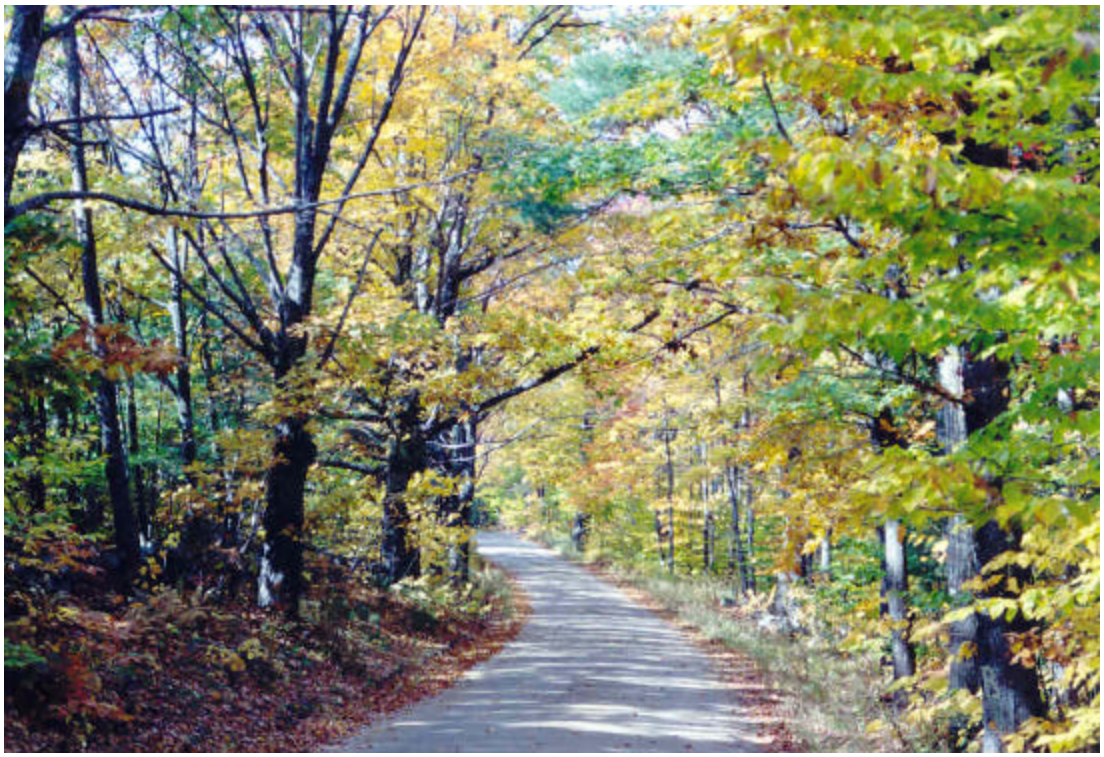
FLESA-Tools ArcView ®
Software Extension
User Guide



Prepared and Published by
North Country and Southern New Hampshire
Resource Conservation and Development Area Councils

FLESA –Tools ArcView ®
Software Extension
User Guide

Prepared and Published by North Country and Southern New Hampshire Resource Conservation and Development Area Councils through the New Hampshire Forestland Evaluation and Site Assessment Committee
2001

RC&D

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Conservation &
Development Councils

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The FLESA-*Tools* ArcView ® Extension was written as an example to illustrate the application of GIS technology in the Forestland Evaluation and Site Assessment process. It is not an official software of the USDA Natural Resources Conservation Service.

All Resource Conservation and Development activities will be provided to anyone regardless of race, color, age, religion, national origin, marital status, or disability.

TABLE OF CONTENTS

Introduction…….…….1

Requirements……..……..……..1

Basic Setup…….……..…….3

Getting Started – Step 1……...…….……3

Getting Started – Step 2……4

Getting Started – Step 3……6

Completing The Land Evaluation Element…….…..…….7

Completing The Site Assessment Element...……...……...…9

Additional Option (Parcel Clip)..……15

Appendix A….……..……..17

FLESA -Tools
An ArcView ® Extension

Introduction

This manual outlines the application of an ArcView 2.3 ® GIS software extension called *FLESA-Tools* developed by the Natural Resources Conservation Service (NRCS). The software extension was developed to demonstrate the capabilities of GIS technology in completing selected components of the Forestland Evaluation and Site Assessment (FLESA) process, specifically the applications required to complete the **Timber Resource Assessment** as described in the FLESA manual. Users of this software extension should have a full understanding of the FLESA process as described in the manual, *Planning for the Future of Local Forests: A Guide for New Hampshire Towns*, prepared and published by North Country and Southern New Hampshire Resource Conservation and Development Area Councils. Application of *FLESA-Tools* using readily available data will greatly improve the efficiency of completing this component of the FLESA process. It will help the local planning committee to quickly evaluate, assess, and compare parcels of forested land within the community to their potential for timber management.

Note that the *FLESA-Tools* and this related user guide are intended only to help the user better understand how to apply GIS technology to the FLESA process. The application utilizes a land-base located in New Boston, New Hampshire and was developed as a demonstration project for the local FLESA planning team. It is not a licensed product or an official software extension of NRCS.

Requirements

This extension requires ArcView 3.2®, Spatial Analyst 2.0®. It is assumed the user is skilled in using ArcView®.

The extension also requires a basic set of data. As outlined in the FLESA manual, the Timber Resource Assessment consist of two elements, each requiring a minimum set of data to complete the process. The first element, **Forestland Evaluation** (Chapter four), requires a map of Important Forest Soil Groups (IFSG), Land Cover (LC), and Parcel Unit Boundaries (Referred to as Land Units in *FLESA-Tools*). See Appendix A for information on obtaining this data for your community. In addition to these maps, a Forest Productivity Matrix (FPM) reference table needs to be available and is included as a separate file (ref_tabl_1) with the extension software package. This table provides scoring values for the various combinations of IFSG and Land Cover combinations that might occur on a specific parcel of land. If different Land Cover types are used, and/or matrix values adjusted as a result of regional characteristics, than the necessary adjustments will need to be made in the table when indicated in the program.

The second element of the process, **Site Assessment** (Chapter five), will require additional data such as roads, slope, streams, or wetlands. The use of this data is covered more thoroughly in the user guide. The source of this data is also discussed in Appendix A.

