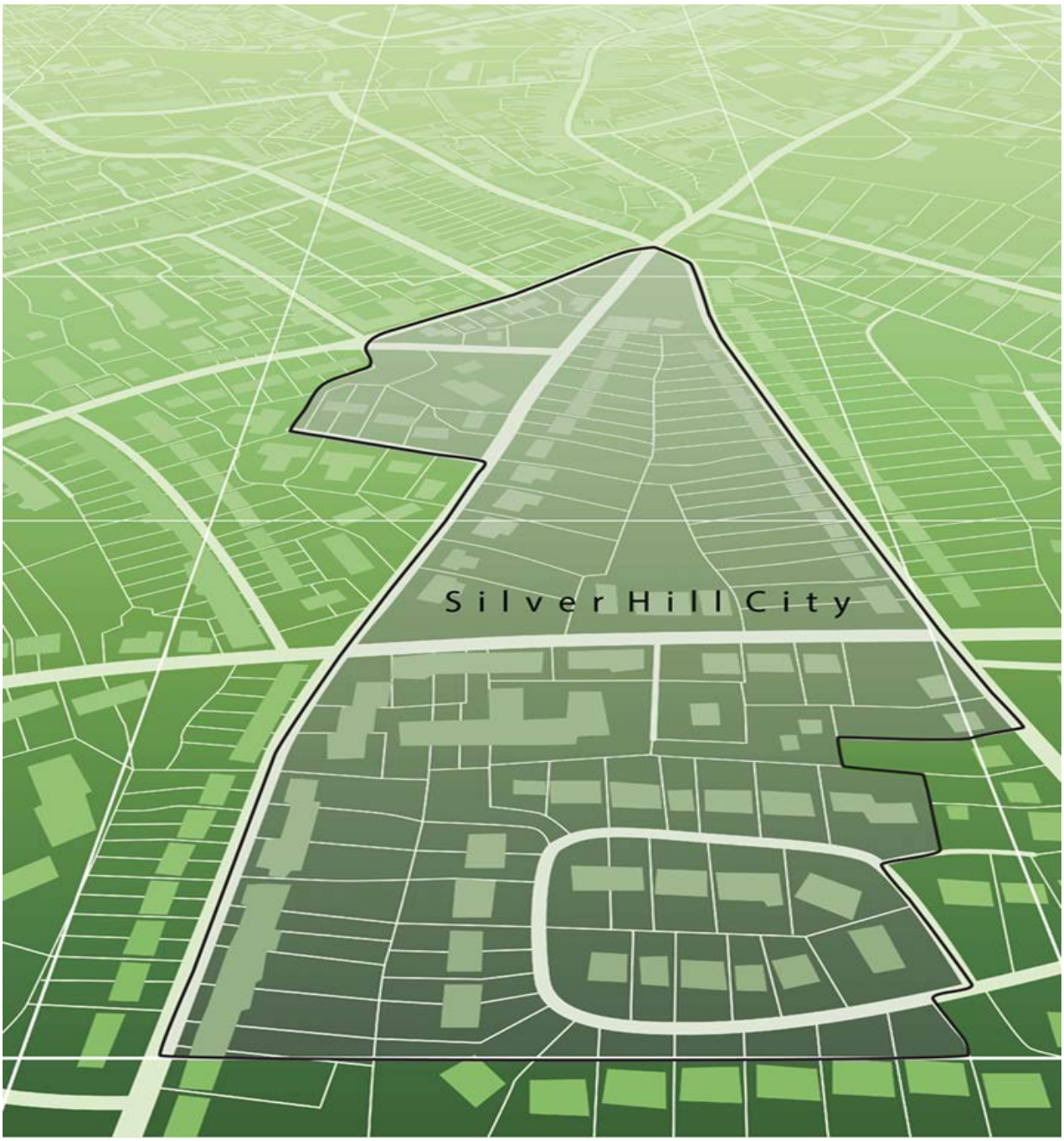
Boundary and Annexation Survey (BAS) Respondent Guide: GUPS

Instructions for using the Geographic Update Partnership Software (GUPS)

Revised as of January 25, 2021



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INTRODUCTION

A. The Boundary and Annexation Survey

The U.S. Census Bureau conducts the Boundary and Annexation Survey (BAS) annually to collect information about selected legally defined geographic areas, such as counties (and equivalent areas), incorporated places, minor civil divisions (MCDs), federally recognized American Indian Areas (AIAs) — including reservations, off-reservation trust lands and tribal subdivisions, and Hawaiian Homelands. BAS also provides an opportunity for participants to review the names and geographic relationships for these areas. Title 13, Section 6, United States Code authorizes this survey.

The Census Bureau uses the boundary information collected during BAS to tabulate data for the decennial and economic censuses, and to support the yearly delivery of the Population Estimates Program (PEP) and the American Community Survey (ACS) data. Maintaining correct boundaries and boundary-to-feature relationships through BAS helps ensure that the Census Bureau assigns the appropriate housing and population counts to each government.

In compliance with the Office of Management and Budget Circular A-16, BAS supports the Census Bureau's spatial data steward responsibilities for the Federal Geographic Data Committee (FGDC) and the Geospatial One-Stop by updating the inventory and boundaries of governments.

In addition, BAS is the source of up-to-date information on changes to the boundaries, codes and names of incorporated places, MCDs, counties (and equivalent areas), Hawaiian Homelands, and federally recognized AIAs, which include reservations and off-reservation trust lands used by the U.S. Geological Survey (USGS), the National Map, and the Geographic Names Information System (GNIS). Please visit the BAS program website at <https://www.census.gov/programs-surveys/bas.html>.

For more information on BAS, please view the BAS video series on the Census Bureau's BAS website at <https://www.census.gov/programs-surveys/bas/library/bas-videos.html>.

B. Key Dates for BAS Respondents

January 1 – Boundary updates must be legally in effect on or before this date to be reported in the current survey year.

March 1 – Boundary updates returned by this date will be reflected in the ACS and PEP data and in next year's BAS materials.
May 31 – Boundary updates returned by this date will be reflected in next year's BAS materials.

C. BAS State Agreements

The Census Bureau has established a number of agreements with states for reporting boundary changes. Please visit the BAS State Agreements webpage within the BAS program website at <https://www.census.gov/programs-surveys/bas/information/state-agreements.html> or call **1-800-972-5651** for information regarding state agreements.

Note: The Census Bureau can only establish BAS state agreements for states that require local governments to report boundary changes to a state agency.

D. Legal Disputes

If the Census Bureau discovers that an area of land is in dispute between two or more jurisdictions, the Census Bureau will not make any boundary corrections until the parties come to a written agreement, or there is a documented final court decision regarding the dispute. To learn more, please contact the Census Bureau Legal Office at **1-301-763-9844.**

For disputes involving tribal areas, the Census Bureau must defer to the Office of the Solicitor at the Department of the Interior for a legal opinion. Often complicated land issues require an extended period of time for resolution, and in those cases, the Census Bureau will retain the current boundary in the database until a legal opinion is issued by the Solicitor's office.

E. Respondent Guide Organization

This guide was created for those who choose to participate in the survey using GUPS. Those using their own GIS should consult the *Boundary and Annexation Survey Respondent Guide: Digital* available on the BAS website: <https://www.census.gov/programs-surveys/bas/information/response-methods.Digital_BAS.html>. Those using paper maps should consult the *Boundary and Annexation Survey Respondent Guide: Paper* available on the BAS website:<https://www.census.gov/programs-surveys/bas/information/response-methods.Paper_BAS.html>.

This guide is equipped with shortcuts to subjects that respondents may want to jump to directly. To move directly to one of these sections, click on the linked text. This guide contains two parts:

Part 1: Provides an overview of BAS. It specifies the:

- **Process and Workflow**Error! Reference source not found.**.**
- **Reviewing BAS Data** (Information specific to the review and update of each type of geographic area).
- **Quality Control and File Submission.**
- **Submitting Files through the Secure Web Incoming Module (SWIM).**
- **Submitting Files on DVD.**

Part 2: Describes GUPS and gives step-by-step instructions (Action/*Result* in table format) for:

- **How to Use GUPS**
- **Requirements and Installation.**
- **How to Install GUPS.**
- **Using GUPS (Basics and Map Management).**
- **How to Access BAS Shapefiles.**
- **Import Data from the Census Bureau's BAS Website.**
- **Download Shapefiles from the BAS Website.**
- **Download Shapefiles from the Census Bureau ftp2 Site.**
- **How to Import User-Provided Data into GUPS.**
- **How to Import a Shared ZIP Shapefile.**
- **Making BAS Updates in GUPS.**
- **How to Update Legal Boundaries.**
- **How to Update Linear Features.**
- **How to Use GUPS Review and Validation Tools.**
- **Exporting a Printable Map.**
- **How to Export ZIP Files to Share/Submit.**
- **Submitting Files to the Census Bureau through SWIM.**

Note: In all the Action/*Result* tables, the action is usually a command or action the participant needs to perform, and the Result(s) of the action will be shown in *italics*. For example, if the participant clicks the GUPS icon on their desktop, *the software should begin to run automatically*.

PART 1 BAS OVERVIEW

SECTION 1. PROCESS AND WORKFLOW

Figure 1 below illustrates the three phases of the work to be completed for BAS. The first section of the diagram includes initial steps. The second section indicates the types of geographic data that should be reviewed and updated. The final section lists the final steps to validate and submit changes.

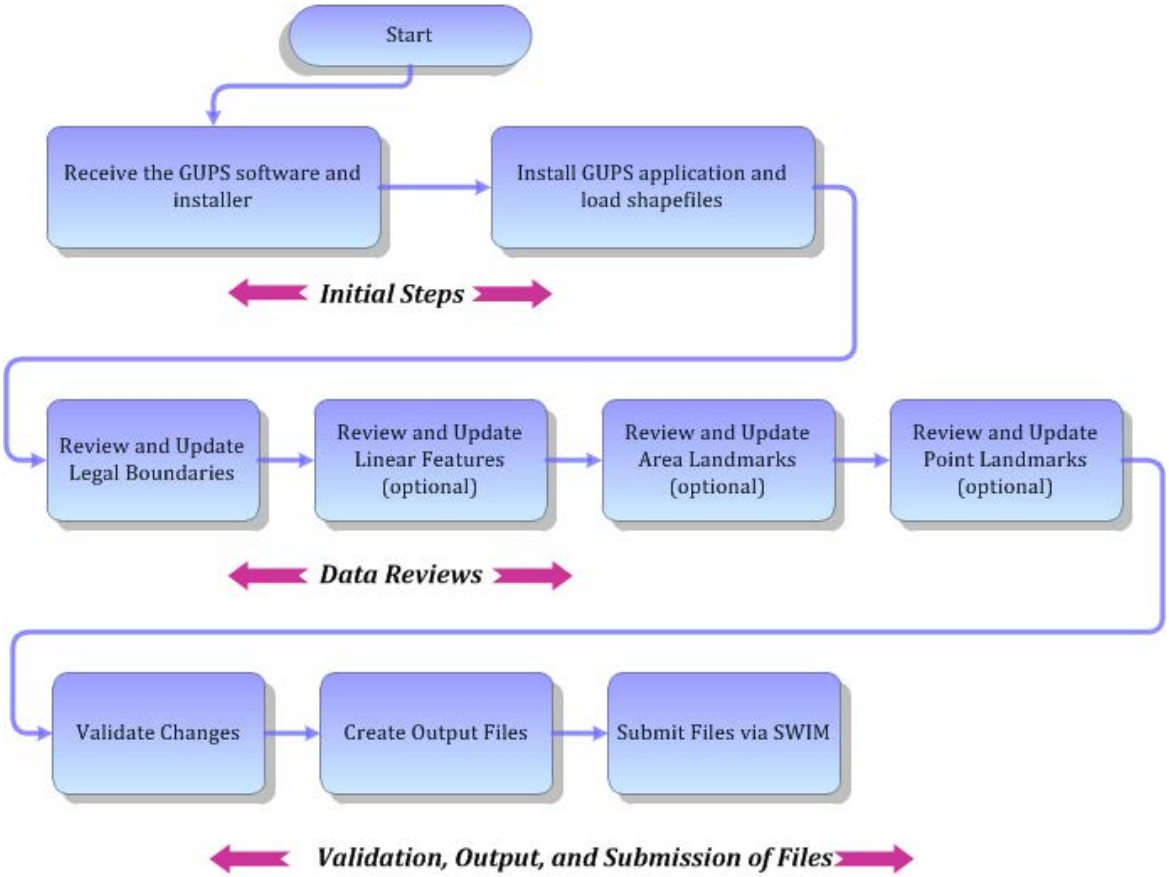

Figure 1. BAS Workflow

The sections of this guide are organized around the topical areas in the diagram and provide needed program information and procedures, as well as relevant deadlines.

See Error! Reference source not found. for a list of contacts and helpful program links.

1.1 Receiving the GUPS Application and Shapefiles

GUPS is available for installation two ways. GUPS software is available for download directly from the BAS website <https://www.census.gov/programs-surveys/bas/technical-documentation/gups-instructions.html>. Participants can also request to receive GUPS software on DVD, which will be shipped in a package that includes a DVD containing GUPS, this respondent guide in portable document format (.pdf), and a read me text (.txt) file.

Once GUPS is installed, BAS shapefiles can be imported from the BAS website directly to the GUPS application. Instructions on how to load data into GUPS appears in **5.2, Import Data from the Census Bureau's BAS Website**. If a participant does not have internet access, they may request shapefiles on DVD. To request a data DVD, call **1-800-972-5651** or email <geo.bas@census.gov>.

1.2 Getting Help

Part 2, How to Use GUPS of this guide contains directions for how to use the tools available within the GUPS application, as well as step-by-step instructions for how to carry out specific shapefile updates (e.g., annexations and deannexations, adding and deleting features and landmarks, etc.).

1.2.1 GUPS Help

Training videos for help with using GUPS are available on the BAS website <https://www.census.gov/programs-surveys/bas/library/bas-videos.html>. In addition, a 508-compliant version of this guide is available at <https://www.census.gov/programs-surveys/bas/information/respondent-guides.html>.

For supplemental information on functions within GUPS that are specific to QGIS, a QGIS user's manual can be found at <https://docs.qgis.org/3.4/en/docs/user_manual/index.html>. The QGIS manual offers particularly helpful information on several activities that are touched on in this guide, but not described in detail, including working with user-provided data layers, creating search expressions for attribute tables, and creating customized coordinate systems. For questions concerning technical problems with the GUPS application, user support is available via telephone at **1-800-972-5651** and by email at <geo.bas@census.gov>.

1.2.2 BAS Help

BAS participants may find the *Boundary and Annexation Survey Respondent Guide: Digital* helpful. Although designed for experienced GIS users, it provides important information on geocoding, topological relationships, and spatial accuracy relevant to Census Bureau shapefiles. This guide can be downloaded at: <https://www.census.gov/programs-surveys/bas/information/response-methods.Digital_BAS.html>.

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SECTION 2. REVIEWING BAS DATA

The Census Bureau requests that participants review and update all legal governments and boundaries within their jurisdiction, including the new incorporation or disincorporation of legal governments, legal boundary changes, and boundary corrections. They may also update linear features and landmarks, including area landmarks, hydrographic areas, and point landmarks, although review of these is optional.

To help conduct their review, the GUPS application allows participants to import and overlay their own geospatial data layers with the Census Bureau shapefiles. Image files may be imported from web mapping services, geodatabases, and other file types. Steps to import the most common types of user-provided data are provided in **5.7 How to Import User-Provided Data into GUPS**.

2.1 Boundary Corrections

A boundary correction is the adjustment of a boundary to correct an error in how the Census Bureau depicts an existing boundary. Boundary corrections should follow the general shape of the existing boundary. Legal documentation is not required when submitting a boundary correction to the Census Bureau.

2.2 Legal Boundary Changes

Legal boundary changes are the result of legal actions (e.g., annexations), and documenting such changes is the primary goal of BAS. AIA legal documentation (e.g., statute, federal court decision, trust deed) must accompany all AIA legal boundary changes, while legal boundary change submissions from incorporated places, MCDs, and counties must provide an authorization number, such as a resolution or ordinance number.

2.3 Reviewing Legal Boundaries

When reviewing legal boundaries, participants should examine the Census Bureau shapefiles for all legal governments within their jurisdiction. These include:

- Incorporated places.
- Minor Civil Divisions (MCDs) such as towns, boroughs, and townships.
- Counties (and county equivalents).
- Consolidated cities.

Table 1 shows the specific changes allowed for each legal government type.

Table 1: Available Change Types by Government Type

Entity Type	Available Change Types
Incorporated Place	• New Entity (New incorporation) • Deleted Entity (Disincorporation) • Addition or Annexation • Deletion or Deannexation • Boundary Correction (add) • Boundary Correction (remove) • Geographic Corridor • Geographic Offset
Minor Civil Division (MCD)	• New Entity • Deleted Entity • Addition or Annexation • Deletion or Deannexation • Boundary Correction (add) • Boundary Correction (remove) • Geographic Corridor • Geographic Offset
County	• New Entity (New incorporation of place and MCD) • Deleted Entity (Disincorporation of place and MCD) • Addition or Annexation • Deletion or Deannexation • Boundary Correction (add) • Boundary Correction (remove) • Geographic Corridor • Geographic Offset
Consolidated City	• New Entity (New incorporation of place and MCD) • Deleted Entity (Disincorporation of place and MCD) • Addition or Annexation • Deletion or Deannexation • Boundary Correction (add) • Boundary Correction (remove) • Geographic Corridor • Geographic Offset

2.4 Requirements for Legal Boundary Changes

2.4.1 Boundary Changes to Legal Government

For a boundary change to an existing legal government (or the new incorporation or disincorporation of a legal government) to be processed as a legal change, participants must provide the legal documentation number (e.g., law or ordinance number), effective date, and authorization type. They are not required to submit paperwork documenting the change.

Note: Although additional documentation is not required, the Census Bureau strongly encourages attaching supporting paperwork to submissions (this may be done directly in GUPS). The paperwork will expedite the Census Bureau's ability to reconcile and process any legal updates.

2.4.2 Boundary Changes to Legal Governments in Georgia and Indiana

For questions about required documentation for a particular jurisdiction, contact the Geography Division by phone at **1-800-972-5651** or by email at <geo.bas@census.gov>.

Georgia: Any legal boundary change made to an incorporated place in the state of Georgia must include: (1) the effective date and (2) the acreage of the new government. In addition, before entering the change, ensure that all annexation/deannexation information has been reported to the Department of Community Affairs (DCA). The DCA provides the Census Bureau a list of the governments that reported boundary changes each year. Any legal boundary changes to incorporated places not on this list will not be placed in the Master Address File and Topologically Integrated Geographic Encoding and Reference (MAF/TIGER) system. For additional information, see: <https://www.census.gov/programs-surveys/bas/information/state-agreements.html>.

Indiana: Per Indiana state law, counties must provide the legal boundary updates for townships. For more information, refer to Indiana Code 36-6 Government of Townships at <http://iga.in.gov/legislative/laws/2020/ic/titles/036>.

2.5 Reviewing Linear Features

It is important that Census Bureau data reflects the most recent linear features to ensure that new or previously missed housing units located along these features are identified and located. When reviewing linear features (edges layer) on the Census Bureau shapefiles, first determine whether any features are missing or need to be deleted. Pay particular attention to areas that have experienced recent population growth or construction activities, as these are the most likely to possess new or altered linear features (e.g., new subdivisions, traffic circles converted to straight ways, or privately maintained roads that serve as public streets, but exclude private driveways).

Attribute updates (e.g., name, class code, and address ranges) may also be added for selected features. For a complete list of MTFCC, refer to **Appendix C**.

To aid in the review of linear features, GUPS allows users to import local street centerline files, hydrographic layers, imagery, and other user-provided geospatial data for reference and comparison against the Census Bureau data.

In the review, please note:

- **S1100 and S1200**—If adding road features with an MTFCC of S1100 (Primary Road) or S1200 (Secondary Road), users must supply a feature name. As is the case for all road features, the feature name should be a proper name or route number.
- **Spatial Inaccuracies**—The Census Bureau will not process the wholesale spatial realignment of features to enhance spatial accuracy. If a feature is in the incorrect location, delete the feature and add it in the correct location. Take this action only if the feature is exceedingly spatially inaccurate and/or the current location (with respect to other features and boundaries) affects the tabulation of housing units to the correct geography, such as legal governments, census tracts, and census blocks.
- **Address Range Changes**—The Census Bureau accepts address range data as part of the linear feature update layer. As with other linear feature updates, the required attributes and corresponding change type for the update must be supplied. In addition, because existing address ranges are not shown in the Census Bureau's outgoing shapefiles, it is recommended that participants only add address ranges to new features.

2.6 Reviewing Area Landmarks and Hydrographic Areas

The Census Bureau accepts updates to area landmarks and hydrographic areas in a similar manner to legal boundary changes. However, area landmarks and hydrographic areas are not legal governments, so no documentation or effective dates are required.

Allowable updates for area landmarks and hydrographic areas are:

- Add new area landmark or hydrographic area.
- Remove area landmark or hydrographic area.
- Change or add landmark name.
- Boundary corrections (add and remove area).

If ***adding*** a new area landmark or hydrographic area, please add only:

- Water bodies.
- Glaciers.
- Airports.
- Cemeteries.
- Golf courses.
- Parks.

The Census Bureau cannot add other types of area landmark/hydrographic areas to the MAF/TIGER System at this time (even though others may already exist in the database). Error! Reference source not found. shows the acceptable MTFCCs for new area landmarks or hydrographic areas.

Table 2: Acceptable MTFCCs for New Area Landmarks/Hydrographic Areas

MTFCC	Description
H2030	Lake/Pond
H2040	Reservoir
H2041	Treatment Pond
H2051	Bay/Estuary/Gulf/Sound
H2081	Glacier
C3023	Island
K1231	Hospital/Hospice/Urgent Care Facility
K1235	Juvenile Institution
K1236	Local Jail or Detention Center
K1237	Federal Penitentiary, State Prison, or Prison Farm
K2110	Military Installation
K2180	Park
K2181	National Park Service Land
K2182	National Forest or Other Federal Land
K2183	Tribal Park, Forest, or Recreation Area
K2184	State Park, Forest, or Recreation Area
K2185	Regional Park, Forest, or Recreation Area
K2186	County Park, Forest, or Recreation Area
K2187	County Subdivision Park, Forest, or Recreation Area
K2188	Incorporated Place Park, Forest, or Recreation Area
K2189	Private Park, Forest, or Recreation Area
K2190	Other Park, Forest, or Recreation Area (quasi-public, independent park, commission, etc.)
K2424	Marina
K2540	University or College
K2457	Airport – Area Representation
K2561	Golf Course
K2582	Cemetery

Area Landmark/Hydrographic Area Changes May Be Delayed

The Census Bureau prioritizes boundary changes to legal areas to meet ACS, PEP, and BAS deadlines. Therefore, there may be delays in incorporating area landmark and hydrographic area changes to the MAF/TIGER system. Please do not resubmit any changes that were sent during the previous year's BAS. The Census Bureau is working on incorporating those changes, and they will be reflected in the next year's BAS materials.

Note: If adding an MTFCC K2457 (Airport – Area Representation) area landmark, please limit the updates to major airports (major regional and international airports). The feature should show the full extent of the airport facility, that is, do not limit the addition to simply the landing strips.

2.7 Reviewing Point Landmarks

Because many of the point landmarks contained in the Census Bureau's MAF/TIGER system originate from the USGS GNIS, which is the official gazetteer of point landmark names for the Federal Government, point landmark updates are limited in BAS. The Census Bureau cannot modify any point landmark imported from the GNIS database.

Thus, be aware that name changes or deletions submitted for the following types of landmarks may be left unchanged:

- K2451 (Airport or Airfield).
- K2582 (Cemetery).
- C3022 (Summit or Pillar).
- C3081 (Locale or Populated Place).

Also, due to Title 13 privacy concerns, any landmark with an MTFCC shown in **Table 3** below cannot be added to the MAF/TIGER system as a point landmark. The MAF/TIGER system no longer maintains any area landmarks with these MTFCCs. Point landmarks with these codes could identify a residence or private business. Thus, it is also important *not* to add any of the point landmark types shown in the table using alternative MTFCCs.

Table 3: Restricted Point Landmark MTFCCs

MTFCC	Description
K1100	Housing Unit Location
K1121	Apartment Building or Complex
K1122	Rooming or Boarding House
K1223	Trailer Court or Mobile Home Park
K1226	Housing Facility/Dormitory for Workers
K1227	Hotel, Motel, Resort, Spa, Hostel, YMCA, or YWCA
K1228	Campground
K1229	Shelter or Mission
K1232	Halfway House/Group Home
K1233	Nursing Home, Retirement Home, or Home for the Aged
K1234	County Home or Poor Farm
K1235	Juvenile Institution
K1241	Sorority, Fraternity, or College Dormitory
K1251	Military Group Quarters
K1299	Other Group Quarters Location
K2100	Governmental
K2197	Mixed Use/Other Non-residential
K2300	Commercial Workplace
K2361	Shopping Center or Major Retail Center
K2362	Industrial Building or Industrial Park

MTFCC	Description
K2363	Office Building or Office Park
K2364	Farm/Vineyard/Winery/Orchard
K2366	Other Employment Center
K2424	Marina
K2500	Other Workplace
K2564	Amusement Center

Point Landmark Changes May Be Delayed

The Census Bureau prioritizes boundary changes to legal areas to meet ACS, PEP, and BAS deadlines. Therefore, there may be delays in incorporating point landmark changes to the MAF/TIGER system. Please do not resubmit any changes that were sent during the previous year's BAS. The Census Bureau is working on incorporating those changes, and they will be reflected in the next year's BAS materials.

SECTION 3. QUALITY CONTROL AND FILE SUBMISSION

3.1 Validating Updates

Once BAS updates are complete, please conduct a review of the change polygons using the validation tools to ensure that:

1. The polygons have no unintended holes (e.g., several faces were annexed but missing a traffic circle or small pond).
2. All boundary corrections meet a minimum size threshold (very small corrections cannot be processed).

Validate Often

Validation tools in GUPS are accessible at any time while working in the application. For best results, utilize the tools often while working to identify errors early and avoid extensive rework. Steps to use the Geographic Review tool and the Review Change Polygons tool are included in **6.5, How to Use GUPS Review and Validation Tools**.

3.2 Submitting Files through the Secure Web Incoming Module (SWIM)

Prompt submission of updates is welcome. It benefits the Census Bureau—allowing the BAS team to review the files early, provide feedback, and avoid backups in file processing—and the participant—guaranteeing their updates are recorded accurately and are reflected in the latest releases of Census Bureau data products.

For those with internet access, all BAS submissions must be made via the SWIM. Due to security reasons, the Census Bureau cannot accept files sent via email or through its alternate File Transfer Protocol (FTP) sites. For those without Internet access, see **3.3, Submitting Files on DVD**.

If participants indicated on their BAS Annual Response Form that they wished to receive or use the GUPS application, they will automatically receive the SWIM URL and a registration token via email. The email should arrive five days after completion of the Annual Response online (or five business days after the Census Bureau receives the paper form).

