

STORMWATER MANAGEMENT

221 Attachment 6

**Township of West Manheim**  
**Table 3**  
**Roughness Coefficients (Manning's 'n')**

**Roughness Coefficients (Manning's 'n') for Overland Flow**  
 (U.S. Army Corps of Engineers, HEC-1 Users Manual)

<b>Surface Description</b>	<b>n</b>
Dense growth	0.4 - 0.5
Pasture	0.3 - 0.4
Lawns	0.2 - 0.3
Bluegrass sod	0.2 - 0.5
Short grass prairie	0.1 - 0.2
Sparse vegetation	0.05 - 0.13
Bare clay-loam soil (eroded)	0.01 - 0.03
Concrete/asphalt	
Very shallow depths (less than 1/4 inch)	0.10 - 0.15
Small depths (1/4 inch to several inches)	0.05 - 0.10

**Roughness Coefficients (Manning's 'n') for Sheet Flow**  
 (U.S. Soil Conservation Service Technical Release 55)

<b>Surface Description</b>	<b>n</b>
Smooth surfaces (concrete, asphalt, gravel, or bare soil)	0.011
Fallow (no residue)	0.05
Cultivated soils:	
Residue cover less than or 20%	0.06
Residue cover greater than 20%	0.17
Grass:	
Short grass prairie	0.15
Dense grasses	0.24
Bermuda grass	0.41
Range (natural)	0.13
Woods:	
Light underbrush	0.40
Dense underbrush	0.80