	\$31,220	\$2,838
PL	Public Parkland	21,181,474	7%	1,576,646	75		0.000	\$0	\$0	0.000	\$0	
OFD	Open Floodway District	18,136,975	11%	1,910,739	394		0.000	\$0	\$0	0.000	\$0	
	Roads/Streets/Railroads	Exempt										
		223,778,349	34%	75,611,392	7,468	4,040		\$716,174			\$1,432,348	



Apart. 126,000 SF
60% Imp. 75,720 SF

SF Resid. 15,000 SF
27% Imp. 4,000 SF

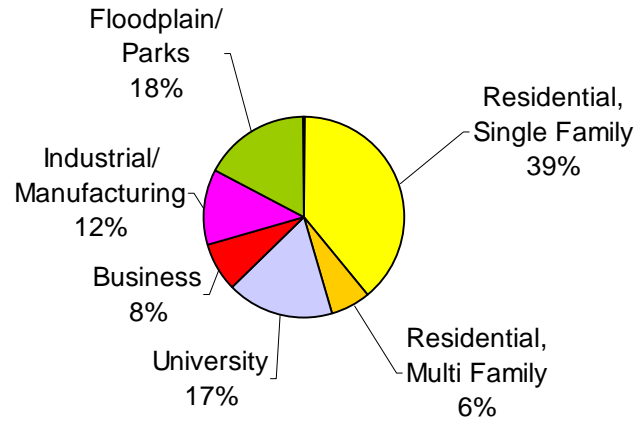
Business 180,000 SF
90% Imp. 162,000 SF

Business 89,200 SF
60% Imp. 54,700 SF

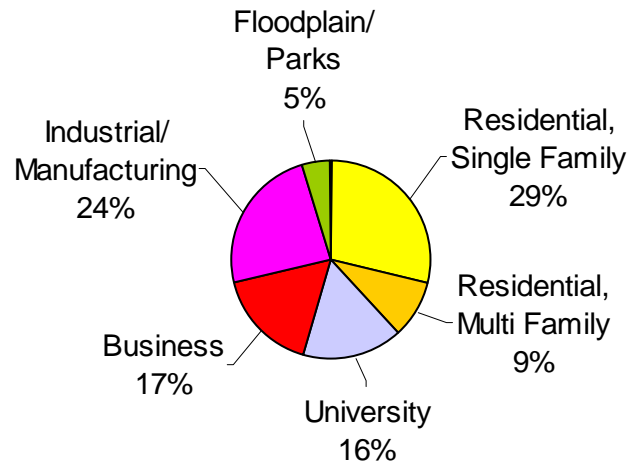
Newark Impervious Area

- City = 8 sq mi (minus roads/railroads)
- Parcels = 7,500
- Total impervious = 34%
- Mean impervious SF residential = 4,000 sf
- One ERU = 4,000 sf