The registration token allows users to establish personal SWIM accounts. If a SWIM token does not arrive after the amount of time specified, email <geo.bas@census.gov> or call **1-800-972-5651**. Once registered, the token will no longer be necessary to log into the system.

Current SWIM Users

If a participant is in another Census Bureau partnership program or participated in a previous BAS year and already has a SWIM account, they may use their current account to submit files for BAS. They do not need to set up a new account.

Note: Participants will not be able to upload a file larger than 250 MB, and SWIM will block participants from uploading a zip file that contains another zip file.

For step-by-step instructions to submit files through SWIM, refer to **Table 49**.

3.3 Submitting Files on DVD

If internet access is unavailable, please copy the. ZIP file(s) to DVD for submission. The DVD should be mailed to:

U.S. Census Bureau
National Processing Center
ATTN: BAS Returns, Bldg 63E
1201 East 10th Street
Jeffersonville, IN 47132

PART 2 HOW TO USE GUPS

SECTION 4. REQUIREMENTS AND INSTALLATION

This section includes information needed to use GUPS. It offers a description of the GUPS application and gives specific instructions (in the form of Step/*Action* tables) for how to use GUPS to make BAS updates. Reminder: this guide is equipped with shortcuts to subjects that respondents may want to jump to directly. To move directly to one of these sections, click on the **linked** text.

Part 2 How to Use GUPS

Requirements and Installation

- **Getting Started** - Lists the hardware and software requirements for GUPS and SWIM.
- **How to Install GUPS** - Provides instructions for installing the application.

Section 5 Using GUPS (Basics and Map Management)

- **How to Access BAS Shapefiles** - Provides instructions to load shapefiles.
- **Import Data from the Census Bureau's BAS Website.**
- Download Shapefiles from the BAS Website.
- **Download Shapefiles from the Census Bureau ftp2 Site.**
- **Using the GUPS Interface** - Including the Menu, Toolbars, Layers Panel or Map Legend, and the Map View area.
- **Menu & Toolbars** - Offers instructions for using the tools available through the menu and toolbars.
- **How to Import User-Provided** Data into GUPS.

Section 6 Making BAS Updates in GUPS

- **How to Update Legal Boundaries** - Gives instructions to make required and optional updates in the application.
- **How to Update Linear Features.**
- **How to Update Area Landmarks and Hydrographic Areas.**
- **How to Update Point Landmarks.**
- **How to Use GUPS Review and Validation Tools.**
- **Exporting a Printable Map.**

Section 7 Submitting Files to the Census Bureau through SWIM - Provides instructions to submit files to the Census Bureau through SWIM.

4.1 Getting Started

Download GUPS from the BAS website at: <https://www.census.gov/programs-surveys/bas/technical-documentation/gups-instructions.html>. If the GUPS package was requested, it should include a DVD containing the GUPS software, respondent guides, and a readme text file.

Before beginning the installation, check that the computer has the capabilities needed to run GUPS (using **Table 4**).

GUPS is based on QGIS (formerly known as Quantum GIS), a free and open-source desktop geographic information system application. To learn more about QGIS, visit their website at <https://www.qgis.org/en/site/>. The GUPS application was developed for use in a desktop PC or a network environment.

Table 4 lists the hardware and software requirements to install and run GUPS. Also included are the software requirements to submit files through the SWIM website.

Table 4: GUPS Hardware and Software Requirements

Hardware	Operating System	Supported Browser
Disk Space Needed to Run GUPS: 4 GB **Disk Space Needed to Store *Shapefiles*:** Shapefile sizes vary. To view the size of the shapefiles, right-click, and choose **Properties** in the drop-down menu. *The **Files Properties** box opens and displays the folder size*. Select multiple files/folders in the list to view their properties via the same method. **RAM:** 4 GB minimum, 8 GB or more recommended for optimal performance.	**Windows®:** To run GUPS, Windows users need one of the following operating systems: • Windows 8® • Windows 10® ***Apple®:*** 0Mac OS X® users must secure a license for Microsoft Windows and use a Windows bridge. The suggested bridge software is Boot Camp®, which comes pre-installed on all Mac computers. Locate instructions for using Boot Camp at: <https://www.apple.com/support/bootcamp/getstarted/>. **IMPORTANT**: Since Boot Camp requires a restart of the computer to set up the bridge, be sure to print the instructions provided at the URL above before beginning installation.	**SWIM runs on the two most recent versions of each of these major browsers:** • Internet Explorer® • Google Chrome® • Mozilla Firefox® • Apple Safari®

Depending on the Windows OS version, the GUPS dialog boxes may have a different appearance than the screenshots contained in the user guide, although the content is the same.

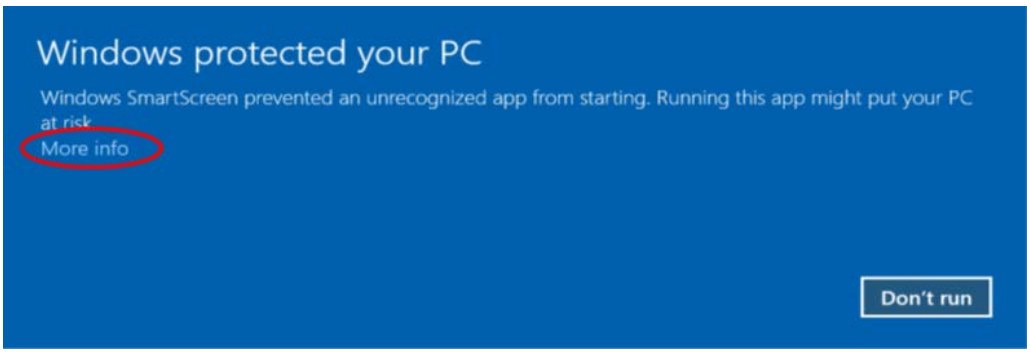
Note: GUPS continues to evolve through updates and revisions. As a result, some discrepancies between the appearance of individual screens or buttons in this guide may differ from the actual software received with the feedback materials. Other variations in color or styles may also exist.

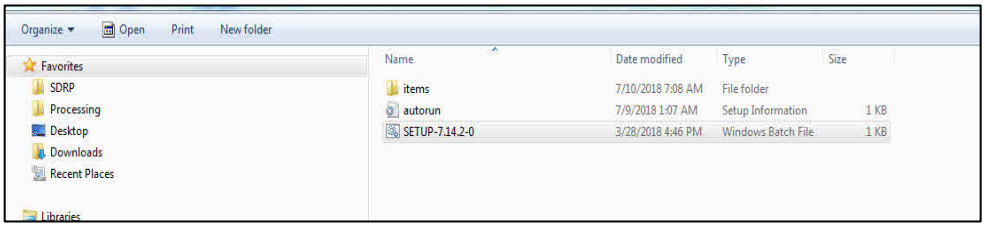
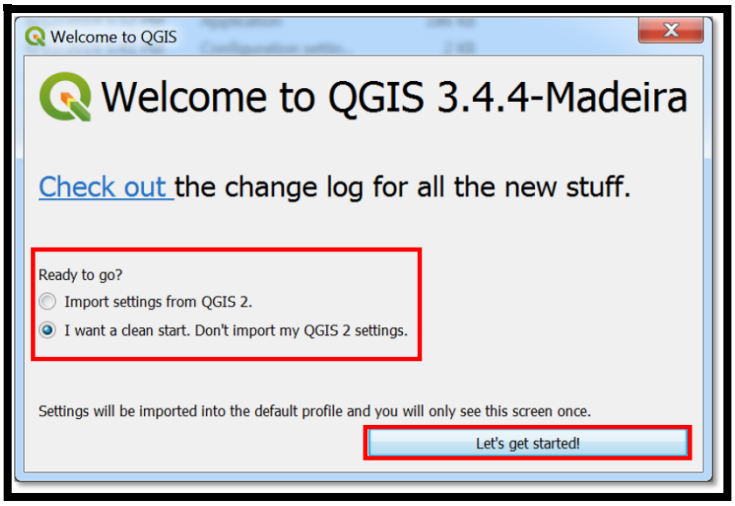
4.2 How to Install GUPS

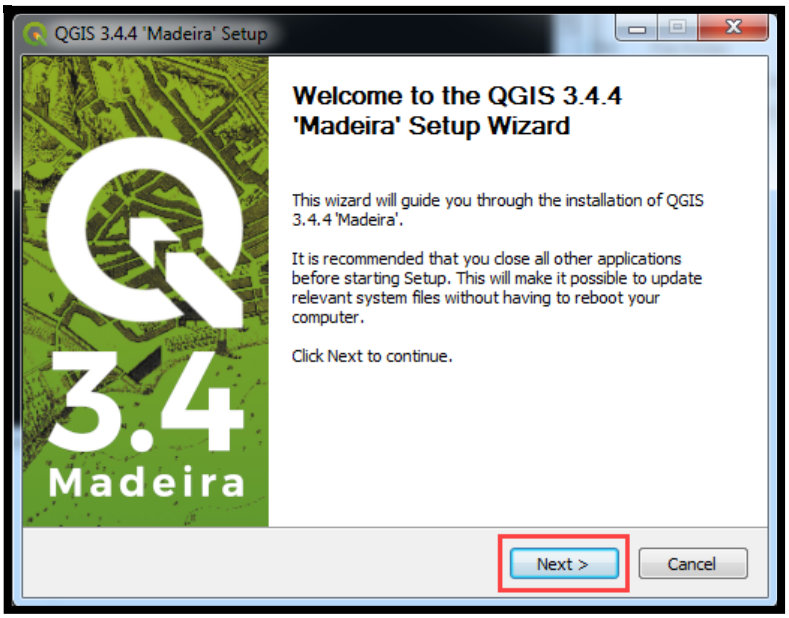
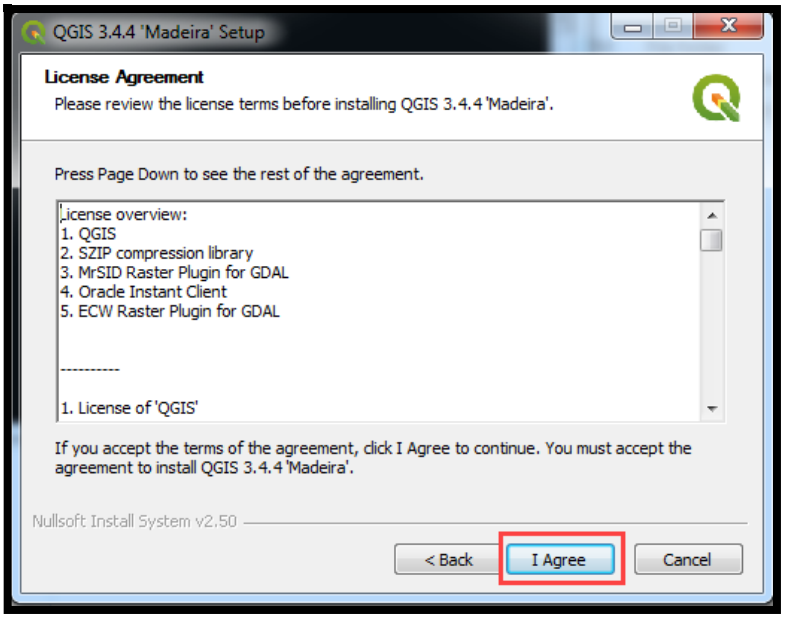
To install the GUPS application users must have Administrator privileges for their computer. If an earlier installation of GUPS is present, please check that it is the correct version for this year's BAS. Go to the **GUPS** tab and select the **About GUPS** option in the drop-down menu to find the GUPS version number. If it is not GUPS Version 13.0.X-X or later, download the most recent version and follow the setup instructions. Alternatively, compare the currently installed

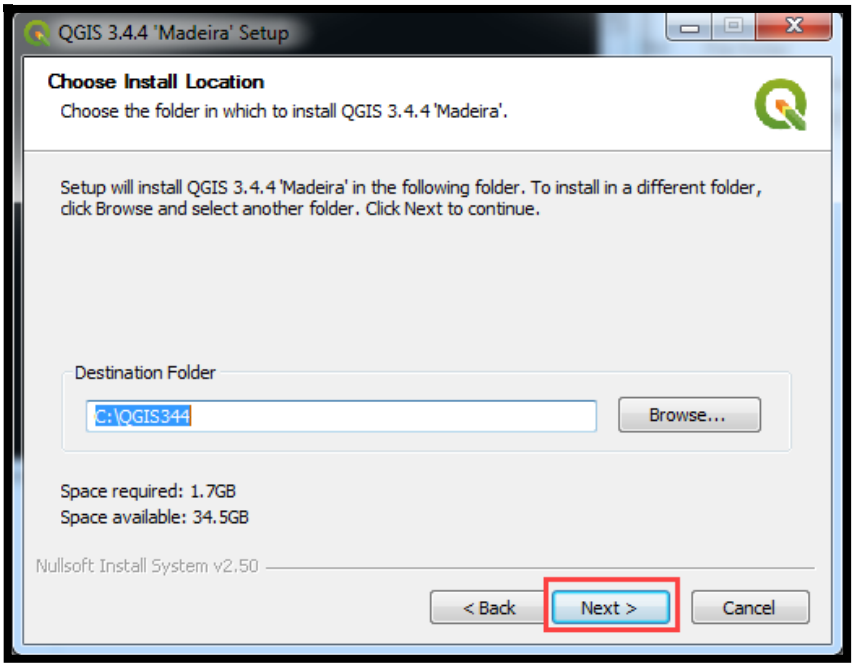
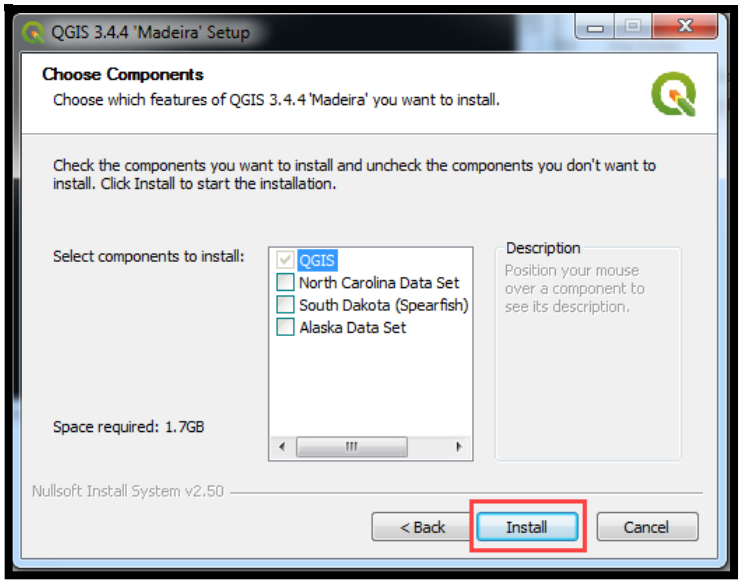
version with the one provided on the Census Bureau's installation DVD to ensure the latest version. To complete the installation, follow the steps in **Table 5**: Install the GUPS Application.

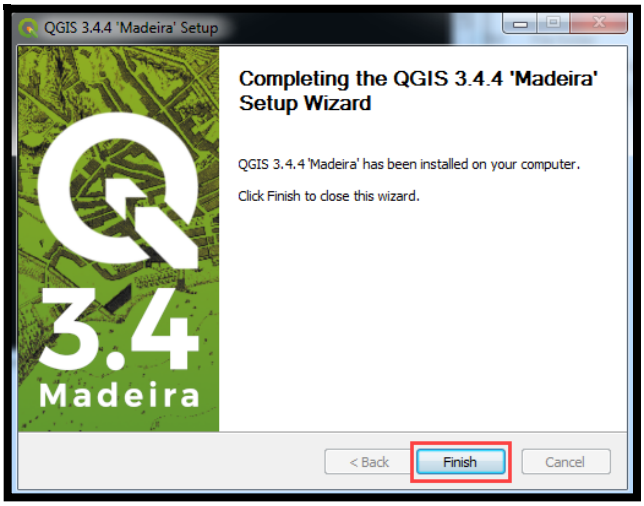
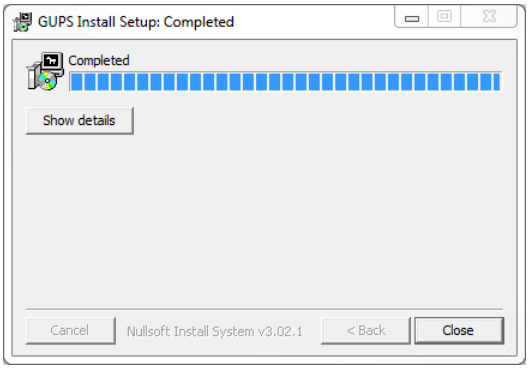
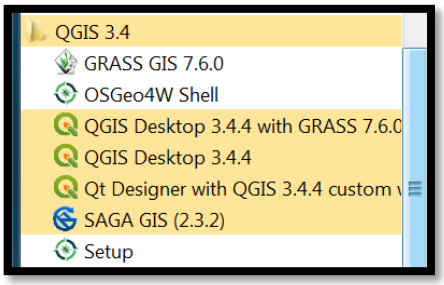
Table 5: Install the GUPS Application

Step	Action and *Result*
Step 1	Click the direct download link <https://www2.census.gov/geo/pvs/gups/gups.zip> or place the installation DVD into the computer's DVD drive. *For some users, a **Windows protected your PC** pop-up box may appear.*  To continue, click '**More info'**, then select '**Run anyway**?'
Step 2	Other users may receive a user account control pop-up that asks, "Do you want to run this file?", "Do you want to allow the following program from an unknown publisher to make changes to this computer?", or a similar query. See an example below. If this pop-up occurs, click Run, Yes, Allow, or an option that allows the installation to proceed. *The software should begin to run automatically*.

Step	Action and *Result*
Step 3	If the software does not run automatically, open Windows Explorer, navigate to the DVD drive, and double-click on the ***Setup<current version number>*.bat** file. **Note**: The name of this file will vary depending on the current GUPS version number, but it will be the only setup **.bat** file available.  If the software still does not run properly, contact the local System Administrator for assistance.
Step 4	A ***Welcome to QGIS 3.4.4-Madeira*** window pops up allowing users to import previous settings used into the default profile. Users may choose to import their settings or to have a clean start. Select the desired options and click "Let's get started".  Before proceeding, close all other programs or applications. Once other programs and applications are closed, click the **Next** button.

Step	Action and *Result*
Step 5	When the installer opens, the ***Welcome to the QGIS Setup Wizard*** screen appears.  **Note**: The version needed for2021 BAS is QGIS 3.4.4 Madeira. If the exact same version of QGIS exists on the computer, an instruction to uninstall and reinstall appears. Participants may retain other versions of QGIS that may be in use for other programs but must reinstall if the same version exists on the computer to ensure installation of the latest update. Before proceeding with installation, close all other programs or applications. Once other programs and applications are closed, click the **Next** button.
Step 6	The ***License Agreement*** screen appears.  Read the License Agreement and click the ***I Agree*** button to continue.

Step	Action and *Result*
Step 7	*The **Choose Install Location*** screen opens. It is recommended to install the application at the default: (i.e., C:\Program files\QGISGUPS). Otherwise, use the **Browse** button to navigate to a preferred location.  The Browse button on this screen allows participants to browse the local computer for an installation location. The Census Bureau recommends the installation of the GUPS application to the default location: (e.g., C:\QGIS344) to prevent installation errors or issues. To begin the installation, click the **Next** button.
Step 8	The ***Choose Components*** screen opens.  '☑QGIS' in the **Select components to install** field is checked and grayed out since it is the default. Simply click **Install** to continue.

Step	Action and *Result*
	To review a previous screen or reread the license agreement, click the **Back** button (each screen contains this button). *This returns the screen to the previous page.*
Step 9	The software should take between 5 and 10 minutes to install. *When it is finished*, the **Completing the QGIS GUPS Setup Wizard** screen opens.  Click the **Finish** button.
Step 10	The ***GUPS Install Setup:* Completed** screen opens showing the status of the installation of GUPS. When completed, click the **Close** button on the following screen. 
Step 11	To complete the installation, click the **Close** button at the bottom of the **GUPS Install Setup: Completed Setup Wizard** screen. *Once the application installs, QGIS will be added to the All Programs Start Menu list.* 

SECTION 5. USING GUPS (BASICS AND MAP MANAGEMENT)

After successfully installing GUPS, participants are ready to start their BAS updates. There are three ways to retrieve shapefiles when starting a new project:

- From the Census Bureau website (loads directly into GUPS).
- From DVD (if one was requested).
- From My Computer (if the files have been downloaded to the hard drive).

Important: X represents the current year in all images where 202x is used.

Table 6 shows the steps to open GUPS and start a new project using the Census Bureau website. **Table 7** shows the same steps to open GUPS, but starts a new project using the Census Bureau provided DVD or My Computer (downloaded Census Bureau shapefiles saved to the hard drive).

5.1 How to Access BAS Shapefiles

BAS shapefiles from the BAS website can be pulled directly into the application when working in GUPS by choosing the Census Web option during project setup. Users can load the shapefiles as needed or load multiple county files at once. This is the preferred method for loading the Census Bureau's BAS shapefiles into GUPS as it ensures that required files are placed in the correct location for the application to access.

Another option for loading files is to download the shapefiles from the BAS website (or from the Census Bureau ftp2 site), then import them into GUPS. BAS shapefiles are available for download from the BAS website here: <https://www.census.gov/geographies/mapping-files/2021/geo/bas/2021-bas-shapefiles.html>. Instructions for how to download Census Bureau shapefiles appear in

Important: X represents the current year in all images where 202x is used.

Table 6 and **Table 7**. Downloading files to the hard drive is not the preferred method when working in GUPS and should be used only when necessary
(e.g., if additional data layers that GUPS does not automatically load need to be pulled in as user-provided data).

If the shapefiles were received part of the GUPS package on a DVD, the files can be loaded directly into GUPS from the DVD. Instructions for how to load shapefiles are contained in **Table 7**, **Step 8**.

Whether pulling the files from the BAS website or from the DVD, the GUPS application unzips them and places them into a pre-established folder created on the computer's home directory during the installation process (C:\GUPSGIS\gupsdata\BAS2021\shape). It then displays them in the application and manages the files. There is no need to take any further action.

CAUTION!

Regardless of the source of the shapefiles, it is important **NOT TO CHANGE** any shapefile or folder name. The files and folders must have the ***exact*** names given for the GUPS application to recognize and load them.

5.2 Import Data from the Census Bureau's BAS Website

To open the GUPS application and begin BAS updates, follow the steps in

Important: X represents the current year in all images where 202x is used.

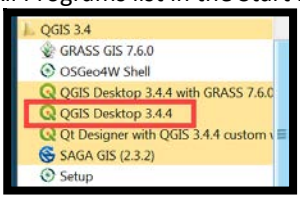
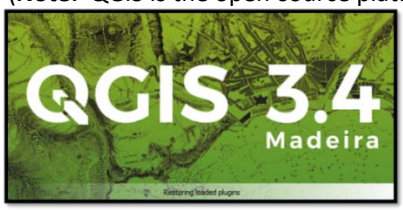
Table 6. Before beginning, note that:

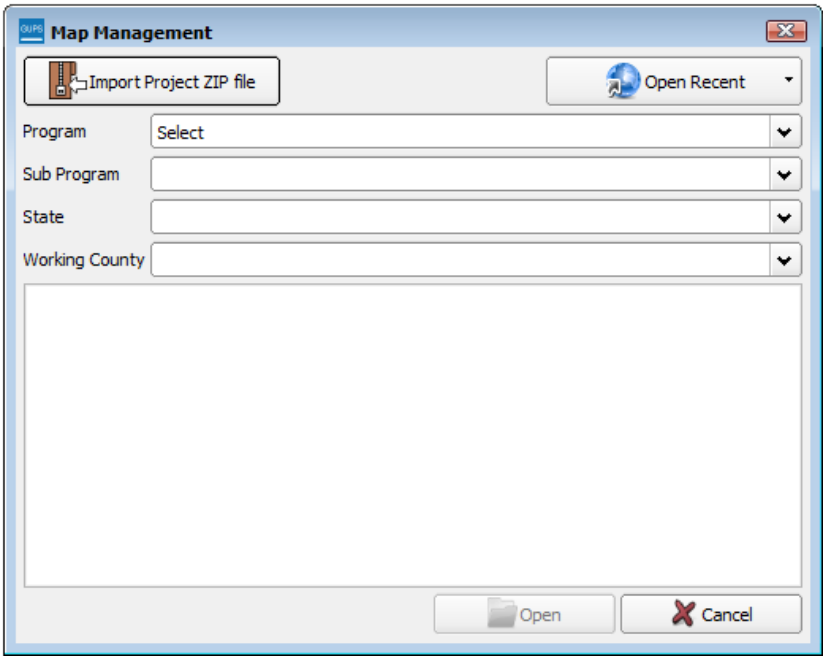
1. To practice using GUPS without committing the changes made, simply exit the system without saving. Before the system closes, it will give the option to discard the changes.
2. If comfortable with the system, but not all changes are completed in one session, simply save the changes, then close the system. When opening GUPS later, reopen the project and continue working.

