Setting up the GSSHA Green & Ampt Infiltration Model

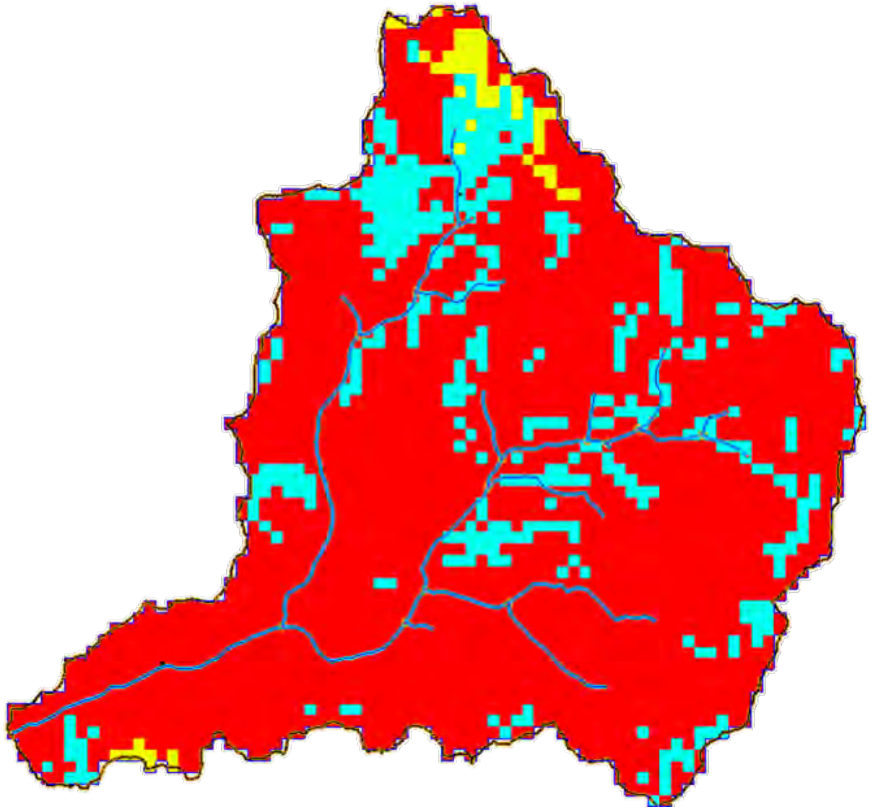
Green and Ampt Parameters

- Derived from soil texture index map or combination soil texture land use index map
- Assigned with mapping table
- Initial values can be taken as average values from Rawls et al. 1983
- Calibrated values are constrained within limits from Rawls et al. 1983

