

# SEDMODL2 Release version

December 2002

## User Manual

## 1.0 Installing and Configuring SEDMODL2

### 1.1 Installing Files and Coverages

- 1.1.1 Download the data and AMLs.
- 1.1.2 UNZIP the .zip file in both the LIB and COVERS directory.
- 1.1.3 Import the desired coverages in the COVERS directory
- 1.1.4 Type *externalall* while in the COVERS directory at the ARC prompt
- 1.1.5 Your directory structure should look like this: (directories in **bold**)

```
sedmodl
  -covers
    --<state abbreviation>geol
    --<state abbreviation>hydro
    --<state abbreviation>prec
    --<state abbreviation>state
  -docs
  -info
  -lib
```

### 1.2 PREPARING COVERAGES

- 1.2.1 SEDMODL2 requires that the coverages and grid used in the analysis be present in the SEDMODL2 workspace. The application provides tools for copying coverages and grids from another location. However, if you are using SDE layers you will need to extract these layers to the SEDMODL2 workspace first. Make sure the projection is defined on the extracted SDE layers. If a coverage extent is greater than the project area boundary you should clip the coverage to the project area boundary. Make sure polygon topology exists for polygon coverages. The elevation grid can be clipped by buffering the boundary polygon coverage with a minimum distance equal to four cell size units from your elevation grid. The cell size of the elevation grid being used can be determined by using the Arc describe command. For example, if the grid cellsize is 40 ft. then buffer the boundary polygon at least 160 ft.  

```
buffer <boundary coverage> <new buffered coverage> # # 160 # poly
```

Clip the elevation grid: 

```
latticeclip <elevation grid path and name> <new buffered coverage> <new elevation grid name>
```

 This extra buffer distance avoids no data problems along the edge of the grid.
- 1.2.2 Each coverage MUST have its' projection defined share a common coordinate system. Use the *describe* command to see if a coordinate system has been defined for a coverage. The *projectcopy* or *projectdefine* command used at the ARC prompt will allow the user to assign a coordinate system to a coverage or grid.
- 1.2.3 If an optional geology coverage is used, make sure to correctly calculate a geologic erosion factor using the guidelines in section 4.2.1 of the SEDMODL2 Technical Documentation. This factor must be calculated for each polygon in the coverage and should be carried as an attribute in the coverage's .PAT.

## **2.0 Starting and Running SEDMODL2**

### **2.1 Startup Menu**

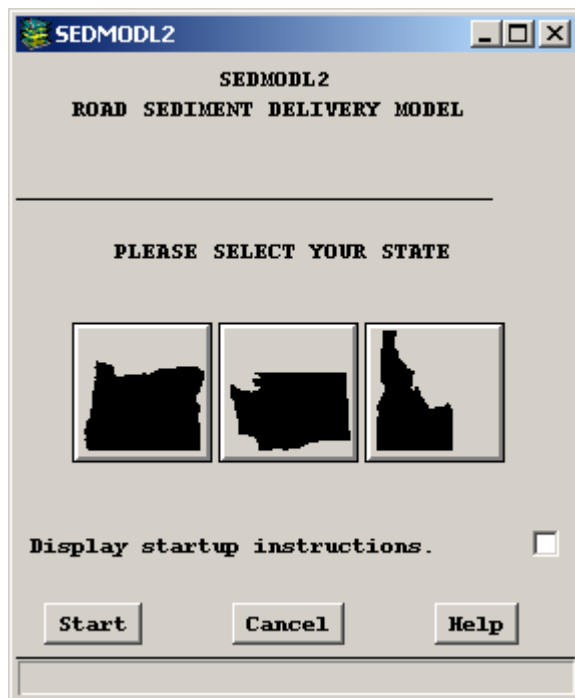
2.1.1 From the ARC prompt in the SEDMODL2 workspace type:

**&run start**

2.1.2 The first menu appears

2.1.3 Select the State Icon button that represents the area you want to run the model on. Selecting a state assists the program by identifying which state geology and rainfall factor coverage to use. If the project area is located in different state then you must provide a geology coverage and a rainfall factor coverage. In this case click any of the three states.

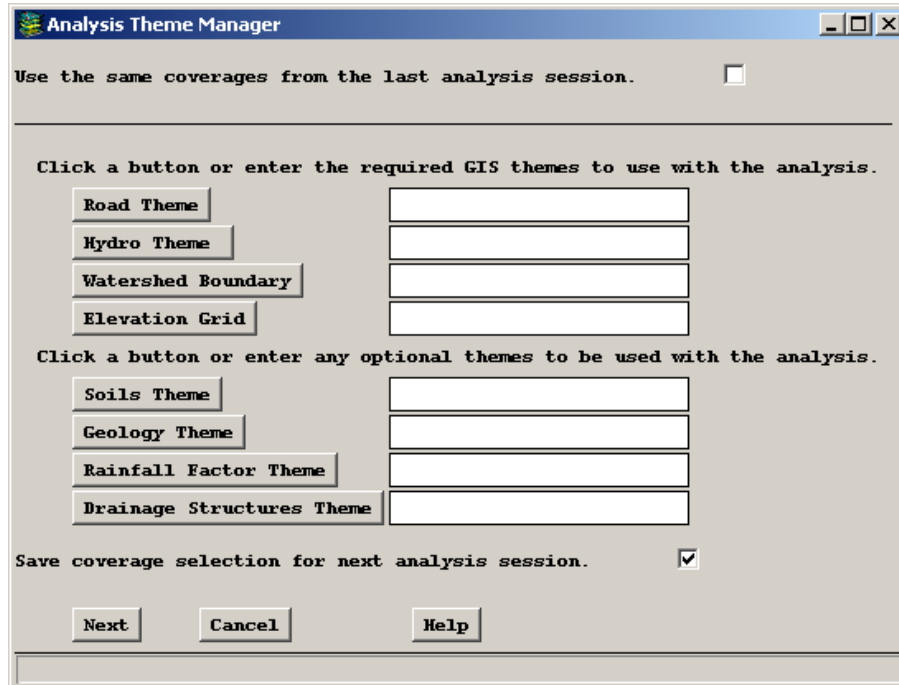
2.1.4 When done, press the **start** button to continue to the next menu.



