

Appendix C– Highlands Module 2 Build - Out Model Impact Factors

Highlands Zone Type	Comparison Zone/Unit Type	Source	Region	Density Dwelling unit (du)/acre *	Efficiency Factor % (1)	Average Household Size (2)	Average School Children in Household (2)	Percent Impervious (3)	Consumptive/Depletive Water Use includes Indoor demand (gpd per person) plus outdoor demand as (gpd per unit) multiplied by Consumptive/Depletive Use Coefficient (4)	Public Water System Demand (5)	Public Wastewater System Generation (6)
<b>SF Estate Residential or (PA-5)</b>				0.05 to 0.20 (0.17 maximum)	95			0.075* acres	(75 gpd/person + 50 gpd/unit) * Consumptive/Depletive Coefficient	100 gallons per person per day	75 gallons per person per day
	Single-family Detached 4-5 BR	Statewide NJ Demographic Multipliers (2)	Northern <sup>1</sup>			3.809	1.072				
Single-family Detached 4-5 BR	Central <sup>2</sup>					3.780	1.094				
<b>SF Rural Residential, Resource Residential, or (PA-4B)</b>				0.21 to 0.5 du/acre (0.17 maximum)	95			0.075* acres	(75 gpd/person + 50 gpd/unit) * Consumptive/Depletive Coefficient	100 gallons per person per day	75 gallons per person per day
	Single-family Detached 4-5 BR	Statewide NJ Demographic Multipliers (2)	Northern <sup>1</sup>			3.809	1.072				
Single-family Detached 4-5 BR	Central <sup>2</sup>					3.780	1.094				
<b>SF Low Density or (PA-4)</b>				0.51 to 1.0 du/acre (1.16 maximum)	80			0.075* acres	(75 gpd/person + 50 gpd/unit) * Consumptive/Depletive Coefficient	100 gallons per person per day	75 gallons per person per day
	Single-family Detached 4-5 BR	Statewide NJ Demographic Multipliers (2)	Northern <sup>1</sup>			3.809	1.072				
Single-family Detached 4-5 BR	Central <sup>2</sup>					3.780	1.094				
<b>SF Medium Density, Suburban Residential, or (PA-3)</b>				1.01 to 3.0 du/acre (3.81 minimum)	75			26.7	(75 gpd/person + 30 gpd/unit) * Consumptive/Depletive Coefficient	100 gallons per person per day	75 gallons per person per day
	Single-Family Detached, 2-3 BR	Statewide NJ Demographic Multipliers (2)	Northern <sup>1</sup>			3.137	0.607				
Single-Family Detached, 2-3 BR	Central <sup>2</sup>					2.578	0.367				
<b>SF High Density or (PA-2)</b>				3.01 to 8.0 du/acre (7.04 minimum)	75			33.7	(75 gpd/person + 5 gpd/unit) * Consumptive/Depletive Coefficient	75 gallons per person per day	75 gallons per person per day
	Single-Family Attached, 2-3 BR	Statewide NJ Demographic Multipliers (2)	Northern <sup>1</sup>			2.477	0.296				
Single-Family Attached, 2-3 BR	Central <sup>2</sup>					2.296	0.292				
<b>Attached/Townhouse or (PA-1)</b>				8.01 to 16.0 du/acre (9.78 minimum)	75			45.7	(75 gpd/person + 5 gpd/unit) * Consumptive/Depletive Coefficient	75 gallons per person per day	75 gallons per person per day

