

# **Municipal Storm Water Build-out Analysis and Non-point Source Loads at Build-out Analysis**

## **Introduction**

As part of the Municipal Storm Water Management Plan, a storm water build-out analysis and a non-point source loads at build-out analysis is required. In March 2004, the Sussex County Office of GIS Management (SCOGISM) announced it will provide all GIS maps and build-out analysis required to the municipalities within Sussex County upon request. The GIS maps were made available to the municipalities in June, 2004 and in February, 2006 the SCOGIS is providing the build-out analysis.

This document discusses the methods and data used for the analysis. At the time of the analysis, the 2002 land use / land cover GIS data is not available. Therefore, the SCOGISM is using the most current available 1995-97 land-use / land cover GIS data. The following is a list of GIS data used in the analysis:

<b>GIS Data</b>	<b>Source</b>	<b>Year</b>
Municipal Boundaries	Sussex County	2003
HUC 14 Boundaries	NJDEP	1999/2000
Municipal Zoning	Sussex County	2003
1995/97 Land Use/Land Cover	NJDEP	1995/1997
County Developable	Sussex County	2003

## **Municipal Zone by HUC 14 Watershed Boundary**

The municipal build-out analysis is conducted at a level based upon municipal zone, within a HUC 14 watershed boundary, within a municipality. In order to conduct the analysis, the municipal zoning boundary has been redefined to the HUC 14 watershed boundary within each municipality if the municipal zone crosses the HUC 14 watershed boundary. Additionally, if the HUC 14 boundary crosses a municipal boundary, the HUC 14 has also been redefined to the municipal boundary. The size of the municipal zone and the HUC 14 watershed boundary is recalculated, in acres, to determine the total acres. For the purpose of this document this data layer is called, **Municipal Zone by HUC 14**.

## **Build-out Analysis Method**

Using the Municipal Zone by HUC 14 and the 1995/97 Land Use/Land Cover layers, a Land Use by Zone layer is created. This process identifies the actual land-use(s) within each municipal zone and is used in the derivation and calculation of the Existing Impervious (%) and the Existing Impervious (acres). Using the % impervious values from the 1995/97 Land Use / Land Cover layer the % impervious by zone is calculated. The following 4 steps below, illustrate the process.

- (1) The size of the Land Use by Zone is recalculated, in acres, to determine the total area for each land use within a zone. Impervious (%) is also added to the analysis.

Municipality: Frankford Township  
HUC14: 02040105040070  
Zone: Agricultural/ Residential (AR)

Land Use	% Impervious	Total Area (acres)
Residential/ Rural/ Single Unit	10%	3.45
Residential/ Rural/ Single Unit	20%	2.38
Other Agriculture	5%	2.83
Other Agriculture	10%	5.58

- (2) The Existing Impervious (acres) were derived by multiplying the Total Area (acres) and the Impervious (%).

Municipality: Frankford Township  
HUC14: 02040105040070  
Zone: Agricultural/ Residential (AR)

Existing Impervious (acres) = Impervious % \* Total Area (acres)

Land Use	% Impervious	Total Area (acres)	Existing Impervious (acres)
Residential/ Rural/ Single Unit	10%	3.45	<b>.345</b>
Residential/ Rural/ Single Unit	20%	2.38	<b>.476</b>
Other Agriculture	5%	2.83	<b>.142</b>
Other Agriculture	10%	5.58	<b>.558</b>

- (3) The Existing Impervious (acres) and the Total Area (acres) are then totaled for each zone.

Municipality: Frankford Township  
HUC14: 02040105040070  
Zone: Agricultural/ Residential (AR)

Land Use	Total Area (acres)	Existing Impervious (acres)
Residential/ Rural/ Single Unit	3.45	0.345
Residential/ Rural/ Single Unit	2.38	0.476
Other Agriculture	2.83	0.142
Other Agriculture	5.58	0.558
<b>Sum</b>	<b>14.24</b>	<b>1.521</b>

- (4) The Existing Impervious (%) was then calculated by dividing the sum of the Existing Impervious (acres) by the sum of the Total Area (acres) and multiplying by 100 to obtain a percentage.