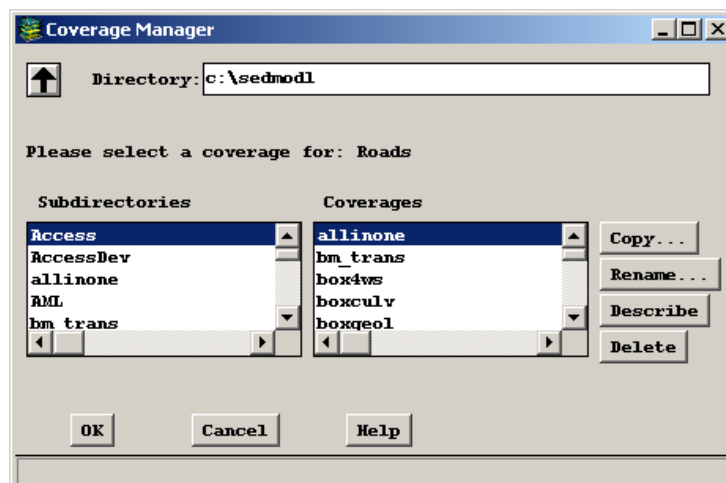
## 2.1 Theme Manager

The Analysis Theme Manager assists the user with locating and identifying the required and optional coverages and elevation grid to be used during the model run. SEDMODL2 will allow the user to load the same GIS data used in a previous analysis session by placing a check mark in the first row of the menu titled "Use the same coverages from the last analysis session. The program defaults to saving the current coverage selection. If you don't want SEDMODL2 to retain this information then uncheck the last menu row titled "Save coverage selection for next analysis session.

The user can either type the coverage name directly into the text box to the right of each coverage selection button, or click on the coverage selection button to bring up the coverage manager menu.



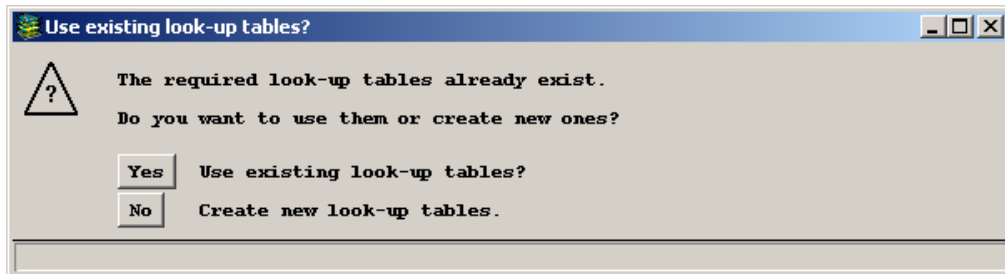
The coverage manager menu assists the user with copying, renaming, describing or deleting.



After required coverages, an elevation grid and any optional coverages have been identified the user can click on the Next button.

SEDMODL2 will perform some basic validation on the coverages and warn the user of any problems encountered.

If a previous analysis session has been run in the SEDMODL2 workspace and the required look-up tables exist, the user will be prompted to indicate whether they want to import the look-up tables into the current session. These look-up tables are used by SEDMODL2 to relate the users' road coverage items to the model parameters. This functionality allows SEDMODL2 to accommodate a wide range of data definitions. If a road coverage data model is static then it is only necessary to map the road coverage items to model parameters once. These settings are maintained in look-up tables and can be used a latter time by SEDMODL2.





## 2.2 Model Parameters Identification Menu

If the user selects no from the “Use Look-Up Tables message box, or the required look-up tables do not exist the Model Parameters identification menu is presented.

Checking for existence of model parameters...

Please indicate whether your road coverage contains item values relating to the following model parameters.

Please select which parameters exist in your road coverage:

- ☐ Road Class (highway, primary, secondary, etc.)
- ☐ Road Surface Type (gravel, pit run, native, etc.)
- ☐ Road Width (measured in feet)
- ☐ Level of Road Use
- ☐ Road Gradient
- ☐ Cutslope Height
- ☐ Cutslope Vegetation Cover (percent)
- ☐ Road prism geometry (inslope, outslope, or crowned)
- ☐ Year of road construction (Format: YYYY)

☐ My road coverage has none of these parameters, run with default values.

or

☐ A single item is a surrogate for all Road Class, Surface, Width, and Use parameters.

Next Cancel Help

SEDMODL2 accommodates a wide range of possible combinations of road coverage data attributes. At a minimum SEDMODL2 must model three user supplied attributes.

These required attributes include:

- Road Surface type
- Road Width (Tread + Ditch)
- Traffic Level

If none of these attributes are present on the road coverage then SEDMODL2 will prompt the user to select from a set number of choices for each of the three categories. Or, if the road data only has a designation of road class the user can assign values for each of the three required parameters to a road class type.

SEDMODL2 will detect whether the road coverage has no more than the standard seven attributes required for an ArcInfo line coverage and independent of the users interaction prompt the user to select values for the three parameters. If this is the case then this menu will not be displayed to the user.

If the road coverage has more than the standard seven attributes required for an ArcInfo line coverage present but none of the items provide information for the three required parameters the user can select the menu choice title “My road coverage has none of these parameters, run with default values.” This selection will prompt the user to identify values for the three parameters.

Another potential data model can include a single item that acts as a surrogate for each of the required parameters. An example would be an item coded as 43 that represents a main haul road with gravel surfacing. If the user wants to use a single item as a surrogate for the required parameters then place a check in the check box for "A single item is a surrogate for all Road Class, Surface, Width and Use Parameters."

