CHRISTOPHER PRENER, PH.D.
SPRING, 2017

WEEK 08
LECTURE 08

INTRO TO GIS$_C$

SPATIAL JOINS

AGENDA

1. Follow-up
2. GISc & Public Policy
3. Modifying Strings
4. Projecting Data
5. Spatial Joins
6. Table Joins

1 FOLLOW-UP

2 GISc & PUBLIC POLICY

3 MODIFYING STRINGS

MODIFYING STRINGS

In order to combine data sources, we sometimes need to modify identification variables or identify coordinate data that may not map correctly.

POTENTIAL ISSUES

- ID variables are string and need to be numeric

ID	X	Y
01	-90.236560	38.637241
02	-90.236799	38.636550
03	-90.237290	38.636661
04	-90.238154	38.636829
05	-90.237682	38.636735
06	-90.238942	38.636996
07	-90.239924	38.637206
08	-90.241313	38.637499
09	-90.236564	38.636492
10	-90.236062	38.636354

POTENTIAL ISSUES

```
destring oldVar, generate(newVar)
```

```
. destring ID, generate(idNum)
ID: all characters numeric;
idNum generated as byte
```

ID
01
02
03
04
05
06
07
08
09
10

idNum
1
2
3
4
5
6
7
8
9
10

POTENTIAL ISSUES

- ID variables are string and need to be numeric
- ID variables are numeric and need to be string

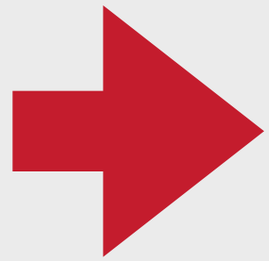
ID	X	Y
1	-90.236560	38.637241
2	-90.236799	38.636550
3	-90.237290	38.636661
4	-90.238154	38.636829
5	-90.237682	38.636735
6	-90.238942	38.636996
7	-90.239924	38.637206
8	-90.241313	38.637499
9	-90.236564	38.636492
10	-90.236062	38.636354

POTENTIAL ISSUES

```
generate newVar = string(oldVar)
```

```
. generate ID = string(idNum, “%02.0f”)
```

idNum
1
2
3
4
5
6
7
8
9
10



ID
1
2
3
4
5
6
7
8
9
10

POTENTIAL ISSUES

```
generate newVar = string(oldVar)
```

```
. generate ID = string(idNum)
```

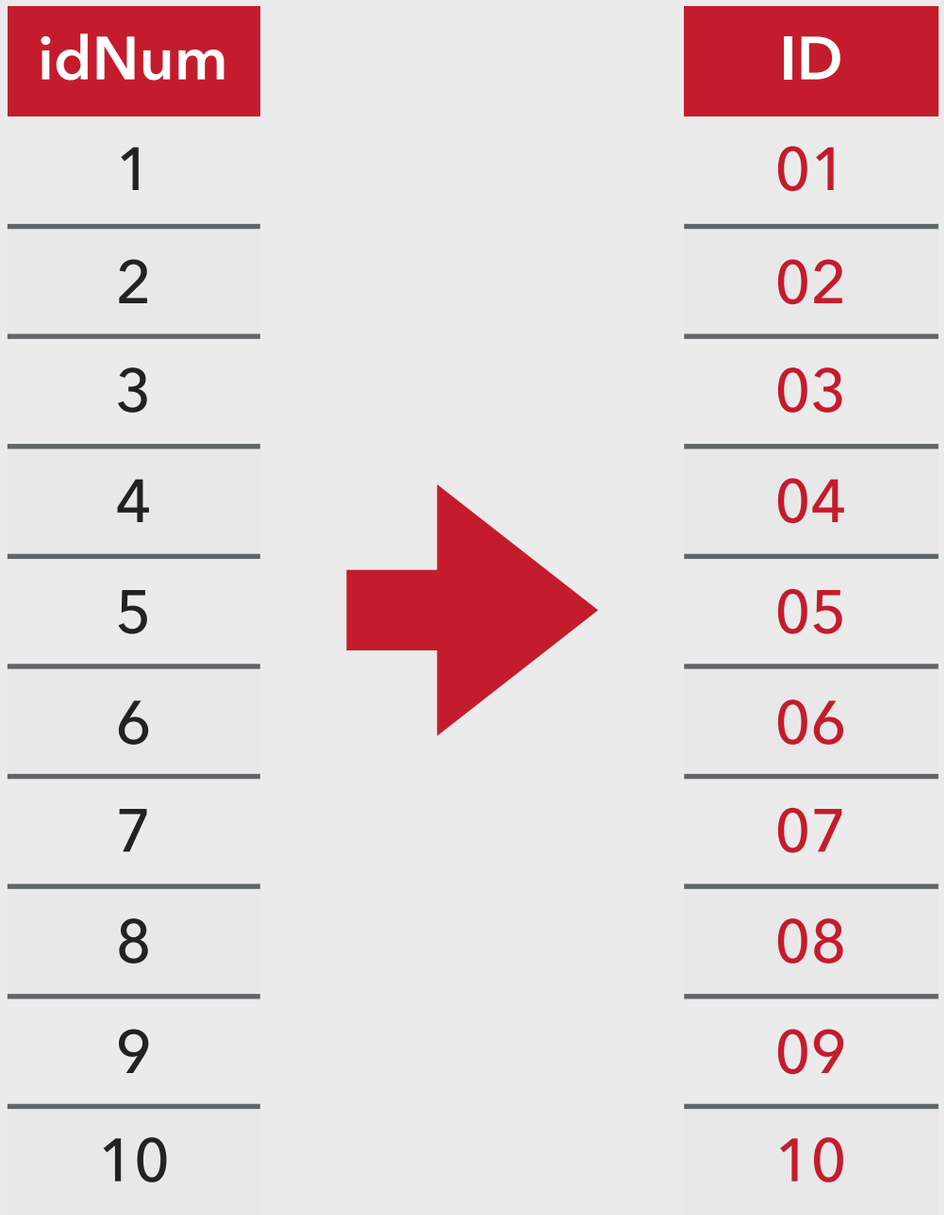
idNum
1
2
3
4
5
6
7
8
9
10

ID
1
2
3
4
5
6
7
8
9
10

POTENTIAL ISSUES

```
generate newVar = string(oldVar, fmt)
```

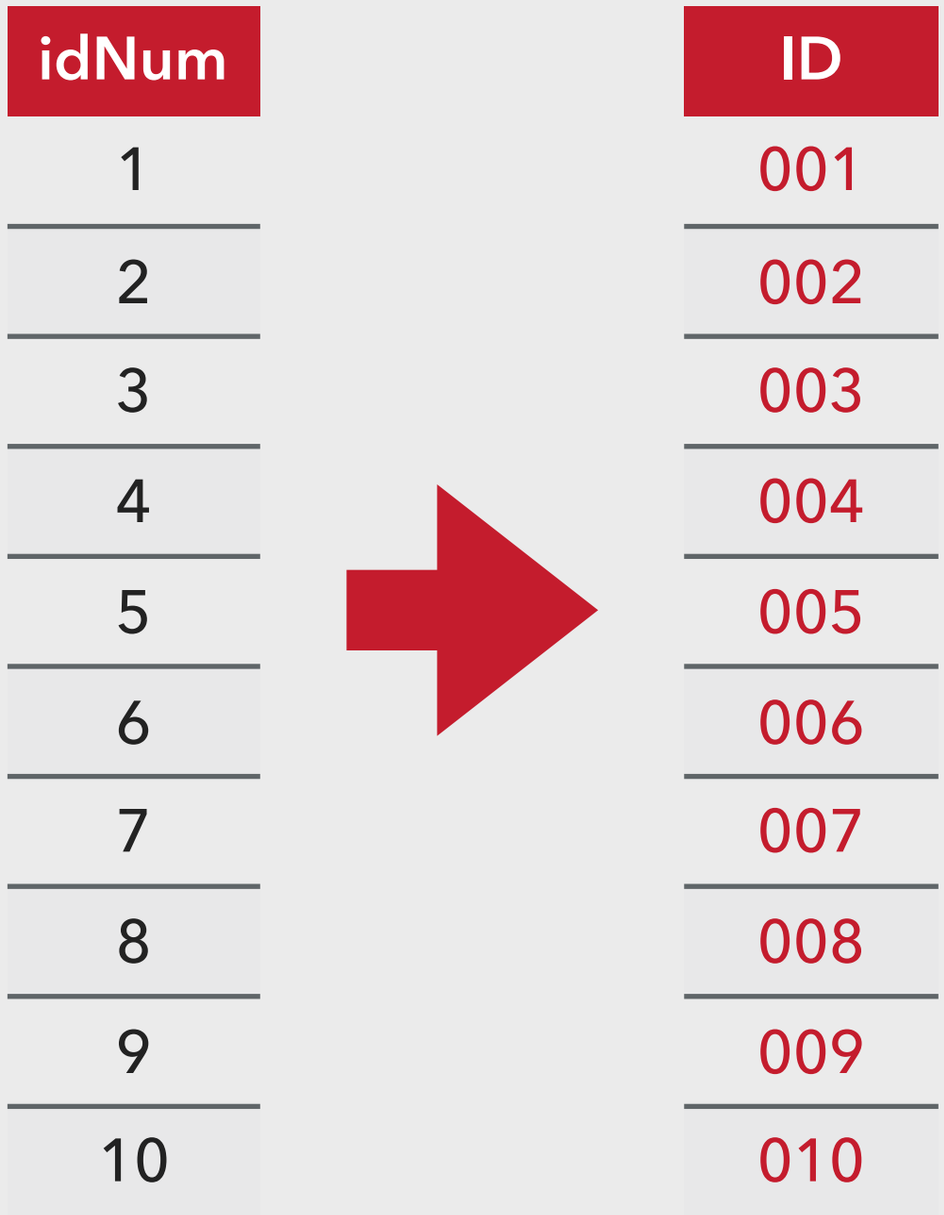
```
. generate ID = string(idNum, "%02.0f")
```



POTENTIAL ISSUES

```
generate newVar = string(oldVar, fmt)
```

```
. generate ID = string(idNum, "%03.0f")
```



POTENTIAL ISSUES

- ID variables are string and need to be numeric
- ID variables are numeric and need to be string
- Coordinate variables are string and need to be numeric

ID	X	Y
1	-90.236560	38.637241
2	-90.236799	38.636550
3	-90.237290	38.636661
4	-90.238154	38.636829
5	-90.237682	38.636735
6	-90.238942	38.636996
7	-90.239924	38.637206
8	-90.241313	38.637499
9	-90.236564	38.636492
10	-90.236062	38.636354

POTENTIAL ISSUES

- ID variables are string and need to be numeric
- ID variables are numeric and need to be string
- Coordinate variables are string and need to be numeric
- Incomplete coordinate data

ID	X	Y
1	-90.236560	38.637241
2	-90.236799	38.636550
3	-90.237290	38.636661
4	-90.238154	38.636829
5	-90.237682	38.636735
6	-90	38
7	-90.239924	38.637206
8	0	0
9	-90.236564	38.636492
10	-90.236062	38.636354

POTENTIAL ISSUES

```
generate lengthVar = strleng(refVar)
```

```
. generate xLeng = strleng(X)
```

X	xLeng
-90.236560	10
-90.236799	10
-90.237290	10
-90.238154	10
-90.237682	10
-90	3
-90.239924	10
0	1
-90.236564	10
-90.236062	10

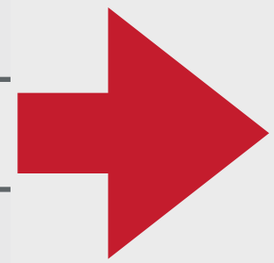
POTENTIAL ISSUES

```
generate newVar = strleng(oldVar)
```

```
. generate xLeng = strLeng(X)
```

```
. replace X = "" if xLeng < 10
```

X
-90.236560
-90.236799
-90.237290
-90.238154
-90.237682
-90
-90.239924
0
-90.236564
-90.236062



X
-90.236560
-90.236799
-90.237290
-90.238154
-90.237682
-90.239924
-90.236564
-90.236062

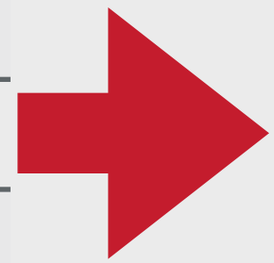
POTENTIAL ISSUES

```
generate newVar = strleng(oldVar)
```

```
. generate xLeng = strLeng(X)

. drop if xLeng < 10
```

X
-90.236560
-90.236799
-90.237290
-90.238154
-90.237682
-90
-90.239924
0
-90.236564
-90.236062

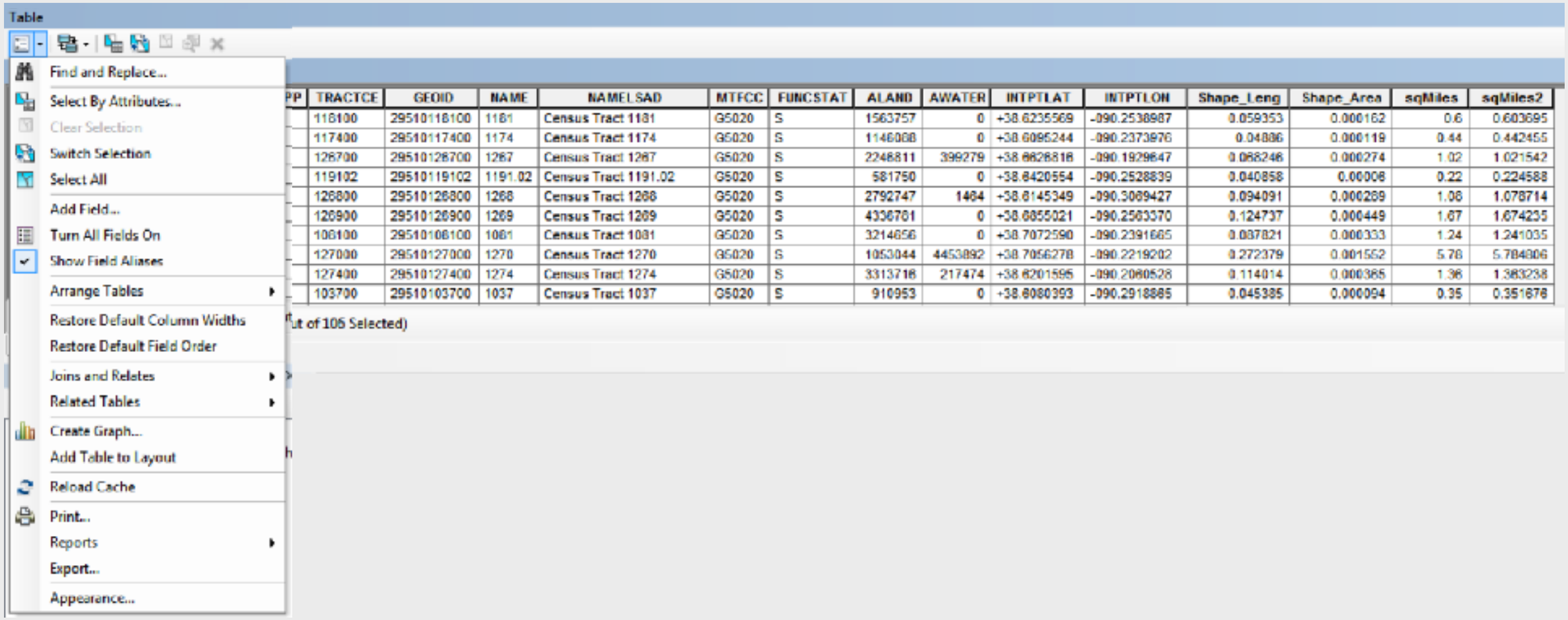


X
-90.236560
-90.236799
-90.237290
-90.238154
-90.237682
-90.239924
-90.236564
-90.236062

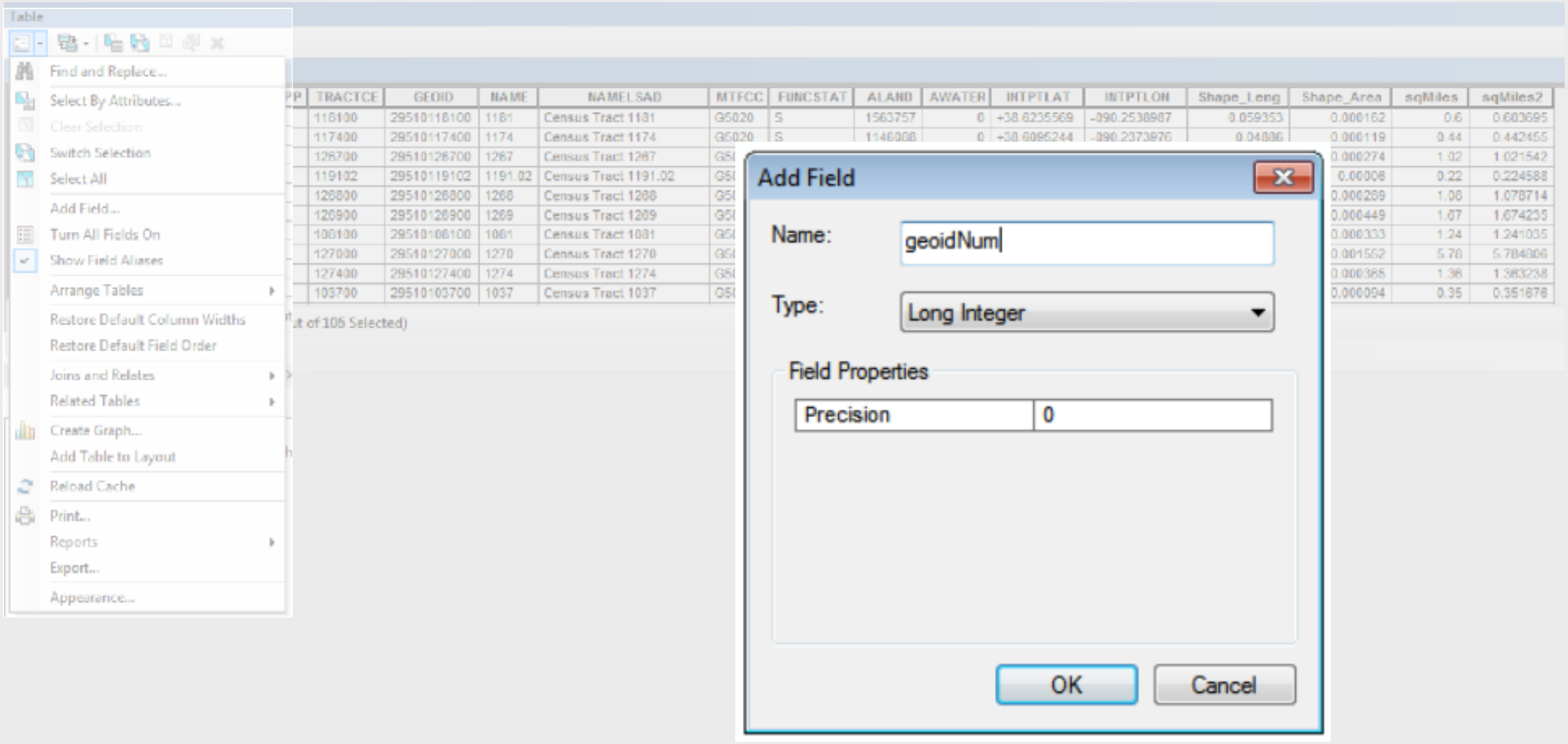
POTENTIAL ISSUES

- ID variables are string and need to be numeric
- ID variables are numeric and need to be string
- Coordinate variables are string and need to be numeric
- Incomplete coordinate data