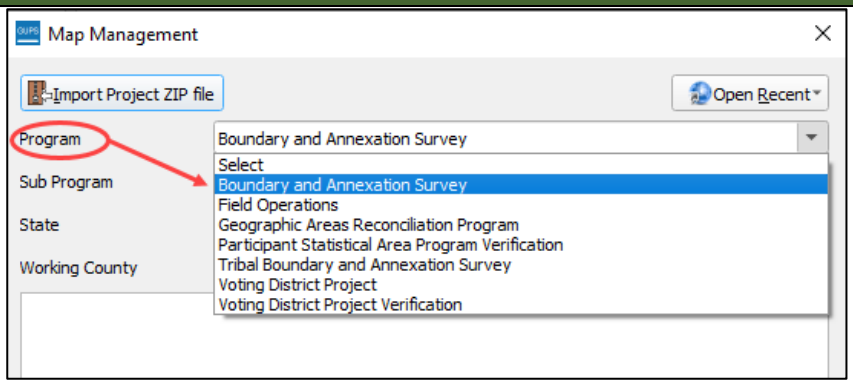
Note: In all the Action/*Result* tables, the action is usually a command or action to perform and the *Result(s)* of the action are in italics. For example, click the QGIS icon on the desktop, *the software should begin to run automatically.*

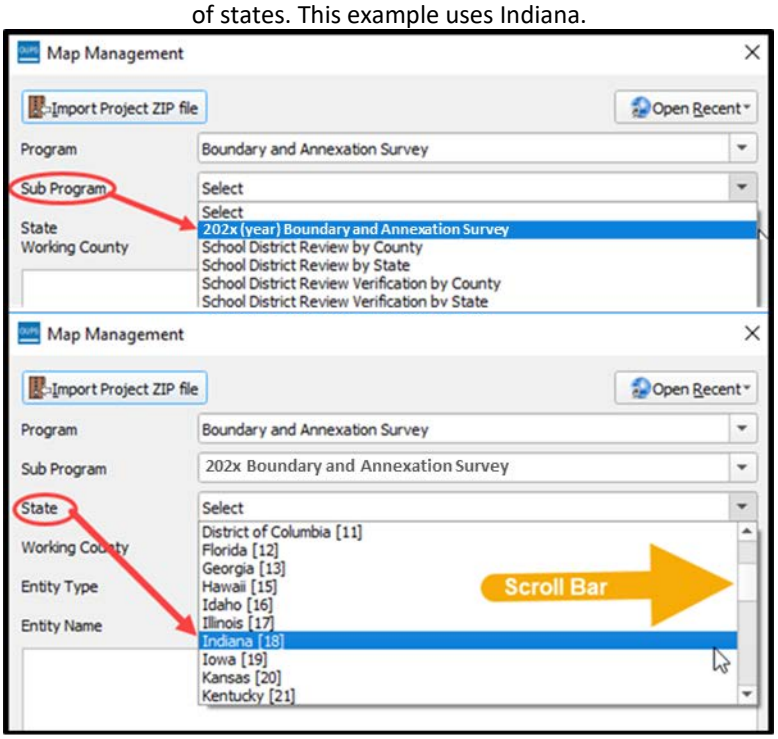
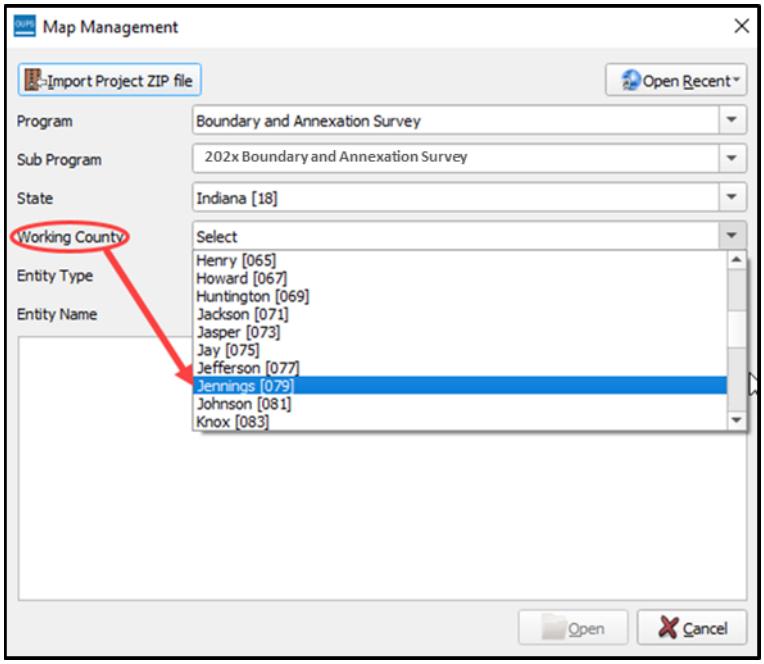
Important: X represents the current year in all images where 202x is used.

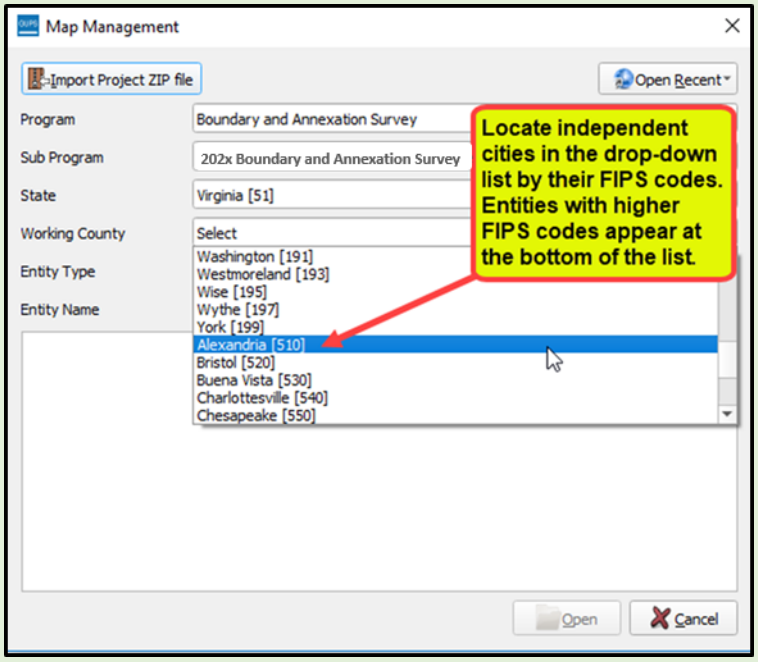
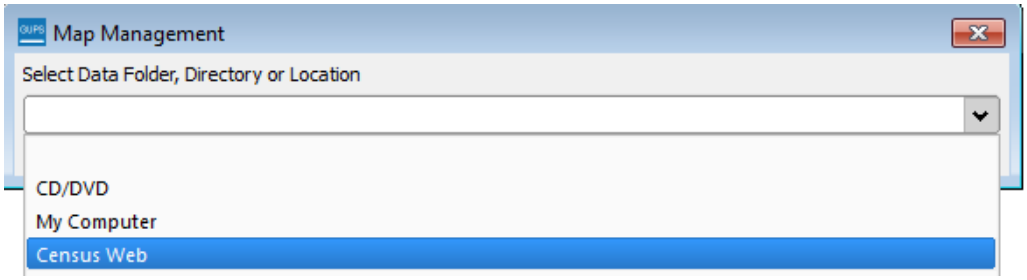
Table 6: Start a New Project Using Shapefiles from the BAS website

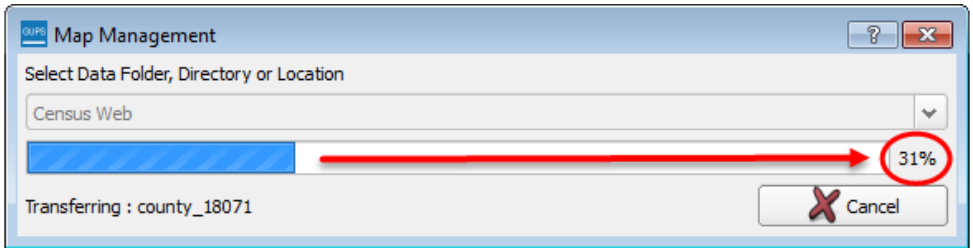
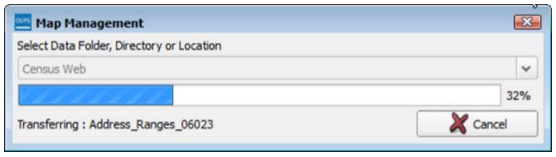
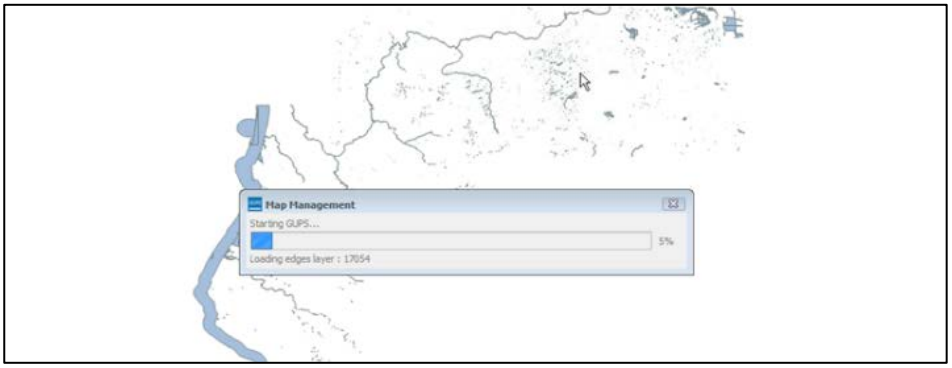
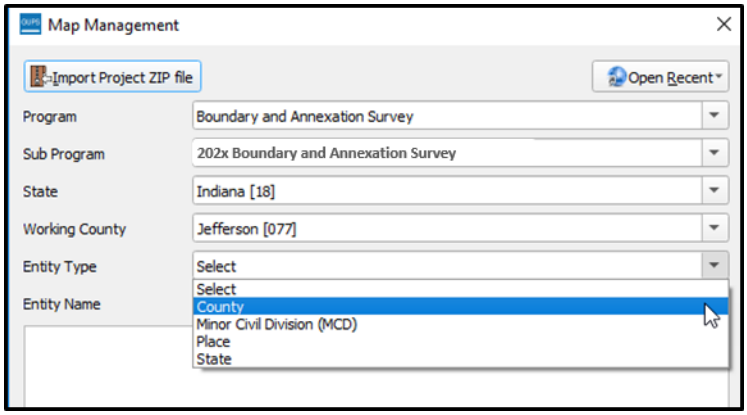
Step	Action and *Result*
Step 1	Select **QGIS Desktop** 3.4.4 from the All Programs list in the Start Menu.  *The QGIS splash screen appears*. (**Note:** QGIS is the open-source platform for building GUPS.) 
Step 2	Wait until the application loads (this may require a few minutes on older computers). *When the GUPS application has loaded, the GUPS main page opens and the QGIS Tips! box appears.*

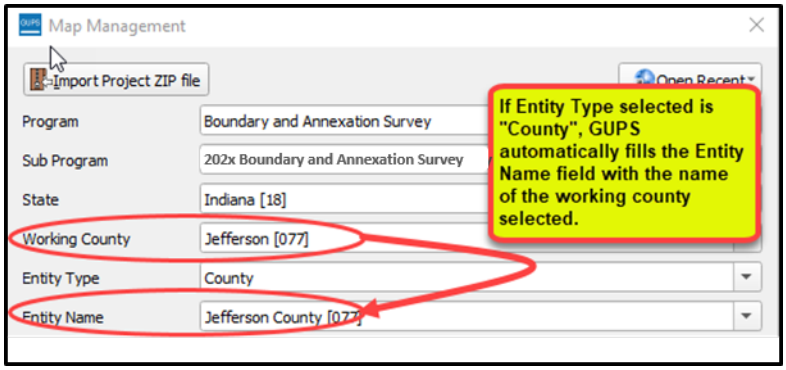
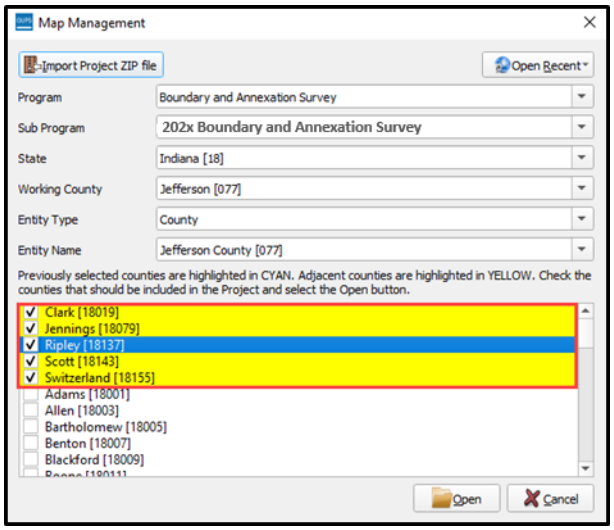
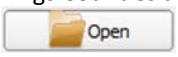
Step	Action and *Result*
	 Note: Since GUPS is built on the QGIS open-source platform, there will be references to QGIS in several locations within the GUPS application.
Step 3	To view QGIS system tips, click the **Next** button to read the first tip. Thereafter use the **Previous** and **Next** buttons to navigate within tips. To no longer see the tips on startup, click the checkbox in the bottom left-hand corner that reads 'I've had enough tips, don't show this on startup anymore!'
Step 4	To begin a GUPS project, close the **QGIS Tips! box** by clicking the **OK** button. *The box closes and the **Map Management** dialog box opens, as shown below.* 
Step 5	In the **Map Management** dialog box, use the drop-down menu next to the **Program** field to select the program, '**Boundary and Annexation Survey'**. '*Boundary and Annexation Survey' populates the field*.

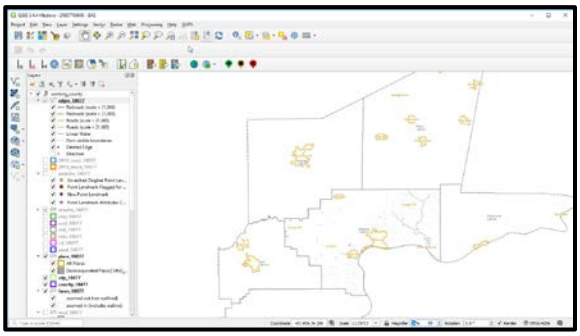
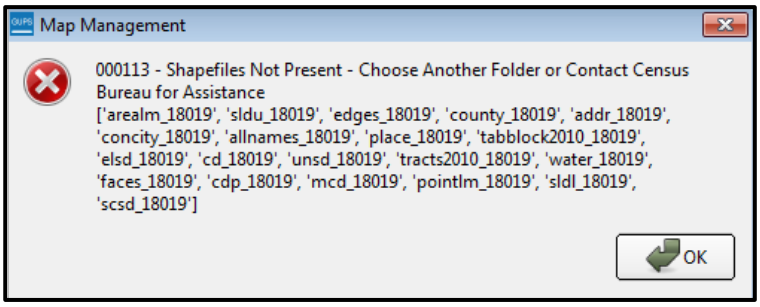
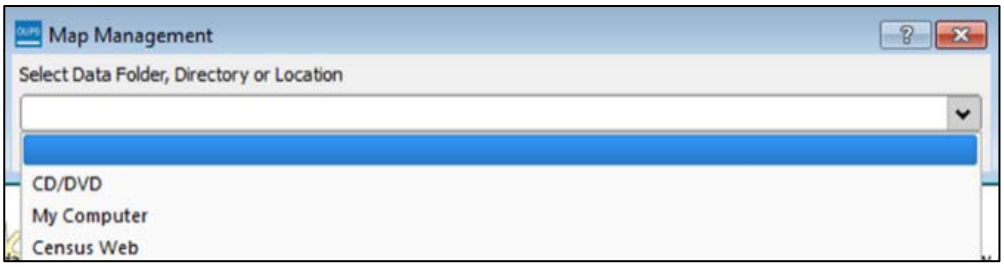
Step	Action and *Result*
	

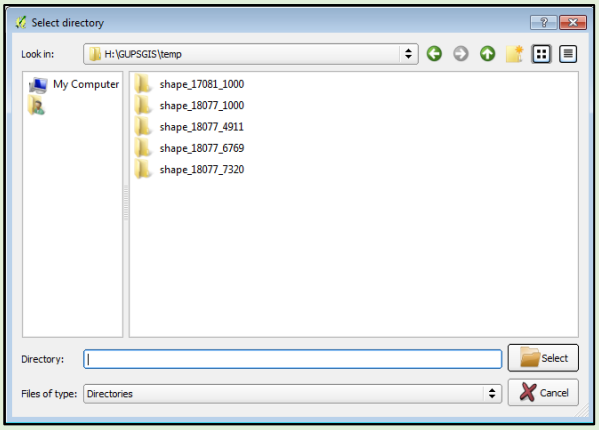
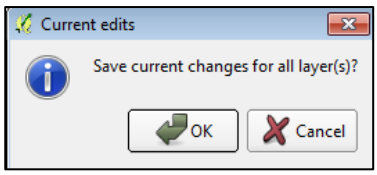
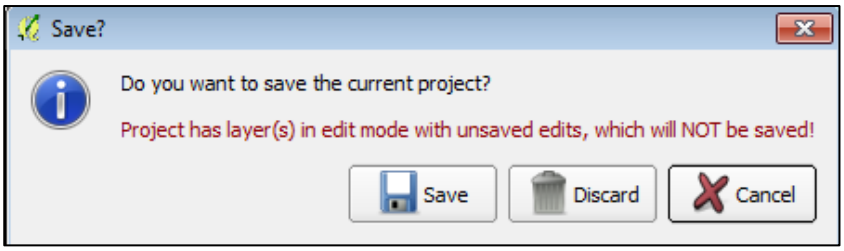
Step	Action and *Result*
Step 6	In the **Sub Program** field, select '**Boundary and Annexation Survey**'. In the **State** field, use the drop-down menu to select a state. The scroll bar to the right allows the user to move up and down the list of states. This example uses Indiana. 
Step 7	In the **Working County** field, use the drop-down menu to select the county to make updates. This example uses Jennings County, Indiana. 

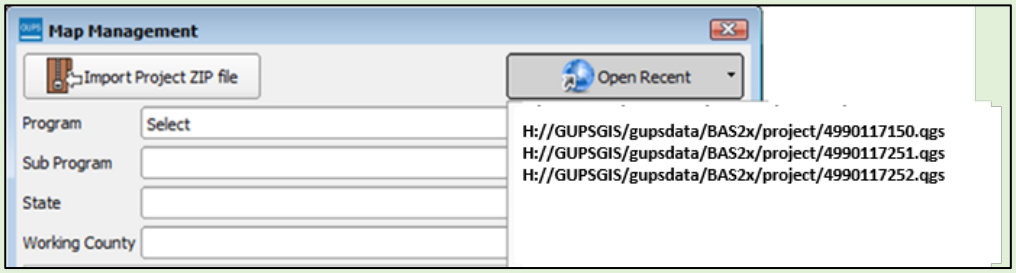
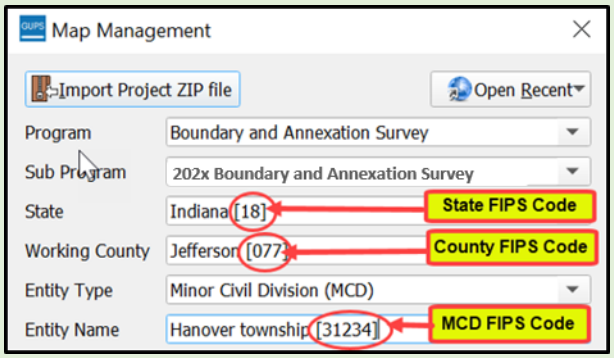
Step	Action and *Result*
	Independent City Users Note that the **Working County** drop-down menu sorts by FIPS code. Search for the city's code rather than assuming it will appear alphabetically. A portion of the **Working County** drop-down list (an example of this uses the State of Virginia) appears below, showing independent cities near the end of the list because their FIPS codes are higher. 
Step 8	After selecting the working county, GUPS will prompt the participant for a location from which to import the county's (or county equivalent's) shapefiles. *The **Select Data Folder, Directory or Location** box opens.*
	GUPS only ask to specify a data download location once per project. When a project has been closed and reopened, the shapefiles automatically load, even if there were no changes during the first session.
Step 9	In the **Select Data Folder, Directory or Location** box drop-down menu, select a data download location. This example assumes the user is pulling the data from the BAS website, so click on **Census Web** in the drop-down menu. 

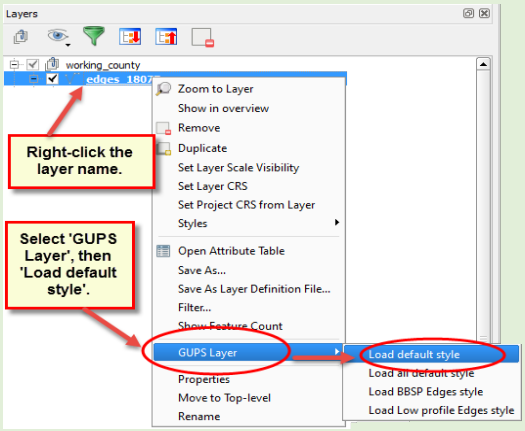
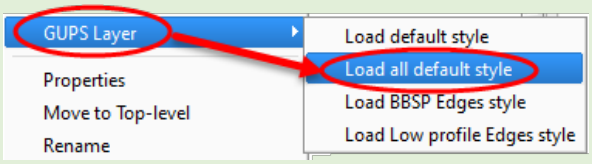
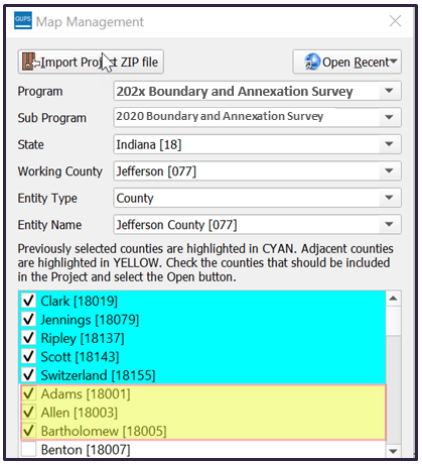
Step	Action and *Result*
Step 10	When **Census Web** is chosen, the shapefile for the county begins to load and progress is displayed by a blue striped bar (color may vary), with the percentage of the upload completed displayed to the right. 
Step 11	As GUPS loads the data, it unzips and copies the files to a folder in the home directory created during the installation process. The data is then loaded into the GUPS application.  
Step 12	*After the files load, GUPS returns to the* ***Map Management*** screen. In the **Entity Type** field drop-down menu, select the type of entity to update. The options are: 'Consolidated City', County', 'Minor Civil Division (MCD)', 'Place', and 'State'. **Note**: The options may vary, depending on the entity types the state contains. Independent city users should select 'Place'. This example assumes a 'County' user. 

Step	Action and *Result*
Step 13	Since the entity type 'County' was the selection and Jefferson County is named as the working county, GUPS automatically fills the **Entity Name** field with 'Jefferson County.' 
	If selecting 'Consolidated City' as the **Entity Type**, the name of the consolidated city-county government automatically fills the **Entity Name** field. If selecting 'Place' as the **Entity Type**, the **Entity Name** field is blank. A drop-down menu, which lists all incorporated places within the working county, allows selection of the correct entity. If selecting 'State' as the entity type, the state selected in the **State** field automatically fills the **Entity Name** field.
Step 14	In all cases, a list of the counties in the state appears at the bottom of the **Map Management** dialog box. Adjacent counties (counties whose borders touch the working county) highlights in yellow and may be checked if necessary. 
Step 15	All checked counties display in the **Map View**. If not wanted in the display, uncheck the box for that county. To select additional counties to display (**up to 10** may be chosen at once), check the checkboxes next to them. Scroll down using the scroll bar to the right to see the full list of counties.
Step 16	For this example, the selection of neighboring Clark and Jennings Counties are selected. Check the checkboxes next to these counties, and then click the Open  button at the bottom of the **Map Management** dialog box.

Step	Action and *Result*
Step 18	*GUPS unzips and copies the files to the GUPS home directory then loads them into the application. The map management screen, with all selections grayed out, will show while the project is loading followed by a progress bar with the message "Starting GUPS."* The data layers for Jefferson County appear in the **Layers Panel** and the maps for the selected adjacent (or other selected counties) appear next to that for the working county in **Map View**. In our example, as shown below, **Map View** displays the maps for Jennings and Clark Counties next to that for Jefferson County. 
Step 19	If for any reason shapefiles are missing from the chosen location in the **Select Data Folder, Directory or Location** drop-down menu, or the files are corrupted and cannot be loaded, *an error message will display*. 
Step 20	Click **OK** to return to the **Map Management** dialog box and then close **Map Management**. Reopen **Map Management** from the **Standard Toolbar**.
Step 21	Try loading the file(s) from another location. After reopening map management, reselect the desired working county and pick another option for loading the files. 

Step	Action and *Result*
	If loading shapefiles using the 'Census Web' and 'CD/DVD' options is not successful, follow the instructions in **Table 7** or **Table** 8 to download the files from the BAS website or Census Bureau's ftp2 site. Then pull them into GUPS using the 'My Computer' option in the **Select Data Folder, Directory or Location** drop-down menu. *When 'My Computer' is selected, the **Select directory** screen opens*.  On this screen, click on the **My Computer** icon in the left-hand corner. Navigate to the location of the files to load, select the files, and then click on the **Select** button at the bottom of the **Select directory** screen. *GUPS unzips and loads the files, then moves them to the pre-established folder in the home directory.*
Step 22	After working on a project, be sure to save before exiting. Otherwise unsaved edits will be lost. To save, click the **Save** icon on the **Standard toolbar**. The **Current edits** pop-up box asks to save the changes for all layer(s).  Click **OK**. The changes are saved.
Step 23	Close the application to discard any changes (click the red X in the upper right-hand corner of the main GUPS page). *A **Save?** pop-up warning prompts to save, discard, or cancel.*  Click **Discard** to not save the current project.

Step	Action and *Result*
Step 24	To reopen a saved project, in the **Map Management** dialog box, click the down arrow next to the **Open Recent** button. *The drop-down menu opens with a list of current projects.*
	If sharing a computer with other GUPS users, multiple project files may appear in the drop-down menu, as shown below. Here three separate users in Mississippi have created projects on the same computer.  To identify which of the entries in the list represents a particular project, look at its number string. This string comprises a BAS ID. Each BAS ID is 11 digits. The first digit indicates the Entity Type (i.e., the user type) (0 = consolidated city; 1 = incorporated place; 2 = county; 3 = MCD; and 7 = state). The next two digits are the state FIPS code. The following three digits are the FIPS code for the working county (these digits are '000' for incorporated places). The final five digits are the FIPS code for the specific incorporated place, consolidated city, or MCD that created the project (for counties, these digits are '00000' since the county is already identified in the string). The number string, 12800040360.qgs reflects a project created by a Place user (for the City of Lena) in Mississippi, where 1 = incorporated place; 28 = Mississippi FIPS code; 000 = placeholder number for non-county entities (if the user were a county user this number would be the FIPS code for Chickasaw County, or 155); and 40360 = the place FIPS code for Lena. The BAS ID information for a particular geography is available within the **Map Management** dialog box. Below is an example for Hanover Township, an MCD in Jefferson County, Indiana. 
Step 25	After identifying the correct file to reopen, select it from the list. The map for the project automatically loads and the layers show in the **Layers Panel**.