FLESA-Tools, standard display legends, the FPM reference table, and this user guide are available by contacting:

Southern NH Conservation Resource and Development Area
The Concord Center
10 Ferry Street, Box 4, Suite 422
Concord, NH 03301

(603) 223-0083

Basic Set Up:

- Start ArcView
- From the File Menu select Extensions
- Scroll down to *FLESA-Tools* and select it (Fig. 1)
- Press OK

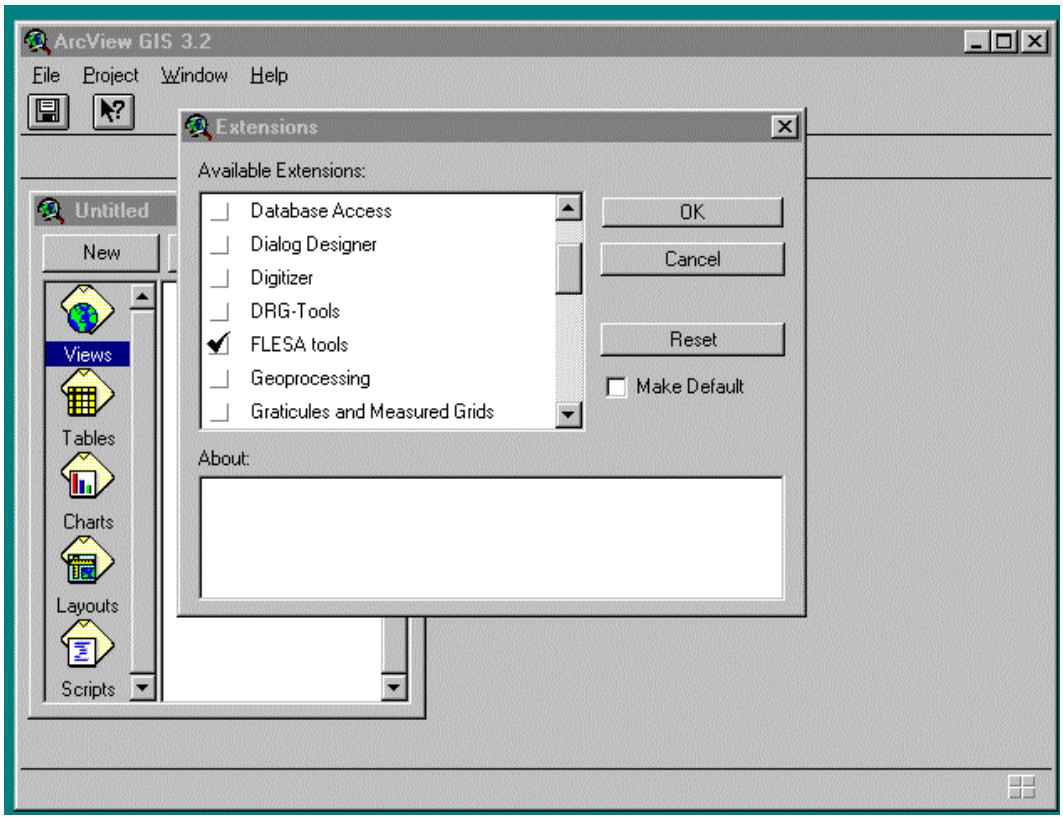


Fig. 1 – Select *FLESA- tools*

Getting Started – Step 1:

- From the Project Window, select Tables
- If "ref_table_1" has not already been loaded, select Add
- Navigate to the directory where you loaded the FPM reference table "ref_tabl_1" (See Extension requirements)
- Select the table and press OK
- With the table name highlighted, select Open
- From the menu bar, select Table, Properties
- If required, adjust field names as necessary (Refer to Appendix A for cross-reference chart)
- From the Project Window open a New View
- Accept the default name, **View1**

Getting Started – Step 2:

- *FLESA-Tools* menu option is now available (Fig. 2). The drop down menu has three active choices: - Add IFSG Theme
  - Add LandCover Theme
  - Add Land Unit Theme

- As you select the theme to be loaded, it will be added to View1 with a stored legend.

- The other menu items are not available until the data themes are added to View1.

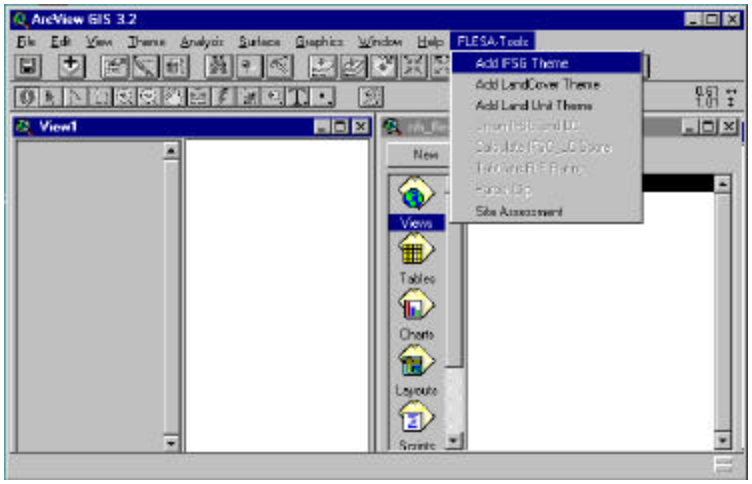


Fig. 2 – FLESA-Tools menu option

- Add the IFSG Theme – Important Forest Soil Groups (Fig. 3)

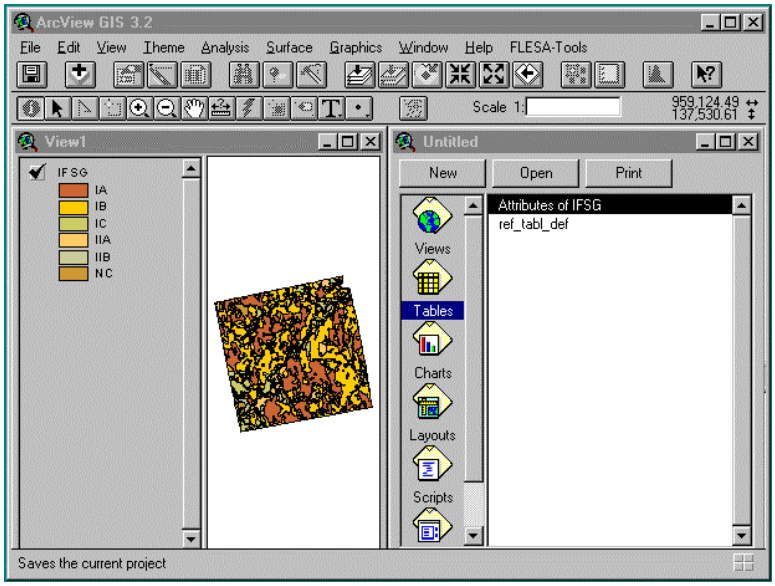


Fig. 3 – Add "Important Forest Soil Groups" Theme

- Add the Land Cover Theme. You will also need to select the field representing the Land Cover Codes. In our example, the field is called “Grid_code” (Fig. 4)