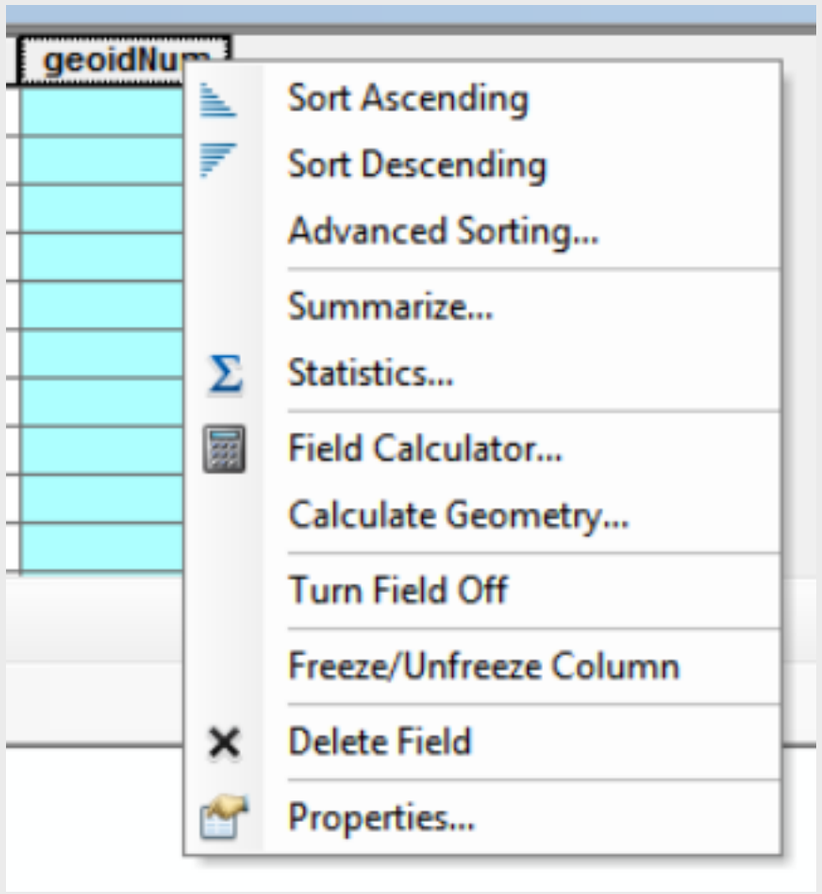
POTENTIAL ISSUES

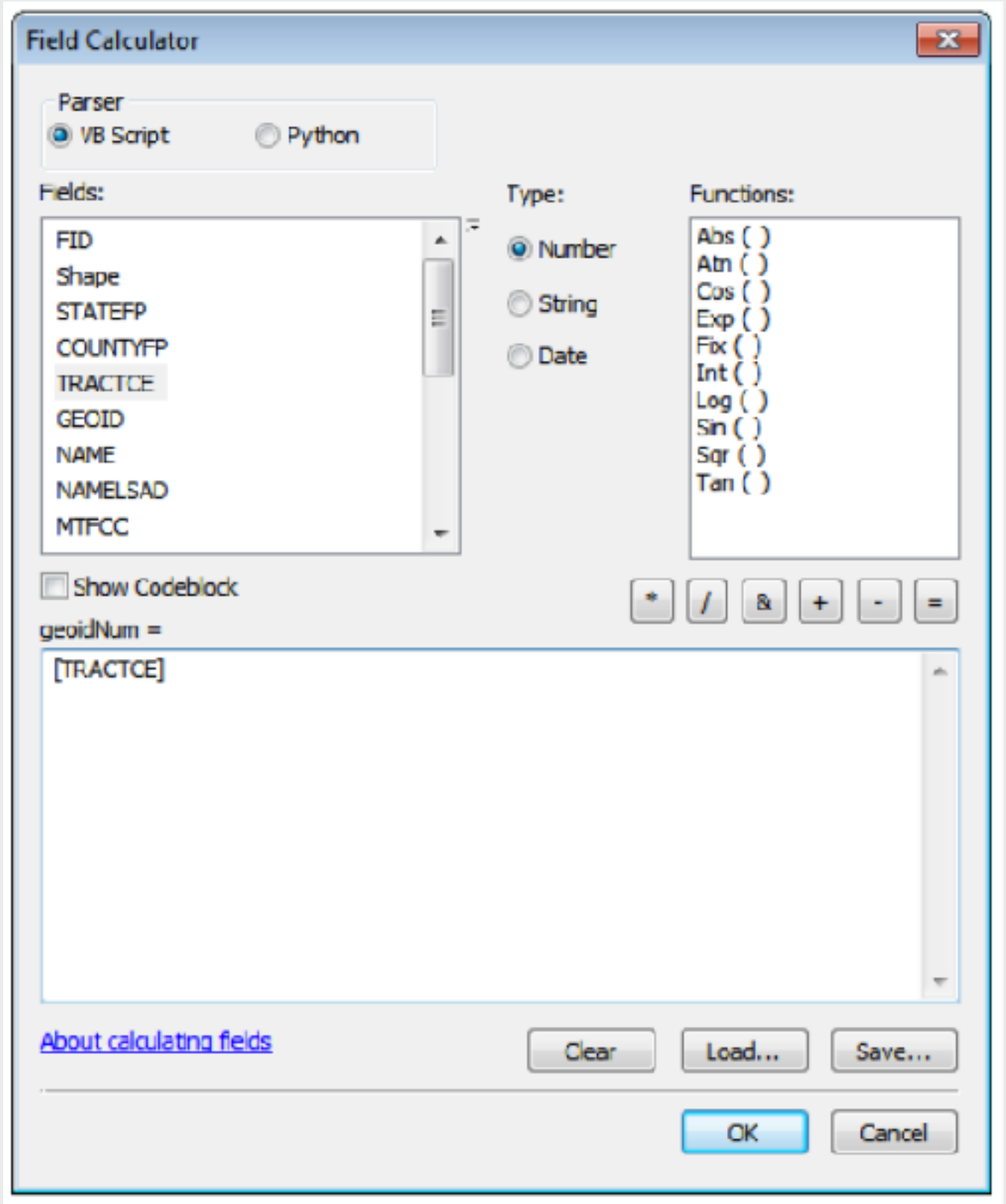


POTENTIAL ISSUES



POTENTIAL ISSUES





4 PROJECTING DATA

PROJECTING DATA

When your tabular data have x,y coordinates (decimal degrees or UTM coordinates), they can be projected into your map document.

PROJECTING DATA

A word of caution - ArcGIS struggles with csv files when importing data in ArcMap. You will likely need to save csv files as xlsx files using Microsoft Excel. This applies to table joins as well.

PROJECTING DATA

Remember that the x coordinate is longitude and the y coordinate is latitude if your data are in decimal degrees.

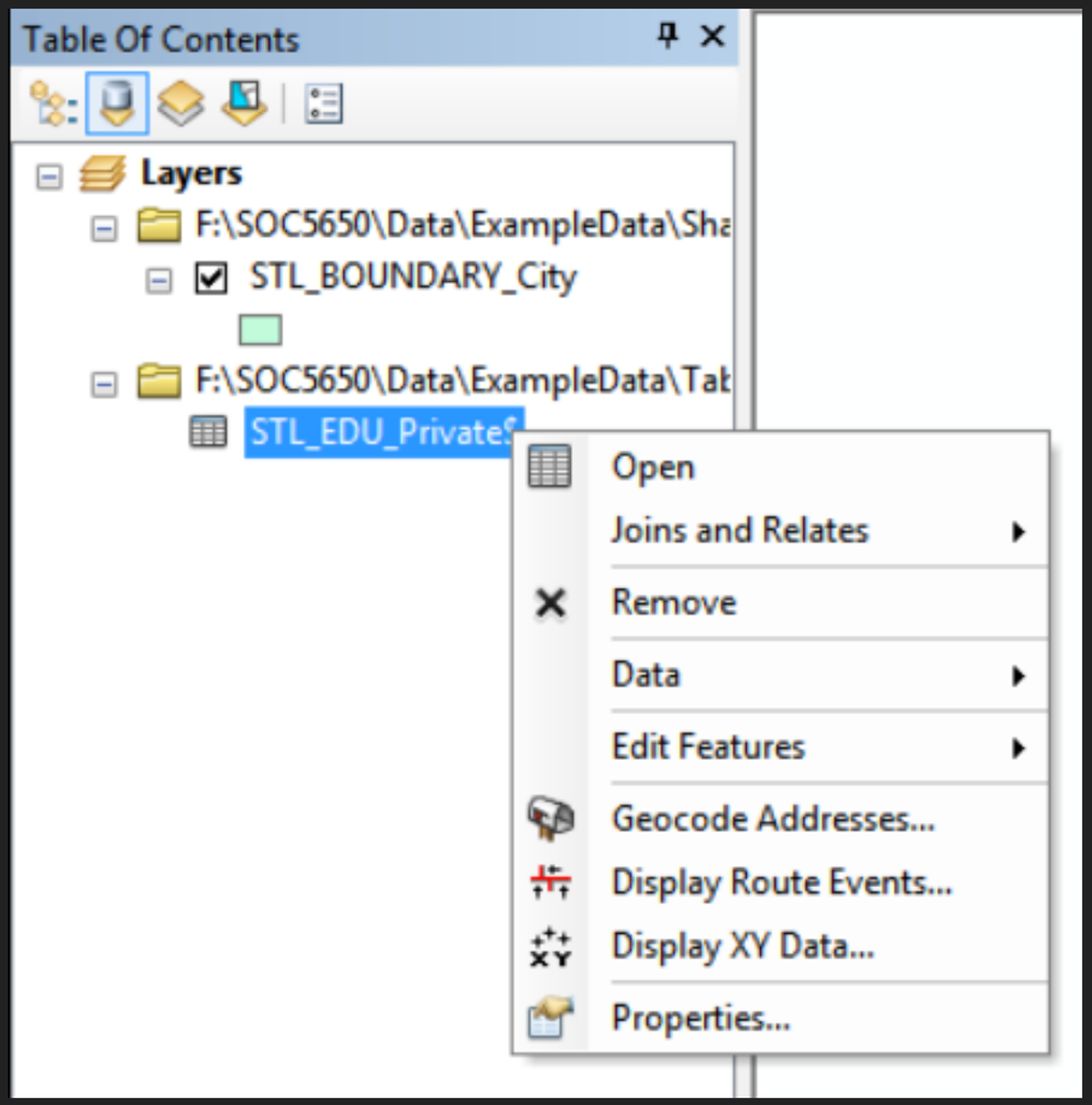
TRANSFORMING TABULAR DATA TO SHAPEFILES

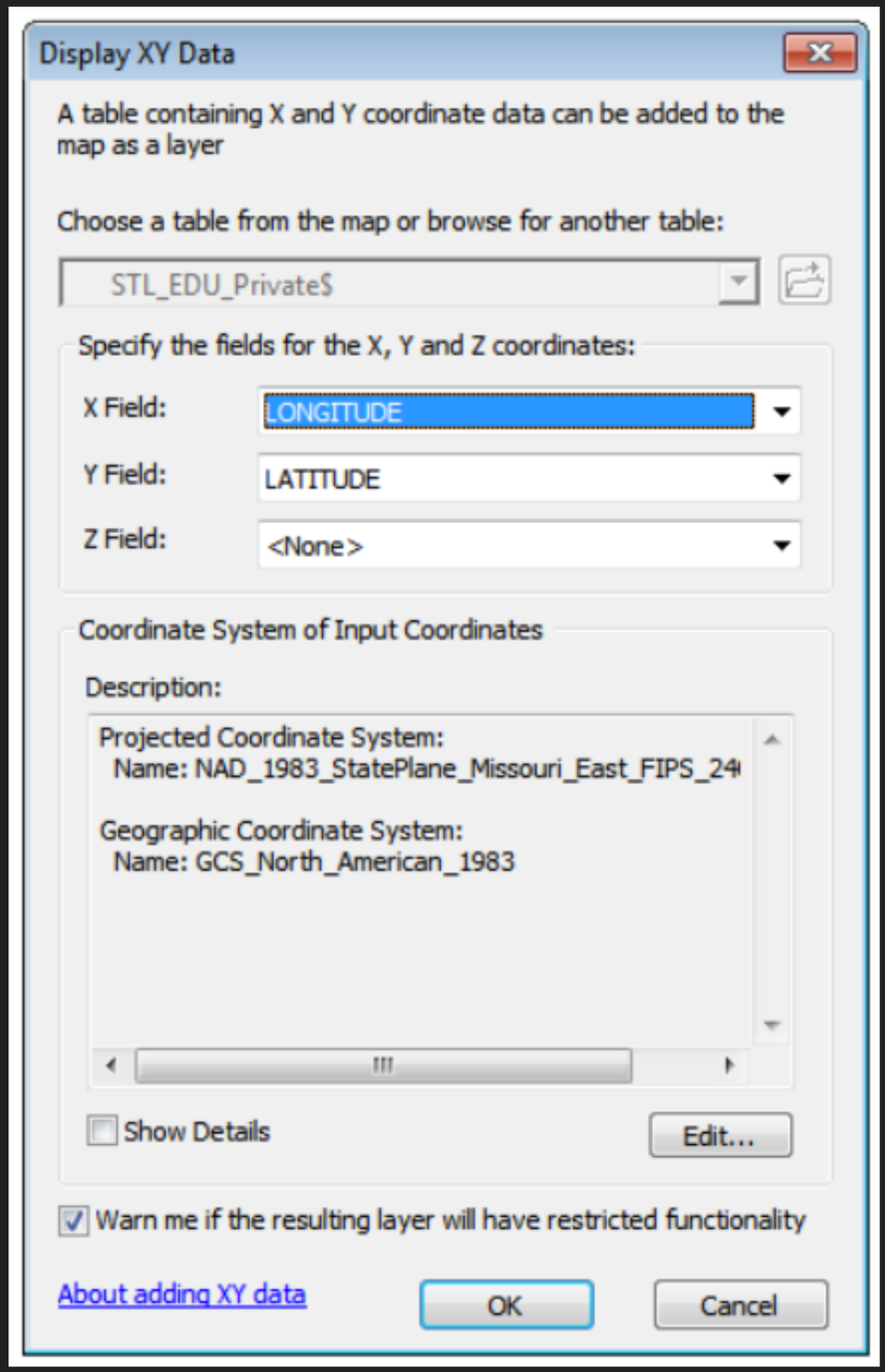
ID	X	Y
1	-90.236560	38.637241
2	-90.236799	38.636550
3	-90.237290	38.636661
4	-90.238154	38.636829
5	-90.237682	38.636735
6	-90.238942	38.636996
7	-90.239924	38.637206
8	-90.241313	38.637499
9	-90.236564	38.636492
10	-90.236062	38.636354

PROJECTING DATA

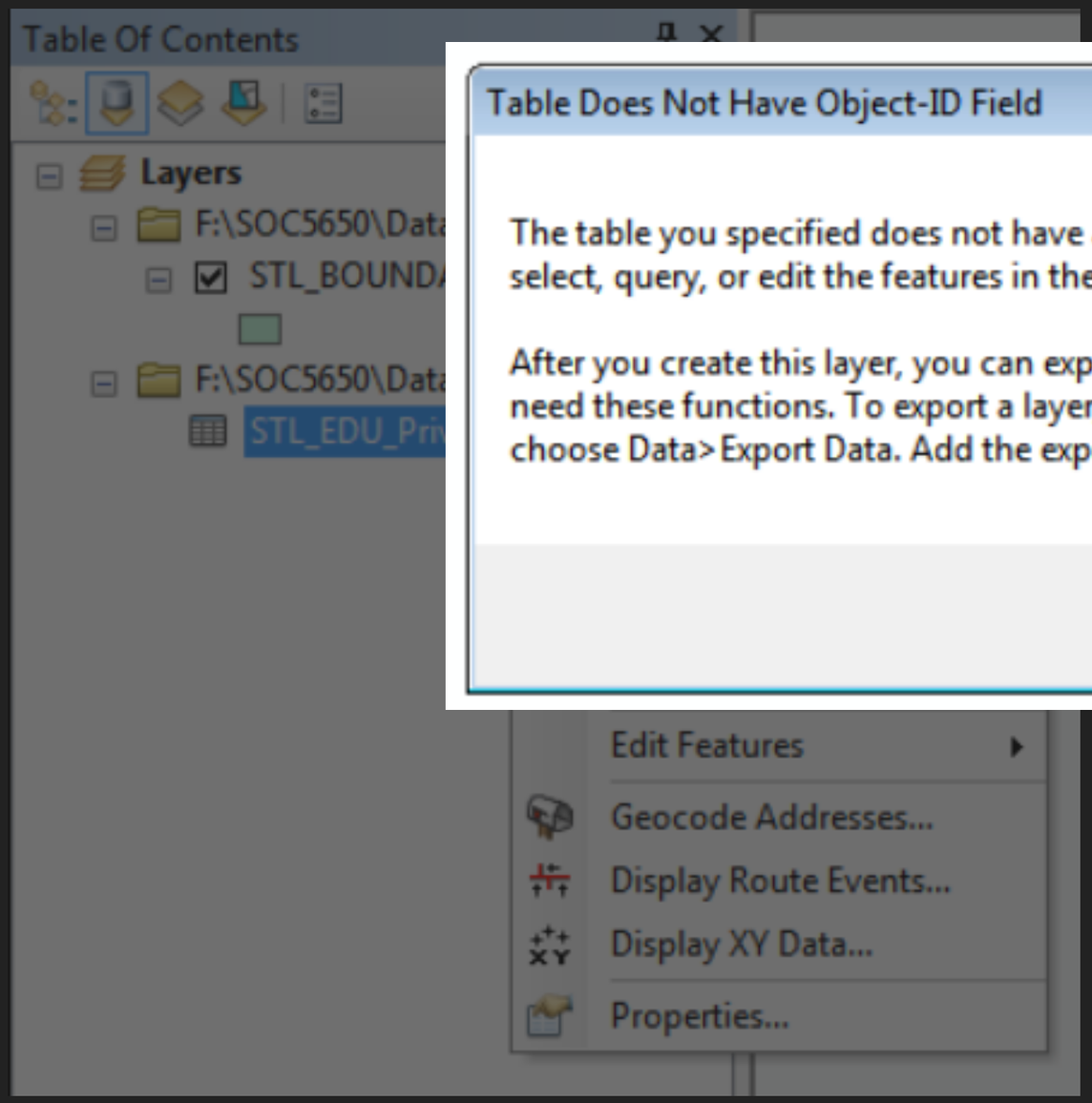
We have the locations of all private schools stored in a csv file with latitude and longitude coordinates. We want to convert them from tabular to geometric data.