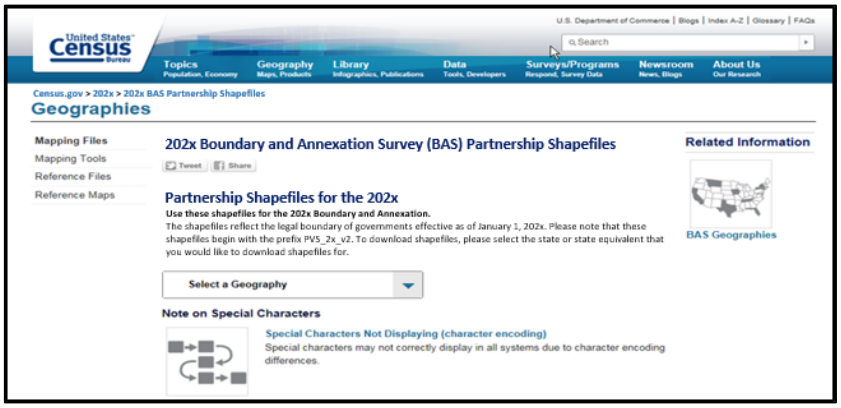
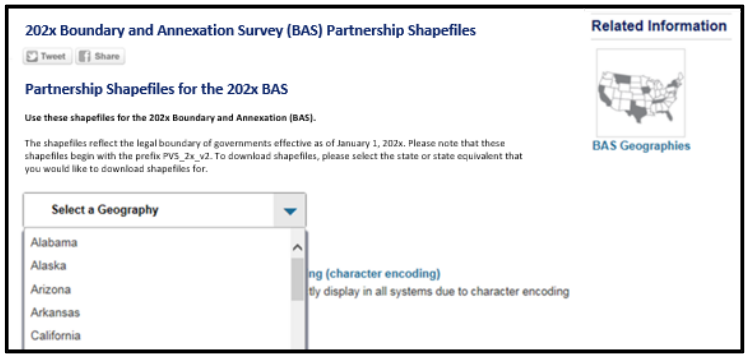
Step	Action and *Result*
	Census Bureau-defined default layers and view settings are loaded each time a new project is started in GUPS. If these default settings have been changed and then are saved during a project, reopening the project will load these saved changes rather than the Census Bureau-defined default layers and view setting. To restore the default settings for a layer: • Click on the layer in the **Layers Panel**. *A drop-down menu opens.* • In the drop-down menu, select '**GUPS Layer**'. *A submenu opens.* • In the submenu, select '**Load default style**' (see illustration below).  To reset the default settings for all layers, select '**Load all default style**.' 
Step 26	When a project is opened in Map Management, any previously selected adjacent (or other selected) counties may appear in cyan and remain checked. Other adjacent counties that have not previously been selected may appear in yellow and are also checked, as shown below.  Additional counties may be loaded at this point.

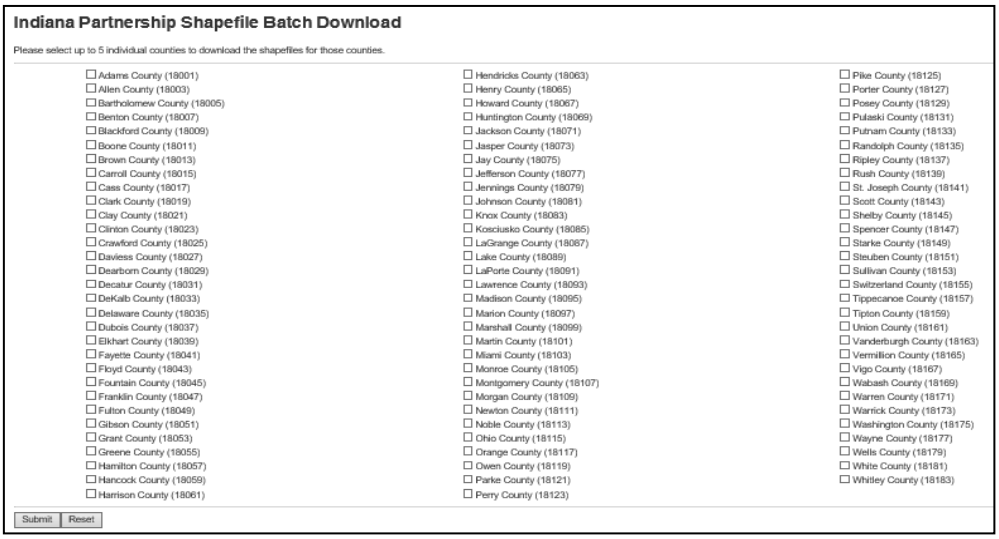
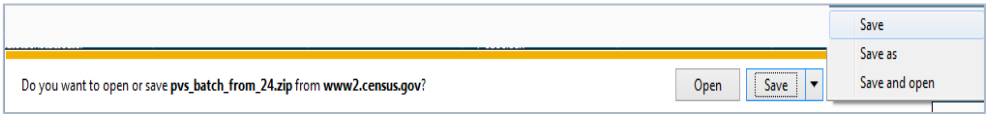
Step	Action and *Result*
	Loading Multiple Files at Once The limit to how many county datasets can be loaded at once is 11 (the working county plus 10 other counties). To load shapefiles for additional counties, after the first 10 are loaded: • Leave the same working county selected in the **Working County** field. • Uncheck the already loaded counties in the **Map Management** dialog box list. • Check the checkboxes for the additional counties (up to 10) to be added. Click the **Open** button and after the **Select Data Folder, Directory or Location** box opens, use the drop-down menu to select the source of the files. Repeat this process as many times as needed.

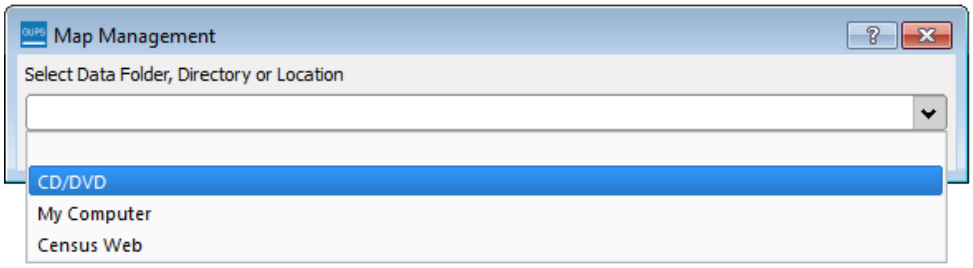
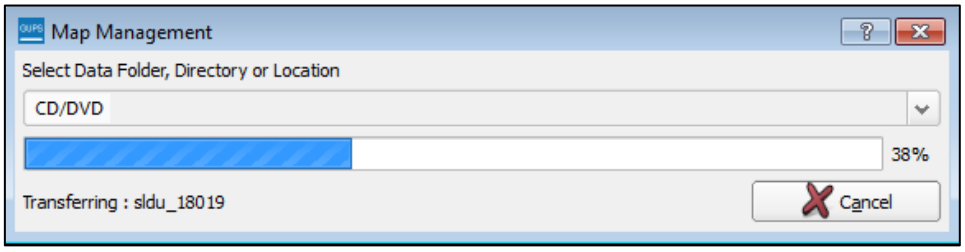
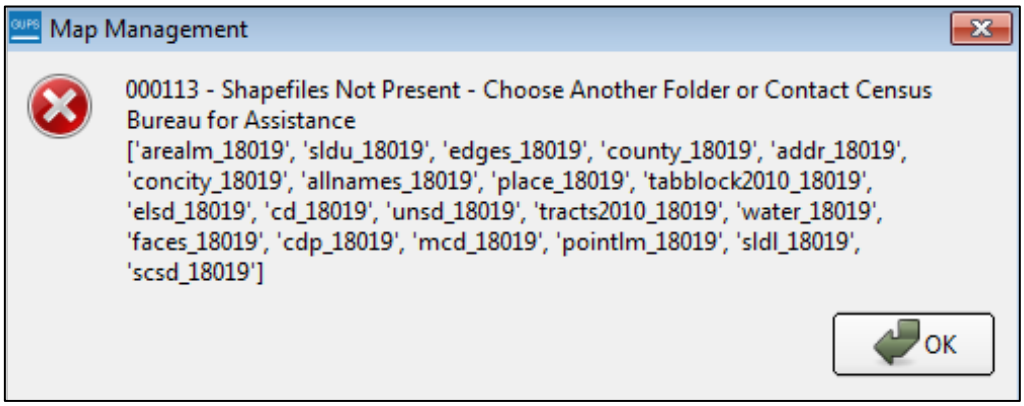
5.3 Download Shapefiles from the BAS Website

Follow the steps in **Table 7** to download the files from the BAS website to the hard drive. Please note that images may vary slightly as website updates are made after this document is published.

Table 7: Download Shapefiles from the BAS Website

Step	Action and *Result*
Step 1	Enter the URL <https://www.census.gov/geographies/mapping-files/2021/geo/bas/2021-bas-shapefiles.html> into a web browser. *The **Boundary and Annexation Survey (BAS) Partnership Shapefiles** page opens.* 
Step 2	Under '2021 Partnership Shapefiles', in the '**Select a Geography**' drop-down box, select the name of the state in which the entity is located from the drop-down list. *The **[State Name] Partnership Shapefile Batch Download** page opens.* 

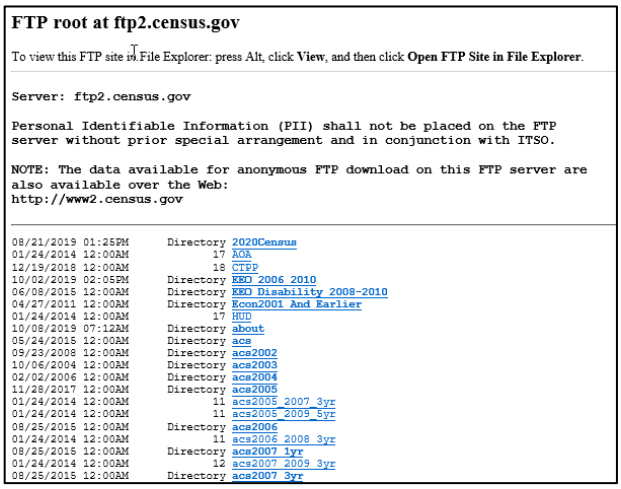
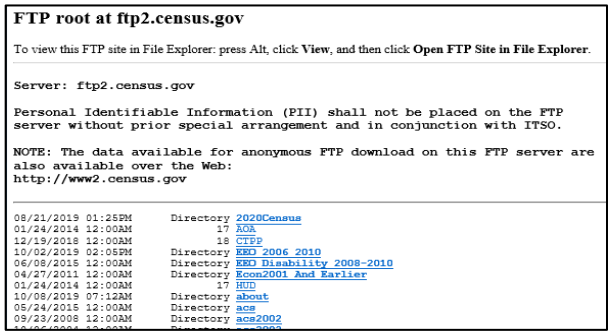
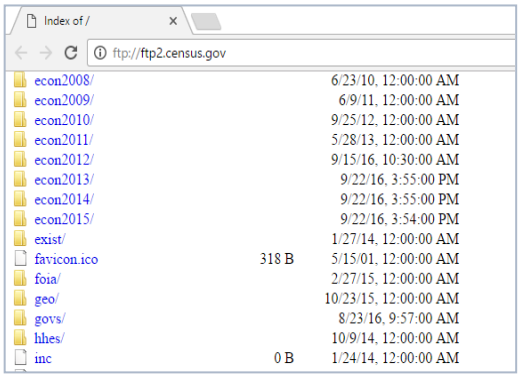
Step	Action and *Result*
Step 3	Select the county(ies) or county equivalent(s) needed by clicking the box next to it. Up to five (5) counties may be selected at a time. Once the counties selection is complete, click the **Submit** button at the bottom left hand side of the page.  **Indiana Partnership Shapefile Batch Download** Please select up to 5 individual counties to download the shapefiles for those counties. ☐ Adams County (18001) ☐ Allen County (18003) ☐ Bartholomew County (18005) ☐ Benton County (18007) ☐ Blackford County (18009) ☐ Boone County (18011) ☐ Brown County (18013) ☐ Carroll County (18015) ☐ Cass County (18017) ☐ Clark County (18019) ☐ Clay County (18021) ☐ Clinton County (18023) ☐ Crawford County (18025) ☐ Daviess County (18027) ☐ Dearborn County (18029) ☐ Decatur County (18031) ☐ DeKalb County (18033) ☐ Delaware County (18035) ☐ Dubois County (18037) ☐ Elkhart County (18039) ☐ Fayette County (18041) ☐ Floyd County (18043) ☐ Fountain County (18045) ☐ Franklin County (18047) ☐ Fulton County (18049) ☐ Gibson County (18051) ☐ Grant County (18053) ☐ Greene County (18055) ☐ Hamilton County (18057) ☐ Hancock County (18059) ☐ Harrison County (18061) ☐ Hendricks County (18063) ☐ Henry County (18065) ☐ Howard County (18067) ☐ Huntington County (18069) ☐ Jackson County (18071) ☐ Jasper County (18073) ☐ Jay County (18075) ☐ Jefferson County (18077) ☐ Jennings County (18079) ☐ Johnson County (18081) ☐ Knox County (18083) ☐ Kosciusko County (18085) ☐ LaGrange County (18087) ☐ Lake County (18089) ☐ LaPorte County (18091) ☐ Lawrence County (18093) ☐ Madison County (18095) ☐ Marion County (18097) ☐ Marshall County (18099) ☐ Martin County (18101) ☐ Miami County (18103) ☐ Monroe County (18105) ☐ Montgomery County (18107) ☐ Morgan County (18109) ☐ Newton County (18111) ☐ Noble County (18113) ☐ Ohio County (18115) ☐ Orange County (18117) ☐ Owen County (18119) ☐ Parke County (18121) ☐ Perry County (18123) ☐ Pike County (18125) ☐ Porter County (18127) ☐ Posey County (18129) ☐ Pulaski County (18131) ☐ Putnam County (18133) ☐ Randolph County (18135) ☐ Ripley County (18137) ☐ Rush County (18139) ☐ St. Joseph County (18141) ☐ Scott County (18143) ☐ Shelby County (18145) ☐ Spencer County (18147) ☐ Starke County (18149) ☐ Steuben County (18151) ☐ Sullivan County (18153) ☐ Switzerland County (18155) ☐ Tippecanoe County (18157) ☐ Tipton County (18159) ☐ Union County (18161) ☐ Vanderburgh County (18163) ☐ Vermillion County (18165) ☐ Vigo County (18167) ☐ Wabash County (18169) ☐ Warren County (18171) ☐ Warrick County (18173) ☐ Washington County (18175) ☐ Wayne County (18177) ☐ Wells County (18179) ☐ White County (18181) ☐ Whitley County (18183) Submit Reset *A prompt to save the file(s) appears.*  Do you want to open or save **pvs_batch_from_24.zip** from **www2.census.gov**? Open Save Save Save as Save and open
Step 4	Click the down arrow next to **Save** and select 'Save As' in the drop-down list. *The **Save As** dialog box appears, with the file appearing in the **File Name** field. If more than one county was selected, a single ZIP file containing the selected counties is saved.*
Step 5	In the **Save As** dialog box, select a location in the home directory to save the files.
Step 6	Click the **Save** button. *The file(s) are saved in the selected location.*
Step 7	To obtain shapefiles for additional counties, repeat the download process as needed.
Step 8	When the geography is selected in GUPS, the application asks to specify the location ('CD/DVD', 'My Computer', or 'Census Web') of the files. When a selection is made, GUPS asks to select a directory. Navigate to the location where the files were saved and select those to be uploaded. *GUPS unzips and loads the files, then moves them to the pre-established folder in the home directory*.

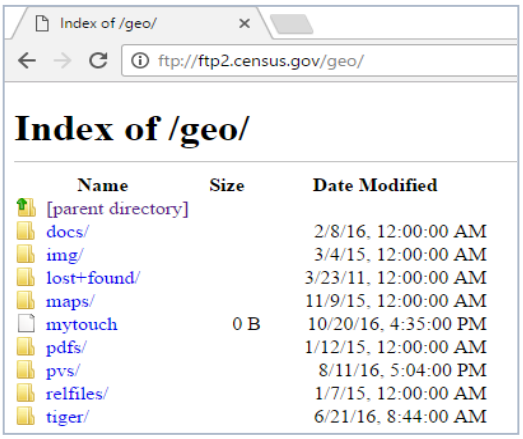
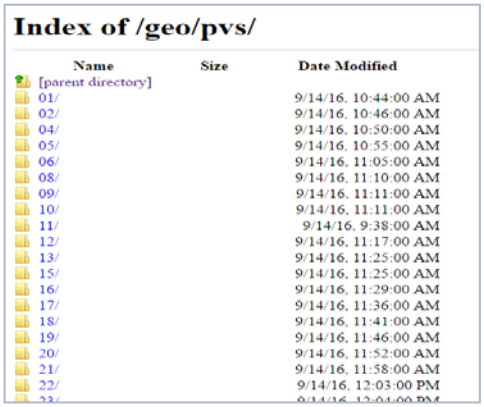
Step	Action and *Result*
Step 9	When the **Select Data Folder, Directory or Location** box opens, use the drop-down menu to select the location from which to pull the shapefiles. In this instance, **this example loads them from a Census Bureau-provided DVD**. To do so, insert the DVD into the DVD drive, then select 'CD/DVD', as shown below.  *The files for Clark and Jennings Counties begin to load and progress is displayed by the blue striped bar (color may vary), with the progress percentage noted to the right.* 
Step 10	If for any reason shapefiles are missing from the location chosen in the **Select Data Folder, Directory or Location** drop-down menu, or the files are corrupted and cannot be loaded, an error message such as the one shown below will display. 

5.4 Download Shapefiles from the Census Bureau ftp2 Site

If using GUPS at the state level, or if downloading shapefiles for several counties at one time, follow the steps in **Table 8.**

Table 8: Download Shapefiles from ftp Site to a Hard Drive (State Users)

Step	Action and *Result*
Step 1	Using Internet Explorer (IE) or another web browser navigate to <ftp://ftp2.census.gov/>. *The **FTP root at ftp2.census.gov** main page opens.* 
Step 2	Press '**Alt**' and click the '**View**' tab on the browser menu and select "**Open FTP site in File Explorer**" to open the Census Bureau FTP site in Windows Explorer (sometimes called file explorer). If using Windows Explorer to access the FTP site, no login information is required.  

Step	Action and *Result*
Step 3	After the Census Bureau FTP site opens in file explorer, click the '**geo**' folder. 
Step 4	Within the '**geo**' folder, click the '**pvs**' folder (**p**artnership **v**erification files). 
Step 5	Select the state folder that contains the county or counties for which data is downloading. The state folders are represented using two-digit state FIPS codes.
Step 6	There are several sets of shapefiles within each state directory. Download the most recent partnership shapefiles. These shapefiles are contained within a zip file with the prefix **partnership_shapefiles_20_v2**. Each zip file ends with a five-digit state-county FIPS code (e.g., 08051) which represents the county data being downloaded. **Make sure to choose the filename with "20_v2", because the "20_v1" files are sometimes also available in the folders**.
Step 7	Select the county or counties to download to the local drive. These files may be copied to any desired location. When selecting a geography in GUPS, the application asks to specify the location ('CD/DVD', 'My Computer', or 'Census Web') of the files. When 'My Computer' is selected, GUPS asks to select a directory. Navigate to the location where the files will be saved and select those that are to be uploaded. *GUPS unzips and loads the files, then moves them to the pre-established folder on the designated home directory.*
	If using an FTP client software such as WinSCP or FileZilla (or other), <ftp://ftp2.census.gov/> may be connected to without a password. Participants should enter 'anonymous' as the user name and their email address as the password.

5.5 Using the GUPS Interface

5.5.1 GUPS Main Page

Figure 2 shows the layout of the main GUPS page. This page contains all the tools needed for making BAS updates. All work is completed from this page. Shown in the figure are the main page elements. These include the:

1. Menu.
2. Layers Panel.
3. Map View (where the data displays).
4. Toolbars (Standard toolbar, BAS toolbar, and Add Layers toolbar).
5. Status Bar (at bottom of page).

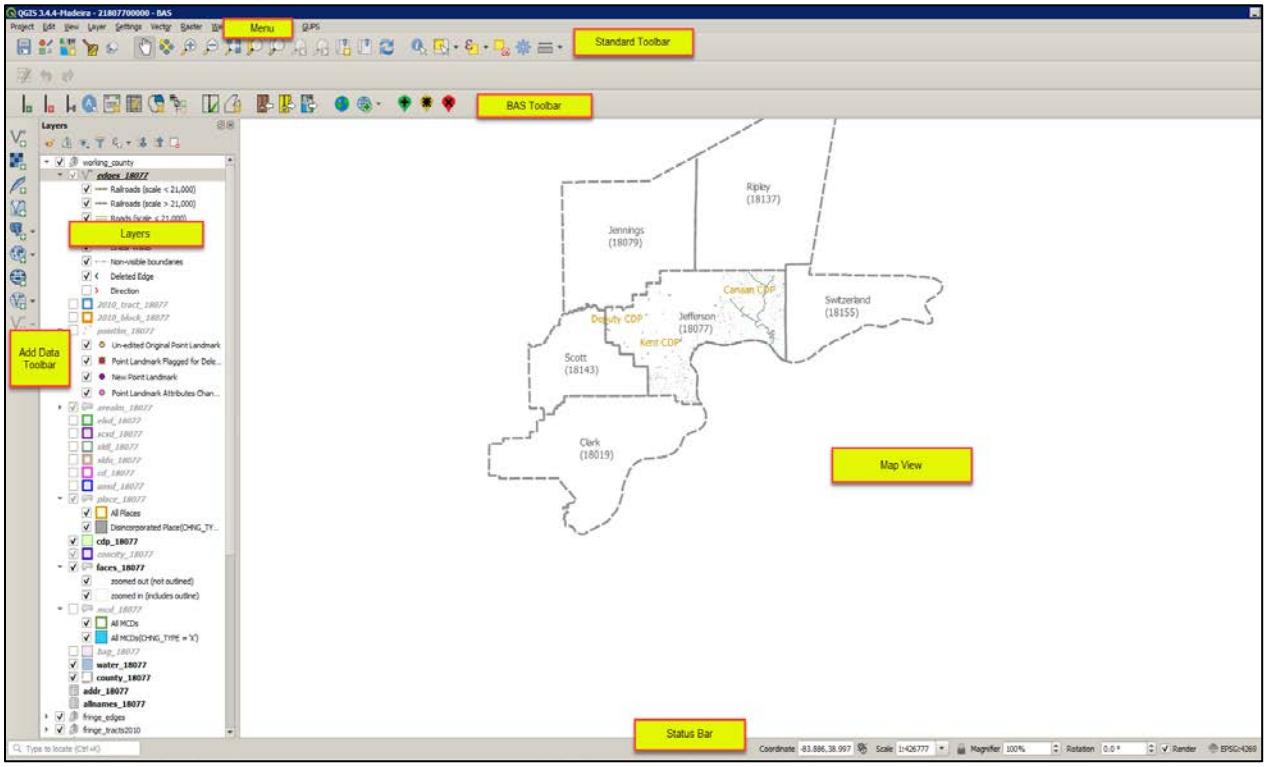
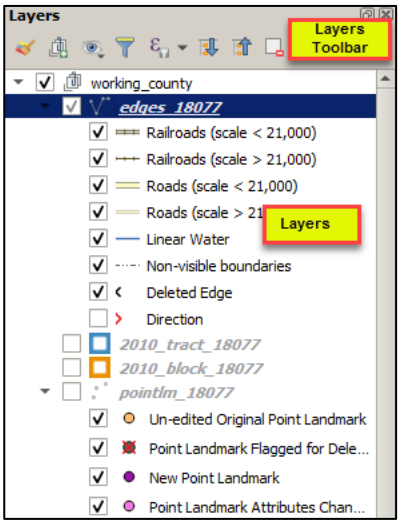
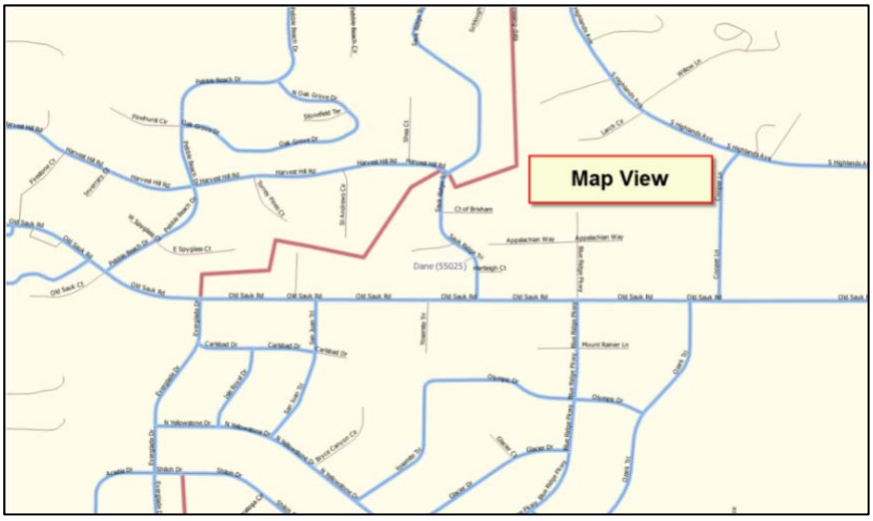


Figure 2. GUPS Main Page Layout

The purpose for each element on the main GUPS page is explained in **5.5.1** through **5.7.1** which describe in detail the individual components and specific functions of each element.

Table 9: GUPS Main Page Elements

Page Element	General Function
Menu	The menu offers basic features such as **Settings** and **Help**; tools to manage the map view and import user-provided data; important calculation, measurement, and geoprocessing tools; and tools needed to make shapefile updates. Note that almost all the functions available from the **menu** are also available in the application's more conveniently located toolbars. Project Edit View Layer Settings Vector Raster Web Processing Help GUPS

Page Element	General Function
Layers Panel	The **Layers Panel** shows the layers on the map for the county selected. Layers (or groups) can be removed, layer visibility managed, and legend content filtered through the Layers toolbar. 
Map View	The **Map View** displays the data for the county selected in the **Map Management** dialog box. 
Standard Toolbar	Provides the navigation and other tools needed to interact with the map and layers' attribute tables.
BAS Toolbar	Gives the specific tools needed to make BAS updates, view linear feature attributes, review and validate changes, import and export zipped files, and print maps.

Page Element	General Function
Manage Layers Toolbar	Offers tools to import non-Census data. Map layers may be superimposed in GUPS to compare the features on the users' maps with those on the Census Bureau shapefiles. **Note**: Although shown horizontally here, this toolbar appears aligned vertically to the left of the **Layers Panel** in the GUPS application.
Status Bar	Displays information on the map scale, projection, and coordinates and allows the user to adjust the display.

5.5.2 Layers Panel and Map View

When choosing a program and geography in the **Map Management** dialog box, GUPS automatically loads a set of default data layers (and default layer groups) defined by the Census Bureau for the program selected. As the map opens in **Map View**, the list of the preset layers (already grouped) appears in the **Layers Panel**.

Use the **Layers Panel** and the small **toolbar** appearing at its top to manage the map view. Note that the **Layers Panel** and the **Map View** windows are interdependent. Selections made in the **Layers Panel** are immediately reflected on the map display.

Close the **Layers Panel** at any time to see more of the map (just click on the small '**x**' in the upper right-hand corner).

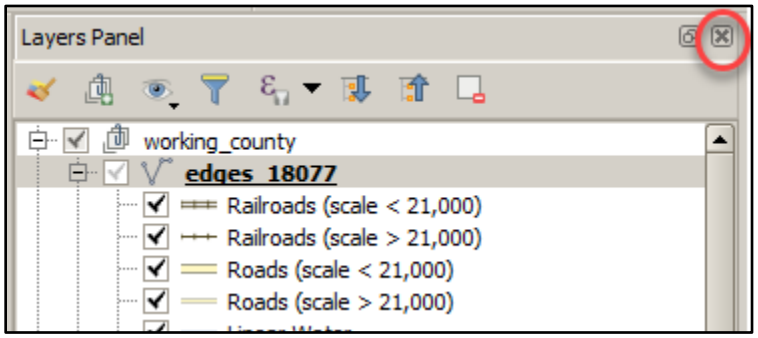


Figure 3. Close Layers Panel

To restore the **Layers Panel**, click the View tab on the Menu, select '**Panels**' in the drop-down menu, click the arrow next to '**Panel**' to open the submenu, then click on '**Layers**'.

