Atkins BMP Assessment Tool

Presented by:
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O.B.O.
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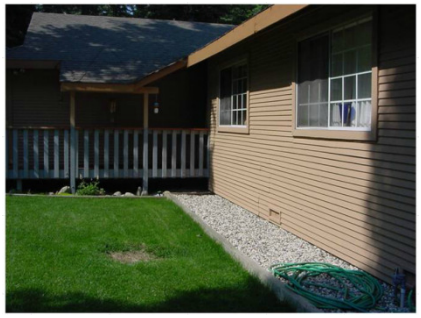
Maryland Association of Floodplain and Stormwater Managers
2015 Annual Conference
October 15, 2015

What are BMPs?

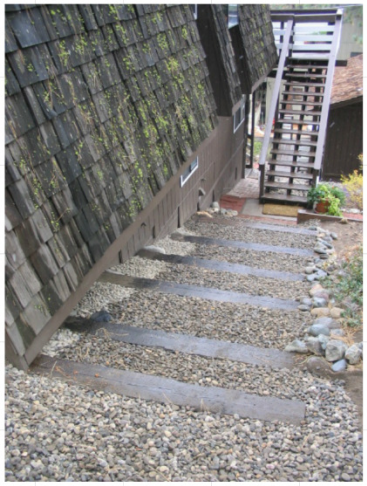
Best Management Practices focused on Stormwater Control

Many Different Types



Dripline Trench

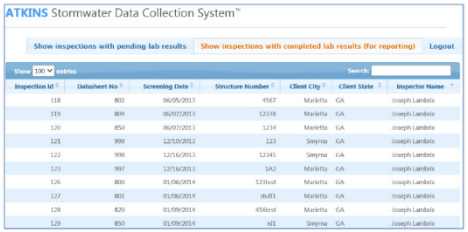
Rain Garden



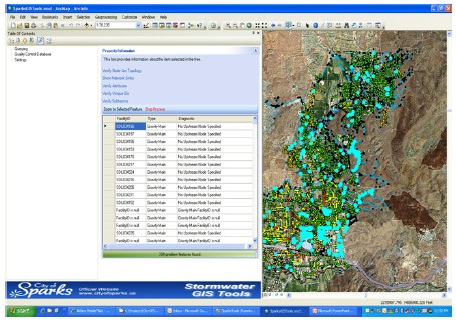
Baffled Trench

Retaining Wall

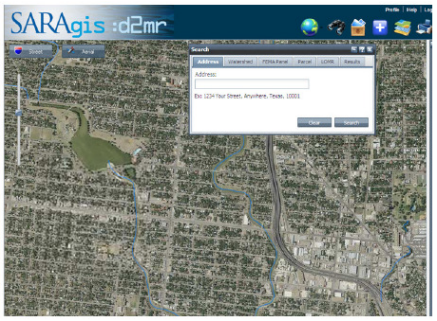
Atkins Stormwater Technologies



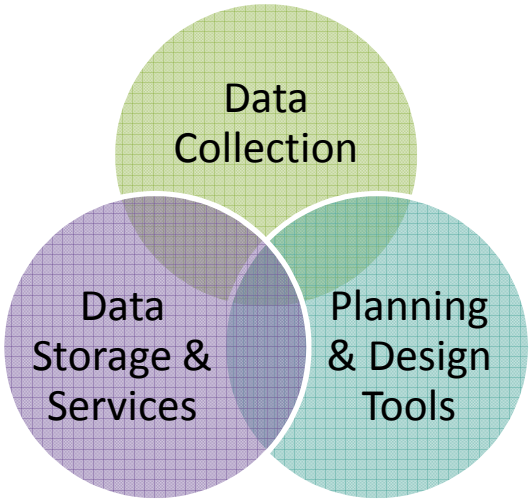
Stormwater DCS
for data collection at regulated stormwater outfalls
Multiple Municipalities, Atlanta GA

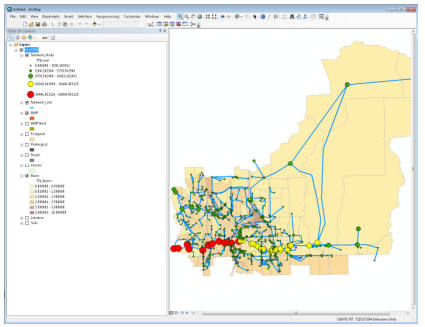


Sparks Tools
for stormwater system advanced querying and quality control
City of Sparks, NV

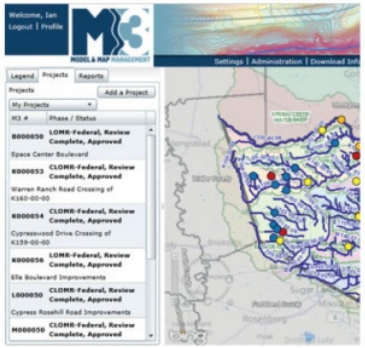


D2MR
for flood model storage
San Antonio River Authority (SARA)





BMP Assessment Tool
a community-scale planning tool for stormwater pollution assessment and prevention
City of Bonita Springs, FL



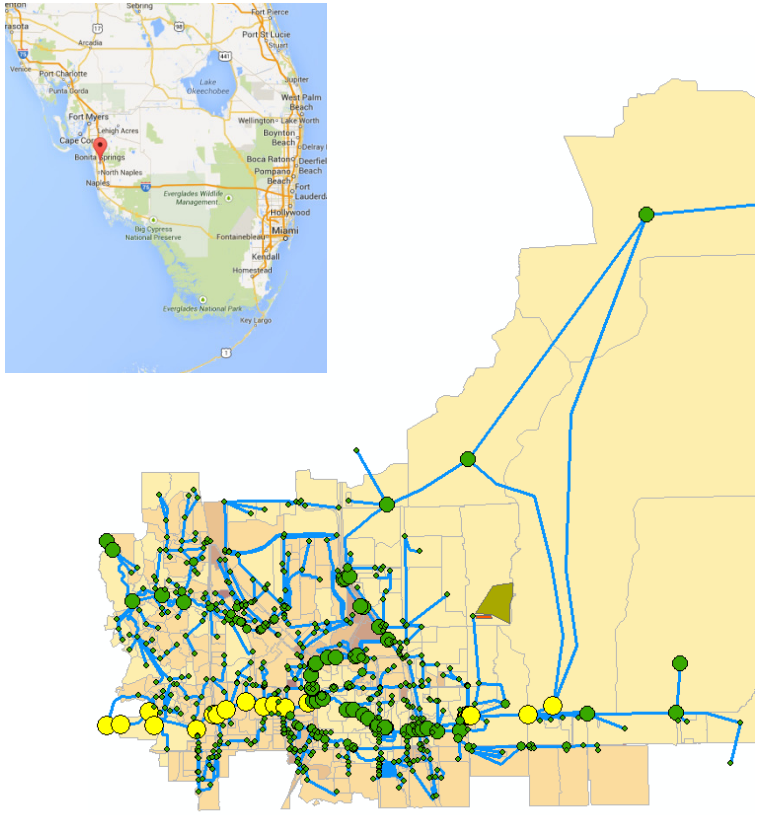
M3
for flood model storage
Harris County Flood Control District

BMP Designer
for residents to design BMP retrofits
Tahoe Regional Planning Agency

BMP Assessment Tool (BAT)

Objective

Tool that estimates pollutant levels throughout stormwater system under different BMP Scenarios

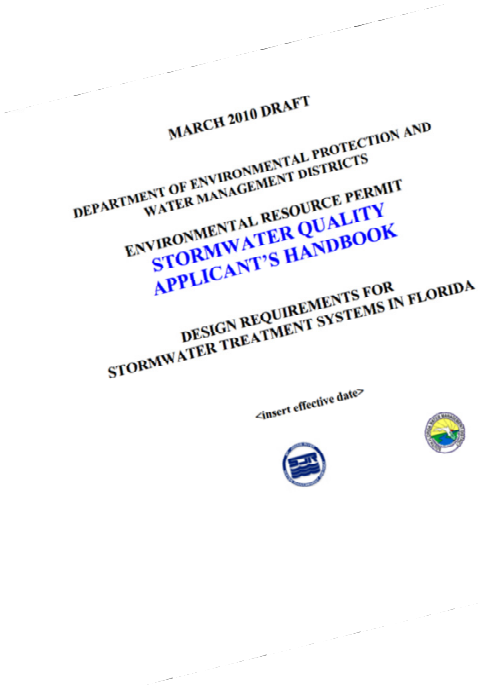


City of Bonita Springs, Florida

Basic Procedure for Estimating System-wide Stormwater Pollutant

Regulated by Florida Dept. of Env. Protection (FLDEP)