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Highlands Zone Type	Comparison Zone/Unit Type	Source	Region	Density Dwelling unit (du)/acre *	Efficiency Factor % (1)	Average Household Size (2)	Average School Children in Household (2)	Percent Impervious (3)	Consumptive/Depletive Water Use includes Indoor demand (gpd per person) plus outdoor demand as (gpd per unit) multiplied by Consumptive/Depletive Use Coefficient (4)	Public Water System Demand (5)	Public Wastewater System Generation (6)
	Single-Family Attached, 2-3 BR	Statewide NJ Demographic Multipliers (2)	Northern <sup>1</sup>			2.477	0.296				
	Single-Family Attached, 2-3 BR		Central <sup>2</sup>				2.296	0.292			
<b>Garden Apartment or (PA-1)</b>				16.01+ du/acre (9.78 minimum)	70			57.1	(75 gpd/person + 5 gpd/unit) * Consumptive/Depletive Coefficient	75 gallons per person per day	75 gallons per person per day
	5+ Units (Own/Rent), 2-3 BR	Statewide NJ Demographic Multipliers (2)	Northern <sup>1</sup>			2.262	0.308				
	5+ Units (Own/Rent), 2-3 BR		Central <sup>2</sup>				2.342	0.373			
<b>Mixed use/Age Restricted Housing (percent mix based on 40% residential and 60% non-residential as Office/Commercial)</b>		Municipal Zoning		Apply zone density and FAR value Note: Use Retail/Commercial Impact factors for non-res %	70	Varies Based on zoning Du/Acre description	0.00	68.8	(75 gpd/person + 5 gpd/unit) * Consumptive/Depletive Coefficient	75 gallons per person per day	75 gallons per person per day
<b>Mixed use (percent mix based on 40% residential and 60% non-residential as Office/Commercial)</b>		Municipal Zoning		Apply zone density and FAR value Note: Use Retail/Commercial Impact factors for non-res %	70	Varies Based on zoning Du/Acre description	Varies Based on zoning Du/Acre description	42.0	(75 gpd/person + 5 gpd/unit) * Consumptive/Depletive Coefficient	75 gallons per person per day	75 gallons per person per day
<b>Senior or Age restricted Housing</b>		Municipal Zoning		Varies Based on zoning Du/Acre description	70	Varies Based on zoning Du/Acre description	0.00	60.3	(75 gpd/person + 5 gpd/unit) * Consumptive/Depletive Coefficient	75 gallons per person per day	75 gallons per person per day

Highlands Build-Out Residential Impact Factors – Sources

\* Residential dwelling units generated by the build out model include both market rate and affordable units.

(1) Source: Efficiencies are given as a percentage, between 0 and 100, where a 100 value means complete efficiency (no land lost to development), and a 0 value means no buildings will be estimated for that land use. For example an efficiency of 70% may be representative of developable land that has a 10% set aside for parks and 20% for roads (100% - 10% - 20% = 70%). Project determined values.

(2) Source: Who Lives in New Jersey Housing? New Jersey Demographic Multipliers, The Profile of Occupants of Residential and nonresidential Development. Listokin, D., Voicu, I., Dolphin, W., Camp, M. Center for Urban Policy Research. Rutgers University. November 2006. Northern NJ values were applied to Bergen, Morris, Passaic, Sussex and Warren County municipalities. Central NJ values were applied to Hunterdon and Somerset County municipalities.

<sup>1</sup> Table II-C-1 North Region of New Jersey Total Persons and Persons by Age (2000) (p. 85)

<sup>2</sup> Table II-D-1 Central Region of New Jersey Total Persons and Persons by Age (2000) (p. 99)

(3) Source: NCNBR, Rutgers University, April 27, 2006. The impervious surface area for new dwelling units large lot zoned areas (\*) is based on an average 15% impervious surface value (per NJDEP LU/LC) and a project determined average homestead area of 0.50 acres. No impact value is attached to the remaining undeveloped area. The impact percentage factors for the other residential composite zones represent weighted averages of NJ Highlands Percent Impervious Surface for all residentially developed lands in that composite zone. The raw data was obtained by overlaying NJ Highlands Zoning and DEP 2002 LU/LC spatial data files, and extracting the calculated percent impervious surface area attached to each LU/LC residential developed land polygon and the acres of associated developed land in each intersecting municipal zone polygon. The impervious surface areas in each municipal zone within the composite zone were aggregated and then divided by the total developed residential land area, to produce a weighted IS average for each composite zone.

