ArcGis· 9

Geodatabase QuickStart Tutorial – 4th part

Exercise 5: Editing adjacent features with a map topology

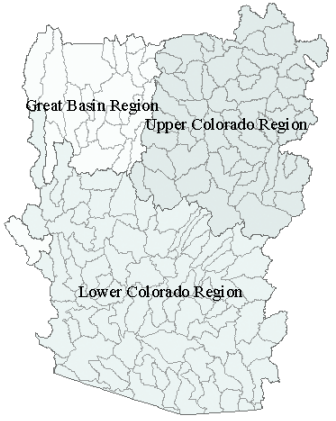
Many vector datasets contain features that share geometry. Features can share edges—for example, line segments—or nodes, the points at the ends of segments. For example, watershed polygons might have common edges along ridgelines, and lake polygons might share their shoreline edges with land cover polygons. Three watersheds might share a single node at a mountain peak, and three river-reach features might share a node at a confluence. You can simultaneously edit shared edges and nodes with the Topology Edit tool when you create a map topology.

Opening the exercise document

In this exercise you will update multiple watershed features in two feature classes using the Topology Edit tool.

1. Start ArcMap.
2. Click the Open button on the Standard toolbar. Navigate to the MapTopology.mxd map document located in the Editor directory where you installed the tutorial data. (C:\ArcGIS\ArcTutor is the default location.) Click the map and click Open.

This map contains two feature classes. Hydro_region contains polygon features representing three large hydrologic regions in the southwestern United States. Note that part of the Great Basin regional watershed has been omitted from the tutorial dataset. Hydro_units contains polygon features representing smaller watersheds within these regions. You can see the features in the Hydro_units feature class because the Hydro_region features are partly transparent.

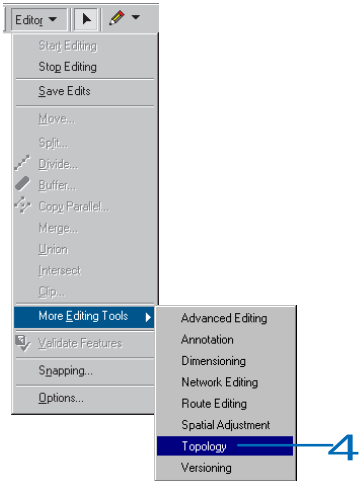


The regional data was derived by dissolving the smaller hydrologic units, so the boundaries of the features in Hydro_regions are already coincident with the boundaries of the smaller watersheds. In this exercise you will create a map topology to allow you to edit the vertices that make up a shared edge and move a node that defines the intersection of multiple features.

3. Click Editor and click Start Editing.

   If the Topology toolbar is not on the map you will add it.

4. Click Editor, point to More Editing Tools, and click Topology.



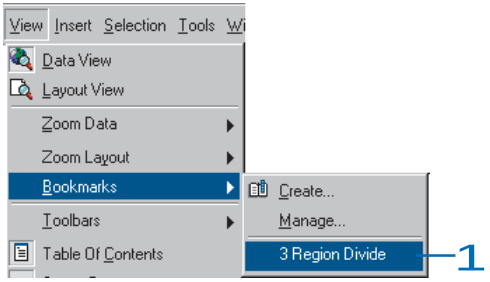
The Topology toolbar contains tools for working with topologically related features. Some features are related by a topology stored in a geodatabase. With an ArcInfo or ArcEditor license, you can use the topology editing tools on this toolbar to edit such geodatabase topologies. For more information on editing geodatabase topology, see the 'Using a geodatabase topology' exercise and the 'Editing topology' chapter of *Editing in ArcMap*.

You may still need to edit features that share geometry when you are working with shapefiles or features in a geodatabase that do not have a topology defined for them. You can use the tools on this toolbar to create a temporary topological relationship between coincident parts of features—a map topology—then edit the shared parts of features. ArcView licensed seats of ArcMap can edit map topologies but not geodatabase topologies. ArcEditor and ArcInfo licensed seats of ArcMap can edit both types of topology.

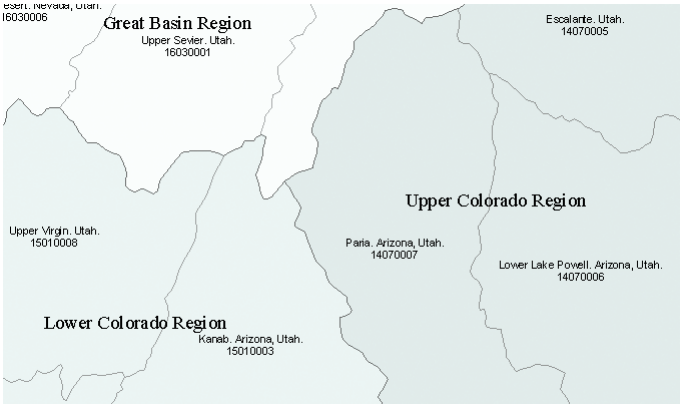
Creating a map topology for an area

Before you create the map topology, you'll zoom in to the area that you want to edit. Zooming in to an area reduces the number of features that the map topology analyzes when building the topology cache.

1. Click View, point to Bookmarks, and click 3 Region Divide.



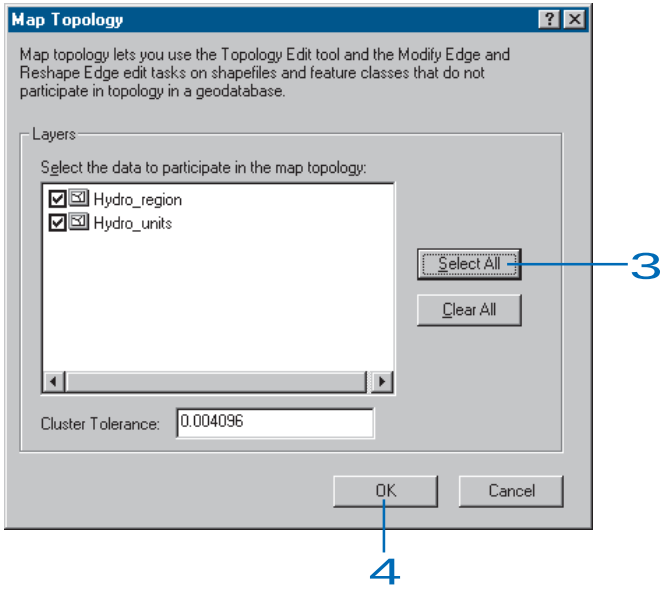
The map zooms to the bookmarked area. Now you can see labels for the smaller watersheds.



2. Click the Map Topology button.

The Map Topology dialog box appears. You can select the feature classes that will participate in the topology and choose a cluster tolerance. The cluster tolerance defines how close together parts of features must be before they are considered to be coincident.

3. Click Select All.



You want all of the features on the map from both feature classes to participate in the map topology.

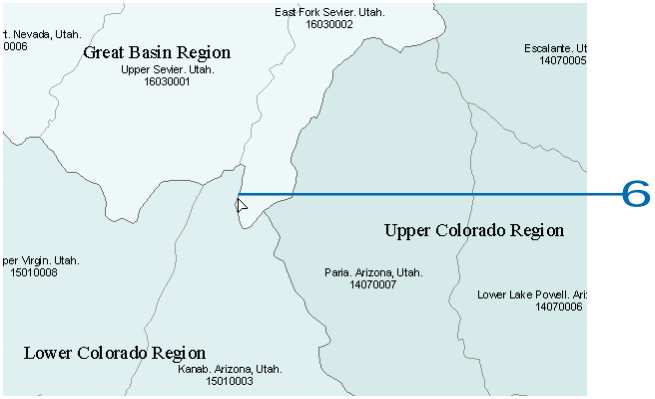
The default cluster tolerance is the minimum possible cluster tolerance and is given in coordinate system units. In this case the dataset is in the Universal Transverse Mercator coordinate system, and the units are meters. You will accept the default cluster tolerance.

4. Click OK.

Now you will start editing the map topology using the Topology Edit tool.

5. Click the Topology Edit tool.

6. Click the edge that is shared by the East Fork Sevier. Utah, polygon (#16030002) and Kanab. Arizona, Utah, polygon (#15010003).

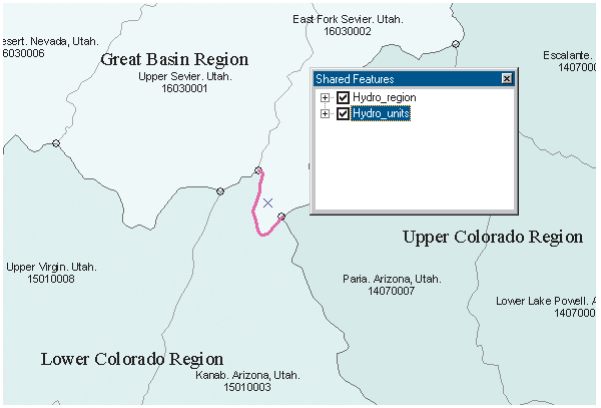


The edge is selected and changes color. If you set ArcMap to show unselected topology nodes while doing the quick-start tutorial, then open circles will also appear around the intersections of the lines that make up the polygon edges. These are unselected nodes in the map topology.

This edge is also shared by the larger regional polygons. To check this you'll use the Show Shared Features tool.

7. Click the Show Shared Features button.

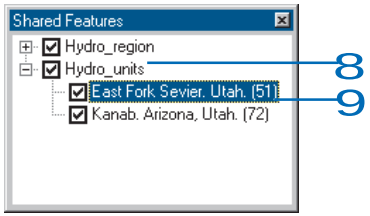
The Shared Features dialog box appears.



You can use this dialog box to investigate which features share a given topology edge or node. You can also use this dialog box to control whether or not edits that you make to a given topology element will be shared by certain features.

The names of both feature classes in the map topology, Hydro_region and Hydro_units, are listed with check marks in this dialog box. The checks mean that the selected topology element is shared by features in these feature classes. Next, you'll see which features share this edge.

8. Double-click Hydro_units.

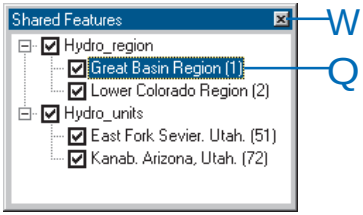


The plus sign changes to a minus, and two more branches expand below Hydro_units. Each of these represents a hydrologic unit feature that shares this edge.

9. Click East Fork Sevier. Utah. (51).

Feature number 51 in the Hydro_units feature class, the East Fork Sevier hydrologic unit, flashes on the map.

10. Double-click Hydro_region and click Great Basin Region (1).



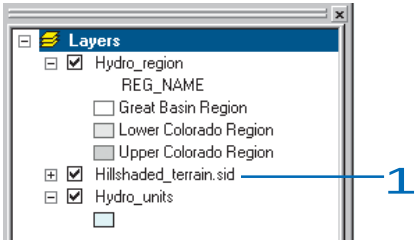
Feature number 1 in the Hydro_region feature class, the Great Basin region, flashes on the map.

11. Close the Shared Features dialog box.

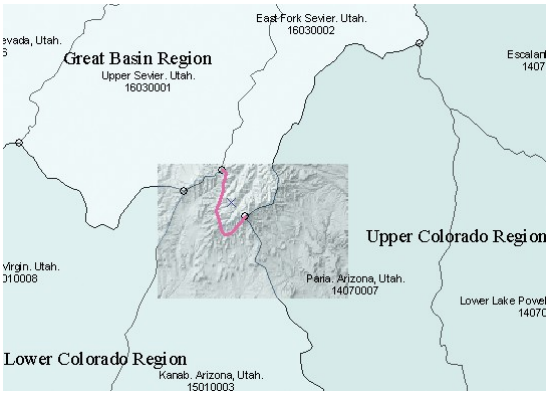
Editing a shared edge in a map topology

Now that you've seen that the features you need to update share this edge, you'll update the boundary of the watersheds to better fit the terrain.

1. Check Hillshaded_terrain.sid to turn on the image in the ArcMap table of contents.



This is a small area of hillshaded terrain extracted from the National Elevation Dataset Shaded Relief Image Service, published by the U.S. Geological Survey. You can add the original image to ArcMap from the Geography Network℠.

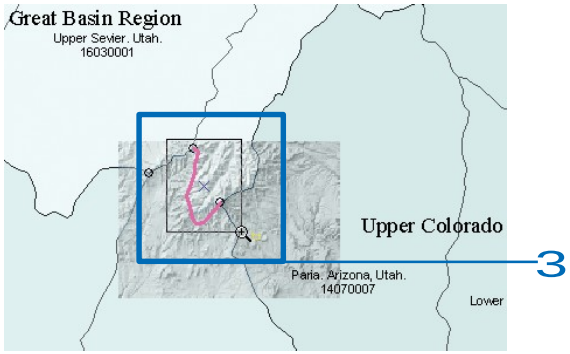


You will use this image, and the guidelines that have been added to it, to update your watershed data.