Municipality: Frankford Township  
HUC14: 02040105040070  
Zone: Agricultural/ Residential (AR)

Existing Impervious % = Existing Impervious (acres)/ Total Area (acres)\*100

	Total Area (acres)	Existing Impervious (acres)	Existing Impervious (%)
Total	14.24	1.521	<b>10.7%</b>

### Wetlands/ Water Layer

The wetland and water areas were identified within the Municipal Zone by HUC 14 layer by selecting the wetland and water land cover from the 1995/97 Land Use/Land Cover layer (NJDEP). The wetland and water area in acres was derived by re-calculating total area in acres.

### Developable Area Layer

All developable areas within the Municipal Zone by HUC 14 layer were identified by selecting the total area of developable from the Developable Lands Layer. The area of developable land was then derived by re-calculating total area in acres.

The Developable Lands were defined by the Sussex County Strategic Growth Advisory Committee (SGAC) as lands under private ownership that are not constrained from being developed. Constrained lands as agreed by the SGAC are defined as the following:

- Federal, state, and non-profit properties (public land)
- Fresh water wetlands including within 150 feet of a fresh water wetland
- Within 150 feet of a stream
- Within 300 feet of C-1 category streams
- Steep slope areas that are greater than 35% slope as determined by the Natural Resource Conservation Service (NRCS) soils data layer.

### **Build-Out Impervious (acres) & Allowable Impervious (%)**

The Total Build-Out of Impervious (acres) is based upon the Developable Area (acres) multiplied by the appropriate Allowable Impervious (%) as found in the table listed below, provided by Sussex County Division of Planning.

<b>Zoning</b>	<b>Allowable Impervious (%)</b>
Mobile Home	50%
Single-family Residential (0-10,000 square feet)	30%
Single-family Residential (10,001-20,000 square feet)	25%
Single-family Residential (20,001-40,000 square feet)	20%
Single-family Residential (40,001-65,340 square feet)	10%
Single-family Residential (1.51 acres to 2.0 acres)	10%
Single-family Residential (2.1 acres to 4.0 acres)	5%
Single-family Residential (4.1 acres to 6.0 acres)	5%
Single-family Residential (greater than 6.1 acres)	1%
Multi-family	40%
Commercial/Business	40%
Industrial	30%
Parks/Conservation	1%
Recreation/Tourism	1%
Congregate Care	40%
Hospital	60%
Public	50%
Planned Residential	40%

### Pollutant Loads by Land Cover

The Pollutant Loads by Land Cover table (below) was re-created from the 2005 NJDEP BMP Manual- Pollutant Loads by Land Cover table. The table defines total Phosphorus, Total Nitrogen, and Total Suspended Solids (lb/acre/yr) based upon eight land cover categories. This table was then used in calculations for the Nonpoint Source Loads at Build-Out table.

Land Cover	Total Phosphorus Load (lbs/acre/year)	Total Nitrogen Load (lbs/acre/year)	Total Suspended Solids Load (lbs/acre/year)
High, Medium Density Residential	1.4	15	140
Low Density, Rural Residential	0.6	5	100
Commercial	2.1	22	200
Industrial	1.5	16	200
Urban, Mixed Urban, Other Urban	1	10	120
Agricultural	1.3	10	300
Forest, Water, Wetlands	0.1	3	40
Barren Land / Transition Areas	0.5	5	60

### Non Point Source Loads at Build Out

Using the Municipal Zone by HUC 14, County Developable and 1995/97 Land Use/Land Cover layers, Developable Area (Acres) within a Municipal Zone within a HUC 14 watershed boundary by Land Use is created.

The Total Phosphorus (lb/yr), Total Nitrogen (lb/yr) and Total Suspended Solids (lb/yr) are calculated by multiplying the Developable Area (acres) by the appropriate values found in the Pollutant Loads by Land Cover table.

### Availability of Analysis

This analysis, the data, and the model used to develop this analysis is available, upon request, by contacting the Sussex County Office of GIS Management, One Spring Street, Newton, NJ 07827, 973-579-0430.