2010 Stormwater Rule


MARCH 2010 DRAFT

DEPARTMENT OF ENVIRONMENTAL PROTECTION AND
WATER MANAGEMENT DISTRICTS

ENVIRONMENTAL RESOURCE PERMIT
STORMWATER QUALITY
APPLICANT'S HANDBOOK

DESIGN REQUIREMENTS FOR
STORMWATER TREATMENT SYSTEMS IN FLORIDA

<insert effective date>

1.Estimate runoff from sub-basins

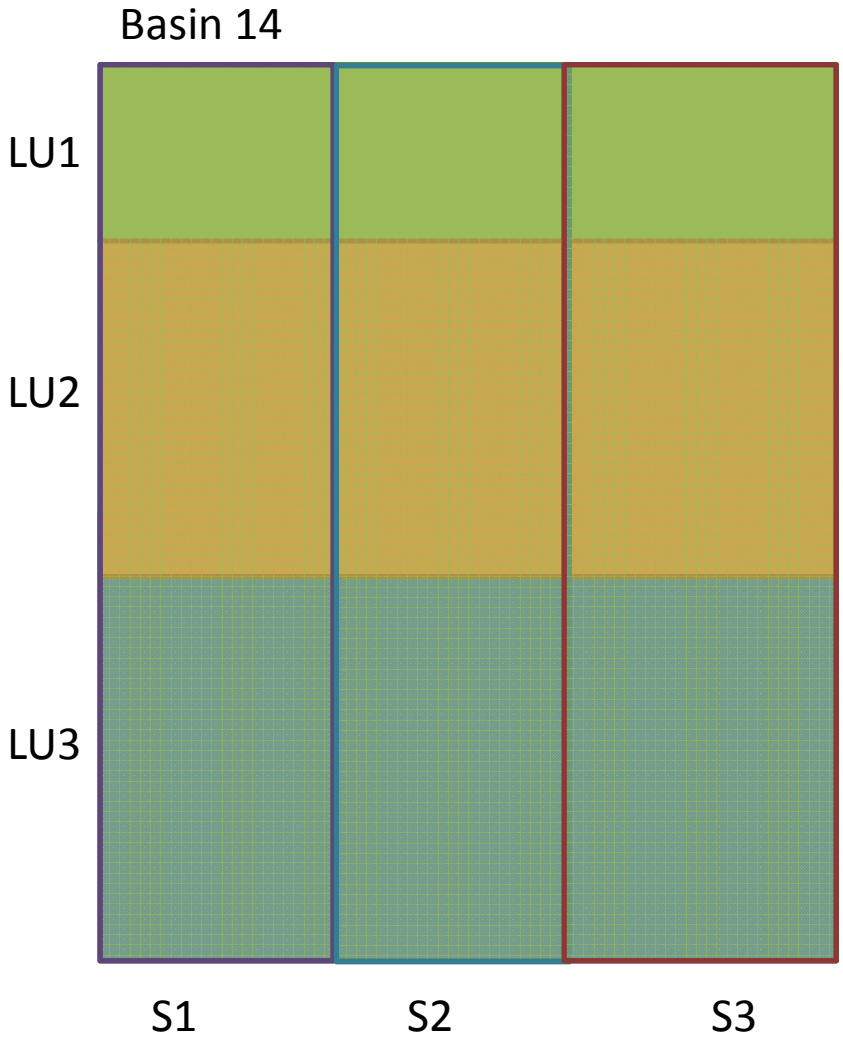
2. Estimate pollutant runoff from sub-basin

2a. Reduce sub-basin pollutant runoff by installing BMPs in the sub-basin.

3. Route pollutant through system

3a. Reduce routed pollutant by installing BMPs on conveyance lines (links).

Estimating Runoff from a Basin



1. For each land use (LU)

a) Evaluate composite Curve Number (CN) over all soil types

b) Evaluate DCIA (directly connected impervious area)

c) C = lookup (composite CN and DCIA)

d) Runoff = Area * AAR * C

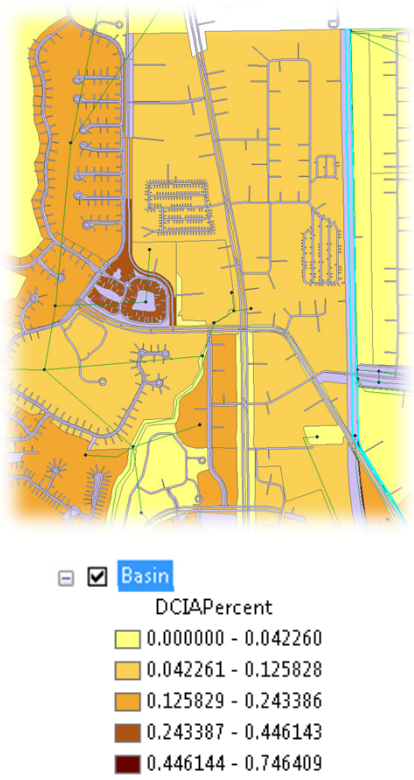
e) Evaluate total nitrogen (TN) and total phosphorus (TP) pollutant using literature conversion factors (e.g. single family residential, TN = 1.5 mg/l)

2. Basin runoff = Sum (LU Runoff)

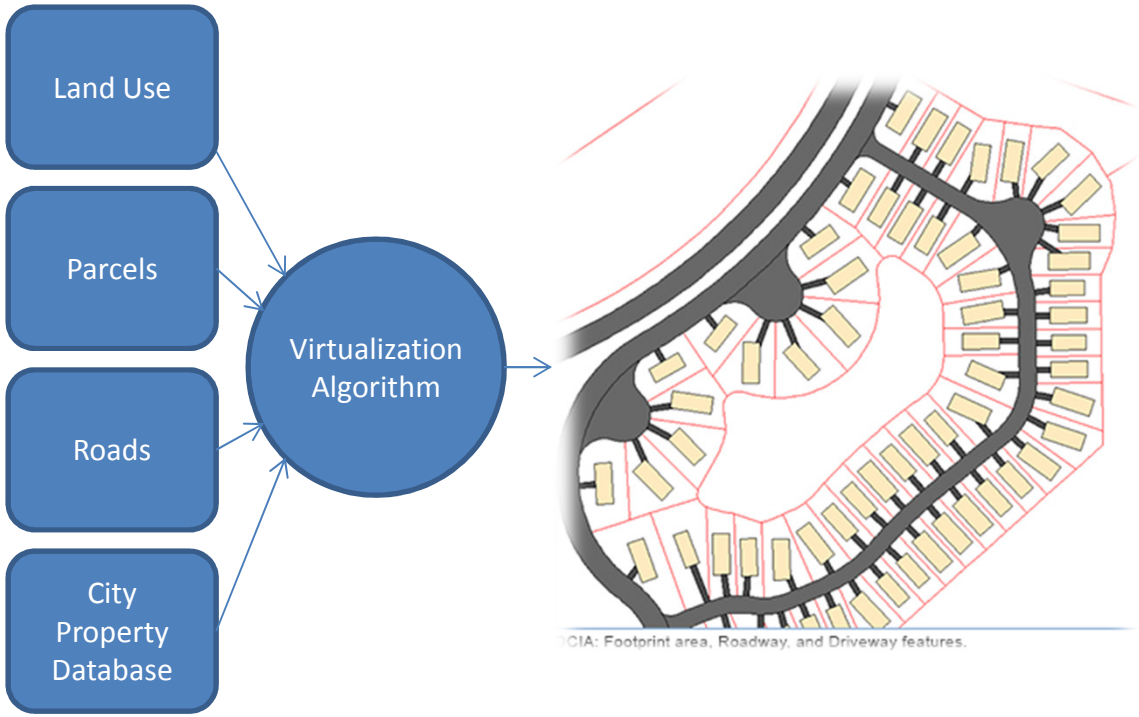
3. Basin pollutant = Sum (LU Pollutant)