2. Press and hold the Z key.

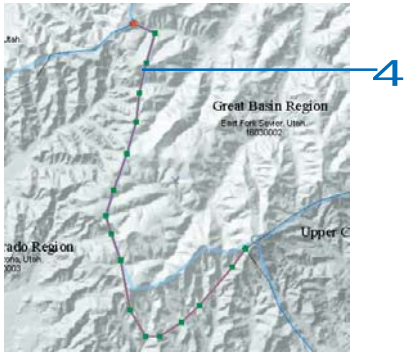
   The pointer becomes the Zoom In tool.

3. While pressing the Z key, click and drag a box around the selected edge.



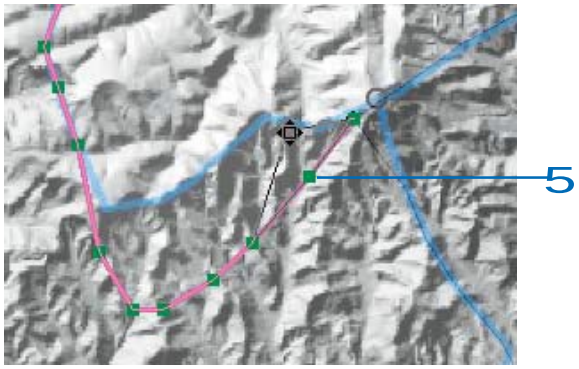
The watershed data that you have is derived from the medium resolution National Hydrography Dataset, published by the United States Geological Survey and the United States Environmental Protection Agency. This data was compiled at a scale of 1:100,000. The National Elevation Dataset hillshade is derived from 1:24,000-scale digital elevation model data. You will use the higher resolution hillshade data to improve the watershed boundaries.

4. Double-click the edge to see the vertices that define the shape of the edge.



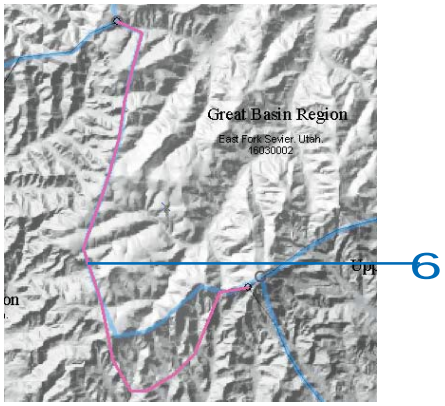
Now you can see the vertices (in green) that define the shape of this edge.

5. Move the pointer over the second vertex from the eastern end of the edge. When the pointer changes to a box with four arrows, click the vertex, drag it northwest, then drop it on the blue guideline.



You could continue reshaping this edge vertex by vertex, but there is a faster way to update it.

6. Click and drag a box across part of the selected edge.

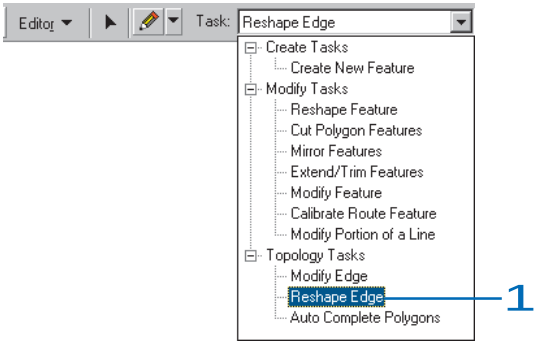


This reselects the edge and refreshes the change you made to it.

Reshape a shared edge in a map topology

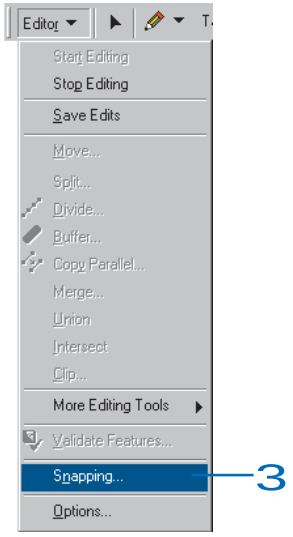
Now you'll use an edit sketch to reshape the shared edge. You'll need to set the edit task to Reshape Edge and turn on snapping to the watershed edges.

1. Click the Task dropdown list and click the Reshape Edge topology task.

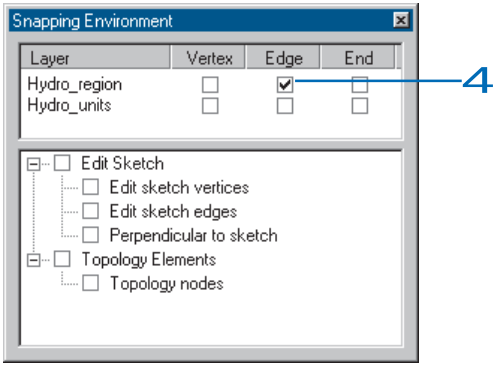


2. Click the Sketch tool on the Editor toolbar.

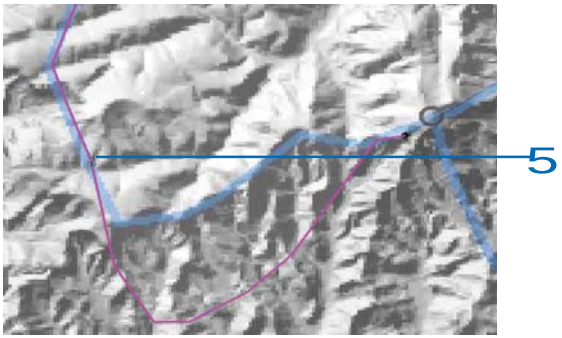
3. Click Editor and click Snapping.



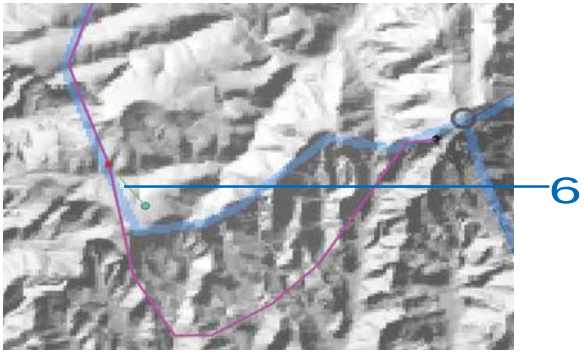
4. Check the box to snap to edges in the Hydro_region feature class, then close the Snapping Environment dialog box.



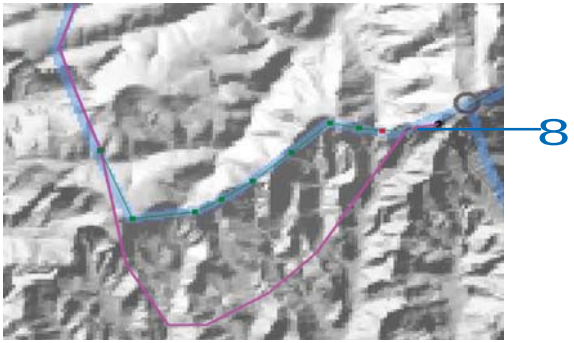
5. Move the pointer over the edge where the selected topology edge and the blue guideline begin to diverge.



6. Click the edge to begin an edit sketch.

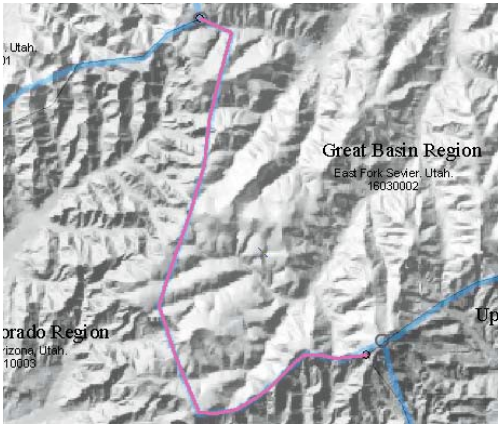


7. Continue adding vertices along the guide line.
8. Make sure that the last vertex you add to the sketch snaps to the edge near the vertex you moved.



9. Press F2 or right-click and click Finish Sketch.

The change that you made with the edit sketch is applied to the shared edge.



Move a shared node in a map topology

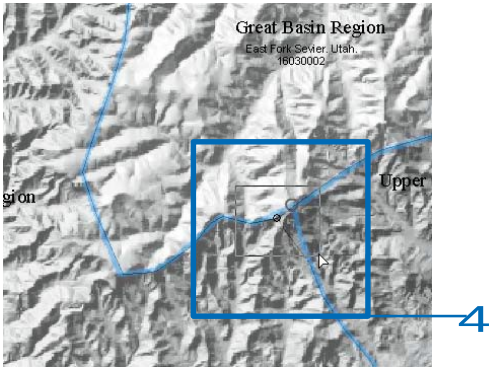
Now that you've adjusted the edge shared by the watershed boundaries, another problem with the existing data needs to be fixed. The node at the east end of the edge is the point where the Great Basin, Upper Colorado, and Lower Colorado Region watersheds come together. You'll move this shared node by a specified number of meters.

1. Click the Topology Edit tool.

2. Click once on the map, off of the edge, to deselect it.
3. Press and hold the N key.

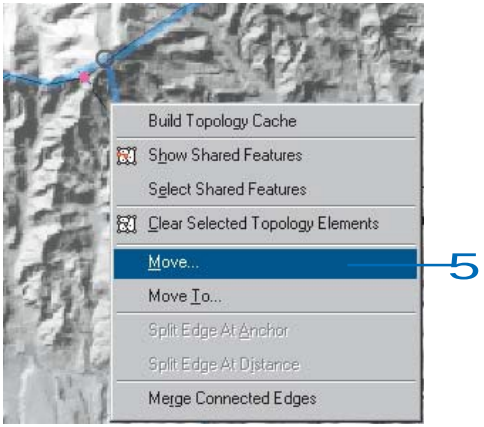
   This temporarily limits the selectable topology elements to nodes.

4. Click and drag a box around the node while holding the N key.



   The node is selected. Now you'll move it to the correct location.

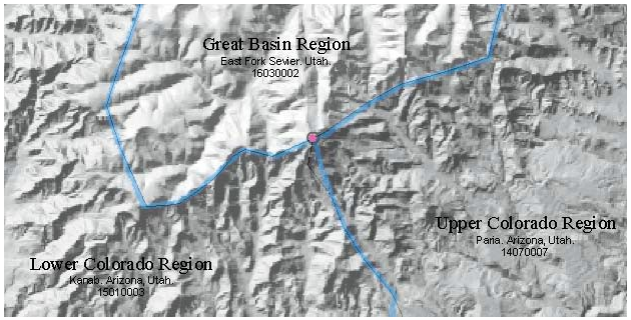
5. Right-click and click Move.



You will move this node 460 meters in the x direction (east) and 410 m in the y direction (north).

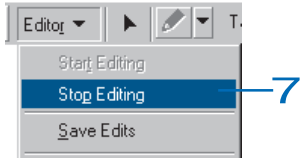
6. Type “460” and “410” in the x and y boxes, then press Enter.

The node is moved to the new location, and all of the features that share it in the map topology are updated.



You could also have moved the node by clicking and dragging it, as you moved the vertex of the topology edge.

7. Click Editor and click Stop Editing.



8. Click Yes if you want to save your edits.

In this exercise you learned how to create a map topology and how to use the Topology Edit tool to edit multiple features that share edges and nodes. The map topology allowed you to maintain the common boundary between the features while simultaneously editing four, then six features in two different feature classes. The Topology Edit tool and the topology editing tasks can also be used to edit the edges and nodes in a geodatabase topology.

Exercise 6: Importing CAD features

ArcMap lets you seamlessly integrate computer-aided design drawings into your work. It allows you to display and query CAD datasets without first having to convert the drawing files to an ESRI format.

The ability to work with CAD drawings in ArcMap is particularly useful if your organization has existing CAD data resources that you need to use immediately in your work.

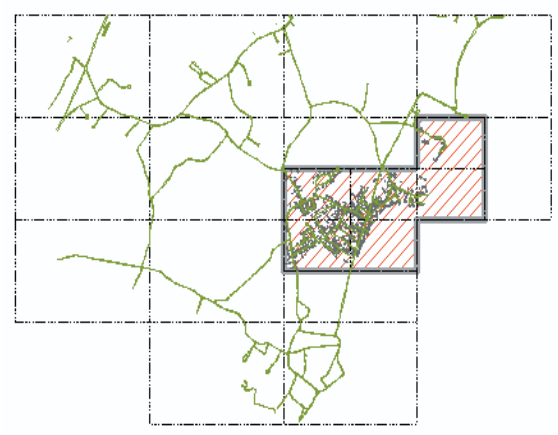
Not only can you perform basic query and analysis functions using ArcMap tools, but you can also snap directly to CAD features or entities when you update your database.