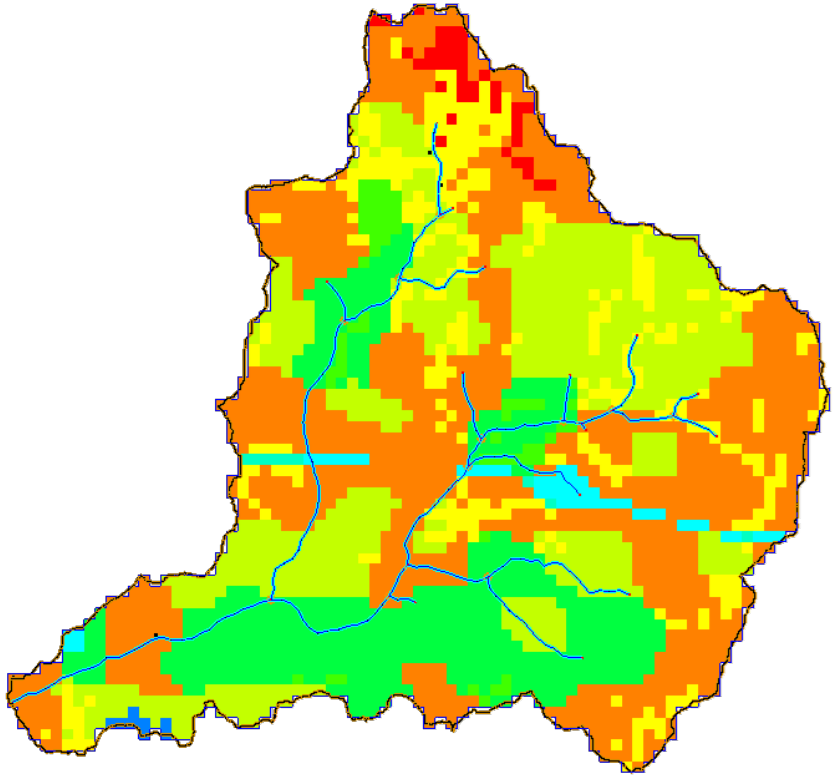
GSSHA Infiltration Setup

- Generate Index Maps
  - Soil or
  - Soil and Land Use Combination
- Define mapping table properties
- Establish initial conditions
- Turn on Green & Ampt simulation
- Save and run
- Visualize the results

