



TatukGIS Editor/Viewer

Viewer 1.8.4

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TatukGIS Editor/Viewer

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Table of Contents

Part I Help	5
1 Introduction	5
Introduction & Product Features	5
Data Formats, Licensing	8
Contact Information	9
Acknowledgments	10
2 Menus	10
File	10
New Project	10
Open	10
Open from server	11
Save	11
Save Project As	12
Save All	12
Export to image	13
Internet Server Wizard	14
Print	15
Print to PDF	16
Print Preview	18
Recent Files	20
Exit	20
Edit	20
Undo	20
Redo	21
Cut	21
Copy	21
Copy Special	22
Paste	24
Clear Clipboard	24
Save Clipboard	25
Load Clipboard	25
View	25
Toolbars	25
Panels	26
Scale	26
Selected	26
Legend	30
MiniMap	31
Intro	32
Data	32
Minimap	40
Desktops	40
Themes	41
Language	41
Full screen	41
Map	42
Full Extent	42
Layer Extent	42
Selected Extent	42
Previous Extent	42

Refresh map	43
Zoom mode	43
Zoom extended mode	43
Drag mode	44
Auto center	44
Auto locate record	44
Map units	45
Select	45
Localize	46
Select by Point	46
Select by Line	47
Select by Polygon	47
Select by Circle	47
Select by Rectangle	48
Select by Clipboard	48
Deselect	48
Clear Selection	49
Invert Selection	49
Select All	49
Select Type	49
Equality	50
Disjoint	51
Intersect	52
Touch	53
Cross	54
Within	55
Contains	56
Overlap	56
Layer	57
New	57
Add	58
Add from server	59
Remove	60
Import	60
Export	61
Merge	63
Restructure	65
Save layer properties	66
Load layer properties	67
Properties	67
Move Up	73
Move Down	74
Visible	74
Shape	74
Edit modes	74
Edit	74
Point	76
Multipoint	76
Line	76
Polygon	77
Rectangle area	78
Rectangle outline	78
Rectangle rotated area	79
Rectangle rotated outline	79
Polygon90 area	80
Polygon90 outline	80
Circle area	81
Circle outline	81

Circle 3point area	82
Circle 3point outline.....	83
Line free	83
Line 90	84
Add Part	84
Delete Part	85
Delete Shape	85
Revert Shape	85
Change Winding.....	86
Split shapes	86
Union shapes	87
Clipboard buffer.....	87
Clipboard convexhull.....	88
Line Smooth	90
Data	91
Export data	91
Import data	91
Set column value.....	93
Load all	94
Tools	94
Map hint	94
Measure	95
Map hotlinks	96
Topology	96
Options	98
Help	102
Tutorial	102
Check for Updates.....	102
About	102

Part II Tutorial 102

1 Introduction to the Viewer/Editor Tutorials	102
2 Tutorials	103
Viewer	103
Tutorial 1 - Main Menu Controls/Options.....	103
Main Menu, MiniMap.....	103
Data panel, hotlinking.....	106
Program Options (Settings)	108
Layer Information	113
Coordinate System information.....	114
Scale Setting	114
Tutorial 2 - Layer Properties & Basic Features.....	115
Vector Layers - Styles.....	116
Pixel Layers	121
Tutorial 3 - Thematic Map Rendering.....	122
Sections: Text Attribute Values.....	122
Sections: Numeric Attribute Values.....	125
Sections: Scale/Zoom Levels.....	132
Rendering Based on a Formula.....	138
Colored-Gradient Value Theme.....	139
Line Width Value Theme.....	142
Use of Symbols.....	147
Tutorial 4 - Thematic Rendering Wizard.....	151
Colored Gradient Value Theme 1.....	151
Colored-Gradient Value Theme 2.....	155
Tutorial 5 - Label Rendering.....	157
Label Styles	158

Label Positions.....	162
Polygon Label Positions.....	168
Map Hints Feature.....	169
Tutorial 6 - Rendering DTM Data.....	170
Tutorial 7 - Pie and Bar Charts.....	174
Pie and Bar Charts.....	174
Chart sizes	177
Tutorial 8 - Spatial Selections.....	178
Select versus Localize.....	178
Spatial Selection Modes.....	181
Copy & Copy Special to Clipboard Layer.....	186
Tutorial 9 - Attribute Queries in Data Panel.....	189
Tutorial 10 - Measurement Tools.....	199
Tutorial 11- Export to Image file.....	201
Tutorial 12 - Export Image Mosaics.....	206
Tutorial 13 - Print, Print Preview, PDF.....	210
Tutorial 14 - URL Referencing (Hot linking).....	215
Editor	218
Tutorial 1 - Main Menu Controls.....	218
Tutorial 2 - Digitize New Map Geometry.....	220
Create New Vector Layer.....	220
Create Vector Polyline Data.....	224
Create Vector Polygon Data.....	231
Create Polygons Holes.....	237
Delete Vectors.....	242
Custom Edit Modes.....	243
Line/Polygon Smoothing.....	248
Create Vectors Using COGO.....	250
Tutorial 3 - Edit Existing Map Data.....	257
Geometry Editing.....	257
Attribute Editing & Restructuring.....	259
Tutorial 4 - Unions and Splitting.....	262
Unions of Shapes.....	262
Splitting of Shapes.....	265
Tutorial 5 - Export Vector Layer/Clipping.....	269
Tutorial 6 - Merging Vector Map Layers.....	272
Tutorial 7 - Import Attribute Data.....	277
Tutorial 8 - Buffers.....	282
Topology Building & Correcting	286
A Short Guide.....	286
Tutorial - Build a Topology Project.....	290
3 FAQ items	297
 Index	 299

1 Help

Enter topic text here.

1.1 Introduction

1.1.1 Introduction & Product Features

Introduction and Main Features of the TatukGIS Viewer & Editor Programs

The TatukGIS Viewer is a free software product and the TatukGIS Editor is a commercial software product requiring the purchase of a license. The Editor supports all features in the Viewer plus additional features mostly relating to the creation, editing, conversion, correction, etc. of vector map files. The company TatukGIS (www.tatukgis.com) is the owner of both the Viewer and Editor products. Both products are developed by TatukGIS from the TatukGIS Developer Kernel GIS toolkit product.

Subject to the terms of the TatukGIS license agreement, the TatukGIS Viewer can be used free of charge and redistributed to others without charge under the condition that no changes are made to the application. A license to use the TatukGIS Editor can be purchased only from TatukGIS or by a TatukGIS authorized reseller. Refer to the TatukGIS software license agreement for more details.

Two sources of documentation are provided for the Viewer and Editor products.

1. The [Help files](#) provide a brief description of the feature or functionality called by each menu command in the program along with brief instructions on how to use each feature. The Help files can be accessed under the *Help/Help* menu.
2. The [Tutorials](#) demonstrate the use of many of the features supported by the Viewer and Editor products with real data sets. Both the Viewer and Editor products include the full set of tutorials for both the Viewer and the Editor. The Tutorials are organized into two sets. The first set, titled Viewer Tutorials, relates to features supported by both the Viewer and Editor. The second set, titled Editor Tutorials, relates to functionality supported only by the Editor. The Tutorials can be accessed under the *Help/Tutorial* menu.

The Viewer and Editor products are updated from time to time, and the updates may be downloaded via the internet. Use the *Help/Check for updates* menu while connected to the internet to check with the TatukGIS web site for the availability of a new update.

A significant number of updated FAQ items relating to the Viewer and Editor can be found on-line via the FAQ page of the www.tatukgis.com web site. The FAQ material is searchable by key word. Users of both the Viewer and Editor may access the on-line FAQ material.

Licensed users (customers) of the TatukGIS Editor also have access to the Editor licensed user forum which is located on the Forums page of the www.tatukgis.com web site.

TatukGIS Viewer

The free TatukGIS Viewer is designed to open and view GIS/CAD and raster image files and projects composed of these files. The Viewer reads most file formats, including the aerial image and vector street map data provided by the leading vendors, and supports many custom rendering, attribute data querying, and other features. Map data in multiple file formats, e.g., SHP, DXF, TAB, GML, TIFF, MrSID, etc. can be opened as separate layers together as part of a single project, with no need to import the data to any common, internal data format. The Viewer can save project configurations to a TatukGIS project file.

The free Viewer offers an easy way to evaluate TatukGIS technology and is a helpful companion tool for the TatukGIS Developer Kernel (DK) toolkit and GIS Internet Server products. Any

mapping project that can be visualized in the free Viewer can be exported to a TatukGIS project file which can be opened in other TatukGIS products or custom applications/solutions created from the TatukGIS Developer Kernel toolkit. The Viewer can also generate a default ASP.NET project to easily publish a TatukGIS project on the web with the TatukGIS Internet Server. This is an easy and affordable path to web publish any GIS project.

Features of the Viewer:

- [Open/read](#) all TatukGIS supported vector and raster file formats, natively, with no importing to an internal format (see the Specifications for a listing of the formats)
- Open map layers in multiple formats together in the same project (work place)
- [Open](#) TatukGIS projects as well as most projects created with ESRI ArcView® or MapInfo Professional® products
- [Create new](#) TatukGIS project files to save all configurations and settings that are unique to a project
- [Zoom](#) in/out, pan
- Unlimited number of layers
- Specify [map scale](#) for viewing/printing
- [Add, remove](#), reorder, and turn on/off layers in a project via the Legend panel
- Powerful [visual layer properties control](#) to set the appearance (colors, styles, fills, borders, outlines, symbols, transparency level, etc.) of vector map layers
- [Manipulate](#) pixel layers, including transparency, histogram, brightness, color enhancing, etc.
- [Generate custom thematic map](#) presentations, including colored-gradient value themes, based on vector attribute values
- [Color Render DTM](#)/grid layer with directional light shading
- [Present data as bar or pie charts](#)
- [Present attribute information as a data table](#) with powerful filtering, querying, and selection features
- Use CGM, WMF, and TrueType [symbols to represent](#) points, lines, polygon fills and perimeters
- [URL hot-linking](#) of map objects to any document referenced by a valid URL (web page, file, even mailto)
- [Custom render label](#) appearances and positioning
- [Attribute Queries](#) using filtering, SQL query builder
- [Spatial Queries](#) (by point, line, circle, rectangle, polygon),
- [Measurement tools](#) for distance, area, and perimeter
- [Print](#) and [print preview](#), [print to PDF](#) format
- [Copy to Clipboard layer](#)
- [Copy visible extent](#) of all layers to Windows clipboard with the EMF meta format
- [Export visible or full extent to image files](#): JPEG, PNG, TIFF, BMP, or TatukGIS PixelStore, PDF
- Mosaic multiple geo-registered images and [export to an image file](#)
- R-tree spatial indexing to enhance performance with very large vector files
- [Multi-language user interface](#) (English, Spanish, German, French, Portuguese, Italian, Greek, Russian, Japanese ...)
- The "[Internet Server Wizard](#)" to easily set up a simple ASP.NET projects for interactive web publishing of mapping projects with the TatukGIS Internet Server or Internet Server LITE.

TatukGIS Editor

The Editor product supports all the functionality in the TatukGIS free Viewer, plus the additional features relating to the digitizing, editing, importing, exporting, merging, converting, and other manipulation of vector geometry and attributes as are listed below. The "Swiss pocket knife" nature of the Editor means that it can be used in many different ways to do many types of tasks. The best way to become familiar with the product and its features is to review the tutorials and by exploring the help file for each menu item that may appear to be of interest.

Features of the Editor:

- [Edit](#) and [save](#) vector file geometry consistent with GIS topology principles

- [Edit](#) or [create](#) vector geometry from a coordinate list
- [Edit](#) or [create](#) vector geometry using COGO (bearing and distance calls)
- [Digitize](#) and save new vector layers
- Create, [edit](#), [import](#), [export](#) vector map attribute data
- Convert vector map layers between [supported file formats](#) with the [import](#) or [export](#) procedures
- Import/export data points data between a map file layer and most GPS devices using the GPX format
- Generate KML files for use with Google Earth
- Perform [unions](#) and [splitting](#) of vector map objects
- [Merge vector map](#) files into a single file layer
- Custom [vector layer export](#) features, including line and polygon clipping
- Create and [edit vector attributes](#)
- Import/merge and [export attribute](#) tables to/from a spread sheet or database
- Special drawing tools: [rectangle](#), [circle](#), [right angle](#), [free line](#) areas and outlines
- [Line smoothing](#) mode using B-splines
- Create and use [buffers](#) and convex hulls to perform spatial selections
- [Save clipboard layers](#)
- Polyline and polygon [topology builder and correction](#) functionality, a powerful feature to systematically identify and correct geometrical mistakes in vector map files
- Concurrent multi-user viewing and editing of the same vector layers stored to SQL database server layers. Support for three SQL database formats.

One feature which may make the Editor unique from some other GIS products is that there is no inherent need to perform any import procedure when opening a file in the application. A SHP, TAB, or MrSID file, for example, will open "natively" in the Editor/Viewer, without the need to perform any conversion to any internal conversion. In fact, layers containing files of multiple formats can be opened, edited, and saved together as common project. The saving of editing changes to any supported vector file format – such as SHP, DXF, GML, MIF, SQL layers, etc. - requires only a simple save operation. The Editor's import and export procedures are required only when converting data from one file format to another. For instance, if an empty DXF format layer has been set up in the Editor but the data to be opened into that layer is in a E00 file, this represents an import procedure (to convert from E00 to DXF). If editing changes are made to the DXF file layer and later there is a need to save the updated data as, for example a GML file, this calls for an export procedure.

Regarding the ability of the Editor to save and convert data to the MIF and DXF vector file formats, because the specifications for these two file files are not available to TatukGIS, i.e., the specifications have not been made available for public access, TatukGIS cannot guarantee that all of the characteristics of the saved data will be exactly the same as in the original file. The is particularly true with features of these data formats which are not compliant with GIS standards. Therefore, as a precaution when first saving editing changes to MIF or DXF files, it is recommended to initially save the changes to a file copy instead of writing over the original files.

Best performance with large data sets:

As long as a few settings are properly optimized, the Viewer/Editor is very fast handling even with the largest data sets and projects. Tips for optimizing performance with large data sets are provided as FAQ item after the product tutorials under the Help/Tutorials menu. (Most Viewer/Editor FAQ items, however, are not included with the product documentation and are found on the TatukGIS web site.)

Check for Updates feature:

The Viewer and Editor products include a feature to automatically check via the internet with the TatukGIS web site for the availability of any update of the product. This can be a useful feature because TatukGIS often provides free product updates with new features and fixes. The user can manually check for updates at any time by clicking on the *Help/Check for Updates* menu item. The check for updates will be automatically performed by the program every seven days if the program is in regular use. The automatic check for update feature can be deactivated by

unchecking the *Autocheck* feature under the *Help/Check for update* menu.

Bug Reporting Feature:

The Viewer and Editor products include the EurekaLog (www.eurekalog.com) bug/error reporting tool. In the event that an error is encountered during the use of the program, the EurekaLog reporting tool will attempt to send to TatukGIS an e-mail with the necessary details to allow TatukGIS to replicate and fix the error in the next product update. The EurekaLog will attempt to send the e-mail using the default e-mail client on the user's computer. Typically the e-mail client will alert the user that the program is trying to send an e-mail and present the user the option to allow or disallow the sending of the e-mail. Please allow any such e-mails to be sent to TatukGIS. This method is much more effective than trying to explain the nature of any bug program crash to TatukGIS. When TatukGIS receives a EurekaLog e-mail documenting any error in the software, there is a very high probability that the error was fixed in the next product update.

1.1.2 Data Formats, Licensing

Viewer Specifications

Licensing

The free Viewer product (not the TatukGIS Editor) may be used free of charge or redistributed to others as long as the program is not altered in any way or sold for money. Refer to the TatukGIS license agreement for details.

Platform

Any Microsoft Windows® 32-bit operating system (Windows 95/98/2000/NT/ME/XP)
Product is stand-alone. No other GIS or CAD software is required.

Requirements (Memory, Processor)

Same as the requirements of the Microsoft Windows operating system

Supported File Formats**Reads Raster Image files**

TIFF (1, 4, 8 and 24-bit, uncompressed, packbits, group4, LZW), ECW/ECWP, MrSID, BIL/SPOT, JPEG, PNG, BMP, RPF (CADRG & CIB), JPEG2000, IMG, TatukGIS PixelStore

Reads Vector Files

SHP, E00, TAB, MID/MIF, DXF, DGN, TIGER, GML, VPF, GDF, DLG, SDTS, KML, GPX

Reads SQL GeoDatabase Map Layers

OPENGIS® Simple Features for SQL implementation, Geomedia® Access Warehouse formats, and TatukGIS binary format

Reads DTM Files

ASCII GRID, FLOAT GRID, BT (Binary Terrain), DTED, ADF

Reads Georeferenced Images

GeoTIFF, World File, and TAB based

Reads Project files:

TatukGIS project file and most ESRI ArcView® (*.APR file) or MapInfo Professional® (*.WOR file) projects

Exports:

TatukGIS Project file (*.ttkgp), retaining all the project set-up and layer appearance settings

Export full, visible, or custom defined extent to the following image file formats:

- TIFF/GeoTIFF (1, 4, 8, 24 bit uncompressed or with LZW compression) + *.TFW and *.TAB files with the geo-registration information
- JPEG (8 bit gray scale, 24 bit, compression level setting) + *.JGW and *.TAB files with the geo-registration information
- PNG (1, 8, and 24 bit) + *.PGW and *.TAB files with the geo-registration information
- BMP (24 bit) + *.BPW and *.TAB files with the geo-registration information
- TatukGIS PixelStore (1, 4, 8, 24 bit and 8 bit gray scale), with geo-registration information

Symbol Types

CGM and TrueType symbols for points and lines; CGM, TrueType, and WMF symbols for fills

Editor Specifications: (same as the Viewer, plus the following)**Licensing**

The TatukGIS Editor product is licensed per user. Refer to the TatukGIS license agreement for details.

Edit/Save/Export vector map files to these file formats:**Shapfile (vector) formats**

SHP, MIF, DXF, GML, DLG, KML, GPX

SQL Geodatabase map layer formats

SQL geodatabase layers with OPENGIS® Simple Features for SQL implementation, Geomedia® SQL Server & Access Warehouse formats, and the TatukGIS SQL binary format

1.1.3 Contact Information

If you have questions or comments regarding the TatukGIS Viewer, TatukGIS Editor, or other TatukGIS products, please contact TatukGIS. Be sure to specify the product name and the version number to which your question or comment refers.

TatukGIS

Plac Kaszubski 8/105
81-350 Gdynia
POLAND

Home page: www.tatukgis.com

Phone: +48 (58) 620 92 62

Fax: +48 (58) 621 09 62

On-line FAQ Material

<http://www.tatukgis.com/Faq/faq.aspx>

Editor Licensed User Form

<https://shop.tatukgis.com/Forum/forumIn.aspx>

E-Mail Sales and Support Inquires

sales@tatukgis.com

1.1.4 Acknowledgments

The TatukGIS Editor and/or Viewer use technologies provided by the following:

- Topology builder ©2004-2005 by ARIS & Ryszard Siwecki
- TPNImage by Gustavo Huffenbacher Daud.
- TBX. Copyright ©2001-2003 Alex A. Denisov. All rights reserved.
- ECW Library. Copyright© Earth Resource Mapping Ltd
- MrSID. Copyright © LizardTech, Inc.
- WPPDF. Copyright © wpCubed GmbH.
- CADRG by Tim Ranger for the Canadian Department of National Defense and is provided 'as-is' without warranty. DND assumes no liability for damages or financial loss incurred in the use of this software.

1.2 Menus

1.2.1 File

1.2.1.1 New Project


Creating a new project

Clicking on the *File/New Project* menu prepares the program for a new project, by closing all open layers and project file settings.

To create a new project:

1. Select the File/New menu command.
2. All open layers will be closed, to prepare the program for the start of a new mapping project.

Tips

1. The new project command can also be accessed with the *New Project*  toolbar icon.
2. Just after starting the program, a new project can also be created by clicking on the *New Project* link at the bottom of the *Recent files* list which is presented in the Intro panel in the main map viewer window.
3. If file layers are open in the program when the New project option is selected, the program will prompt for the saving of changes to the open layers before closing them.

1.2.1.2 Open

Opening an existing file or project

Clicking on the *File/Open* menu provides for the selection and opening of an existing project file or an individual vector or image file as a layer. Because a project file typically contains multiple map layers, this menu item opens all the layers of the project, along with all the visual layer property settings for each layer, in a single step.



To open an existing project or graphic file:

1. Select the *File/Open Project* menu command.
2. Select the file path from the *Look in* list in the *Open* dialog box.
3. Double-click on the folder where the file is located.
4. Double-click on the file name.

Annotation

- The *Open* dialog box shows files of *all supported files (formats)* by default. To change this to show only files of a single format, select the appropriate format filter from the *Files of type* list. This can be helpful when looking in a folder which contains many files of different types.

Tips

1. An existing project file can also be opened by clicking on the *Open...*  toolbar button or by using the Ctrl + O shortcut.
2. An individual vector or image file can also be opened by clicking on the *Add...*  toolbar icon.
3. Just after starting the program, the *Open* dialog box can also be opened by clicking on the *More* link in the *Recent files* list within the Introduction panel.

1.2.1.3 Open from server

Opening an existing file located on a remote server

Clicking on the *File/Open from server* menu provides for the opening a file located on a remote server as a map layer.

To open an existing project or graphic file:

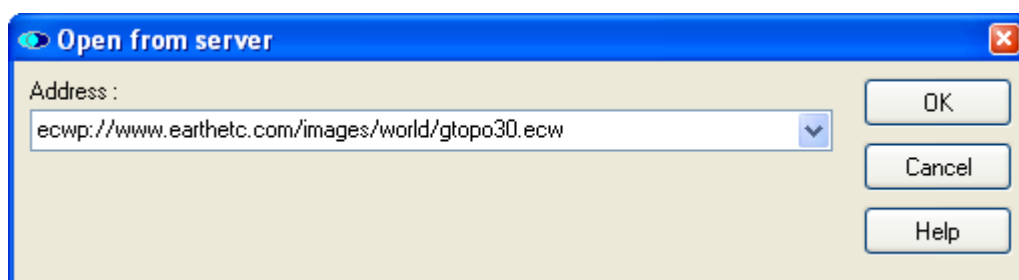
1. Select the *File/Open from server* menu command which opens the *Open from server* window.
2. Enter the path to the location of the file on the remote server.
3. Click on the *OK* button to connect to the remote file.

Annotation:

- The remote server based map file can be an ECW file (based on the ECWP protocol), a WMS layer, a TatukGIS SQL server layer, etc.

Tips:

1. A file on a remote server can also be opened as a layer via the *Layer/Add from server* menu command using the same procedure.
2. As of version 1.7, the *Add from server* feature supports only the ECWP format. The feature will be expanded to support other server based file formats in future product updates.



(The link is to a test ECW image.)

1.2.1.4 Save

Saving a layer

While working on project or individual layer, it is possible to save the current state of a particular layer, i.e., all changes made to the layer since the last save operation.

To save a layer:

1. Select (highlight) the layer that you want to save in the Editor *Legend* panel.
2. Click on the *File/Save* menu command.

Annotations

1. If no changes have been made to the selected layer since the last saving, the *File/Save* menu option will not be active.
2. The *File/Save* option does not save any changes to any layers other than the layer selected (highlighted) in the *Legend* panel.
3. The *File/Save* feature is offered only in the Editor. (The Viewer does not support the changing or saving of data.)

Tips

1. The Ctrl + S shortcut can also be used to save the selected layer.
2. Saving is always performed to the same file type (file format) that the layer is already in.

1.2.1.5 Save Project As**Saving a new project or changes to an existing project**

Both the Viewer and the Editor can save project files. Project files contain all the set up configurations, such as which files are included as layers in the project, the paths to each file that is a project layer, the rendered appearance of the map data of each project layer, etc. When saving a new project (one that has not been previously saved), the user must specify a new file name and the file path (folder). When saving a project that has already been saved, the user can save changes to the already existing project file or save the current project status to a new project file.

To save a new project:

1. Click on the *File/Save Project As* menu option
2. Select file path from the *Save in* list in the *Save Project* dialog box.
3. Double-click on the folder where you want to store the project file.
4. Click on the name of an already existing project in the *File name* field or enter the name for a new project file to be created.
5. Click on the *Save* button.

Tip

- The *File/Save Project As* command may be used to create a copy of an existing project. If the copy is saved under a different name, the original project file will remain unchanged.


1.2.1.6 Save All**Saving all changes to the project file and changes to the data in the open layers in one step****To Save All:**

Select the *File/Save All* menu command.

Annotations

1. This command saves not only all changes to all file layers within the project, but also any updates to the project file configurations.
2. This command saves the project file configurations only if the project file already exists. This command is not for the initial creation of a project file.

Tips

1. Changes to the project file and data in the layers can also be saved by using *Save All*  toolbar icon or by using Shift + Ctrl + S shortcut.
2. The *File/Save all* feature is offered only in the Editor. (The Viewer does not support the changing or saving of data.)

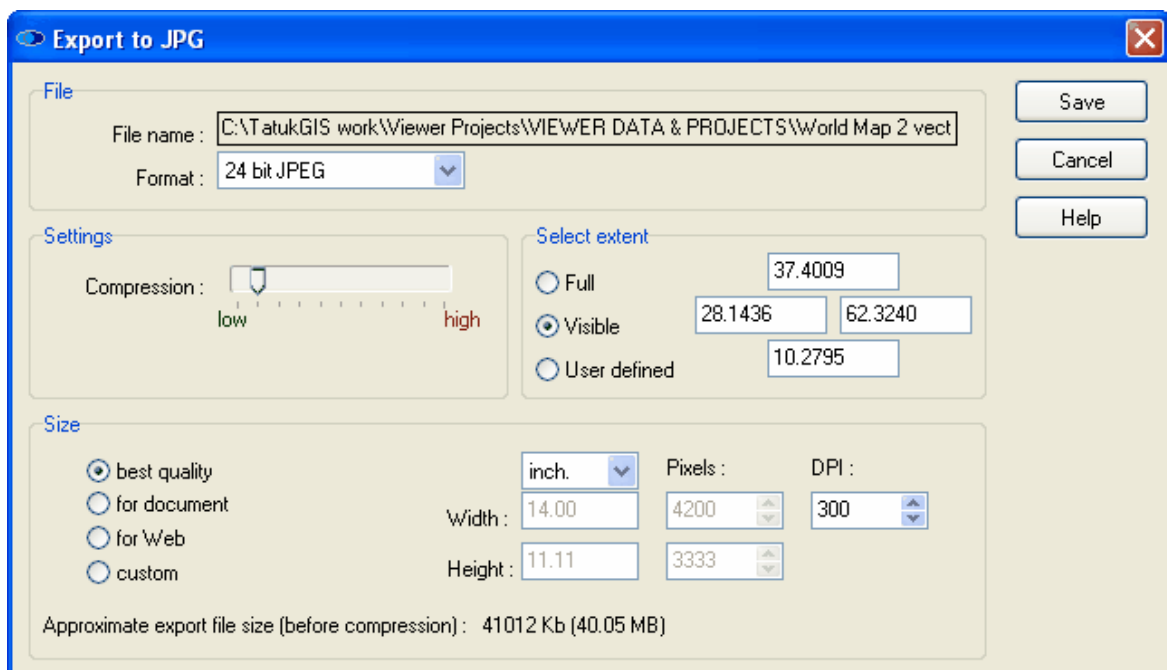
1.2.1.7 Export to image

Exporting and saving to an image file

Any layer or map project presentation that is visible in the map viewer window may be exported to a choice of several supported image file types (formats). The export can reflect multiple open layers.

To save the appearance of an open project to an image file:

1. Select the *File/Export to image* menu command to open the *Export to image ...* window.
2. Select the file path to save the export image file in the *Save in* list.
3. Double-click on the folder where the new image file is to be saved.
4. Select or enter the name for the new image file that is to be created in the *File name* field.
5. Select the format for the export image file from the supported file types presented in the *Save as type* list.
6. Make any modifications to the export file properties in the *Export to ...* window. Modifications can include the number of bits for the export image, extent selection, compression level, and resolution level.
7. Click on the *Save* button in the *Export to ...* window to start the computation process of generating the new export image file.




(The JPEG compression level can be controlled by the user, for the best file size versus quality level compromise.)

Annotations

1. Only the Editor, and not the free Viewer, supports the *User defined* extent selection option.
2. When defining file properties in the *Export to...* dialog box, the resolution (which influences the export file size) may be either i) selected from three predefined resolution levels by clicking on the *Best Quality* (4,000 pixels in the width if source data is vector only), *For Document* (300 DPI with a width of 14 cm), or *For Web* (600 pixels in the width) buttons or ii) custom defined by setting the *width*, *height*, and *DPI* (dots per inch).
3. The *Extent* option within the *Export to...* dialog box allows the user to specify whether the export image is to be generated from the entire map project extent (the *Full* option) or only from of the portion of the map project currently visible in the map viewer window (the *Visible* option). (The Editor also provides for a more precise, *User defined* option which uses x,y coordinate values to define the top, bottom, right, and left limits of the extent area.)

4. The program presents an approximation of the size of the source data that is to be exported to the new image file, after considering the extent, resolution, number of bits the export is generated to, and other factors. This approximation does not consider the compression that may be applied by the file type (format) selected for the export image. (Some formats, such as JPEG, PNG, and TIFF with LZW compression, apply compression and other formats, such as BMP or standard TIFF, do not apply compression.) The size approximation will automatically update to reflect changes in the settings in this window.

Tips

1. Because the JPEG and PNG formats are size limited (even though the size limits are not specified by the specifications of these file types), the use of these two formats are generally recommended only when the source data being exported from does not exceed approximately 25 Mb. The export of more data to the JPEG or PNG file formats can result in files that are unstable and may not open or work properly in other software programs.
2. The same procedure as described above can also be initiated by clicking on the *Export to image*  toolbar icon.
3. If the *Best Quality* setting is selected and the source data includes one or more raster image layers, the export image will be generated at the resolution level equal to that of the source raster layer with the highest resolution.
4. For the most efficient export file size, select the number of bits option (from the *Format* drop down list) which is not greater than required to handle the number of colors in the source data.
5. Refer to the Viewer **Export to Image File** Tutorial for more detail on this topic and a demonstration of the export to image procedure.

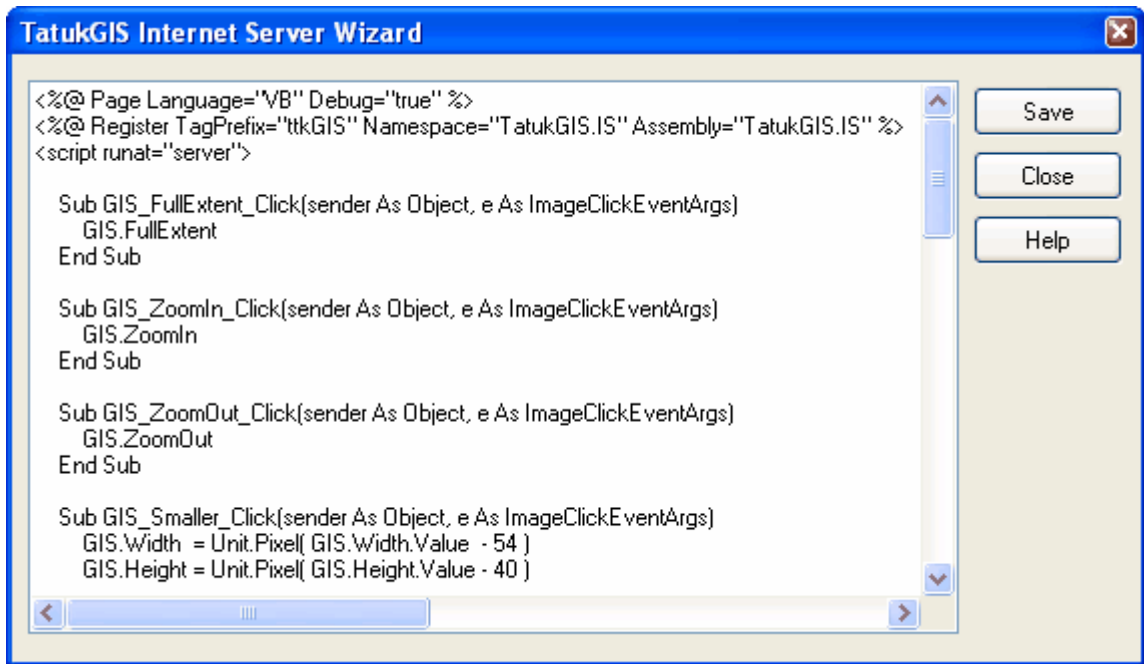
1.2.1.8 Internet Server Wizard

Setting up a mapping project as an WWW site

The Viewer or Editor can generate any TatukGIS mapping project open in the program as an ASP.NET web server project with default settings. The exported ASP.NET project can then be easily interactively web published using TatukGIS Internet Server or Internet Server LITE products.

To prepare an ASP.NET project for web publishing:

1. Select the *File/Internet Server Wizard* menu command to open the *TatukGIS Internet Server Wizard* window.
2. Click the *Save* button.
3. Select a file path for the new ASP.NET file from the *Save in* list within the *Save As* dialog box.
4. Double-click on the folder where the new ASP.NET file is to be saved.
5. Set the name of the new ASP.NET file in the *File name* field.
6. Click on the *Save* button.

**Tip**

- Using the Viewer/Editor to export the TatukGIS project as an ASP.NET project can save time and effort. The default ASP.NET project set-up can be customized within the TatukGIS Internet Server or Internet Server LITE product.

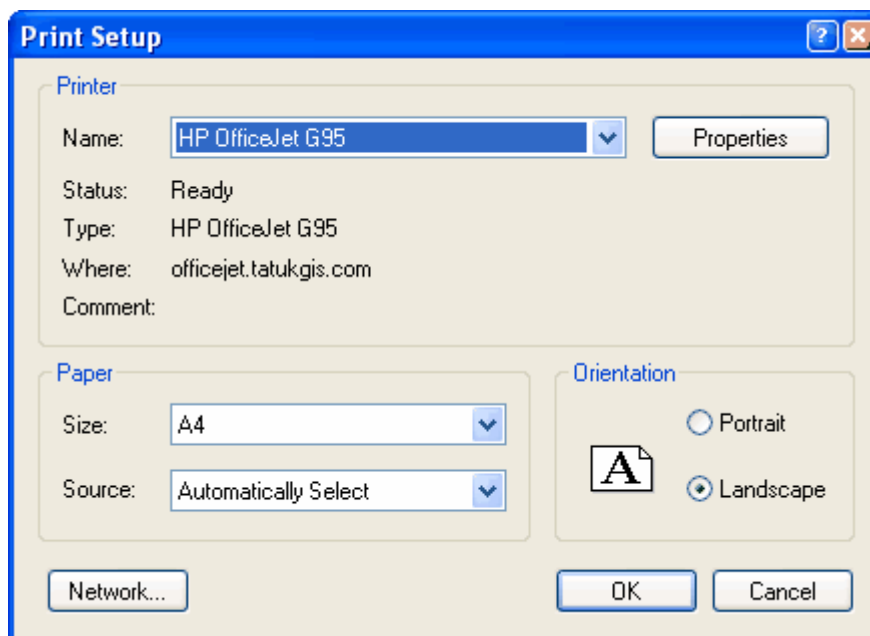
1.2.1.9 Print**Printing documents**

The Viewer/Editor program supports the printing of any layer or map project presentation that is visible in the map viewer window. The print procedure can use any printing device that is properly connected and configured to the computer.

The process of installing and configuring a printing device is controlled by the Windows operations system. Each type of printing device has its own properties. Detailed information about installing and configuring a printer can be found in the manual supplied by the printer manufacturer and in the Windows help system.

To print a document (map view):

1. Click on the *File/Print* menu option to open the *Print* window.
2. Select the printer from the *Name* list.
3. Select the paper size from the *Size* list.
4. Select the paper source from the *Source* list.
5. Set the printing orientation to either *Portrait* or *Landscape*.
6. Click on the *OK* button to start the print job.




To set advanced properties for the printing device:

1. Proceed with the points 1 and 2 above.
2. Click on the *Properties* button.
3. Use the control elements in the combo box to set the desired properties for a selected printer.

Annotation

- In addition to the map view window, if the Legend and/or MiniMap are open, it prints these out as well. The date and scale ratio are also included on the print out. The inclusion of these items in the print out can be customized by using the Print Preview feature, which is available under the *File/Print Preview* menu.

Tip

1. To print out at a give scale level, set the scale ratio located at the bottom of the map viewer window before commencing the print set up procedure. Note that the map units must first be selected before it is possible to specify the scale ratio. (The map units are specified in the window that can be opened with the *Map/Map units* menu command.)
2. The same procedure described above can also be initiated by clicking on the *Print...*  toolbar icon.

1.2.1.10 Print to PDF

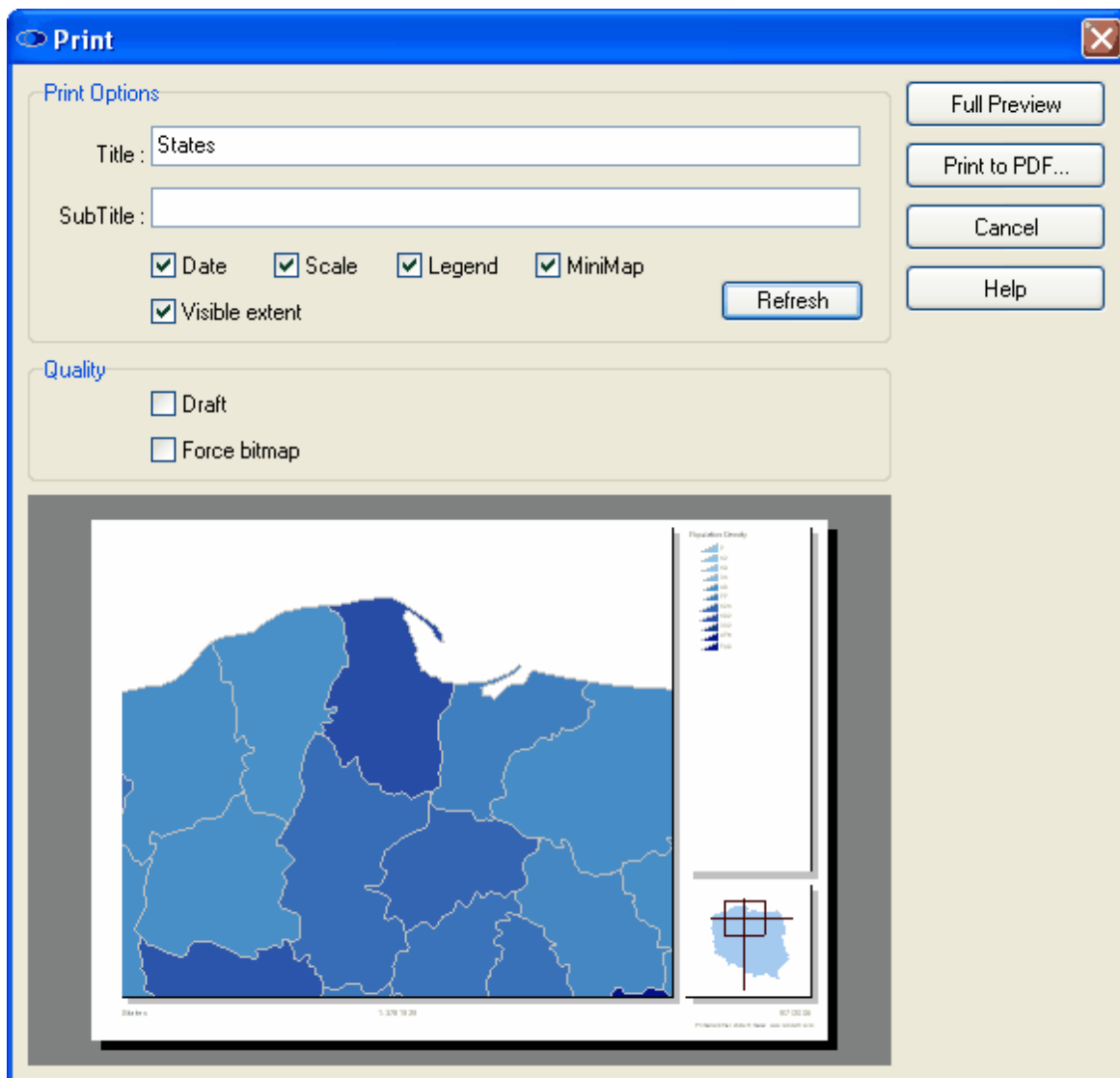
Printing to a PDF document

The TatukGIS Viewer/Editor includes its own engine to export any view of a mapping project to a vector quality PDF file. The possibility to generate the print out to a portable and almost universally compatible PDF file makes for easier cooperation with professional printers and contractors who may not use the TatukGIS Viewer/Editor program.

To print a map view to a PDF file:

1. Click on the *File/Print to PDF* menu command to open the *Print* window.
2. Enter a title, if desired, for the printed document in the *Title* field. The title will appear in the bottom-left corner of the PDF page.
3. Enter a subtitle, if desired, for the printed document in the *Sub Title* field. This will appear in the bottom-left corner of the PDF page, below the title.
4. Use the check boxes to specify whether the *Date*, *Scale*, *Legend*, and *Minimap* are to be included in the PDF document.
5. Click on the *Refresh* button.

6. Use the *Quality* check boxes to, if desired, activate *Draft* and/or *Force bitmap*. (These settings are explained below.)
7. Click on the *Print to PDF* button to open the *Print to Acrobat Reader PDF* window.
8. Select the file path in which to save the PDF document file in the *Save in* list.
9. Double-click on the folder where the PDF file is to be saved.
10. Set the name for the new PDF file in the *File name* field.
11. Click on the *Save* button.





- *Draft* will speed up the printing process with some printer types by using a lower quality level.


- *Force bitmap* is useful in situations in which some types of map objects are not properly represented on the printer due to incompatibilities between the Windows operating system and the printer engine. For example, sometimes semi-transparent or filled polygons can be misinterpreted by the printer. Use of the *Force bitmap* option forces the printer to represent such situations as they actually appear on the screen.

Annotations

1. It is possible to see the effect of changes to the *Date*, *Scale*, *Legend*, and *Minimap* check boxes, before performing the *Print to PDF* operation by clicking on the *Refresh* button.
2. It is possible to see a full screen preview by clicking on the *Full Preview* button. Within the *Full Preview* window, it is possible to change the printing properties with the *Print options*

 toolbar icon or to print the document using the *Print*  toolbar icon.

Tips

1. To print out at a give scale level, set the scale ratio located at the bottom of the map viewer window before commencing the print set up procedure. Note that the map units, located under the *Map/Map units* menu, must first be selected before it is possible to specify the scale ratio.
2. The procedure described above can also be initiated by clicking on the *Print to PDF*  toolbar icon.
3. Refer to the Viewer **Print, Print Preview, PDF** tutorial for a demonstration of print to PDF procedure.

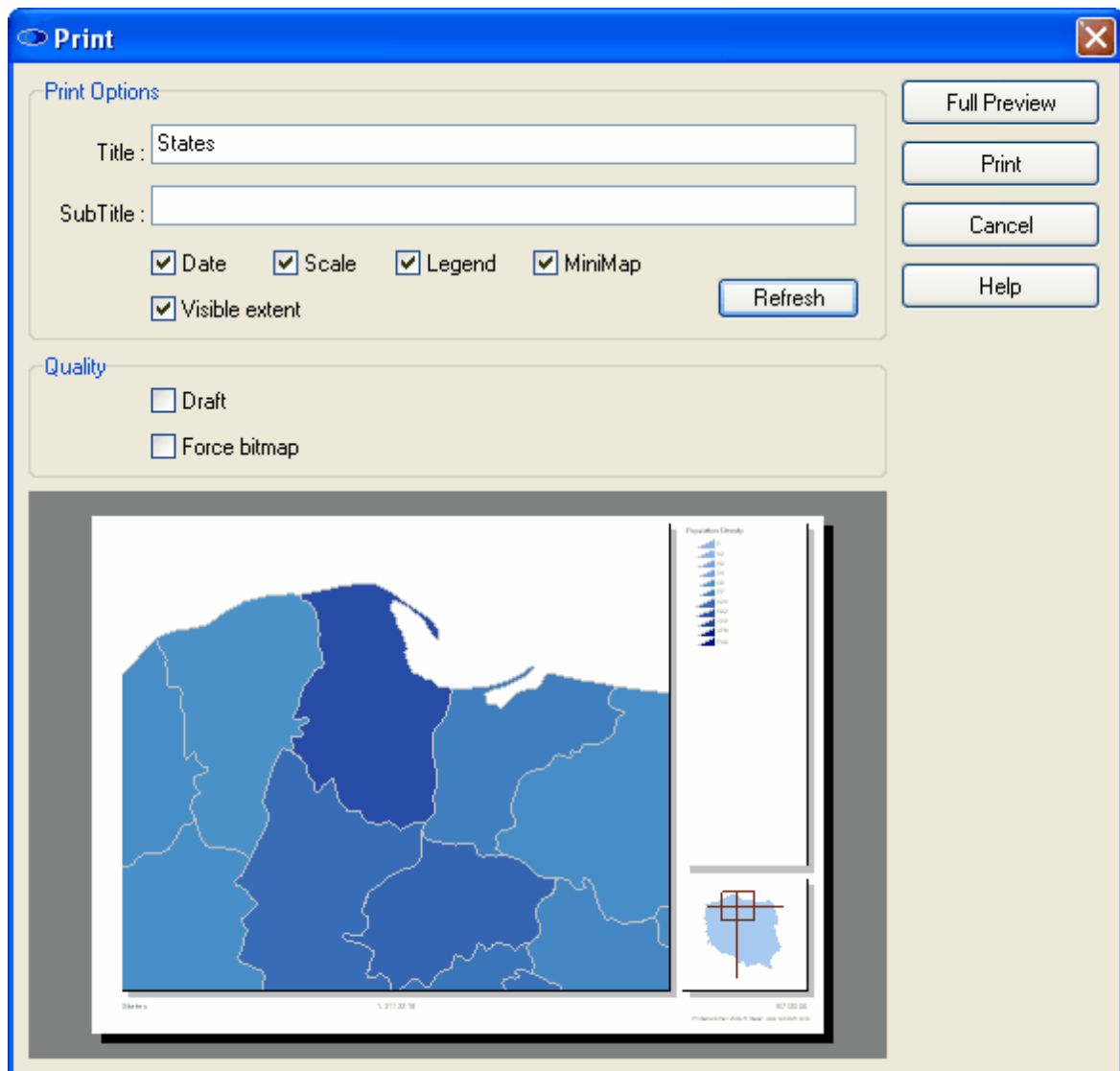
1.2.1.11 Print Preview

Previewing an image before printing

The Print Preview feature allows the user to custom define the printing settings and preview the print document before generating the print-out.

To generate a preview of document before printing:



1. Click on the *File/Print Preview* menu option.
2. Enter the title for the document, if desired, that is to be printed in the *Title* field. The title will appear in the bottom-left corner of the page.
3. Enter the subtitle for the printed document, if desired, in the *Sub Title* field. This will appear in the bottom-left corner of the page, below the title.
4. Use the check boxes to set whether the *Date*, *Scale*, *Legend*, and *Minimap* are to be included in the print out. 5.
5. Click on the *Refresh* button to preview the effect of the settings made in points 2 - 4 above.
6. If needed, repeat the steps 2 - 5.
7. Use the *Quality* check boxes to, if desired, activate the *Draft* and/or *Force bitmap* settings. (These settings are explained below.)
8. Click on the *Print* button to begin the print job.



- *Draft* will speed up the printing process with some printer types by using a lower quality level.

- *Force bitmap* is useful in situations in which some types of map objects are not properly represented on the printer due to incompatibilities between the Windows operating system and the printer engine. For example, sometimes semi-transparent or filled polygons can be misinterpreted by the printer. Use of the *Force bitmap* option forces the printer to represent such situations as they actually appear on the screen.

Annotations

1. It is also possible to see the preview in full screen mode by clicking on the *Full Preview* button within the *Print* dialog box.
2. Within the *Full preview* window, it is possible to set the printing properties by clicking on the *Print options*  toolbar icon or using the Ctrl + E shortcut.
3. Within *Full preview* window, it is possible to print the document by clicking on the *Print*  toolbar icon or using the Ctrl + P shortcut. This will skip the print preview step.

Tip

1. To print out at a give scale level, set the scale ratio located at the bottom of the map viewer window before commencing the print set up procedure. Note that the map units,

located under the *Map/Map units* menu, must first be selected before it is possible to specify the scale ratio. Refer to the *Map units* help file for more information.

2. When used in conjunction with the *Force bitmap* setting, *Draft* mode will always speed up the printing of forced bitmap type outputs.
3. Refer to the Viewer **Print, Print Preview, PDF** tutorial for a demonstration of the print preview procedure.

1.2.1.12 Recent Files

Opening recently used files

It is possible to quickly open a recently used project file without using the *File/Open Project* menu and the *Open* dialog box.

To open a recently used file:

1. Select the *File/Recent Files* menu command.
2. Select a file from the list that is shown.

Tip

Just after starting the program a list of recently opened files is also presented in the main window. The user can simply select a file from that list by clicking on the file name.

1.2.1.13 Exit

Exiting from the program

The Viewer/Editor program can be closed at any time.

To quit the program:

- Click on the *File/Exit* menu option.

Annotation

- If the program notices there are unsaved changes in any of the opened files, it will prompt if the user would like to save the changes before closing.

1.2.2 Edit

1.2.2.1 Undo


Undoing the last edit change

In most editing situations the Editor provides for the possibility to cancel (undo) the most recent edit operation that as performed on a single vertex.


To undo the most recent editing change:

- Select the *Edit/Undo* menu command.

Annotation

- If the context of the situation is such that it is impossible to *Undo* the most recent edit change, the *Undo* menu command will not be active.
- The *Undo* feature can also be accessed by clicking on the *Undo*  toolbar button or by using the Ctrl + Z shortcut.

Tips

- The Undo feature is only for reversing the most recent editing operation performed on a single vertex. If the most recent editing operation an entire shape or a part within a shape, such as in the event of an accidental deletion of a shape or a part within a shape, use the *Revert Shape* feature to restore the shape. *Revert Shape* can be called via the *Shape/Revert Shape* menu or by clicking on the  toolbar button.

1.2.2.2 Redo

Canceling an Undo operation

The Editor user can cancel an *Undo* operation, reverting the situation back to its original state before the *Undo* operation was performed. The cancellation of an *Undo* operation is referred to as *Redo*.


To cancel the Undo operation:

- Select the *Redo/Edit* menu option.

Annotation

- If the context of the situation is such that it is impossible to *Redo* the most recent Undo operation, the *Redo* menu option will not be active.

Tip

- The Redo function can also be accessed by clicking on the *Redo*  toolbar icon or using the Ctrl + Y shortcut.

1.2.2.3 Cut

Cutting vector map objects

The Editor program offers one way to cut (remove) vector map geometry from a layer and paste to a temporary clipboard layer:

- Using a newly created *Clipboard* layer in the Viewer/Editor program.


To cut vector map objects to the Viewer/Editor Clipboard layer:

1. Select (highlight) in the *Legend panel* the layer from which map geometry is to be cut.
2. Use a spatial select (query) tool or an attribute query to select a vector object or group of objects that is to be cut.
3. Select the *Edit/Cut* menu option.

Annotations

1. A Clipboard layer to contain the objects that are cut is automatically created by the *Cut* procedure.
2. The *Edit/Cut* feature copies all the selected objects (vectors) to the clipboard as a single object, i.e., all the cut objects are fused into a single object.
3. The objects from source layer will be deleted from this layer.

Tips

1. The Clipboard layer is not file type specific. It is a temporary, in-memory layer.
2. Any vector type (point, multipoint, polyline, or polygon) can be cut (moved) to the clipboard, even at the same time.
3. Only the vector geometry, and not the file attributes, are cut (moved) to the *Clipboard* layer.
4. The Cut function can also be accessed by clicking on the *Cut*  toolbar icon or by using the Ctrl + X shortcut.
5. The Editor program (not the Viewer) can be used to save information on the Clipboard layer to any of the supported vector formats (file types).

1.2.2.4 Copy

Copying vector map objects

The program offers two ways to copy vector map geometry to a temporary clipboard layer:

- Using the Windows operating system clipboard
- Using a newly created *Clipboard* layer in the Viewer/Editor program.

To copy the vector map objects to the operating system clipboard:

1. Select (highlight) in the *Legend panel* the layer from which map geometry is to be copied to the clipboard.
3. Use the Zoom and Drag features to frame the view extent as desired.
3. Select the *Edit/Copy* menu command.
4. Paste the copied information to the desired location.


To copy vector map objects to the Viewer/Editor Clipboard layer:

1. Select (highlight) in the *Legend panel* the layer from which map geometry is to be copied.
2. Use a spatial select (query) tool or an attribute query to select a vector object or group of objects that is to be copied.
3. Select the *Edit/Copy* menu option.

Annotations

1. Copying selected objects to the Clipboard layer also copies the selected objects to the Windows operating system clipboard.
2. A Clipboard layer to contain the copied objects is automatically created by the *Copy* procedure
3. The *Edit/Copy* feature copies all the selected objects (vectors) to the clipboard as a single object, i.e., all the copied objects are fused into a single object.

Tips

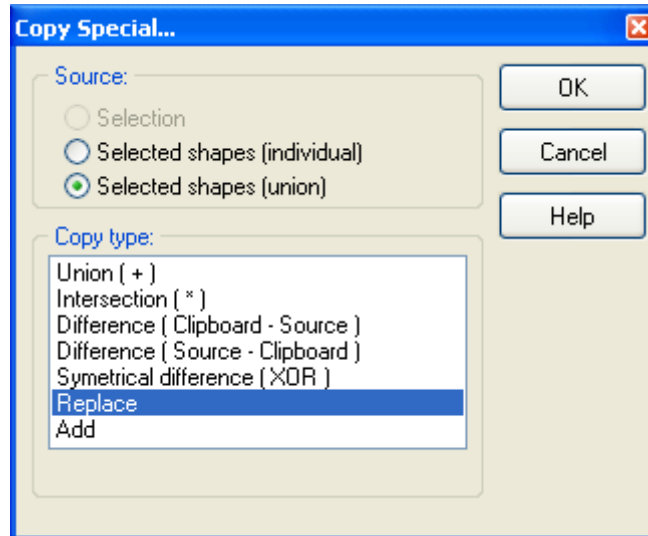
1. The Clipboard layer is not file type specific. It is a temporary, in-memory layer.
2. Any vector type (point, multipoint, polyline, or polygon) can be copied to the clipboard, even at the same time.
3. Only the vector geometry, and not the file attributes, are copied to the *Clipboard layer*.
4. The Copy function can also be accessed by clicking on the *Copy*  toolbar icon or by using the Ctrl + C shortcut.
5. The Editor program (not the Viewer) can be used to save information on the Clipboard layer to any of the supported vector formats (file types).

1.2.2.5 Copy Special**Special copying of objects to Clipboard**

Vector objects can be copied to the *Clipboard* layer in customized (advanced) ways using the *Copy Special* feature.

To Special Copy selected objects to the Clipboard layer:

1. Select (highlight) in the Legend panel the layer from which objects are to be copied.
2. Select the object or objects to be copied using either a spatial select tool or an attribute query.
3. Select the *Editor/Copy Special* menu command.
4. Choose one of the *Source* options to custom define how the selected data is copied from the source layer.
5. Choose one of the *Copy Type* options to custom define in the way in which the selected objects are copied to the Clipboard layer.
6. Click the *OK* button to perform the Copy Special operation to the Clipboard layer.



By making the right source and copy type selections in the Copy Special combo box, objects can be selectively added, subtracted, exchanged, or merged on the Clipboard layer.


Source options

- *Selection* - Copy only the spatial selection figure (circle, rectangle, polygon, line, etc.) to the Clipboard layer.
- *Selected shapes (individual)* - Copy all selected vector objects to the Clipboard layer individually as separate objects (exactly as they were in the source layer).
- *Selected shapes (union)* - Copy all selected objects to the Clipboard layer as a single fused object (as when using the regular *Copy* feature)

Copy Types Options - These options spatially relate (using vector topology) the geometry being copied using the Copy Spatial procedure with the geometry that is already on the Clipboard layer in the following ways:

- *Union (+)* - Adds the newly copied geometry to any geometry that already exists in the Clipboard layer.
- *Intersection (*)* - Places on the Clipboard layer only the portion the geometry that is common between the newly special copied geometry and the geometry that was previously on the Clipboard layer.
- *Difference (Clipboard - Source)* - Places on the Clipboard layer only the portion of the geometry that was previously on the Clipboard layer which is not common with the newly Special Copied geometry.
- *Difference (Source - Clipboard)* - Places on the Clipboard only the portion of the newly Special Copied geometry that is not common with the geometry that was previously on the Clipboard.
- *Symmetrical difference (XOR)* - Places on the Clipboard only the portions of both the newly Special Copied and the geometry previously on the Clipboard layer which are not in common.
- *Replace* - Replace all objects presently on the Clipboard layer with the newly Special Copied geometry.
- *Add* - adds selected objects to the Clipboard layer

Tips

1. The Copy Special feature can also be accessed by clicking on the *Copy Special*  toolbar icon.
2. The Clipboard layer is not file type specific. It is a temporary, in-memory layer.
3. Only the vector geometry, and not the file attributes, are copied to the *Clipboard* layer.
4. The vector geometry can be edited within the Clipboard layer (only with the Editor product).

5. One useful way of using geometry on a clipboard layer is to use it to perform a spatial query on another vector layer.
6. For more guidance on this topic refer to the demonstration provided in the **Viewer Spatial Select - Copy & Copy Special to Clipboard Tutorial**.
7. The Editor program (not the Viewer) can be used to save information on the Clipboard layer to any of the supported vector file types.

1.2.2.6 Paste

Paste vector map objects

The Editor program offers one way to paste vector map geometry from a temporary clipboard layer to active layer:

- Using a newly created *Clipboard* layer in the Editor program.


To paste vector map objects from the Editor Clipboard layer:

1. Select (highlight) in the *Legend panel* the layer from which map geometry is to be copied.
2. Use a spatial select (query) tool or an attribute query to select a vector object or group of objects that is to be copy to clipboard layer.
3. Copy selected objects to clipboard layer by [Edit/Copy](#) or [Edit/Copy special](#)
4. Select the *Edit/Paste* menu option to paste objects to active layer.

Annotations

1. A Clipboard layer to contain the objects that are copy is automatically created by the *Copy* procedure.

Tips

1. The Clipboard layer is not file type specific. It is a temporary, in-memory layer.
2. Any vector type (point, multipoint, polyline, or polygon) can be paste from the clipboard, even at the same time.
3. Only the vector geometry, and not the file attributes, are paste from the *Clipboard* layer.
4. The Paste function can also be accessed by clicking on the *Paste*  toolbar icon or by using the Ctrl + V shortcut.
5. The Editor program (not the Viewer) can be used to save information on the Clipboard layer to any of the supported vector formats (file types).

1.2.2.7 Clear Clipboard

Clearing the Clipboard layer

It is possible to quickly erase all the objects that have been copied to the clipboard layer.


To clear the Clipboard layer:

- Select the *Edit/Clear Clipboard* menu command.

Annotation

- The *Edit/Clear Clipboard* menu command does not clear the Windows operating system clipboard.

Tip

- The Clear Clipboard feature can also be accessed by clicking on the *Clear Clipboard*  toolbar icon.

1.2.2.8 Save Clipboard

Saving the Clipboard layer

The Editor program provides for saving the Clipboard layer for further use.

To save the Clipboard layer:

1. Select the *Edit/Save Clipboard* menu command.
2. Choose the file path to which the Clipboard layer is to be saved from the *Save in* list in the *Create New Layer* window.
3. Double click on the destination folder.
4. Enter a name for the new file to be created in the *File Name* window.
5. Select the file format for the Clipboard layer from the *Save as type* list.
6. Click the *Save* button.

The geometry in the Clipboard layer will be saved to the selected file.

Tip

1. The Editor program (not the Viewer) can be used to save information on the Clipboard layer to any of the supported vector file types.
2. The vector geometry can be edited within the clipboard layer (only with the Editor product).

1.2.2.9 Load Clipboard

Loading a map file to a Clipboard layer.

A previously saved vector file can be loaded to the clipboard layer.

To load vector geometry to the clipboard layer:

1. Select the *Edit/Load Clipboard* menu command.
2. Select the file path for the file that is to be loaded from the *Look in* drop down list.
3. Double click on the folder in which the file is stored.
4. Double click on the name of the file.

1.2.3 View

1.2.3.1 Toolbars

Turn toolbars on/off

The toolbars containing the menu icons (located below the menu bar) can be turned on/off.

To turn any toolbar on or off:

1. Select the *View/Toolbars* menu command.
2. Check or uncheck the space next to the names of each toolbar in the list to turn selected toolbar icons on/off.

Tips:

1. The default toolbar settings and locations can be reset by clicking on *View/Toolbars/Default* menu command.
2. The locations of each toolbar in the application can be customized by dragging to a new position.
3. The toolbar on/off settings are remembered when the Viewer/Editor application is next opened.

1.2.3.2 Panels

Turn panels on/off and reposition

The appearance of individual panels, e.g., Scale, Attributes, Legend panel, Minimap panel, Introduction, Data, and Search, can be turned on/off. Each panel can be repositioned within or outside of the program window.

To turn any panel on or off:

1. Select the *View/Panels* menu command.
2. Click on the space next to the name of the panel (to check or uncheck the space) to turn the panel on/off.

To reposition panels:

The locations of any open panels in the Viewer/Editor program can be repositioned by simply dragging the panel to the new location. Panels can even be repositioned outside of the frame of the Viewer/Editor program, if desired.

Tip:

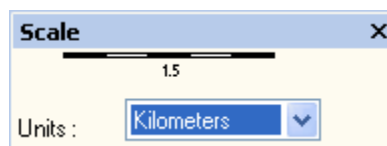
- Use the *View/Panels/Default* menu option to return all panels to their default positions.

1.2.3.2.1 Scale

The *Scale* panel presents a scale bar and allows the user to set the scale bar to be presented in a choice of units: meters, kilometers, feet, miles.

Annotations

1. The map units for the layer must be specified by the user before the scale bar can present accurate information.
2. The map units are specified within the *Map units* window, which can be accessed via the *Map/Map units* menu or by clicking on the *Setup* button in the *Scale* panel.



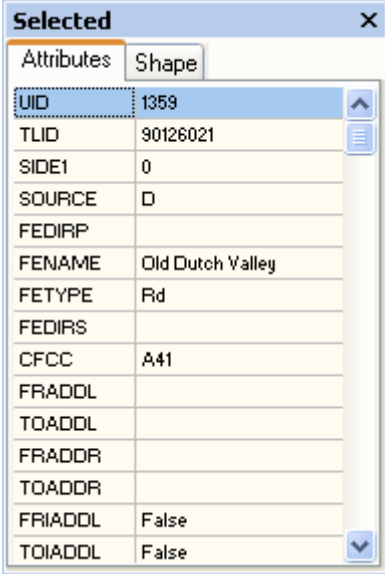
1.2.3.2.2 Selected

The *Selected* panel contains several tabs which present information relating to an object (or objects) that has been selected while in either Select mode or Edit mode.

In Select mode, the *Attributes* and *Shape* tabs are visible within the *Selected* panel. In Edit mode (which is only supported in the Editor product), the *Smooth*, *Points*, and *COGO* tabs also become visible within the *Selected* panel.

Attributes Tab

The *Attributes* tab presents the attribute information for a selected vector object when in either Select or Edit mode. The information is presented in two columns. The left column, which is frequently titled 'UID', contains the attribute names. The attribute names are common for all vector objects in the layer. The right column contains the attribute values (information), which can be unique for each object.

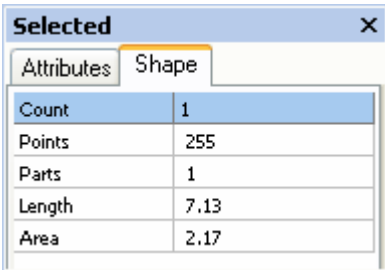


Selected	
Attributes	Shape
UID	1359
TLID	90126021
SIDE1	0
SOURCE	D
FEDIRP	
FENAME	Old Dutch Valley
FETYPE	Rd
FEDIRS	
CFCC	A41
FRADDL	
TOADDL	
FRADDR	
TOADDR	
FRIADDL	False
TOIADDL	False

Shape Tab


The *Shape* tab contains information about the geometry of the selected vector object when in either Select or Edit mode. *Count* presents the number of vectors that are currently selected. *Points* provides the number of vertices composing the selected vector(s), *Parts* presents the number of parts composing the selected vector, *Length* provides the length if the vector is a line or the length of the perimeter if the vector is a polygon, and *Area* provides the area if the selected vector is a polygon.

The word *Shape* is a common GIS term for a vector object.

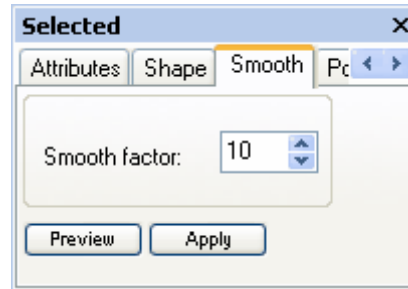


Selected	
Attributes	Shape
Count	1
Points	255
Parts	1
Length	7.13
Area	2.17

Smooth Tab

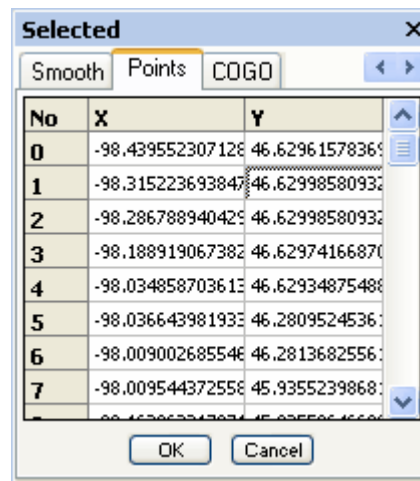
The Smooth tab automatically opens when either the smooth shape feature is called, either by clicking on the *Smooth shape*  toolbar icon or using the *Shape/Smooth shape* menu. This panel allows the user to customize the smooth factor that can be applied to a selected line or polygon vector.

For more information on the smooth shape feature, refer to the help file description of the *Shape/Smooth shape* menu or to the **Editor Digitize New Map Geometry - Line/Polygon Smoothing Tutorial**.

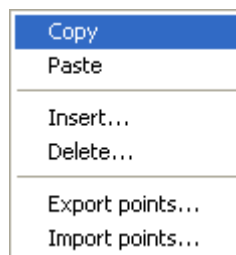


Points Tab

The Points tab presents the x and y coordinate information for each vertex composing the selected vector object. The vector can be edited by left clicking on a field containing a y or x coordinate of one of the points, changing the data in the field, and clicking on the OK button to record the change(s). Upon clicking on the *OK* button, the change to the geometry of the selected vector is immediately visible.



Right mouse clicking on the *Points* tab presents the following options.



Copy - Left click on a field to select it, and the *Copy* function copies the data in the field so that it can then be pasted to another file, such as to a MS Word or Excel document.

Paste - Left click on a field to select it, and the *Paste* function inserts data into that field which has been copied from another source, such as from a MS Word or Excel document, ASCII file, etc.

Insert - Left click on a field to select a *point* (vertex) which forms the vector, and the *Insert* feature adds a new point to the vector in a position that is between the selected point and the point with the preceding number.

Delete - Left click on a field to select a point, and the *Delete* function will delete the selected point from the vector.

Export Points - Exports the entire table of points coordinate information under *Points* tab to another file type, such as a text (*.txt) file or Excel (*.xls) spreadsheet.

Import Points - Imports and fills the *Points* tab with point coordinate information from another source such as a text (*.txt) file or Excel (*.xls) spreadsheet. This operation effectively creates a new vector object on the selected map layer from the imported point coordinates. If a vector is selected when the import points operation is performed, the selected vector is replaced by the object created from the imported points. Otherwise a new vector shape is created from the imported points. The type of the vector created - point, multi-point, line or polygon - is determined by the vector type of the layer if importing into a SHP format layer and is specified by the user if importing into another write supported format layer, e.g., MIF, GML, DXF, SQL database layer.

Point coordinates in a text file can look like this:

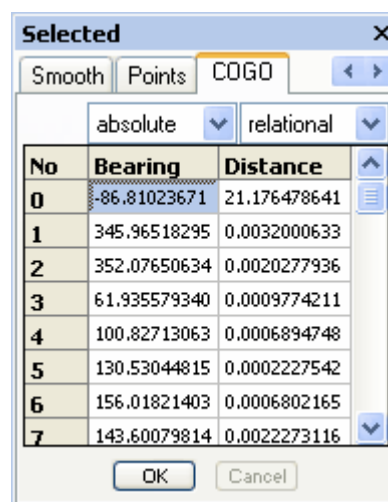
```
246,-311
327,-156
435,-309
565,-202
"" ""
"
```

The Editor supports the following file types when with the copy, paste, export points functions. Points can be imported from text (*.txt) or Excel files.



COGO Tab

The *COGO* tab - COGO is an acronym for coordinate geometry - is similar to the *Points* tab, but presents the geometry of the selected object in terms of bearing and distance measurements. The data for only the first point - number 0 - is presented in terms of x,y coordinates. The information for all subsequent points is presented in terms of bearing (direction on a 360 degree basis) and distance relative to the previous point(s). Each data field in the COGO tab can be edited, and the effect on the geometry of the vector object is immediately visible after clicking on the *OK* button to record the change(s).



There are two options - *absolute* and *relational* - for entering both the *Bearing* and *Distance* data. The meanings of these settings are as follows:

Bearing - absolute: The angle is measured starting from absolute North (0 degrees) in a 0 - 360 degree manor.

Bearing - relational: The angle is measured starting from the direction of the last line segment, in a 0 - 360 degree manor. (The direction of the last line segment is considered to be 0 degrees.)

Distance - absolute: The distance of each vertex is measured from the first/beginning vertex of the vector, not from the previously numbered or nearest vertex.

Distance - relational: The distance is measured from the previously numbered vertex.

1.2.3.2.3 Legend

The *Legend* panel is one of the most important user interface feature. The Legend present a summary of the open layers at any given time and provides a user friendly way to manipulate and rearrange the layers of a project and to access the layer appearance settings.

The presentation of information in the Legend panel can be customized in several ways:

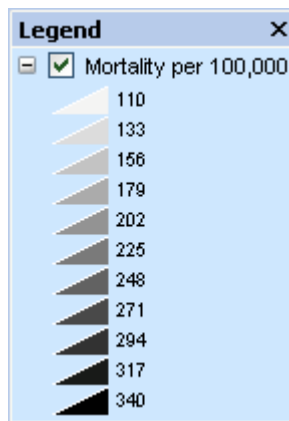
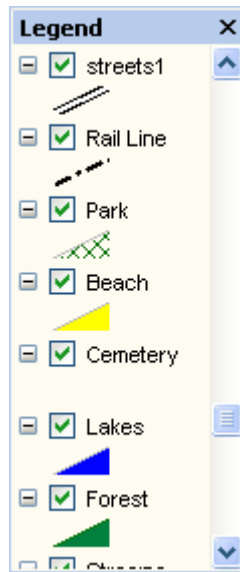
- Present the layer names. The layer names presented in the *Legend* can be customized in the *Caption* field under the *Layer* tab within the layer properties combo window.
- Present a small graphic segment from the point, line, or polygon layer by activating the *Include in legend* check box in the *Marker*, *Line*, or *Polygon* tab within the layer properties combo window.
- Present the value ranges on which map data in a selected vector layer is rendered by activating the *Include in legend* check box in the *Marker*, *Line*, or *Polygon* tab within the layer properties combo window.
- Present pie/bar chart information by activating the *Include in legend* check box in the *Chart* tab within the layer properties combo window.
- Present label information by activating the *Include in legend* check box in the *Label* tab of the layer properties combo window.

A project can be manipulated via the Legend panel in several ways:

- Double click on a layer to open the layer properties combo window for that layer.
- Reposition the order of the layer presentation by dragging a layer up or down in the layer list.
- Hide a layer by unchecking the check box for that layer.
- Select a layer for analysis or editing by highlighting the layer.
- Apply layer properties from one layer to another layer by right clicking on a layer and selecting the "Save Layer Properties" (as an *.ini file) option. Then right click on the layer to which the layer properties are to be applied and selecting the Load Layer Properties (from an *.ini file) option.

Annotation

- All the manipulation operations described above can also be performed via the various program menus, but working directly via the project legend is intuitive and user friendly.



1.2.3.2.4 MiniMap

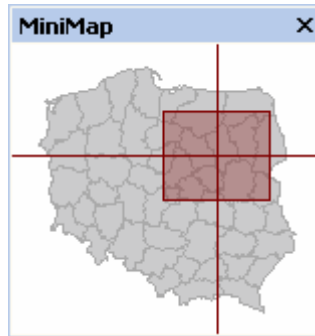
The *MiniMap* panel can be loaded with one of the open map layers to provide an orientation of the positioning of the map viewer window relative to the full extent of the layer loaded to the *MiniMap* panel. Besides providing a navigation aid, the visible map extent can be panned (dragged) from the *MiniMap* panel as well as from the main viewer window.

To load a layer to the *MiniMap* panel:

Right click on one of the layers in the Legend panel and select the *Use in MiniMap* option. Alternatively, highlight the layer in the *Legend* panel and then select the *View/MiniMap* menu.

Tips

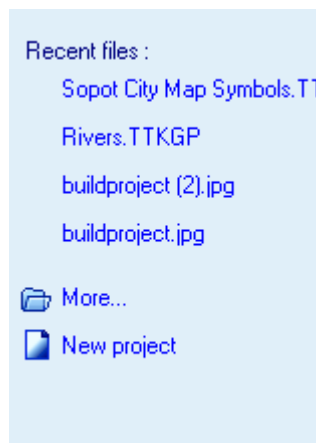
1. Try to select a layer for the MiniMap which best represents the full extent of the overall project
2. Use a layer for the MiniMap which is not a very, very large file. This is because only minimal detail can be presented in the small MiniMap layer, but the use of a very large file as the MiniMap can negatively effect performance.
3. If the MiniMap is an important feature of a project presentation, consider making a special, small JPEG image file from the full project extent for presentation in the *MiniMap* panel. This layer can be turned off (hidden) in the *Legend* panel.



1.2.3.2.5 Intro

The Intro panel presents the file paths to the most recently opened files and projects. The Intro panel appears in the main map viewer window when the program is first opened and automatically disappears after a file or project has been opened in the program.

The Intro panel can be turned on/off by checking/unchecking the Intro panel item in the *General* tab within the *Options* combo window. This can be accessed via the *Tools/Options* menu.




1.2.3.2.6 Data

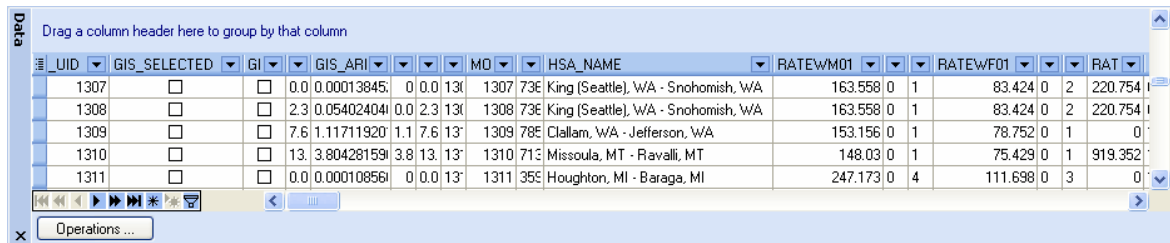
Showing the attribute information in the Data panel

The data values held by the attributes of any vector file layer, or a user defined subset of that data, can be presented as a grid table for viewing, querying, and other operations. The term record(s) is used to describe the rows of attribute data presented in the *Data* panel. The GIS_UID attribute of each record contains a unique UID (unit identifier number) that corresponds to a specific geometric shape in the map file with the same UID number. Each record (row of data) contains all the attribute information for that geometric shape on the map. The default organization of the data table is vertically by UID and horizontally by attribute name. The default organization can be customized by dragging and dropping columns to a new location, by sorting by a selected attribute value, by performing spatial selections or based on a visible map extent, query statements against attribute values, etc. The Editor (not the free Viewer) can be used to create or edit the attribute data within the *Data* panel, export data from the *Data* panel, or import data into the *Data* panel as new attributes of a selected vector map file.

Map to Data Panel Operations

To display the vector attribute values (data) in the *Data* panel:

1. Select (highlight) the vector map layer of interest in the *Legend* panel.
2. Open the *Data* panel by selecting either the *Data/Show Data* menu or by clicking on the *Show Data*  toolbar icon.
3. Per the default settings, all the attribute information for the selected layer is presented in the expandable table.
4. If required, the process of loading the data panel can be manually interrupted by pressing the *Esc* key.




UID	GIS_SELECTED	GI	GIS_ARI	MO	HSA_NAME	RATEWM01	RATEWFD1	RAT
1307	<input type="checkbox"/>	<input type="checkbox"/>	0.0 0.00013845	0 0.0 13	1307 73E King (Seattle), WA - Snohomish, WA	163.558 0	1	83.424 0 2 220.754
1308	<input type="checkbox"/>	<input type="checkbox"/>	2.3 0.05402404	0.0 2.3 13	1308 73E King (Seattle), WA - Snohomish, WA	163.558 0	1	83.424 0 2 220.754
1309	<input type="checkbox"/>	<input type="checkbox"/>	7.6 1.11711920	1.1 7.6 13	1309 78E Clallam, WA - Jefferson, WA	153.156 0	1	78.752 0 1 0
1310	<input type="checkbox"/>	<input type="checkbox"/>	13. 3.90428159	3.8 13. 13	1310 71E Missoula, MT - Ravalli, MT	148.03 0	1	75.429 0 1 919.352
1311	<input type="checkbox"/>	<input type="checkbox"/>	0.0 0.00010856	0 0.0 13	1311 35E Houghton, MI - Baraga, MI	247.173 0	4	111.698 0 3 0

(The expandable *Data* panel contains many powerful features.)

To display data from a different layer:

- Change the layer that is selected in the *Legend* panel by clicking on the new layer with the mouse cursor.

To switch the *Data* panel off:

- The *Data* panel can be closed at any time by again clicking on the *Show Data*  toolbar icon, or by selecting the *Data/Show Data* menu command, or by simply clicking on the **X** in the lower left corner of the panel.

Record count feature:

If this feature is activated via the *Tools/Options/Data panel* menu, the number of records presently contained by the *Data* panel and the total number of records in the map layer are presented as a status bar panel just below the *Data* panel. If, for example, the *Data* panel presently contains 75 records out of a total of 3,598 records in the map layer, the presentation in the status bar would be:

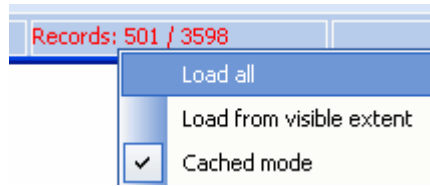
Records: 75 / 3598

One record corresponds to one geometric shape (object) in the map layer. Each record can contain a large number of attribute fields.

The meaning of the color of the record count information is as follows:

- **Black.** (The default color.) This means that *Cached mode* is enabled and that the full data set has been loaded into the *Data* panel and into cache (RAM) memory.
- **Orange.** *Cached mode* is disabled. This means the *Data* panel features which are dependent on *Cached mode* will be disabled and the data is loaded to the *Data* panel directly from the computer hard disk. This is OK if it is the user's intent.
- **Red.** *Cached mode* is active but not all the records were loaded into the cache (RAM) memory. Possible explanations for this are that the user interrupted the loading of the data by clicking on the *Esc* key or the *Abort* button in the progress bar before the completion of the data loading process, lack of sufficient RAM memory to hold the data, or some other fault. This is a situation that should be corrected, either by disabling *Cached mode* or by again reloading the data to cached memory. Otherwise any operations performed within the *Data* panel will not reflect all the data contained by the map file data set.

Clicking on the record count information opens the a pop up menu window with the following options which can be used to remedy a red or orange color situation. (The same menu options are also provided in the *Operations* pop up menu.)



- **Load all** - Loads all attribute records from the map file into the *Data* panel. If *Cached mode* is active, the records are also loaded into cached memory.
- **Load from visible extent** - Loads attribute records for the shapes contained within visible map extent into the *Data* panel. If *Cached mode* is active, the records are also loaded into cached memory.
- **Cached mode** (a check box) - Check to activate *Cached mode* and load of all records into the *Cached* memory. Uncheck to deactivate *Cached mode*.

Use of *Cached mode* to enable additional *Data* panel functionality:

The *Cached mode* feature loads all the attribute records for the entire map file into the computer's cached (RAM) memory. This enables a number of useful *Data* panel features:

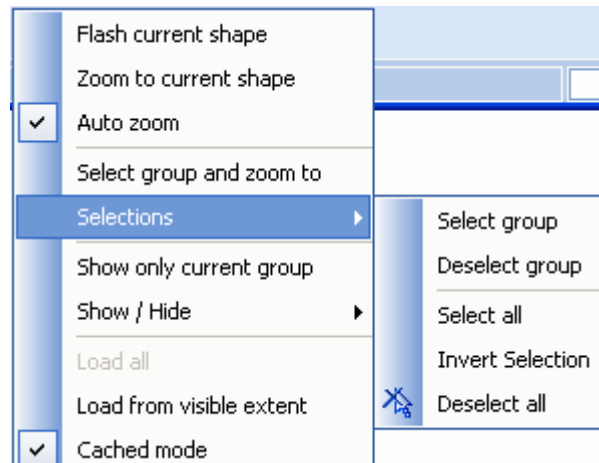
- i) presentation of all values contained by a given attribute as a drop down selection list in the heading of each attribute column.
- ii) quick filtering for any given attribute value (by clicking on the value as it appears in the drop down list).
- ii) quick numerical or alphabetical sorting of the data table based on the values held any one attribute (by clicking on the header of any attribute column name in the *Data* panel).
- iii) auto grouping by attribute value (performed by dragging the column header to the margin at the top of the data panel).

Per the default settings, *Cached mode* is automatically active in most situations. This means that the attribute data from the selected map layer is automatically loaded into cached memory when the *Data* panel is first opened. Because, however, of the time required to load very, very large record sets (several 10,000's of records) into the cache memory, the default application settings automatically load the data to the cached memory if the size of the selected map file does not exceed 9,999 records. Even if the default *Auto Cached mode* settings result in the *Cached mode* initially being inactive with a given file, the loading of the data to cached memory can be forced at any time by clicking on the *Cached mode* option in the *Operations* pop up menu window, to cause the check box to appear just to the left of this menu item. The *Operations* pop up menu window can be opened either by clicking on the *Operations* button at the bottom of the *Data* panel or by right clicking on the *Data* panel. (The *Cached mode* option is also presented when clicking on the record count panel in the status bar.)

The [Tools/Options.../Data panel](#) menu can be used to turn on/off the *Auto Cached mode* feature or to customize the records threshold level.

Data panel Operations:

The *Data* panel includes a number of operations to control the map presentation or to select records on the map. The options are provided in the *Operations* pop up menu, which can be opened by either clicking on the *Operations* button in the *Data* panel or by right clicking with the mouse cursor on the *Data* panel.



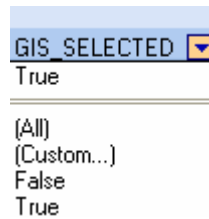
(Operations pop up menu.)

- **Flash current shape** - Makes the record that is presently highlighted in the Data panel flash on the map.
- **Zoom to current shape** - Makes the map view zoom in to the location of the record that is presently highlighted (by mouse clicking) in the Data panel.
- **Auto zoom** - When checked, makes the map view recurrently zoom into the location of the record that is presently highlighted in the Data panel, until the feature is deactivated. (A check mark shows if this feature is currently active or inactive.)
- **Select group and zoom to** - Performs the selection on the map of all records presently contained in the data panel and adjusts the visible extent to best present on the map the group of records that are selected.
- **Selections/**
 - **Select group** - Performs the selection on the map of all records presently contained in the data panel without changing the visible extent.
 - **Deselect group** - Turns off the selection of all records presently contained by the Data panel.
 - **Select all** - Selects on the map all records in the map file. (Same as the Select/Deselect menu in the main application menu panel.)
 - **Invert Selection** - Turns off the selection on the map of all records that are presently selected and selects all records which are presently unselected. (Same as the Select/Invert Selection menu in the main application menu panel.)
 - **Deselect all** - Turns off the selection of all records that are presently selected. (Same as the Select/Deselect all menu in the main application menu panel.)
- **Show only current group** - Hides all records on the map except those presently contained in the Data panel.
- **Show / Hide/**
 - **Show selected** - Shows on the map only the records that presently selected. All other records are hidden on the map.
 - **Hide selected** - Hides on the map all records that are selected. Shows all records that are non selected.
 - **Show group** - Shows on the map both all records that are presently contained by the Data panel. No records are hidden by this command.
 - **Show all** - Shows on the map all records contained by the map file. This can be used to reverse prior operations which hid some records. (Same as the Select/Show all menu in the main application menu panel.)
 - **Hide all** - Hides on the map all records contained by the map file. The prepares the map presentation to then show only specified records. (Same as the Select/Hide all menu in the main application menu panel.)
- **Load from visible extent** - Loads into the Data panel all records contained within the current visible map extent.
- **Cached mode** - When checked, Cached mode is turned on. Cached mode causes the data to be loaded into cached (RAM) memory to enable additional Data table features.

To fill the Data panel only with attribute data relating to objects that are selected on the map:

1. Verify that *Cached mode* is enabled.

2. Use the map window selection tool (point, circle, rectangle, etc.) to select one or more objects (polygons, lines, points) on the map.
3. From the drop down menu in the *GIS_Selected* attribute column, select the *True* option.



This will populate the *Data* table only with attribute data of the geometric shapes that are presently selected on the map.

To fill only with attribute data relating to the objects contained by the current visible map extent:

1. Adjust the visible map extent as desired by zooming in/out and panning on the map.
2. Click on the *Operations* button in the lower left corner of the Database panel (or right mouse click on the *Data* table) to open operations pop up menu.
3. Select the *Load from visible extent* option.

This will cause the *Data* table to populate with only the attribute data relating to the geometric shapes that are located within the current visible map extent.

Data Panel to Map Operations

To select on the map the records that are presently contained by the *Data* panel:

- Click on the *Operations...* button at the bottom of the *Data* panel, or right click on *Data* panel, to open the operations pop up menu window.
- Select the *Selection/Select group* option from the pop up menu window.

To select on the map and zoom to the records are presently contained by the *Data* panel:

- Click on the *Operations...* button at the bottom of the *Data* panel, or right click on *Data* panel, to open the operations pop up menu window.
- Select the *Select group and zoom to* option from the pop up menu window.

This results in all records currently contained within the *Data* panel becoming selected on the map and visible extent and zoom level automatically adjusts to best present the map area that contains the selected objects.

To manually select or deselect specific objects:

- Check or uncheck the *GIS_SELECTED* check box in the *Data* panel for the object.

Records that are selected in this way in the *Data* panel will become selected on the map.

To automatically adjust the visible map extent to zoom in on the record that is presently highlighted in the *Data* panel:

- Click on the *Operations...* button at the bottom of the *Data* panel, or right click on *Data* panel, to open the operations pop up menu window.
- Select the *Auto zoom* feature. The turns on the check mark next to this feature in the pop up window.
- Click on any record (row) in the *Data* panel to highlight the record.

The visible map extent automatically zooms to display the highlighted record.

To group the data based on the values contained by an attribute:

- Use the mouse cursor to drag the column header containing the attribute name to near the position of the text '*Drag a column header here to group by that column*' located in the top margin of the Data panel.

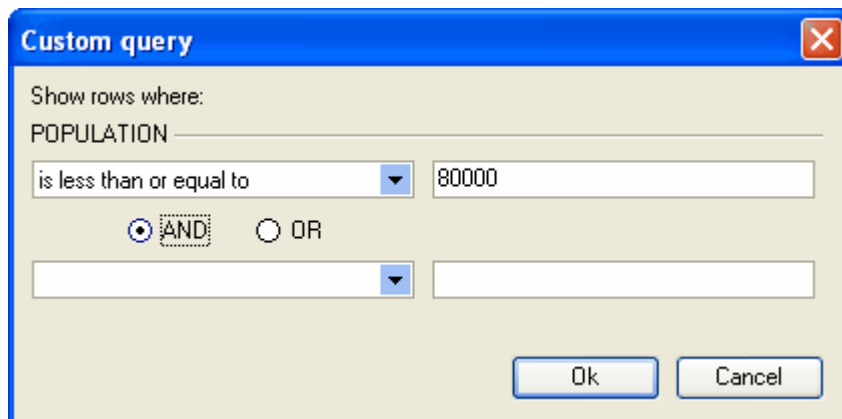
Any records for which this attribute contains the same numeric or alphabetic value will be automatically grouped together.

Attribute Querying Using the *Data* panel

One important method of populating the *Data* panel with a specific subset of data is by using query statements to filter for the records matching the query.

To Query based information contained by a single attribute:

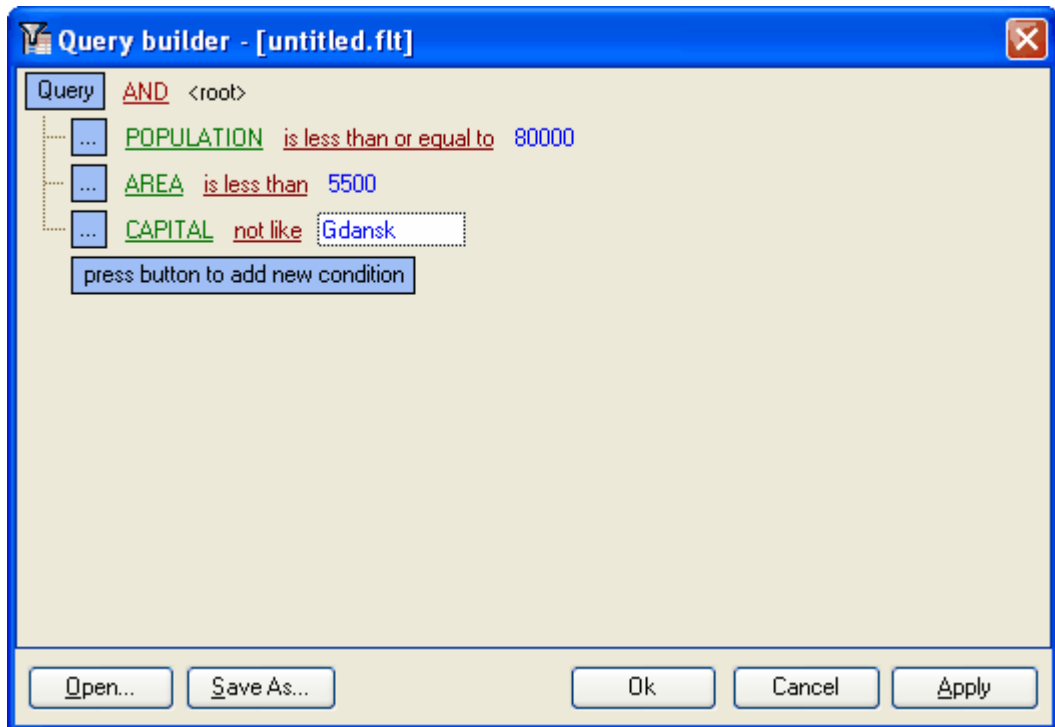
- Simple Query Method: Click on any value in the drop down list next to any of the attribute names at the top of each column to select all objects for which this attribute contains the same value. This method is enabled only in *Cached mode*. (Use the *Select group and zoom* to option in the *Operations* pop up menu to select the filtered records on the map.)
- Custom Query Method: Click on the (*Custom...*) option which is the top most item in the drop down list next to each of the attribute names at the top of each column to open the *Custom query* window to define the query. (Use the *Operations...* button and then the *Select and Zoom* menu option to select the results of the query on the map.)



(A query definition based on values contained by a single attribute.)

To Query based on information contained by multiple attributes:

- Click on the *Query* button near the bottom left corner of the *Data* panel to open the *Query builder* window to define the query. Very sophisticated queries of both numerical and text data can be defined with *Query builder*.



(A query definition based on the values contained by three attributes.)

To perform attribute queries limited to records contained by the visible extent:

- Adjust the visible map extent to as desired.
- Click on the *Operations* button in the *Data* panel and select the *Load from visible extent* command from the pop up window to fill the *Data* panel with the records that are located on the map within the current visible extent.
- Use the *Custom query* or *Query builder* window to define and perform the attribute query, as described above.

To perform attribute queries limited to records that are selected on the map

- Perform the selection on the map of a group of shapes using one of the selection tools found under the *Select* menu.
- Click on *True* in the drop down list at the top of the *GIS_SELECTED* attribute column in the *Data* panel to load the selected records into the *Data* panel. Alternatively click on (*Options...*) in the same drop down list to open the *Custom query* window and define in that window that *GIS_Selected = True*.
- Click on *OK* to fill the *Data* panel with the selected records.
- Use the *Query builder* window to define the attribute query statement(s) and click on the *OK* or *Apply* button to perform the query.

To delete or further customize a query statement:

- Click on the check mark next to the query in the *Data* panel to turn off the query.
- Click on the **X** in the check box next to the query statement in the *Data* panel to delete the query.
- Click on the *Customize* button to the right of the query statement to open the *Query builder* window to further customize the query.

Drag a column header here to group by that column

GIS_UID	GI	GI				MO	HSA_NAME	RATEWM01		RATEWF0		RATEB			
2023	<input type="checkbox"/>	<input type="checkbox"/>	0.8	0.0	0.0	0.8	2023 94	New York, NY - Kings (New York), NY	257.324	0	5	144.618	0	5	270.
2029	<input type="checkbox"/>	<input type="checkbox"/>	3.8	0.4	0.4	3.8	2029 11C	Mifflin, PA - Huntingdon, PA	250.605	0	4	121.51	0	4	77.
2032	<input type="checkbox"/>	<input type="checkbox"/>	1.2	0.0	0.0	1.2	2032 94	New York, NY - Kings (New York), NY	257.324	0	5	144.618	0	5	270.
2035	<input type="checkbox"/>	<input type="checkbox"/>	4.6	0.9	0.9	4.6	2035 57	Cambria, PA - Blair (Altoona), PA	247.682	0	4	124.82	0	4	274.
2043	<input type="checkbox"/>	<input type="checkbox"/>	0.6	0.0	0.0	0.6	2043 94	New York, NY - Kings (New York), NY	257.324	0	5	144.618	0	5	270.

(RATEWM01 >= 241) Customize...

Operations ...

(The query `RATEWM01 >= 241` is active. Click on the check box to disable. Click on the X to remove.)

Tip: Any query will be performed only on the records presently contained in the *Data* table. Therefore, normally any old queries should be removed before performing the next query in order to first reload the *Data* panel with the full record set.

Editing attribute data, Importing, and Exporting Using the *Data* panel (supported in the Editor only)

To edit attribute value information:

1. Click on the value to be modified.
2. Edit the field value to make desired changes.
3. The changes are saved to the vector map file the next time that a Save operation is performed.

To Export data from the *Data* panel to an external file type:

1. Select the *Data/Export data* menu to open the *Save As* window.
2. Within the *Save As* window select the file path, file name, and the file type to which the data is to be exported.
3. Click on the *Save* button in the *Save As* window to perform the data export operation.

The Export operation can save data to the following file types:

HTML files
ASCII Text file
MS Excel file
XML document

A more detailed description of the data export procedure is provided in the [Data/Export data](#) help file.

To Import data from an external source (database or spreadsheet file):

1. Select (highlight) the map layer into which the data is to be imported and open the *Data* panel.
2. Use the *Data/Import data* menu option to open the *Import Data* window.
3. Follow the steps described in the [Data/Import data](#) help file.

Tips

- To apply the same attribute value for all records of a map file (for all fields of a selected attribute column in the *Data* panel), refer to the *Data/Set column value* menu.
- The process of caching very large data sets into RAM memory and be interrupted at any time by pressing the *Esc* key. This will result in the data being only partially loaded to cache memory - a situation that should be corrected by either disabling *Cached mode* or reloading the full data set in *Cached mode*.

1.2.3.3 Minimap

Orientation and navigating using the Minimap.

The Minimap panel provides an intuitive orientation of the visible map extent open in the map window at any time relative to entire extent of a selected map layer. Any layer of a mapping project can be displayed in the Minimap panel.

To create a Minimap:

1. To turn on the *Minimap* panel, use the *View/Panels* menu option and click on the space next to the *Minimap* option from the panel list. This will place a check mark next to *Minimap* and will open the Minimap panel.
2. Click on the *View/Minimap/Minimap Layer* to select which layer is to be presented in Minimap panel.
3. From the *Look in* list in the *Open* combo box, select the file path to the map file that is to be opened in the Minimap panel.
4. Double click on the folder in which the file is saved.
5. Double click on the file name.

To navigate using the Minimap:

- Use the cursor to drag the focus point or view area rectangle on the Minimap or to click on the Minimap to reposition the view area on the Minimap layer.

To remove a file from the Minimap panel:

- Select the *View/Minimap/Clear* menu command.

To define the Minimap colors:

1. Select the *View/Minimap* menu command and then click on *Background color*, *Layer color*, *Layer outline*, or *View-finder color*.
2. Pick a color from the color options panel.

Tips


1. When choosing a layer to present in the Minimap panel, best is to select a file layer which covers the whole extent project, but also a file that is not extremely large (due to the processing/speed consideration).
2. Typically one of the layers in a project is selected as the MiniMap layer.
3. Any of the layers open in the Legend panel can be selected as the Minimap layer by using the cursor to right click on the layer within the Legend panel and then selecting the *Use in MiniMap* option.

1.2.3.4 Desktops


Saving and loading the program desktop layout

It is possible to save, and later reload, all the settings relating to the positions and on/off settings of all the panels and toolbars.

To save the current desktop layout:

1. Select the *View/Desktops* menu command, and then click on *Save Desktop* option .
2. From the *Save in* list within the *Save Desktop...* combo box, select the file path to which the desktop layout is to be saved.
3. Double click on the file folder to which the desktop layout is to be saved.
4. Enter the file name to which the desktop will be saved.
5. Click the *Save* button.

To load a previously saved desktop layout:

1. Select the *View/Desktops* menu command and then click on *Load Desktop* .
2. From the *Look in* list in the *Load Desktop...* combo box, select the file path from which the desktop layout is to be loaded.
3. Double click the folder in with the file with the desktop layout is saved.
4. Double click on the file name.

To restore the default settings

Select the *View/Desktops/Default* menu command.

Tip

- The *Desktop* layout settings are remembered when the Viewer/Editor application is next opened.

1.2.3.5 Themes**Choosing a Theme for the program's user interface**

It is possible to customize the program's user interface appearance to the preferences and habits of an individual user.

To change an interface theme:

1. Select the *Viewer/Themes* menu command.
2. Select the desired theme from the available list.

Tip

- The *Themes* setting is remembered when the Viewer/Editor application is next opened.

1.2.3.6 Language**Select a Language for the program's user interface**

The program's menus, messages, and strings can be 'localized' to a number of supported languages, e.g., English, German, Spanish, French, Italian, Portuguese, Polish, Swedish, Japanese, Greek, Russian, Czech, Ukrainian, Thai.


To change the user interface language:

1. Select the *View/Language* menu command.
2. Select the desired language from the available options in the list.

1.2.3.7 Full screen**Turn full screen mode on/off**

It is sometimes useful if the viewer window work area covers the maximum space occupied by the program, without the use of part of the space for the panels. The visibility of all panels may be quickly turned off to achieve the full screen effect.

To turn the full screen on or off:

- Select the *Viewer/Full screen* menu option .

Tips

1. Full screen mode can also be turned on by pressing the F11 key.
2. While working in the full screen mode, the user can also revert back to regular mode by clicking on the *Full Screen* button located in the upper right corner of the application window.

1.2.4 Map

1.2.4.1 Full Extent


Full extension of the map

The Viewer/Editor program provides a feature to zoom all the way out, in one step, to the level at which the entirety of the mapping project (encompassing the extent of all the layers) is visible in the map viewer window.

To show the full project extent in the map viewer window:

- Select the *Map/Full Extent* menu command.

Tip

- The Full Extent command is also available by clicking on the *Full Extent*  toolbar icon or the F3 key.

1.2.4.2 Layer Extent


Full Extent of a Layer

The Viewer/Editor program provides a feature to zoom out, in one step, to the level in which the entirety of the selected map layer is visible in the map viewer window.

To show the full extent of a layer in the map viewer window:

1. Select (highlight) one of the open file layers in the *Legend panel*.
2. Select the *Map/Layer Extent* menu command.

Tip


- The Layer Extent command can also be available by clicking on the *Layer Extent*  toolbar icon or by using the Ctrl + F3 shortcut.

1.2.4.3 Selected Extent

Displaying an area containing selected objects

The position and zoom level of the map viewer window can be set to make the viewer extent focus on a selected map object or group of objects.

To adjust viewer extent to focus on the area containing selected objects:

1. Select (highlight) in the *Legend panel* the layer which contains the object(s) of interest.
2. Use one of the spatial select tools or an attribute query to select an object or group of objects.
3. Select the *Map/Selected Extent* menu command .


The map view will automatically zoom in to the area containing selected objects, to level in which the entirety of the selected objects is visible, plus a small boarder area.

1.2.4.4 Previous Extent


Returning to the extent prior to the last zooming or panning event

The Previous Extent feature allows the user to return to the exact same extent as was visible before the most recent zoom or pan (drag) operation(s).

To return the viewer extent to as it was before the last zoom or panning event

1. Select the *Map/Previous Extent* menu, or click on the  toolbar button.
2. The first click returns to be most recent extent, the second click to the second most recent extent, etc.
3. The Previous Extent function works as a loop. On the fifth click the view extent returns to

as it was before the Previous Extent function was selected.

Tip The  toolbar button is active only after performing a zooming or panning procedure on the map.

1.2.4.5 Refresh map

This operation generates a fresh rendering of the map layer that is selected in the Legend panel. This can be useful in some situations, such as if the user clicks on the *Esc* to break the process of loading the map before completed.

1.2.4.6 Zoom mode

Zooming in/out - regular mode

One map viewer zooming feature supported by the Viewer/Editor is the regular *Zoom mode*.

To zoom in:




1. Select the *Map/Zoom mode* menu command.
2. Draw a rectangular area on the map by clicking on the map and then dragging the cursor in the right-downward direction.
3. Depress the mouse button when the rectangle is properly drawn.
4. The placement of the rectangle will control the place on the map where the zooming operation is centered.
5. To zoom in by a lessor factor, draw a relatively larger rectangle. To zoom in by a greater factor, draw a relatively smaller rectangle.

To zoom out:

The procedure is the same as for zooming in, but instead drag the cursor in the left-upward direction.

To zoom out by a relatively lessor factor, draw a relatively larger rectangle. To zoom out by a relatively greater factor, draw a relatively smaller rectangle.

Tips

1. Zoom mode can also be accessed by clicking on the *Zoom mode*  toolbar icon or by using the Ctrl + M shortcut.
2. The mouse scroll wheel can also be used to zoom in/out.
3. The choice between i) Zoom mode , ii) Zoom Extended mode , and iii) use of the mouse wheel to for zooming operations is just a matter of user preference. All perform the same task, but using different techniques.

1.2.4.7 Zoom extended mode




Zooming in/out - extended mode

A second map view zooming feature supported by the Viewer/Editor is the *Zoom extended mode*.

To use the Zoom extended mode:

1. Select the *Map/Zoom extended mode* menu command.
2. Place the mouse cursor at the place on the map where the new map view is to be centered after the zooming operation is performed.
3. Drag the cursor in the downward direction to zoom in. Drag the cursor in the upward direction to zoom out. The map view will zoom in or out as the cursor is being drug, allowing the user to control the level of the zoom.
4. Release the cursor at the desired zoom level.

Tips

1. Zoom extended mode can also be accessed by clicking on the *Zoom extended mode*  toolbar icon.
2. The mouse scroll wheel can also be used to zoom in/out.
3. The choice between i) Zoom mode , ii) Zoom Extended mode , and iii) use of the mouse wheel to for zooming operations is just a matter of user preference. All perform the same task, but using different techniques.


1.2.4.8 Drag mode**Dragging the map view**

The visible map area in the map viewer window can be dragged (panned) in any direction to the limits of the layer or project extent.

To drag the map view area:

1. Select the *Map/Drag mode* menu command.
2. Drag the map file in any direction using the mouse cursor. (Right mouse click, drag, and release the mouse button.)

Tips

1. Drag mode can also be accessed by clicking on the *Drag mode*  toolbar icon.
2. As long as the mouse cursor is anywhere within the map viewer area, *Drag mode* can also be conveniently activated by just depressing the *Shift* key. This feature can be very helpful when dragging the map view during the process of digitizing a layer or performing other editing operations because it eliminates the need to convert between edit and drag modes by using the menu commands or toolbar icons.

1.2.4.9 Auto center

Auto center is a map mode which results in the map extent automatically adjusting to center the visible map extent after each mouse click on the map at place of the click. A check mark next to the *Map/Auto center* menu command indicates that *Auto center* mode is active.

This feature can be useful when editing/digitizing new data because it eliminates the need to, from time to time, manually drag the map view to re-center the work area.

The setting of this feature is not remembered when the application is next closed.

Tip:

- If the intent is to make the application retain the *Auto center* mode as a default setting for when the application is next opened, set the *Auto center* feature in the *Tools/Options/Map* window

1.2.4.10 Auto locate record

Auto locate record is a mode that results in the finding and highlighting of the record in the Data table associated with any shape that is selected on the map. A check mark next to the *Map/Auto locate record* menu command indicates that *Auto located record* mode is active.

Auto locate record mode works only with the *Select/Localize* or *Select/Select by Point* operations.

The setting of this feature is not remembered when the application is closed.

Tip:

- When the Auto locate record mode is active with large files, it can significantly reduce the speed of some operations.

1.2.4.11 Map units

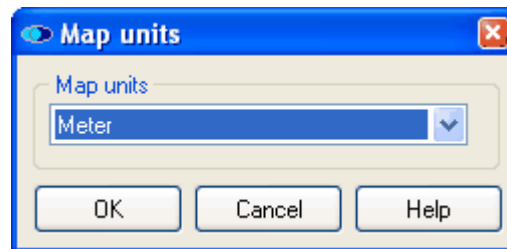
Activating map scale features based on map units

The program supports scale related features which require the user to first manually specify the map units of the layer(s) open in the program. The user must be familiar with the projection/coordinate system that the map layer(s) is in and correctly enter the linear distances units used by the projection. Once the distance units (map units) have been entered, the two scale related features become active:

- A scale ratio (located at the bottom of the map viewer window) which correlates distances on the map viewer window to real distances on the ground
- A distance scale panel.

To enter the map units

1. With one or more map layers open in the program, select the *Map/Map units* menu command to open the *Map units* window.
2. Select the correct units from the *Map units* drop down list.
3. Click on the *OK* button to register the selection.



Annotations

1. After the map units are specified, the scale ratio may be entered by the user in order to specify the scale at which the map is presented in the map viewer window. For example, if the user specifies a scale ratio of 1:25,000, this would set the zoom level such that one linear unit on the screen corresponds to 25,000 of the same linear/distance units on the ground. The map view will automatically zoom in/out to the appropriate level when the scale ratio is updated. (Click on the *Enter* key after entering an updated scale level to register the change.)
2. To print a map to a specified scale, just specify the scale ratio for the map view before commencing the printing procedure. The same scale will carry over to the printing operation.
3. The map units are saved to the project file and, therefore, are specific to a project and not to a map layer.
4. The presentation units for the scale bar (kilometers, meters, miles, feet) is specified in the *Scale* panel and is independent of the map units. However, the map units must be properly set for the scale bar to work properly.

Tip

- If the map is defined in longitude/latitude coordinates (with no linear map units), such as the common WGS84 coordinate system, the correct Map units choice will be one of the angular unit options at the bottom of the list, which are: *Radian*, *Decimal Degree*, *Decimal Minute*, *Decimal Second*, *Gon* or *Grad*. The most typical angular unit is *Decimal Degree*.

1.2.5 Select

Spatially selecting map objects

The Viewer/Editor program provides for many possibilities to spatially select map objects on a selected map layer.







Select modes:

- Select by point
- Select by line
- Select by polygon
- Select by rectangle
- Select by circle
- Select by clipboard.
- Localize by point

Each of the select tools can be used to perform the spatial selection of map objects from the layer specified (highlighted) in the *Legend panel*.

The *Localize* tool can be used to select an object from any layer open in the Viewer/Editor, regardless of which layer is selected (highlighted) in the Legend panel.

Tips


1. Select modes can also be accessed by clicking on the appropriate *Select mode* icon. Depending on which Select mode is active, this icon appears as one of the following: , , , , , or .
2. Spatial select operations are also sometimes referred to as 'spatial queries'.

1.2.5.1 Localize

Localize feature

The *Localize* feature is a selection mode allowing the selection of a single vector object or group of vector objects in the same layer regardless of which layer contains the object or group of objects. The layer initially selected in the Legend panel is not relevant.

To select an object(s) using the *Localize* mode:

1. Select the *Localize*  mode using the *Map/Select Mode/Localize* menu command or from the drop down list under the Select toolbar icon.
2. Click on the object of interest in the map viewer window with the cursor to select it.

Annotations


1. The selected object will be highlighted and the Legend panel will automatically update to highlight the layer which contains the selected object.
2. Select multiple objects at the same time by holding down the *Ctrl* key while selecting. The average, mean, minimum and maximum of the attribute values of the selected objects will be presented in the *Attribute panel*.

1.2.5.2 Select by Point

Select by Point mode

The *Select by Point* mode provides for the selection of a single vector object or group of vector objects within a selected layer by mouse clicking on each object individually.

To select object(s) using the *Select by Point* mode:

1. Select (highlight) in the Legend panel the layer on which the selection is to be performed.
2. Select the *Select by Point*  mode using the *Map/Select Mode/Select by Point* menu command or from the drop down list under the Select toolbar icon.
3. Click on the object of interest in the map viewer window to select it.

Annotations

1. The selected object will be highlighted and attributes of the selected object will appear in the *Attribute panel*.
2. Select multiple objects at the same time by holding down the *Ctrl* key while selecting. The


average, mean, minimum and maximum of the attribute values of the selected objects will be presented in the *Attribute panel*.

1.2.5.3 Select by Line

Select by Line mode

The *Select by Line* mode provides for the spatial selection of a one or multiple vector objects with a drawn line.

To select objects using the *Select by Line* mode:

1. Select (highlight) in the *Legend panel* the layer on which the selection is to be performed.
2. Select the *Select by Line*  mode with the *Map/Select Mode/Select by Line* menu command or from the drop down list under the *Select* toolbar icon.
3. Draw any line on the map view.
4. Double click to finish drawing the line.

Annotation


- All objects selected by the line will be highlighted and the average, mean, minimum, and maximum of the attribute values of the selected objects will be presented in the *Attribute panel*.

1.2.5.4 Select by Polygon

Select by Polygon mode

The *Select by Polygon* mode provides for the spatial selection of a one or multiple vector objects with a drawn polygon.

To select objects using the *Select by Polygon* mode:

1. Select (highlight) in the *Legend panel* the layer on which the selection is to be performed.
2. Select the *Select by Polygon*  mode with the *Map/Select Mode/Select by Polygon* menu command or from the drop down list under the *Select* toolbar icon.
3. Draw a polygon on the map by mouse clicking to place the vertices forming the polygon perimeter.
4. Double click to finish drawing the polygon.

Annotation


- All objects selected by the drawn polygon will be highlighted and the average, mean, minimum, and maximum of the attribute values of the selected objects will be presented in the *Attribute panel*.

1.2.5.5 Select by Circle

Select by Circle mode

The *Select by Circle* mode provides for the spatial selection of a one or multiple vector objects with a drawn circle.

To select objects using the *Select by Circle* mode:

1. Select (highlight) in the *Legend panel* the layer on which the selection is to be performed.
2. Select the *Select by Circle*  mode with the *Map/Select Mode/Select by Circle* menu command or from the drop down list under the *Select* toolbar icon.
3. Draw a circle on the map by mouse clicking at the center of the circle and dragging the cursor to any point where the perimeter of the circle is to be formed.
4. Release the mouse button to complete drawing the circle.


Annotation

- All objects selected by the drawn circle will be highlighted and the average, mean, minimum, and maximum of the attribute values of the selected objects will be presented in the Attribute panel.

1.2.5.6 Select by Rectangle**Select by Rectangle mode**

The Select by Rectangle mode provides for the selection of a one or multiple vector objects with a drawn rectangle.

To select objects using the *Select by Rectangle* mode:

1. Select (highlight) in the Legend panel the layer on which the selection is to be performed.
2. Select the *Select by Rectangle*  mode with the *Map/Select Mode/Select by Rectangle* menu command or from the drop down list under the *Select* toolbar icon.
3. Mouse click with the cursor on the places where two opposite corners of the rectangle are to be located.


Annotation

- All objects selected by the drawn rectangle will be highlighted and the average, mean, minimum, and maximum of the attribute values of the selected objects will be presented in the Attribute panel.

1.2.5.7 Select by Clipboard**Select by Clipboard**

Vector objects on any given layer can be selected with the use of any unique geometric figure that may exist on the Clipboard layer.

To select objects using the *Select by Clipboard* mode:

1. Select (highlight) in the Legend panel the layer on which the selection is to be performed.
2. Place the selection geometry on the Clipboard layer.
3. Select the *Select by Clipboard*  mode using the *Map/Select Mode/Select by Clipboard* menu command or from the drop down list under the *Select* toolbar icon.

Annotation

- All objects selected by the clipboard geometry will be highlighted and the average, mean, minimum, and maximum of the attribute values of the selected objects will be presented in the *Attribute panel*.

1.2.5.8 Deselect**Deselect**

The Deselect feature turns off the selection that has been made using any of the spatial selection modes.

To deselect all selected objects:

- Click on the *Deselect*  toolbar icon when objects on the map have been selected.

Tips

1. Changing the selected layer in the *Legend panel* also causes deselection.
2. Deselect can also be performed using the *Map/Select mode/Deselect menu command*.

1.2.5.9 Clear Selection

Clear a spatial selection

When a line, rectangle, circle, polygon has been used to make a selection, the *Clear Selection* option removes the selection figure from the map viewer while leaving the selected objects highlighted.

To clear a selection:

- Select the *Map/Select Mode/Clear Selection* menu command after performing a spatial selection using a line, polygon, rectangle, or circle.

1.2.5.10 Invert Selection

Invert Selection

It is possible to invert a selection on any map layer. Objects that are not selected will be selected, and objects currently selected will be deselected.

To invert selection:

- Click the *Map/Select mode/Invert selection* menu command after any selection has been performed.

1.2.5.11 Select All

Select All

The *Select All* feature is used to select all objects on a map layer.

To select all objects in the layer:

1. Select (highlight) in the *Legend panel* the layer on which the selection is to be performed.
2. Click on the *Map/Select mode/Select All* menu command.

Annotation

- All objects on the layer will be highlighted and the average, mean, minimum, and maximum of the attribute values of the selected objects will be presented in the Attribute panel.

1.2.5.12 Select Type

Select type possibilities for use with the spatial select operations

The selection of map objects is dependent on the geometrical relation of each map object to the geometry of the selection figure. For instance, when using a selection area defined by a drawn circle, should objects that only touch the perimeter of the selection circle be included in the selection? Should the selection include only objects that are completely within the circle area, or also those that are only partially inside the circle area? What if the object is fully inside the area, but touches the perimeter of the selection area? Perhaps the selection should be only for objects that are cut by the perimeter of the selection area (partially inside, partially outside), or only of objects that are fully outside the selection area?

The Viewer/Editor program supports a number of possibilities to define the relationship basis on which the selection is performed. These relationship possibilities are referred to as *Selection Types*.

To set up the desired Select Type:



1. Use the *Map/Select mode/Select type* menu command.
2. Select the desired *Select Type* from the available list.

Each of the *Select Type* options are explained in the following sections with the use of graphical images.

Annotation

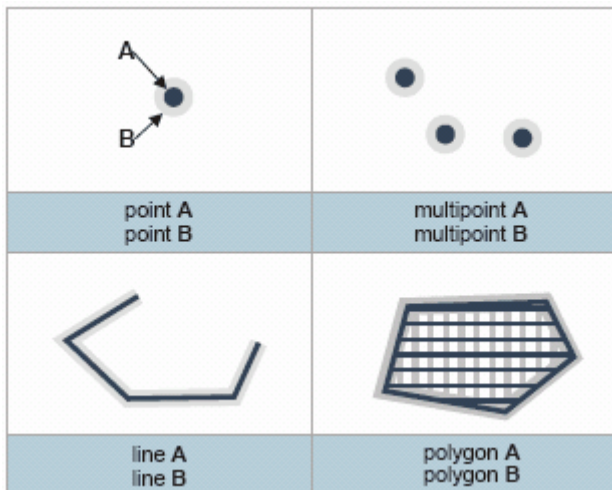
The geometric relationship defined by each *Select Type* can involve the same or different vector object types (point, multi-point, line, polygon), except when specified otherwise in the *Select Type* description.

Tips

1. The *Select Type* options list can also be accessed from the drop down list next to the *Select mode* toolbar icon, which appears as one of the following -  or  - depending on which select mode is active.
2. If unsure which *Select Type* to use, the *Intersect (interior-interior)* option is a reasonable default choice.

1.2.5.12.1 Equality

The interiors intersect and no interior or boundary of one shape intersects with the exterior or boundary of the other shape. Therefore, the geometry of the two objects is exactly the same.