This exercise will show you how to import CAD features directly into your edit session; this will allow you to easily integrate CAD features into your work.

Opening the Exercise document

1. Start ArcMap.
2. Click the Open button on the Standard toolbar. Navigate to the WorkingWithCAD.mxd map document located in the Editor directory where you installed the tutorial data. (C:\ArcGIS\ArcTutor is the default location.)

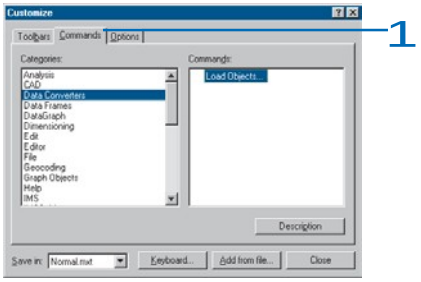
3. Zoom to the area of the map identified by the red hatched polygon.



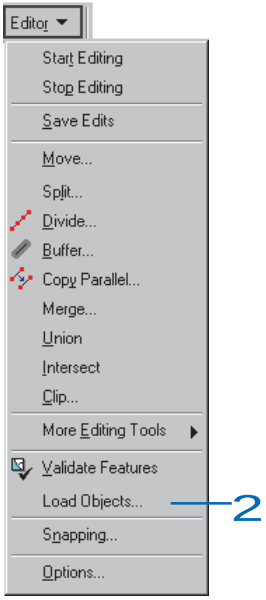
Using the Load Objects wizard

You can import CAD entities directly from CAD feature classes using the Load Objects wizard. However, you'll need to add the Load Objects wizard into ArcMap first.

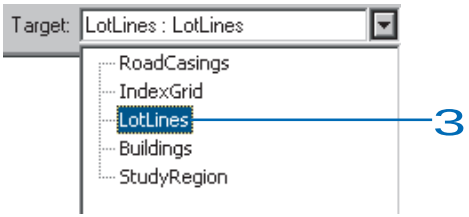
1. Click the Tools menu and click Customize. Click the Commands tab.



2. Click the Data Converters category from the Categories list and drag and drop the Load Objects command onto the Editor menu. Close the Customize dialog box.



3. Click Editor and click Start Editing. Set the Target layer to the LotLines layer. This is the layer into which you will load the parcel lines.



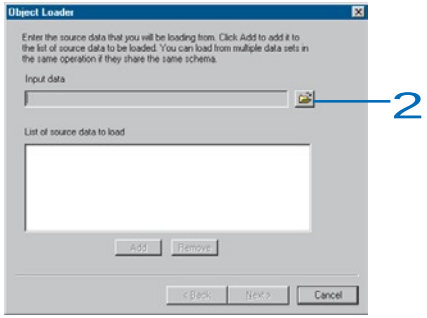
Loading CAD features

With the target layer set to the lot lines feature class, you are ready to load features directly from the CAD drawing.

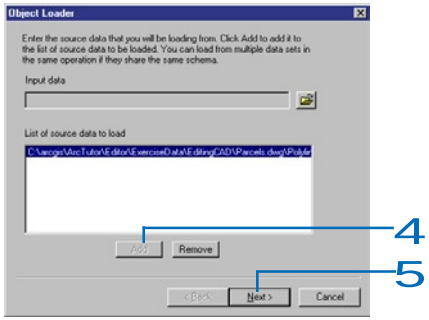
CAD drawings are represented in two ways: CAD drawing files and CAD drawing datasets. CAD drawing datasets contain feature classes organized by point, line, or polygon shape types.

Each CAD feature in a CAD feature class contains a Layer field; it lets you identify the CAD drawing layer that each feature is derived from. In this exercise, you'll extract the features belonging to the lot line layer of the polyline feature class into your empty lot line geodatabase feature class.

1. Click Editor and click Load Objects.
2. Click the Browse button, located to the right of the Input data list. Navigate to where you installed the ArcTutor sample data (C:\ArcGIS\ArcTutor by default), then navigate to the Editor\ExerciseData\EditingCAD directory.



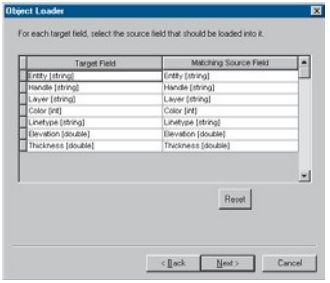
3. Double-click the Parcels.dwg drawing dataset. Click the Polyline feature class and click the Open button.
4. Click the Add button to add the CAD feature class—listed in the Input data list—to the list of source data to load.
5. Click Next.



Matching input and target fields

The next step in the wizard lets you match the fields of the CAD feature class with the fields in your target layer.

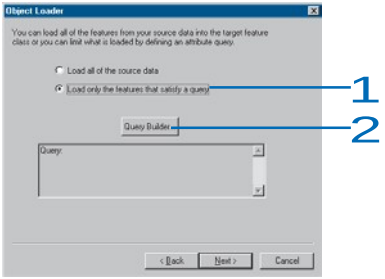
1. Accept the default field mappings for this exercise. Click Next.



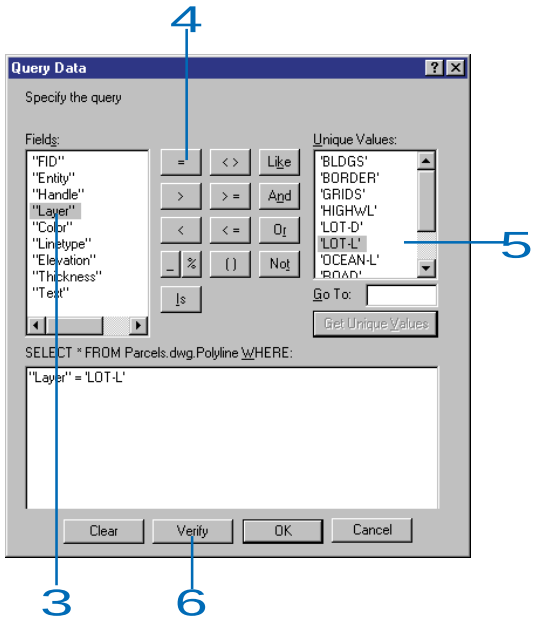
Defining a query

Since all CAD layers are combined into a single feature class containing a Layer attribute value, you will define an attribute query so that only features with a layer name = 'LOT-L' will be loaded into the target layer.

1. Click the option to load only features that satisfy the query.
2. Click Query Builder to define the query.



3. Double-click Layer in the Fields list. This adds the string to the where clause for the query.



4. Click the equal (=) sign.
5. Click Get Unique Values to display all unique attribute values for the Layer field. Double-click LOT-L from the list to complete the query.

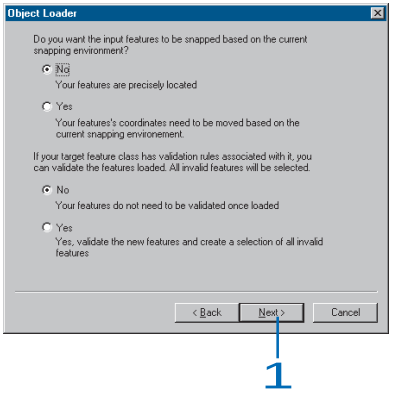
   After completing the steps above, your query should read: "Layer" = 'LOT-L'. You can alter the query by typing directly into the where clause box.
6. Click Verify to ensure that you have created a valid SQL where clause.
7. Click OK. Make sure that you have a valid query expression before applying the query to the wizard.
8. Click Next on the Object Loader dialog box.

Snapping and validation

Next, the Object Loader will ask if you want to apply any snapping agents that you have set in the Snapping Environment dialog box to features as they are loaded into the map and whether you want to validate each feature that is added.

If you're concerned about the connectivity between features that you import and existing features in your database, you may want to apply snapping. However, you should be aware that features will move within the current snapping tolerance. If the source CAD data was constructed using coordinate geometry, applying snapping may reduce the accuracy of the original data.

1. Click Next (do not apply snapping).

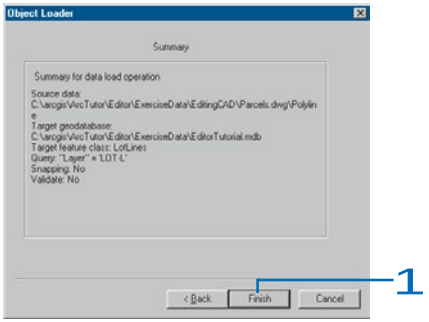


Completing the wizard and loading features

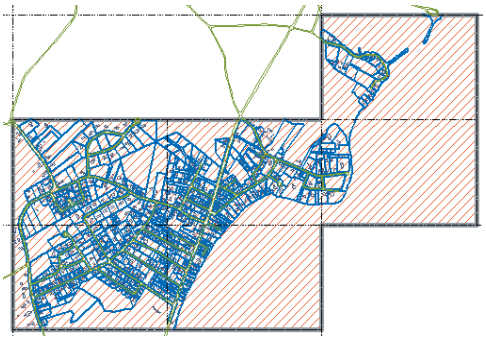
The final dialog box provides a summary of the options that you chose through each step of the wizard. You can examine each of your steps and click Back if you made any mistakes.

1. Click Finish.

   A progress indicator will appear.



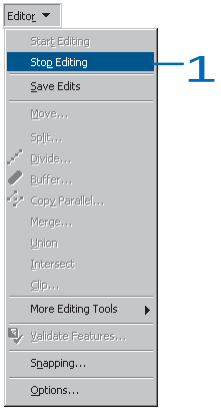
   Once the wizard has finished loading features, you may need to refresh the display to see the new lot lines.



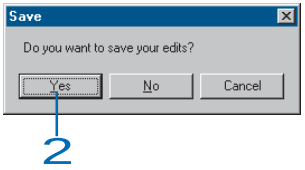
Saving your edits

Now that you have successfully loaded CAD data into your edit session, you can stop editing and save your edits.

1. Click Editor and click Stop Editing.



2. Click Yes to save your edits. You'll use this data in the next exercise.



In this exercise, you learned how to load CAD features directly into your GIS database. You were able to import features by their shape type and by their CAD layer name using the Load Objects wizard. But you don't have to import CAD data to use it. You can also snap directly to CAD features or simply display and query their attributes. For more information about CAD drawings, see *Using ArcCatalog*.

Exercise 7: Using geodatabase topology to clean up your data

The CAD lot lines data that you loaded in the previous exercise needs some quality checking, editing, and other processing in order for you to have useful parcel polygon features for your geodatabase.

You will create a simple geodatabase topology rule to help you find digitizing errors in the lot line data, then use the topology and editing tools to fix these errors. Once the problems, mostly lines that do not close to form polygons, are fixed, you will create a new polygon feature class from the lot lines. You'll add the polygons to the topology, then use the topology to identify and resolve other errors in the data.

If you have not loaded the lot lines, a duplicate of this feature dataset with the lot lines already loaded may be found where the tutorial data is installed at: C:\ArcGIS\ArcTutor\Editor\ExerciseData\TopologyEdits\TopologyTutorial.mdb.

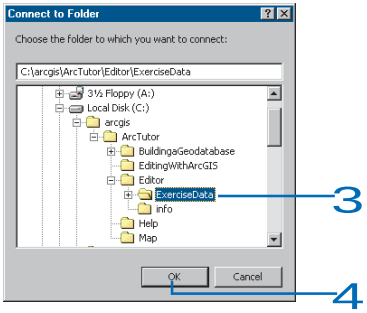
You must close ArcMap before building the topology to release the lock on the database.

1. Close ArcMap. You do not need to save changes to the map.

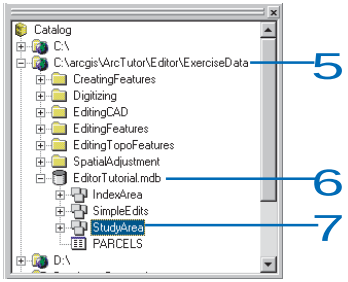
Navigating to the study area dataset

1. Start ArcCatalog.
2. Click the Connect to Folder button.

3. Navigate to the ExerciseData folder. The default location for this folder is C:\ArcGIS\ArcTutor\Editor.



4. Click OK.
5. Double-click the folder connection.
6. Double-click the EditorTutorial.mdb geodatabase.



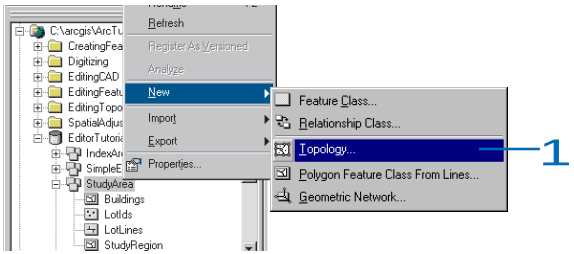
7. Click StudyArea.