City of Newark Zoning Districts by Parcel Area



City of Newark Zoning Districts by Impervious Cover Area



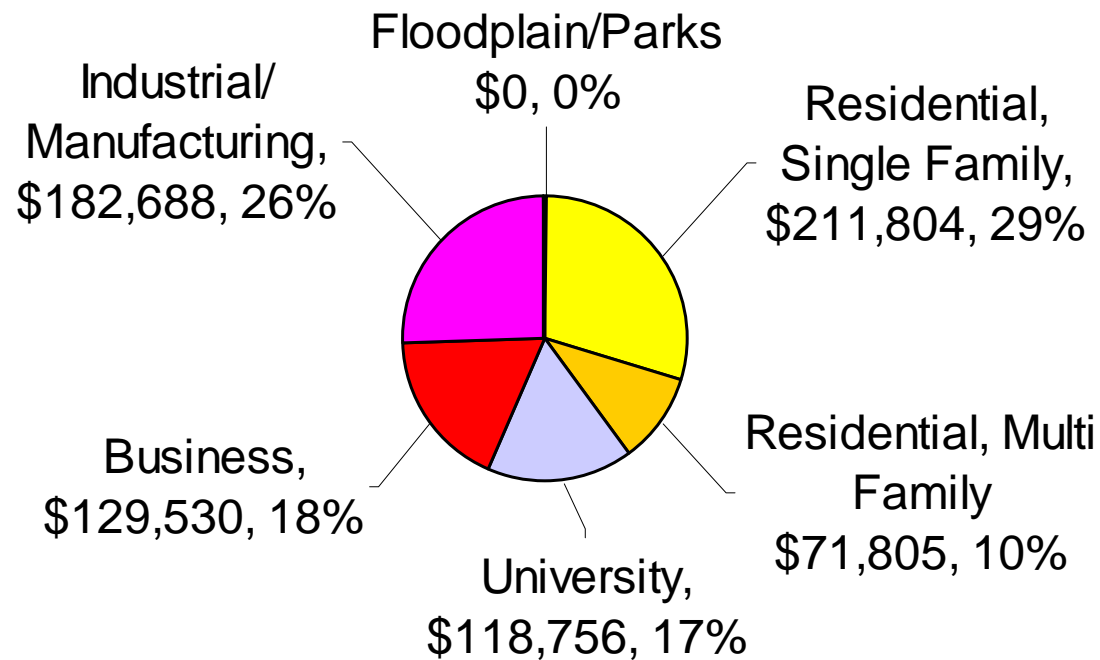
Stormwater Utility Revenues

- **Option 1 (\$0.01 per sf impervious)**
 - \$716,174 per year
 - \$3.33 per month (SF residential)
- **Option 2 (\$0.02 per sf impervious)**
 - \$1,432,348 per year
 - \$6.75 per month (SF residential)

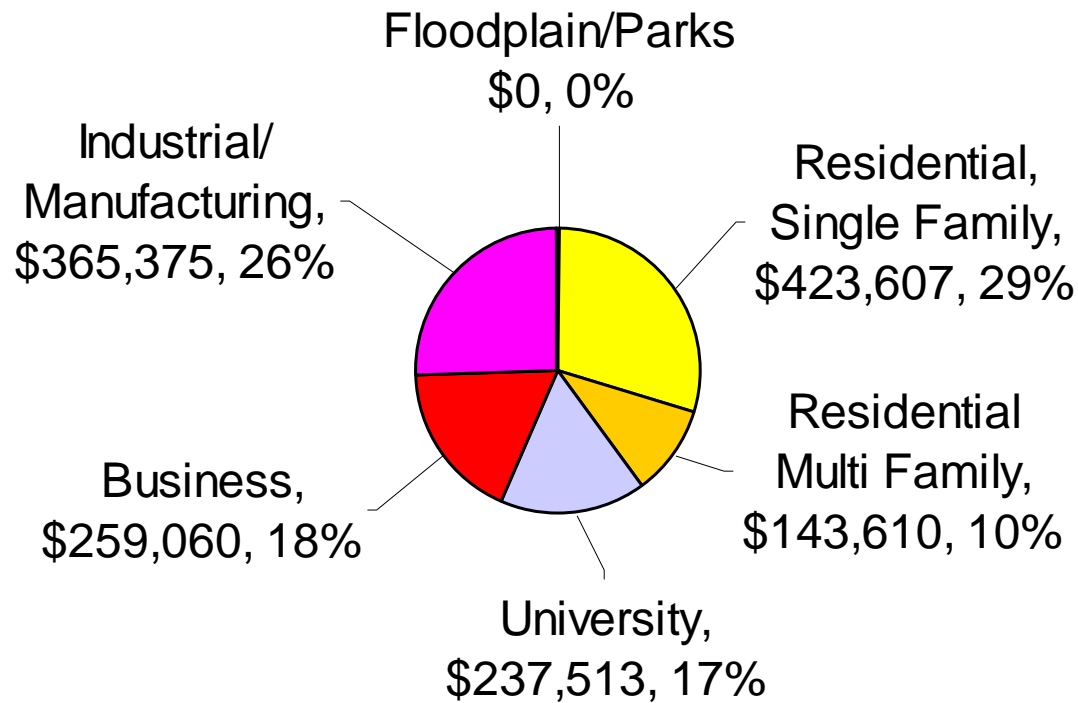
Stormwater Utility Revenues

- **Option 1A (\$0.01 per sf impervious)**
 - \$716,174 per year
 - \$5.08 per mo. (RH residential, 21,780 sf)
 - \$3.92 per mo. (RT residential, 15,000 sf)
 - \$3.42 per mo. (RS residential, 9,000 sf)
 - \$2.83 per mo. (RD residential, 6,250 sf)
- **Option 2A (\$0.02 per sf impervious)**
 - \$1,432,348 per year
 - 2 x \$0.01 (Tiered SF residential)