- Resulting Land Cover Theme is illustrated in Fig. 5

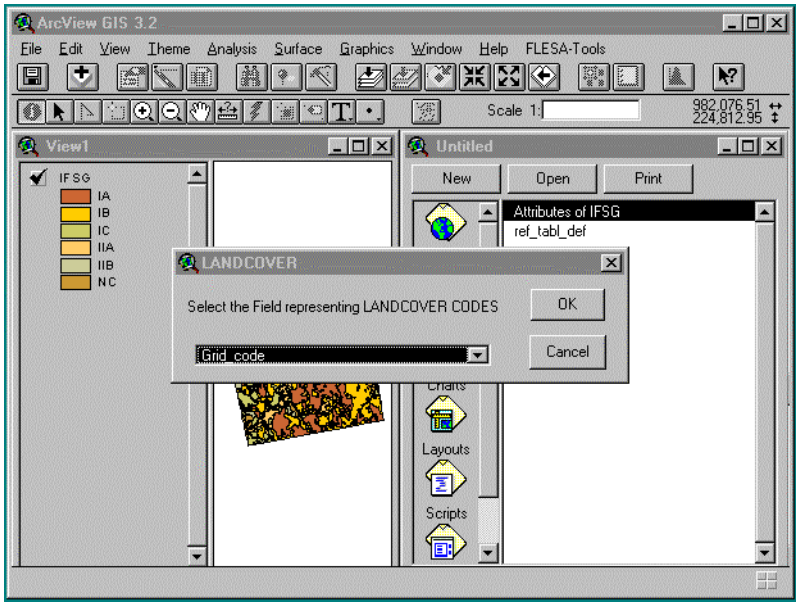


Fig. 4 – Select “Grid code”

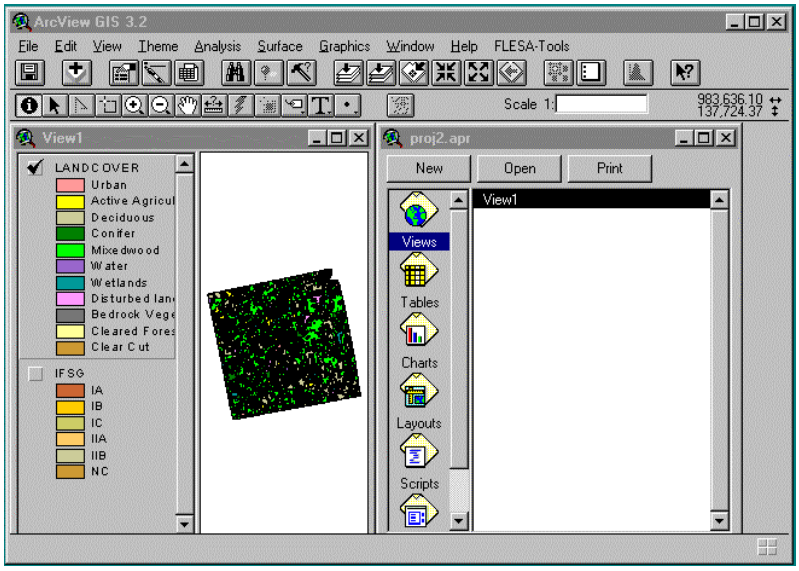


Fig. 5 – “Land Cover Theme”

- Add the Land Unit Theme (Fig. 6). This is the parcel boundary data available for your community.

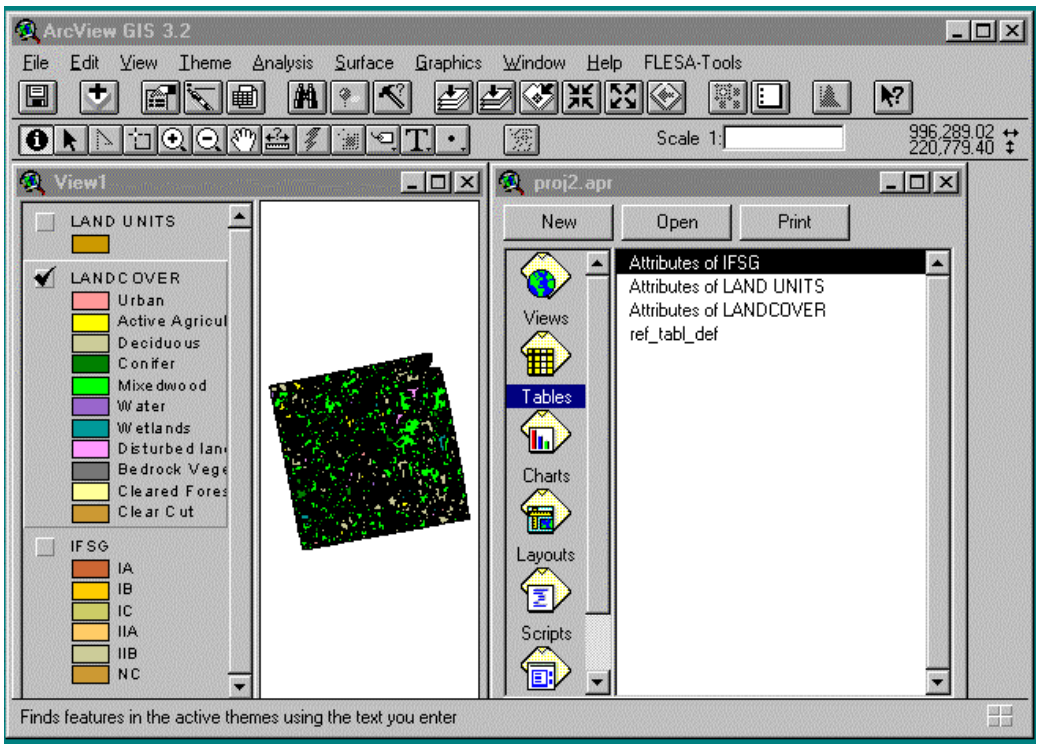


Fig. 6 – "Land Unit" Theme

<u>Getting Started – Step 3</u>:

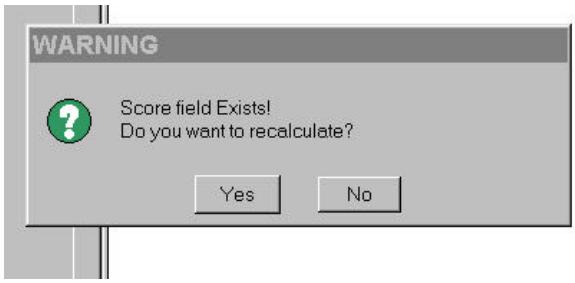
- Select the next option on the *FLESA-Tools* menu, "Union IFSG and LC". This step identifies the Important Forest Soil Group / Forest Cover combinations for the project area and can take two or more hours to execute. In order to complete this step, the program makes two passes over the data. It is also dependent on the size of the project land base.

