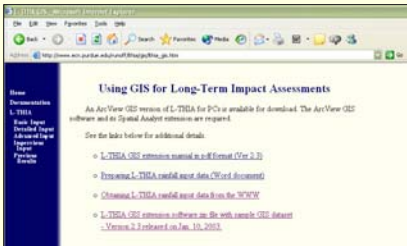


L-THIA Exercise

L-THIA Download & Set-up

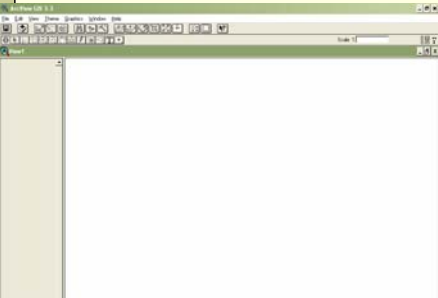
- Download L-THIA Extension from Purdue University at http://www.ecn.purdue.edu/runoff/lthia/gis/lthia_gis.htm
- L-THIA GIS Extension Software Zip File with Sample GIS Dataset
- Unzip the file "lthia_gis_ext_v23_and_sample_gis_data.zip"
- Follow "Readme" file for set-up info



L-THIA Exercise

Create ArcView L-THIA Project

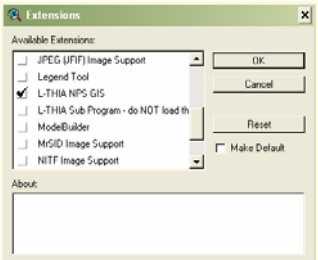
Open ArcView 3.x with New View



L-THIA Exercise

L-THIA Extension

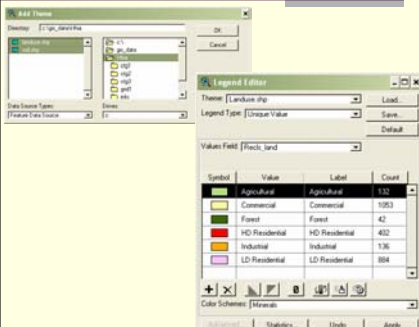
Load the Extension "L-THIA NPS GIS"



L-THIA Exercise

Create ArcView Project

- Add Land Use and Soils Shapefiles
- Using Legend Editor, change legends

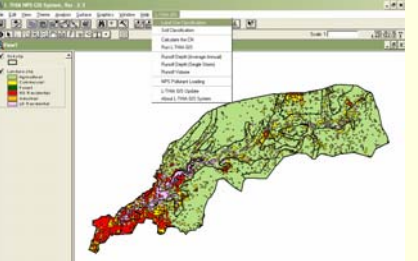


| Symbol | Value | Label | Count |
|---------------|----------------|----------------|-------|
| [Green] | Agricultural | Agricultural | 102 |
| [Yellow] | Commercial | Commercial | 1052 |
| [Light Green] | Forest | Forest | 42 |
| [Red] | HD Residential | HD Residential | 432 |
| [Blue] | Industrial | Industrial | 136 |
| [Purple] | LD Residential | LD Residential | 884 |

L-THIA Exercise

Land Use Classification

- From "L-THIA GIS" menu, select "Land Use Classification"
- This function will create additional fields to the land use theme table that are used to calculate the curve number
- This function also creates a grid version of the land use theme



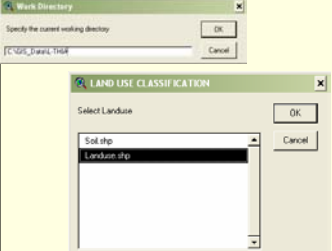
The land use and soil hydrologic group themes must have fields that follow L-THIA conventions. The land use theme must contain a conventional land use classification and code fields. The soils theme must have a field that contains hydrologic soil groups and associated codes.

L-THIA Exercise

Land Use Classification

Series of windows:

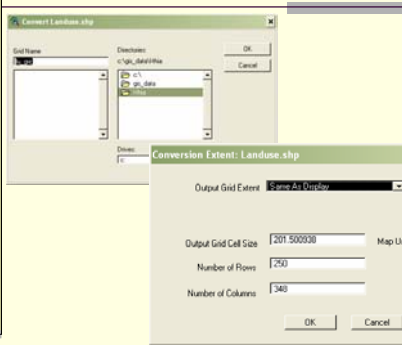
- Specify Current Working Directory
- Choose Land Use Classification shapefile