   This is the feature dataset into which you loaded the CAD lot lines in the previous exercise.

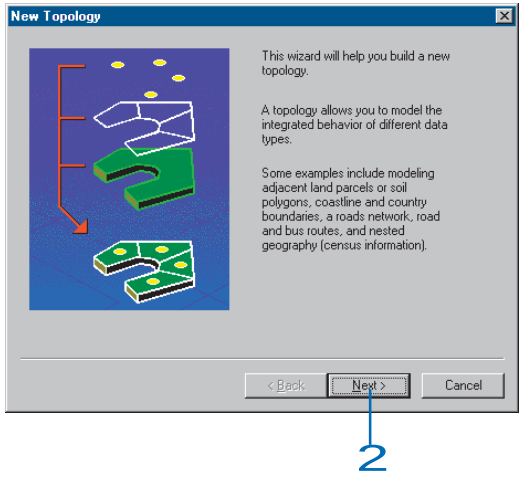
Creating a geodatabase topology

Now you'll create a geodatabase topology to help you find errors in the LotLines data. The topology will be simple, involving one feature class and one topology rule.

1. Right-click the StudyArea dataset, point to New, and click Topology.



2. Click Next.



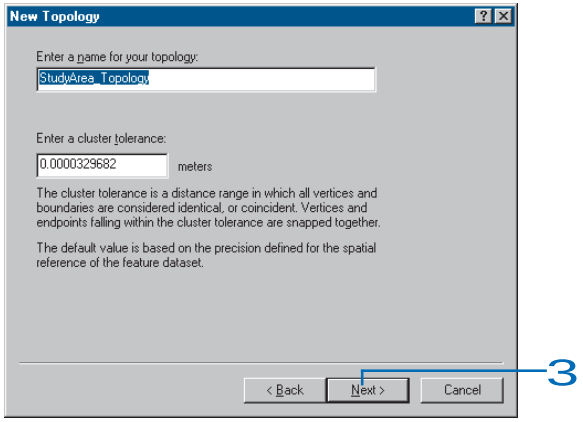
On the next panel of the wizard, you can set the cluster tolerance. The cluster tolerance is the minimum distance that separate parts of features can be from each other. Vertices and edges of features that fall within the cluster tolerance are snapped together.

By default, the wizard gives the smallest possible cluster tolerance, which is determined by the precision of the spatial reference of the dataset. The precision of a dataset defines how many system units can be stored per unit of linear measure and controls how precisely coordinates are stored in the dataset.

This dataset has a precision of about 62,500 units per meter, so the smallest resolvable ground distance in the data is 0.000016 m, or about 1/100th of a millimeter. The actual precision at which the data was collected is considerably coarser.

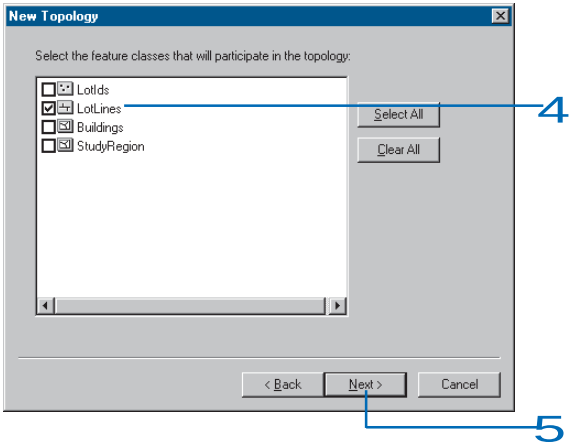
The cluster tolerance is 0.000033 m. Parts of features within this distance of one another will be snapped together. You'll accept the default cluster tolerance.

3. Click Next.



Now you can choose which feature classes in the dataset to include in the topology.

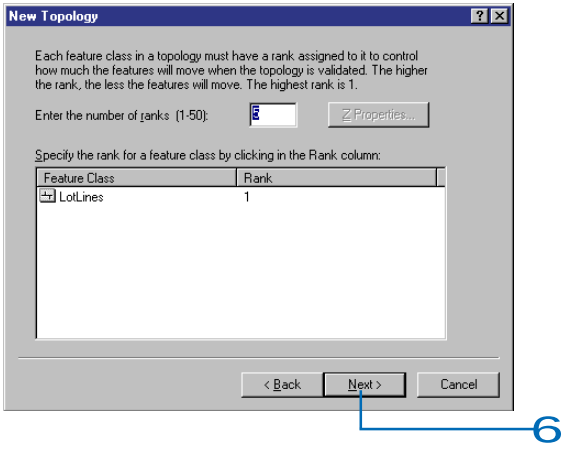
4. Check LotLines.



5. Click Next.

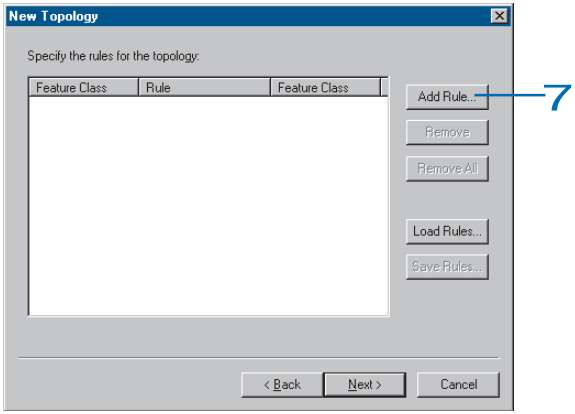
   When you have more than one feature class in a topology, you can give them different ranks. When vertices or edges of features fall within the cluster tolerance of each other, the feature class ranks control which is moved to the other's location. Feature classes of a lower rank will be snapped to feature classes of a higher rank. The highest rank is 1; the lowest is 50. Parts of features of the same rank that fall within the cluster tolerance are geometrically averaged.

6. Click Next.

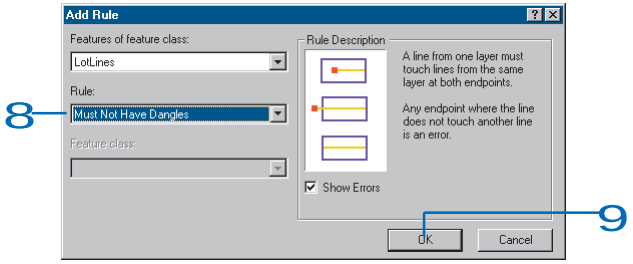


   When you build a topology, you can pick the rules that will govern the allowable spatial relationships between features.

7. Click Add Rule.



8. Click the Rule dropdown list and click Must Not Have Dangles.

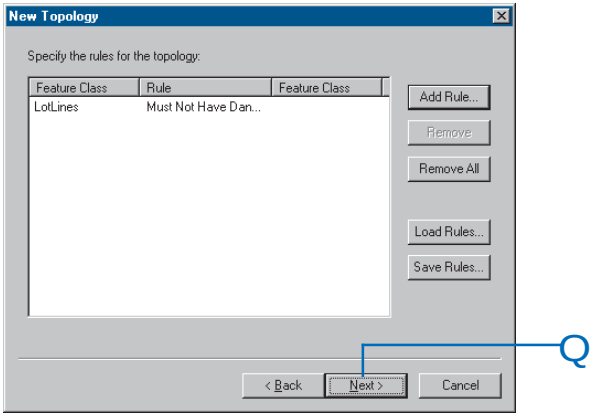


Dangles are the endpoints of lines that are not snapped to other lines in the feature class. You will want to find the dangles in the LotLines feature class because they represent places where the imported CAD line work will not produce closed polygons.

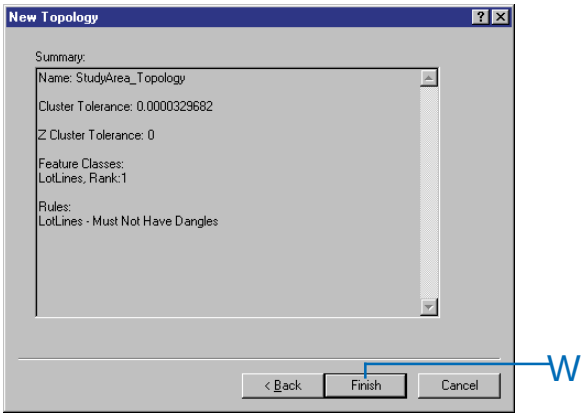
9. Click OK.

   The rule is added to the list of topology rules.

10. Click Next.

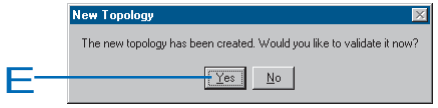


11. Click Finish.



You get a message that the topology is being built, then another asking whether you want to validate the topology now.

12. Click Yes.



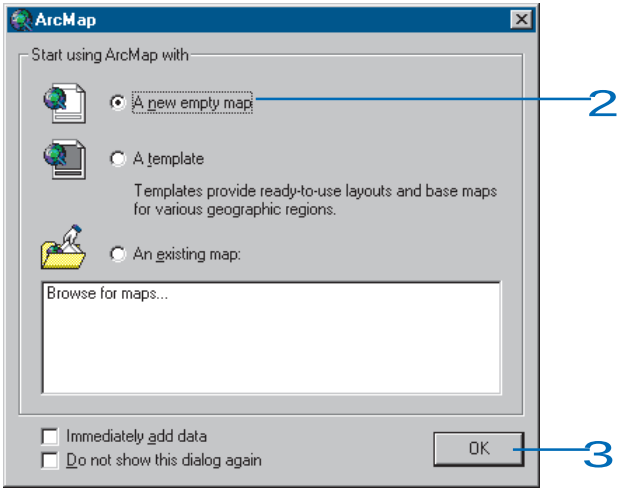
You get a message that the topology is being validated, and the new topology appears in the StudyArea dataset.

Adding the topology to the map

Now you'll use the topology to help you find the dangle errors in the LotLines data. It is important to clean up this data before you create polygon features because only one lot polygon will be created if a line dividing two lots does not completely separate them.

1. Click the Launch ArcMap button to start a new map.

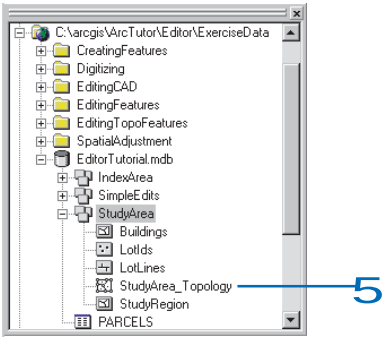
2. If the Startup dialog box appears, click the button to start a new empty map.



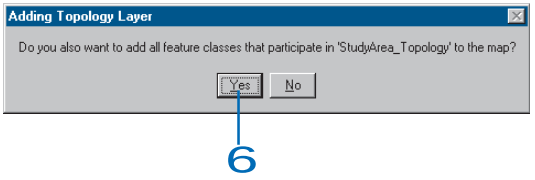
3. Click OK.

4. Resize the ArcMap and ArcCatalog windows so that you can see both.

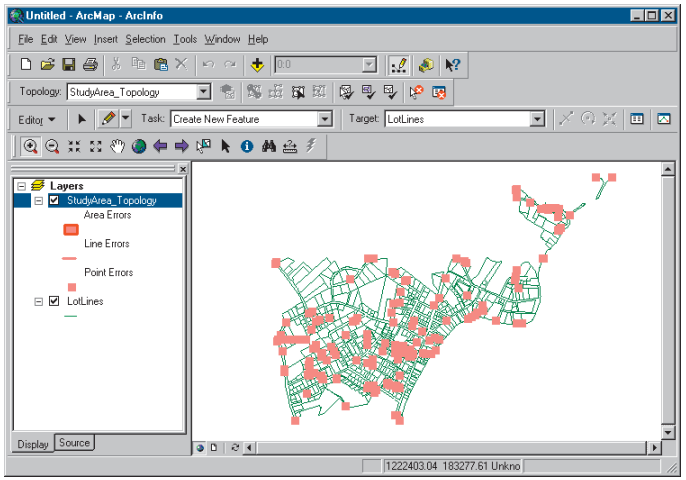
5. Click StudyArea_Topology and drag it onto the map.



6. Click Yes when you are asked whether to add all of the layers that participate in the topology.



The topology layer and the LotLines features are added to the map.



The Topology layer shows all of the topology errors. Notice that in the ArcMap table of contents, the topology layer can show Area, Line, and Point errors. This topology only has one feature class and one rule, so all of the topology errors relate to that rule. The topology rule specifies that LotLines must not have dangles. The error geometry for dangles is a point, located at the dangling end of a line feature. All of the red error features on the map are dangles.