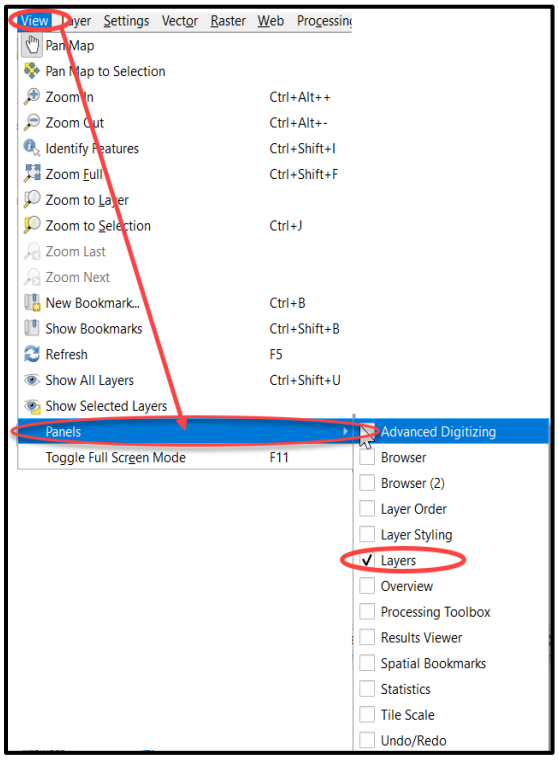


Figure 4. Restore the Layers Panel

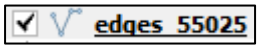
The **Layers Panel** will then reopen and display in its default position on the page.

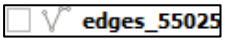
5.5.3 Managing the Map View from Within the Layers Panel

Within the **Layers Panel**, layer visibility can be managed (i.e., determine what layers display on the map), data layers reordered, and new layer symbology set.

Manage Layer Visibility

To add or remove layers from the map view:

- Click the checkbox next to a layer to turn it on in the map view. 

- Uncheck the checkbox next to a layer to turn it off in the map view. 

Note: To remove a layer from the map document right-click the name of the layer and select '**Remove Layer**' in the drop-down menu. The layer will be removed from the map document. After removal, the layer would need to be re-added if needed again.

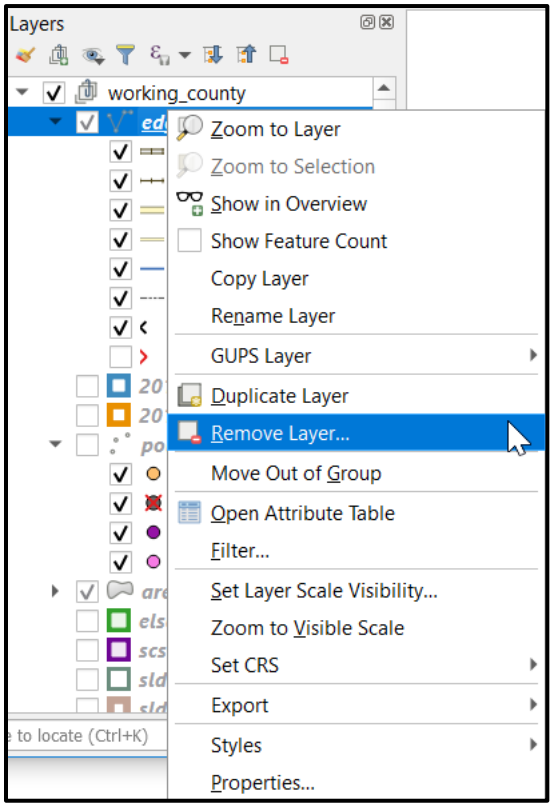


Figure 5. Managing Layer Visibility

Reorder Data Layers

In the **Layers Panel**, the order in which the layers are listed determines how the layers display on the map. The layers at the top display on top of those below them. To change the display order:

1. Left click on the layer name.
2. Hold down the mouse button and drag the layer to the desired position in the list.
3. Release the mouse button to place the layer in its new position. The map display will then reflect the new layer order in the **Layers Panel**.

Expand/Contract Layers Panel Menus

To expand or contract the menu for a layer or layer group:

- Click on the ‘ ▸ ’ sign to *expand the group*. When the box shows a check mark next to the layer name

, the layer’s submenu opens:

- Click on the box and uncheck next to the layer to *close the submenu(s).*

5.6 Menu & Toolbars

The main **Menu**, the **Standard toolbar**, and the **BAS t**oolbar are located at the top of the GUPS page. These toolbars offer general GIS and system tools used to make BAS updates.

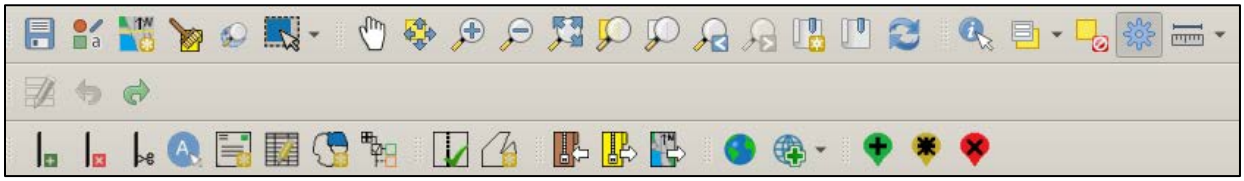


Figure 6. Menu and Toolbars

The **Manage Layer toolbar**, the vertical toolbar located to the left of the **Layers Panel** (shown here in a horizontal position) allows the importing of user-provided data.

Figure 7. Manage Layer Toolbar

Note: Although the **Menu** is always located at the top of the page and cannot be moved, the toolbars may be moved to a more convenient location. For example, drag the **Add Data** toolbar to the top of the page to expand the area available for the **Layers Panel** and **Map View**.

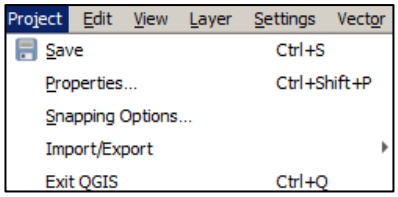
While working with the toolbars, hover the mouse over any toolbar button to see the name of the tool it represents. Resize and reposition the toolbars by dragging them.

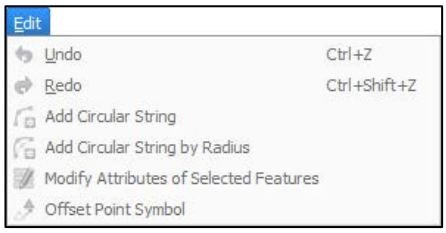
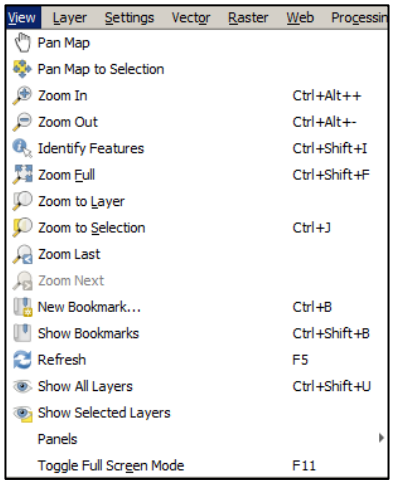
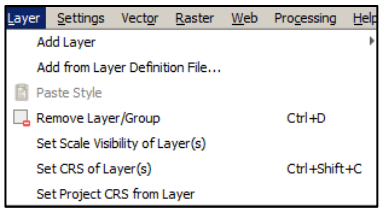
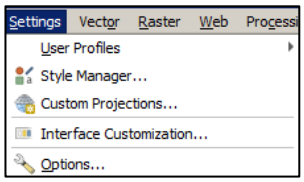
The Menu, the Standard toolbar, and the BAS toolbar are described in the section below. The Add Data toolbar is discussed in **5.7, How to Import User-Provided Data into GUPS**.

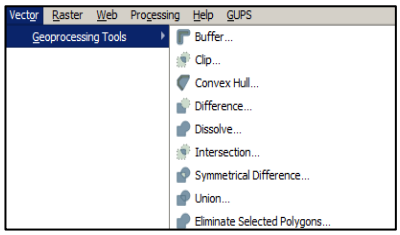
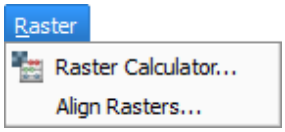
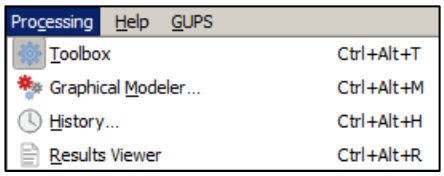
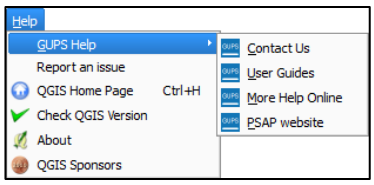
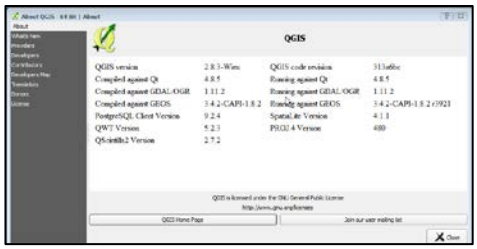
5.6.1 Menu Tabs

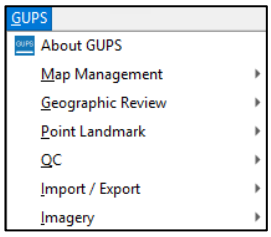
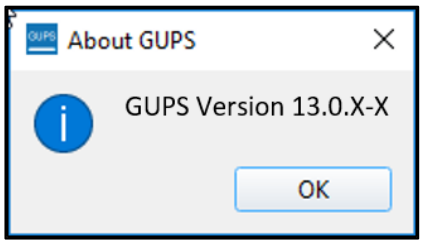
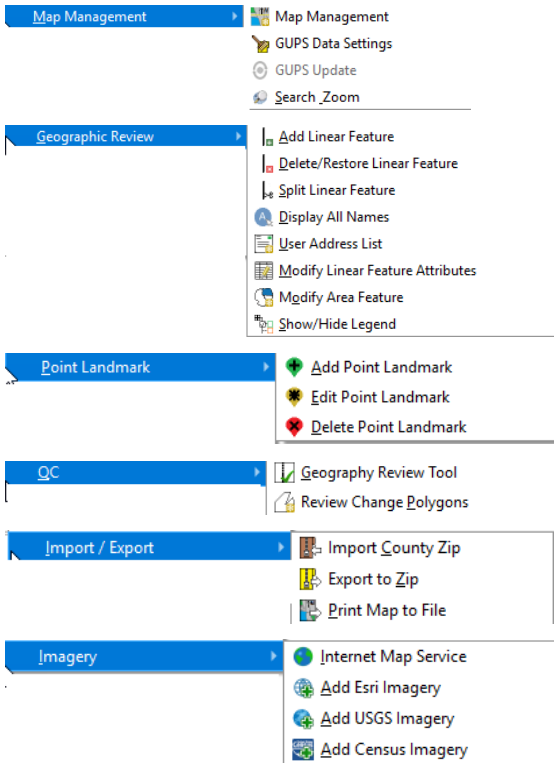
Table 10 below defines each of the tabs on the main **Menu**, provides an image of the drop-down options for each, and describes each tab's function.

Table 10: Menu Tabs and Their Functions

Tab	Drop-down Menu	Function/Description
Project		From the **Project** tab, click on 'Save' to save the project, click on '**Import/Export'** to create an image file of the map in **Map View**, or exit the application. When using '**Export Map to Image'** sub-menu under **'Import/Export'**, GUPS provides various image file type formats when exporting a map view (.png, .jpg, .tif, etc.).

Tab	Drop-down Menu	Function/Description
Edit		From the **Edit** tab, click 'Undo' to undo the last action or 'Redo' to redo an undone action. **Note:** For '**Undo'** to work, the correct layer must be selected in the **Layers Panel**. For example, if a linear feature is added to the **Edges** layer, then the layer is deselected by selecting the **Area Landmarks** layer, '**Undo'** will not delete the linear feature. The **Edges** layer must be selected to undo the linear feature's addition. **Note:** Multiple actions can be undone on a single layer (e.g., the addition of several linear features) if the project has not been saved. If the project is saved, the Undo option is disabled until more changes are made.
View		The **View** tab is used to complete several actions also available on the **Standard toolbar**. Included are options for navigating the map, identifying feature attributes, measuring distance, and creating spatial bookmarks to return to the same map view at a later time. This location also provides a way to: • Set what toolbars display. • Restore the **Layers Panel** if it has been closed it (click '**Panels'** in the drop-down menu, click the right arrow, click '**Layers'** in the Layers down-menu). • Refresh the map to restore it to the original map extent.
Layer		The **Layer** tab on the Main menu toolbar allows you to Add Layer, Add from Layer Definition File, Paste Style, Remove Layer/Group, Set Scale Visibility of Layer(s), set Coordinate Reference System (CRS) of layer(s), and set project CRS from layer. **Note:** Many of these same functions are more conveniently located on the **Add Layers** toolbar and the small toolbar that sits at the top of the **Layers Panel.**
Settings		The **Settings** tab provides access to User Profiles, Style Manager, Custom Projections, Interface Customization, and General Options for QGIS.

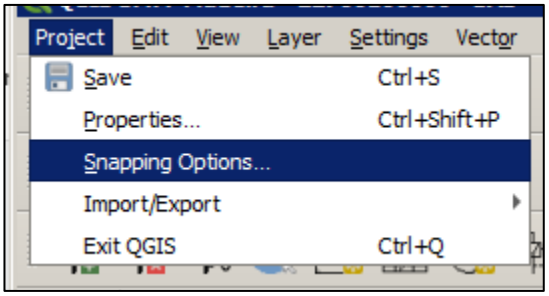
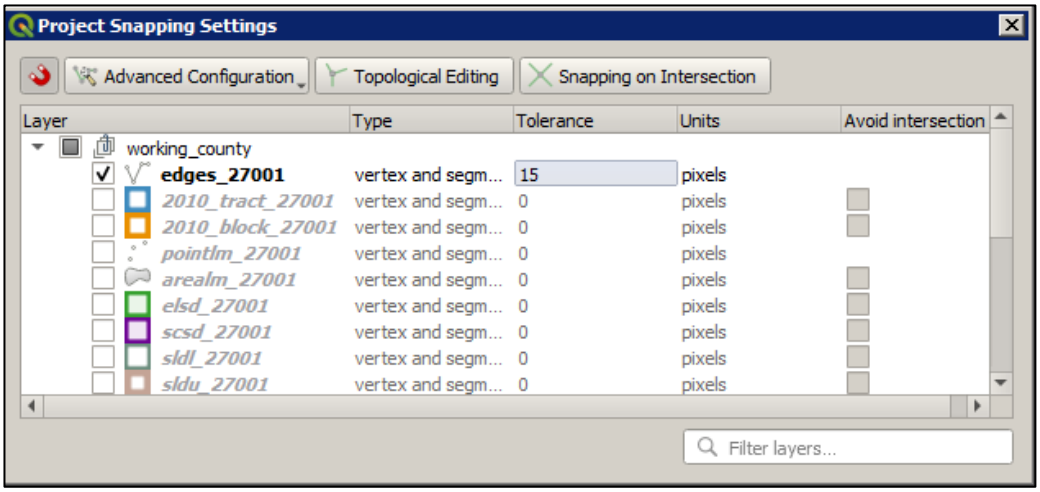
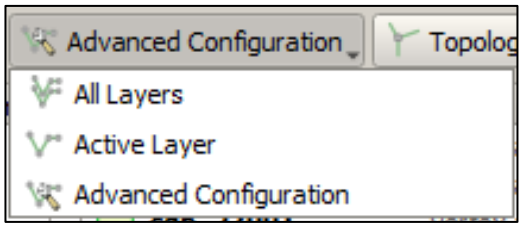
Tab	Drop-down Menu	Function/Description
Vector		The **Vector** tab provides access to several Geoprocessing Tools, used to create buffers around features, overlay areas to create an intersection, union, or symmetrical difference, merge features, and perform other common geoprocessing actions.
Raster		The **Raster** tab provides access to a Raster Calculator, which performs calculations on the basis of existing raster pixel values. It includes a Georeferencer tool, which can be used to assign coordinates to the raster, and access to the Terrain Analysis, Projection, Conversion, Extraction, Analysis, and Miscellaneous Tools to assist in drawing land detail
Processing		Although available to GUPS users, the options under the **Processing** tab are not needed for Census Bureau geographic program participation. The items under this tab pertain to algorithms, creating models, viewing the results of algorithms executed, and history.
Help	 	The **Help** tab provides tools for understanding QGIS (the open-source platform on which GUPS was developed) and the GUPS application itself. It also contains BAS contact information, access to the online version of this guide, training videos, and other information. Clicking the **About** option will bring up the latest version of GUPS installed on the computer.

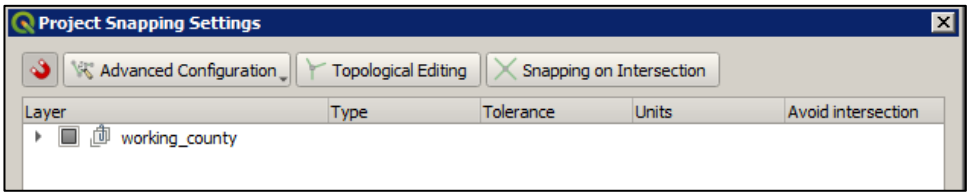
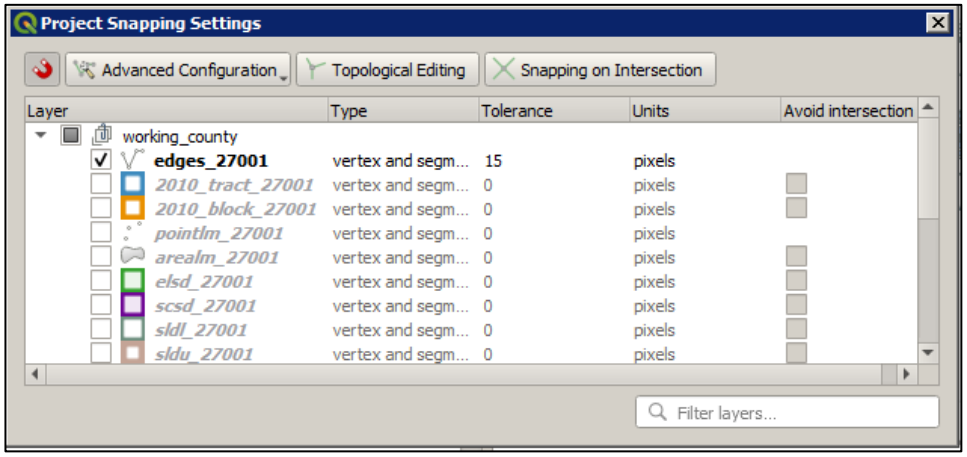
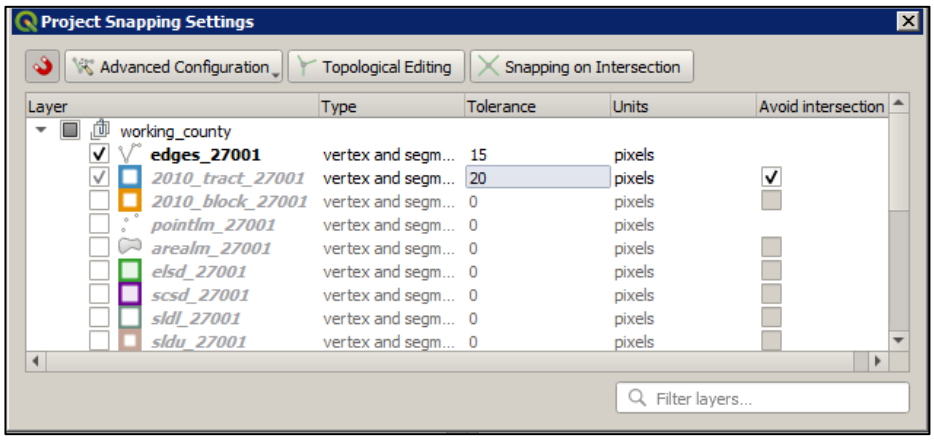
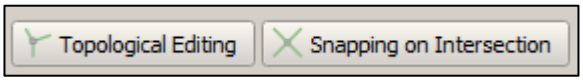
Tab	Drop-down Menu	Function/Description
GUPS	 Click the **About GUPS** option in the drop-down menu to find the GUPS version number. This number will be required if technical assistant is needed. Here the version number is 13.0.X-X current_202x1008. The. The number that appears may be more recent based on the user's computer and software. 	The **GUPS** tab provides quick access to Map Management, Geographic Review, Point Landmark, Quality Control (QC), Import/Export, and Imagery drop-down screens. 

Note on Snapping Tolerances

Snapping tolerances in GUPS are pre-defined by layer (e.g., the default tolerance for edges is set to 15 pixels). When making boundary corrections, it may be beneficial to adjust the snapping tolerances for a layer or layers. To do this, follow the steps in the table below.

Table 11: Adjust Snapping Tolerances

Step	Action and *Result*
Step 1	In the **Project** tab drop-down menu, click on '**Snapping Options**'.  *The **Snapping Setting** dialog box opens.* 
Step 2	From the **Advanced Configuration** drop-down menu, select whether to apply the tolerance adjustment to the current layer only or to all layers. 

Step	Action and *Result*
Step 3	Within the Layer window, you will need to expand the layer menu to see all the layers  
Step 4	Check the box next to each layer to snap. From the **Tolerance** drop-down menu, use the up and down arrows to select the value, and then select the units (map units or pixels) in the drop-down to the right to avoid intersection. 
Step 5	To enable topological editing and/or snapping on an intersection, select either box. 
Step 6	Exit out of the window. *The new snapping tolerances are set.*

5.6.3 Standard Toolbar Buttons

The **Standard toolbar** provides the navigation tools to interact with the map and layers' attribute tables.

Figure 8. Standard Toolbar

The **Standard toolbar** includes several smaller toolbars. Each sub-toolbar is identified by a series of small parallel lines that precede it.

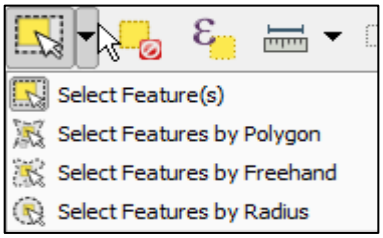
Figure 9. Sub-tool Markers

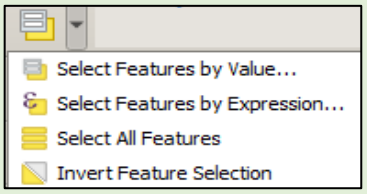
The first sub-toolbar contains the **Save** button, **Style Manager** button, **Map Management** button, **GUPS Data Settings** button, the **Search** button, and the **Select Features** button. The second sub-toolbar provides tools for viewing, navigating the map and creating spatial bookmarks in **Map View**, and the third sub-toolbar is used to identify, select features by value, deselect all features on the map, access processing tools in the Toolbox, and make measurements.

The location of the sub-toolbars can be moved by simply left-clicking the parallel lines preceding the sub-toolbar and while holding down the mouse, dragging the sub-toolbar to the desired location. Each button on the Standard toolbar and its purpose is defined in **Table 12**.

Table 12: Standard Toolbar Buttons

Button	Name	Function/Description
	Save	Saves the current GUPS project, including any user changes to layer properties, projection, last viewed extent, and layers added.
	Style Manager	Allows customization of map symbology.
	Map Management	Chooses a geographic participant program in GUPS and access the automatically loaded default map display layers based on the program chosen.
	GUPS Data Settings	**Warning! This tool deletes files and folders permanently!** Change GUPSGIS data working directory and clean GUPS project data.
	Search	Searches the map by place, landmark, or street name and zoom automatically to the feature.
	Pan Map	Shifts the map in **Map View** without changing the map scale. Click the button, then click a location on the map to re-center the map to the clicked location.

Button	Name	Function/Description
	Pan Map to Selection	Shifts the map in **Map View** to the rows selected in the attribute table for a selected feature. After selecting a feature(s), click the button to re-center the map based on the selected feature(s).
	Zoom In	Displays the map in **Map View** at a larger scale. Click the button, then click on the map at the location to be zoomed to.
	Zoom Out	Displays the map in **Map View** at a smaller scale.
	Zoom Full	Displays the map in **Map View** at a smaller scale and zooms the map view to the full extent of the county.
	Zoom to Selection	Zooms the **Map View** to the rows selected by query in the attribute table for a feature(s). After selecting a feature(s) on the map, click the button to view the feature(s) at a larger map scale.
	Zoom to Layer	Zooms the **Map View** to the layer selected in the **Layers Panel**. After selecting the layer, click the button to zoom to the layer's extent.
	Zoom Last	Zooms the **Map View** to the previous map extent.
	Zoom Next	Zooms the **Map View** forward to the next map extent (only if a previous extent is available).
	New Bookmark	Creates and names a spatial bookmark of the current map view.
	Show Bookmarks	Displays all bookmarks created by the user.
	Refresh	Displays **Map View** to initial full display.
	Identify Features	Identifies geographic features. Click the button, then click on a feature on the map to identify the feature at the location.
	Select Features by Area or Single Click	Allows the user to select layer features in the map window with a single click, by dragging the cursor, or by drawing graphics on the screen. 

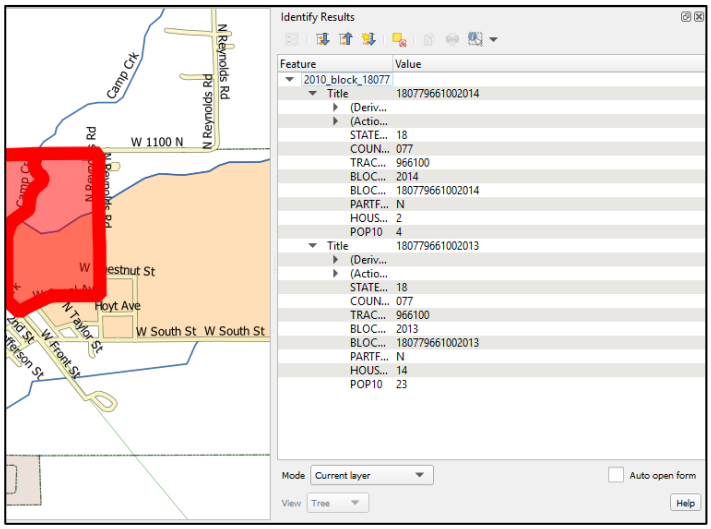
Button	Name	Function/Description
	Select Features by Value	Allows selection of features by value or expression. 
	Deselect Features from All Layers	Deselects selected features from all layers.
	Processing Toolbox	Displays list of processing tools available.
	Measure	Provides options to measure linear distance, area, and angles on the map.