- A new data theme is created and added automatically to View1 called "IFSG_LC". Now the project is ready to begin the Land Evaluation component of FLESA.

Completing The Land Evaluation Element:

- The first step in completing the Land Evaluation element is to calculate the Forest Productivity Matrix (FPM) score for the combinations created under the union process.

- Select the option "Calculate IFSG_LC Score". You will see the following warning message if you have previously run this option. Select "Yes" to continue with the calculation.



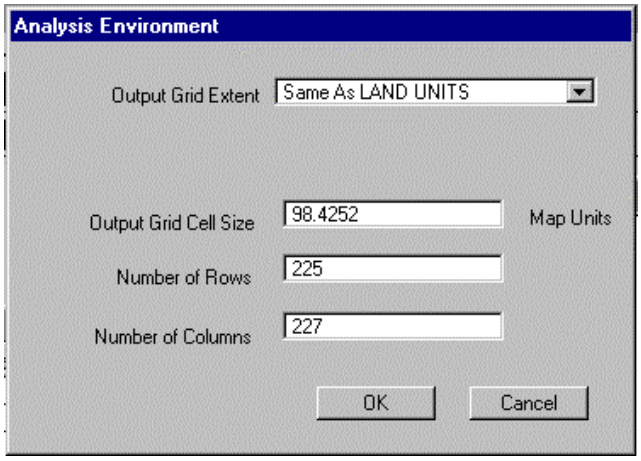
- This step uses reference table ref_tabl_1 to assign a FPM score based on the IFSG and Land Cover combinations. As outlined earlier, this reference table must be added to the project, and if necessary, the field names edited so they reference the grid codes correctly.

ref_tabl_1.dbf

lfsg	410	412	414	415	416	419	420	421	422	423	424	429	430
IIA	80	90	75	90	95	90	50	100	90	80	65	40	80
IB	70	75	60	70	80	70	70	90	75	65	60	65	70
IC	50	50	45	45	50	45	50	80	60	50	55	50	50
IIA	20	15	10	15	25	15	20	30	20	10	10	10	25
IIB	10	10	10	10	10	10	20	10	10	10	10	10	15
NC	0	0	0	0	0	0	0	0	0	0	0	0	0

- Assigning FPM scores only takes about a minute to run. It will overwrite existing scores if they exist from previous runs

- After FPM, take the menu option to "Tabulate FLE ratings".



- The recommended setting for the Analysis Environment Output Grid Extent is to set it to the LAND UNITS theme. This assures that the analysis is performed on the full extent of the study area if the extent of the View has been changed. The extent of the LAND UNITS theme should be slightly more than the area that encompasses the data, thus reducing the amount of processing required. The output grid cell size should reflect the cell size of the LandCover Data. If the source data had a 30 meter cell size the value would be 98.4252.

- Press OK when this pop up window is showing.

- When you press OK, the "Attributes of LAND UNITS" will open and the theme will be turned on to display the data (Fig. 7). This step looks at each individual land unit or parcel and performs a weighted calculation of the score in the IFSG_LC table and writes the results in the LAND UNITS table as "FLErating". The maximum rating is 100.

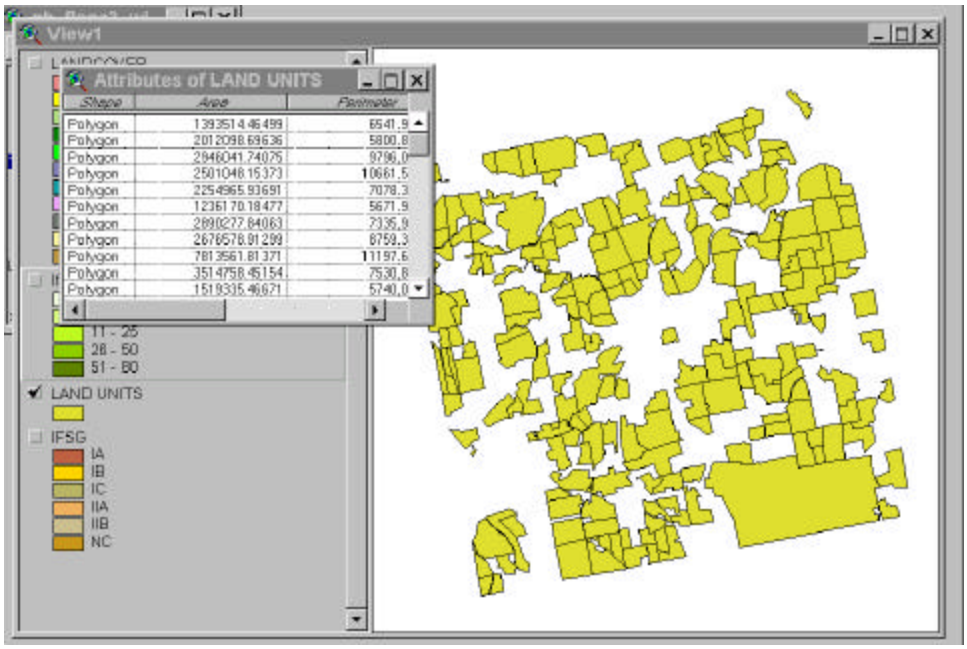
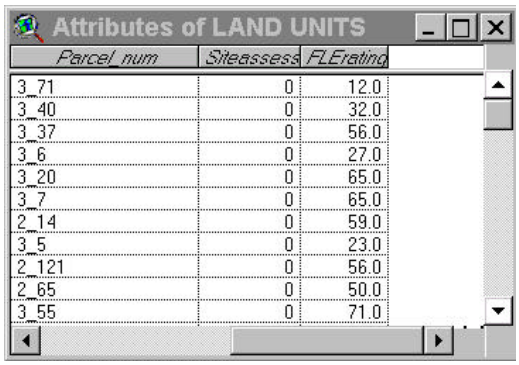


Fig. 7 – "Attributes of LAND UNITS"



Attributes of LAND UNITS

Parcel_num	Siteassess	FLErating
3_71	0	12.0
3_40	0	32.0
3_37	0	56.0
3_6	0	27.0
3_20	0	65.0
3_7	0	65.0
2_14	0	59.0
3_5	0	23.0
2_121	0	56.0
2_65	0	50.0
3_55	0	71.0

- With the FLErating added to the LANDS UNITS table, the evaluation component is completed. Close the table and continue on with the next step.