Handling DCIA

Traditionally…
land use-based

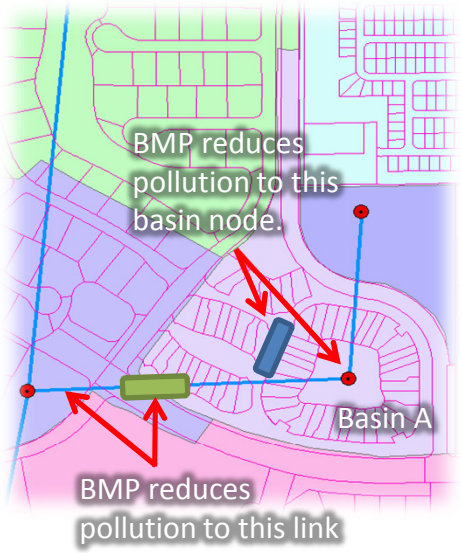


We wanted more accuracy…
so we virtualized it



Handling BMPs

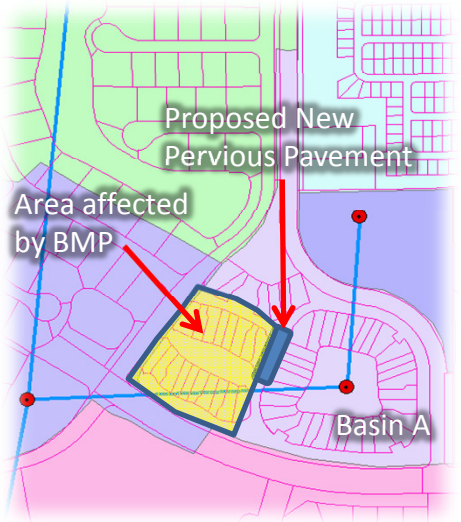
Two types of BMPs



1. **BMPs that reduce pollutant flowing to a basin NODE.**
   - BMP Shed required
   - Eg. pervious pavement
   - BMP must be associated with a Node

2. **BMPs that reduce pollutant flowing through a LINK.**
   - BMP Shed is not applicable
   - Eg. Detention basin, swale
   - BMP must be associated with a Link

The "BMP Shed"

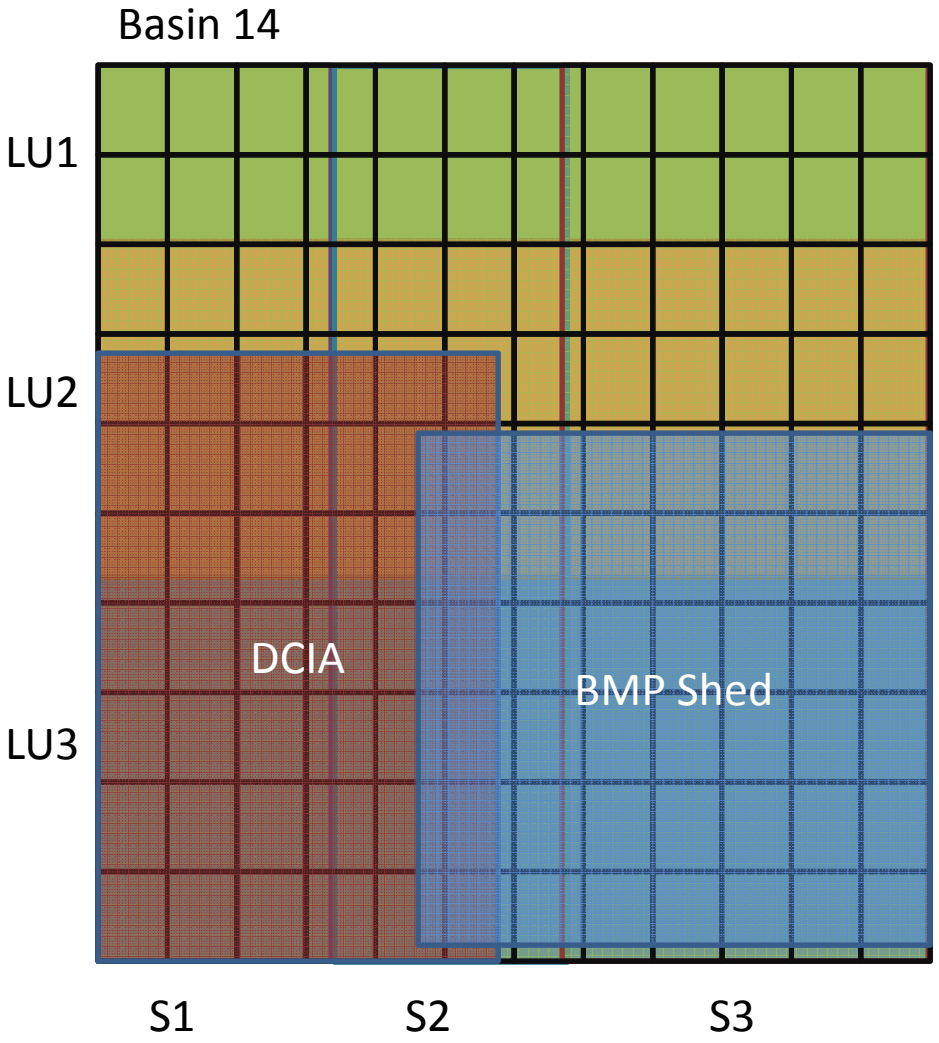


All node-based BMPs will have an affected "BMP Shed" (ie, area contributing to the BMP)

Therefore, in addition to sketching the BMP itself, the user must sketch the contributing runoff area using the **BMP Shed** tool

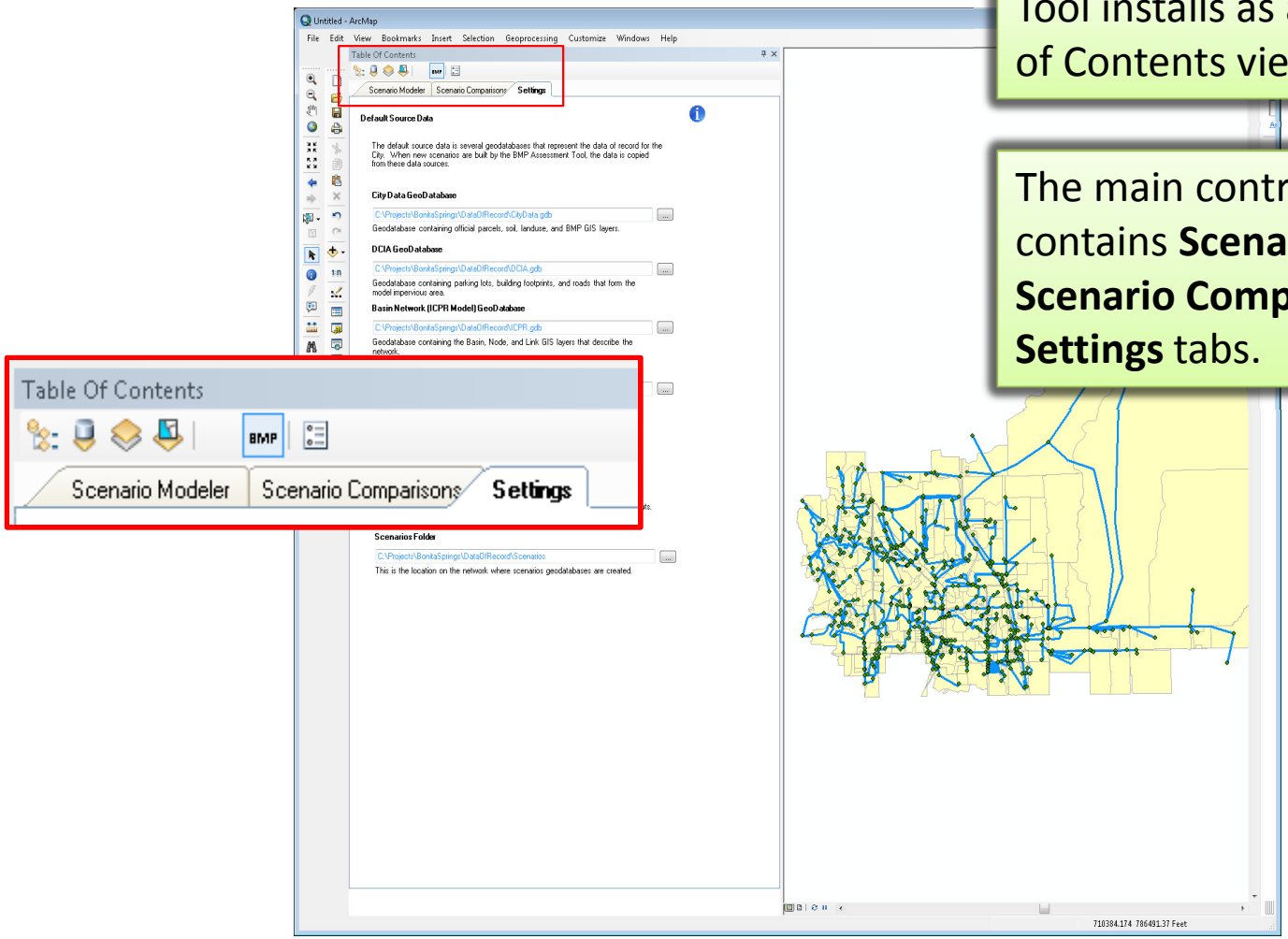
Note, this is different than a link-based BMP which requires only the BMP to be sketched