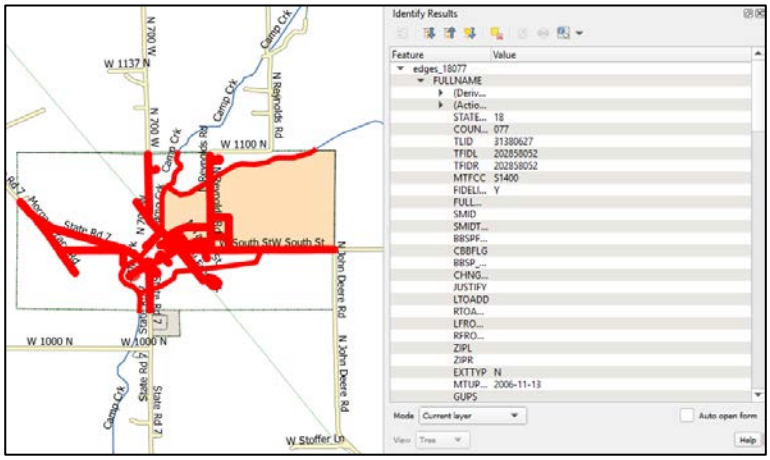
Most of the sub-toolbar buttons defined above are straight-forward. Those related to features, however, require further explanation. These buttons are used to identify and select/deselect features on the map and to view feature attributes. They are also used to make measurements and create spatial bookmarks.

Identify a Feature Using the Identify Features Button

To identify a feature on the map, follow the steps in **Table 13**.

Table 13: Identify a Feature on the Map

Step	Action and *Result*
Step 1	Click the **Identify** button on the **Standard toolbar**.
Step 2	Then right-click on the feature. *The results will display in drop-down menus on the map.*  To see all attributes for the feature, select Identify all' in the **faces** drop-down menu.

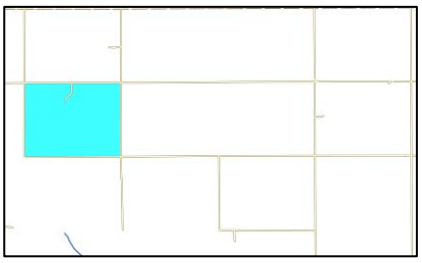
Step	Action and *Result*
Step 3	Alternately, click the **Identify** button, then left click on the feature. *The feature turns red (color may vary) and the **Identify Results** screen opens under the **Layers Panel**, showing the feature attributes.* (Note that here the screen has been dragged from beneath the **Layers Panel** so that it sits over the map.) 

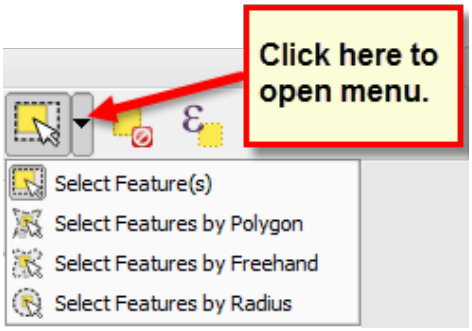
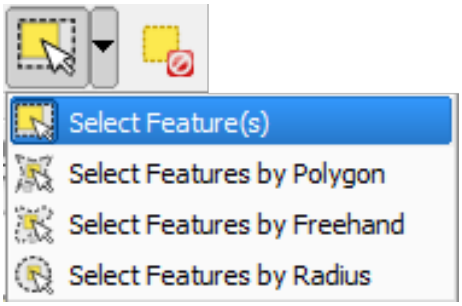
Select/Deselect Features Using the Select Features and Deselect Features Buttons

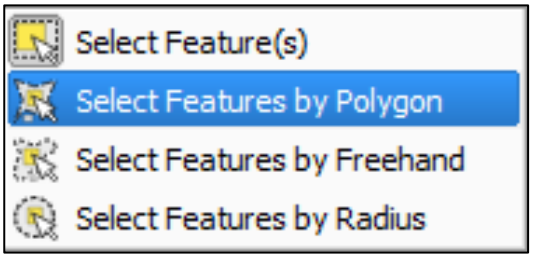
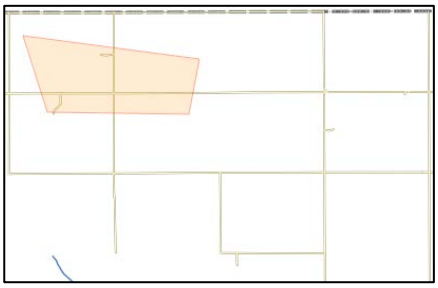
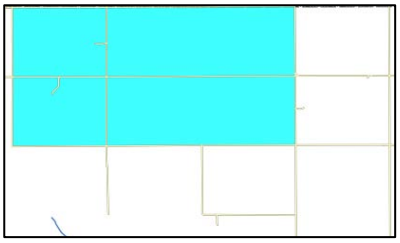
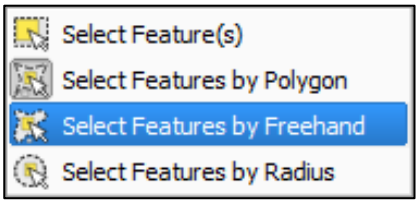
The **Select Features** button provides several ways to select features on the map. The **Deselect Features from All Layers** button allows users to deselect previously selected features.

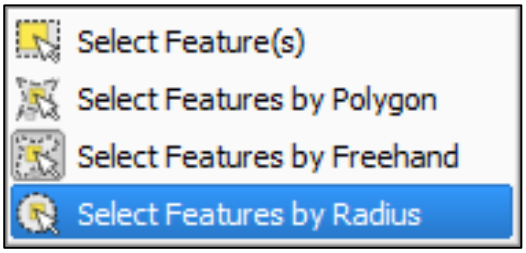
Table 14 describes each of the feature selection methods, discusses when one might be preferable over another, and explains how to deselect features.

Table 14: Select/Deselect Features on the Map

Step	Action and *Result*
Step 1	To begin, click on a layer name in the **Layers Panel**. For example, to select a linear feature, click on the 'edges' layer. To select faces, click on the 'faces' layer.
Step 2	Click once on the **Select Features** button on the **Standard Toolbar**.
Step 3	To select an edge or face on the map, click on it. In this example, select 'faces' in the **Layers Panel** and click on a face. *The face selected turns cyan.* 

Step	Action and *Result*
Step 4	To select more than one face, hold down the **CTRL** key while clicking on the additional face(s). This method is useful when selecting noncontiguous faces, as shown below.
	To select multiple features, click the **Select** Feature button, then drag the cursor over the features on the map. This method is useful when selecting several contiguous faces or a large number of nearby linear features without having to click each feature one by one.
	A Note on GUPS Tools GUPS tools remain active until a different tool is selected. For example, if the **Select Features** tool is used to choose faces for a new area landmark, then in order to add a new linear feature instead, the **Add Linear Feature** tool must be clicked before clicking on the map again. If not, the **Select Features** tool, still active, selects a face.
Step 5	To open other **Select Features** options, click on the down arrow to the right of the **Select Features** button. *The **Select Features** drop-down menu opens.*  Note that when a menu option is selected, the button's appearance changes.
Step 6	The first option in the menu, '**Select Feature(s)**', duplicates the functions made available in the Select Features button on the toolbar. 

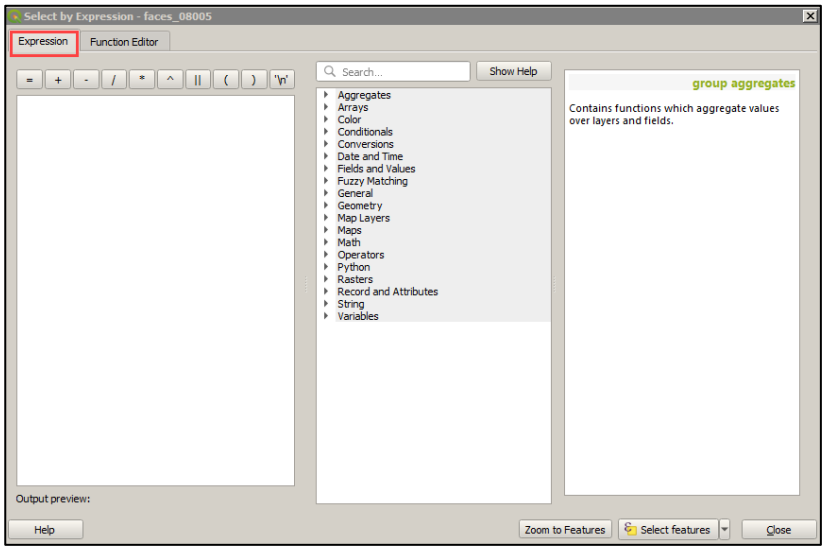
Step	Action and *Result*
Step 7	The second option, '**Select Features by Polygon**', selects features via a polygon drawn on the map. To use this feature select it in the drop-down menu, then follow the steps below. 
Step 8	Left click on the map to begin the polygon. Drag the cursor to extend the line, left click, and then extend the line in a new direction. Finish by closing the polygon, as shown below. 
Step 9	To complete the selection, right-click. *All faces with an edge appearing within the polygon are highlighted in cyan.* 
Step 10	The third option, '**Select Features by Freehand**', selects features based on user-defined shapes drawn on the map.  To use this option, click on the map and use the cursor to draw any shape (polygon, triangle, circle, etc.). *If the shape does not cross any edges, the single face in which the shape is drawn is selected and turns cyan. If the shape crosses several faces, all faces whose edges are crossed are selected and turn cyan.* **Note:** This method is particularly useful when attempting to select a very small face. For example, draw a tiny triangle within a face to select it.

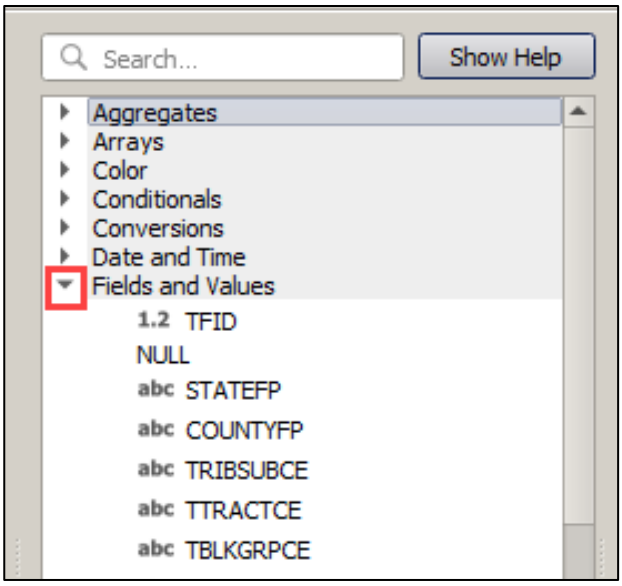
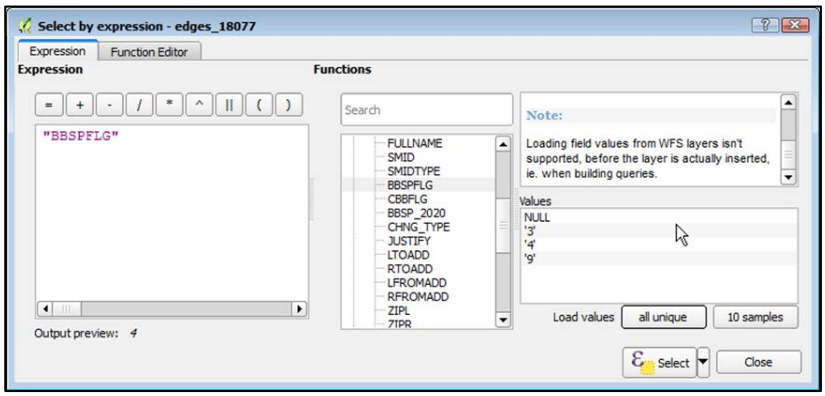
Step	Action and *Result*
Step 11	The final option, '**Select Features by Radius,**' selects features by defining a circle around the features to select.  To use this tool, left click on the map, then hold down the mouse and drag the cursor outward to expand the circle. Release the mouse when done. *The feature(s) selected is (are) highlighted in cyan.*
Step 12	Polygons can be deselected by holding and using the same selection option to select by holding **CTRL** and retracing over the polygons or deselect a feature or features automatically by clicking the **Deselect Features from All Layers** button once. *The selected features in all layers are deselected*.

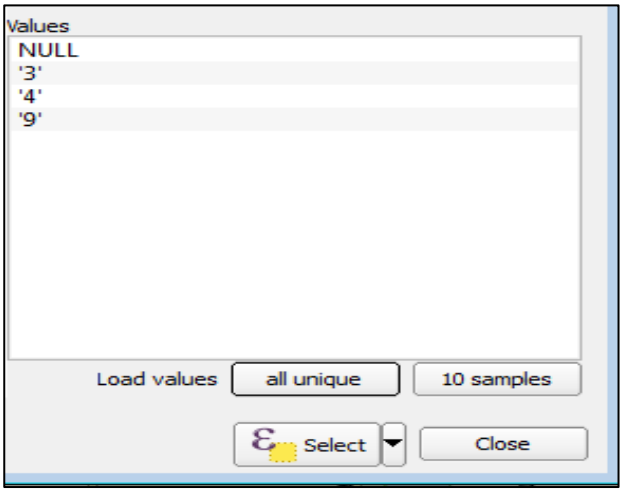
Select Features by Querying the Attribute Table

Another method to select features is by querying the attribute table. To do so, follow the steps in **Table 15**. In this example, the attribute table is being queried for the edges layer to locate and select all linear features flagged as edges for block boundaries.

Table 15: Select Features by Querying the Attribute Table

Step	Action and *Result*
Step 1	Click the **Select Features by Value button** on the **Standard toolbar**. In the drop-down menu, **Select by Expression** window opens. The window has two tabs: **Expression** and **Function Editor**. 

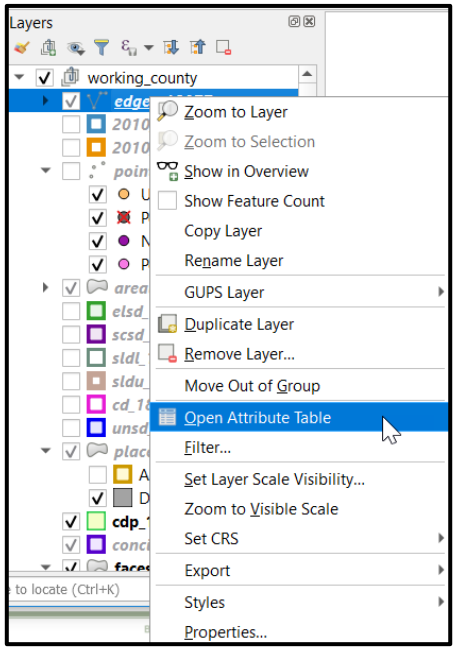
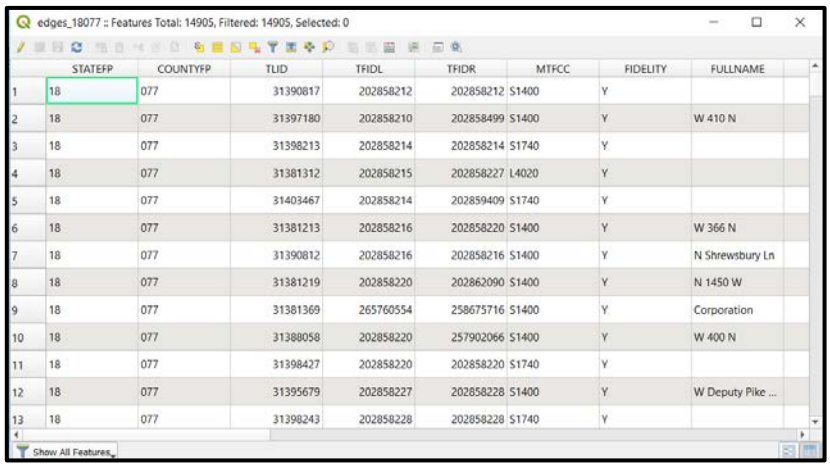
Step	Action and *Result*
Step 2	Under the **Expressions** tab, click the ‘ ▸ ’ symbol next to the items in the **Functions** field to display their submenus. 
Step 3	To build a query, click the ‘**+**’ sign next to ‘**Fields and Values’** to open the list of choices and then double-click on a field name. In this example, the ‘**BBSP Flag’** is selected to search for all features flagged as edges for block boundaries. *Once selected, “**BBSP Flag**” appears in the expression pane, and a **Load values** field is added to the **Fields** pane at the bottom far-right corner.* 
Step 4	Select an operator from a full list by clicking the ‘**+**’ sign next to “Operators” in the **Functions** pane. **OR**, if one needs a commonly used operator such as equals, plus, or minus, click its corresponding button in the row of buttons at the top of the **Expression** pane.
Step 5	In this example, the operator for equals is needed. Double-click the ‘=‘ operator button. *The expression in the Expression pane now reads “BBSP Flag” =.*

Step	Action and *Result*
Step 6	To select a specific value for the field “BBSP Flag”, click either the **all unique** or **10 samples** button in the **Load values** field. *The **Values** field above the buttons populates with all allowed values.* 
Step 7	Select a value. Then select ‘**4’** by double-clicking on it in the **Values** field list. *The expression changes to “BBSP Flag” = ‘4’.*
Step 8	Click the **Select by Expression** button just below the **Load values** field. Then click **Close**. *All edges marked with a BBSP Flag with a value of ‘**4**’ turn cyan on the map.*

View an Attribute Table for a Layer on the Map

To view an attribute table for a map layer, follow the steps in Table 16.

Table 16: View Layer Attributes Using the Attributes Table

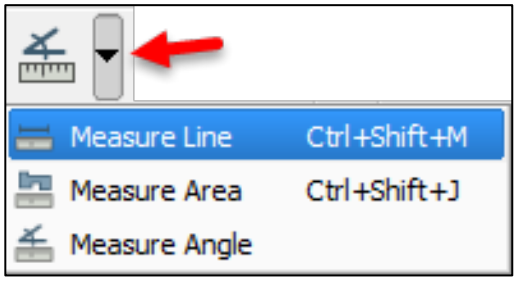
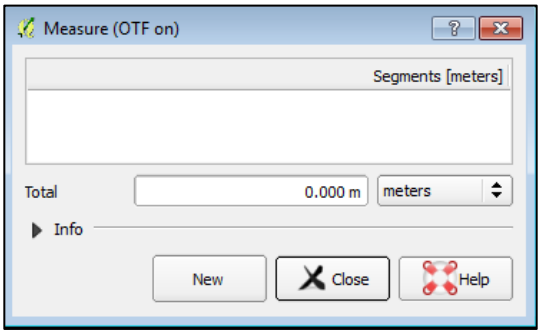
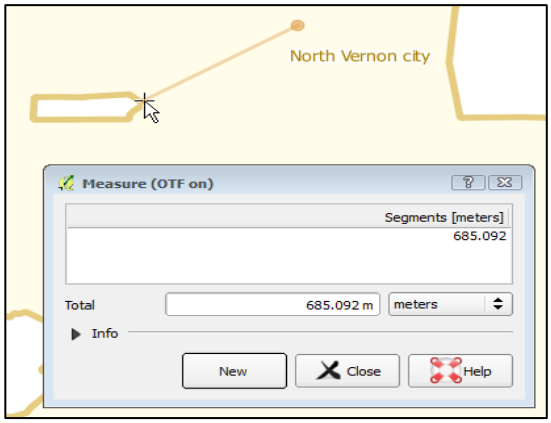
Step	Action and *Result*
Step 1	Right-click the layer in the **Layers Panel**. *The drop-down menu opens.* 
Step 2	Click the '**Open Attribute Table**' option in the drop-down menu. *The Attribute table opens showing all features in the layer and their attributes (e.g., name, MTFCCs, etc.). Each column represents a separate attribute and each row an individual feature.* 
Step 3	To select a feature to view, click on the number on the far left of the row. To select multiple features, click on the number of the row for the first feature one wants to select, then press the **CTRL** key. While holding the **CTRL** key down, click on the numbers for the other individual rows one wants to select. To select a range of features, click on the number for the row showing the first feature one wants to select, then press the **SHIFT** key. While holding down the **SHIFT** key, click on the number for the last row one wants to select.

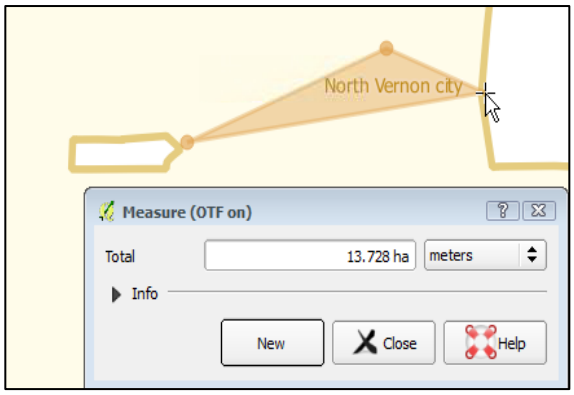
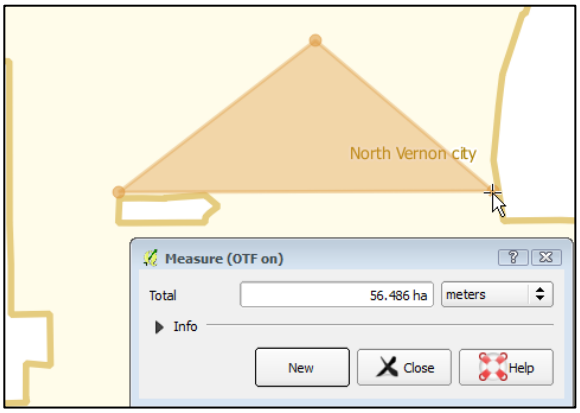
	STATEFP	COUNTYFP	TLID	TFIDL	TFIDR	MTFCC	FIDELITY	FULLNAME
1	18	077	31390817	202858212	202858212	S1400	Y	
2	18	077	31397180	202858210	202858499	S1400	Y	W 410 N
3	18	077	31398213	202858214	202858214	S1740	Y	
4	18	077	31381312	202858215	202858227	L4020	Y	
5	18	077	31403467	202858214	202859409	S1740	Y	
6	18	077	31381213	202858216	202858220	S1400	Y	W 366 N
7	18	077	31390812	202858216	202858216	S1400	Y	N Shrewsbury Ln
8	18	077	31381219	202858220	202862090	S1400	Y	N 1450 W
9	18	077	31381369	265760554	258675716	S1400	Y	Corporation
10	18	077	31388058	202858220	257902066	S1400	Y	W 400 N
11	18	077	31398427	202858220	202858220	S1740	Y	
12	18	077	31395679	202858227	202858228	S1400	Y	W Deputy Pike ...
13	18	077	31398243	202858228	202858228	S1740	Y	

Determine Distance, Area, and Angles on the Map

To measure the distance between two or more points, area, or an angle on a map, follow the steps in **Table 17**.

Table 17: Measure Distances, Area, and Angles on a Map

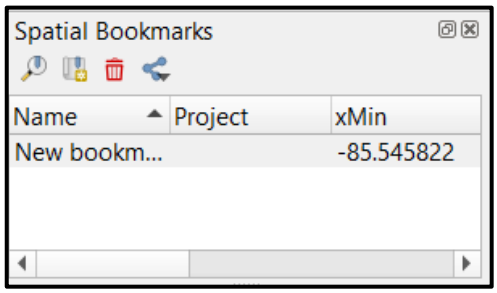
Step	Action and *Result*
Step 1	Click the **Measure** button on the **Standard toolbar**. *The **Measure** button drop-down menu opens.* 
Step 2	To measure the distance between two points on the map, select '**Measure Line**' in the drop-down menu. *The **Measure** box opens.* 
Step 3	Zoom to the map location to be measured. Then click on the beginning point on the map and continue clicking on points until one reaches the final point. Right-click when finished. *The length of each segment of the line drawn, as well as the total length of the line between the beginning point and the ending point, appear in the **Measure** box.* 

Step	Action and *Result*
Step 4	To measure area on the map, select '**Measure Area**' in the drop-down menu. *The **Measure** box opens.* When the box opens, left click on the map to begin drawing a polygon around the area one wants to measure. Left click when each vertex of the polygon is reached. When finished, right-click*. The area polygon encompasses appears in the **Total** field. Use the drop-down to the right to see the area in other units of measure.*  To begin a new measurement, click the **New** button.
Step 5	To measure an angle on the map, first select the '**Measure Angle**' option in the drop-down menu. Then left click on the map to begin drawing the angle. Drag the mouse (but do not hold down the mouse button) to create the first side of the angle. Then left click. Drag the mouse again (again without holding down the mouse button) to draw the second leg. *The **Angle** box opens showing the angle measurement.* 

Save Locations on a Map Using the Bookmark Button

To save geographic locations on the map and view them later, follow the steps in Table 18.

Table 18: Bookmark Locations on a Map

Step	Action and *Result*
Step 1	Zoom to the location on the map in **Map View** to be bookmark and click on the **New Bookmark** button on the **Standard toolbar**. *The **Spatial Bookmarks** box opens.* 
Step 2	Click on the row named '**New bookmark**'. Then backspace over '**New bookmark**' and type in a descriptive name for the bookmark (255-character limit). *The bookmark is added.*
Step 3	To view and manage spatial bookmarks, click on the **Show Bookmarks** button on the **Standard toolbar**. *The **Spatial Bookmarks** dialog box again opens*. To zoom to a bookmark, click on a bookmark name in the dialog box and then click the **Zoom to bookmark** button. To delete a bookmark, click on the bookmark name, then press the **Delete bookmark** button.
	Bookmark names and coordinates can be edited from the **Geospatial Bookmarks** dialog box.

5.6.4 BAS Toolbar Buttons

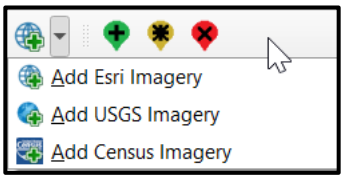
The **BAS toolbar** provides BAS-specific functions needed to complete a participant's review and update activities, as well as to import and export zipped shapefiles.

Figure 10. BAS Toolbar

Each toolbar button is described in **Table 19**.

Table 19: BAS Toolbar Buttons

Button	Name	Function/Description
	Add Linear Feature	Add a new linear feature.
	Delete/Restore Linear Feature	Delete an existing linear feature.
	Split Linear Feature	Split a linear feature. One may need to split a linear feature to accurately reflect an entity's location. This feature "splits" the original into two.