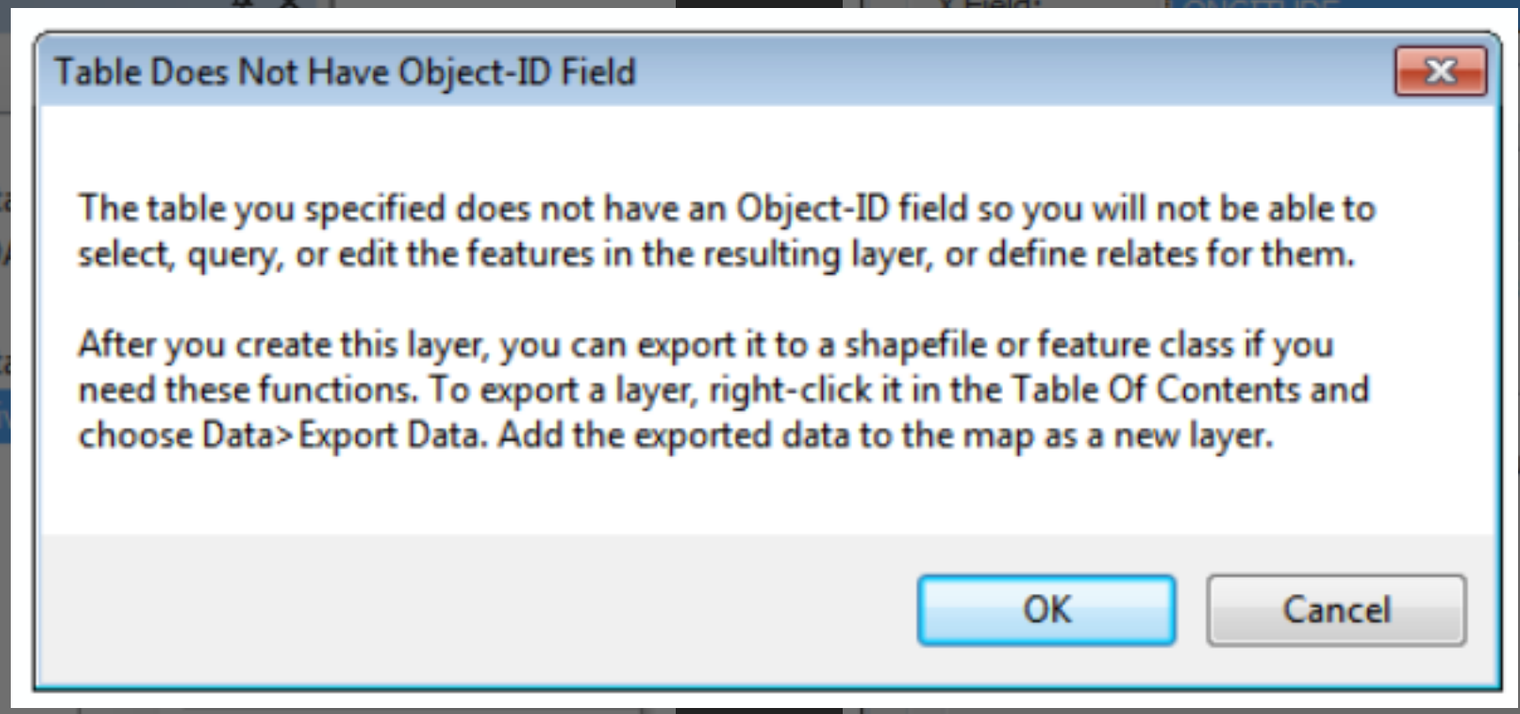
DISPLAY DATA

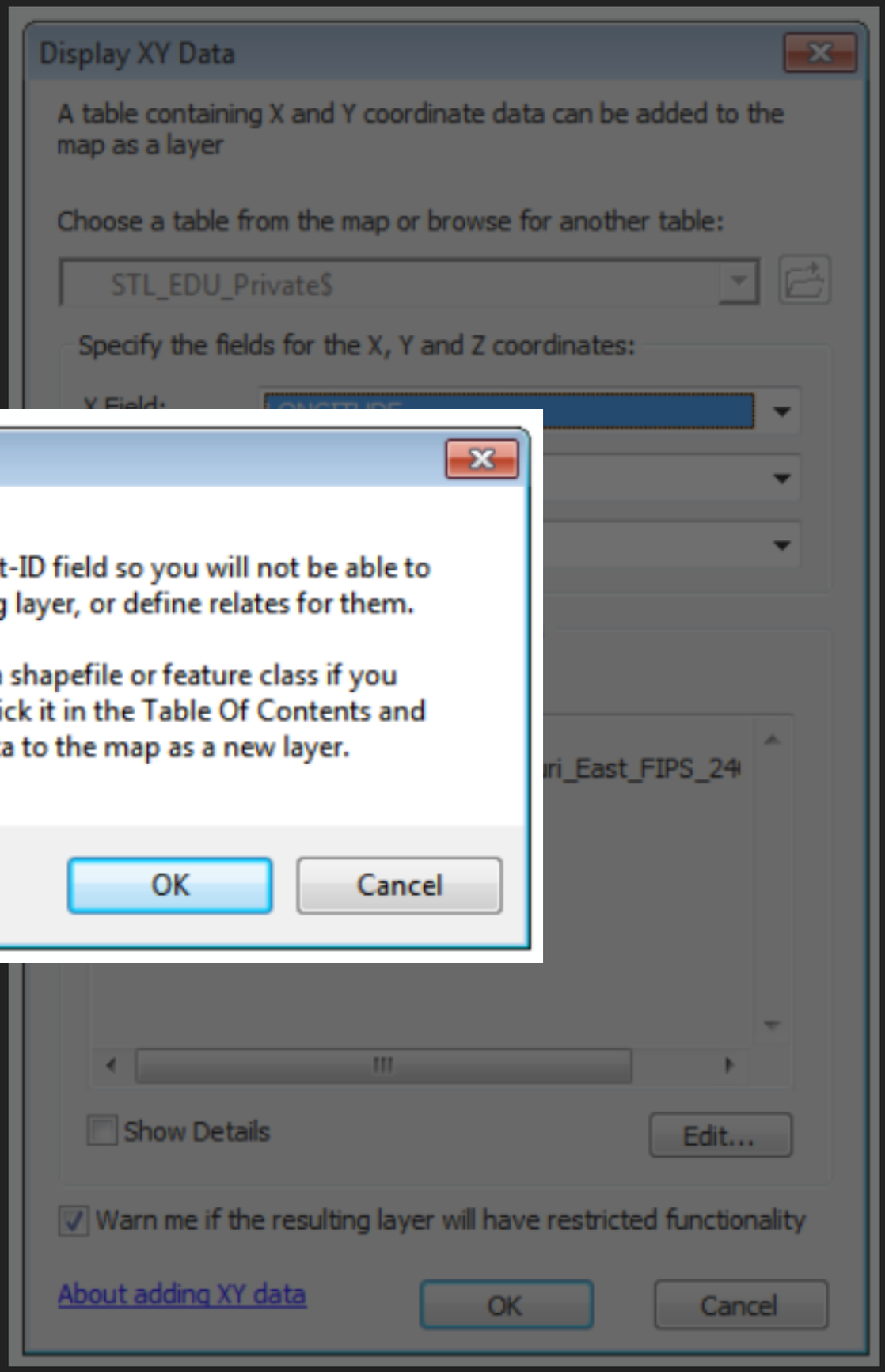




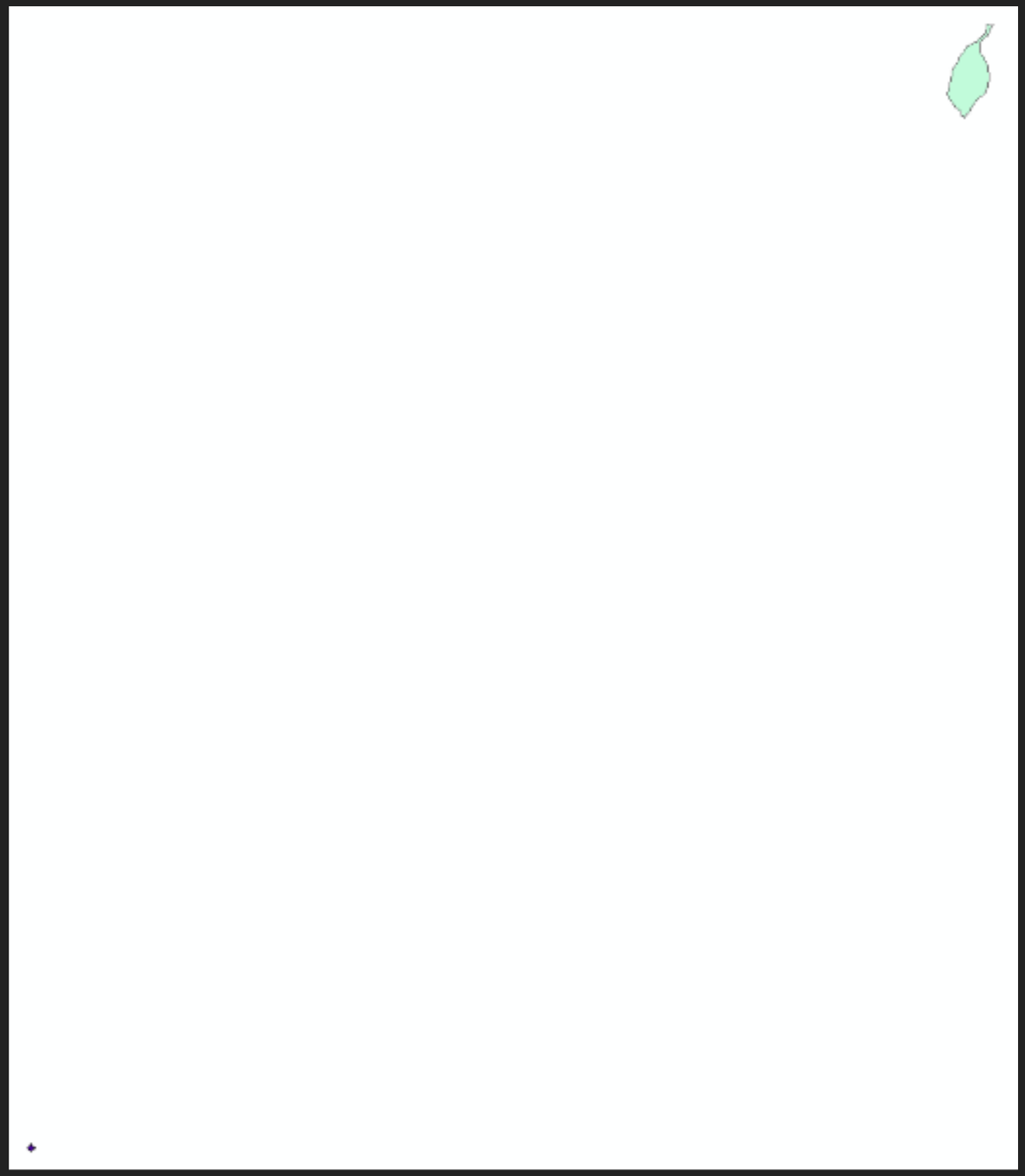
DISPLAY DATA

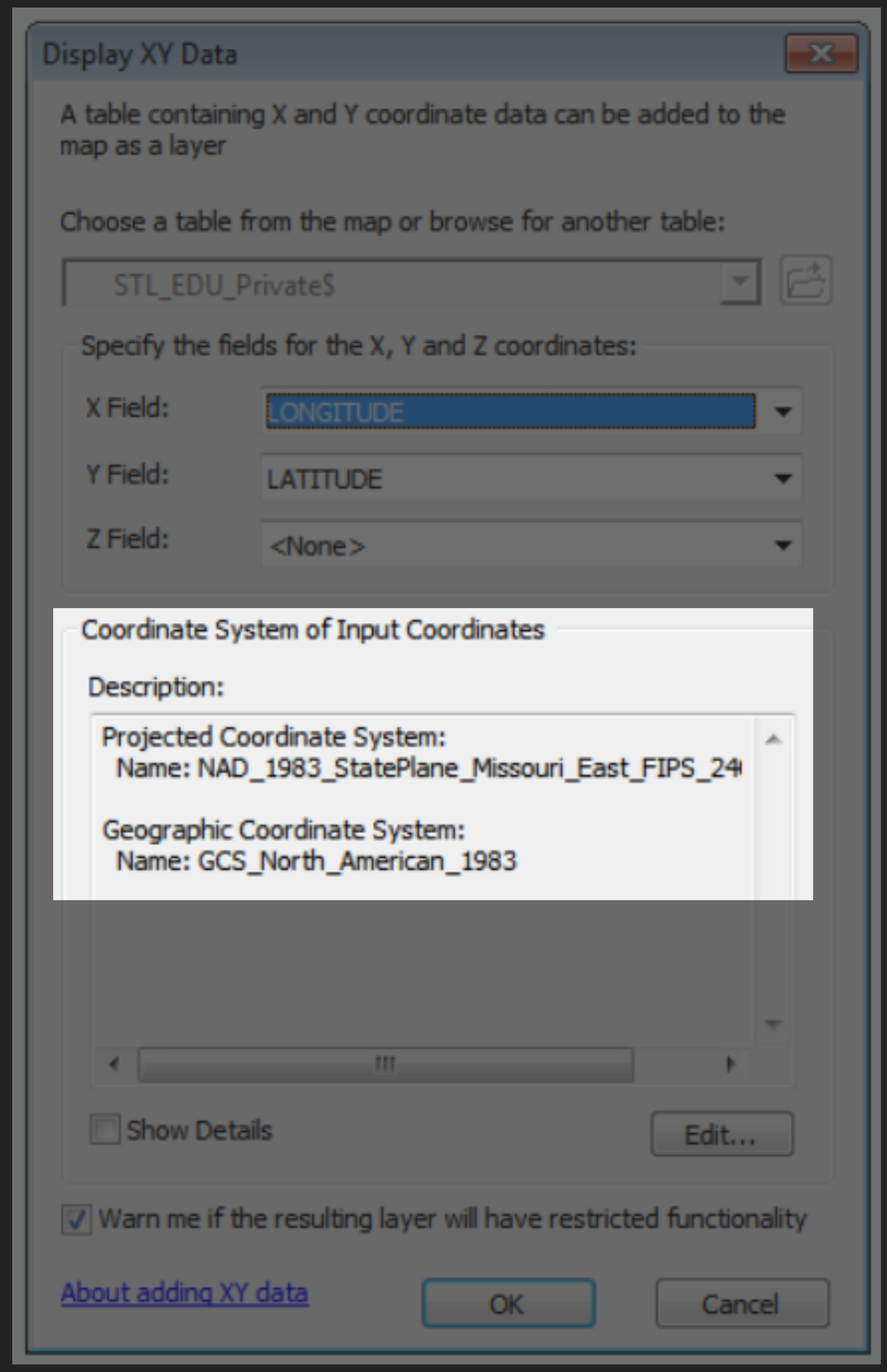






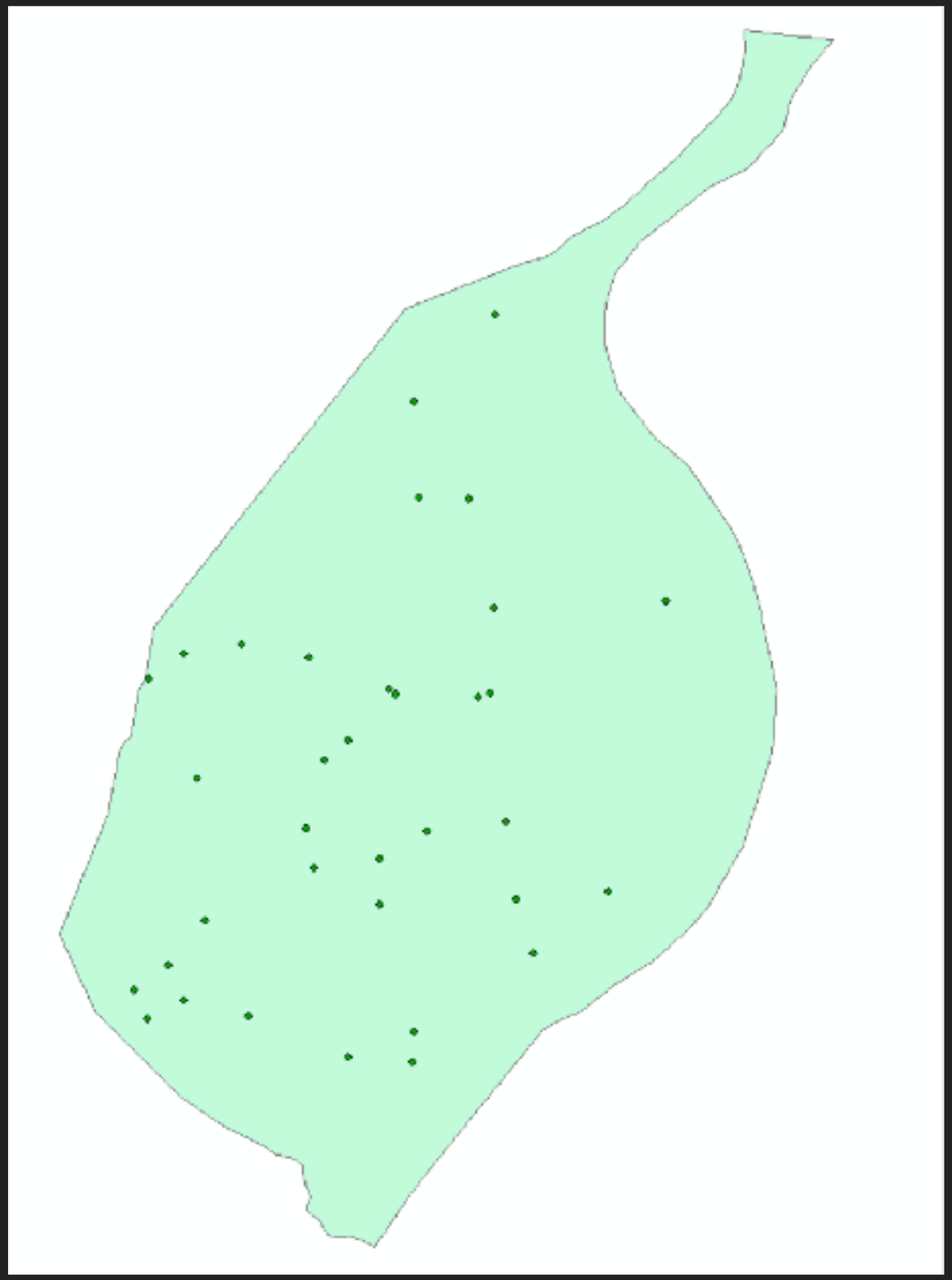
CHECKING DATA

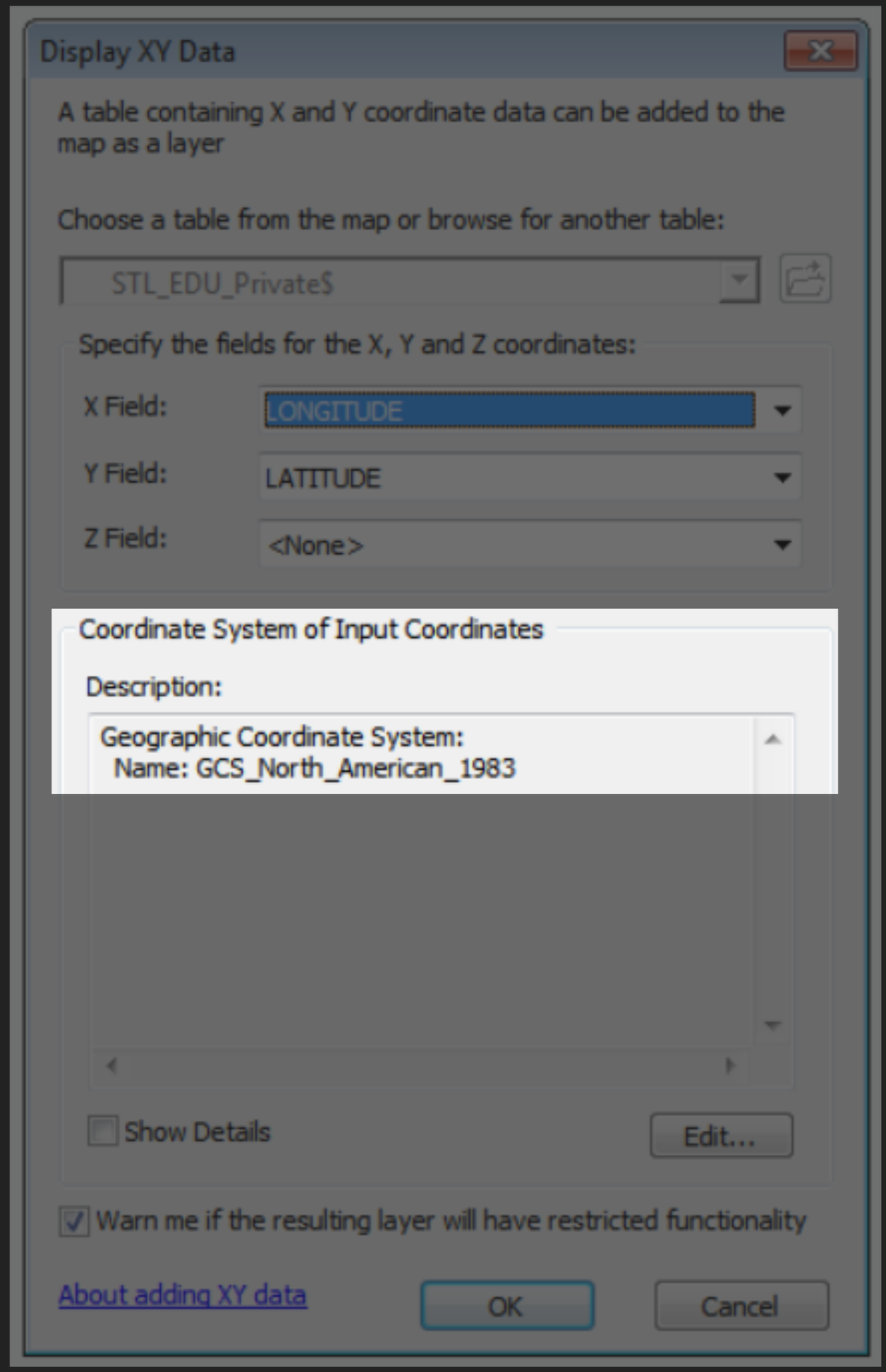




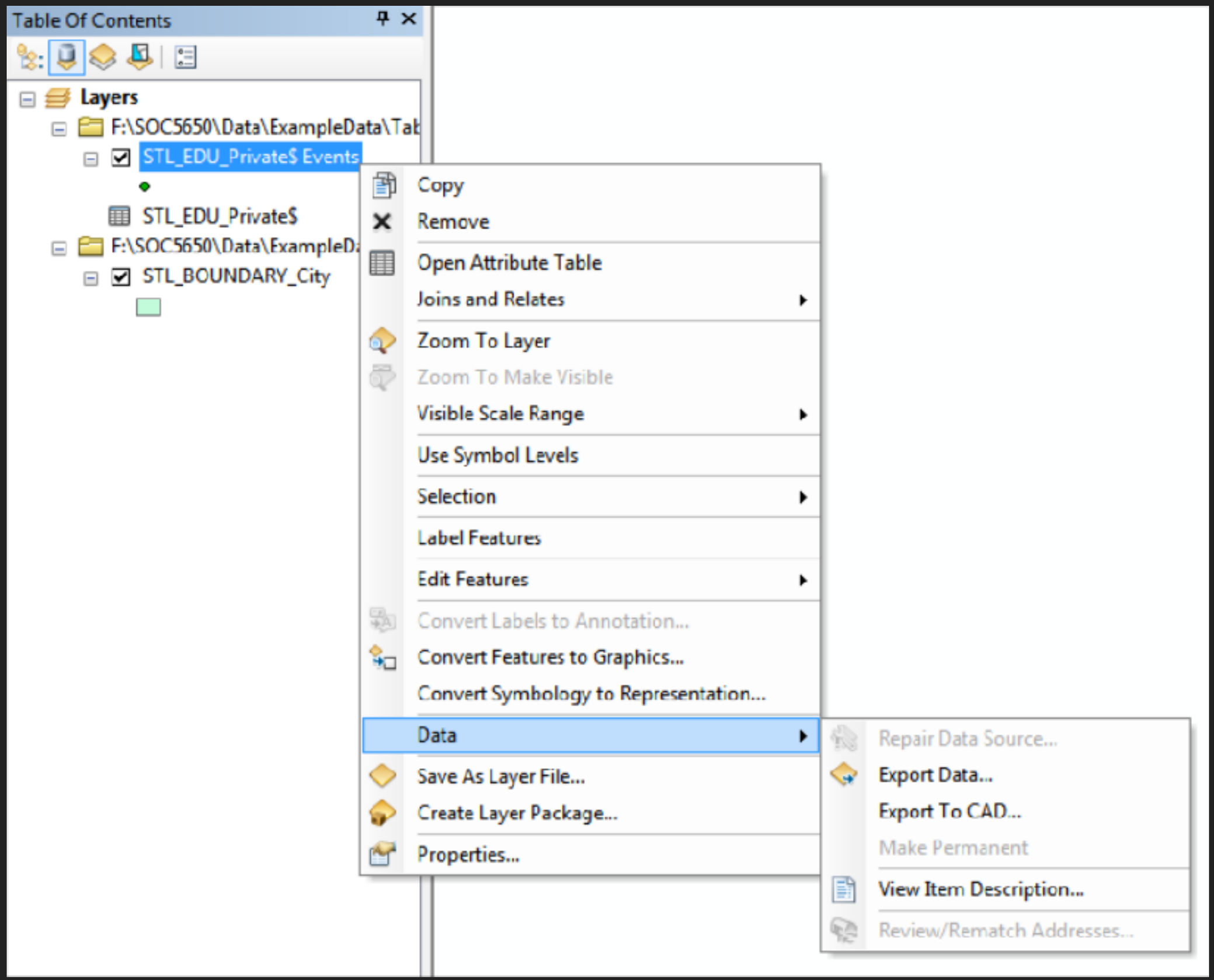