L-THIA Exercise

Land Use Classification

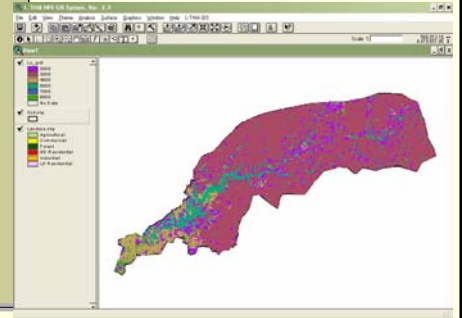
- Name the new Land Use grid file
- Accept default output information



L-THIA Exercise

Land Use Classification

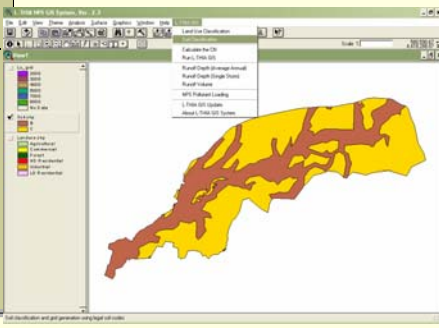
- Output land use grid file



L-THIA Exercise

Soil Classification

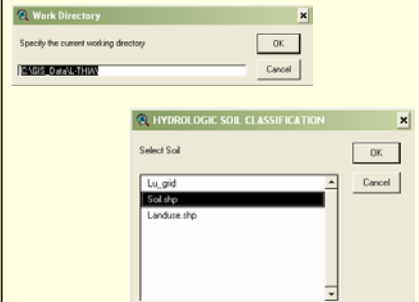
- Focusing on soil theme,
- Select "Soil Classification" from "L-THIA GIS" menu



L-THIA Exercise

Soil Classification

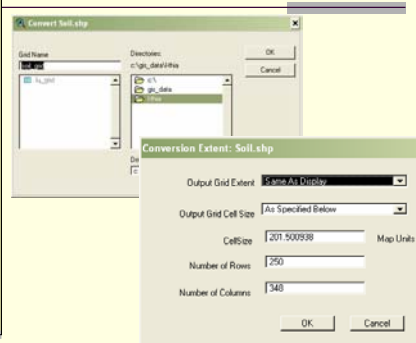
- Series of screens:
- Select working directory (to save data to)
- Choose "soil.shp" as Hydrologic Soil Classification" theme



L-THIA Exercise

Soil Classification

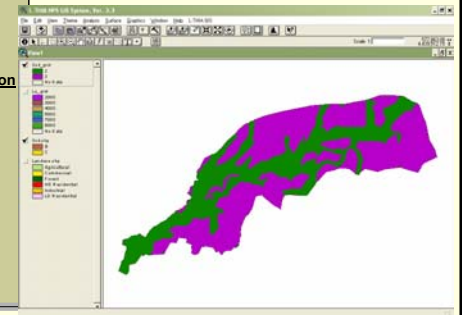
- Series of screens:
- Name grid file: "soil_grid"
- Maintain output parameters for soil.shp



L-THIA Exercise

Soil Classification

- Output soil grid

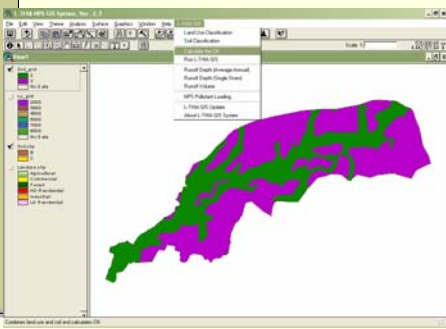


L-THIA Exercise

Curve Number (CN) Calculation

- Select "Calculate the CN" command

(CN method is a modeling technique which assumes a triangular runoff hydrograph)



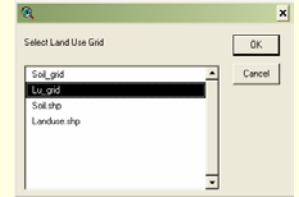
L-THIA Exercise

Curve Number (CN) Calculation

- In the series of new screens, answer the following:

- Set working directory

- Select Land Use Grid - "lu_grid"