The remaining option for selecting parameter values on the coverage is to individually select the following parameters:

- Road Class – If a road class designation is present on the coverage.
- Road Surface Type – If the type of surfacing is known.
- Road Width – If the road width is known.
- Level of Road Use – If traffic patterns are known.
- Road Gradient – If Road gradient is available as an attribute on the road coverage it must be expressed as a whole number greater than or equal to 0. Code records where no data exists to -9999 prior to running SEDMODL2. No data records will be modeled using values derived from the DEM.
- Cutslope Height – If Cutslope Height is available as an attribute on the road coverage it must be measured in feet and can be recorded in tenths of a foot. Code records where no data exists to -9999 prior to running SEDMODL2. No data records will be modeled using values derived from the digital elevation model (DEM).
- Cutslope Vegetation Cover (includes rock or non-erosive surface) – If Cutslope Cover is available as an attribute on the road coverage it must be expressed as a number ranging from 0 to 100. Code records where no data exists to -9999 prior to running SEDMODL2. No data records will be modeled using a user supplied default value.
- Road Prism Geometry – If Road Prism Geometry is available as an attribute on the road coverage it must be defined as a text data type with legal values of "INSLOPED", "OUTSLOPED", or "CROWNED". Unpopulated records will be modeled as "INSLOPED." Outsloped roads with a berm should be coded as insloped.
- Construction Year – The affects of new roads can be modeled if the construction year is known for a given road segment and that item is available and specified by the user. The user will have an opportunity to specify a reference year that will be used by the model to calculate road age from. This functionality allows the user to *go back or forward in time* to determine the effect of road age on sediment production. The format of construction year must be yyyy.

A new output directory structure has been developed to organize project results into.

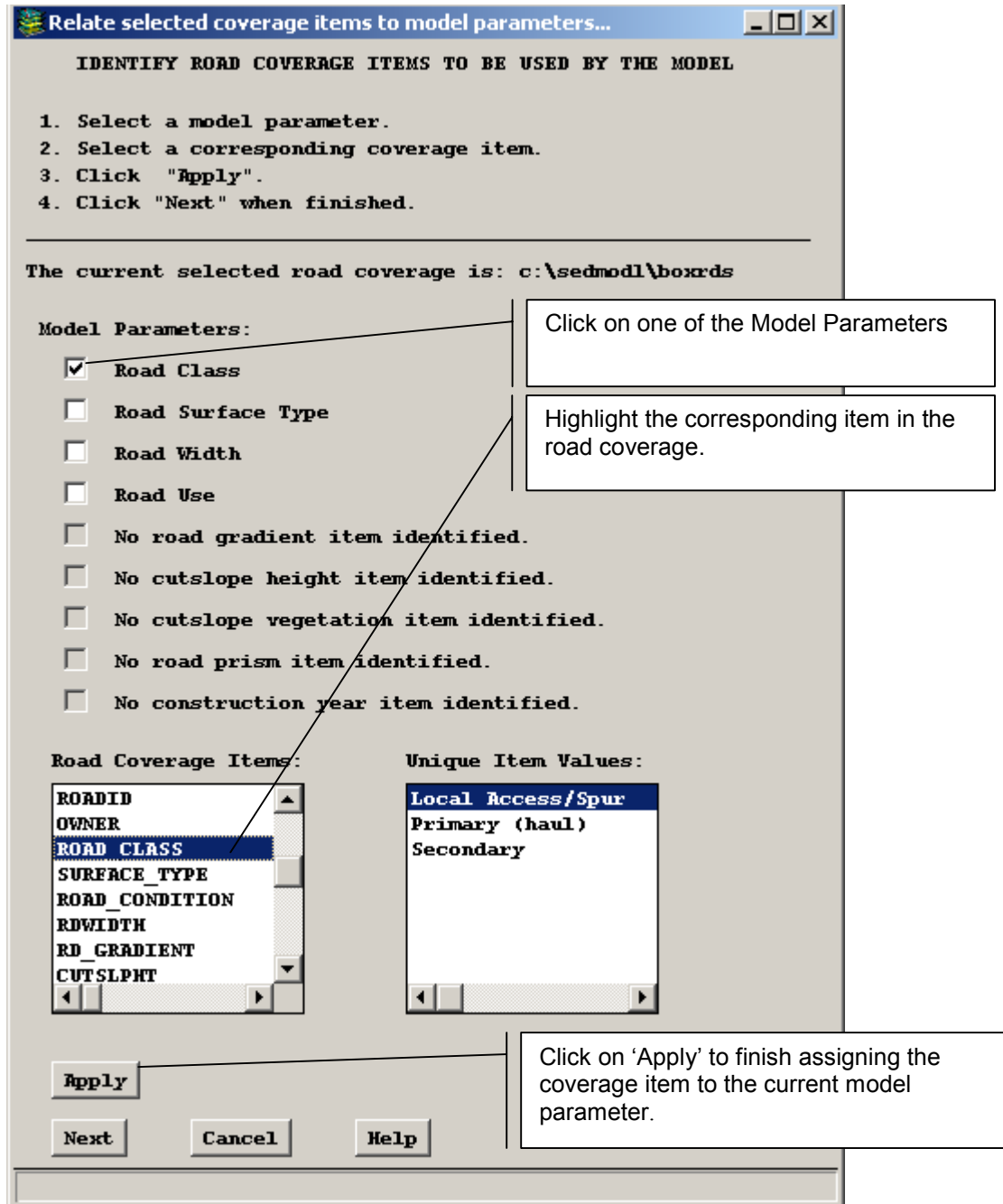
```
Your project area has been processed through Sedmodl.
The directory structure for the output is listed below.

c:\sedmodl\TST_010523\
|__access (sedmodl.dbf, db_ini.dbf, TST_010523.mde)
|__aml (map.aml)
|__docs (TST_3-010523.txt)
|__graphics (TST_map.gra)
|__info
|__outcovs\
|   |__TST_rdsed
|   |__TSTbdry
|   |__TSThydro
|   |__info
|__shapefiles (TSTsegs.shp)
```