A\B	Interior	Boundary	Exterior
Interior	T	*	F
Boundary	*	*	*
Exterior	F	F	*

T = true, there is an intersection

F = false, there is no intersection

* = the criteria is not relevant to the relationship definition

1.2.5.12.2 Disjoint

There is no intersection of any kind between two objects.

point A point B	point A multipoint B	multipoint A multipoint B
point A line B	multipoint A line B	line A polygon B
point A polygon B	multipoint A polygon B	polygon A polygon B

A \ B	Interior	Boundary	Exterior
Interior	F	F	*
Boundary	F	F	*
Exterior	*	*	*

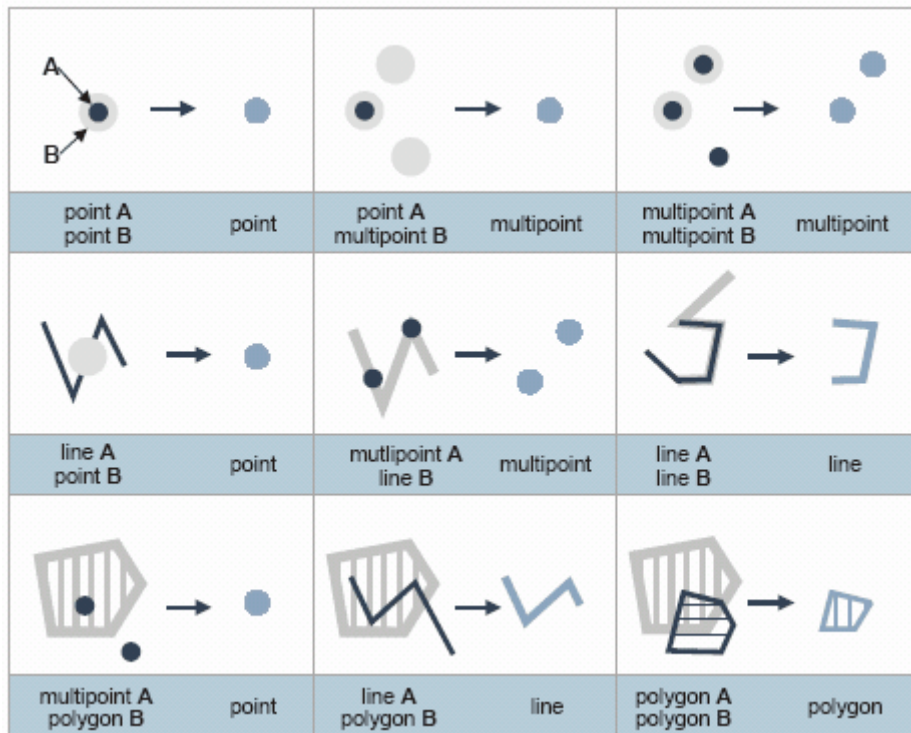
T = true, there is an intersection

F = false, there is no intersection

* = the criteria is not relevant to the relationship definition

1.2.5.12.3 Intersect

Some portion of the interior of one object intersects with some element of the other object. There are four possible ways to define the intersection, as described below.



Interior-Interior: Some portion of interiors of each object intersect with the other, i.e., the interiors are common to each other.

A\B	Interior	Boundary	Exterior
Interior	T	*	*
Boundary	*	*	*
Exterior	*	*	*

Interior-Boundary: The interior of A intersects the boundary of B

A\B	Interior	Boundary	Exterior
Interior	*	T	*
Boundary	*	*	*
Exterior	*	*	*

Boundary-Interior: The boundary of A intersects the interior of B

A\B	Interior	Boundary	Exterior
Interior	*	*	*
Boundary	T	*	*
Exterior	*	*	*

Boundary-Boundary: The boundary of A intersects the boundary of B

A\B	Interior	Boundary	Exterior
Interior	*	*	*
Boundary	*	T	*
Exterior	*	*	*

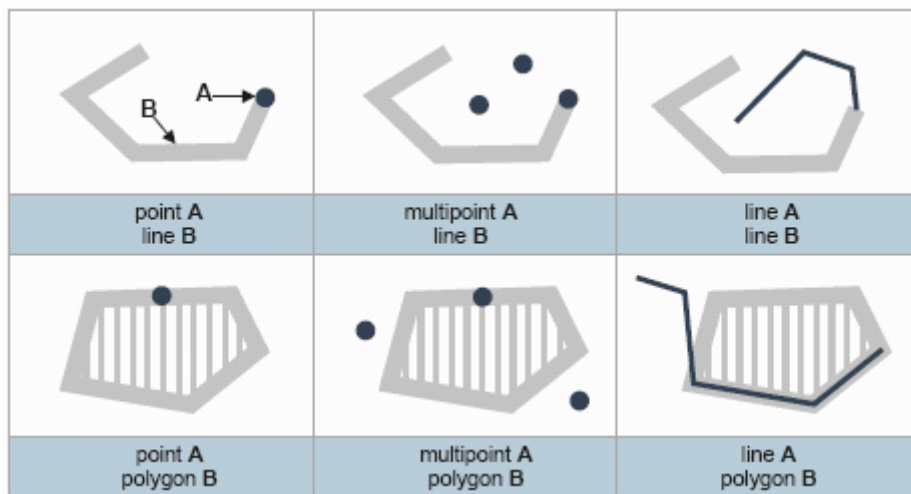
T = true, there is an intersection

F = false, there is no intersection

* = the criteria is not relevant to the relationship definition

1.2.5.12.4 Touch

The boundary of one object touches either the boundary or the interior of the other object.



Boundary-Interior: Boundary of A intersects with interior of B.

A\B	Interior	Boundary	Exterior
Interior	F	*	*
Boundary	T	*	*
Exterior	*	*	*

Boundary-Boundary: Boundary of A intersects boundary of B (but not the interior of B)

A\B	Interior	Boundary	Exterior
Interior	F	*	*
Boundary	*	T	*
Exterior	*	*	*

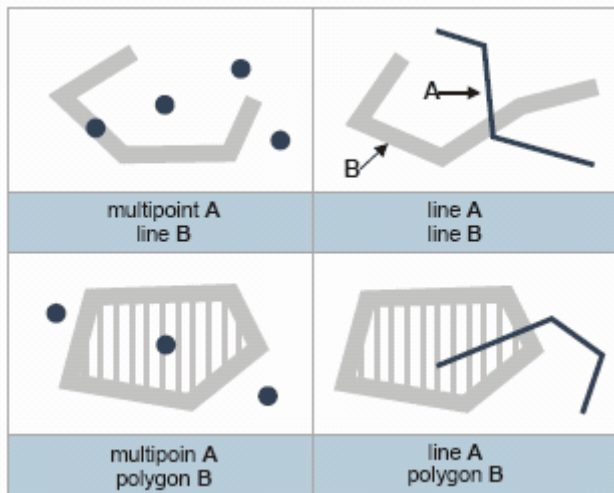
T = true, there is an intersection

F = false, there is no intersection

* = the criteria is not relevant to the relationship definition

1.2.5.12.5 Cross

This is generally for relating objects of different types, e.g., point, multipoint, line, polygon, except for the line-to-line option. (See [Overlap](#) for relating shapes of the same type).



Cross: A crosses B if the interiors intersect and the exterior of B intersects with the interior of A.
General formula (except line-to-line situations).

A\B	Interior	Boundary	Exterior
Interior	T	*	T
Boundary	*	*	*
Exterior	*	*	*

Cross (lines only): Line A crosses Line B (and B crosses A) if the dimension of the intersection equals 0 (is a point). Only for line-to-line relationships.

A\B	Interior	Boundary	Exterior
Interior	0	*	*
Boundary	*	*	*
Exterior	*	*	*

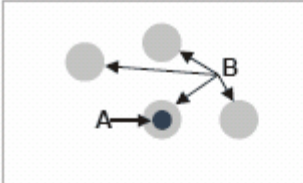
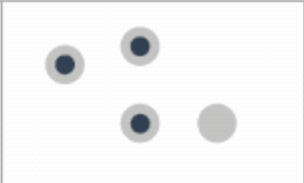



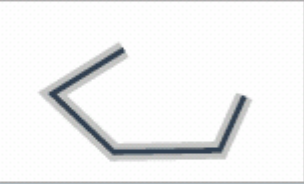



T = true, there is an intersection

F = false, there is no intersection

* = the criteria is not relevant to the relationship definition

1.2.5.12.6 Within

One object is entirely within the other object.

		
point A multipoint B	multipoint A multipoint B	multipoint A polygon B
		
point A line B	multipoint A line B	line A line B
		
point A polygon B	line A polygon B	polygon A polygon B

A is within B if the interiors intersect and the exterior of B is not intersected by the Interior or boundary of A.

A\B	Interior	Boundary	Exterior
Interior	T	*	F
Boundary	*	*	F
Exterior	*	*	*

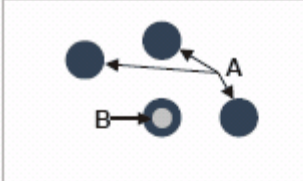


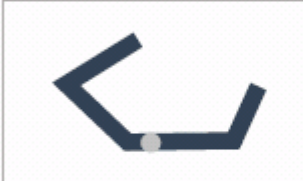
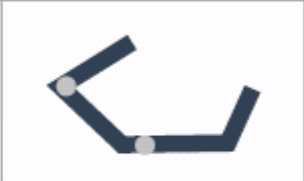
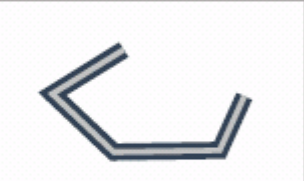



T = true, there is an intersection

F = false, there is no intersection

* = the criteria is not relevant to the relationship definition

1.2.5.12.7 Contains

One object contains the entirety of the other object.

		
multipoint A point B	multipoint A multipoint B	polygon A multipoint B
		
line A point B	line A multipoint B	line A line B
		
polygon A point B	polygon A line B	polygon A polygon B


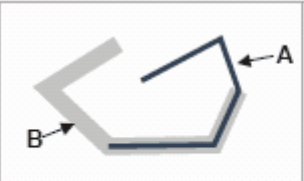

A contains B if the interiors intersect and the exterior of A is not intersected by the Interior or boundary of B.

A\B	Interior	Boundary	Exterior
Interior	T	*	*
Boundary	*	*	*
Exterior	F	F	*

1.2.5.12.8 Overlap

This is for relating objects only of the same type. So a polygon can overlap with another polygon, but not with a line. (Refer to [Cross](#) for relating shapes only of different types.)

A portion interiors, but not all of the interiors, of each object intersect.

		
multipoint A multipoint B	line A line B	polygon A polygon B

Overlap: A overlaps B (and B overlaps A) if both the interiors and exteriors intersect. General formula (except line-to-line situations).

A\B	Interior	Boundary	Exterior
Interior	T	*	T
Boundary	*	*	*
Exterior	T	*	*

Overlap (lines only): A overlaps B (and B overlap A) if the interior intersection has a dimension equal to 1 (is a line) and the exteriors intersect. Only for line-to-line relationships.

A\B	Interior	Boundary	Exterior
Interior	1	*	T
Boundary	*	*	*
Exterior	T	*	*

T = true, there is an intersection

F = false, there is no intersection

* = the criteria is not relevant to the relationship definition

1.2.6 Layer

Concept of Map Layers

Each map file is opened in the program as a separate layer. An unlimited number of layers can be opened in the program at the same time. The layers together may compose a project. The appearance of the map data in each layer can be individually customized using the layer properties settings.

A layer can hold either vector map data or raster imagery data, such as an aerial photo or scanned map image. Generally (although there may be exceptions with some file types), each vector layer can hold only one type of vector data, e.g., points, multipoints, lines, or polygons.

The order of the layers in a project is presented in the *Legend* panel. The layer order influences the overall project appearance. Layers near the top of the list in the *Legend* panel have priority over layers that are lower in the layer list in visibility conflict situations. For instance, a raster map layer can hide all data in layers under it. The layers can be reordered by mouse clicking on a layer in the *Legend* panel and dragging it to a new location in the layer list. The visibility of layers can also be turned on/off using the check boxes in the *Legend* panel.

1.2.6.1 New

Creating a new layer

The Editor program (not the free Viewer) provides a feature to create and open a new (empty) vector map layer. The file type of the new layer can be any vector file type (format) to which the Editor supports the creation and saving of data. The most common reason to create a new (empty) layer is to then import an existing vector map file of a different format into the new layer, with the format conversion of the imported data to the file type of the new layer. (If the intent is to open an existing map file as an additional layer, with no file format conversion, simply use the [Layer/Add](#) feature.

There are two ways to add vector map data to the new layer:

1. Import an existing vector file into the layer, using the [Layer/Import](#) menu command. The imported file can be any supported file type. If the file type (format) of the import file differs from the file type of the layer, the imported map data is converted to the file type of the layer during the import operation.
2. Digitize new data to the layer using the [Edit](#) mode drawing tools.

To create a new layer:

1. Select the *Layer/New* menu command to open the *Create New Layer...* dialog box.
2. Set the file path to the folder that is to contain the new file from the *Save in* list.
3. Double click on the folder to which the new file layer is to be saved.
4. Enter a file name for the new file in the *File name* field.
6. Select the file type (format) for the newly created layer from the *Save as type* drop down list of supported file types (formats).
7. Click on the *OK* button to complete the procedure and create the new layer.

The new (empty) layer opens automatically in the Editor.

Annotation:

- One of the file type options for the creation of a new layer is '*TatukGIS SQL Layer(*.ttkls)*', which means that the new map layer will be a SQL database file. The default database connections (configuration) save the layer to an Access SQL database file, pursuant to a choice of three formats:
 - OpenGIS SQL Simple Features for SQL Implementation
 - The TatukGIS (native) binary SQL vector layers method.
 - Geomedia Access Warehouse or Geomedia SQL Server

An SQL layer file can also be configured an SQL Server database product, e.g., MSSQL, Oracle, Interbase, MSSQL, DB2, etc., but only with specialized knowledge.


Tips:

- If creating the new layer as an SQL database layer, use a file name without spaces or any special characters. This will ensure that the file name is compatible with various SQL database products.

1.2.6.2 Add**Adding a layer to the project**

At any time, and existing map file (vector, image, grid) of any supported file type can be opened as a layer in the program with the use of the *Layer/Add* feature. The added file is opened in its original format. If other data layers are already open in the program, the opened file will be added as an additional layer.

To open/add an existing file as a layer:


1. Select the *Layer/Add* menu command or click on the *Add Layer*  toolbar button to open the *Open* dialog box.
2. From the *Look in* drop down list near the top of the *Open* dialog box, select the path to the folder that contains the file that is to be opened.
3. Double click on the file folder that contains the file to be imported.
4. Confirm that the *Files of a type* filter selection at the bottom of the *Open* dialog box displays the desired file in the window.
5. Click on the file to fill the *File name* field with the name of the file.
6. Click on the *Open* button to display the selected file as an additional layer in the program.

Tip

- If the file that you are looking for is not visible in the *Open* window, try selecting a *Files of a type* filter other than the all inclusive '*All files (*.*)*' option. For example, if looking for a TAB format vector map file, try using the '*All Vector Files*' filter. If looking for an image file or DTM (grid) file of any format, try using the '*All Pixel Files*' or '*All Grid Files*' filter selections. These three slightly more restrictive filter selections are provided near the top of the *Files of a type* drop down menu. The problem can be that TatukGIS products

support more file types than the 'All files (*.*)' selection option in *Files of a type* drop down list of the standard Windows *Open* dialog box is capable of filtering. (The standard Windows drop down list is limited to approximately 256 characters - corresponding to the sum of all the file endings of the supported formats) defined by a single filter. The file extensions composed of characters beyond the limit are ignored and are not visible in this window.)

Annotations

1. The *Layer/Add* function opens the added file as a separate layer in the file's original format. No file format conversion is performed.
2. The added layer can be saved, along with any other open layers, as part of a new project using the *File/Save Project As...* menu command.
3. If the other layers are already organized together as existing project file, the project file can be updated to include the newly opened layer by selecting the *File/Save Project As* menu command or clicking on the *Save All*  toolbar icon.
4. Vector files of multiple types (formats) may be opened together as layers in the same project, without the need to perform any file format conversions.

Tips

- The add layer feature can also be accessed by right mouse clicking on the map viewer window and selecting *Add...*

1.2.6.3 Add from server

Adding an existing file located on a remote server

Clicking on the *Layer/Add from Server* menu provides for the opening file located on a remote server as a map layer.

To open an existing project or graphic file:

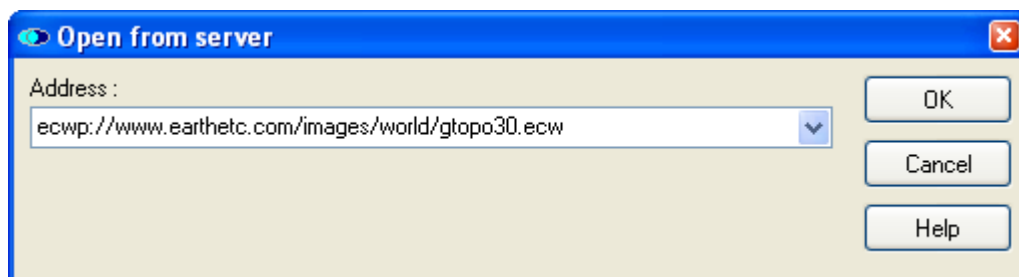
1. Select the *Layer/Add from server* menu command which opens the *Open from server* window.
2. Enter the path to the location of the file on the remote server.
3. Click on the *OK* button to connect to the remote file.

Annotation:

- The remote server based map file can be an ECW file (based on the ECWP protocol), an WMS or WFS layer, a TatukGIS SQL server layer, etc.

Tips

- A file on a remote server can also be opened as a layer via the *File/Open from server* menu command using the same procedure.
- As of version 1.7, the *Add from server* feature supports only the ECWP format. The feature will be expanded to support other server based file formats in future product updates.




(The link is to a test ECW image.)

1.2.6.4 Remove


Remove a layer from a project

Any layer can be removed from the Viewer/Editor program at any time. This procedure simply closes the file contained by the layer that is removed. If editing changes have been made to the file, the program will prompt to first save the changes. If the layer is part of an opened project, only the selected layer is removed and all other layers remain open.

To remove a layer from an open project:

1. Select (highlight) in the *Legend* panel the layer to be removed.
2. Select the *Layer/Delete* menu command or click on the *Remove*  toolbar button.

Annotation

- If the removed layer was open in the program as part of a saved project, the project file will be updated to omit the removed layer the next time that the project file is saved (by using the *File/Save Project As* menu command or clicking on the *Save All*  toolbar icon).

Tip

- A selected layer can be also removed by using the Ctrl + Del short cut.

1.2.6.5 Import

Importing a file layer

The Editor (not the free Viewer) contains a feature to open a vector map file into an layer that has already been created (using [Layer/New](#)) and is open in the program. If the import file is of a file type (format) that is different than the file type of the layer, the imported data will be automatically converted to the file type of the layer.

To import data to an existing layer:

1. Select (highlight) in the *Legend* panel the layer to which a file is to be imported. (Typically this would be a new and empty layer that was created using the [Layer/New](#) procedure.)
2. Select the *Layer/Import* menu command to launch the *Open* dialog box.
3. From the *Look in* drop down list near the top of the *Open* dialog box, select the file path to the file to be imported.
4. Double click on the file folder that contains the file to be imported.
5. Confirm that the *Files of a type* filter selection at the bottom of the *Open* dialog box displays the desired file in the window.
6. Click on the file to fill the *File name* field with the name of the file.
8. Click on the *Open* button import the data from file.

The data from the file will opened into the specified layer, after any necessary conversion to the format of the layer.

Annotations

1. If importing to a SHP file layer, the shape type (point, multipoint, polyline, or polygon) of the import file must be of the same vector type as the layer to which the data is imported. Otherwise the procedure will result in an error message stating that the file types are not compatible.
2. The original file from which the import is performed is not altered by the import procedure.

Tips

1. Be careful not to import into a layer that contain useful data. Any data in the layer to which the import is performed will be overwritten.

2. If the objective is to import data and combine (merge) it with data contained by an already existing map layer, use instead the [Layer/Merge](#) menu.
3. Only vector map files, and not image (pixel) files, can be imported. (Pixel layers can simply be opened as a layer in their existing format.)
4. If the file that you are looking for is not visible in the *Open* window, try selecting a *Files of a type* filter other than the all inclusive 'All files (*.*)' option. For example, if looking for a TAB format vector map file, try using the 'All Vector Files' filter. If looking for an image file or DTM (grid) file of any format, try using the 'All Pixel Files' or 'All Grid Files' filter selections. These three slightly more restrictive filter selections are provided near the top of the *Files of a type* drop down menu. The problem can be that TatukGIS products support more file types than the 'All files (*.*)' selection option in *Files of a type* drop down list of the standard Windows *Open* dialog box is capable of filtering. (The standard Windows drop down list is limited to approximately 256 characters - corresponding to the sum of all the file endings of the supported formats) defined by a single filter. The file extensions composed of characters beyond the limit are ignored and are not visible in this window.)

1.2.6.6 Export

Exporting a vector map layer

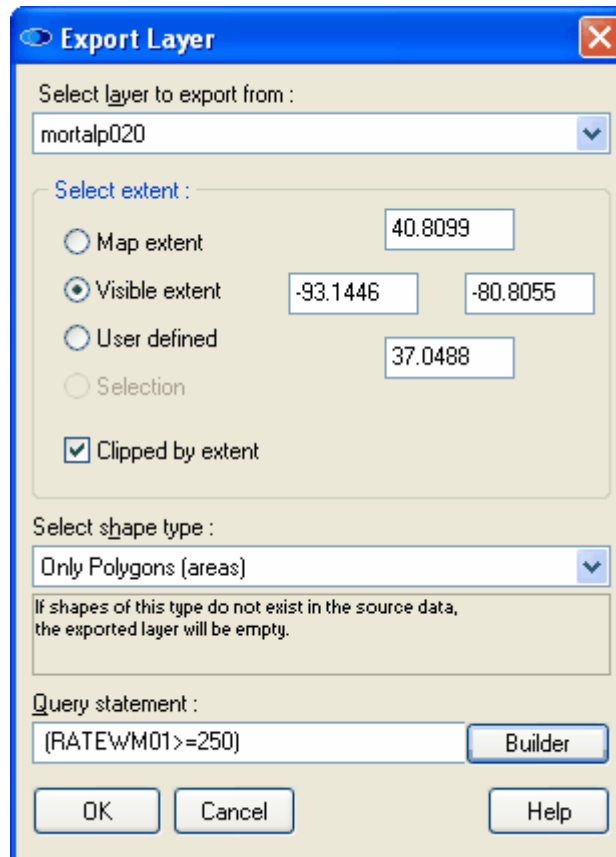
The Editor program offers an export procedure to save a vector map layer, or selected elements of the vector map file contained by a layer, to a new file that can be of any file format to which the Editor program supports the writing (saving) of data. The layer export function is specifically for situations requiring the conversion of the saved vector map data to a different format or the saving of only a specially defined subset of the data contained by the layer. (If the intent is to merely save an entire vector map layer to a file of the same type, i.e., with no format conversion, use simply the [File/Save](#) feature.)

The layer export operation allows the user limit the data that is exported by spatial extent, shape type (polygon, line, point, or multi-point), and/or attribute query statement. The *Layer Export* procedure includes a vector clipping feature to cut shapes at the extent boundaries.

To export data from a selected layer:

1. Select the *Layer/Export* menu command, which launches the *Export Layer* dialog box.
2. Select the open layer from which the export is to be generated from the drop down list in the *Select layer to export from* field.
3. Specify the spatial extent from which data is to be exported, with one of the provided options:
 - *Map extent* - Export the entire layer
 - *Visible extent* - Export the extent of the layer that is presently visible in the map viewer window.
 - *User defined* - Export an extent that is manually defined by the user by entering x coordinate values of the right and left extent limits and the y coordinate values of the top and bottom extent limits.
 - *Selection* - Export only the shapes that are currently selected on the map.
4. Use the *Select shape type* field to select type of shape data (points, multi-points, lines, polygon areas, or all shape types) to be exported from the layer to the export file.
5. If desired, use an attribute query statement to further filter the shapes that are to be exported based on attribute information. A simple query statement can be entered directly to the *Query statement* field or click on the *Builder* button to open the *SQL Query Builder* window to define a more complex query.
3. Click the *OK* button to close the *Export Layer* window and launch the *Open As* dialog window.
4. From the *Save in* field, select the file path for the new file to be created by the export procedure.
5. Enter the file name for the export file in the *File name* field.

6. Select the file type (format) to which the export file is to be generated from the drop down list of supported formats in the *Save as type* field.
7. Click on the *Save* button to start the computation operation to generate the export file. Wait for the export operation to be completed.



(Export of only the polygon shapes within the visible extent that have RATEWM01 attribute values greater than or equal to 250.)

Annotations

1. When exporting from a *Visible extent* or *User defined* extent, the *Clipped by extent* check box becomes active. If this box is checked, all shapes that are partially inside and partially outside the selected extent area will be cut (clipped) at the extent boundaries. This can be a very useful feature. If the *Clipped by extent* check box is not checked, the entirety of all vectors that are at least partially within the extent area will be exported.
2. If exporting from a layer containing multiple shape types to a SHP file, only one shape type can be exported to each SHP file (due the specification of the SHP file type). An attempt to export multiple shape types to a single layer will result in an error message.
3. One of the export format options is "*TatukGIS SQL Layer (*.ttkls)*", which provides for the export to an SQL database file. The default database connections (configuration) saves the layer to an Access SQL database file, pursuant to a choice of two formats:
 - OpenGIS SQL Simple Features for SQL Implementation
 - The TatukGIS (native) binary SQL vector layers method.
 - Geomedia Access Warehouse or Geomedia SQL Server

An SQL layer file can also be configured an SQL Server database product, e.g., MSSQL, Oracle, Interbase, MSSQL, DB2, etc., but only with specialized knowledge.

Attention!

- If the file name provided already exists, the existing data in the file will be automatically overwritten by the export procedure.

Tips

1. If creating the new layer as an SQL database layer, use a file name without spaces or any special characters. This is necessary to ensure that the file name is compatible with various SQL database products.
2. If the intent is to export data from multiple layers (such as SHP file layers which each layer containing data of only a single shape type) into a single file of a type that can contain multiple shape types, refer to the [Layer/Merge](#) feature.
3. The *SQL Query Builder* feature is explained in more detail in the *View/Panels/Data* help file and in the **Viewer Attribute Queries Tutorial**.
4. For a demonstration of the layer export procedure, refer to the **Editor Export Vector Layer/Clipping Tutorial**.

1.2.6.7 Merge

Merging vector layers

The Editor (not the free Viewer) can be used to merge (combine) two vector map files into a single file or merge only selected elements of one vector file into another file. The merger procedure imports the shape geometry and attributes from a map file on the computer hard disk into a destination vector map layer that is already open in the Editor program and selected (highlighted) in the *Legend* panel. Typically the two files involved would cover the same or partially overlapping geographic space or contiguous geographic spaces. The layer merge feature provides the user with the means to control how the vector map attributes are merged and to restrict the data that is imported from the source file by spatial extent, shape type, and/or attribute query statement.

Note: Even though the description in this help file refers to a source file being 'imported' into the destination layer, the *Layer/Merge* feature is not to be confused with the [Layer/Import](#) feature. A the *Layer/Merge* feature is to combine data from two vector map two files into one file whereas the *Layer/Import* feature is only opens a vector map file of a given file format into an empty layer of a different file format, thereby converted the format of the data.

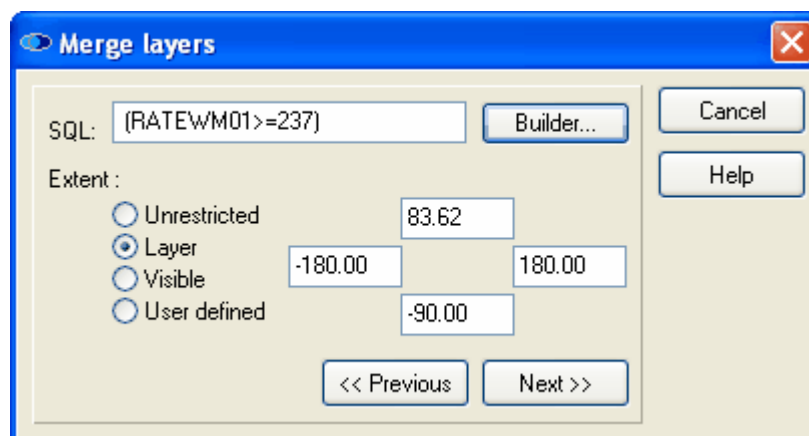
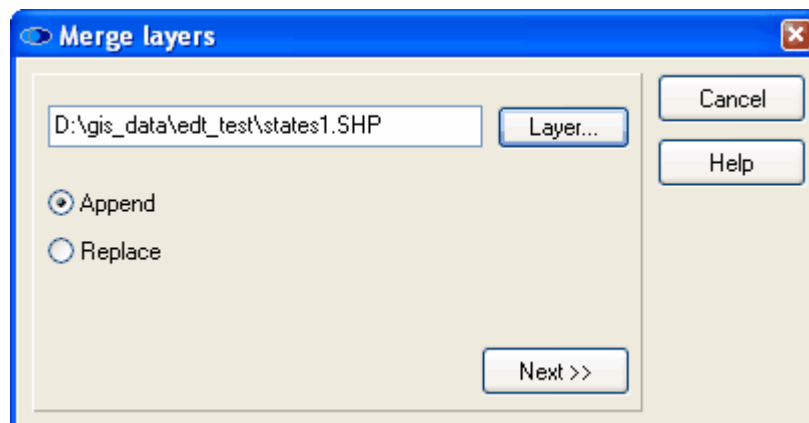
To merge one vector file (or elements of) into another vector layer:

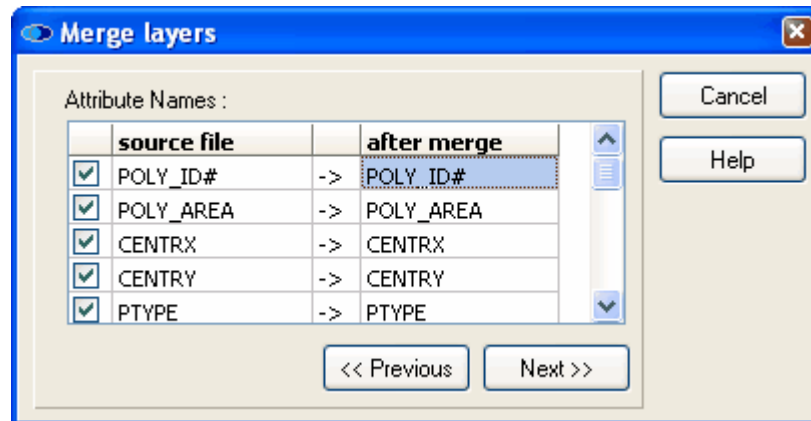
1. Select (highlight) in the *Legend* panel the destination layer into which data is to be imported.
2. Select the *Layer/Merge* menu option to open the *Merge layers* window.
3. Click the *Layer* button in the *Merge layers* window to launch the *Open* file dialog box for selecting the file path to the source file from which data is to be imported.
4. Select in the *Look in* list the file path to the source file from which data is to be imported into the destination layer.
5. Double-click on the folder where the file is stored.
6. Double-click on the file name, which will close the *Open* file dialog box. The name of the selected file will then appear in the *Merge layers* window.
7. Select either the *Append* or *Replace* option to define the merge procedure. (*Append* will result in the data from the import file being merged with the data in the destination layer. *Replace* will result in the data from the import file replacing the data in the destination layer. *Append* is the appropriate selection in most situations.)
8. Click on the *Next* button located at the bottom of the *Merge Layers* window to progress to the second *Merge layers* window.
9. The second *Merge layers* window provide for options to restrict the imported data by attribute query or by spatial extent. The spatial extent options are as follow:
 - *Unrestricted* - Import the entire extent of the source file, i.e., no restrictions on the source layer extent.
 - *Layer* - Import only data from the source file that is within the extent of the destination layer.
 - *Visible* - Import only data from the source file that is within the current visible extent of

the destination layer (as is presently visible in the map viewer window).

- *User defined* - Import only data from the source file that is within a spatial extent that is manually defined by the user by entering x coordinate values for the right and left extent limits and y coordinate values of the top and bottom extent limits
10. If the data imported from the source file is to be limited by attribute query, click on the *Builder* button to open the *SQL Query Builder* window. The *SQL Query Builder* window provides for the construction of SQL query statement(s) to import only the shapes from the source file that match the query statement(s). After constructing the SQL query, click on the *Apply* button to close the *SQL Query Builder* window and return to the *Merge layers* window.
 11. Click the *Next* button in the *Merge layers* window to open the next *Merge layers* window.
 12. In the next *Merge layers* window, define the vector attributes from the import file that are to be imported into the destination layer and the name of each attribute after the merge operation is performed. Then click on the *Next* button to begin the merger computation process. Depending on the file sizes involved, the computation process can require several seconds or minutes to perform.
 13. When the data *Merge process* bar in the next window reaches its full length, indicating that the merger computation process has completed, click on the *Done* button to close the merger related window.

The result of the layer merger will be visible in the Editor map viewer window.





Annotation

1. The layer created by the merge operation will replace the data that had been open in the destination layer, and will assume the name and file path of the previously opened file. If the intent is not overwrite the original file with the merged data, save the merged (destination) layer to a different file name.
2. The data in the source file is not modified by the merge operation.

Tip

- Refer to the **Editor Layer Merging Tutorial** for a demonstration of merging two vector map files.
- The Merge operation can be useful for combining multiple SHP format files, perhaps containing multiple shape types, into a single file of a file type that allows multiple shape types in the same file, .e.g, DXF, GML, KML, etc.

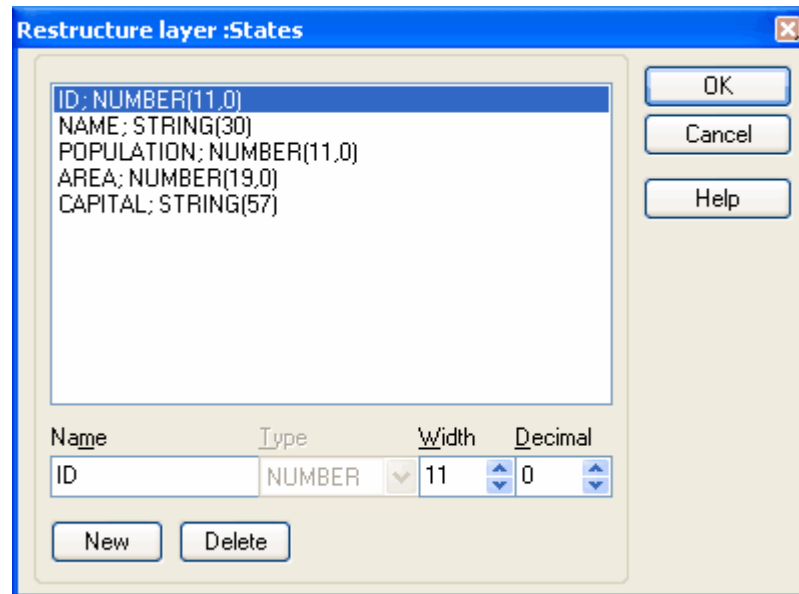
1.2.6.8 Restructure

Modifying vector file attributes

A common list of attributes may be assigned to all vector objects contained by a vector map file. Each attribute has a value field which can contain information of a specified type, e.g., numbers, text, dates, etc. Sometimes the attributes attached to a vector map file must be revised (edited), e.g., attributes added, deleted, renamed, or reclassified. One way to perform such changes is via the *Restructure Layer* dialog box.

To modify the attributes of a select layer:

1. Select (highlight) the file layer to be modified in the *Legend* panel.
2. Select the *Layer/Restructure* menu command, which opens the *Restructure* combo box containing a list of all the attributes associated with the selected layer.
3. The *Restructure* combo box provides for four possible operations:
 - Delete an attribute selected from the list
 - Rename an attribute selected from the list
 - Change the length of the data field of an attribute selected from the list
 - Add a new attribute, specifying the name, type, and data field length
4. Click the *OK* button to close the *Restructure* combo box and record the changes to the open layer.
5. The changes will be permanently updated to the file the next time that changes to the map file are saved.



Annotations

1. It is not possible to change the *type* of an already existing attribute. The type may be selected only when an attribute is initially created.
2. There are five possible attribute types: *String* (for text information), *Number* (for numeric information), *Float* (for numbers with decimals), *Boolean* (true/false information), and *Date* (calendar date information).

Tips

1. Refer to the **Editor Attribute Editing & Restructuring Tutorial** for more guidance on editing and restructuring the attributes of a vector file layer.
2. The editing of attributes can also be initiated by right clicking under the UID column in the Attribute panel. (The proper layer must first be selected in the *Legend panel*.)

1.2.6.9 Save layer properties

The Save layer properties function allows all the layer property settings of a selected layer to be saved as an *.ini file. The saved layer properties can then be applied (loaded) to another layer. This can be a significant time saving feature when the objective is to apply the same or similar rendering property settings to multiple layers.

To save the layer properties:

1. With the layer of interest selected (highlighted) in the *Legend panel*, select the *Layer/Save layer properties* menu to open the *Save as* window.
2. Use the *Save in* and *File name* fields to specify the file path and file name for the *.ini file to which the layer properties are to be saved.
3. Click on the *Save* button.

The layer properties of the selected layer will be saved to the specified *.ini file.

Tip:

- The *Save layer properties* function can also be accessed by right clicking on the selected layer in the *Legend panel*.

1.2.6.10 Load layer properties

The Load layer properties function allows all the layer properties settings that have previously been saved to an *.ini file to be loaded (applied) to a selected layer. This can be a significant time saving feature when the objective is to apply the same or similar rendering property settings to multiple layers.

To save the layer properties:

1. With the layer to which the layer properties are to be loaded selected (highlighted) in the *Legend* panel, select the *Layer/Load layer properties* menu to open the *Open* window.
2. Use the *Look in* and *File name* fields to select the *.ini file from which layer properties are to be loaded to the selected layer.
3. Click on the *Open* button.

The layer properties from the selected *.ini file will be loaded to the selected layer.

Tip:


- The *Load layer properties* function can also be accessed by right clicking on the selected layer in the *Legend* panel.

1.2.6.11 Properties

Layer properties

The appearance properties for each layer of a project can be set individually in both the Viewer and Editor by using the layer properties combo box. The layer properties combo box provides the user interface to control all the layer appearance possibilities. Because the rendering and appearance possibilities are extensive, the layer properties combo box provides for many setting options with the settings organized under tabs, some of which contain sub tabs with more settings options. Some settings are relevant (available) only for a given layer type, e.g. raster (image), vector points, vector polylines, or vector polygons.

There are two ways to open the layer properties combo box:

1. Select the Layer/Properties menu command  while the layer to be modified is selected (highlighted) the *Legend* panel, or
2. Simply double mouse click on the layer in the *Legend* panel.

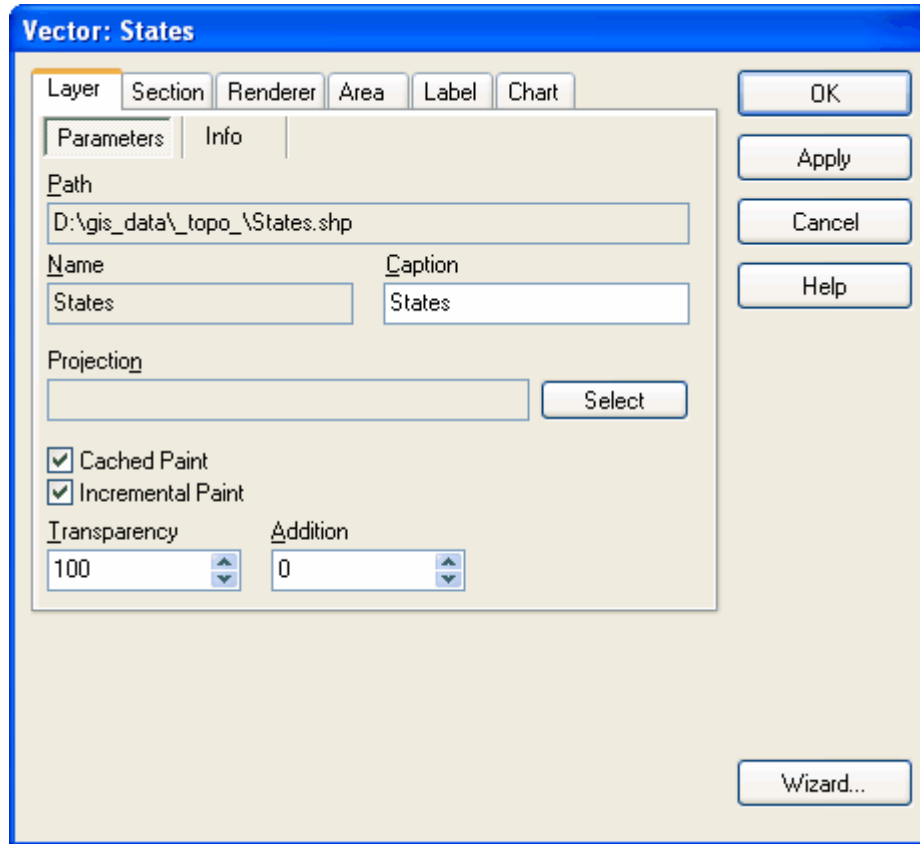
Properties configured in the Layer tab

The *Layer/Parameters* sub tab contains:

- The *Path* field containing the path to the file contained by the selected layer. This field is read-only.
- The *Name* field contains only the name of the file contained by the selected layer. This field is read-only.
- The *Caption* field contains the name of the layer as displayed in the Legend panel. This field can be edited.
- The *Projection* field relates to the geographic coordinate system of the selected layer. (This feature is not implemented in version 1.x)
- Check boxes to activate or deactivate the *Cached Paint* and *Incremental Paint* features relating specifically to the rendering of selected layer. (Refer to the **Viewer Tools Options** in Viewer Tutorial 1 for more information on these features.)
- The *Transparency* field contains an editable value that controls the transparency level of the entire layer. The values can be from 0 - 100, with 0 corresponding to full transparency (invisible) and 100 corresponding to full visibility.
- The *Addition* field contains a factor of 0 - 100 which determines the degree to which the background color of the layer is added to the color of the objects. (This feature can be useful for anaglyphs.)

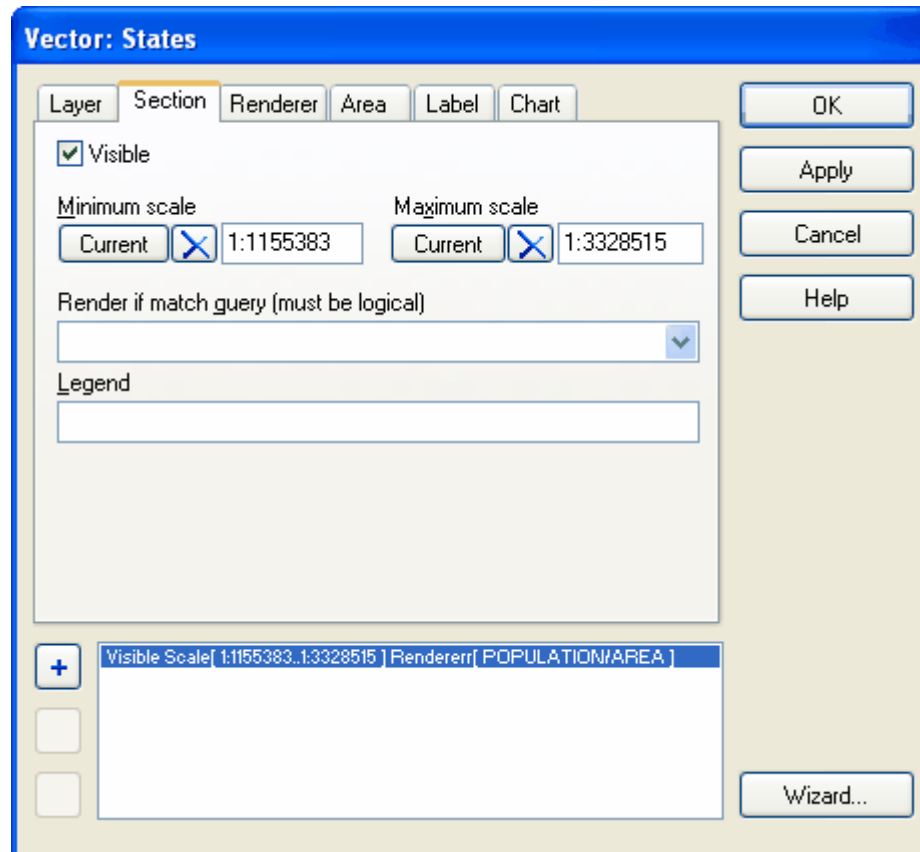
The *Layer/Info* sub tab contains read-only information relating to the file format of the selected layer and provides a *User comments* field for the user to place any notes or text information

relating to the layer.



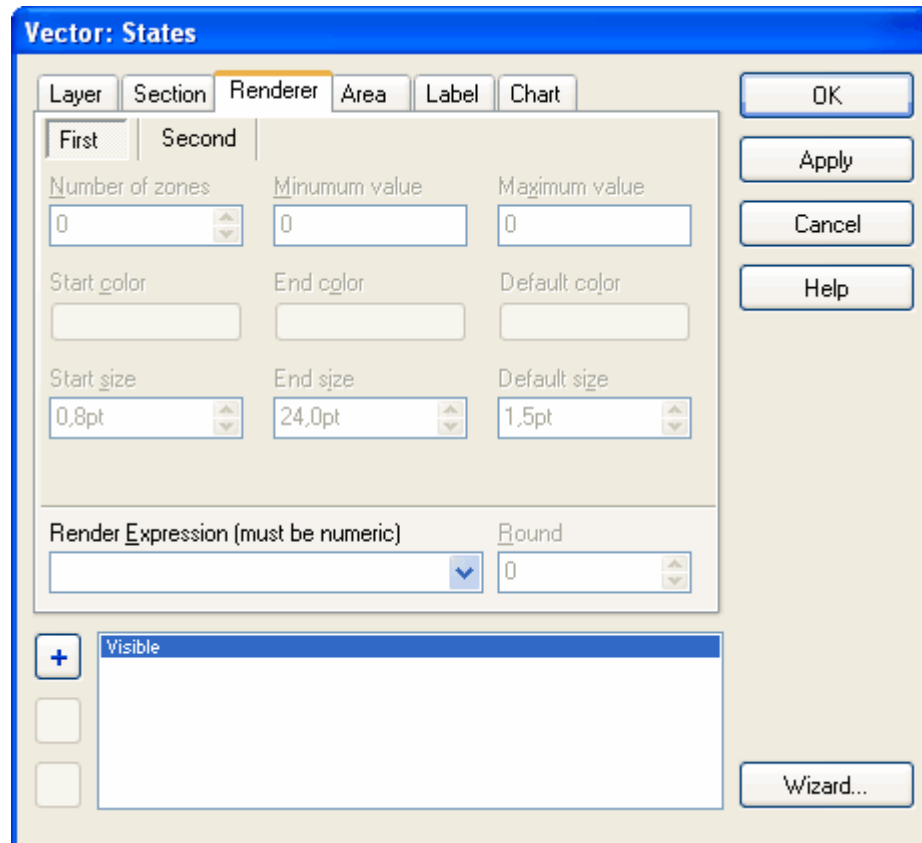
Properties configured in the **Section** tab

The tab provides options to control the visibility of vector objects in the layer. With the use of this feature objects on the map can be rendered, or rendered in a specific way with regards to color, polygons fills, line thickness, with labels, etc., only when the map view is between specific minimum and maximum scale levels (zoom levels). The *Render if match query* field allows the user to define value ranges of a selected attribute to determine how the objects in the layer are to be rendered. By entering a name for each value range in the Legend field, the name assigned to each range can be made to appear in the Legend panel.



Properties configured in the *Renderer* tab

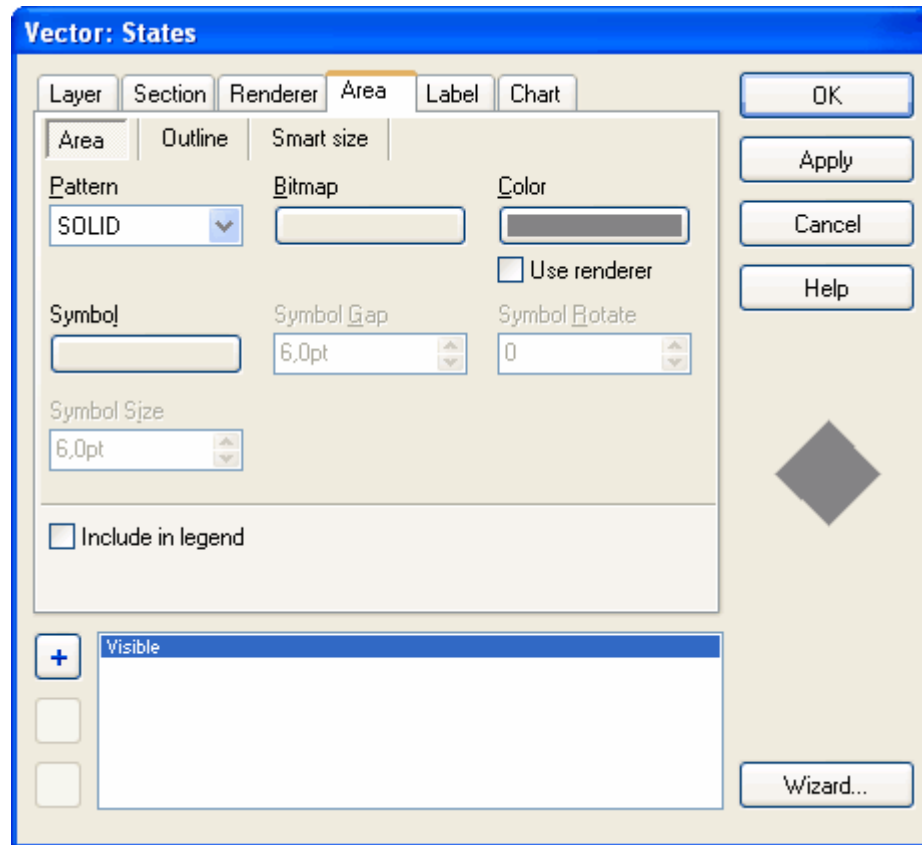
The options under the *Renderer* tab allows for setting value zones for the rendering of colors, sizes, etc. based on the value ranges of a selected attribute(s).



Properties configured in the Area tab

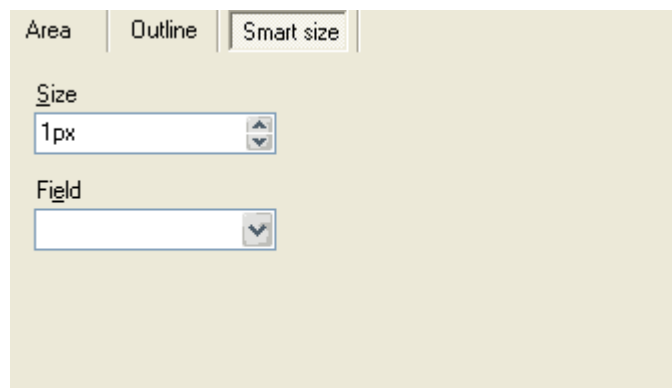
The *Area* tab presents a number of options to custom define the rendering of polygon areas, including the pattern, color, outline width, outline color, use of symbols as polygon fills, etc. If symbols are used to fill the polygons, the *Symbol Gap*, *Symbol Rotate*, and *Symbol Size* options allow the user to set the spacing between the repetition of the symbol, to set the rotation each incidence of the symbol in the fill, and the size (in points; 1 point = 1/72 inch) of each incidence of the symbol. The *Include in legend* check box allows the user to determine if a small representation of the rendered symbol should appear under the layer name in the Legend panel.

If the selected layer is a line layer, this tab is titled *Line* and if it is a point or multi-point layer, the tab is titled *Marker*. In each case the setting options are similar, but a bit different to reflect the geometric differences. For example, a symbol in a line layer would be rendered repeatedly to represent a line feature and a symbol would be used in a points layer would be to represent the location of a point. If the layer is a CAD style DXF or DGN file, vector polygons, lines, and points can all be contained in a single map layer.



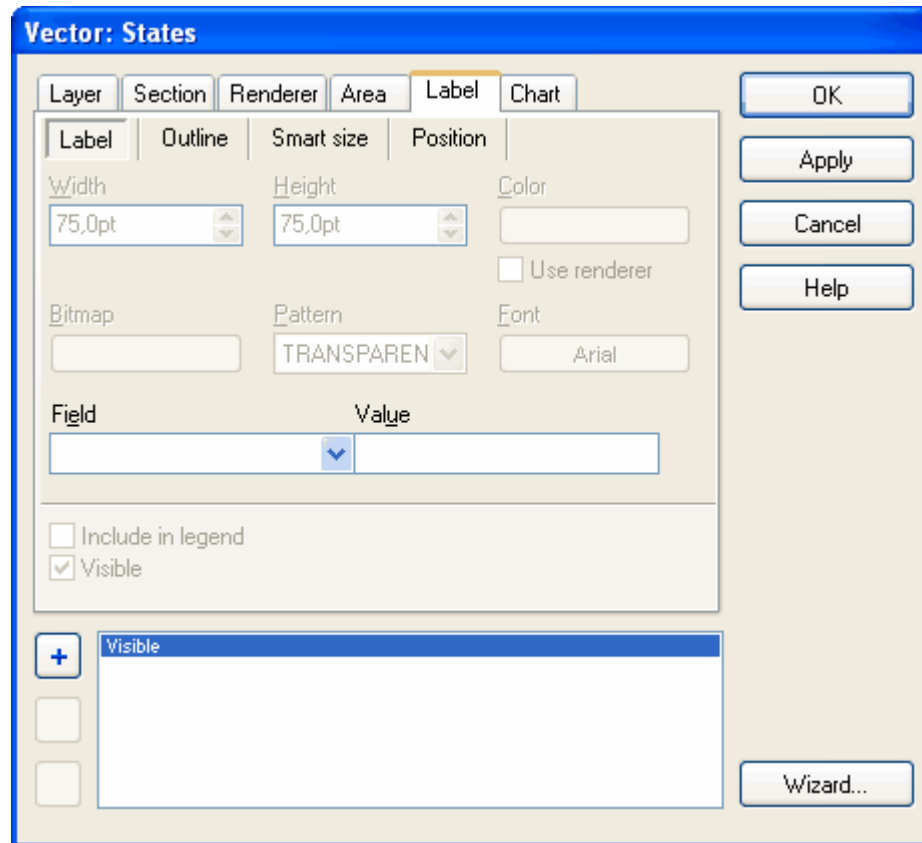
Note the *Smart size* feature. This is an important layer property which allows the user to specify a size threshold for the rendering of vector shape features in the layer. Shapes that are smaller than the size threshold at any given zoom level (scale level) are not rendered. With very large vector file layers, use of a *Smart Size* can dramatically speed up the opening of vector map files and the rendering speed at relatively zoomed out extent levels. This is because the software is released from wasting computational resources to render objects which are typically too small at a given zoom level to have a meaningful effect on the map view. Sometimes use of the *Smart Size* feature can enhance the map view by reducing clutter.

The *Smart Size* can be set in terms of points (pt) or pixels (px). A common *Smart Size* setting is 1 pixel (1px), which means that any line or polygon feature in the layer with a size that is less than one full pixel at the present zoom level (scale), will not be rendered on the map. Naturally the *Smart Size* feature is more meaningful for polygon and line layers. Point shapes do not have a size. Turn off the *Smart Size* feature by setting the size to 0.0.



Properties configured in the *Label* tab

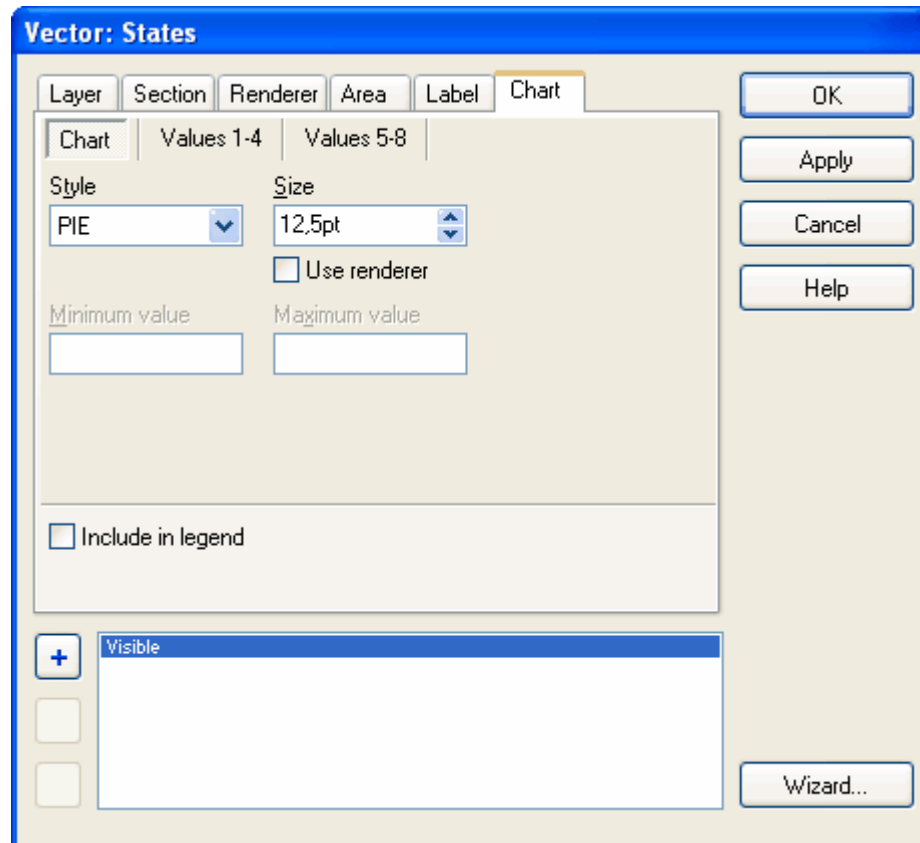
Text information that is contained in selected attribute fields of the selected layer may be presented as label information. The Label tab allows for the selection of the attributes to be associated with the labels, the size and lengths of the labels, the color and way that the labels are rendered, label outlines, the text font, the positioning relative to the associated map object, etc. The *Include in Legend* check box determines if the labels also appear in the Legend panel and the *Visible* check box allows for the labels of any selected layer to be turned on/off.



Properties configured in the *Chart* tab

Numeric data contained by selected layer attributes can be rendered as pie and bar charts, typically for polygon areas. The *Charts* tab allows for the definition of the chart type, size, colors, etc. The numeric data presented in the charts can be taken straight from attribute fields or it can be defined with a mathematical formula use the values contained by one or more attributes.

Click on the OK button to close the layer properties combo box and see the effect of the updated property settings in the map viewer window.



Annotation

- All the layer property settings for each layer of a project are saved to the project file so that the project can later be reopened with all the layer property settings remembered.

Tips


1. The *Wizard* tool offers a quick and easy way to thematically render a layer based on the information in a selected attribute. Click on the *Wizard* button to launch the Wizard window.
2. Refer to Viewer tutorials 2 - 7 for detailed guidance on the use settings within the layer parameters combo box.
3. The layer properties dialog box can also be opened by using the Alt + Enter shortcut.
4. It is possible to see the effect of the updated layer property settings without closing the combo box window, by clicking on the *Apply* button.

1.2.6.12 Move Up

Changing the order of layers

The layers of a project can be organized in any order or priority. In visibility conflict situations, layers closer to the top of the layer list have priority to those closer to the bottom of the layer list.

To move a selected layer up by one layer:

1. Select (highlight) the layer to be moved in the *Legend* panel.
2. Select the *Layer/Move Up*  menu command.

After the layer move operation is performed, the new layer order is reflected in the *Legend* panel.

Tip


- An even faster method is to select a layer in the *Legend panel* and drag it to the desired location in the layer list.

1.2.6.13 Move Down

Changing the order of layers

The layers of a project can be organized in any order or priority. In visibility conflict situations, layers closer to the top of the layer list have priority to those closer to the bottom of the layer list.

To move a selected layer down by one layer:

1. Select (highlight) the layer to be moved in the *Legend* panel.
2. Select the *Layer/Move Down*  menu command.

After the layer move operation is performed, the new layer order will be reflected in the *Legend* panel.

Tip

- An even faster method is to select a layer in the *Legend panel* and drag it to the desired location in the layer list.

1.2.6.14 Visible

Displaying and hiding layers

The visibility of any open layer can be individually turned on/off as desired, without adding or removing the layer from the program.

To display a layer:

- Ensure that the check box next to the layer name in the *Legend* panel is checked.

To hide (make invisible) a layer:

- Uncheck the check box next to the layer name in the *Legend* panel.

Tips

1. The visibility of any layer selected in the *Legend* panel can also be turned on/off using check box in the *Layer/Visibility* menu command.
2. The visibility level of a layer can be controlled as a transparency factor, using a scale of 0 - 100, within the layer properties combo box under the *Layers/Parameters* tab.

1.2.7 Shape

The term "shape" is commonly used by GIS professionals to mean a single vector object. Therefore a shape can be a point, multipoint, line, or polygon figure.

1.2.7.1 Edit modes

1.2.7.1.1 Edit







Editing vector map geometry

The Editor mode functionality - Creating and editing vertices (points) in already existing vector geometry




Edit mode functionality can involve:

- Modifying the location or deleting existing vertices (points) belonging to existing geometrical figures.
- Adding new vertices to existing figures.
- Adding vertices to create new geometric figures (sometimes referred to as "digitizing")


Geometric figures can be polygon areas, lines, single points, or groups of points. Each geometric figure is composed of one or more vertices, with straight lines connecting the space between each vertex. The *Edit* mode functionality can be accessed via the *Shape/Edit mode* menu option or by


using the Edit mode toolbar icons. Depending on the current edit mode, the Edit mode icon can appear as the following: , , , , or  or as one of several other custom edit modes. The default Edit mode setting is the *Edit*  mode.

To edit the position or delete vertices (points) of a existing vector object:


1. Select in the *Legend* panel the layer containing the vector to be edited.
2. Access the Edit tool either by using the *Shape/Edit mode/Edit* menu option or by clicking on the *Edit*  toolbar icon.
3. Select the geometric figure (vector) which is to be modified by clicking on it. (When using any of the edit modes the cursor will appear as a )
4. Click on any point (vertex) that is part of the selected vector and drag the vertex to a new location. If required, edit the locations of any other vertices composing the selected vector. (If a vertex is to be deleted, click on the vertex without dragging to a new location. The vertex will disappear.)
5. Finish the edit procedure for this vector and record the changes by again clicking on the *Edit*  toolbar icon.

To add new vertices to an existing vector polygon, line, or multi-point vector object:

1. (Same as step 1 above.)
2. (Same as step 2 above.)
3. (Same as step 3 above.)
4. Click the mouse cursor in the place where the new vertex is to be placed. If the vector being modified is a polygon area or a line, the shape of the figure will be changed in such a way that the new vertex will be linked with straight lines to the two closest already existing vertices.
5. Finish the edit procedure for this vector by again clicking on *Edit*  icon.

As usual, the edit changes will be permanently updated to the file that contains the selected layer when the data is next saved, such as by clicking on the *Save All*  menu icon.

Annotation

The *snapping* feature can make the digitizing process go more smoothly, saving time and errors. The placement of the vertices can be snapped to the positions of vertices contained any layer open in the Editor, including the layer that is being edited. Select the snap-to layer from the drop down list in the toolbar located just to the right of the *Edit*  icon. The default setting is *no snapping*.

Tips




1. If the location of a newly placed vertex is incorrect, change the location by simply clicking on it and dragging to the proper location.
2. Only the Edit modes that are appropriate for the type or vector layer (point, line, or polygon) that is selected in the Legend panel will be active. The inactive edit mode options will appear light gray.
3. Edit related menu options can also be accessed by right mouse clicking when in editing mode.
4. The term "Shape" is commonly used in the GIS community to mean a vector geometric figure, which can be a point, multipoint, line, or polygon.
5. Only the Editor, and not the Viewer, can perform editing operations. The Viewer does not edit or save data.
6. Refer to the **Editor Edit Existing Map Data Tutorial** for more guidance on the editing of existing vector map data.


1.2.7.1.2 Point

Creating points (vectors)

The *Point* Edit mode tool is used for creating a single points on a point layer. Each point is separate vector object, independent of any other points in the layer.

To add a new point:

1. Select in the *Legend* panel the point layer to which the new point is to be added.
2. Access the Point edit mode either by using the *Shape/Edit mode/Point* menu option or by simply clicking on the *Edit Mode* toolbar icon, which will appear as a  if the edit mode is current on *Point*. The cursor will then appear as a .
3. Click on the place on the map where the new vector point is to be located.
4. Continue clicking on the map to add additional points. Each click will add a new point at the location of the mouse cursor.
5. Again click on the Edit mode icon, which will still appear as a , to complete and record the points created during the point editing session.

As usual, the edit changes will be permanently updated to the file that contains the selected layer when the data is next saved, such as by clicking on the *Save All*  menu icon.

Tip




- Consider using the snapping tool to snap vector placement to the locations of already existing vectors in a selected layer. Select the snap-to layer from the drop down list in the toolbar located just to the right of the *Edit* mode icon.

1.2.7.1.3 Multipoint

Creating multi point figures (vectors)

The *Multipoint* Edit mode tool is used create groups of associated points on a multipoint layer. A multipoint figure is composed of two or more points forming a group, with each group of points a separate vector object.

To add a new point:

1. Select in the *Legend* panel the multipoint layer to which the new multipoint figure is to be added.
2. Access the *Multipoint* edit mode either by using the *Shape/Edit mode/Multipoint* menu option or by simply clicking on the edit mode toolbar icon, which will appear as a  if the edit mode is currently on *multipoint*. The cursor will then appear as a .
3. Click on the place on the map where the first point is to be located. Continue to click to add additional points to the multipoint figure. Each newly created point of each multipoint figure will be assigned a sequential number.
4. Again click on the Edit mode toolbar icon, which will still appear as a , to complete and record the new multipoint figure. This also sets the Editor program to begin drawing the next multipoint vector, if required.

Tip




- Consider using the snapping tool to snap vector placement to the locations of already existing vectors in a selected layer. Select the snap-to layer from the drop down list in the toolbar located just to the right of the *Edit* mode icon.

1.2.7.1.4 Line

Drawing a line

The *Line* edit tool is used to create lines (also referred to as polylines). A line is composed of two or more sequentially numbered vertices with straight line segments connecting the vertices. Each line is a separate vector object.


To add a new line:

1. Select in the *Legend* panel the polyline layer to which the new line is to be added.
2. Access the *Line* edit mode either by using the *Shape/Edit mode/Line* menu option or by simply clicking on the edit mode toolbar icon, which will appear as a  if the edit mode is currently on *Line*. The cursor will then appear as a .
3. Click on the place on the map where the new vector line is to begin. Click on the place where each subsequent vertex of the line is to be located.
4. Again click on the Edit mode toolbar icon, which will still appear as a , to complete and record the new line figure. This also sets the Editor program to start drawing the next line, if required.

Annotations

1. Each vertex forming a line is numbered in increasing order, starting with "0".
2. The most recently inserted vertex is the color red.
3. If a new vertex is positioned greater than 90 degrees relative to the last segment at the end of the line, the vertex will be connected to the nearest existing vertex in the line, forming a new segment at the end of the line. If a new vertex is positioned at less than a 90 degree angle from the last segment at the end of the line, the new vertex will be connected with the two closest existing vertices in that line, forming two new line segments. In this event, the vertices will be renumbered accordingly.
4. Holding down the *Ctrl* key will force the new vertex to be connected only to the most recently placed vertex, i.e. the vertex in the line with the highest number.

Tips




1. Consider using the snapping tool to snap vector placements to the locations of already existing vectors in a selected layer. Select the snap-to layer from the drop down list in the toolbar located just to the right of the *Edit*  icon.
2. Refer to the **Editor Digitize New Map Geometry Tutorial** for additional guidance on creating line vectors.

1.2.7.1.5 Polygon

Drawing a polygon area vector

The *Polygon* edit mode tool is used to create a polygon area. A polygon area is composed of three or more sequentially numbered vertices. The borders of the polygon area are formed by straight lines segments connecting the vertices.

To add a new polygon:


1. Select in the *Legend* panel the polygon layer to which the new polygon area is to be added.
2. Access the *Polygon* edit mode either by using the *Shape/Edit mode/Polygon* menu option or by simply clicking on the edit mode toolbar icon, which will appear as a  if the edit mode is currently on *Polygon*. The cursor will then appear as a .
3. Click on the place on the map where the first vector forming the new polygon is to be located. Then click on the place where each subsequent vertex forming the boarder of the polygon is to be located until the polygon is fully formed.
4. Again click on the Editor mode icon, which will still appear as a , to complete and record the new polygon area figure. This also sets the Editor program to start drawing the next polygon, if required.

Annotations

1. Every vertex forming a polygon is numbered in an ascending order, starting with "0". The order of the numbering normally ascends in the clockwise direction, and is sometimes referred to as the "winding".

2. The last inserted vertex is marked red color.
3. Each new vertex is automatically connected with the with two closest already existing vertices, resulting in the creation of additional sides to the polygon.

Tips



1. Consider using the snapping tool to snap vector placement to the locations of already existing vectors in a selected layer. Select the snap-to layer from the drop down list in the toolbar located just to the right of the *Edit*  icon.
2. Refer to **Editor Digitize New Map Geometry Tutorial** for additional guidance on creating polygons.

1.2.7.1.6 Rectangle area

Drawing a Rectangle Area (polygon vector)

The *Rectangle* drawing tool is used to draw an area with the shape of a rectangle, i.e., an shape with four sides connecting at 90 degree angles. The rectangles sides will be parallel to the borders of the map viewer window.

To draw a rectangle area:

1. Select in the *Legend* panel a layer that contains polygon data.
2. Select the Rectangle area drawing tool using either the *Shape/Edit mode/Rectangle area* menu option or by selecting the *Rectangle area*  option from the drop down list under the Edit mode toolbar icon.
3. Mouse click with the cursor on the place where one of the corners of the rectangle is to be located.
4. Mouse click on the place where the opposite corner of the rectangle is to be located. (Alternatively, hold down the left mouse button and drag the cursor from the first corner to the place for the opposite corner of the rectangle.) The rectangle will finish forming automatically after the placement of the second corner.
5. After one rectangle is formed, continue clicking to start drawing the next rectangle, if required.
6. Click again on the Edit mode icon, which will still appear as a , to complete and record the figures created during the rectangle polygon drawing session.

Tip


- The *Rectangle* option appears twice in the *Shape/Edit mode* menu drop down option list. One *Rectangle* option is for the creation of a polygon area vector and the other *Rectangle* option is for the creation of a line vector forming a rectangle outline. Depending on whether the layer selected in the *Legend* panel is a polygon or line layer, only the correct option in the drop down list will be active.


1.2.7.1.7 Rectangle outline

Drawing a rectangle outline (line vector)

The *Rectangle* outline tool is used to draw outlines of a rectangle geometric figure, in which four sides connect at 90 degree angles. The four sides will be parallel to the borders of the map viewer window. The resulting vector type is a line.

To draw a rectangle outline:

1. Select in the *Legend* panel a layer that contains polyline data.
2. Select the *Rectangle* outline drawing tool using either the *Shape/Edit mode/Rectangle outline* menu option or by selecting the *Rectangle outline*  option from the drop down list under the Edit mode toolbar icon.
3. Mouse click with the cursor on the place where one of the corners of the rectangle is to be located.

4. Click on the place where the opposite corner of the rectangle is to be located. (Alternatively, hold down the left mouse button and drag the cursor from the placement of the first corner to the place for the opposite corner of the rectangle.) The rectangle outline will finish forming automatically after the placement of the second corner.
5. After one rectangle outline is formed, continue clicking to start drawing the next rectangle outline, if necessary.
6. Click again on the Edit mode icon, which will still appear as a , to complete and record the figure(s) created during the rectangle outline drawing session.

Tip



- The *Rectangle* option appears twice in the *Shape/Edit mode* menu drop down option list. One *Rectangle* option is for the creation of a polygon area vector and the other *Rectangle* option is for the creation of a line vector forming a rectangle outline. Depending on whether the layer selected in the *Legend* panel is a polygon or line layer, only the correct option in the drop down list will be active.

1.2.7.1.8 Rectangle rotated area

Drawing a rotated rectangle area (polygon vector)

The *Rectangle rotated* tool is used to draw a rectangle polygon area, with four sides connecting at 90 degree angles, in which the sides are at some angle (not parallel) to the borders of the map viewer window.

To draw a rotated rectangle area:

1. Select in the *Legend* panel a layer that contains polygon data.
2. Select the Rectangle area drawing tool using either the *Shape/Edit mode/Rectangle* menu option or by selecting the *Rectangle rotated area*  option from the drop down list under the Edit mode toolbar icon.
3. Click with the mouse cursor on the place where one of the corners of the rectangle is to be located.
4. Click on the place where a second corner of the rectangle is to be located.
5. Click on the place where a third corner of the rectangle is to be located. After the third corner is placed, the rectangle will finish forming automatically.
6. After one rectangle area is formed, continue clicking to start drawing the next rectangle polygon, if required.
7. Click again on the Edit mode icon, which will still appear as a , to record the figure(s) created during the rotated rectangle polygon(s) drawing session.

Tip

- The *Rectangle rotated* option appears twice in the *Shape/Edit mode* menu drop down option list. One *Rectangle rotated* option is for the creation of a polygon area vector and the other *Rectangle rotated* option is for the creation of a line vector forming a rectangle outline. Depending on whether the layer selected in the *Legend* panel is a polygon or line layer, only the correct option in the drop down list is active.



1.2.7.1.9 Rectangle rotated outline

Drawing a rotated rectangle outline (line vector)

The *Rectangle rotated* outline tool is used to draw an outline of a rectangle geometric figure, with four side connecting at 90 degree angles, in which the sides are at some angle (not parallel) to the borders of the map viewer window. The resulting vector type is a line.

To draw a rectangle outline:

1. Select in the *Legend* panel a layer that contains polyline data.

2. Select the *Rectangle rotated* outline drawing tool using either the *Shape/Edit mode/Rectangle rotated* outline menu option or by selecting the *Rectangle rotated* outline  option from the drop down list under the Edit mode toolbar icon.
3. Click with the mouse cursor on the place where one of the corners of the rectangle is to be located.
4. Click on the place where a second corner of the rectangle is to be located.
5. Click on the place where a third corner of the rectangle is to be located. After the third corner is placed, the rectangle outline will finish forming automatically.
6. After one rotated rectangle outline is formed, continue clicking to start drawing the next rotated rectangle outline.
6. Click again on the Edit mode icon, which will still appear as a , to record the rotated rectangle outline(s) drawing session.

Tip




- The *Rectangle rotated* option appears twice in the *Shape/Edit mode* menu drop down option list. One *Rectangle rotated* option is for the creation of a polygon area vector and the other *Rectangle rotated* option is for the creation of a line vector forming a rectangle outline. Depending on whether the layer selected in the *Legend* panel is a polygon or line layer, only the correct option in the drop down list will be active.

1.2.7.1.10 Polygon90 area

Drawing right angles as part of a polygon area

The Editor provides a custom tool for the creation of exact 90 degree (right) angles when drawing a vector polygon.

To draw this kind of figure:

1. Select in the *Legend* panel a layer that contains polygon data.
2. Select the Polygon 90 drawing tool using either the *Shape/Edit mode/Polygon 90 area* menu option or by selecting the *Polygon 90 area*  option from the drop down list under the Edit mode toolbar icon.
3. The Polygon 90 mode forces the creation of 90 degree angles in the polygon perimeter.
4. When finished making 90 angles, double click to complete the polygon and to set the program to commence drawing the next polygon with 90 angles.
5. Click again on the Edit mode toolbar icon, which will still appear as a , to record the figure(s) drawn during the Polygon 90 drawing session.
6. If required, the polygons can be further edited using the normal method by reselecting the polygon in *Edit*  mode.

Tip

- The *Polygon 90* option appears twice in the *Shape/Edit mode* menu drop down option list. One *Polygon 90* option is for the creation of a polygon area vector and the other *Polygon* option is for the creation of a line vectors forming a polygon outline. Depending on whether the layer selected in the *Legend* panel is a polygon or line layer, only the correct option in the drop down list will be active.


1.2.7.1.11 Polygon90 outline



Drawing a polygon outline with right angles (line vector)

The polygon 90° outline tool can be used to draw a polyline vector in the shape of a polygon with 90 degree angles.

To draw this kind of figure:

1. Select in the *Legend* panel a layer that contains vector line data.
2. Select the *Polygon 90* drawing tool using either the *Shape/Edit mode/Polygon 90 outline*

menu option or by selecting the *Polygon 90* outline  option from the drop down list under the Edit mode toolbar icon.

3. The Polygon 90 mode forces bends in the line to be created at exact 90 degree angles.
4. When finished with one figure composed of 90 angles, double click on the first vertex to complete the figure and set the program to commence drawing the next figure with 90 angles.
5. Click on the Edit mode toolbar icon, which will still appear as a , to record the figure(s) drawn during the drawing session.
6. If required, the resulting lines can be further edited using the normal method by reselecting the polygon in *Edit*  mode.

Tip




- The *Polygon 90* option appears twice in the *Shape/Edit mode* menu drop down option list. One *Polygon 90* option is for the creation of a polygon area vector and the other *Polygon* option is for the creation of a line vector forming a polygon outline. Depending on whether the layer selected in the *Legend* panel is a polygon or line layer, only the correct option in the drop down list will be active.

1.2.7.1.12 Circle area

Drawing a circle area polygon

The Circle area drawing tool is used to easily create a near circle geometric figure composed 64 well placed vertices. The resulting figure is a GIS polygon. The Editor provides for two methods to create a circle polygon area - the *Circle* area tool and the *Circle 3point base* area tool. This is the first of these two methods.

To draw a circle area using the *Circle* tool:

1. Select in the *Legend* panel a layer that contains vector polygon data.
2. Select the *Circle* drawing tool using either the *Shape/Edit mode/Circle* area menu option or by selecting the *Circle* area  option from the drop down list under the Edit mode toolbar icon.
3. Draw the circle area by clicking on the point that is to be the center of the circle and dragging the cursor to a point that is to be on the perimeter of the circle, and release the mouse button. The circle will appear immediately.
4. If desired, draw more circle areas by repeating the procedure in the above step.
5. Click on the Edit mode toolbar icon, which will still appear as a , to record the figure(s) drawn during the circle drawing session.
7. If required, the circle polygons can be further edited using the normal method by reselecting the circle when in *Edit*  mode.

Tip

- The *Circle* option appears twice in the *Shape/Edit mode* menu drop down option list. One *Circle* option is for the creation of a polygon vector area and the other *Circle* option is for the creation of a line vector in the form of a circle outline. Depending on whether the layer selected in the *Legend* panel is a polygon or line layer, only the correct option in the drop down list will be active.




1.2.7.1.13 Circle outline

Drawing a circle outline (line vector)

The Circle outline drawing tool is used to easily create a line in the shape of a near circle from 64 well placed vertices. The resulting figure is a GIS polyline. The Editor provides for two methods to create a circle outline - the *Circle* outline tool and the *Circle 3point base* outline tool. This is the

first of these two methods.

To draw a circle outline using the *Circle* tool:

1. Select in the *Legend* panel a layer that contains vector line data.
2. Select the *Circle* drawing tool using either the *Shape/Edit mode/Circle* outline menu option or by selecting the *Circle* outline  option from the drop down list under the Edit mode toolbar icon.
3. Draw the circle outline by clicking on the point that is to be the center of the circle and dragging the cursor to a point that is to be on the perimeter of the circle, and release the mouse button. The circle will appear immediately.
4. If desired, draw more circle outlines by repeating the procedure in the above step.
5. Click on the Edit mode toolbar icon, which will still appear as a , to record the figure(s) drawn during the circle drawing session.
7. If required, the circle outlines can be further edited using the normal method by reselecting the circle when in *Edit*  mode.

Tip




- The *Circle* option appears twice in the *Shape/Edit mode* menu drop down option list. One *Circle* option is for the creation of polygon vector areas and the other *Circle* option is for the creation of a line vectors in the form of a circle. Depending on whether the layer selected in the *Legend* panel is a polygon or line layer, only the correct option in the drop down list will be active.

1.2.7.1.14 Circle 3point area

Drawing a circle area polygon

The Circle area drawing tool is used to easily create a near circle geometric figure from 64 well placed vertices. The resulting figure is a GIS polygon. The Editor provides for two methods to create a circle polygon area - the *Circle* area tool and the *Circle 3point base* area tool. This is the second of these two methods.

To draw a circle area using the *Circle 3point base* method:

1. Select in the *Legend* panel a layer that contains vector polygon data.
2. Select the *Circle* drawing tool using either the *Shape/Edit mode/Circle 3point base* area menu option or by selecting the *Circle 3point base* area  option from the drop down list under the Edit mode toolbar icon.
3. Mouse click with the cursor on a place that is to be on the perimeter of the circle.
4. Mouse click on a second point that is to be on the perimeter of the circle. These two points define the circle's chord.
5. Mouse click on a third point that is to be on the perimeter of the circle. The location of this point will define the radius and the circle will automatically form.
6. If desired, draw more circle areas by repeating the procedures in the above steps.
8. Click on the Edit mode toolbar icon, which will still appear as a , to record the figure(s) drawn during the circle drawing session.
9. If required, the circle polygons can be further edited using the normal method by reselecting the circle when in *Edit*  mode.

Annotation

- While moving the cursor between inserting the second and the third point, the circle's chord, radius, and perimeter are dynamically illustrated on the screen.

Tip

- The *Circle 3point base* option appears twice in the *Shape/Edit mode* menu drop down option list. One *Circle 3point base* option is for the creation of a polygon vector area and




the other *Circle 3point base* option is for the creation of a line vectors in the form of a circle outline. Depending on whether the layer selected in the *Legend* panel is a polygon or line layer, only the correct option in the drop down list will be active.

1.2.7.1.15 Circle 3point outline

Drawing a circle outline (line vector)

The Circle area drawing tool is used to easily create a near circle outline from 64 well placed vertices. The resulting figure is a GIS polyline. The Editor provides for two methods to create a circle outline - the *Circle* outline tool and the *Circle 3point base* outline tool. This is the second of these two methods.

To draw a circle area outline using the *Circle 3point base* method:

1. Select in the *Legend* panel a layer that contains vector polyline data.
2. Select the *Circle* drawing tool using either the *Shape/Edit mode/Circle 3point base* outline menu option or by selecting the *Circle 3point base* outline  option from the drop down list under the Edit mode toolbar icon.
3. Mouse click with the cursor on a place that is to be on the perimeter of the circle.
4. Mouse click on a second point that is to be on the perimeter of the circle. These two points define the circle's chord.
5. Mouse click on a third point that is to be on the perimeter of the circle. The location of this point will define the radius and the circle will automatically form.
6. If desired, draw more circle outlines by repeating the above steps.
7. Click on the Edit mode toolbar icon, which will still appear as a , to record the figure(s) drawn during the circle drawing session.
8. If required, the circle polylines can be further edited using the normal method by reselecting the circle when in *Edit*  mode.

Annotation

- While moving the cursor between inserting the second and the third points, the circle's chord, radius, and perimeter are dynamically illustrated on the screen.

Tip


- The *Circle 3point base* option appears twice in the *Shape/Edit mode* menu drop down option list. One *Circle 3point base* option is for the creation of polygon vector areas and the other *Circle 3point base* option is for the creation of a line vectors in the form of a circle outline. Depending on whether the layer selected in the *Legend panel* is a polygon or line layer, only the correct option in the drop down list will be active.


1.2.7.1.16 Line free

Drawing a free line (line vector)

The free line drawing tool is used to create custom line vectors by dragging the mouse cursor across the screen. The geometric shape of the line is formed by a large number of automatically placed vertices.

To draw a free line:

1. Select in the *Legend* panel a layer that contains vector polyline data.
2. Select the *Circle* drawing tool using either the *Shape/Edit mode/Line free* menu option or by selecting the *Line free*  option from the drop down list under the Edit mode toolbar icon.
3. Depress the left mouse button and drag the cursor across the map version screen. The line will begin appearing as the as the mouse cursor is dragged.
4. Double click to stop the formation of one free line and set the program to start drawing

- the next free line.
5. Make more free lines, if desired, by repeating the procedure described in the step above.
 6. Click again on the Edit mode icon, which will still appear as a , to record the lines created during the free line drawing session.

Annotation




If the mouse button is released during a part of the mouse cursor dragging procedure, a straight line segment will be created between the release point and the point at which the mouse button is again depressed.

1.2.7.1.17 Line 90

Drawing a line with right angles (line vector)

The *Line 90°* tool can be used to draw a polyline vector with one or more 90 degree bends (changes in direction).

To draw this kind of figure:




1. Select in the *Legend* panel a layer that contains vector line data.
2. Select the *Line 90* drawing tool using either the *Shape/Edit mode/Line 90* menu option or by selecting the *Line 90*  option from the drop down list under the Edit mode toolbar icon.
3. The Line 90 mode forces bends in the line to be created at exact 90 degree angles.
4. When finished with one line composed of one or more 90 angles, double click to complete the line and to set the program to commence drawing the next line with 90 angles.
5. Click again on the Edit mode toolbar icon, which will still appear as a , to record the lines drawn during the *Line 90* drawing session.
6. If required, the resulting lines can be further edited using the normal method by reselecting a line while in *Edit*  mode.


1.2.7.2 Add Part

Creating multi-part vectors

A single vector object (polygon, polyline, or multipoint) can be composed of multiple "parts". The number of parts that can be within a single vector object is virtually unlimited.

To add a new part to an existing vector object:

1. Select (highlight) the layer that is to be edited in the *Legend* panel.
2. Select the *Select edit* tool either with the *Shape/Edit/Edit* menu option or by clicking on the *Edit*  toolbar icon.
3. With mouse cursor, which now appears as a , click on the object to which a new part is to be added.
4. Select the *Shape/Add Part* menu command.
5. Insert new vertices that are to compose the new part added to the selected vector by mouse clicking.
6. Click again on the *Edit* tool  icon to complete the *Add Part* editing operation. This also sets the Editor problem to start the next editing operation, if required.

As usual, the edit changes will be permanently updated to the file that contains the selected layer when the data is next saved, such as by clicking on the *Save All*  menu icon.

Tips

1. The *Add Part* feature can also be accessed by using the Shift + Ctrl + A shortcut.
2. One example of how the Add Part feature can be useful is to make a hole in a polygon area.
3. When two or more vectors are combined in a "union" procedure, the different vectors


become "parts" of the new vector object created from the union. Refer to the *Shapes/Union shapes* help file or the **Editor Unions and Splitting Tutorial** for more information on unions.


1.2.7.3 Delete Part

Deleting a part from a multipart vector

It is possible to delete a part of a multipart vector object. This operation deletes all the vertices forming the part that is selected for deletion.

To delete a part from an existing multipart vector:

1. Select the layer in the *Legend* panel which contains the vector to be edited (the part deleted).
2. Select the *Edit* tool either with the *Shape/Edit/Edit* menu option or by clicking on the *Edit*  toolbar icon.
3. Mouse click on (to select) the vector part to be deleted.
4. Click on the *Shape/Delete Part* menu command.

As usual, the edit changes will be permanently updated to the file that contains the selected layer when the data is next saved, such as by clicking on the *Save All*  menu icon.

Tip



- The *Delete Part* function can also be accessed using the Shift + Ctrl + D shortcut.


1.2.7.4 Delete Shape

Deleting vector objects

It is possible to delete a selected vector object from a map layer.

To delete an object:

1. Select the layer in the *Legend* panel which contains the vector to be edited.
2. Select the *Select* edit tool using either the *Shape/Edit mode/Edit* menu command or by clicking on the *Edit*  toolbar icon.
3. Select, using one of the select tools under the *Map/Select mode* menu, the vector object(s) to be deleted.
4. Select the *Shape/Delete Shape* menu command or click on the *Delete Shape*  toolbar icon.

As usual, the edit changes will be permanently updated to the file that contains the selected layer when the data is next saved, such as by clicking on the *Save All*  menu icon.

Tips



1. The *Delete Shape* function can also be accessed using the Shift + Ctrl + Del shortcut.
2. If a vector is deleted by mistake, and as long as the modifications (edit changes) to the vector have not yet been saved to the file (by using the *Save* or *Save All* command), the vector can still be recovered by closing the layer without saving changes and reopening the file layer.

1.2.7.5 Revert Shape

Reverting a modified vector object shape to its original state

As long as the modifications (edit changes) to a vector shape have not yet been saved to the file (by using the *Save* or *Save All* command), the shape can be restored to its original state, i.e., as it was prior to the changes performed during the current edit session.

To revert unsaved modifications to a vector (revert a vector to its last saved state):

1. Select (highlight) the layer in the *Legend* panel which contains the vector to be restored.
2. Select the Select edit tool using either the *Shape/Edit mode/Edit* menu command or by clicking on the *Edit*  toolbar icon.
3. Select, using one of the selection modes under the *Map/Select mode* menu, the vector object(s) to be restored.
4. Select the *Shape/Revert Shape* menu command or click on the *Revert Shape*  toolbar icon.

Tips


- The *Revert Shape* function can also be accessed by using the Shift+Ctrl+R shortcut.
- The *Revert Shape* function can be very useful in the event of an accidental deletion of a shape or part of a shape. Just use this feature to restore that which was deleted.

1.2.7.6 Change Winding

Reversing direction of the points numbering in a polygon

All points forming vector polygon area are numbered sequentially, normally in the clockwise direction, starting from the first point that was created. In some situations, however, it is necessary to reverse the order of the points numbering to the counter-clockwise direction. The direction (clockwise or counter-clockwise) of the points numbering, is referred to as the "winding".

To reverse the points numbering order (the winding):

1. Select (highlight) the polygon layer in the *Legend* panel which contains the polygon that is to be modified.
2. Select the Select edit tool using either the *Shape/Edit mode/Edit* menu command or by clicking on the *Edit*  toolbar icon.
3. Use a select tool to select the vector polygon in which the winding is to be reversed.
4. Select the *Shape/Change winding* menu command.

Tip



- A hole inside a polygon area can be created by reversing the winding, to the counter-clockwise direction, of the polygon forming the hole


1.2.7.7 Split shapes

Splitting vector objects

Any vector object composed of multiple vertices (multipoint, polyline, and polygon types) can be split into pieces.

To split a vector object into smaller pieces:

1. Select the layer in the *Legend panel* which contains the vector to be modified.
2. Select the Select edit tool using either the *Shape/Edit mode/Edit* menu command or by clicking on the *Edit*  toolbar icon.
3. Mouse click on (to select) the vector that is to be split.
4. Select the *Shape/Split Shapes* menu command or click on the *Split Shape*  toolbar icon.
5. Use the options in the *Shape split* panel to define how to handle the vector attributes and other options.
6. Click on the *Next* button perform the split operation.

As usual, the edit changes will be permanently updated to the file that contains the selected layer when the data is next saved, such as by clicking on the *Save All*  menu icon.

Tips


1. Remember when splitting Multipoint and Polygon objects that the ends of the splitting line should be outside the boundaries of the object.
2. Splitting is possible even when not in an Editing mode.
3. The snapping feature - to the vertices in the selected snap-to layer - can be used during the drawing of very complex cutting lines
4. Refer to the **Editor Unions and Splitting Tutorial for more guidance.**


1.2.7.8 Union shapes

Making a union from multiple vector objects

Any vector object composed of multiple vertices (multipoint, polyline, and polygon types) can be combined into a single vector object in a union procedure.

To form a union from multiple vectors:

1. Select the layer in the *Legend* panel which contains the vectors to be combined in the union.
2. Select the Shapes Union function using the *Shape/Union Shapes* menu command or by clicking on the *Shapes Union*  toolbar icon. This will cause the *Shapes union* panel to appear.
3. Select the vectors that are to form the union using any of the Select tools, e.g., Select by Point, Select by Circle, Select by Rectangle, etc.
4. Click on the *Next* button in the *Shapes union* panel.
5. Select between the two options: *Blank attributes* (apply no attribute field information to the new vector object formed by the union) or *Attributes from the first shape* (apply the attributes from the first selected vector object to the new vector object formed by the union).
6. Check or uncheck the *Replace source* option to specify if i) the new vector formed by the union should replace the original vectors or ii) if the original vectors selected for the union should remain after the new vector is formed by the union.
7. Click on the *Next* button to perform the union operation.

As usual, the edit changes will be permanently updated to the file that contains the selected layer when the data is next saved, such as by clicking on the *Save All*  menu icon.

Tips:

1. Each vector included in the union will become a "part" of the new vector formed by the union.
2. Making a union is possible even when not in an Editing mode.
3. Refer to the **Editor Unions and Splitting Tutorial** for more detailed guidance.

1.2.7.9 Clipboard buffer

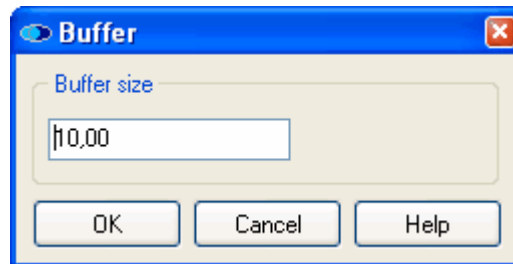
Creating a buffer

The Editor program provides for the creation of a buffer from any vector type (point, multi-point, line, or polygon). A buffer is defined as total area within a specified distance of any given geometric feature.

To create a buffer around a vector feature:

1. Use one of the spatial select tools under the *Map/Select mode* menu to select the vector object for which a buffer is to be created.
2. Select the vector object or objects from which the buffer is to be created.
3. Copy the selected object or objects to the Clipboard layer using either the *Edit/Copy* or *Edit/Copy Special* menu options.

4. Select the *Shape/Clipboard buffer* menu command to open the *Buffer* window.
3. Enter the *Buffer size* in map units.
6. Click on the OK button to generate the buffer to the Clipboard layer. The buffer will replace the vectors that were previously in the Clipboard layer.



Annotations

1. A buffer is a normal polygon vector.
2. The buffer is generated in the SHP file format.
3. The Clipboard layer containing the buffer polygon can be saved and later reloaded to the Clipboard layer for use in subsequent operations, such as to perform a spatial selection using the content of the clipboard, which is available under *Map/Select Mode/Select by Clipboard* menu option.

Tips

1. The buffer feature can be very useful with certain spatial selection operations. For example, the use of a buffer to perform a spatial selection would be perfect to select all land parcels that are within the right-of-way area of a selected or planned new highway.
2. The map layer must be in a projected coordinate system with linear units (meters, feet, etc.) to be able to know the real buffer size. If the buffer is generated from an objects in a map layer that is defined in longitude/latitude coordinates, such as the common WGS84 coordinate system, the buffer size will also be defined in coordinates (and not in linear units). This might be acceptable for general visualization, but it is meaningless if any degree of precision is required.

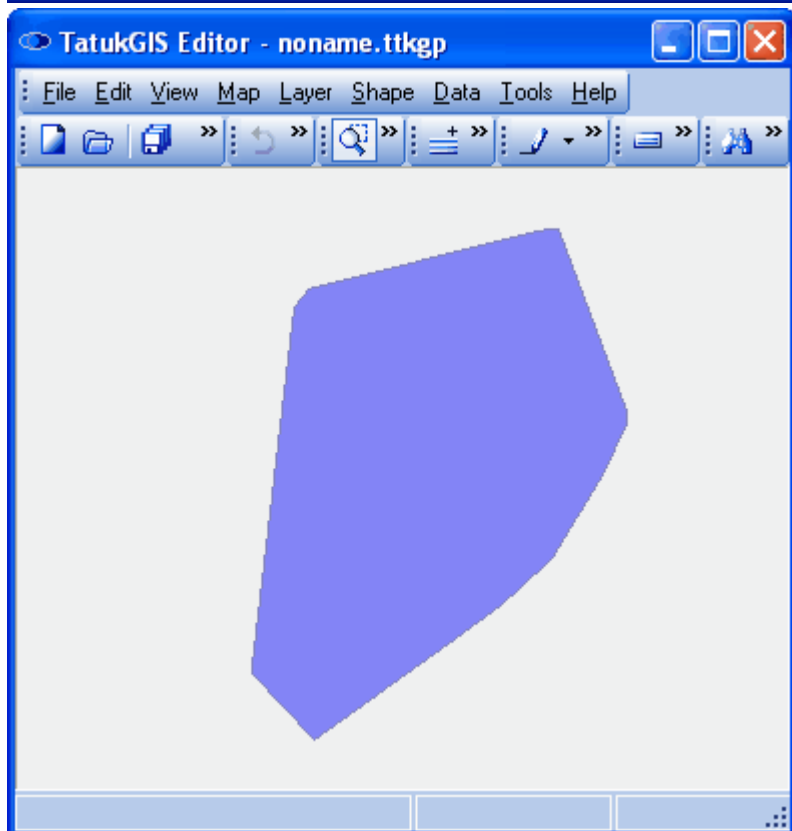
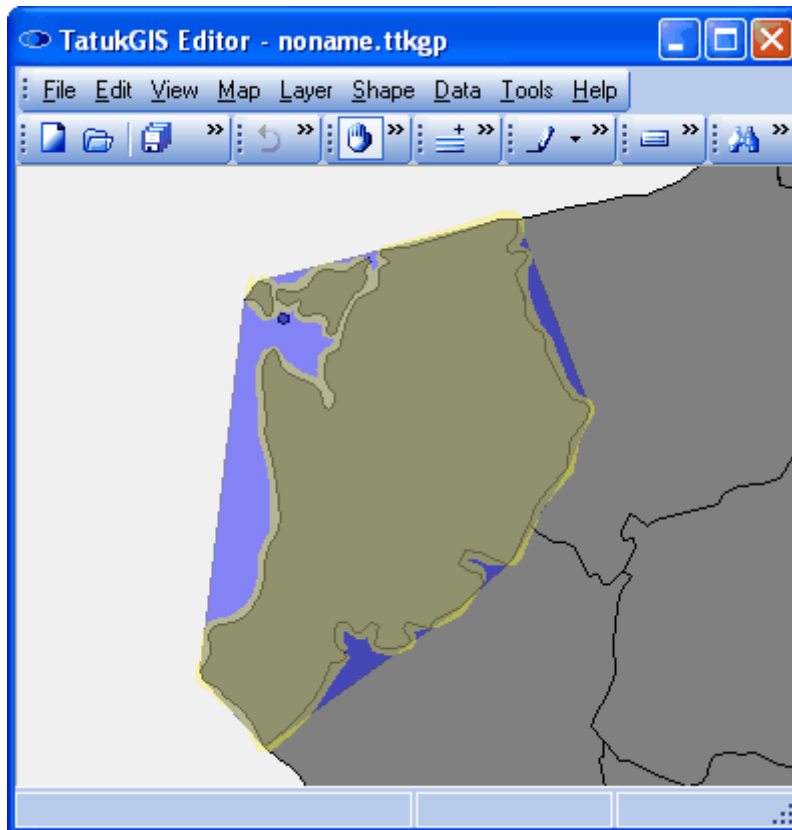
1.2.7.10 Clipboard convexhull

The Editor program provides for the creation of a convex hull form any selected vector object or group of multiple vector objects.

To create a convex hull around a vector feature(s):

1. Use one of the spatial select tools under the *Map/Select mode* menu to select the vector object(s) from which the convex hull is to be created.
2. Select the vector object or objects from which the convex hull is to be created.
3. Copy the selected object or objects to the Clipboard layer using either the *Edit/Copy* or *Edit/Copy Special* menu options.
4. Select the *Shape/Clipboard convexhull* menu command to form the convex hull.

The convex hull will replace the previously copied shape in the Clipboard layer.



Annotations

1. A convex hull is a normal polygon vector.



2. The convex hull is generated in the SHP file format.
3. The Clipboard layer containing the convex hull polygon can be saved and later reloaded to the Clipboard layer for use in subsequent operations, such as to perform a spatial selection using the content of the clipboard, which is available under *Map/Select Mode/Select by Clipboard* menu option.

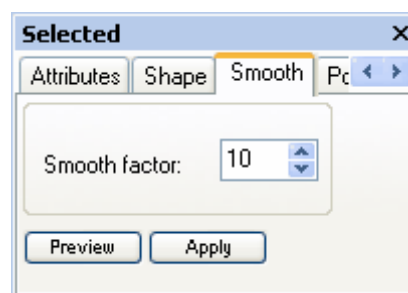
1.2.7.11 Line Smooth

Smoothing lines

The Editor provides a special editing feature to make vector lines and polygon perimeters more smooth. Vector lines and polygon perimeters naturally tend to be less than fully smooth because they are composed of a series of straight line segments connecting a series of points. The smoothing function makes the bends in the lines or perimeters more gradual by automatically adding many more well placed line vertices.

To smoothen a polyline or polygon perimeter:

1. Select (highlight) the polyline layer in the *Legend* panel which contains a line to be smoothed.
2. Enter editing mode either by using the *Shape/Edit mode/Edit* menu or by clicking on the *Edit*  toolbar icon.
3. Mouse click on (to select it) the vector line or polygon to be smoothed.
4. Select the Smooth Shape function using either the *Shape/Smooth shape* menu command or by clicking on the *Smooth shape*  toolbar icon. This will generate a *preview* of the smoothing result based on the default settings and open the *BSpline* panel.
5. Evaluate if the smoothing result generated by the default settings is acceptable or not. If not, experiment with increasing or decreasing the *Smooth factor* setting, which will increase or decrease the number of vertices added to the line or polygon perimeter. Then *preview* again to see the effect.
6. When the smoothing effect that is visible in the preview is acceptable, click on the *Apply* button to edit the selected vector by applying the smoothing factor.



Tips

1. One example of when the smoothing function can be useful is when creating lines to represent a general course - such as the general course of a ferry line between two ports or an airplane route between two cities - in which the smooth appearance of the line is more important than the exact placement of each vertex of the line.
2. Refer to **Editor Digitize New Map Geometry Tutorial** for more guidance on the line smoothing feature.

1.2.8 Data


1.2.8.1 Export data

Exporting vector attribute data to other programs

The Editor product allows for the attribute data generated to the *Data* panel to then be exported to other software programs, such as SQL database products or an Excel spreadsheet. The data can be exported to a number of supported formats:

- HTML document
- ASCII text file
- MS Excel spreadsheet
- XML document

To export attribute data from the Data panel:

1. Select (highlight) the vector file layer of interest in the *Legend* panel.
2. Open the *Data* panel by selecting either the *Data/Show Data* menu or by clicking on the *Show Data*  toolbar icon.
3. Select the *Data/Export Data* menu command, which opens the *Save As* dialog box.
4. Select the file path to which the data is to be saved in the *Save in* list of the dialog box.
5. Set the name for the file to which the data is to be exported in the *File name* field.
7. Select the file type from the *Save as type* drop down list.
8. Click on the *Save* button to complete the data export procedure.

Tip:

The Data menu is a feature of the Editor and not the free Viewer.

1.2.8.2 Import data

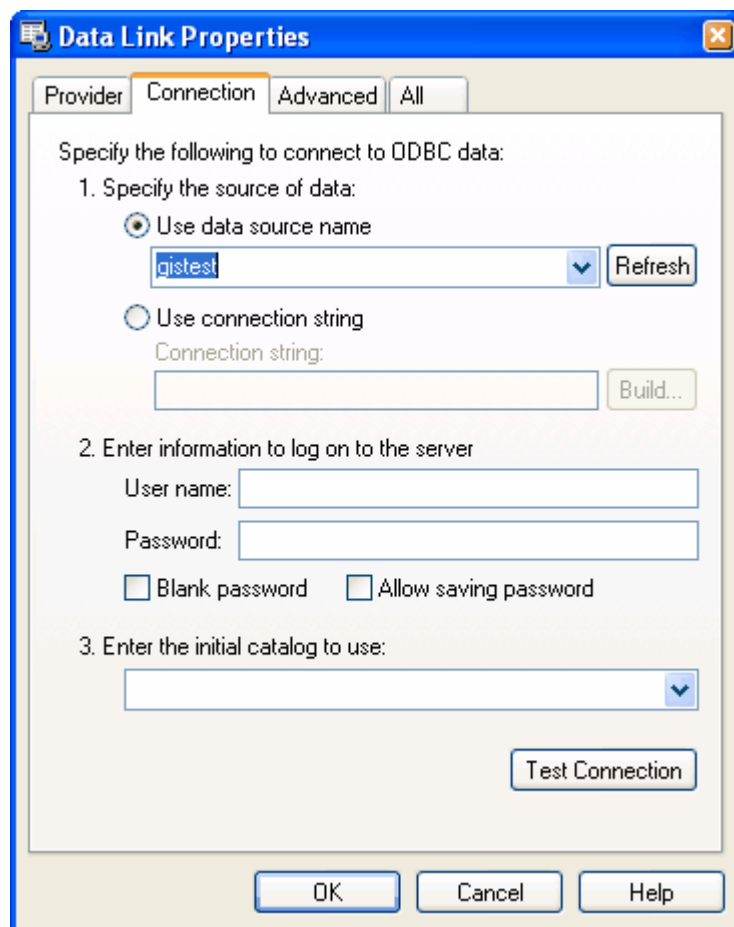
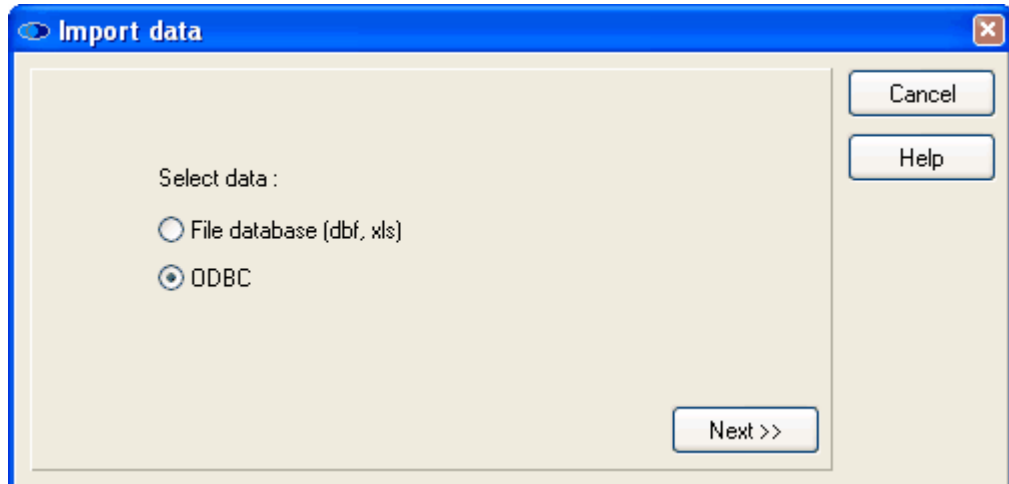
Importing external data into vector layer

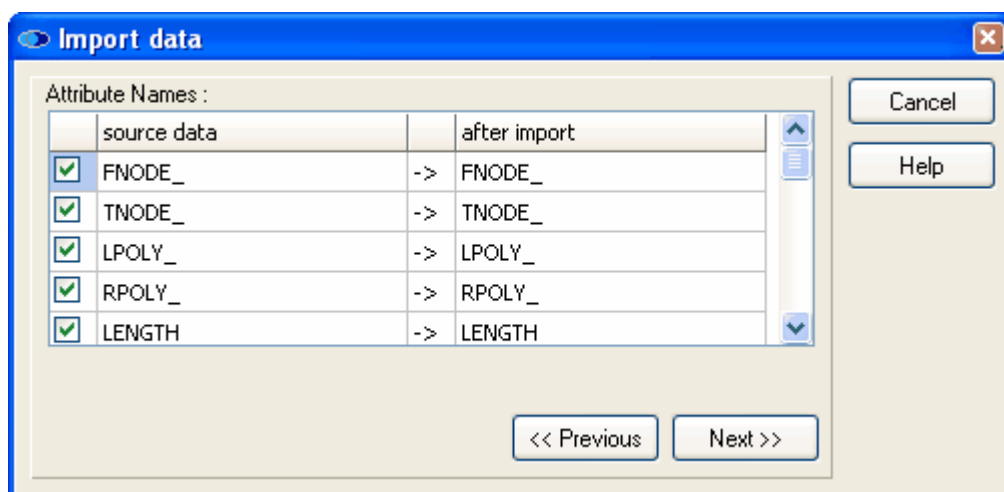
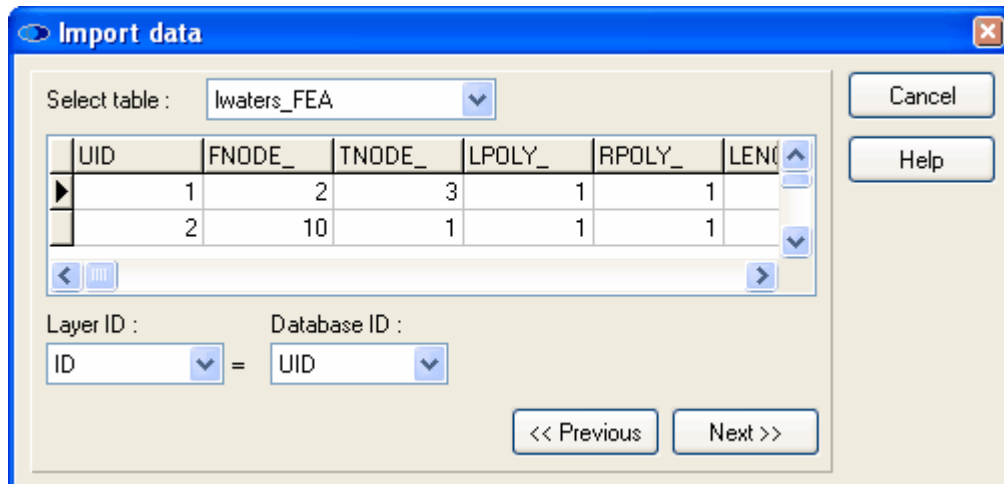
The Editor can be used to import data from another source, such as a database or Excel spreadsheet, into the attributes of a vector map layer. The imported data can either be loaded to already existing attributes or as new attributes which are created during the import procedure. This can be a powerful feature in some situations.

To import data from an external source as attribute values of a vector file layer:

1. Select (highlight) in the *Legend* panel the vector file layer into which data is to be imported.
2. Select the *Data/Import Data* menu to open the *Import Data* dialog box (pictured below).
3. Choose between the two data source types: i) *File database (dbf, xls)* or ii) *ODBC*. The first option relates to an a dBF database or an Excel spread sheet file and the *ODBC* option relates to a SQL database such as Access or a more powerful database product such as MSSQL, Interbase, MYSQL, Oracle, etc. Click on the *Next* button to launch the next window.
4. If the *File database (dbf, xls)* option was selected in the prior window, the *Open* window will next appear to select the file path of the file containing the data to be imported. If the *ODBC* was selected in the prior window, the *Data Link Properties* window will next appear to set the connections to the SQL database that contains the data to be imported.
5. The *Data Link Properties* window is from the Microsoft Windows operating system, and is not part of the Editor program. Configure the linkages to the SQL database within the *Data Link Properties* combo box using the Windows standard procedures.
6. The next window, titled *Import Data*, presents a small portion of the import data table and allows the selection of one attribute from the map layer (*Layer ID*) and one column from the import table (*Database ID*) that will govern how the import data is connected to the map layer to perform the import procedure. The selected layer attribute (*Layer ID*) and the data contained by the selected import data table column (*Database ID*) must be of the same type, e.g., String, Number, Float, Boolean, and Date. When finished, click on the *Next* button.

7. The next window, also titled *Import Data*, allows the selection of which rows from the data table are to be imported, the attribute names to which the data is to be imported, and if any of the import data is to replace data held by existing attributes. When finished, click on the *Next* button to commence the computational process of importing the data into the map file.
8. The progress of the computation process is shown in the final window as a status bar. When the computation process is finished, click the *Done* button.




**Tip**

1. The easiest way to get a clean connection between the map layer and the import table is to select a *Layer ID* of an attribute which contains a unique value for each vector in the layer and a *Database ID* of a column which contains a unique value in each row of the data table.
2. Refer to the **Editor Import Attribute Data Tutorial** for a demonstration of importing selected data from an external database table as attribute values of a vector map layer.

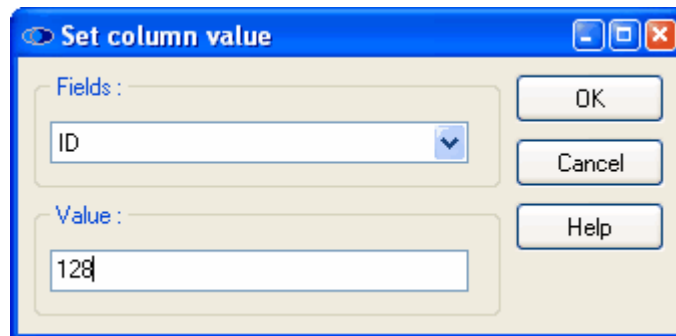
1.2.8.3 Set column value**Set a column value**

This feature allows the user to enter the same value (numeric, text, etc. information) to an attribute field for all selected vector objects. The value can be applied to the selected attribute for all vector objects in the layer, or just to a selected group of vector objects from the layer. This can be a time saving feature in some situations.

To set a column value:

1. Select (highlight) the layer of interest in the *Legend* panel.
2. Select either the *Show Data Panel*  toolbar icon or the *Data/Show Data* menu to present the attributes of all the selected vector objects to which a common attribute value is to be applied to one or more of the attributes.
3. Select the *Data/Set Column Value...* menu to open the *Set column value* window.
4. Select the column name (i.e., the attribute name) to which a common value is to be entered from the *Fields* drop down list.

5. Enter to the *Value* field the value (information) that is to be recorded to this attribute for all the vector objects presented in the *Data* panel table.
6. Click on the *OK* button to record the value.



Tips:

1. The *Set column value* window can also be opened by right clicking on one of the columns in the *Data* panel table and then selecting the *Set column value...* feature from the list of options.
2. The type of value information (number, text, date, etc.) entered must match the type of the selected attribute. For instance, text information cannot be entered to a numeric attribute.

1.2.8.4 Load all

Load All attribute records from the selected map file into the Data panel

To load all:

- Ensure that the correct layer is highlighted in the Legend panel
- Click on the *Data/Load all* menu command or the *Load all* item in the *Operations* pop up menu in the *Data* panel


1.2.9 Tools

1.2.9.1 Map hint

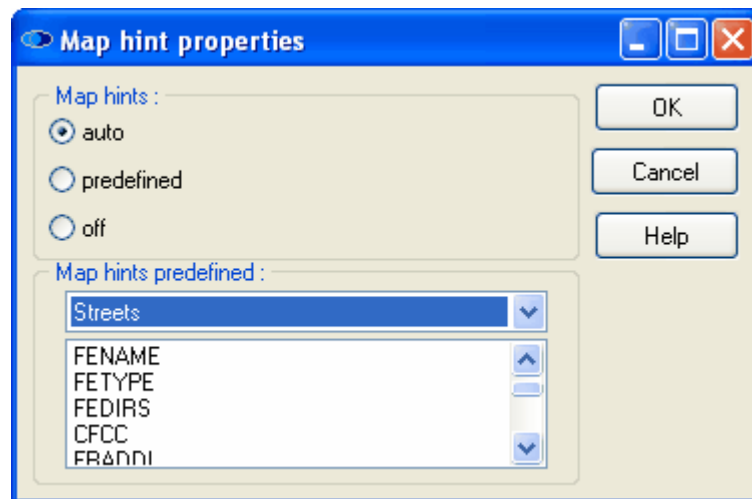
Displaying a hint (attribute information) about each map object

It is possible to configure the Viewer/Editor program to make either i) the content of a selected attribute (a hint about the a vector map object) or ii) all the attribute information automatically appear in the map viewer window whenever the mouse cursor is held stationary over a particular vector object. If a pixel or grid layer is being viewed, the map hint feature will automatically show the data associated with pixel under the mouse cursor.

To configure Map hint properties:

1. Select the *Tools/Map hint* menu or the *Map hint*  toolbar icon to open the *Map hint properties* dialog box.
2. Select one of the following options:
 - *Auto* - Show all the attribute information (attribute name and content) relating to the object
 - *Predefined* - Show only the content of a selected attribute field relating to the object
 - *Off* - Disables the map hint feature.
3. Click on the *OK* button to register the settings.

While in while in *select by point* or *localize* mode, hold the mouse cursor over a vector object (if the layer is vector) or over a pixel (in the layer is a pixel image or grid file) to display the map hint information. The proper layer must be highlighted in the *Legend* panel.


**Tip**

- The Map Hints settings are saved with the project file.

1.2.9.2 Measure**Measuring distances and areas**

The Viewer/Editor offers measurement tools to measure a distance or area on the map, by clicking on the map to create a temporary line or polygon which disappears after the measurement operation has been performed. When performing a measurement, the dimensions (length/perimeter and area) are displayed in the *Measure* panel.

To perform a measurement:

1. Select the layer on which the measurement is to be performed in the *Legend* panel. (If all the layers open in the program reflect the same coordinate system, the selection of the layer is irrelevant.)
2. Select the *Tools/Measure* menu or click on the *Measure*  toolbar icon to see the list of measure options. Select one of the measure tool options.
 - *Measure: line* - measure the length of a temporary drawn line, which can contain multiple vertices and line segments
 - *Measure: polygon* - measure the perimeter length and area of a temporary custom drawn polygon
 - *Measure: rectangle* - measure the perimeter length and area of a temporary standard rectangle figure
 - *Measure: rectangle rotated* - measure the perimeter length and area of a temporary rotated rectangle figure
 - *Measure: circle* - measure the perimeter length and area of a temporary drawn circle

The selection of one of the measure tools will automatically open the *Measure* panel.

3. Draw a line or polygon area vector on the map and the dimensions (length/perimeter and area) are interactively (in real time) presented in the *Measure* panel.

Annotations

1. The measurements are presented in the same units as the map units of the file layer on which the measurement operation is performed. Therefore the user must know the coordinate system information for the map file layer.
2. The map layer must be in a projected coordinate system with linear units (meters, feet,

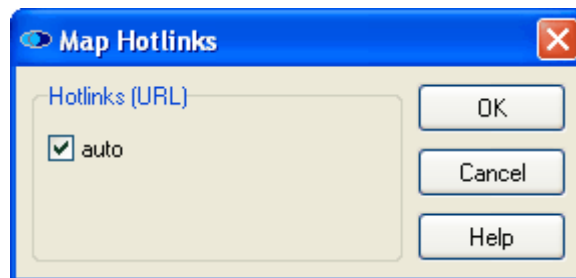
etc.) for the measurement tool to yield accurate results. If, the measurement is performed on a layer defined in longitude/latitude coordinates, such as the common WGS84 coordinate system, the measurement results will be provided in coordinates, which is meaningless.

Tips

1. Click on the **X** at the top right corner of the *Measure* panel to close the panel.
2. Refer to the **Viewer Measurement Tools Tutorial** for more guidance.

1.2.9.3 Map hotlinks

The *Map Hotlinks* check box, which can be accessed via the *Tools/Map hotlinks* menu, provides an option to turn off any URL links (referencing) that might be set up in the project. If the *Hotlinks (URL) auto* option is active (checked), the Viewer/Editor attempts to connect to the first URL link (if one is present) contained by any attribute field when the user double-clicks on a map object while in *select by point* or *localize* modes. The linkage can be to a document or image file, a web site address, or even to automatically launch a pre-addressed e-mail via Microsoft Outlook.