CHECK DATA

CHECKING DATA

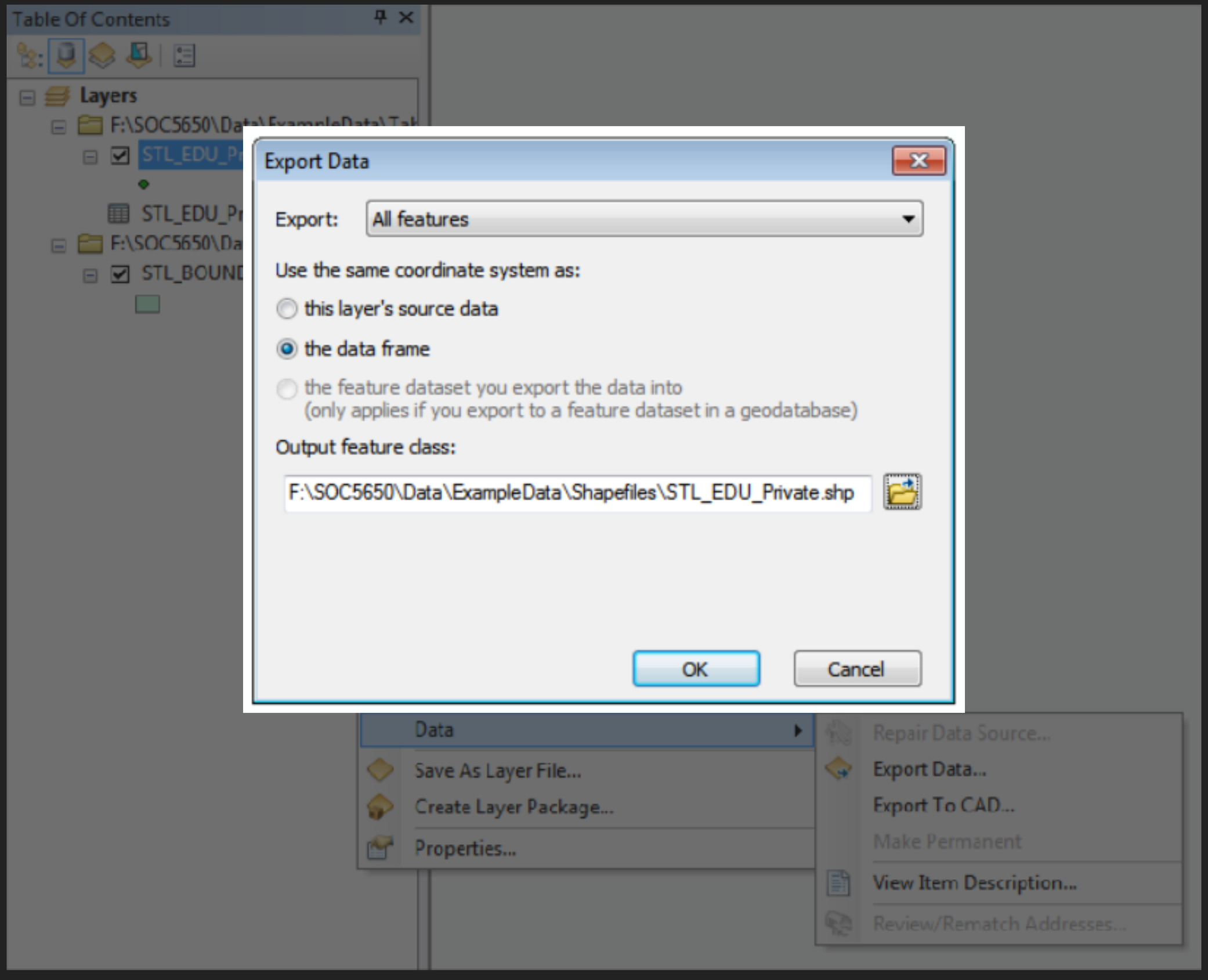




EXPORTING DATA



EXPORTING DATA



5 SPATIAL JOINS

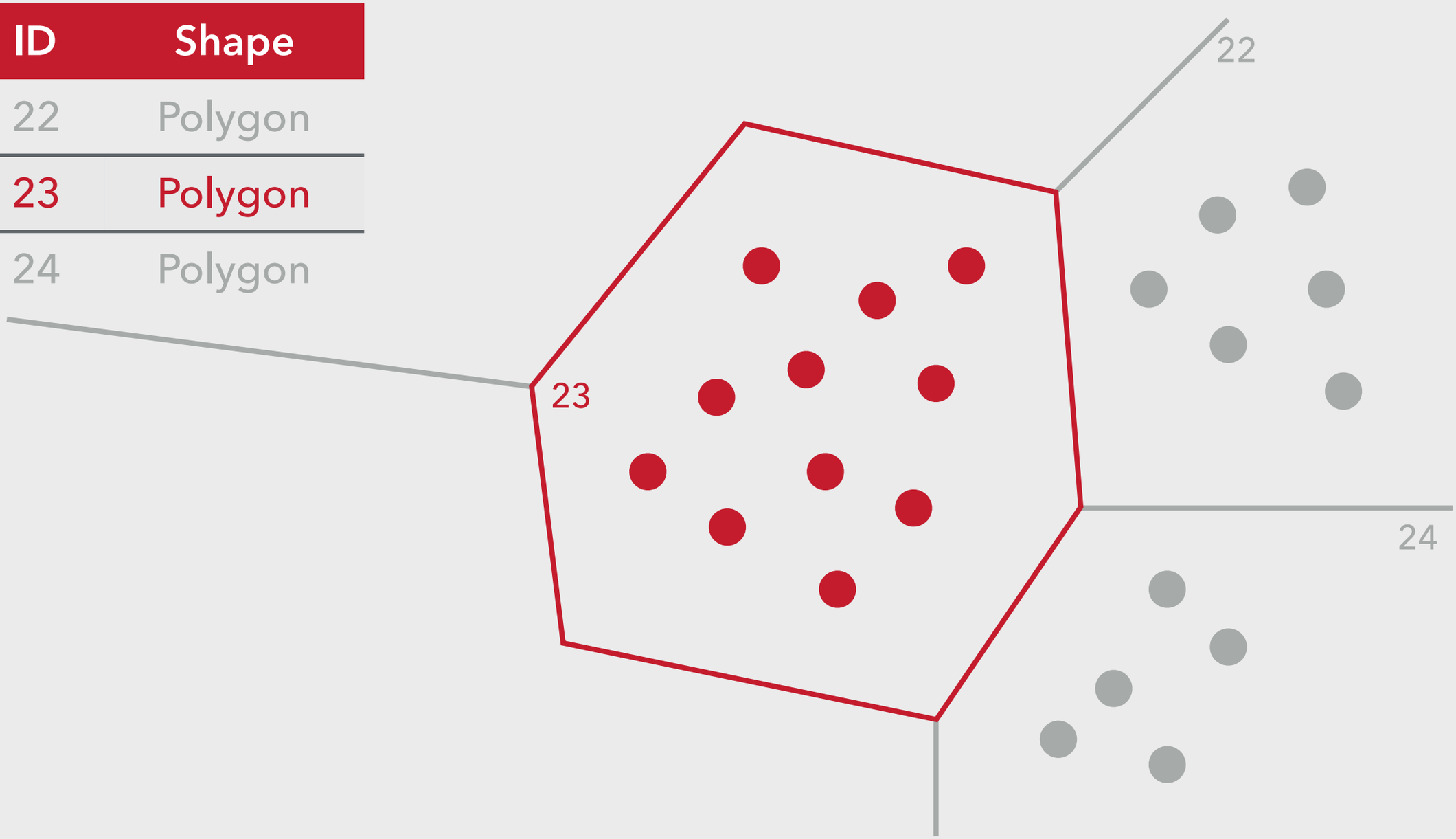
POINTS TO POLYGONS

When the target layer consists of polygons and the reference layer consists of point data, you can get a count or average of point values within each polygon.