Generate Index Maps

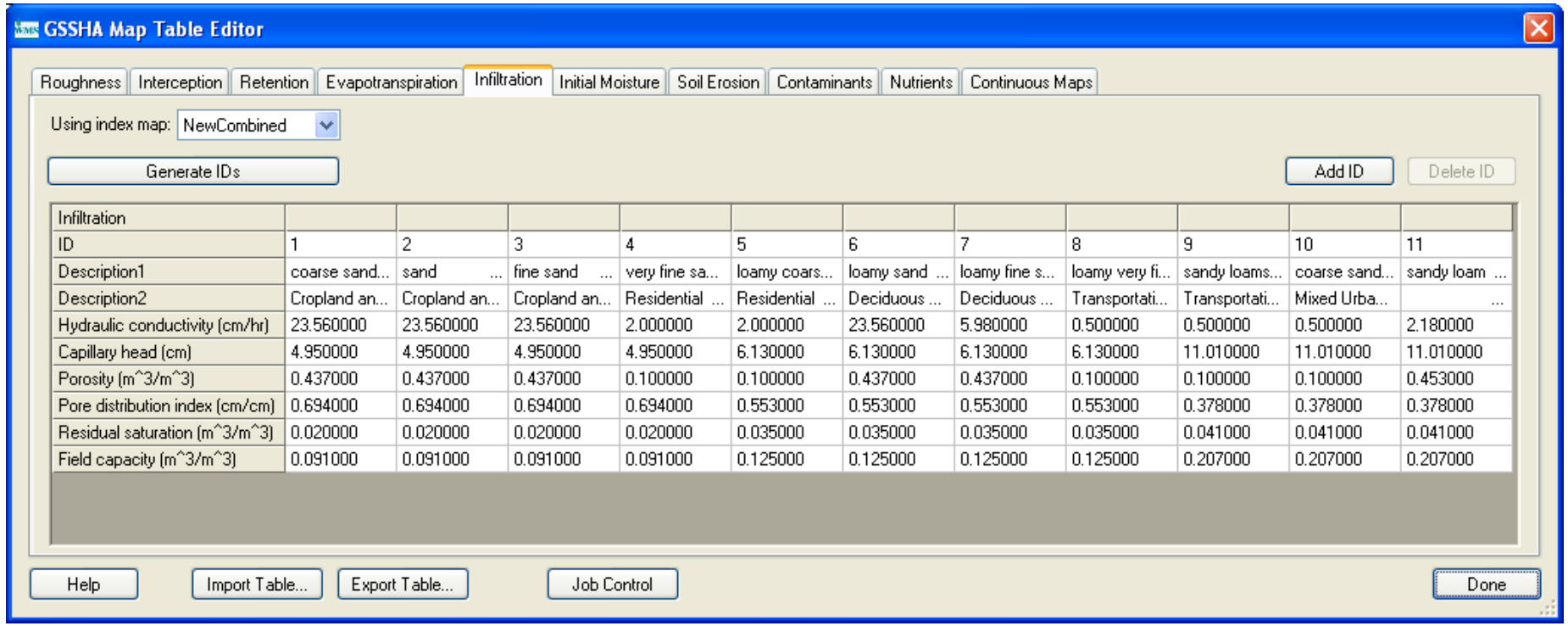


Soils



Land Use

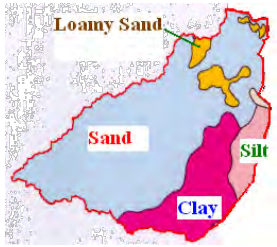
Define Mapping Table Properties



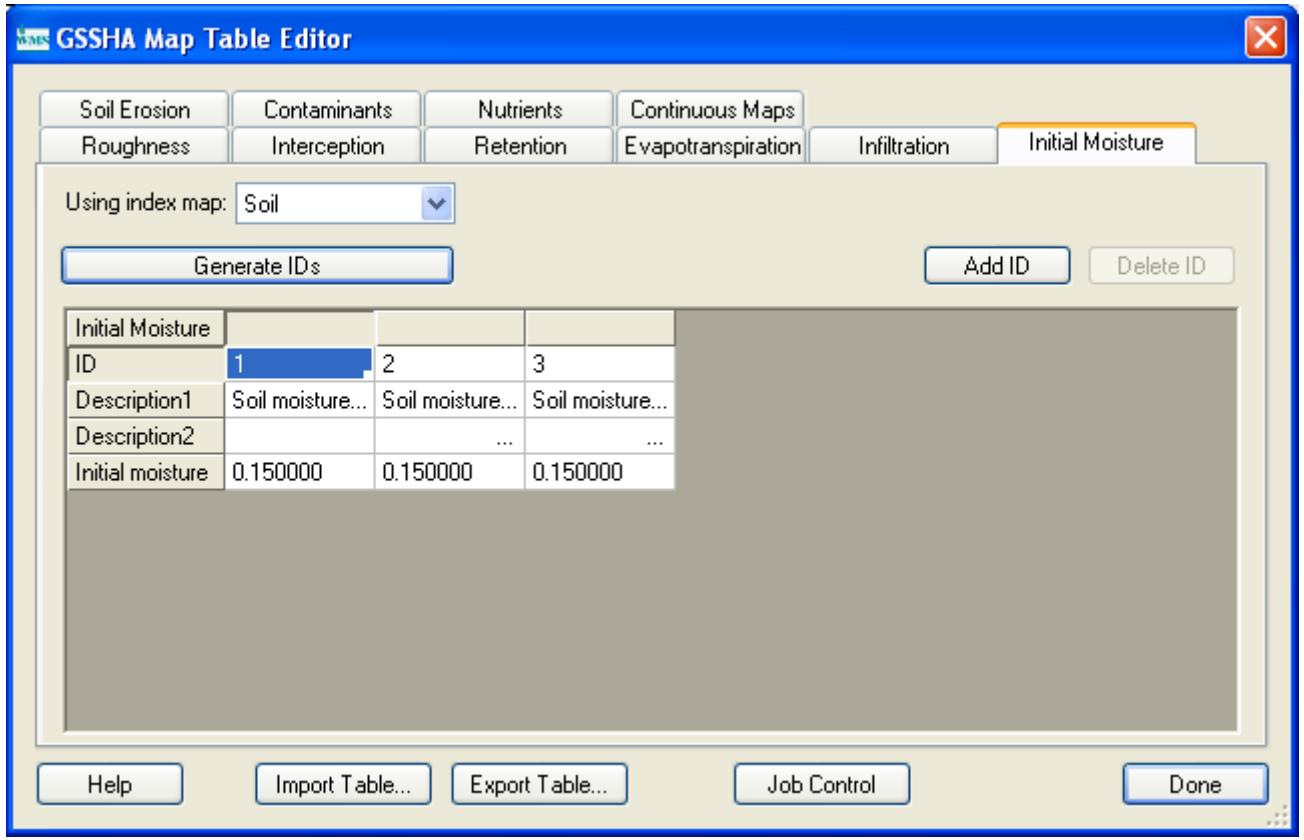
Infiltration											
ID	1	2	3	4	5	6	7	8	9	10	11
Description1	coarse sand...	sand ...	fine sand ...	very fine sa...	loamy coars...	loamy sand ...	loamy fine s...	loamy very fi...	sandy loams...	coarse sand...	sandy loam ...
Description2	Cropland an...	Cropland an...	Cropland an...	Residential ...	Residential ...	Deciduous ...	Deciduous ...	Transportati...	Transportati...	Mixed Urba...	...
Hydraulic conductivity (cm/hr)	23.560000	23.560000	23.560000	2.000000	2.000000	23.560000	5.980000	0.500000	0.500000	0.500000	2.180000
Capillary head (cm)	4.950000	4.950000	4.950000	4.950000	6.130000	6.130000	6.130000	6.130000	11.010000	11.010000	11.010000
Porosity (m^3/m^3)	0.437000	0.437000	0.437000	0.100000	0.100000	0.437000	0.437000	0.100000	0.100000	0.100000	0.453000
Pore distribution index (cm/cm)	0.694000	0.694000	0.694000	0.694000	0.553000	0.553000	0.553000	0.553000	0.378000	0.378000	0.378000
Residual saturation (m^3/m^3)	0.020000	0.020000	0.020000	0.020000	0.035000	0.035000	0.035000	0.035000	0.041000	0.041000	0.041000
Field capacity (m^3/m^3)	0.091000	0.091000	0.091000	0.091000	0.125000	0.125000	0.125000	0.125000	0.207000	0.207000	0.207000