(4) Source: Center for Urban Policy Research (CUPR), September 2000. NJGS Consumptive Use Coefficients. For consumptive uses, a factor of 29% is utilized. For depletive uses, a factor of 100% is used

(5) Source: NJDEP N.J.A.C. 7:10 Safe Drinking Water Act Regulations Adopted November 4, 2004, 7:10-12.6 Water Volume Requirements and State Plan Impact Assessment

(6) Source: NJDEP N.J.A.C. 7:14A-23.3 Pollutant Discharge Elimination System: Technical Requirements For TWA Applications; Projected flow criteria

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Highlands Composite Zone Type	Floor Area Ratio	Efficiency Factor %(1)	Region	Jobs per 1,000 sf (2)	Percent Impervious (3)	Consumptive/Depletive Water Use multiplied by Consumptive/Depletive Use Coefficient (4)	Public Water System Demand (5)	Public Wastewater System Generation (6)
Office/Commercial	Based on zoning	80	Northeast US	2.99	78.3	0.125 gpd/sf * Consumptive/Depletive Coefficient	0.125 gallons/day/sf	0.10 gallons/day/sf
Retail	Based on zoning	80	Northeast US	1.63	72.5	0.125 gpd/sf * Consumptive/Depletive Coefficient	0.125 gallons/day/sf	0.10 gallons/day/sf
Industrial	Based on zoning	80	Northeast US	1.11	53.4	25 gpd/sf * Consumptive/Depletive Coefficient	25 gallons per person per day	25 gallons per person per day

**Highlands Build-Out Non-Residential Impact Factors – Sources**

- (1) Source: Efficiencies are given as a percentage, between 0 and 100, where a 100 value means complete efficiency (no land lost to development), and a 0 value means no buildings will be estimated for that land use. For example an efficiency of 70% may be representative of developable land that has a 10% set aside for parks and 20% for roads (100% - 10% - 20% = 70%). Project determined values.
- (2) Source: Who Lives in New Jersey Housing? New Jersey Demographic Multipliers, The Profile of Occupants of Residential and nonresidential Development. Listokin, D., Voicu, I., Dolphin, W., Camp, M. Center for Urban Policy Research. Rutgers University. November 2006.
- <sup>a</sup> Table II-I-3 Commercial - Office Employees per 1,000 Square Feet of Gross Floor Area (GFA) (p. 136)  
(Reported Northeast mean value).
- <sup>b</sup> Table II-I-4 Commercial – Retail Employees per 1,000 Square Feet of Gross Floor Area (GFA) (p. 139)  
(Value derived by averaging the mean number of employees per 1,000 sq. ft. of GFA for retail (excluding mall), retail (enclosed mall), and retail (strip shopping mall) space in the Northeast).
- <sup>c</sup> Table II-I-6 Industrial – Warehouses Employees per 1,000 Square Feet of Gross Floor Area (GFA) (p. 143)  
(Value derived by averaging the mean number of employees per 1,000 sq. ft. of GFA for Non-Refrigerated and Refrigerated space in the Northeast).
- (3) Source: NCNBR, Rutgers University, April 27, 2006. The impervious surface area for new dwelling units large lot zoned areas (\*) is based on an average 15% impervious surface value (per NJDEP LU/LC) and a project determined average homestead area of 0.50 acres. No impact value is attached to the remaining undeveloped area. The impact percentage factors for the other residential composite zones represent weighted averages of NJ Highlands Percent Impervious Surface for all residentially developed lands in that composite zone. The raw data was obtained by overlaying NJ Highlands Zoning and DEP 2002 LU/LC spatial data files, and extracting the calculated percent impervious surface area attached to each LU/LC residential developed land polygon and the acres of associated developed land in each intersecting municipal zone polygon. The impervious surface areas in each municipal zone within the composite zone were aggregated and then divided by the total developed residential land area, to produce a weighted IS average for each composite zone.
- (4) Source: NJDEP N.J.A.C. 7:10 Safe Drinking Water Act Regulations Adopted November 4, 2004, 7:10-12.6 Water Volume Requirements and State Plan Impact Assessment, Center for Urban Policy Research (CUPR), September 2000.
- (5) Source: NJDEP N.J.A.C. 7:9A Standards for Individual Subsurface Disposal Systems Updated August 15, 1999 , 7:9A-7.4 Volume of Sanitary Sewerage.
- (6) Source: NJDEP N.J.A.C. 7:14A-23.3 Pollutant Discharge Elimination System: Technical Requirements For TWA Applications; Projected flow criteria