At the completion of a SEDMODL2 analysis session, the user can locate a new workspace located directly below the root SEDMODL2 workspace. The naming convention for this workspace is the three letter prefix specified by the user during the SEDMODL2 run (or in the boundary polygon coverage if SEDMODL2 is run in batch mode) an underscore ("\_") and the date the analysis was completed (date format = yymmdd). Six subdirectories and one additional workspace are located beneath this new workspace. The contents of these subdirectories is:

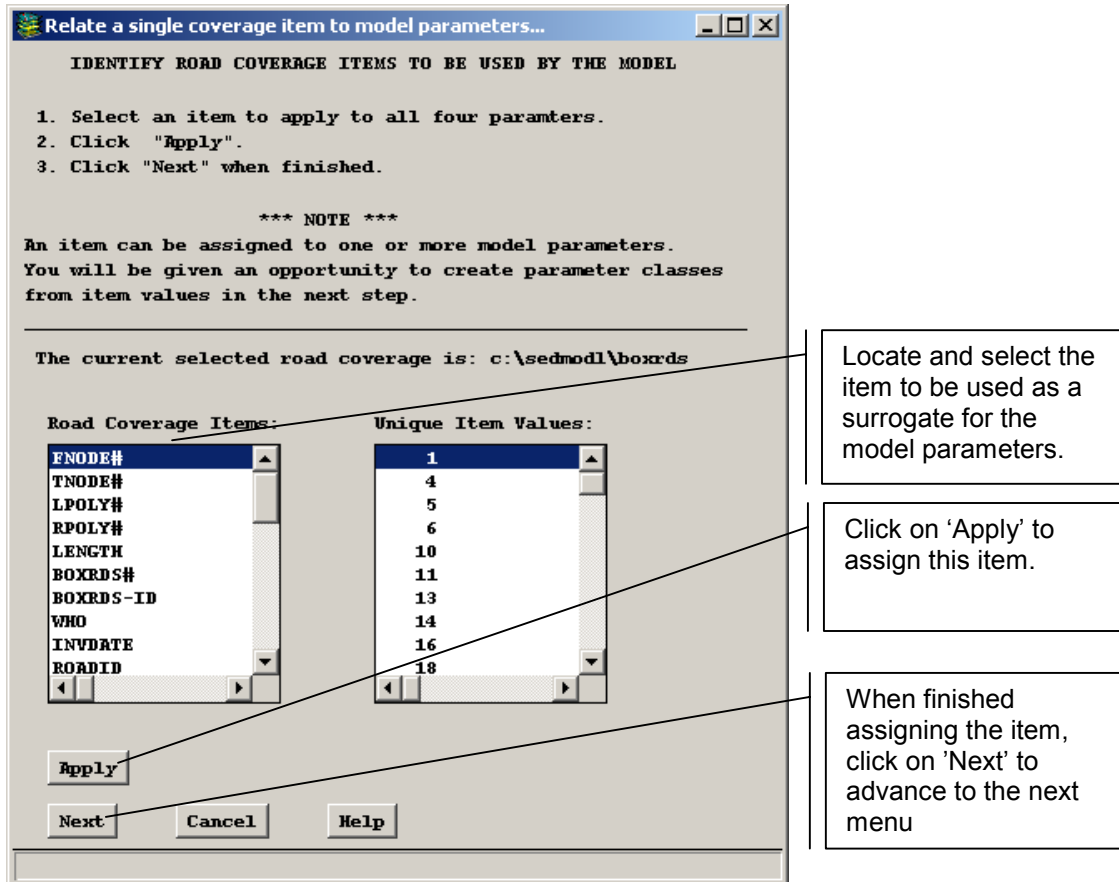
- access – This subdirectory contains the dBase files that will be imported into SEDMODL2 scenario modeler, and a copy of the Access application that should be used to import the files into.
- aml – This subdirectory contains the map composition program that can be edited or run to produce the map composition for the project area.
- docs – This subdirectory contains the documentation file that describes the input parameters and results of the analysis session.
- graphics – This subdirectory contains the ArcInfo graphics file that was created from the map composition.
- outcovs – This workspace contains the output road coverage as well as the boundary and hydrography coverages. The Access application expects to find these coverages in this subdirectory.
- shapefiles – This subdirectory contains a shapefile that is based on the route created during the SEDMODL2 run.

The following menu example illustrates a case where the user has indicated that Road Class, Road Surface, Road Width, and Road Use exists as items on the road coverage.