Estimated Annual Revenue (\$716,174 at \$0.01 per sf) City of Newark Stormwater Utility



Estimated Annual Revenue (\$1,432,348 at \$0.02 per sf) City of Newark Stormwater Utility



Mean Impervious per Parcel

<u>Zoning</u>	<u>Imp. Area</u>	<u>Imp. %</u>
SF Residential	4,000 sf	24%
Residential Apt.	13,000 sf	51%
Central Business	32,880 sf	83%
Industrial	147,856 sf	69%
Manufact./Office	141,907 sf	46%

Stormwater Fee Examples

Parcel	Area (sf)	Imperv (sf)	Imperv (%)	Fee (\$0.01)	Fee (\$0.02)
Rite Aid	89,200	54,700	60%	\$547	\$1,094
Newark SC	711,900	603,060	85%	\$6,031	\$12,061
Panera	17,100	17,100	100%	\$171	\$342
First Church	53,850	23,820	44%	\$238	\$476
Downes Sch.	519,610	170,300	33%	\$1,703	\$3,406

Public Education Program

- Inform property owners re: stormwater utility benefits.
 - Reduce flood/stormwater problems.
 - Improve water quality.
- Meet with commercial properties that generate high stormwater runoff and tax exempt properties.
- Establish a stormwater utility website.
- Create a stormwater utility brochure.

Legal Authority

- Municipalities in Delaware are authorized to form stormwater utilities under Chapter 40, Title 7 of the Delaware Code.
- *“(c) Authority is also granted to the Department, conservation districts, counties or municipalities to establish a stormwater utility as an alternative to total funding under the fee system.”*

Stormwater Fee Options

Designation	Option 1 (\$0.01/sf) Stormwater Fee	Option 2 (\$0.02/sf) Stormwater Fee
Residential, One-family, detached, semidetached	\$3.33 monthly	\$6.75 monthly
Multifamily Residential, University, Business, Manufacturing, Industrial, Office	\$10.00/1000 sf monthly	\$20.00/1000 sf monthly
Open floodway district (undeveloped)	No building permitted	No building permitted
Parkland, Roads/streets, Railroads. City – owned land. City – leased parking facilities	Exempt	Exempt
Projected Annual Revenue	\$716,174	\$1,432,348

Recommendations

- Consider water/sewer/electric or property assessment billing systems to assess the stormwater fee with latter being the preferred mechanism.
- Consider adopting stormwater utility ordinance to recover annual costs of stormwater services (\$1.6 M) provided to parcel owners with effective date January 1, 2010.

Stormwater Utility Ordinance

CHAPTER 26 STREETS¹

Art. I. In General, §§ 26-1--26-10.1

Art. II. Street Construction, §§ 26-11--26-17

Art. III. Sidewalks, §§ 26-18--26-32

Art. IV. Street Vacation, §§ 26-33--26-36

Art. V. Easements, §§ 26-37--26-39

Art. VI. Drainage Swales and Ditches, § 26-40

Insert:

Art. VII. Stormwater Utility

Stormwater Utility Ordinance

ARTICLE VII STORMWATER UTILITY

Sec. 26-41. Definitions

Sec. 26-42. Authority.

Sec. 26-43. Stormwater utility.

Sec. 26-44. Service charges, rates and fee schedule.

Sec. 26-45. Exemptions.

Sec. 26-46. Billing method, responsible parties.

Sec. 26-47. Backbilling.

Sec. 26-48. Complaints regarding a bill.

Sec. 26-49. Appeal.