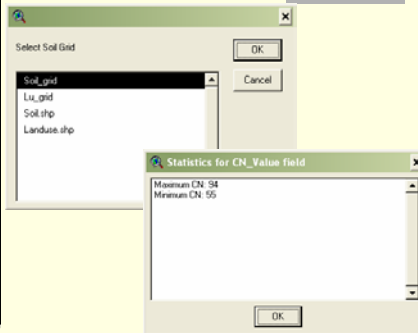


L-THIA Exercise

Curve Number (CN) Calculation

- Choose "soil_grid" as Soil Grid

- Agree to Statistics for CN_Value field

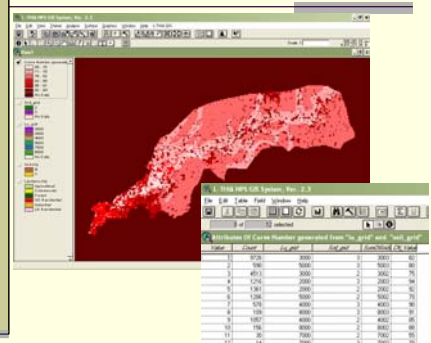


L-THIA Exercise

Curve Number (CN) Calculation

- Output Curve Number shapefile

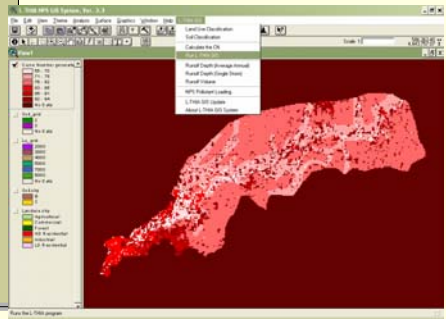
- Output Attribute Table



L-THIA Exercise

Running the L-THIA Program

- Select the "Run L-THIA GIS" command



L-THIA Exercise

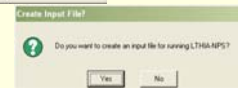
Running the L-THIA Program

- In the next series of screens,

- Select "No" to use an already saved input file

- Click "OK" regarding the input file info

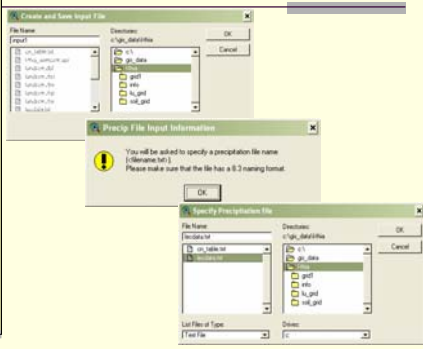
- "Yes" Create an input file for running L-THIA-NPS



L-THIA Exercise

Running the L-THIA Program

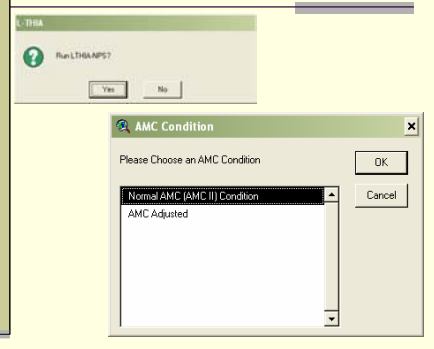
- Create an Input file named "input1"
- Agree to the Precipitation file input info
- Use the Precipitation file named "lecddata.txt"



L-THIA Exercise

Running the L-THIA Program

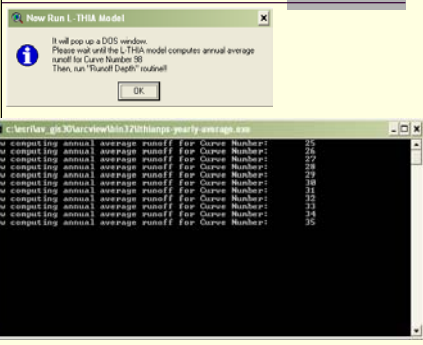
- Select "Yes" to Run LTHIA-NPS
- Choose the "Normal" Antecedent Moisture Condition (AMC)



L-THIA Exercise

Running the L-THIA Program

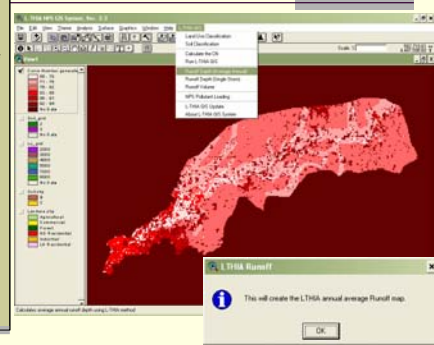
- Agree to the next screen, informing you of next steps to run model
- A Dos window will appear & indicates that L-THIA is calculating average direct runoff depth for a series of Curve Numbers