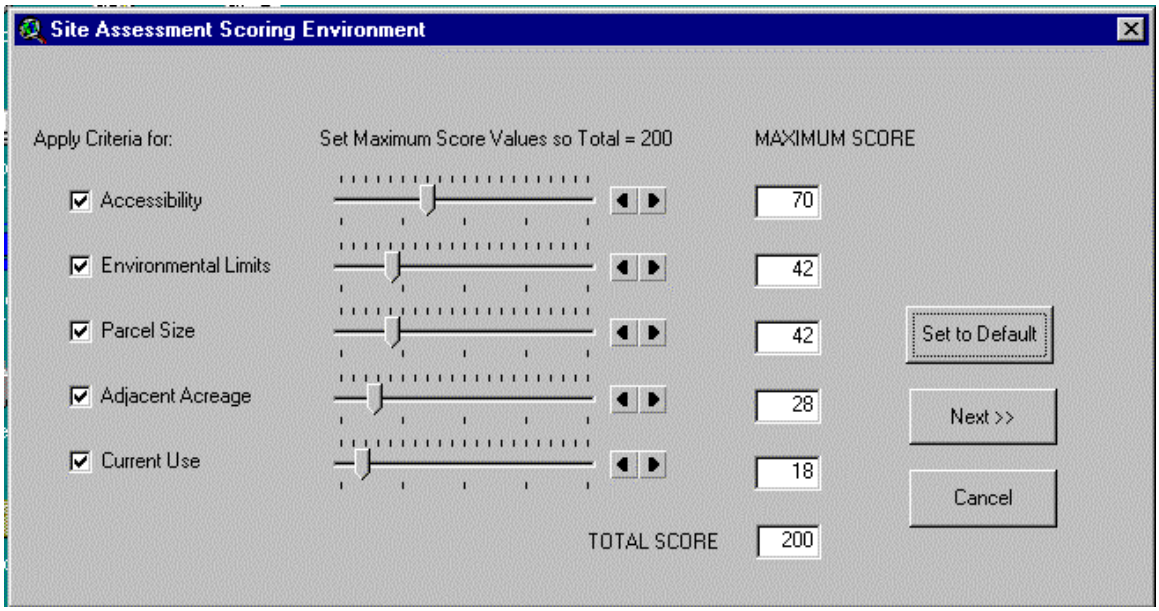
Completing The Site Assessment Element:

- The first step in completing the Site Assessment element of the process is to add the additional data themes to View1 necessary to complete the assessment steps.

  Note: The actual selection of criteria and assigned scores will be based on decisions made by the FLESA team and local community. This in turn may affect how the following steps are structured and the data themes that are used to represent the criteria attributes. If the selected criteria for assessment and related attributes differ from the following example, modification by a person knowledgeable in writing ArcView GIS Extensions will be required.

- For this example, add the buffered road themes and environmental limits theme. These themes relate to the attributes used to support the accessibility criteria and environmental criteria respectively. If Current Use is determined to be a scoring criteria, be sure that there is a field in the LAND UNITS attribute table called "CurrentUse", and that it contains the values "Yes" or "No".

- Select "Site Assessment" from *FLESA-Tools* and decide which criteria to use and the maximum score to assign each factor. The total must add up to 200 points.



- If you are uncertain how to set the values, you can press "Set to Default":

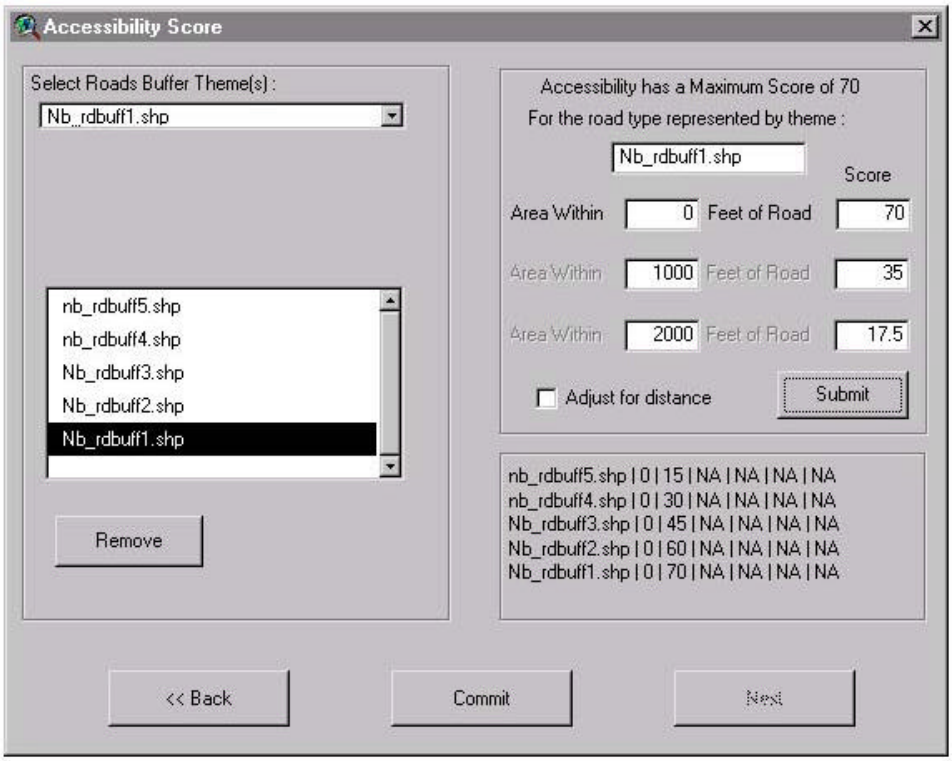
- For the Current Use criteria, if current use information is not available in the Land Unit Theme (Parcel Boundary data), the Current Use option will be disabled and the scores should be adjusted for the remaining criteria so that they equal the required 200 assessment points.

- When all values are set press Next. The Site Assessment procedure will process through each of the criteria and update the <u>LAND UNITS table</u> (Created at the end of the Land Evaluation procedure) with the appropriate values resulting from the following steps.

  Note: Pressing <BACK will return the user to the Site Assessment Scoring Dialog without deleting any of the scoring that was accomplished up to that point.

- Make certain a buffered road layer is created for each standard of road with a buffer width of at least 100 feet and they are added to View1 if you are using the "Accessibility" assessment criteria.

The standard(s) of road to be used can be determined earlier in the process and the buffered road layers created to reflect these standards of roads, i.e. if you just want to use paved and gravel roads, than create one buffered paved road layer and one buffered gravel roads layer. In the following example, five standards of roads are used. Nb_rdbuff1.shp represents the highest road standard.