Tip


- Refer to the **Viewer URL Referencing Tutorial** for guidance on the use of URL referencing (hot linking).

1.2.9.4 Topology

Topology Builder/Corrector for Polygon and Polyline data

TatukGIS Editor includes an advanced feature to build topology from a vector line or polygon layer which can be used to identify or systematically correct geometrical imperfections throughout the layer. Powerful algorithms are used to systematically review the layer geometry and generate information about the geometrical characteristics of the source layer to new layers which are organized into a topology project. The information in the topology project can be used to review the topology data, detect and identify geometrical errors, and systematically repair the errors based on a user determined tolerance level. Errors might include overlapping polygons, gaps between polygons, line segments that fail to close at intersections, dangling line segments, etc. This can be a tremendous labor saving feature.

To build a topology project for a vector polygon or polyline map layer:

1. Select (highlight) in the *Legend* panel the line or polygon source layer from which the topology project is to be generated.
2. Select the *Tools/Topology/Topology* menu command, or click on the *Topology*  toolbar icon, to open the *Topology builder and corrector* dialog box.
3. Select in the *Output project file* field the path and file name to save the topology project that is to be generated. The file name must have the TatukGIS project file ending - *.ttkqp - because the topology project will be created as a standard TatukGIS project file.
4. Within the *Topology builder and corrector* dialog box, select the *Topology Type* - *Polygonal* or *Linear* - to be generated.

5. From the *Additional layers* options select whether to create any additional topology related layers during the topology build procedure. The options are:
 - *intersections* - creates a new layer containing the coordinates of all instances in which two lines or polygon edges intersect
 - *nodes* - creates a new layer containing the coordinates of all line or polygon nodes
 - *edges* - creates a new layer containing all line or polygon edges
 - *centroids* - creates a new layer with the centroid points of all polygons (not active when building *linear* topology)
8. Set in the *Tolerance (layer units)* field the tolerance level to be used by the program when searching for apparent geometrical errors. The tolerance is in the same distance units as the linear units of the map layer, as defined by the projected coordinate system of the map layer.
9. Click on the *OK* button to commence the computation process. A progress bar will show the progress of the computation process.
10. When the computation process is finished, a small window with text *Topology successfully created* will appear. Click on the *OK* button.
11. Then a second small window will appear with the question *Open topology project?* Click on the *OK* button to view the topology project that has been generated.

The topology project layers, containing information about apparent geometrical errors in the layer, will appear in the Editor map viewer window. Descriptive information for each topology information layer will appear in the *Legend* panel.

Topology builder and corrector

Source layer: States Status: OK

Output project file: D:\gis_data\topo_states.TTKGP

Topology type: Polygonal Linear

Additional layers: intersections, nodes, edges, centroids

Tolerance (layer units): 0.000000000

Topology input feature: lines, polygons

Progress information: simple extended

Buttons: OK, Cancel, Help

Annotations

1. If a tolerance of ' 0.00 ' is specified (entered to the *Tolerance (layer units)* field), no automatic topology corrections will be performed on the source layer. Corrections are performed only if any tolerance level other than 0.00 is selected.
2. The *Tolerance* is defined in map units. If the map reflects a projection system with linear units, the map units are the same as the linear units of the projection. Therefore it is

necessary to know something about the coordinate system of the source layer on which the topology build is performed.


3. If the map layer is in an unprojected coordinate system with angular units (such as WGS84), the tolerance can still be set in decimal degrees or whatever other angular map units the layer is in. The use of angular units, however, is not recommended because the tolerances can significantly differ near the equator and poles.
4. The topology project layers are generated to the SHP file format. The attributes are stored as dbf files.
5. Each centroid is always forced to be inside the polygon.

Tips

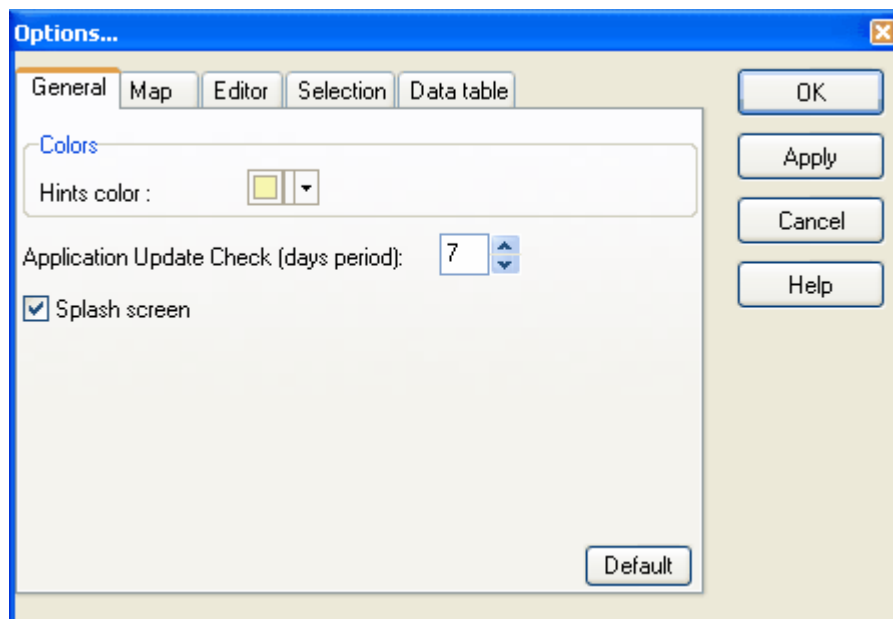
1. The *Topology type* (type of topology information to be generated) need not be the same as the type of the vectors in the source layer.
2. Refer to the **Topology Building & Correcting - A Short Guide** and the **Topology Building & Correcting - Tutorial** for more guidance and a demonstration of the use of the topology functionality.

1.2.9.5 Options

Customizing the program settings

The *Options...* combo box pictured below provides an easy way to customize the Viewer/Editor program's basic settings. This combo box can be opened by selecting the *Tools/Options* menu or by clicking on the *Options*  toolbar icon. The *Options...* settings are at the software program level and are remembered when the application is next opened. These settings are not saved to the project file.

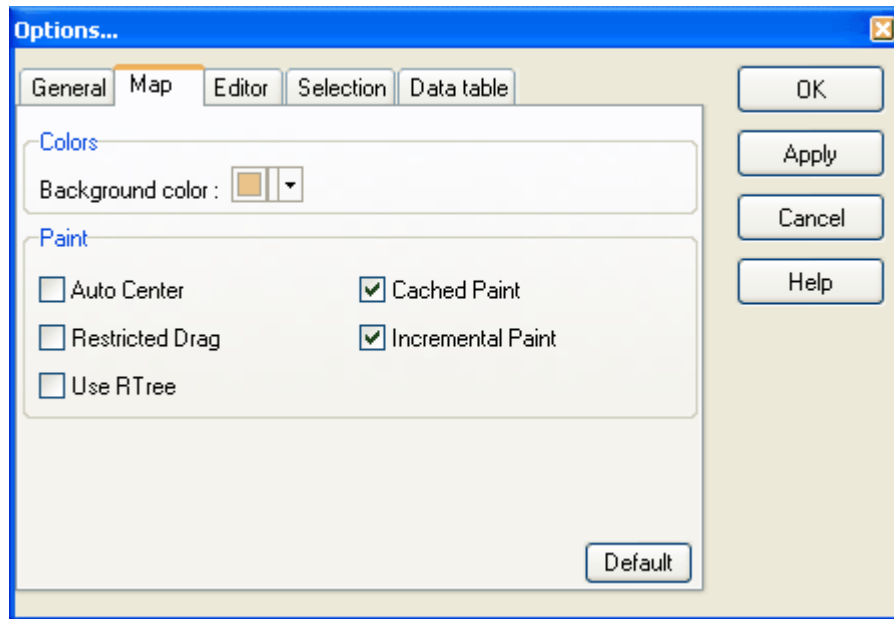
The settings are provided with the five tabs pictured in the image below.



The General tab

This tab provides the settings to control appearance and behavior issues that are specific to the TatukGIS application, i.e., not related to GIS functionality.

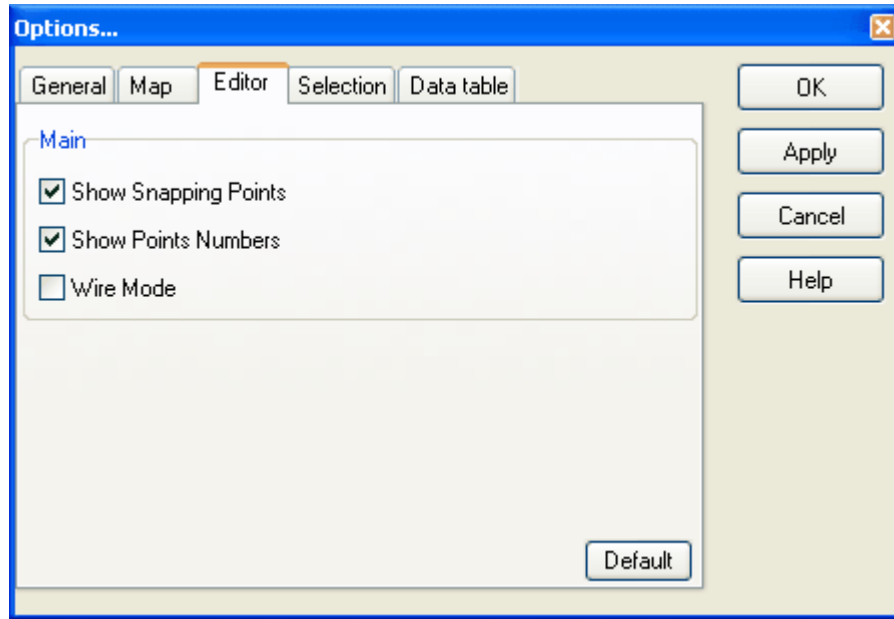
- *Hints color* - provides a palette for selecting the background color to present "Map Hints".
- *Application Update Check* - Controls the interval (number of days) between automatic checks with the www.TatukGIS.com web site (when working on-line) to determine if TatukGIS has made an updated version of the program available for download.
- *Splash screen* - If checked, presents the TatukGIS splash screen for a few seconds each time that the program is first opened.



The Map tab

This tab provides settings to control the map appearance and some important universal map rendering options.

- *Background Color* - Provides a color palette to set the background color for each map view.
- *Auto Center* - If checked, this feature makes the map view extent automatically adjust to center the map view on the point of the last mouse click. This can be useful when digitizing new data.
- *Restricted Drag* - If checked, this feature restricts panning (dragging the map) to the aggregate of the extents of all the open layers, i.e., the "Full Extent".
- *Use R Tree* - If checked, this feature activates spatial indexing of vector map layers, which can dramatically improve rendering performance with very, very large vector files at relatively closer zoom levels.
- *Cached Paint* - If checked, this feature can eliminate screen flickering with very large vector data sets. (*Refer to Viewer Tutorial 1 for a more detailed description of this important feature and guidance on when to use it.*)
- *Incremental Paint* - If checked, the program performs only a preliminary rendering of the layer(s) during map view movements, which can dramatically improve performance with very large and complicated vector data sets when the map view is being updated frequently. (*Refer to Viewer Tutorial 1 for a more detailed description of this important feature and guidance on when to use it.*)

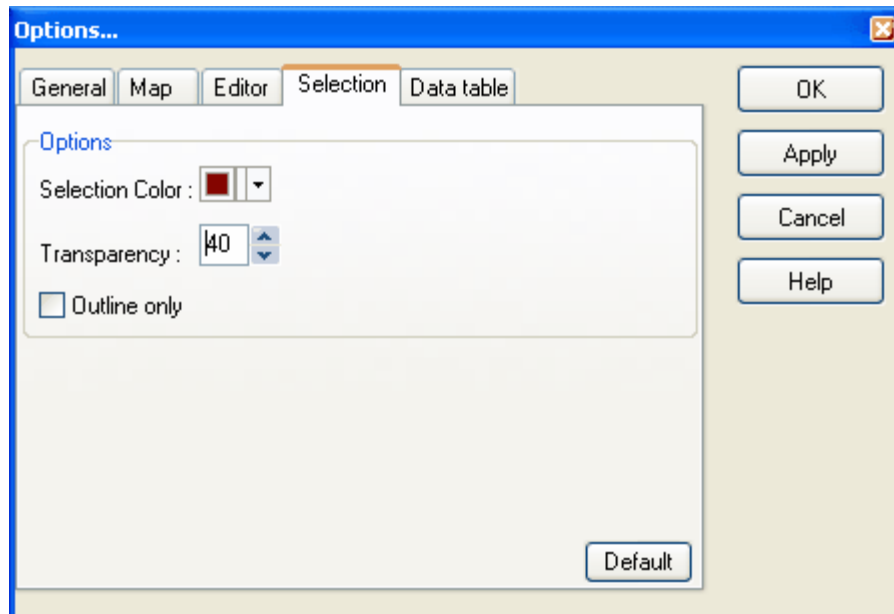


(The Editor tab exists only in the Editor, not in the free Viewer.)

The Editor tab

This tab provides settings to control the appearance of objects during the editing process. This tab is available only in the TatukGIS Editor - not in the free TatukGIS Viewer.

- *Show Tracking Points* - If checked, all vertices of all vectors in the selected layer are visible. If unchecked, only the vertices of the selected vector or the vector in the process of being edited are visible.
- *Show Points Numbers* - If checked, the vertex numbers of the selected vector (or the vector in the process of being edited) are visible.
- *Wire Mode* - If checked, a thin black line shows how the vector geometry of the vector being edited appeared before the most recent change was made.



The Selection tab

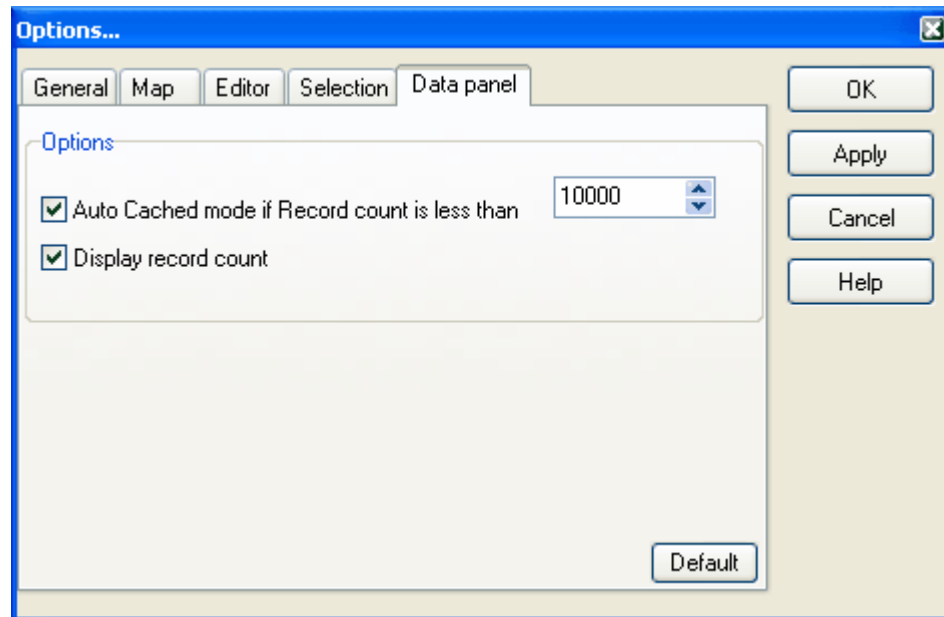
This tab provides for settings to control how that objects that have been selected are highlighted in the map presentation.

- *Selection Color* - Provides a color palette to define the color used to highlight selected objects.

- *Transparency* - Controls the transparency level of the color used to highlight objects that have been selected. The range is 0 - 100, with 0 corresponding to total transparency.
- *Outline Only* - If checked, only the outline, and not the fill (interior), of polygon objects are highlighted when selected.

To change program settings:

Change the settings within the combo boxes and click on *OK*.



The *Data table* tab

This tab provides settings relating to the [Data panel](#).

- *Auto Cached mode if Record count is less than* - If checked, *Cached mode* will be automatically active with any layer containing less than the specified number of records. (One *record* corresponds to one geometric shape - polygon, line, point - in the map file.) By default, *Cached mode* is applied when the *Data panel* is opened with any map file in which the total number of records is less than 10,000.
- *Display record count* - If checked, the total number of records presently contained in *Data panel* and the total number of records contained by the map layer are presented in the status bar just under the *Data panel*. If, for example, the situation were that the *Data panel* presently contained 75 records out of 3,598 records in the entire shapefile layer, the *record count* would be presented in the status bar as following:

Records: 75 / 3598

Annotations:

1. Clicking on the *Default* button returns all settings in the *Options...* combo box to the factory default settings.
2. Setting changes may be applied to the map view without closing the *Options...* window, by clicking on the *Apply* button.

1.2.10 Help

1.2.10.1 Tutorial

Using program tutorials

TatukGIS Viewer/Editor program is provided with a number of tutorials which demonstrate in detail most of the Viewer/Editor functionality and features. The tutorials are organized into two sets:

1. *Viewer Tutorials* - relate to the functionality supported in both the Viewer and Editor programs.
2. *Editor Tutorials* - relate to the functionality supported only by the Editor program.

To access the tutorials:

- Select the *Help/Tutorial* menu command.

1.2.10.2 Check for Updates

Checking for new versions and updates

If the computer running the Viewer/Editor program is connected to the internet, it is possible to check with the www.TatukGIS.com web site for the availability of new release versions and updates of the program. If a new update is available, it can be downloaded directly from the www.TatukGIS.com web site and installed. The *Check for Updates* procedure can be performed automatically by the program at specified time intervals or manually by the user.

To manually check for new version upgrades/updates:

- Select the *Help/Check* menu command and click on the *Check* button when connected to the internet.

To set the program to automatically check for new version upgrades/updates:

1. Check the *Autocheck* check box in the *Check for updates* window which can be found under the *Help/Check for Updates* menu.
2. The frequency in which the *autocheck* procedure is performed can be set in the dialog box found under the *Tools/Options/General* menu option.

1.2.10.3 About

The *About* box contains brief information about program

To see the information in the *About* box about program:

- Select the *Help/About* menu. The About box contains information such as the program name, the program version number, program owner, copyrights, libraries, and acknowledgments.

2 Tutorial

2.1 Introduction to the Viewer/Editor Tutorials

Please first read the Editor/Viewer Product introduction which is found under the program's *Help/Help* menu.

The Tutorials demonstrate the use of many of the features supported by the Viewer and Editor products with real data sets. Both products include the full set of Tutorials for both the Viewer and the Editor. The Tutorials are organized into two sets. The first set, titled Viewer Tutorials, relates to features supported by both the Viewer and Editor. The second set, titled Editor Tutorials, relates to functionality supported only by the Editor. The Tutorials can be accessed under the

Help/Tutorials menu.

Additional instructions on the use every menu command in the application are provided by the Viewer/Editor help files, which can be found under the *Help* menu.

2.2 Tutorials

2.2.1 Viewer

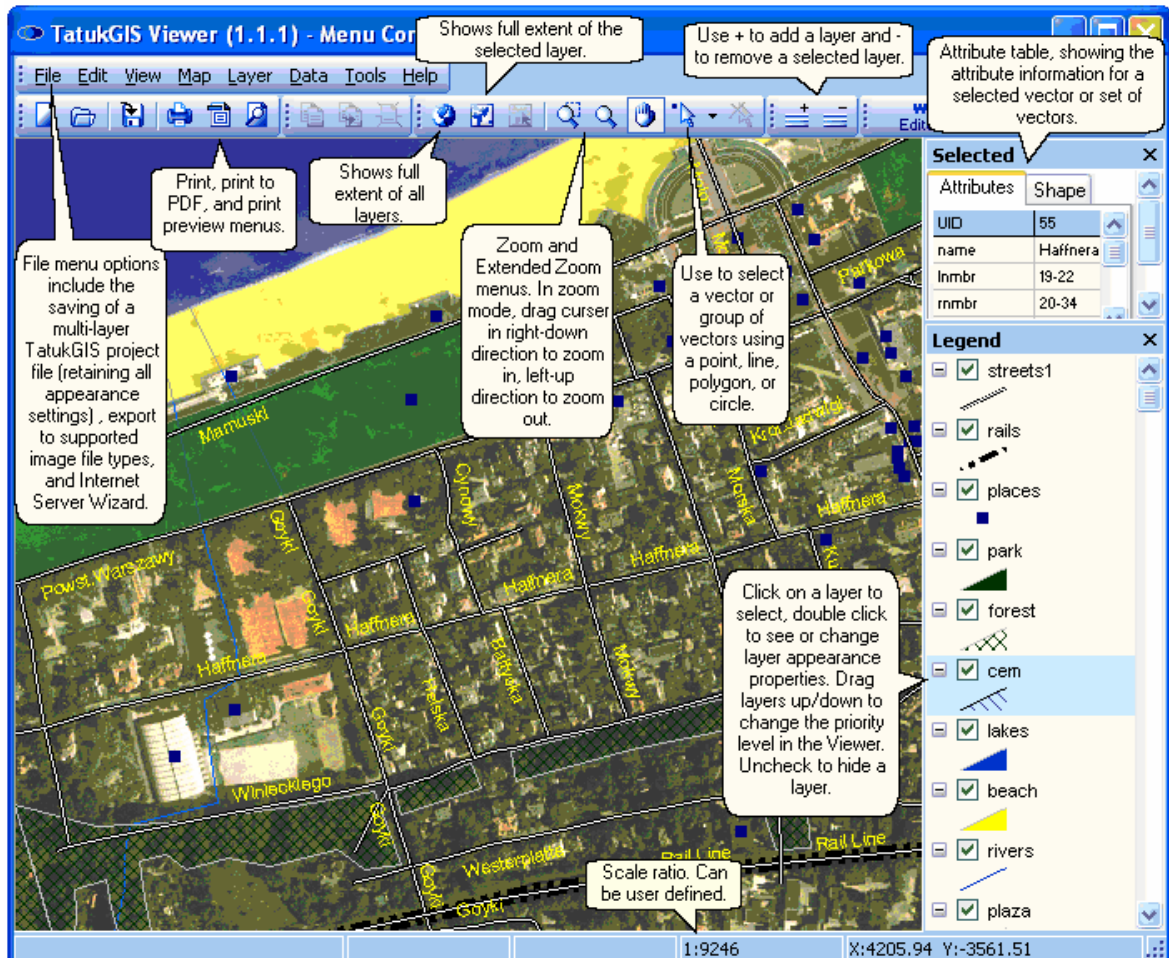
2.2.1.1 Tutorial 1 - Main Menu Controls/Options

This first section provides an introduction to the main Viewer controls and application settings, with a brief description of each. Of particular importance are the description of the Cashed Paint, Incremental Paint, and R-tree index features.

The same menu controls are also shared by the TatukGIS Editor product, but some menu items specific to the Editor do not appear in the Viewer. These additional Editor specific menu controls are covered in Editor Tutorial 1 - Main Menu Controls

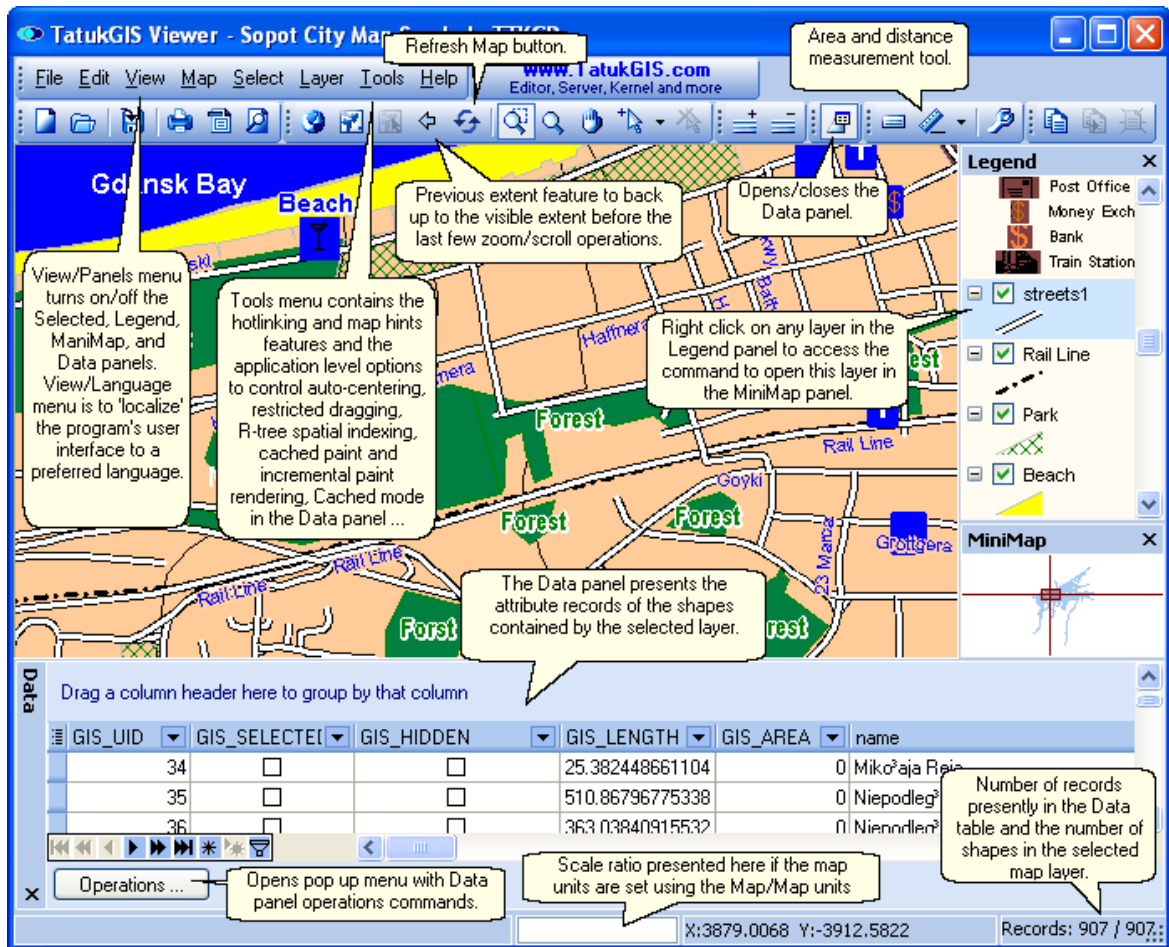
2.2.1.1.1 Main Menu, MiniMap

The following image shows a number of vector map layers open in the Viewer on top of a aerial image layer. Some of the vector polygon layers have been set to 50% transparency to allow partial visibility of the aerial image underneath the vector polygons. The *Selected (Attributes)* panel and *Legend* panel have been turned on.



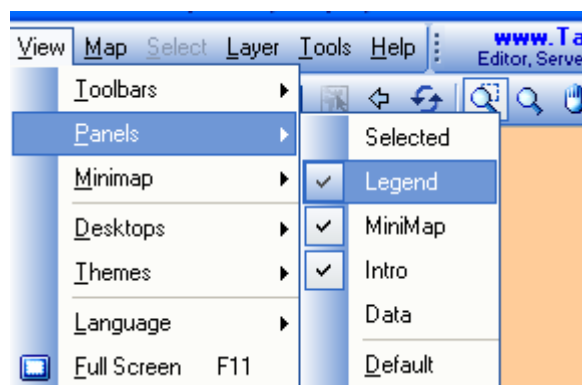
(Viewer main menu controls)

The following image shows the Viewer with the aerial image layer turned off and with the Data panel opened. Queries for text or numeric attribute information can be performed within the Data panel and the results of the query can then be displayed on the map. This image below also shows the activation of the MiniMap panel, which can be loaded with one of the open map layers to provide an orientation of the positioning of the map viewer window relative to the full extent of the layer loaded to the MiniMap panel. Besides providing a navigation aid, the visible map extent can be panned (dragged) from the MiniMap panel as well as from the main viewer window.



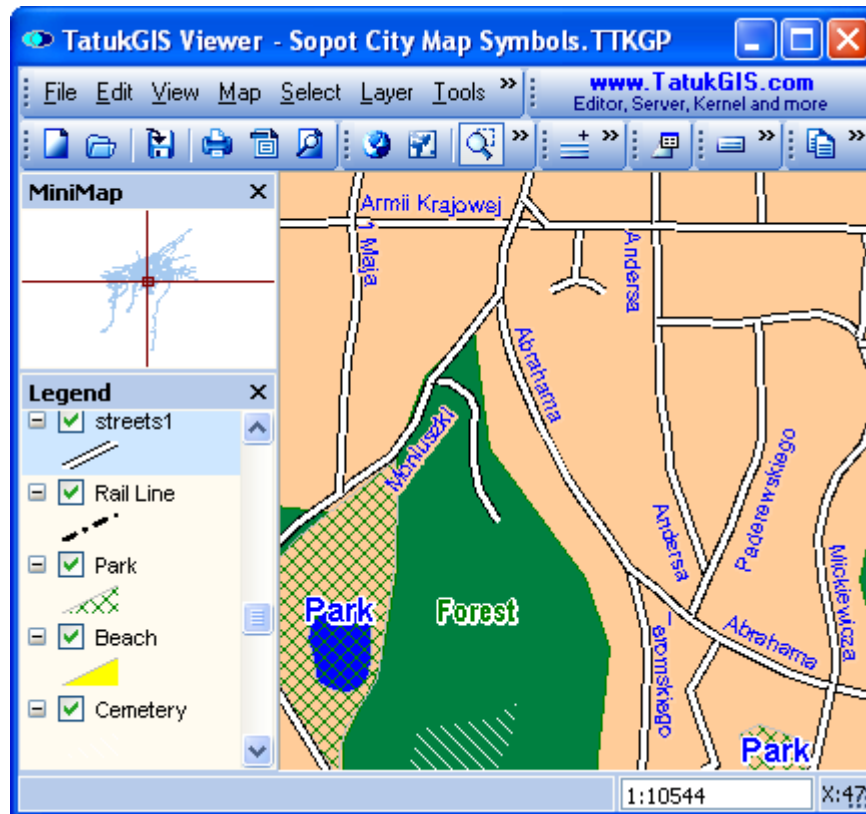
(Viewer main menu controls)

As pictured below, the *Legend* and *MiniMap* panels are turned on in the above view, but not the *Selected* panel (which contains the *Attributes* tab). All of the panels, which can individually be turned on/off, are visible in the drop down menu list.




(View/Panels menu commands.)

The locations of the Viewer panels, menu bars, etc. can be repositioned by simply dragging and releasing. The user interface is fully customizable. Panels can even be repositioned outside of the Viewer window. The program remembers the new positions the next time that it is opened. The View/Panels/Default menu can be used to return all panels to the default positions and settings.




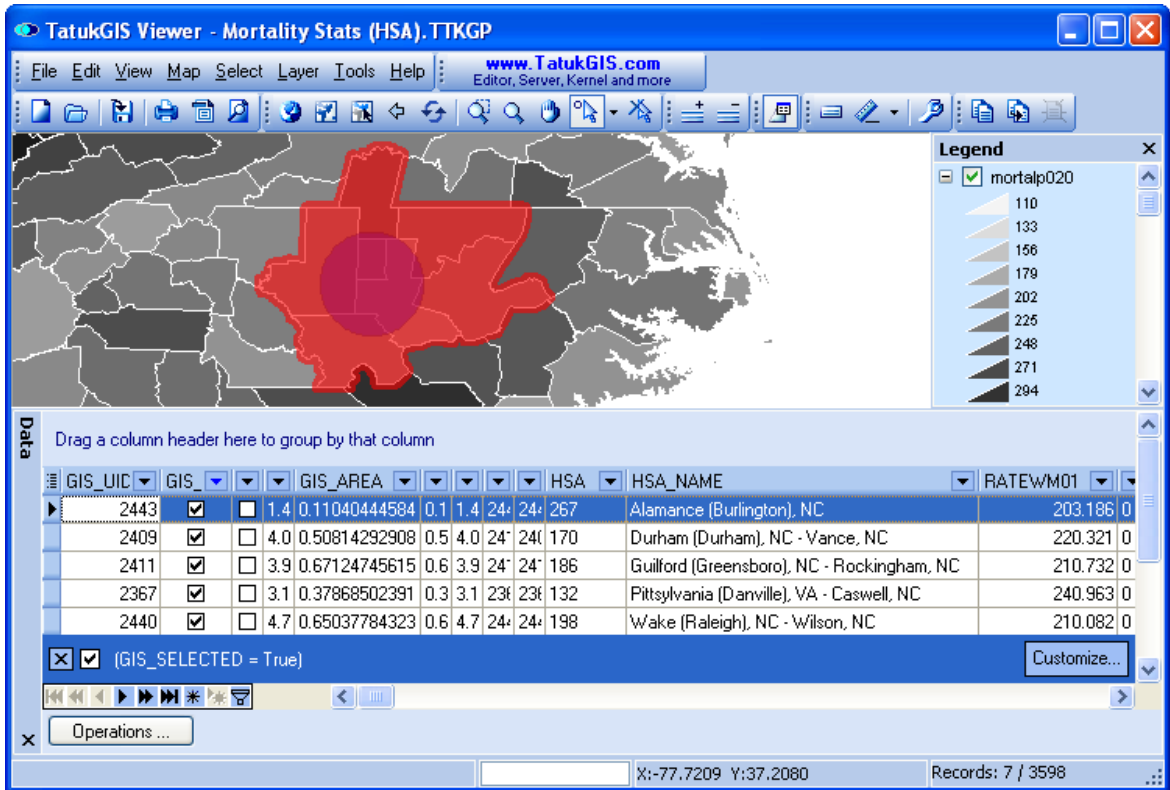
(MiniMap and Legend panels after dragging to new positions.)

2.2.1.1.2 Data panel, hotlinking

In addition to the attribute panel, the data (values) contained by the vector map attributes of a selected layer can be presented in table form by clicking on the *Show Data Panel*  toolbar icon (or using the *Data/Show Data* menu command). The data presented in the *Data* panel can be for the entire map file, or it can be limited to the data associated with the objects within the currently visible map extent, or limited to just to the objects that have been selected with the use of a spatial selection technique, such as by drawing a line, polygon, circle, rectangle on the map. The *Data* panel supports a number of other very useful features to organize, group, and present the attribute data and to search for records meeting specific search parameters using the SQL query builder feature. If desired, the map presentation can be linked to the operations performed in the *Data* panel so that the results of queries performed in the *Data* panel are automatically highlighted on the map.

The Editor product also provides for the export and import of the attribute data to/from other sources and file types, and for the editing of attribute values within the *Data* panel.

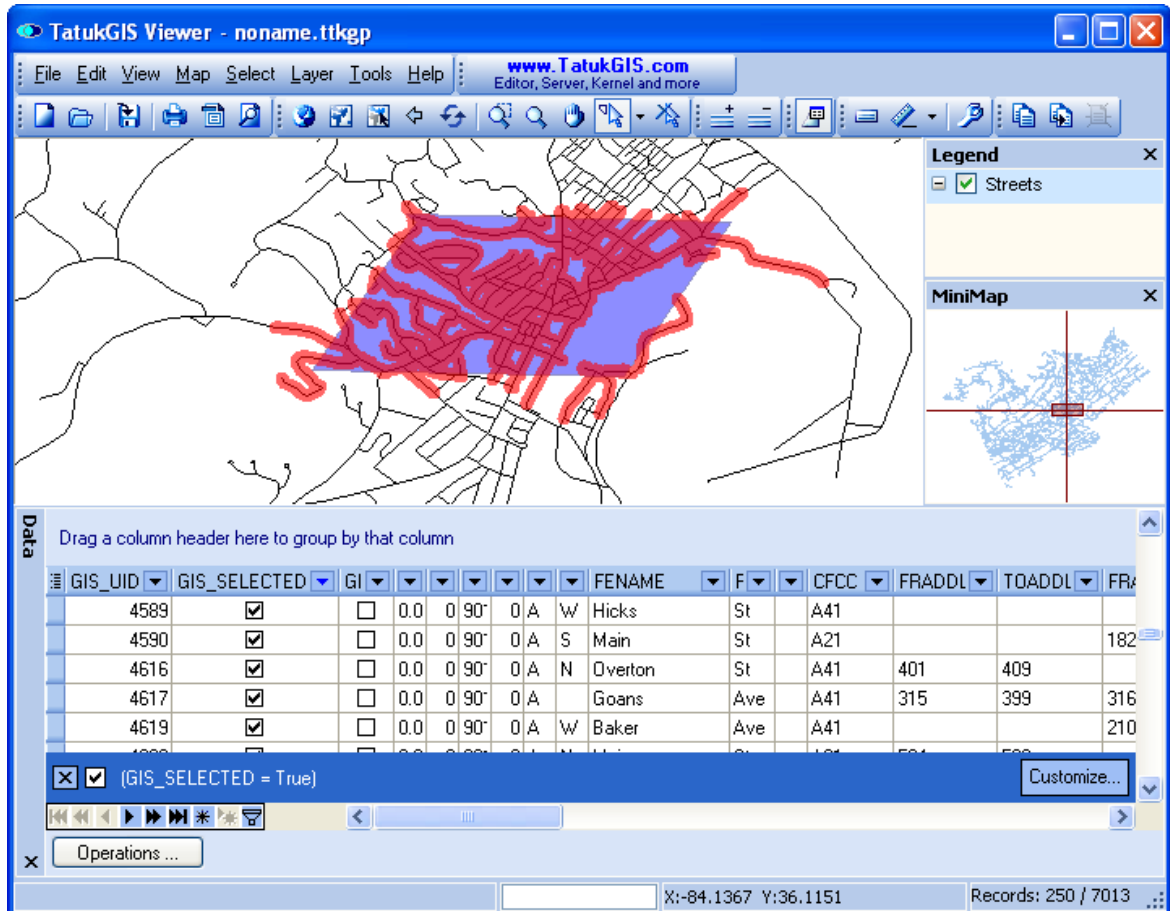
The image below shows the selection of seven polygon areas with the use of the *Circle Select* tool . The attribute information for the selected polygons is presented in the *Data* panel below the map. Because the *Selected only* feature is checked, only the data for the seven polygons is presented in the *Data* panel. The organization of the data columns can be rearranged by simply dragging and dropping and otherwise organized for presentation. Note from the information provided in the lower right corner of the Viewer window that 7 out of a total of 3,598 records in this vector map file are currently selected.



(Spatial selection using a circle. Data panel is filled with the attribute data of the 7 selected shapes.)

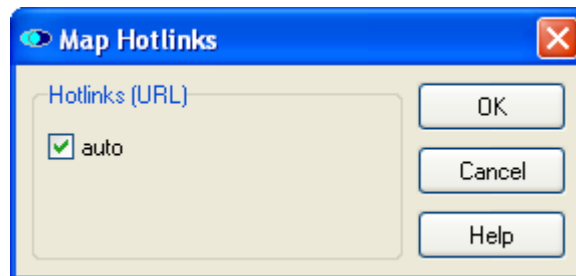
The following image shows the use of a polygon - created using the *Select by Polygon* tool - to perform a selection of streets on a standard U.S. Census Department TIGER street map layer. The attribute data for the 366 selected street records (out of a total 7,013 records in this file) is presented in the *Data* panel table at the bottom.

For more information about the *Data* panel and the various settings and options, refer to the *View/Panels/Data menu* help file and to the [Attribute Query tutorial](#).




(Spatial selection with a polygon. Data panel is filled with the records of the 250 selected shapes.)

The *Hotlinks (URL) auto* check box, which can be accessed via the *Tools/Map hotlinks* menu, provides an option to turn on/off any URL hot links that might be set up in the project. If the *Hotlinks (URL) auto* option is active (checked), the Viewer/Editor attempts to connect to the first URL link (if one is present) contained by any attribute field when the user double-clicks on a map object while in *select by point* or *localize* modes. The linkage can be to a document or image file, a web site address, or even to a pre-addressed e-mail via Microsoft Outlook. URL Referencing (hot linking) is demonstrated in a later tutorial.

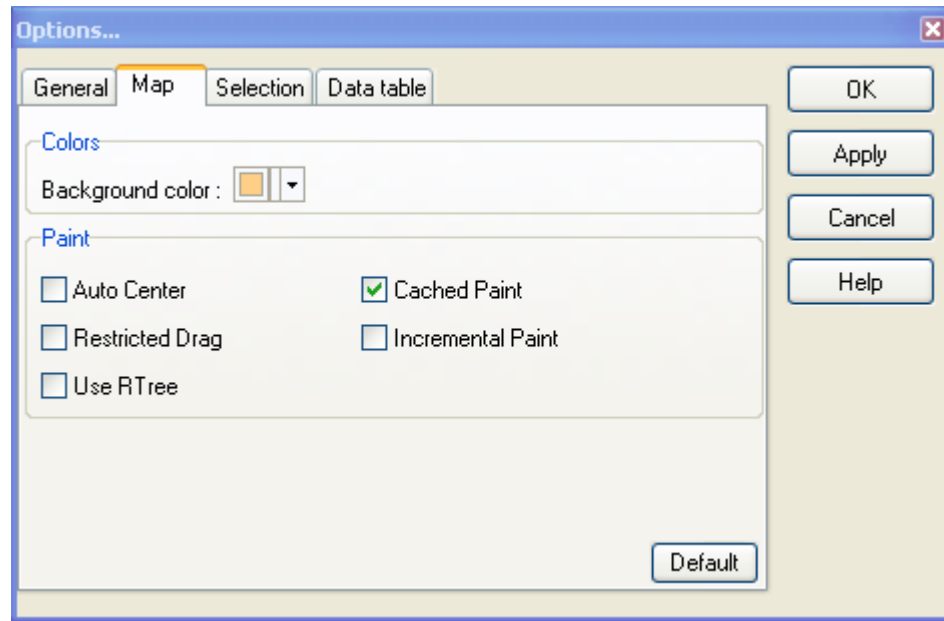


2.2.1.1.3 Program Options (Settings)

The program provides the *Options...* dialog box to control the application options settings. These are default program settings which are remembered the next time that the Editor/Viewer program is opened. These settings are not saved to project files.

The options settings in the Viewer are organized in the Viewer under four tabs, e.g., *General*, *Map*, *Selection*, and *Data panel*. This combo box is accessed by clicking on the *Options*  toolbar button (or via the *Tools/Options* menu command). The image below shows the default map viewing settings under the *Map* tab. These settings are generally appropriate for most situations, at least in the beginning.

The *Options* window in the TatukGIS Editor contains one additional tab - *Editor* - which is not pictured here. The options provided by *Editor* tab are explained in Editor Tutorial 1.



Auto Center: If activated, the map view area is automatically adjusted to re-center the view on the most recently selected object/vector or place on the map that has been clicked with the mouse cursor. (This feature is perhaps most useful when digitizing new vector data with the Editor, to automatically re-center the view based on the last mouse click so that the digitizing process never has to be interrupted by reaching the edge of the visible map extent.)

Restricted Drag: If activated, this restricts the zooming or panning (dragging) of the view to only the *full extent* area. The full extent is the total extent represented by the by all the layers together.

R-tree: If activated, r-tree indexing is applied to any opened vector layer (with the exception of SQL based vector layers). This feature is turned off by default because, if the R-tree is turned on the first opening of a new map layer in the viewer is delayed by the building of the R-tree index. The advantage of using R-tree is that it can dramatically increase the speed of simple operations, such as scrolling, zooming, and attribute queries, with extremely large vector files.

Cached Paint: If the CachedPaint mode turned on, the map view is first generated to an internal bitmap image and then presented in the view window. The advantage of this is that it can result in improved performance (particularly the elimination of screen flickering) with very large data sets involving the presentation of many labels and charts.

If the CachedPaint feature is turned off, the user can see the repaint process in action in map move events (scrolling, zooming), both after the first and the second buffer operations of the TatukGIS IncrementalPaint process. When working with very large data sets with many layers or using a slow computer, the map repaint process can be seen in progress, vector by vector. The major disadvantage of cached paint off mode is that it introduces a flicker in the map presentation during move events.

It may not be possible to use the CachedPaint feature with old computers that have limited

graphics processing capability or in situations involving an extremely large monitor (perhaps 30,000 x 30,000 pixels). Otherwise, the choice whether or not to use the cached paint option is a matter of user preference. CachedPaint mode must be turned on to enable a layer semi-transparency factor.

Whereas the cached paint setting under the *Tools/Options* menu is a Viewer level setting for all layers, cached paint can also be applied on an individual layer basis from within the *Layer/Properties/Layer/Parameters* dialog box. This allows for the possibility of turning off the cached paint feature only for the top most layer(s). This can be useful, for example, if the top most layer is used for the dynamic presentation of a moving object, such as with GPS tracking. Layers in the Viewer are always drawn from the bottom most layer to the top most layer. Therefore, if cached paint is to be turned off for only a single layer, that layer must be positioned as the top most layer. If cached paint is to be turned off for a group of layers, all must be organized as the top most layers. A CachedPaint off setting for any layer will not count if the layer is below any other layer in which CachedPaint is turned on.

The default Viewer settings are that CachedPaint is turned on at both the Viewer level and for each of the layer individually.

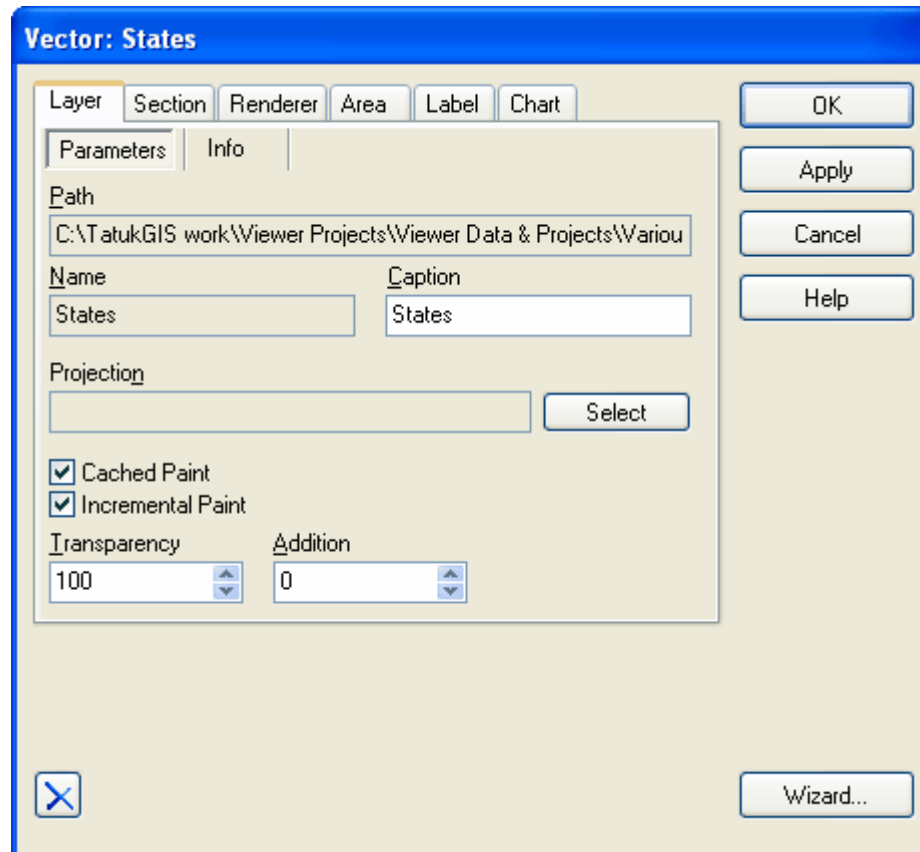
Incremental Paint: With TatukGIS software, the repainting (rendering/drawing) of vector layers is performed in two phases - the draft presentation phase and final presentation phase. The draft phase presents a fast draw of only the vector geometry and the portion of the style features that are of a nature which can be drawn very fast. The draft presentation omits difficult to render features such as labels, charts, fancy polygon fills, and some symbols. The final presentation phase presents a detailed paint of the full map features, with complete vector style features, labels, etc. The two stage drawing process does not apply to raster image layers.

If the IncrementalPaint feature in the *Tools/Options* dialog box is turned on, the Viewer performs only the quick, phase 1 draft presentation of vector layers while the map is in movement (scrolling), and performs the final phase 2 paint procedure only after the map movement has ceased for long enough to generate the full map presentation. The result can be a dramatic improvement in speed with large data sets, particularly those with many layers or a large raster image file. If the IncrementalPaint is turned off, the map is repainted in full detail while the map movement is in progress, with significantly greater consumption of computational resources and loss of speed.

Whereas the default incremental paint setting at the overall Viewer level - in the *Tools/Options* menu dialog box - is turned on, the default IncrementalPaint setting at each of the individual layer levels is turned off. The result is fast performance during moves but only blank space is redrawn at the window margins. Therefore, the user must also activate the IncrementalPaint at the layer level for each of the layers to be presented in IncrementalPaint mode. Refer to the *Layer/Properties/Layer/Parameters* menu option of a selected layer to see the local IncrementalPaint setting for that layer.

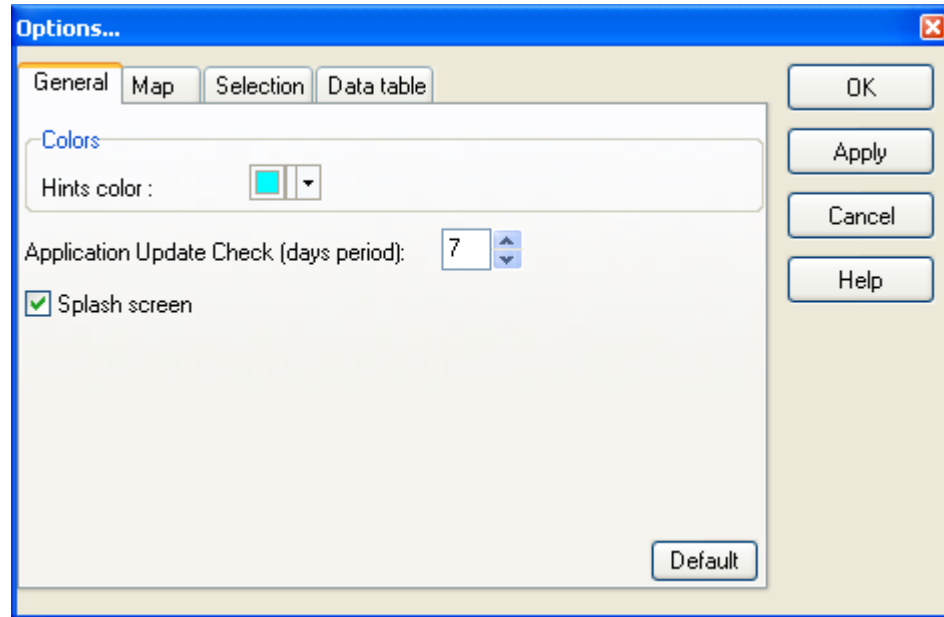
The ability to also make the IncrementalPaint determination at the layer level allows for a hybrid presentation, such as to maximize performance speed by performing the draft paint of only the most important layer(s) during map moves. For example, only a street map layer might be set to paint incrementally during map moves triggered by the real time GPS tracking of a moving object at close zoom levels. For best performance with large raster images, leave IncrementalPaint turned on at the Viewer level but turned off for the layer containing the raster image.

The following image shows the *Layer/Properties/Layer/Parameters* combo box, where the *Cached Paint* and *Incremental Paint* features can be turned on/off for a selected layer level.



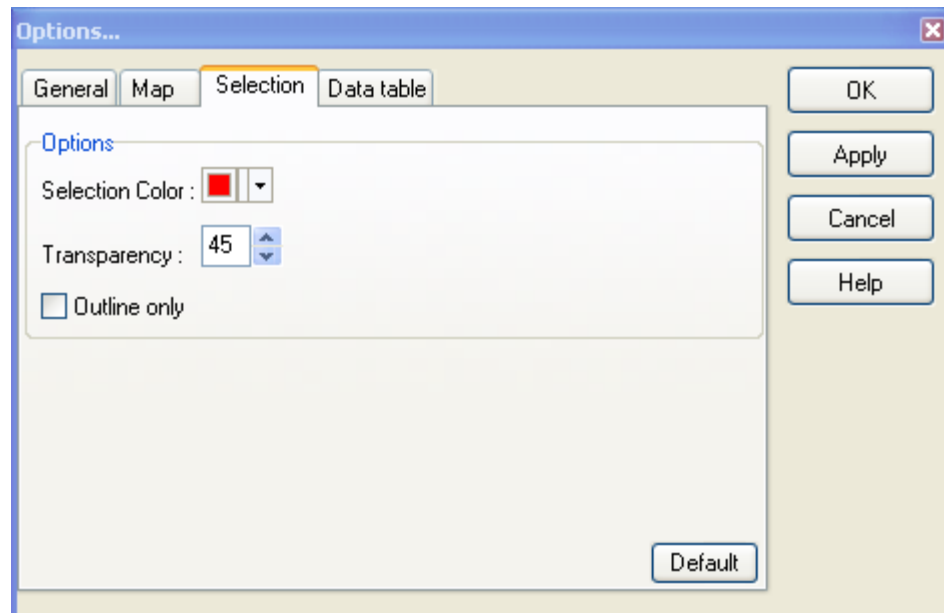
The *General* tab provides settings to control appearance and behavior issues that are specific to the TatukGIS application, i.e., not related to GIS functionality.

- *Hints color* - provides a palate for selecting the background color of the "Map Hints" object information feature.
- *Application Update Check* - Controls the interval (number of days) between automatic checks with the www.TatukGIS.com web site (when working on-line) to determine if TatukGIS has made available an updated version of the program for download.
- *Splash screen* - If checked, presents the TatukGIS splash screen for a few seconds each time that the program is first opened.



The *Selection* tab provides for settings to control how that objects that have been selected are highlighted in the map presentation.

- *Selection Color* - Provides a color palette to define the color used to highlight selected objects.
- *Transparency* - Controls the transparency level of the color used to highlight objects that have been selected. The range is 0 - 100, with 0 corresponding to total transparency.
- *Outline Only* - If checked, only the outline, and not the fill (interior), of polygon objects are highlighted when selected.

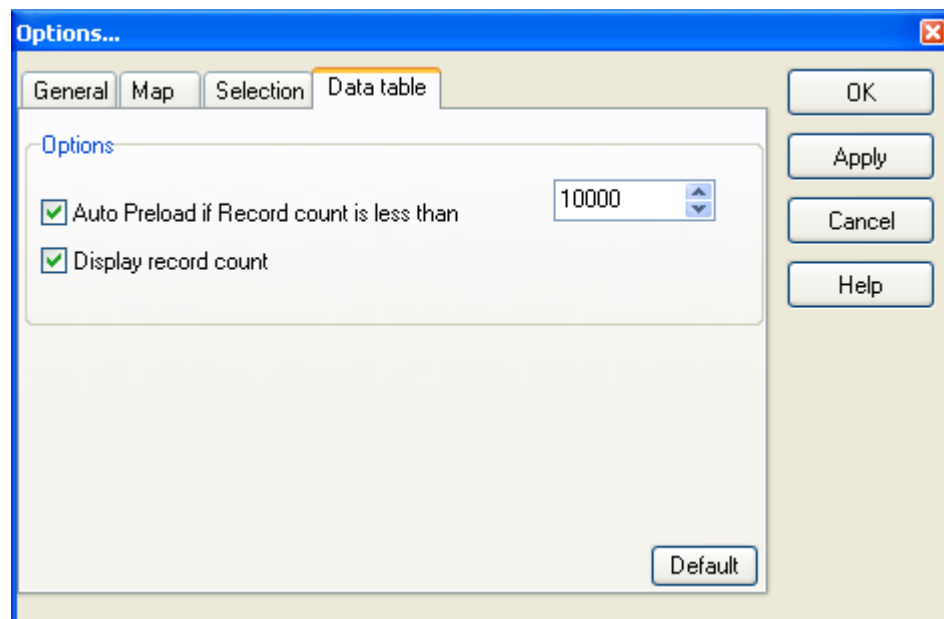


The *Data table* tab provides two options relating to who data is presented in the data table panel.

- *Auto Preload if Record count is less than* - When active, any time that a selected layer contains fewer records (shapes: line, points, or polygons) than this number, the attribute data will

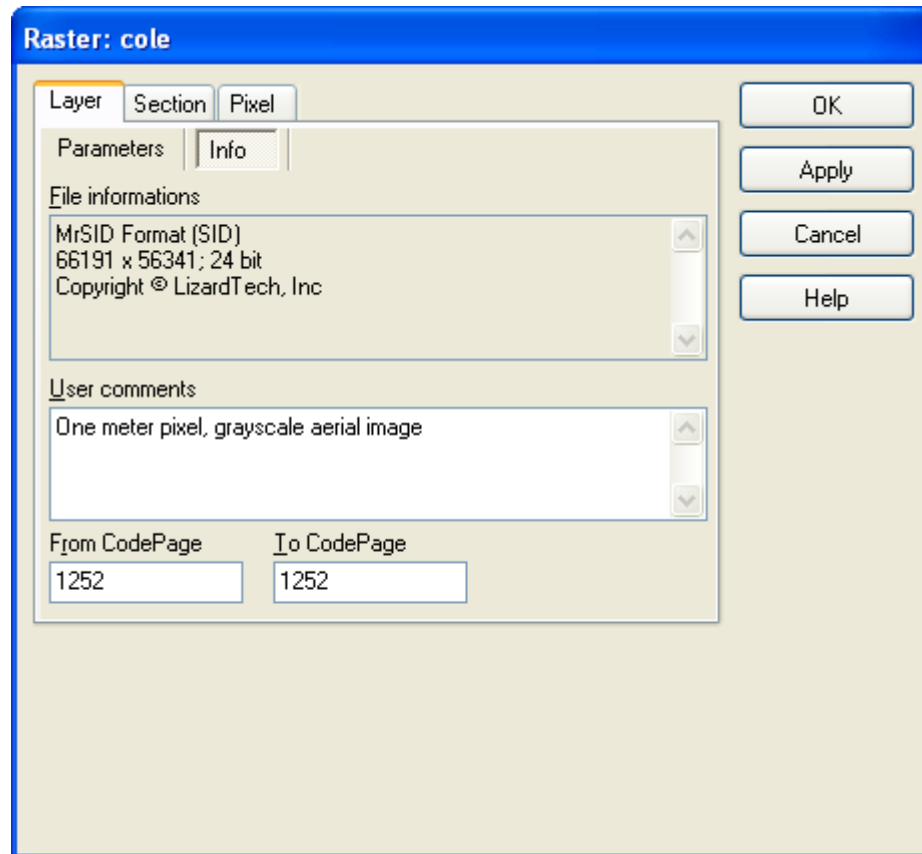
automatically "preload" into the data table. Use of the preloaded mode enables much greater functionality in the data table, but is lower. With a map layer containing less than 10,000, the speed deficit should not be a problem. This threshold number is adjustable.

- *Display record count* - When active, the total number of records presently contained in the data table and the total number of records (shapes) contained by the selected map layer appear at the bottom of the map window. For example, the figures 22 / 789 would mean that 22 records are presently contained by the data panel out of a total of 789 records (shapes) contained by the layer.



2.2.1.1.4 Layer Information


The file format type of the layer selected (highlighted) in the *Legend* panel can be found at the *Layer/Properties/Layer/Info* dialog box, as pictured below. If the selected layer is an image file, the number of pixels composing the width and height of the image is presented here as well. This information can be useful when exporting from a raster image layer.



2.2.1.1.5 Coordinate System information

The Viewer uses the coordinate system associated with a vector or image file to position it in the correct position relative to other layers open in a mapping project. However, version 1x of the Viewer and Editor does not perform on-the-fly reprojection of vector map layers from different coordinate systems to a common coordinate system. Therefore all layers must first be in the same coordinate system to be properly viewed together.

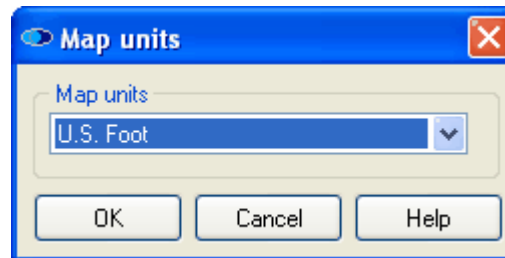
When an image file that is not referenced to a coordinate system is opened in the Viewer, by default the Viewer assigns screen coordinates to each pixel of the image, starting with the first pixel in the lower left corner, which is assigned the coordinates 0,0.

If two vector map or image files in very different coordinate systems are opened together in the Viewer, the locations of the two files can appear so far apart that in *Full Extent*  mode the files appear in the viewer window as two dots.

2.2.1.1.6 Scale Setting

The Viewer provides a scale ratio at the bottom of the main map viewer window, which shows the relationship between any distance on the map as currently visible in the viewer window and real distances on the ground. But, because version 1.x of the Viewer does not read the distance units information directly from the file, the scale feature is active only if the user manually enters the map units (meters, feet, nautical miles, decimal degrees, etc.) on the open layer(s). Therefore the user must be familiar with the map units (which is part of the coordinate system information) of the map file to properly use the scale feature. If the wrong map units are selected, the scaling will be inaccurate.

To set the map units, use the *Map/Map units* menu to open the *Map units* window, which appears below. Select the appropriate units from the drop down list and click on the *OK* button. Note from the drop down list that the map units can be linear (meters, feet, nautical miles, etc.), or in latitude/longitude coordinates. Lat/Long coordinates may be defined as radians, decimal degrees, decimal minutes, decimal seconds, grons, or grads. (Decimal degree is the most common way of expressing lat/long coordinates).



After the map units are specified, the scale ratio will appear just below the main map viewer window, as shown below.

1:25000

This ratio, 1:25,000, means that, at the present zoom level, one distance unit on the screen corresponds to 25,000 of the same distance units on the ground.

The user can specify the scale ratio by editing the ratio number in the scale ratio box. Click on the *Enter* key to register the change. The map level will automatically adjust to the zoom level corresponding to the entered scale ratio.


The scale level is applicable to printing operations. Simply set up the desired scale in the Viewer before starting the print or print preview procedure and the same scale will persist during the print operation.

The setting of the map units also allows the program to present valid information in the *Scale* bar panel (a feature of the Editor only). The distance units (meters, kilometers, feet, miles) for the scale bar presentation can then be specified within the *Scale* panel.




The *Scale* bar panel, which is a feature of the Editor and not the free Viewer, can be turned on using the *View/Panels/Scale* menu item.



2.2.1.2 Tutorial 2 - Layer Properties & Basic Features

The Viewer may be used to alter the appearance of both vector and raster data. The following tutorial uses a mosaiced TatukGIS PixelStore format aerial image file and a DGN format vector map file of the same terrain, and referenced to the same coordinate system. If you are familiar with the TatukGIS Aerial Imagery Corrector (AIC) product, you might recognize the data used for this tutorial from one of the AIC tutorials. The PixelStore image was created from aerial images that were rectified, georeferenced, and mosaiced with the AIC, using the DGN vector file as the reference file. Therefore, it is natural that these two data layers exactly match, i.e., because the PixelStore image was georeferenced to the same coordinate system as the DGN map file.

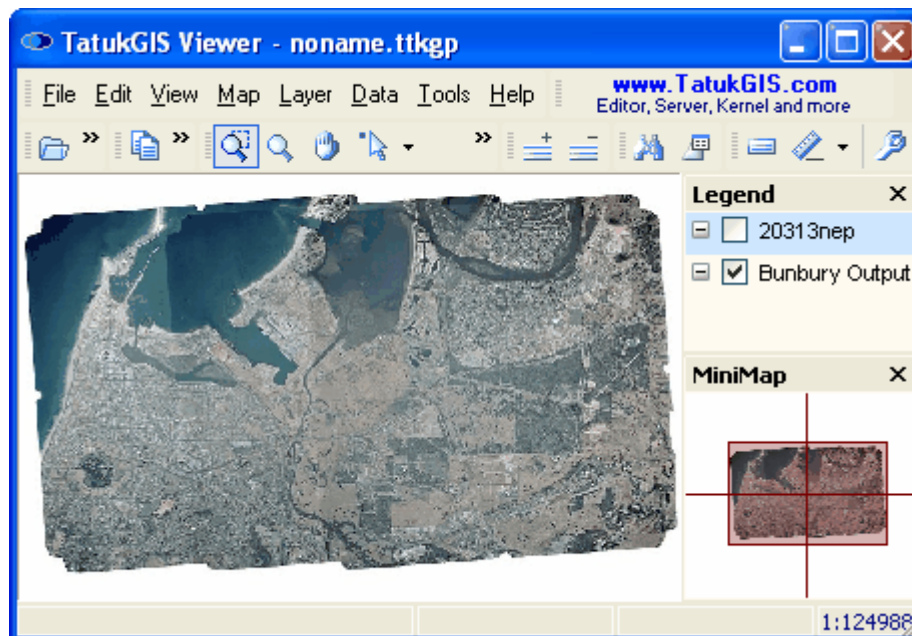
NOTE: If two or more layers of the same terrain, but reflecting different coordinate system, are opened at the same time in the Viewer, they will likely not overlap by a very large margin. When such images are opened together in *full extent*  mode, the files can be so far apart that each appears as a point.

2.2.1.2.1 Vector Layers - Styles

A file can be opened as a layer using the *Add...* layer  toolbar button (same as the *Layer/Add...* menu command) or using the *Open...*  file toolbar button (same as the *File/Open...* menu command). The *Open...*  file toolbar button can also be used to open project files which typically contain multiple layers.

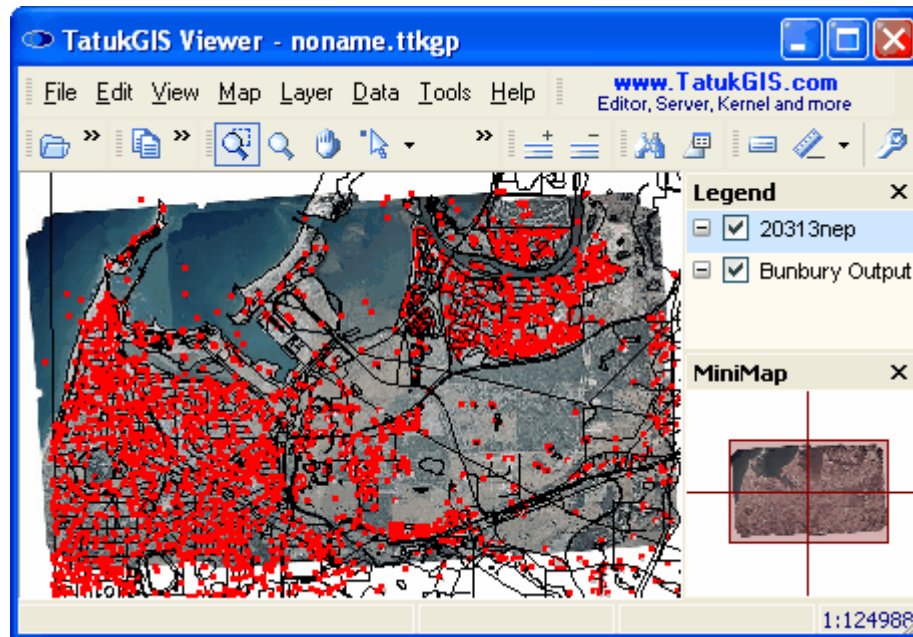
As presented in the image, the *Add...* layer  toolbar button has been used to open two map files as two different map layers. (The *Remove* layer icon  is used to remove a layer from the viewer.) The file names of each layer are visible in the *Legend* panel. The 'Bunbury Output' layer is a TatukGIS PixelStore aerial image file and the '20313nep' layer contains a DGN format vector file. The DGN map layer (20313nep) is not visible in this image because this layer is not checked in the *Legend* panel. The 'Bunbury Output' layer has also been opened in the *MiniMap* panel by right clicking on that layer in the *Legend* panel and selecting the *Use in MiniMap* command.




The "Bunbury Output" PixelStore mosaiced image file was previously created using the TatukGIS Aerial Imagery Corrector (AIC) product from three TIFF format aerial images. Refer to the AIC product tutorials for information about the creation of this image mosaic.

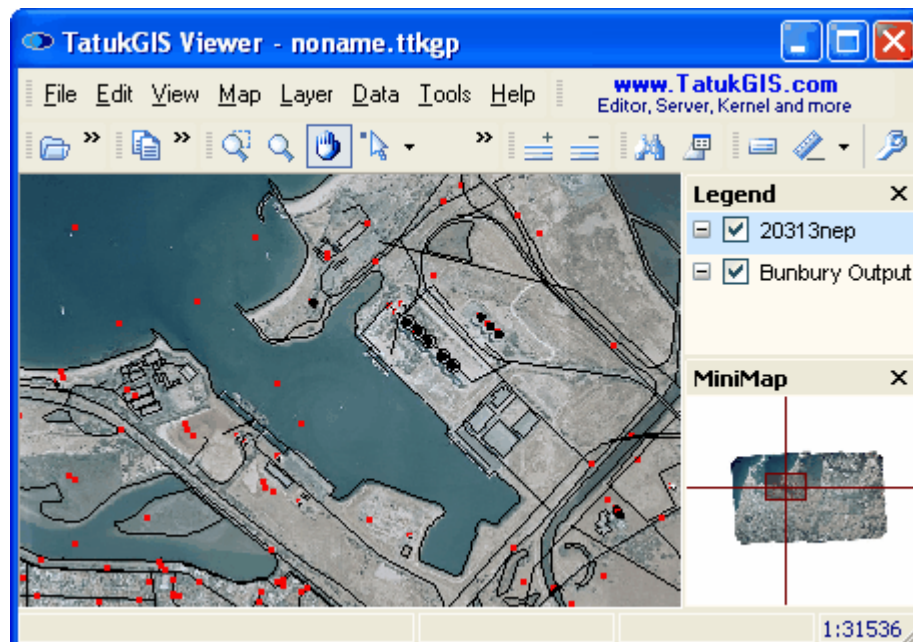


Now place a check mark by the vector map layer in the *Legend* panel to also turn on the visibility of that layer. As reflected by the order of the layers in the Legend panel, the vector map layer lies on top of the image layer. The layers can be reordered by simply dragging a layer higher or lower within the *Legend* panel.

NOTE: Only the vector geometry of the DGN file is visible in this image, not the original DGN color and styles. The Viewer actually presents DGN and DXF files with the original colors and styles when the files are first opened, but this information is overridden by the TatukGIS layer properties when the *Layer/Properties* dialog box for that layer is opened (by double clicking on the layer in the *Legend* panel) and then closed. Also note that the DGN file format (which is a CAD format) is a bit unusual for GIS, because DGN files can contain different shape types (point, multipoint, line, and polygon) in the same vector file layer. GIS principles require that only one shape type be contained by any single layer.

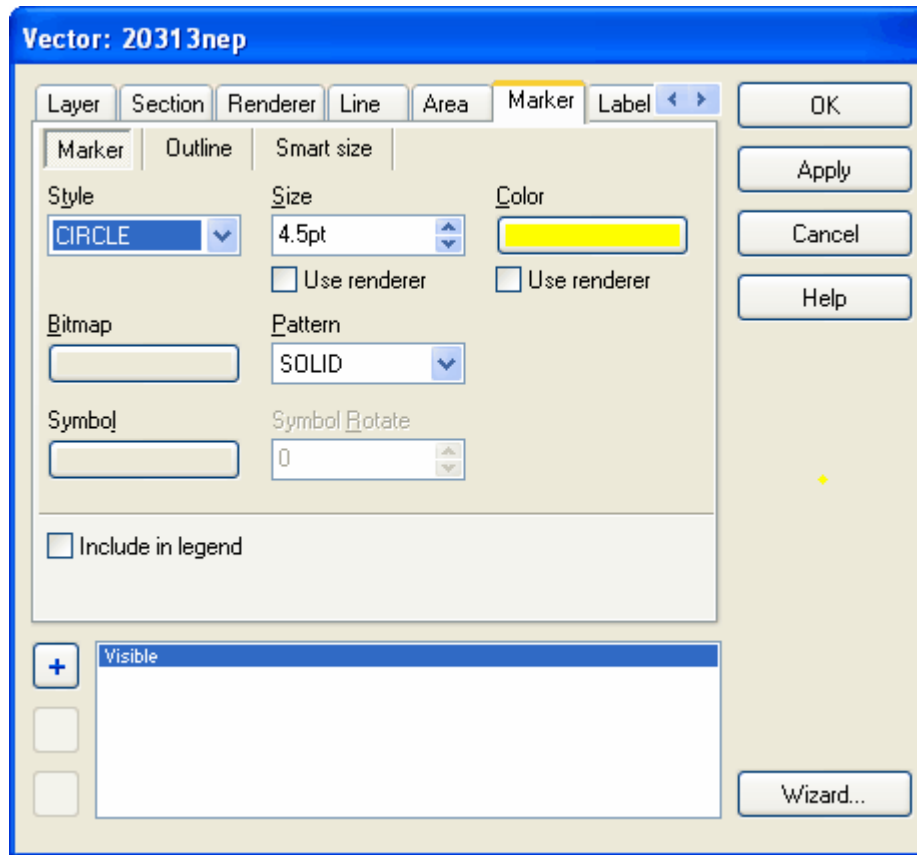


After selecting the *Zoom mode*  toolbar icon (or the *Map/Zoom mode* menu command), zoom in by dragging the mouse pointer across the map image in the right-down direction. Zoom out by dragging the mouse pointer in the opposite direction. Alternatively the *Zoom Expanded Mode*  may be used to zoom in/out by dragging the cursor on the map in the up or down direction. Select the *Drag mode*  toolbar icon (or use the *Map/Drag Mode* menu command) to push the image around in the Viewer window.

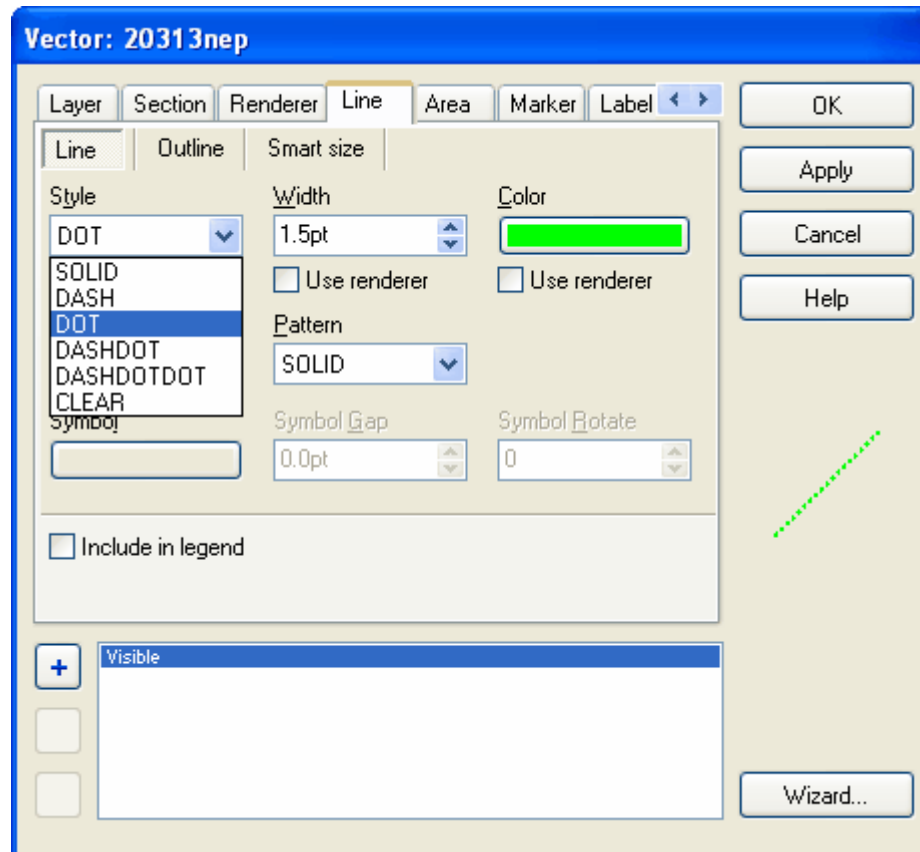


Open the Layer Properties dialog window for the vector layer by either double clicking on the layer in the *Legend panel* or by selecting the *Layer/Properties* menu while the vector layer is highlighted in the Legend panel. Then go to the *Marker* (vector points) tab to review and change the appearance the properties associated with the vector points (markers). In the demonstration the appearance of the vector points is changed by applying i) the color yellow (in place of the original red), ii) a circular appearance (in place of original square shapes) and iii) reducing the size of

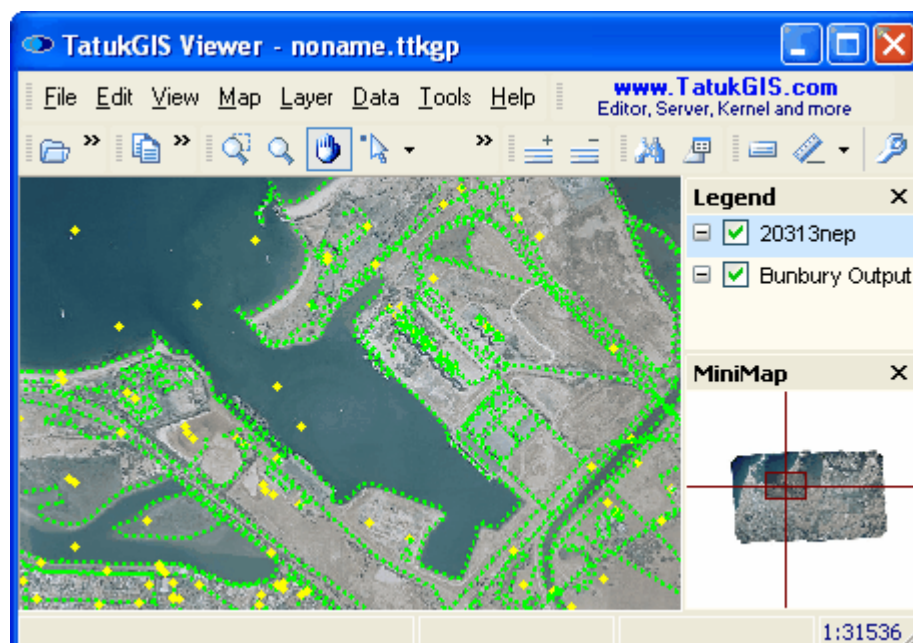
each marker to 4.5 pts (points; 1 pt. = 1/72 inch).



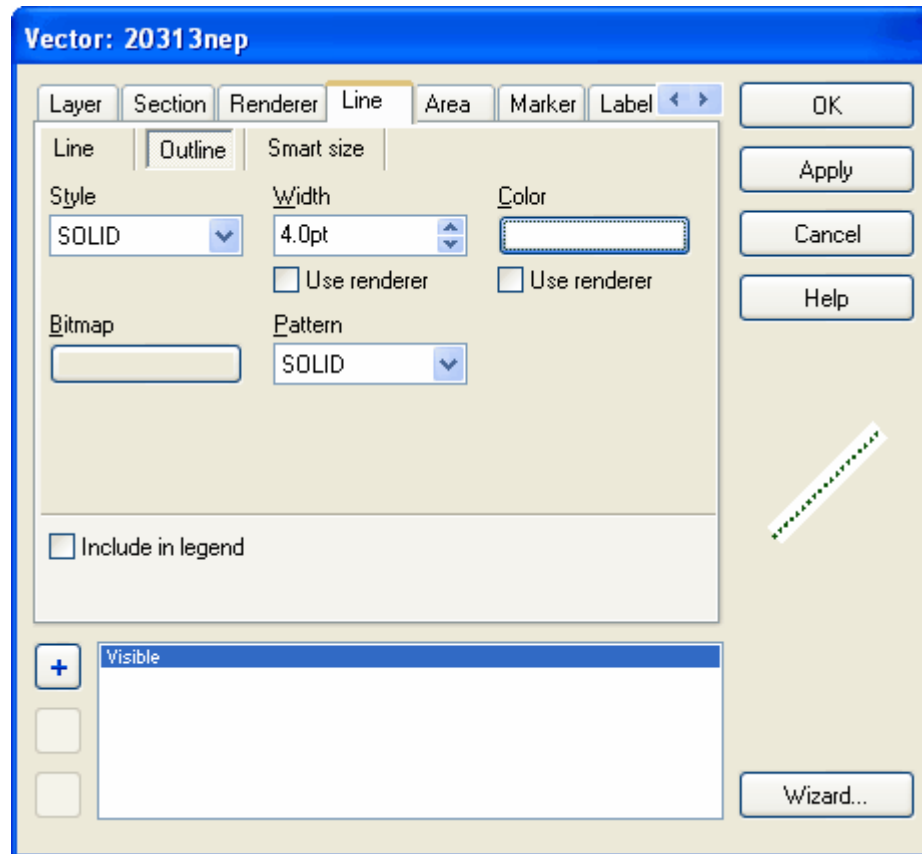
Now go to the *Line* tab to review and alter the style settings for the vector lines. As shown in the image below, i) the line color is changed to green (from the original color black), ii) the line width is changed to 1.5 pt, and iii) the line style is changed to dotted (from the original solid).



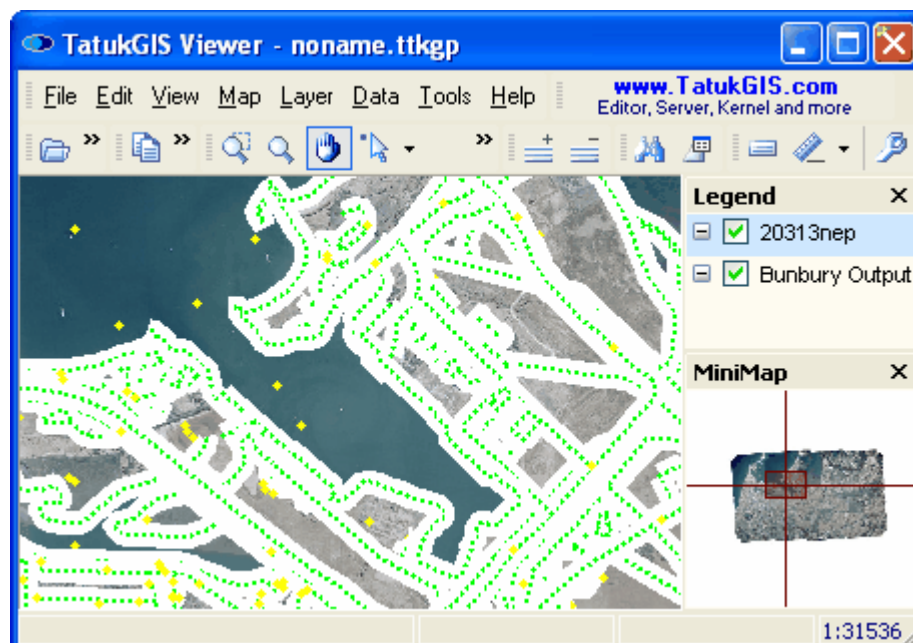
Click on either the *Apply* or the *OK* button to refresh the viewer window to reflect the updated layer property settings. The *OK* button closes the layer Properties dialog box. The *Apply* button refreshes the map viewer window while keeping the Properties dialog box open (to allow more changes).




Specify an outline for the vector data. Below a 4 pt. wide white outline is set for each vector line.



The result.



The above offers just a hint of the vector rendering possibilities. For instance, points, lines and polygon fills or perimeters can be represented by WMF, or TrueType symbols.

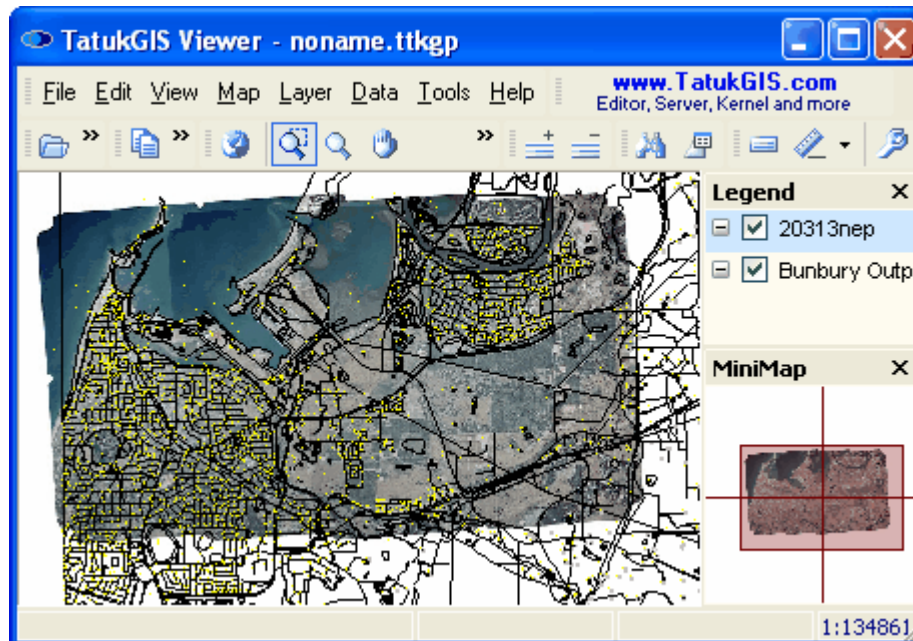
If desired, save the map appearance settings to a TatukGIS project file using the *File/Save*  as

menu command.

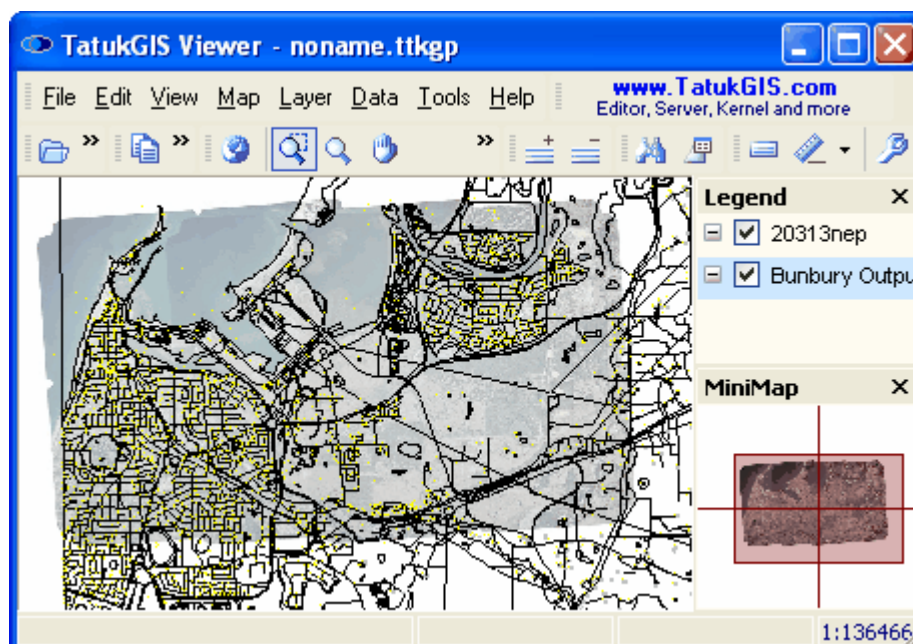
2.2.1.2.2 Pixel Layers

The *Properties* combo box can also be used to alter the appearance of pixel image data in several ways, including color enhancement, inversion, grey scale, histogram, transparency factor, etc. Below the transparency level (the setting is found in the *Layer/Properties/Layer/Parameters* tab), of the aerial image layer is reduced from 100% to 40%.

Transparency level = 100%.



Transparency level = 40%.



If desired, save the appearance set up to a TatukGIS project file using the *File/Save as* menu command.

2.2.1.3 Tutorial 3 - Thematic Map Rendering

The Viewer can be used to render vector data (points, lines, or polygons) thematically, including the representation of a colored-gradient value theme, based on information contained in vector attribute fields. The following tutorial provides a demonstration of some of the thematic rendering possibilities. The procedure is the same for rendering any style information, including colors, line types, polygon fills, polygon borders, icons/symbols, bitmap images, etc., based on information by the layer attributes.

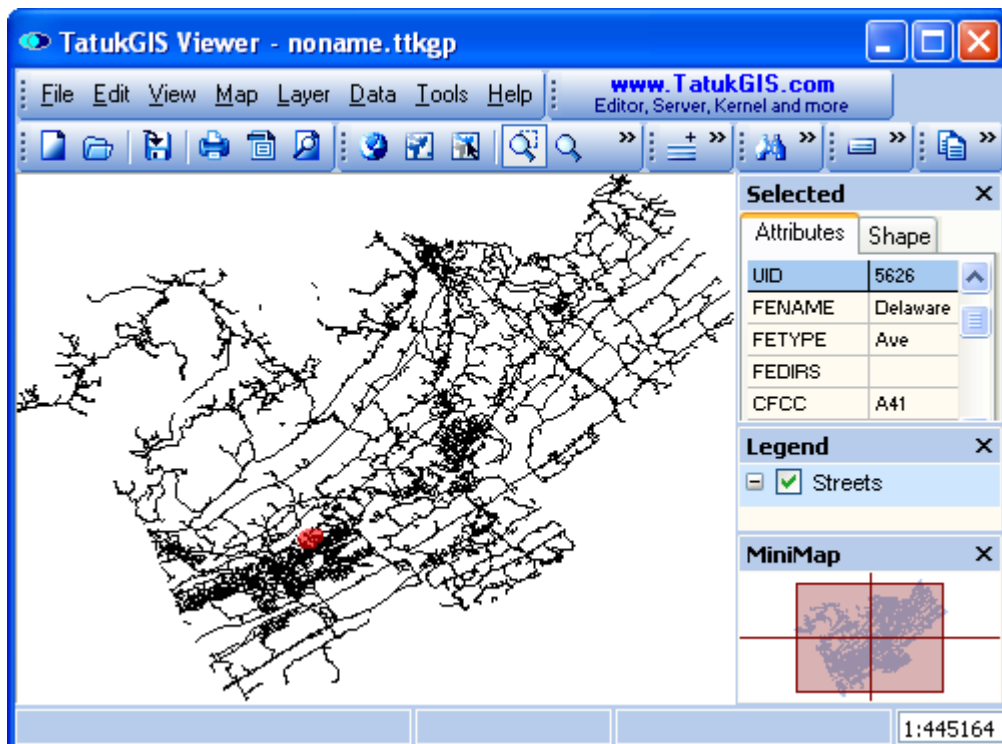
Whereas this tutorial shows the manual way of setting up a colored-gradient value theme, Tutorial 4 shows an easier way by using the rendering *Wizard*.

This tutorial uses a SHP format vector polygon file reflecting administrative regions in Poland (the old administrative regions they were consolidated in the late 1990's) and a standard U.S. Department of Census TIGER street map file.

2.2.1.3.1 Sections: Text Attribute Values

This example shows the use of the Section feature to render selected objects within a vector map file in a particular manor based on text attribute information.

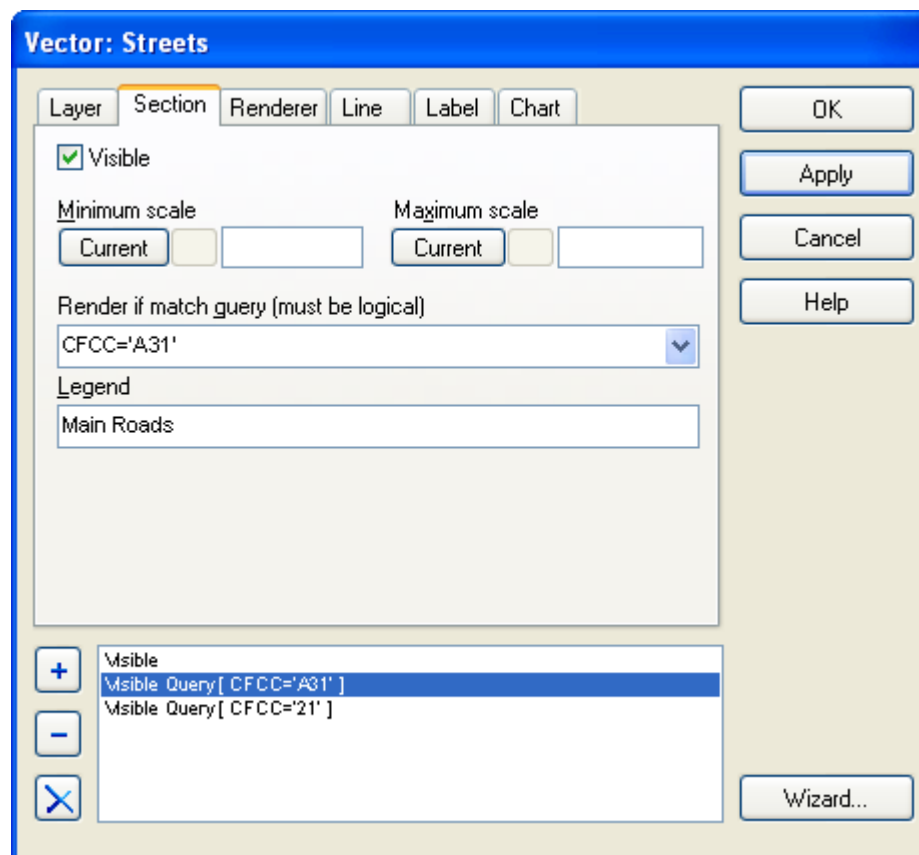
The file used for this demonstration is a standard U.S. Dept. of Census TIGER vector road/street map file in the tiger data format. The key attribute for demonstration purposes is the "CFCC" attribute, which contains the road and street type (classification code). The data in this file contains roads/streets of three classifications. *A41* is the classification for typical city streets and minor roads and *A31* and *A21* are classifications for relatively more significant roads or highways. In the image below Delaware Ave. has been selected, which has the *CFCC* attribute value *A41*. The "*A41*" is a text value.



Under the *Section* tab within the Layer Properties dialog window, set up sections defined by logical attribute queries based on the values of the *CFCC* attribute. Unlike with numeric values, text information must be enclosed with single quotation marks (' '). Single quotation marks are used to identify text (non numeric) attribute information. Other examples of text attribute information might be 'Male' and 'Female' for sex or 'Admin 1', 'Admin 2', etc. for administrative zones.

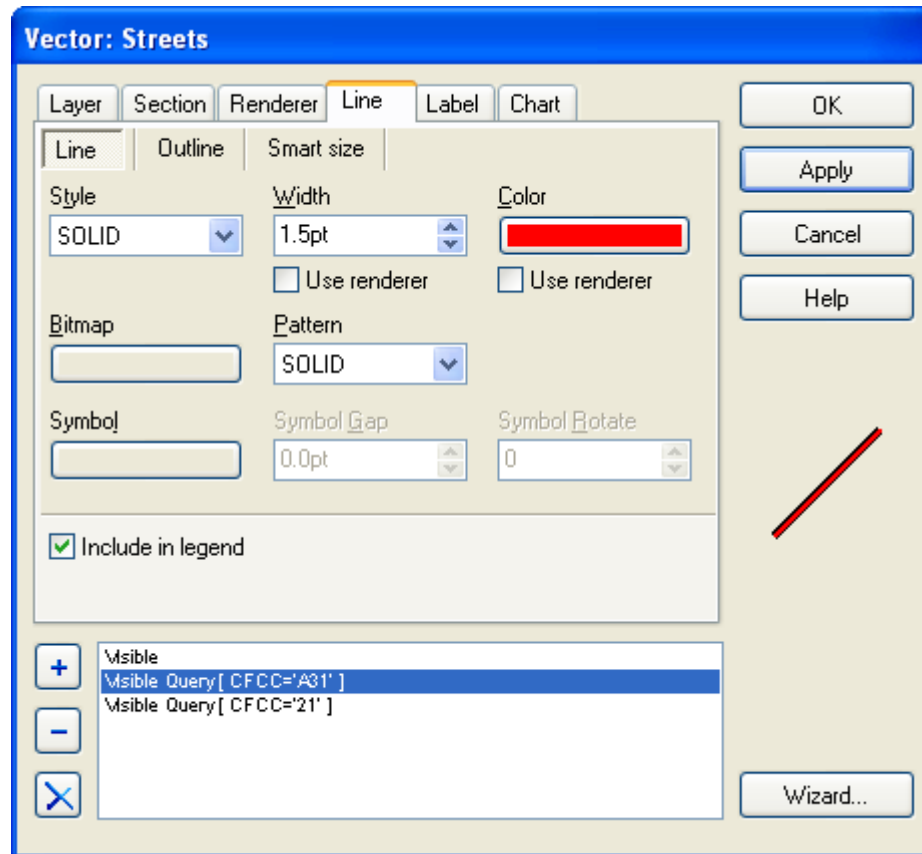
NOTE 1: Be careful to not use double quotation marks (" ") to connote text information.

NOTE 2: Be careful not to delete or change the default *Visible* section. This default section is to match all objects in the layer that are not matched by the custom query definitions set by the user. Use of the default *Visible* section means that all map objects not matching the custom query definitions set by the user are rendered according to the default layer render properties. If the default *Visible* section is eliminated, all objects in the layer that do not match custom queries will not be rendered at all, i.e., will not be visible.

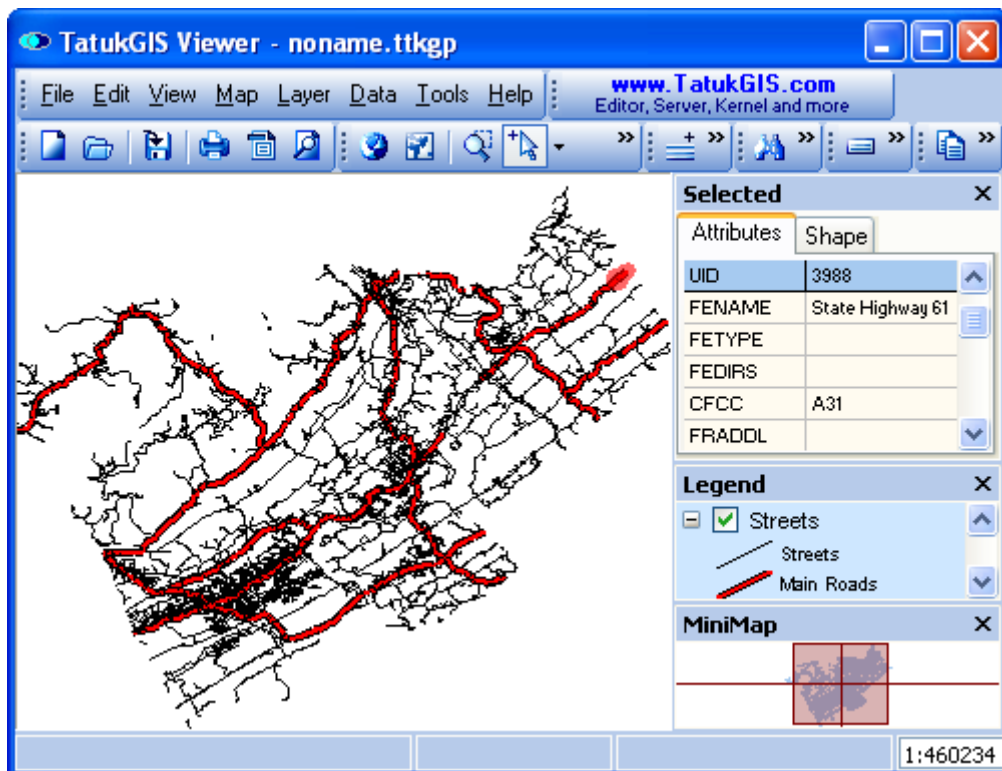


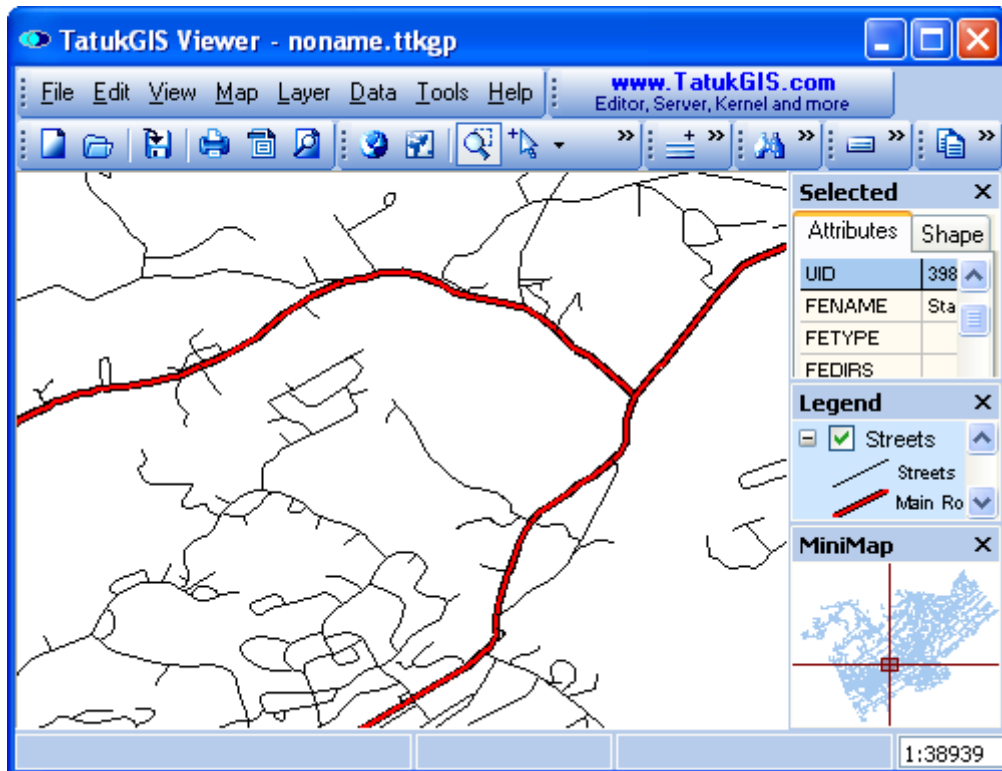
Associate colors and line widths which readily distinguish the major roads/highways from the more minor roads and streets. In this example, whereas the default layer property render settings are to present lines in solid black color with a width is 0.3 pts., the streets/roads with a *CFCC* attribute value of *A31* are set to be rendered solid red color with a width of 1.5 pt., and with 3 pt. wide solid black outlines. The settings under the *Outline* tab are used to specify the color and width of the outlines.

Note that the *Include in legend* option under the *Line* tab has been checked, which means that the legend name that was entered for this section under the *Section* tab will be presented in the *Legend* panel along with a graphic representation.



The result is presented below, at two zoom levels. Note that the map scale at each zoom level is presented by the numeric ratio in the lower right corner of the window.





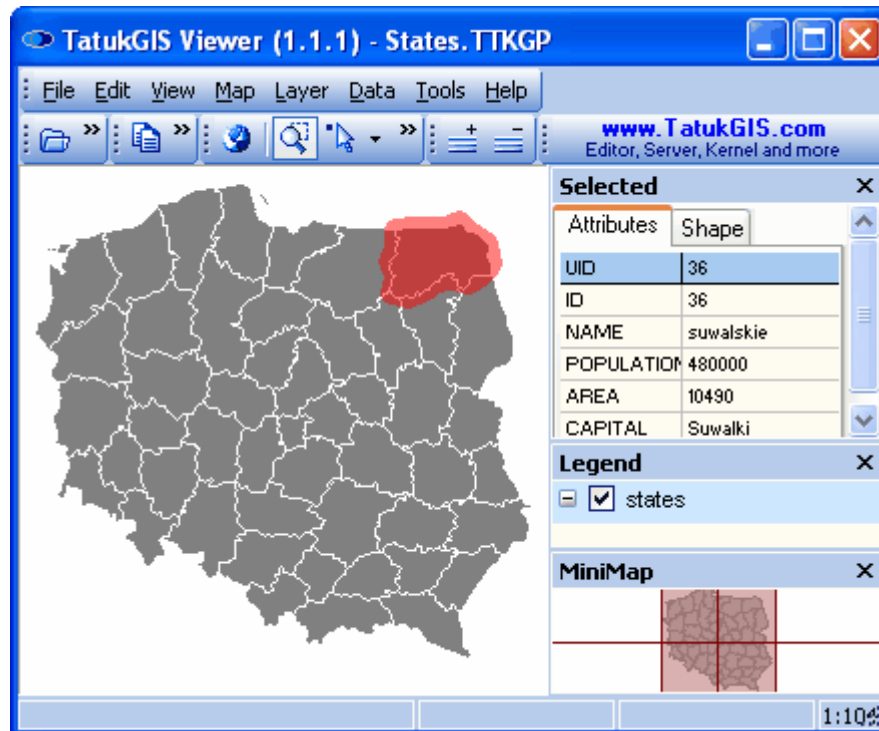


2.2.1.3.2 Sections: Numeric Attribute Values

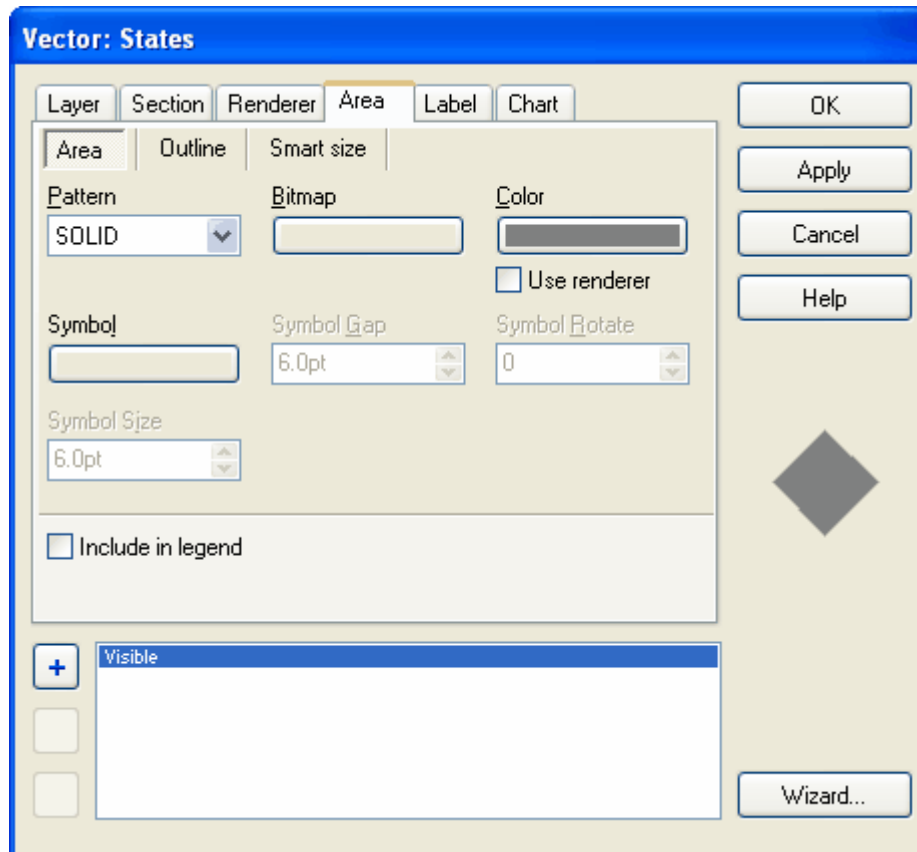
As pictured below, the *States* vector polygon file has been opened in the Viewer. The *States* layer has also been opened in the *MiniMap* panel by right clicking on that layer in the *Legend* panel. The *.TTKGP file ending shown as the top of the Viewer window indicates that this data has already been saved as a TatukGIS project file, and that the data has been reopened in the Viewer as a project file. (*.TTKGP is the file ending for a TatukGIS project file.)

This tutorial shows how to define sections based on numeric attribute queries and render each section a different color. Each section will be defined by a range of values contained by a selected attribute.

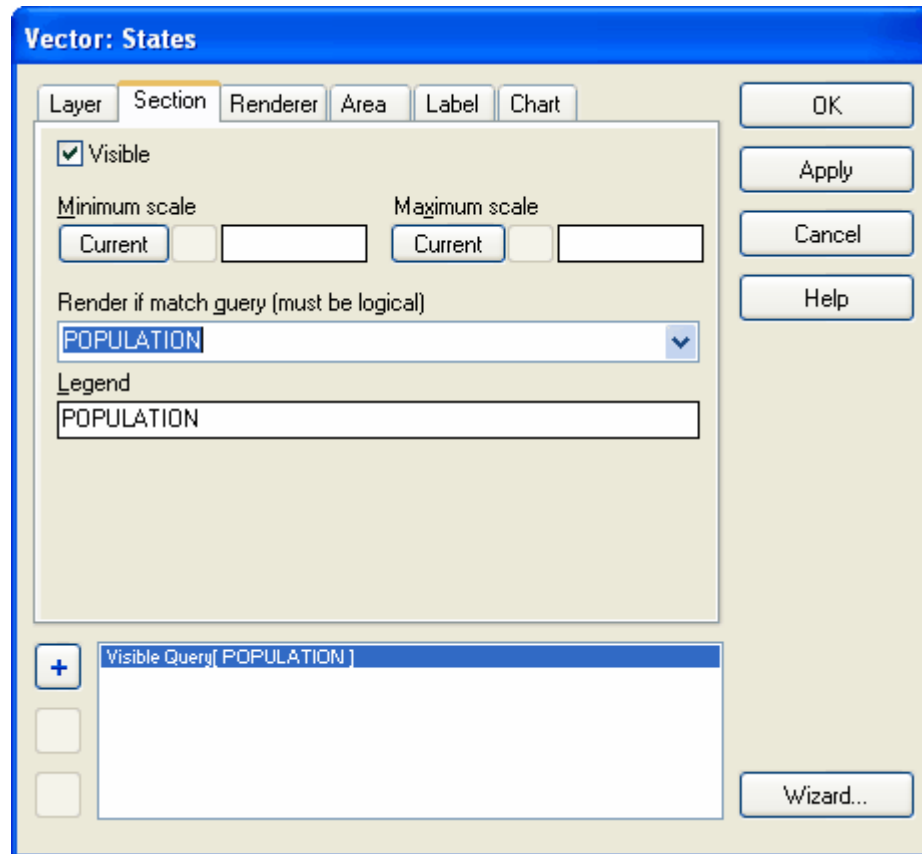
Click on and highlight one of the polygon areas using the *Select mode*  toolbar icon (or the *Map/Select mode* menu). When in *Select mode* the mouse cursor will appear as a . The layer attributes automatically appear in the *Attributes* tab within the *Selected* panel. The attribute names (in the left hand column titled UID) are common to all vectors in the layer. The values in the right hand column are specific to the selected vector polygon.



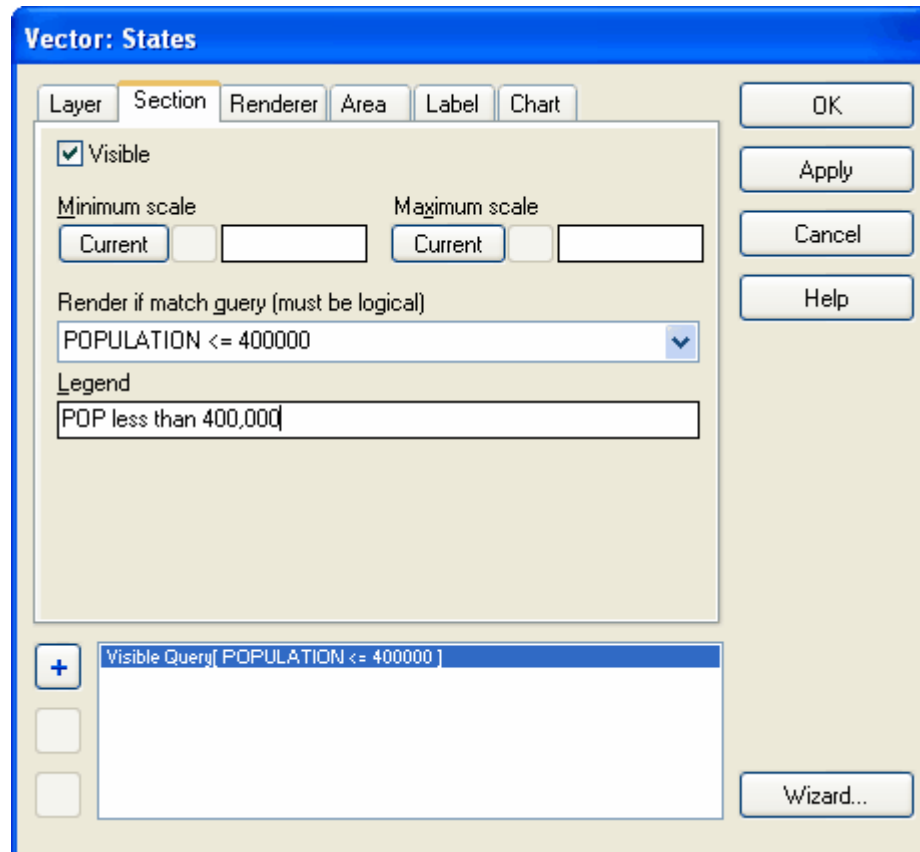
Open the Layer Properties dialog window for this layer by either double clicking on the layer in the *Legend* panel or using the *Layer/Properties* menu command while the layer of interest is selected (highlighted) in the *Legend* panel. Since this layer is composed of vector polygon areas, the Layer Properties combo box opens by default to the *Area* tab window. (If the selected layer contained vector point or line data, this tab would be named *Line* or *Marker*, and the selection of settings would be slightly different.)



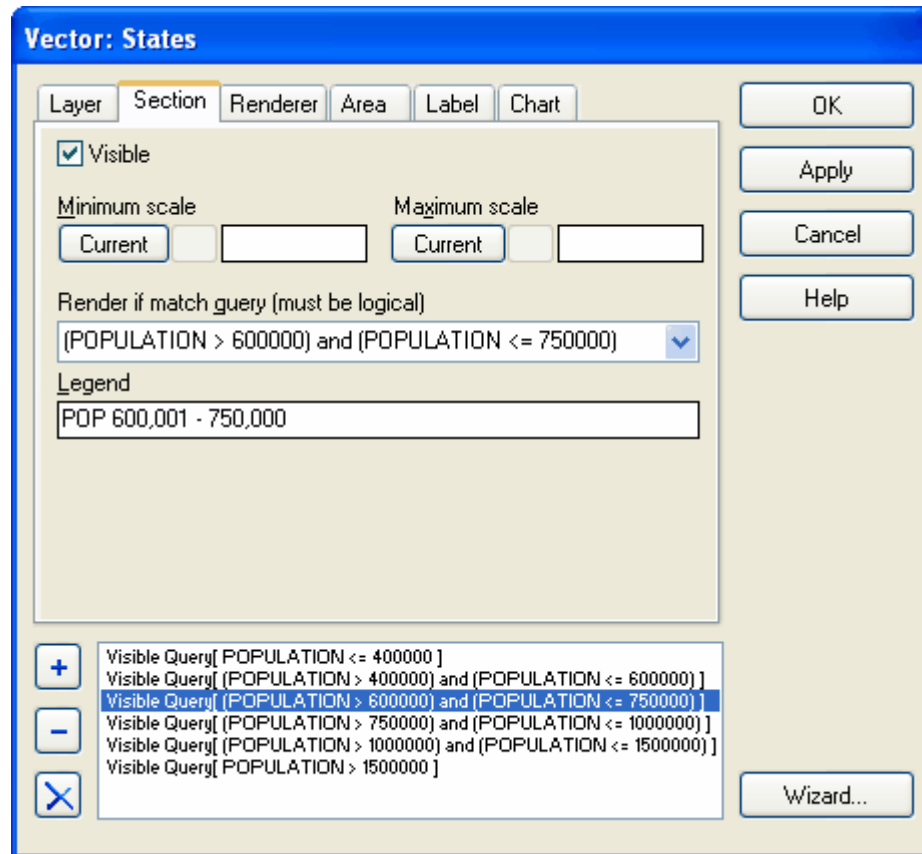
Open the *Section* tab window. Select a vector attribute on which to define the sections, i.e., on which to base a rendering. In this example, the *POPULATION* attribute is selected, which contains numeric values.



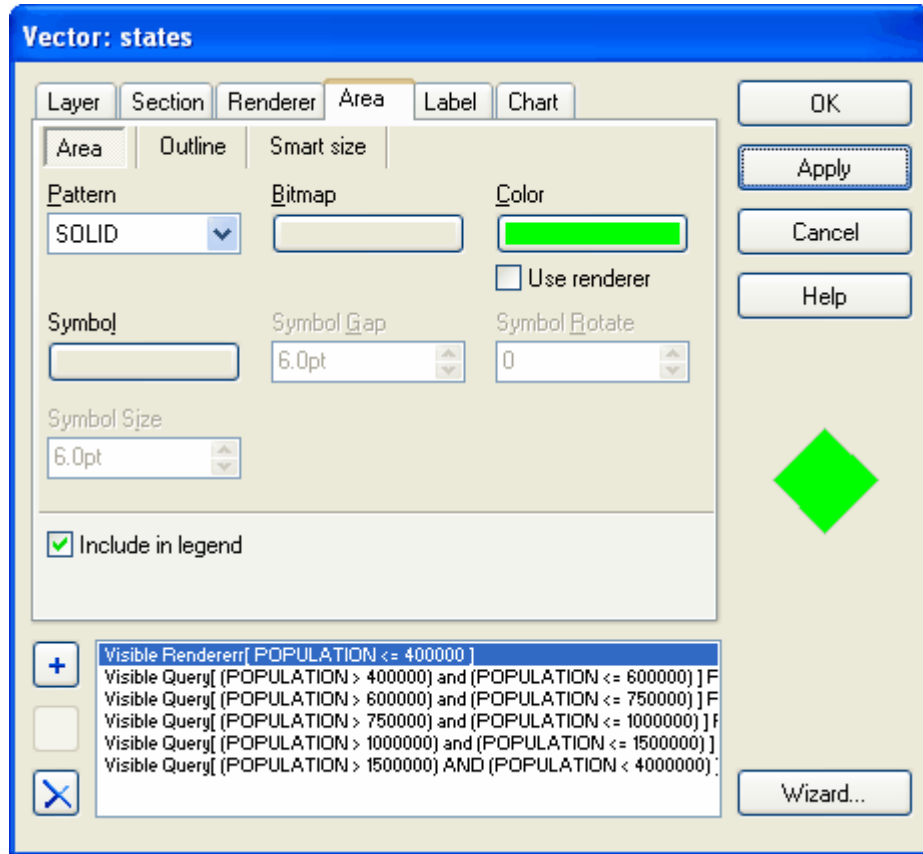
Prepare logical query definitions. As illustrated below, the first section is for any objects (polygons) in this layer for which the *POPULATION* attribute containing a value equal to or less than 400,000.