Table of Green and Ampt Values (Rawls et al, 1983)

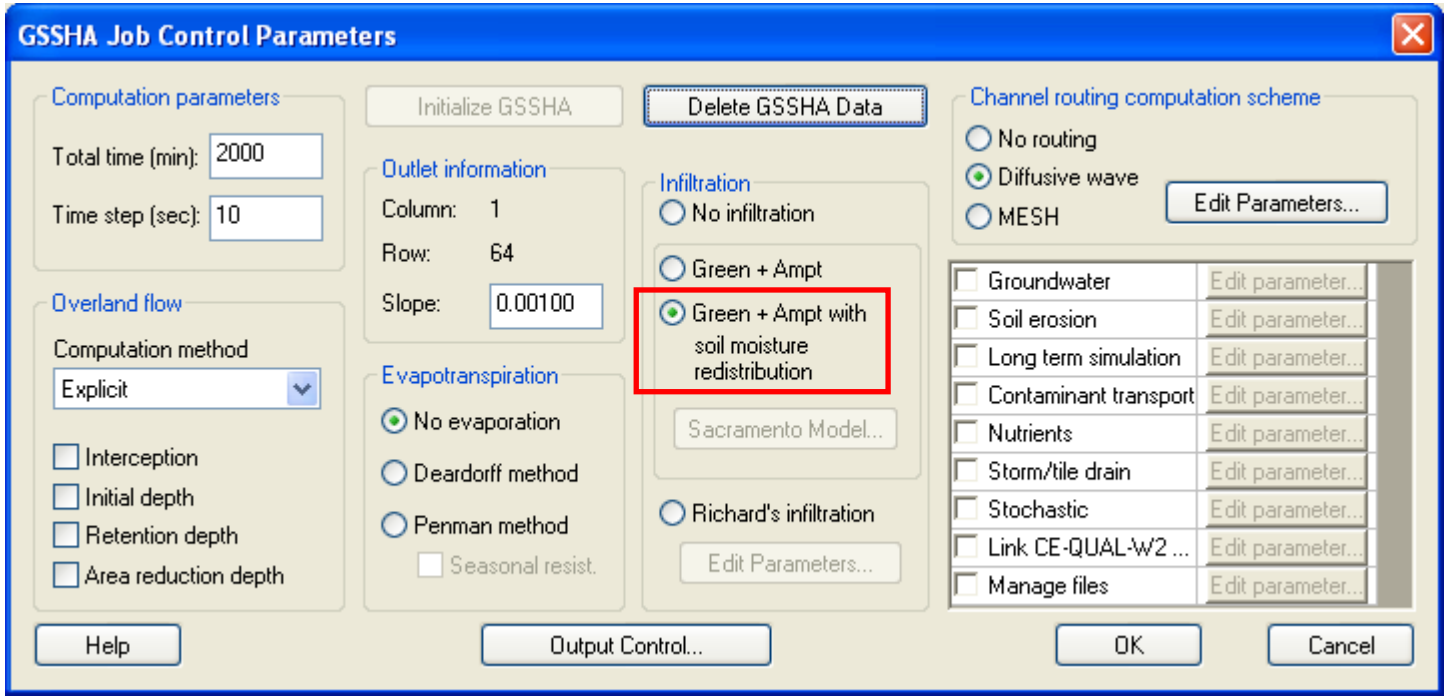
Water-Retention properties classified by soil texture									
USDA Textural Classification	Total Porosity cm3/cm3 (θ_s)	Residual water content cm3/cm3 (θ_r)	Effective Porosity cm3/cm3 (θ_0)	Bubbling Pressure Geometric mean,cm (ψb)	Pore size distribution Arithmentic Mean (λ)	Field Capacity (Water Retained at -33kPa) cm3/cm3	Wilting Point (Water Retained at -1500 kPa) cm3/cm3	Hydraulic Conductivity, cmh^{-1} (K_s)	ψ_f (cm)
Sand	0.437	0.02	0.417	7.26	0.694	0.091	0.033	4.95	4.95
	(0.374 - 0.500)	(0.001 - 0.039)	(0.354 - 0.480)	(136 - 38.74)	(0.298 - 1.090)	(0.018 - 0.164)	(0.007 - 0.059)		
Loamy sand	0.437	0.035	0.401	8.69	0.553	0.125	0.055	6.13	6.13
	(0.368 - 0.506)	(0.003 - 0.067)	(0.329 - 0.473)	(1.80 - 41.85)	(0.234 - 0.872)	(0.060 - 0.190)	(0.019 - 0.091)		
Sandy loam	0.453	0.041	0.412	14.66	0.378	0.207	0.095	11.01	11.01
	(0.351 - 0.555)	- 0.024 - 0.108	(0.283 - 0.541)	(3.45 - 62.24)	(0.140 - 0.616)	(0.126 - 0.288)	(0.031 - 0.159)		
Loam	0.463	0.027	0.434	11.15	0.252	0.27	0.117	8.89	8.89
	(0.375 - 0.551)	- 0.020 - 0.074	(0.334 - 0.534)	(1.63 - 76.40)	(0.086 - 0.418)	(0.195 - 0.345)	(0.069 - 0.165)		
Silt loam	0.501	0.015	0.486	20.76	0.234	0.33	0.133	16.68	16.68
	(0.420 - 0.582)	- 0.028 - 0.058	(0.394-0.578)	(3.58 - 120.4)	(0.105 - 0.363)	(0.258 - 0.402)	(0.078 - 0.188)		
Sandy clay loam	0.398	0.068	0.33	28.08	0.319	0.255	0.148	21.85	21.85
	(0.332 - 0.464)	- 0.001 - 0.137	(0.235 - 0.425)	(5.57 - 141.5)	(0.079 - 0.559)	(0.186 - 0.324)	(0.085 - 0.211)		
Clay loam	0.464	0.075	0.39	25.89	0.242	0.318	0.197	20.88	20.88
	(0.409 - 0.519)	- 0.024 - 0.174	(0.279 - 0.501)	(5.80 - 115.7)	(0.070 - 0.414)	(0.250 - 0.386)	(0.115 - 0.279)		
Silty clay loam	0.47!	0.04	0.432	32.56	0.177	0.366	0.208	27.30	27.30
	(0.418 - 0.524)	- 0.038 - 0.118	(0.347 - 0.517)	(6.68-158.7)	(0.039 - 0.315)	(0.304 - 0.428)	(0.138 - 0.278)		
Sandy clay	0.43	0.109	0.321	29.17	0.223	0.339	0.239	23.90	23.90
	(0.370 - 0.490)	(0.013 - 0.205)	(0.207 - 0.435)	(4.96 - 171.6)	(0.048 - 0.398)	(0.245 - 0.433)	(0.162 - 0.316)		
Silty clay	0.479	0.056	0.423	34.19	0.15	0.387	0.25	29.22	29.22
	(0.425 - 0.533)	- 0.024 - 0.136	(0.334 - 0.512)	(7.04 - 166.2)	(0.040 - 0.260)	(0.332 - 0.442)	(0.193 - 0.307)		
Clay	0.475	0.09	0.385	37.3	0.165	0.396	0.272	31.63	31.63
	(0.427 - 0.523)	- 0.015 - 0.195	(0.269 - 0.501)	(7.43 - 187.2)	(0.037 - 0.293)	(0.326 - 0A66)	(0.208 - 0.336)		
	First Line is the mean value, second line is ± one standard deviation about the mean								