Inserting DCIA and BMPs into Pollutant Estimation



- Calculate using a grid approach
- DCIA affects only the grid cells the impervious area overlies
- Pollutant is reduced only within BMP Shed.

BMP Assessment Tool (BAT) Screen Shots



Tool installs as an item in Table of Contents view of Esri ArcMap

The main control is a tab that contains **Scenario Modeler**, **Scenario Comparisons**, and **Settings** tabs.

BMP Assessment Tool (BAT) Screen Shots (cont)

Scenario Modeler | Scenario Comparisons | **Settings**

Default Source Data

The default source data is several geodatabases that represent the data of record for the City. When new scenarios are built by the BMP Assessment Tool, the data is copied from these data sources.

City Data GeoDatabase

C:\Projects\BonitaSprings\DataOfRecord\CityData.gdb ...

Geodatabase containing official parcels, soil, landuse, and BMP GIS layers.

DCIA GeoDatabase

C:\Projects\BonitaSprings\DataOfRecord\DCIA.gdb ...

Geodatabase containing parking lots, building footprints, and roads that form the model impervious area.

Basin Network (ICPR Model) GeoDatabase

C:\Projects\BonitaSprings\DataOfRecord\ICPR.gdb ...

Geodatabase containing the Basin, Node, and Link GIS layers that describe the network.

Lookup Tables GeoDatabase

C:\Projects\BonitaSprings\DataOfRecord\BMPLookUpTables.gdb ...

Geodatabasing contains the required lookup tables for runoff and pollutant loading estimation

Verify All Data Sources

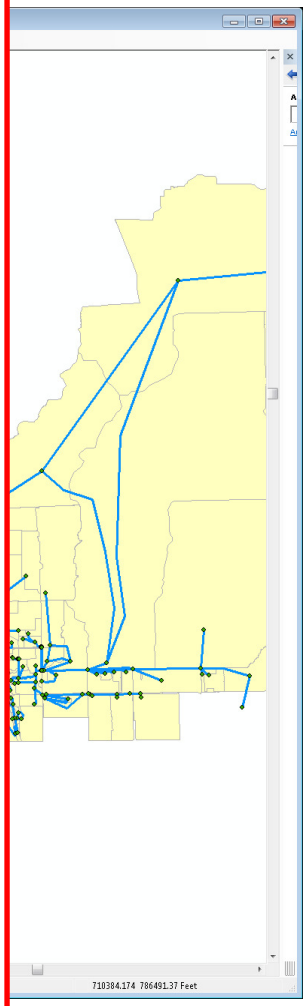
Working Folders

These are the folders the tool uses as locations for storing working data and outputs.

Scenarios Folder

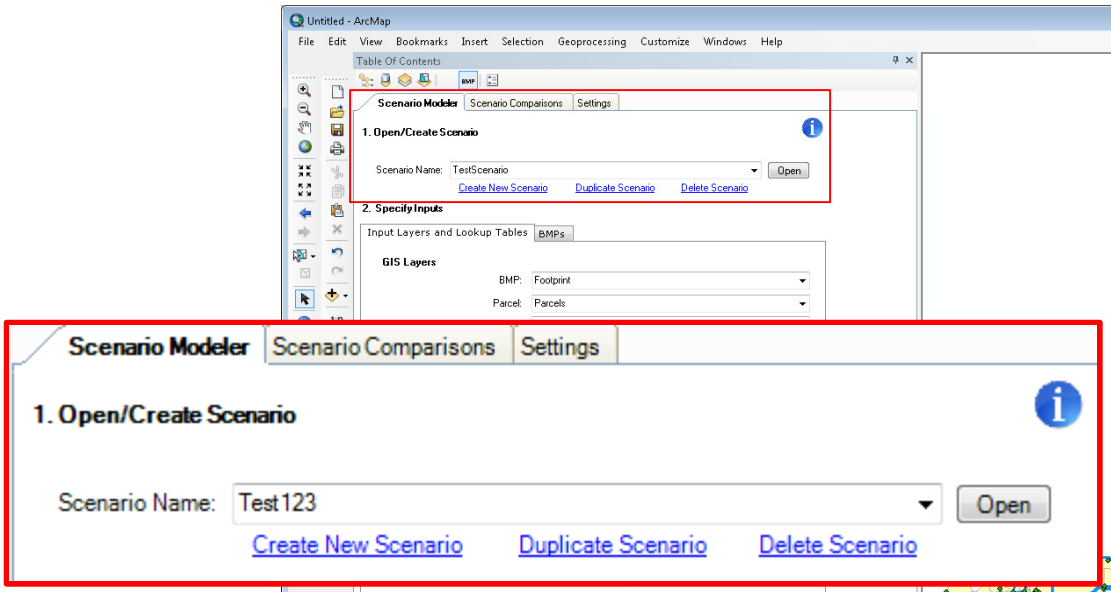
C:\Projects\BonitaSprings\DataOfRecord\Scenarios ...

This is the location on the network where scenarios geodatabases are created.



- Scenarios
- BMPLookupTables.gdb
  - CNbySoilLU
  - PctDCbyLU
  - PollutantLoadingByLanduse
  - RunoffC
  - SoilClasses
- CityData.gdb
  - BMP
  - BMPShed
  - Landuse
  - Parcels
  - Soils
- DCIA.gdb
  - Footprint
  - ParkingLot
  - Roads
- ICPR.gdb
  - Basin
  - Network_Link
  - Network_Node