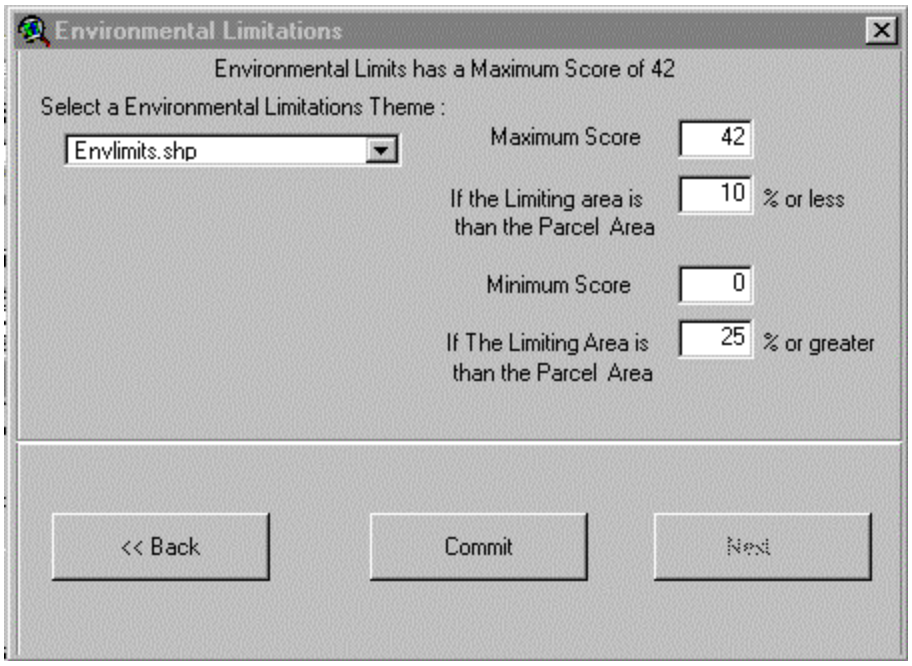
- Select each buffered road theme from the dropdown list. The selected themes will be added to the selected list box. To add a theme to the scoring box, select one theme from the selected list box in the order of the lowest to the highest road standard. Assign a score to each road theme, and press Submit. The scored themes will be added to the scored theme list. When all buffered roads themes are scored and listed in ascending order press Commit.

  Note: The optional "Adjust for distance" checkbox assigns the score based on the area of the parcel that is a specified distance from the road.

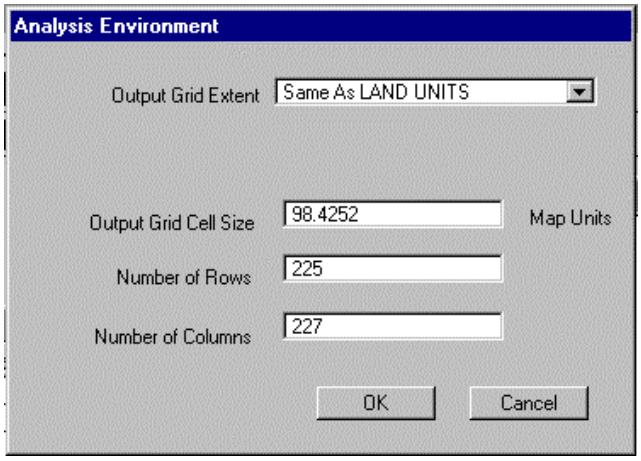
- Press Next to move to the "Environmental Limitations" dialog.

  Note: The Environmental Limits theme utilized in this demonstration is derived from a combination of steep slope, buffers around streams, wetlands and water bodies. Again, make sure this theme has been created reflecting local decisions

and available data, and added to View1 if you are using the "Environmental Limits" criteria. Other locally produced data themes indicating the location of ecologically sensitive areas should be used to create this theme if available, but it does not need to be attributed for the specific elements in its contents. The polygon area alone indicates an environmental limitation.



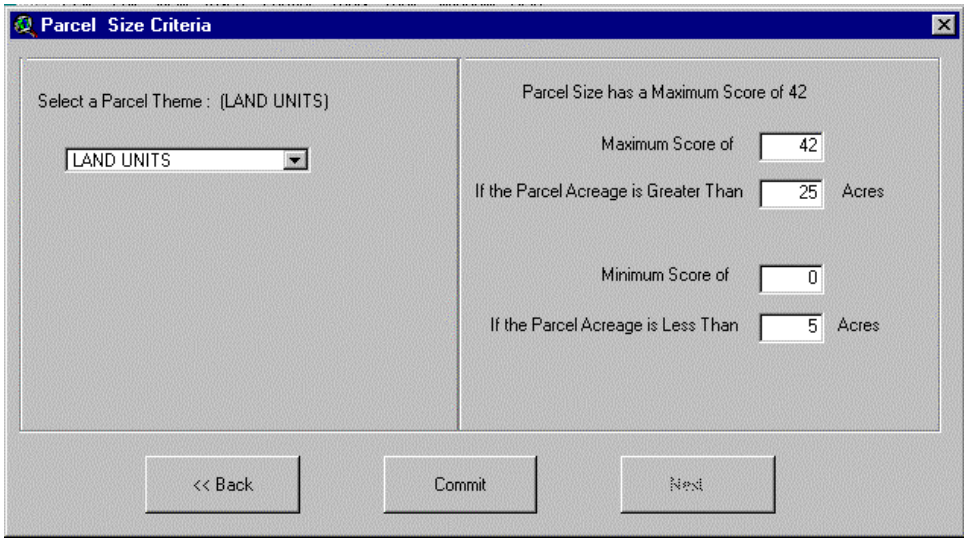
- Once you enter values, and press Commit.



- Set analysis environment as in the Land Evaluation.
- Press OK.

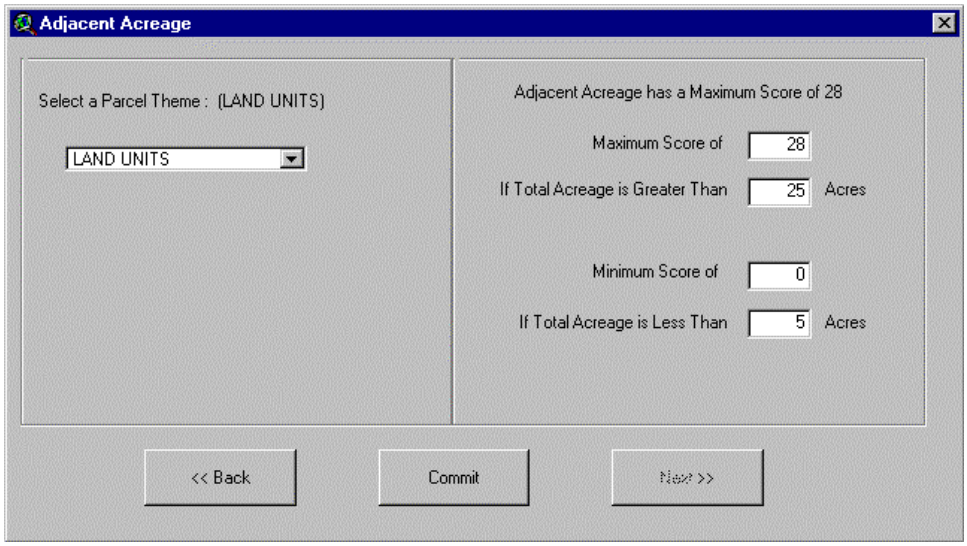
- This will take a few minutes while the system is tabulating areas based on the parcels file. Press Next when it completes the processing.