L-THIA Exercise

Runoff Depth Calculation

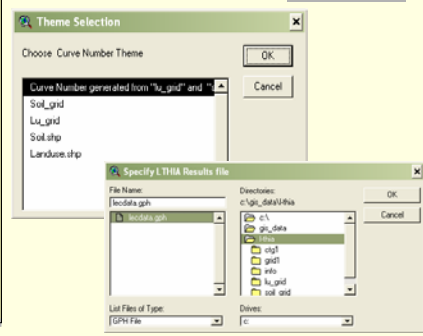
- The output files are prepared, so a runoff depth can be calculated
- Select "Runoff Depth (Average Annual)"
- Check "Ok" with the screen detailing the creation of a runoff map



L-THIA Exercise

Runoff Depth Calculation

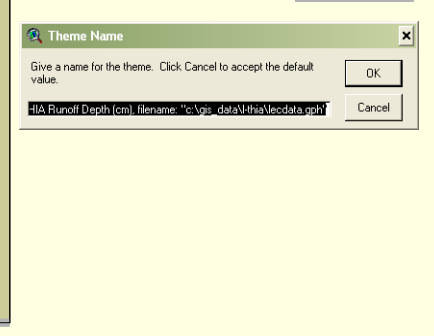
- In the next series of screens,
- Choose the Curve Number Theme as "Curve Number"
- Specify the LTHIA Results as "lecddata.gph"



L-THIA Exercise

Runoff Depth Calculation

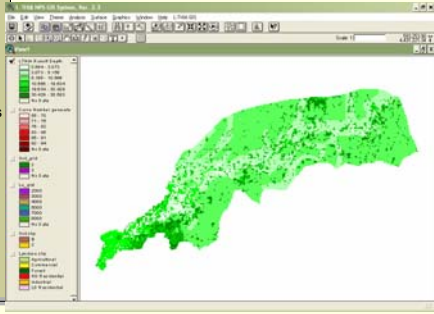
- For the new theme name, click "Cancel" to keep the default name



L-THIA Exercise

Runoff Depth Calculation

•The average annual runoff depth there is added to the map view



L-THIA Exercise

Runoff Depth Calculation

•The average annual runoff depth in cm is added to the Attribute Table

Attributes of L-THIA Runoff Depth

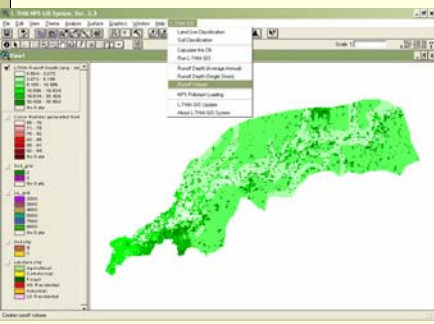
| ID | Color | Lu_gnd | Curve No. | Runoff Co. val | Area_sqm | Runoff Depth | Area/Runoff | |
|----|-------|--------|-----------|----------------|----------|----------------|-------------|------|
| 1 | 9796 | 3000 | 3 | 3000 | 60 | Agricultural | 10.57 | 0.90 |
| 2 | 506 | 3000 | 3 | 3000 | 60 | LI Residential | 1.43 | 0.90 |
| 3 | 4912 | 3000 | 2 | 3000 | 79 | Agricultural | 5.14 | 0.90 |
| 4 | 1274 | 2000 | 3 | 2000 | 60 | Commercial | 29.50 | 0.90 |
| 5 | 1363 | 2000 | 2 | 2000 | 52 | Commercial | 36.43 | 0.90 |
| 6 | 1266 | 3000 | 3 | 3000 | 79 | LI Residential | 1.07 | 0.90 |
| 7 | 579 | 4000 | 3 | 4000 | 90 | HI Residential | 24.37 | 0.90 |
| 8 | 109 | 8000 | 3 | 8000 | 99 | Industrial | 27.19 | 0.90 |
| 9 | 1067 | 4000 | 2 | 4000 | 69 | HI Residential | 14.96 | 0.90 |
| 10 | 156 | 8000 | 2 | 8000 | 69 | Industrial | 19.43 | 0.90 |
| 11 | 90 | 7000 | 2 | 7000 | 69 | Forest | 1.96 | 0.90 |
| 12 | 14 | 7000 | 3 | 7000 | 79 | Forest | 3.07 | 0.90 |