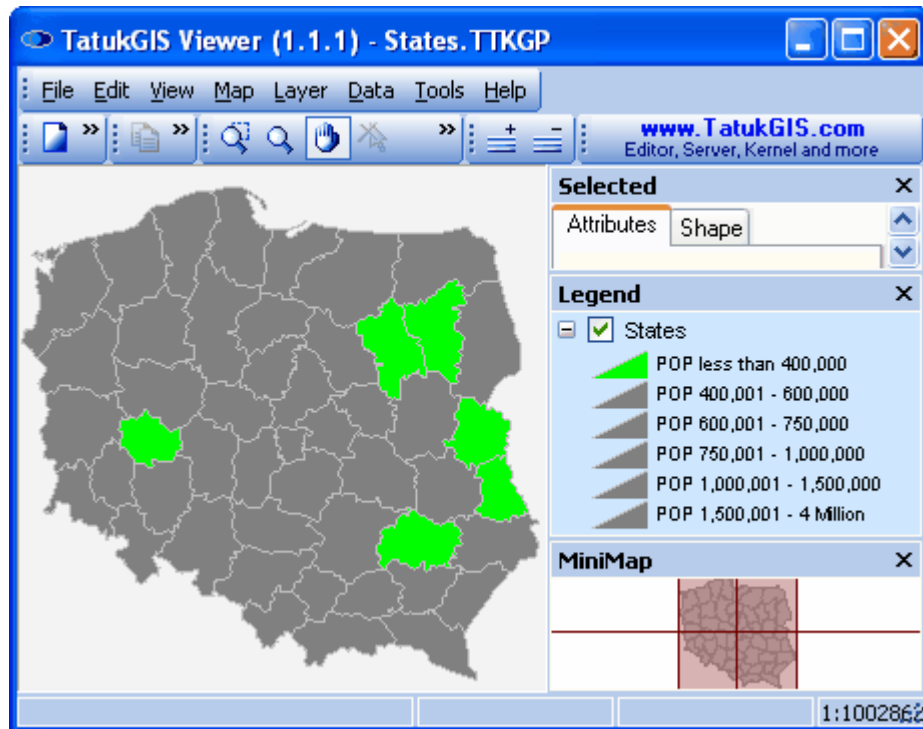
Add as many sections defined by attribute query definitions as desired. The section highlighted below is defined by all polygons in the layer with a *POPULATION* value that is greater than 600,000 and less than or equal to 750,000.



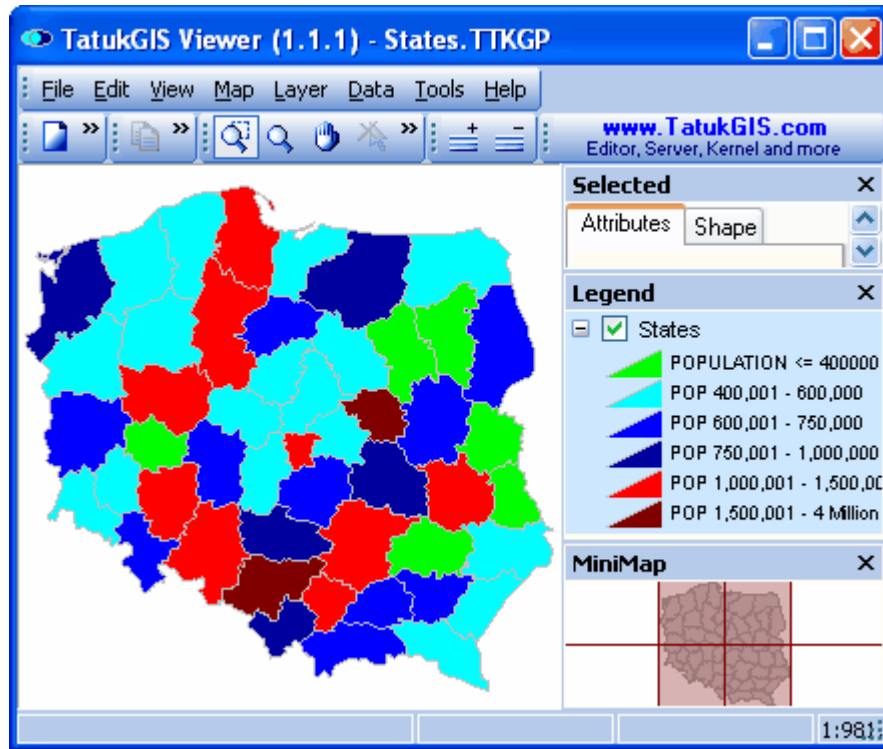
Now a style must be associated with each of the sections. The association of styles to a map layer is sometimes referred to as a *style sheet*. In this example the polygon interiors (also referred to as polygon "fills") are rendered based on sections defined by value ranges of the POPULATION attribute. The shade of green shown below is associated with the first section, which is defined by POPULATION values that are less than or equal to 400,000. Note that the *Include in legend* box is checked for this section (as well as for all the other sections), so that the *Legend* name which was entered under the *Section* tab will be presented in the *Legend* panel.



The result appears below. Six administrative regions (polygon areas) have a population that is less than or equal to 400,000.



After associating unique colors to the other sections, the rendered result is as pictured below. Note the color legend with the names of each section.

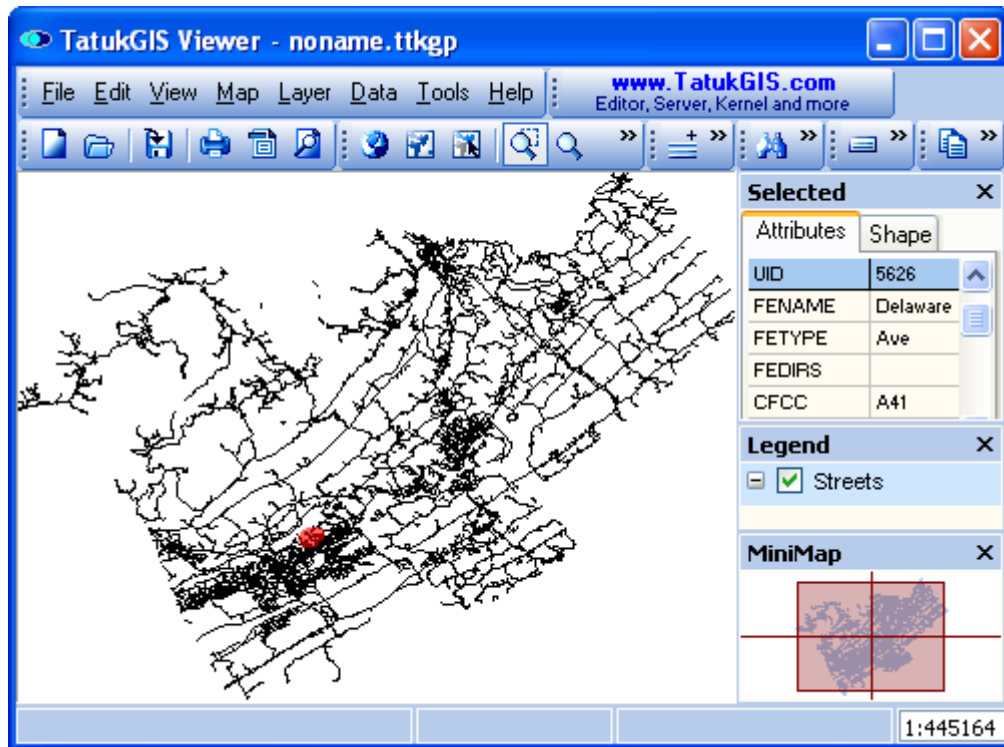


If desired, save this rendering configuration up as a new TatukGIS project file using the *File/Save as* menu (or to save changes to the project file if the project already existed).

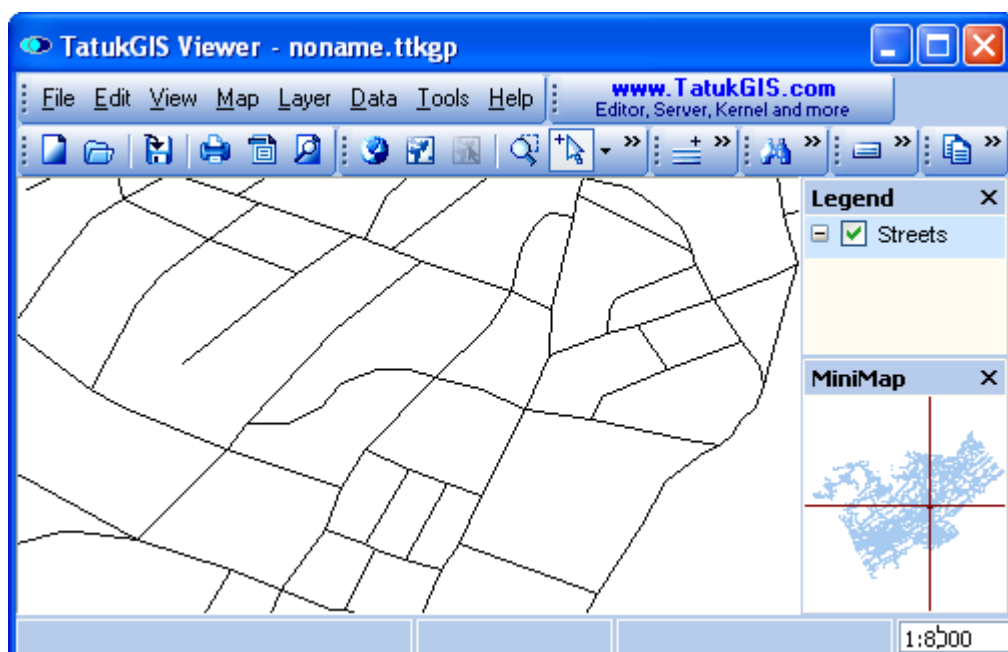
2.2.1.3.3 Sections: Scale/Zoom Levels

This exercise demonstrates the use of sections based on zoom levels (map scale levels) as well as attribute query statements. Vector map layers can be custom rendered based on a combination of zoom level (sometimes also referred to as thresholds) and attribute queries. While this exercise demonstrate the custom rendering of lines, the same logic can be used to custom render labels, polygon fills, symbols or any other aspect of the map appearance based on a combination of zoom levels and attribute query definitions.

Note that while scale levels can be set even when the map units are undefined, the procedure can be more logical if the map units have been specified. Refer to the *Map/Map units* menu and help file for more on setting the map units.



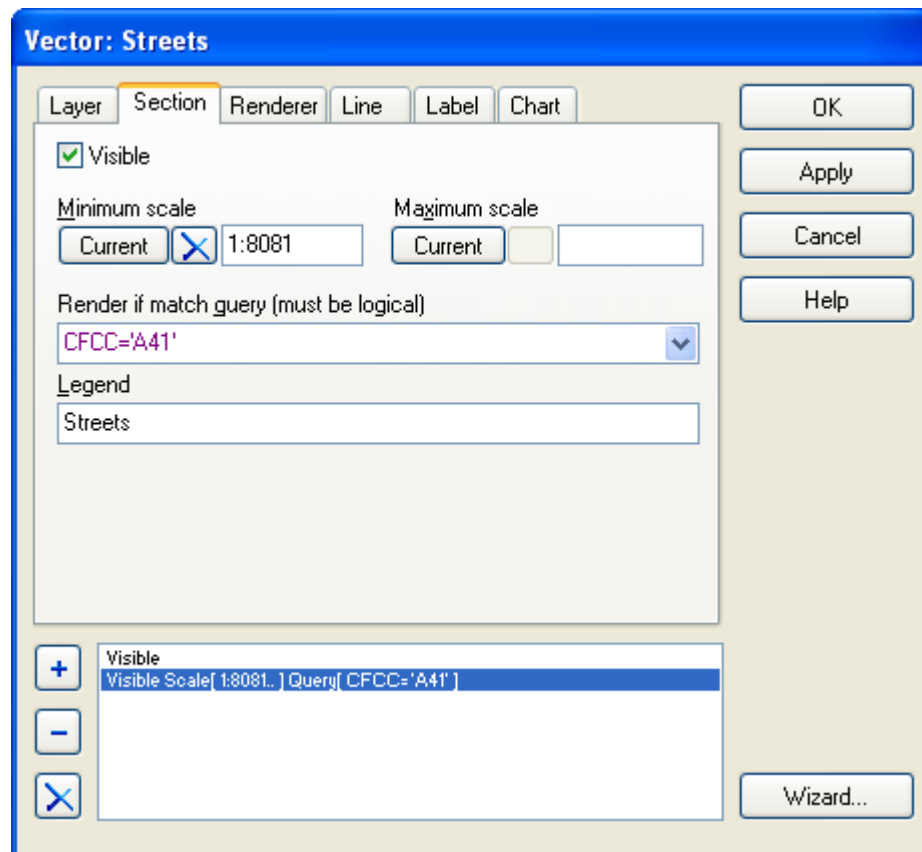
The easiest way to starting setting a scale threshold is to first zoom in on the map to the level at which different rendering settings are desired. One way to quickly zoom to an exact scale level is to type the scale ratio into the scale box at the bottom of the window and click on the *Enter* key. As shown in the image below, the scale at this zoom level is the desired 1:8000. Then click on the *Streets* layer in the *Legend* panel to open the Layer Properties combo window.



Under the *Section* tab within the Layer Properties dialog window, click on the '+' button to create a new section. As shown below, the render query for this section is set to match any streets with a *CFCC* attribute value of *A41*, which means most of the streets in the layer. Furthermore, the minimum scale (zoom level) at which this section is to be applicable has been set at 1:8081 by

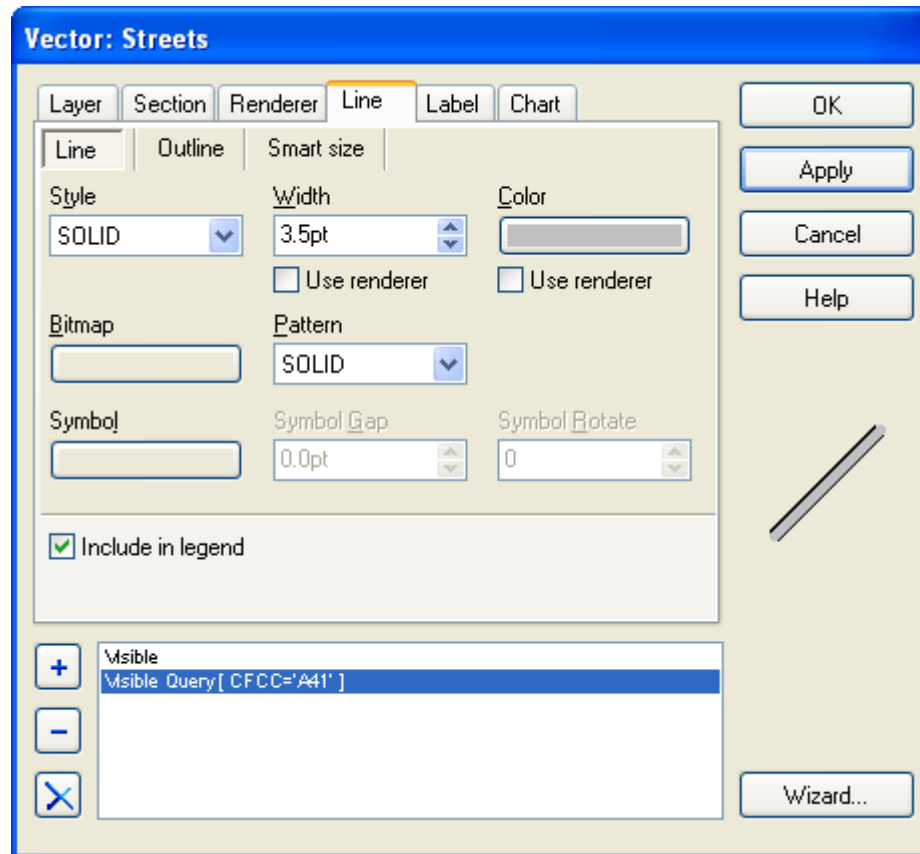
clicking on the *Minimum scale Current* button. The *Current* button prefills the *Minimum scale* field with a value that is slightly less than the current scale level (1:8000), so that the current scale level is included in the section. A *Minimum scale* level could also be entered to this field manually.

By defining the section with the minimum scale level (and no maximum scale level), this means that this section will apply to all zoom levels corresponding to a scale of 1:8000 or greater, i.e. closer zoom levels. If desired the range could be limited on the maximum end by also selecting a value for the *Maximum scale*.

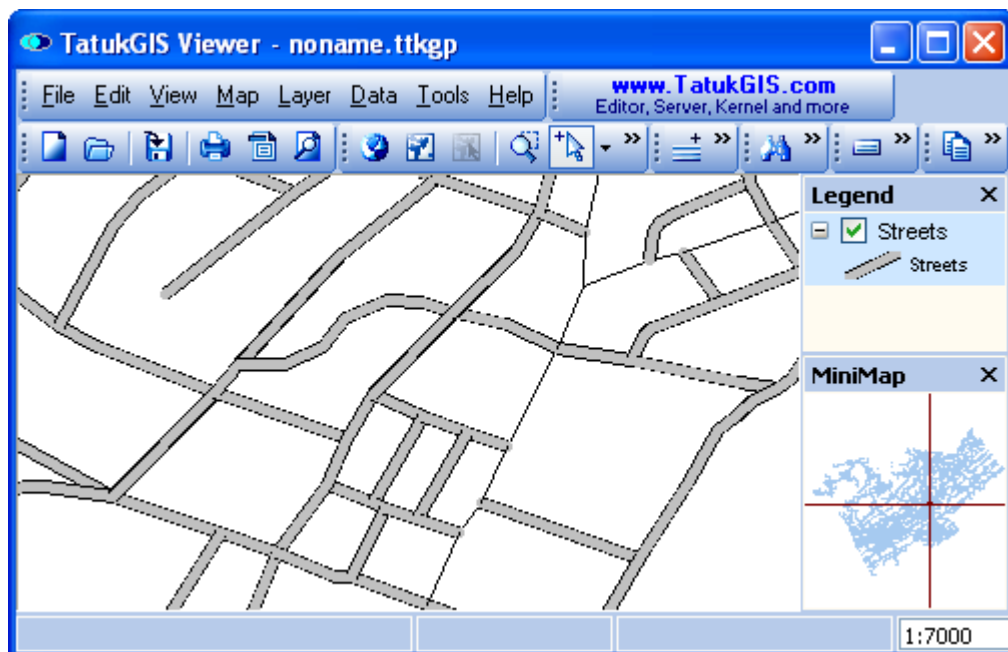


Given that this is a layer containing polylines, the render settings are provided under the *Line* tab. Note that the correction section must be highlighted at the bottom when selecting the rendering settings for that section. In this example, the streets matching this section - *CFCC* attribute values of *A41* AND zoom levels at which the scale is greater than 1:8,000 - are to be rendered gray color, with a width of 3.5 pt., and with .1 pt. wide black outline (selected under the *Line/Outline* tab). (1 pt = 1/72 inch.)

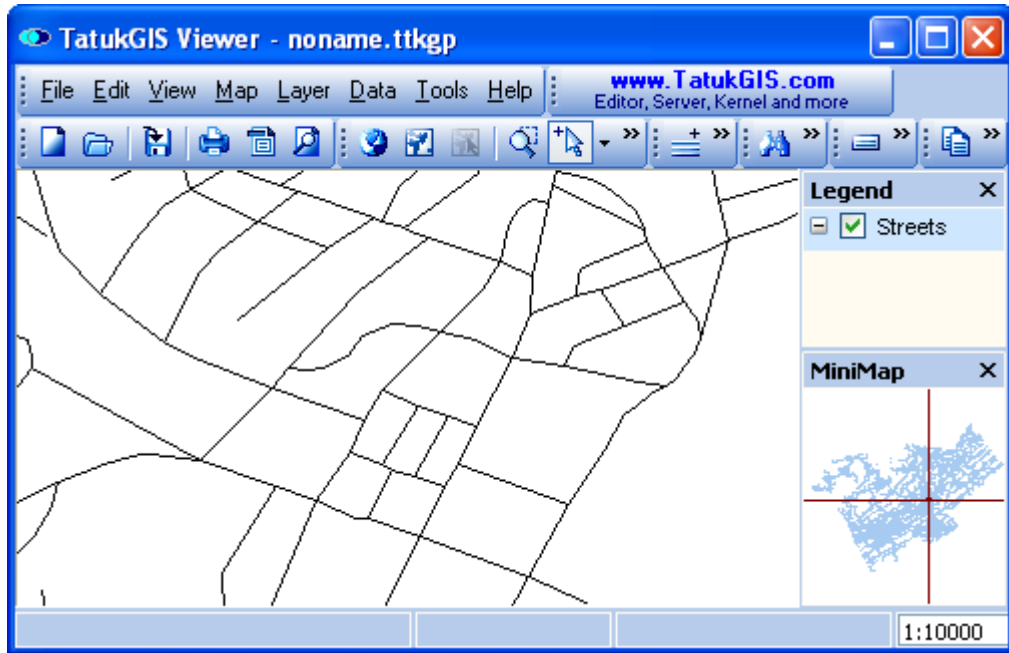
Note that the labels of the map objects defined by this section could be custom rendered via the settings under the *Label* tab.



Two images below present the result when zoomed to a scale that is greater than 1:8000 and less than 1:8000. Note that the current scale level is presented in the scale box at the bottom of each window.

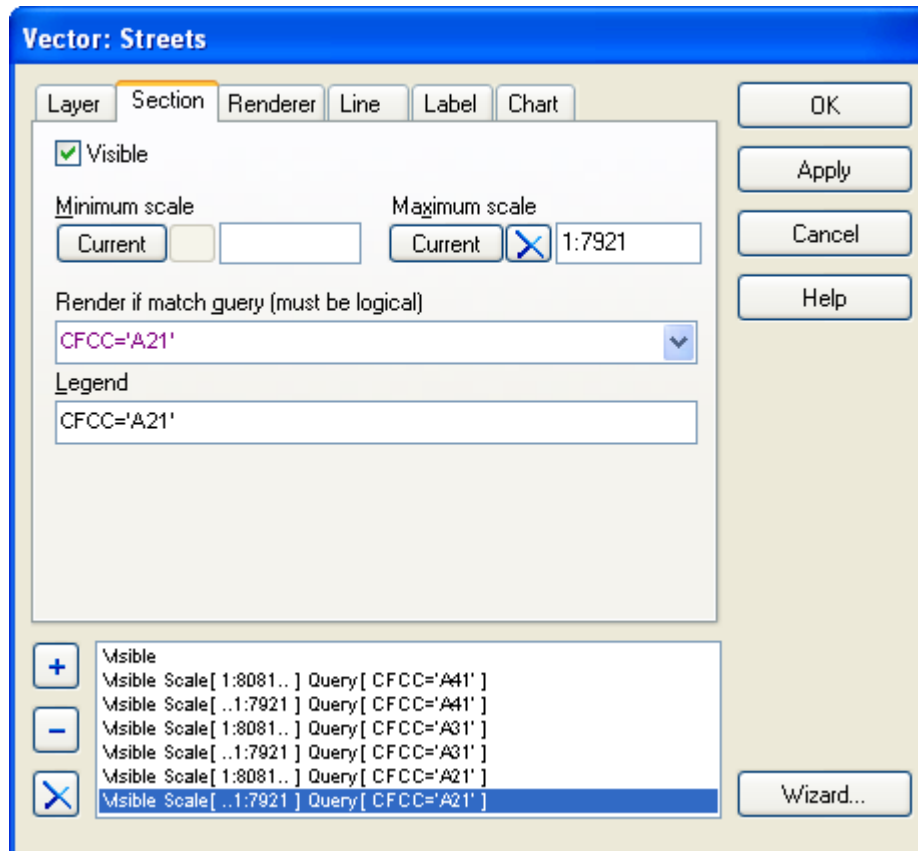


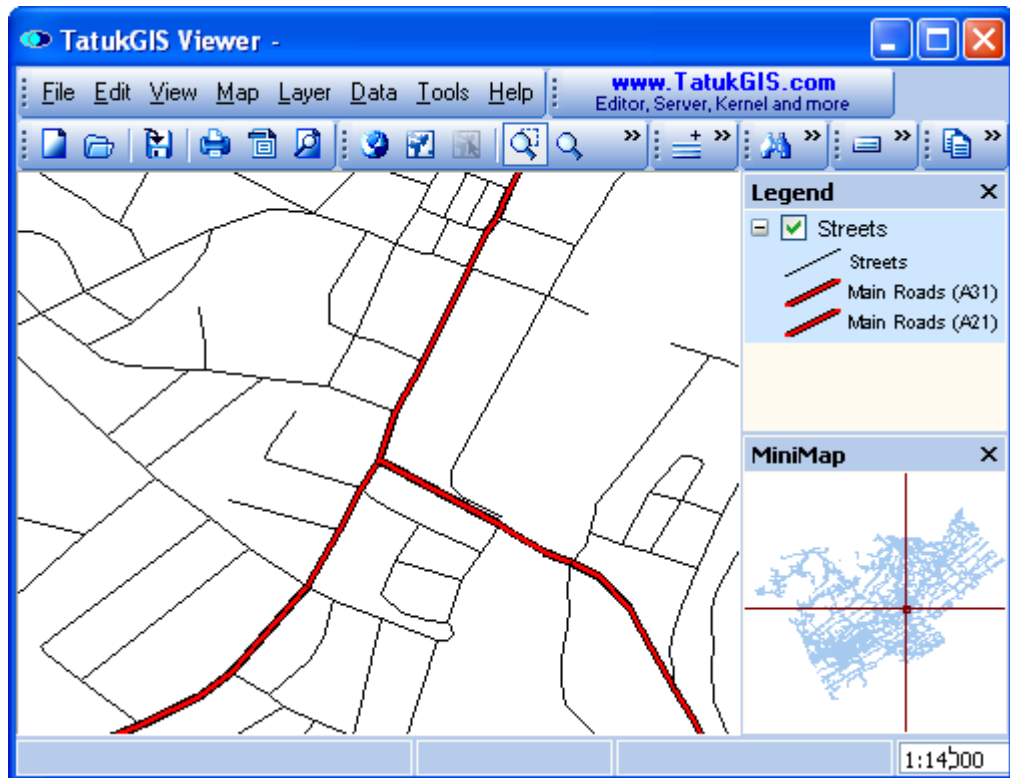
Scale = 1:7,000



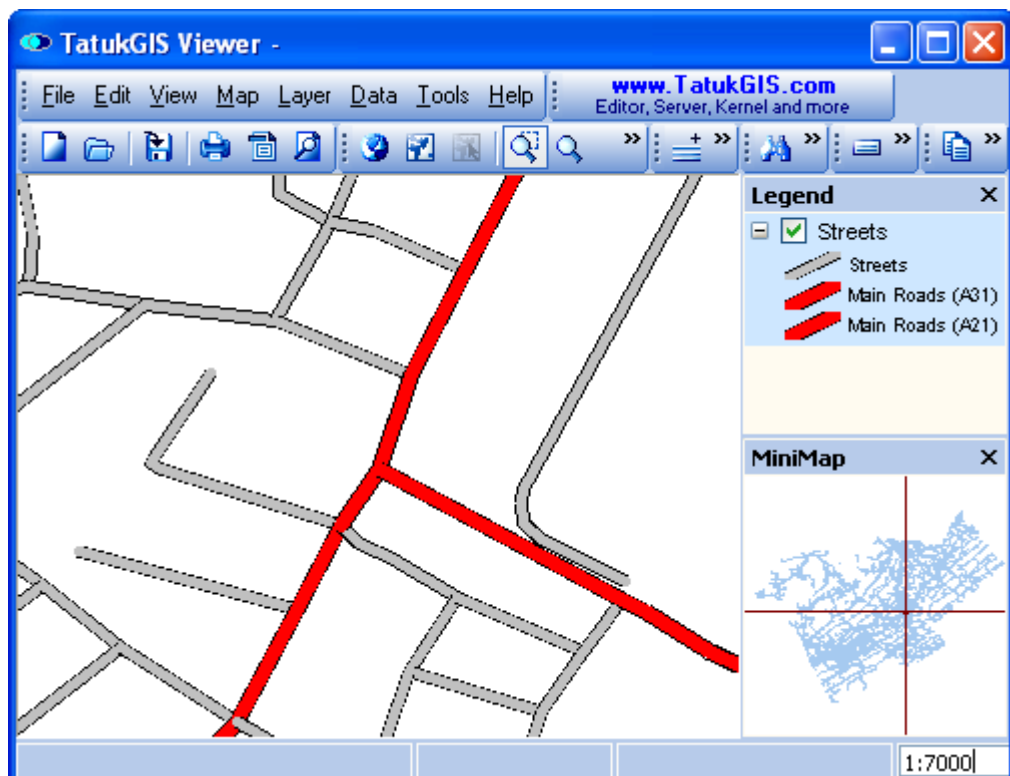
Scale = 1:10,000

Next define how the streets with *CFCC* attributes values of *A31* and *A21* are to be rendered at zoom levels in which the scale is more and less than 1:8000. In this example, these streets are set to be rendered with a width of 1.5 pt. at the closer zoom levels and with a width of 5.0 pt at more distant zoom levels. The results are shown below.





Scale = 1:14,000

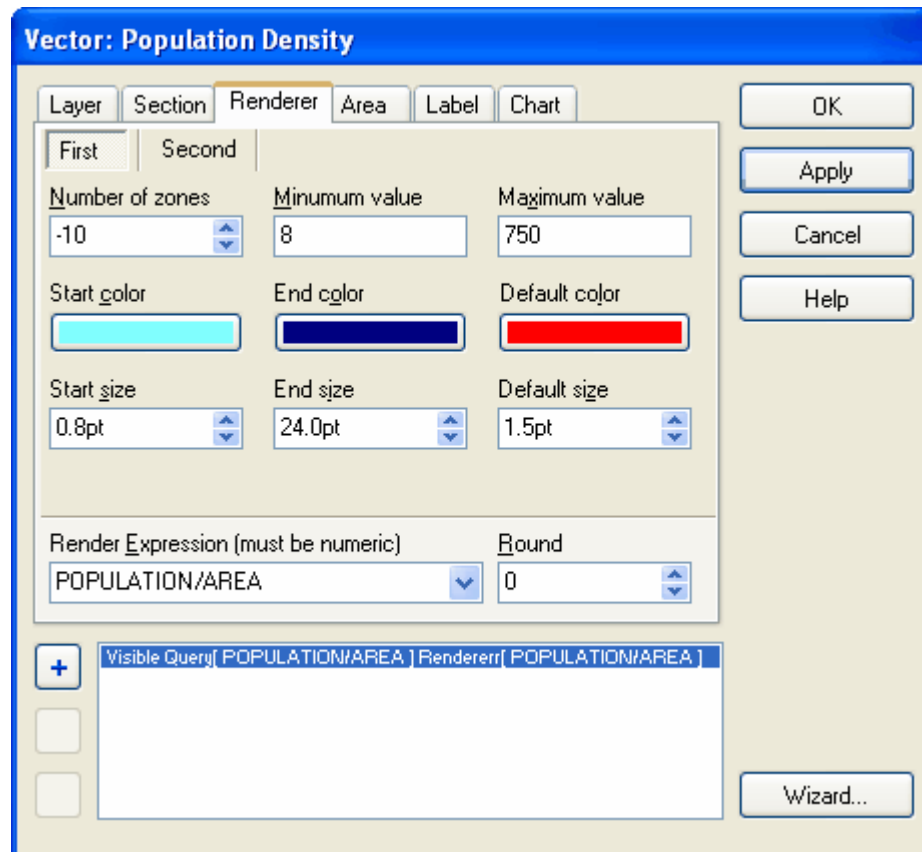


Scale = 1:7,000

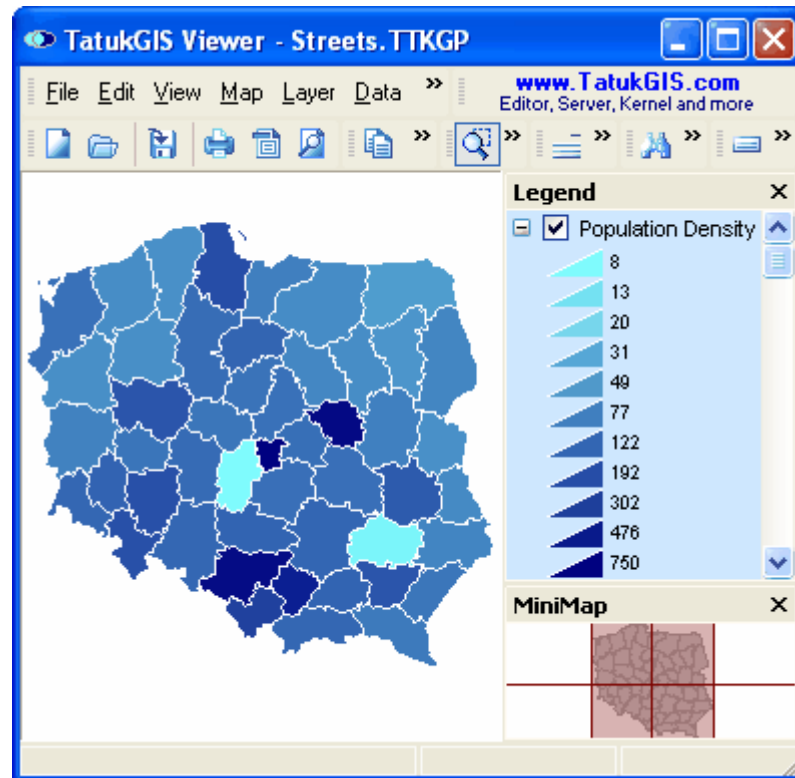
2.2.1.3.4 Rendering Based on a Formula

As opposed to just rendering based on the values of a single attribute, the rendering may be based on a formula using multiple attributes. In this example each *POPULATION* attribute value is divided by the *area* attribute value, in order to render a colored-gradient value theme presentation of population density.

Note below that the *Render Expression* is defined by the formula *POPULATION* divided by *AREA*. The formula can reflect any logical combination of attributes to thematically render a desired concept. Only attributes with numerical values can be used in formulas.



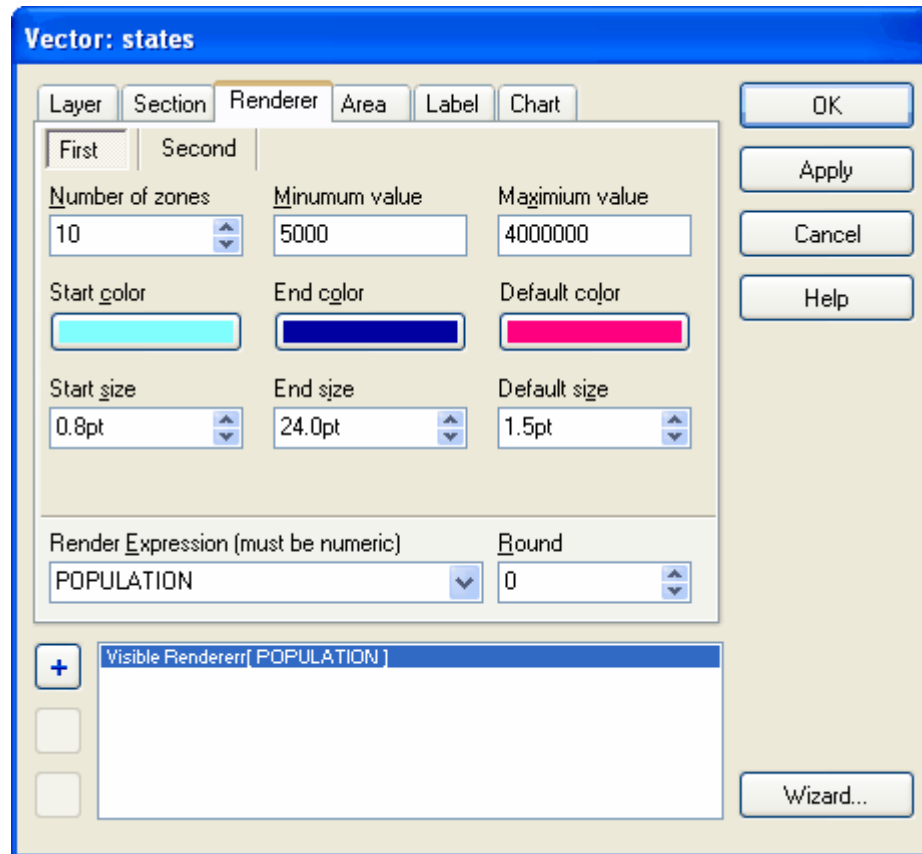
The rendered result.



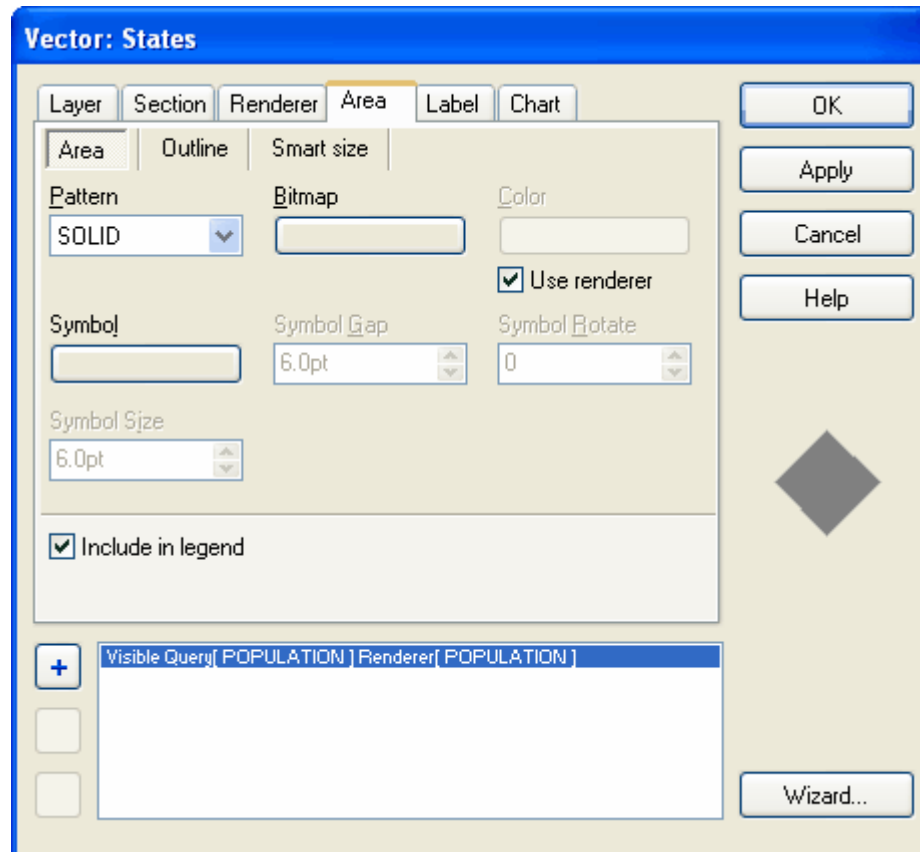
2.2.1.3.5 Colored-Gradient Value Theme

Perhaps simpler and more intuitive than the use of sections is to define a color-gradient value theme based on value ranges. This is done via the settings in the *Renderer* tab window within the Layer Properties dialog window to automatically organize the map objects into groups based on a specified number of value ranges contained by a selected attribute. As shown in the image below, the following parameters have been set:

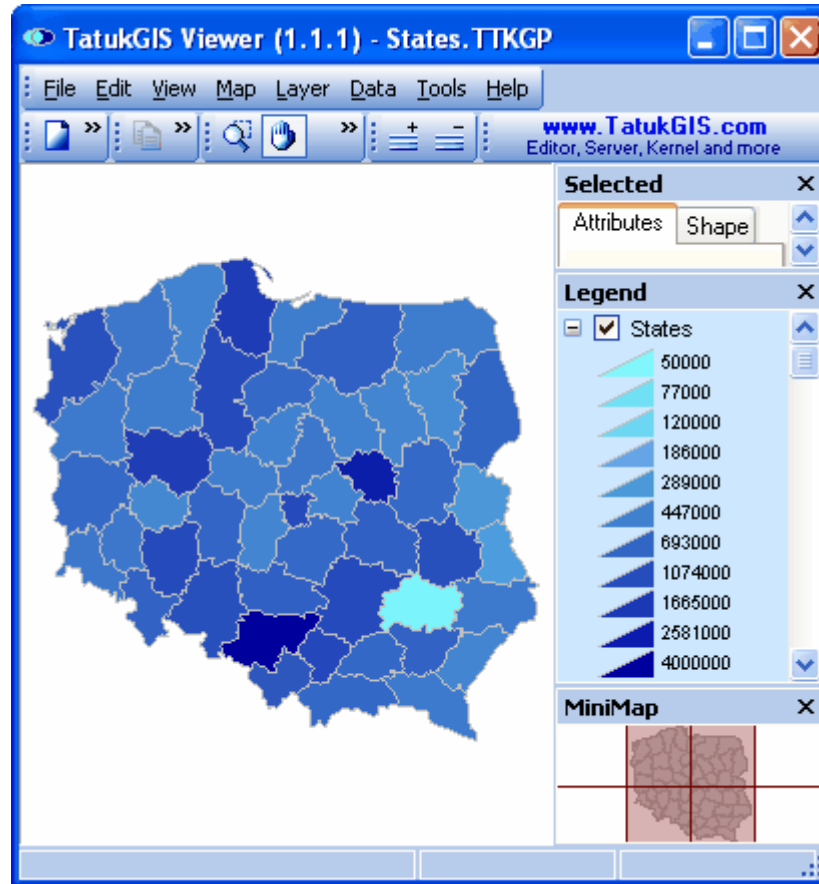
- the *POPULATION* attribute is selected to base the rendering
- the number of population groups (color zones reflecting population value ranges) is set at 10
- a starting and ending color range is selected (pale blue to represent the lowest population value range to very dark blue to represent the highest population value range)
- the minimum and maximum population values to be rendered is set at 50,000 and 4 million, respectively. (The maximum and minimum values were found by first reviewing the *POPULATION* attribute values of some the polygon areas. Because the max/min values for a data set are sometimes not readily known, this is one reason that the render *Wizard* can be helpful. The *Wizard* automatically figures out the min and max values contained by the selected attribute.)
- the default color is set as bright red, so that it will be readily visible if the population value of any polygon area is outside of the max/min range.



Return to the *Area* tab window. Rather than manually associate the colors to sections, this time just check the *Use renderer* option. This tells the Viewer to render the colors based on the parameters specified under the *Renderer* tab. Also note that the *Include in legend* option has been checked, to generate a ramped color legend in the *Legend* panel.



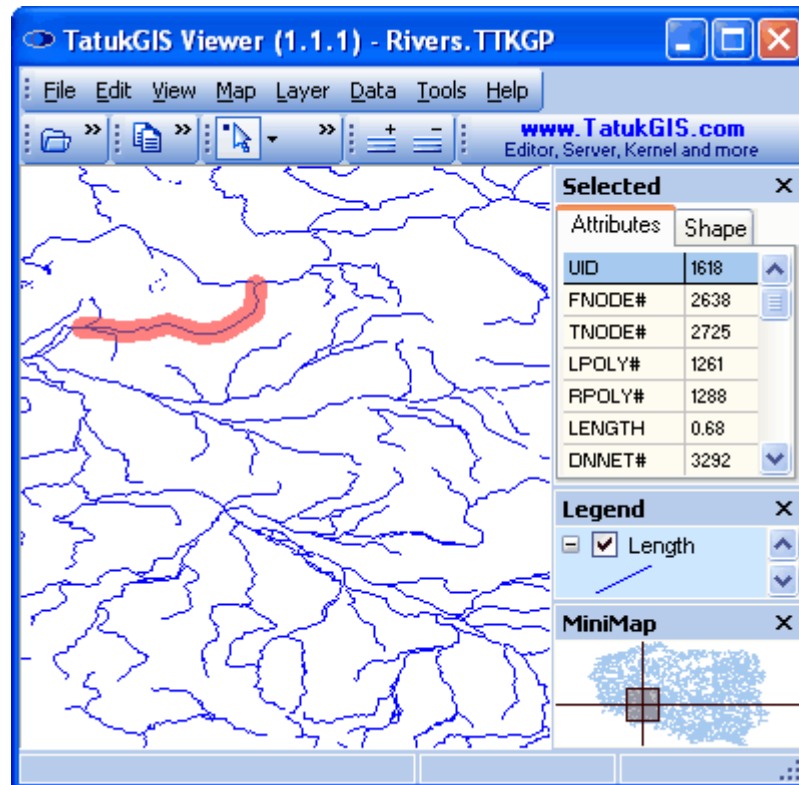
The result is presented below. Note that, even though 10 zones were specified, 11 colors are rendered. The colors and the numbers in the legend represent the starting point (low limit) of each value zone (range of values), plus the top limit of the top zone. This ensures that all values between the bottom limit of the lowest zone and the top limit of the highest zone are reflected in the result. When generating a colored-gradient value theme, the number of colors rendered will always be one more than the number of zones selected. (If the program rendered only the medium or average value of each zone (range), the number of colors would equal the number of zones specified, but important data points with values at the very high and low ends could be omitted from the rendered result.)



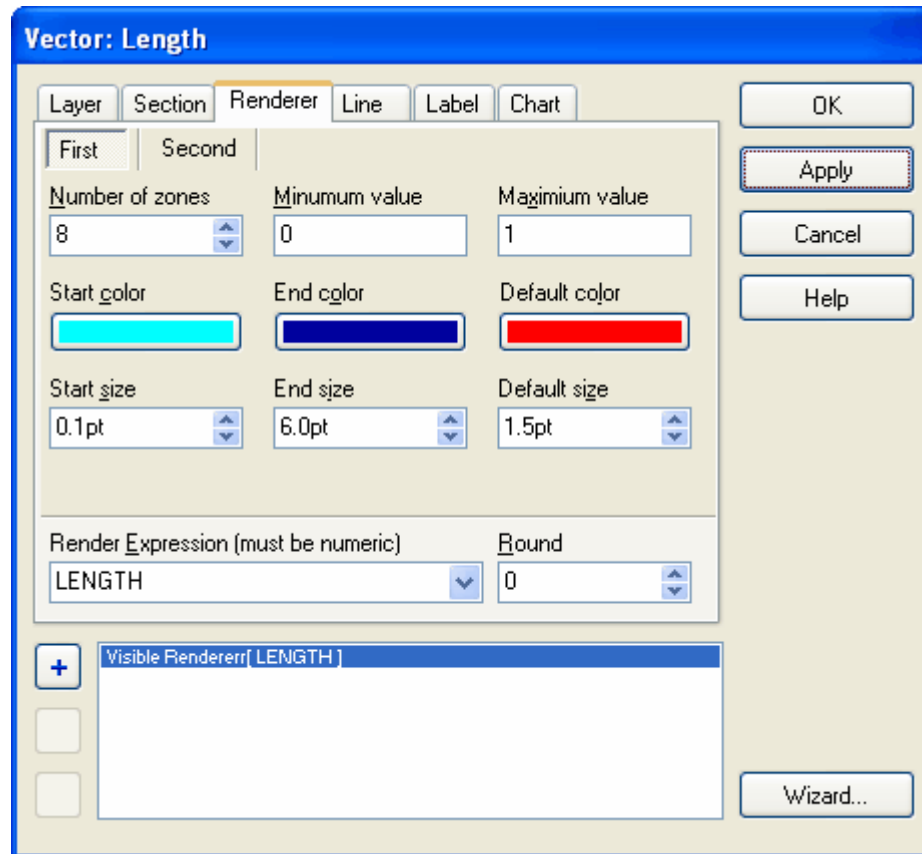
If desired, save as a new TatukGIS project file using the *File/Save as* menu command (or to save changes to the project file if one already exists).

2.2.1.3.6 Line Width Value Theme

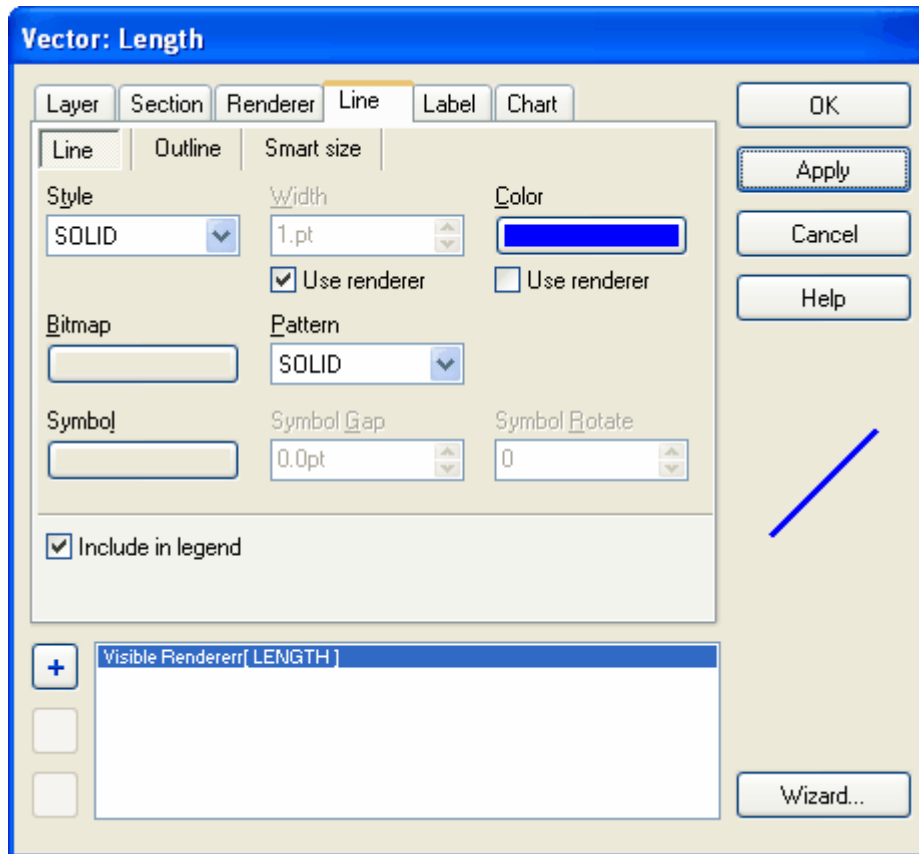
More than just colors can be rendered based on ranges of attribute values. Other possibilities are polygon outline colors or widths, line colors or widths, point sizes, etc. This example uses a SHP format line vector map representing segments of rivers and streams to demonstrate the rendering of line widths based on the values of a selected attribute. This example uses the *LENTGH* attribute. Imagine how the attribute could contain data represent the capacity or throughput of pipelines or electrical power lines, automobile traffic on a road network, etc.



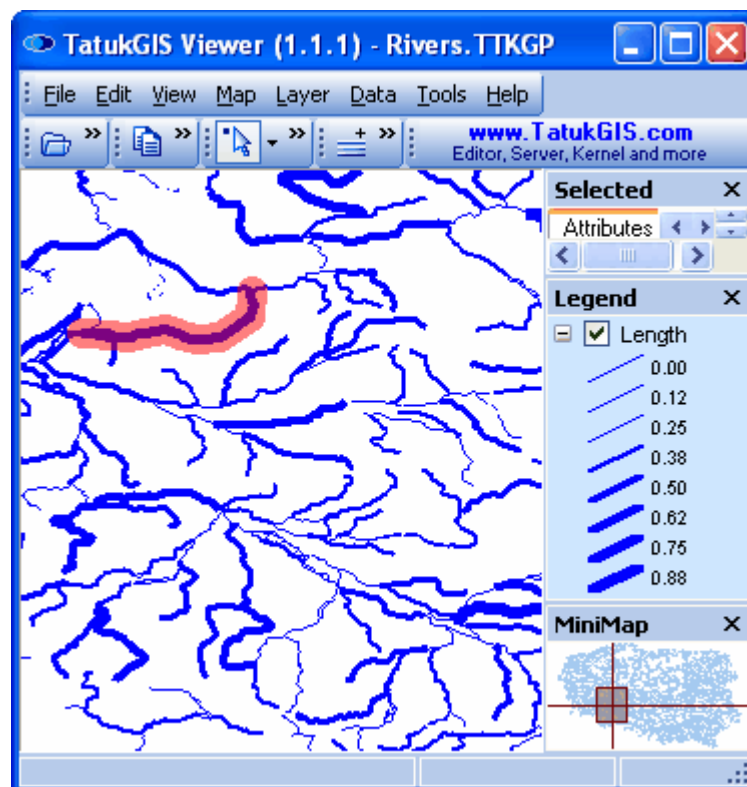
Open the Layer Properties dialog box and then the *Section* tab to select the attribute to be rendered. Notice that with this layer there is a *Line* tab (as opposed to the *Area* tab in the prior example which used a polygon layer), because the program has recognized that the selected layer contains only line features. As shown below, the *LENGTH* attribute is selected for the *Render Expression* and the attribute value ranges to be rendered are specified a from 0 to 1. This range includes all the values held by the *LENGTH* attribute in this particular file. (This information was known only after reviewing the *LENGTH* attribute values in this file.) The *number of zones* is set at 8 and the range of line widths to be rendered is set at a minimum of 0.1 pt (1 pt = 1/72 inch) and a maximum of 6 pts.



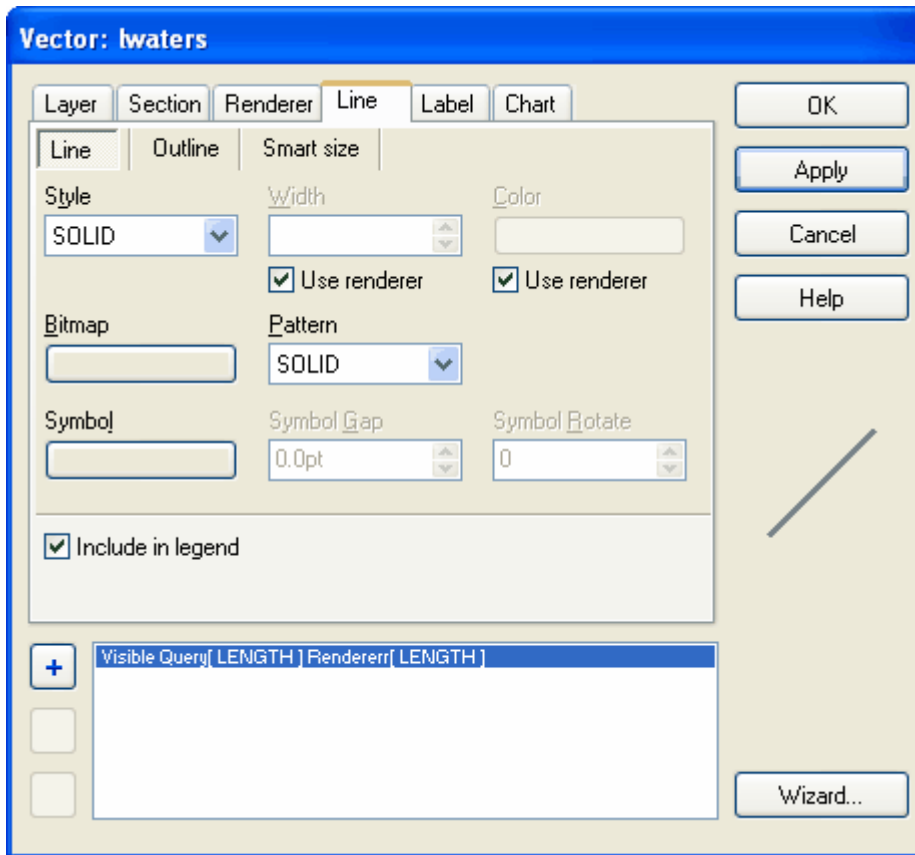
Within the *Line* tab window, the *Use renderer* option is checked for *Width*, but not for *Color*.



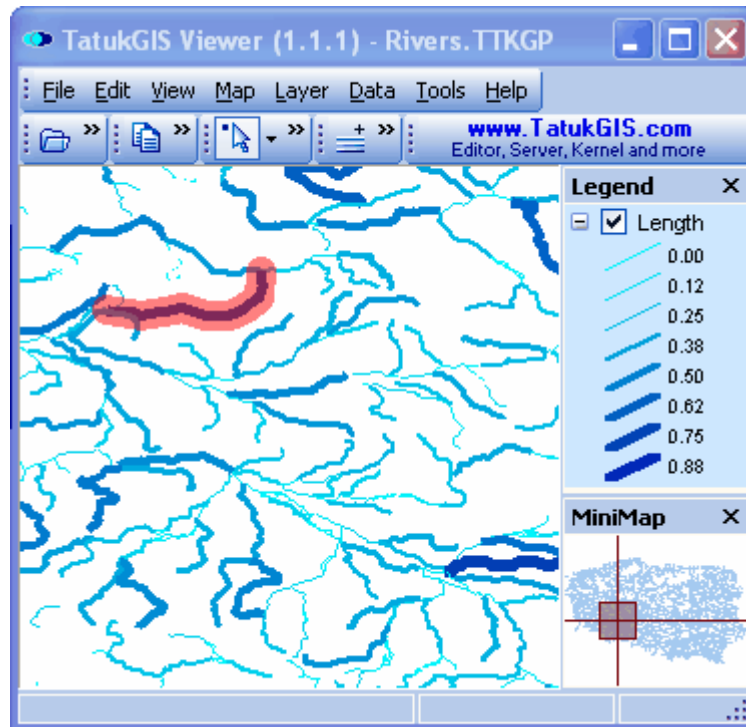
The result.



Now activate the rendering of line colors and well as line widths, both based on the *LENGTH* attribute.



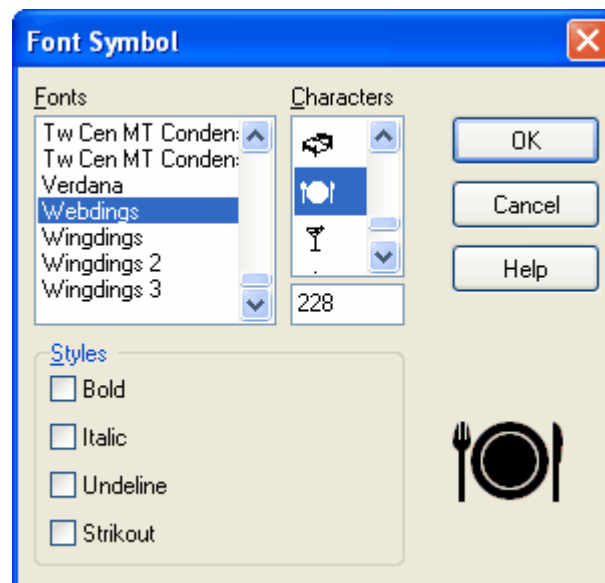
The result. Although line width and color gradient are both based on the *LENGTH* attribute in this example, the width and color could be based on different attributes. This allows for many possibilities.



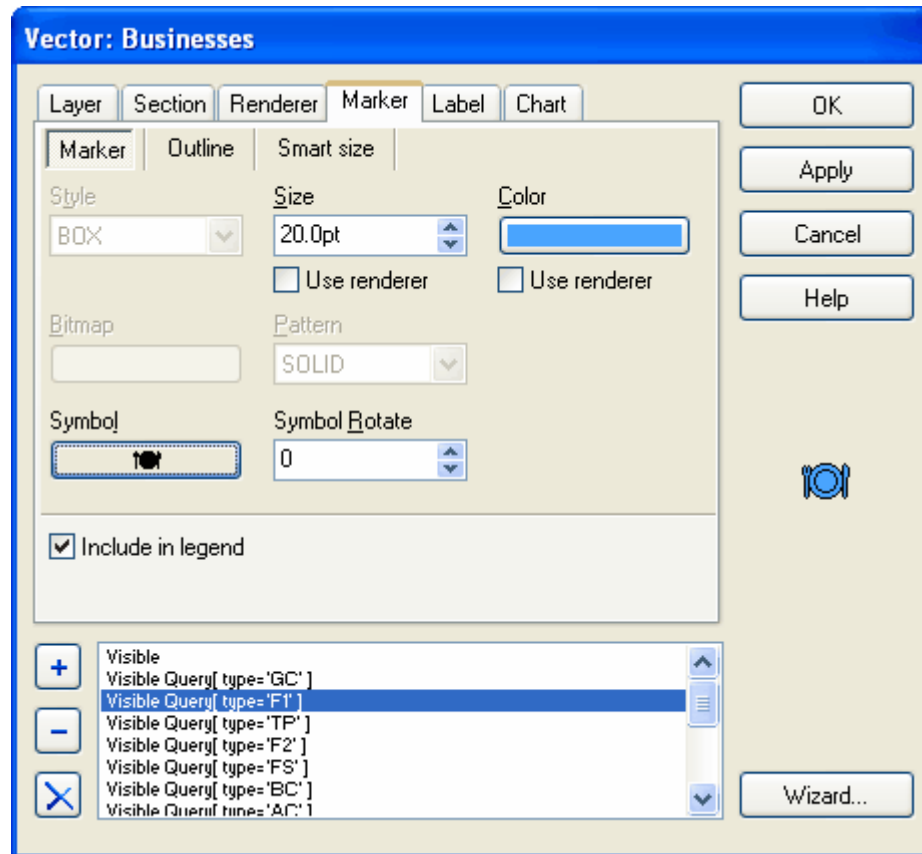
2.2.1.3.7 Use of Symbols

The Viewer supports the use of CGM and TrueType symbols to represent points, lines polygon outlines and CGM, TrueType, and WMF symbols for polygon fills.

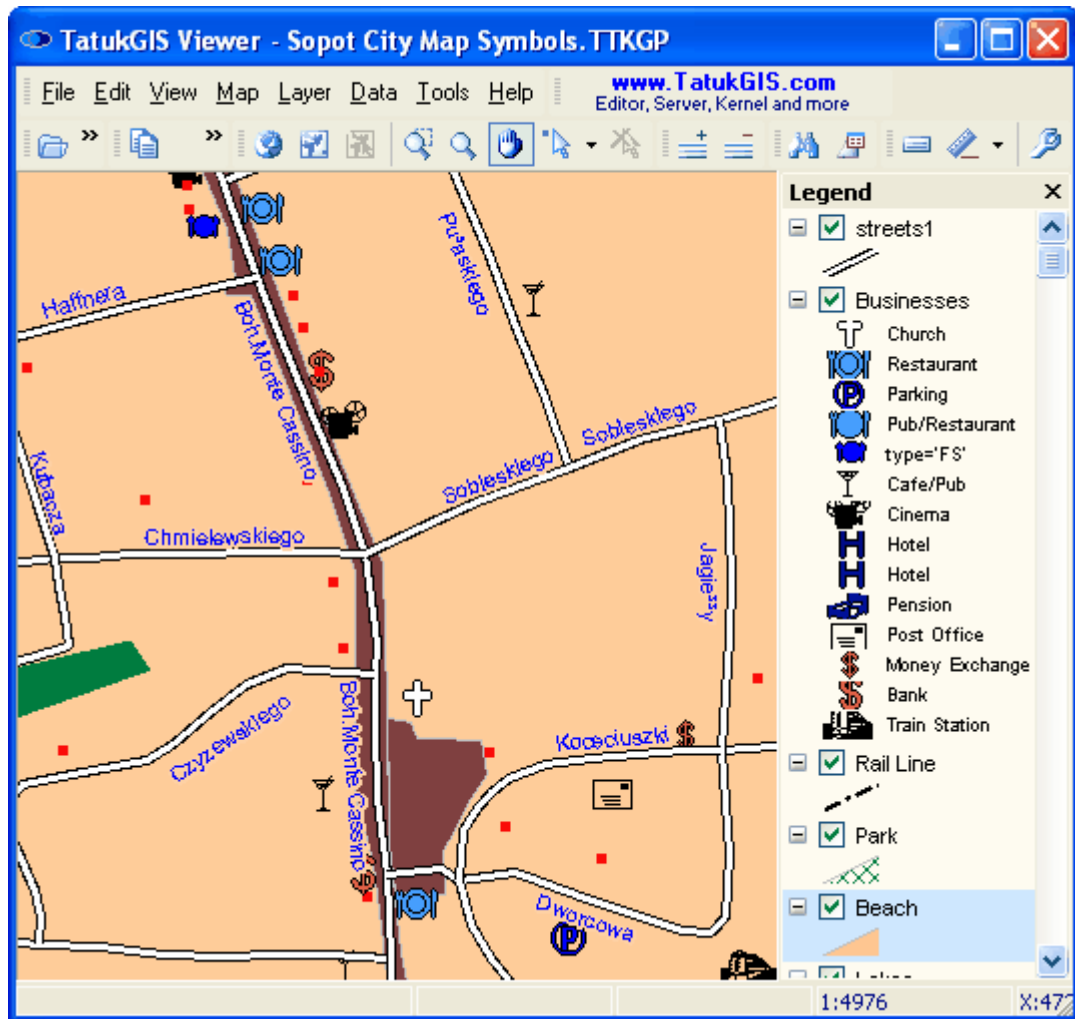
As illustrated by the images below, a *Webding* symbol is selected from the list contained in the Viewer to represent each point in the selected layer in which the *type* attribute contains the text information *F1*. Note that when the selection is based on attribute text information, as opposed to a numeric value, the text must be contained by ' ' marks. (Do not use " " marks.)



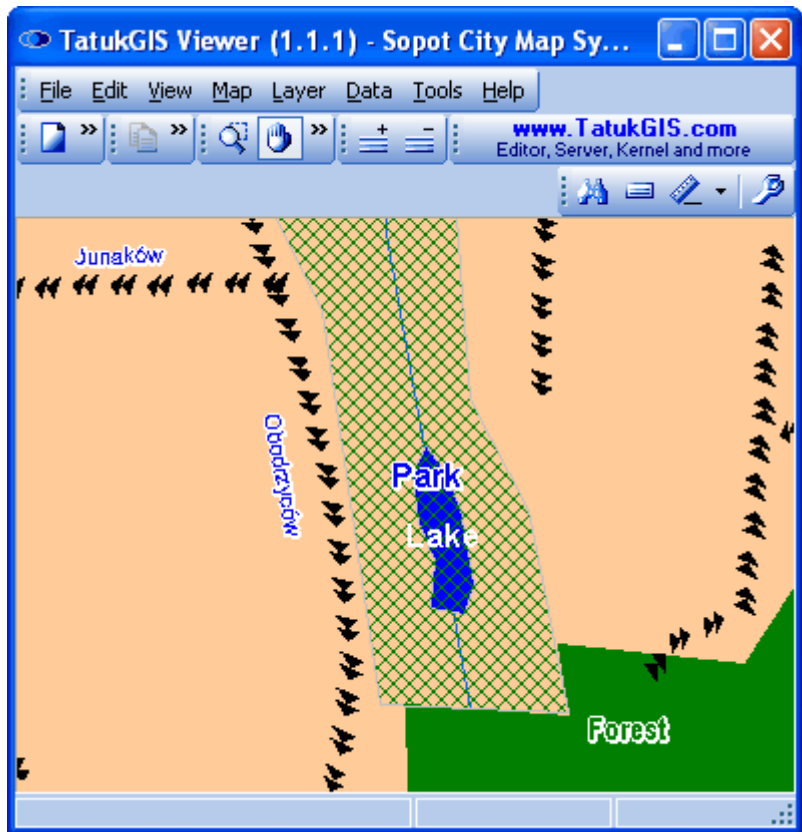
The symbol is set to be rendered light blue color and a size of 20 points.



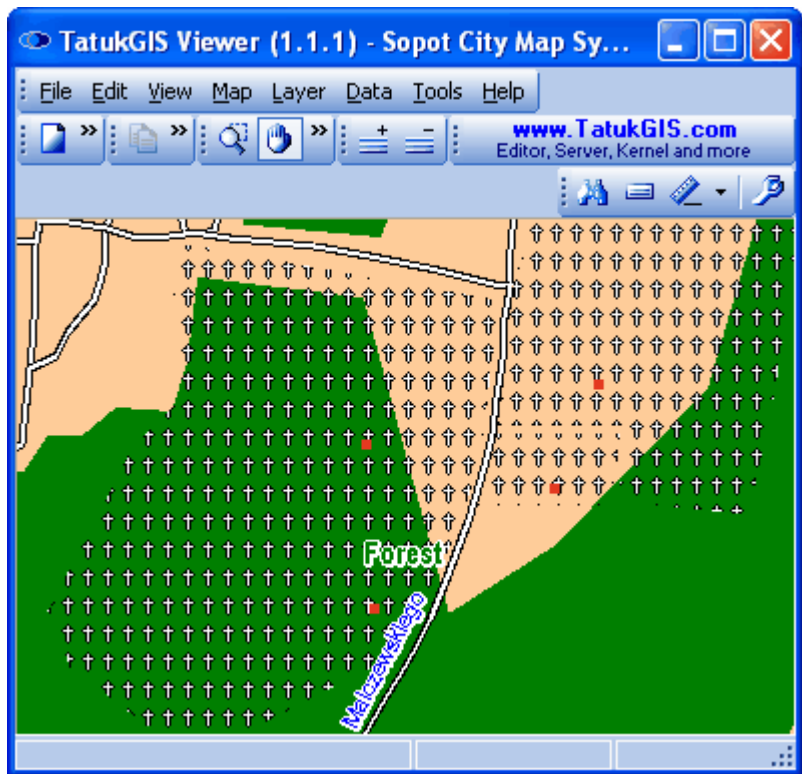
This image shows the map after various symbols, representing churches, restaurants, hotels, etc., have been associated with vector points on the map.



The image below shows the use of a repeating symbol to represent lines.



Below a repeating symbol has been selected to fill a polygon representing the area of a cemetery.



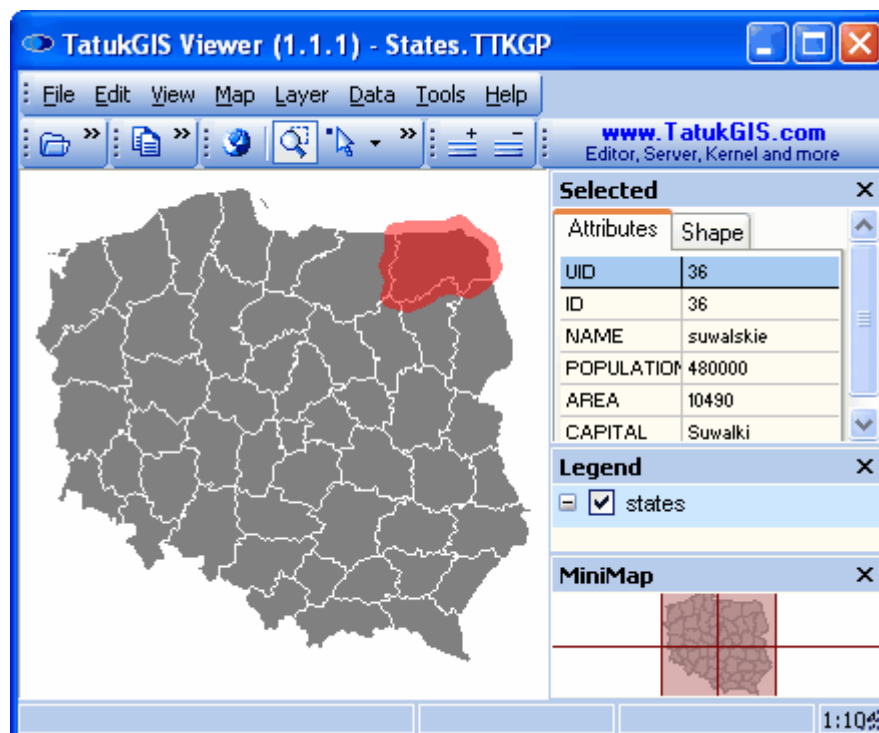
2.2.1.4 Tutorial 4 - Thematic Rendering Wizard

The Wizard button, which is located in the lower right corner of the *Layer/Properties* dialog box, allows the user to quickly set up and quickly render a map based on ranges of attribute values. Although the rendering is most typically performed with shades of color, many other aspects of the map - line widths, marker sizes, etc. - can be rendered in the same way using the Wizard. The Wizard sets up the rendering operation based on the responses to questions presented in three easy to follow dialog boxes. One reason that use of the Wizard is quick and easy is because it automatically determines the max/min values of any selected attribute and automatically detects whether the attribute field contains a numerical value or text information.

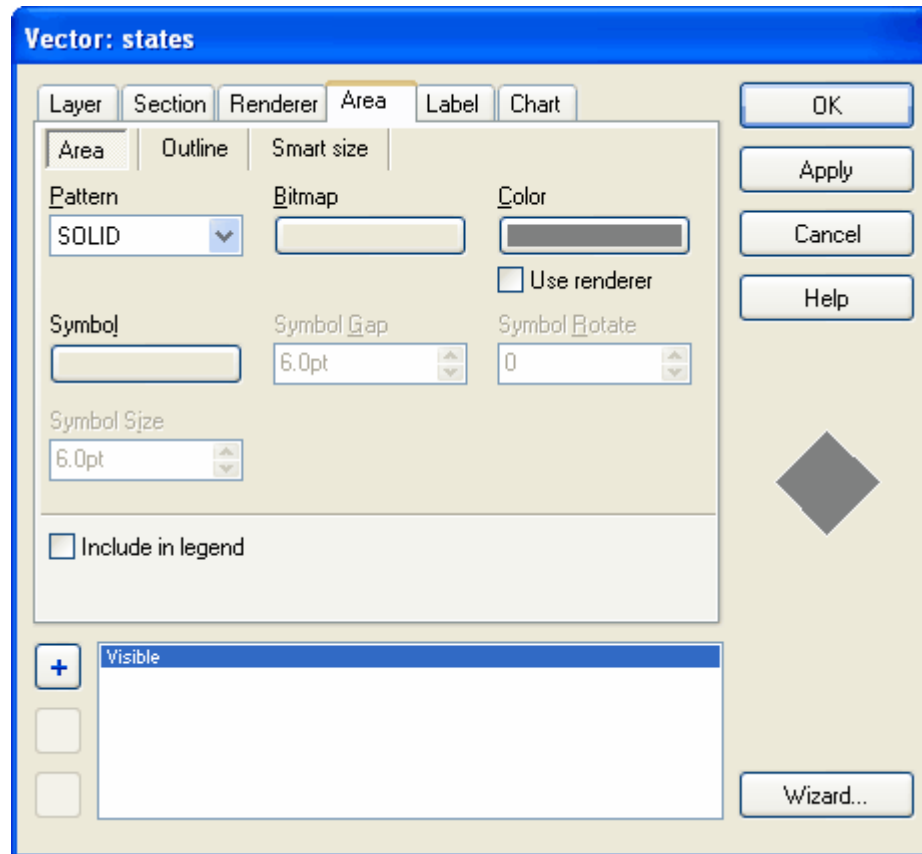
2.2.1.4.1 Colored Gradient Value Theme 1

This example demonstrates the use of the Rendering Wizard to quickly and easily generate a colored-gradient theme reflecting value ranges of a selected attribute. Polygon fills are rendered by color based on values contained by the POPULATION attribute. The Wizard sets up the rendering operation based on user responses to questions presented in three easy to follow dialog boxes.

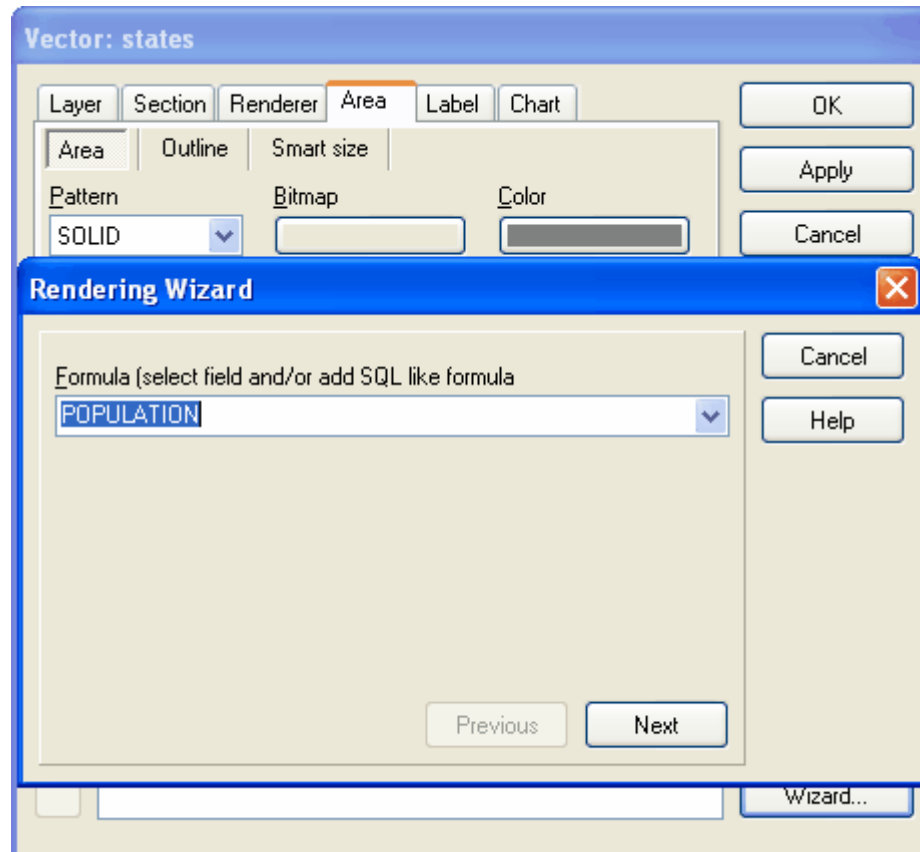
Open the map file (the same file as used in Tutorial 3).



Go to the *Layer/Properties* dialog window and click on the *Wizard* button in the lower right corner.



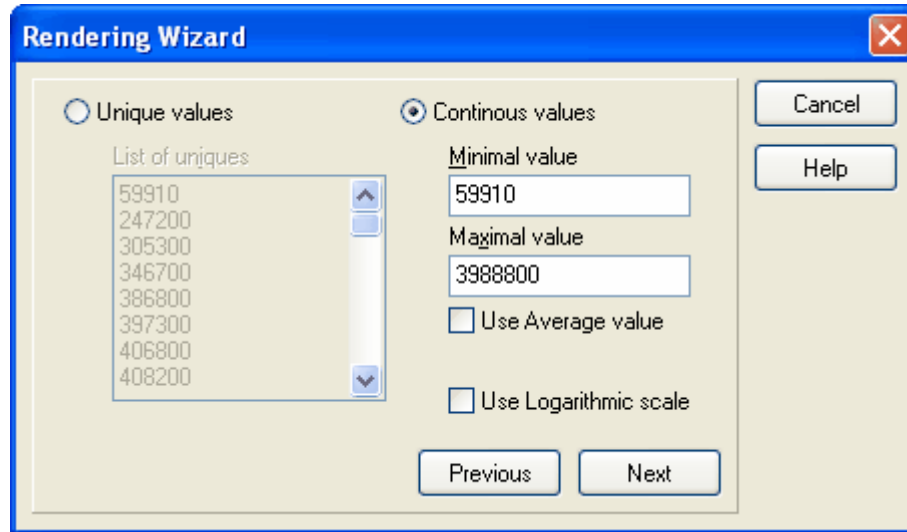
The first *Rendering Wizard* window requests the selection of an attribute (or the entry of a formula based on multiple attributes containing numerical values). The POPULATION attribute is selected, which of course, contains numerical values.



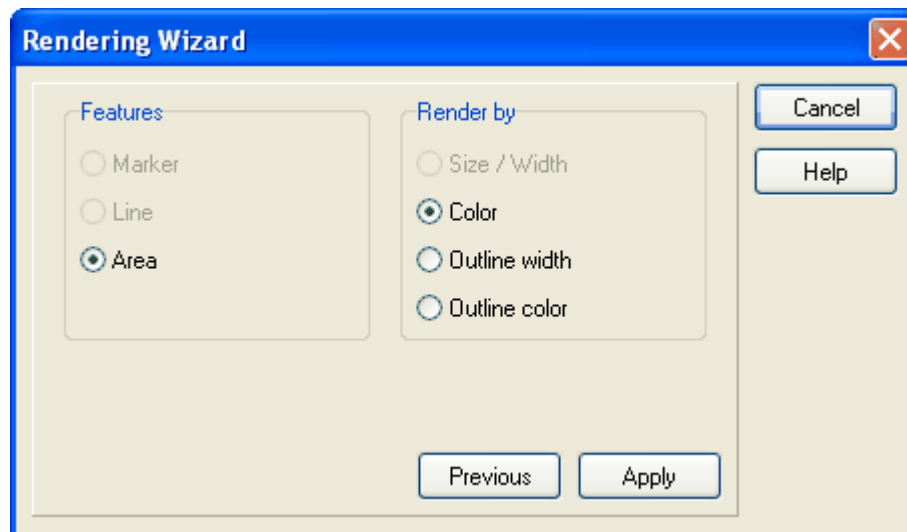
The second *Rendering Wizard* window asks the user to select between rendering all the unique values contained by the selected attribute or a continuous colored-gradient value theme with a finite number of zones. If the *Unique values* option is selected, the Wizard randomly assigns colors to each value or text information contained by the selected attribute. If the *Continuous values* option is selected, the Wizard renders a colored-gradient value theme, using the starting and ending colors specified in the combo box under the *Renderer* tab. If the selected attribute contains text values, only the *Unique values* option will be active.

Note that the Wizard automatically determines the maximum and minimum values and whether the attribute contains text or numeric values. This can speed up the process dramatically.

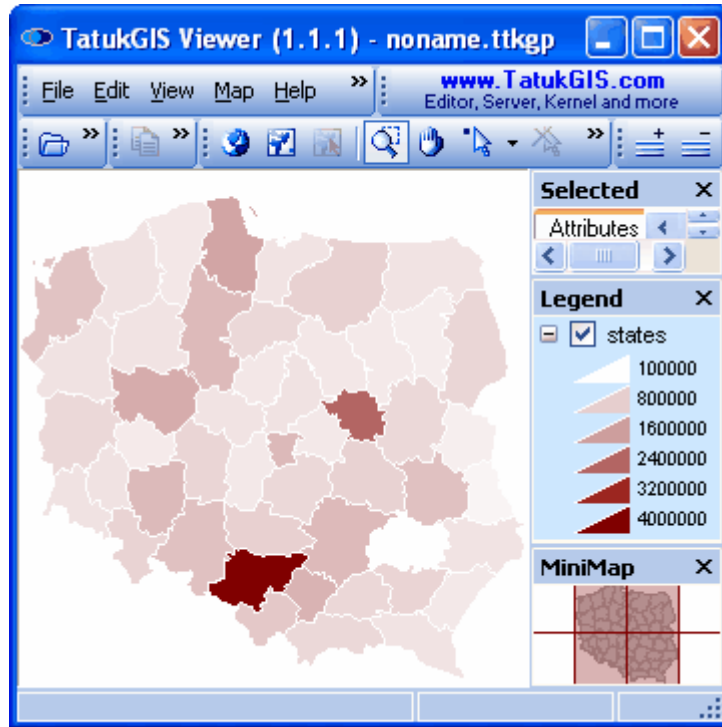
In this example, the *Continuous values* option is selected to present the population data as a colored-gradient value theme.



The third *Rendering Wizard* window asks the user to specify whether the information should be rendered as the color of the polygon areas, the width of the polygon outlines, or the color of the polygon outlines. In this case a *color* option (to render polygon fills) is selected. If the layer contained vector line features, this dialog box would offer the choice between rendering line colors or line widths. If the layer contained point vectors, this dialog box would offer the choice between rendering the points using colors or size.

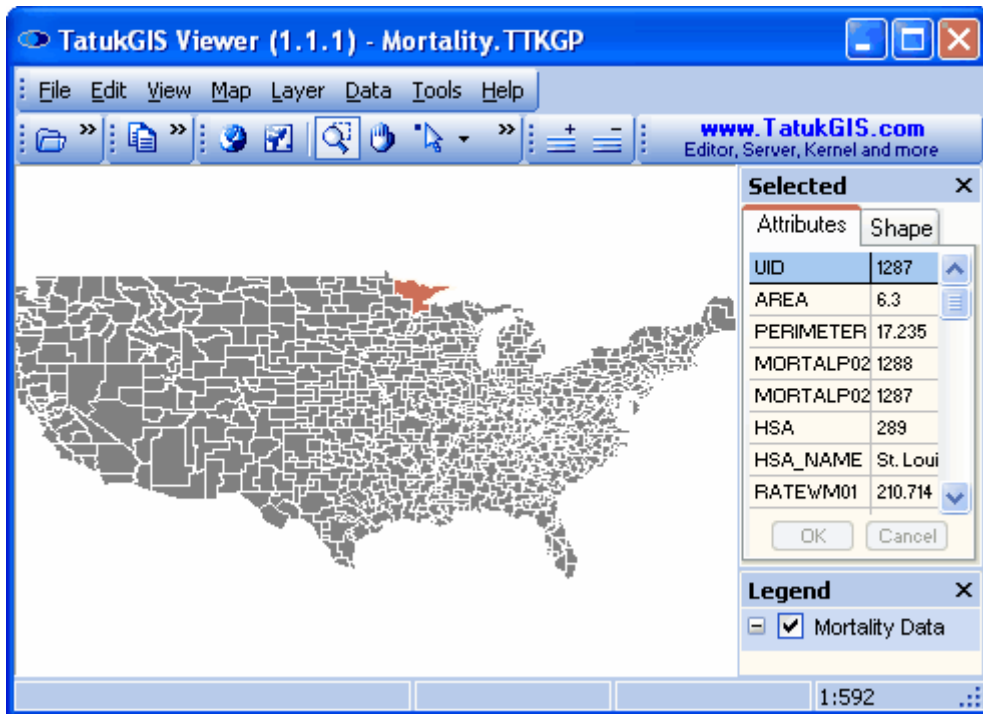


The result. By default, the Wizard renders based on six color gradients, but the number of gradients can be modified in *Renderer* tab window.



2.2.1.4.2 Colored-Gradient Value Theme 2

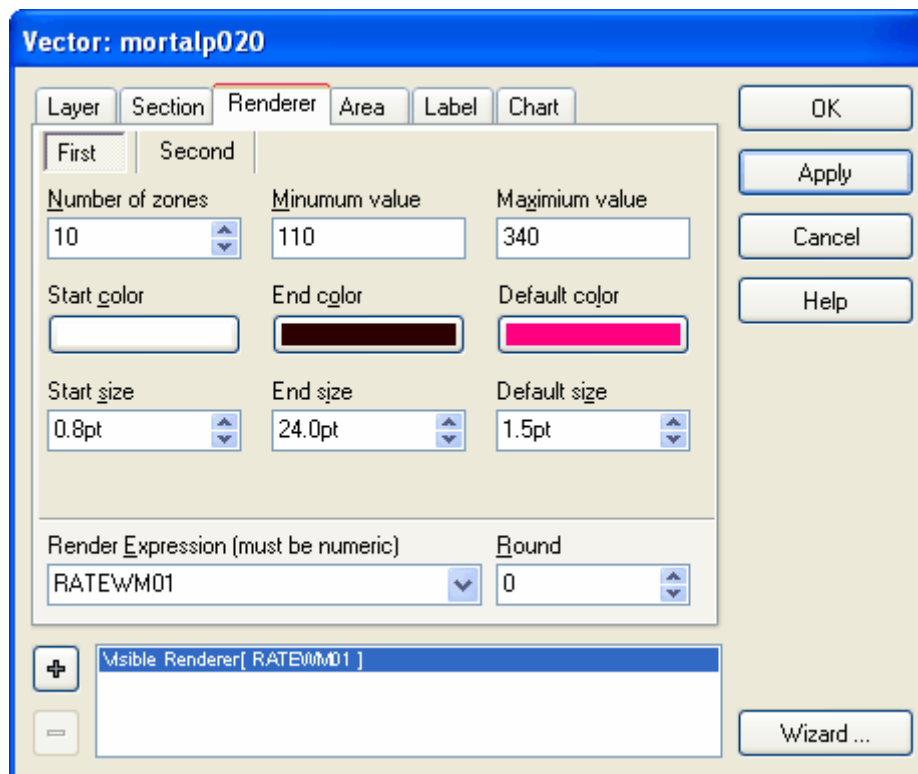
This example demonstrates the use of the rendering wizard to generate a colored-gradient value theme. It is similar to the prior example, but using larger and more complicated map layer. The map file is a SHP format vector polygon map representing Health Service Areas (HSA) in the continental United States. HSA's are geographical territories for which medical data is collected and analyzed. The attributes of this file contain extensive medical mortality statistics and other data.



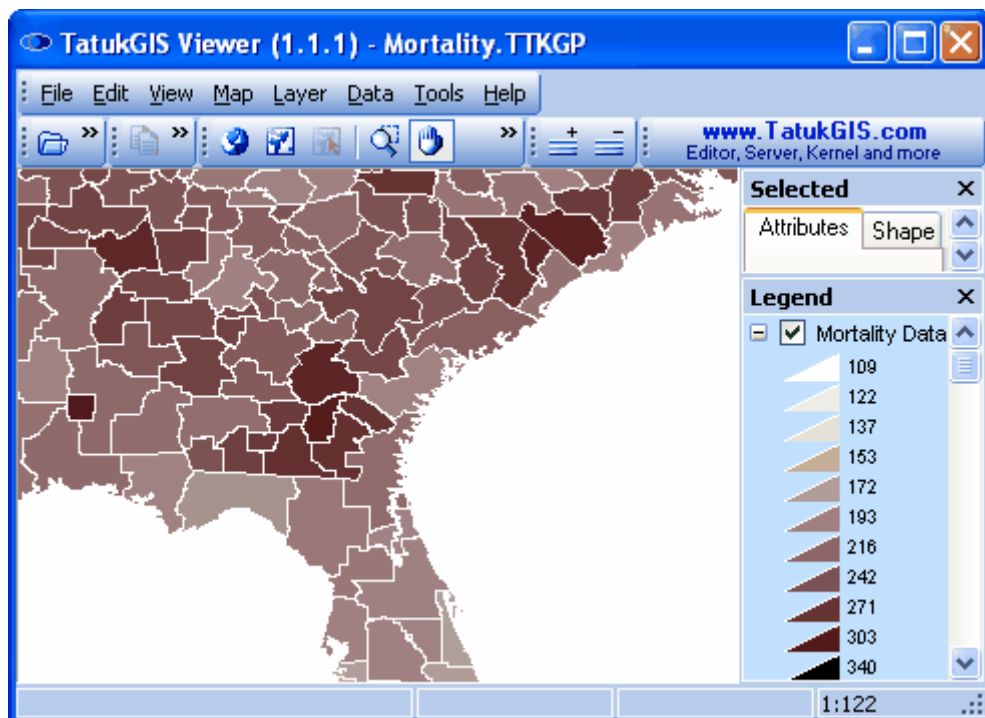
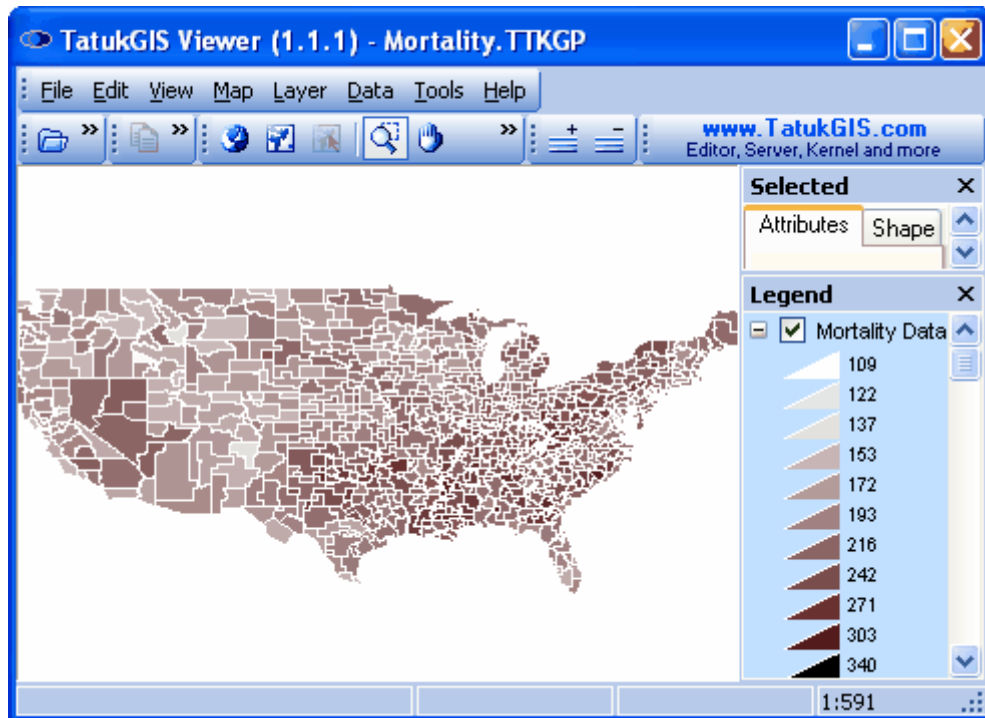
Using the *Layer/Properties* menu, or by clicking on the layer in the *Legend* panel, open the Layer Properties dialog box window to enter the map render settings. This demonstration focuses on the *RATEWM01* attribute, which contains the mortality rate of the white male population due to heart disease per 100,000 population. (The 01 code corresponds to heart disease and "WF" corresponds to white male.) The color range is set to be white to dark brown, the number of zones to be rendered is 10, and the minimum and maximum values are set at 110 and 340.

Within the window under the *Renderer* tab, the default color is set to bright pink so that it would be apparent if the *RATEWM01* value for any polygon is outside of the selected range. The approximate minimum and maximum values in this example were determined by trial and error rendering of the layer until all bright red default areas were eliminated, but still keeping the range as tight as possible. (A quicker method is to use the thematic rendering wizard, which is explained in Tutorial 4.)

The *Use renderer* box under the *Area* tab has been checked to tell the Viewer use the *Renderer* tab window settings. If this box were not checked, the Viewer would ignore settings under the *Renderer* tab and only refer to the color and other parameters in the window under the *Area* tab. Click on the *Apply* or *OK* button to render the map.



The rendered result.



2.2.1.5 Tutorial 5 - Label Rendering

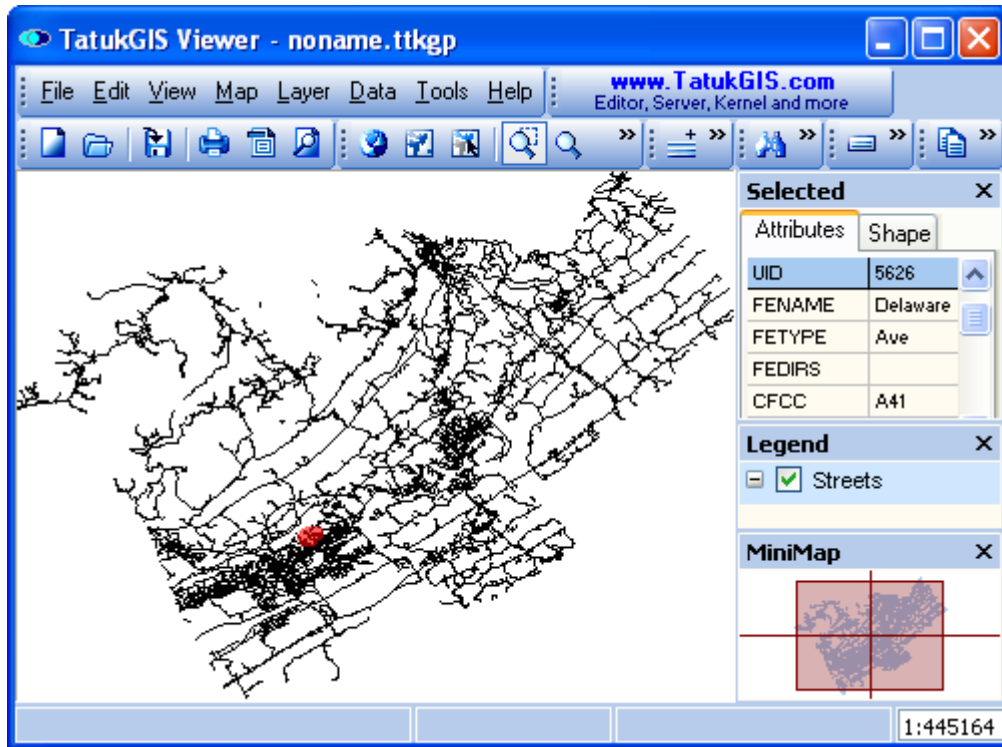
This tutorial demonstrates how to set up and customize the positioning, size, color, and other visual aspects of vector labels. Labels can be set up to show the information contained by any attribute.

Note #1: In complicated map rendering situations, it is recommended to set up the label rendering first, before setting up the rendering of other aspects of the layer appearance.

Note #2: The rendering of label based on zoom level is covered in Tutorial 3 - Thematic Map Rendering, [Sections:Scale/Zoom Levels](#).

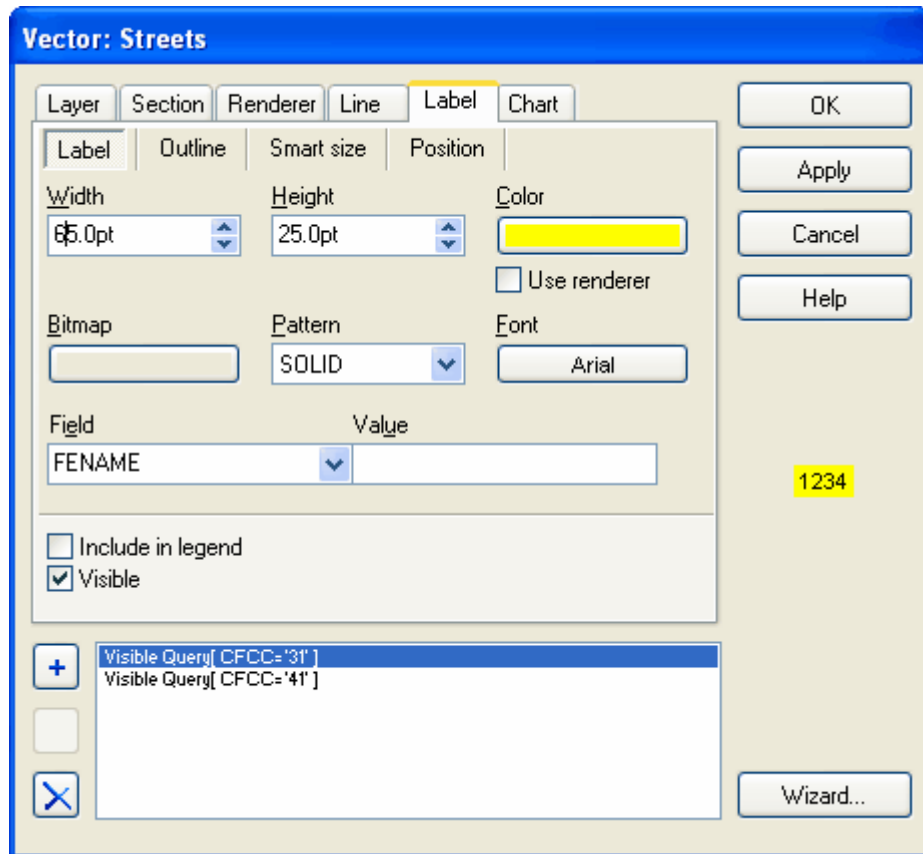
2.2.1.5.1 Label Styles

The Viewer can be used to set or alter the colors, size, transparency level, outline, text font, positions, etc. of labels. This demonstration uses a U.S. Department of Census TIGER vector line road/street map file. The procedure is the same for labeling vector points and polygon areas.

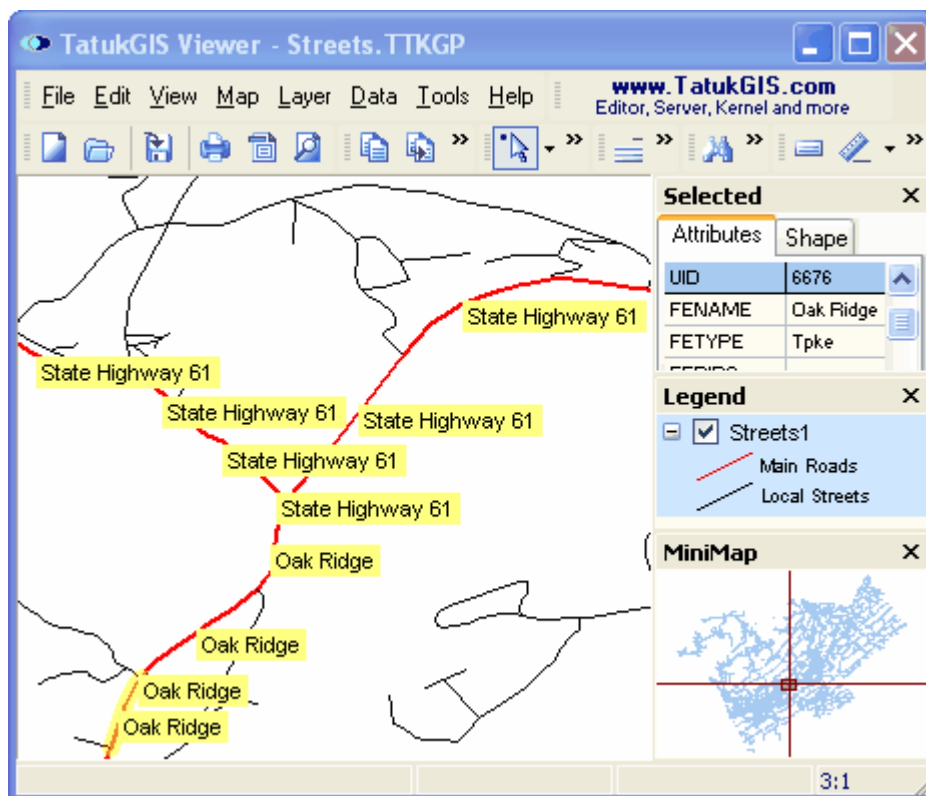


The information contained by any attribute can be presented in the labels. This example uses the labels to present street/road names, which are contained by the *FENAME* attribute. Note below that the *FENAME* attribute has been selected in the *Field* box under the Layer Properties' *Label* tab. Also pictured below, the label size and color are selected for all roads of the class *A31*. The road class information is contained in the *CFCC* attribute.

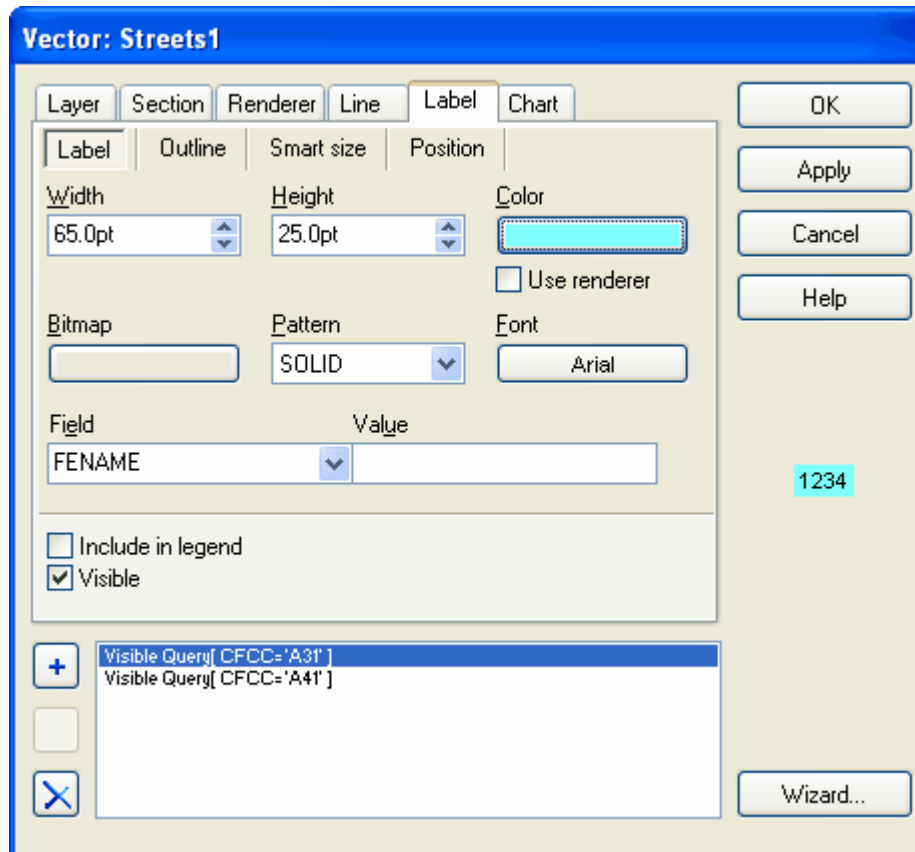
Note that the labels for an entire layer can be tuned on/off, without changing the label rendering set-up, by checking/unchecking the *Visible* option.



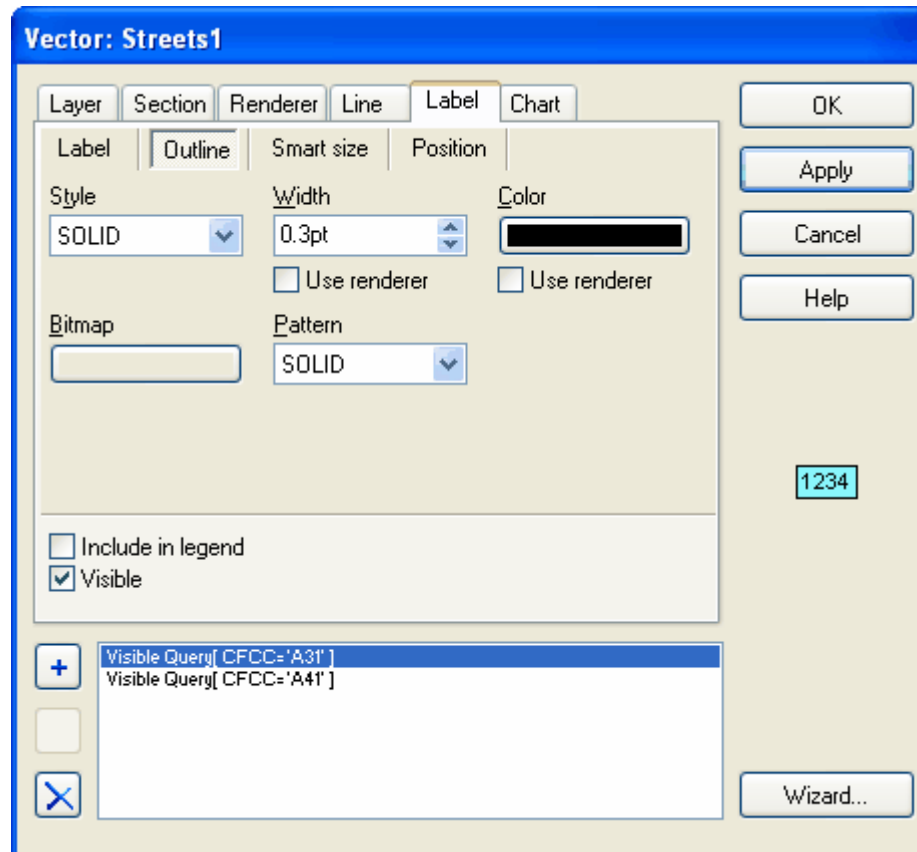
The result.



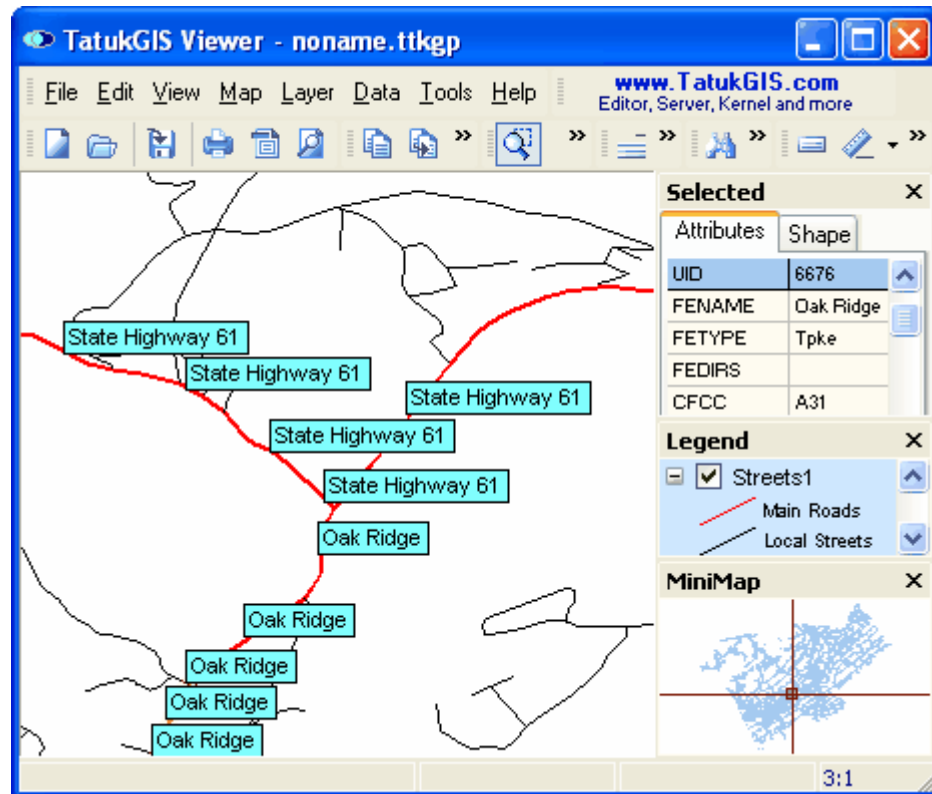
Now experiment with the label color.



And with the label outline.

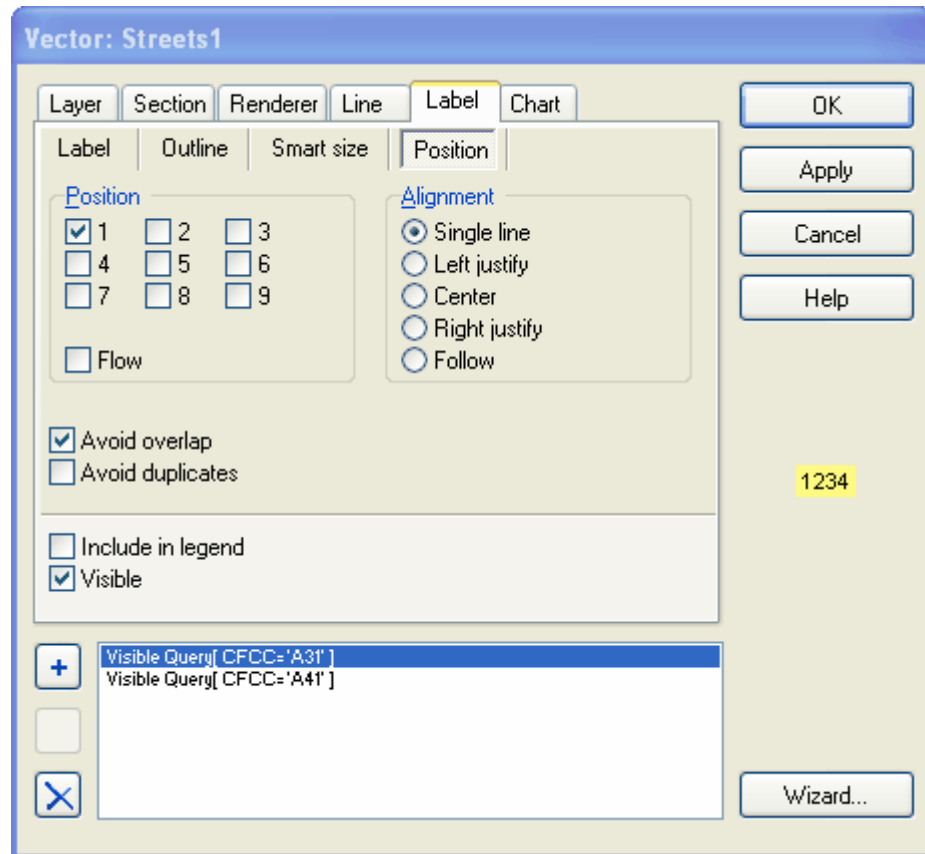


The result. If duplicate labels (more than one label for a single polygon in any map view) are not desired, the label duplication can be turned off by checking the *Avoid duplicates* option under the *Label/Position* tab.

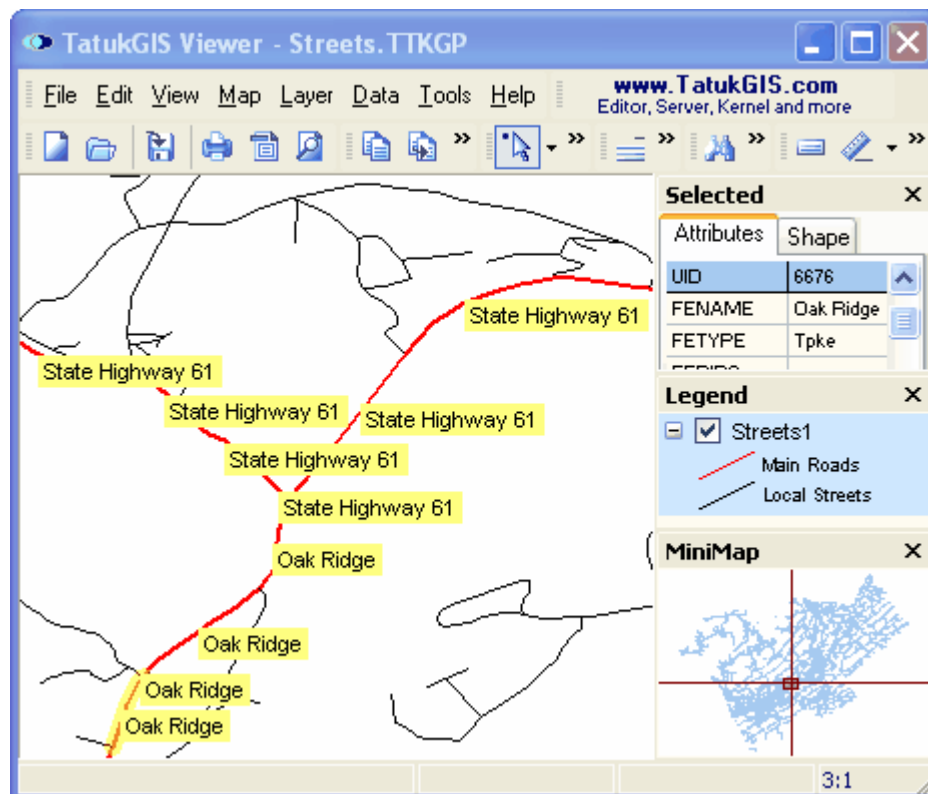


2.2.1.5.2 Label Positions

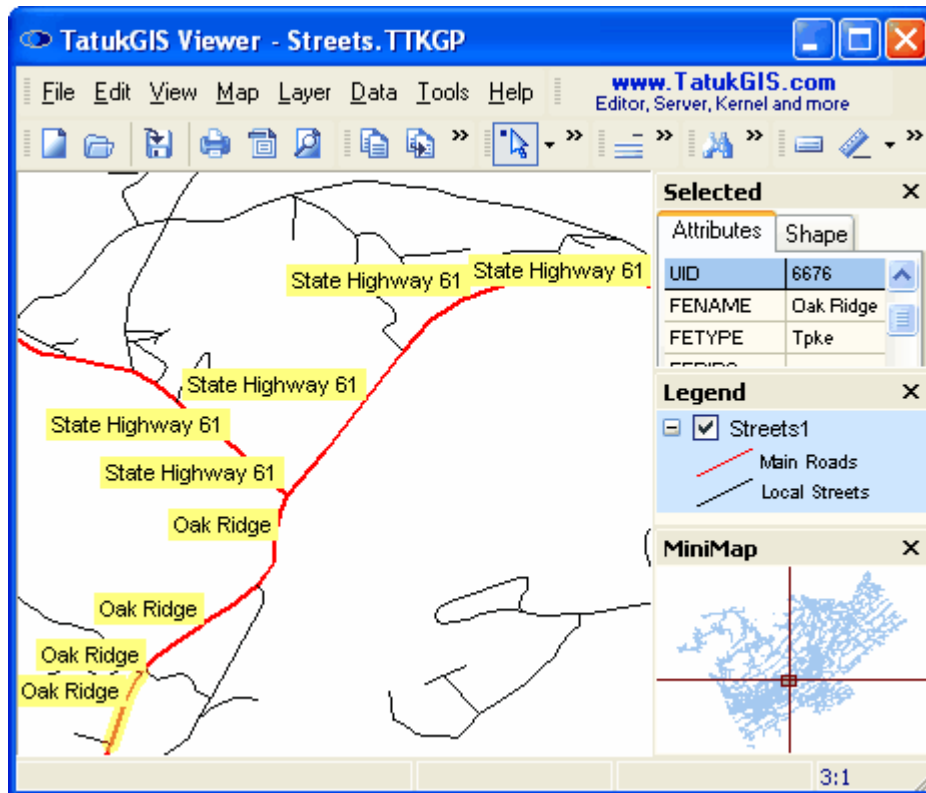
First of all, experiment with adjusting the position of the labels relative to the associated vector. Here the relative position is changed to position 1, from the original position 9.