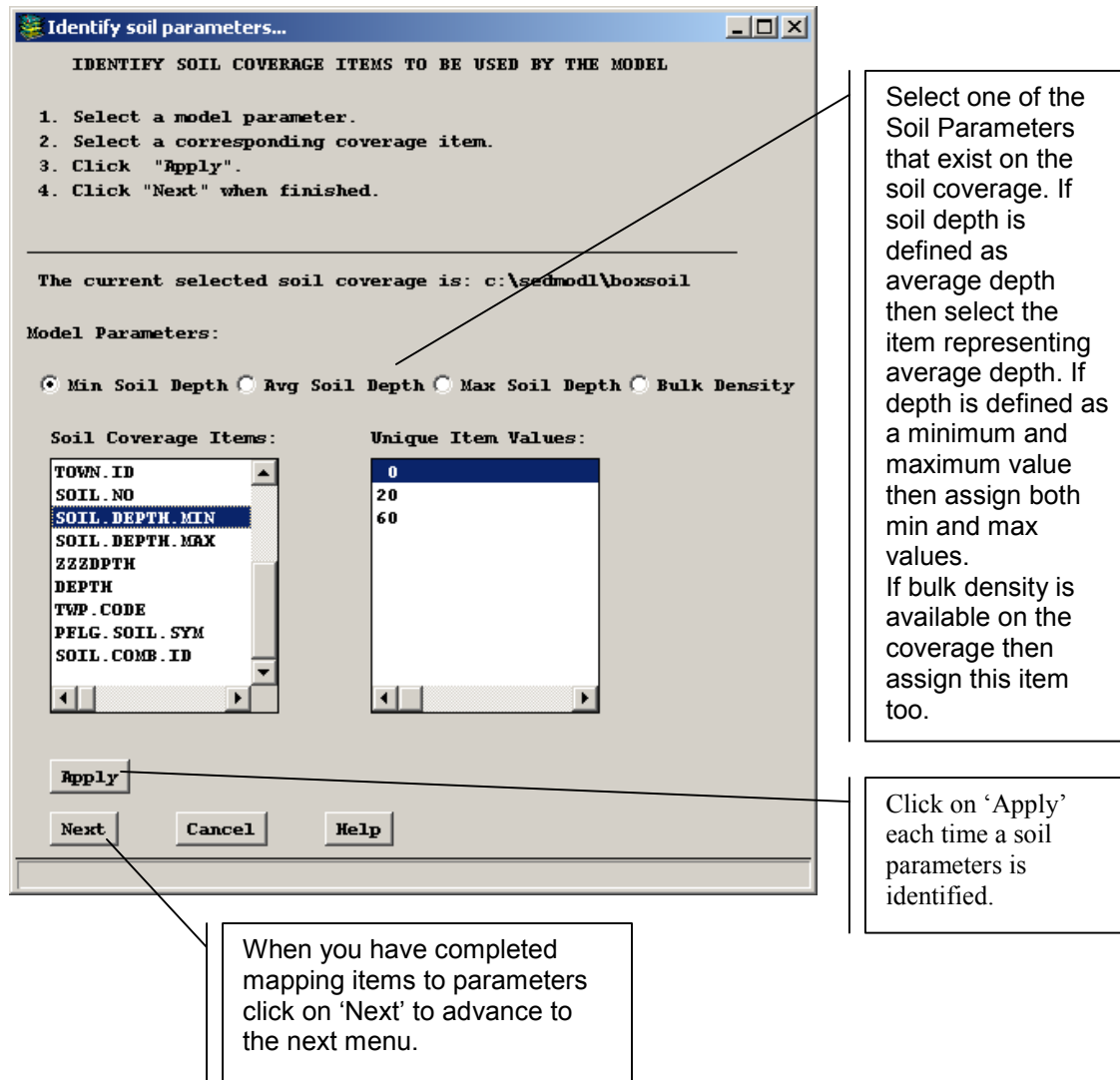
Repeat the process for each of the items you identified as being present on the road coverage. When all items have been assigned to a parameter the user can click on 'Next' to advance to the next menu. Note that items not identified as being present on the road coverage are disabled.

If the user indicates that one item is a surrogate for model parameters then the user will be presented with the following menu instead of the Selected Items menu.



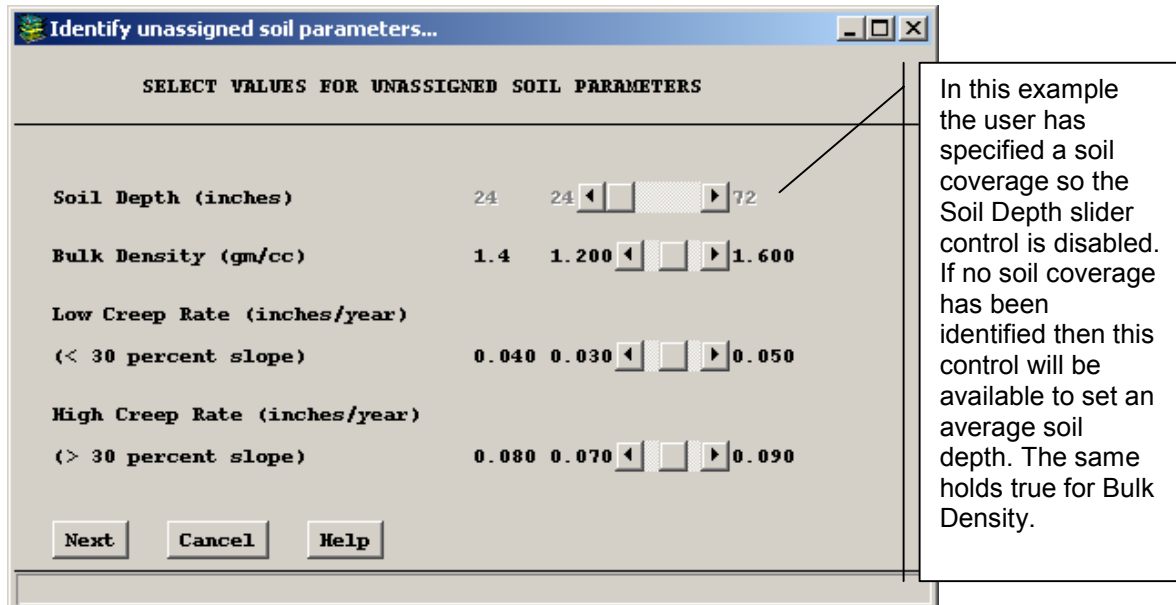
If optional coverages were identified to be used in the current SEDMODL2 analysis session then the user will be asked to identify key items that relate to the corresponding model parameters.

For example, if a soil coverage is provided the Identify Soil Parameters menu will be presented.