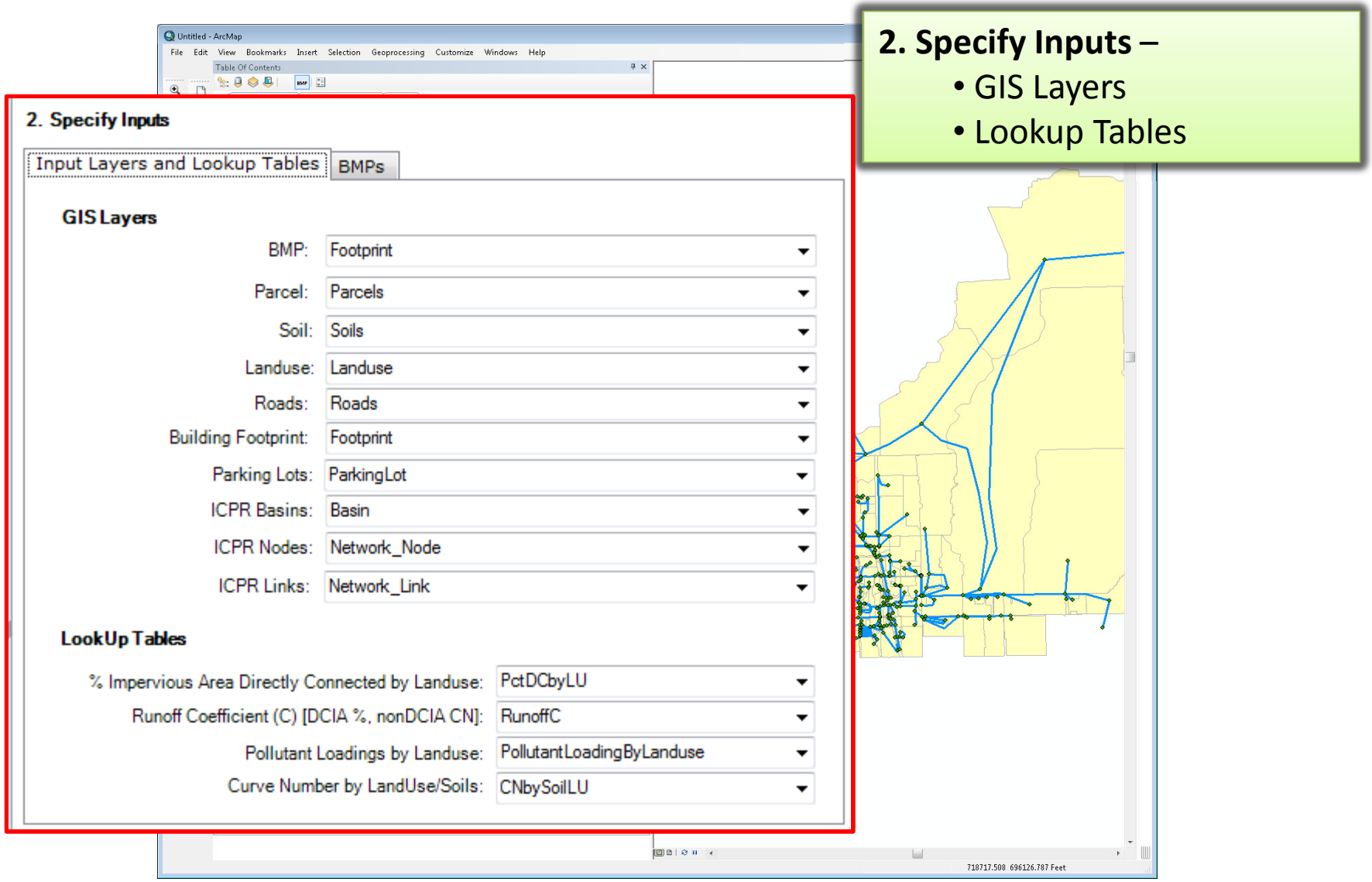
BMP Assessment Tool (BAT) Screen Shots (cont)



The **Scenario Modeler** tab is where the user (1) manages scenarios, (2) defines the GIS Layers and names of the required Lookup Tables, and (3) runs the pollutant loading evaluations.

1. Open/Create Scenario Modeler – management of scenarios: open existing, create new, duplicate, and delete scenarios.

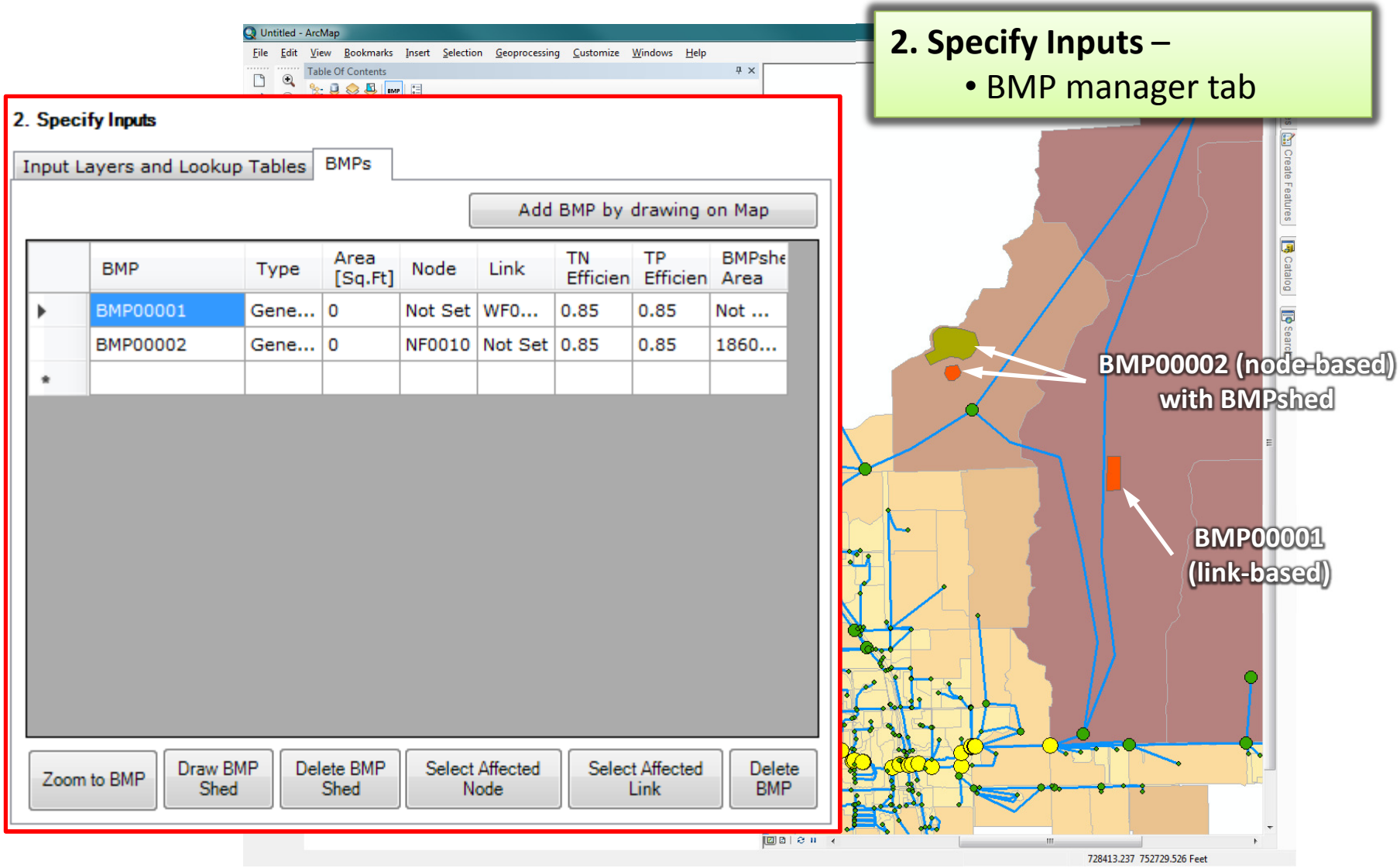
BMP Assessment Tool (BAT) Screen Shots (cont)