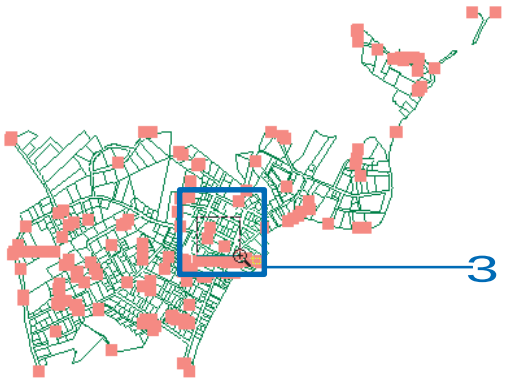
Finding topology errors

The next step to make this data useful is to identify the topology errors that are present. Lot lines that have a dangle, where one end of the line is not connected to another lot line, are errors that you need to find in order to clean up this data so you can create lot polygons. Some dangles need to be extended to close a polygon; others overshoot the line that they should snap to and need to be trimmed. You will find some of these errors now.

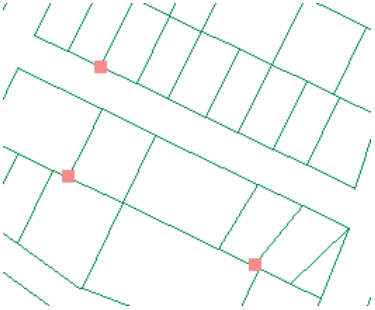
1. Click Editor and click Start Editing.

2. Click the Zoom In tool.

3. Click and drag a box around the three red error features located near the middle of the map, to the right of and above the north–south and east–west trending series of errors.

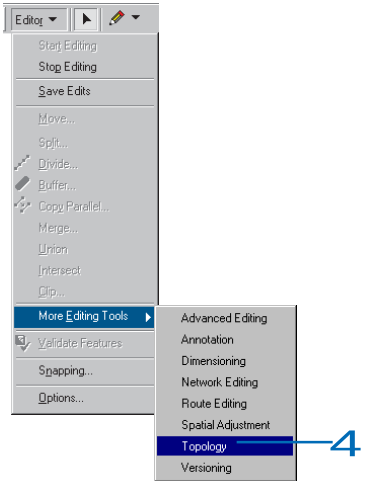


Now you can see three of the errors.



You will use tools on the Topology toolbar to find out more about these errors and to correct them. If the Topology toolbar is visible, skip the next step in which you add the toolbar.

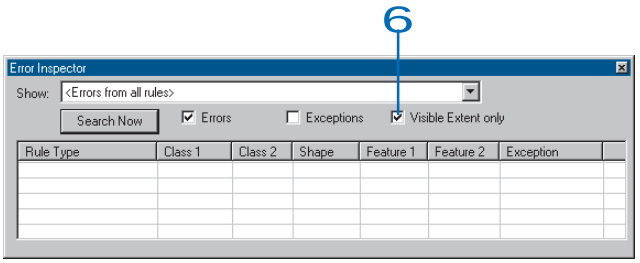
4. Click Editor, point to More Editing Tools, and click Topology.



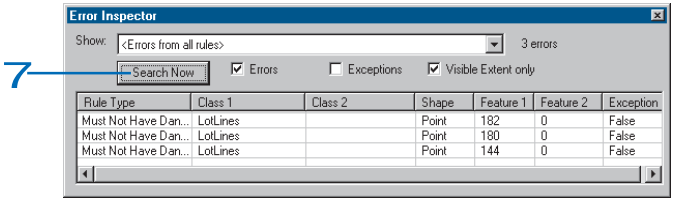
5. Click the Error Inspector button on the Topology toolbar.

   The Error Inspector allows you to manage and interact with all of the topology errors on your map.

6. Check the Errors and Visible Extent only check boxes.



7. Click Search Now.



You may see additional errors if the map display changed shape when you added the Error Inspector.

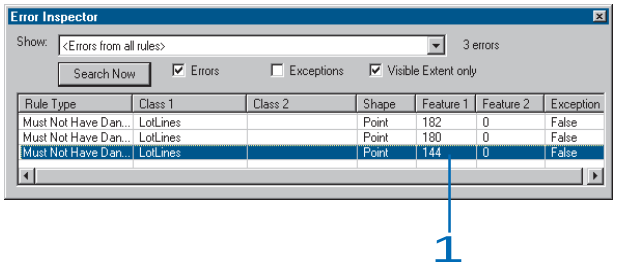
Correcting an overshoot error

All of the errors on the map are violations of the Must Not Have Dangles rule. However, there are several different problems that can cause this type of error. A dangle error can be caused by a line that extends too far beyond the line it is supposed to touch or by a line that doesn't extend quite far enough. These are called overshoots and undershoots, respectively.

Dangles can also occur where features have been digitized from adjacent map sheets. These lines sometimes need to be snapped together so they connect to form a continuous line. Other dangle errors occur at the edge of map sheets, where a line is cut off on the original source data.

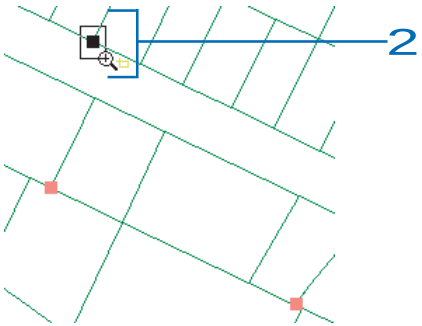
You will now correct one of the errors on this map.

1. Click 144 in the Feature 1 column.

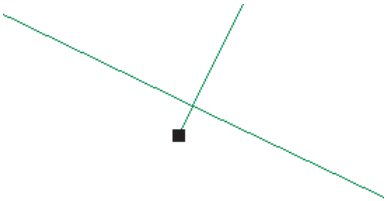


The feature flashes on the map, and the error feature turns black to show that it's selected.

2. Click and drag a small box around the error to zoom to the error.

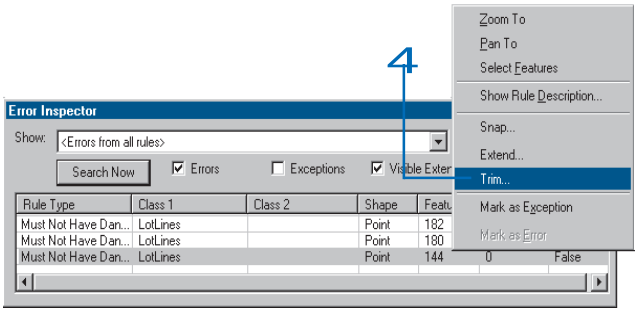


3. Zoom in again, if necessary, until you can see where the lot line with the error crosses the other lot line.



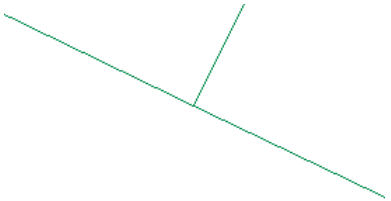
This is an overshoot error, a type of error that is often found in line work imported from CAD programs or digitized without using snapping to control the connectivity of the line features.

4. Right-click the error in the Error Inspector and click Trim.



5. Type “3” in the Maximum Distance box and press Enter.

The dangling segment is trimmed back to where the lines intersect, and the error disappears.

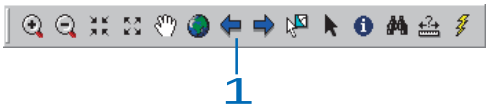


The Error Inspector context menu provided a list of potential fixes for this error. You trimmed the line feature to fix this error. You also could have marked the error as an exception or snapped or extended the line until it reached another feature.

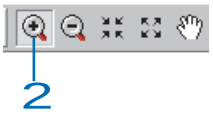
Correcting an undershoot error

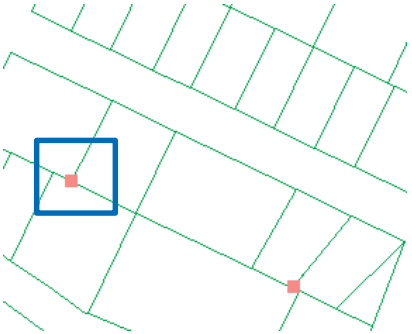
Now you’ll correct another type of dangle error.

1. Click the Go Back to Previous Extent button until you can see the two remaining errors in this area of the data.

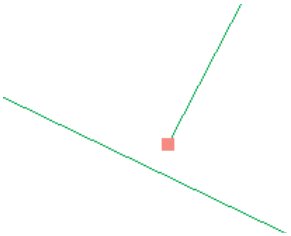


2. Click the Zoom In tool and drag a box to zoom in to the westernmost of the two remaining errors.





3. Zoom in again, if necessary, until you can see where the lot line with the error fails to connect to the other lot line.

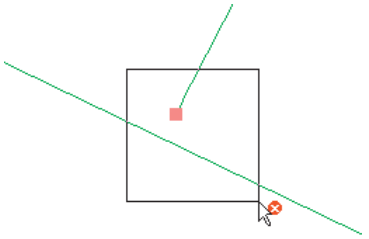


This is an undershoot error, another type of error that is often found in line work imported from CAD programs or digitized without using snapping to control the connectivity of the line features. The end of this line fell short by a little more than half a meter. You'll fix this error by extending the undershoot until it meets the line it should have been snapped to.

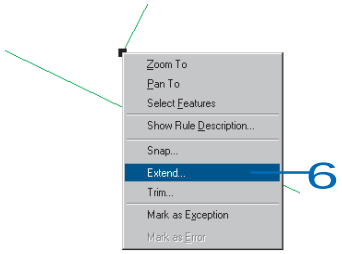
4. Click the Fix Topology Error tool.

The Fix Topology Error tool lets you interactively select and apply predefined fixes to topology errors on the map.

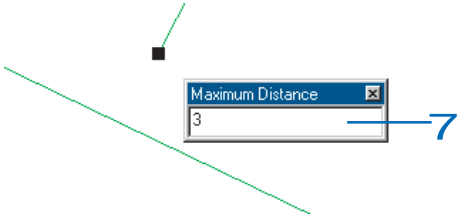
5. Click and drag a box around the error.



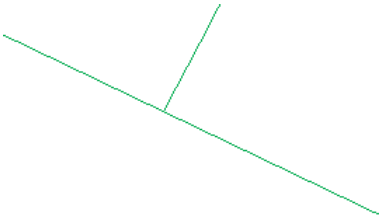
6. Right-click on the map and click Extend.



7. Type “3” in the Maximum Distance box and press Enter.



You’ve corrected the undershoot by extending the line with the dangle to the other line.

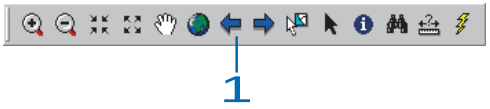


If the distance to the next line had been greater than the three-meter maximum distance you specified, the line would not have been extended.

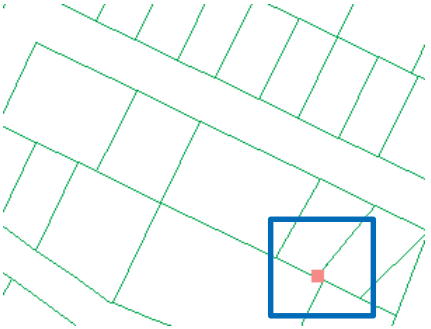
Correcting a double-digitized line

Sometimes a given line or part of a line is digitized twice in the course of creating the data. This may happen with CAD drawings or with lines digitized on a digitizing tablet.

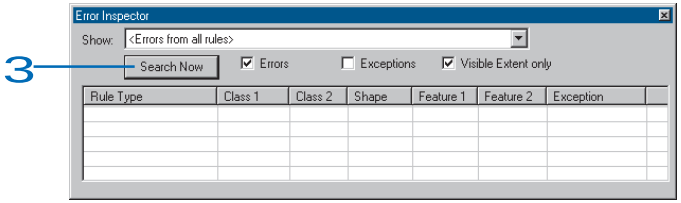
1. Click the Go Back to Previous Extent button until you can see the one remaining error in this area of the data.



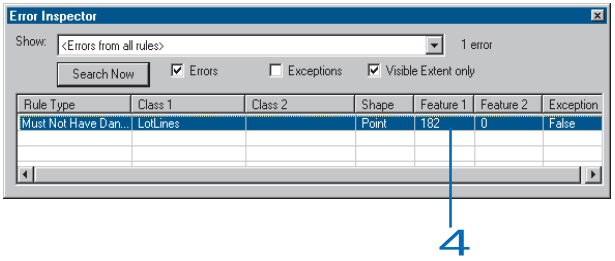
2. Click the Zoom In tool and drag a box to zoom in to the remaining error.



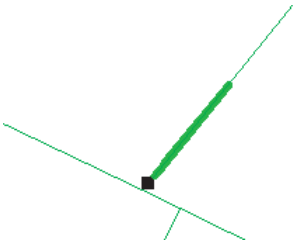
3. In the Error Inspector, click Search Now.