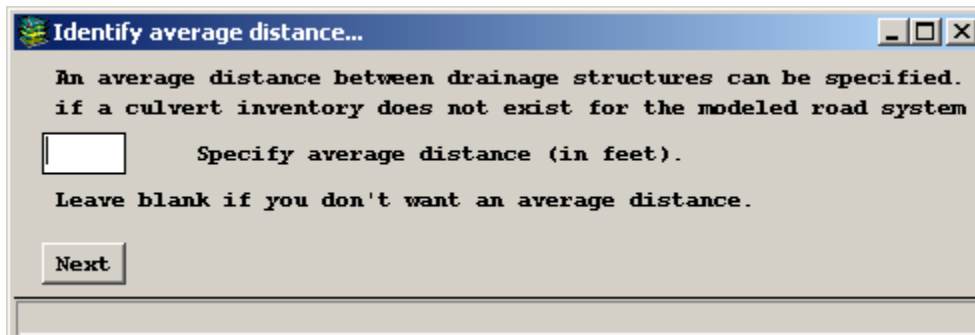
If a Geology coverage and Rainfall Factor coverage are specified, the user will be asked to perform similar tasks for mapping coverage items to model parameters

The soil factors menu will be presented to the user next to complete assigning model parameters to user supplied values.

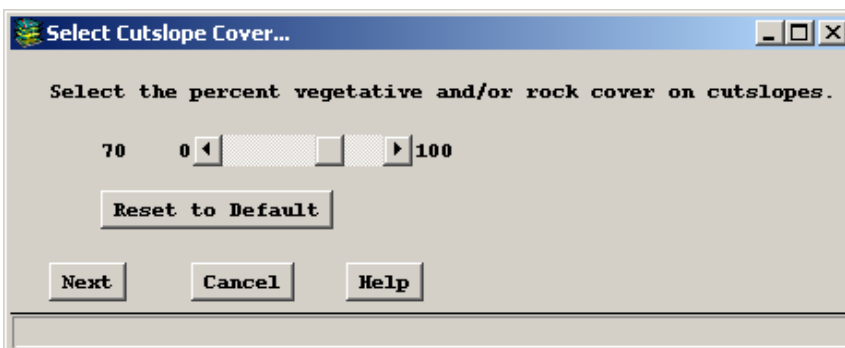


Assign a soil creep rate for the two slope breaks. Click on 'Next' to advance to the next menu.

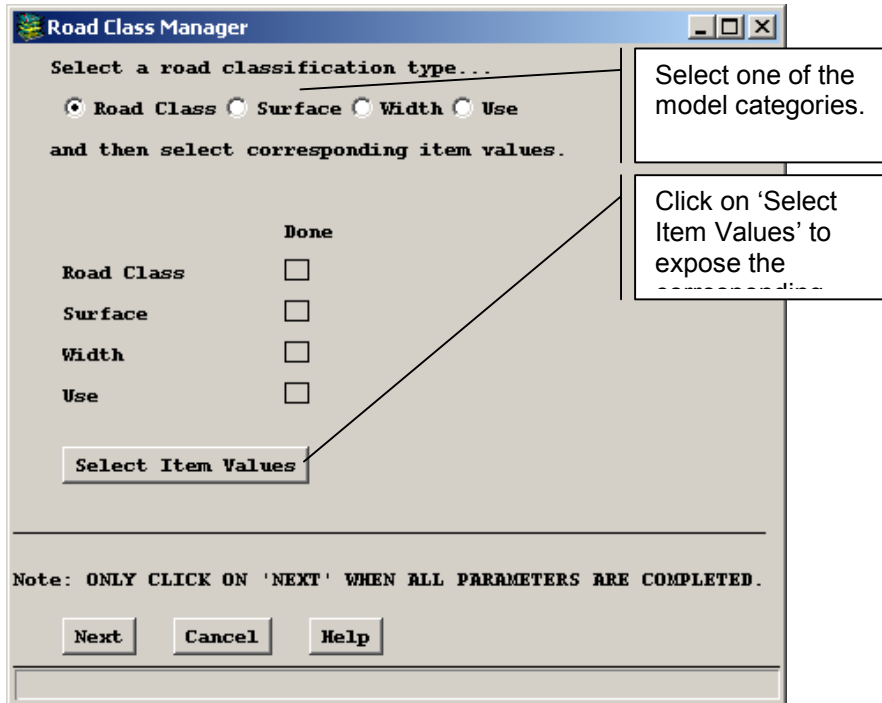
If a drainage structure coverage has not been specified then the user has the option to specify an average drainage spacing distance that will be used to shorten road segments (arcs) into the specified distance. The menu for identifying this distance appears as:



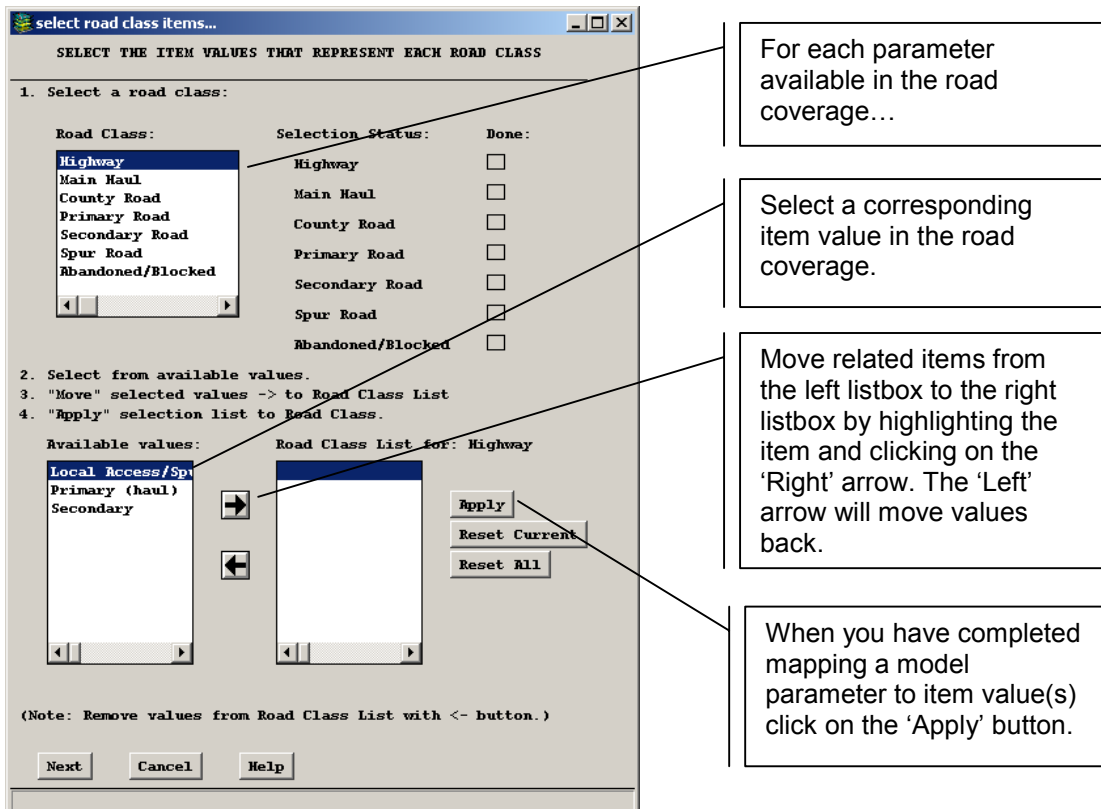
If an item on the road coverage for Cutslope Cover has not been identified then the user can specify a default value to be applied to all roads in the analysis area. The Cutslope Cover menu appears as:



If items were identified as being present on the road coverage then it is necessary to map the item values to corresponding model parameters. The Road Class Manager menu provides the tools to do the item to parameter mapping.



An example of an item-to-parameter menu is:





Complete this process for each of the four parameters listed on the Road Class Manager Menu.

Road width can be related to Road Class by the following menu:

**Select Road Widths...**

Load default values. ☐

Road Width	Min	Max
Highway	30	120
Main Haul	20	40
County Road	15	60
Primary Road	15	35
Secondary Road	10	30
Spur Road	10	20
Abandoned/Blocked	10	30

Save values as default. ☐

Reset to Original Defaults

Next Cancel Help

Road Use can be related to Road Class in the following menu:

**Select Road Use...**

Select a level of use for each road class.

Highway	<input type="radio"/> None	<input type="radio"/> Occasional	<input type="radio"/> Light	<input type="radio"/> Moderate	<input type="radio"/> Moderately Heavy	<input checked="" type="radio"/> Heavy
Main Haul	<input type="radio"/> None	<input type="radio"/> Occasional	<input type="radio"/> Light	<input type="radio"/> Moderate	<input type="radio"/> Moderately Heavy	<input checked="" type="radio"/> Heavy
County Road	<input type="radio"/> None	<input type="radio"/> Occasional	<input type="radio"/> Light	<input type="radio"/> Moderate	<input checked="" type="radio"/> Moderately Heavy	<input type="radio"/> Heavy
Primary Road	<input type="radio"/> None	<input type="radio"/> Occasional	<input type="radio"/> Light	<input checked="" type="radio"/> Moderate	<input type="radio"/> Moderately Heavy	<input type="radio"/> Heavy
Secondary Road	<input type="radio"/> None	<input type="radio"/> Occasional	<input checked="" type="radio"/> Light	<input type="radio"/> Moderate	<input type="radio"/> Moderately Heavy	<input type="radio"/> Heavy
Spur Road	<input type="radio"/> None	<input checked="" type="radio"/> Occasional	<input type="radio"/> Light	<input type="radio"/> Moderate	<input type="radio"/> Moderately Heavy	<input type="radio"/> Heavy
Abandoned/Blocked	<input checked="" type="radio"/> None	<input type="radio"/> Occasional	<input type="radio"/> Light	<input type="radio"/> Moderate	<input type="radio"/> Moderately Heavy	<input type="radio"/> Heavy

Reset to Original Defaults

Load default values. ☐

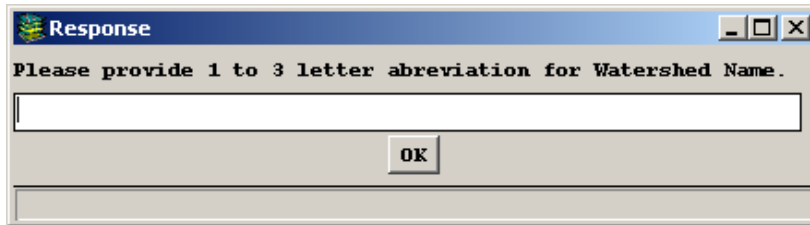
Save current settings as defaults. ☐

Next Cancel Help

Click on the 'Next' button to advance to the next menu after completing all requirements of the Road Class Manager menu.

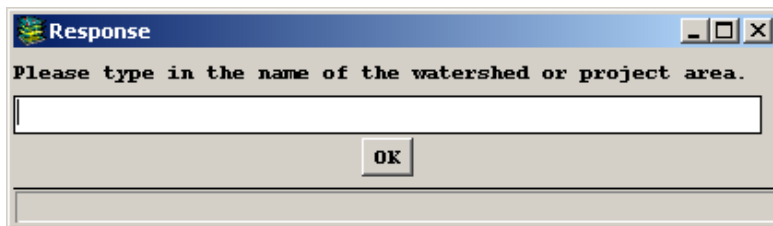
In order to create a unique reference for the current project a three-letter prefix is assigned to the output road coverage, application added item names within the coverage, and report names. The user is requested to provide this three-letter prefix as well as a more descriptive project title (watershed name).

The three-letter prefix identification menu appears as:



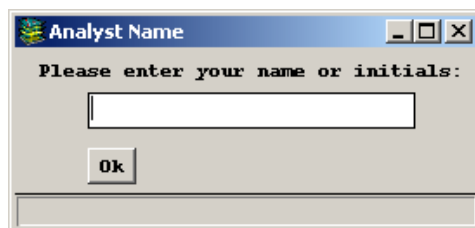
A screenshot of a Windows-style dialog box titled "Response". The dialog has a blue title bar with a small icon on the left and standard minimize, maximize, and close buttons on the right. The main text area contains the instruction "Please provide 1 to 3 letter abbreviation for Watershed Name." in a monospaced font. Below the text is a single-line text input field. At the bottom center of the dialog is an "OK" button.