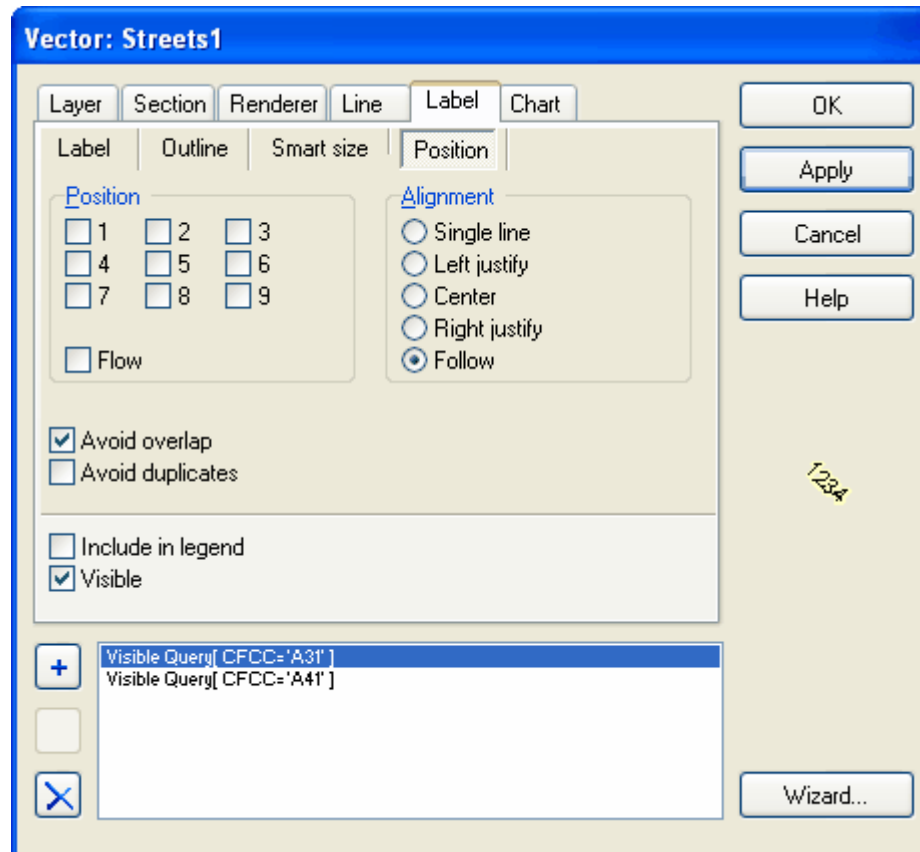
Rendered with the original label position 9.



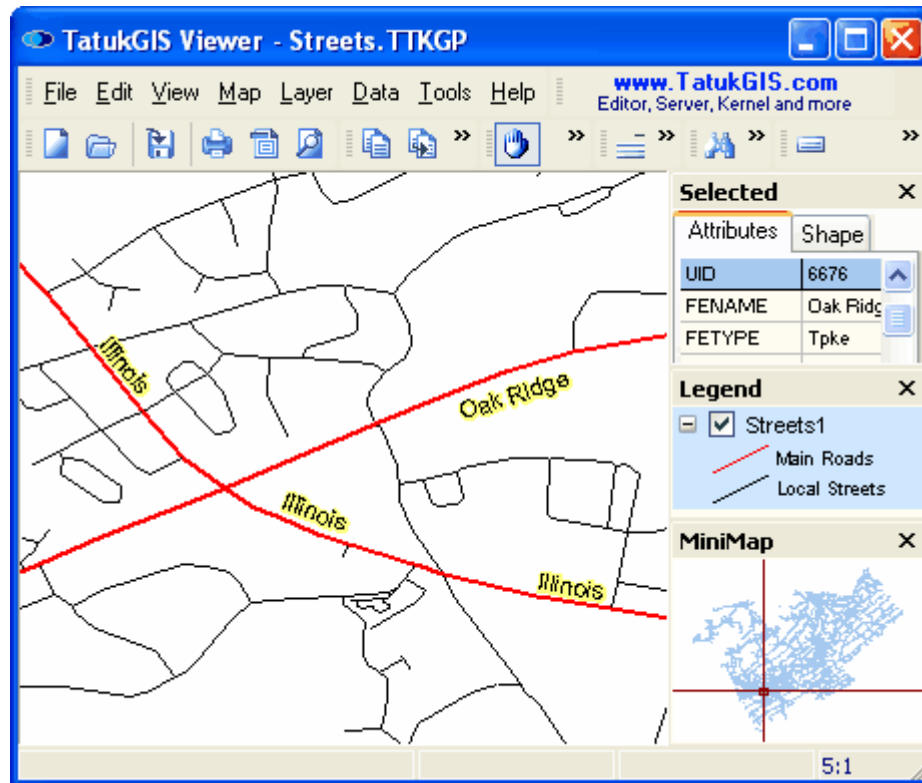
Rendered with label position 1.



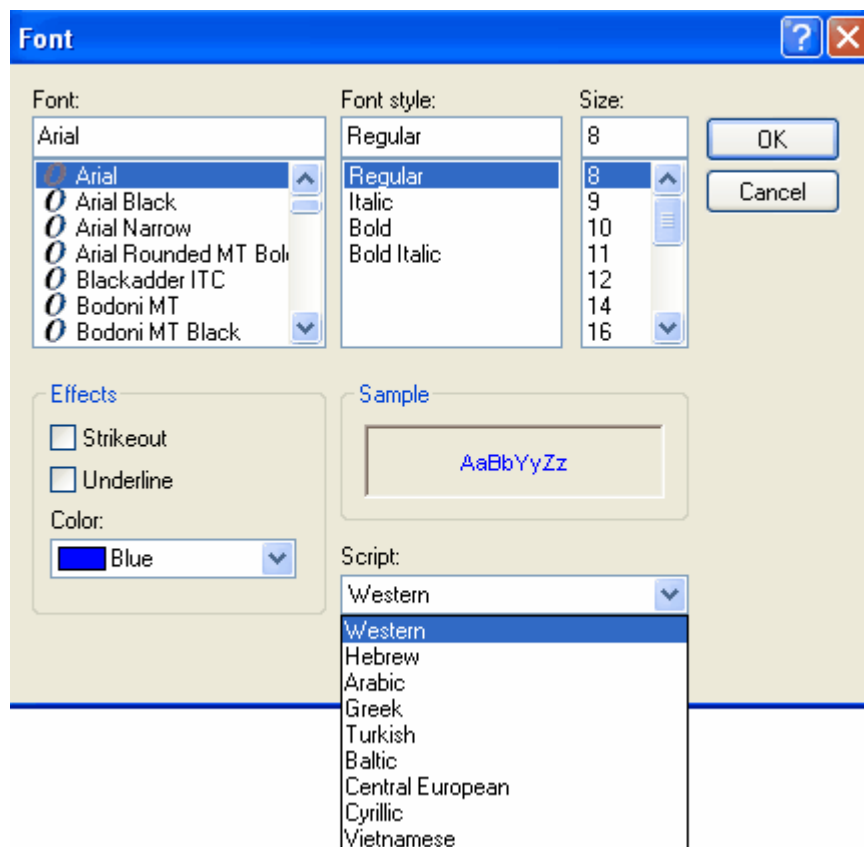
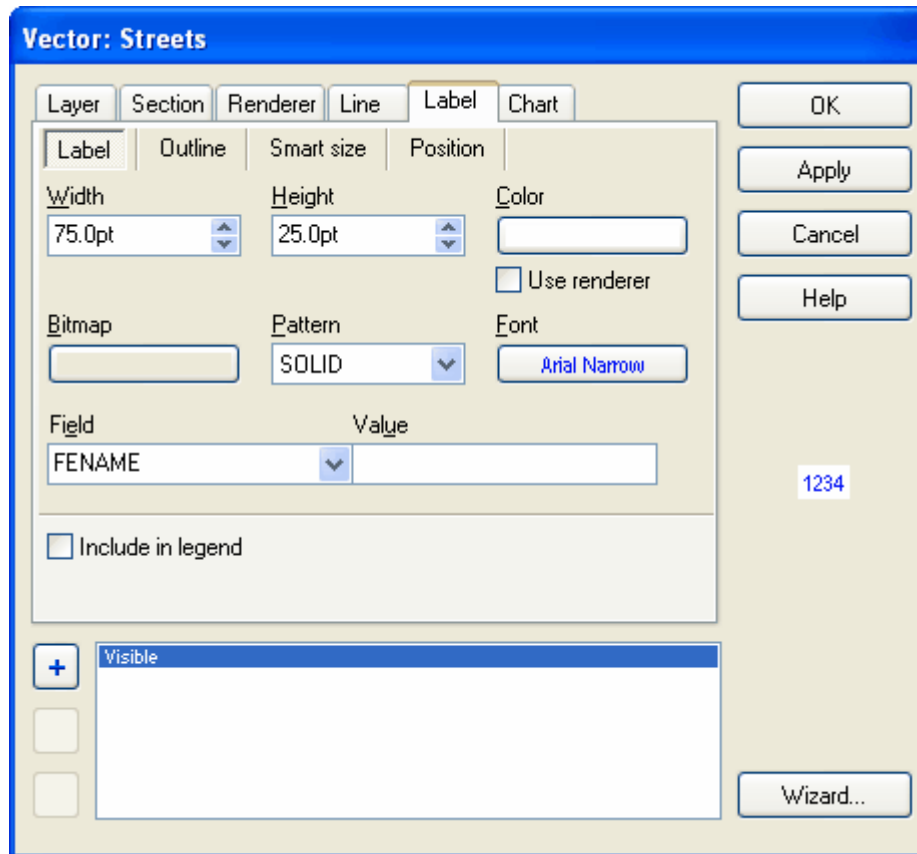
Now the label position is set to *follow* the vector line. Note that the *Avoid overlap* setting is activated as the default. This feature prevents labels of any layer, even when many map layers are open together, from ever overlapping.



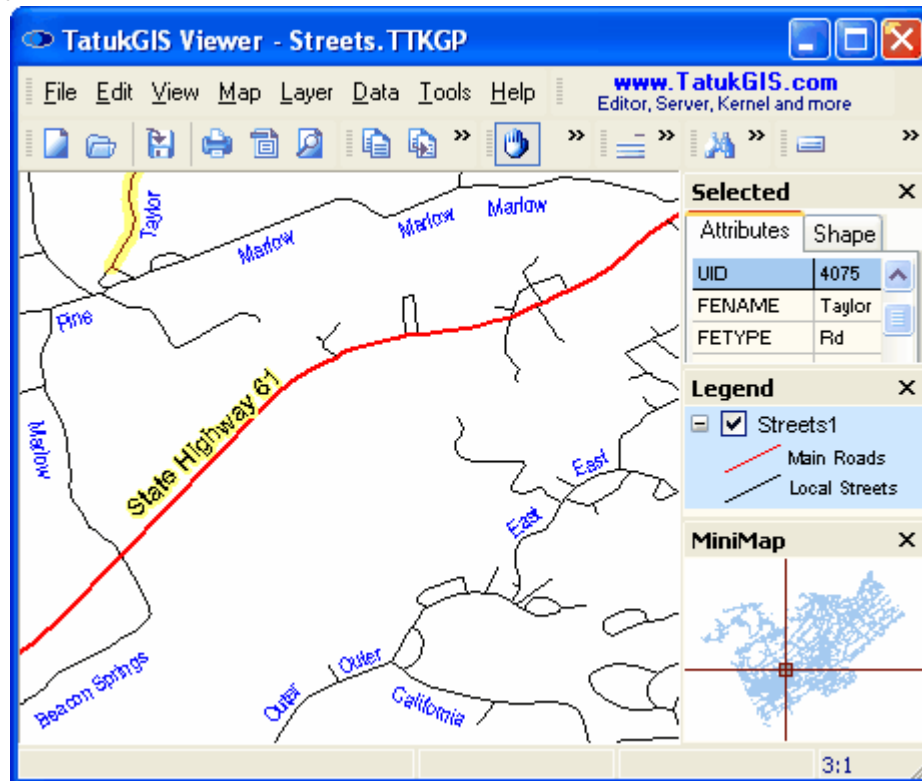
The result. The Viewer program positions the label to follow the line, and tries to place the label in the best fitting position along the line, i.e., next to the straightest available segment of the line in any given view. Notice how the labels automatically reposition to the best fitting positions along the lines as the user pans or zooms in or out.



The label fonts can be customized in many ways. As shown below, the Section feature can be used to set a unique appearance for the name labels of the streets with the *CFCC* attribute value *A41*. A unique font, color, and size is specified. A number of script types are supported, such as Greek, Cyrillic, Arabic, Hebrew, Central European, etc.



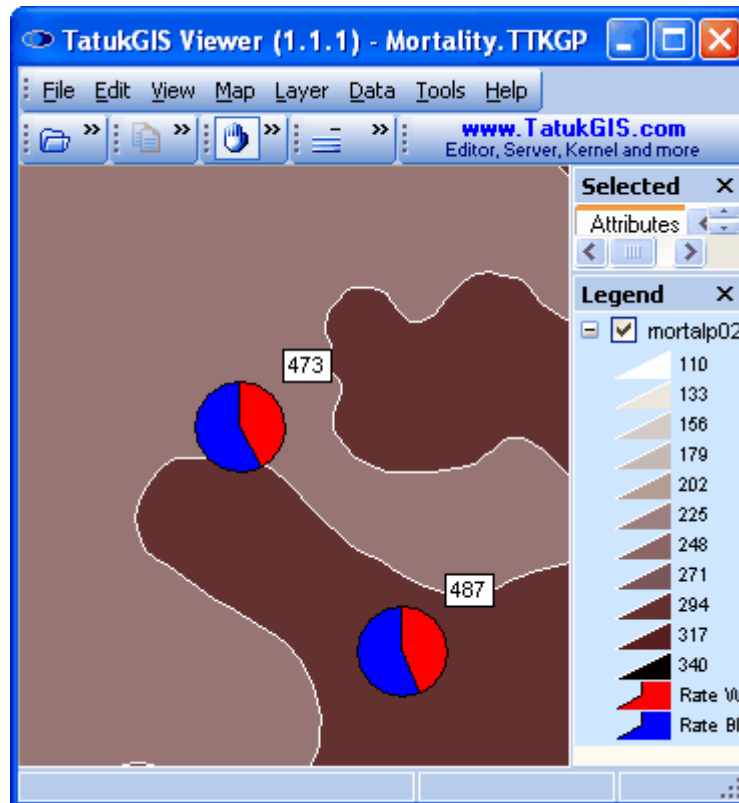
The result.




2.2.1.5.3 Polygon Label Positions

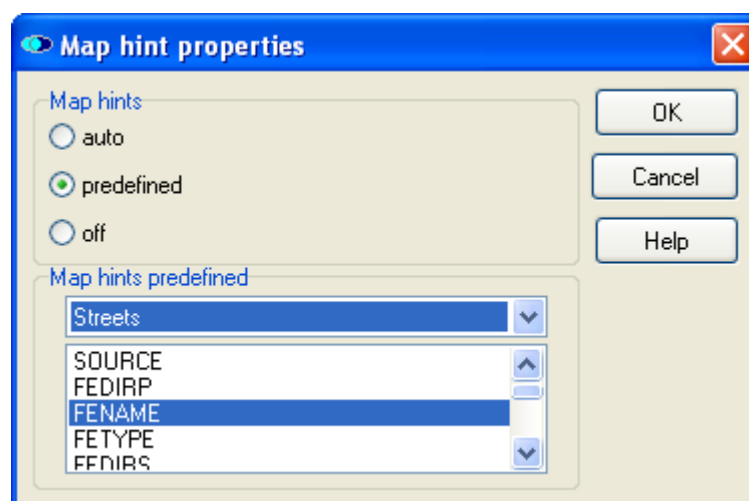
As long as the *flow* option is checked in the window under the Layer/Properties' *Label/Position* tab, the Viewer attempts to always place the labels of polygons in "good fitting" locations, for any zoom level and view position. The Viewer does simply position the label at the polygon centroid position. The Viewer also does not render the polygon labels in the very best positions, because achieving the perfect placements would consume too much computational resources and unduly reduce the rendering speed with large data sets. The objective is to offer the best compromise between position quality and speed.

As illustrated below, even with these very irregularly shaped polygons, the Viewer does a reasonably good job placing the pie charts and labels inside the proper polygon area. (The pie charts are positioned according to the positioning of the labels.) As pictured below, if a simple centroid approach were used, the chart and label for polygon 487 would probably fall inside polygon 473. Also, if the *Avoid overlap* option is checked in the *Layer/Properties/Label/Position* dialog box, the Viewer ensures that labels and charts never overlap, even if many layers are open together in a project.




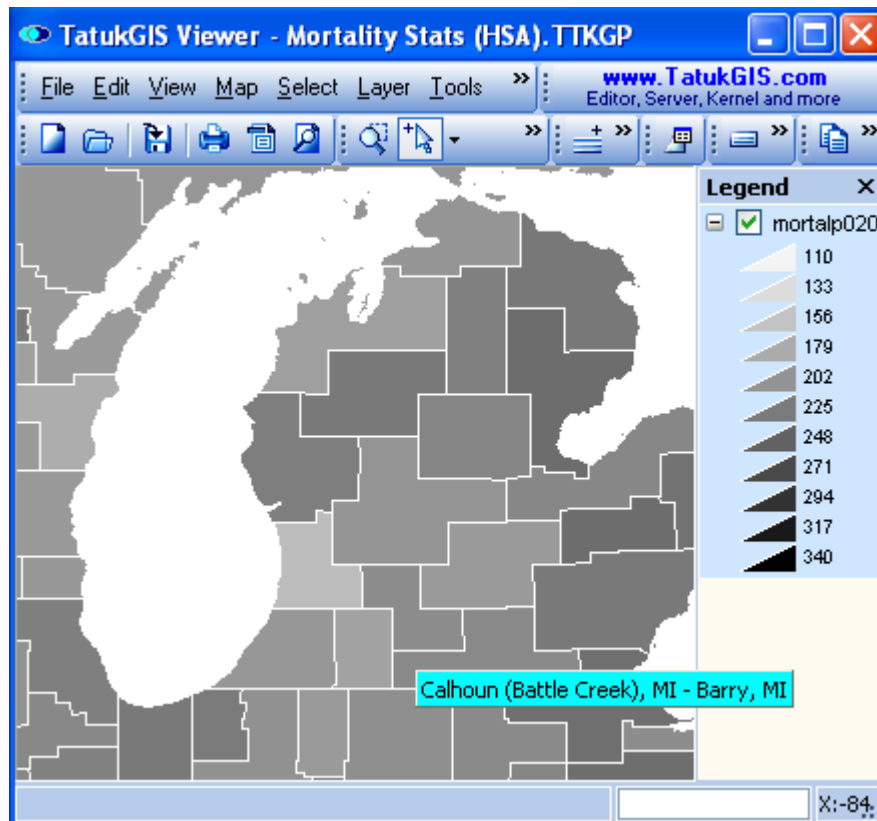
2.2.1.5.4 Map Hints Feature

Map hints is a quasi labeling feature that automatically presents selected vector attribute information whenever the cursor is held over any vector object while in *select by point* or *localize* modes. No mouse clicking is required. If a pixel or grid layer is being viewed, the map hints features automatically presents the information about the pixel under the mouse cursor. Use the *Map Hint*  toolbar icon (or the *Tools/Map hint* menu command) to access the *Map hint properties* combo box. The *auto* setting results in the presentation of all the attribute information relating to a vector object, whereas the *predefined* setting results in the presentation for each vector of only the information contained by a selected attribute for that vector object. Any sort of text or numerical information can be presented in this way using the Map Hints feature. As illustrated below, the HSA_NAME attribute is selected which contains the name of the polygon areas.



(Selection of the attribute which is to be presented as a Map Hint.)

As the cursor (not visible in the screen shot, but in select mode the cursor appears as ) is held over one of the polygon areas, the name information contained in the HSA_NAME attribute field automatically pops up in the temporary label. As the select pointer is moved across the map, the map hint information automatically updates to show the information contained by this attribute for any shape under the position of the cursor. The map hints feature works the same way with vector line and point layers, as well as with raster image layers. Note that the layer for which the map hints feature is active must be selected (highlighted) in the *Legend* panel.

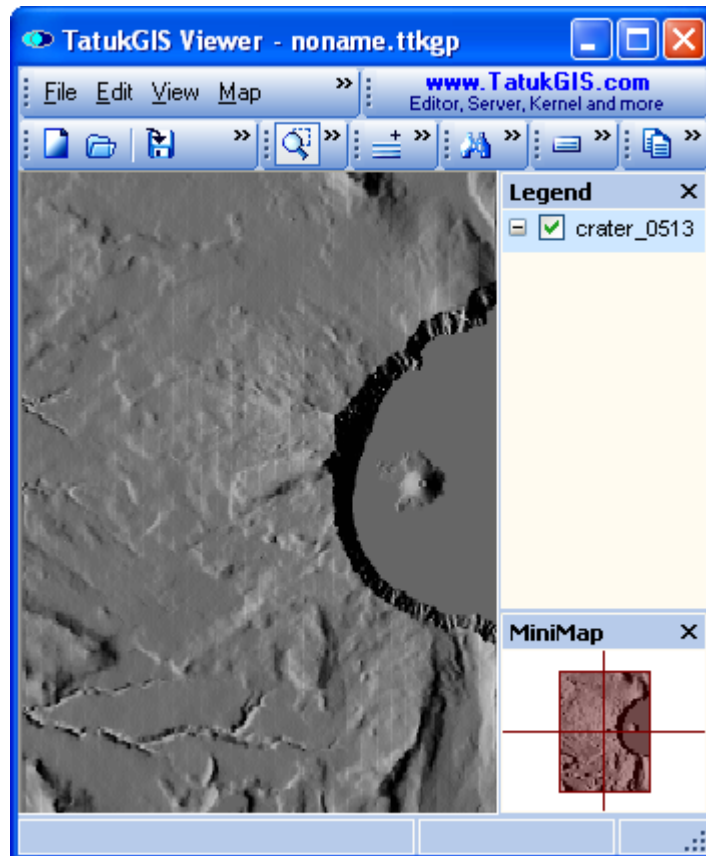


(Map hint information automatically appear when the mouse cursor is held over a shape.)

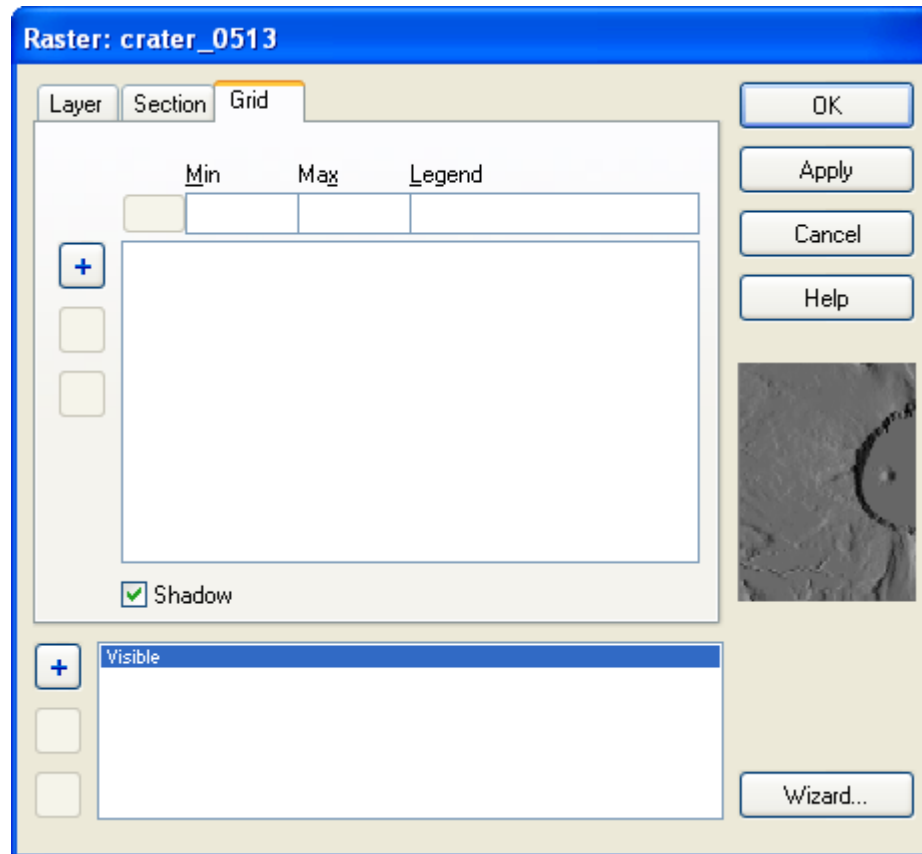
2.2.1.6 Tutorial 6 - Rendering DTM Data

The Viewer can be used to color render Digital Terrain Models (DTM) data as colors zones and to present the data with simulated lighting and shadow. (DTM data is sometimes also referred to as Digital Elevation Model - DEM.) DTM data is based on raster formats but with extra information in the form of numeric values attached to each pixel of the raster image. Because the pixels are organized in rows and columns, DTM files are also commonly referred to as "grid" data. The numeric value assigned to each pixel/grid typically represents the altitude of the ground covered by that pixel. However, the values can also represent other information such as temperature, radio or wireless telephone signal strength, rainfall level, soil sample composition data....

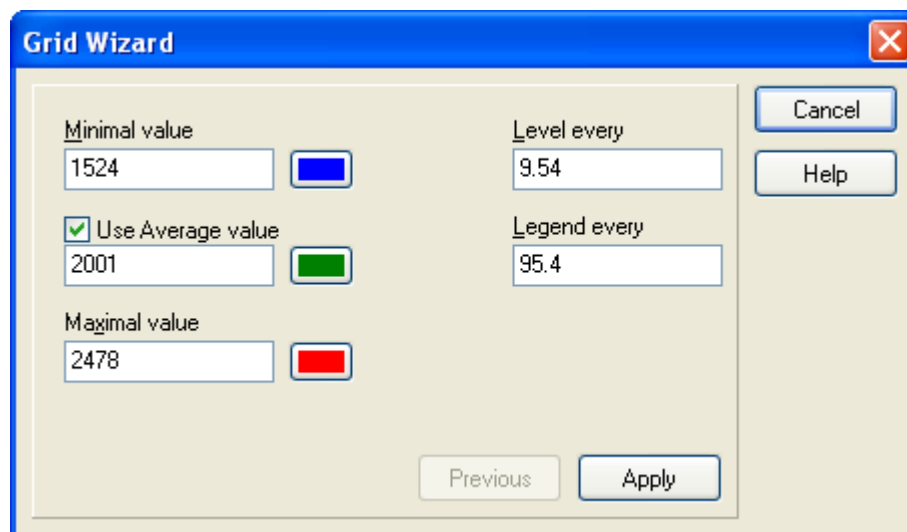
In the image below, a BT (Binary Terrain) file containing elevation data has been opened in the Viewer. This particular file is of the territory near an extent, lake filled, volcanic crater. When first opened in the Viewer, the file initially appears as a gray-scale image, with the shades of gray reflecting the altitude relative to sea level of the ground covered by each grid cell (pixel). By default, the Viewer applies shading (angled lighting and shadow). The lighting is applied from the left side of the image from a height angle of 45 degrees.



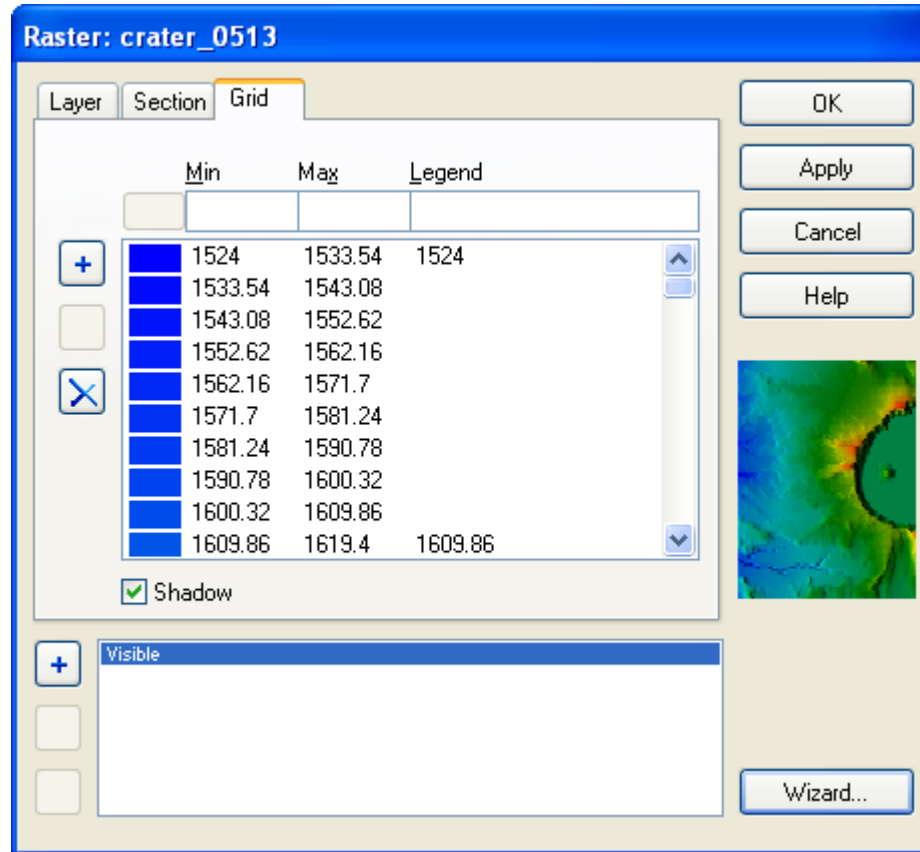
Double left click on the DTM file in the *Legend* panel to open the *Grid* window which is within the Layer Properties window. This window can also be accessed by using the *Layer/Properties/Grid* menu command. The presentation can be custom defined by entering the minimum and maximum value of each range, selecting the color for that range, and providing the information to appear in the Legend next to the color representing that range. Much faster is to just use the *Wizard*. Start by clicking on the *Wizard* button near the bottom of this window.



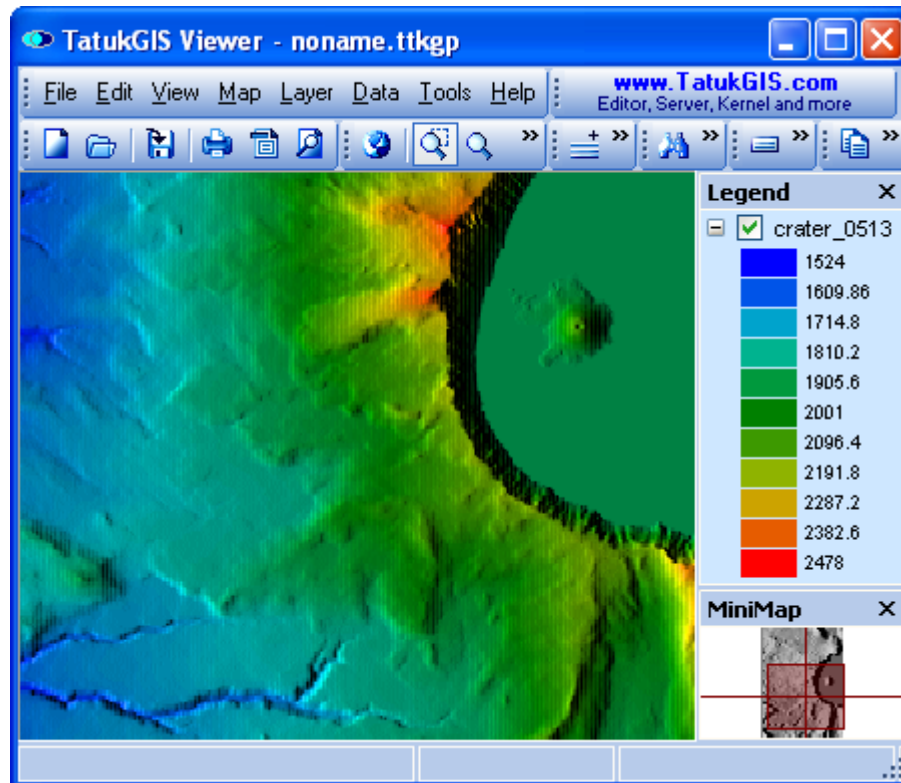
The *Grid Wizard* window appears after clicking on the *Wizard* button in the prior screen. Note that the default settings are to render from the lowest value present in the file to the highest value present in the file. The values contained by this file range from 1,524 at the lowest point on the map to 2,478 at the highest point on the map. The full range of altitude values contained in this file is 954 units. The default Wizard settings divide the values into zones such that a total of 100 colors are rendered on the map and a total of 10 color zones are presented in the legend. With this file, the shade of color rendered on the map will change each 9.54 units and each color level in the legend will represent a range of 95.4 units. These default settings can be easily customized by the user.



After clicking on the *Apply* button, the next window provides a preview of each of the 100 value ranges to be rendered on the map, along the color associated to each range, and the value ranges and colors to be presented in the Legend. The ranges can be customized in this menu screen or the user can return to the *Grid Wizard* window by again clicking on *Wizard* button. Note the *Shadow* check box in this window, which allows the shading feature to be turned on/off.



Click on the *Apply* button to generate the rendering of the DTM layer and legend based on the settings. The result appears below. The rendered DTM layer can be used as a background layer in a project which also contains vector layers, such as street maps, hiking trails, land parcels, etc.



2.2.1.7 Tutorial 7 - Pie and Bar Charts

This Tutorial uses a SHP format vector map of Health Service Areas (HSA) in the United States. Each HSA is represented by a vector polygon area with attribute values representing mortality and other data. The mortality data, categorized by cause of death, is collected by medical officials, compiled, and loaded to the vector map attributes for further analysis.

2.2.1.7.1 Pie and Bar Charts

The Layer Properties settings can be used to render pie or bar charts based on attribute information. As shown below in the window under the *Chart* tab, the color red is selected to represent the white male mortality rate (RATEWM01) resulting from heart disease and the color blue is selected to represent the black male mortality rate (RATEBM01) resulting from heart disease. Also note that the *Include in legend* option has been checked so that the information will also appear in the Viewer legend. Be sure to set the chart size in the *Chart/Chart* dialog box. In this example, the chart sizes are set to be 20 pts.

Vector: mortalp020

Layer Section **Renderer** Area Label **Chart**

Chart Values 1-4 Values 5-8

Values	Legends
1 RATEWM01	White Male Rate
2	
3 RATEBM01	Black Male Rate
4	

Include in legend

+ Visible Query[RATEWM01] Rendererr[RATEWM01]

Wizard...

Vector: mortalp020

Layer Section **Renderer** Area Label **Chart**

Chart Values 1-4 Values 5-8

Style: PIE

Size: 20.0pt

Use renderer

Minimum value: 10

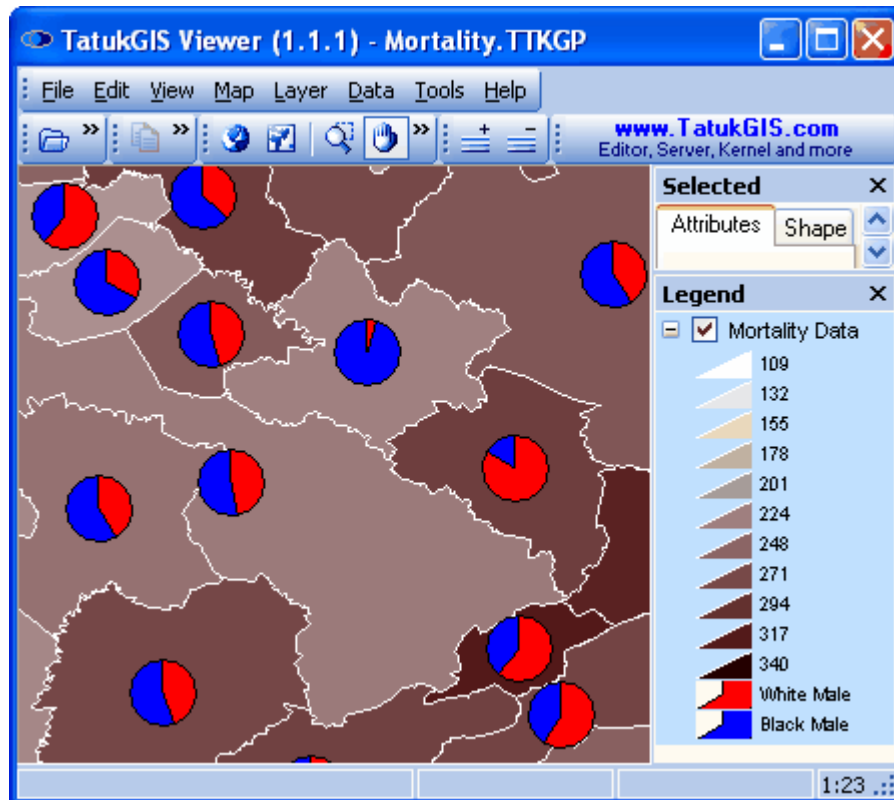
Maximum value: 300

Include in legend

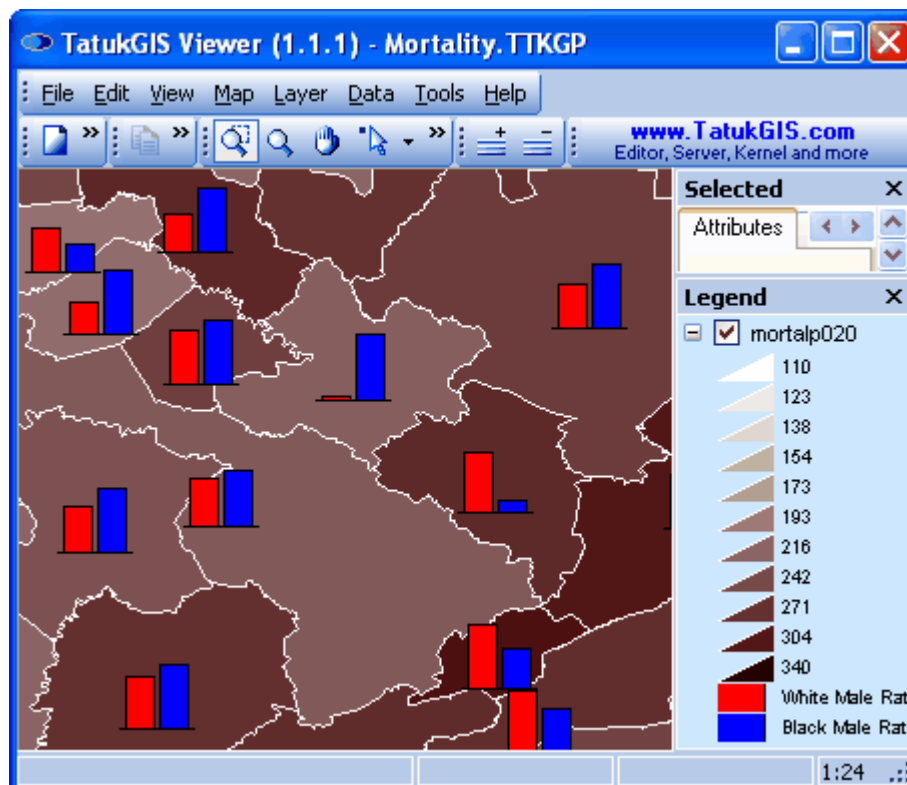
+ Visible Query[RATEWM01] Rendererr[RATEWM01]

Wizard...

The rendered result.



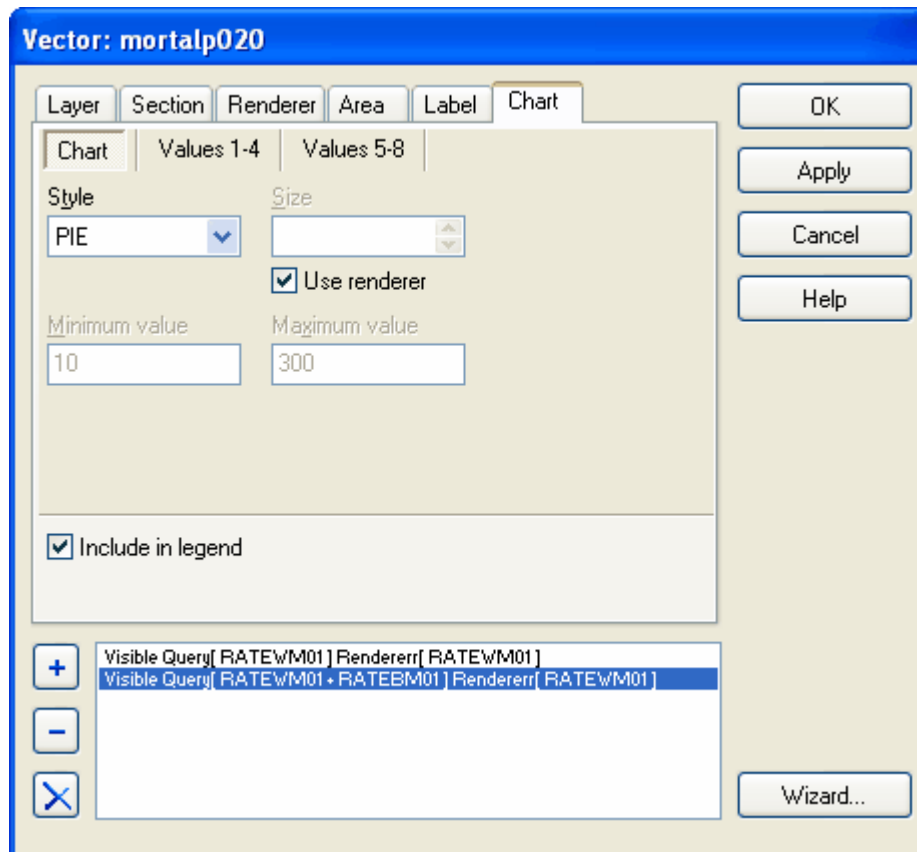
The rendered result when the use of bar charts is selected.



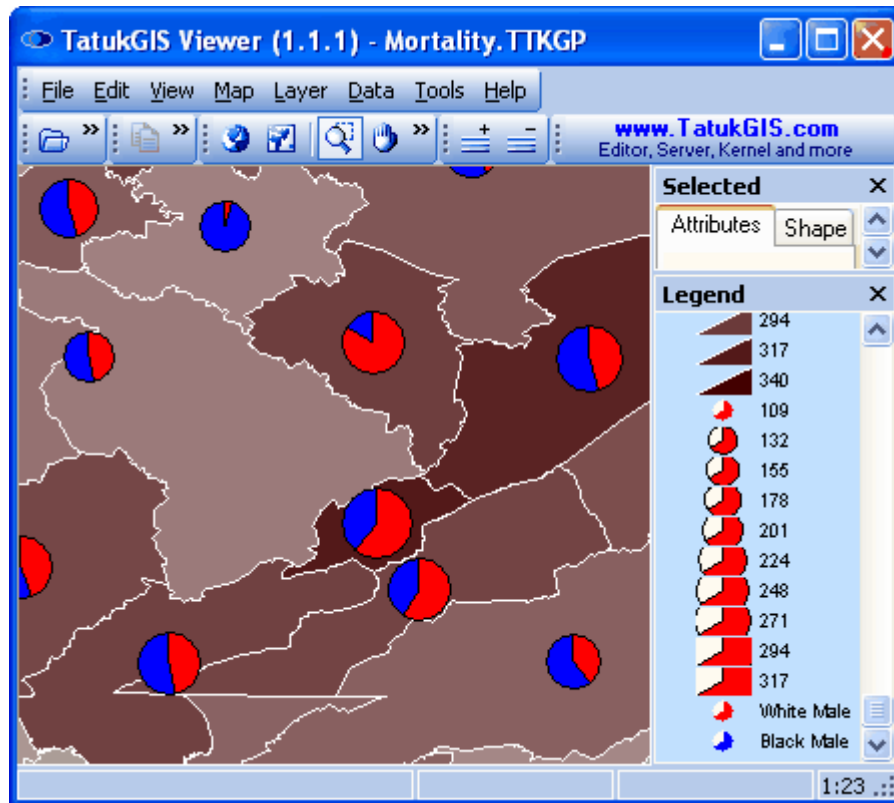
2.2.1.7.2 Chart sizes

The size of the pie or bar charts can also be rendered to reflect numeric values of a selected attribute field, or a formula based multiple attribute containing numeric values. This demonstration renders pie chart sizes based on the sum of the cardiovascular disease mortality rates for white and for black men. Therefore, the chart size presents the overall rate for white and black men together, while the colors within each pie chart present the relative mortality rates of black and white men.

The *Start size* and *End size* values for the charts, which are defined in pixels, must also be specified under the *Renderer* tab.





The result.





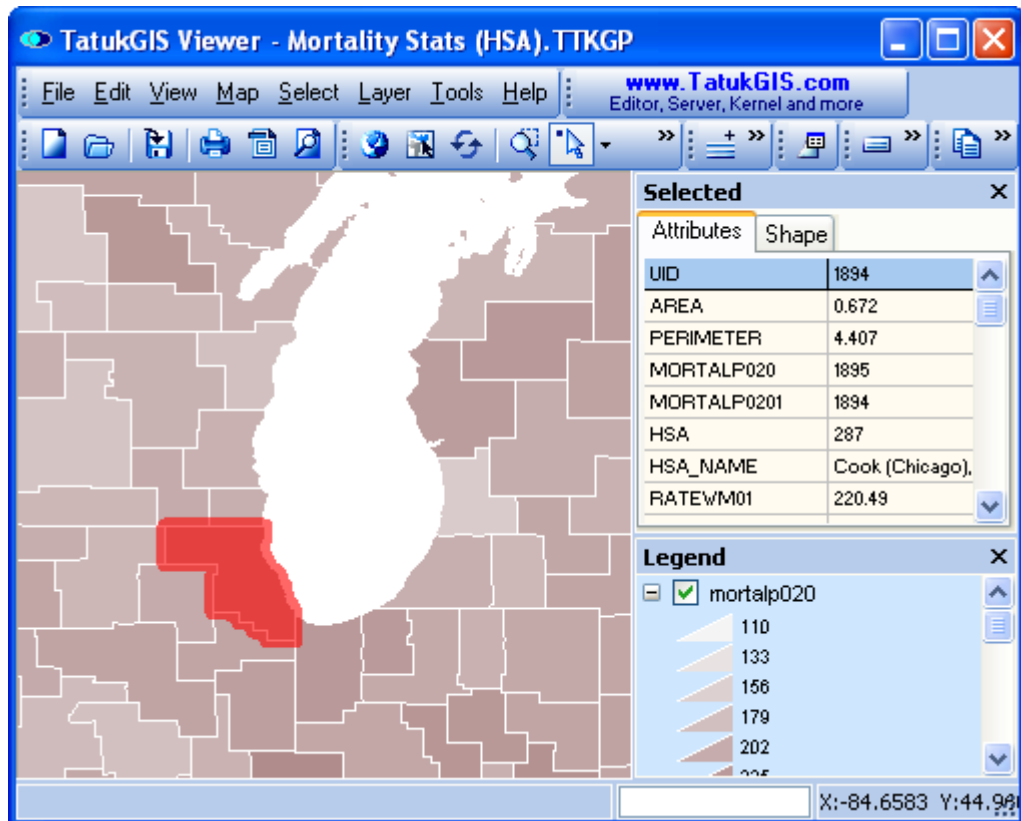
2.2.1.8 Tutorial 8 - Spatial Selections



This tutorial demonstrates some of the spatial selection techniques supported by the program, to provide an orientation to the possibilities.

2.2.1.8.1 Select versus Localize

The Viewer offers two options to select a single object from vector map data - *Select by Point*  and *Localize* . *Select by Point* can be used to select objects only from the vector map layer which is highlighted in the *Legend* panel. *Localize* can be used to select an object regardless of which layer it is in and regardless of the layer selected in the *Legend* panel. The *Localize* feature can be very useful when many layers of similar data are open together in the Viewer at the same time, making it difficult to figure out which layer contains which objects.

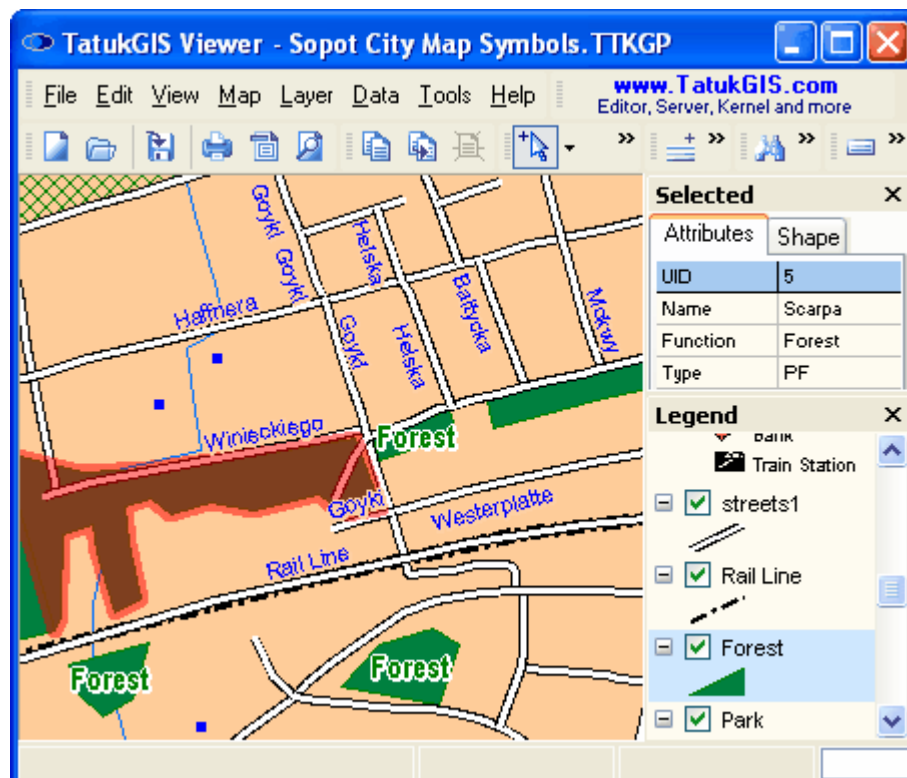
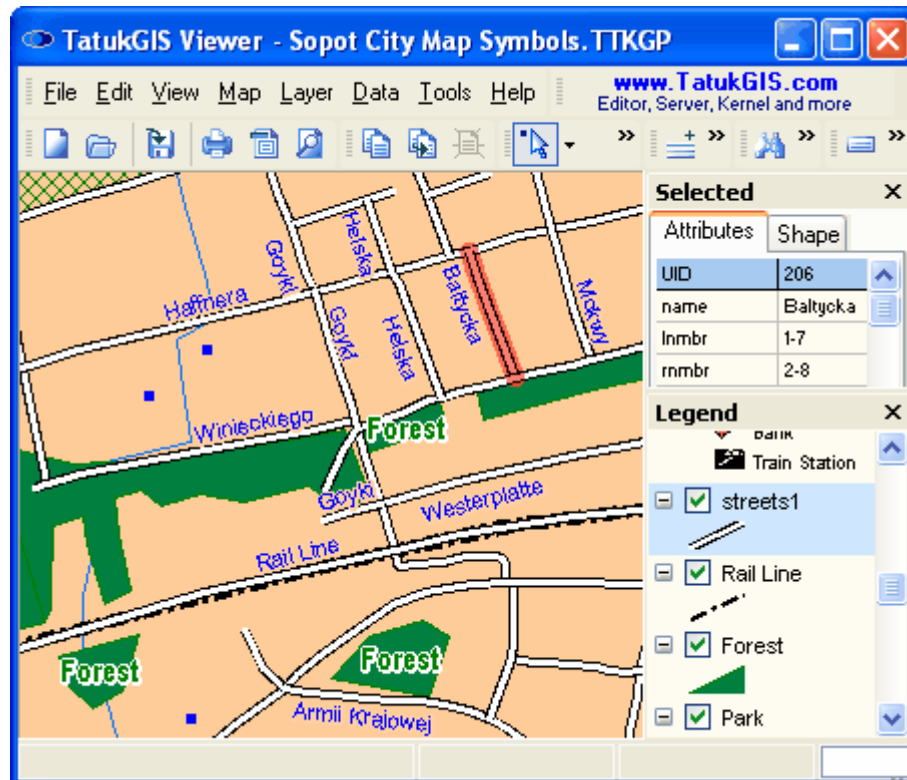
Select an object. While in *Select by Point* mode , left mouse click on a vector contained by the layer which is highlighted in the *Legend* panel. (When in a select mode the mouse cursor will appear as a .) The selected vector object will become highlighted on the map and the attributes of the selected object will be presented in the *Attributes* panel.



Localize an object. While in *Localize* mode , left mouse click on a vector contained by any layer open in the Viewer. (As in *Select by Point* mode, the mouse cursor will appear as a ) The selected vector object will become highlighted on the map and the attributes of the selected object will be presented in the *Attributes* panel.


The first image below shows the Viewer after the selection of a street from the line layer highlighted in the *Legend* panel using the *Select by Point* mode. The second image shows the Viewer after using the *Localize* mode to select a segment of forest from a polygon layer, which is contained by a layer other than the layer highlighted in the *Legend* panel. The Viewer has identified the object and automatically updated the Legend panel to highlight the layer which contains the "localized" object.

Localize is the only selection tool that is layer independent.

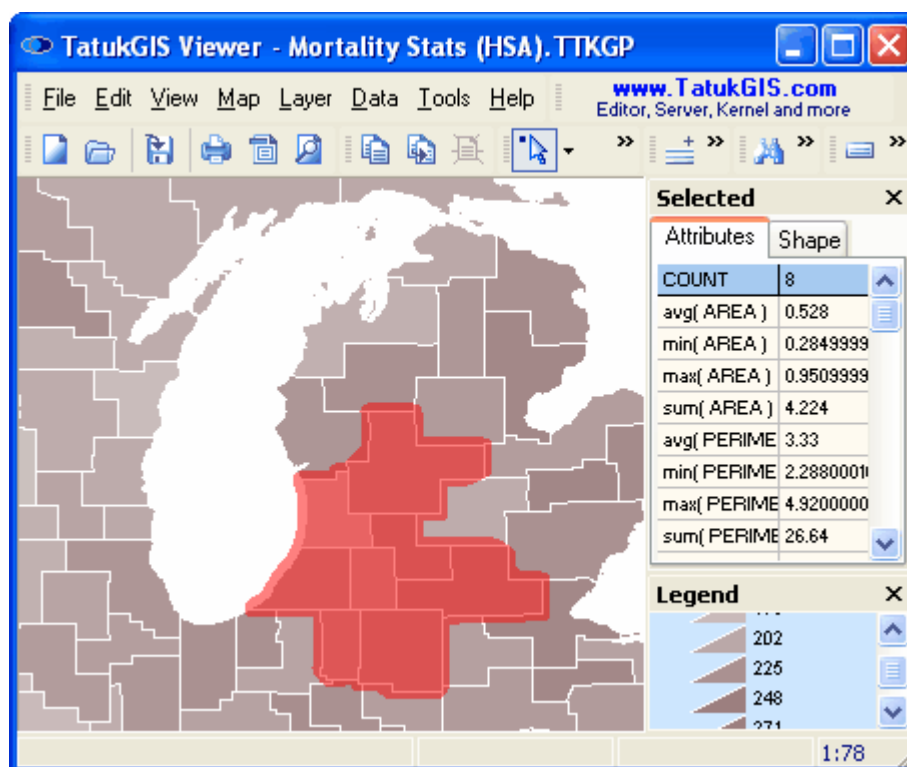



2.2.1.8.2 Spatial Selection Modes

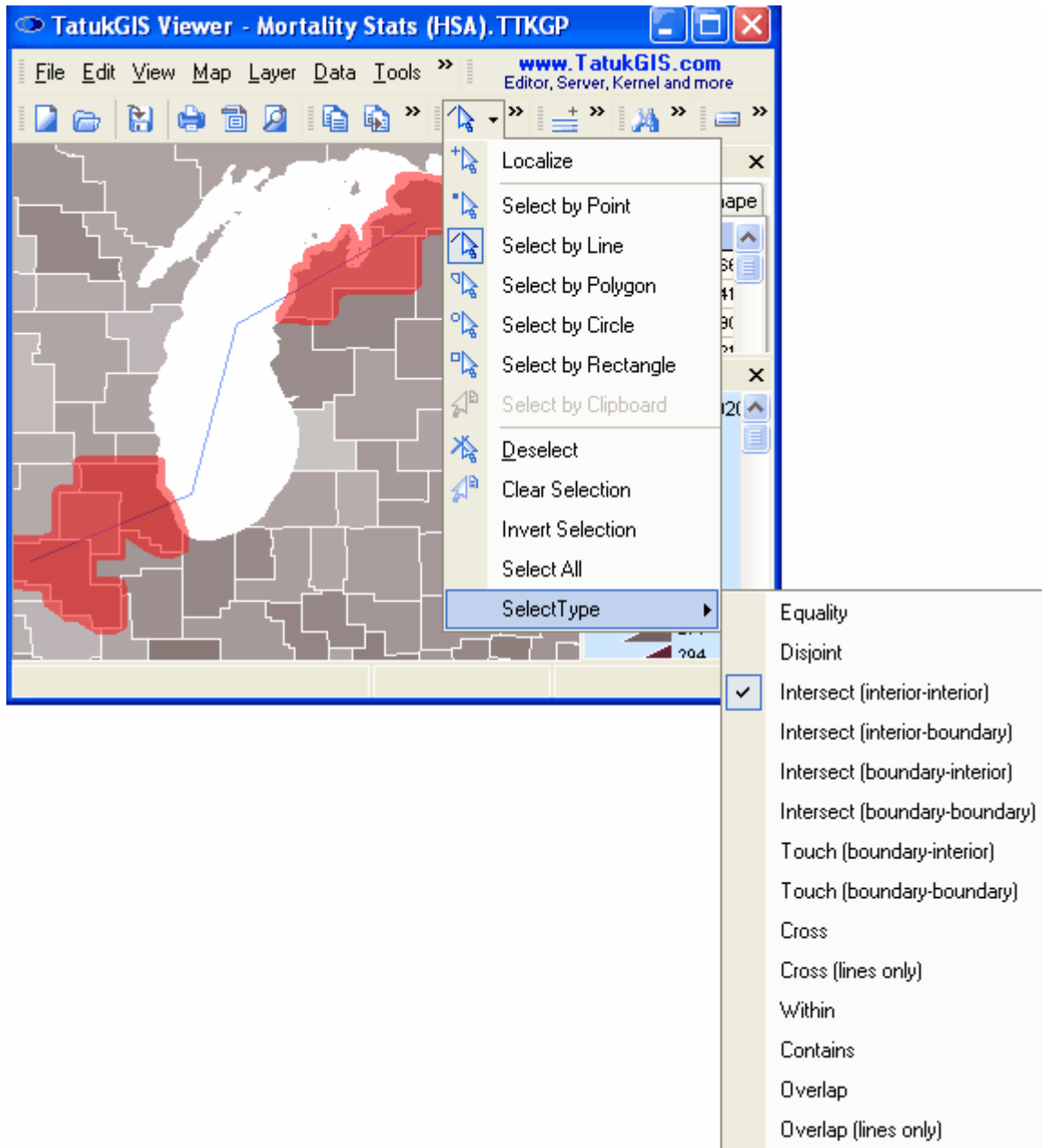
In addition to the selection of a single vector object at a time, the Viewer offers a number of sophisticated options for the selection of multiple objects on a selected layer based on a spatial criteria. These operations are sometimes referred to as 'spatial queries'.


Multi-Select by Point: While in *Select by Point* mode  and with the *Ctrl* key depressed, select multiple polygon vectors (areas) together by pointing and clicking on each vector with the mouse pointer. The Viewer automatically calculates and presents the average, minimum, maximum, and sum of the values of each attribute field. As pictured below, the multi-select feature is used to select the eight highlighted polygon areas. The average, minimum, maximum, and sum of the area and perimeter attribute values for the group of selected polygon areas is visible in the attribute panel.

Like with *Select by Point* tool, *Localize* can also be used with the *Ctrl* key to select multiple objects on the same layer.

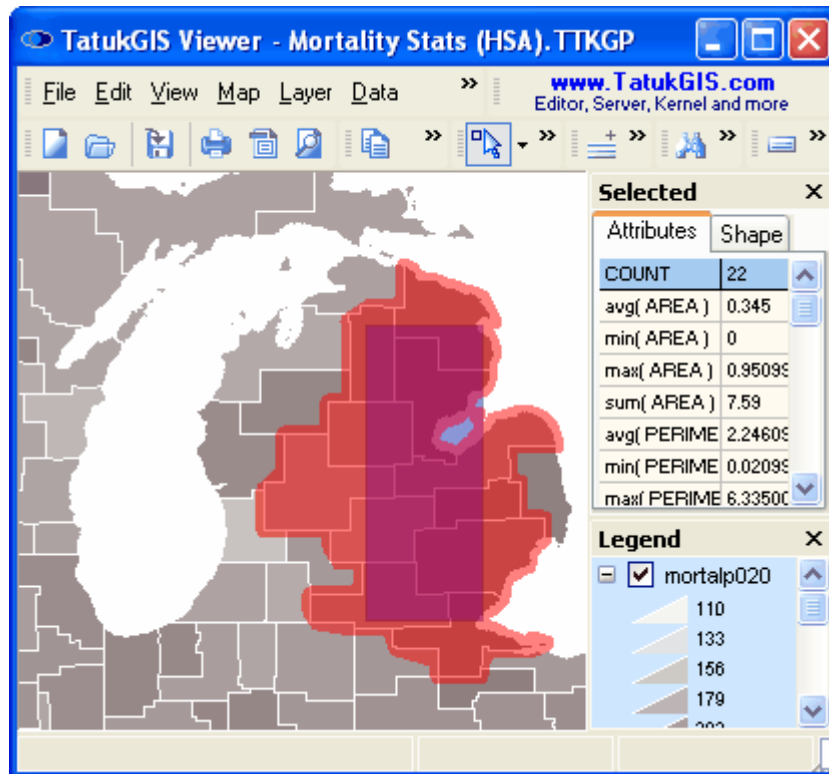



Select by Line: Use the *Select by Line* mode  to draw a line to select all polygon areas which are intersected by the line. Double click to finish drawing the line. Note that the geometric *Select Type* used in this example is *Intersect (interior-interior)*, which is one of the more commonly used select types. This select type performs the selection based on any intersection of some portion of the interior of the selection figure (the line) with some portion of the interior of the vector objects in the layer. As is visible in the image below, a number of other selection types are available to precisely define the relation between the selection figure and the vector objects in the map layer.

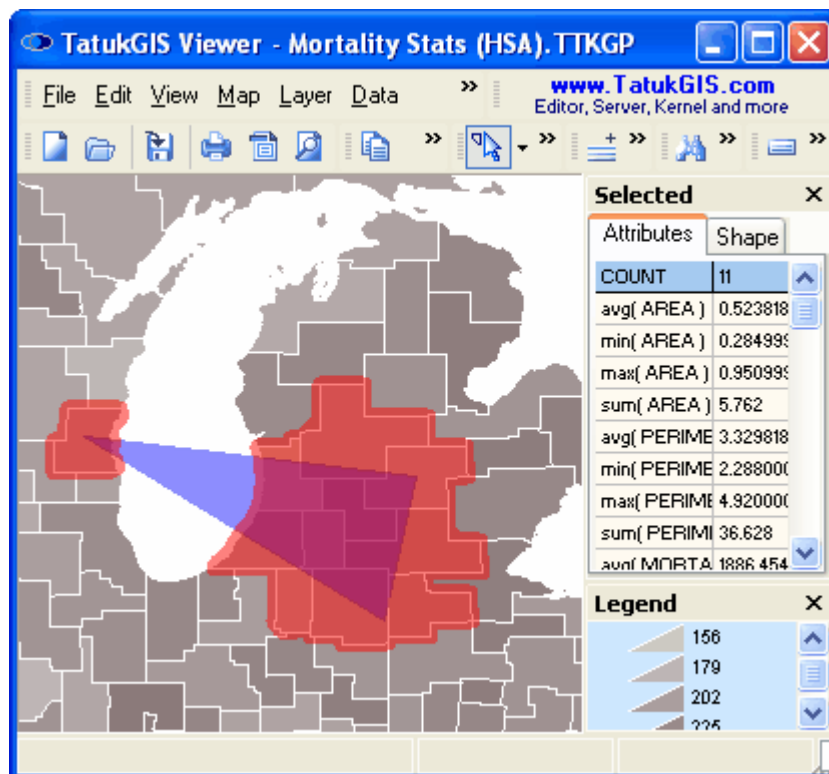



Select by Rectangle: Use the *Select by Rectangle* mode  to select with the use of a drawn rectangle geometric figure. Draw the rectangle by mouse clicking on the map to place one corner of the rectangle and clicking a second time to place the opposite corner of the rectangle. (Alternatively, mouse click to place one corner and then drag the mouse cursor to the position of the opposite corner and release the mouse button.)

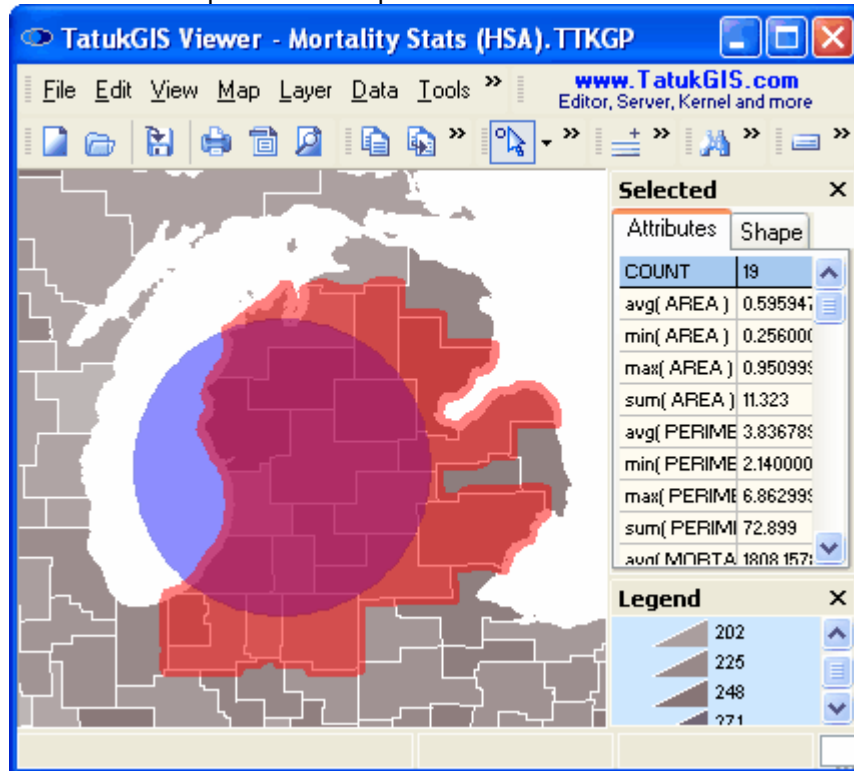
As shown below, reflecting the *Intersect (interior-interior)* select type, all polygon areas with at least some portion of their interior in common with the interior of the selection rectangle are selected.



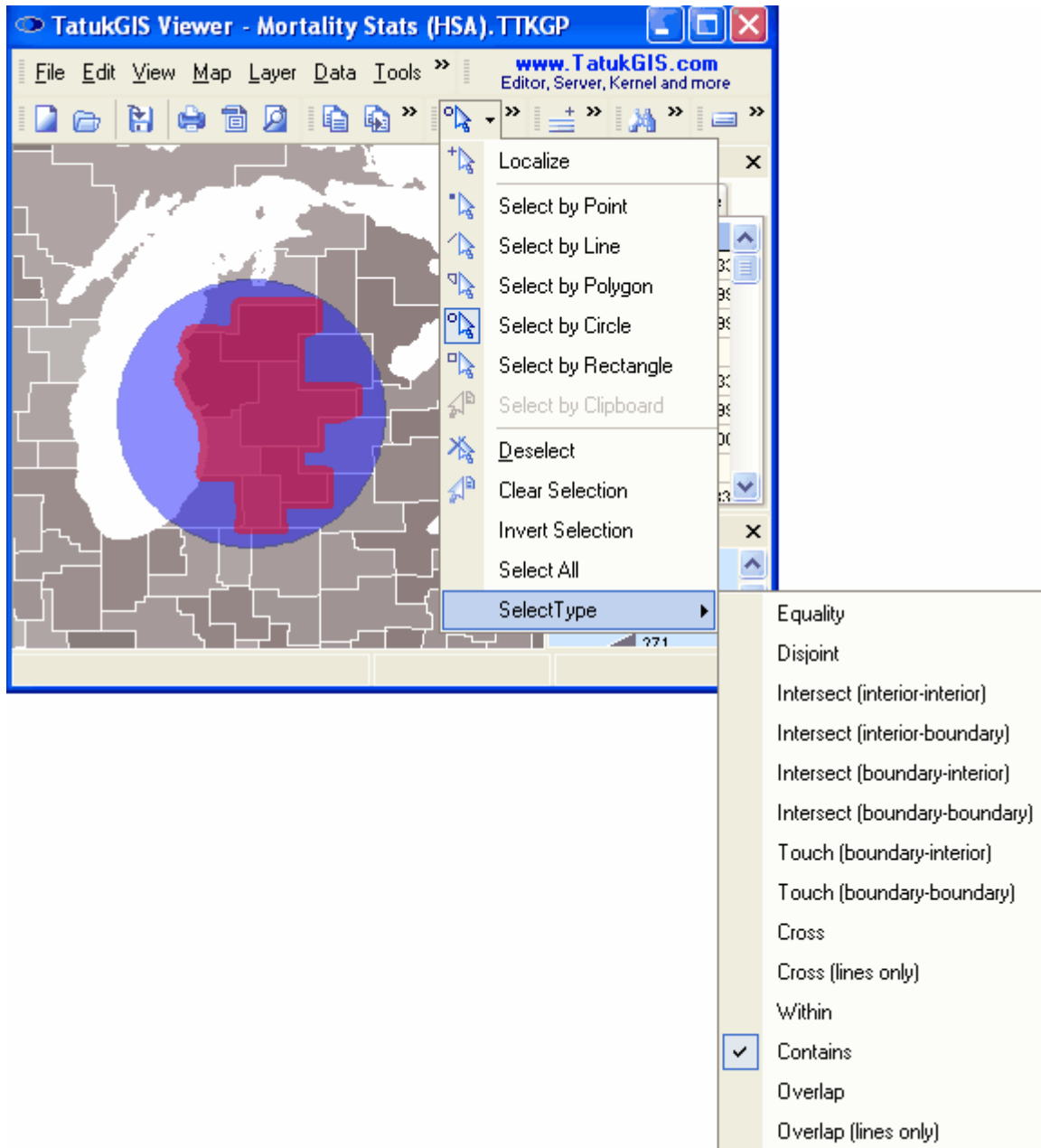
Select by Polygon: Use the *Select by Polygon* mode  to perform a selection using a drawn polygon area. Draw the polygon by clicking with the cursor to place each corner of the polygon boundary. Double click when placing the final corner of the polygon boundary to automatically form the polygon area.



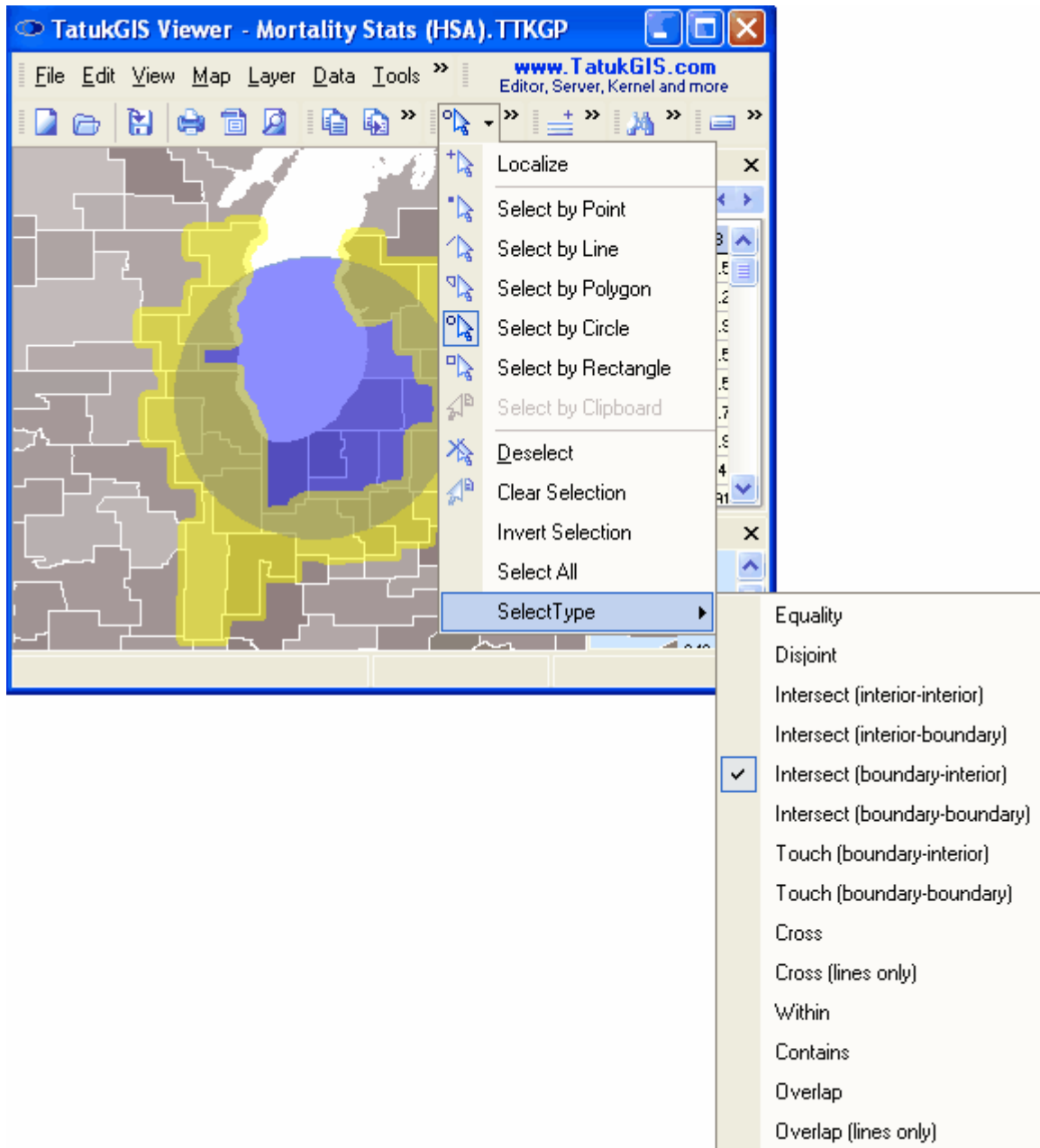
Select by Circle: Use the *Select by Circle* mode  to perform a selection with the use of a drawn circle. Draw the circle by clicking on the map position for the circle center and dragging the cursor to the placement of the circle perimeter. Depress the mouse button to finish.




The following image shows the use of exactly the same selection circle as in the image above, but with the selection performed based on the *Contains* Select Type setting. The result is the selection of only the polygon areas which are fully inside (contained by) the circle.



The next image shows a selection by circle but using the *Intersect (boundary-interior) Select Type*. The result is that only polygon areas which are intersected by the perimeter (boundary) of the circle are selected. For the purpose of demonstration, the selection color (this setting is under the *Tools/Options/Selection* menu), has been changed from semitransparent red to semitransparent yellow.

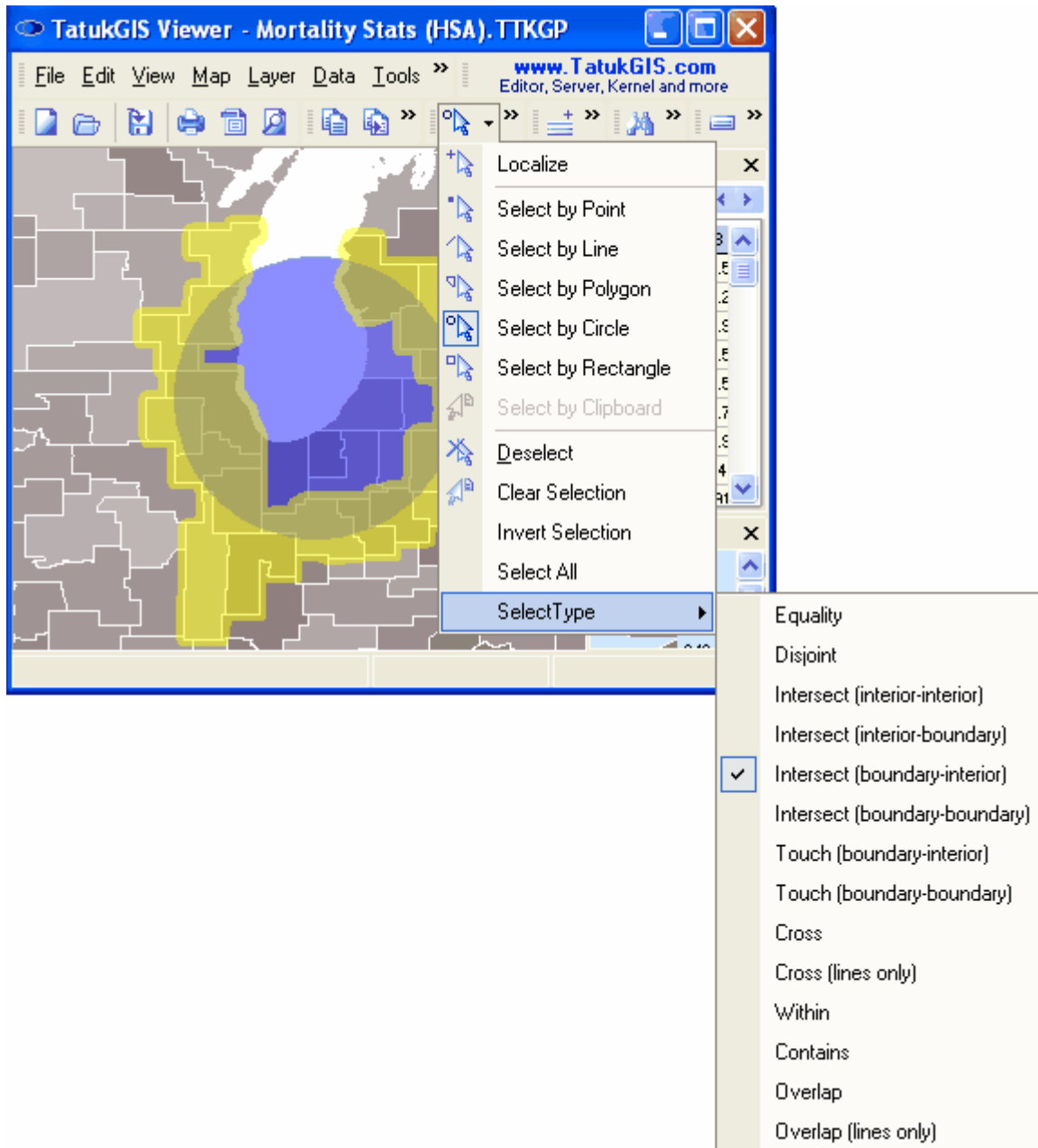



2.2.1.8.3 Copy & Copy Special to Clipboard Layer

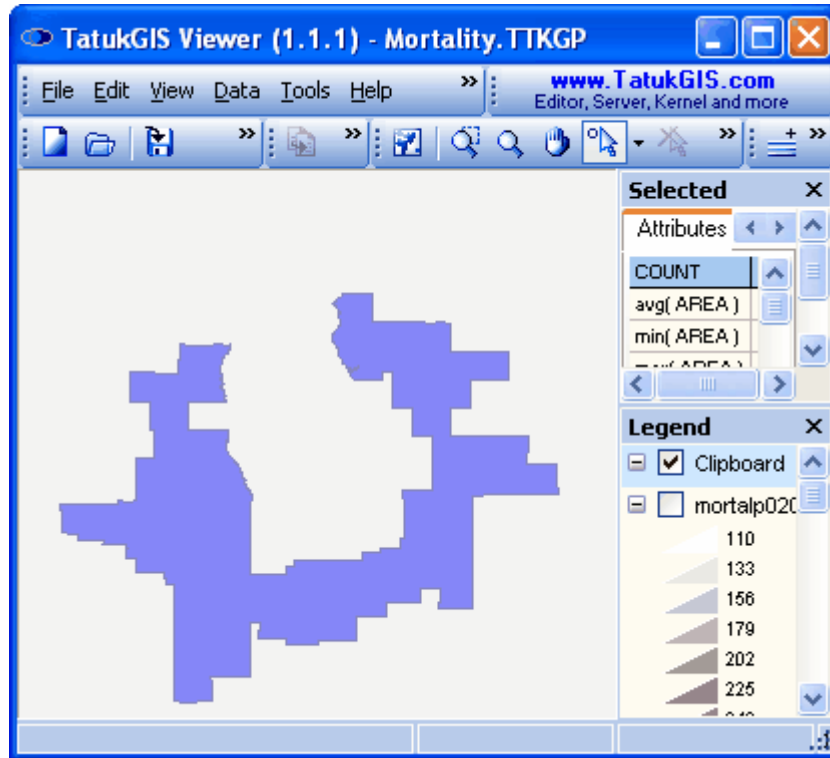
The Copy feature, which is accessed using the *Copy*  toolbar icon (or the *Edit/Copy* menu command), is used to copy selected vector geometry to a *Clipboard* layer. The Clipboard layer is an 'in-memory' layer (without any normal file format) and contains only the vector geometry. Attributes are not copied to the Clipboard layer.


Furthermore to the functionality demonstrated below, the *Copy* function also adds the selected vectors to the Windows clipboard using the EMF meta format. This provides for easy insertion into many other types of files, such as a Word document or to CorelDRAW.

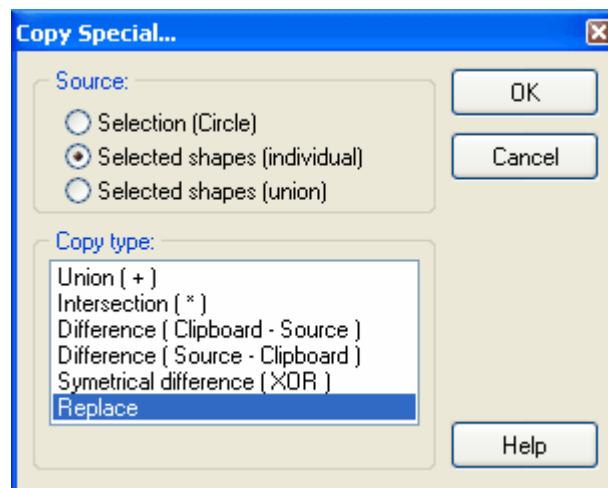
This example uses the results of the last spatial select operation from the prior section to demonstrate the Copy procedure.



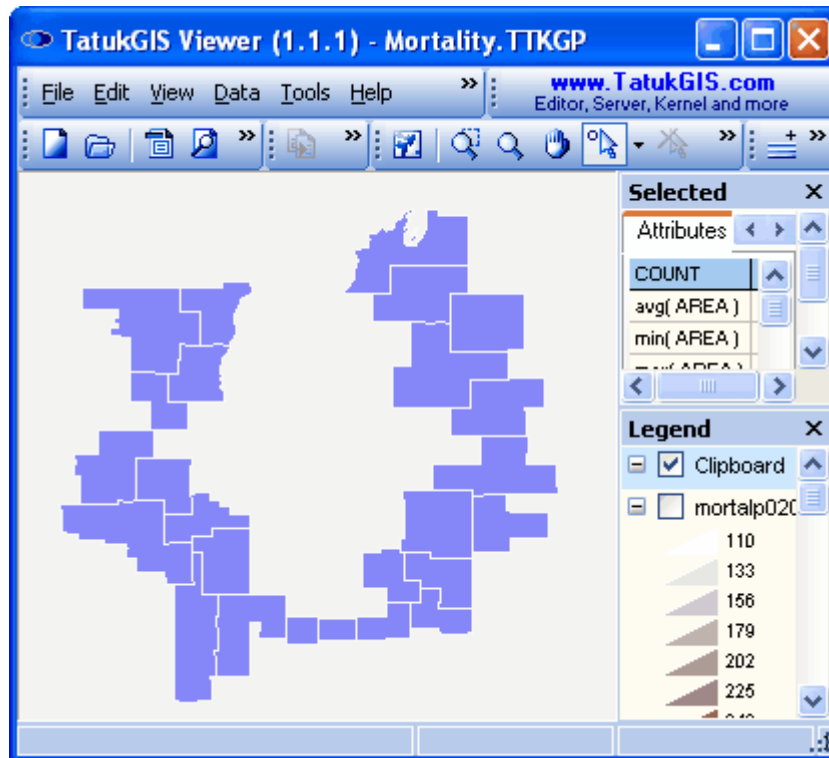
As pictured below, the *Copy*  feature (also available under the *Edit/Copy* menu) has been used to create a copy of the selected objects on a *Clipboard* layer. During the copying process, all the selected polygons were fused (via a union) into a single vector polygon. (In this image the visibility of the original polygon map layer is turned off in the *Legend* panel to more clearly show just the geometry that has been copied to the *Clipboard* layer.)





The *Copy Special*  feature (also available under the *Edit/Copy Special* menu) provides for copying to the clipboard layer with more options to customize the result. By making the right source and copy type selections in the *Copy Special* combo box, map objects can be selectively added, subtracted, exchanged, or merged on the Clipboard layer. The *Copy Special* to Clipboard layer functionality is a powerful tool. Refer to the description of the *Copy Special* feature in the Help files for more detail on each of the *Copy type* options.



The *Selected shapes (individual)* option, as selected in the image above, results in the selected polygon areas being individually copied to the clipboard layer, as multiple vector polygons.



Note that after a Clipboard layer has been created, the *Select by Clipboard*  option under the *Map/Select* menu becomes active. This spatial select option allows the use of any geometry on the clipboard layer to perform a spatial selection on any selected map layer.


The *Clear Clipboard*  feature (also available under the *Edit/Clear Clipboard* menu) is used to remove all data from a clipboard layer.

The Editor product (not supported in the Viewer) supports saving data from the clipboard layer to any supported vector format. A saved clipboard layer can later be reloaded to the Clipboard of either the Viewer or Editor program, using the *Edit/Load Clipboard* menu command.

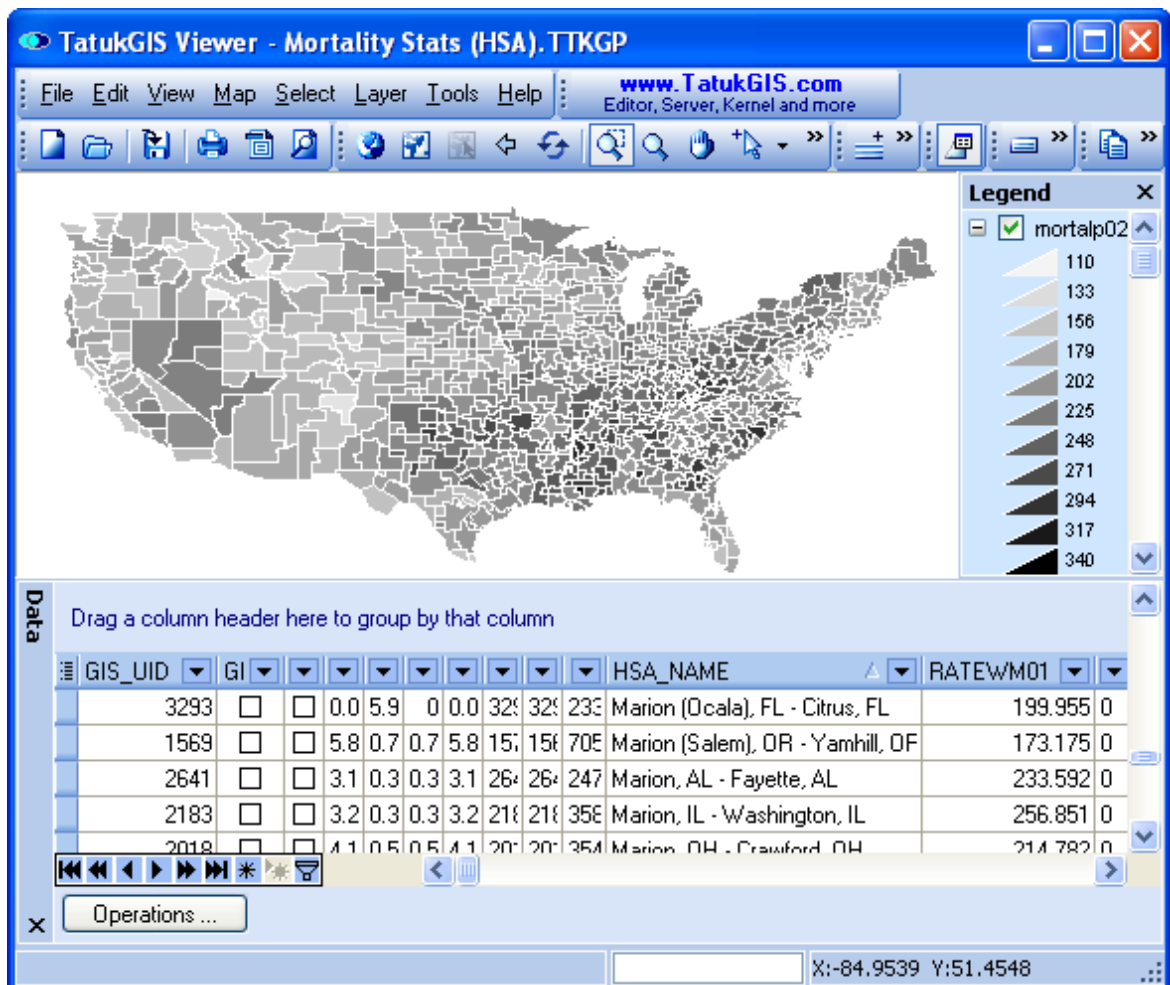
2.2.1.9 Tutorial 9 - Attribute Queries in Data Panel

The *Data* panel contains powerful features to filter or query for records with attribute information that matches specific search criteria. Records matching the query criteria can then be selected in the map window. A subset of shapes from the map can be loaded to the Data table, with of a spatial selection tool or based on a given visible extent, and queries performed just on this subset of records.

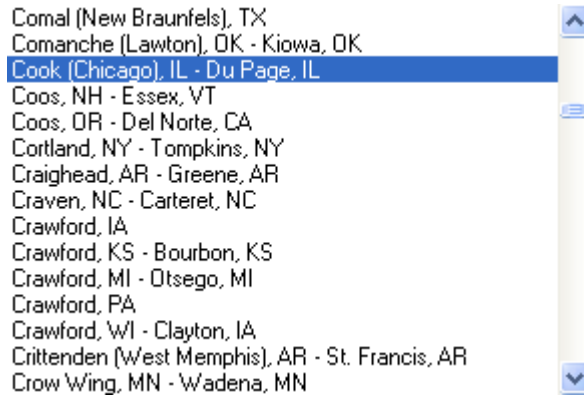
The exercise does not attempt to explain every feature or menu item within the *Data* panel. Refer to the *Data* panel help file for a description of each feature. All operations presented in this tutorial are performed with *Data* panel *Cached mode* active, as is the default setting.

This tutorial uses the same SHP format polygon map of Health Service Areas (HSA) in the United States that was used in earlier tutorials. First use the *Show Data Panel*  button to open the *Data* panel. Per the default settings, the panel will automatically fill with the full attribute data set contained by the selected layer. By default, the data is arranged vertically by the *GIS_UID* (unit

identification) number and horizontally by attribute name. Each row in the *Data* table contains a record with the full set of attribute data for the corresponding geometric shape on the map with the matching *GIS_UID* number.

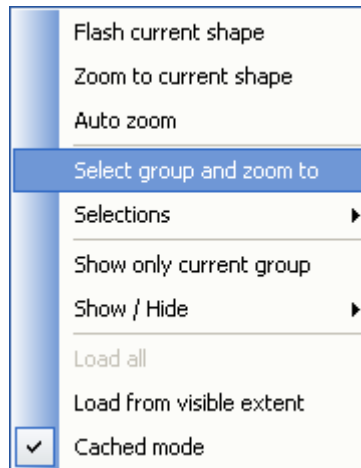


1. Manual filter. The first exercise demonstrates how to search for a single record, in this case the Cook County HSA (Cook County is in Illinois), by searching *HSA_NAME* attribute for the text information "Cook". If a mouse click is performed on the attribute name in the heading of any column, the rows in the table will reorder to reflect the numeric or alphabetic order of the data in that column. Click on the *HSA_NAME* attribute to reorder the records based on the alphabetical order of the text information held by the *HSA_NAME* attribute. Then click on the drop down list next to this attribute name and scroll down to "Cook". Because the text "Cook" is at the beginning of the attribute name, it is quickly found in the drop down list. The procedure could not be easier.

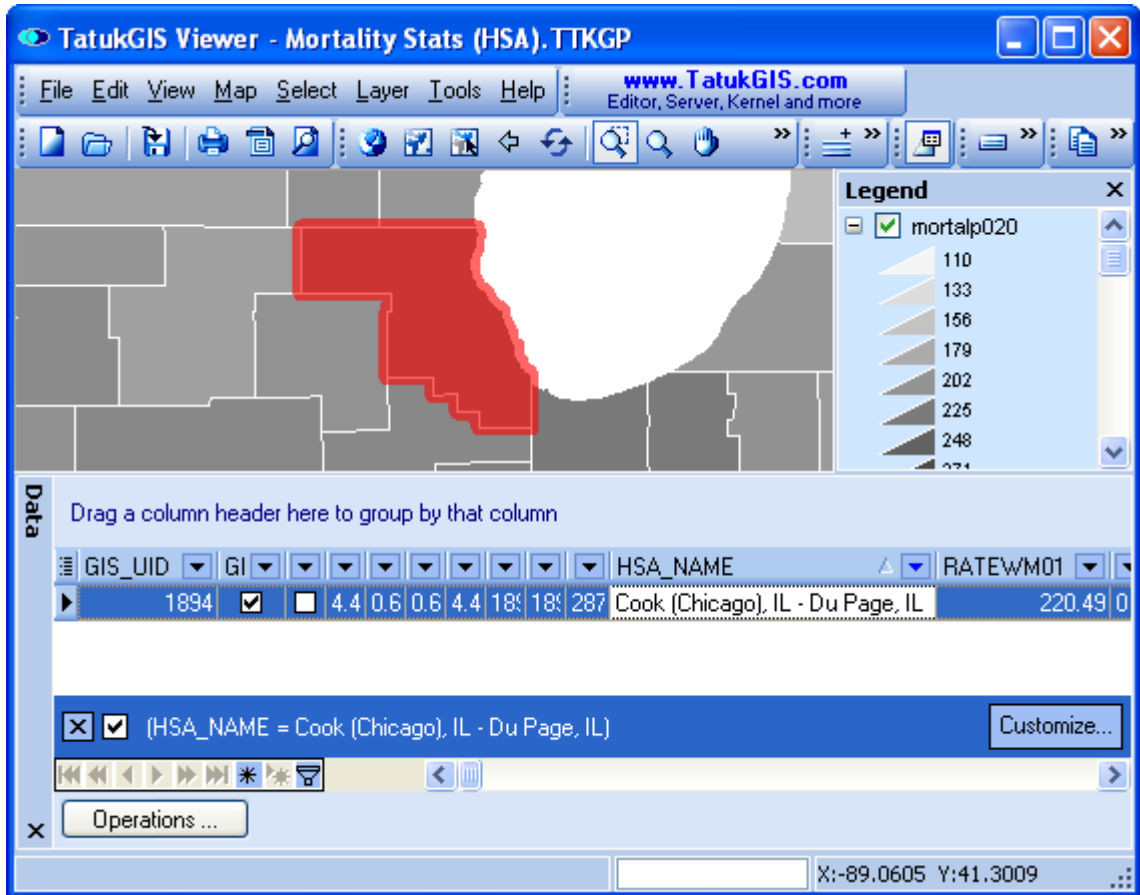


Comal (New Braunfels), TX
Comanche (Lawton), OK - Kiowa, OK
Cook (Chicago), IL - Du Page, IL
Coos, NH - Essex, VT
Coos, OR - Del Norte, CA
Cortland, NY - Tompkins, NY
Craighead, AR - Greene, AR
Craven, NC - Carteret, NC
Crawford, IA
Crawford, KS - Bourbon, KS
Crawford, MI - Otsego, MI
Crawford, PA
Crawford, WI - Clayton, IA
Crittenden (West Memphis), AR - St. Francis, AR
Crow Wing, MN - Wadena, MN

Click on this item in the drop down list to filter for this item. The filter is for all records with the *HSA_NAME* attribute information "cook", but this name is unique in the list. Therefore, only the single item is filtered and presented in the *Data* panel. Use the *Zoom to current shape* or *Select group and zoom to* command to zoom in on the filtered item on the map. These menu commands are available in a pop up menu that is opened by clicking on the *Command* button or right mouse clicking on the *Data* panel.



The image below shows the *Data* panel containing only the one filtered record and the map viewer after the *Select group and zoom to* operation. If multiple records were visible in the *Data* table, the selection and zoom operation would have been performed on the entire group.

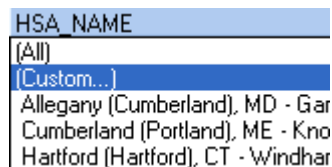


(Map view extent automatically adjusts to zoom in on the selected record.)

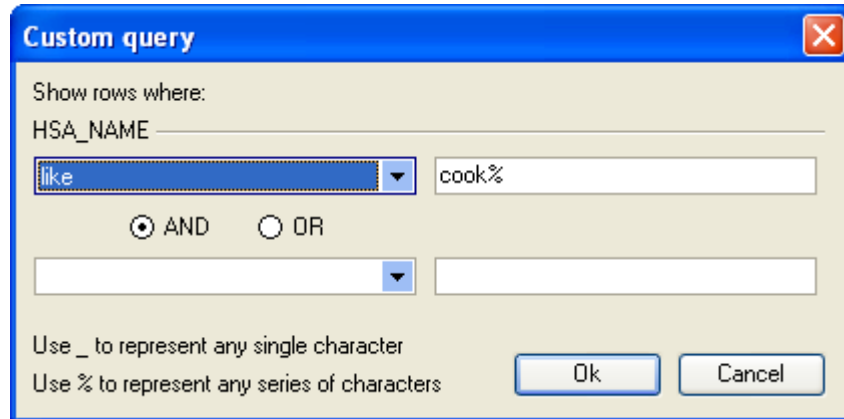
The filter operation actually creates the attribute query statement (*HSA_NAME = Cook (Chicago)...* which now appears just below the data table within the *Data* panel. Click on the check box (to uncheck it) to deactivate the query. Click on the **X** box next to the query statement to delete the query and refill the data panel with all records.

Note: Records in the Data table can also be selected on the map by applying a check mark for each record in the *GIS_Selected* column (which is typically the second column from the left).

2. Custom query. Select the (*Custom...*) option from the drop down list under the *HSA_NAME* attribute column heading.



This opens the *Custom query* panel, which provides for sophisticated queries of the values of any selected attribute. In this example, because the query is for text information, the "like" relationship setting is used. Because the attribute value may contain additional text than just "Cook", the "%" mark is added after the text "Cook" to substitute for the remaining information in the attribute field.

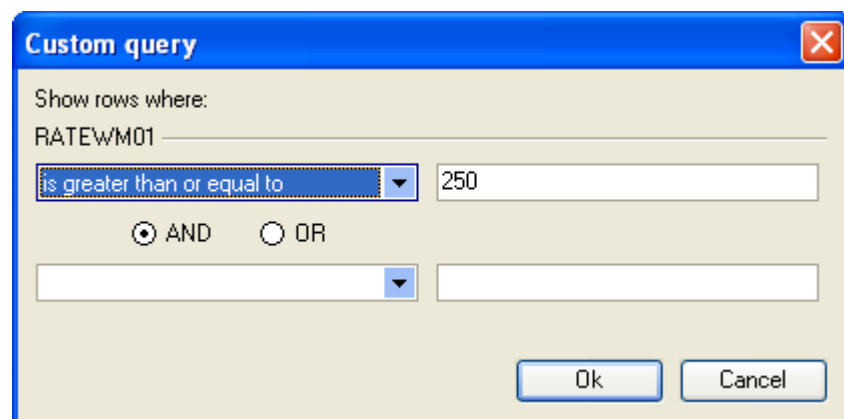


(Query definition for text alphabetic values.)

As when using the manual search method, the result is easily found.

3. Custom query for numeric values. The next exercise demonstrates a query for a range of numeric attribute values. The query is for all polygon records with a *RATEWM01* attribute value greater than or equal to 250. The *RATEWM01* attribute contains the mortality rate from heart disease for white males. This query will yield all HSA areas in which the annual mortality rate resulting from heart disease in the white male population is greater than 250 per 100,000 population.

Go to the *RATEWM01* attribute column in the *Data* panel and, from the drop down list, again select the (*Custom...*) option to open the *Custom query* panel. This time define the query for all *RATEWM01* attribute values greater than or equal to 250. Note that the *Custom query* panel provides for more sophisticated queries using multiple query statements, but all relating to a single attribute. Click on the *OK* button in the *Custom query* panel to populate the *Data* panel with only the records that match the query.



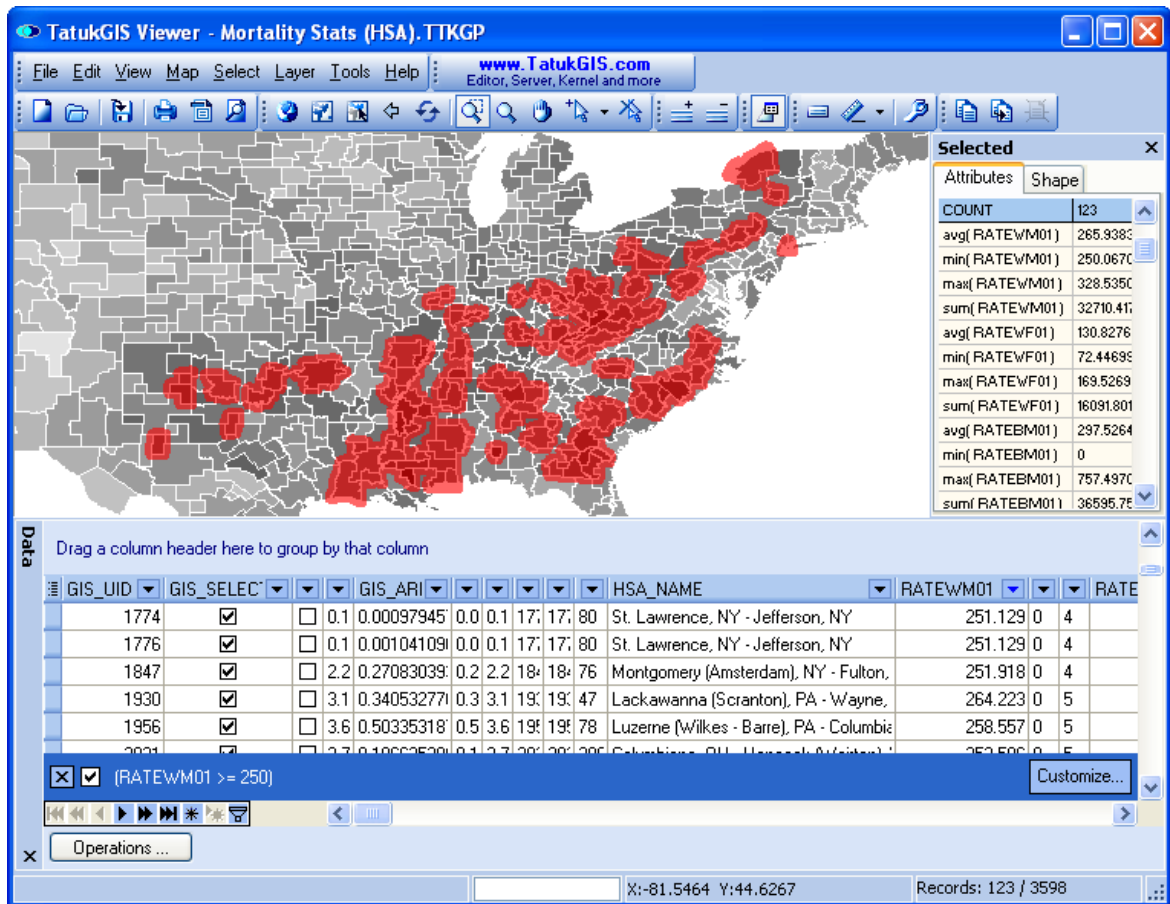
(Query definition for a range of numeric values.)

In this case, only 123 records, out of a total of 3,598 records contained by the map file, match the query. This information is presented in the status bar at the bottom of the application window.

Now select the group of 123 records presently contained by the *Data* panel on the map. Again perform the *Select group and zoom to* operation as described above. As pictured below, this operation selects on the map all records presently contained by the *Data* panel and zooms the map view to the proper extent to best view the shapes associated with the queried records.

The statistical calculations presented in the *Attributes* tab within the *Selected* panel reveal that the average heart disease related mortality rate of the 123 HSA areas selected by this query is 265.9.4 per 100,000. The highest value from the selected group is 328.5 and the lowest value is

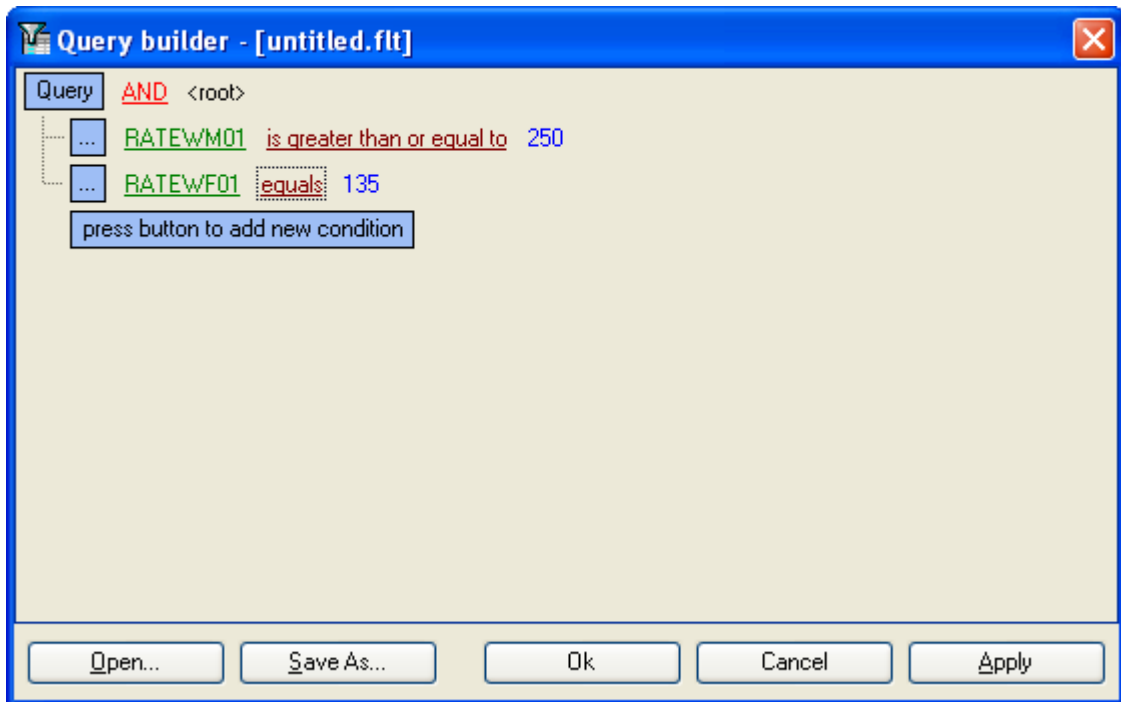
250.1. Notice the geographical concentrations of mortality rates resulting from heart disease.



(The Records information shows that 123 records from a total of 3,598 matched the query.)

Note that the query selection can be cleared from the *Data* panel at any time by clicking on the " X " in the check box just below data table within the *Data* panel.

4. Query builder. Still more sophisticated queries can be defined based on values or value ranges contained by multiple attributes by using the *Query builder* feature. The *Query builder* panel is accessed by clicking on the *Query* button near the bottom left corner of the *Data* panel. In this example, the query is defined based on two attributes - *RATEWM01* and *RATEWF01*. The *RATEWF01* attribute contains the mortality rate data from heart disease for the white female population. The query is for all records with a *RATEWM01* value greater than or equal to 250 AND a *RATEWF01* attribute value greater than 135.



(A more complex query for values ranges contained by two attributes.)

Click on the *OK* or *Apply* button in the *Query builder* panel to fill the *Data* panel with the records that match the query. As is visible in the record count information panel below, 43 records match these query parameters.

Again use the *Select group and zoom to* option in the pop up menu window to perform an new selection on the map. Statistical data for the selected records is presented in the *Selected* panel/*Attributes* tab. The average rate for white men in the 43 HSA areas selected by the query is 273.6 per 100,000 and the average rate for white women in these HSA areas is 142.3 per 100,000.



The screenshot shows the TatukGIS Viewer interface. The main map area displays a grid of polygons, with several highlighted in red. The 'Selected' panel on the right shows summary statistics for the selected records. The 'Data' panel at the bottom shows a table of records with columns for GIS_UID, GIS_SELECTED, GIS_ARI, GIS_ARI2, GIS_ARI3, GIS_ARI4, GIS_ARI5, GIS_ARI6, GIS_ARI7, GIS_ARI8, GIS_ARI9, GIS_ARI10, HSA_NAME, and RATEWM01. An attribute query is entered in the 'Data' panel: `(RATEWM01 >= 250) and (RATEWF01 > 135)`. The status bar at the bottom indicates 'Records: 45 / 3598'.

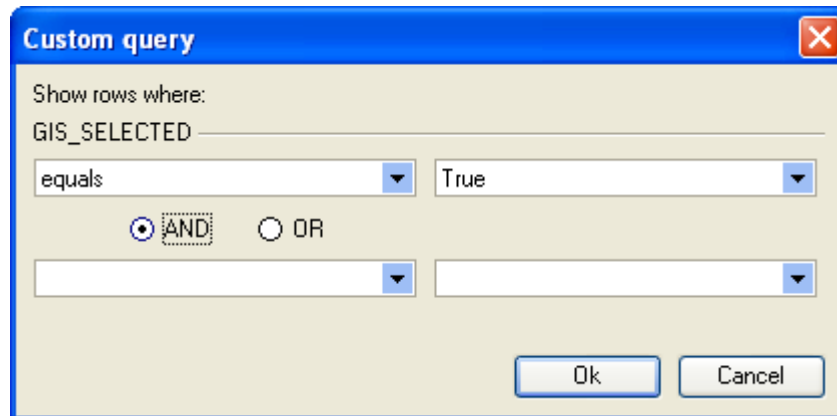
Attribute	Value
COUNT	45
avg(RATEWM01)	273.6408
min(RATEWM01)	252.2408
max(RATEWM01)	328.5350
sum(RATEWM01)	12313.84
avg(RATEWF01)	142.3270
min(RATEWF01)	135.5679
max(RATEWF01)	163.5269
sum(RATEWF01)	6404.719
avg(RATEBM01)	316.1874
min(RATEBM01)	85.4000

GIS_UID	GIS_SELECTED	GIS_ARI	GIS_ARI2	GIS_ARI3	GIS_ARI4	GIS_ARI5	GIS_ARI6	GIS_ARI7	GIS_ARI8	GIS_ARI9	GIS_ARI10	HSA_NAME	RATEWM01
2046	<input checked="" type="checkbox"/>	0.4	0.00269696	0.0	0.4	20	20	94	New York, NY - Kings (New York), NY				257.324 0
2134	<input checked="" type="checkbox"/>	5.0	0.60502179	0.6	5.0	21	21	337	Scioto, OH - Ross, OH				274.98 0
2139	<input checked="" type="checkbox"/>	3.9	0.62875909	0.6	3.9	21	21	92	Harrison, WV - Lewis, WV				261.799 0
2163	<input checked="" type="checkbox"/>	4.0	0.47715650	0.4	4.0	21	21	283	Gallia, OH - Mason, WV				266.548 0
2181	<input checked="" type="checkbox"/>	2.2	0.15268505	0.1	2.2	21	21	365	Clark (Jeffersonville), IN - Scott, IN				253.97 0

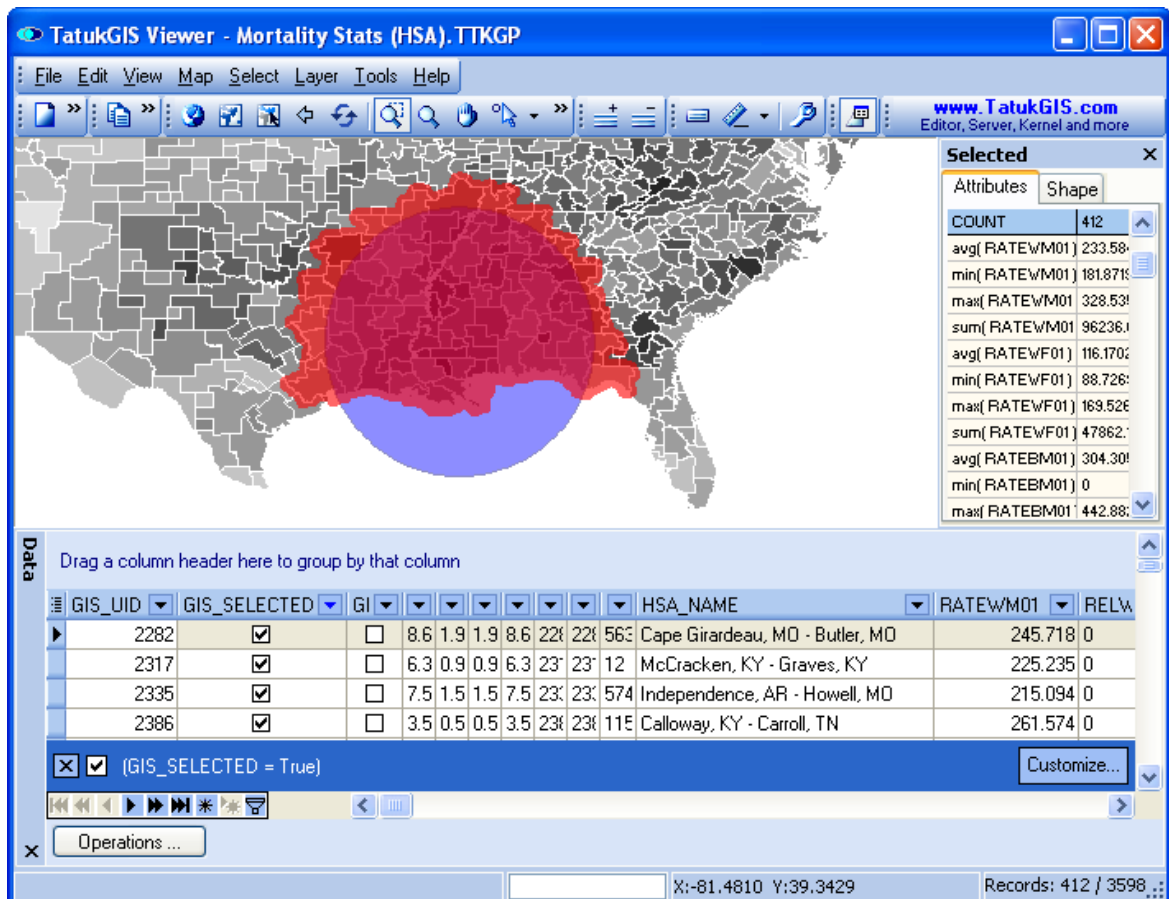
(Only 45 of 3,598 records match the query.)

5. Spatial selection and Attribute Query together. An attribute query can be limited to the shapes contained by a visible map extent or to a group of shapes that have been spatially selected on the map. The procedure with the visible extent is to first adjust the visible extent as desired and then use the *Load from visible extent* operation to fill the *Data* panel with this subset of records from the map. Then perform the attribute query on this subset of records. The procedure with a spatial selection is to first perform the spatial selection on the map and then set the *GIS_SELECTED* attribute to *true* to fill the *Data* table with the selected records. The following exercise demonstrates the use of a spatial selection with an attribute query.

First use the select tool  to select some objects on the map. In this example the circle select tool  is used to perform the selection on the map all the polygon shapes which at least partially overlap the selection circle. Then, from the drop down menu next to the *GIS_SELECTED* attribute column (the second column from the left), click on either the *True* option to or the *(Custom...)* option. Use of the *True* option automatically fills the *Data* panel with the records for all shapes that are selected on the map. The *(Custom...)* option opens the *Custom query* window. Within that window, define that *GIS_SELECTED* equals *True*, as shown below. Click on the *OK* button to fill the *Data* panel with the records of the shapes selected on the map.

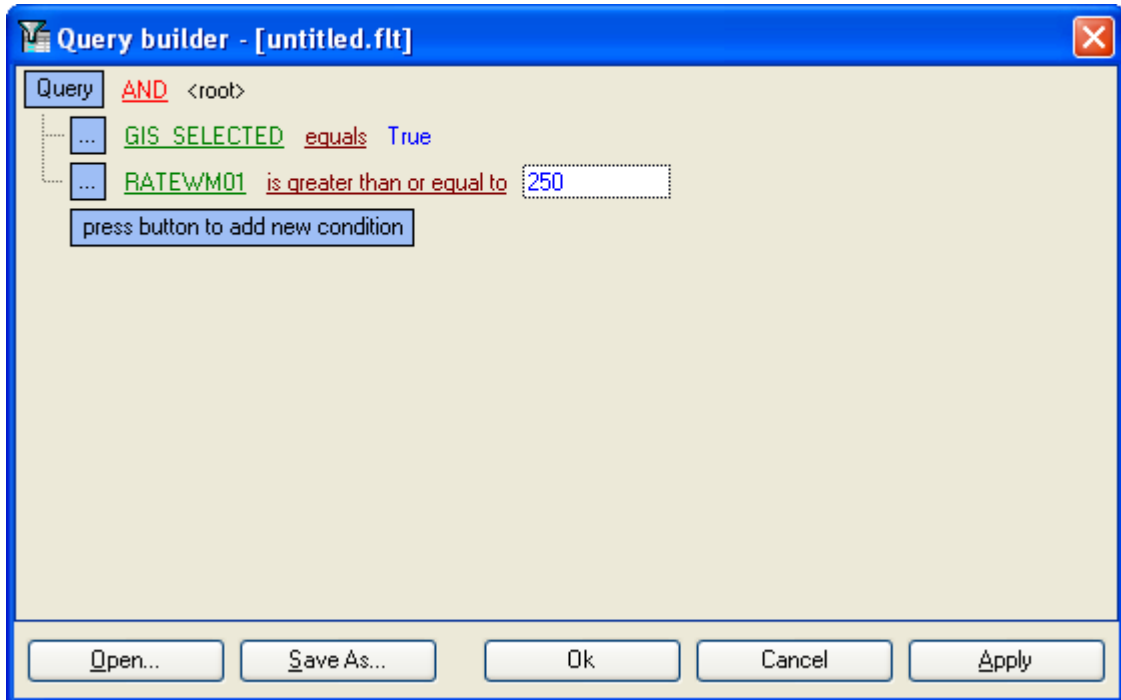


As is visible from the record count in the lower right corner of the Viewer window, the *Data* panel has been filled with 412 selected records.