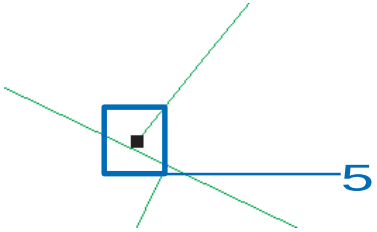
4. Click the numeric value in the Feature 1 column.



The line feature with the dangle flashes. Notice that the whole lot line did not flash.

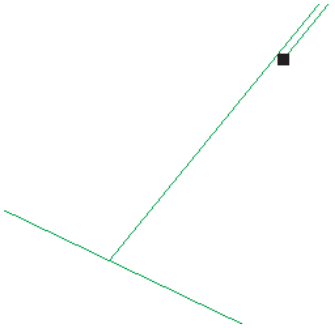


5. Click and drag a box to zoom closer to the dangle error.

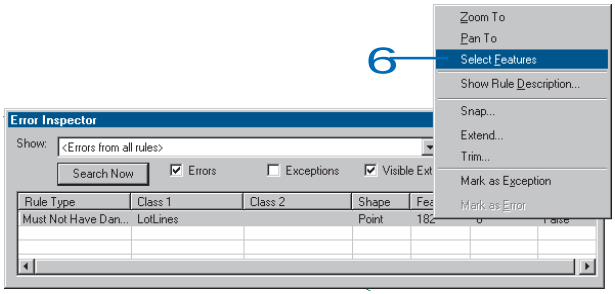


If necessary, zoom in again until you can see that there are two nearly parallel lot lines, one of which has the dangle.

You'll correct this error by deleting the extra line.

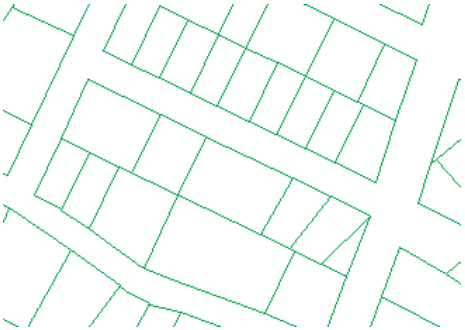


6. Right-click the numeric value in the Feature 1 column and click Select Features, then press the Delete key.



The extra line is deleted.

7. Click the Go Back to Previous Extent button until you can see the area that you've been working on.



You've fixed three errors that resulted from violations of the Must Not Have Dangles rule. In each case the error was corrected by editing the geometry of a lot line feature by trimming, extending, or deleting the feature.

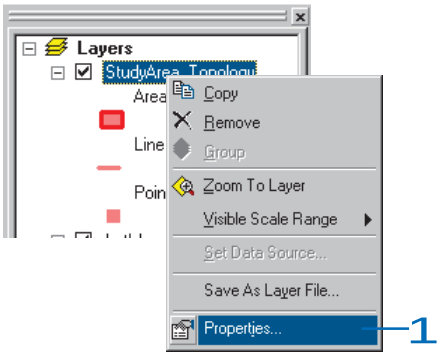
Topology errors are useful for tracking where there are problems with your data, but correcting the error requires you to correct the data—you can't edit the Topology error feature layer directly.

Reviewing the areas you've edited

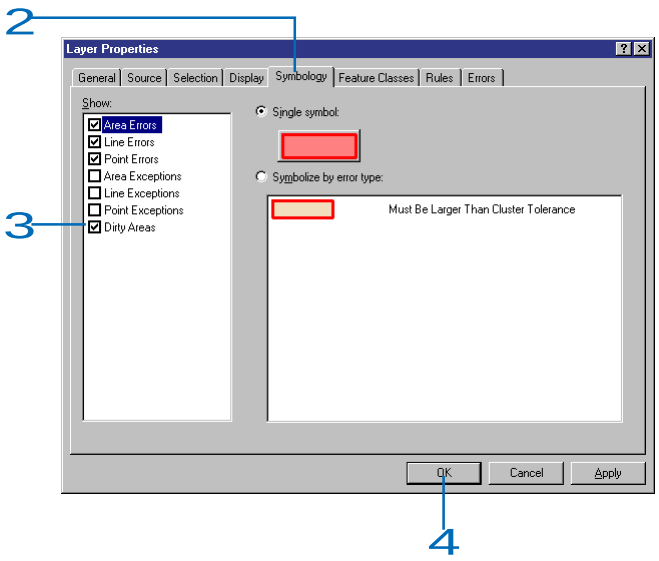
When you edit features in a topology, the topology tracks where changes have been made. These places are called dirty areas because a topology rule could potentially have been violated by the edits, but the error, if it exists, cannot be found until the dirty area is validated again. When you validate the topology again, it just checks the dirty areas.

You can see the areas that have been edited by showing the dirty areas in the topology layer.

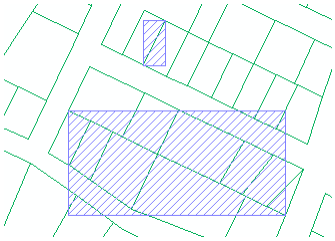
1. Click StudyArea_Topology in the ArcMap table of contents so only it is selected. Right-click it and click Properties.



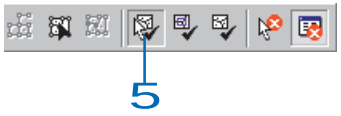
2. Click the Symbology tab.
3. Check Dirty Areas.
4. Click OK.



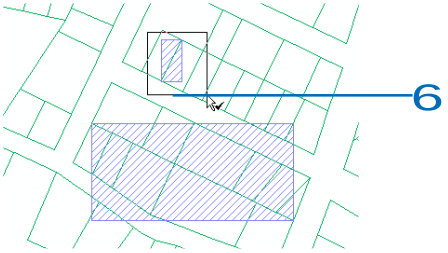
Now you can see the dirty areas on the map. The dirty areas cover the features that you edited. Dirty areas optimize the validation process, as only these must be checked for errors.



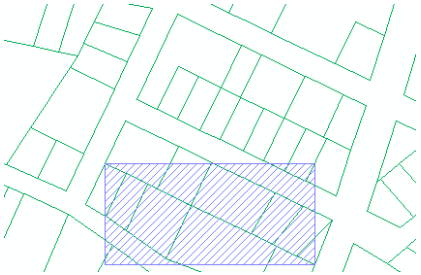
5. Click the Validate Topology in Specified Area tool.



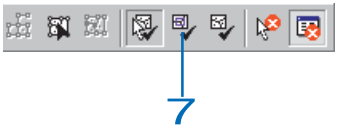
6. Click and drag a box around the northern dirty area.



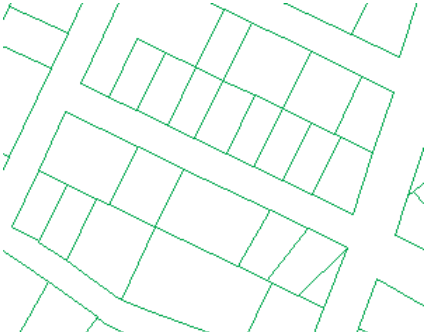
The dirty area is removed, and no errors are found in the area you validated.



7. Click the Validate Topology in Current Extent button.



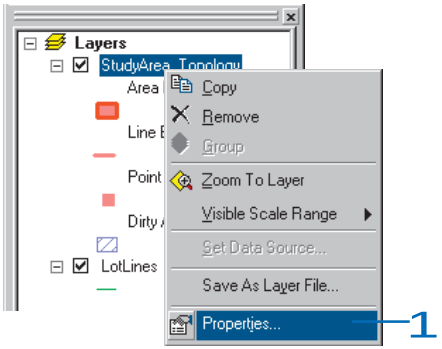
The topology is validated for the other areas you edited, and the dirty area is removed.



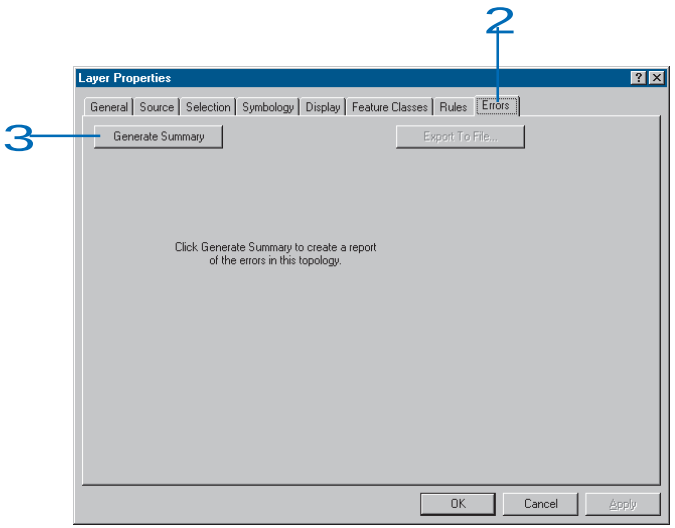
Creating a report of the status of the data

Next you'll generate a report summarizing the number of topology errors remaining in the data.

1. Right-click the topology in the ArcMap table of contents and click Properties.

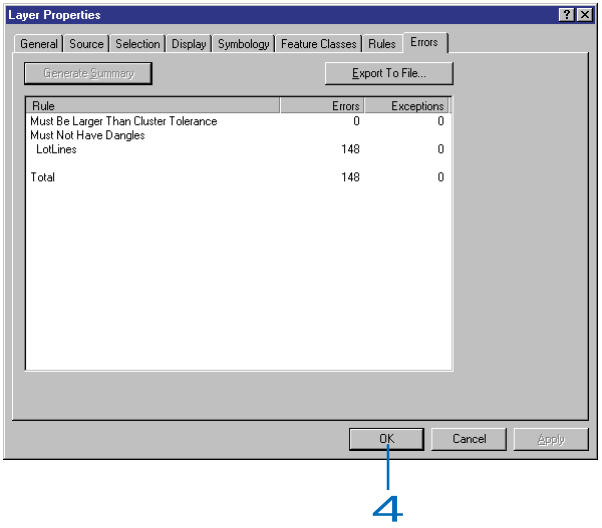


2. Click the Errors tab.



3. Click Generate Summary.

   The summary shows the number of topology errors and exceptions; you may have a different number of errors. You could save this report to a text file to document the status of the data, but you do not need to do so for this exercise.



4. Click OK.

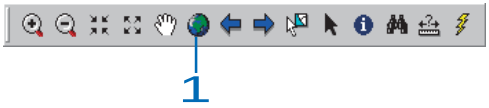
Fixing multiple errors at once

Many errors, like the double-digitized line, need to be fixed one at a time by deleting, modifying, or moving individual features. Some errors must be fixed by creating new features. However, sometimes a feature class contains a number of errors, such as the overshoots and undershoots, that are simple to fix. When this is the case, you can select multiple errors at once with the Fix Topology Error tool and apply the same fix to all of them. If you prefer, you can individually check each error using the Error Inspector. This is a work flow and quality assurance decision that your organization should make before you begin applying topology fixes to multiple errors.

Before applying a fix to multiple errors, it's a good idea to look at your data and evaluate whether the fixes are appropriate. You would not want to trim lines with dangles that actually needed to be snapped to another line, or extend a line that actually needed to be trimmed.

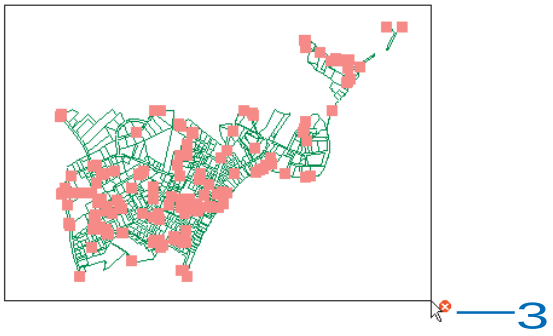
In this case, if you extend dangling lines that are within three meters of another line, you're not likely to cause problems with your data, since the parcels and rights-of-way are larger than three meters.

Now you'll use this method to clean up several errors at one time.



1. Click the Full Extent button.

2. Click the Fix Topology Error tool.

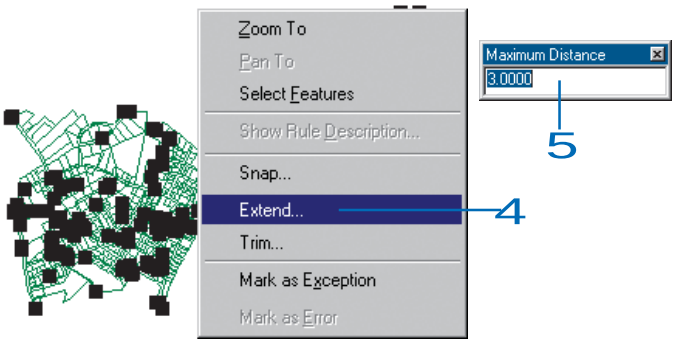


3. Click and drag a box around all of the errors on the map.

   This selects all of the errors. Now you'll fix the undershoots.