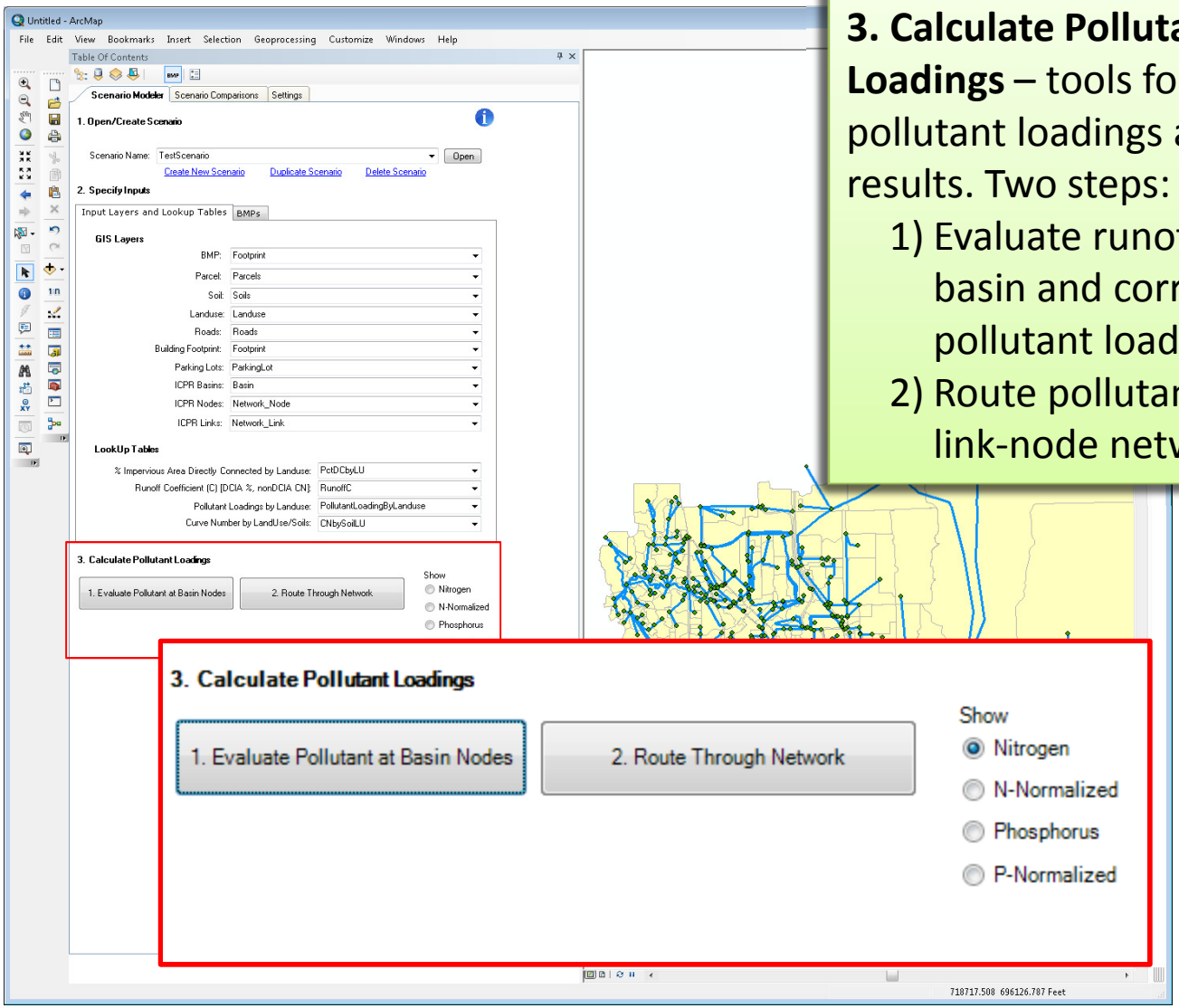
2. Specify Inputs –

- GIS Layers
- Lookup Tables

BMP Assessment Tool (BAT) Screen Shots (cont)



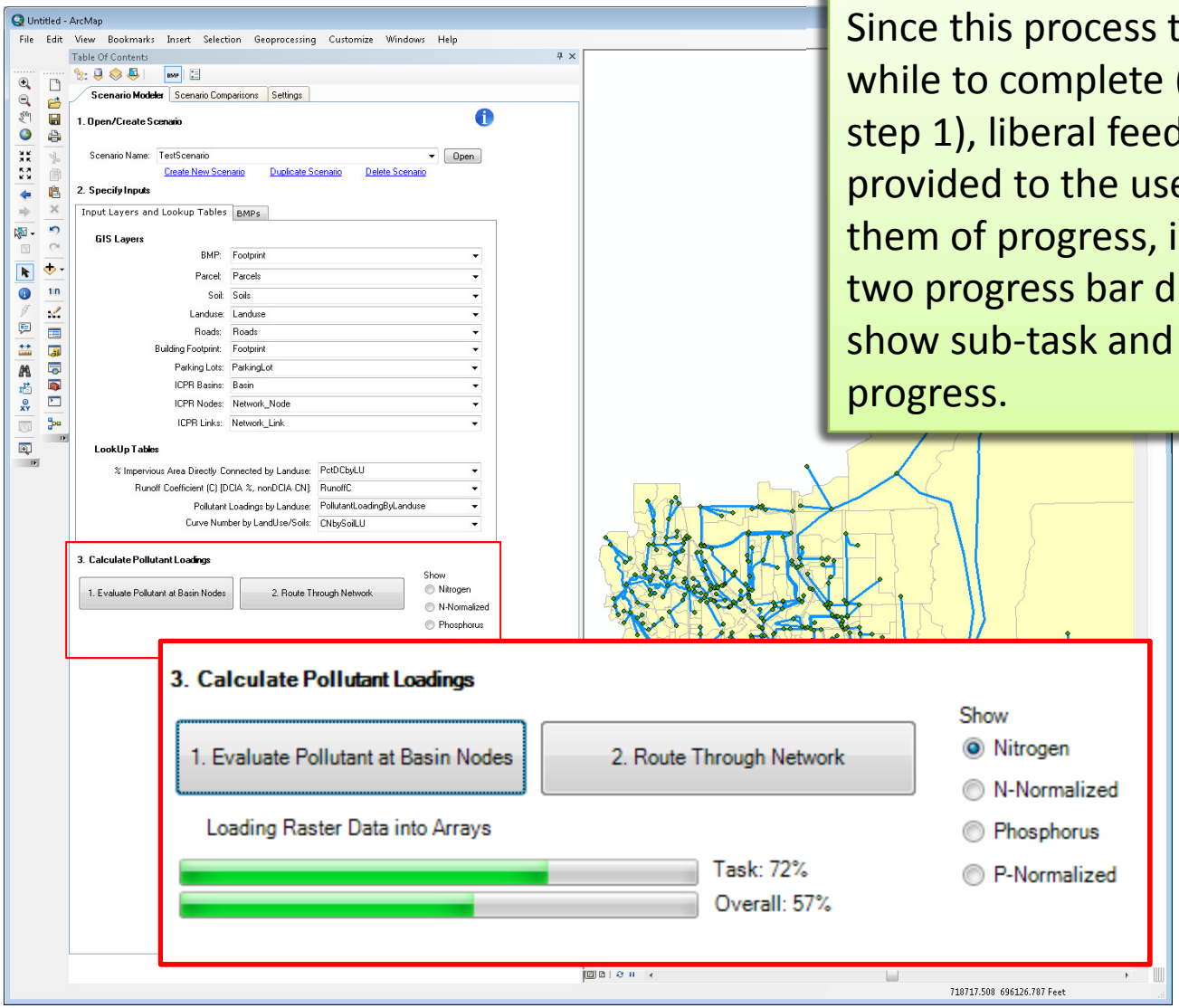
BMP Assessment Tool (BAT) Screen Shots (cont)



3. Calculate Pollutant Loadings – tools for evaluating pollutant loadings and viewing results. Two steps:

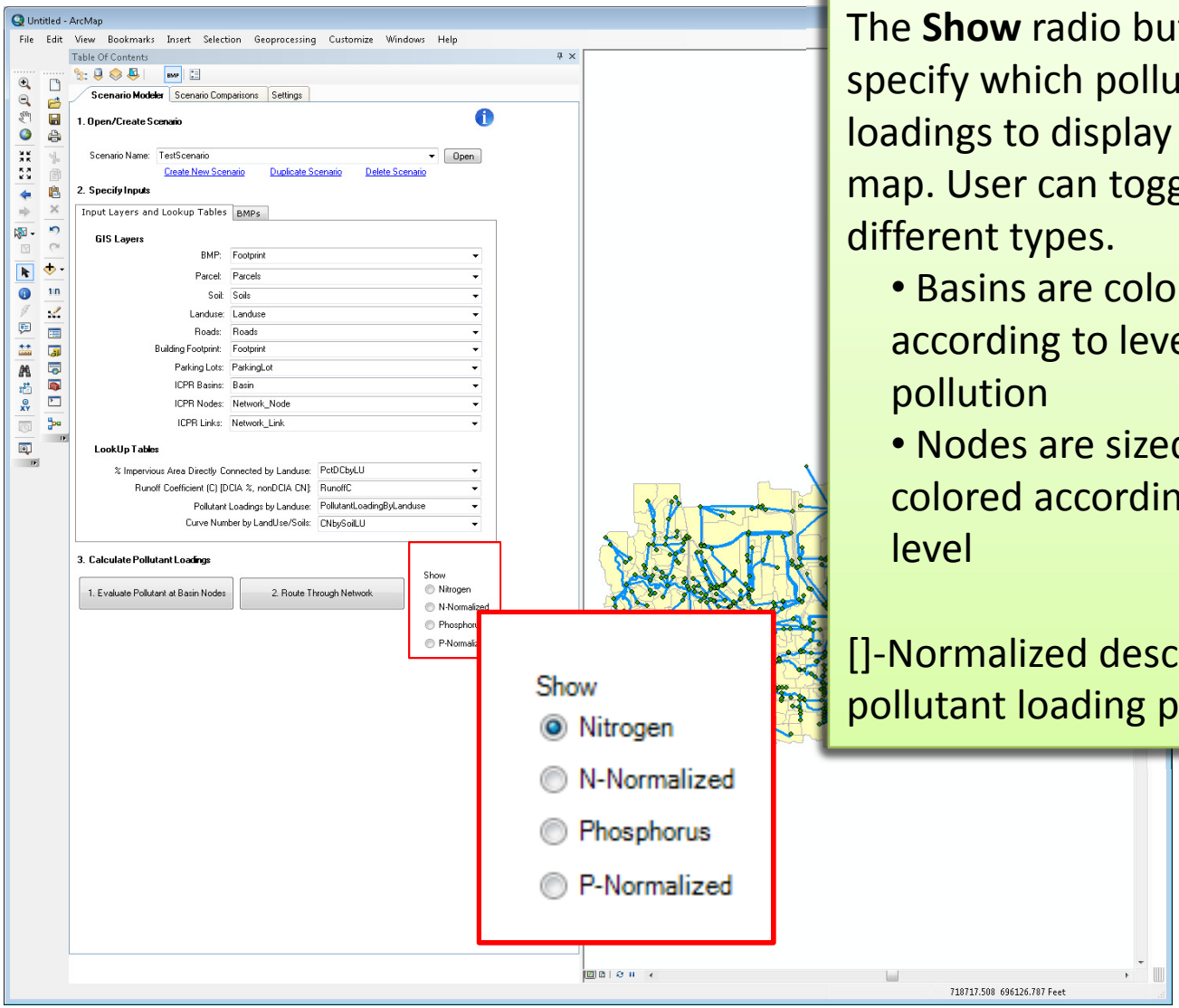
1) Evaluate runoff for each basin and corresponding pollutant load at node
2) Route pollutants through link-node network.