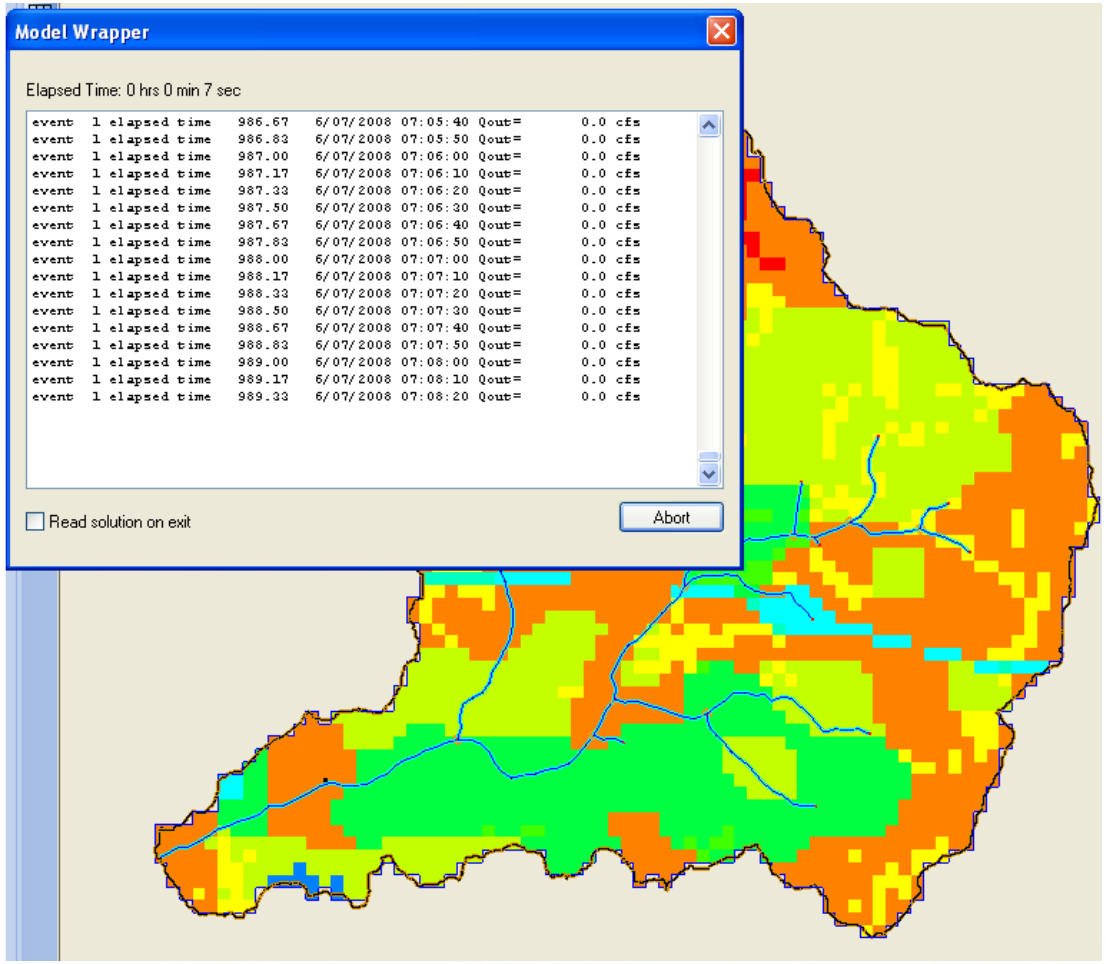
Establish Initial Conditions



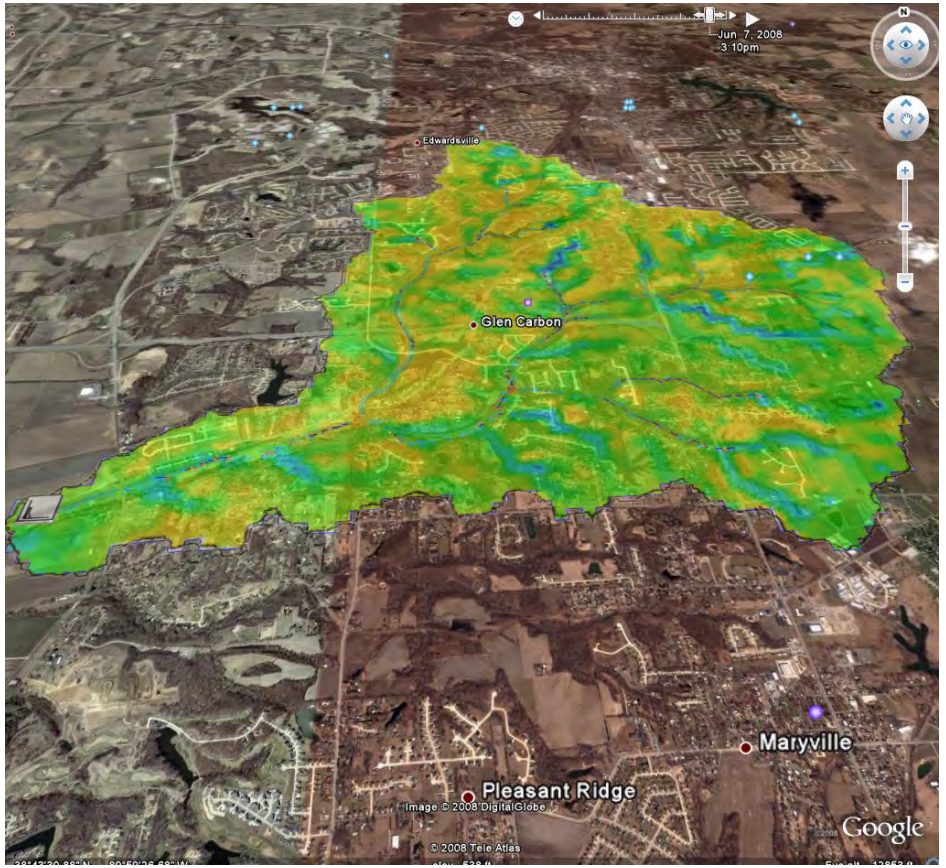
Turn on Green & Ampt Simulation



Save and Run


Model Wrapper
Elapsed Time: 0 hrs 0 min 7 sec
event 1 elapsed time 986.67 6/07/2008 07:05:40 Qout= 0.0 cfs
event 1 elapsed time 986.83 6/07/2008 07:05:50 Qout= 0.0 cfs
event 1 elapsed time 987.00 6/07/2008 07:06:00 Qout= 0.0 cfs
event 1 elapsed time 987.17 6/07/2008 07:06:10 Qout= 0.0 cfs
event 1 elapsed time 987.33 6/07/2008 07:06:20 Qout= 0.0 cfs
event 1 elapsed time 987.50 6/07/2008 07:06:30 Qout= 0.0 cfs
event 1 elapsed time 987.67 6/07/2008 07:06:40 Qout= 0.0 cfs
event 1 elapsed time 987.83 6/07/2008 07:06:50 Qout= 0.0 cfs
event 1 elapsed time 988.00 6/07/2008 07:07:00 Qout= 0.0 cfs
event 1 elapsed time 988.17 6/07/2008 07:07:10 Qout= 0.0 cfs
event 1 elapsed time 988.33 6/07/2008 07:07:20 Qout= 0.0 cfs
event 1 elapsed time 988.50 6/07/2008 07:07:30 Qout= 0.0 cfs
event 1 elapsed time 988.67 6/07/2008 07:07:40 Qout= 0.0 cfs
event 1 elapsed time 988.83 6/07/2008 07:07:50 Qout= 0.0 cfs
event 1 elapsed time 989.00 6/07/2008 07:08:00 Qout= 0.0 cfs
event 1 elapsed time 989.17 6/07/2008 07:08:10 Qout= 0.0 cfs
event 1 elapsed time 989.33 6/07/2008 07:08:20 Qout= 0.0 cfs
Read solution on exit
Abort

Visualize the Infiltration Results



Workshop