POINTS TO POLYGONS

Target Layer

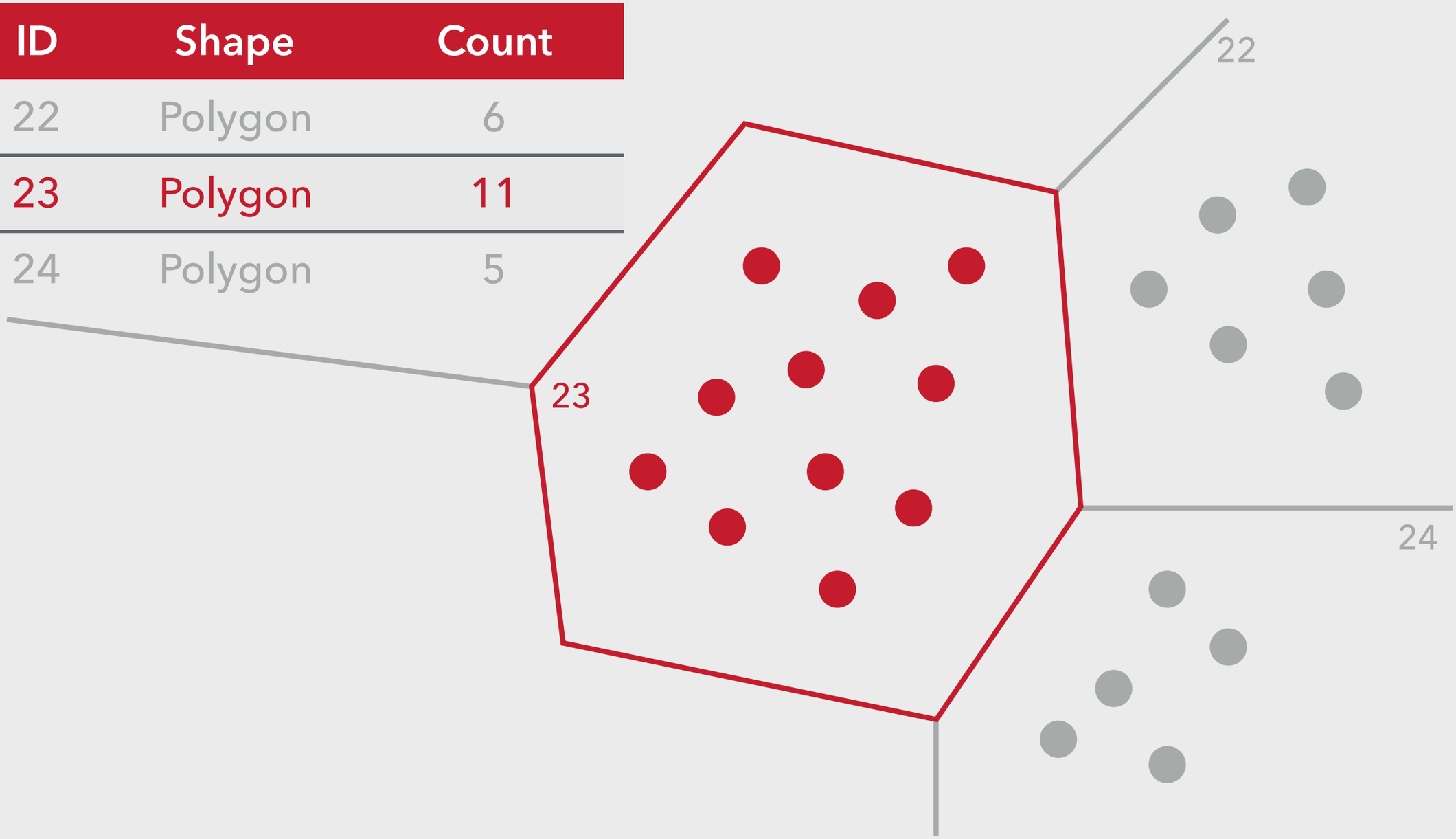
ID	Shape
22	Polygon
23	Polygon
24	Polygon



POINTS TO POLYGONS

Target Layer

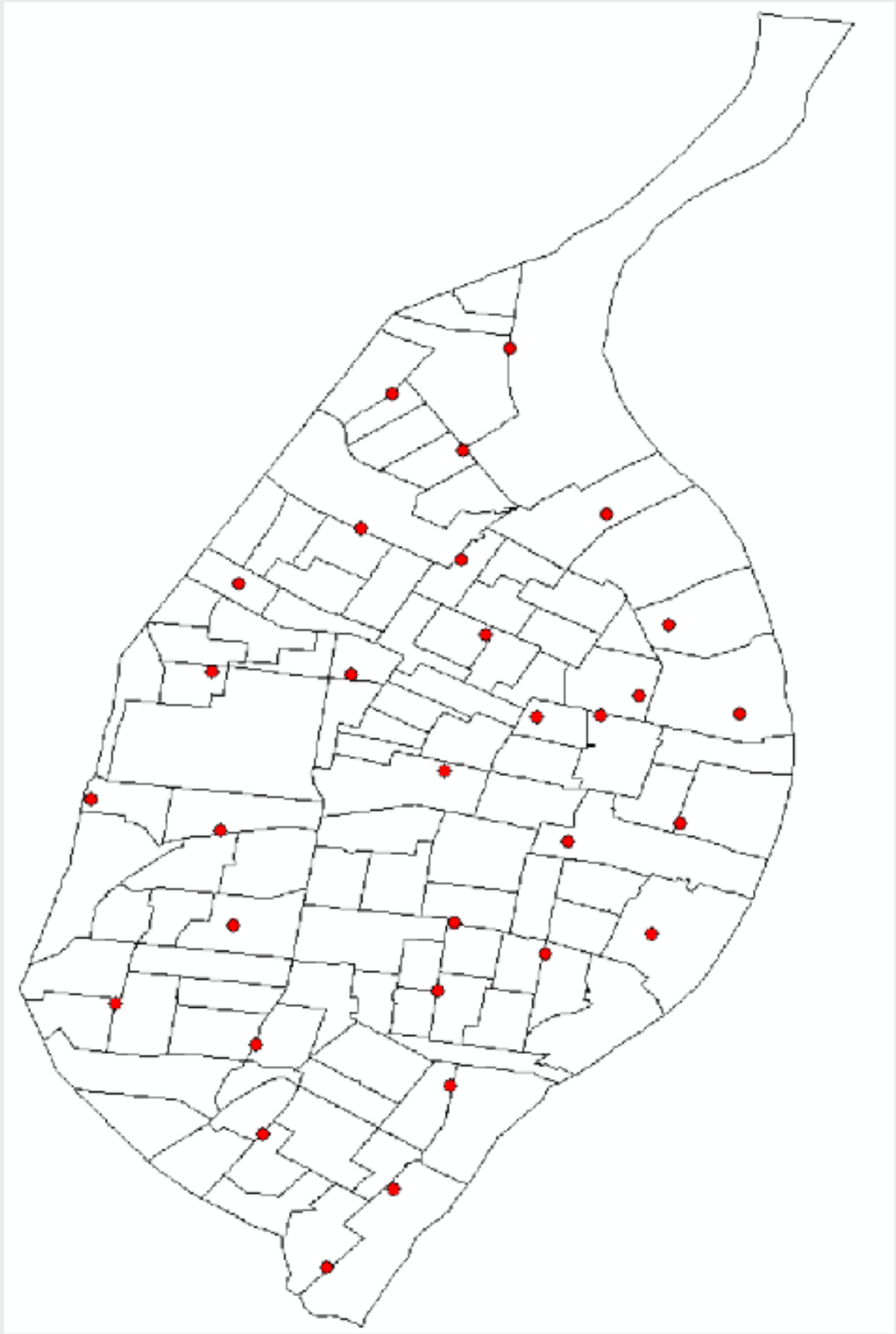
ID	Shape	Count
22	Polygon	6
23	Polygon	11
24	Polygon	5



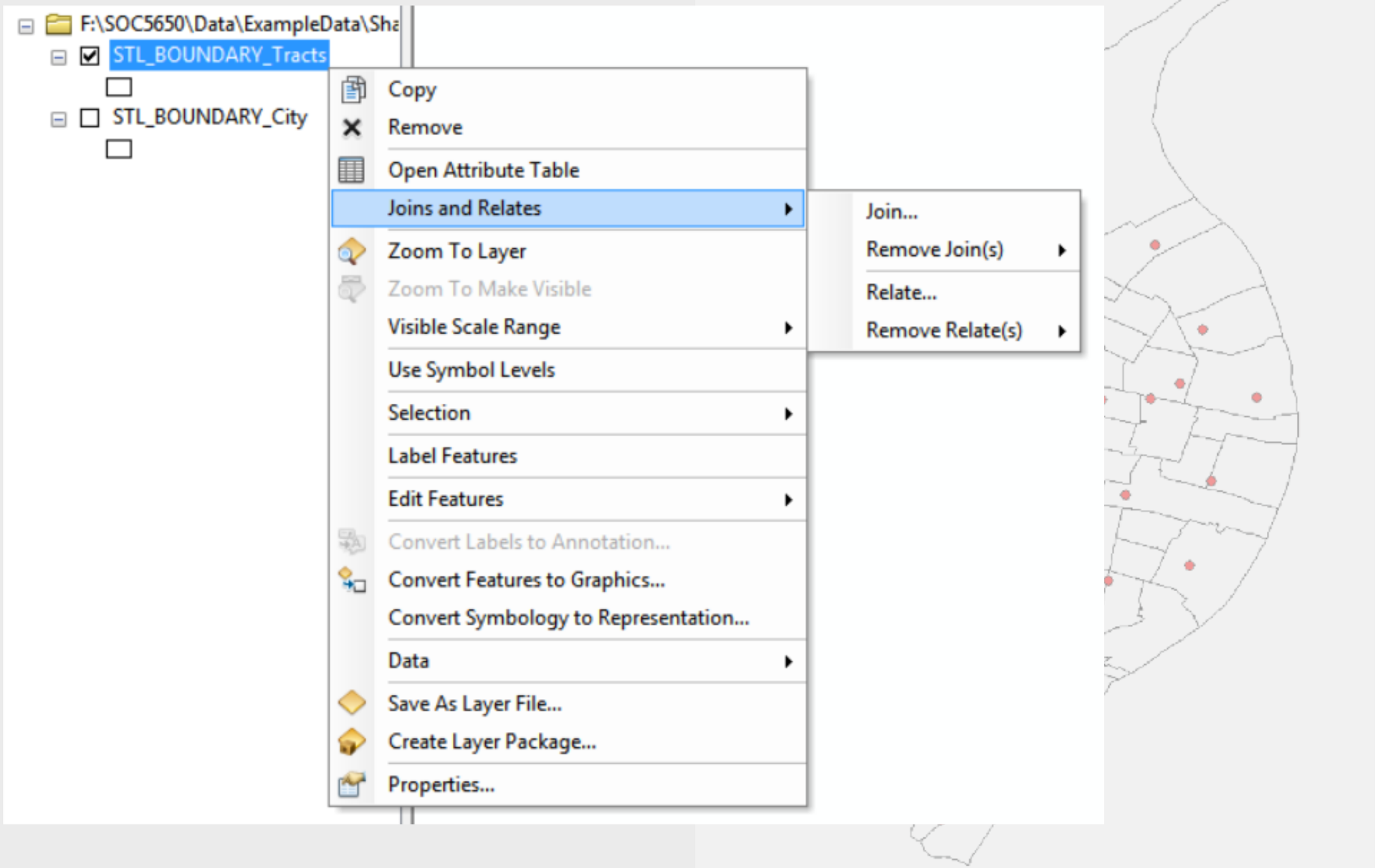
POINTS TO POLYGONS

How many fire stations in St. Louis lie within each Census Tract?

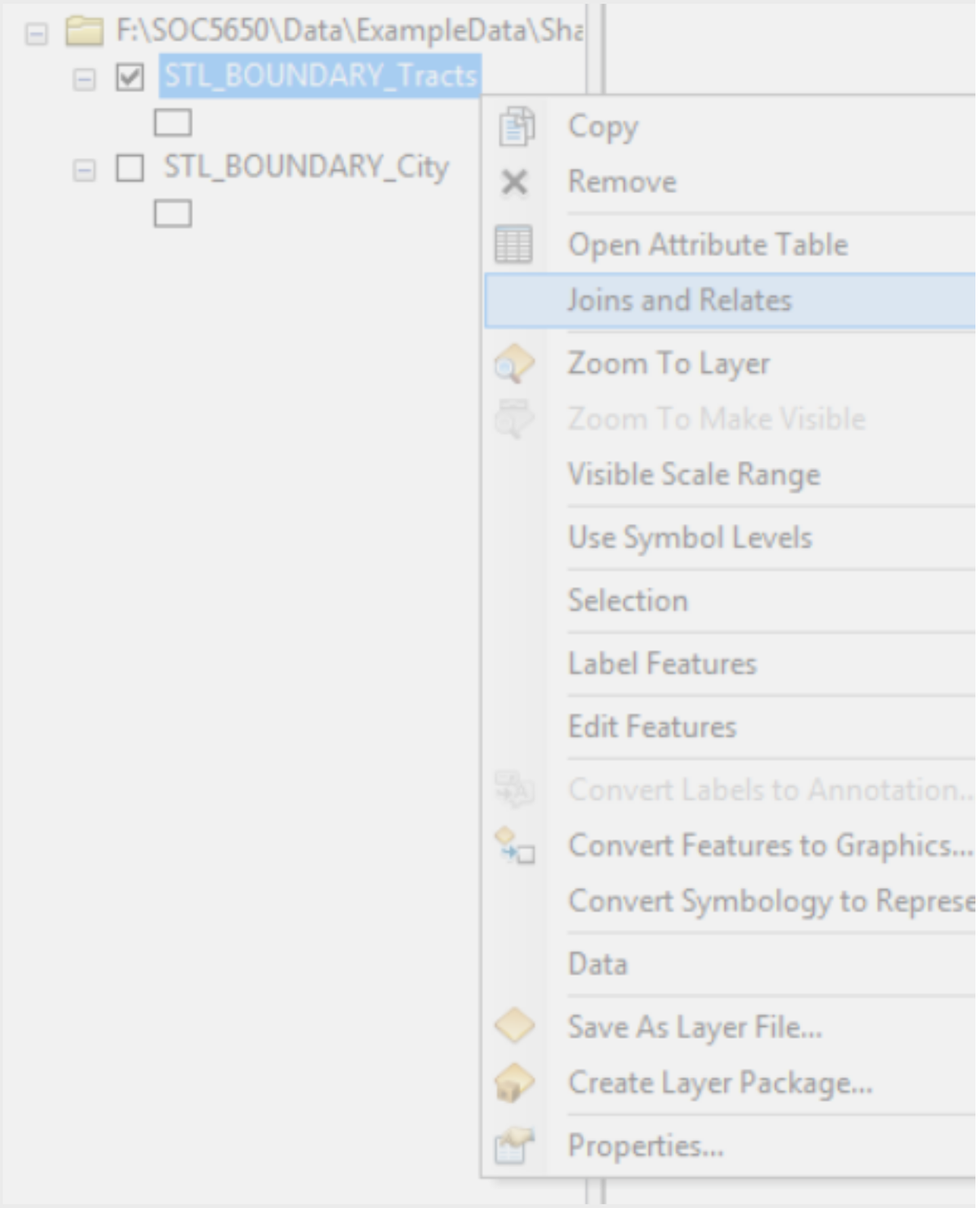
POINTS TO POLYGONS

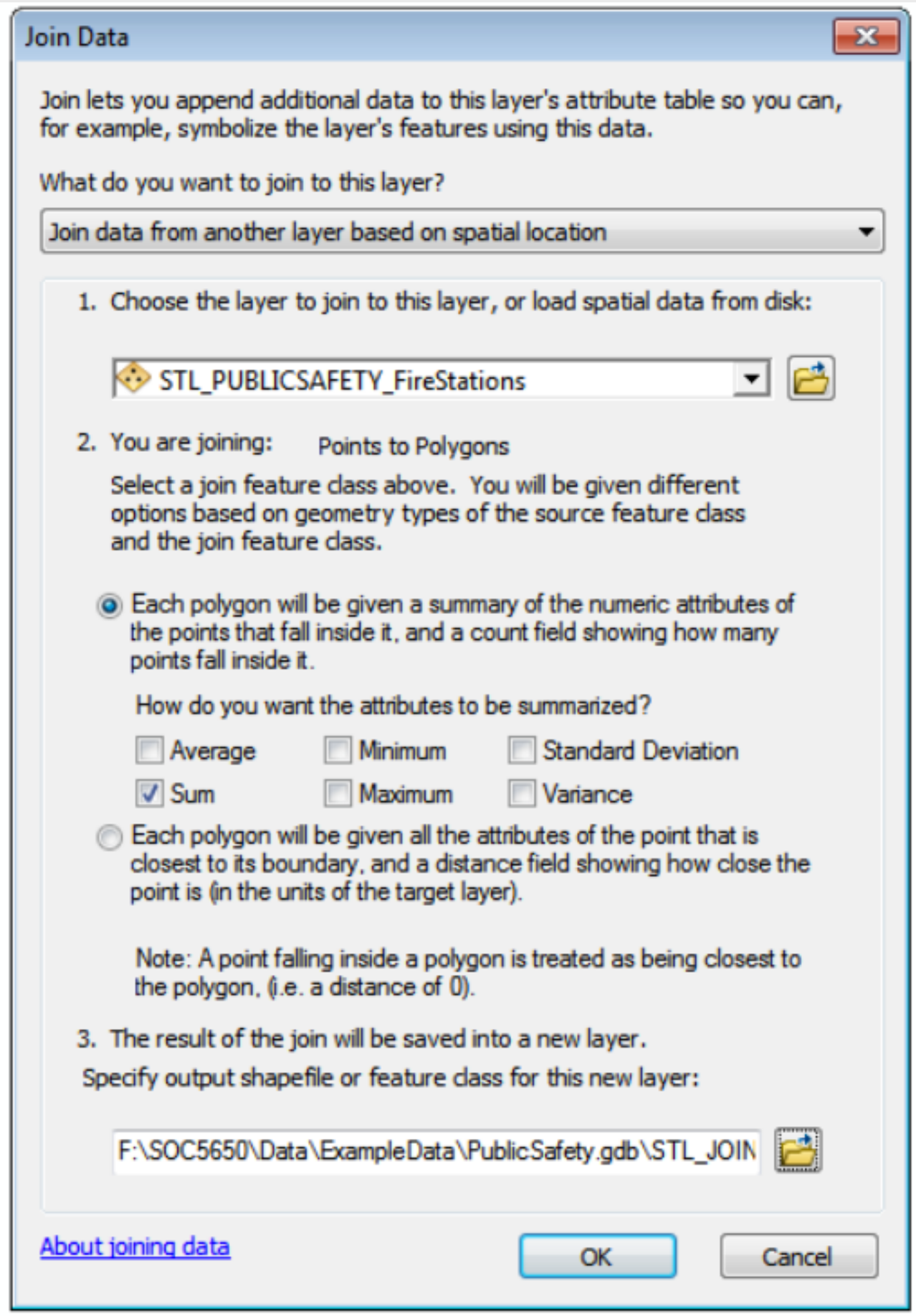


POINTS TO POLYGONS



POINTS TO POLYGONS





POLYGONS TO POINTS

When the target layer consists of points and the reference layer consists of polygons data, you can assign the attributes of the polygons to the points that lie within them.