- The next criterion is “Parcel Size”.



- Enter values in the parcel acreage and minimum score fields. Press Commit, then Next.

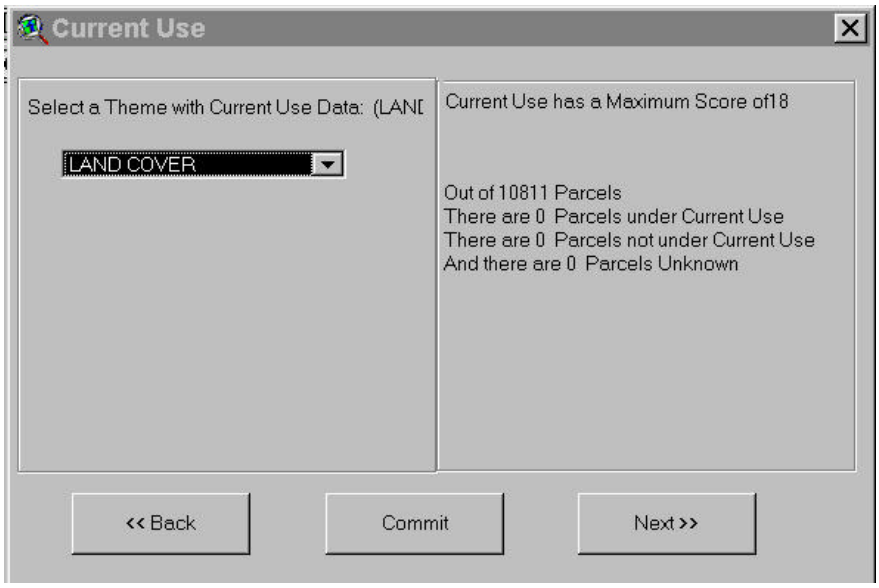
- The “Adjacent Acreage” criteria will look at the size of adjacent land units or parcels and assign a score based on the assigned values.



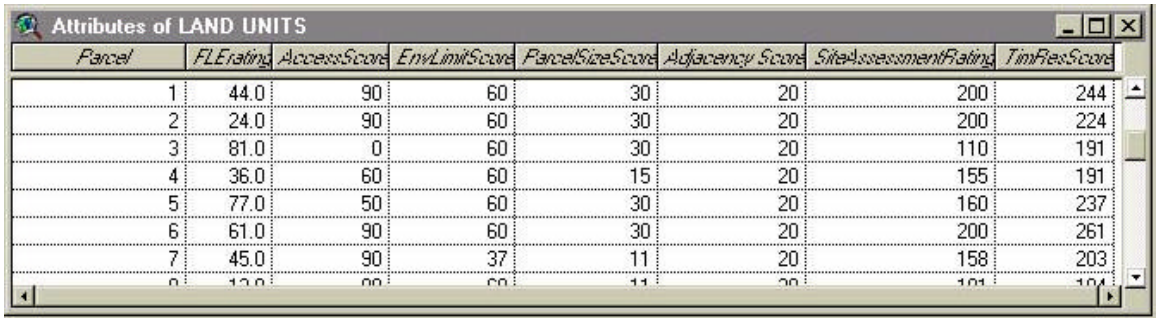
- Select the parcel theme (LAND UNITS). Fill in the values, press Commit, then Next. This only takes a moment to calculate adjacency values and record them in the LAND UNITS table.

- The last criteria calculation is “Current Use”.

  Note: This criterion uses attributes associated with the Land Units Theme. It is scored the maximum value if the land unit or parcel is in current use and zero if it is not. If the data is not available in the Land Units Theme this criteria will not be available.



- The final result is an updated LAND UNITS table that has a site assessment value based on the previous queries and input provided. The total possible value between the Land Evaluation and Site Assessment elements is 300 points. A good way to view the results is to use a graduated color legend to group the sum of the FLE rating and the Site Assessment rating field of the Land Units attribute table. A new field, TimResScore, is created to contain this sum.



Parcel	FLERating	AccessScore	EnvLimitScore	ParcelSizeScore	Adjacency Score	SiteAssessmentRating	TimResScore
1	44.0	90	60	30	20	200	244
2	24.0	90	60	30	20	200	224
3	81.0	0	60	30	20	110	191
4	36.0	60	60	15	20	155	191
5	77.0	50	60	30	20	160	237
6	61.0	90	60	30	20	200	261
7	45.0	90	37	11	20	158	203

Additional Option:

- An additional option exists on the ***FLESA-Tools*** menu.
- Parcel Clip is available to select a single parcel for mapping, documentation, and report writing. If the clip is run after the Site Assessment is complete, a map of any criteria can be produced.
- With the LAND UNITS theme active, use the selection tool to select the parcel of interest.
- From the ***FLESA-Tools*** menu, select Parcel Clip (Fig. 8). The program will clip, merge, and split polygons to create a new parcel theme for the selected parcel.