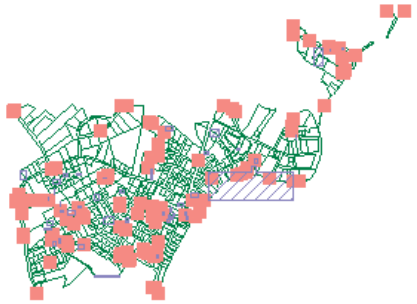
4. Right-click on the map and click Extend.

5. The Maximum Distance you set when you fixed the other undershoot is fine, so press Enter.

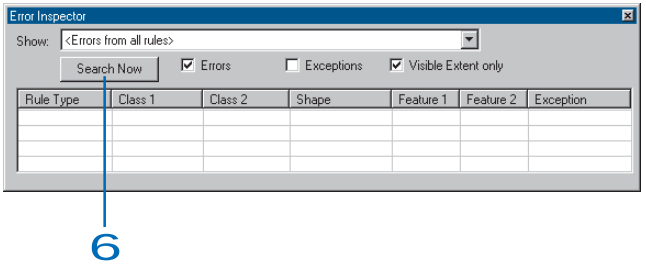


The process may take a few seconds while all of the features with dangles are checked to see if there is a feature within three meters that they can be extended to.

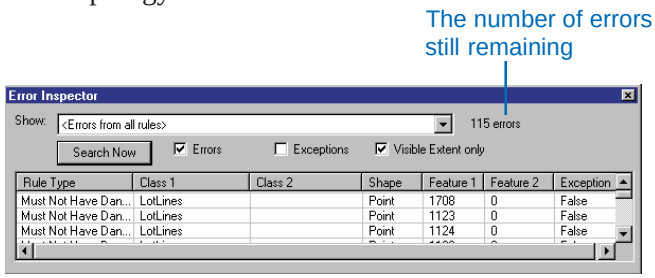
The undershoots are fixed, and a number of dirty areas appear on the map. Each dirty area marks the bounding box of a feature that was edited by the extend error fix.



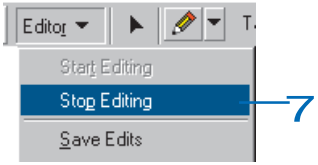
6. Click Search Now on the Error Inspector.



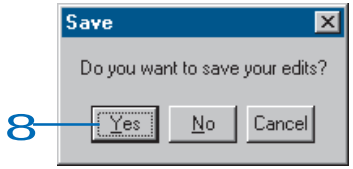
The number of topology errors is displayed to the right of the Show dropdown menu; you may have a different number of errors remaining. You will notice that many have been fixed. You could continue fixing topology errors to clean up this data, but you'll skip ahead in the process now, to see some other ways to clean up data with topology.



7. Click the Editor menu and click Stop Editing.



8. Click Yes to save your edits.

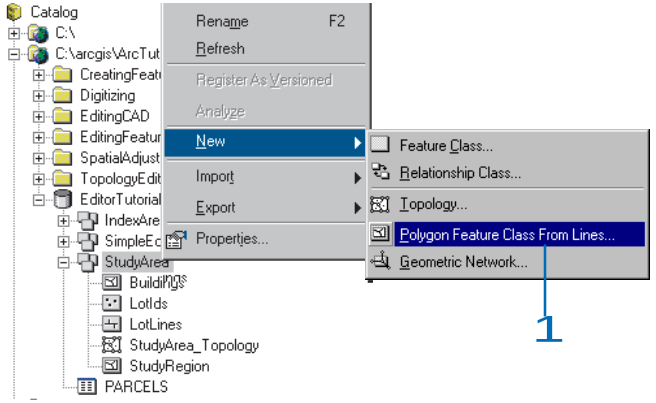


9. Close ArcMap.

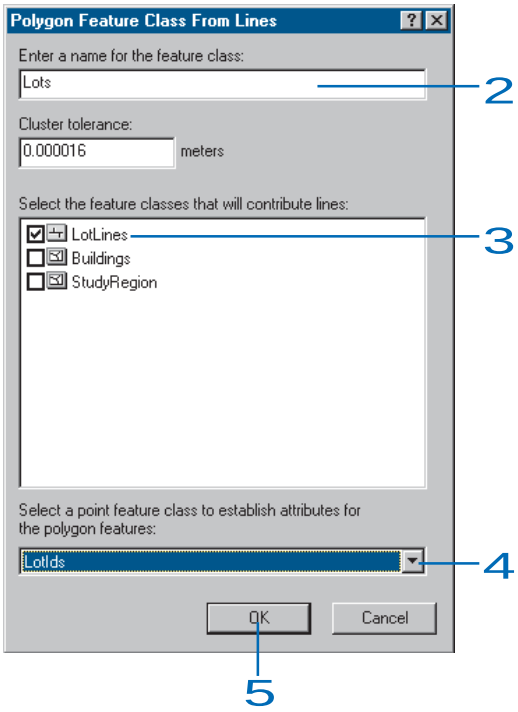
Creating a new polygon feature class

Now you'll create a new feature class of Lot polygons from the lot lines feature class that you've been working on and from a point feature class that will supply the attributes of the new lot features.

1. Right-click the StudyArea dataset in ArcCatalog, point to New and click Polygon Feature Class From Lines.

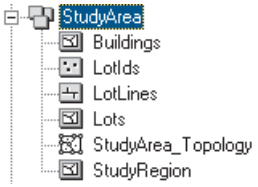


2. Type “Lots” as the new feature class’s name.



3. Check LotLines.
4. Click the point feature class dropdown list and click LotIds.
5. Click OK.

The new Lots polygon feature class is added to the StudyArea dataset. Next, you will include the Lots and LotIds feature classes in the topology so you can add rules to help you continue to clean up the data.



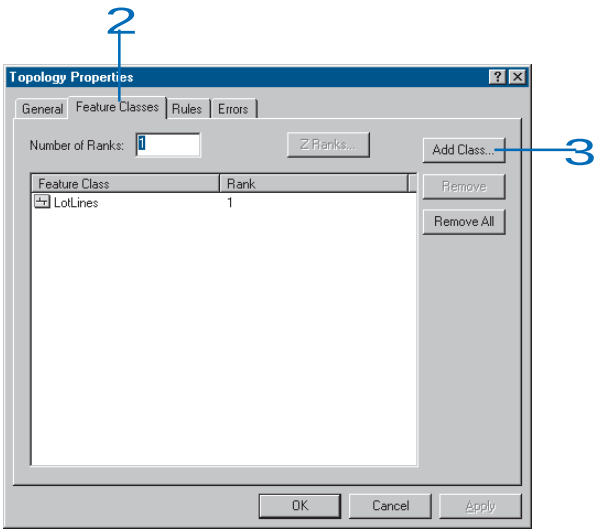
Adding feature classes to the topology

Before you can add topology rules for feature classes, you need to add the feature classes to the topology.

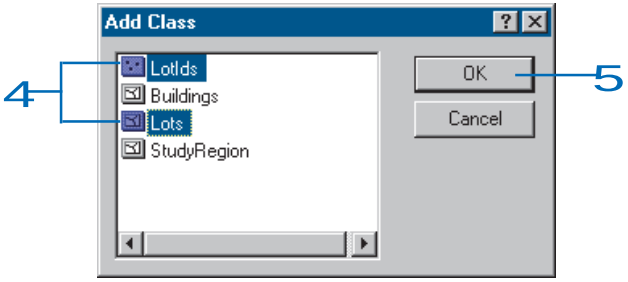
It is important to note that you are using this topology for the purpose of improving the polygon feature class you created from line work and points. You do not need to have the line or point feature classes to model the Lots—some organizations might decide to keep the LotLine feature class to provide easy annotation of lot boundary lengths, others might not. Likewise, the Lots Parcel_ID attribute is now stored in the polygon feature class—you’re using the LotIds feature class to quality check the data you’ve created. You might well decide not to keep the LotIds feature class when you’ve finished checking the data.

1. Right-click StudyArea_Topology and click Properties.

2. Click the Feature Classes tab.



3. Click Add Class.
4. Click LotIds, press and hold the Ctrl key, and click Lots.

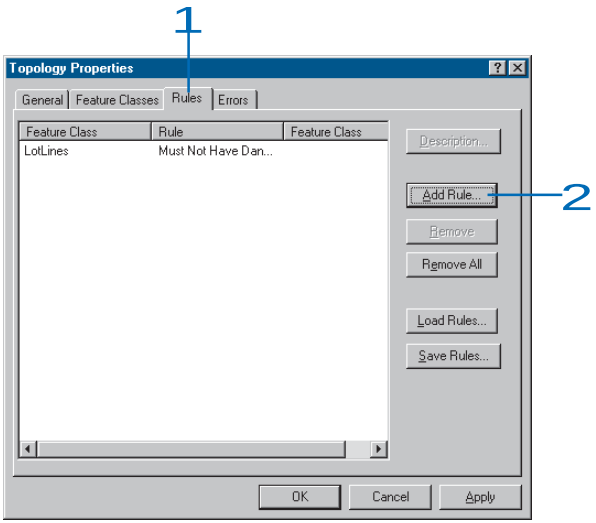


5. Click OK.

   Now that you've added these two feature classes to the topology, you can include them in topology rules.

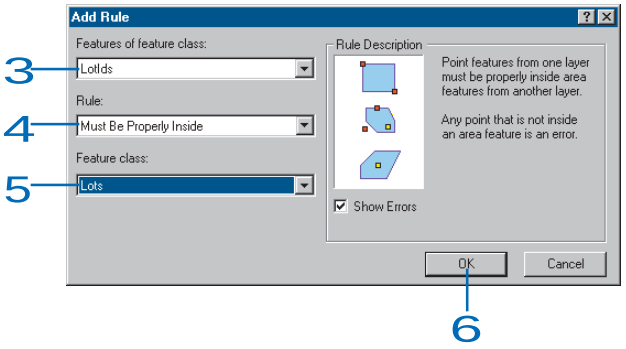
Adding rules to the topology

1. Click the Rules tab.



2. Click Add Rule.

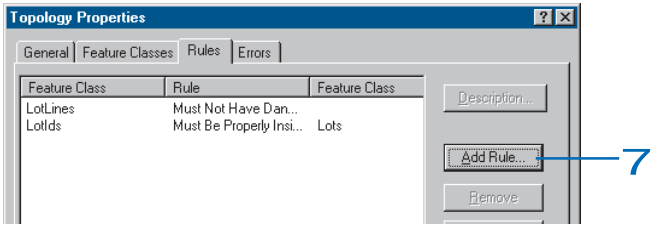
3. Click the Features of feature class dropdown arrow and click LotIds.



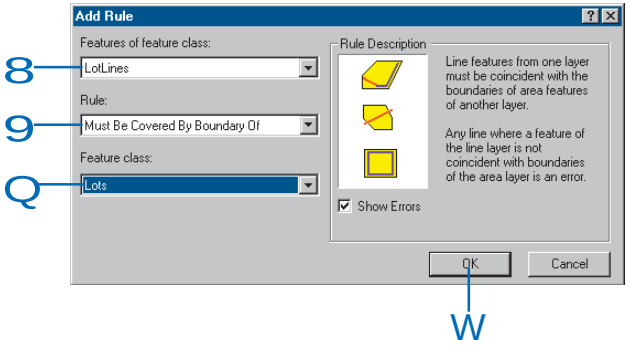
4. Click the Rule dropdown arrow and click Must be Properly Inside.
5. Click the Feature class dropdown arrow and click Lots.
6. Click OK.

This rule will be useful for finding places where lot polygons were not formed due to breaks in the line work.

7. Click Add Rule.



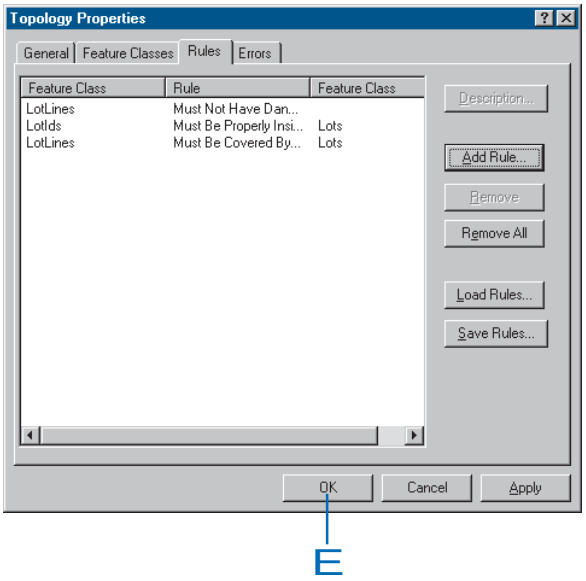
8. Click the Features of feature class dropdown arrow and click LotLines.