L-THIA Exercise

Runoff Volume Calculation

•The recently created runoff depth map can be used to create a runoff volume map

•Select the "Runoff Volume" command

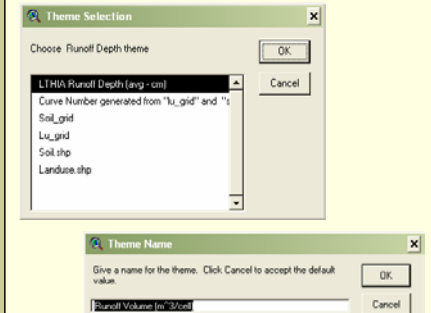


L-THIA Exercise

Runoff Volume Calculation

•Select the Runoff Depth theme as "LTHIA Runoff Depth"

•Click "Cancel" to name the file by the default name

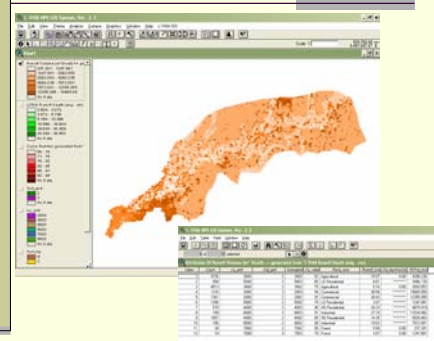


L-THIA Exercise

Runoff Volume Calculation

•The Runoff Volume theme will be added to the map view

•Runoff Volume calculations will also be added to the attribute table



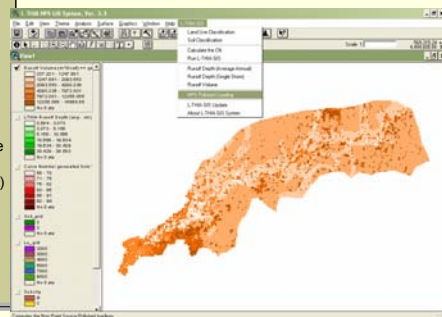
L-THIA Exercise

Non Point Source Pollutant Loading

•After arriving at a runoff volume, we can estimate the annual Non Point Source Pollutant Loading

•NPS pollution can be estimated from runoff volume theme and event mean concentration (EMC) NPS data

•Select "NPS Pollutant Loading" command



**Non Point Source
Pollutant Loading**

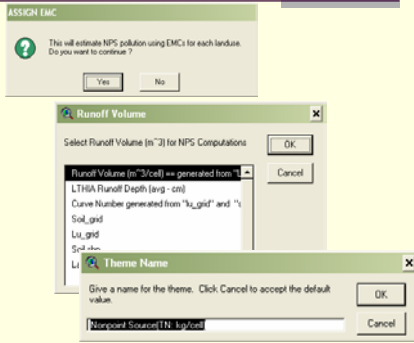
•In the series of windows, answer the following:

•Select "Yes" to estimate NPS pollution using EMCs

•Select the newly created "Runoff Volume" for NPS Computations

•Keep the default name for the new theme - click "Cancel"

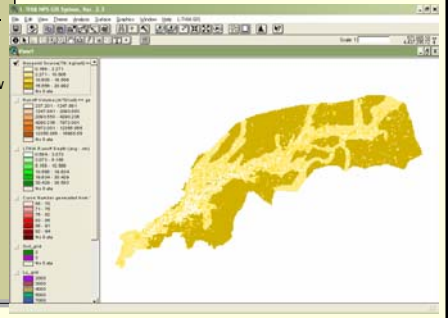
L-THIA Exercise



L-THIA Exercise

**Non Point Source
Pollutant Loading**

•The new Non Point Source Theme will be added to the view



**Non Point Source
Pollutant Loading**

•In the Attribute Table, concentrations of pollutants will be quantified

L-THIA Exercise

| ID | Runoff Volume (in ³ /cell) | LTHIA Runoff Depth (avg - cm) | Curve Number generated from "k_u_gnd" and "l_u_gnd" | Soil_gnd | Lu_gnd | Li_gnd |
|----|---------------------------------------|-------------------------------|---|----------|--------|--------|
| 1 | 1000 | 100 | 100 | 100 | 100 | 100 |
| 2 | 2000 | 200 | 200 | 200 | 200 | 200 |
| 3 | 3000 | 300 | 300 | 300 | 300 | 300 |
| 4 | 4000 | 400 | 400 | 400 | 400 | 400 |
| 5 | 5000 | 500 | 500 | 500 | 500 | 500 |
| 6 | 6000 | 600 | 600 | 600 | 600 | 600 |
| 7 | 7000 | 700 | 700 | 700 | 700 | 700 |
| 8 | 8000 | 800 | 800 | 800 | 800 | 800 |
| 9 | 9000 | 900 | 900 | 900 | 900 | 900 |
| 10 | 10000 | 1000 | 1000 | 1000 | 1000 | 1000 |