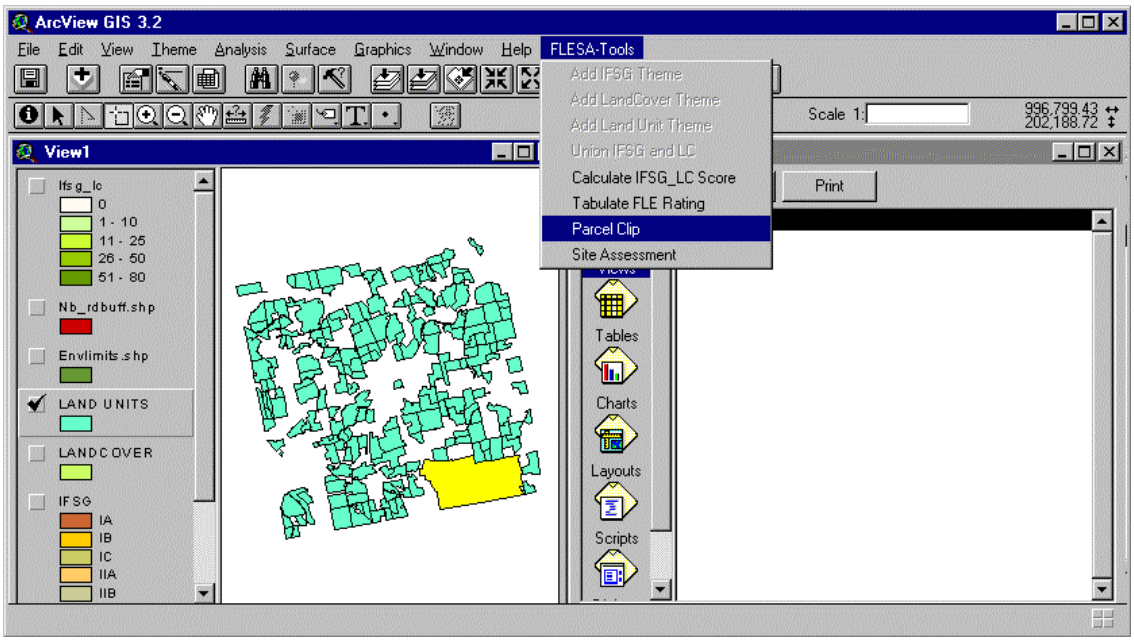
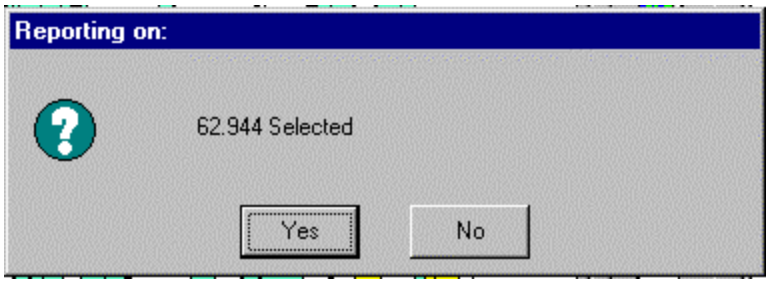


Fig. 8 – "Parcel Clip" option



- A new view is created (Fig. 9) with the parcel and its attributes. The view is named the same as the parcel number. A map of the parcel can be produced for any of its attributes.

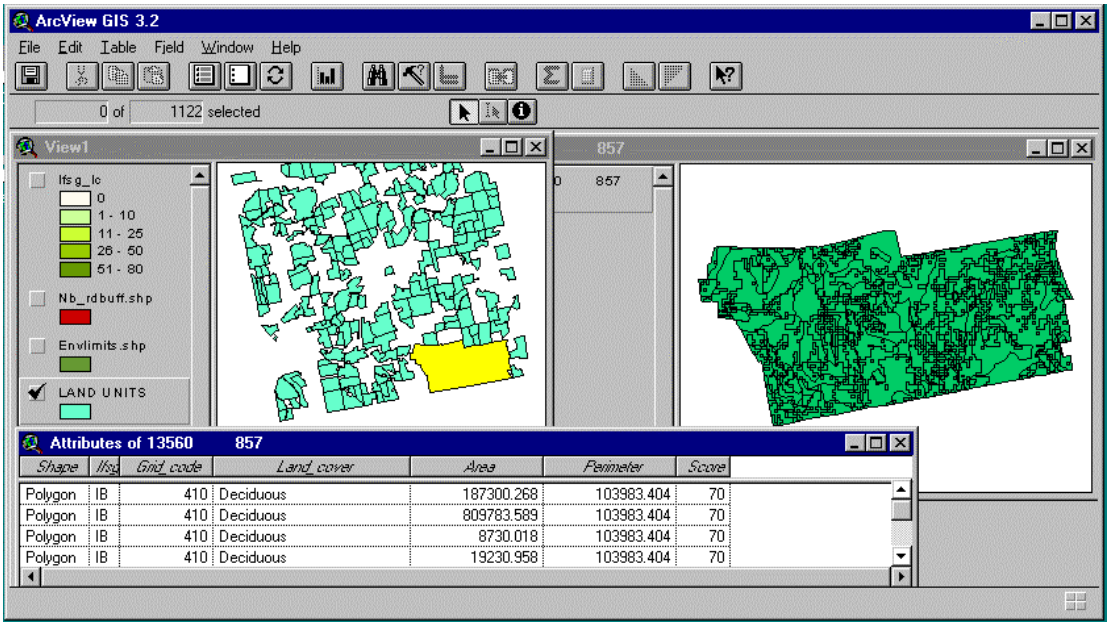


Fig. 9 – New parcel view

Appendix A

Where to file *FLESA-Tools*:
This software extension needs to be placed in the ArcView® extension directory-
ESRI/AV_30/ARCVIEW/EXT32

Minimum Data Layers For Land Evaluation:
Important Forest Soil Groups – IFSG – available from NRCS
Forest Types or Land Cover – LandCover – available from GRANIT
Parcels Boundary – LandUnits – Available from your local tax map office. May need to be digitized.

Web site for community data:
The state of NH has an official GIS web site with an on-line data catalog available to look up data layers that are available for your community to download.
http://www.granit.sr.unh.edu

Reference Table – ref_tabl_1:
It is important that the field names are correct. If they are not, use **Table Properties** and assign aliases to correct them. This is a standard reference table, which is used by *FLESA-Tools* to assign a score based on the Important Forest Soil Groups and the Land Cover for a parcel.

ref_tabl_1.dbf

Ifsg	410	412	414	415	416	419	420	421	422	423	424	429	430
IIA	80	90	75	90	95	90	50	100	90	80	65	40	80
IB	70	75	60	70	80	70	70	90	75	65	60	65	70
IC	50	50	45	45	50	45	50	80	60	50	55	50	50
IIA	20	15	10	15	25	15	20	30	20	10	10	10	25
IIB	10	10	10	10	10	10	20	10	10	10	10	10	15
NC	0	0	0	0	0	0	0	0	0	0	0	0	0

Hints & Tips for running this extension:

1. Make certain that the data directory is editable and that all attribute tables can be edited, not READ-ONLY.
2. Standard legends are used to display data – ifsg.avl, landunits.avl, landcover.avl
3. The view name must be **VIEW1.**
4. The land cover data must have a **Grid-Code** field.
5. LandUnits attribute table must have **Acres** computed.

6. LandUnits attribute table must have a field named "**Current Use"** if the Current Use option is used during the Site Assessment. The values for Current Use are either "Yes" or "No".
7. Before beginning the Site Assessment add additional data themes to View1 to determine accessibility, and environmental limits.
8. When setting the Analysis Environment Output Grid Cell Size, be sure to press "Enter" after entering the grid value.