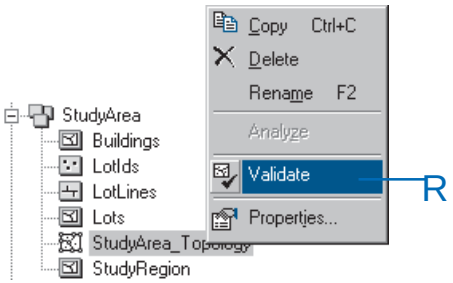
9. Click the Rule dropdown arrow and click Must be Covered By Boundary Of.
10. Click the Feature class dropdown arrow and click Lots.
11. Click OK.

This rule will be useful for finding polygons that were not completely split due to gaps in the line work.

12. Click OK.



13. Right-click StudyArea_Topology and click Validate.

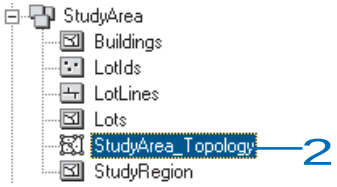


You've added two more feature classes to the topology and added topology rules to control their spatial relationships.

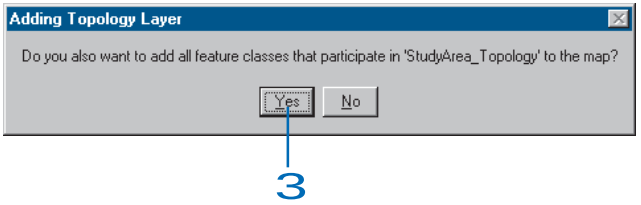
Adding the new topology to ArcMap

Now you'll examine the revised topology in ArcMap and continue cleaning up your data.

1. Start ArcMap.
2. Click and drag the topology from ArcCatalog onto ArcMap.



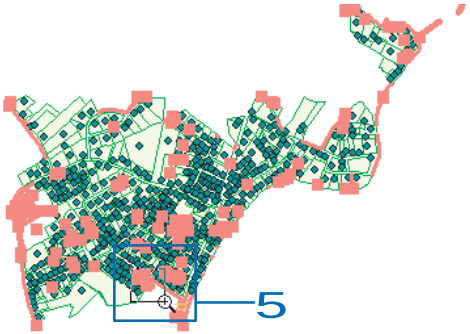
3. Click Yes to add all of the feature classes that participate in the topology to the map.



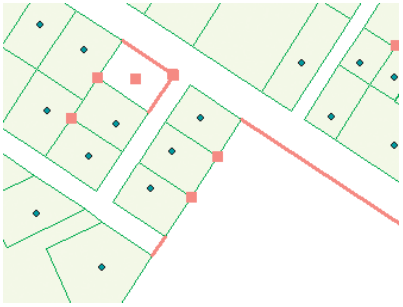
The topology and the feature classes that participate in it are added to the map.

4. Click the Zoom In tool.

5. Click and drag a box around the central part of the south edge of the data.



Now there are line and point errors visible on the map.

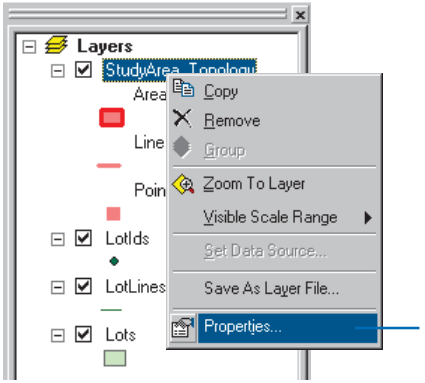


The red lines represent a new type of error feature, line errors. These show violations of the Must Be Covered By Boundary Of rule. There are two types of point errors now, violations of the Must Not Have Dangles rule, which you're already familiar with, and violations of the Must Be Properly Inside rule.

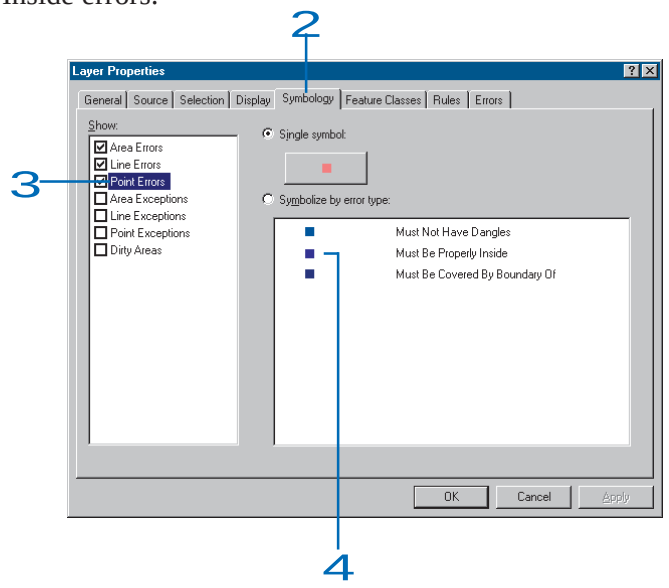
Changing a point error symbol

Since there is now more than one type of point error, you will change the symbology of the Topology layer to make it clearer which errors are which.

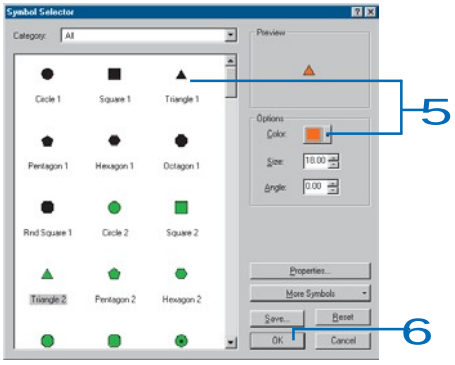
1. Click StudyArea_Topology in the ArcMap table of contents so only it is selected. Right-click it and click Properties.



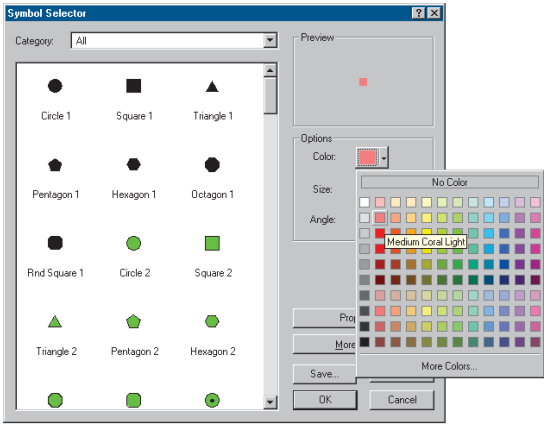
2. Click the Symbology tab.
3. Click Point Errors.
4. Double-click the square symbol for Must Be Properly Inside errors.



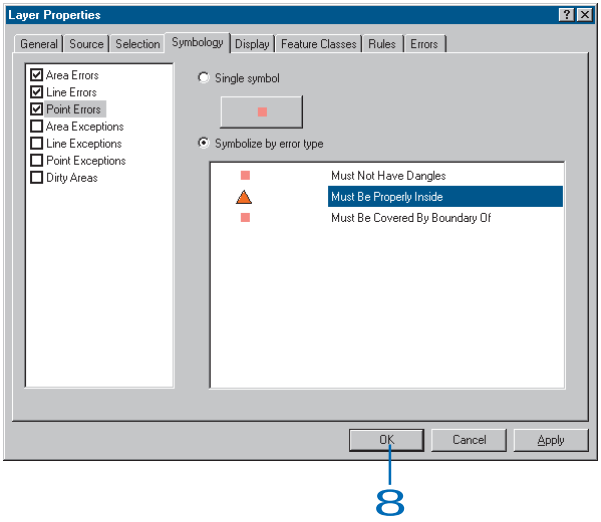
5. Click a triangle symbol and set the color to red.



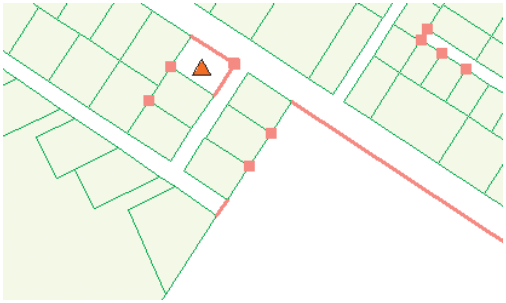
6. Click OK.
7. Double-click each of the square symbols for the other two errors and set their colors to Medium Coral Light.



8. Click OK on all dialog boxes.



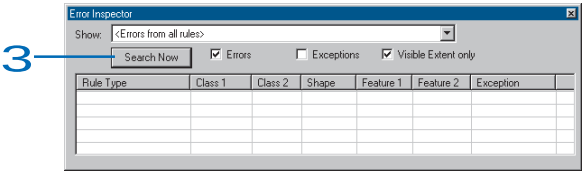
The triangle marks the LotID point for a lot that was not created when you created polygons from lines. The red square to the east of the triangle is actually a pair of dangles where the lot lines were not snapped together. The two lot lines are marked as errors because they are not covered by a lot polygon boundary.



1. Click Editor and click Start Editing.

2. Click the Error Inspector button.

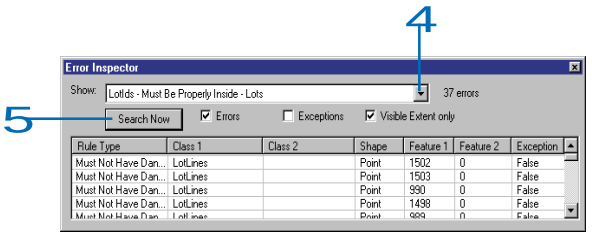
3. Click Search Now.



The visible extent of your map will determine how many errors you see.

4. Click the Show dropdown list and click LotIds - Must Be Properly Inside - Lots.

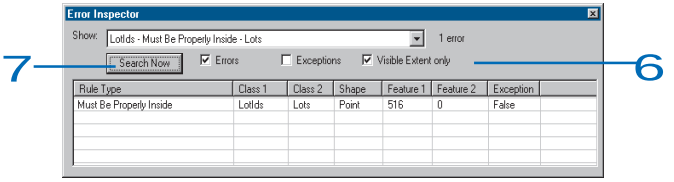
5. Click Search Now.



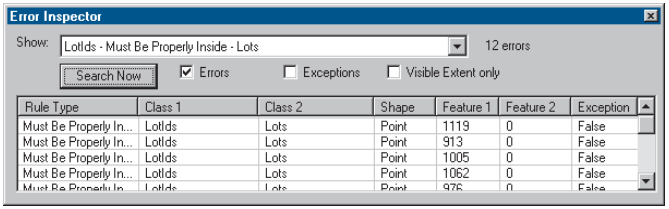
Now you can see the one violation of this rule visible in this part of the data. You can use the Error Inspector to sort through the various types of topology errors in your map.

6. Uncheck Visible Extent only.

7. Click Search Now.

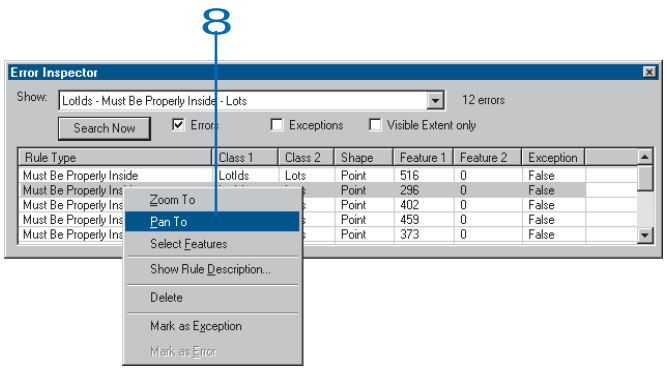


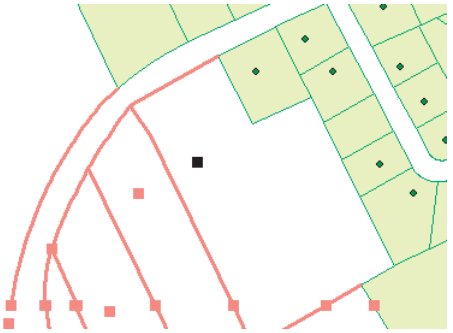
There are several violations of this rule in the topology. After you fix this error, you could use the Error Inspector to systematically find the other LotIDs that are not within Lot polygons, although for this exercise you will not.



8. Right-click a feature in the Error Inspector table and click Pan To.

   The map pans to the error you selected.





Now you'll go back to the error you were just looking at and fix it.

9. Click the Go Back to Previous Extent button.