(Data panel is filled with 412 records selected by the circle.)

Now click on the *Customize* button to open the *Query builder* window to add a second query statement. To make matters easy, we again use the query statement for all records with *RATEWM01* values greater than or equal to 250. The query will be performed only against the 412 records presently in the *Data* panel. Click on the *OK* or *Apply* button to perform the new query.



(A spatial selection together with an attribute query.)

A total of 47 records located on the map within the circle selection area match the query.

Selected

Attributes	Shape
COUNT	412
avg(RATEWM01)	233.58
min(RATEWM01)	181.871
max(RATEWM01)	328.531
sum(RATEWM01)	96236.1
avg(RATEWF01)	116.170
min(RATEWF01)	88.726
max(RATEWF01)	169.526
sum(RATEWF01)	47862.1
avg(RATEBM01)	304.301

Data

Drag a column header here to group by that column

GIS_UID	GIS_SELECTED	GI							HSA_NAME	RATEWM01	RELV
2386	<input checked="" type="checkbox"/>	<input type="checkbox"/>	3.5	0.5	0.5	3.5	23	23	11E Calloway, KY - Carroll, TN	261.574	0
2396	<input checked="" type="checkbox"/>	<input type="checkbox"/>	5.6	1.1	1.1	5.6	23	23	571 Craighead, AR - Greene, AR	251.488	0
2426	<input checked="" type="checkbox"/>	<input type="checkbox"/>	4.2	0.3	0.3	4.2	24	24	614 Mississippi, AR - Pemiscot, MO	290.394	0
2470	<input checked="" type="checkbox"/>	<input type="checkbox"/>	2.2	0.1	0.1	2.2	24	24	521 Jackson, AR	281.864	0

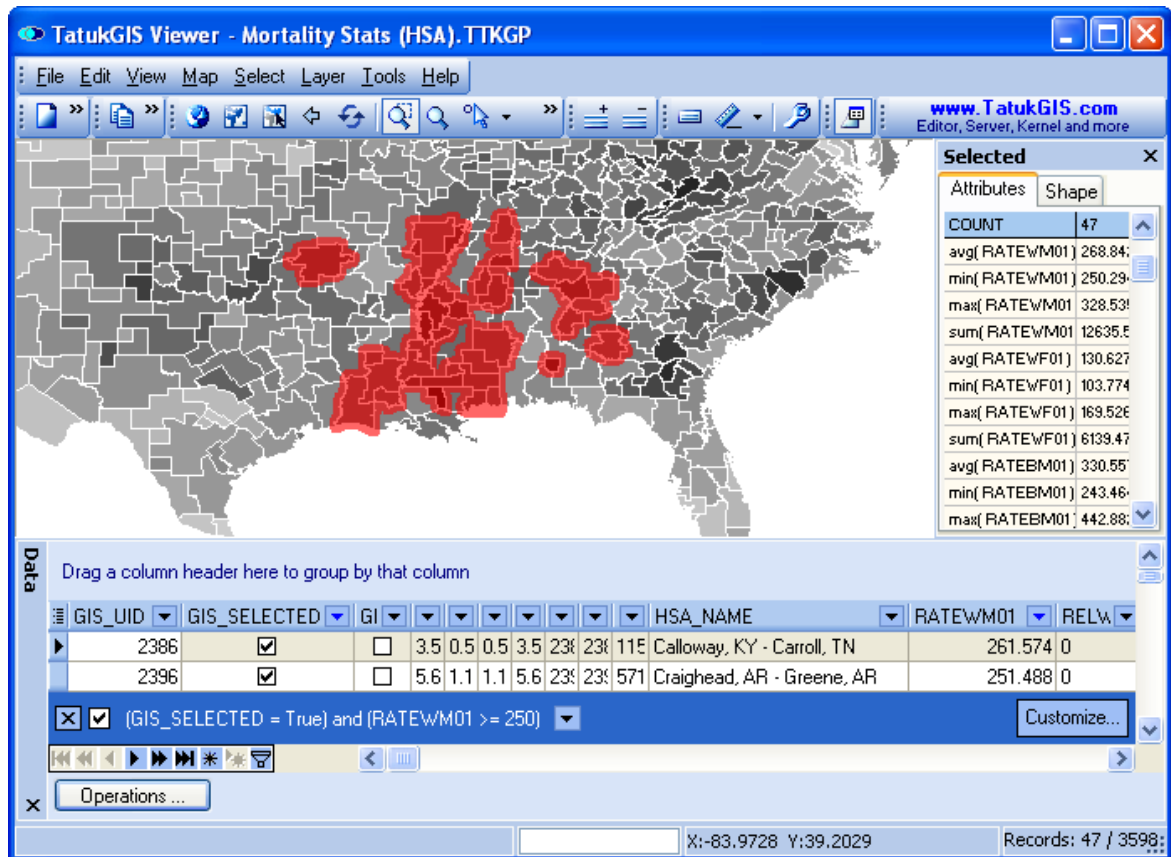
(GIS_SELECTED = True) and (RATEWM01 >= 250) Customize...

Operations ...

X: -86,4022 Y: 38,0030 Records: 47 / 3598

(48 records lie within the selected area and match the attribute query statement.)

Use either the *Selections/Select group* operation or *Select group and zoom to* operation to now select on the map the 47 records now contained by the *Data* panel.



(The group of records from the *Data* panel have now been selected on the map.)

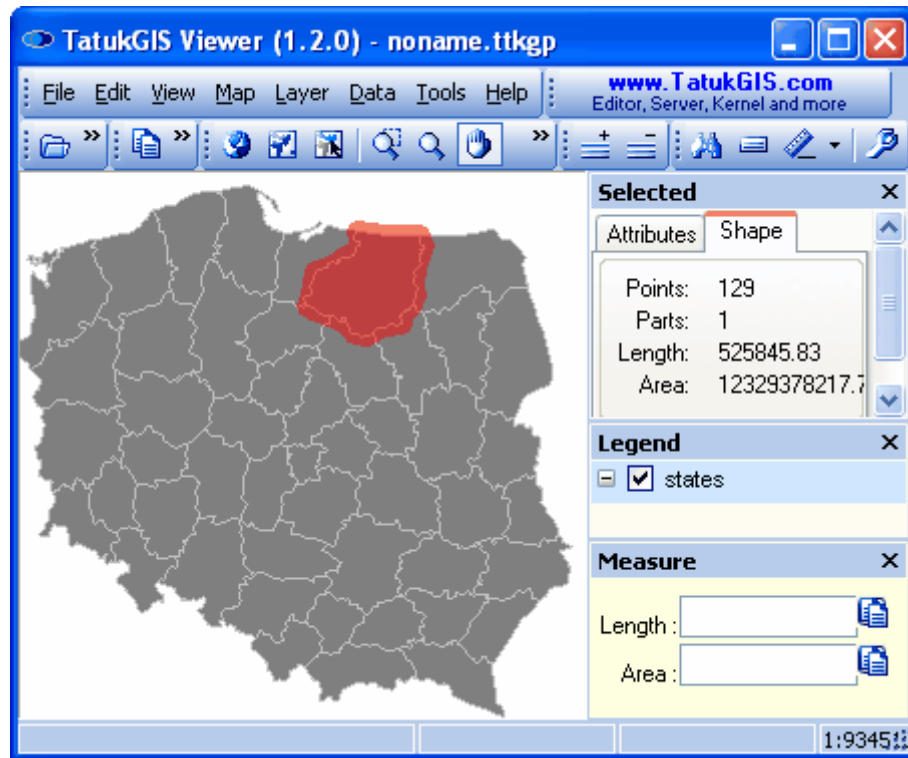
The *Data* panel in the Editor program (but not the free Viewer) can be used to export attribute data from the *Data* panel to a spreadsheet or database file. The Editor can also export the selected map geometry to a new vector map file.

2.2.1.10 Tutorial 10 - Measurement Tools

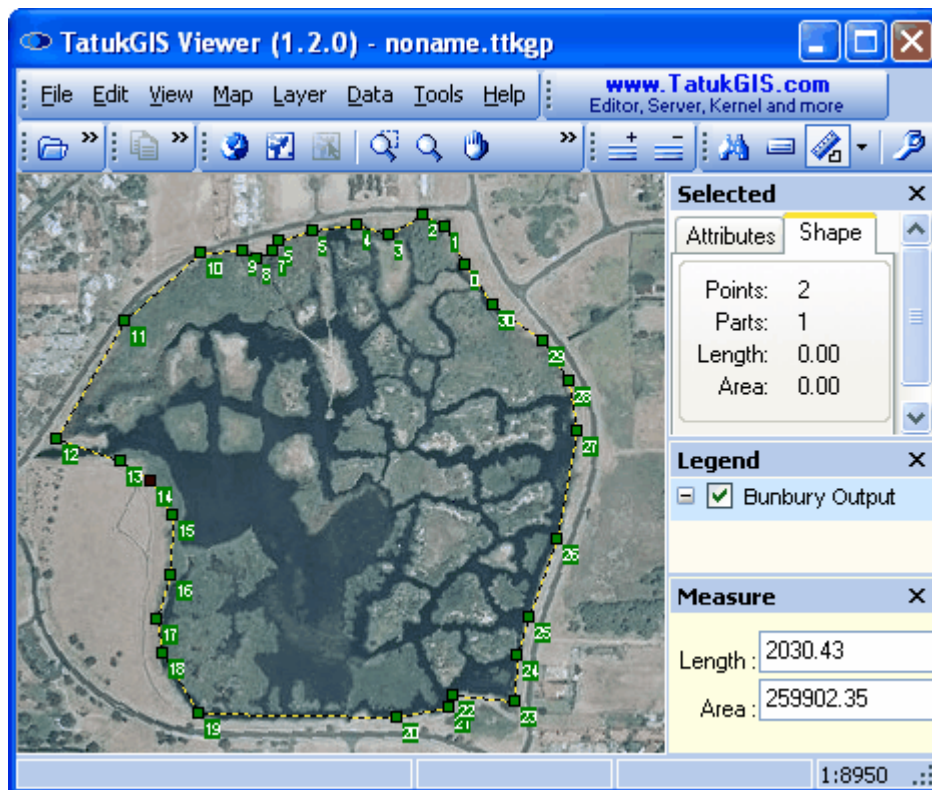
The Viewer provides two ways to measure length/distance or the areas and perimeters of areas. One method calculates these measurements based on an already existing vector in an open layer. The second method calculates these measurements from a temporary line or polygon which is drawn on top of the other map layers.

The map layer(s) must be in a projected coordinate system, with linear units (meters, feet, etc.), for the measurement to yield accurate results, because the measurement results are presented in the same units as the units used by the coordinate system. If, for example, the measurement were performed on a layer defined in longitude/latitude coordinates, such as the common WGS84 coordinate system, the measurement results will also be provided in coordinates, which is not meaningful.

In the following image, the number of points, parts, length (which is the length of the perimeter in the case of a polygon), and area of the selected polygon are visible under the *Shape* tab in the *Attribute* panel. The data presented is calculated from the geometry of the vector object, and not from the information which may be contained by the attributes of the selected vector. The distance/area measurements are presented in 'map units', which are the same as the linear units of the projection.




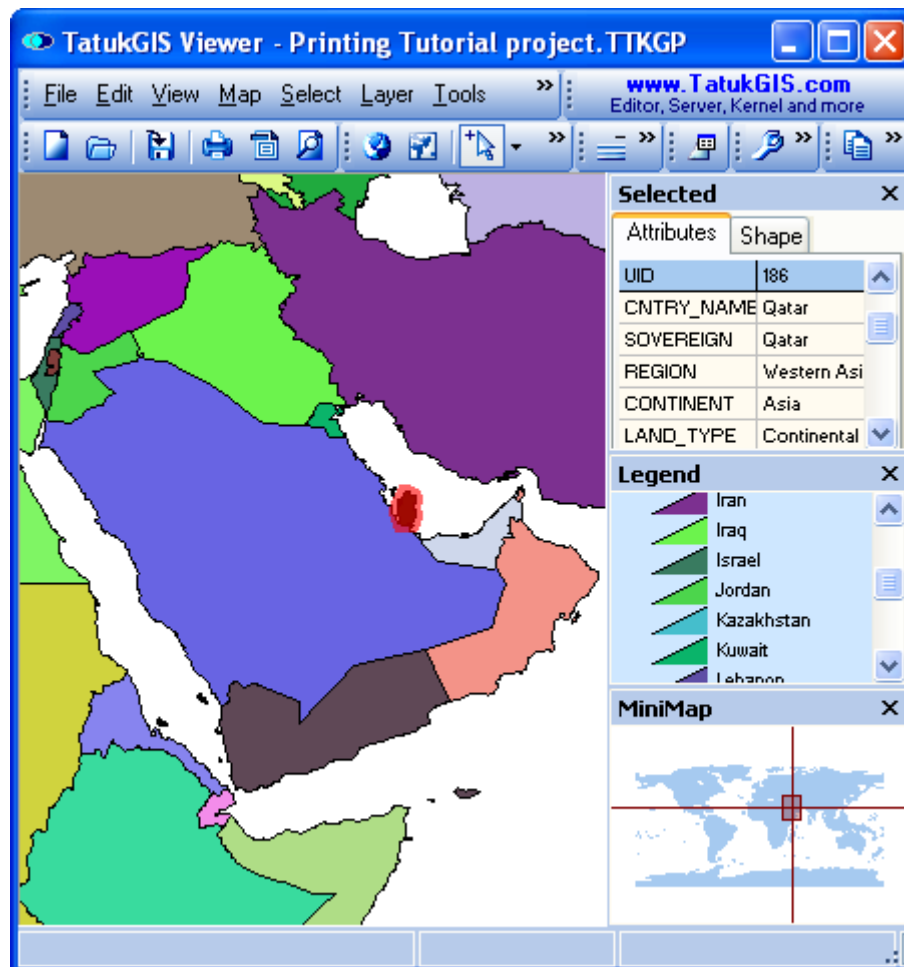
The area/distance/perimeter measurement tool is opened by clicking on the *Measure* icon (or using *Tools/Measure* menu command). This tool allows the user to draw temporary line or polygon area that is to be measured.



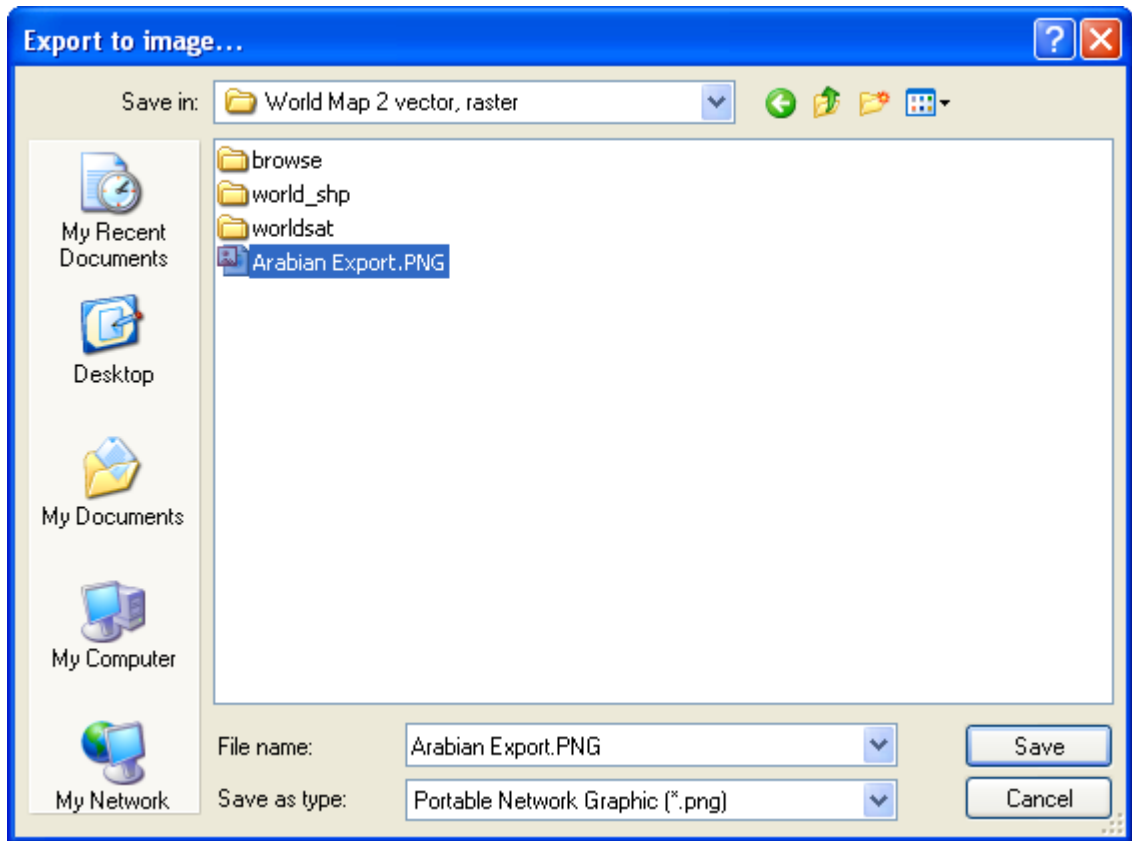
2.2.1.11 Tutorial 11- Export to Image file

The Viewer supports advanced image file export functionality. The export to image procedure generates the export image from a specified extent (area) of the source map data, as the data is visibly presented in the Viewer map window. The source data can be composed multiple layers, which can be raster or vector, and reflects the rendering configurations set up in the layer properties. The export is generated only from the map viewer window, and does not include any of the panels (Attributes, Legend, MiniMap, etc.) which may be open. (The export to a PDF document file is explained in the Print, Print Preview, PDF tutorial.)

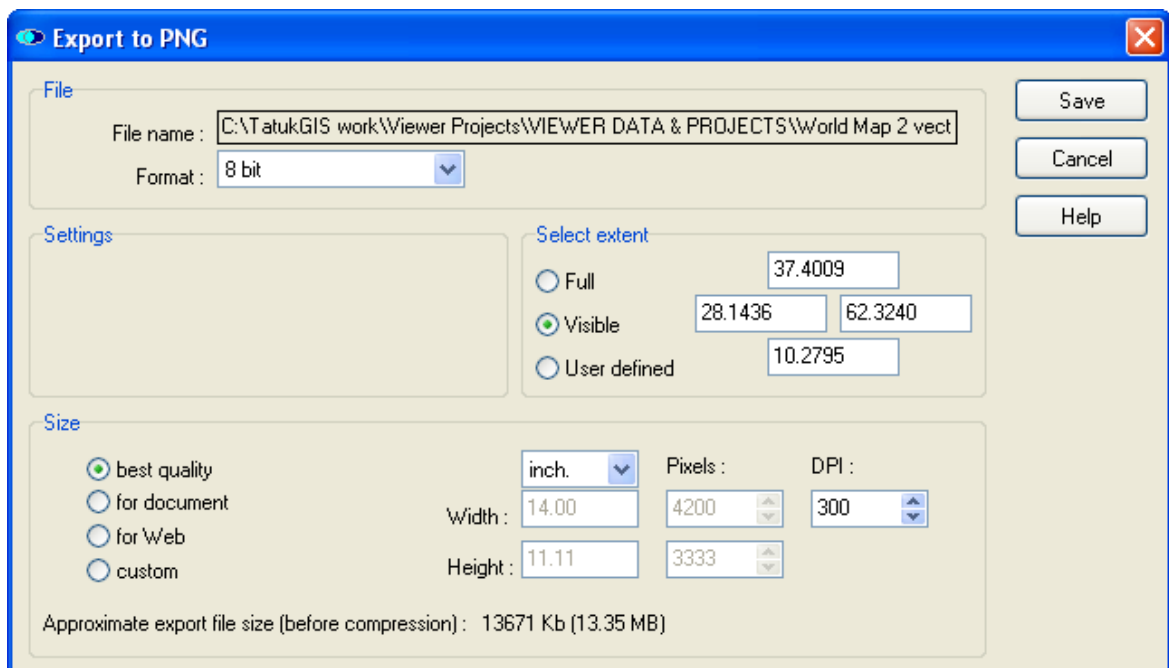
This demonstration uses a SHP format vector world map with the color of each country rendered at random. As illustrated below, the visible extent is zoomed in to the region of the Arabian Peninsula. This visible map extent will be exported to an image file. Begin the export procedure by clicking on the *Export to image*  toolbar icon (or using the *File/Export to image* menu command).



The Viewer will advance to the *Export to image ...* window, which allows the user to enter a file name for the image to be created by the export procedure and select the format (file type) of the export image. The PNG file type is selected for this exercise. (The PNG format is a good compression format choice for source data with a limited number of colors, like with this situation.) Click on the *Save* button to proceed to the *Export to __* window.



The *Export to __* window provides for the selection of the extent of the source data to be exported from and the file type, resolution, and compression level of the export image that is to be generated.

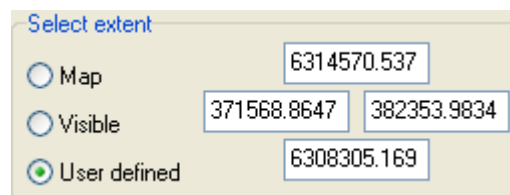


(With 8-bit and *Best Quality* selections, the estimated size of the data to be exported is 13.35 .)

Export Extent:

The extent of the source data that is generated to the export image can be defined in two ways:

- *Full*: The full extent of all open map layers.
- *Visible*: The extent that is presently visible in the map viewer window.
- *User defined*: The extent is precisely defined by entering coordinate values, an upper and lower y coordinate value and a right and left x coordinate value. The *User defined* option is supported only in the TatukGIS Editor, not the free Viewer.



The screenshot shows a dialog box titled "Select extent" with three radio button options: "Map", "Visible", and "User defined". The "User defined" option is selected. To the right of the "User defined" option, there are four input fields containing numerical values: 6314570.537, 371568.8647, 382353.9834, and 6308305.169.

(The definition of the extent to be exported using x,y coordinate values.)

Export Resolution:

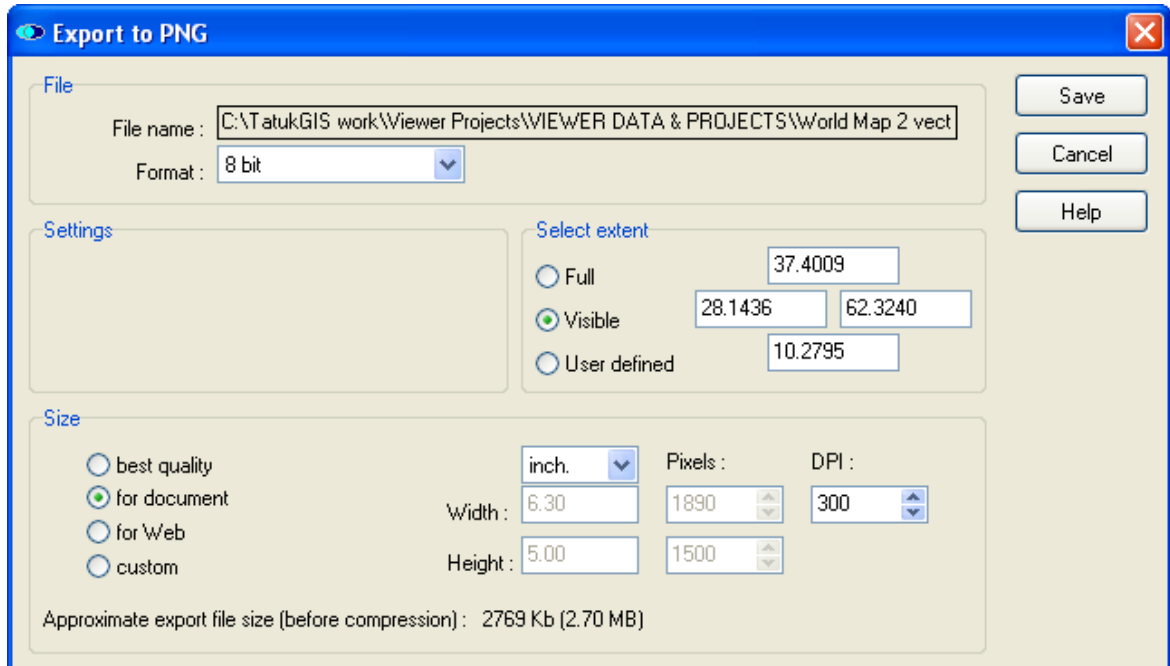
To make the selection of the export resolution as simple as possible, buttons are provided for the selection of the three most useful export quality levels: *Best Quality*, *For Document*, and *For Web*.

Best Quality - If generating the export image from a raster image layer, or a source data set including a raster image layer, this setting generates the export image at the same resolution level (pixel density) as the source image. If the source data contains image layers of different resolutions, the *Best Quality* setting generates the export image at the resolution level equal to the source image layer with the highest resolution. (This situation will result in some up resampling of the portions of the export image generated from raster layers of lower resolution levels.)

If the export is generated only from source layers containing vector data (like in this demonstration), the *Best Quality* setting generates the export image with 4,000 pixels in the width and with the number of pixels in the height proportionate to the height-width ratio of the source extent.

For Document - This setting generates the export image with a resolution level that is of a reasonable quality (versus the file size) for use as a typical physical document, which is a width of 14 cm and a DPI (dots per inch) of 300. The number of pixels in the height will be proportionate to the height-width ratio of the source extent.

For Web - This setting generates the export image with a resolution level which is the maximum that is typically web published - 640 pixels in the width and the height proportionate to the height-width ratio of the source extent.



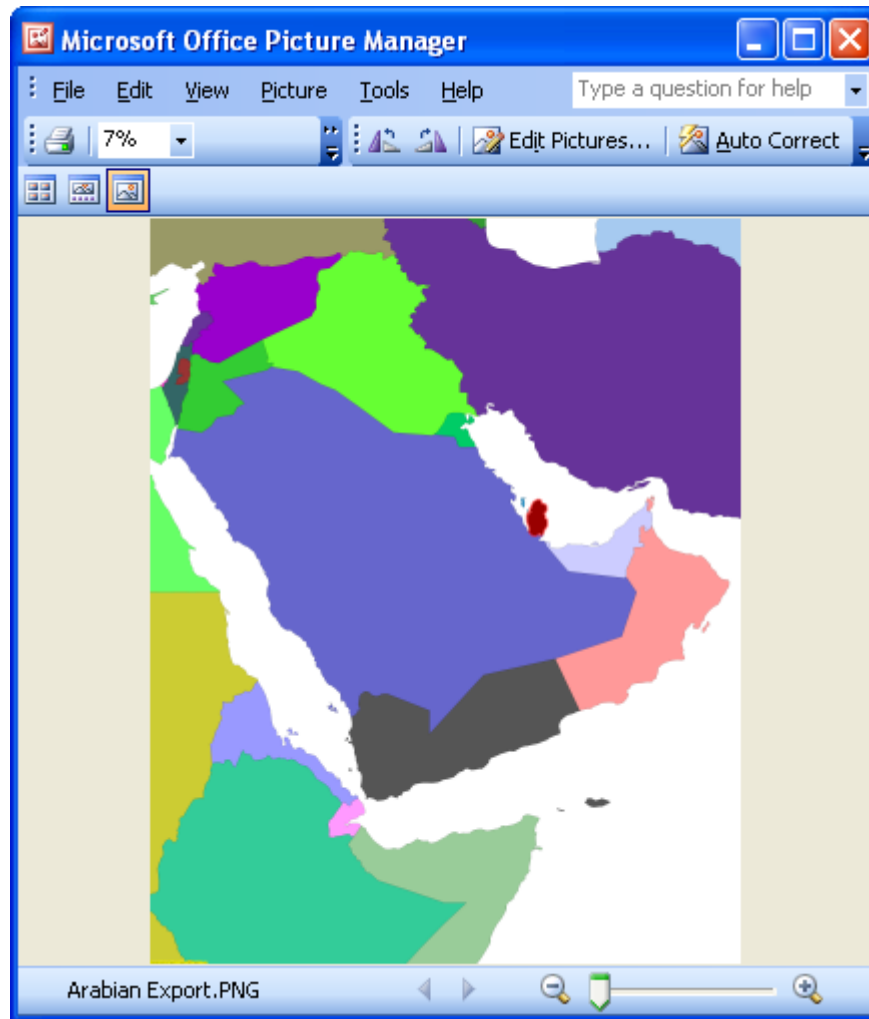
(With the *For Document* resolution setting, estimated size of the data to be exported is only 2.7 MB.)

In addition to the three, one-button export resolution settings, the export resolution can be custom defined based on either i) the number of pixels in the height and width of the image or ii) the image height and width in measurement units (inches, centimeters, or millimeters) in combination with the DPI. The second option can be useful if the export image file is to be printed, such as by a professional printing shop.

This window provides an advanced estimate of the size of the export image file to be created - approximately 2.7 MB in this example - before any compression is performed in the event that the export is generated to an image compression file type, e.g., JPEG, PNG, or TIFF-LZW. If the source data includes a raster image layer and the *Best Quality* setting is selected, the estimated size will reflect the resolution of the source raster image, the selected export extent, and bit level of the export image. (Note that the information about the height and width in pixels of any image opened as a layer in the Viewer can be found under the menu *Layer/Properties/Layer/Info*.) If the resolution (pixel density) of the export image is specified by the user, such as with the use of the *For Document* or *For Web* options, the resolution of any raster image layers in the source data has no bearing on the size of the export image.

Depending on the level of any JPEG, PNG, or TIFF-LZW compression applied during the export process, the actual export image file size can be significantly less than the estimated size before compression. In this example, the PNG compression reduced the exported PNG image file to only 66 KB.

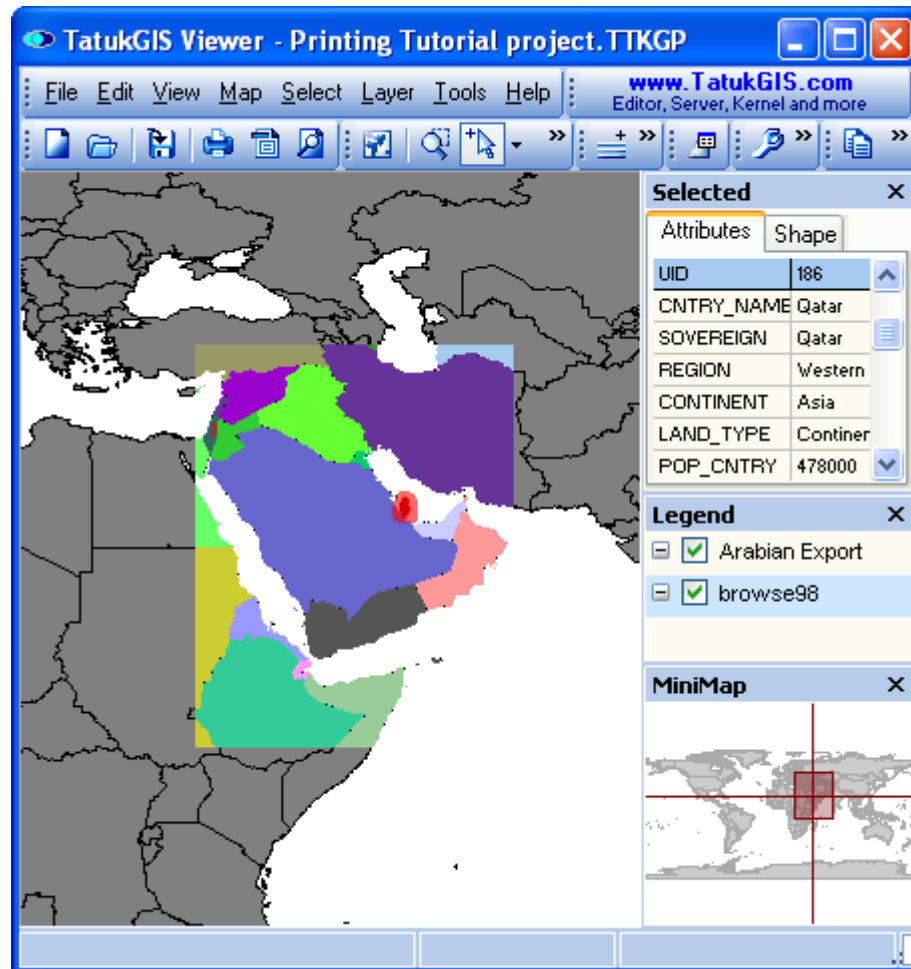
Below the exported PNG image is opened in another commercial image viewing software product.

**Image Registration files:**

During the PNG export process, the Viewer also generates a *.PGW file (a World File) and a *.TAB file (TAB registration file). These files contain information about the coordinate system of the exported image to allow the exported image to be correctly opened in other GIS software products which understand geographic coordinate systems. For example, the image below shows the exported PNG image opened in the Viewer as a separate layer over the original vector map layer. The PNG image is automatically positioned correctly relative to the vector map layer. Without a *.PGW or *.TAB file (some GIS software programs understand the *.PGW format and others the *.TAB format; TatukGIS products understand both file types), the program would not know where to position the PNG image. The Viewer generates an associated World File and TAB registration file with any exported image, but the file endings are different for each format, e.g., TIFF, JPEG, BMP, etc. To work properly, the World File and/or TAB registration file must be kept in the same file folder as the image file.

When the export is to the TIFF format, the Viewer also generates the TIFF as a GeoTIFF, thereby embedding the coordinate information within the TIFF file itself.

In the image below the exported image file, named "Arabian Export" as is visible in the Legend, has been opened as a layer on top of the original vector world map layer. The vector world map has been rendered grey color to highlight the proper placement of the PNG image file.



Size considerations when exporting to JPEG and PNG files:

The export of more than 25 MB, before compression, to JPEG or PNG files is generally not recommended. The export of larger sizes to JPEG or PNG can work OK in some situations, but in other situations the resulting image may not open or work properly in some software products. Certainly the export of over 100 Mb to the JPEG or PNG formats is risky.

If size is an issue, consider exporting instead to the TIFF or BMP formats, which have no inherent size limitations. The Viewer also exports to TIFF with LZW compression, which has no inherent size limitations. Alternatively, consider using the PixelStore image format, which is designed by TatukGIS specifically to efficiently handle huge images.

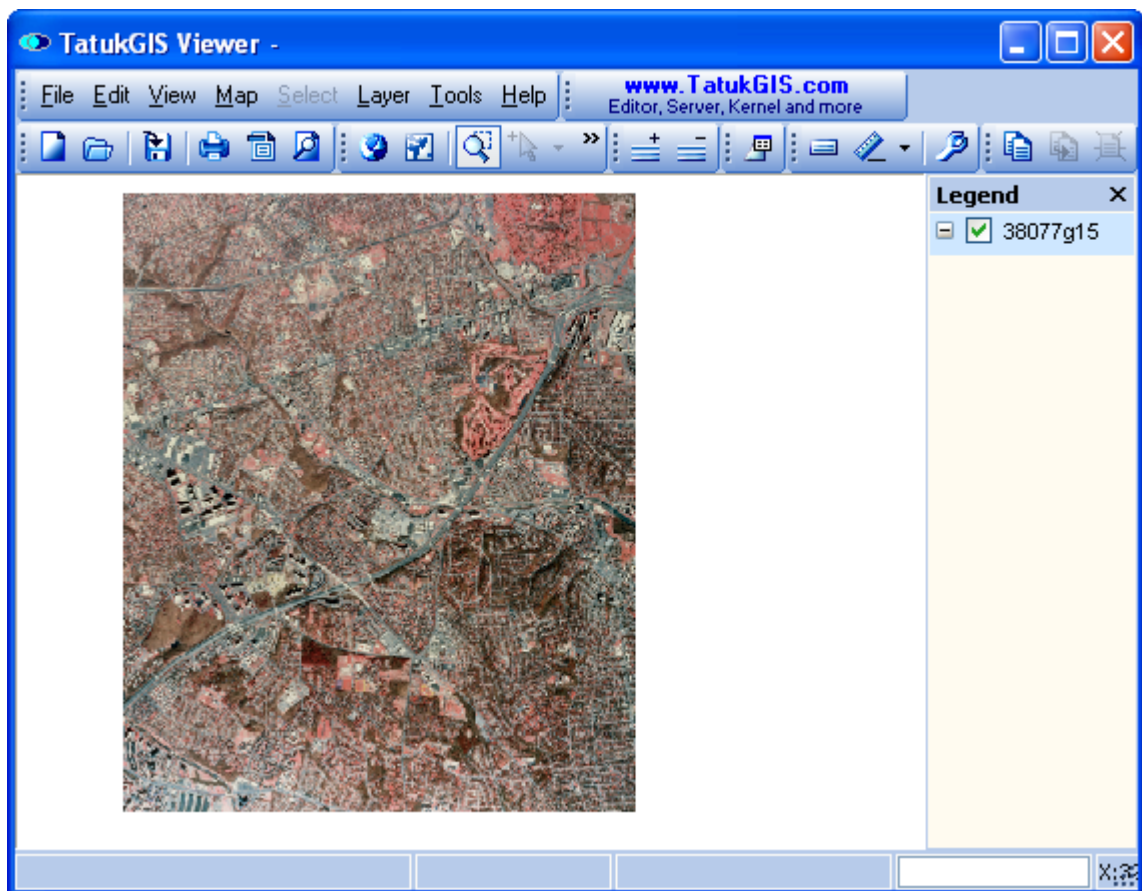
2.2.1.12 Tutorial 12 - Export Image Mosaics

Multiple georeferenced image files can be opened as separate layers in the Viewer and viewed together and saved together to a single image file. The starting images must be in the same geographic coordinate system so that the Viewer knows how to position the images relative to each other and well rectified so that they mosaic together nicely.

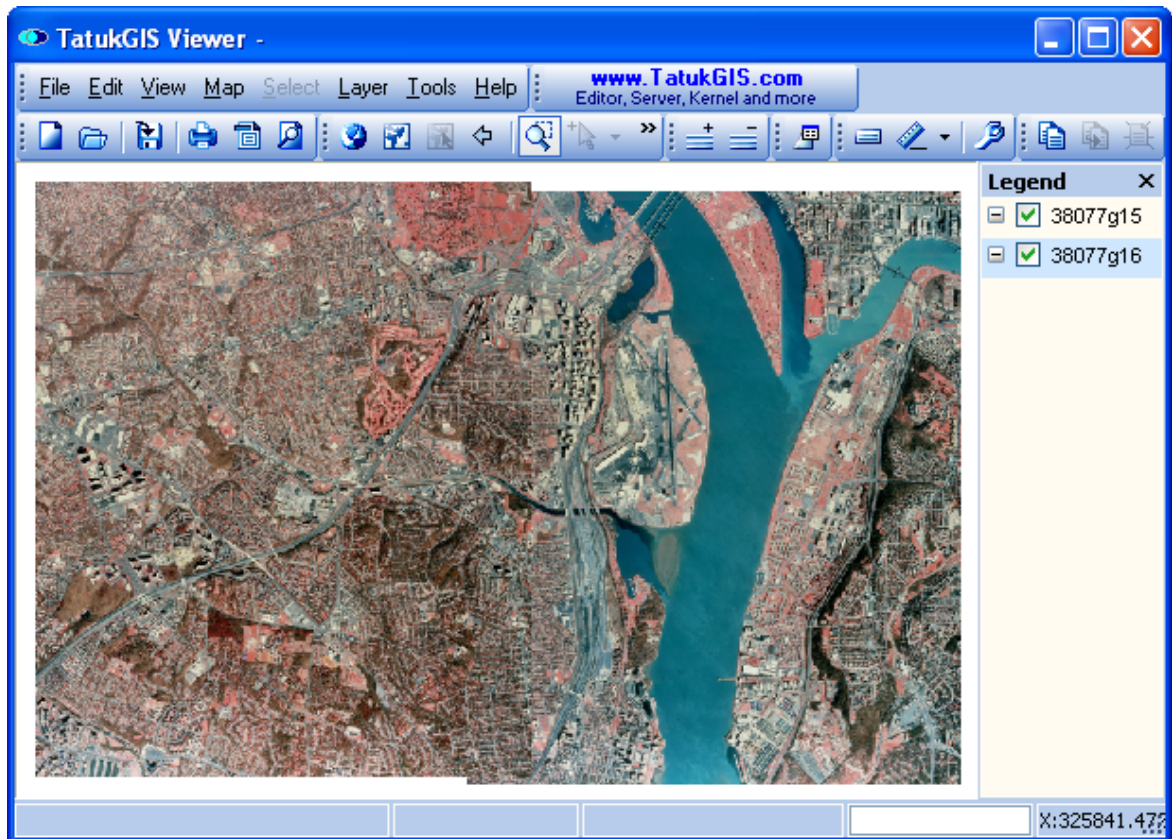
This Tutorial uses two standard U.S. Geological Survey DOQQ aerial TIFF format images. Each image is paired with an associated World file (*.TFW) which contains the coordinate system information for the image.

Although this example shows the mosaicing of only two images, there is no limit on the number of images that can be opened together in the Viewer or exported to a single image mosaic.

Below a single TIFF image is opened in the Viewer.

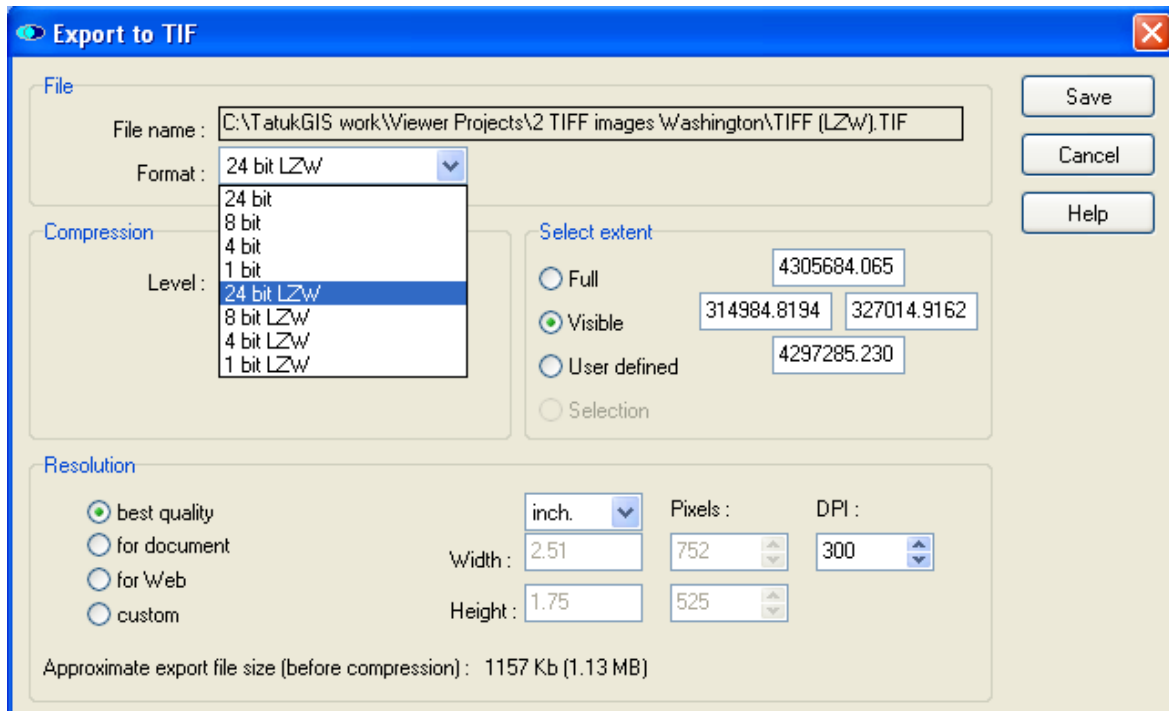


Now second TIFF image, of territory that is adjacent to the territory of the first image, is opened as a second layer in the Viewer.



As explained in the prior tutorial, click on the *Export to image*  toolbar icon (or use the *File/Export to image* menu command) to select the file path for the export file and to open the *Export to ...* window. The parameters for this image export are defined as pictured below. The export is to be generated to a 24-bit TIFF with LZW compression. The *Best Quality* setting has been selected, which will create the export image at the same resolution level as the source images. (Information about the resolution of the source images can be found in the *Layer/Properties/Layer/Info* window.)

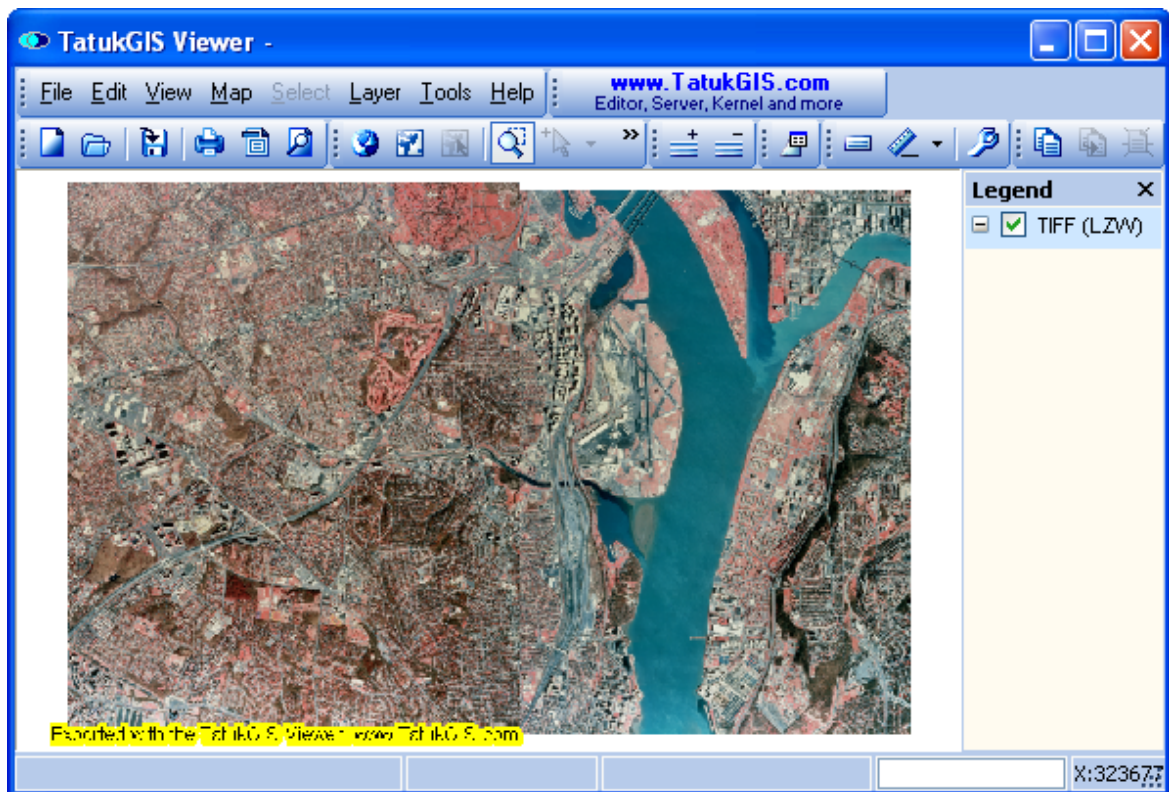
(As shown in the window below, the total uncompressed file size being exported is only approximately 1.08 MB. (The relatively small size is because the resolution of the images used for this example was previously reduced from the original quality of the DOQQ TIFF aerial images provided by the U.S. Geological Survey. The original images were each well over 100 Mb.)



(The User defined extent option is available only in the Editor, not in the free Viewer.)

The exported result - a TIFF mosaic, with LZW compression. Note in the *Legend* panel that now only the single TIFF image layer is open in the Viewer.



The free TatukGIS Viewer adds the text "Exported with the TatukGIS Viewer: www.TatukGIS.com" in yellow color in the lower left corner of the exported image. If the TatukGIS Editor were used to generate the exported image, this text is not added to the image.

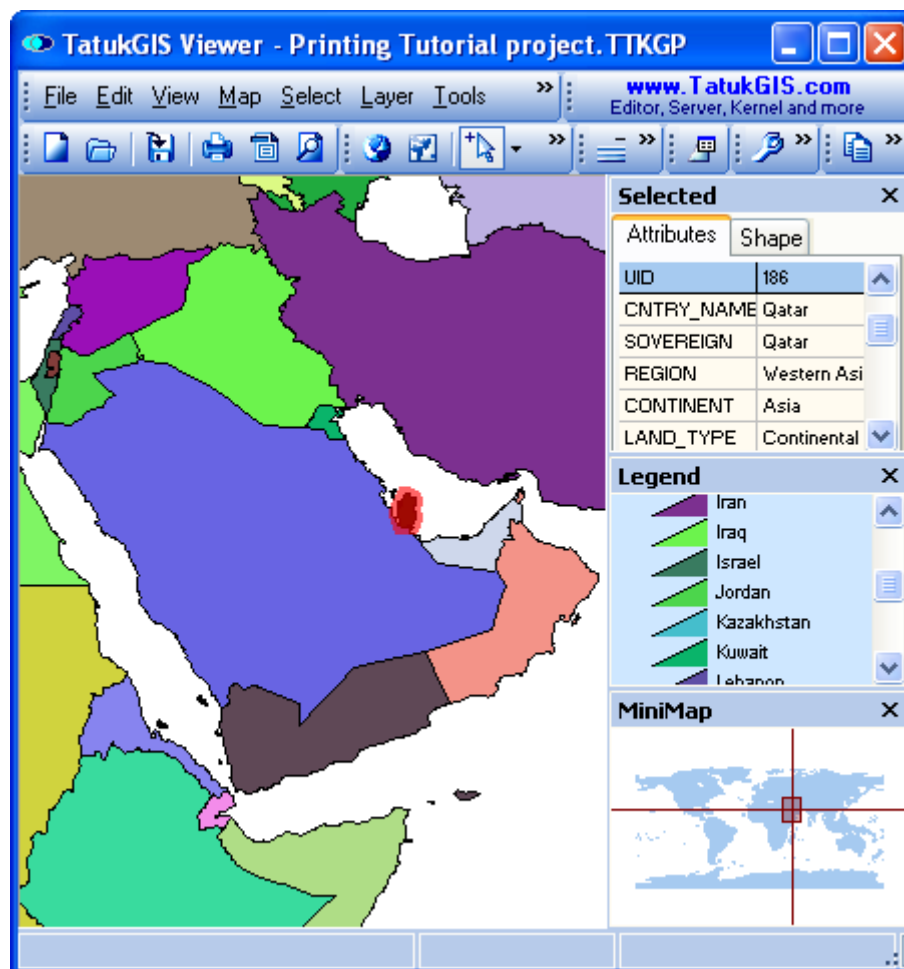


2.2.1.13 Tutorial 13 - Print, Print Preview, PDF

Any map view can be printed directly from a local printer or printed to a map quality Adobe Acrobat PDF (a vector format) file that can be saved. This tutorial demonstrates these procedures using the same map data and map view as used in the earlier Export to Image File tutorial. In addition to the PDF file generation demonstrated here, the Copy feature (access with the *Edit/Copy* menu command) can be used to copy the visible extent to the Windows clipboard as an EMF file, for inclusion to a Word document, CorelDRAW, etc.

The printing is performed to the same scale as the map appears in the map viewer window just before starting the printing procedure. Refer to the Scale Setting instructions under the Viewer Main Menu controls for more information about the scale setting.

Click on the *Print Preview*  toolbar icon (or use the *File/Print Preview* menu command) to start the print procedure. The print preview step can be skipped by instead using the *Print*  toolbar icon (or the menu *File/Print* menu command).

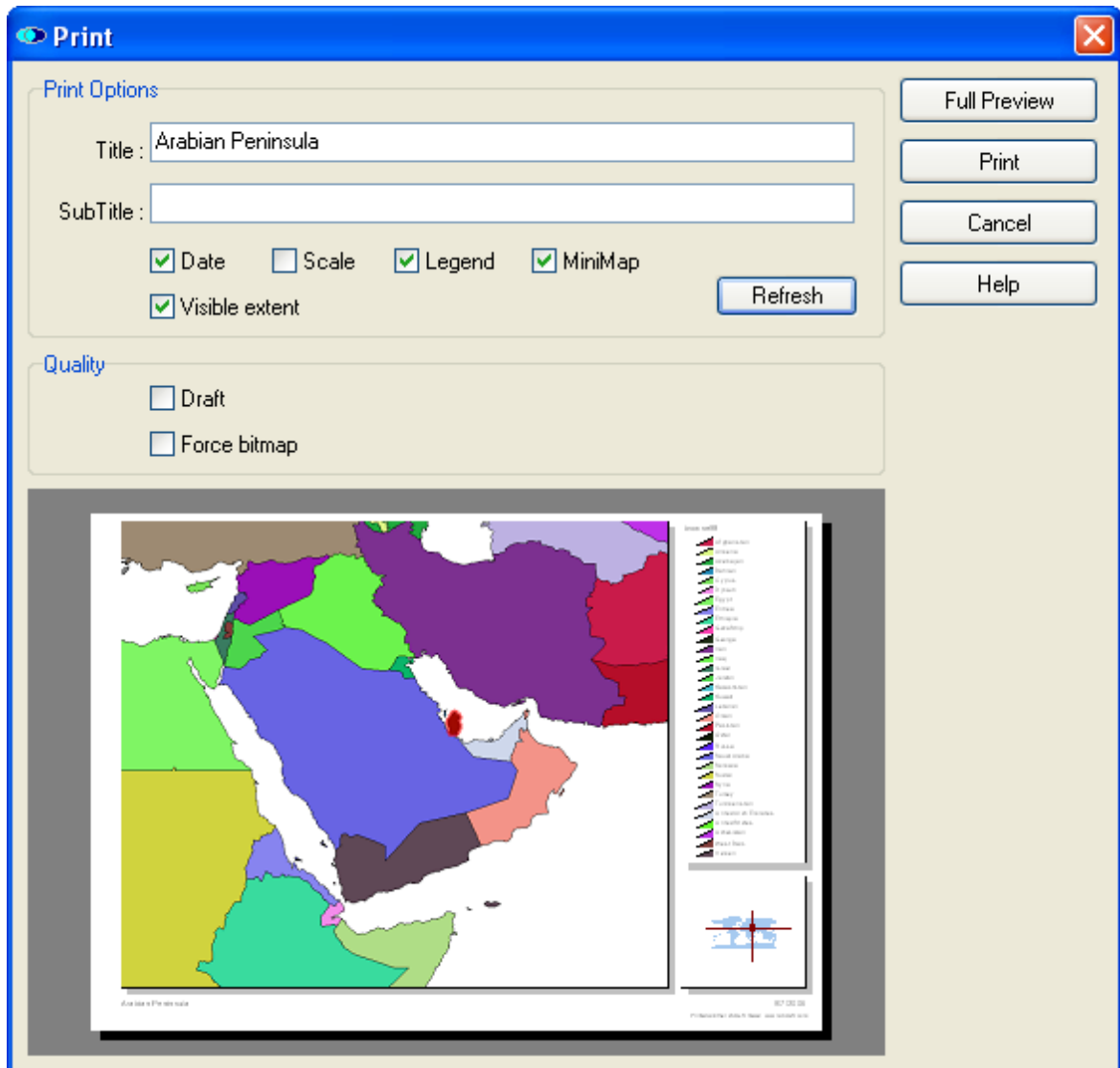


The Print Preview dialog box allows the user to enter a title and subtitle that may be printed in the lower left corner of the map, and to determine whether to include the date, scale, Legend, and MiniMap in the printed output. The print functionality always prints the visible extent, or an area just large enough to capture at least the visible extent after any height/width re-sizing. Printing can include the *Legend* and *MiniMap* panels, but cannot include the *Attributes* information panel.

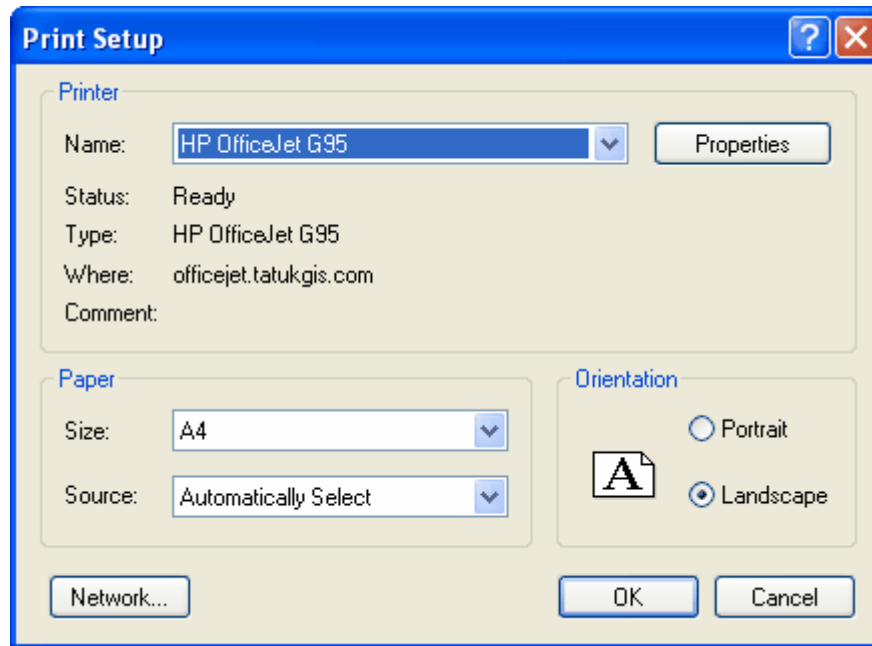
The *Quality* options provide for:


- *Draft* will speed up the printing process with some printer types by using a lower quality level. When used in conjunction with the *Force bitmap* setting, *Draft* mode will always speed up the printing of forced bitmap type outputs.
- *Force bitmap* is useful in situations in which some types of map objects are not properly represented on the printer due to incompatibilities between the Windows operating system and the printer engine. For example, sometimes semi-transparent or filled polygons can be misinterpreted by the printer. Use of the *Force bitmap* option forces the printer to represent such situations as they actually appear on the screen.

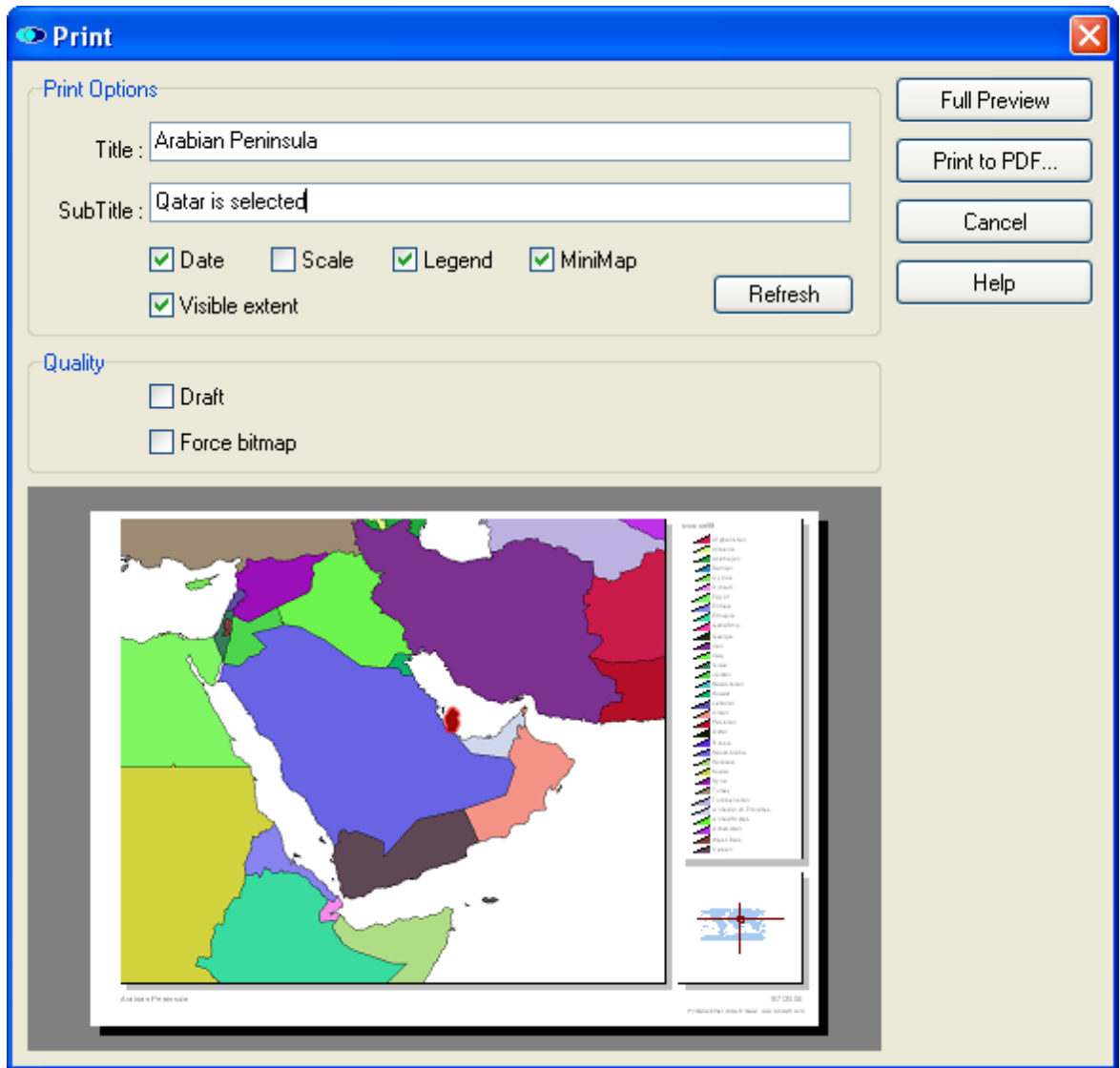
Click on the *Print* button.

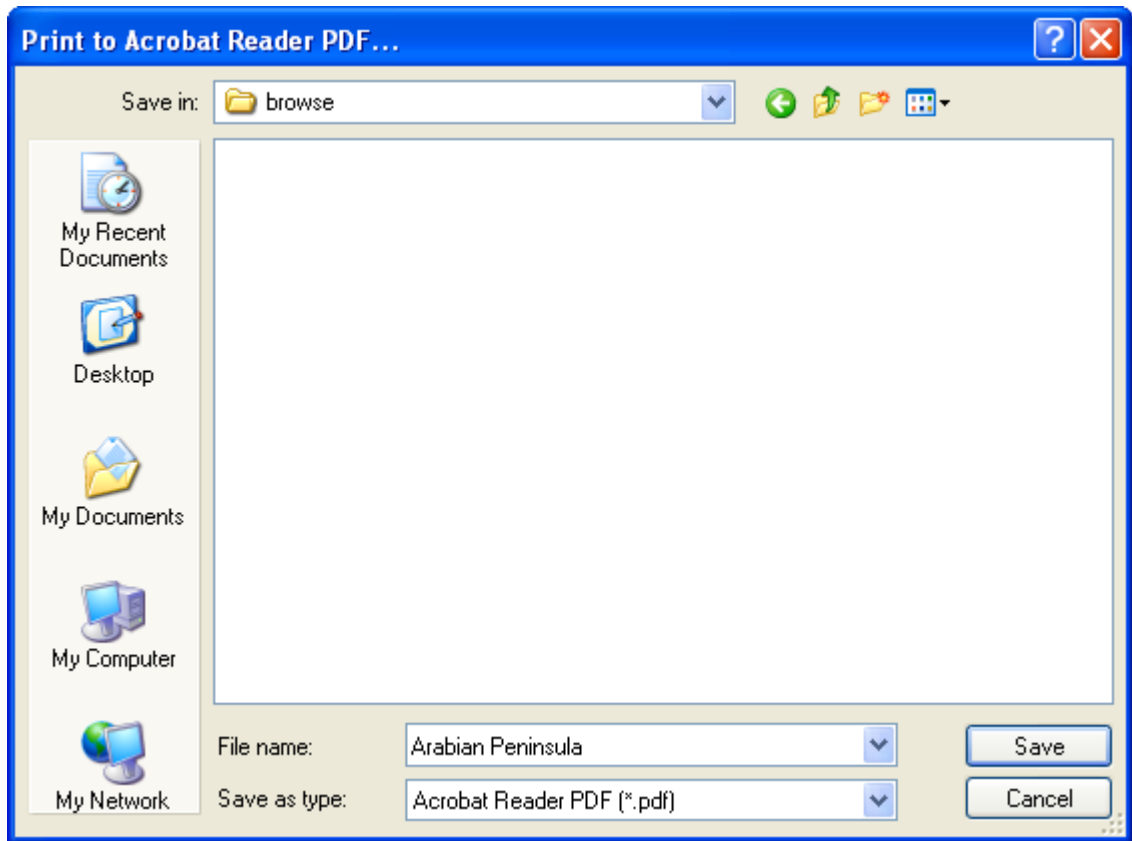


The next dialog box allows the user to customize the printer set-up options, if required. Click on the *OK* button to sent the print job to the printer.

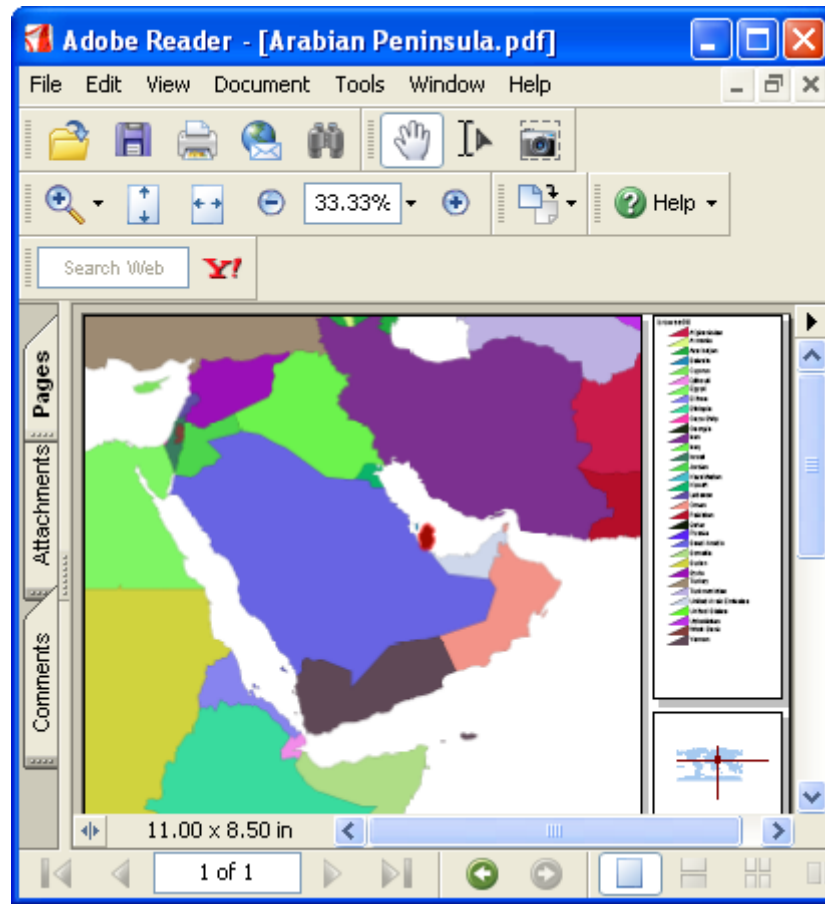


If the intent is to print to a PDF document, select the *Print to PDF*  toolbar button (or the *File/Print to PDF* menu command) to advance to a print preview dialog box that is similar to the one shown above but that contains the *Print to PDF* button. Click on the *Print to PDF* button to generate a PDF file from the selected extent.





Below the exported PDF file has been opened in Adobe Acrobat Reader.

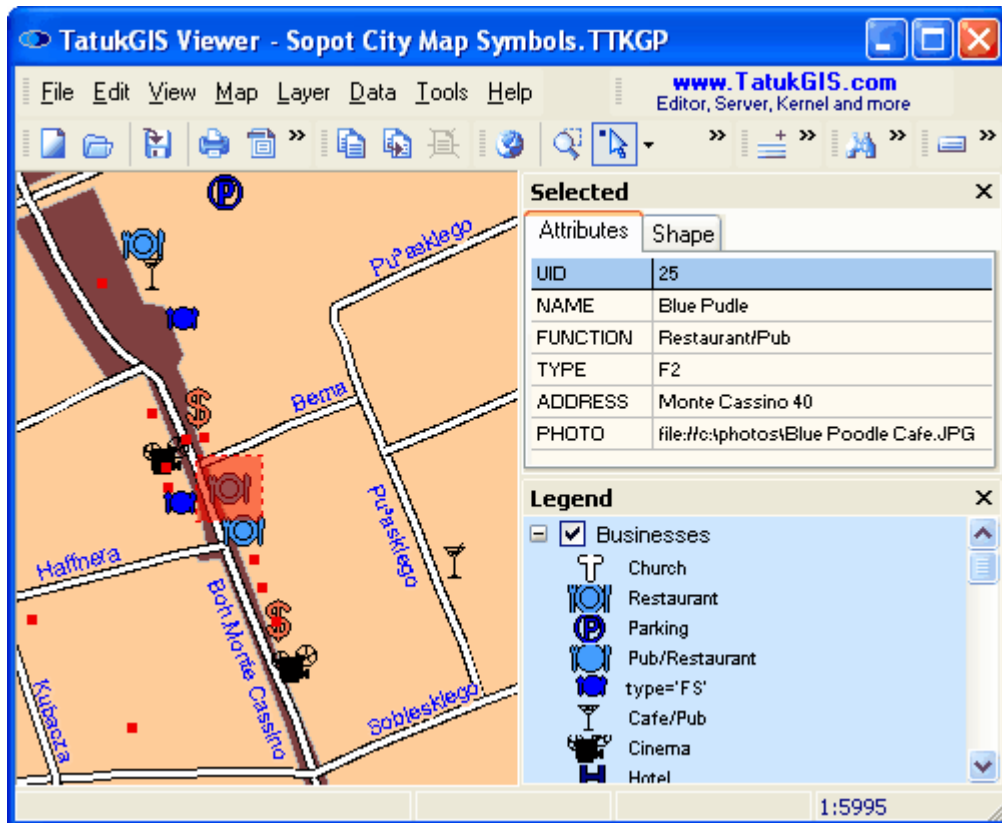


2.2.1.14 Tutorial 14 - URL Referencing (Hot linking)

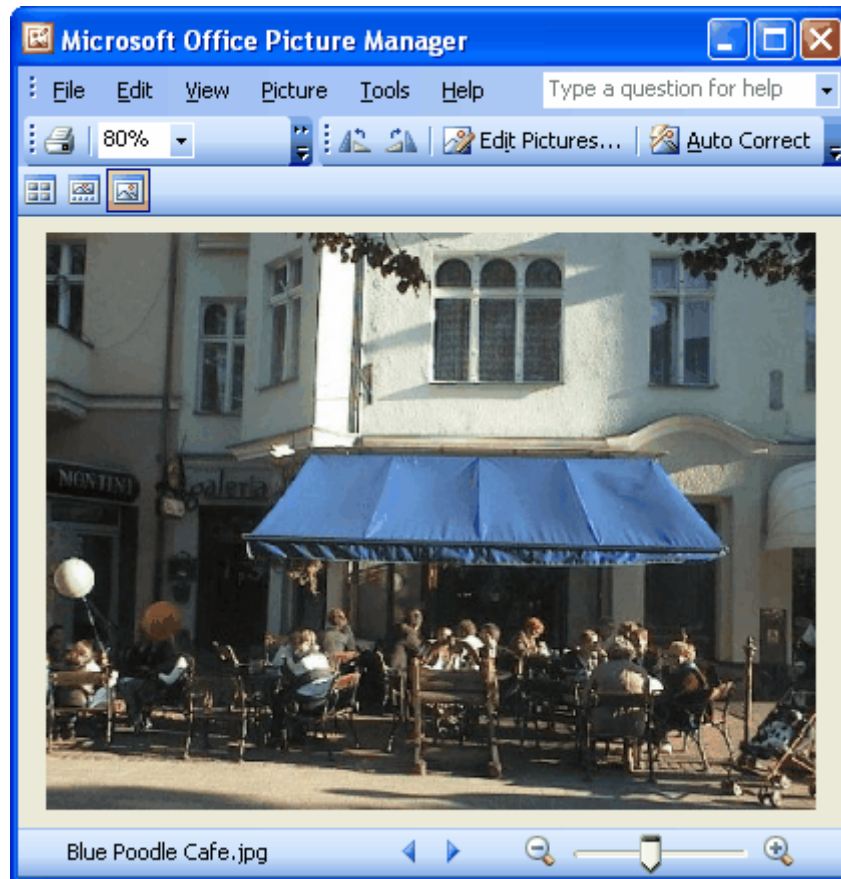
Vector objects in any vector map layer can be referenced to other files (images, documents, etc) or web pages using the URL hot-linking feature. This allows a project to be set up so that if the user double-clicks on a vector point (such as represented by a symbol), polygon area, line segment, etc. while in *localize* or *select by point* mode, the Viewer automatically links to the associated file. The linkage can be to document or image file, a web site address, or even to automatically launch a pre-addressed e-mail via Microsoft Outlook.

The following images show the linkage of one symbol representing the location of a cafe with a JPG image of the cafe stored on the C drive of the computer at the file path location: *file://c:\photos\Blue Poodle Cafe.jpg*. Note that this file link has been recorded in the *photo* attribute field.

(Of course, the URL information cannot be added to the attribute field using only the Viewer itself, because the Viewer does not support attribute editing. The URL information can be set up using the TatukGIS Editor or any other software with GIS editing capabilities. The Viewer can then be used to distribute the project with the URL referencing to final users.)



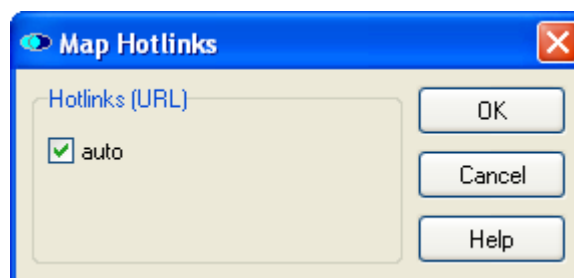
When the user double-clicks on the symbol, the following image of the cafe is automatically launched. The URL linkage mechanism refers to the first URL link address contained by any attribute field for the vector object.



To link to a web page, enter the information to the attribute field like: `http://.....` For example, to link a map object to the TatukGIS home page, the URL would be entered as: `http://www.tatukgis.com`.

To launch a pre-addressed e-mail, enter the information to the attribute field as: `mailto:.....` For example, if the e-mail is to be sent to TatukGIS, use: `mailto:sales@tatukgis.com`.

An option to turn off the URL hot linking functionality is available under the *Tools/Map hotlinks* menu. Uncheck the *(URL) auto* check box to turn hot linking off.

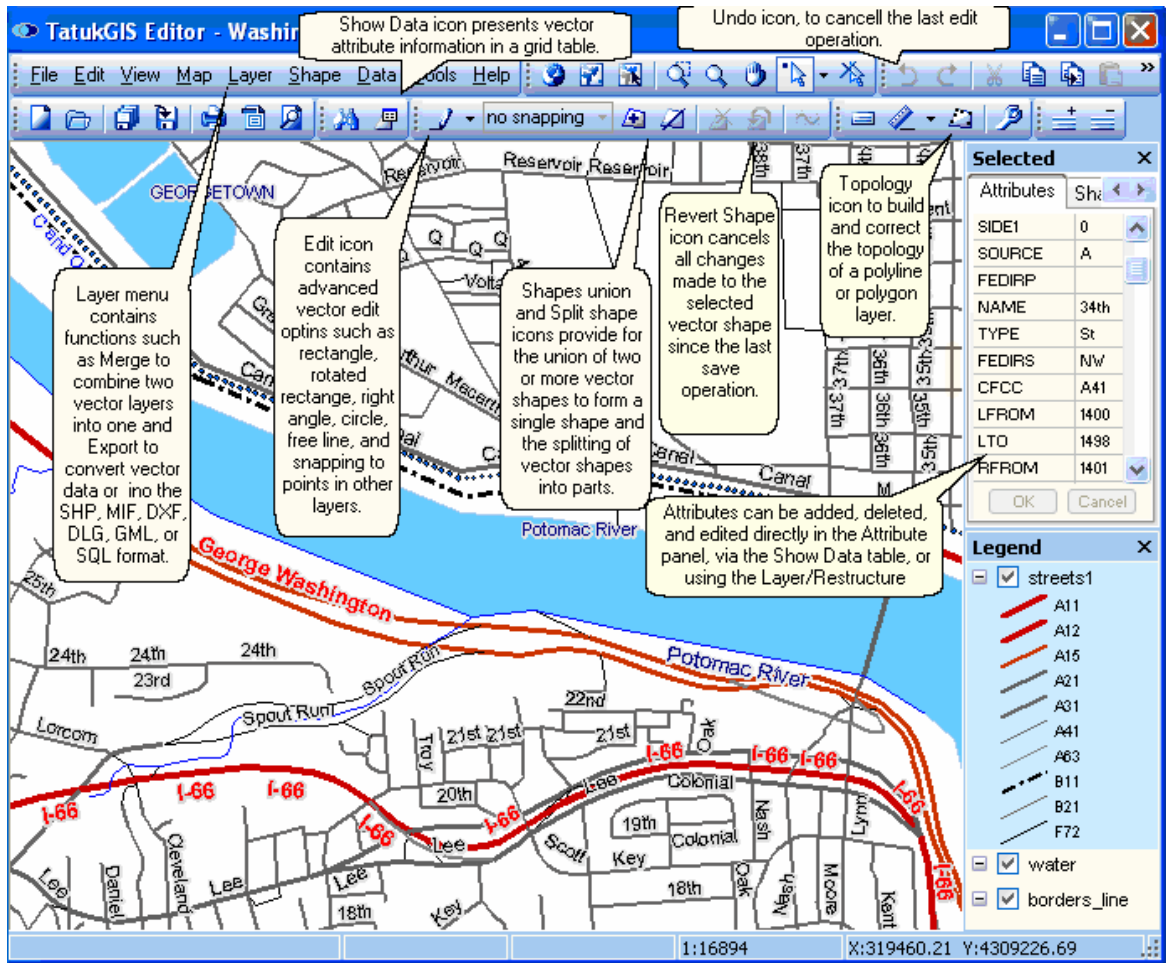


2.2.2 Editor


2.2.2.1 Tutorial 1 - Main Menu Controls

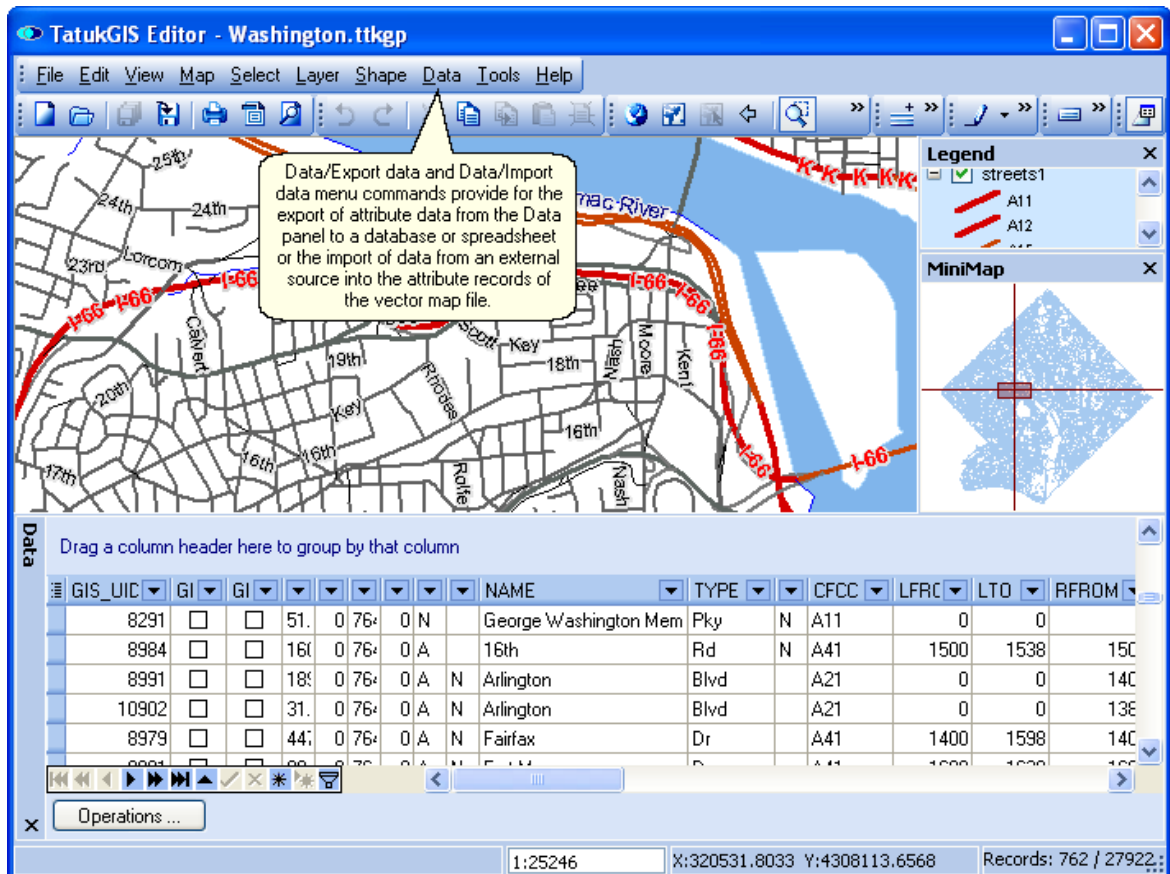
This image shows the most important menu controls which are unique to the Editor, i.e., not already covered in the Viewer tutorials. Because the TatukGIS Editor supports all the functionality of the TatukGIS free Viewer, also refer to the Viewer Menu Control descriptions.

A U.S. Department of Census TIGER street map data layer is open in the Viewer. The streets have been rendered by color and width based on the CFCC (street type) attribute.



(Menu commands specific to the Editor, i.e., not supported in the free Viewer product.)

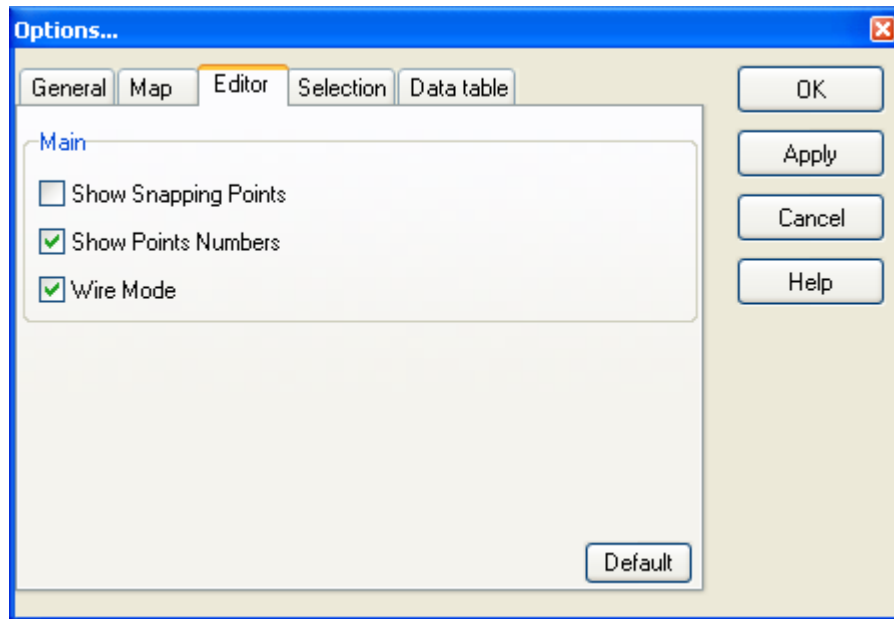
This image shows the Editor with the *Show Data Panel*  option activated to present the attribute records for the selected map layer. The *Load from visible extent* feature (accessed via the *Operations* button) has been used to fill the *Data* panel only with subset of attribute records that are attached to the geometric shapes that are located within the visible map extent. The attribute data can be viewed, filtered, queried, or edited in the *Data* panel or exported from the *Data* panel to a spreadsheet or database file.



(Data panel filled with the 762 records located within the visible map extent. The map file contains a total of 27,922 records.)

The *Options...* combo box of the Editor program includes one additional tab - the *Editor* tab - which is not part of the Viewer. This the window under this tab, which can be accessed using the *Options* toolbar icon (or the *Tools/Options* menu command), allows three program settings which are specific to editing of vector geometry to be turned on/off.

- The *Show Tracking Points* feature shows the vertices (points) forming all vectors on the layer that is being edited.
- The *Show Points Numbers* feature shows the numbers of the vertices (points) of any vector object that is selected in edit mode.
- The *Wire Mode* feature shows the effect of the addition of a new vertex (point) on an existing polygon before the new vertex is actually created.



2.2.2.2 Tutorial 2 - Digitize New Map Geometry

This tutorial shows how to create new vector data layers and the ways to add vector data to layers. It demonstrates the creation of new polyline and polygon vector map layers on which new vector geometry will be manually drawn using the program's editing features, with the use of a rectified and georeferenced aerial image as a background layer. This process of creating new map data is sometimes referred to as "digitizing" or "vectorizing".

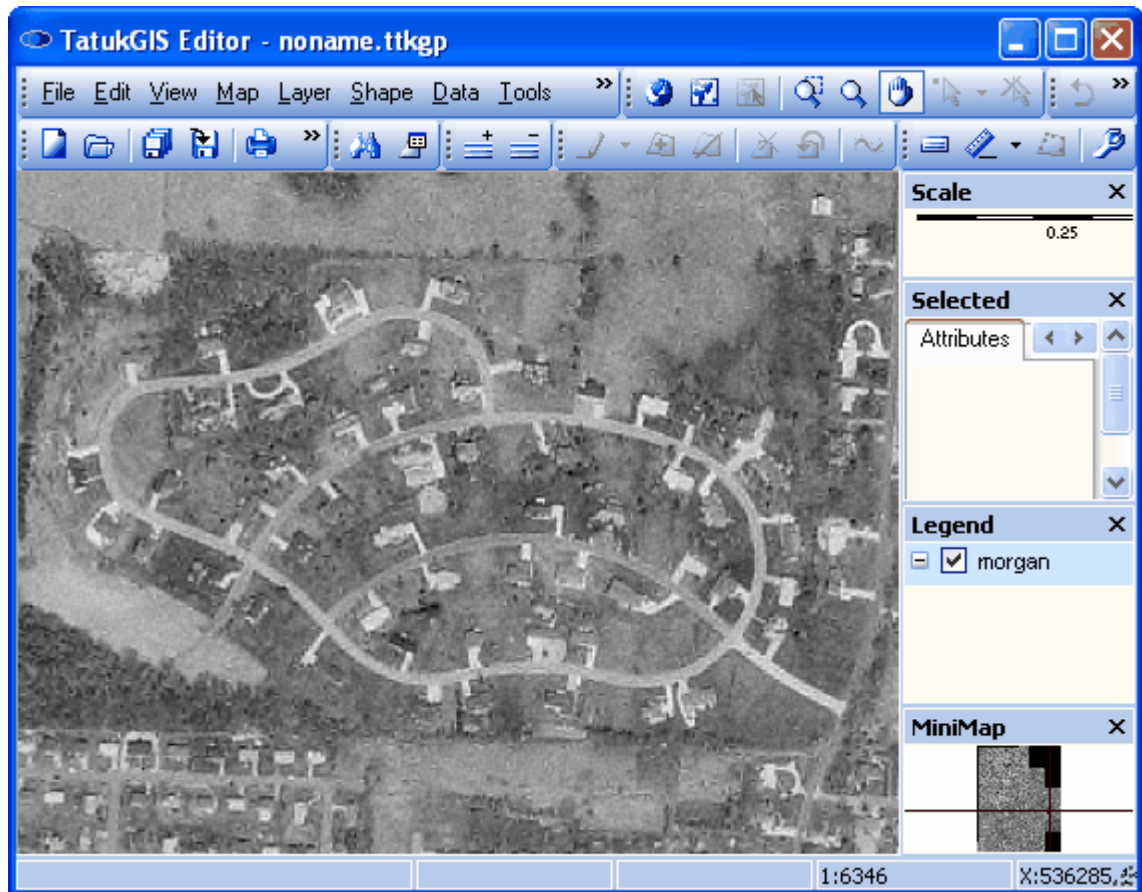
Although this tutorial shows the creation of polyline and polygon data, the procedure for creating point and multipoint layers is digitizing new point data to the layers, is essentially the same.


2.2.2.2.1 Create New Vector Layer

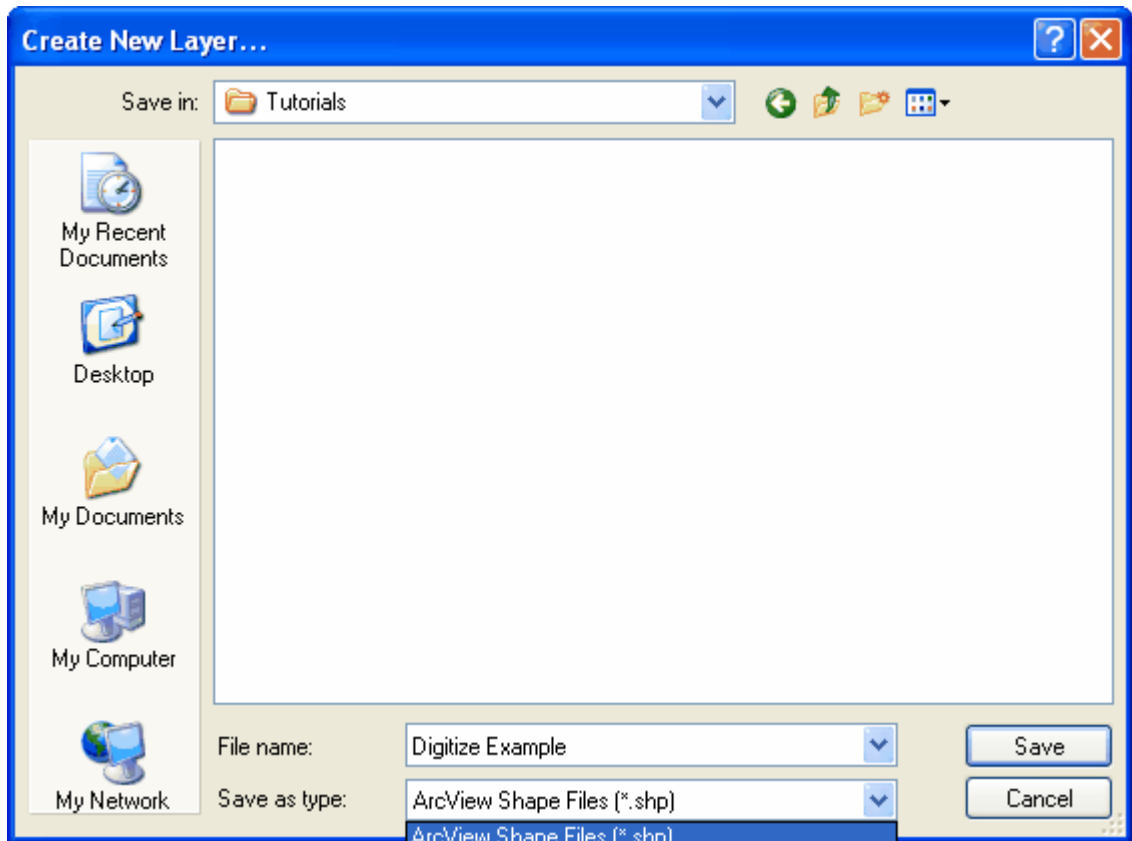
The create new layer procedure creates a new and empty vector file which is automatically loaded as a layer in the Editor. The file type (format) of the new layer is selected at the time of its creation. The new layer can then be populated with vector geometry in two ways: 1) use the *Layer/Import* menu to import an already existing file into the new layer or 2) 'digitize' new vector map data from scratch using the *Edit mode* drawing tools. Either way, the data added to the new layer will be in the format which is specified when the layer is first created. If an existing vector map file of a different format is imported into the layer, the data will be automatically converted to the format of the layer during the import process.

The following demonstrates the digitizing of vector data to the new layer, using an orthorectified (high accuracy) aerial photo as a reference layer.

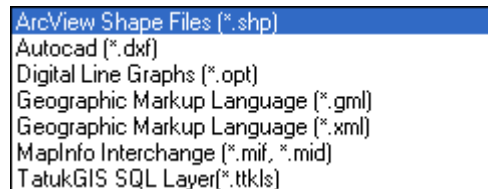
The screen image below shows a black and white, MrSID format, aerial image opened in the Editor. The MrSID image covers an entire county in the United States, but the view is zoomed in on the area of a local neighborhood subdivision.



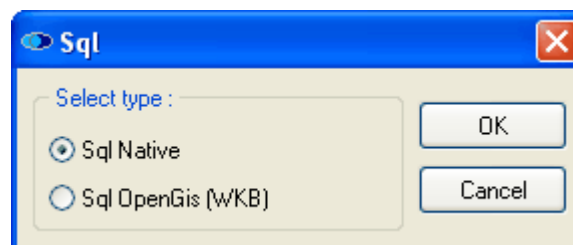
Use the *Layer/New* menu command  to open the *Create New Layer...* window. Select the file path from the *Save in* field and the file name in the *File name* field. Select the file type (format) for the new vector layer by selecting from the supported vector file types listed in the drop down list in the *Save as type* field.



The Editor can create new layers to a choice of the following file formats.



The format option at the bottom of the list, *TatukGIS SQL Layer (*.ttkls)*, is for exporting the layer to a SQL geodatabase file. The default database configuration exports the vector layer to a Microsoft Access database file with a choice between two formats: i) *SQL Native*, which is TatukGIS binary SQL method, or ii) *SQL OpenGIS (WKB)*, which is with OpenGIS Simple Features for SQL Implementation.



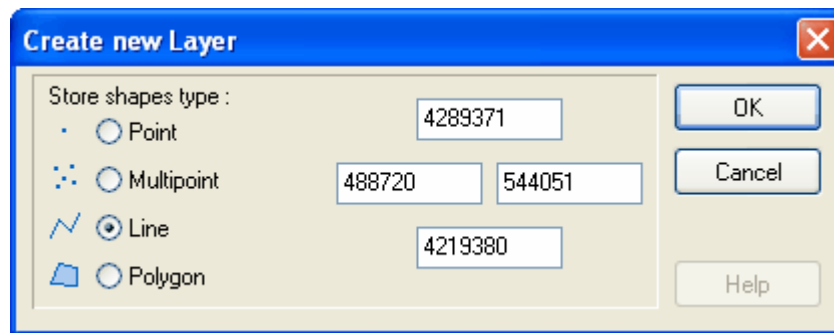
When creating SQL based geodatabase layer, select a file name without any spaces or unusual characters. This is to ensure that the file name is compatible with the various SQL database products.

The layer can be exported to i) SQL database products other than MS Access (such as MYSQL, Oracle, DB2, Interbase, MSSQL, etc.) or ii) the Geomedia® SQL Server Warehouse format, only

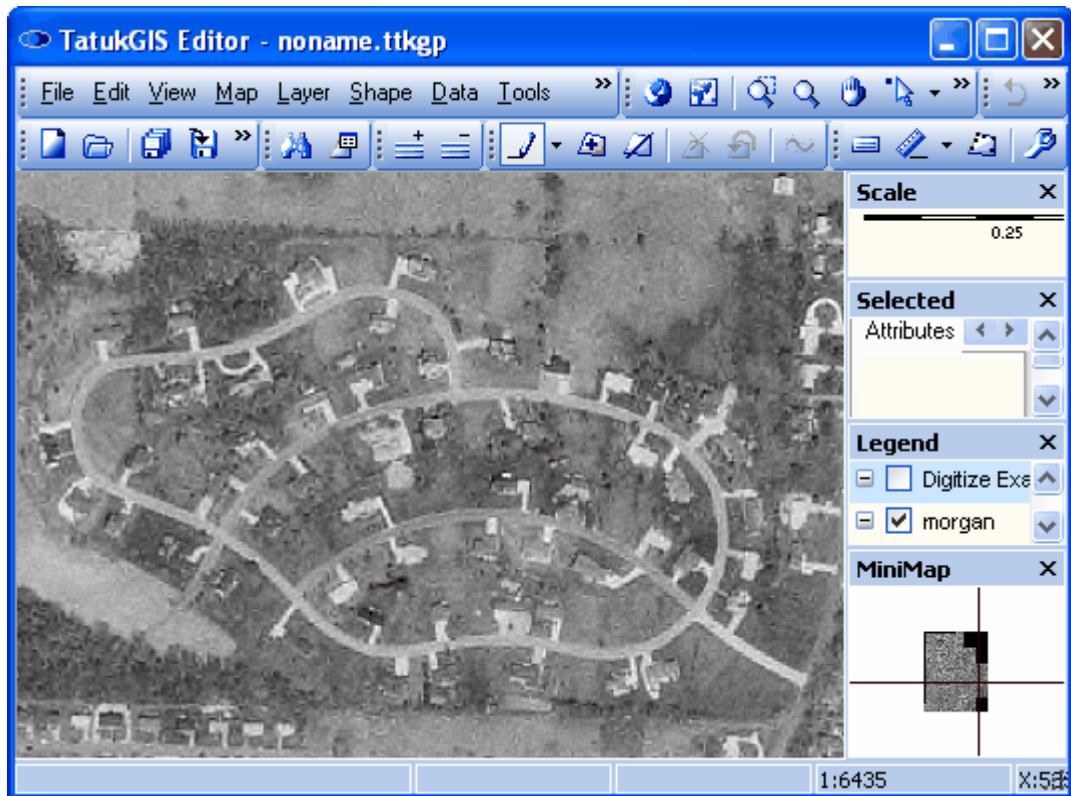
by manually customizing the SQL database connector (*.ttkls) files. The creation of a SQL geodatabase layer in one of these SQL server database products, or in the Geomedia® SQL Server Warehouse format, would typically indicate a multi-user environment and require an administrator to create and manage the database connections/configuration. (For some more details on setting up the SQL database connector (*.ttkls) files, refer one of the FAQ items relating to this topic.)



When the *Save* button in the *Create New Layer ...* window is selected, the *Create New Layer* dialog box automatically appears. This dialog box allows the user to specify 1) the type of vector geometry - *Point*, *Multipoint*, *Line*, or *Polygon* - the layer is to contain and the 2) extent of the layer. The default extent, as shown below, reflects the total extent all the layers currently open in the Editor, and is defined by the x axis coordinate of the left and right boundaries by the y axis coordinate of the top and bottom boundaries. Generally these x and y extent values will reflect the coordinate system of the layer(s) currently open in the Viewer, assuming that the layer(s) are in a geographic coordinate system.

Since, in this example, only the single image layer is open in the Viewer, the default extent settings for the new vector layer reflect the extent of the georeferenced MrSID image.




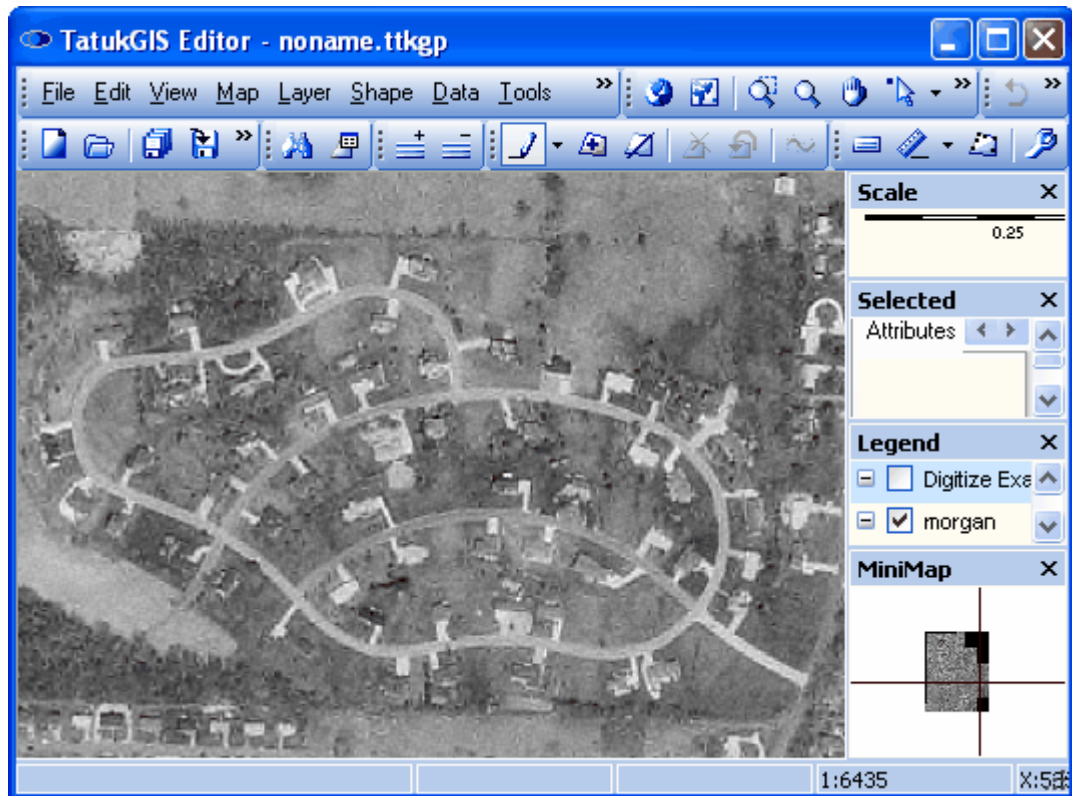
As seen in the *Legend* panel below, the newly created (and empty) polyline file has now been opened as a layer in Editor.







At any time layers can be added or removed from the program by using the *Add* layer toolbar icon  (or the *Layer/Add* menu command) or the *Remove* layer toolbar icon  (or the *Layer/Remove* menu command).

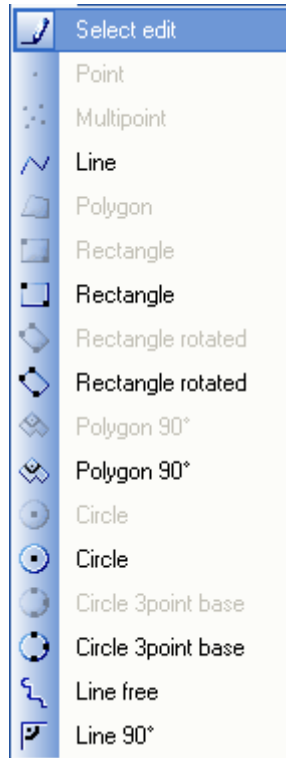
2.2.2.2.2 Create Vector Polyline Data




Start drawing vector data to the newly created layer by i) highlighting the new layer in the Legend panel and ii) clicking on the edit modes toolbar icon. (Alternatively use the *Shape/Edit mode* menu). When in the default *Edit* mode, this toolbar icon appears as a . Then select the desired editing mode from the drop down list. Notice that not all edit modes are activate for polyline layers. The edit modes which are activate (appropriate) for polyline layers are presented in the drop down list in bold black, whereas the drawing modes which are inactive (inappropriate) for polyline layers are presented in light gray color. These inactive edit modes will become active when working on layers containing other types of vector geometry, e.g., points, multi-points, or polygons.




Because this demonstration involves the creation of line vectors to represent irregular street patterns, the *Line*  edit mode option is appropriate. The edit mode icon will convert from the default *Edit*  mode to *Line*  mode. The *Line*  icon will remain in place until a different edit mode is selected or the user returns to *Select edit* mode. The edit mode icon always appears as the icon corresponding to the currently selected edit mode.

The all the available edit modes are presented in the drop down list next to the edit mode icon in the toolbar.

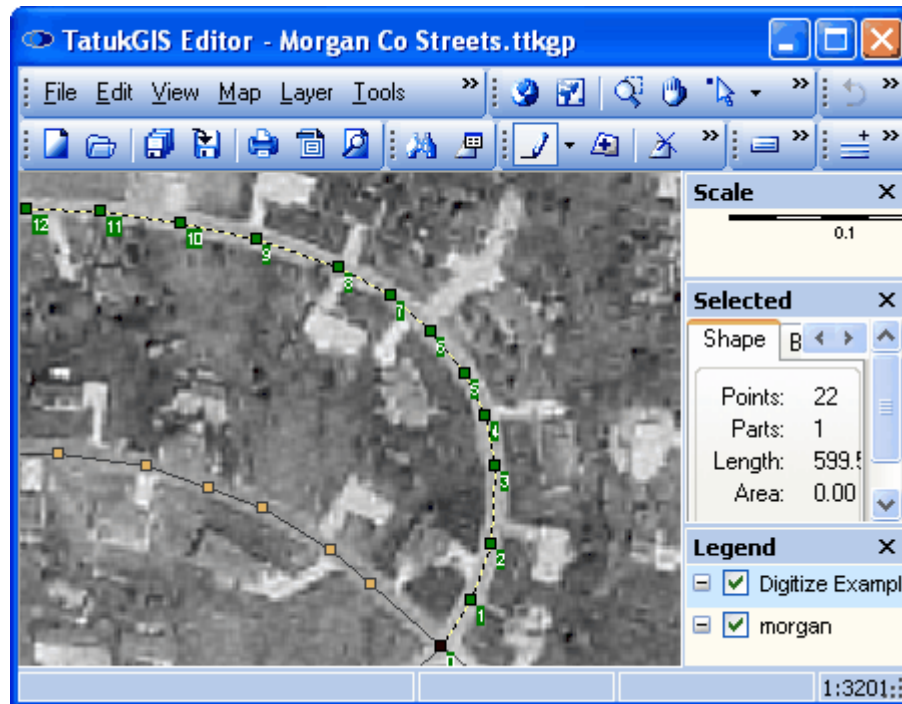





Then zoom in to a comfortable level at the proper place on the image and start placing the vertices (points) to form the lines. This is done by positioning the cursor (which now appears as a ) and clicking with the left mouse button. Use the zoom  or drag mode  tools to reposition the visible map area when necessary. The user can drag without leaving the edit mode by temporarily depressing the *Shift* key and dragging the image with the mouse cursor. The user can zoom in/out without leaving the edit mode by temporarily depressing the *Alt* key and dragging the cursor in the upward direction on the map (to zoom out) or the downward direction on the map (to zoom in). The mouse wheel can also be used to zoom in/out without leaving the edit mode.




Another option is to activate the *Auto Center* feature under the *Tools/Options/Map* menu. When activated, the *Auto Center* feature automatically repositions the map area in the viewer window to center on the place of the last mouse click. This eliminates the need to reposition the map view because the editing process has neared the edge of the view extent.

To complete one line and begin another, simply click on the *Line*  icon in the toolbar and start drawing the next line. This allows for the rapid completion of one vector line and the starting of the next one.

The following screen view shows portions of two streets that have been digitized as vector polylines. The green polyline with the numbered vertices appears so because it has been selected using *Select edit* mode. Notice that information (length, number of vertices, number of parts) about the selected polyline is presented under the *Shape* tab in the *Attribute* panel.

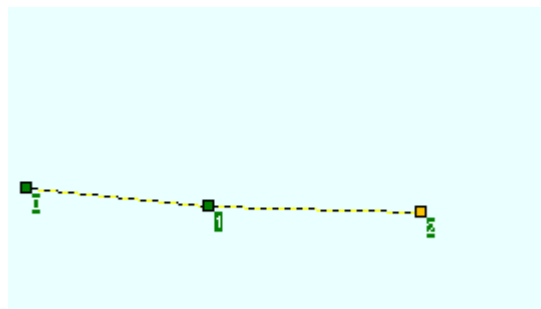


If a vertex is misplaced or some other mistake is performed during the process of editing a vector, the mistake can be quickly corrected by clicking on the *Undo*  toolbar icon. *Undo* cancels the action performed by the last mouse click. Click on *Undo*  a second time to also cancel the action performed by mouse click before the last one. Click on *Undo*  a third time to also cancel the mouse click before that one, etc. If a vertex is inaccurately placed, it can also be repositioned by depressing the right mouse button and dragging the selected vertex to the accurate position, then releasing the mouse button. Any vertex of a vector selected in *Select edit* mode can be deleted by left clicking while holding the mouse cursor over that vertex.

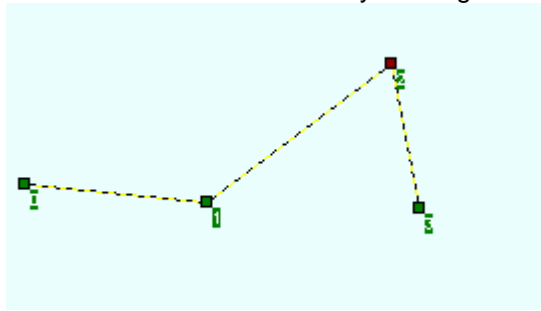
All geometric changes made to any vector since the last time that data was saved can be cancelled (reversed) in one quick step using the *Revert Shape*  feature. First select the vector to be reverted while *Edit*  mode, then perform the reversion on the selected vector by clicking on the *Revert Shape*  toolbar icon (or using the *Shape/Revert Shape* menu command). The *Revert Shape* feature can be used on any vector that has been edited since the last time the data was saved. The function is not limited to the last edited vector.

When creating vertices to form a polyline, if any vertex placement is at greater than a 90 degree angle from direction of the last-created line segment, the Editor program will assume that the intent is to insert the new vertex between two already existing vertices, as pictured below.

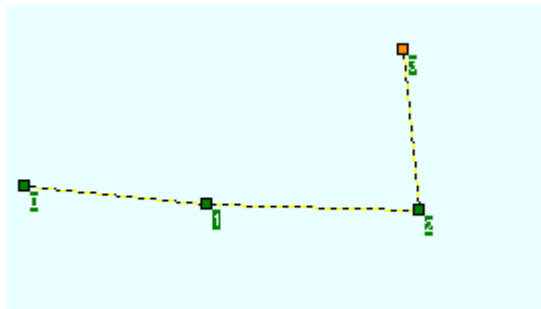
Starting polyline.



The program inserts the new vertex between two already existing vertices.



If the intent is to connect the new vertex to the last-placed vertex, this can be achieved by depressing the *Ctrl* key while mousing clicking to generate the new vertex. The result is pictured below.

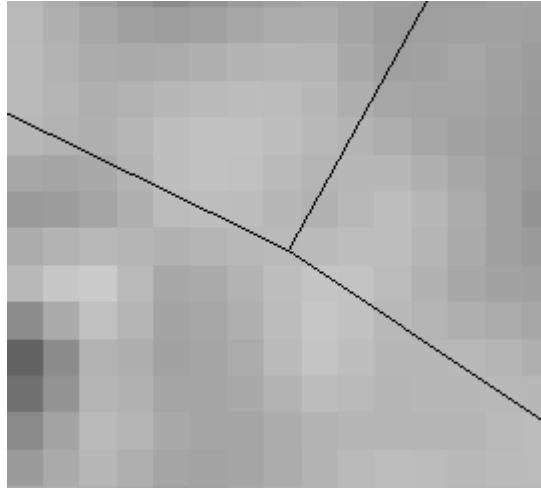


As the polylines are created, the *snapping* feature can be used to automatically close the intersections of the vector polylines. The snapping feature automatically positions the placement of the new vertex at exactly the same place as any vertex of another vector located very nearby. Without *snapping* it would be very difficult to exactly join intersecting polylines at intersection points - there would always be a small gap or small overlap which would be visible at a very close zoom level. The snapping is performed only to nearby line vertices, and not to any segment of a line between the vertices. (When the first vertex of a new polygon is drawn, all the vertices in the snap-to layer will become highlighted as yellow colored points.)

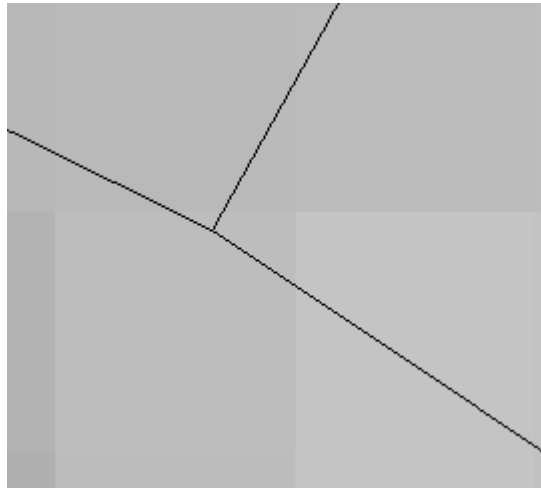
Snapping may be performed to the vertices of any vector layer that is open in the Editor. The "snap-to" layer is selected from the drop down list located on the toolbar just to the right of the edit mode icon.

The following images shows that even at very, very close zoom levels, the closure at the intersection point is perfect.

Line intersection at a close zoom level.




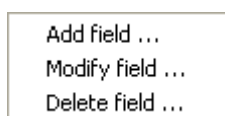
Line intersection viewed at an even closer zoom level.



The user can temporarily override the snapping feature by depressing the *Ctrl* key when mouse clicking to place a vertex. This is important for situations in which new vertices must be placed at unique locations which are extremely close to, but not the same as, already existing vertices.

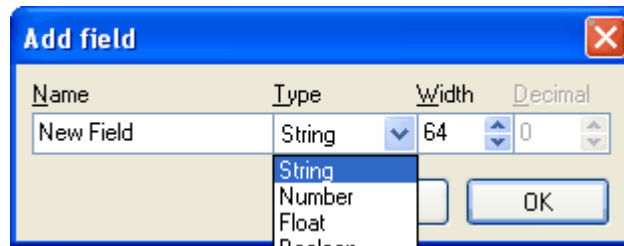
In addition to the creation of the polyline map geometry, attributes such as street names, street types, etc. can be assigned to each individual polyline. The UID record names (the left column in the *Attributes* panel when the *Attributes* tab is selected) are the same for all polylines (true for any vector type) in a layer. The value fields (the right column in the *Attributes* panel) may contain unique information for each individual vector.

To add an attribute to contain a value field for each vector in a layer, first select (highlight) the appropriate layer in the *Legend* panel and select a vector in the layer to make the attribute information appear in the *Attributes* panel. Then right click in the *UID* column in the *Attributes* panel. (The *Show Data Panel*  option must be turned off when doing this.) Three options will appear as follows:



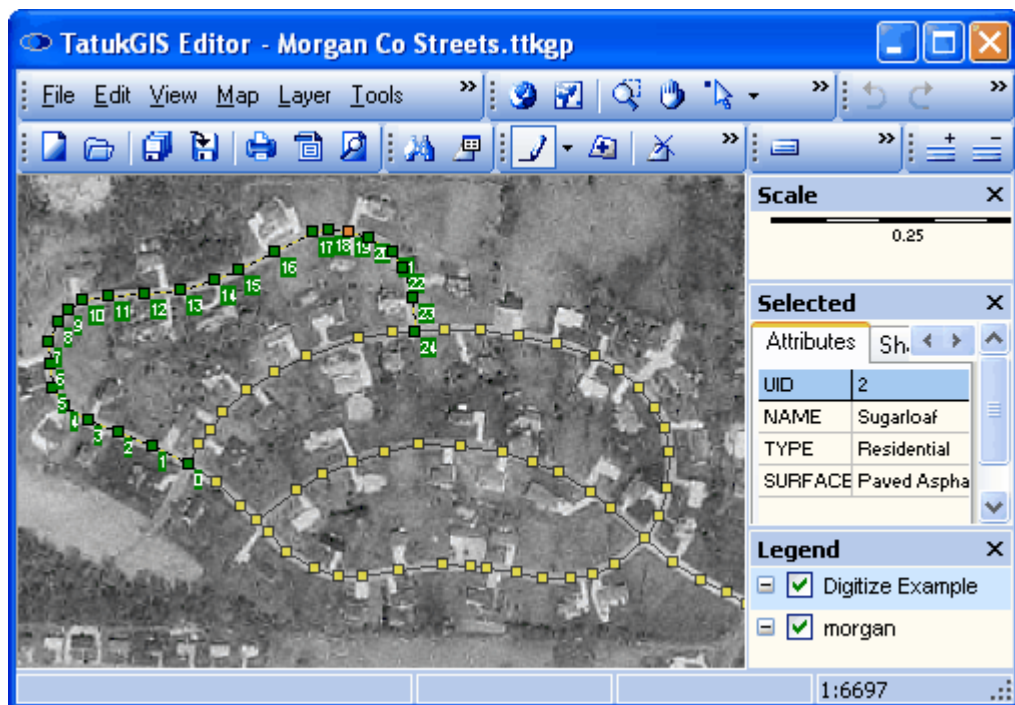
Select the *Add field* option to open the *Add field* window and enter the required information to create new attribute for the layer. The unique value field for each vector object (such as the


name) must be entered in the right column in the Attribute panel, after selecting the vector in the layer. For more information on editing attributes, refer to the Editor "Editing Existing Map Data - Attribute Editing and Restructure" tutorial.



The next image is after the streets in the neighborhood have all been digitized. As is visible in the *Attributes* tab within the *Selected* panel, attribute information has been assigned to the selected line (the line with the green numbered vertices). After entering attribute information for a vector, click on the *OK* button in the *Attributes* panel to accept the entered information. Then the attribute information will be saved with the vector geometry the next time that the vector layer is saved.

Notice in the image below that the text "Morgan Co MrSID.ttkgp" at the top of the application window has replaced the text, "noname.ttkgp", which earlier appeared in this place. This means that the data set open in the Editor has been saved as a TatukGIS (*.ttkgp) project file with the file name "Morgan Co MrSID.ttkgp". The default "noname.ttkgp" only appears in this place until the data set open in the program has been saved as a TatukGIS project file. Any data set open in the Viewer/Editor can be saved as a TatukGIS project file using the *File/Save Project As* menu.