BMP Assessment Tool (BAT) Screen Shots (cont)



Since this process takes a while to complete (especially step 1), liberal feedback is provided to the user to inform them of progress, including a two progress bar display to show sub-task and overall progress.

BMP Assessment Tool (BAT) Screen Shots (cont)

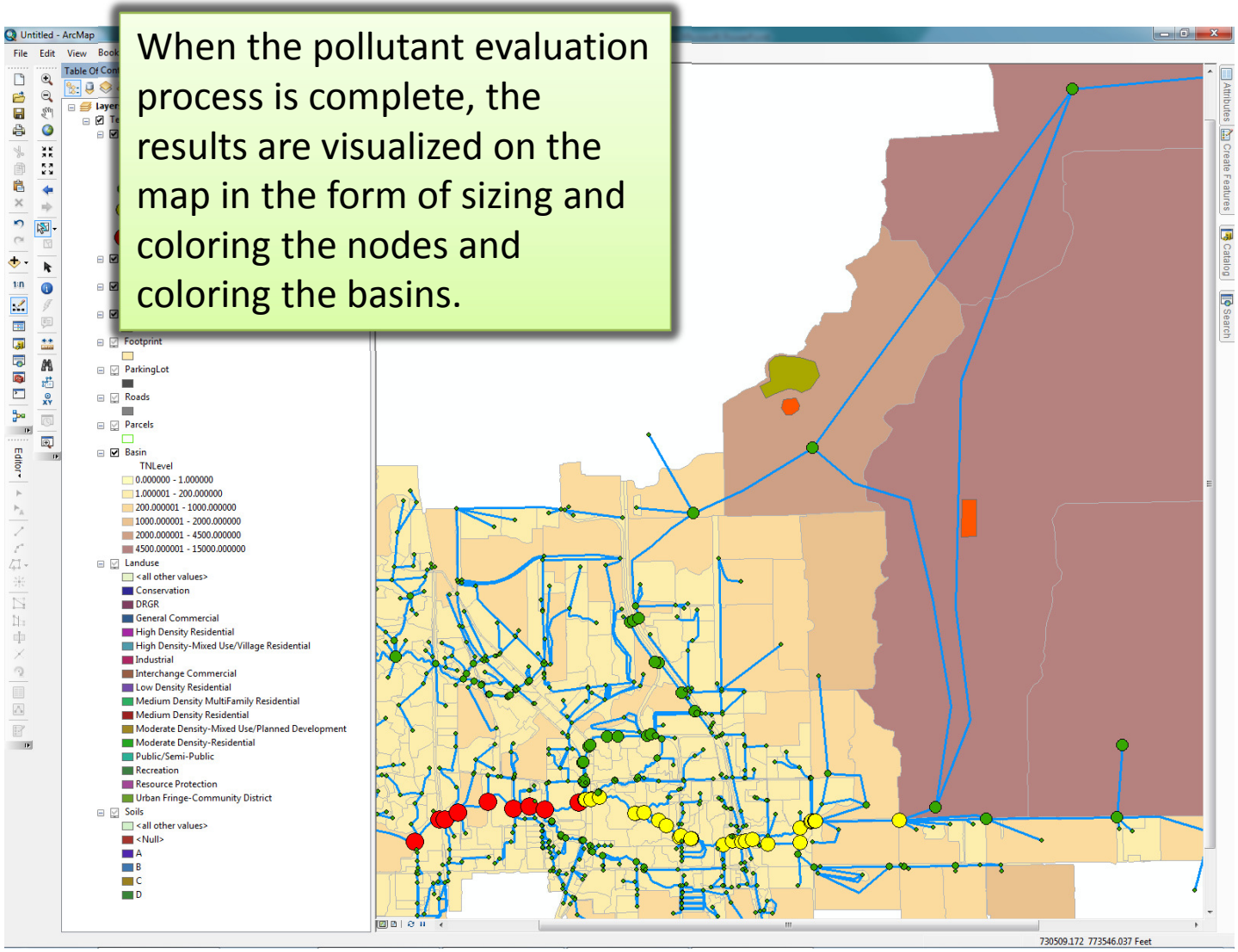


The **Show** radio buttons specify which pollutant loadings to display on the map. User can toggle between different types.

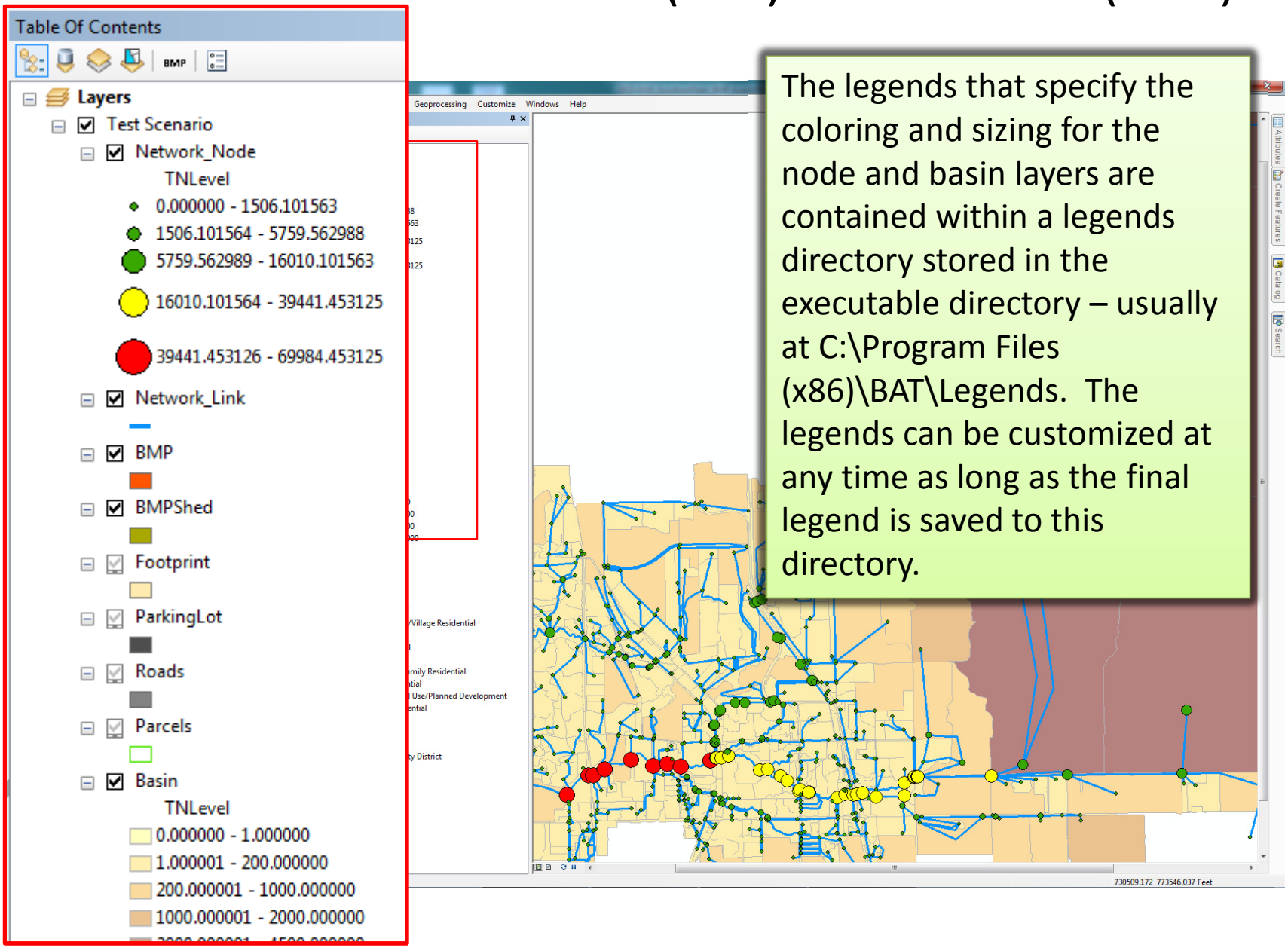
- Basins are colored according to level of pollution
- Nodes are sized and colored according to their level