Button	Name	Function/Description
	Display All Names	Displays all names for a street with multiple names assigned in the MAF/TIGER System.
	User Address List	Import an address list (.csv, .txt, etc.) into GUPS.
	Modify Linear Feature Attributes	Edit attributes of a selected linear feature.
	Modify Area Feature	Make updates to legal area (annexations, deannexations, boundary corrections, etc.).
	Show/Hide Legend	Shows or hides the layer.
	Geography Review Tool	Review the attribute table for a layer.
	Review Change Polygons	Review change polygons in a layer and make corrections (reviews change polygons for holes and minimum size).
	Import County ZIP	Import zipped GUPS project shared by another GUPS user.
	Export to ZIP	Create the ZIP file containing all required data and shapefiles to be submitted to the Census Bureau or to share with another GUPS user.
	Print Map to File	Export a printable map in *.pdf, *.png, *.tif, or *.jpeg format.
	Internet Map Service	Displays the chosen map location in an internet mapping service, such as Google or Bing Maps
	Add Esri Imagery	Displays satellite imagery overlaid on the QGIS map 
	Add Point Landmark	Add a new point landmark.
	Edit Point Landmark	Edit point landmark attributes.
	Delete Point Landmark	Delete an existing point landmark.

5.6.5 Status Bar

The **Status bar** at the bottom of the GUPS main page displays information about the map. It allows one to adjust the map scale and see the mouse cursor's coordinates on the map.

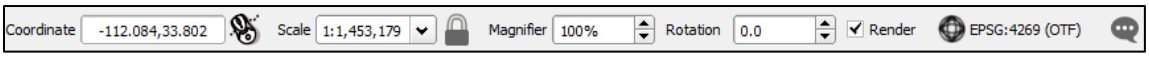
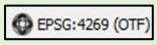


Figure 11. Status Bar

Table 20 describes each element of the Status bar.

Table 20: Status Bar Elements

Item	Description
Coordinate	Shows the current position in map coordinates (default is decimal degrees for GUPS) as the map cursor is moved across the map.
	Toggles between the coordinate position of the mouse cursor or the map view extents as the map is panned and zoomed.
Scale	Shows the current zoom level in the **Map View**. Can be changed by selecting one of the predefined levels from the drop down, by typing in a new ratio, or using the scroll wheel on the mouse.
	Locks the scale to use the magnifier to zoom in or out.
Magnifier	Allows the user to zoom without changing the scale.
Rotation	Shows the map rotation.
Render	Temporarily prevents layers from drawing. Enable by clicking the checkbox immediately to the left of "Render".
	Clicking on the icon opens the projection properties for the current map.
	Displays system messages for the QGIS session.

5.7 How to Import User-Provided Data into GUPS

5.7.1 The Add Data Toolbar

To import one's own imagery, geodatabase, shapefiles, web mapping service, or other data layers into GUPS, use the **Add Data toolbar**.

Figure 12. Add Data Toolbar

Although shown in a horizontal position in Figure 12, the **Add Data toolbar** appears arranged vertically to the left of the **Layers Panel** in GUPS. Its buttons are described in Table 21.

Table 21: Add Data Toolbar Buttons

Button	Name	Function/Description
	Add Vector Layer	Add vector-based shapefile and geodatabase files.
	Add Raster Layer	Add raster-based shapefile and geodatabase files.
	Add SpatialLite Layer	Add data from a SpatialLite database.
	Add/Edit Virtual Layer	Add or Edit Virtual Layers.
	Add PostGIS Layer	Add PostGIS layer.
	Add WMS/WMTS Layer	Add Web Mapping Services (WMS) and Web Mapping Tile Services (WMTS). Publicly accessible and secured WMS services are supported.
	Add WCS Layer	Add Web Coverage Services (WCS), which provide access to raster data useful for client-side map rendering.
	Add WFS Layer	Add Web Feature Services (WFS).
	New Shapefile Layer	Add a new shapefile layer or new temporary scratch layer.

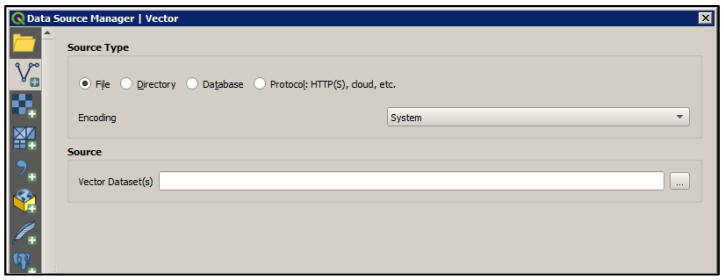
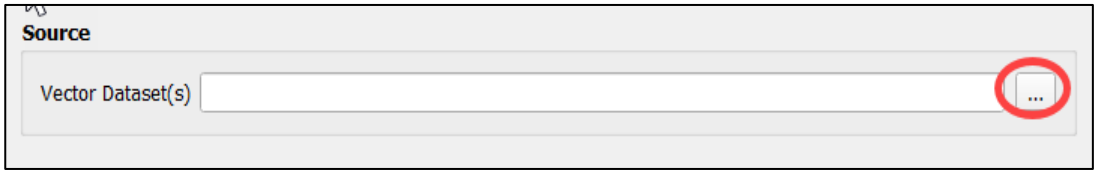
5.7.2 How to Upload User-Provided Data Layers

GUPS supports vector data in a number of formats, including those supported by the OGR library data provider plugin, such as Esri shapefiles, MapInfo MIF (interchange format), and MapInfo TAB (native format). It also supports PostGIS layers in a PostgreSQL database and SpatiaLite layers. Support for additional data types (e.g., delimited text) is provided by additional data provider plugins.

Below are the steps to import the most commonly used data formats. To load shapefile or geodatabase data layers into the map, follow the steps in the table below.

Note: **Only one user-provided data layer may be uploaded at a time**. If uploading multiple data layers, note that GUPS will only allow uploading one layer at a time.

Table 22: Load Shapefiles/Geodatabase Layers

Step	Action and *Result*
Step 1	Begin the upload. Click the **Add Vector Layer** button on the **Add Data toolbar**. *The **Data Source Manager** dialog box opens.* 
Step 2	In the **Encoding** drop-down menu, the default value is '**System**'. If an error message displays when opening a file, use the drop-down to select UTF-8. *UTF-8 populates the **Encoding** field*.
Step 3	To locate the vector dataset source, click the button with ellipses and navigate to the folder where the shapefile or geodatabase is saved on the computer. 
Step 4	Left click the file to upload, then click the **Open** button. Once the file is selected, click the **Add** button. *The shapefile/geodatabase is added to the **Layers Panel** and to the **Map View** window.*

To load data from a web mapping service, follow the steps in **Table 23** below.

Table 23: Load Data from a Web Mapping Service

Step	Action and *Result*
Step 1	Begin the upload. Click the **Add WMS/WMTS Layer** button on the **Add Data toolbar**. *The **Data Source Manager** dialog box opens.*
Step 2	Select the web mapping service. Click the **Layers** tab, then click the **New** button under the tab. *The **Create a new WMS/WMTS Connection** dialog box opens.*
Step 3	In the **Name** field, type a name for the web mapping imagery service. In the **URL** field, type the URL for the service. If the service requires a user name and password, type them in the fields provided. Click **OK**. *The service will be added to the drop-down menu for web mapping services appearing just below the **Labels** tab.* **Note**: If working inside a firewall, users may be prompted to enter a user name and password to obtain resources from outside the firewall.
Step 4	Select the imagery service added in the drop-down menu. *The available layers appear in the **ID/Name/Title/Abstract** box.*

Step	Action and *Result*
Step 5	Click on the layer to display, then click the **Add** button. *The WMS is added to the map showing in **Map View** and to the **Layers Panel.***
	When the WMS is added, it displays over the top of other layers selected for **Map View**. To make it display below these layers, click on the WMS layer and, while holding down the mouse button, drag it to the bottom of the **Layers Panel**.

If participants do not have access to a web mapping service, have a poor Internet connection, or work under a restrictive firewall, other types of imagery files may still be added to GUPS (e.g., a county or state imagery dataset). One option for adding imagery may be the National Agricultural Imagery Service (NAIP), supplied in web mapping service format by the U.S. Geological Survey, follow the steps in **Table 24**.

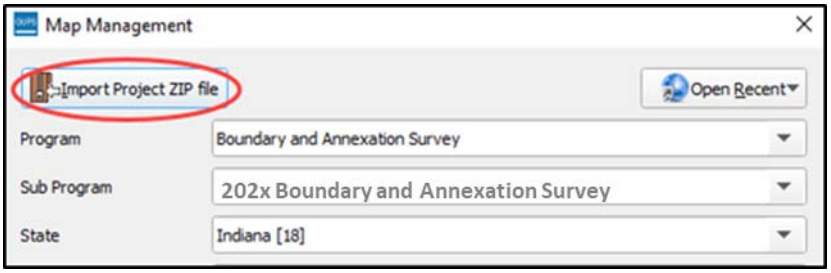
Table 24: Add Imagery Files

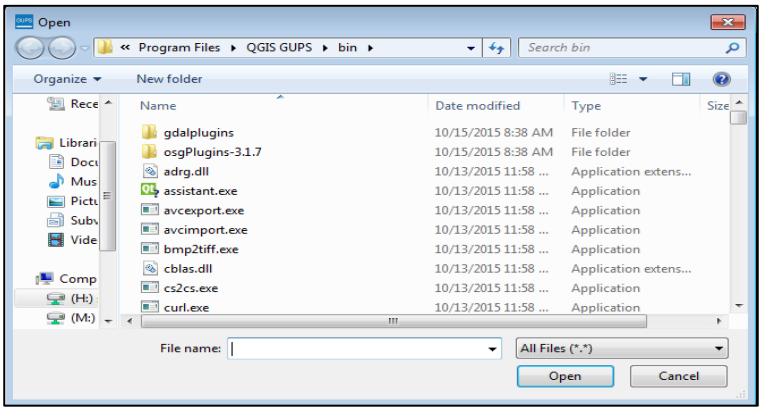
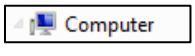
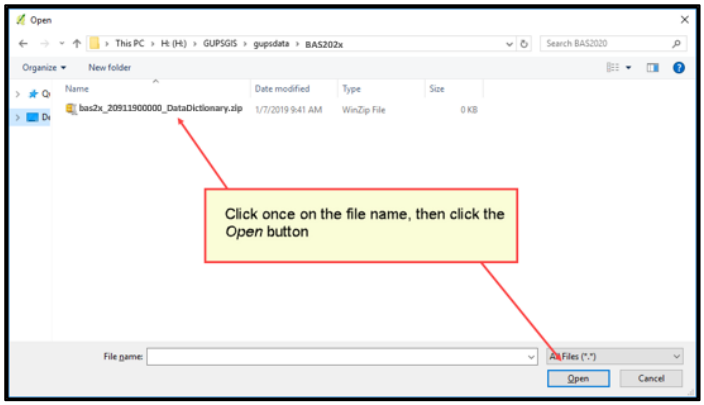
Step	Action and *Result*
Step 1	Click the **Add Raster Layer** button on the **Add Data toolbar**. *The **Data Source Manager** dialog box opens.*
Step 2	Navigate to the folder where the imagery file is stored.
Step 3	Select the file, click **Open and then click the Add button**. *The file loads into GUPS.*

5.7.3 How to Import a Shared ZIP Shapefile

To import Census Bureau shapefiles already updated by another user, use the **Import Project ZIP File** button(available both on the BAS toolbar and in the Map Management dialog box), then follow the steps in **Table 25** below.

Table 25: Import a ZIP File Shared by Another User

Step	Action and *Result*
Step 1	Click the **Import Project ZIP File** button in the upper left-hand corner of the **Map Management** dialog box:  OR on the BAS toolbar:

Step	Action and *Result*
Step 2	The **Open** file window displays. 
Step 3	From this window, click on the '**Computer**' icon (called '**My Computer**' in some versions of Windows) located in the far-left-hand pane.  When the list of directories opens, navigate to the location where the shared ZIP file is located.
Step 4	Click once on the file, click the **Open** button.  The file loads into **Map View**.

SECTION 6. MAKING BAS UPDATES IN GUPS

The tables in this section provide step-by-step instructions for making BAS updates. The examples assume participants have read and understood the directions for opening GUPS and using Map Management. If not yet comfortable with Map Management, please review the contents of **Section 5 Using GUPS (Basics and Map Management)** before making updates. It is highly recommended to use a source of imagery data when making any BAS updates.

6.1 How to Update Legal Boundaries

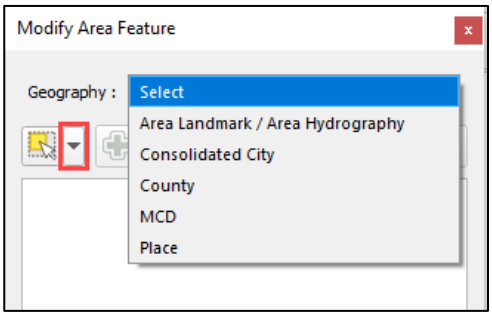
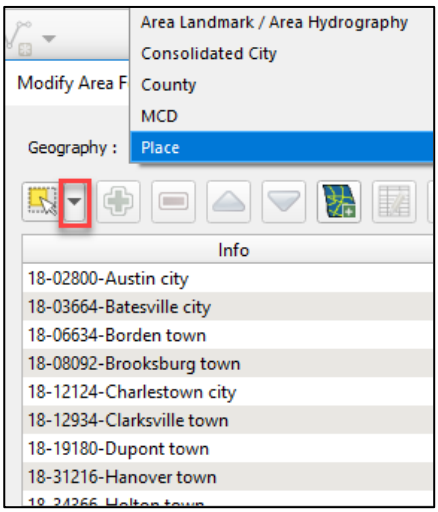
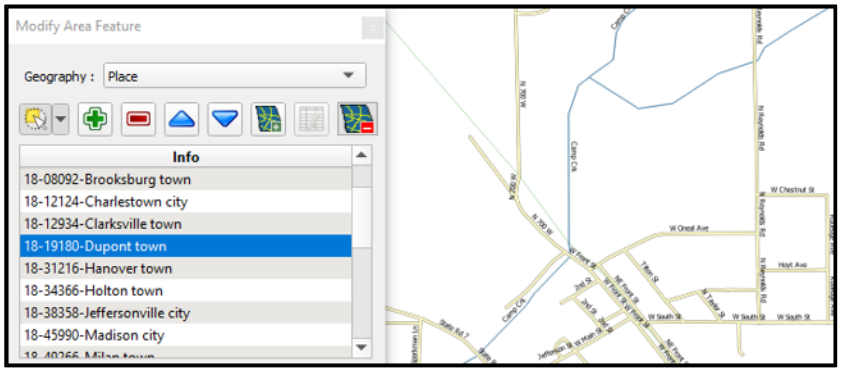
All examples shown here, although using real data, are purely fictitious. They are employed for purposes of illustration only and do not indicate any actual geographic changes.

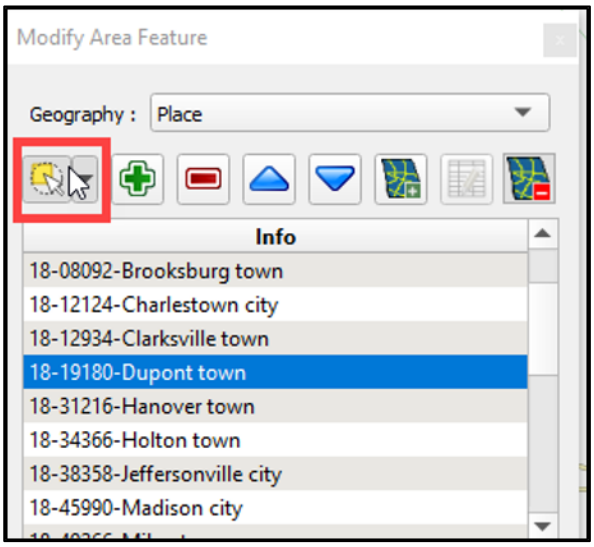
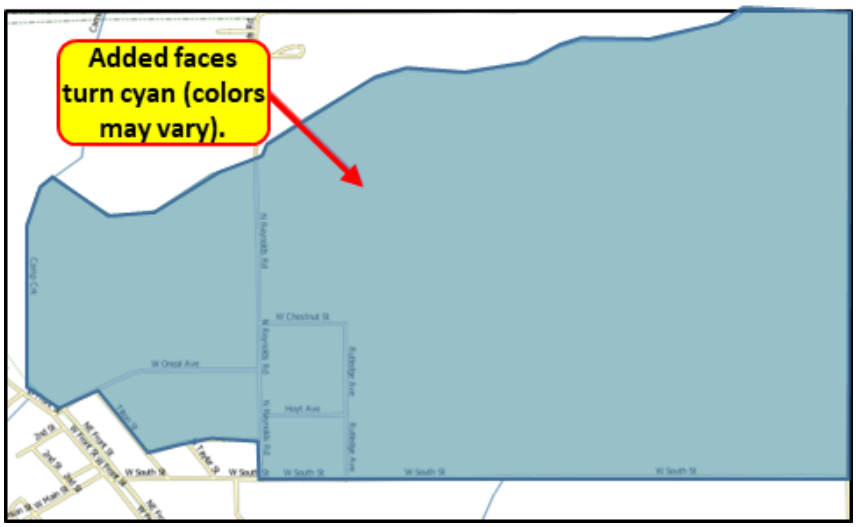
6.1.1 Recording an Annexation

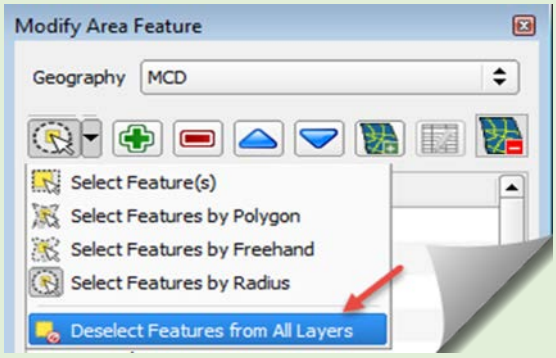
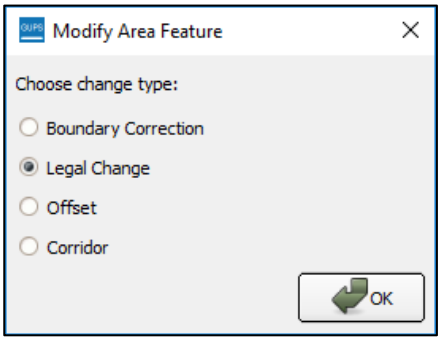
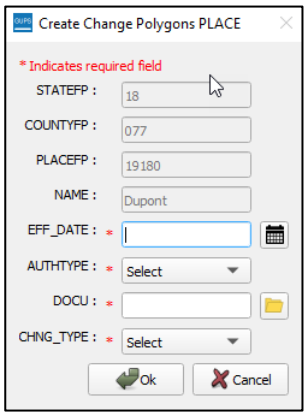
Follow the steps in the **Table 26** to record an annexation. The fictitious example in this table looks at an incorporated place named Kissimmee, Florida. Kissimmee has annexed several parcels previously outside its city limits.

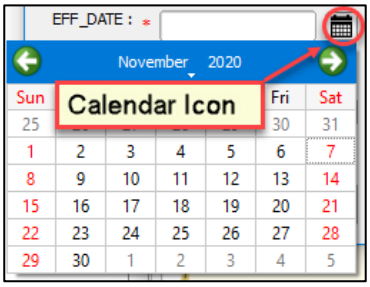
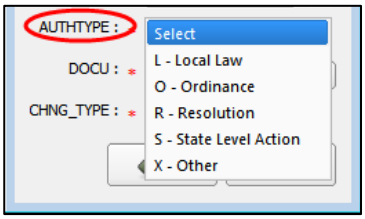
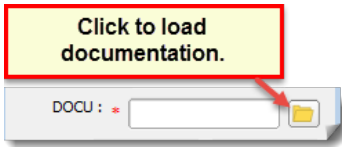
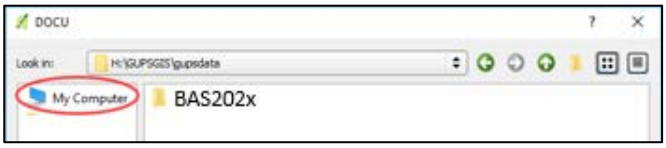
Table 26: Record an Annexation

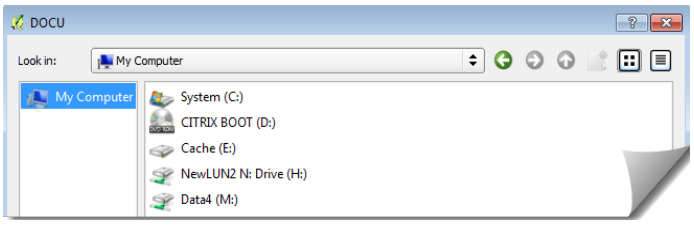
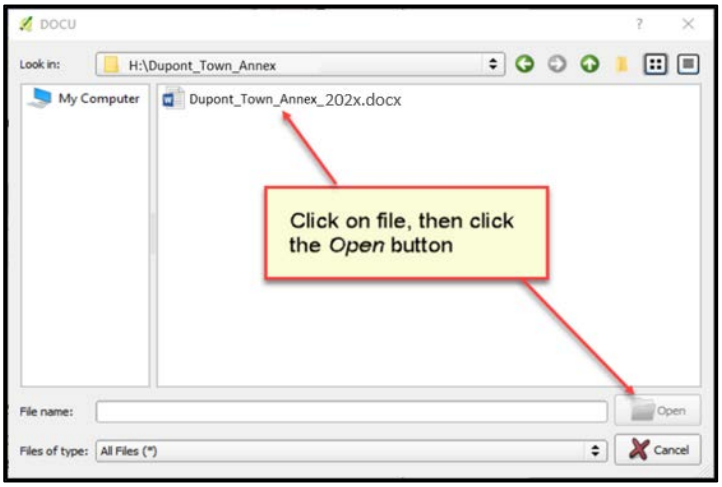
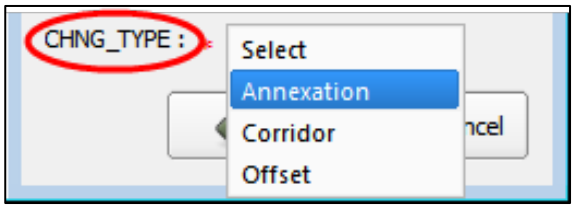
Step	Action and *Result*
Step 1	Open in **Map View** the county that contains the place (or other legal entity) that is annexing area. Be sure to have all layers one wants to see on the map checked in the **Layers Panel**.
Step 2	Click the Modify Area Feature button on the BAS toolbar. The **Modify Area Feature** dialog box opens.

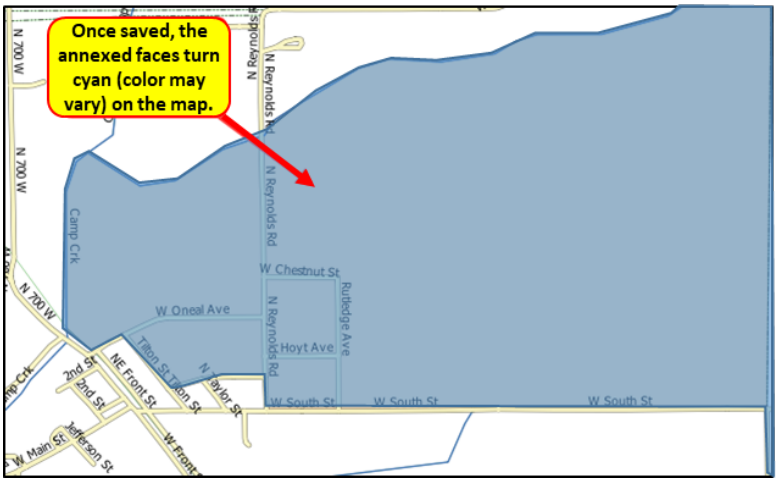
Step	Action and *Result*
Step 3	Click the drop-down area next to the **Geography** field, and select the entity type (here '**Place**'), from the drop-down menu. *A list of all incorporated places in the county appears in the **Info** list in the bottom portion of the dialog box.*  
Step 4	Double-click on the row in the list for the place that is making the annexation (here 'Dupont Town'). (**Note**: The list of places is short, but in some cases it can be long. Use the scroll bar to the right of the list to move up and down the list, if needed.) *Once the row is double-clicked on, the map zooms to the place selected.*  If the map does not zoom to a scale sufficient to make the changes, click on the **Zoom in** button on the **Standard toolbar**.

Step	Action and *Result*
Step 5	To select the faces to add to Dupont Town, click on the small down arrow next to the **Select Features** button on the dialog box toolbar. *The **Select Features** button drop-down menu opens*. In this example the "radius" method is used to select the faces to be added to Dupont Town. Click on '**Select Features by Radius**' in the menu. 
Step 6	Next, go to the map and place the cursor where the faces are to be added. To select a single face, simply drag the cursor outward in the center of the face. To select multiple faces, drag the cursor across the edges that separate the faces. In this example, seven faces were selected. *The faces selected turn cyan.* 
	Because all geographic areas consist of faces, one may need to "split" a face to accurately reflect an entity's boundary. To split a face, digitize a new line that represents the boundary's location (click on **Table** 33 for instructions to add a linear feature) and assign it the appropriate MTFCC. This splits the original face into two faces. The new face can now be added to the new entity.

Step	Action and *Result*
	If a face is accidentally selected, it can be deselected with the **Deselect Features from All Layers** option in the **Select Feature(s)** drop-down menu. 
Step 7	Click the **Add Area** button on the dialog box toolbar. The **Modify Area Feature Choose Change Type** pop-up box appears and asks to choose a change type.  Since this is an annexation, click the '**Legal Change**' radio button, then click **OK**.
Step 8	The **Create Change Polygons** dialog box opens, with the State and County FIPS codes, and the place name already populated. 

Step	Action and *Result*
Step 9	Click the calendar icon next to the **EFF_DATE** field to open the calendar, then click on the effective date for the annexation.  The selected date will populate the **EFF_DATE** field.
Step 10	Select an authority type for the annexation in the **AUTHTYPE** field drop-down menu. 
Step 11	In the **DOCU** field, type in the ordinance or other legal documentation number authorizing the annexation or upload documentation for the change. To upload documentation, click the folder icon next to the **DOCU** field.  The **DOCU** window opens. 

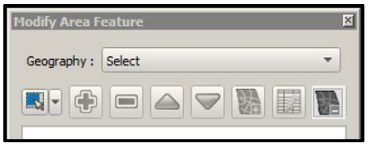
Step	Action and *Result*
Step 12	Click on the icon for '**My Computer**' (or simply '**Computer**' in some Windows versions) to open the directory where the documentation was saved. The directories display, as shown below. 
Step 13	Select the appropriate directory in the list and navigate to the file to be uploaded as documentation, then click the file. *The file name appears in the **File name** field*. To upload the file, click the **Open** button.  The name of the document populates the **DOCU** field on the dialog box.
Step 14	Finally, select '**Annexation**' in the drop-down menu for the **CHNG_TYPE** field. 