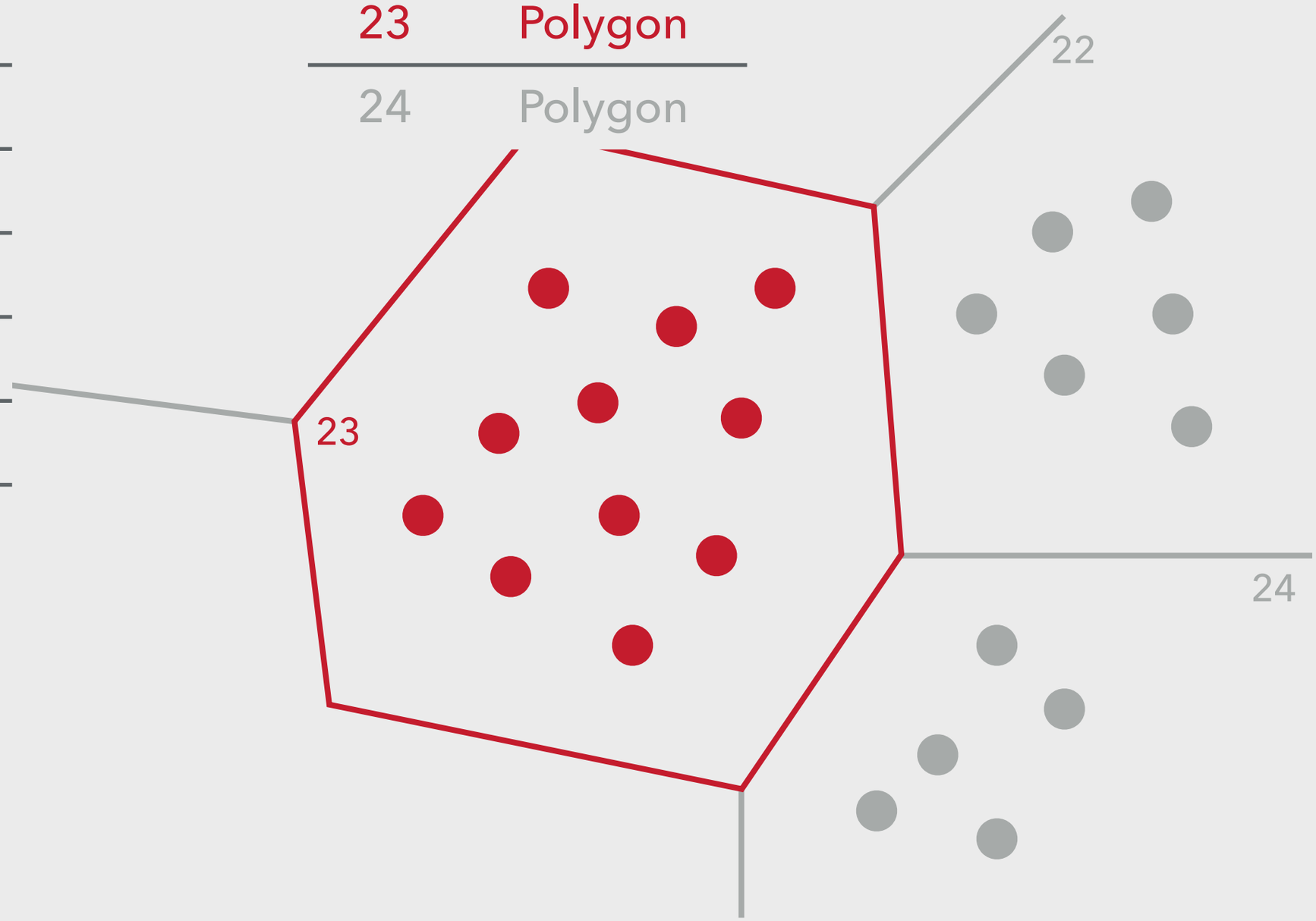
POLYGONS TO POINTS

Target Layer

ID	Shape
104	Point
105	Point
106	Point
105	Point
106	Point
107	Point
108	Point
109	Point

Reference Layer

ID	Shape
22	Polygon
23	Polygon
24	Polygon



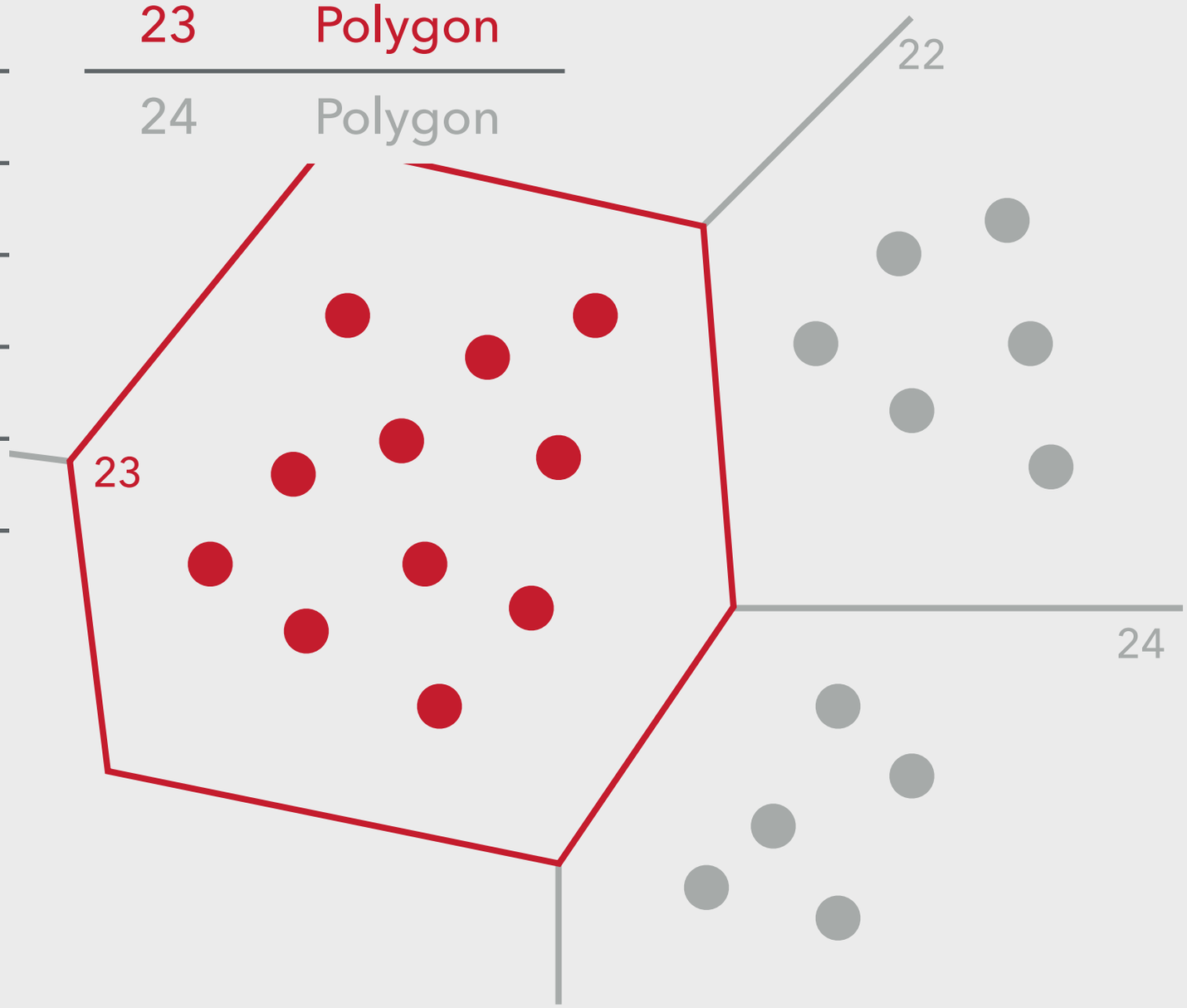
POLYGONS TO POINTS

Target Layer

ID	Shape	polyID
104	Point	22
105	Point	23
106	Point	24
105	Point	23
106	Point	23
107	Point	23
108	Point	23
109	Point	24

Reference Layer

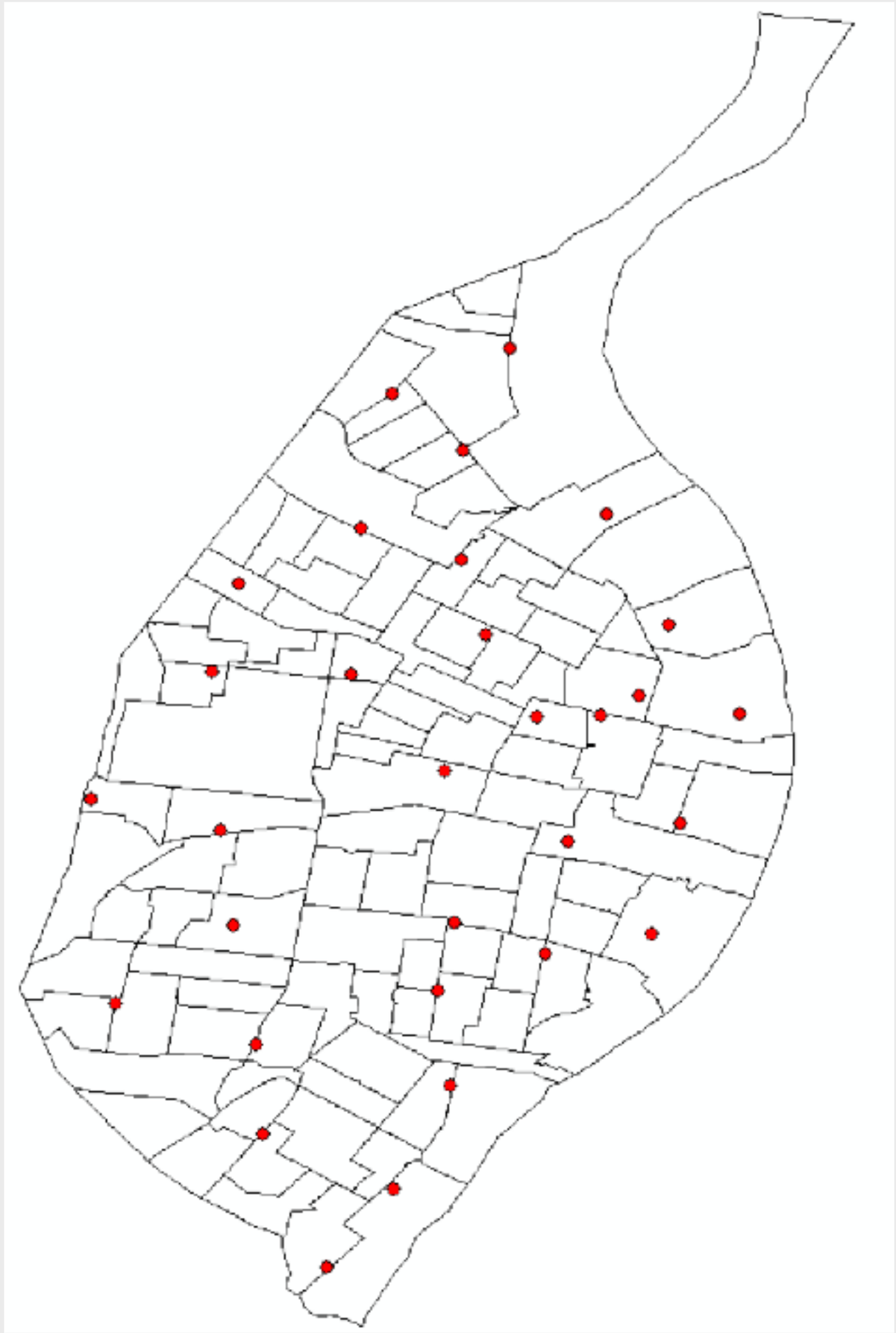
ID	Shape
22	Polygon
23	Polygon
24	Polygon



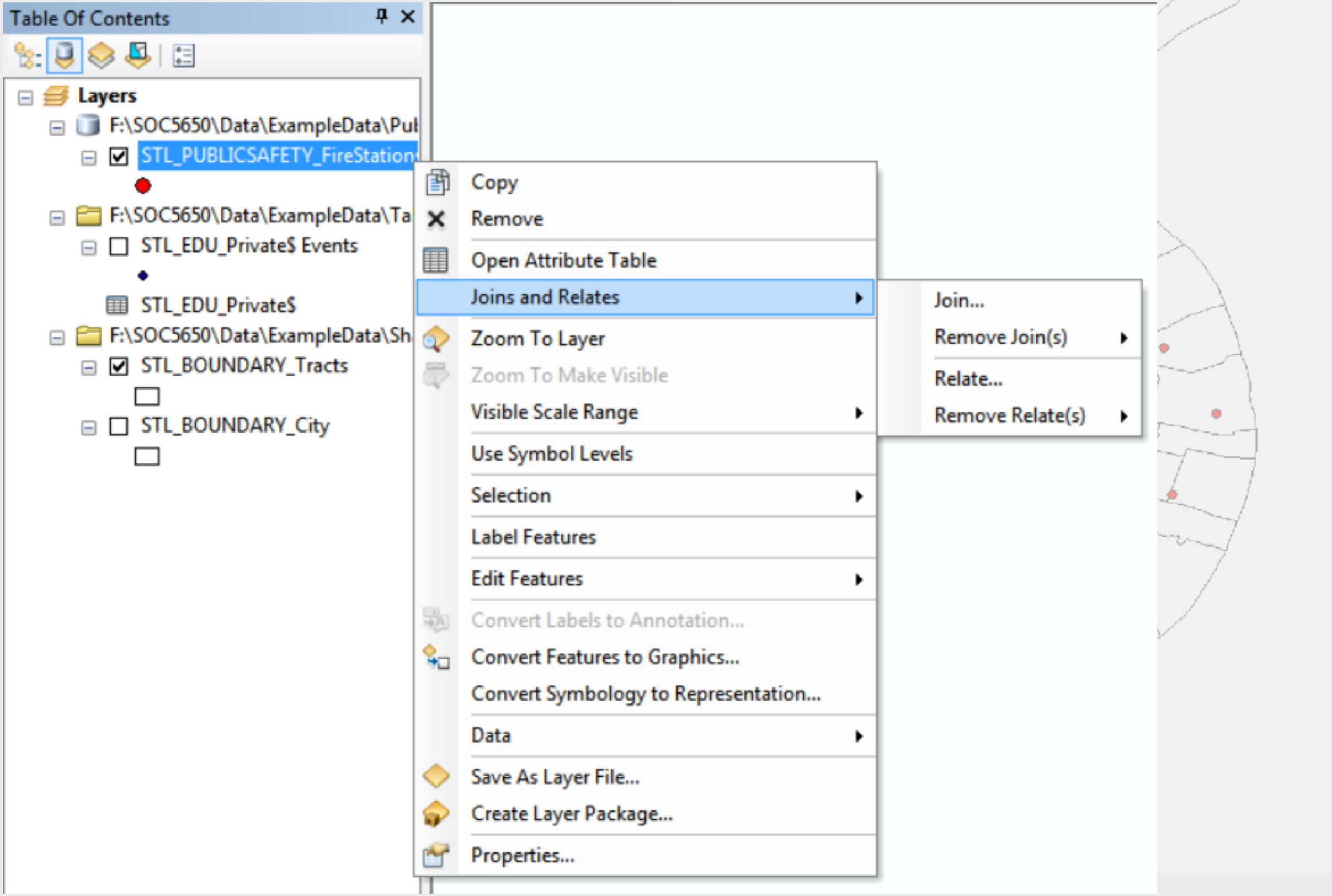
POLYGONS TO POINTS

What Census Tract does each fire station lie within?

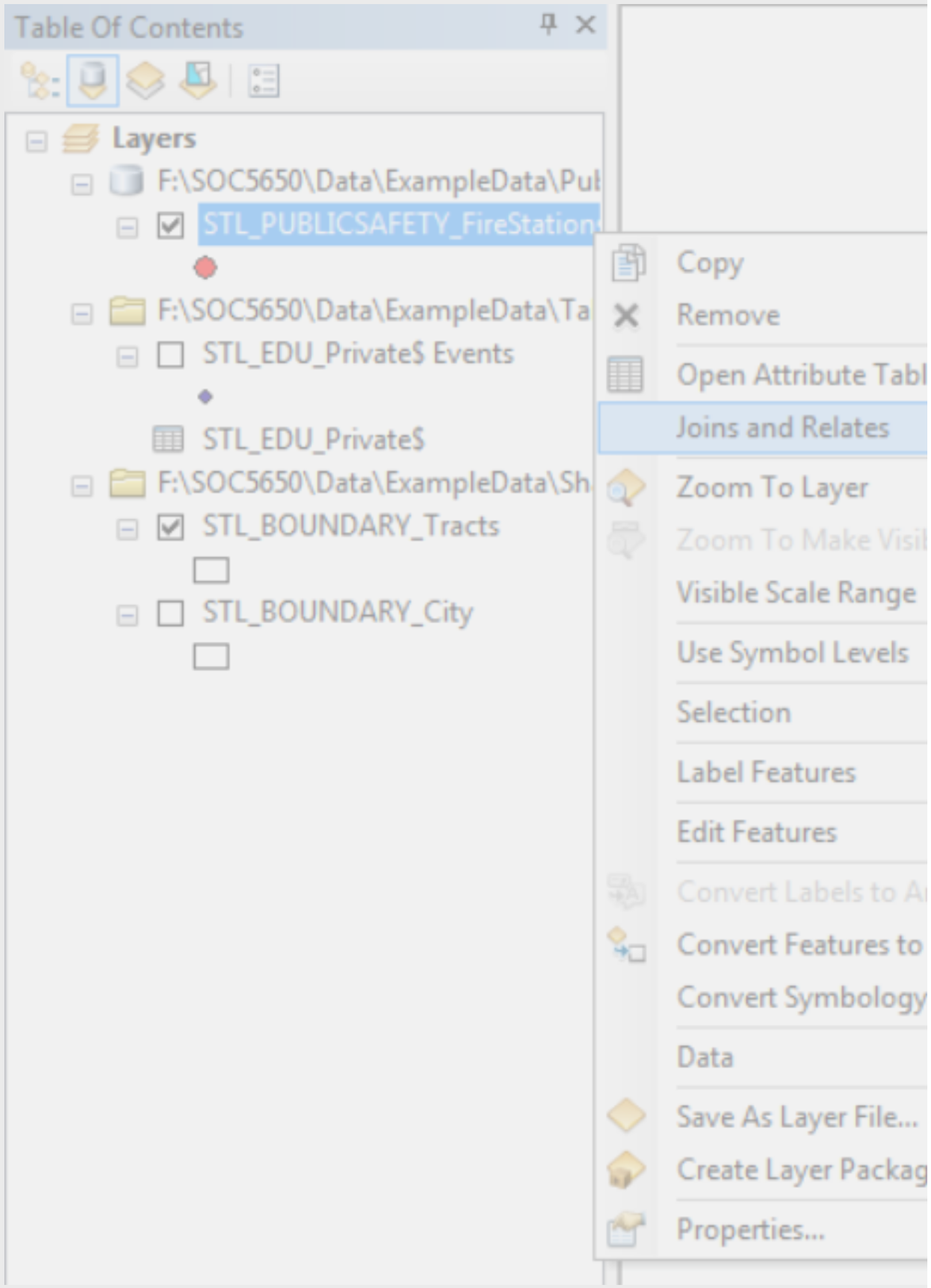
POLYGONS TO POINTS

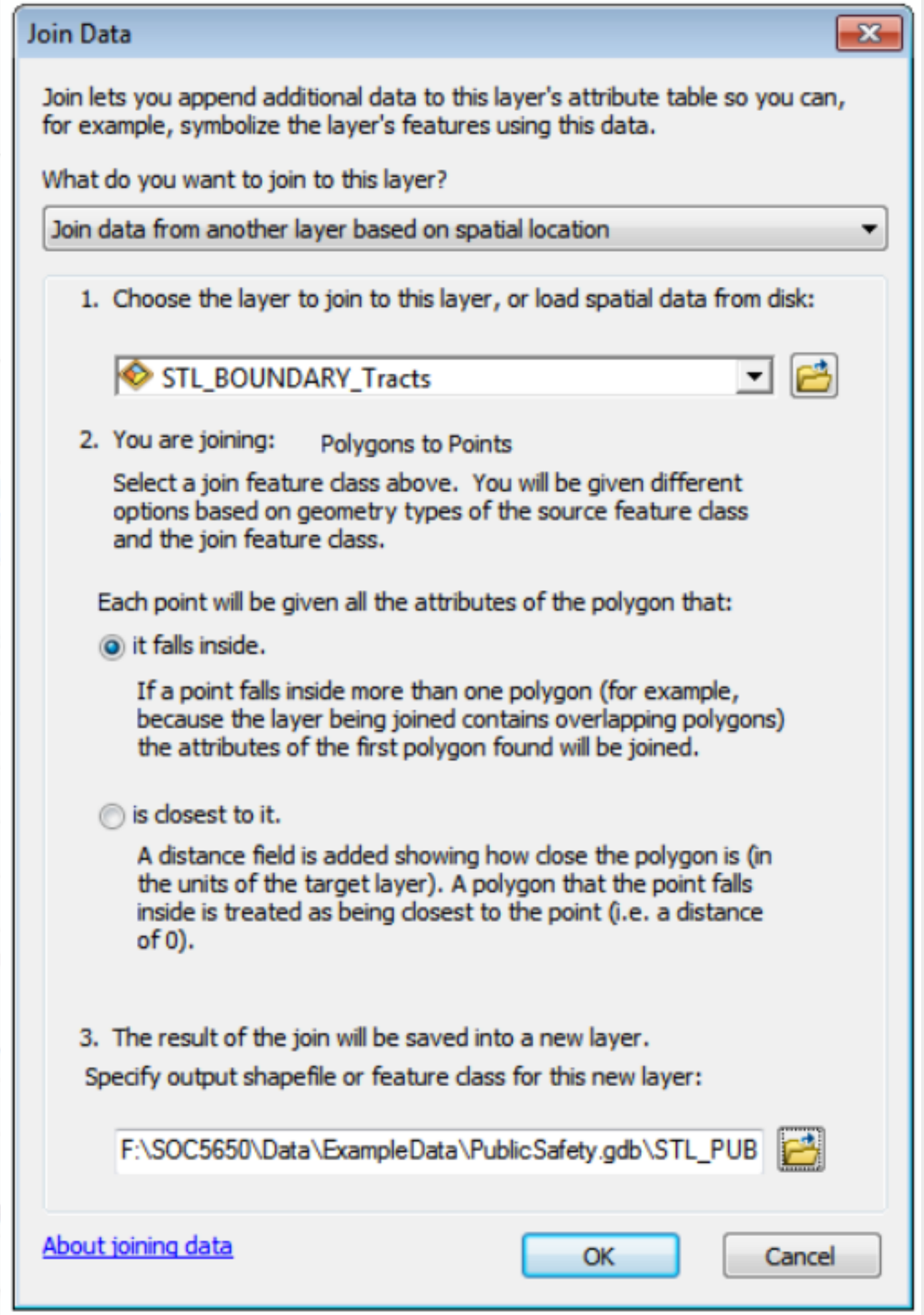


POLYGONS TO POINTS



POLYGONS TO POINTS





POINTS TO POINTS

When the both layers consist of points, you can assign the attributes of one point to another based on proximity.