[]-Normalized describes the pollutant loading per acre.

BMP Assessment Tool (BAT) Screen Shots (cont)

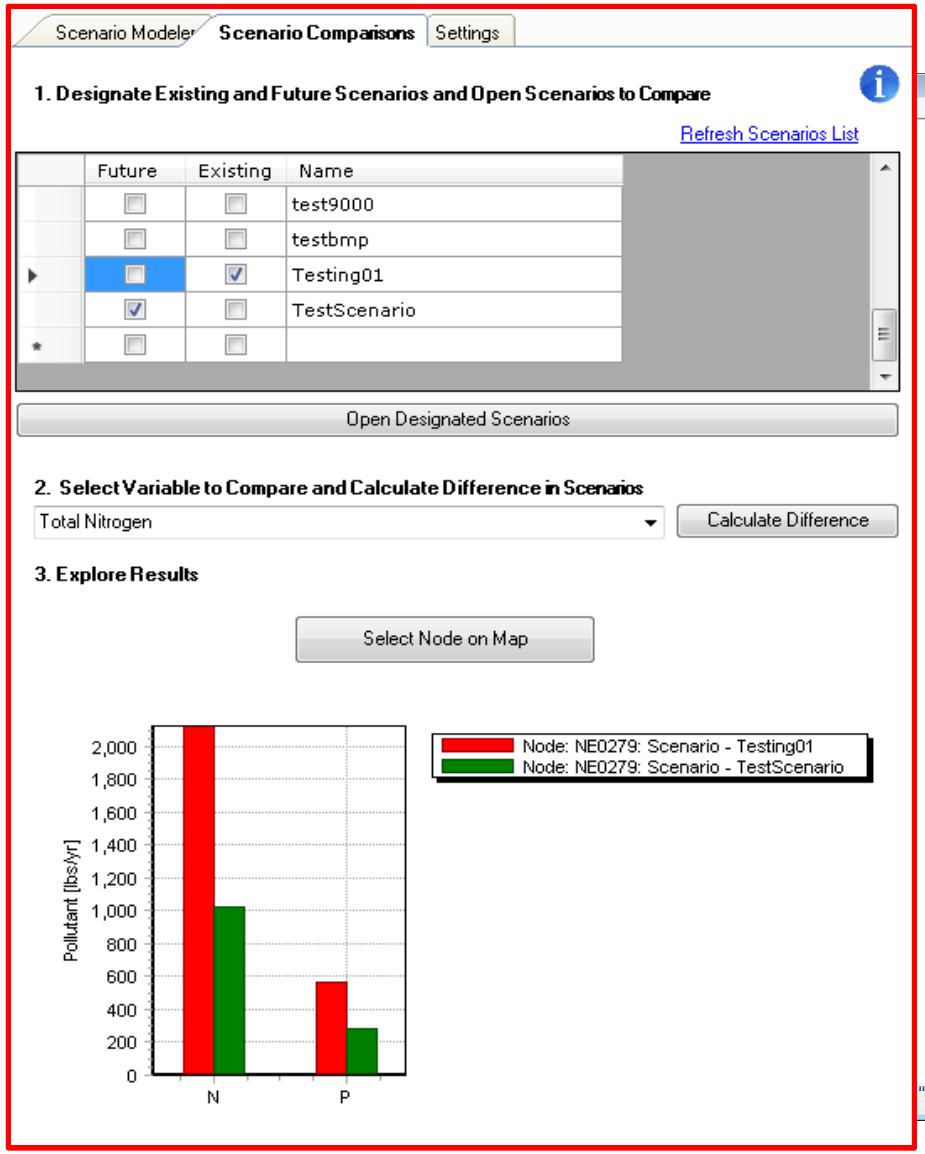


BMP Assessment Tool (BAT) Screen Shots (cont)



The legends that specify the coloring and sizing for the node and basin layers are contained within a legends directory stored in the executable directory – usually at C:\Program Files (x86)\BAT\Legends. The legends can be customized at any time as long as the final legend is saved to this directory.

BMP Assessment Tool (BAT) Screen Shots (cont)



The **Scenario Comparisons** tab is where the user selects different modeling scenarios for comparison.

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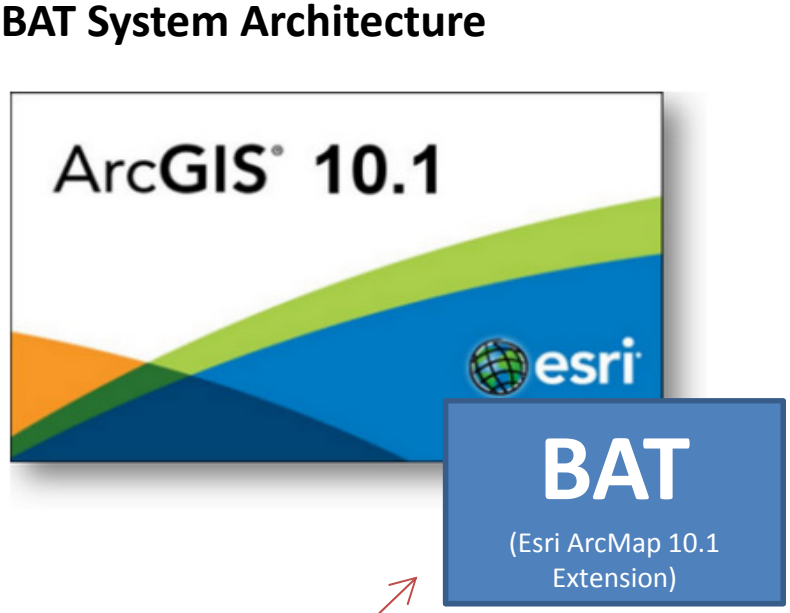
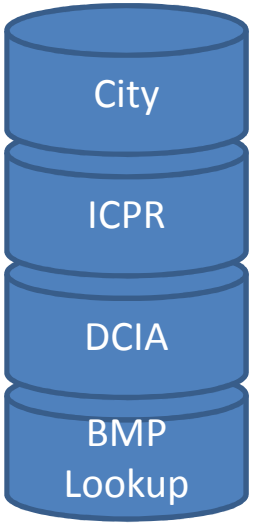
1. Select and open designated scenarios
2. Calculate the differences
3. Chart the results by selected node

BAT System Architecture

BAT System Architecture





Databases of Record

Store Official City GIS layers and FLDEP lookup tables for pollutant calculations.

Executable Directory

Typically at C:\Program Files (x86)\BAT

GDBDefaults.txt

Specifies default paths for Databases of Record and Scenarios Directory.

Legends

Stores legend (.lyr) files that give symbology for GIS layers.

Scenarios Directory

Stores all generated scenario databases.

More Information and Questions

Contacts:

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