The project title menu appears as:



A screenshot of a Windows-style dialog box titled "Response". The dialog has a blue title bar with a small icon on the left and standard minimize, maximize, and close buttons on the right. The main text area contains the instruction "Please type in the name of the watershed or project area." in a monospaced font. Below the text is a single-line text input field. At the bottom center of the dialog is an "OK" button.

The user is also asked to provide their name which will be included in the documentation file.



A screenshot of a Windows-style dialog box titled "Analyst Name". The dialog has a blue title bar with a small icon on the left and standard minimize, maximize, and close buttons on the right. The main text area contains the instruction "Please enter your name or initials:" in a monospaced font. Below the text is a single-line text input field. At the bottom center of the dialog is an "Ok" button.

Once the required information has been provided, the user is presented with a documentation report to review. The user should take the time to review this report to insure that the model run is based on correct assumptions.

After reviewing the report the user will be provided an opportunity to edit certain elements, close the application and start over, or continue on with the model run.

## Item Definitions Defined by SEDMODL2

The following items are added to various coverages and grids during the model run. If these items exist on you coverages or grids the values may be overwritten by SEDMODL2. If they do exist they must be defined in a manner consistent with the definition listed below.

Please substitute the variable `%.name%` with the three letter prefix requested from the user by SEDMODL2.

`%.name%_age 4 5 b`

`%.name%_ccf 6 6 n 4`

`%.name%_csacre 16 16 n 8`

`%.name%_cutslp_sed 16 16 n 3`

`%.name%_df 5 5 n 2`

`%.name%_miles 16 16 n 4`

`%.name%_precf 16 16 n 4`

`%.name%_ratio 5 5 n 2`

`%.name%_rdacres 16 16 n 3`

`%.name%_rdwidth 16 16 n 2`

`%.name%_rgf 4 4 n 2`

`%.name%_seg_id 4 5 b`

`%.name%_seg_sumsed 8 18 f 6`

`%.name%_seg_sumtrd 8 18 f 6`

`%.name%_seg_wacslpht 8 18 f 6`

`%.name%_seg_wawdth 8 18 f 6`

`%.name%_sf 4 4 n 2`

`%.name%_sumsed 16 16 n 2`

`%.name%_tf 6 6 n 2`

`%.name%_tread_sed 16 16 n 3`

`%.name%_ttl_sed 16 16 n 3`

`%spot_item% 4 12 f 3`

`rdclassval 1 1 i`

`rdsurfval 1 1 i`

`rduseval 6 6 n 2`

`rdwidth 3 3 i`

`bdens 16 16 n 9`

`class_brks 1 1 i`

`cslphei 5 5 n 1`

`delcode 1 1 i`

`delnum 10 10 i`

`depth`

depth 6 6 n 1  
dist%bnum% 4 4 i  
elev 6 6 i  
elev 4 5 b 0  
grd 10 10 n 3  
grd 2 2 i  
hsgf 5 5 n 1  
hsgrad 3 3 i # slope  
l2 16 16 n 4  
new 6 6 c  
rate 8 8 n 5  
s2 16 16 n 8  
sed 16 16 n 5  
seg\_id 6 6 i  
sitx 20 20 c  
slope 5 5 i  
slpf 3 3 n 1  
tmp 12 12 c  
tmp%cntr% 12 12 c  
tmp\_ccf 8 18 f 4  
tmpval 16 16 n 1  
water 1 1 i  
wmrdslp 16 16 n 1  
xlink 6 6 i  
xyzdel 3 3 i

## Model Parameters provided By User

SEDMODL2 accommodates a wide range of road information associated with ArcInfo road coverage. Road surface type, road width, and road traffic use are the basic elements required by SEDMODL2. Other attributes are derived from the elevation grid, soil, geology, and rainfall factor polygons. Additional attributes can be available on the road coverage that:

- override values derived from the elevation grid;
- feature level attributes that localize model parameters otherwise modelled as a single value for all roads;
- other attributes not previously addressed by SEDMODL2.

In order to achieve the desired results from a SEDMODL2 run it is important that effective database design and development occur. Failure to do so may skew the results of the model run or generate unreliable results.

## Overriding Values Derived from the Elevation Grid

With SEDMODL2, feature level attributes relating to cutslope height and road gradient can override values previously derived from the elevation grid. To avoid potential errors or misrepresentation of model results please review this section and make certain your data conforms to these standards.

Cutslope height – Cutslope height is measured in feet. Height can be recorded in tenths of a foot. Code records where no data exists to –9999 prior to running SEDMODL2. No data records will be modeled using values derived from the digital elevation model (DEM).

Road gradient – Road gradient must be expressed as a whole number greater than or equal to 0. Code records where no data exists to –9999 prior to running SEDMODL2. No data records will be modeled using values derived from the DEM.

## Using Localised Data Instead of Global Values

Cutslope vegetation cover (includes rock or non-erosive surface) – Cutslope cover must be expressed as a number ranging from 0 to 100. If this item is present and identified by the user then values occurring in each record will be applied to the model. Code records where no data exists to –9999 prior to running SEDMODL2. No data records will be modeled using a user supplied default value.

Road prism geometry (insloped, outsloped, crowned) – Road prism geometry must be defined as a text data type with legal values of “INSLOPED”, “OUTSLOPED”, or “CROWNED”. Unpopulated records will be modeled as “INSLOPED.” Outsloped roads with a berm should be coded as insloped.

## New Feature Level Attributes

Construction Year – The affects of new roads can be modeled if the construction year is known for a given road segment and that item is available and specified by the user. The user will have an opportunity to specify a reference year that will be used by the model to calculate road age from. This functionality allows the user to *go back or forward in time* to determine the effect of road age on sediment production. The construction item should be defined as a number with a year format of yyyy.