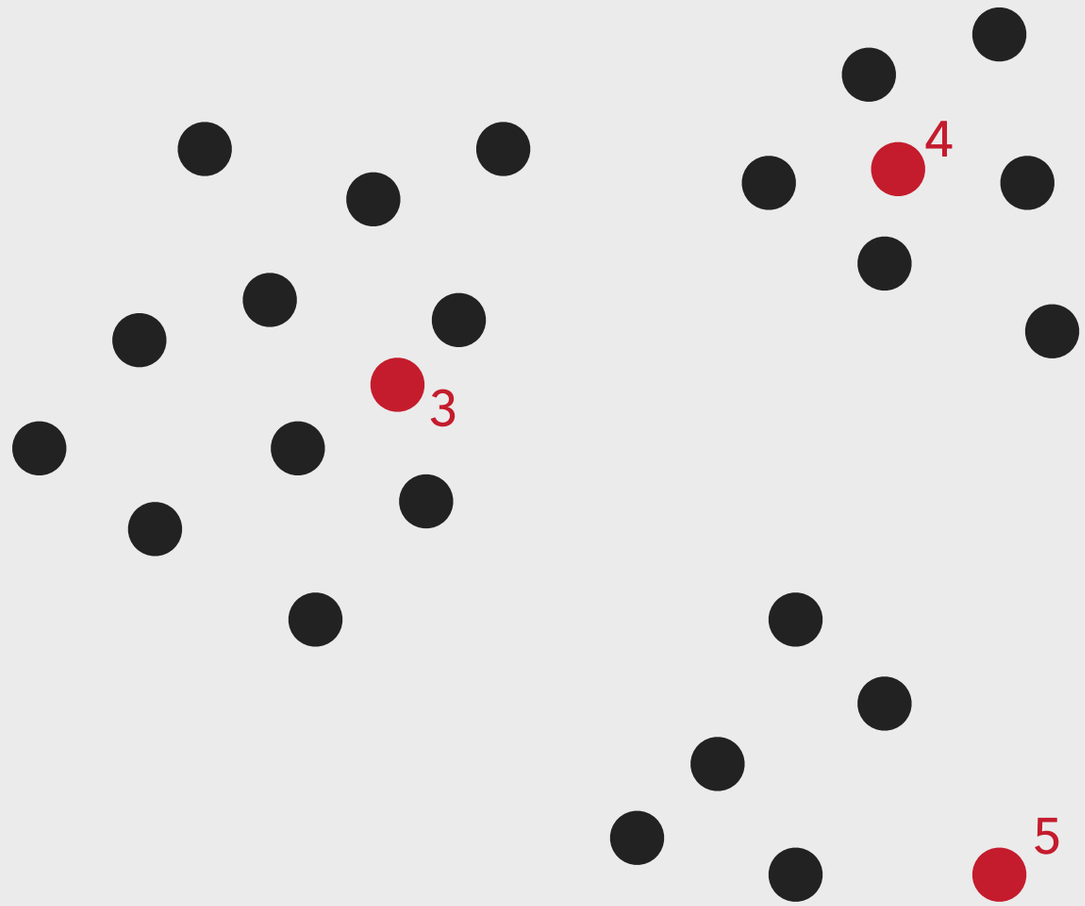
POLYGONS TO POINTS

Target Layer

ID	Shape
104	Point
105	Point
106	Point
105	Point
106	Point
107	Point
108	Point
109	Point

Reference Layer

ID	Shape
3	Point
4	Point
5	Point



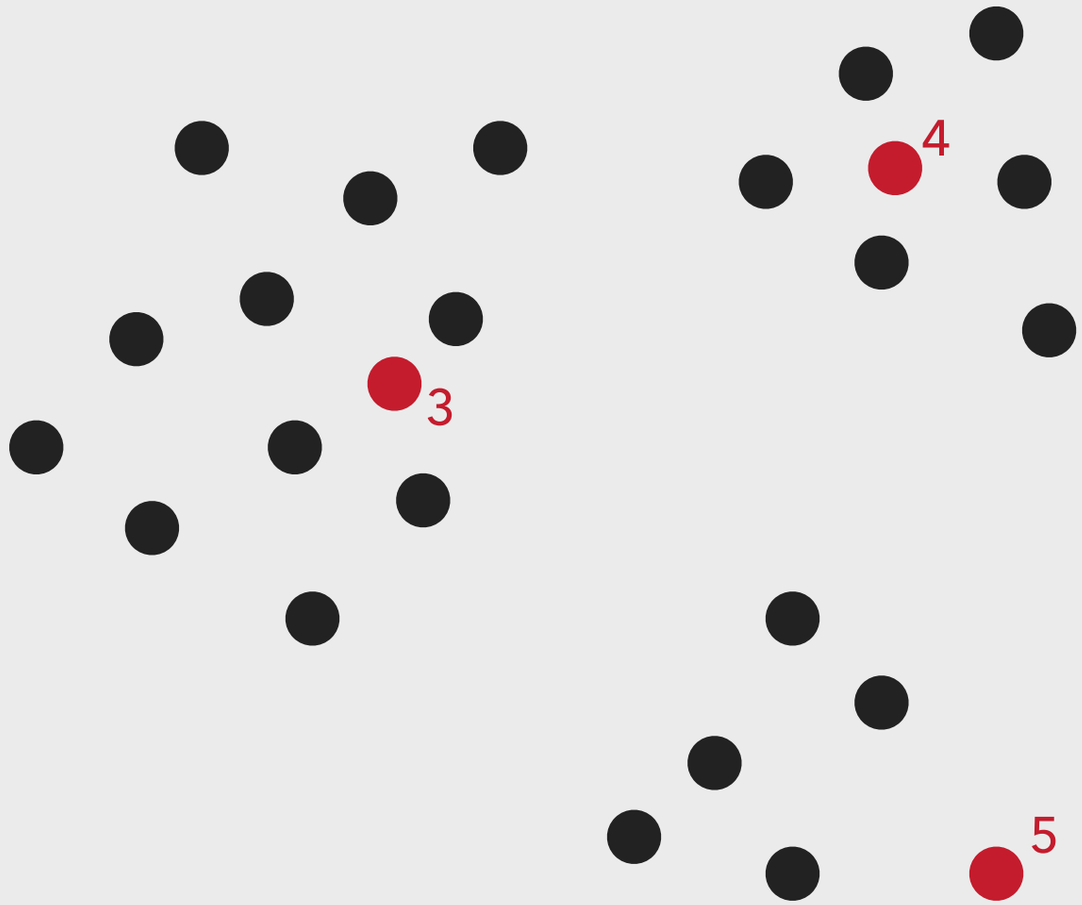
POLYGONS TO POINTS

Target Layer

ID	Shape	sID
104	Point	3
105	Point	3
106	Point	4
105	Point	3
106	Point	3
107	Point	3
108	Point	3
109	Point	5

Reference Layer

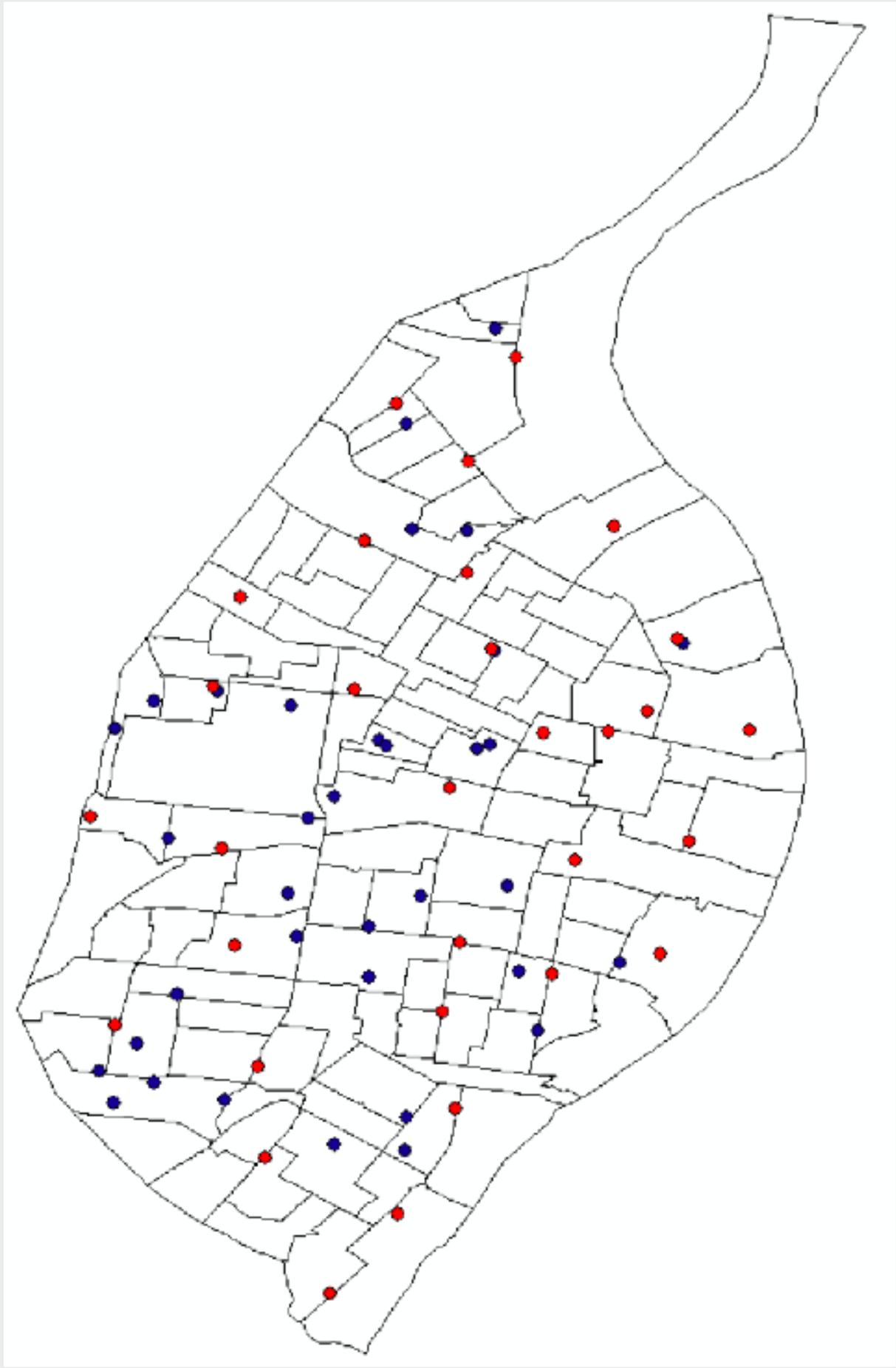
sID	Shape
3	Point
4	Point
5	Point



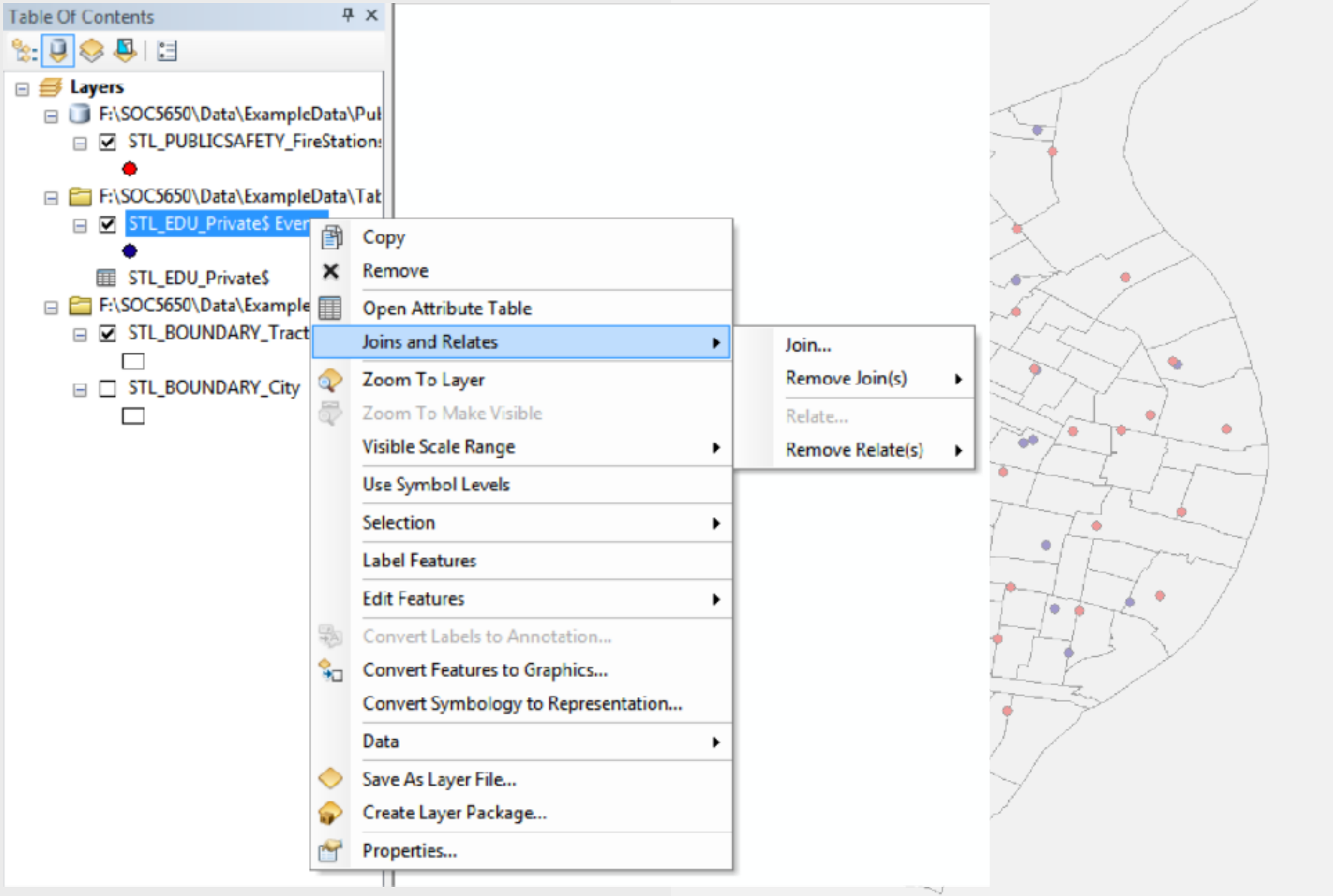
POINTS TO POINTS

What is the nearest fire station to each private school?