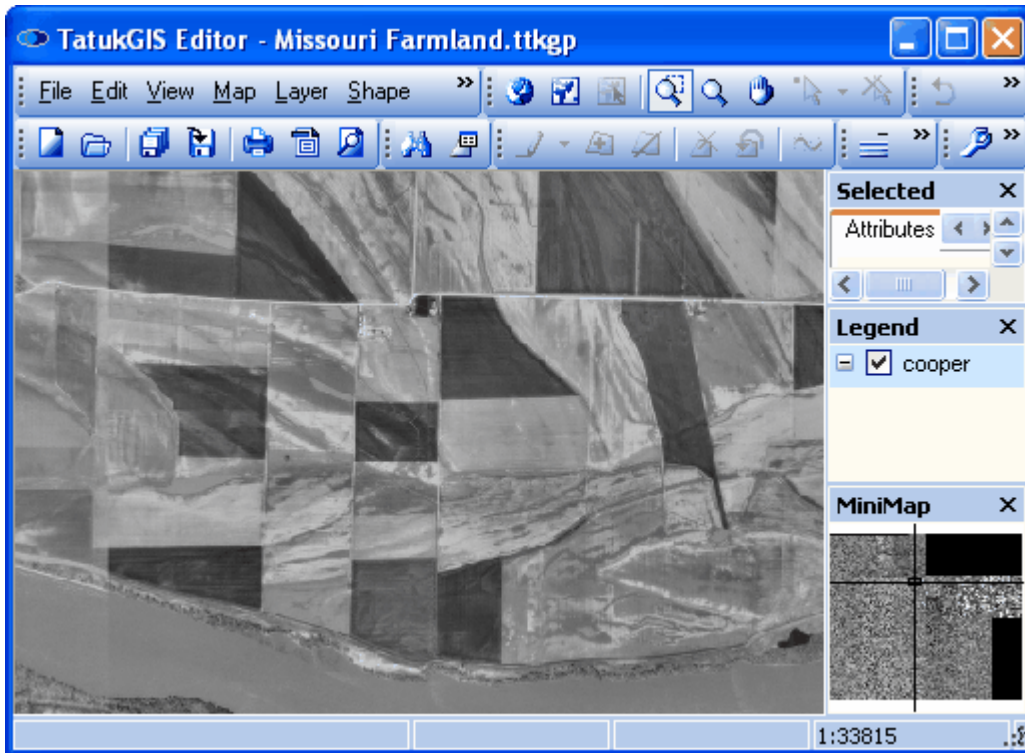


Use the *Save All*  toolbar icon (or the *File/Save All* menu) to save all changes to the vector layers. Use the *File/Save* menu to save changes only to the layer that is selected in the *Legend* panel.

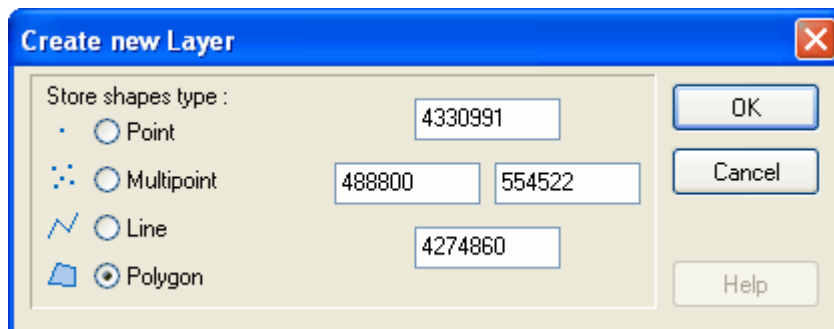
2.2.2.2.3 Create Vector Polygon Data

This section demonstrates the digitizing of vector polygon areas. Some elements of the editing procedure are explained in more detail in the prior section demonstrating line digitizing. It is best to review the prior section first.

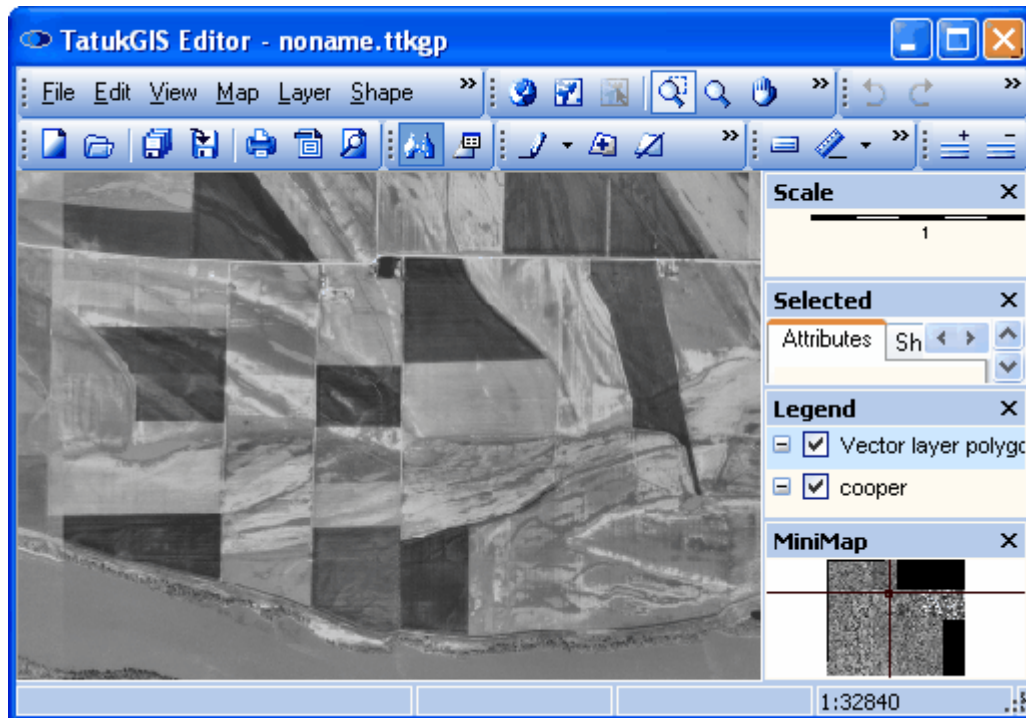
Polygon vectors to will be drawn to represent the crop fields in the area of farmland captured in an a MrSID format aerial image. As is visible below, the MrSID image titled "cooper" is opened in the Editor.




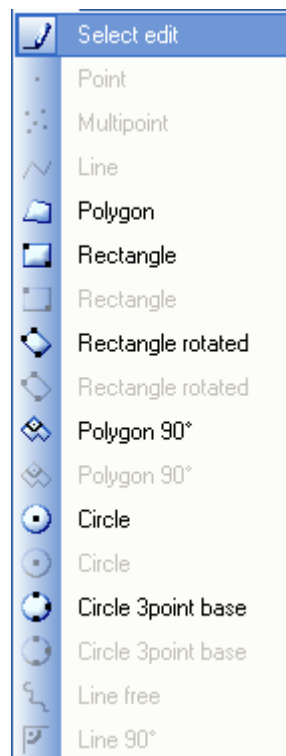
First create a new vector layer, as was demonstrated in an earlier section of this tutorial, but this time select that the layer be for polygon data.





As is visible in the *Legend* panel of the image below, the new (and empty) polygon vector layer named "Vector layer polygons" has been loaded to the Editor. The vector layer is positioned on top of the aerial image layer so that the polygons to be created will be visible on top of the aerial image.



With the vector layer highlighted in the *Legend* panel, select the *Polygon*  mode from the drop down edit mode list in the toolbar.

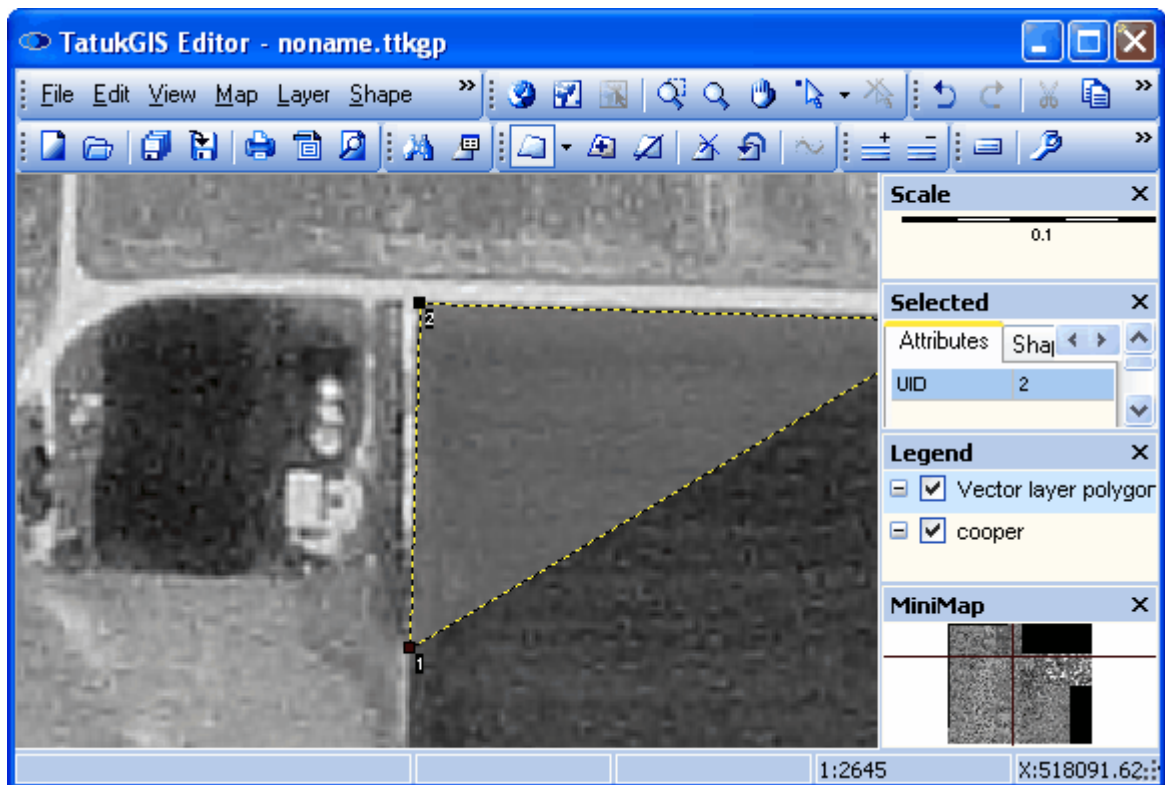


Zoom in to a comfortable level in the appropriate place and begin placing the vertices to form the polygons by positioning the cursor (which now appears as a ) and right clicking with the mouse. To complete one polygon and begin another, just click again on the *Polygon*  icon and

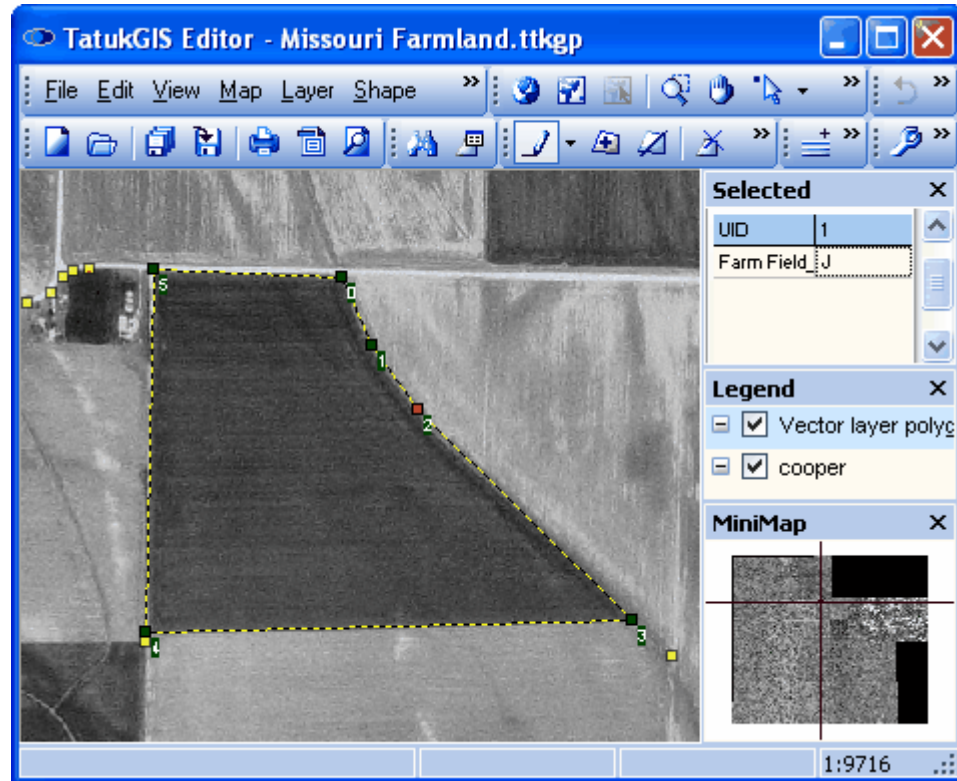
start forming the next polygon. Note that the default *Edit* icon has been replaced in the toolbar by the *Polygon* icon. The *Polygon* icon will remain in that place until the user changes the edit mode.

The user can drag (pan) the image without leaving the edit mode by temporarily depressing the *Shift* key. The user can zoom in/out without leaving the edit mode by temporarily depressing the *Alt* key.

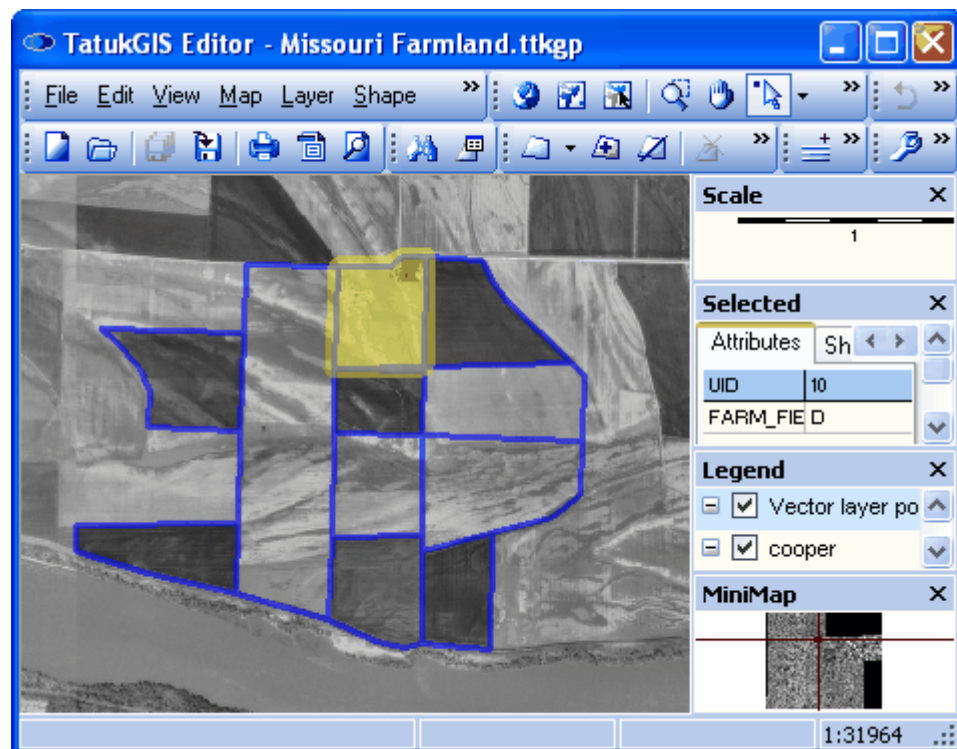
The following screen shot shows the partial vectorization of one of the farm fields on the image.



The next image shows a completed polygon, formed by six vertices numbered 0 - 5. Notice in the *Attribute* panel that the attribute editing functionality has been used to create a layer attribute to assign unique names (identifiers) for each polygon. The polygon area selected in image below has been assigned the name "J".

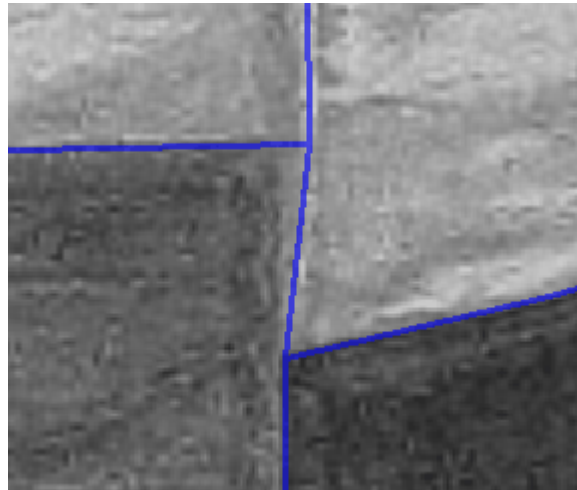


Polygons have been created to represent eleven fields of this farm, named "A" though "K". Farm field "D" is selected in the image below. The layer properties have been used to render the polygon interiors as fully transparent and the polygon perimeters as thick blue lines.

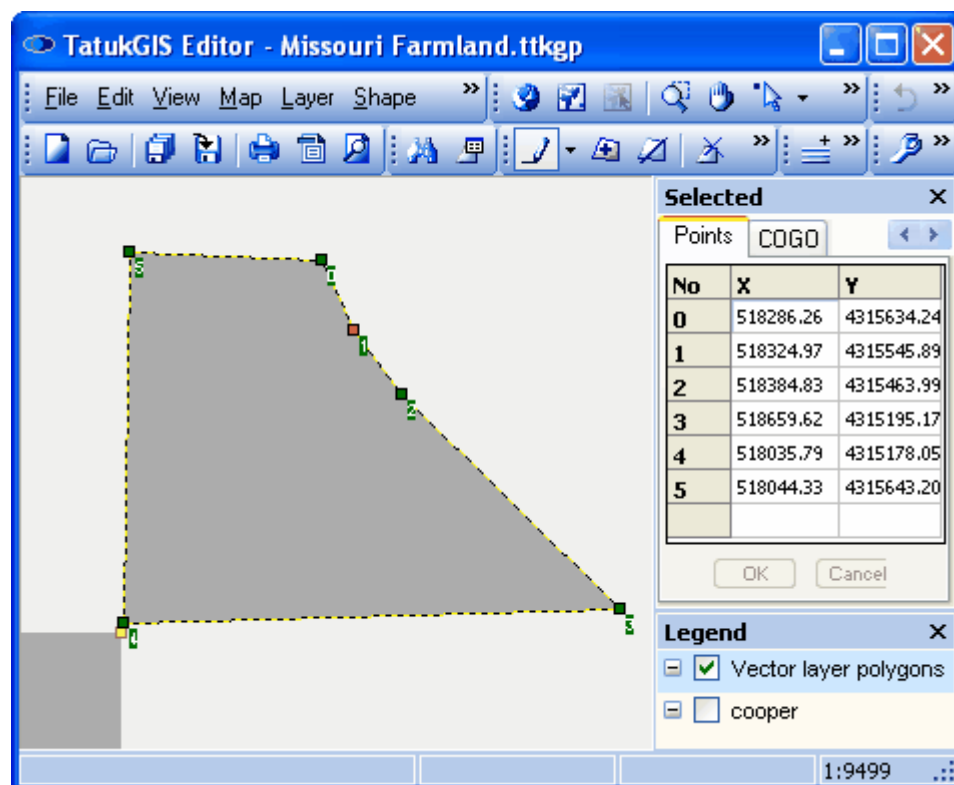


The automatic snapping feature during the editing process allows contiguous polygons to be

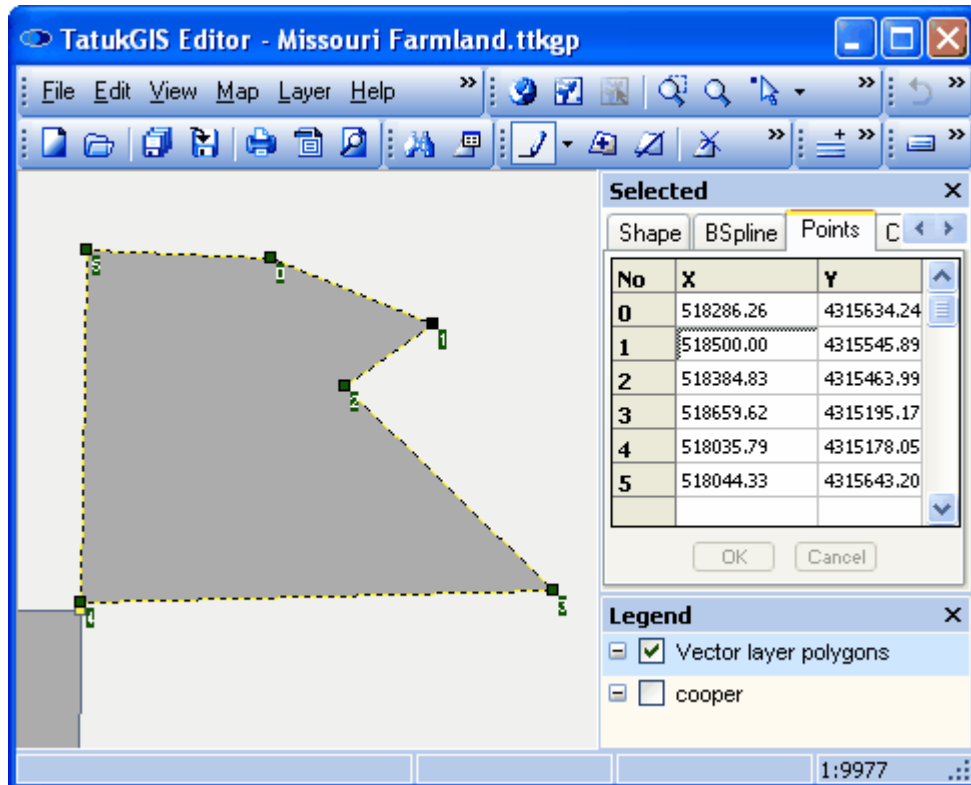
quickly created without error, by simply using the vertices from the adjacent polygons to position the vertices of the adjacent polygon. (The snapping mode can be temporarily deactivated by depressing the *Ctrl* key when mouse clicking.) The placement of the vertices can be snapped to the positions of vertices contained any open layer by selecting the snap-to layer from the drop down list in the toolbar located just to the right of the Edit mode icon.



Information other than just the vector attributes can be viewed in the *Selected* panel. In the following view the *Points* tab within the *Selected* panel is opened while a polygon is selected in *Edit* mode. The x,y coordinates of each of the six vertices forming the selected polygon can be viewed and edited from the list in the panel, thereby altering the geometry of the selected polygon. In this way a polygon can also be created from scratch by simply entering a series of x,y coordinates.



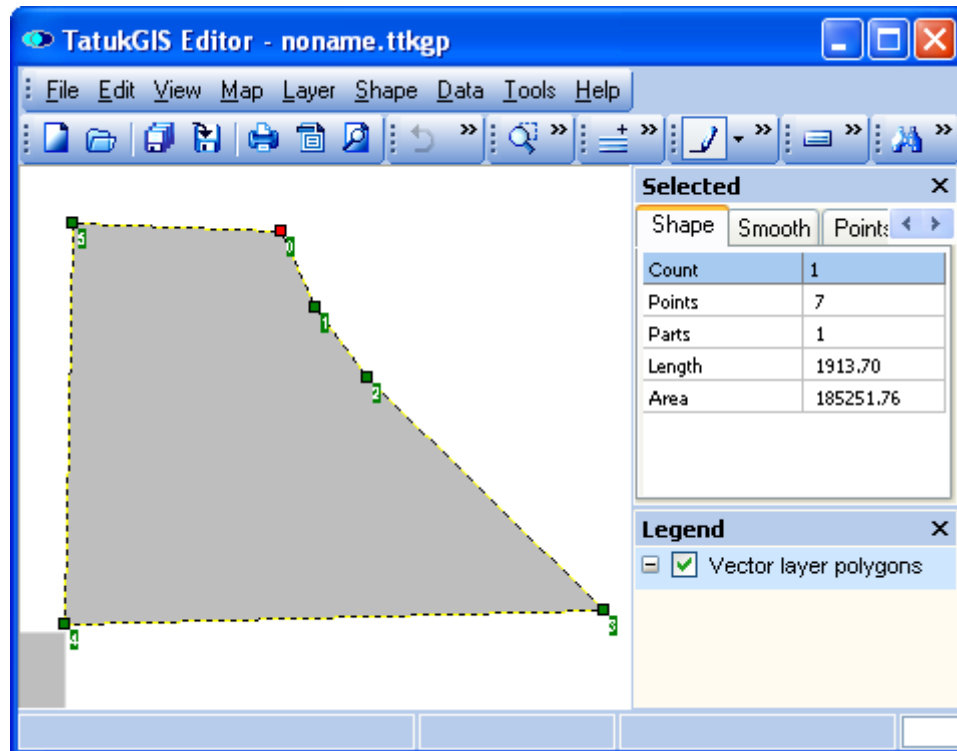
Below the x coordinate of vertex number 1 has been increased from 51834.97 to 51850.00, with immediate effect on the polygon geometry.



New points can be added to the selected polygon by right clicking on the table under the *Points* tab. The entire coordinate table can be copied and pasted to a document or other file or exported/imported to/from another source. (Refer to the Joining Attributes tutorial.)

As shown in the next image, the *Shape* tab within the *Selected* panel provides other information about the geometry of the selected polygon, e.g., the total number of points (vertices) that form the polygon, the number of parts, the length of the polygon perimeter, and the polygon area. The perimeter length and area information is provided in map units, which reflect the coordinate system of the layer or project opened in the program. (In this case, the coordinate system is the coordinate system of the MrSID aerial image which was initially opened in the Editor.)

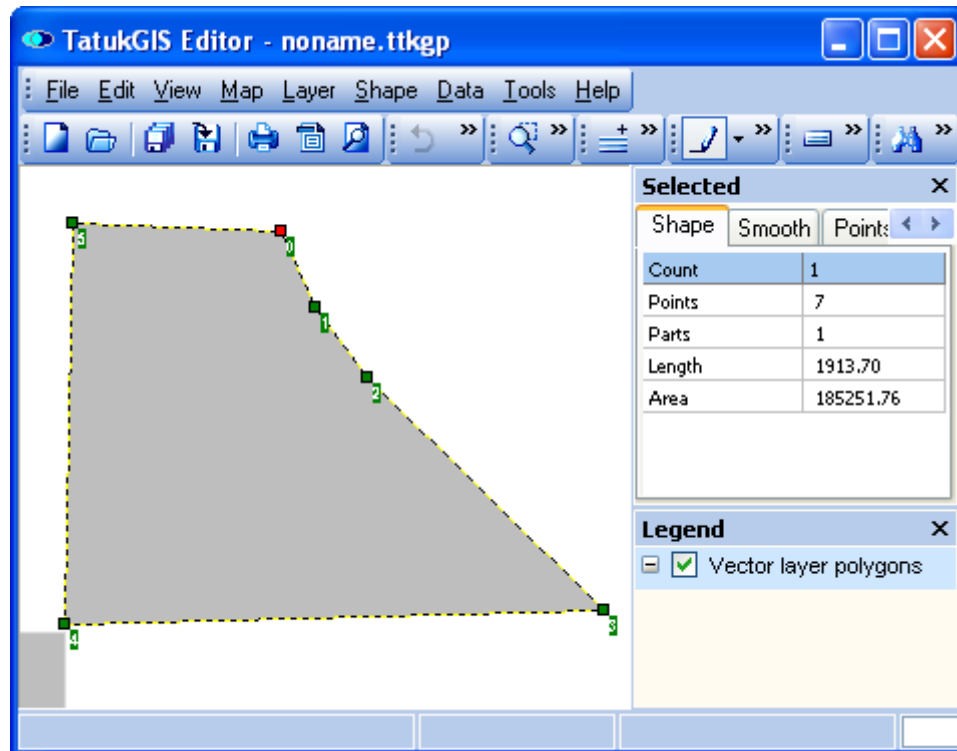
Note that the number of points (vertices) of a polygon as shown under this tab is always one more than the number of vertices that can be edited. This is because the final vertex is exactly in the same position as the number 0 vertex. This ensures proper closure of the polygon.



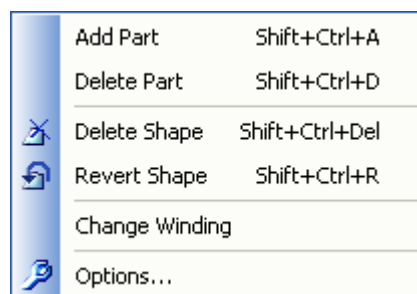
Use the *File/Save all* menu (or the *Save all*  icon) to save the newly created vector data or changes. The *File/Save* menu can also be used if the intent is to save only the selected layer.

2.2.2.2.4 Create Polygons Holes

GIS principles require that polygons in a single layer should never overlap and that the numbering of the vertices forming a polygon should be in the clockwise order. But the Editor can be used to make holes in a polygon by using the Add Part feature. The image below presents one of the polygons created in the prior exercise. This exercise starts with that polygon.



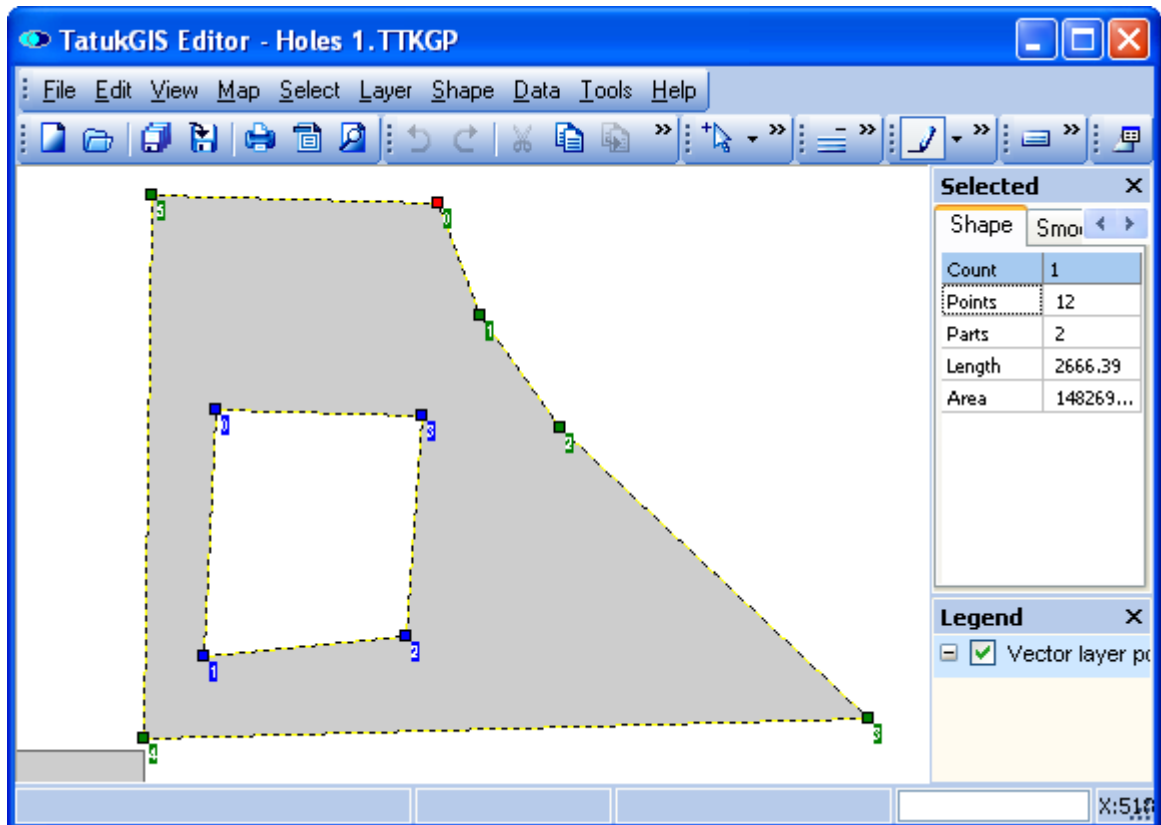
Select the polygon to which the hole is not be added and right click to see the following menu options. Select *Add Part*.



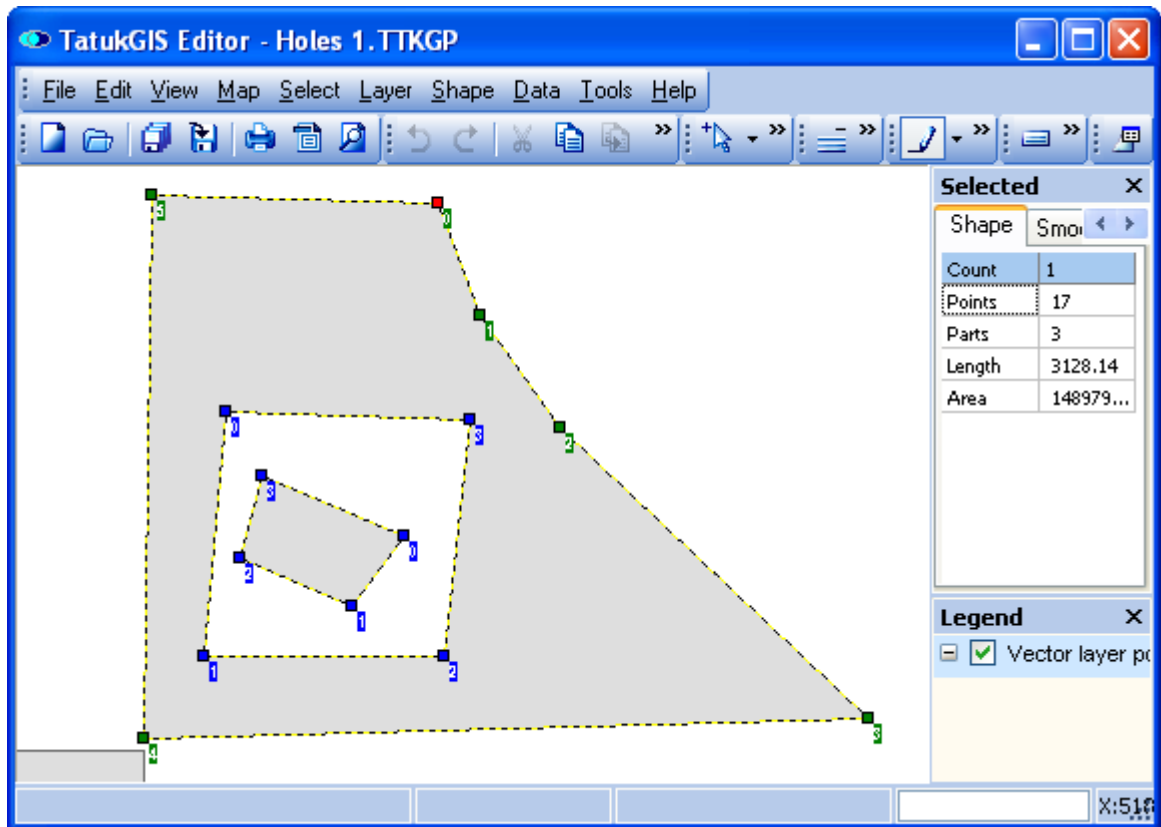
Digitize the polygon that is to form the hole in the original polygon. Notice that whereas the numbering of the vertices forming the original layer are in clockwise order, the points forming the hole are in counter clockwise order. The order of the points is known as the "winding". The default polygon winding is always clockwise, but the winding of polygon holes created by the Editor is always the opposite direction. This keeps the polygon topology correct and consistent with GIS principles. Notice that the *Selected* panel now shows that the selected polygon contains two parts - the part forming the hole and the part forming the remainder of the polygon.

NOTE: In some situations the changes must be saved before the numbering of the vertices is properly set.

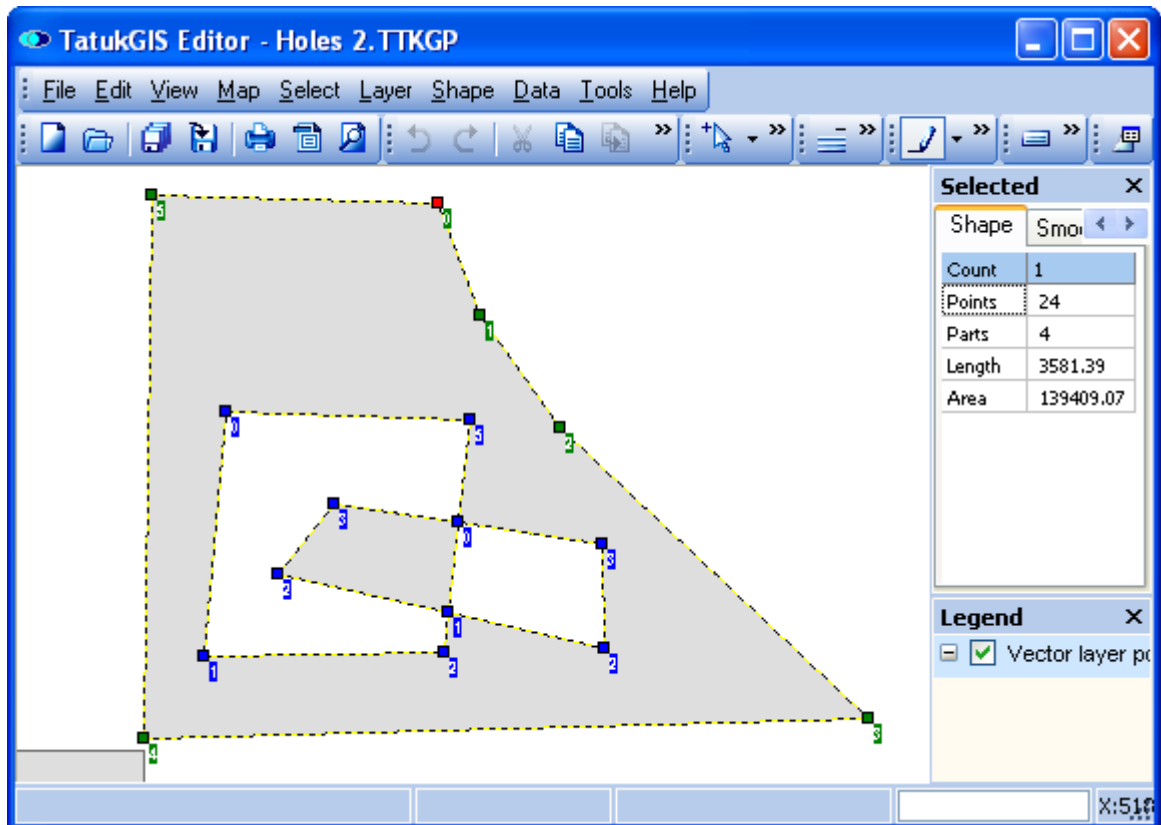
To later select the polygon part forming the hole (and not the large polygon that contains the hole) for editing or deletion, mouse click near one of the vertices that forms the part while in edit mode. To edit the selected part, just move or add to the individual vertices. To delete the selected part, right click and select the *Delete Part* option.



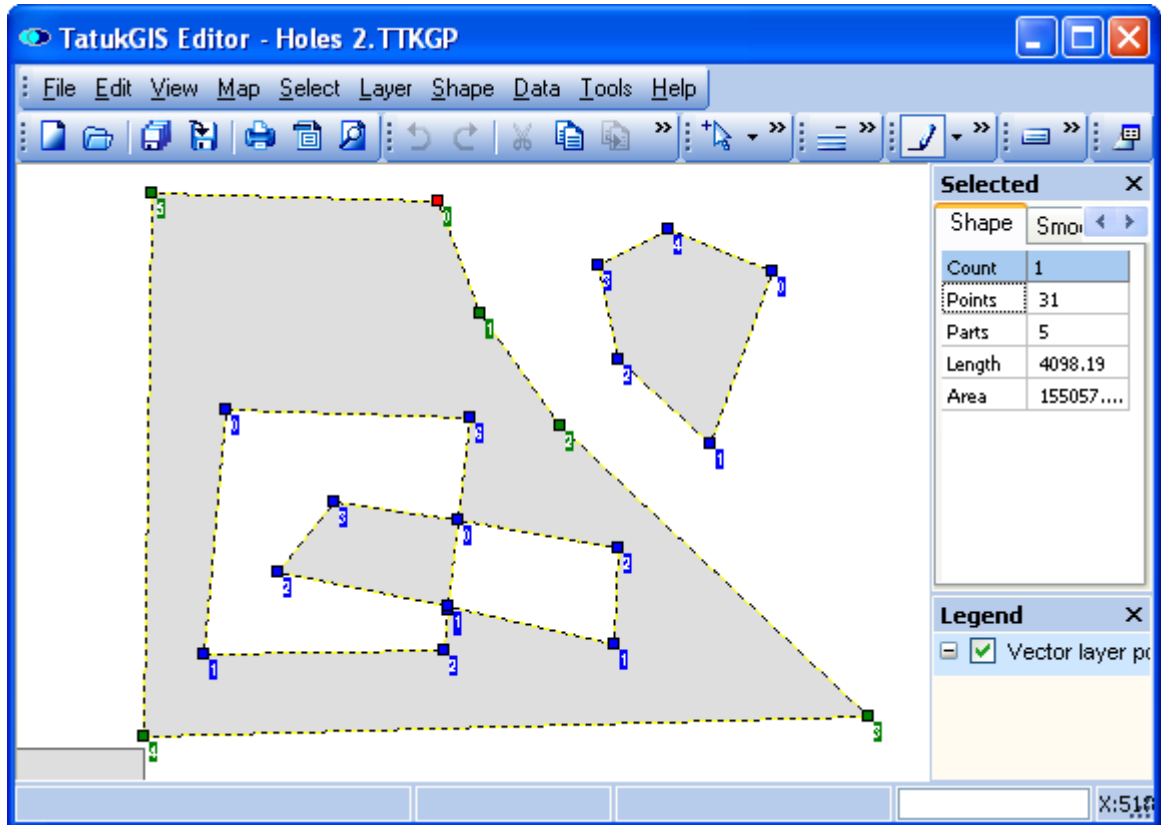
To take this a step further by creating a hole inside the hole. Select the shape while in edit mode, again right click and select *Add Part*, and digitize a hole inside the hole. Note that the winding of the hole inside the hole is clockwise, so in the opposite direction from that of the polygon part that contains it.




To test with a still more complicated situation, now create the inner part (hole) so that it is partially inside and partially outside the existing hole. Notice that upon the next save operation, the Editor automatically cuts the new polygon into two parts so that one part is wholly contained by the existing polygon hole and the other part is wholly outside the existing polygon hole. Again the GIS topology is correct because the winding of both of the newly created parts is opposite to the polygon that contains the part.

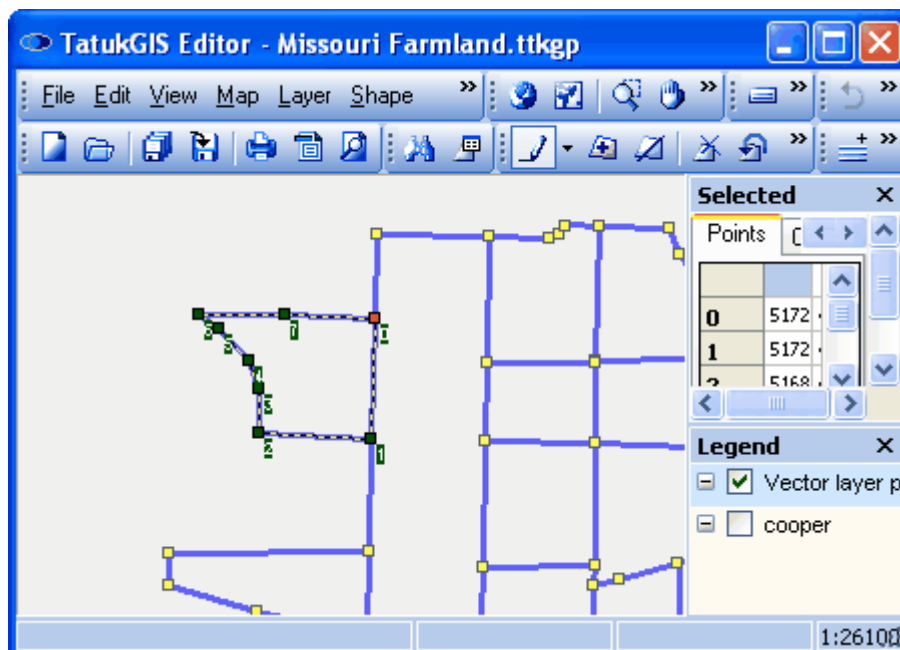



Of course, polygon parts do not have to be holes. Parts often are outside of the area of the original polygon shape. Naturally any part that does not represent a hole has clockwise winding.



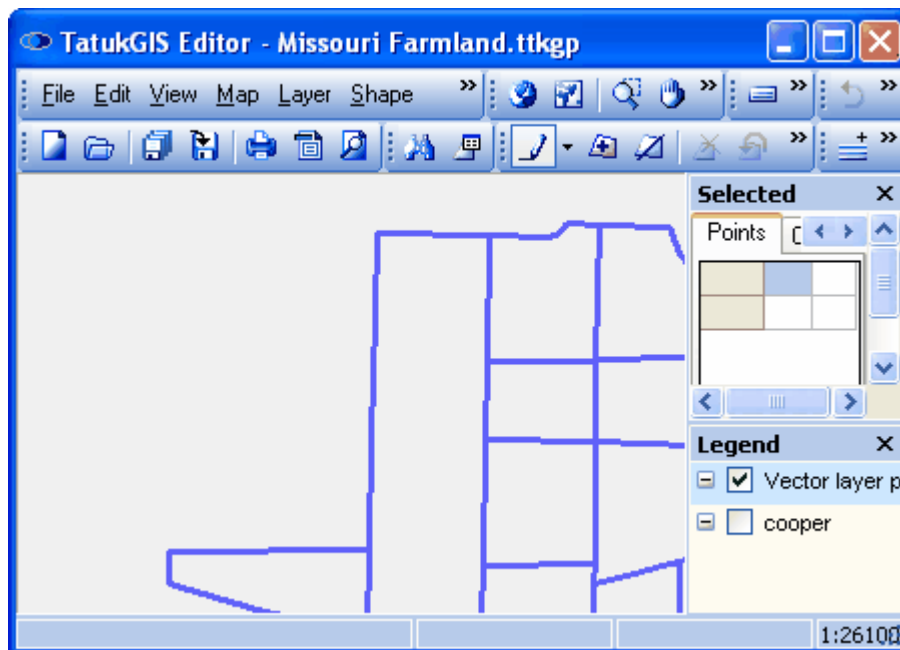
2.2.2.2.5 Delete Vectors

To delete a vector, using the *Edit*  toolbar icon (or the *Shape/Edit mode/Edit* menu command), first select the vector by clicking on it. In the image below, the polygon representing Field A is selected while in *Select edit* mode.



Then click on the *Delete shape*  toolbar icon (or use the *Shape/Delete Shape* menu command)

to delete the selected vector (shape). (The deleted vector will be permanently deleted only when the data is next saved.) In the image below, the Field A polygon has been deleted from the polygon layer.



As a data protection feature, vectors can only be deleted when in Edit mode. If the a vector or vectors are selected in any other way, such as using the *Select by Point* tool or via an attribute query, deletion of the selected vector or vectors is not possible.

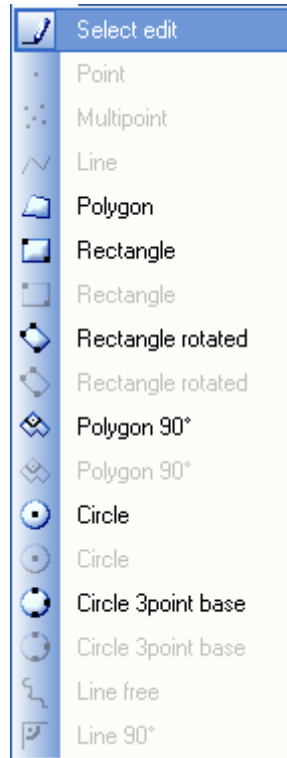
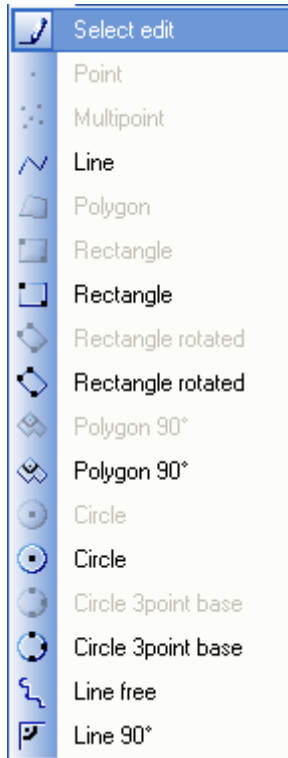
Use the *File/Save All* menu command to permanently delete the deleted vectors from the saved file.

2.2.2.2.6 Custom Edit Modes

The Editor offers a number of useful tools to easily draw special features that might have to be created repeatedly when digitizing vector map data. The following special drawing tools can be found under the *Shape/Edit Mode* menu or by clicking on drop down list next to the default *Edit* icon.


Edit modes for polyline layers:

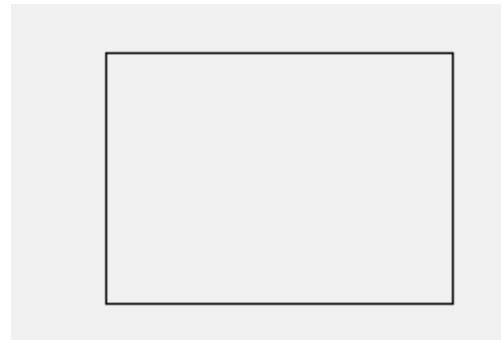
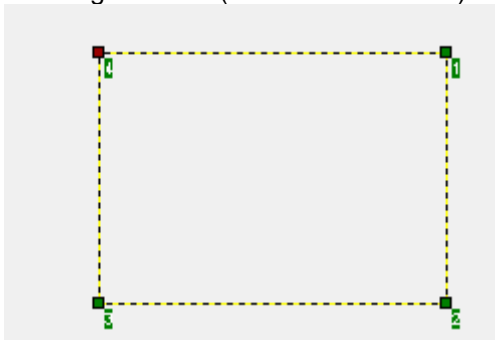
Edit modes for polygon layers:



As with the creation of standard points, lines, and polygons, some figures can be finished and the next figure begun by clicking on the relevant edit mode icon in the toolbar. For the figures composed by a finite number of vertices, the next figure can be started even without returning to the edit mode icon in the toolbar. Some other figure types can be completed (finished) by double clicking.

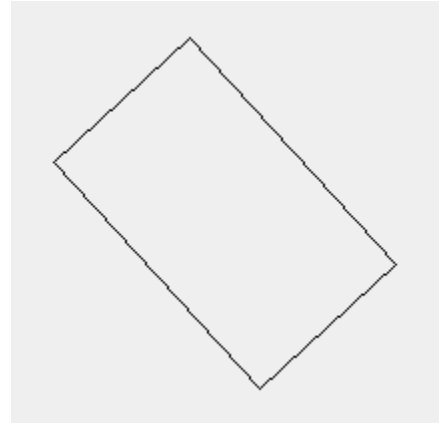
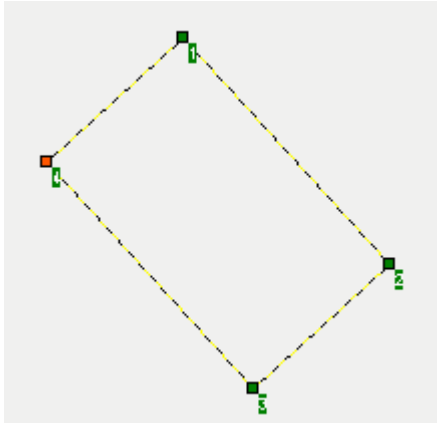
The following vector outline figures can be drawn on a polyline layer:

Rectangle outline (use the  edit tool)



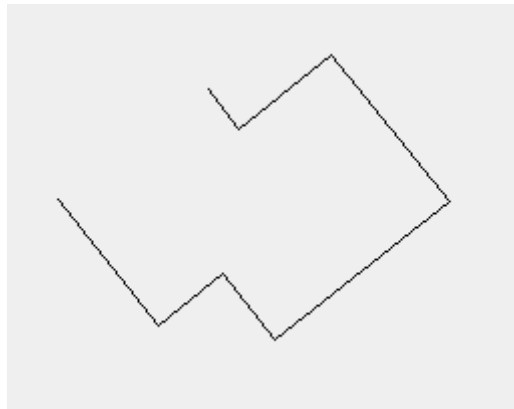
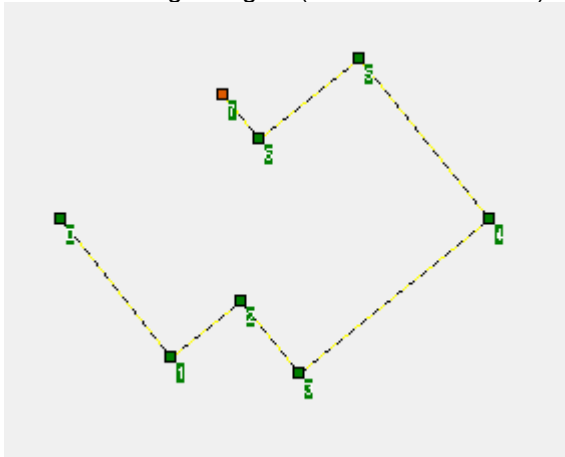
Mouse click where two opposite corners are to be placed (or left mouse click, drag, and release). Rectangle automatically completes after placement of the second corner (or if done by dragging, upon release of the mouse button).

Rotated rectangle outline (use the  edit tool)



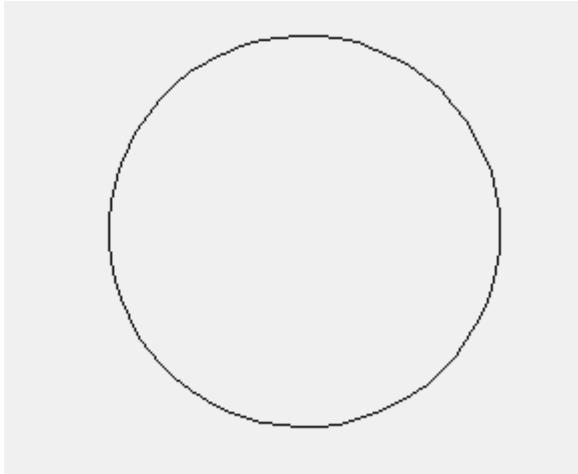
Place the locations of three corners with mouse clicks. Rectangle automatically completes after the placement of the third corner.


Line with all right angles (use the  edit tool)




Series of left mouse clicks. Double click to close the figure (to make a closed polygon outline), if desired.

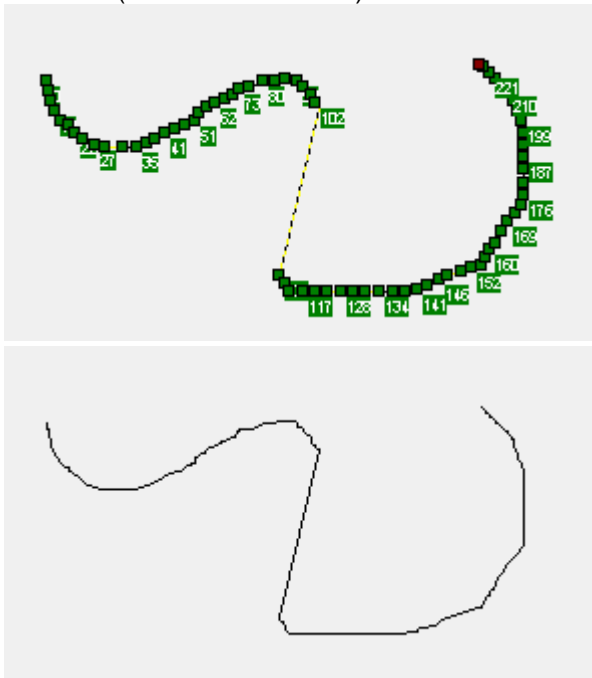
Circle outline (2 techniques for circle drawing are provided)



Technique 1 (Circle using the  edit tool): Left mouse click, drag and release. Circle completes upon release of mouse button.

Technique 2 (Circle 3 point base using the  edit tool): Left mouse click on three points to be placed on the circle perimeter. Circle completes after placement of the third point.

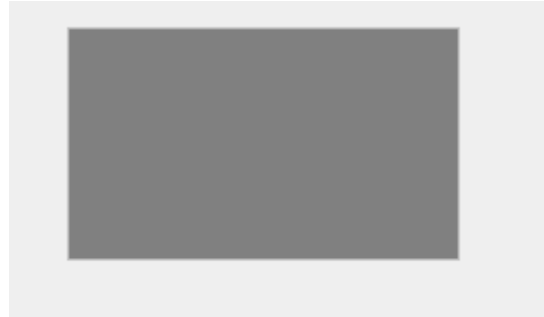
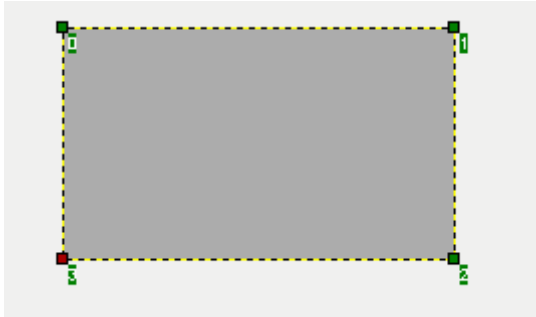
Free line (use the  edit tool)




Right mouse click, drag, and release. Reposition the cursor and start dragging again to continue the same line from a new place, with a straight line segment connecting the free line segments. Double click can be used to complete the formation of the line.

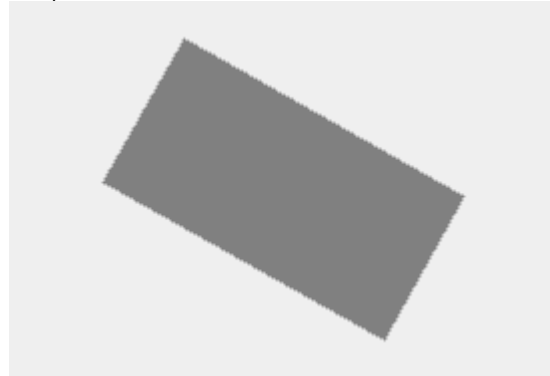
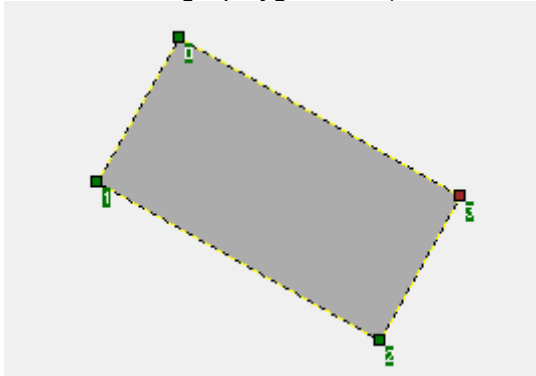
The following polygon vector figures (areas) can be drawn on a polygon layer:

Rectangle polygon area (use the  edit tool)




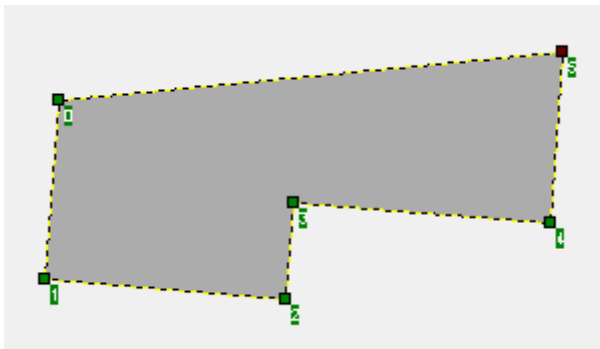
Mouse click to place two opposite corners of the rectangle (or mouse click, drag, and release). Rectangle automatically completes after placement of the second corner (or if done by dragging, upon release of the mouse button).

Rotated rectangle polygon area (use the  edit tool)



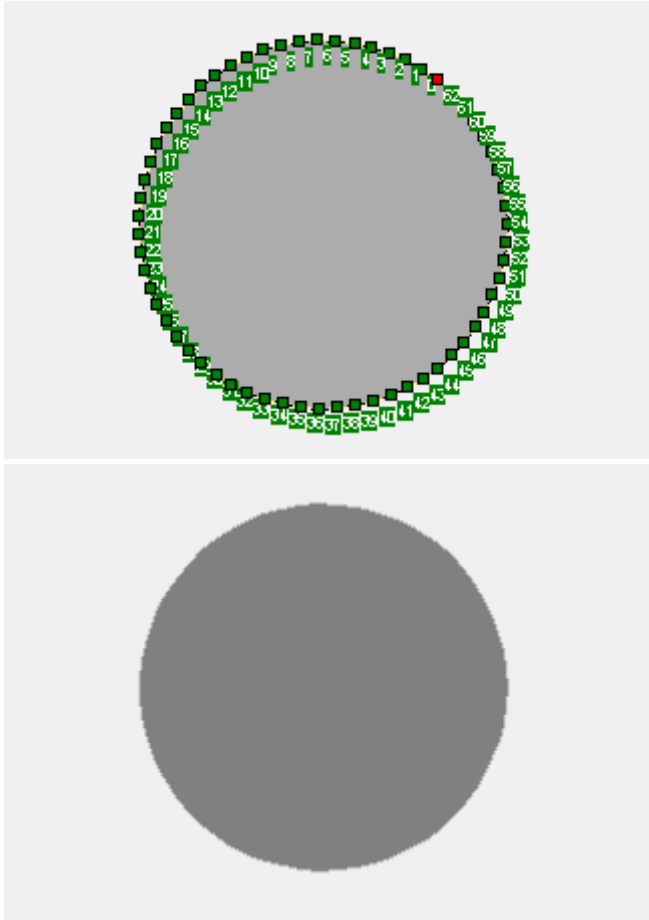
Place the locations of three corners with mouse clicks. Rectangle automatically completes after the placement of the third corner.


Polygon 90 degree, for creating polygons with multiple 90 degree angles. All angles are 90 deg. except for the two angles formed by the closure side of the polygon. (Use the  edit tool.)




Series of clicks. Double click to close.

Circle polygon (2 techniques for circle drawing are provided)



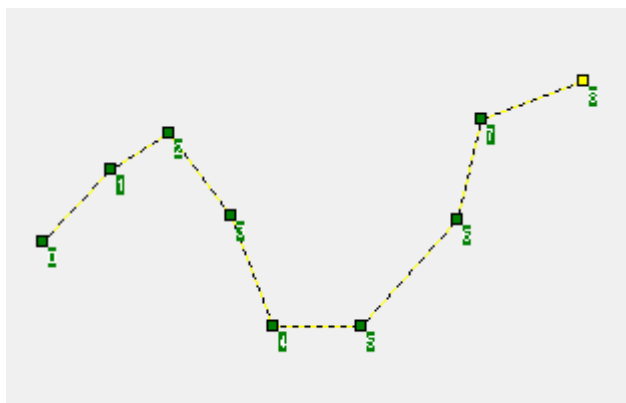
Technique 1 (Circle using the  edit tool): Left mouse click, drag and release. Circle completes upon release of mouse button.


Technique 2 (Circle 3 point base using the  edit tool): Lift mouse click on three points to be placed on the circle perimeter. Circle completes after placement of the third point.

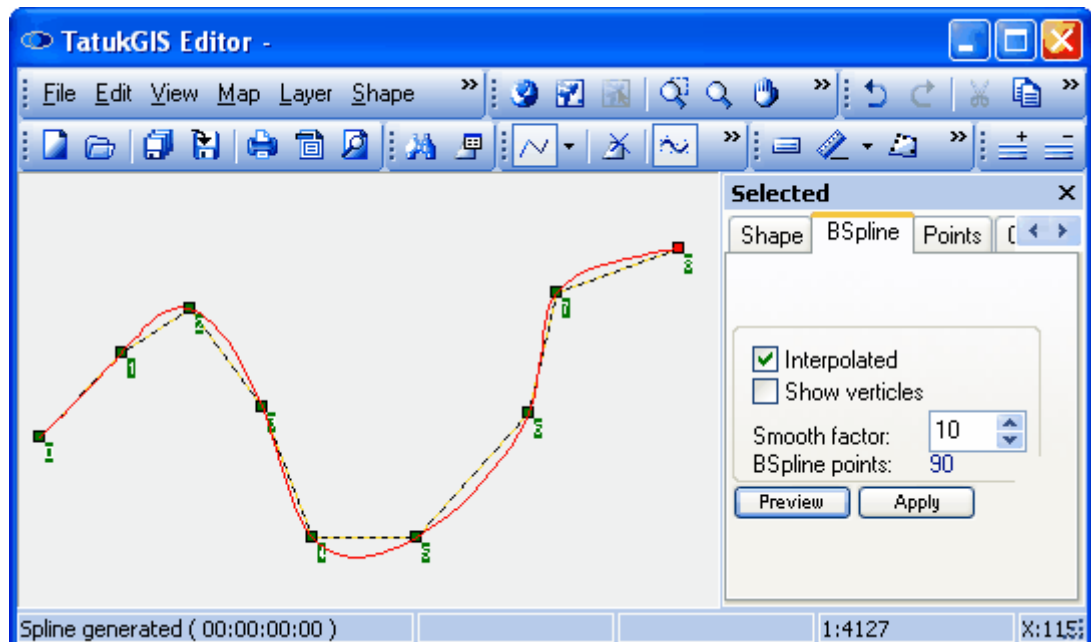
2.2.2.2.7 Line/Polygon Smoothing

The Smooth Shape function is used to convert a normal polyline or polygon perimeter into a smoothed line or polygon perimeter. This feature can be very useful in some occasions, such as to present the projected routes of a ships or airplanes.

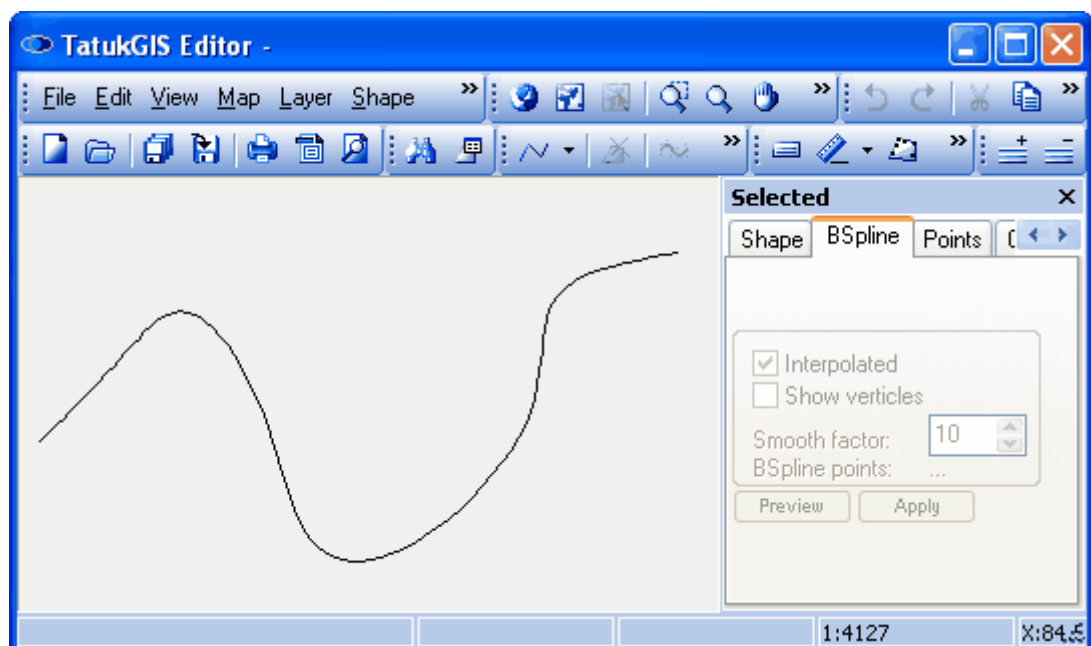
The following image shows a typical polyline created in the Editor.



While in editing mode, select a line or polygon vector and then click on the *Smooth shape*  toolbar icon (or using the *Shape/Smooth shape* menu). As shown in the next image, this results in a preview presentation of how the line will appear after smoothing is applied and opens the *BSpline* tab within the *Attribute* panel. In this example, the default *smooth factor* setting of 10 will generate a smoothed vector line formed with 90 points (vertices). The *smooth factor* may be customized by increasing or decreasing the number of vertices used to form the smoothed line, as desired.

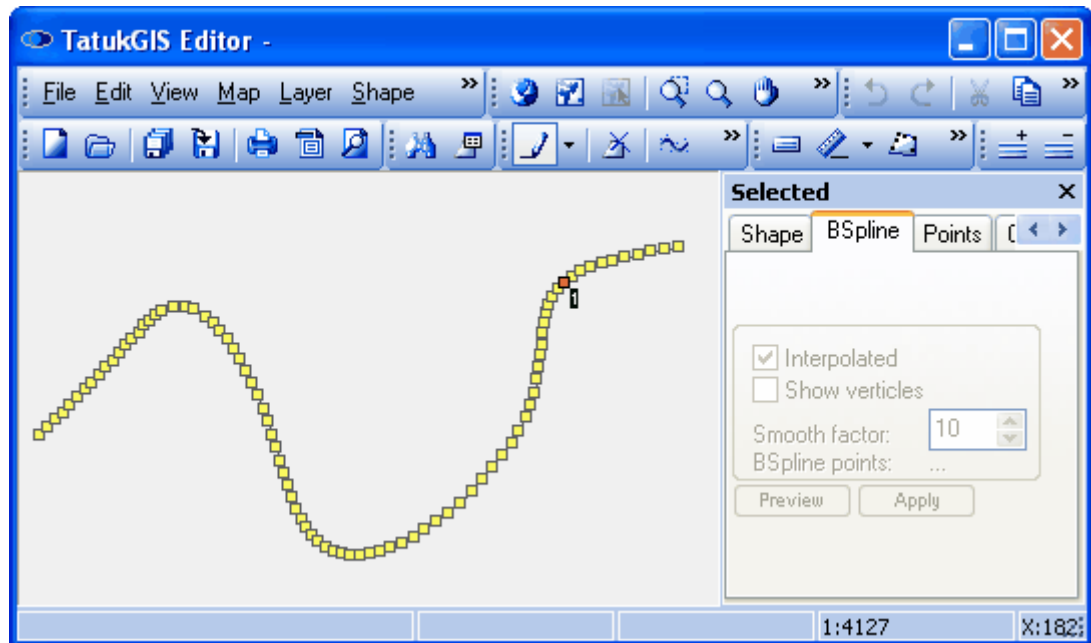


Click on the *Apply* button to replace the previous line with the new smoothed line, as presented in the image below.



In the next image the smoothed line has been selected using the *Edit*  tool to illustrate how the

smoothed line is still a normal vector polyline, but one formed by many well placed vertices.



2.2.2.2.8 Create Vectors Using COGO

COGO is a system of using bearings and distances to define a course line or other vector geometry. The Editor COGO functionality can be used to define vectors in terms of bearing and distances from vertex to vertex, as opposed to using x, y coordinates to define the location of each vertex. The creation (editing) of vector geometry - polylines and polygons - can be performed by entering a series of bearing and distance information.

This demonstration uses an actual courthouse land parcel deed record from the state of Iowa in the United States to plot the parcel over a georeferenced topological map and a orthorectified GeoTIFF format aerial image. Both of these raster layers are in the NAD83 Iowa State Planes, North Zone, US Foot geographic coordinate system. The survey description for Parcel B provided in following Plat of Survey is used to draw the boundaries of Parcel B to a new vector polyline layer. (The parcel could also have been drawn as a vector polygon.) The Plat of Survey information is as follows:

PLAT OF SURVEY

PARCEL B IN PART OF THE N1/2 OF NW1/4 OF SECTION 23, TOWNSHIP 85 NORTH, RANGE 4 EAST OF THE 5TH PRINCIPAL MERIDIAN, JACKSON COUNTY, IOWA

SURVEY DESCRIPTION: PARCEL B

THAT PART OF THE NORTH HALF OF THE NORTHWEST QUARTER OF SECTION 23, TOWNSHIP 85 NORTH, RANGE 4 EAST OF THE 5TH PRINCIPAL MERIDIAN, JACKSON COUNTRY IOWA, DESCRIBED AS FOLLOWS:

- COMMENCING AT THE NORTHWEST CORNER OF SAID SECTION 23:
- THENCE NORTH 87 DEGREES 22 MINUTES 04 SECONDS EAST (ASSUMED BEARING) 885.98 FEET ALONG THE NORTH LINE OF THE NORTHWEST QUARTER OF SAID SECTION 23 TO THE POINT OF BEGINNING;
- THENCE CONTINUING NORTH 87 DEGREES 22 MINUTES 04 SECTIONS EAST 233.93 FEET ALONG SAID NORTH LINE;
- THENCE SOUTH 02 DEGREES 37 MINUTES 56 SECONDS EAST 72.55 FEET; TO THE SOUTHERLY RIGHT-OF-WAY LINE OF COUNTY ROAD E17 (150TH STREET);
- THENCE SOUTH 21 DEGREES 36 MINUTES 39 SECONDS EAST 156.12 FEET;

- THENCE SOUTH 30 DEGREES 39 MINUTES 54 SECONDS EAST 476.90 FEET TO THE NORTHERNMOST CORNER OF THE PARCEL OF RECORD DESCRIBED IN THE WARRANTY DEED DATED SEPTEMBER 17, 1971 AND FILED SEPTEMBER 21, 1971 AT BOOK 113, PAGE 44 AT THE JACKSON COUNTY RECORDER'S OFFICE;

- THENCE SOUTH 58 DEGREES 32 MINUTES 06 SECONDS WEST 296.00 FEET ALONG THE NORTHWESTERLY LINE OF THE SAID PARCEL TO THE WESTERNMOST CORNER OF SAID PARCEL;

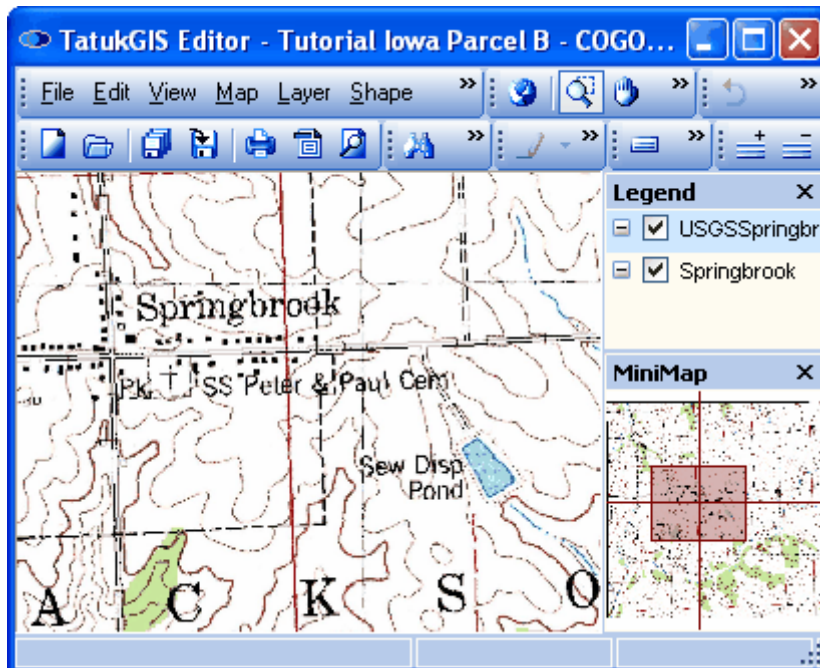
- THENCE NORTH 34 DEGREES 45 MINUTES 57 SECONDS WEST 570.60 FEET;

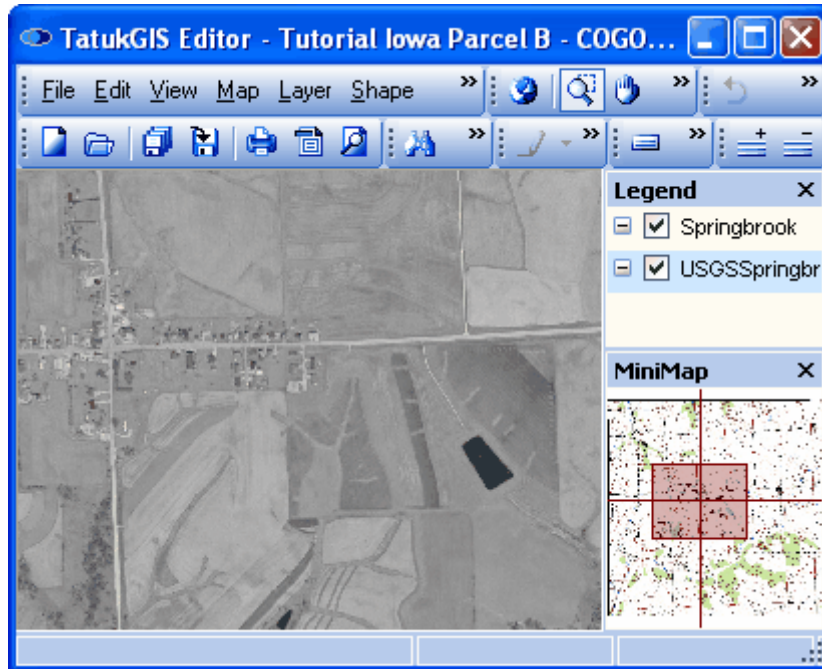
- THENCE NORTH 10 DEGREES 34 MINUTES 17 SECONDS EAST 236.27 FEET TO THE SOUTHERLY RIGHT-OF-WAY LINE OF COUNTY ROAD E17;

- THENCE NORTH 02 DEGREES 37 MINUTES 56 SECONDS WEST 70.67 FEET TO THE POINT OF BEGINNING.

SAID PARCEL B CONTAINS 5.40 ACRES MORE OR LESS, INCLUDING 0.38 ACRES OF COUNTY ROAD EASEMENT ACROSS THE NORTHERLY PORTION THEREOF.

The two screen views below show the topographical map layer (USGSSpringbrook) and the aerial image layer (Springbrook) open in the Editor. In the first view the topographical map is positioned as the top layer and in the second image the aerial image layer is positioned on top.

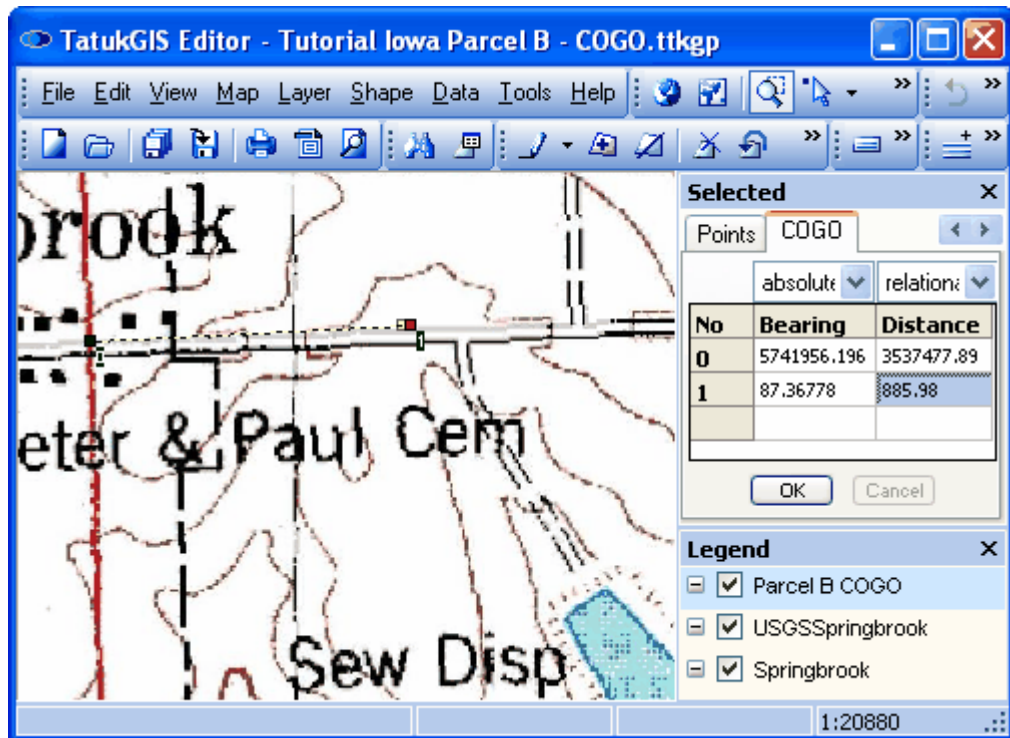




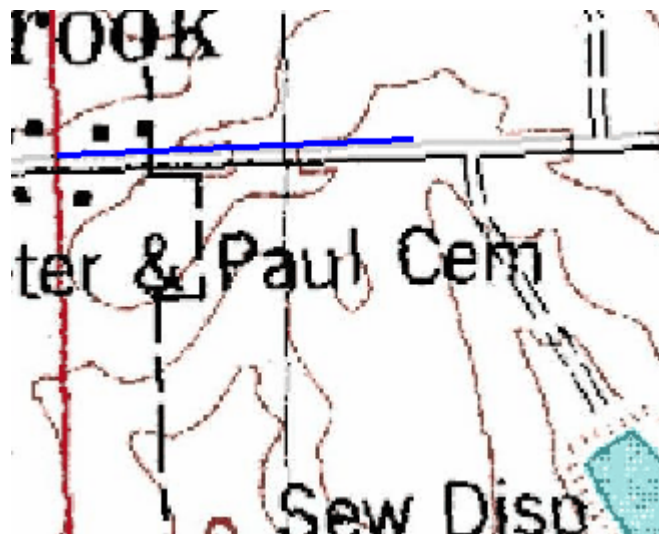
The trickiest step in this exercise is identifying the starting reference point, "THE NORTHWEST CORNER OF SAID SECTION 23", as accurately as possible on either the topographical map or the aerial image. The borders of Section 23 are marked on the topographical map, but the topographical map is less accurate than the orthophotomap image. It would be very helpful if the actual coordinates for the northwest corner of Section 23 (the reference point) were known. Unfortunately this information is not provided in the survey description.

Create a vector polyline layer as shown in Editor Tutorial 1. Begin by manually placing the reference point on the raster map with the *Points* tab selected in the Attribute panel, and then switch to the COGO tab to enter the first bearing and distance call from the survey description. This first bearing/distance call has been entered in the screen image below. Notice that the bearing definition provided the survey description (North 87 degrees 22 Minutes 04 Seconds East) had to be manually converted to 87.36778 degrees in the 0 - 360 degree system. (A later update of the Editor will allow the input of such deed call bearings in the original format.)

Also note that the first vertex, No 0, is always represented by x,y coordinates in the table under the COGO tab, even though this is technically incorrect because the names at the top of these columns are *Bearing* and *Distance*. (This is because of the difficulty of showing different column names for only the first vertex.) All vertices other than No 0 in the table under the COGO tab are presented in terms of bearing and distance.



The result is as appears below. To make this first line segment clearly visible, the layer properties of the new Parcel B polyline layer have been set to render the lines bright blue and with a 2.0 pixel width.



Continue entering the bearing/distance calls into the table under the *COGO* tab to continue drawing the Parcel B boundaries. The *Attributes* panel/*COGO* tab can be moved from the Editor to another place on the desktop and resized during the data entry process, if the user finds this more convenient.

The table under the *COGO* tab appears as follows after all the bearing/distance calls have been entered. At this time, note that the *absolute* option has been selected for the *Bearing* data and the *relational* option has been selected for the *Distance* data. There are two options - *absolute* and *relational* - for entering both the Bearing and Distance data. The meanings of these settings are as follows:

Bearing - absolute: The angle is measured starting from absolute North (0 degrees) in a 0 - 360 degree manor.

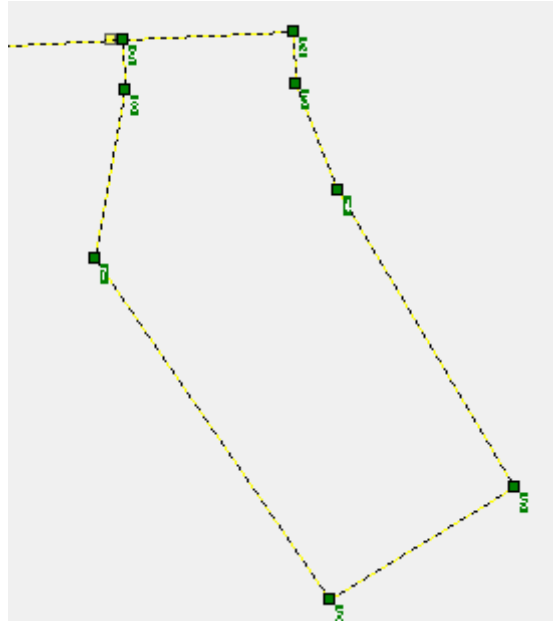
Bearing - relational: The angle is measured starting from the direction of the last line segment, in a 0 - 360 degree manor. (The direction of the last line segment is considered to be 0 degrees.)

Distance - absolute: The distance of each vertex is measured from the first/beginning vertex of the vector, not from the previously numbered or nearest vertex.

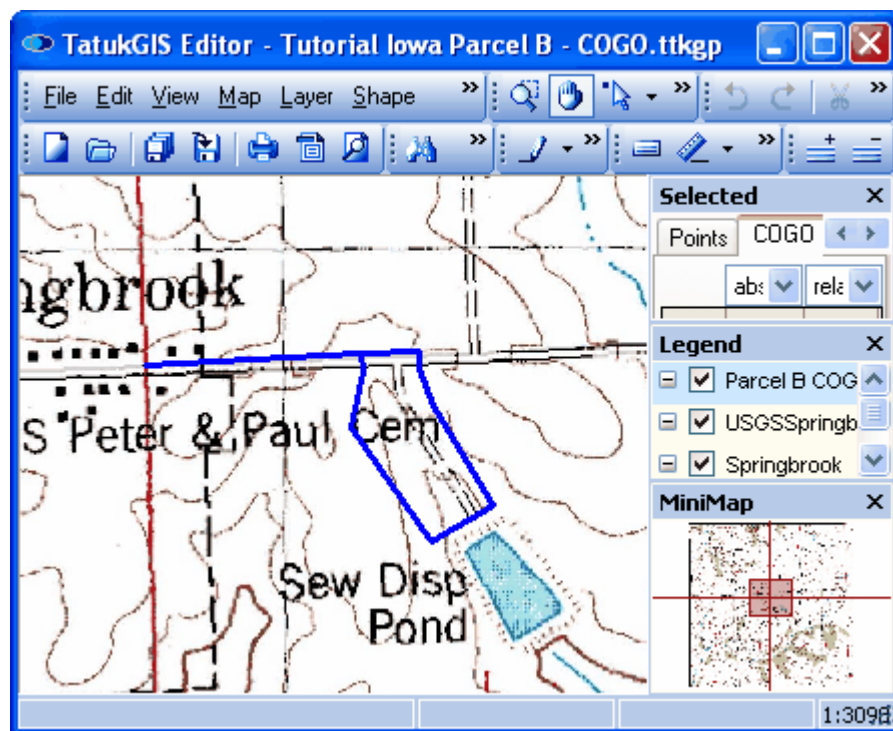
Distance - relational: The distance is measured from the previously numbered vertex.

No	Bearing	Distance
0	5741956.19617822	3537477.89010206
1	86.8634761724175	885.979999999935
2	87.3676700000472	233.929999999988
3	177.366699999901	72.5500000000002
4	158.610799999923	156.120000000089
5	149.334999999944	476.900000000059
6	238.53499999997	295.999999999957
7	325.234166999985	570.600000000234
8	10.5713300000029	236.269999999998
9	357.367499999957	70.6699999998478

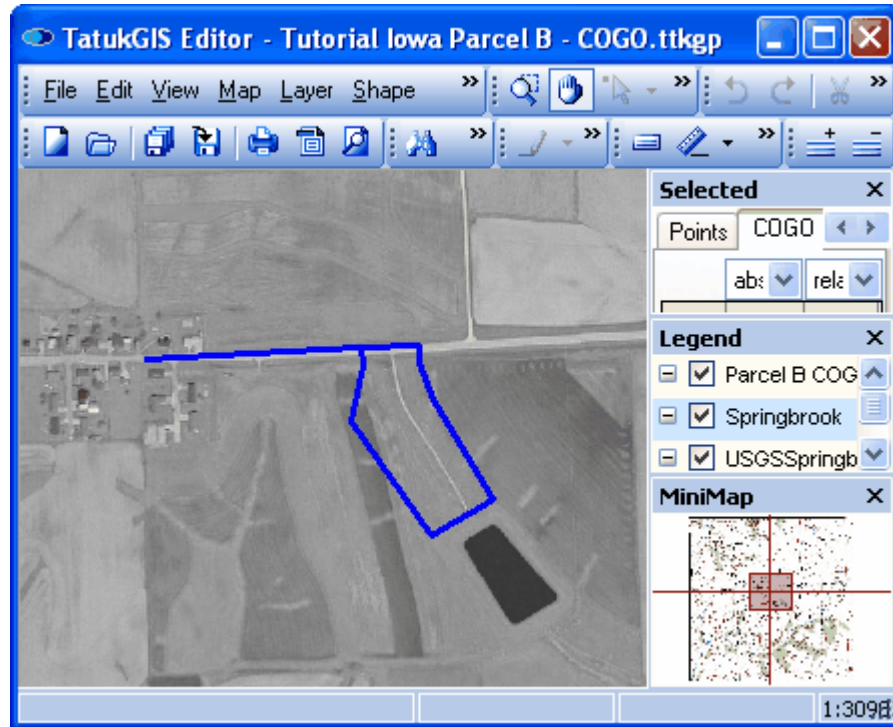
The completed parcel boundary line generated from the above bearing/distance calls appears below, while the line is still selected in edit mode. The closure of the final vertex (point No 9) with the "Point of Beginning" (vertex No 1) is not perfect, but the closure error is very, very small - approximately 0.3 feet. (The *Ctrl* key was depressed when the OK button was clicked following the entry of the final call, to prevent the automatic snapping of the final vertex No 9 to the "Point of Beginning" vertex No 1.) This small error could be explained by an inaccuracy in the conversion of the bearings to the 0 - 360 scale or it could reflect a small mistake or rounding error in the survey description itself. A non closure by a few inches is insignificant.




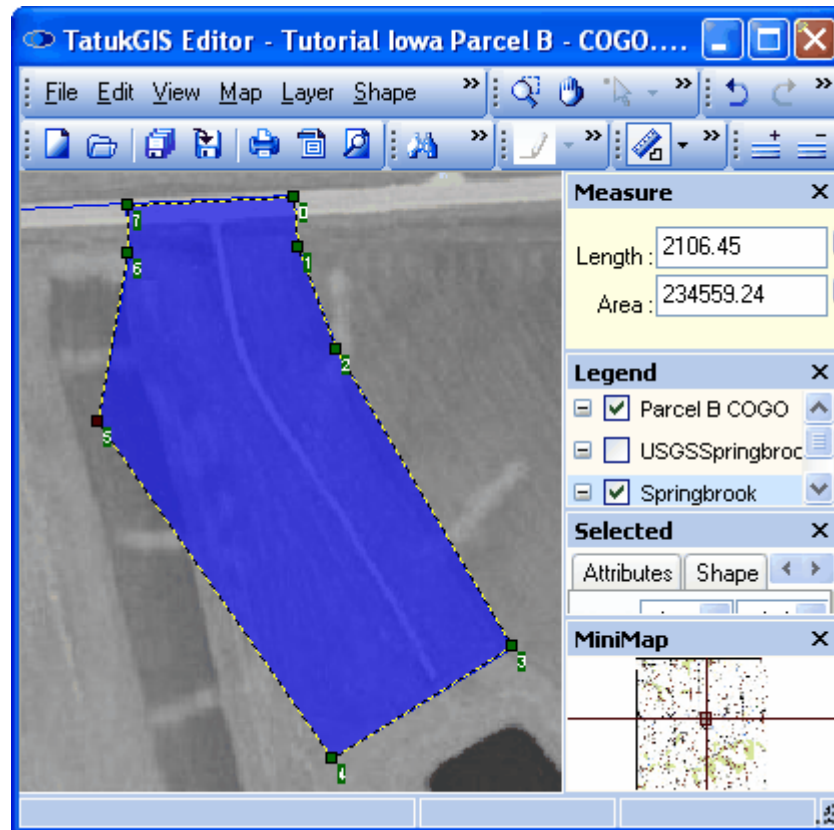
The appearance of the land parcel boundary over the topographical map.



The appearance of the land parcel boundaries over the aerial image.



As an interesting check, the polygon measure tool  (explained in Viewer Tutorial 9) is used to check if the area formed by the drawn boundary lines agrees with the parcel area as stated in the survey description. As pictured below, the Editor program calculates the area to be 234, 559.24 units. Since the raster images originally opened in the Editor are georeferenced to the Iowa State Plane coordinate system, which uses feet as the measurement unit, these area units represent square feet. An acre is composed of 43,560 square feet. Therefore the 234,559.24 square feet figure equates to 5.385 acres ($234,560.24 / 43,560 = 5.385$). This compares very closely to the survey description, which states that the Parcel B contains 5.4 acres, more or less. In fact, the area calculated by the Editor is probably more accurate than the figure provided in the survey description.

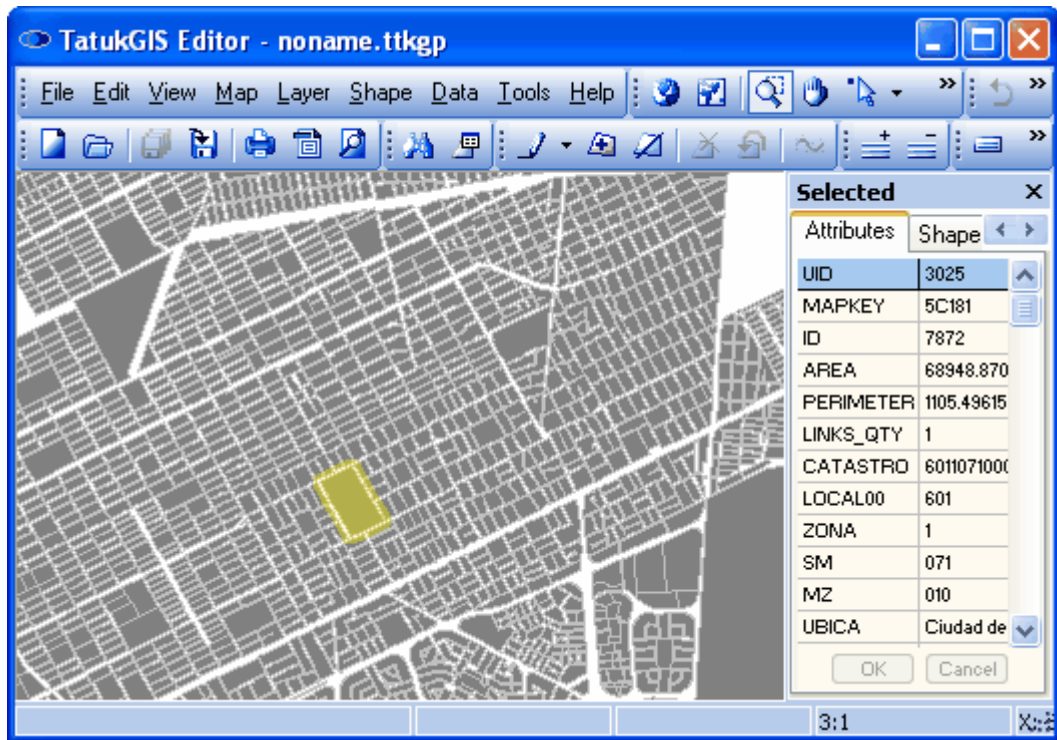



2.2.2.3 Tutorial 3 - Edit Existing Map Data

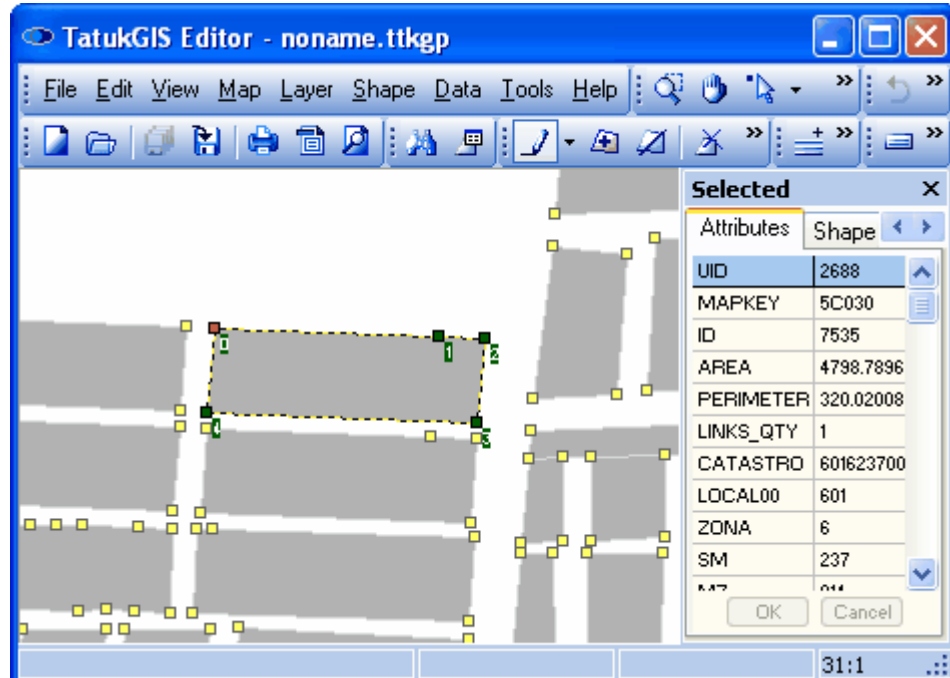
This example demonstrates the editing of geometry and the attribute information of an already existing vector map data layer. The tutorial uses a polygon map which contains cadastral data for a city. The procedures demonstrated are the same for files containing polylines or vector point data.

2.2.2.3.1 Geometry Editing

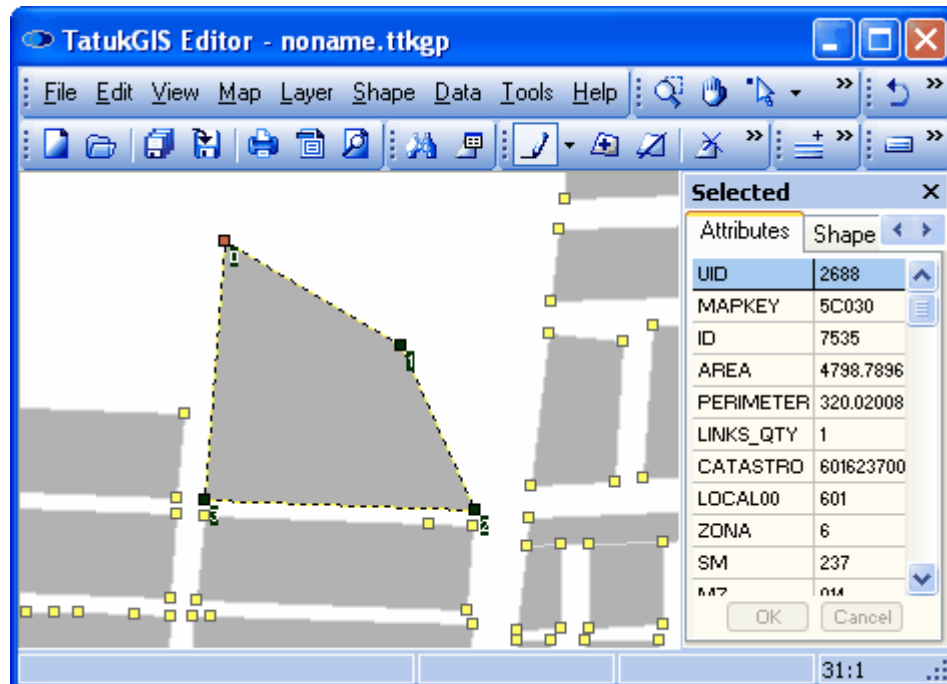
This example demonstrates the editing of the geometry and attributes of an already existing vector map data layer. In the image below a cadastral map of a city is open in the Editor. The attribute information for the selected parcel is visible in the *Attributes* panel.



In the image below a single polygon vector, representing the area of a real estate parcel, has been selected using the *Edit* toolbar icon. (When in *Edit* mode the cursor appears as a .)



In the following image, the geometry of the polygon selected above has been edited by dragging two of the vertices forming the polygon to new locations and by deleting a third vertex of the original polygon.

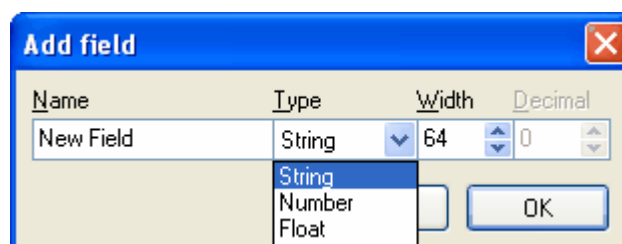
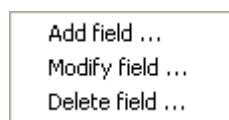


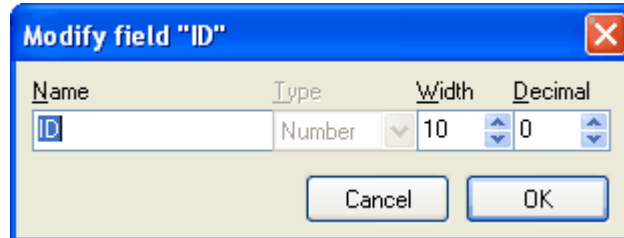
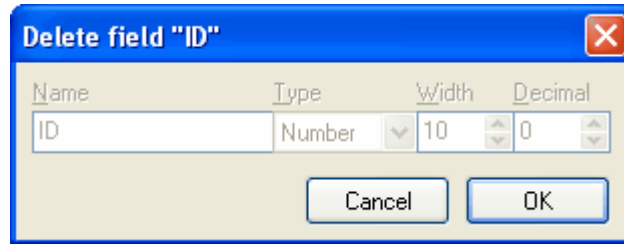
Save the changes, if desired, using the *Save all* toolbar icon (or the *File/Save all* menu). The *File/Save* menu can also be used if the intent is to save changes of only the selected layer.



2.2.2.3.2 Attribute Editing & Restructuring


Any of the attribute data can be easily edited, either vector by vector within the *Attributes* tab of the *Selected* panel or within the *Data* panel which presents the attribute information for all selected vectors in table form.

To add, delete, or modify attribute records or attribute field information from the *Attributes* tab, right mouse click on the UID column of the *Attributes* tab after the selection of a vector from the layer of interest. (The *Data* panel - accessed with *Show Data Panel* toolbar icon - must be turned off when editing attribute information via the *Attributes* tab.) This will lead to the following windows and options. In the case of the *Delete* and *Modify* options, the operation performed is specific to the attribute that is selected in the *Attributes* panel.





Attribute data can also be edited directly within the Data panel. Click on the *Show Data Panel*  toolbar icon (or use the *Data/Show Data* menu) to present all attribute data for the selected map layer in the Data panel. Alternatively, use a spatial selection tool, such as , to present in the *Data* panel only the attribute data for selected objects.

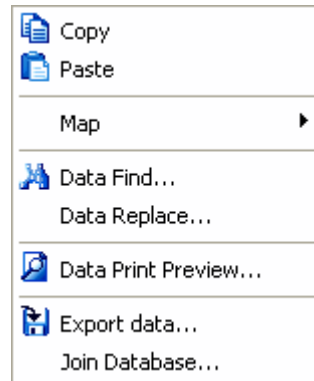
In the image below, the *Select by Point* tool  was used to select the 10 polygons which are highlighted. The table contains the attribute information for these 10 polygons. To edit the data in any given field, just click on the field and edit by retyping the data. The changes will be updated to the file upon the next save operation.

The Data panel table contains the following data:

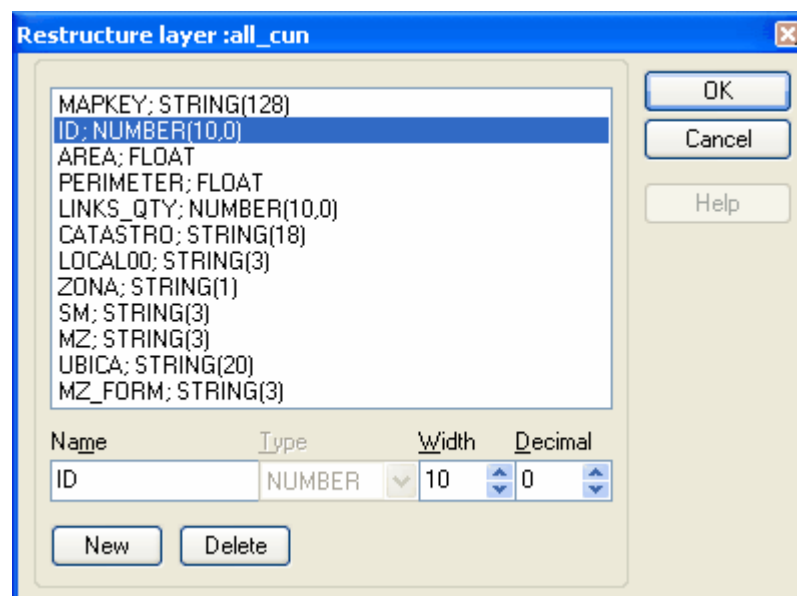
GIS_UID	GIS_SELECTED	GI				ID	AREA	PERIMETER		CATASTRO	ZONA	SI
2688	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0.0	4.1	5C	7535	4798.78967	320.02008	1	6016237000	601 6	23
3967	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0.0	1.4	5C	8814	1702.28125	194.10366	1	6016237000	601 6	23
3968	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0.0	4.2	5C	8815	4937.42188	326.8124	1	6016237000	601 6	23
3974	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0.0	1.4	5C	8821	1702.28113	194.10366	1	6016237000	601 6	23
3975	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0.0	3.4	5C	8822	3978.96069	258.47341	1	6016237000	601 6	23
3978	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0.0	2.1	5C	8825	2484.70703	208.59765	1	6016237000	601 6	23

(The attribute 'CATASTRO' for the shape with UID 3968 has been clicked on to be edited.)

Right mouse click on the data table for options to export the selected attribute data to another file or to join the attributes to records in an SQL database. The Editor supports the export of attribute information to the following file types: HTML file, ASCII (text) file, MS Word file, MS Excel file, CSV format (text), and XML file.



The attribute restructure feature, which can be accessed under the *Layer/Restructure* menu, presents all the attributes of the selected vector layer in a single dialog box, allowing for the editing of the structure of the attribute table, i.e., the editing of the attribute names, the width of the attribute information field, the deletion of attributes, and the addition of new attributes.



The same attribute table operations can also be performed by right mouse clicking on the Attribute panel when any vector in the layer is selected, but the Attribute Restructure feature presents a more comprehensive overview of the attribute structure, showing the attribute types and field width information of all the attributes in a single window.

The attribute restructure feature is not for entering attribute field information (values), which would be specific for each vector. Attribute field information is entered or edited only via *Attributes* panel or the *Show Data* table. Yet another option is to prepare or edit the attribute information in another software program and import the edited attribute table back to map layer in the Editor.

Note that five attribute types are provided for:


String - Attributes with a data field normal text information

Number - Attributes with a data field for numeric information

Float - Attributes with a data field for numbers with decimals

Boolean - Attributes with a data field for true/false information

Date - Attributes with a data field for calendar date information

Use the *File/Save All* menu option (or the *Save All*  toolbar icon) to save changes to vector attribute information.

2.2.2.4 Tutorial 4 - Unions and Splitting


The Editor supports the creation of unions from multiple vector objects (shapes) into a single vector object and the splitting of a single vector object into multiple vectors. These are important topology related functions which can be used to alter vector map geometry in sophisticated ways.

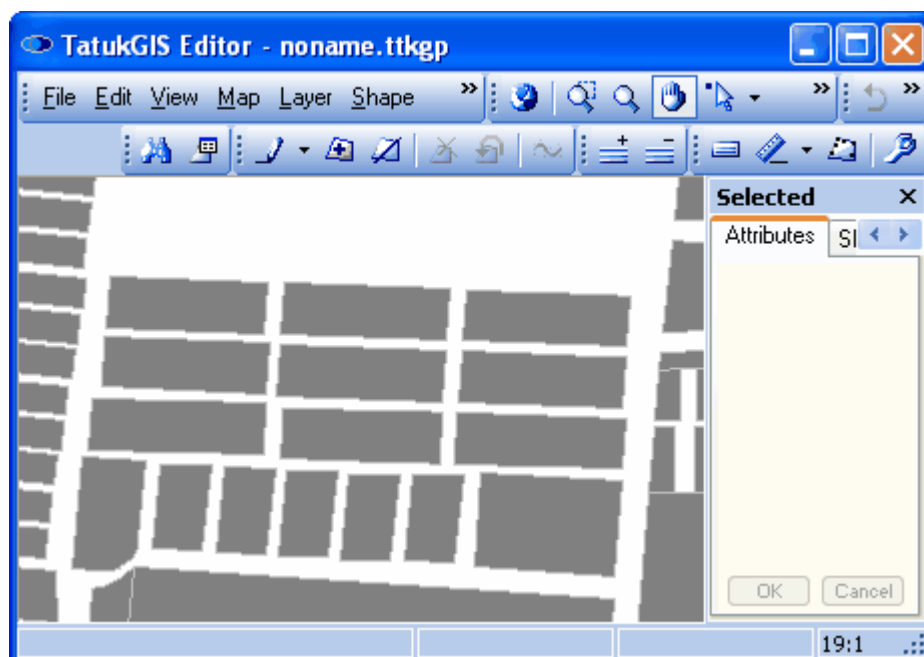
The following tutorials use a polygon map layer to demonstrate these unions and splitting, but the logic and procedures are the same for polyline and point vector data. (Of course, a single point cannot be split, but points can be joined to form multipoint objects.)

2.2.2.4.1 Unions of Shapes

The multiple vector objects from the same layer may be combined to form a single geometric vector object. This procedure is commonly referred to as a 'union'. The following exercise demonstrates the union of polygons representing four adjacent city lot parcels into a single large lot - such as if someone purchased four lots to join together to build a luxury home or a commercial building.

Although this example shows the union of only four polygons, unions can involve hundreds or thousands of point, polyline, or polygon vectors from the same layer.

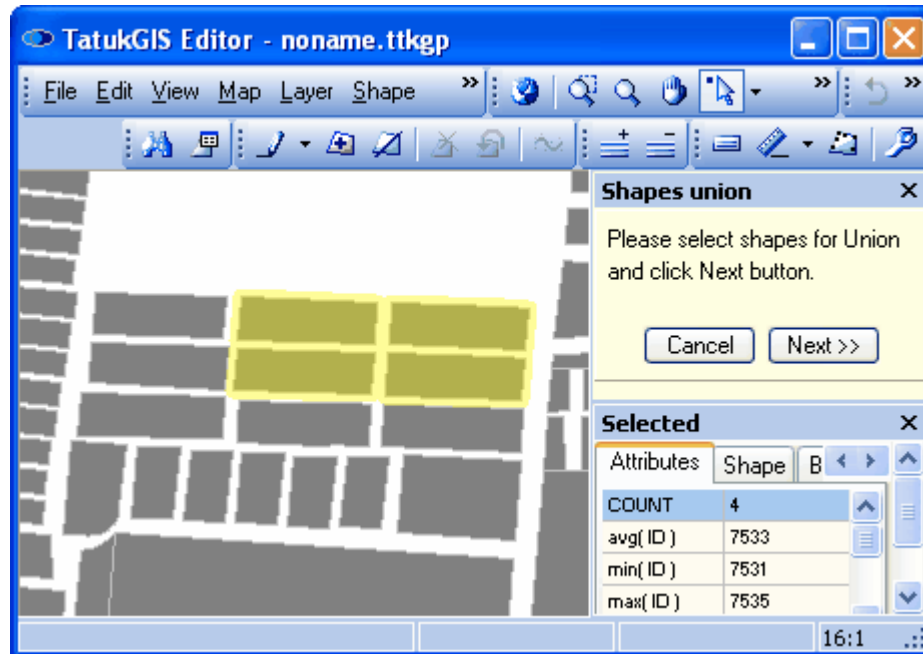
Begin by zooming into the area of interest and selecting the *Shapes union*  toolbar icon (or using the *Shape/Union shapes* menu command).



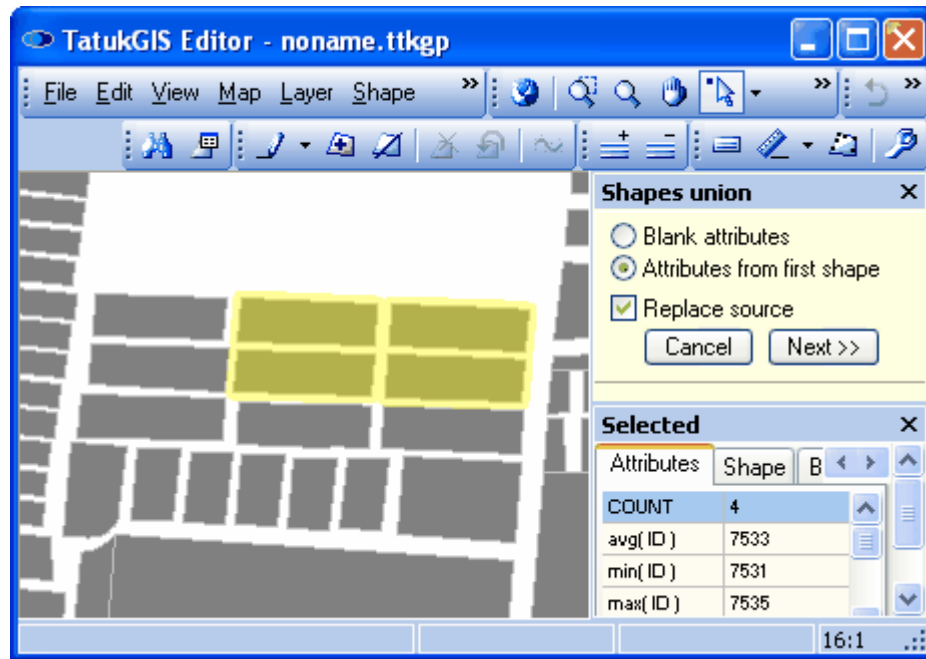
Upon clicking on the *Shapes union* icon, a *Shapes union* wizard panel is automatically inserted

above the *Attributes* panel to guide the user through the procedure. The first step is to use the *Select* tool to select the vectors to be combined to form the union. The vectors can be selected individually using the *Select by Point* tool in combination with the *Ctrl* key and clicking on each vector. If the union involves many vectors, or is to cover specific spatial area, any of the spatial selection methods (polygon, rectangle, circle, etc.) can also be used to identify the vectors to be combined in the union.

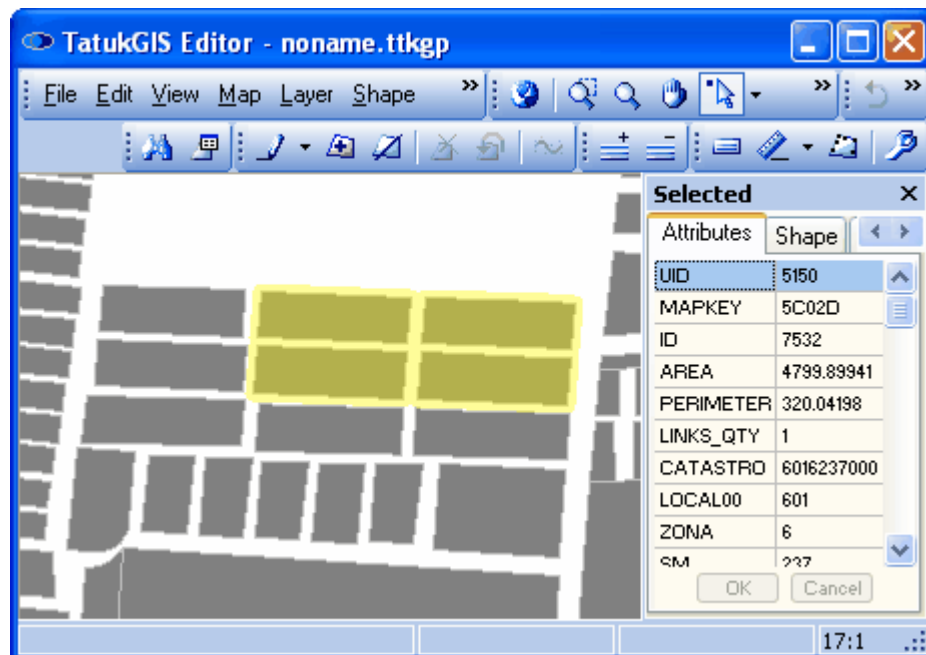
As shown in the following image, four adjacent vectors are selected for the union. It can be important which vector polygon is selected first, because the attribute values from the first selected polygon can be applied to the new polygon to be created from the union.



In the next step the wizard asks the user to i) decide either to assign no attribute value information (*blank attributes*) or the attribute values from the first selected polygon (shape) to the new polygon to be formed from the union and ii) whether or not the new polygon should *replace* the source polygons selected for the union. In this example the attribute information from the first selected polygon will be applied to the new polygon and the new polygon will replace the four original polygons. This means that the four source polygons will be deleted.

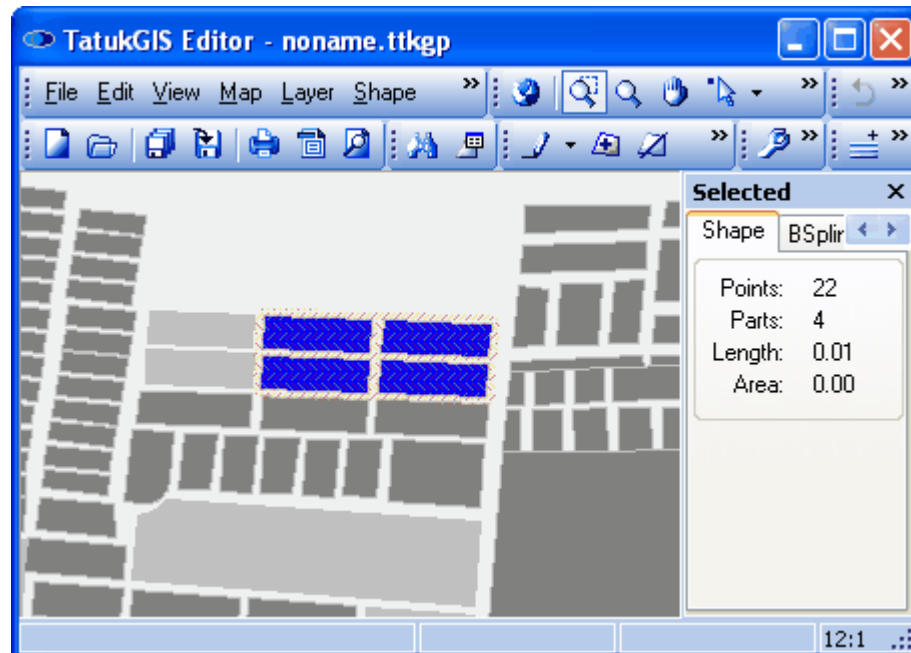


The result appears below, with the newly formed polygon selected to show the attribute information. The four polygons have been combined into a single polygon geometric object, and the attribute information from the first selected polygon has been applied to the newly formed polygon.