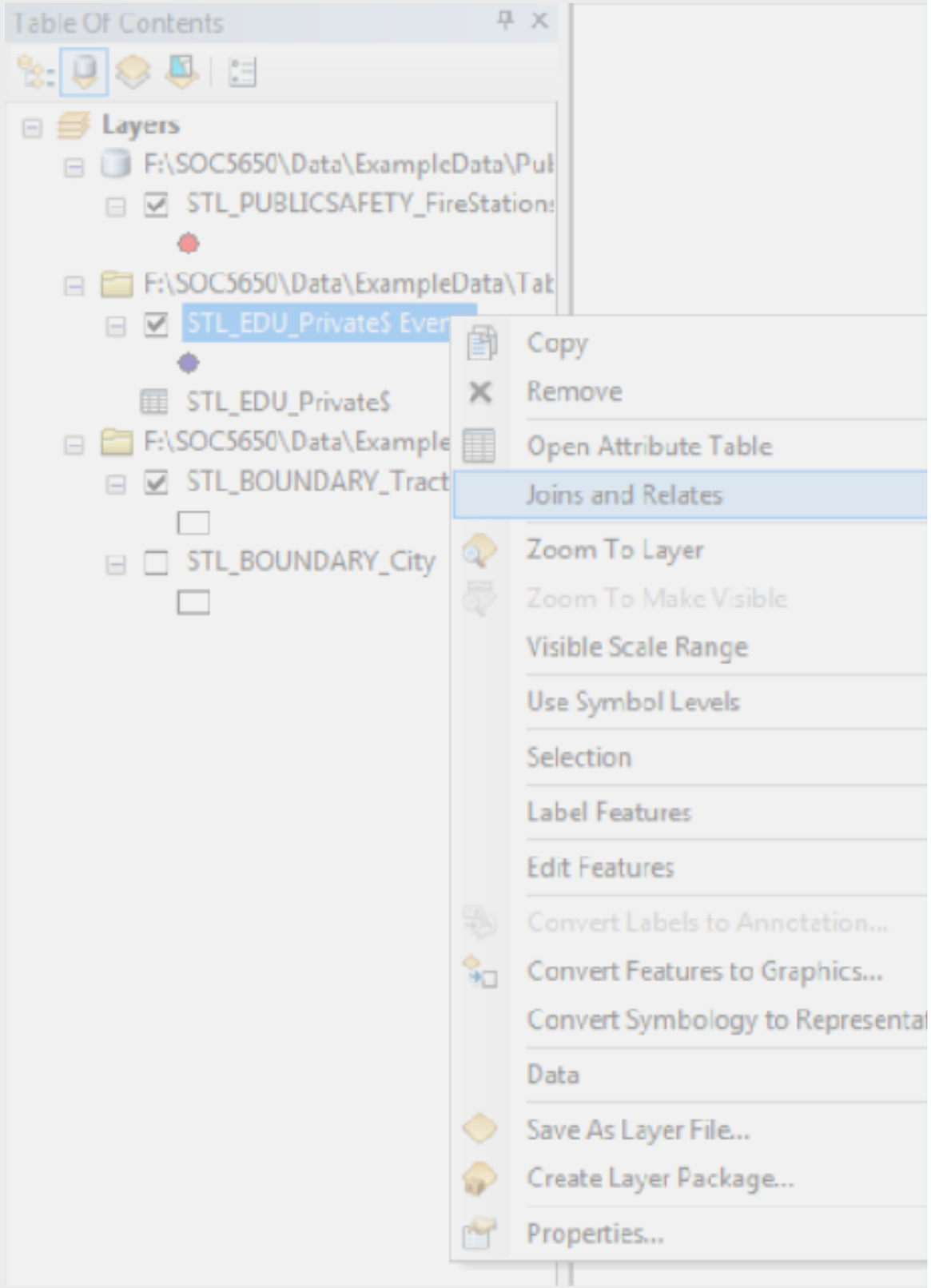
POINTS TO POINTS

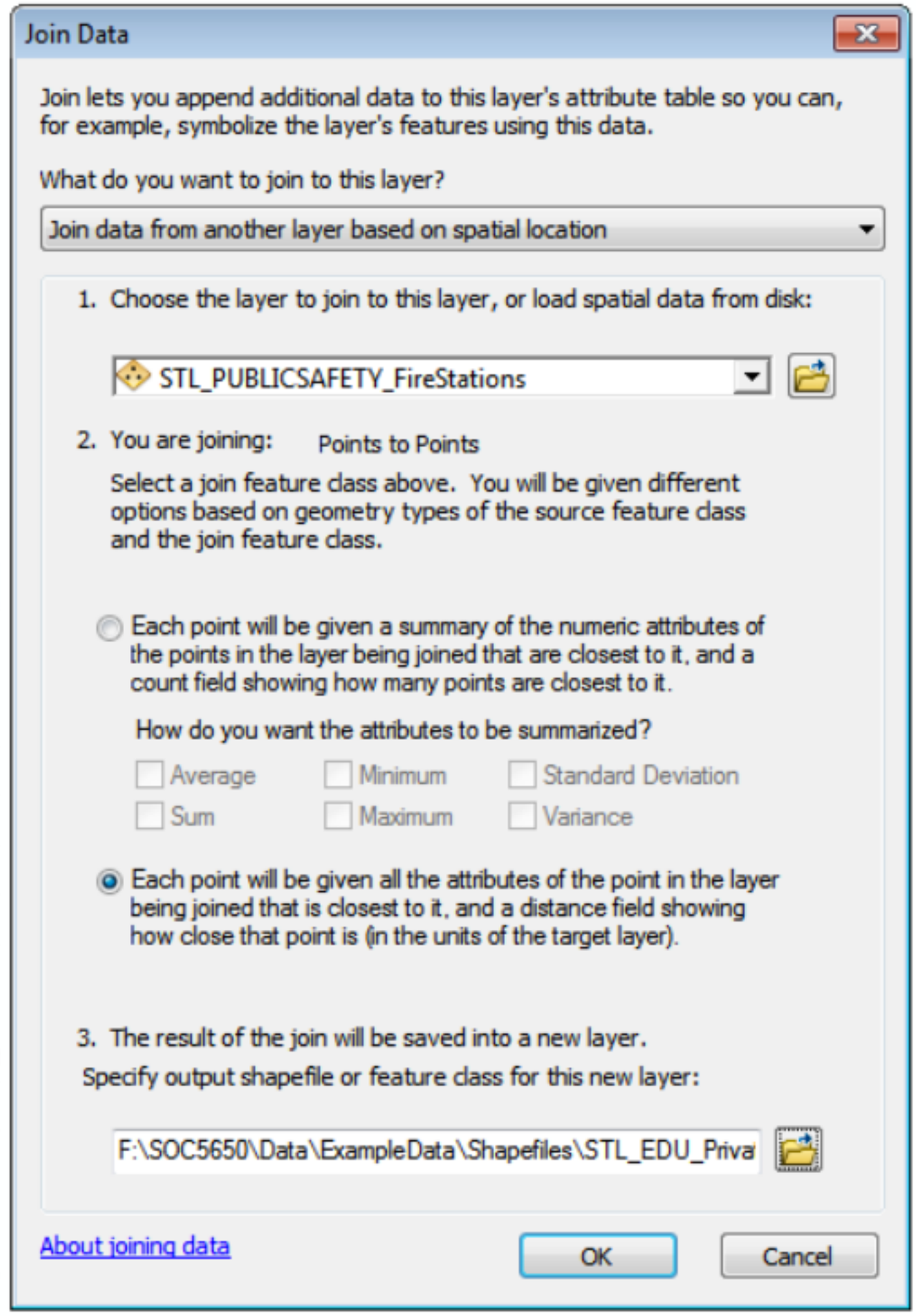


POINTS TO POINTS



POINTS TO POINTS





6 TABLE JOINS

TABLE JOINS

When your tabular data have ID numbers that correspond to ID numbers in a shapefile or feature class, they can be joined to those spatial data.

COMBINING TABULAR DATA

Target Layer

ID	X	Y
1	-90.236560	38.637241
2	-90.236799	38.636550
3	-90.237290	38.636661
4	-90.238154	38.636829
5	-90.237682	38.636735
6	-90.238942	38.636996
7	-90.239924	38.637206
8	-90.241313	38.637499
9	-90.236564	38.636492
10	-90.236062	38.636354

+

Tabular Data

ID	NAME
1	Morrissey Hall
2	Duborg Hall
3	Des Peres Hall
4	Beracha Hall
5	Xavier Hall
6	Xavier Annex
7	Notre Dame Hall
8	McGannon Hall
9	Adorjan Hall
10	Wuller Hall

COMBINING TABULAR DATA

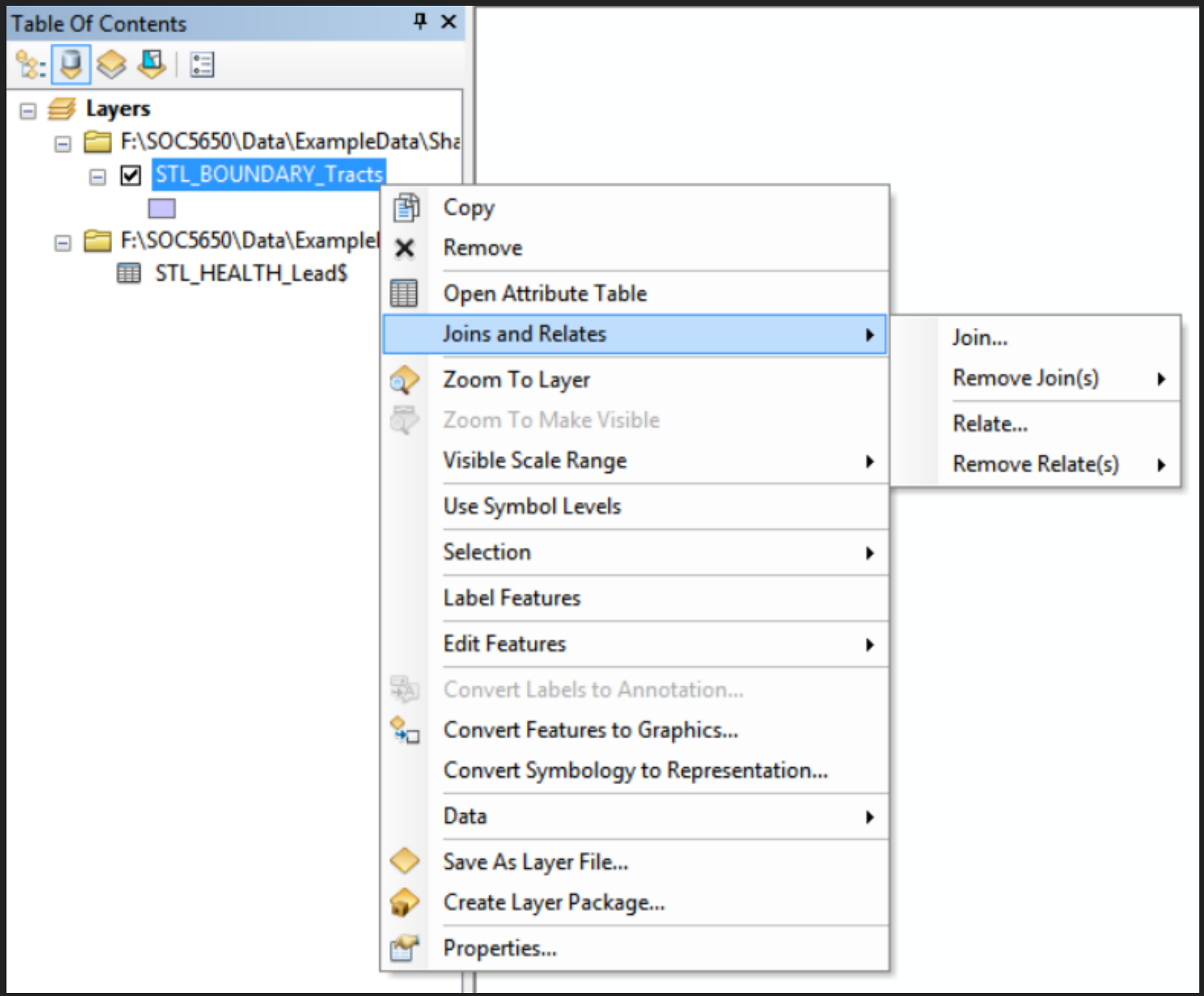
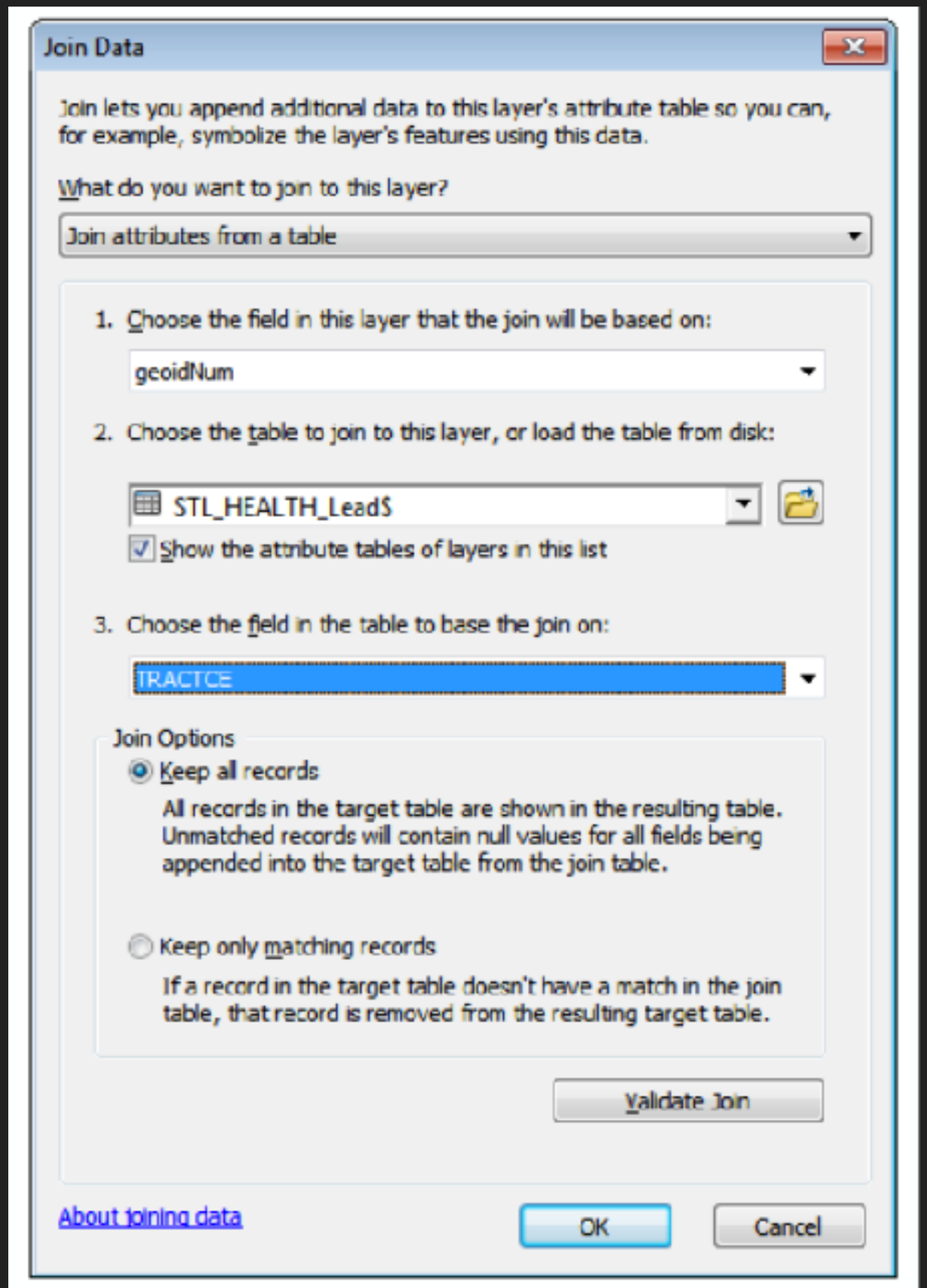
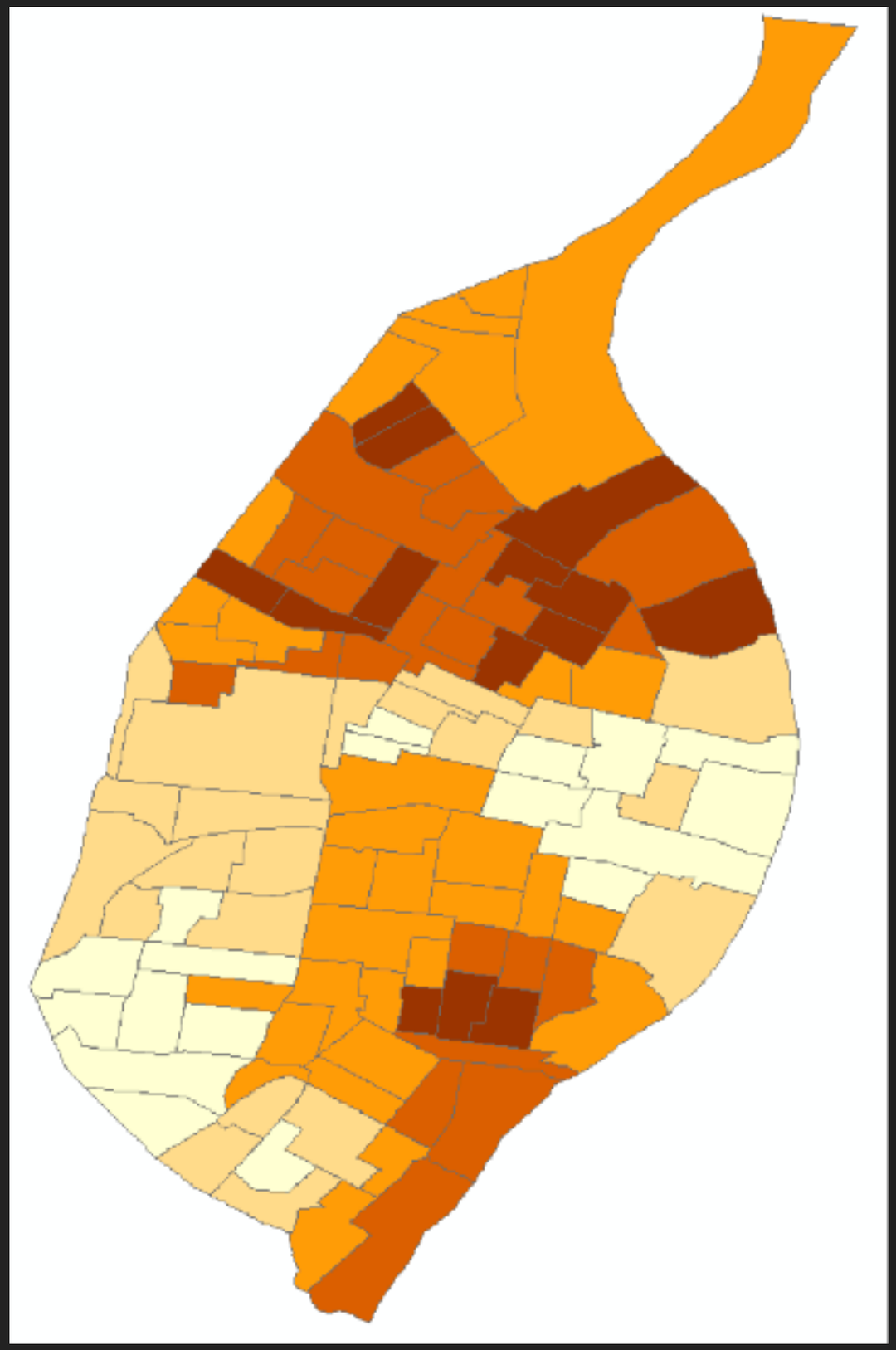
Joined Data

ID	X	Y	NAME
1	-90.236560	38.637241	Morrissey Hall
2	-90.236799	38.636550	Duborg Hall
3	-90.237290	38.636661	Des Peres Hall
4	-90.238154	38.636829	Beracha Hall
5	-90.237682	38.636735	Xavier Hall
6	-90.238942	38.636996	Xavier Annex
7	-90.239924	38.637206	Notre Dame Hall
8	-90.241313	38.637499	McGannon Hall
9	-90.236564	38.636492	Adorjan Hall
10	-90.236062	38.636354	Wuller Hall

TABLE JOINS

We have data on blood lead level testing results for each Census Tract in a csv file as well as a shapefile of Census Tract boundaries.

COMBINING TABULAR DATA IN ARCGIS



COMBINING TABULAR DATA IN ARCGIS