To better illustrate the result of the union operation, in the following image the layer properties have been used to render the map layer based on the *ID* attribute. The polygon with the *ID* number equal to 7532 (the new polygon created by the union) is rendered blue color, while all polygons with *ID* numbers less than 7532 are rendered light grey and all polygons with *ID* numbers greater than 7532 are rendered dark grey. (For more information on layer rendering, refer to Viewer tutorials 2 - 4.)


As shown below, the information in the *Shape* tab within the *Attributes* panel shows that the polygon created from the union is formed by 22 points (vertices) - all the vertices from the four original polygons - and is composed of 4 parts. Each of the original (source) polygons now form a 'part' of the single polygon vector created from the union. The area of the new polygon is the sum of the areas of the four source polygons and the perimeter length of the new polygon is the sum of the outer sides from the four source polygons.




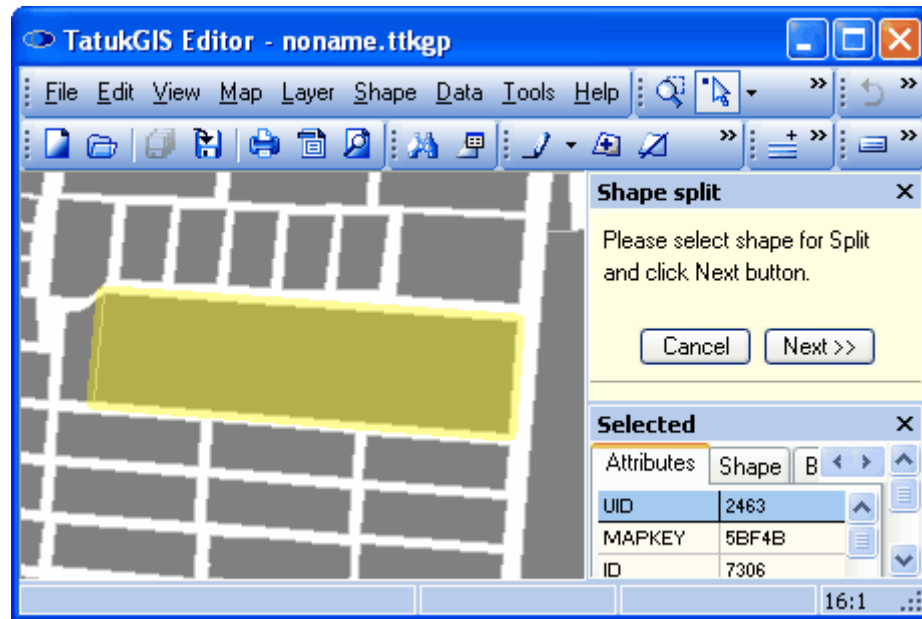
Note: The vector source objects selected for a union need not be touching each other.


Save the changes if desired.

2.2.2.4.2 Splitting of Shapes

This example demonstrates how cut a vector polygon into multiple polygons. The polygon to be split is selected in first image below. Begin by clicking on the *Split shape*  toolbar icon (or using the *Shape/Split shapes* menu option). The splitting functionality can be used even when not in an editing mode.

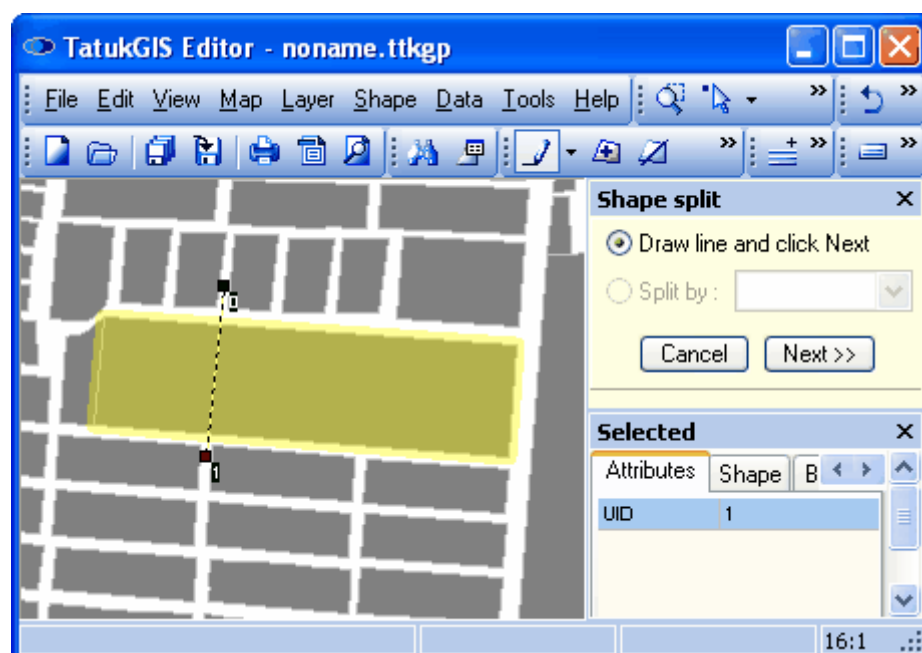
Follow the instructions in the *Shape split* wizard that is automatically inserted above the *Selected* panel, and use the *Select by Point*  menu option to select the polygon to be split. Then click on the *Next* button.



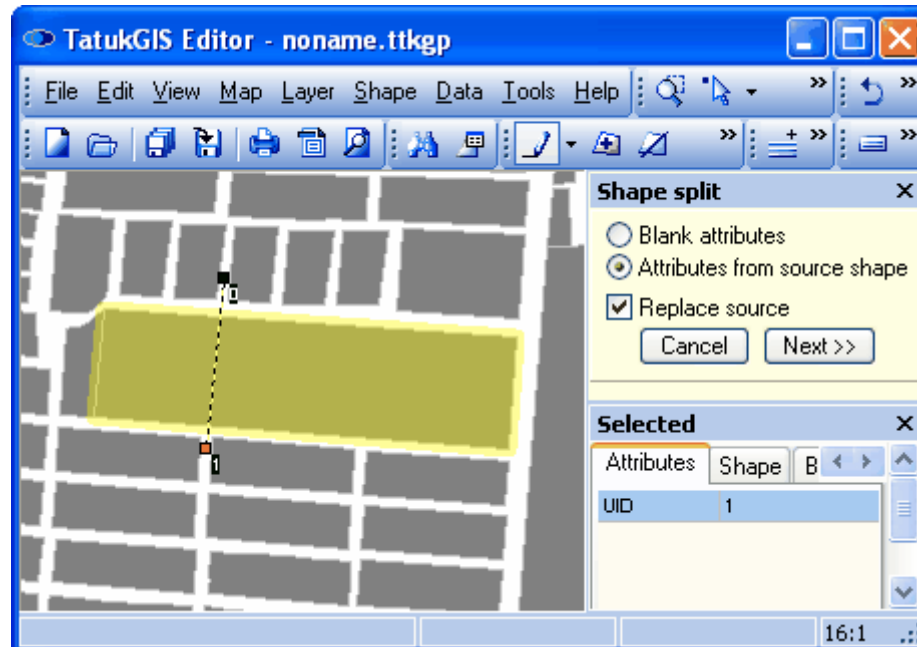
At this point the mouse cursor automatically converts to a . Position the cursor and use left mouse clicks to place temporary points to form a temporarily line marking the place where the polygon vector is to be cut. Be sure that the cut line intersects the perimeter of the polygon in two places.

Note that the wizard also offers a second option - *Split by* - to specify the cut line. In the event that multiple vector file layers are open in the Editor, this option allows the use of an already existing polyline from another layer to cut the polygon. In this way, for example, a river polyline, held in a separate layer, flowing through the interior a land parcel could be used to subdivide the parcel into the portions on either side of the river. The *Split by* option is inactive in this example because only a single layer is open in the Editor.

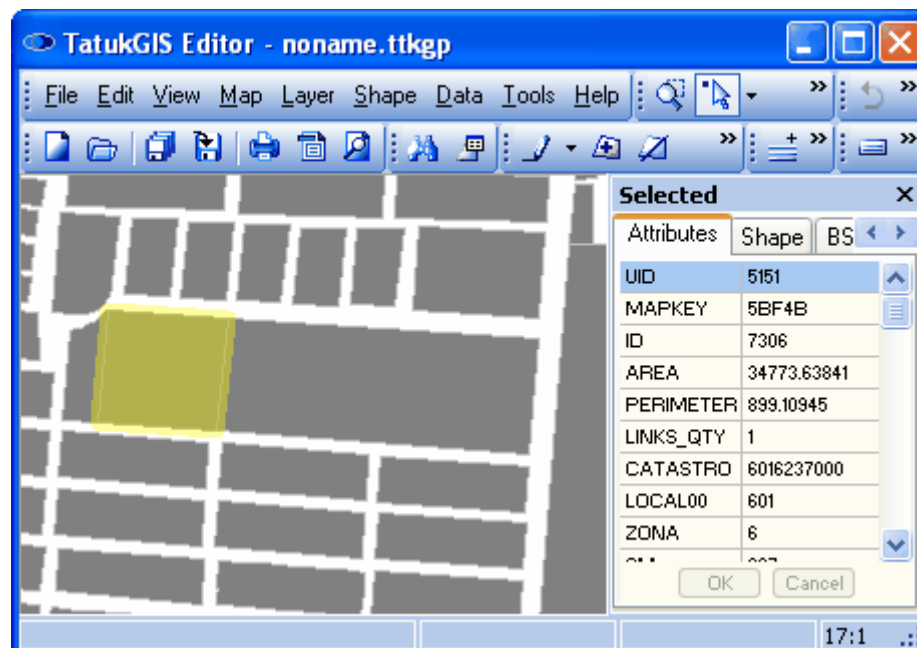
Notice that the attribute information for the polygon to be split has disappeared from the attribute panel. This is because it is not clear as this stage of the procedure what attribute information should be applied to the two newly created polygons. Click on the *Next* button.



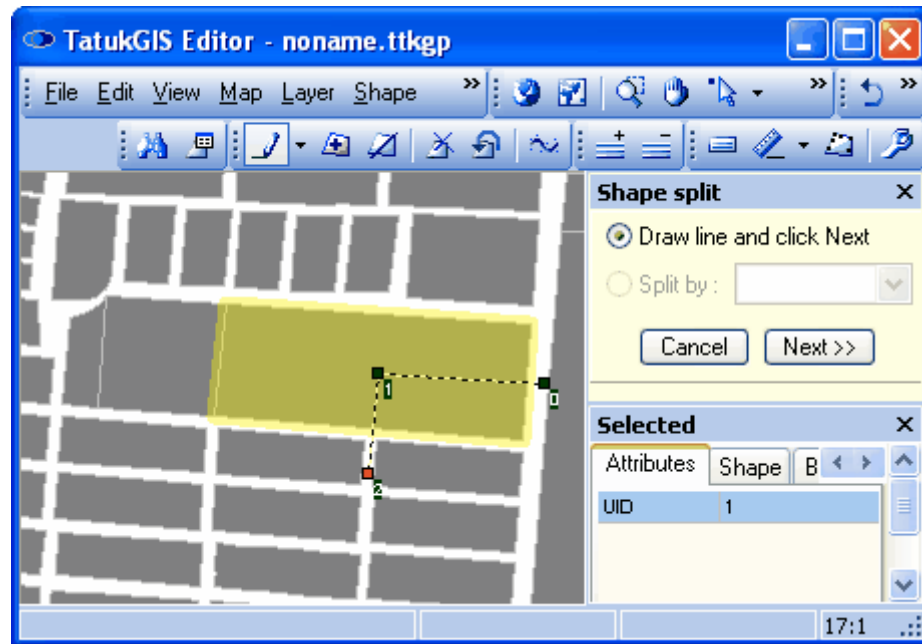
In the next step the wizard asks the user i) to chose between assigning empty attribute information fields to the two new polygons to be created from the splitting operation or to assign to each new polygon the attribute information from the original polygon and ii) whether or not the original polygon is to remain or to be replaced by the two newly created polygons. In this example the attribute information from the original polygon will be applied to the two new polygons and the new polygons will replace (delete) the original polygon.



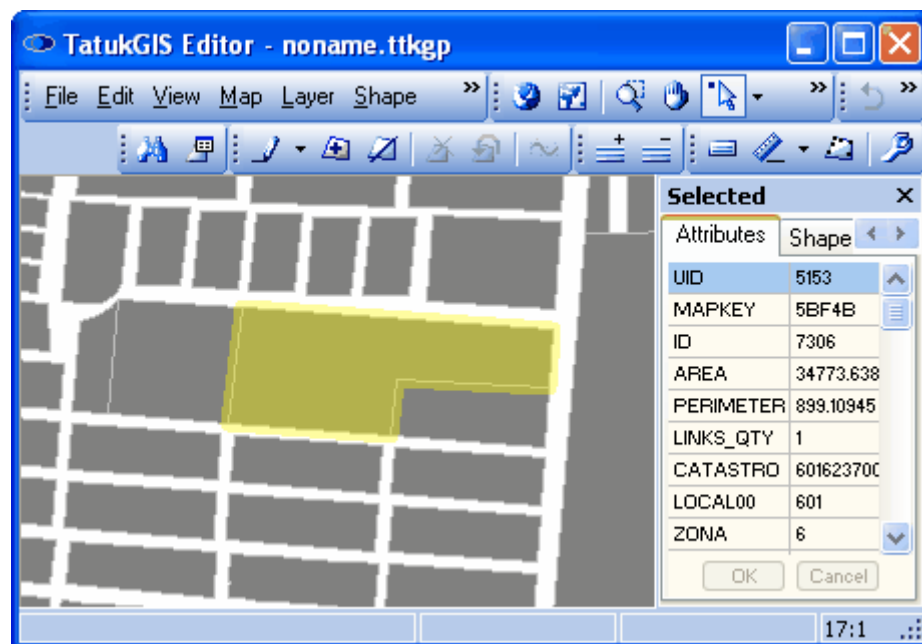
In the following image the smaller of the two new polygons is selected. Notice that the attribute information is the same as of the original polygon.



As illustrated below, the cutting line need not be straight. In fact, the cutting line can be as complex as the situation requires.



The result. If the resulting subdivided polygons must exactly match precision survey data, the accuracy of the newly formed polygons can be refined by editing the x,y coordinates of each vertex forming the polygons in the table under the *Points* tab within the *Selected* panel.



When drawing very complicated splitting lines, using the snapping feature (same as used with normal editing) can be helpful.

Save the changes to the file on disk, if desired.

2.2.2.5 Tutorial 5 - Export Vector Layer/Clipping

The Editor provides two ways to select the file type (format) of a layer and, if required, convert existing vector data into a different file format. The first way is when a new layer for vector data is first created, as discussed in the Editor Create New Map Geometry - Create New Vector Layer" section of Editor Tutorial 1. Then the file type conversion is performed if a file of a different type is "imported" into the new layer. The second way is with the use of the layer export function, which provides for the export of a vector layer to (or subset of the layer) to any supported file type. The export features provides settings to allow the user to export only a specific extent (area) or specific elements from the source vector layer.

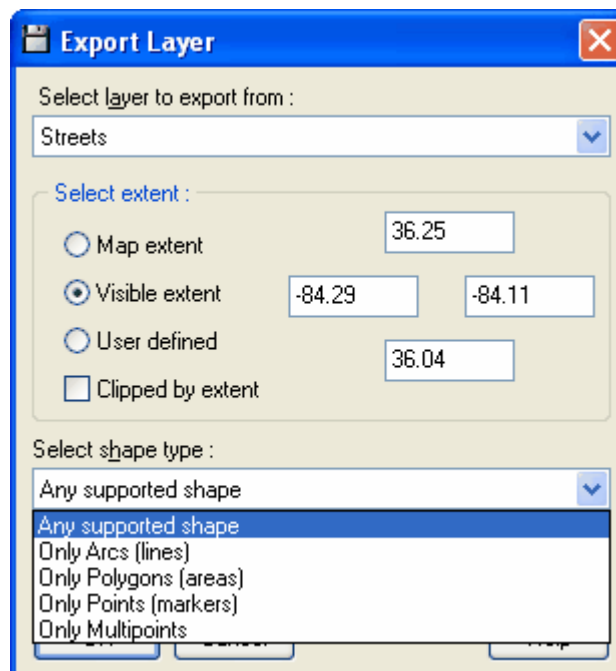
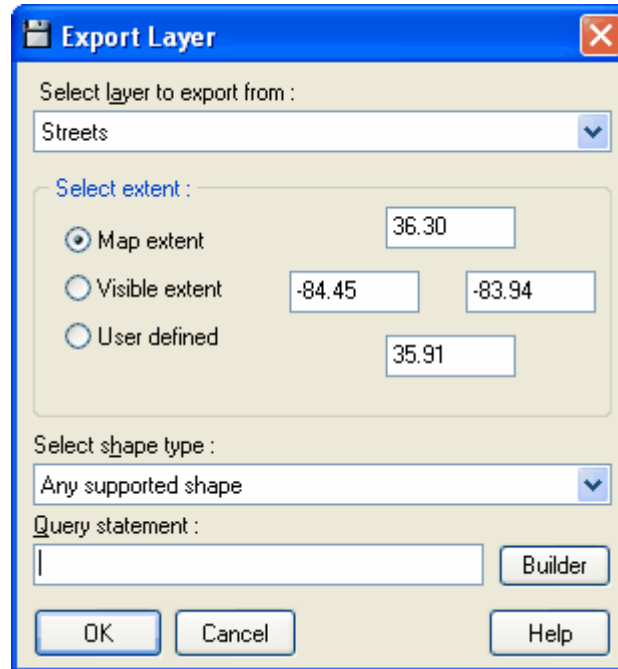
Begin the export procedure by using the *Layer/Export* menu command to open the *Export Layer* combo box. This combo box provides settings to allow the user to precisely define the source data to be exported. Use the *Select layer to export from* field to select the source layer from which the export is to be generated. As is visible in the image below, the 'Streets' layer is selected as the export source layer for this demonstration. ('Streets' is the same TIGER format street/road map polyline file that was used in Viewer Label Rendering tutorial).

The *Export Layer* combo box provides options to export only a subset of the source layer. The export can be limited by:

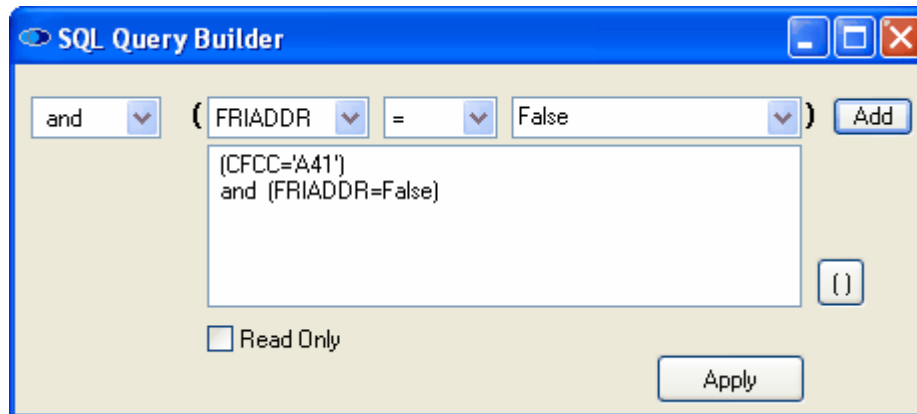
- Extent - Limits the extent of the source layer to be exported.
- Shape Type - Limits the export to a selected vector type, e.g., polygon, polyline, multipoint, point. (This is useful with CAD file types which can contain multiple vector types in the same file layer.)
- Query Statement - Limits the export to the vectors selected by an SQL query against specific attribute values.

If the intent is to export the entire extent of the layer, the *Map extent* is the correct selection. If the intent is to export less than the full extent of the selected layer, use the *Visible extent* option to export only the portion of the map layer that is presently visible in the map viewer window or the *User defined* option to export an extent that is manually defined by entering x coordinate values for the left and right extent boundaries and y coordinate values for the top and bottom extent boundaries.

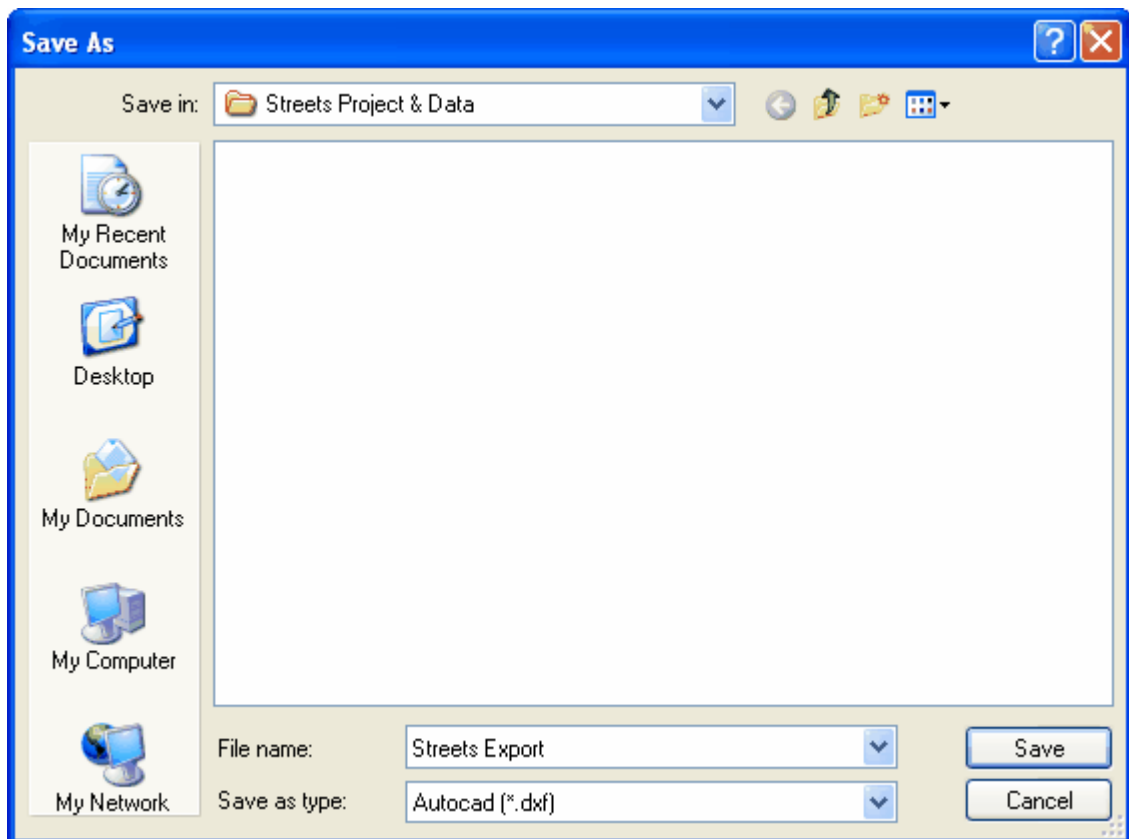
If either the *Visible extent* or *User defined* option is selected, the *Clipped by extent* check box is automatically added, as is shown below in the second screen image of the *Export Layer* combo box. If the *Clipped by extent* option is left unchecked, the export operation will include the entirety of any vectors that are at least partially contained by the export extent. If the *Clipped by extent* option is checked, the export operation will include only the portions of vectors that are within the export extent. Vectors that are partially inside and partially outside the extent will be clipped (cut) at the extent boundaries and only the portions that are inside the extent will be exported. This procedure is commonly referred to as polygon or line "clipping".



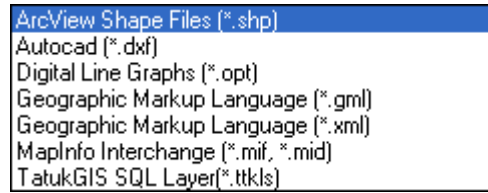
Click on the *Builder* option in the *Export Layer* dialog box to open the *SQL Query Builder* tool. In the example pictured below, a query has been created to export only the streets with a *CFCC* attribute value of 'A41' and with a *FRIADDR* attribute value of 'False'. The *CFCC* attribute contains road grade classifications, and A41 is one of the classifications. Therefore, in this example, only street or roads with the A41 classification and with the *FRIADDR* set to false will be exported from the selected layer. The SQL query can be complex, with the use of a number of query statements.



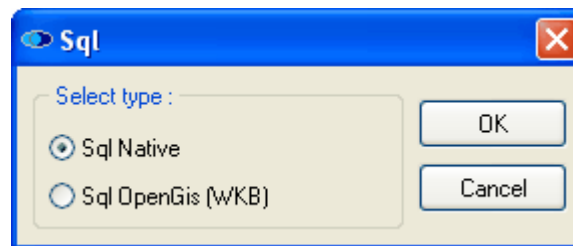
Click on the *OK* button in the *Export Layer* dialog box to open the *Save As* dialog box. This dialog box provides for the selection of i) the file path and file name to save the exported data and ii) the vector file type of the export file. As is visible at the bottom of this window, the DXF file type is selected for the new file to be created by the export procedure. (DXF is a CAD family vector file type.)



The Editor can export vector data to any of the following file formats:



The format option at the bottom of the list, *TatukGIS SQL Layer (*.ttkls)*, is for exporting the vector map geometry and attribute information to an SQL geodatabase file. The default database configuration exports the vector layer to a Microsoft Access database file with a choice between two formats: i) *SQL Native*, which is TatukGIS binary SQL method, or ii) *SQL OpenGIS (WKB)*, which is with OpenGIS Simple Features for SQL Implementation.



When exporting to an SQL geodatabase file, select a file name without any spaces or unusual characters. This is to ensure that the file name is compatible with the various SQL database products.

The layer can also be exported to i) SQL database products other than MS Access (such as MYSQL, Oracle, DB2, Interbase, MSSQL, etc.) or ii) the Geomedia® SQL Server Warehouse format, but only by manually customizing the SQL database connector (*.ttkls) files. The saving as a SQL geodatabase layer to one of these SQL server database products, or to the Geomedia® SQL Server Warehouse format, typically indicates a multi-user environment and requires an administrator to create and manage the database connections/configuration. (For some more details on setting up the SQL database connector (*.ttkls) files, refer one of the FAQ items relating to this topic.)

Regarding the TatukGIS (native) binary geodatabase method versus the OpenGIS method, the advantage of the TatukGIS method is that it is moderately faster - perhaps by factor of 30%. The advantage of the OpenGIS method is that it is more widely accepted and thoroughly documented. (For more information on the OPENGIS® SQL geodatabase method, refer to Simple Features for SQL (Doc 99-049) at www.opengis.org.)

2.2.2.6 Tutorial 6 - Merging Vector Map Layers

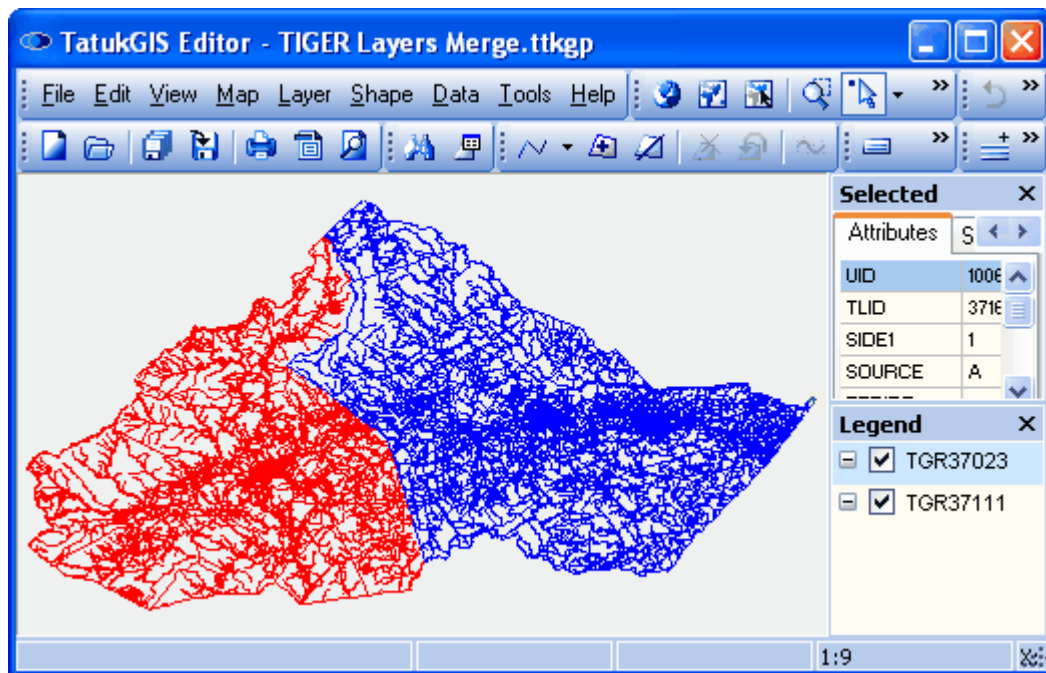
The Editor supports a vector map merging feature that is used to combine two vector map files into one, or to merge selected elements of one file into another. The layer merge procedure involves the import of vector map data from a source file into the file contained by a destination layer which is open in the Editor program. Although this tutorial demonstrates the merger of two files covering adjacent map areas (spatial extents) and containing the same shape type (polylines), the *Merge* feature is also used to combine files with overlapping map extents or to combine SHP format file layers files containing different shape types (polygons, lines, points, multi-points) into a single file of a format which accommodates multiple shape types in the same file. Whereas the SHP format specifications permit only one shape type per file, many formats (DXF, GML, KML etc.) can hold multiple shape types in the same layer.

A single *Merge* operation can combine only two map files into one file. Therefore, the *Merge* procedure must be repeated to merge more than two files together into a single file. The *Merge*

operation can be refined to import and merge only a restricted subset of map data from the source file. The imported data can be restricted by spatial extent or by the use of attribute query definitions to import only the shapes matching the query.

This demonstration uses two TIGER standard (in the SHP format) data polyline files (TIGER files are prepared by the U.S. Department of the Census and contain geocoded roads and streets, rivers and streams, and other information) into a single file.

The image below shows the two polyline files opened together in the Editor. The files contain data for two adjacent counties located in the state of North Carolina - Burke County (file TGR37023) and McDowell County (file TGR37111). To better show the files in the map window, the layer properties have been set to render the Burke County file the color blue and the McDowell county file data the color red.

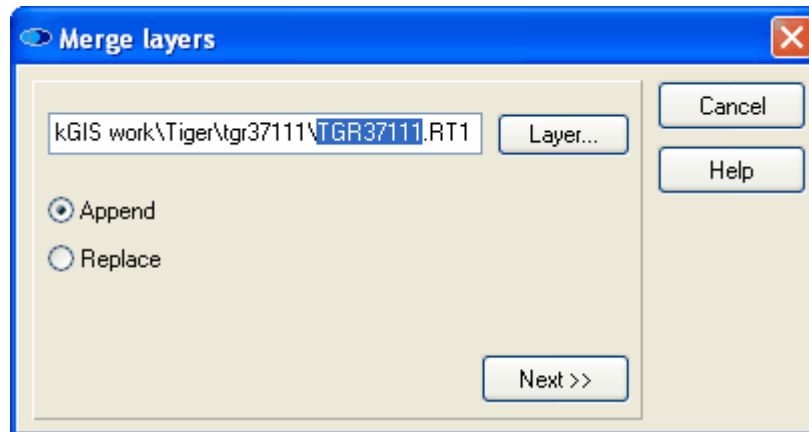


(Two separate vector map files.)

The layer merge procedure involves the import of a *source* vector map file into a destination vector map layer that is already open in the Editor and that has been selected (highlighted) in the *Legend* panel. As shown in the above image, the Burke County (file TGR37023) has been selected as the destination layer in the *Legend* panel. The fact that the source file TGR37111 is also open in the Editor is irrelevant. Any number of other layers can be open in the Editor at the time of the merger. The layer merge operation affects (changes) only data in the destination layer.

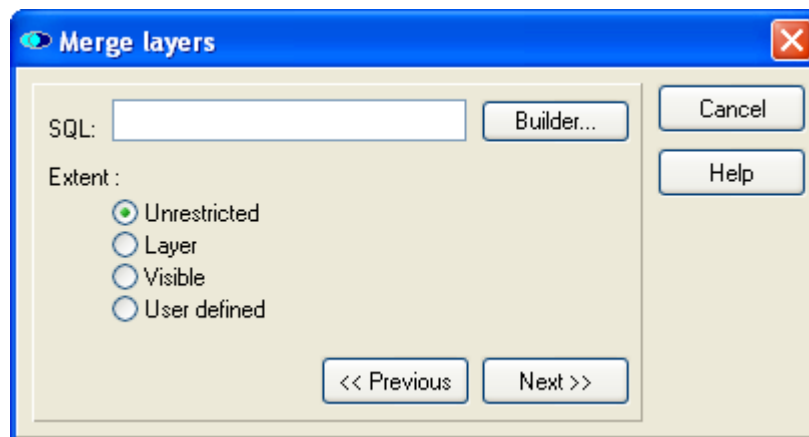
Next use the *Layer/Merge* menu command to open the *Merge layers* window. This window allows the selection of the source vector map file from the computer hard disk which contains the data to be imported into the destination layer. As shown in the following image, the McDowell County (file TGR37111) has been selected as the source file.

Regarding the choice between *Append* or *Replace* in the *Merge layers dialog box*, the default *Append* option is appropriate for most layer merge situations. The *Append* option imports the data from the source file into the destination layer and merges it with the data contained by the destination layer. The *Replace* option results in the replacement of the data in the destination layer with the import data, while retaining the file name, file path, layer properties of the destination layer.



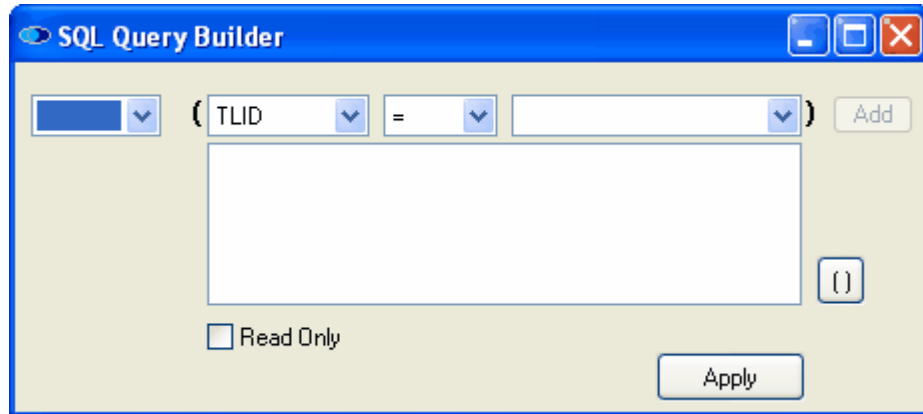
(Selection of the source file to be imported and merged into the destination layer.)

The layer merger procedure provides the means to restrict the import of data from the source file by extent (map area). The default *Unrestricted* setting is appropriate in most situations because it permits the entire extent of the import file to be merged into the destination layer, even if the extent of some or all of the import data is outside of the initial extent of the destination layer. If required, the extent of the destination layer is automatically increased to accommodate the imported data. The *Layer* setting limits the import of data to only that which is within the extent of the destination layer. This setting will keep the destination layer extent unchanged. The *Visible* setting restricts the import to just the data that is located within the extent that is currently visible in the map viewer window. The *User defined* setting limits the merge operation to a precisely defined extent, which the user must specify by entering x coordinate values to define the right and left extent boundaries and y coordinate values to define the top and bottom extent boundaries.



(The merger operation can be limited based on extent.)

The imported data can also be restricted (filtered) with the use of SQL query statements against the attribute information contained by the source file. Click on the *Builder* button in the *Merge layers* window to open the *SQL Query Builder* window. Use of the *SQL Query Builder* tool is further explained in the previous Editor tutorial - **Vector Layer Export/Clipping**. After a query statement, or a combination of query statements, has been defined in the *SQL Query Builder* window, click on the *Apply* button to apply the query definitions and return to the previous *Merge layers* window. Then click on the *Next* button to advance to the next window of the layer merger set up procedure.

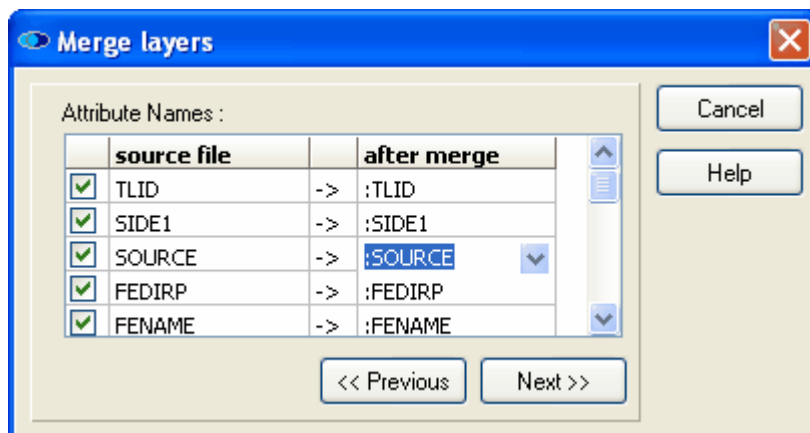


((The merger operation can be limited based on attribute query statements))

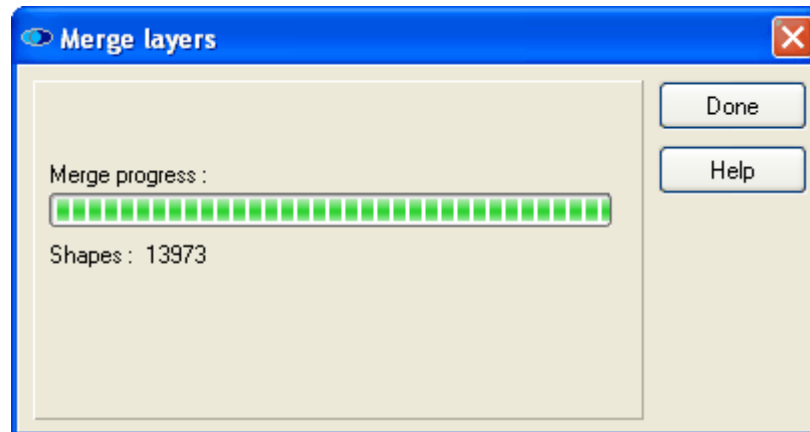
The merge operation involves the vector attribute data as well as the vector geometry. The next *Merge layers* window allows the user to specify how the attribute data from the import (*source file*) is added to the destination layer. The attribute names from the import file are listed in the left column titled *source file* and attribute names as they are to appear in the destination layer after the merge operation are listed in the right column titled *after merge*. In this example the attribute names in both columns are the same (because these two files are similar and contain the same type of information), but the names in the *after merge* column can be edited. This is done either by left mouse clicking on a selected field in the *after merge* column and editing the attribute name within the field or by clicking a second time on the field to activate the drop down selection list which is preloaded with the attribute names from the destination file.

Any attribute from the import *source file* can be omitted from the merge operation by unchecking the check box next to that attribute name.

In this particular situation, it makes little sense to change or omit any of the imported file attributes because these two files are very similar and with the same attribute naming. In other situations the files involved can have very different attribute information. In such situations, this panel is very important. Click on *Next* to start the layer merge computation process. A new *Merge layers* window with a progress bar will appear.

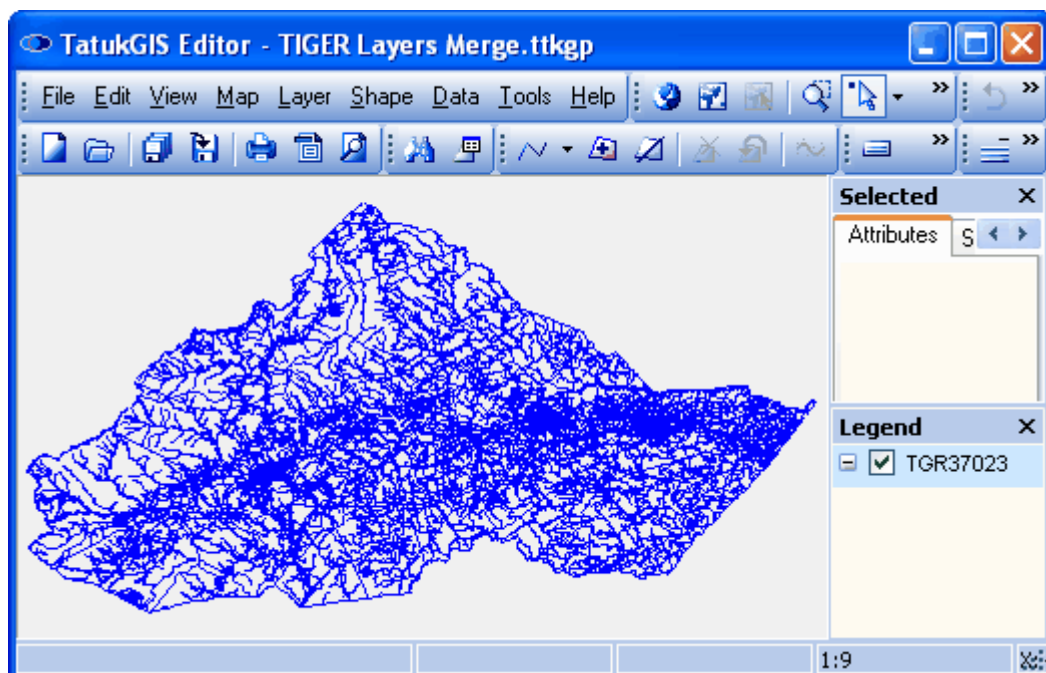


((Determine which attributes are to be imported and the naming.))



13,973 shapes (vectors objects) were imported from the source file to and written to the destination layer during the merge operation. Click on the *Done* button to see the result.

The result of the layer merge operation is presented below. Notice that the *Legend* panel now contains only the single destination layer. The file format and the visual layer property settings of the destination layer (the blue color in the example) - remain unchanged.



(The result of the merger - a single file.)

Save the merged destination layer, if desired. The layer can be saved either to a new file name or by writing over the original file TGR37023.

Although the vectors have been merged into a single file, the polyline vectors representing roads, streets, rivers, etc. are still different vectors on either side of the old boundary (the county line) between the two original map files. If the merged file is to be used for any sort of networking operations, such as optimal road/street routing, these vectors must be joined together at the old boundary. One way to do this is to perform unions, line by line, using the procedure demonstrated in Editor **Unions and Splitting** tutorial. Much more efficient, however, is to use the vector topology builder/corrector functionality, which can be accessed via the *Tools/Topology* menu command, to systematically identify and correct all such topological errors (dangling line nodes in this case) in the layer geometry. The topology builder/corrector functionality provided in the Editor is a powerful tool which can save an enormous amount of labor in situations such as this. Imagine

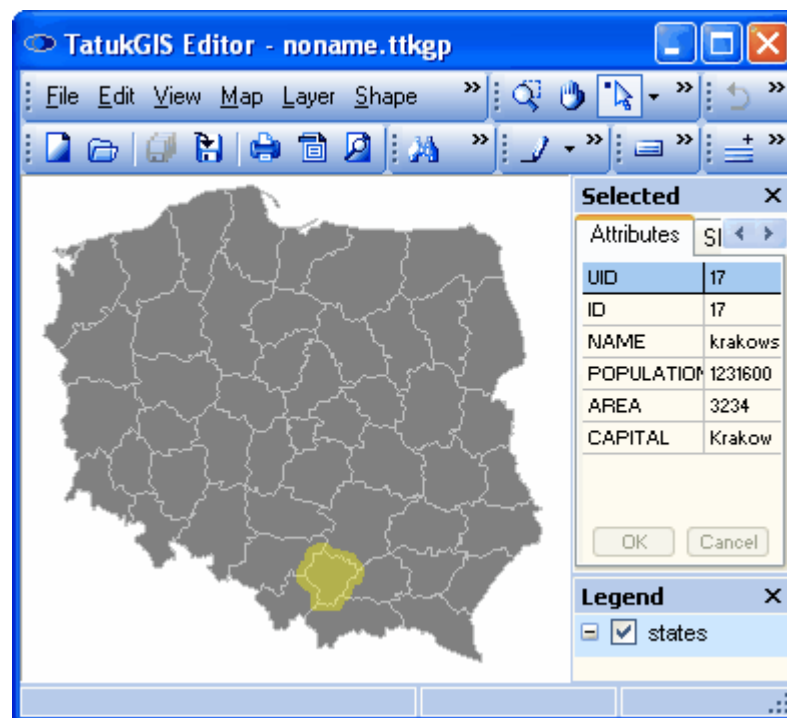
if the files for all the 100 counties in North Carolina needed to be merged and topologically corrected for use with a state-wide vehicle routing application!

2.2.2.7 Tutorial 7 - Import Attribute Data

The Editor supports both the exporting and importing of vector file attribute information to/from other software programs - such as a database or spreadsheet. This tutorial demonstrates the import of attribute values from an external database file.

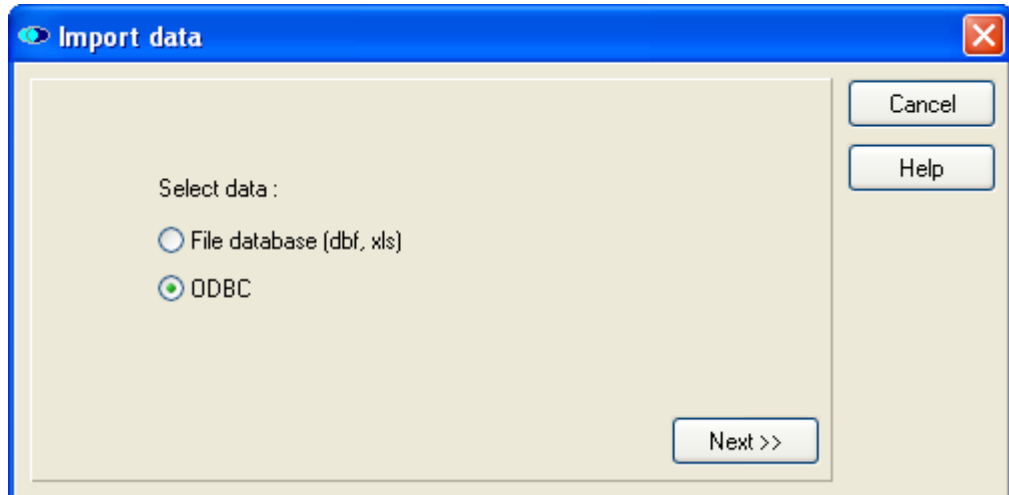
Notice that the vector polygon map of Poland shown below has only five attributes - ID, NAME, POPULATION, AREA, and CAPITAL - which are visible in the attribute window. This exercise will import additional attributes from an external database file to the vector map layer. If desired, the import procedure could also be structured to replace some or all of the existing attributes of the map layer.

Ensure that the map vector layer that is to be imported into is selected (highlighted) in the *Legend* panel.

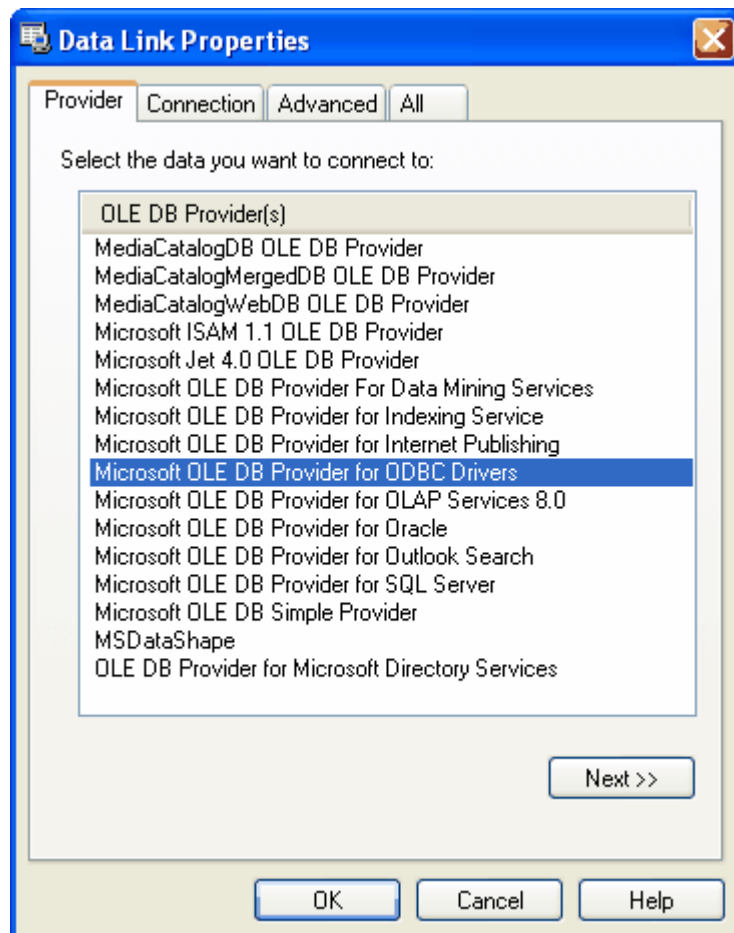


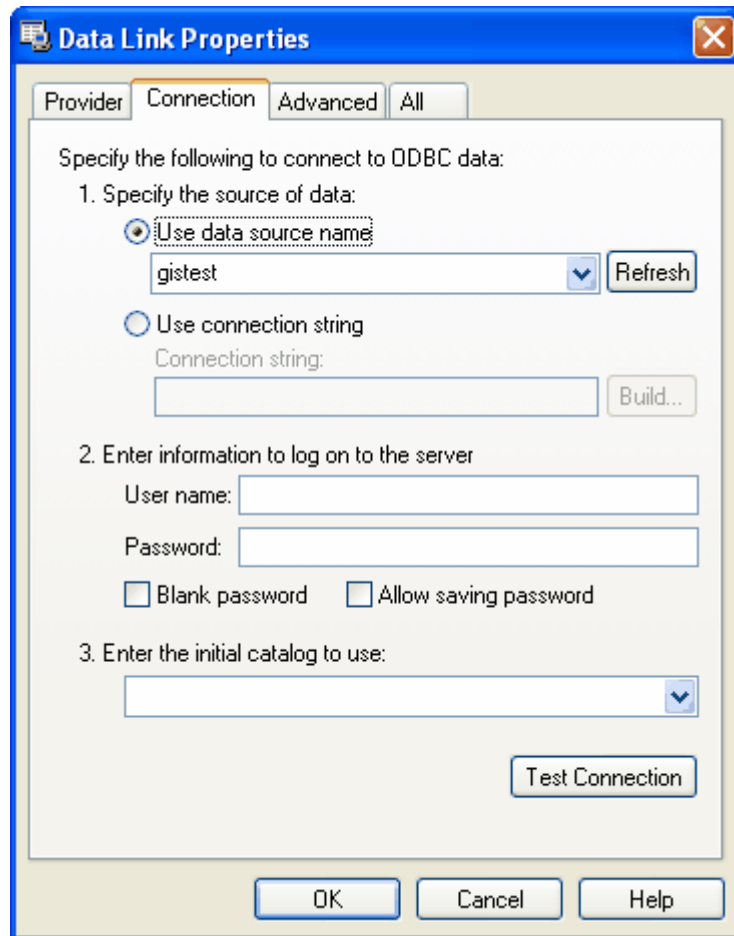
(Polygon UID number 17 is selected on the map.)

Begin the attribute import procedure by selecting the *Data/Import Data* menu command. This will launch the screen below which requires the user to select whether the attribute table to be imported will be imported from is i) a dBF database or an Excel spread sheet (xls) file or ii) an SQL database file using an *ODBC* connection. An SQL database file can be Microsoft Access or some a more powerful SQL database such as MSSQL, Oracle, Interbase, etc. In this case the data to be imported from is stored in an Access database file, so *ODBC* is selected.

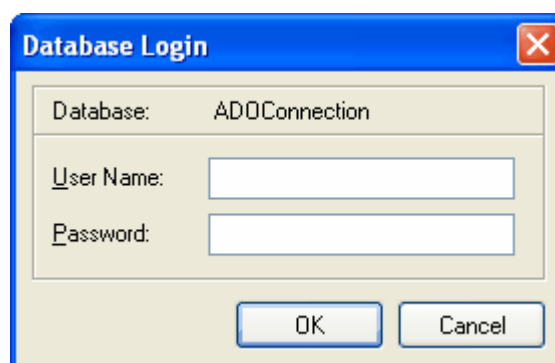


Click on the *Next* button to open the *Data Link Properties* dialog box from Windows operating system. (This dialog box is part of the Windows O/S and not part of the TatukGIS Editor program.) The default setting in the *Provider* tab is correct. The file name of the source Access database file containing data to be imported must be selected under the *Connection* tab. In this case information will be imported from the "gistest" database file.





Click on *OK* and the next screen from the Windows O/S appears asking for log-in information to access the selected database file. Because the standard Windows default settings do not require that database files on a PC be password protected, the *gistest* file is not password protected and this information can be left blank. Proceed by clicking the *OK* button.



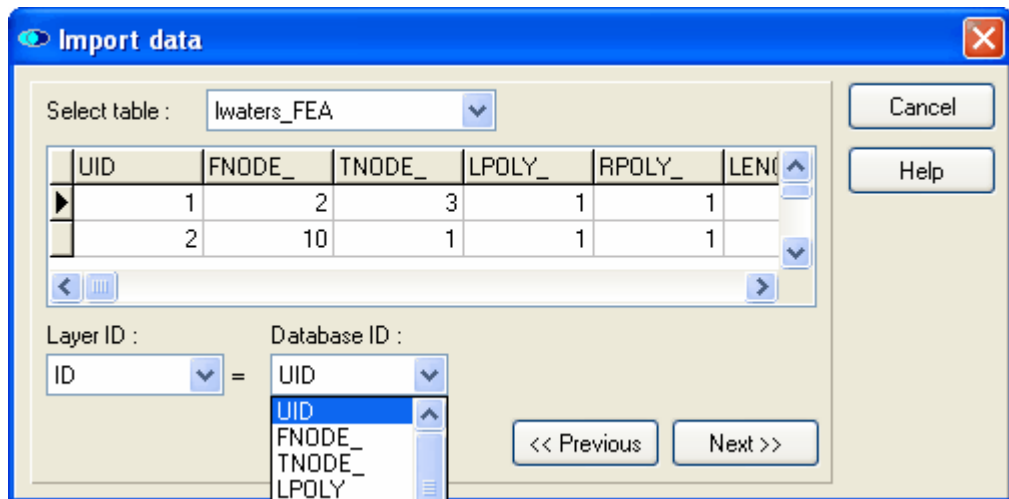
The next window, titled *Import data*, presents a glimpse of the database table from which data is to be imported. This window permits the user to specify generally how the database table is to be connected to and imported into the vector map layer, by matching values held by a selected attribute from the map layer to the values of a selected column in the data table. The layer attribute is selected from the *Layer ID* drop down list and the data table column is selected from the *Database ID* drop down list.

As illustrated by the settings in the image of the *Import data* window shown below, this import operation is set up to connect the unique number for each map vector as contained by the 'ID' attribute to the corresponding number contained in the 'UID' column of the import data table. Keep in mind that the data type of the selected layer attribute (the *Layer ID*) must be the same as the type of data held in selected column from the import table (the *Database ID*). The possible data types are: *String, Number, Float, Boolean, or Date*.

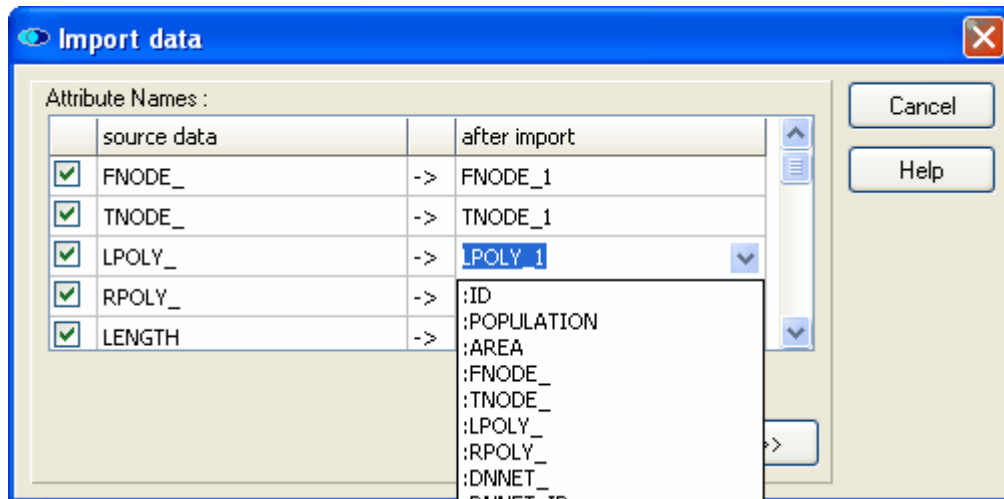
The result is that the data contained by each row from the database with UID numbers 1 - 49 will be added as new attribute values to the polygon vectors with the corresponding ID numbers. There are a total of 49 polygons in this particular map layer, so only the first 49 rows of data from the table will be imported.

Note that easiest way to create a clean connection is to match a column from the import table which contains a unique value for each record (row of data) to an attribute from the vector map layer which also contains a unique value for each vector object, as was done in this example.

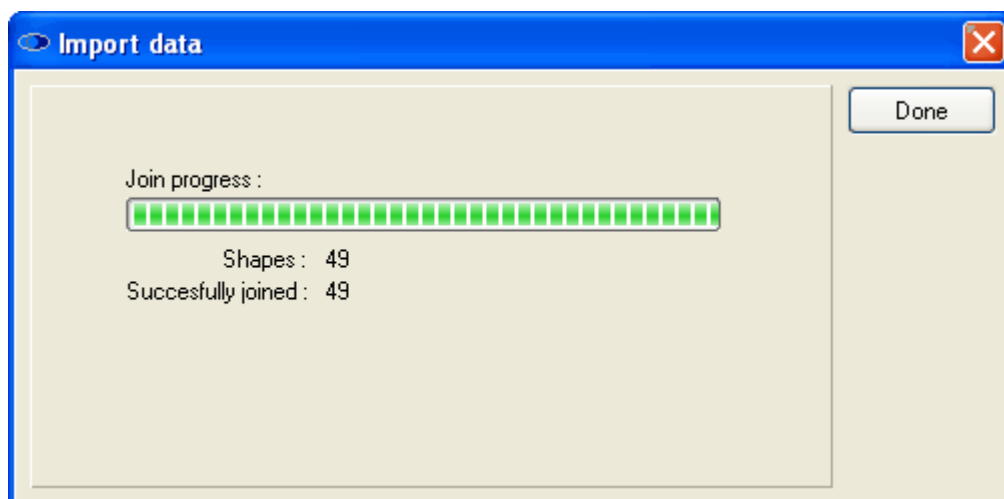
Click on *Next* to proceed.



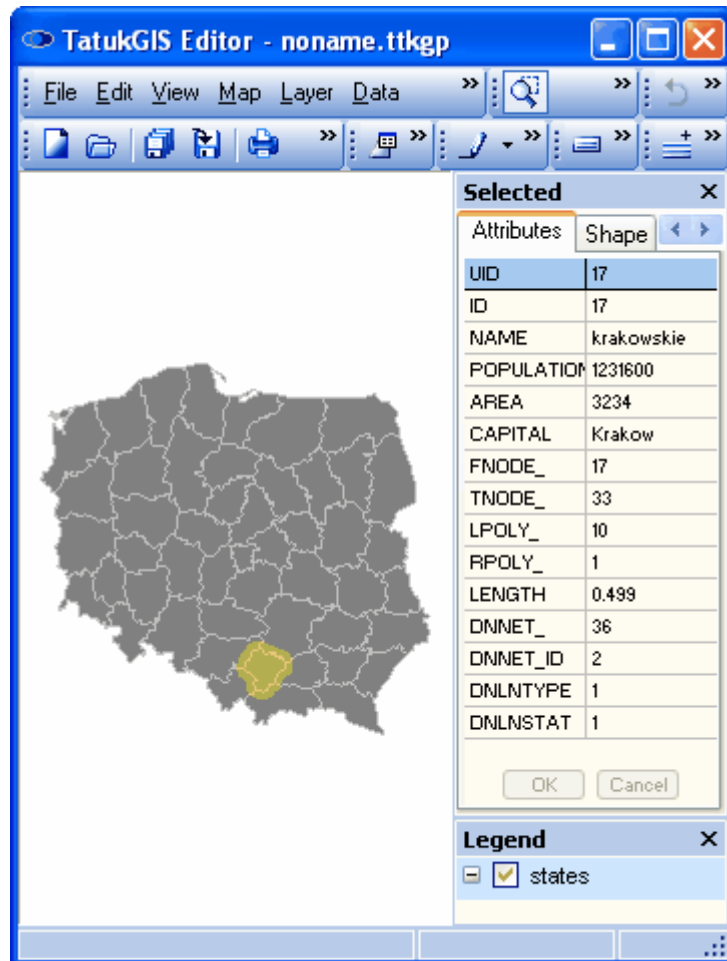
Whereas the previous window sets the general rule for importing the data, the next window provides the possibility to customize any of the connections used to 'join' the import table to the map layer to perform the import operation. Some rows from the database table can be omitted, names of the new attributes can be modified, or the data in a selected column from the import table can be directed to replace the data contained by an already existing attribute. Just left mouse click on a field under the *after import* column to edit how the attribute name is to appear in the layer after the import. Mouse click the field a second time to open a pre-loaded drop down selection list containing i) all the attribute names from the vector map layer and ii) all the column names from the import database table.




Click on the *Next* button and the Editor will commence the data import computation process. A new *Import data* window will appear with a progress bar. As shown in this window below, data from the external data table has been joined to each of the 49 polygons in the map layer. Data from the external table with UID numbers higher than 49 were not imported. Click on *Done*.



The next image shows the selection of the same polygon as was selected in the first image of this tutorial. As is visible in the *Attribute* tab within the *Selected* panel, this layer now contains many more attributes than the original five. The new attribute names correspond to the column headings from the external database table. The values of the new attributes for this polygon were taken from the row of the external database table with the UID number 17. The attributes of every polygon vector in this layer now contain similar information that was imported from the database table.



(Polygon UID number 17 now contains the additional imported attributes.)

The expanded attribute information is displayed below in the *Data* panel. The *Data* panel is opened by selecting the *Show Data Panel*  toolbar icon (or the *Data/Show Data* menu command).

The screenshot shows the 'Data' panel with a table of attributes for various Polish voivodeships. The table has columns for GIS_UID, NAME, POPULATION, AREA, CAPITAL, and several other attributes. The row for 'gdanskie' (UID 9) is highlighted.

GIS_UID	GI	GI	NAME	POPULA	AREA	CAPITAL	FNODE_	TNODE_	LPOLY	RPOLY	LENGTH
7		396 610	7 czestochowskie	776700	6182	Czestochowa	17	14	1	8	0.038
8		458 578	8 elblaskie	481000	6103	Elblag	13	18	1	1	0.029
9		493 778	9 gdanskie	1439000	7394	Gdansk	14	19	1	1	0.1
10		493 858	10 gorzowskie	500700	8484	Gorzow Wielkop	8	20	1	6	0.085
11		404 448	11 jeleniogorskie	517900	4378	Jelenia Góra	20	16	10	6	0.045
12		388 648	12 kaliskie	710800	6512	Kalisz	23	21	1	1	0.008
13		437 668	13 katowickie	3988800	6650	Katowice	24	6	1	1	0.176
14		558 918	14 kieleckie	1126700	9211	Kielce	26	22	1	1	0.484

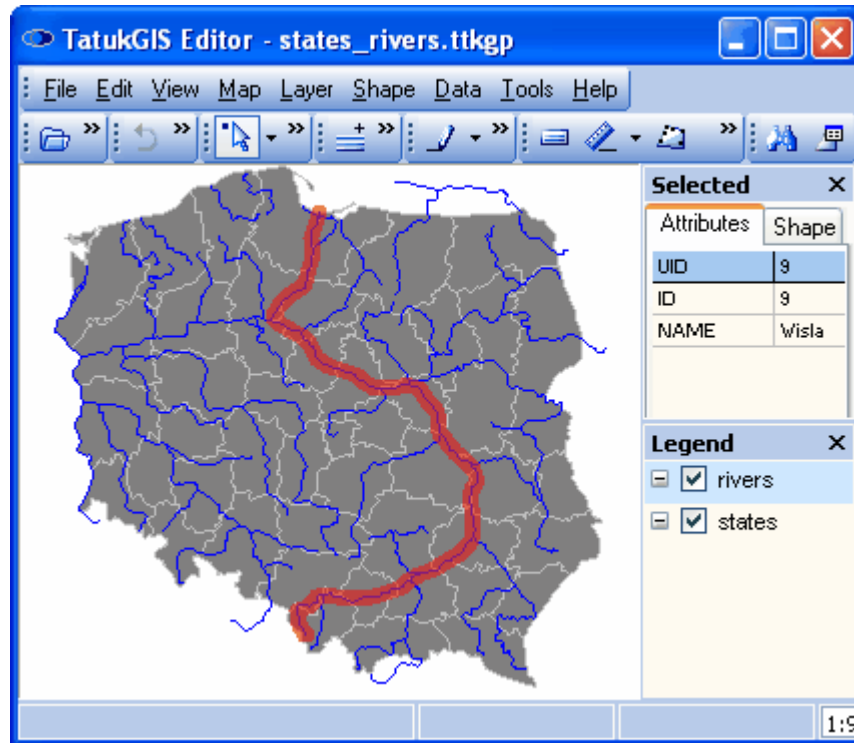
2.2.2.8 Tutorial 8 - Buffers

The Editor can be used to create a buffer from any vector type, e.g., points, multipoints, lines, or polygons, and the resulting buffer can then be used to perform a spatial selection on any selected layer.

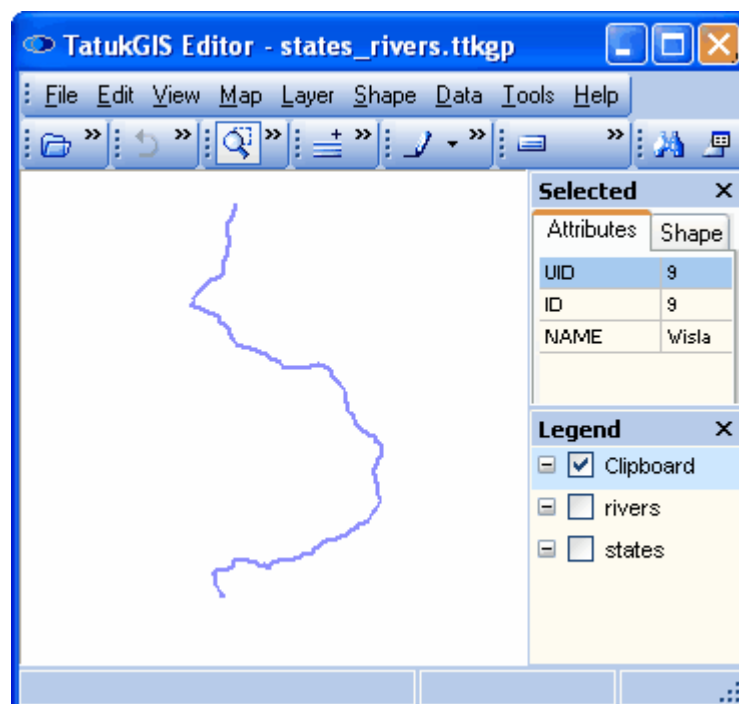
This exercise uses two layers. One is a polygon layer representing administrative areas of Poland and the other is a line layer representing the major rivers in Poland. In this exercise, a buffer is

created from a selected river and the buffer is used to select all polygon areas with at least some overlapping area with the buffer.

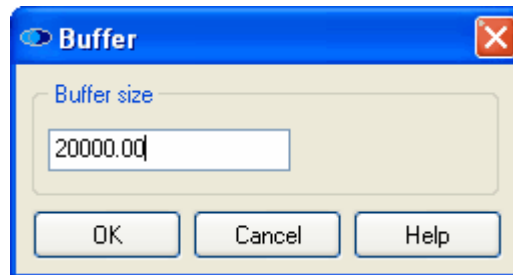
In the following image, the longest river in Poland (the Wisla) has been selected using the *Select by Point* tool.



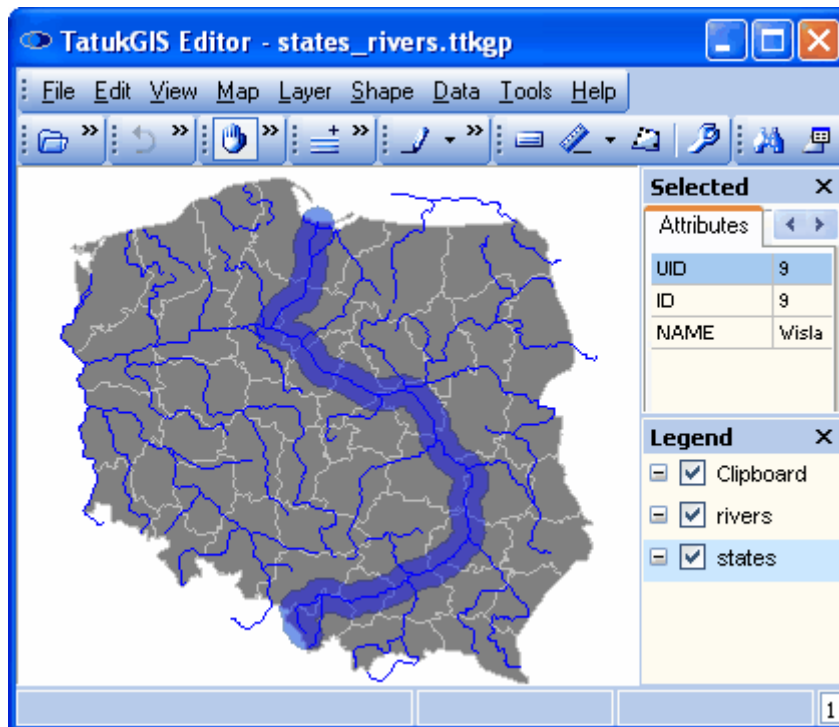
The *Edit/Copy* menu command is used to copy the selected river to the Clipboard layer.





The *Shape/Clipboard buffer* menu command opens the *Buffer* window, which permits the selection of the buffer size. The buffer size is defined in map units. This map units of these two layers are in meters. The buffer size is set at 20,000 meters (20 kilometers).

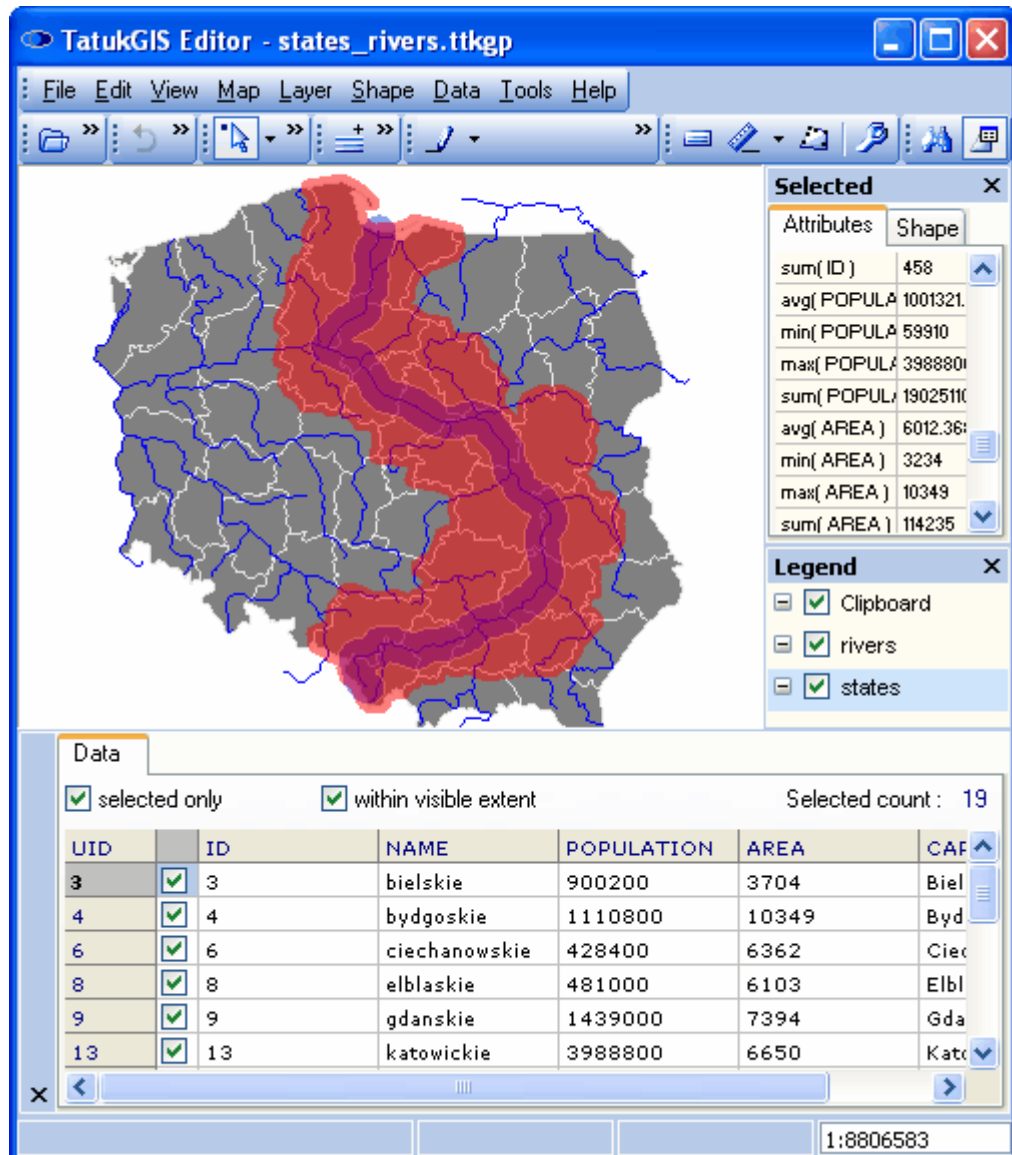


This resulting buffer is visible in the image below. The buffer replaced the river line vector that was previously in Clipboard layer.

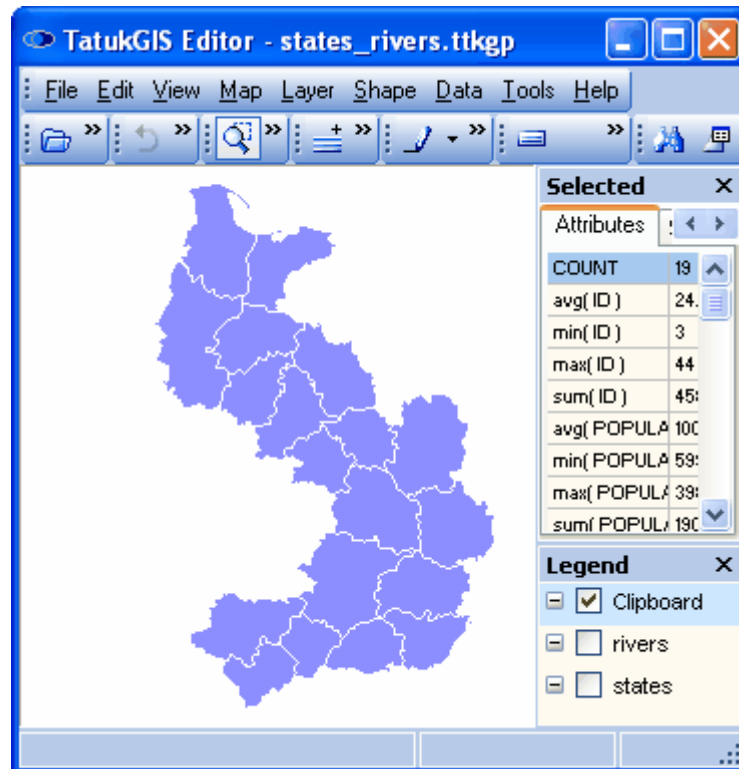


Next ensure that the states layer is selected (highlighted) in the Legend panel. Then select the *Map/Select/Select by Clipboard* menu command, which is represented by the  select mode icon, to perform a spatial selection on the *states* layer using the geometry of the clipboard layer. The result is presented in the following image.

As with any selection of multiple map objects, the average, minimum, maximum, and sum of the values of each of the attributes of the selected polygons are presented in *Attributes* panel. The *Show Data Panel*  toolbar icon has been used to also present the attribute data associated with the selected polygons in table form below the map viewer window.




In the image below, the *Edit/Clipboard Special* menu command has been used to copy the selected polygons, as individual vectors, to the Clipboard layer for further use.

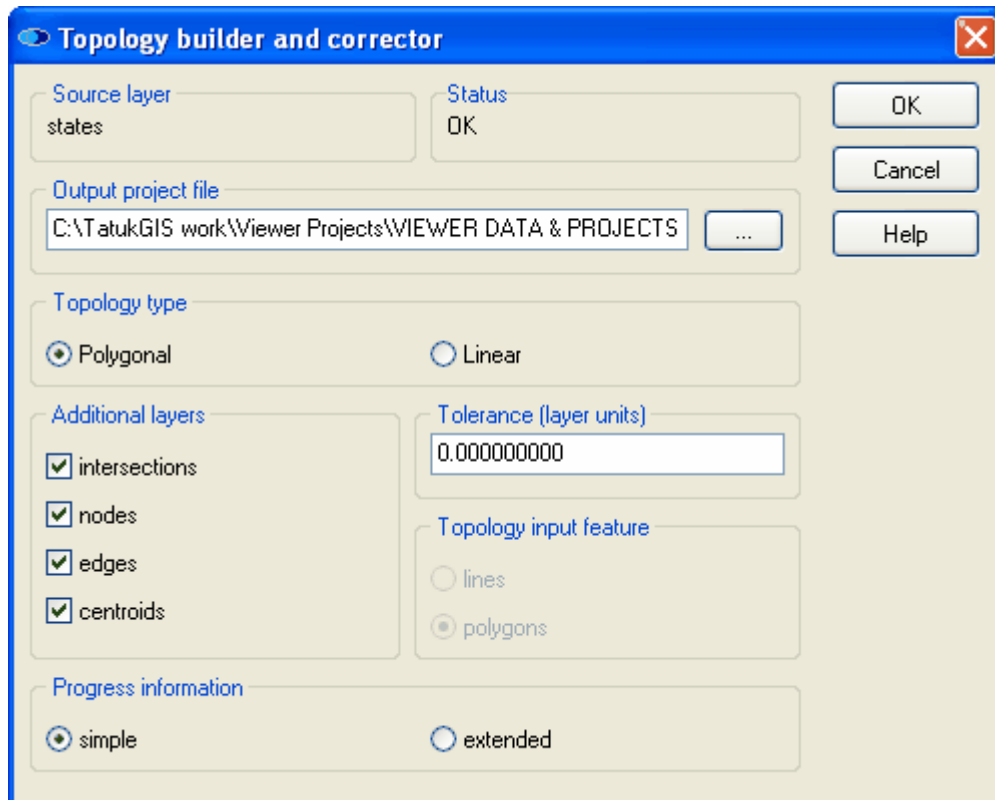


2.2.3 Topology Building & Correcting

2.2.3.1 A Short Guide

The topology builder and corrector functionality is provided as a separate DLL to the TatukGIS Editor. The Topology unit uses powerful custom algorithms to systematically review a selected vector layer to identify and correct errors in the file geometry based on a tolerance level set by the user. Topology can be built from a line or polygon source layer. The topology related information generated from a topology build operation is saved to SHP format vector files which are grouped together into a topology project file. The topology project can then be reviewed in the Editor map viewer window along with the original file layer.

The *Topology builder and corrector* combo box window provides the main interface to this functionality. After first selecting (highlighting) in the *Legend* panel the source vector map layer from which the topology is to be built, this window can be accessed by clicking on the *Topology*  toolbar icon (or using the *Tools/Topology/Topology* menu command).



Using the *Output project file* field, select or enter the file path for the new topology related files that will be created by the procedure. Because the information created by the topology build operation will be organized by a project file, the selected file name will have the *.ttkpg extension. Then select the type of topology - either *Polygonal* or *Linear* - that is to be generated, using one of the two radio buttons in the **Topology type** panel. The type of the topology to be created does not have to be the same as the type of the source vectors. For example, a polygonal topography could be created from a polyline layer.

If the *topology type* selection is **Polygonal**:

- Attributes in the output dbf file when the source feature is LINE or POLYGON: POLY_ID# (polygon identifier), POLY_AREA (area of polygon in square map units), CNTRX (X coordinate of the polygon centroid) and CNTRY (Y coordinate of the polygon centroid);
- Attributes of the output dbf file when the source feature is POLYGON will additionally contain the attribute PTYPE (type of polygon). PTYPE=0 means a correct polygon, PTYPE=2 means a hole (warning, no source polygon in this place), and PTYPE=3 means an overlap (error, two polygons partially overlap). The resulting polygons will also inherit the attributes of the source polygons.

If the *topology type* selection is **Linear**:

- Attributes of the output dbf file when the source feature is LINE or POLYGON will be this same: LINE_ID# (polyline identifier), FNODE# (from node), TNODE# (to node), LENGTH (length of polyline in map units), LTYPE (type of polyline). The LTYPE value is equal to the number of dangling nodes in a polyline. LTYPE=0 means that both from and to nodes have other polylines connected to them, LTYPE=1 means that only one node has another polyline connected and the second is dangling, LTYPE=2 means that both the from and to nodes are dangling. The resulting polylines will also inherit the attributes of the source polylines.

Tolerance defines the search radius (in map units) to be used by the algorithm to correct apparent topology errors. If the *Tolerance* is equal to zero, the apparent geometrical errors will be identified (highlighted) for review, but no corrections will be performed to the source layer. This

means that the borders of output polygons will not be modified at all. Selection of a *Tolerance* greater than zero causes any edges positioned closer to the node than the *Tolerance* to be snapped to this node and the borders of the output polygons to be modified. It is up to the user to define the search radius, and the radius value should be chosen carefully. Experience shows that the number of polygon edges shorter than the selected radius should not exceed 5% of the total number of edges. The use of a radius that is too big may cause a significant number of polygons to disappear or create a significant number of false polygons.

The recommended *Tolerance* radius should be determined as follows:

- create topology with *Tolerance* = 0.0 (default);
- find all topological errors by selecting polygons with PTYPE = 2 (hole) or 3 (overlap) by typing "PTYPE > 1" in the search tool;
- measure the distance between the edge and the node in selected polygons (which are usually triangular) ;
- determine the typical distance;
- repeat building topology with that typical distance;
- check the result and adjust the *Tolerance* if necessary.

Additional layers panel contains 4 check boxes to allow the user select the creation of 4 additional files during the topology build procedure. The attributes of these files are independent of the selected *Topology type*.

- Intersections: this file (output_t_in.shp, point type) contains the coordinates of all cases in which two edges intersect at a point which is not a node. The attributes of dbf file are: ID#, X coordinate, and Y coordinate. If no intersections are found, the *intersections* file will not be created.
- Centroids: this file (output_t_cn.shp, point type) contains the coordinates of the centroids of all polygons generated during the building of the topology. Centroids are forced to always be inside the polygon. The attributes contained by the dbf file are exactly the same as the attributes of the output polygons. This file will be created only when the selected *Topology type* is *Polygonal*.
- Nodes: this file (output_t_nd.shp, point type) contains the coordinates of the nodes of all edges. Attributes contained by the dbf file are: ID#, X coordinate, Y coordinate, and frequency. FREQ equal to zero indicates that this node did not take part in the topology building process. Practically this means that this is dangling node (one that does not connect at least two polygon edges). A dangling edge contains at least one dangling node. The user can select these nodes by typing "FREQ = 0" in the search tool.
- Edges: this file (output_t_ed.shp, line type) contains all edges. Attributes contained by the dbf file are: ID# (edge identifier), FNODE# (from node identifier), TNODE# (to node identifier), LPOLY# (identifier of left polygon in output file), RPOLY# (identifier of right polygon in output file), LENGTH (length of edge in map units), LPS (identifier of left polygon in source layer), and RPS (identifier of right polygon in source layer). This file provides the possibility to deeply penetrate the internal structure of the polygons created by the topological building process.

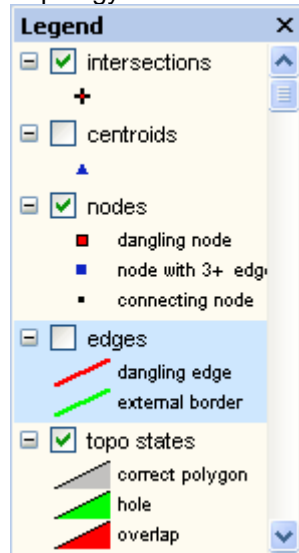
Examples:

1. typing "(LPOLY# = 5) OR (RPOLY# = 5)" in the search tool will select all edges used to build the output polygon with ID# = 5.
2. typing "(LPS = 5) OR (RPS = 5)" in the search tool will select all edges used to build the source polygon with ID# = 5.
3. typing "(LPOLY# = -1) AND (RPOLY# = -1)" in the search tool will select all edges of the external border of the analyzed area. Let's assume we have a map of land parcels forming a district. This selection will show the borders of the district. In the case of buildings, the selection will show the external walls of the left and right most positioned buildings.
4. typing "(LPOLY# < 0) AND (RPOLY# < 0)" in the search tool will select all dangling edges (edges which are not used to create polygons).
5. typing "(LPOLY# = -3) OR (RPOLY# = -3)" in the search tool will select all edges of any polygons which are not contained in or contiguous to other polygons (external

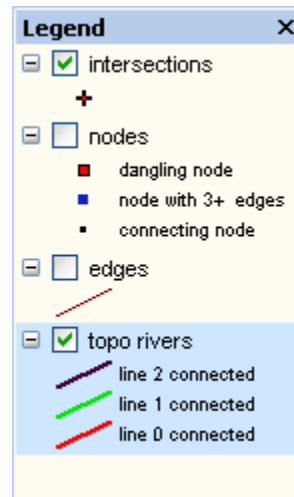
islands). Let's assume we have a map of buildings in a town. This selection will show the external walls of all buildings. In the case of land parcels, the selection should be empty.

Much of the topology information discussed above is intuitively organized in the topology project as map layers that are presented in the *Legend* panel. The topology information contained by each map layer can be turned on/off as desired.

Polygon topology:



Line topology:




NOTE: The DBF file accepts a field length of up to 255 characters. Because the output files are in the *.SHP format, the output attributes are stored in dbf files. So, the maximum length of a field in the input attribute table should not exceed 255 characters.

2.2.3.2 Tutorial - Build a Topology Project

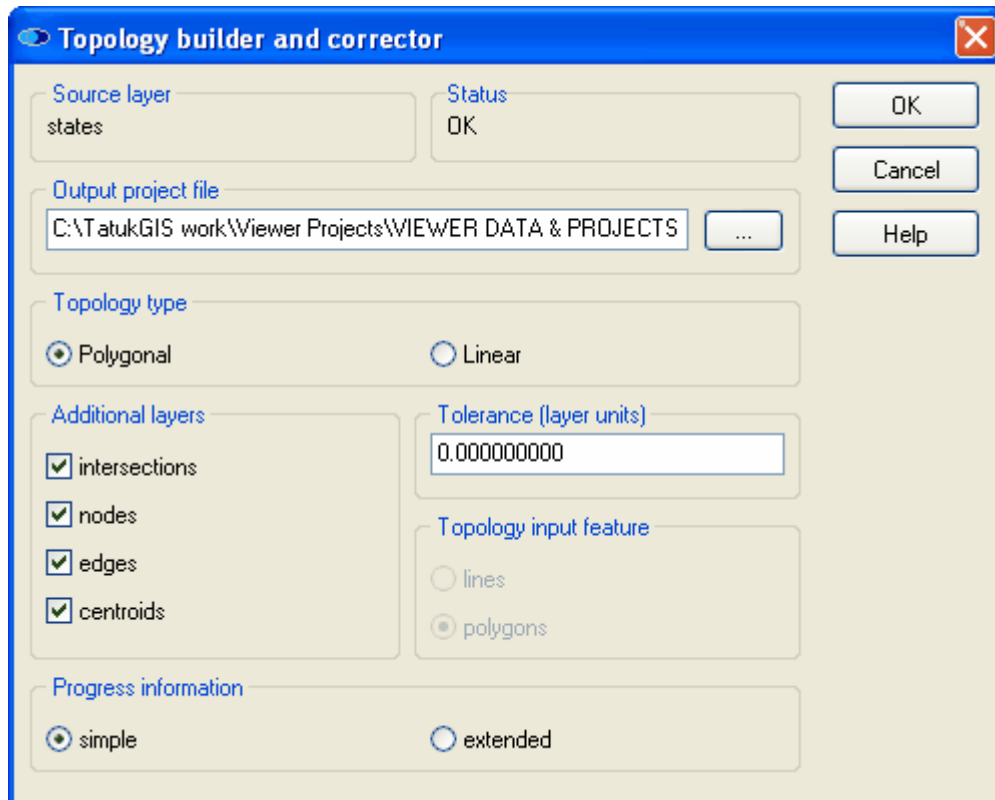
This tutorial demonstrates the creation of a topology project from a vector polygon layer. The source layer is a vector polygon map - the same as has been used in previous tutorials.



Click on the *Topology*  toolbar icon to open the *Topology builder and corrector* window. Select a file path in the *Output project file* field for the topology project file that is to be created by the topology building operation. The file will be a TatukGIS project file, so it will have the *.ttkqp ending. This topology project file will contain all the layers with topology data that will be created by the topology build operation.

As shown in the image below, the *Topology type* to be created in this example is selected as *Polygonal*. To generate all possible data for this demonstration, all of the *Additional layers* options are checked. The *Tolerance* is left at the 0.00 default setting, which means that the procedure will not perform any automatic corrections to the source layer. (If any tolerance other than 0.00 is selected, topology corrections will be automatically performed to the layer.) Press the *OK* button to begin the computation process of generating the topology files that will compose the topology project. A progress bar will appear until the computation is completed. With this example, the duration of the computation procedure is only a couple of seconds. The computation process can require minutes if the file is very large.

When the procedure is finished, a small window will open stating that the topology operation is finished. Click on the *OK* button. Then a second small window will open asking "Open Topology Project?" Again select on the *OK* button.

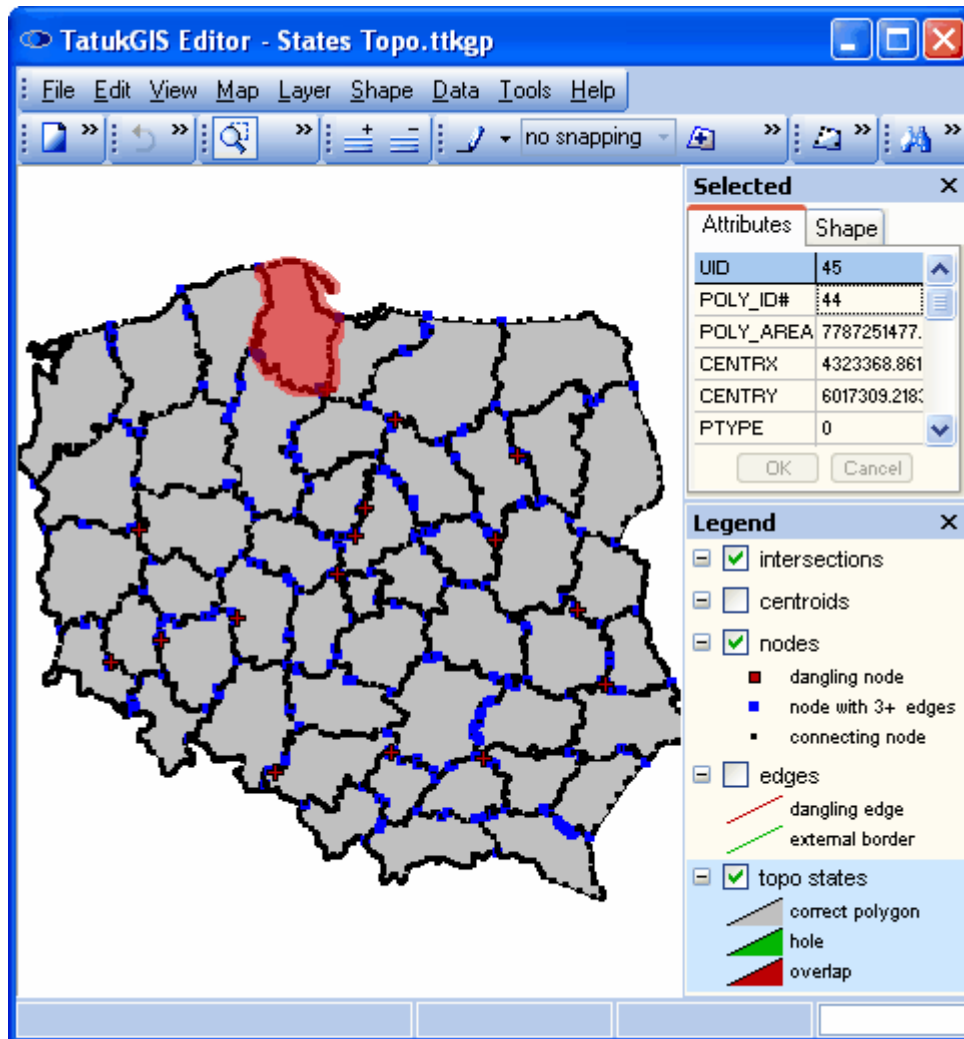


The result is presented in the image below. First notice from the selected polygon the extra attributes that have been added by the topology build operation. These attributes are discussed in the prior section - Topology Builder/Corrector - A Short Guide. Next notice how the results of the topology build are organized as layers presented in the *Legend* panel. The information help by each layer can be turned on/off.

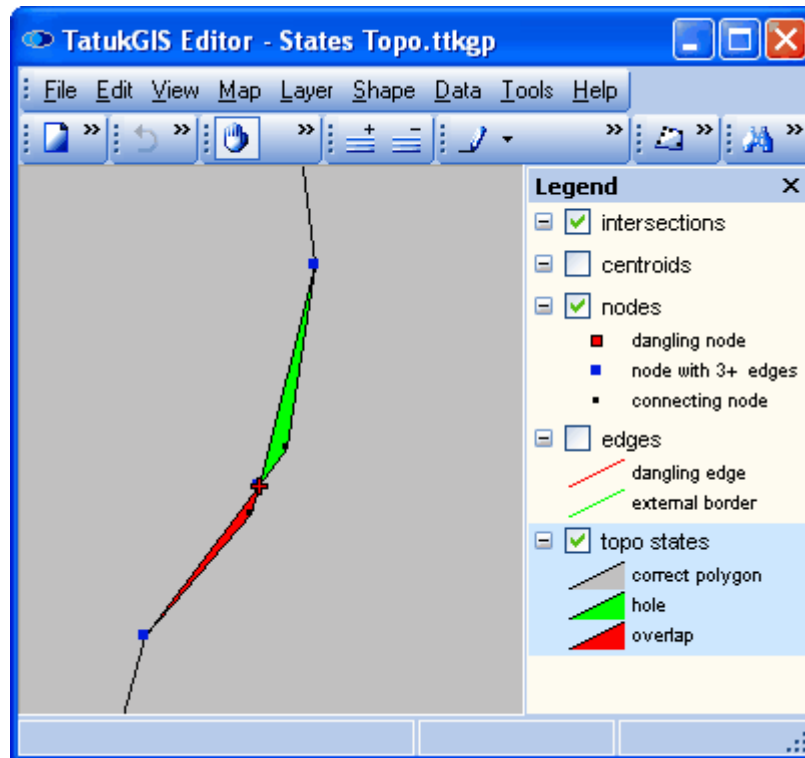
The *intersections* layer is turned on, and presents a small + at each place in which polygons edges intersect (not just touch). Since polygons in a layer should never overlap, the edges of polygons should never intersect with each other. Such instances are signs of geometrical mistakes in the data.

The *nodes* layer classifies the vertices that form the polygons into three categories: i) normal *connecting nodes*, ii) *nodes with 3+ edges* (three or more edges), or iii) *dangling nodes*. The second and third categories can represent errors. If the node with three edges is at the place where three polygons meet, this it is OK. If it is at a place between only two polygons, where only two polygon edges should be connected, it suggests a geometric mistake. A *dangling node* is one that does not connect to at least two lines forming a polygon edge, which would be inappropriate in a polygon layer and, therefore, a mistake.

The *topo* layer classifies the area of the map layer into three categories: i) *correct polygon*, ii) a *hole* between polygons, or iii) an *overlap* of polygon interiors. The categories are presented on the map by color.



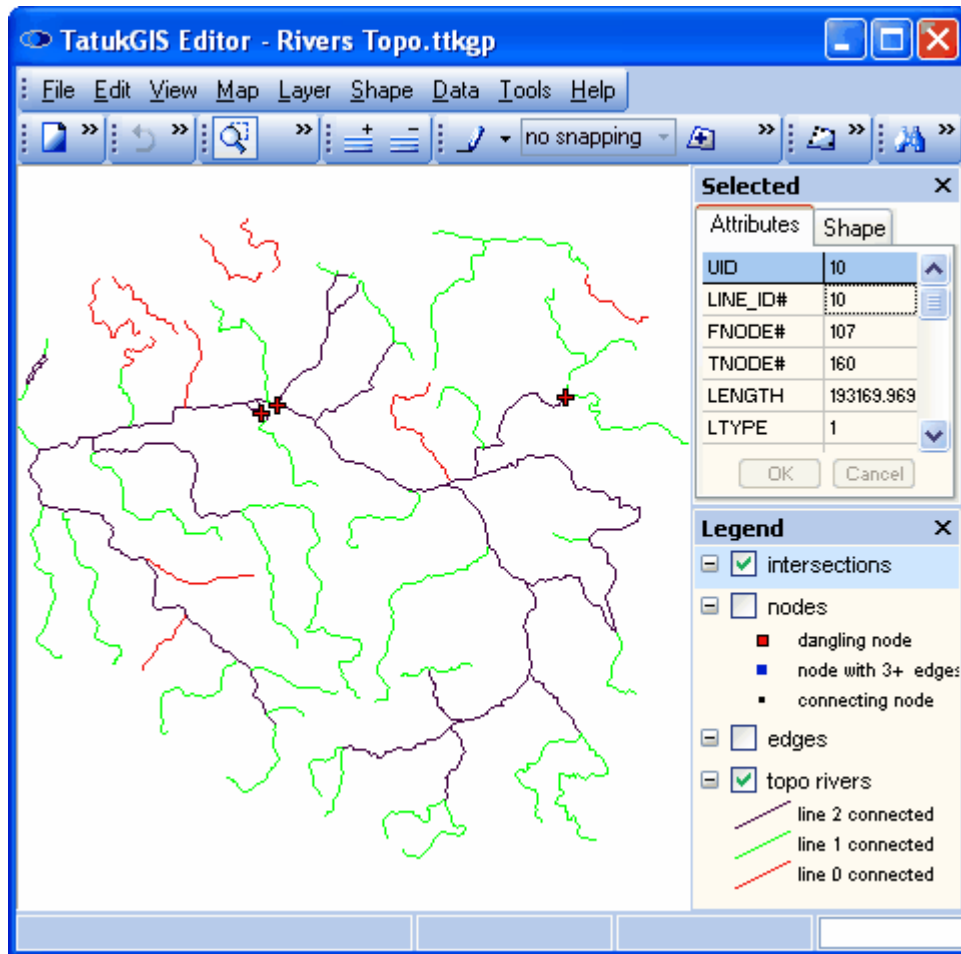
A hole between polygons and a polygon overlap at close zoom. The + shows the place where the polygon boundaries intersect.



The next image presents a topology project created from a line file representing rivers.

The *intersections* layer shows places where the lines intersect (cross each other, not just connect to each other). Generally rivers do not cross each other, so these are probably a sign of geometric errors.

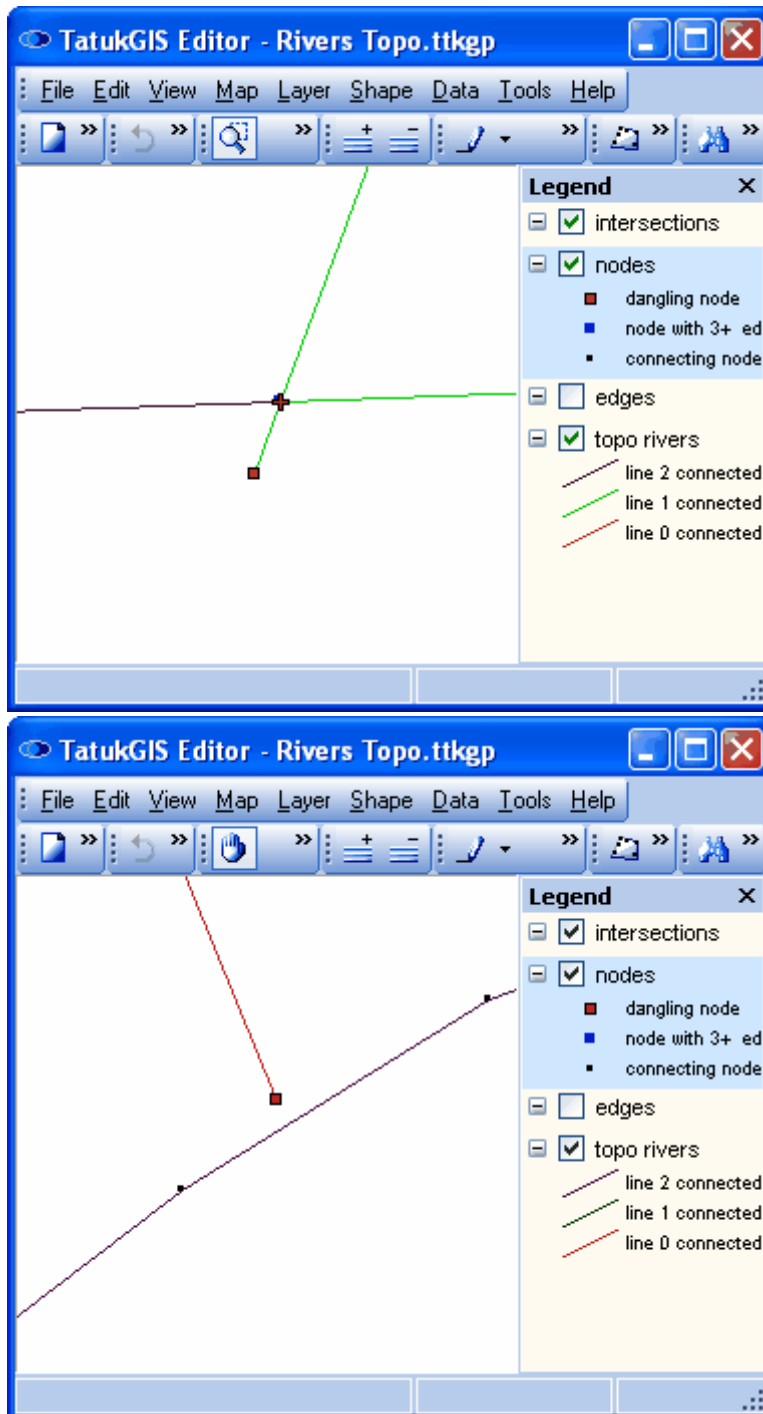
The *topo* layer categorizes the lines into three types: i) lines connected to other lines at both ends (*line 2 connected*), ii) lines connected to another line only at one end (*line 1 connected*), and iii) lines with no connections to other lines at either end (*line 0 connected*). The types are presented by color.



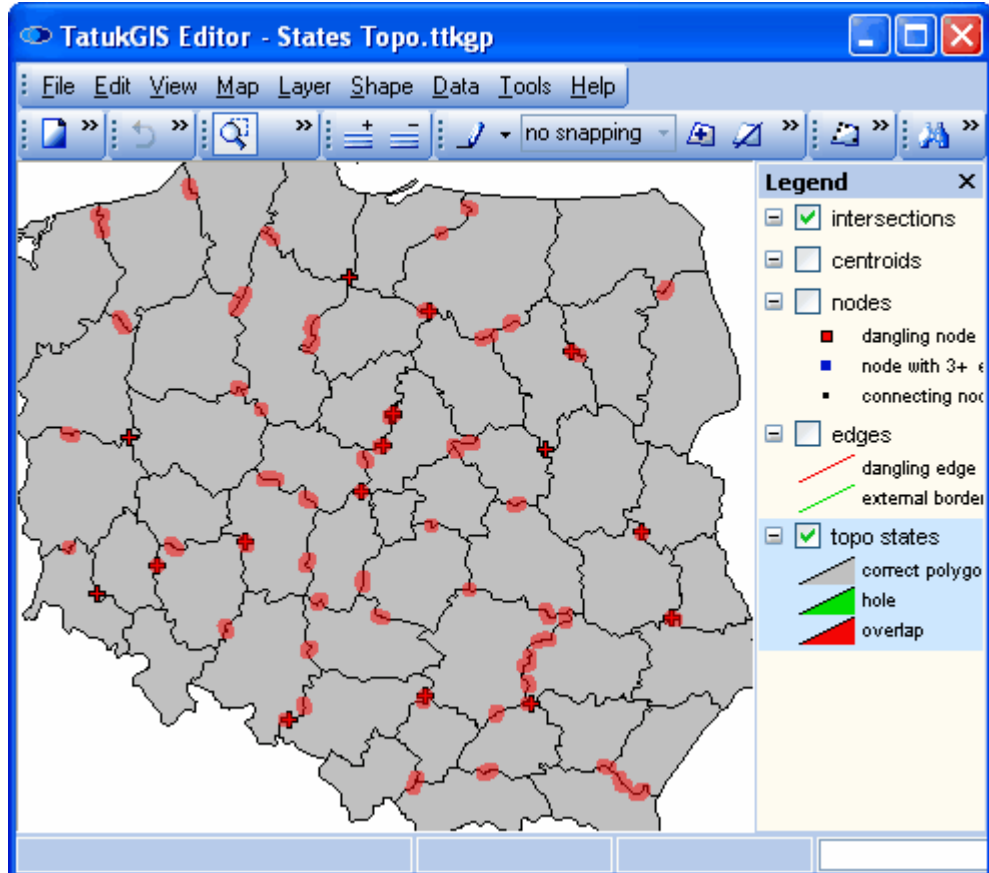
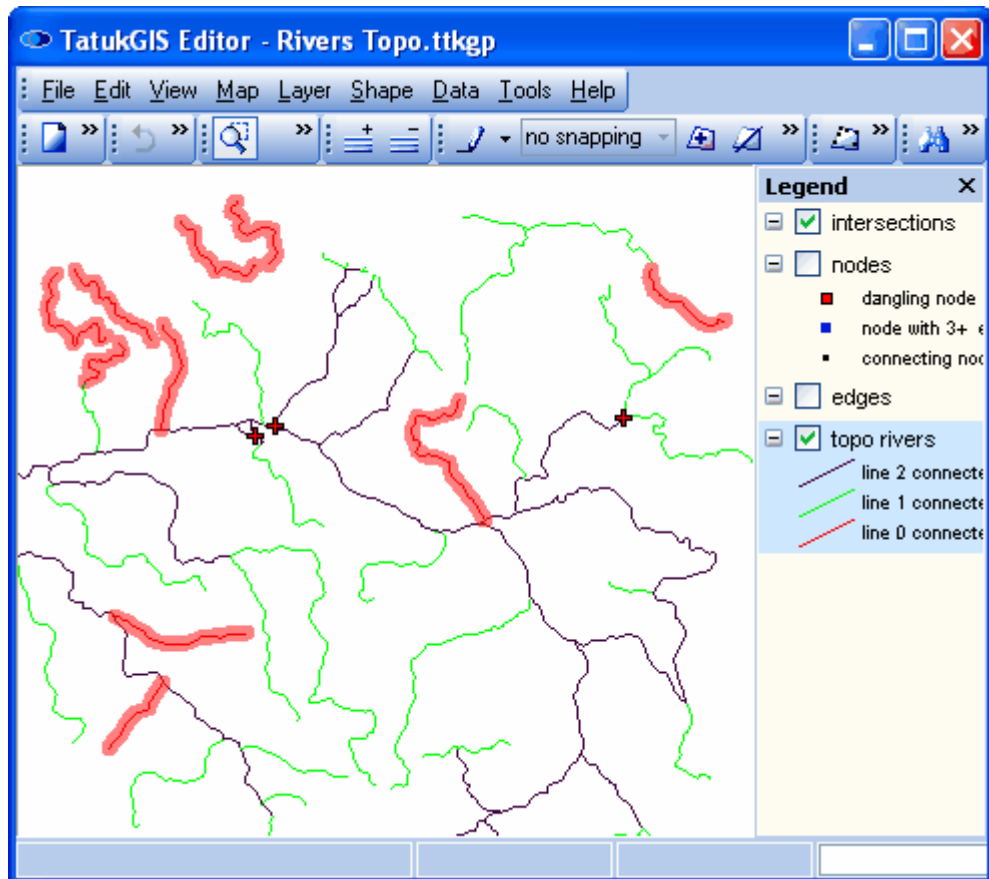
Errors in the file geometry are obvious at close zoom levels.

An intersection and a dangling node.
because a line does not connect.

Two dangling nodes



In the left image below, the *Tools/Topology/Show lines 0 connected* menu command has been used to select all lines in the layer which do not connect to another line at both ends. In the right image below, the *Tools/Topology/Show Polygons holes* menu command has been used to show all holes between polygons in the layer.



Now that the general nature of the errors in the data is known, the user can again run the topology builder operation, but this time selecting a tolerance level other than 0.00 so that topological corrections are performed to the source layers.

2.3 FAQ items

Additional and more updated FAQ material is available on the searchable FAQ page of the TatukGIS web site at the link:
<http://www.tatukgis.com/Faq/faq.aspx>.

To focus only on the FAQ material that is relevant to the TatukGIS Viewer and Editor products, make the selection shown below in the *Product* drop down list. Use the key word search tool to look for FAQ items relating to specific areas of interest.

FAQ Search

Product: GIS Viewer & Editor Search for word(s) or enter FAQ number: vector export Search

The AND operator is used with multiple search words

Page 1 of 4 items

Q10688 - I have implemented the mini map sample code in my DK application but it is v
 move the mini map cursor because the layer used in the MiniMap window is very large. I
 the MiniMap, this can make the application run slow. Therefore, best is to present a ... (Modified: 20

Q10674 - Can the TatukGIS Editor be used to "chop" an ESRI SHP format map file into s
 segment a separate SHP file? For instance, I might want to chop a map file covering a 30x30 km
 files, with each file covering a unique 10x10 km area from the original coverage. ... (Modified: 2006

Q10706 - I used the Editor to export a KML file from a SHP layer but the resulting KML fi
 in Google Earth? The KML file that you provided is projected (to a projected coordinate system) TH
 work with Google Earth. Probably your starting SHP file was project ... (Modified: 2006-08-17)

Q10709 - How can I convert SHP data, contained in multiple layers with one shape type,
 polygons, per layer, into a single KML file with multiple shape types? If I export each SHP f

(Results from a search using the key words "vector" and "export".)

Licensed users of the Editor product have log-in access to the Editor licensed user forum on the TatukGIS web site at this link: <https://shop.tatukgis.com/Forum/forumIn.aspx>

FAQ items:

1. How can I improve the speed of the Editor/Viewer with my data?

1. With vector layers, ensure that a reasonable 'Smart Size' setting is selected. The suggested default Smart Size is one pixel (1px). Use of this feature can dramatically enhance the speed of opening large vector files and the speed when panning at relatively zoomed out view levels. Smart Size is a visual layer property setting.
2. With vector layers, ensure that the R-tree spatial indexing feature is enabled. Although use of this feature will make a file open more slowly on the first opening (because the R-tree index file must be created upon the first opening), use of the R-tree feature can dramatically increase the speed of zooming and panning operations with large files at relatively closer zoom levels. The R-tree feature is an application level setting and is controlled via the Tools/Options/Map menu.
3. With raster image layers or large vector map layers, enable the Incremental Paint feature at the application level (controlled via the Tools/Options/Map menu). With raster image layers, enable Incremental Paint at the application level but turn off the Incremental Paint feature at the layer level (controlled via the visual layer properties settings for each layer).
4. With very large raster image layers, consider converting the image data into the TatukGIS PixelStore format. PixelStore can

be much faster because the image is seamlessly (invisibly) organized as image tiles held in an SQL database.

2. I know that the TatukGIS free Viewer and Editor opens MrSID file, but when I select 'All Supported Files' from the 'File of Type' drop down list in the 'Open' dialog window, my MrSID side files are not visible. What's wrong?

TatukGIS products support more file formats than the standard Windows OpenFileDialog dialog box drop down list is capable of showing. This standard drop down list is limited to approximately 256 characters (corresponding to the sum of all the file endings of the supported formats) for a single filter. Characters beyond the limit are ignored.

Therefore, if a file of a type which the TatukGIS product should open does not appear when the 'All supported files' option is selected, try specifically selecting the file type - in this case 'LizardTech MrSID (*.sid)' - from the drop down list of supported file types. Alternatively, select one of the sub categories that are provided in the drop down list, such as 'All Vector Files', 'All Pixel Files', or 'All Grid Files'.

3. Using the TatukGIS free Viewer, it seems that the TIFF export procedure is a bit slower than I would expect?

It is true that our TIFF export process could be considered a bit slow, but the tradeoff is that TatukGIS software can export really HUGE (even 2 GB) TIFF files. Small files can be generated more quickly by using the clipboard procedure supported by the Viewer.

4. How can I create polygon areas from my TIGER line boundaries, such as county boundaries, city limit boundaries, school district boundaries, etc.?

Use the Topology Builder functionality in the TatukGIS Editor. Just select the option to build 'Polygonal' topology from your TIGER line layer.

The topology functionality in the TatukGIS Editor can be used to convert vector line data in any supported format into a polygon layer.

Index

- A -

- Alt key 224, 231
- attribute 122
 - numeric values 122
 - panel 231, 259, 277
 - table 259
 - text information 122
- edit 259
- export 259
- formula 138
- import 259, 272, 277
- in table form 218
- numeric values 189
- panel 162, 199
- query (search) 103, 189
- restructure 259
- tab 224
- types 224
- union 262
- use to render 122, 125, 138

auto center 108

- B -

- bearing and distance 250

- C -

- cached paint 108
- charts (pie and bar) 174
 - size 177
- Clip 269
 - by extent 269
 - from a layer 269
- clipboard layer 186
- COGO 250
- colored-gradient value theme 138, 139, 151
- convex hulls 5
- coordinate geometry 250
- coordinate system 201, 206, 231
- copy 186
 - special 186
 - to clipboard 186
- Ctrl key 224, 231, 250, 262

- D -

- data link properties 277
- database 297
 - connector 297
 - join 277
- delete shape 242
- digital terrain model (DTM) 170
 - digital elevation model (DEM) 170

- E -

- edit 259
 - attributes 259
 - by coordinates 231
 - delete shape 242
 - line 224
 - line smoothing 248
 - snapping 224, 231
 - split shape 265
 - union 262
 - vector geometry 257
- edit modes 224
 - 90 deg. angle 243
 - circle 243
 - line smoothing 243
 - rectangle 243
- EMF meta file 186, 210
- export 259
 - attributes 259
 - file 231
 - image 201
 - image mosaic 206
 - image quality 201
 - layer 269
 - TIFF 297
 - vector file 231

- F -

- file export 231
- file formats 220, 269
- full extent 115

- G -

- Geomedia files 297
- geometric relation 181
- GeoTIFF file 201

- I -

- image 201
 - compression 201
 - export 201
 - export mosaic 206
 - export quality 201
 - quality 201
 - resolution 201
- import 259, 272, 277
 - attributes 259, 272, 277
- incremental paint 108

- J -

- join 277
 - database 277

- L -

- labels 158
 - avoid duplication 158
 - follow-the-line 162
 - fonts 162
 - position 162
 - position with in polygons 168
 - render 157, 297
 - script types 162
- layer 269
 - clipping 269
 - export 269
 - extent 220
 - merge 272
- layer properties 113, 116, 121, 125, 142, 151, 170
- legend 139
 - color ramped 139
 - panel 116, 139, 174
- LZW compression 206

- M -

- Map Hint 106, 215
- measure tools 199, 250
- menu controls 218
 - Editor 218
 - Viewer 103
- merge layers 272
- MiniMap panel 103, 210
- mosaic images 206

- N -

- new layer 220

- O -

- options (tools) 108, 297
- outline 158

- P -

- pixel resampling 201
- PixelStore image file 201
- points tab 231, 250
- polygon vectors 231
- print 210
 - date 210
 - preview 210
 - printer set-up 210
 - scale 210
 - to PDF 210
 - visible extent 210

- Q -

- query attributes 103, 189

- R -

- Render 177
 - chart size 177
 - charts (pie and bar) 174
 - colored-gradient value theme 151
 - color-gradient value theme 139
 - continuous values 151
 - DTM data 170
 - labels 157, 158, 162, 297
 - outline 142
 - styles 125
 - using formula 138
 - using text info. 122
 - using unique values 151
 - zones 139, 142, 170
- restricted drag 108
- revert shape 224
- RSTOPO 272, 286
- r-tree index 108, 297

- S -

save 186
 clipboard layer 186
 data 116, 220, 224, 257, 259

search panel 189

select 106
 by circle 181, 186, 218
 by line 181
 by point 181, 259, 262, 265
 by polygon 181
 by rectangle 181
 edit 224, 231, 242, 243, 248, 257
 mode 125
 spatial 178

shape tab 199, 231

Shift key 224, 231

Show Data Panel 106, 218, 224, 259, 277

smoothing factor (line) 248

snapping 224, 231

spatial select 178

split shape 265

SQL database 259

SQL query builder 189, 269, 272

symbols 116, 147

- T -

TAB registration file 201

TatukGIS project file 125, 224

thematic map 122

thematic rendering wizard 151

TIFF export 297

TIGER files 297

topology builder/corrector 272, 286

transparency 103, 108, 121

- U -

undo 224

union of shapes 262

units 250

URL reference 215
 launch e-mail 215
 link to web page 215

- V -

vector data 122

vector types 220

- W -

World File 201, 206

- Z -

zoom mode 116