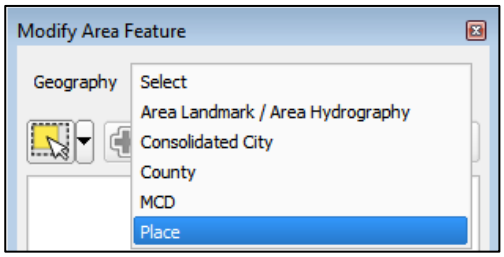
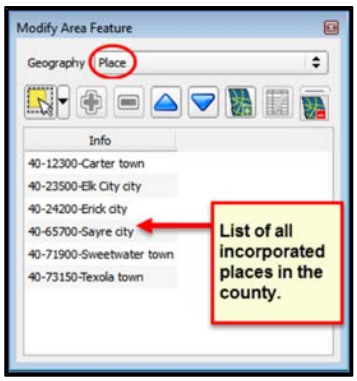
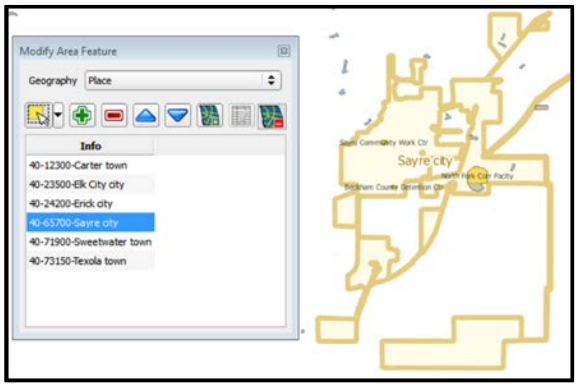
Step	Action and *Result*
Step 15	When finished, click **OK**. *The added faces (once saved) turn cyan in color on the map (color may vary).* 

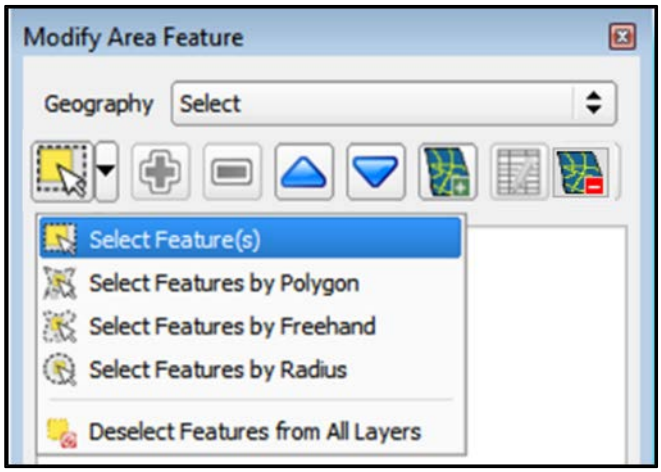
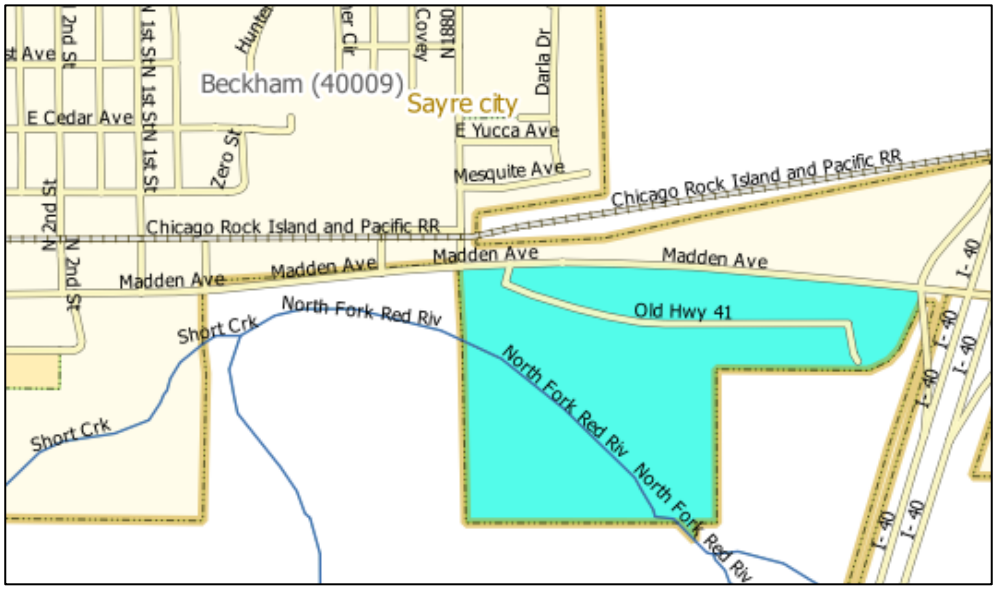
6.1.2 Recording a Deannexation

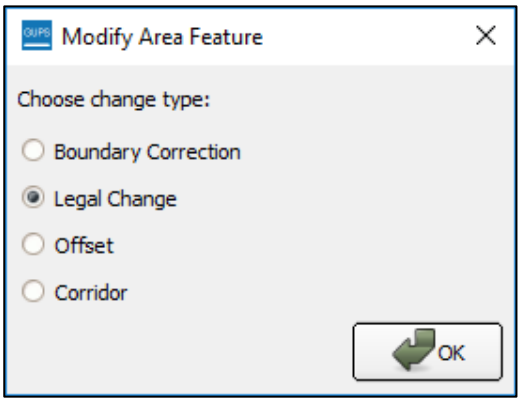
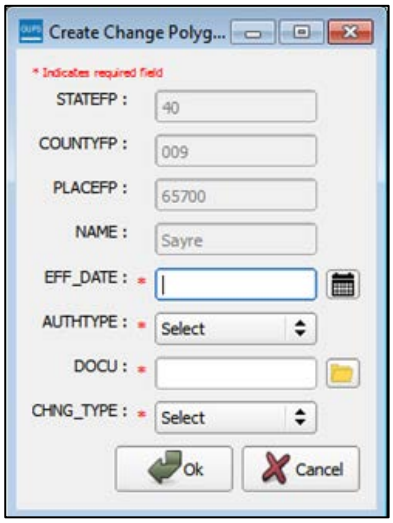
Follow the steps in **Table 27** to record a deannexation. The fictitious example in this table uses Sayre City, an incorporated place in Oklahoma.

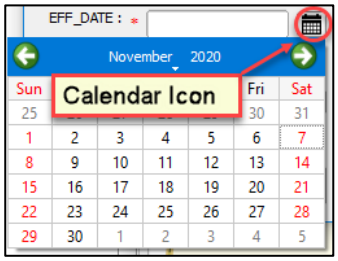
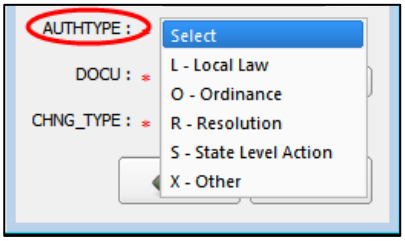
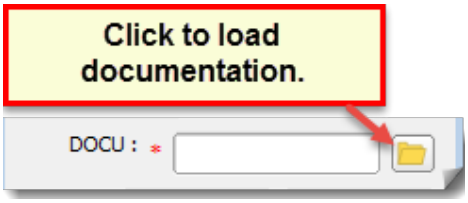
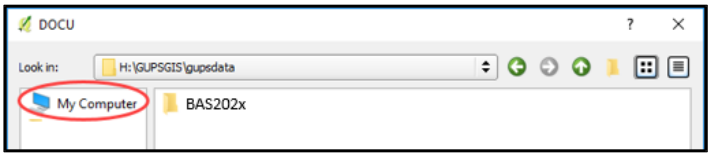
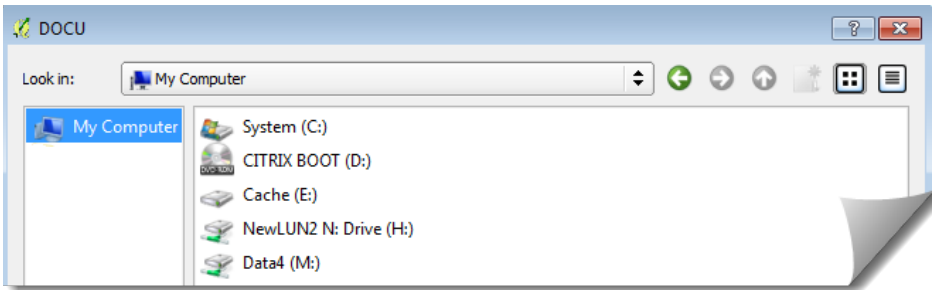
Table 27: Recording a Deannexation

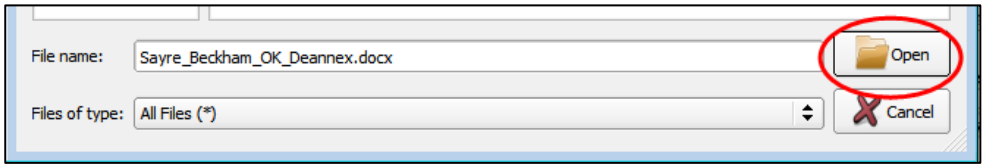
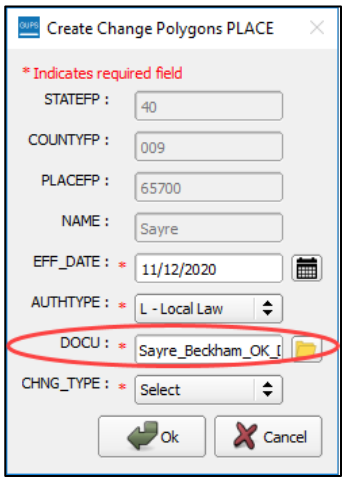
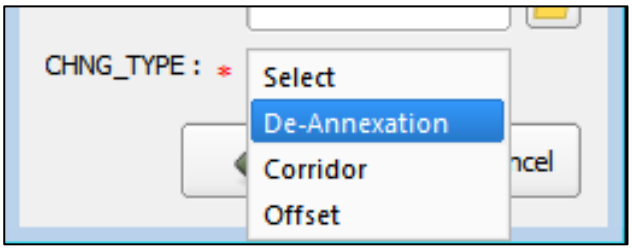
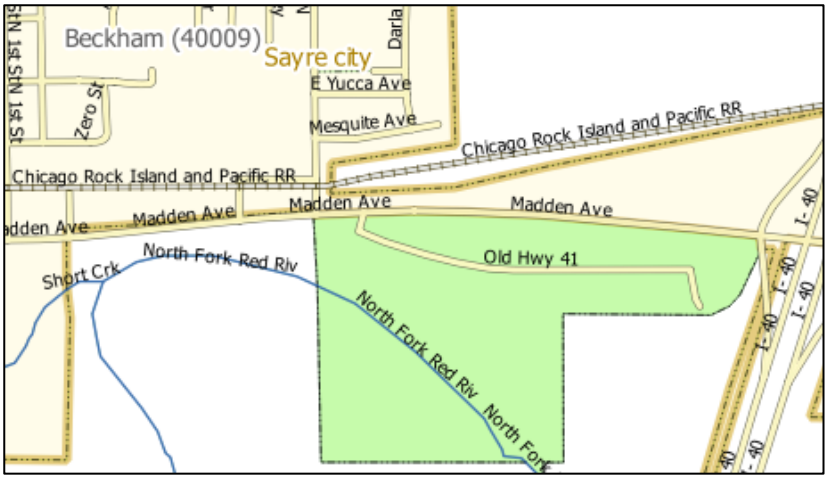
Step	Action and *Result*
Step 1	Open in **Map View** the county that contains the place (or other legal entity) that is deannexing area. Be sure that all layers needed on the map are checked in the **Layers Panel**.
Step 2	Click the Modify Area Feature button on the BAS toolbar. The Modify Area Feature dialog box opens. 

Step	Action and *Result*
Step 3	Click the arrow next to the **Geography** field and select in the drop-down menu the entity type from which to deannex area. This example is deannexing land from an incorporated place, so '**Place**' is selected.  *Place appears in the **Geography** field and a list of all incorporated places in the county appears in the **Info** list in the bottom portion of the dialog box.* 
Step 4	Click on the place name (Sayre city) in the list. *The map zooms to Sayre.* 

Step	Action and *Result*
Step 5	Zoom on the map to the location where the deannexation occurred. Then choose a method for selecting the faces to be deannexed. In this example, in the drop-down menu for the **Select Features** tool, click on the '**Select Feature(s)**' option. 
Step 6	Click on a face to select it. To select more than one face, depress the **CTRL** key, and while holding the **CTRL** key down, click each face to be deannexed. *The selected face(s) turn cyan.* 
	Because all geographic areas consist of faces, one may need to "split" a face to accurately reflect an entity's boundary. To split a face, digitize a new line that represents the boundary's location (click on **Table** 33 for instructions to add a linear feature) and assign it the appropriate MTFCC. This splits the original face into two faces. One can now select the face to add to the new entity.

Step	Action and *Result*
Step 7	Click the **Remove Area** button on the dialog box toolbar. The **Modify Area Feature Choose change type** pop-up box appears and asks to choose a change type. 
Step 8	Since this is a legal deannexation, click the '**Legal Change**' radio button, then click **OK**. *The **Create Change Polygons** dialog box opens.* 

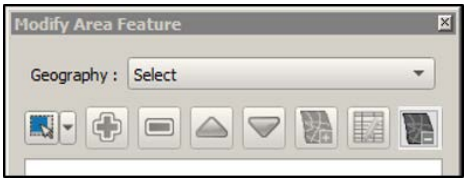
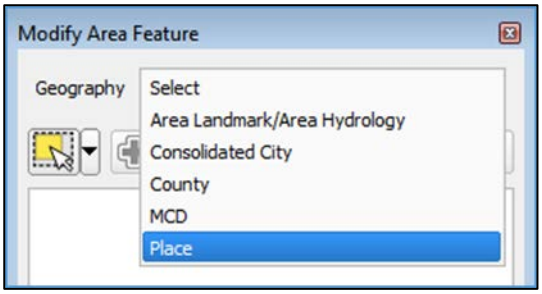
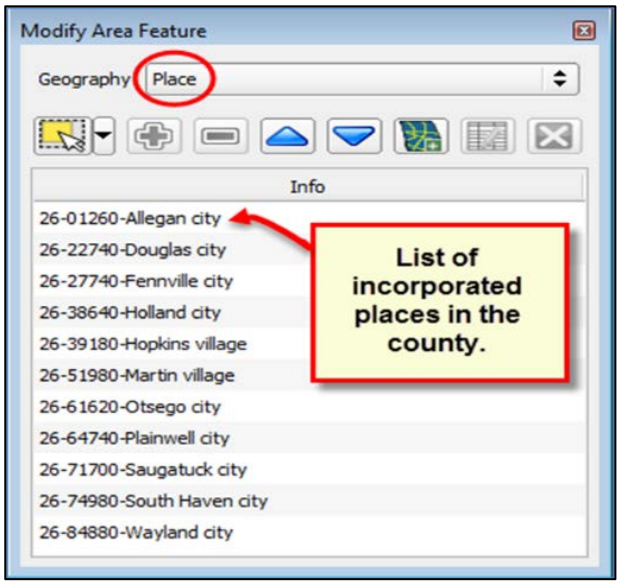
Step	Action and *Result*
Step 9	In the **Create Change Polygons** dialog box, click the calendar icon next to the **EFF_DATE** field and, when the calendar opens, click on the date which the deannexation became effective.  The date selected populates the **EFF_DATE** field.
Step 10	Select an authority type for the deannexation in the **AUTHTYPE** field drop-down menu. 
Step 11	In the **DOCU** field, type in the ordinance or other legal documentation number authorizing the deannexation or upload legal documentation for the change. To upload documentation, click the folder icon next to the **DOCU** field.  When the **DOCU** window opens, click on the icon for 'My Computer' (or simply 'Computer' in some Windows versions) to open the directory where the documentation had been saved.  The directories display, as shown below. 

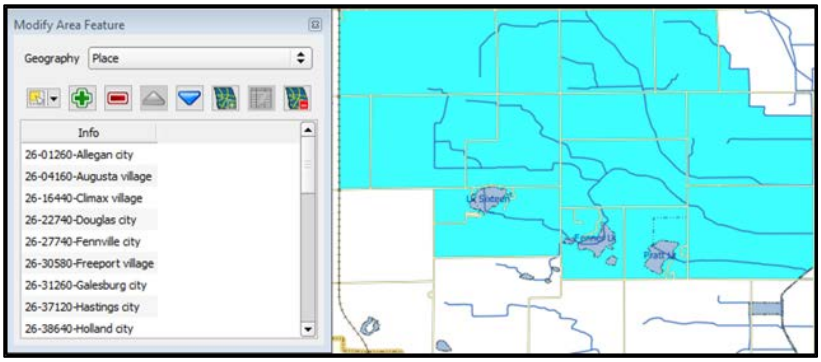
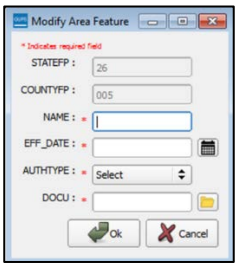
Step	Action and *Result*
Step 12	Select the appropriate directory and navigate to the file to upload. Click the file. Then click the **Open** button at the bottom of the **DOCU** window.  GUPS uploads the file and the file name appears in the **DOCU** field in the **Create Change Polygons** dialog box. 
Step 13	In the **CHNG_TYPE** field drop-down menu, select '**De-annexation**'. 
Step 14	When finished, click **OK**. *The selected faces turn green on the map (color may vary).* 

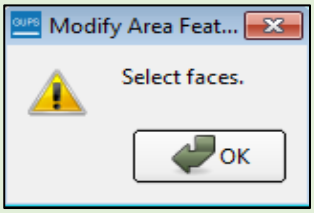
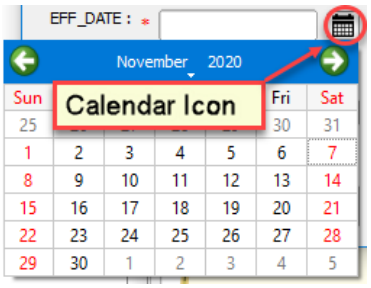
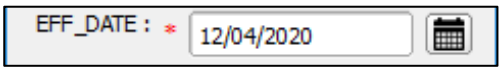
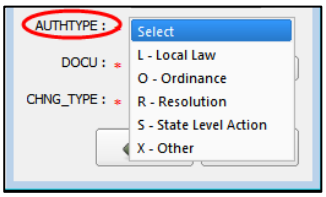
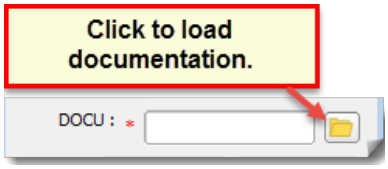
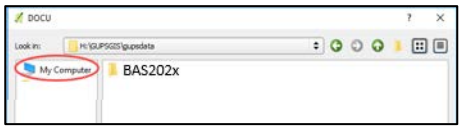
6.1.3 Adding a New Legal Government (New Incorporation)

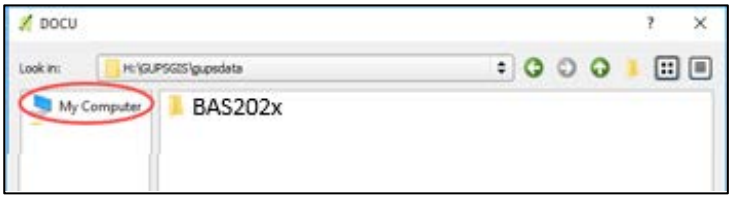
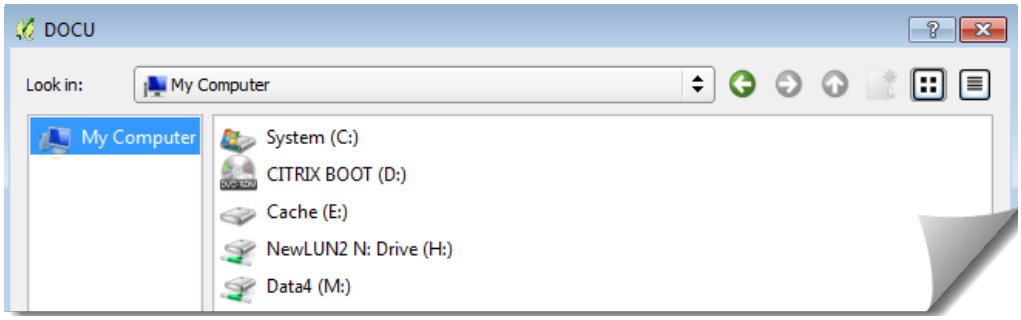
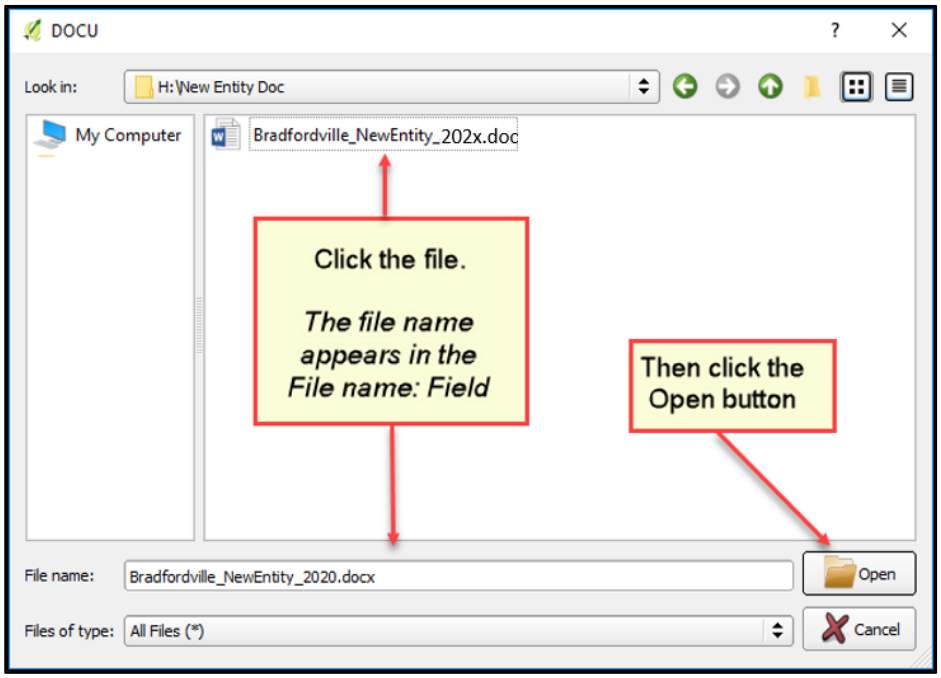
Follow the steps **Table 28** to add a new legal government. In this example, a fictitious newly incorporated place in Michigan is being added.

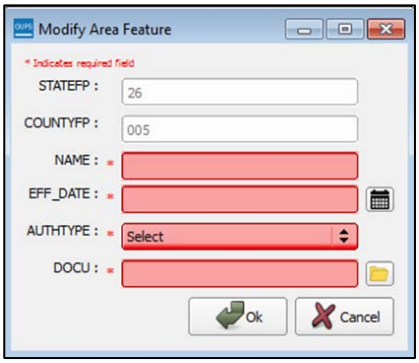
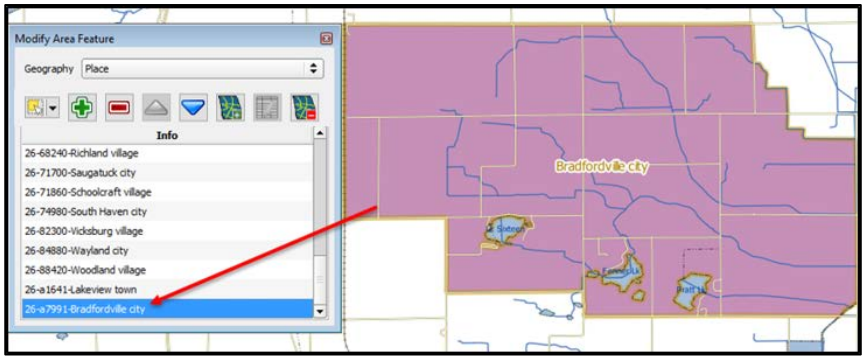
Table 28: Adding a New Legal Government

Step	Action and *Result*
Step 1	Open in **Map View** the county where one wants to add a new entity. Be sure all necessary layers are checked in the **Layers Panel**.
Step 2	Click the Modify Area Feature button on the BAS toolbar. The **Modify Area Feature** dialog box opens. 
Step 3	Click the drop-down arrow next to the **Geography** field and select the entity type to add from the drop-down menu. In this example a newly incorporated city is added, so '**Place**' is selected.  *Place appears in the **Geography** field and a list of all incorporated places in the county appears in the **Info** list.* 

Step	Action and *Result*
Step 4	Zoom to the location where the new entity is located. To select the faces for the entity, left-click *once* on the **Select Features** button on the dialog box toolbar.
Step 5	Then click on the map to select the face or faces. If the entity includes only a single face, simply click once on the face to select it. If the entity includes several contiguous faces, after clicking on the first face, depress the **CTRL** key and while holding it down, left-click on each additional face to be added. *The selected faces turn cyan.*  **Note**: Faces may also be selected (after clicking the **Select Features** button) by simply dragging the cursor over the edges that mark their boundaries. Additional means of selecting faces (by polygon, by freehand, and by radius) are discussed in **Table 14: Select/Deselect Features on the Map**.
	Because all geographic areas consist of faces, a participant may need to "split" a face to accurately reflect an entity's boundary. To split a face, digitize a new line that represents the boundary's location (click on **Table** 33 for instructions to add a linear feature) and assign it the appropriate MTFCC. This splits the original face into two faces. Now select the face to add to the new entity.
Step 6	To record the new entity, click the **Add Entity** button on the dialog box toolbar. The **Modify Area Feature** new entity dialog box opens. 

Step	Action and *Result*
	Note: If the **Add Entity** button is clicked before selecting the faces, a pop-up box warning will appear. Simply click **OK** and add the faces. 
Step 7	In the new entity dialog box, type the new legal entity name in the **Name** field.
Step 8	Next add the effective date for the legal change. Click on the calendar icon next to the **EFF_DATE** field and, when the calendar opens, click on the effective date.  The date selected populates the **EFF_DATE** field. 
Step 9	Next, add the authority type using the **AUTHTYPE** drop-down menu. 
Step 10	Finally, either type in the ordinance or other legal documentation number authorizing the new entity in the **DOCU** field, or upload documentation for the change. To upload documentation, click the folder icon next to the **DOCU** field.  The **DOCU** window opens. 

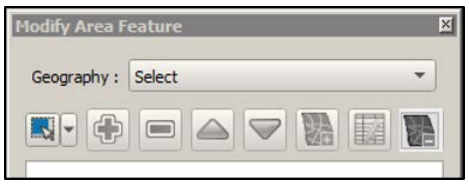
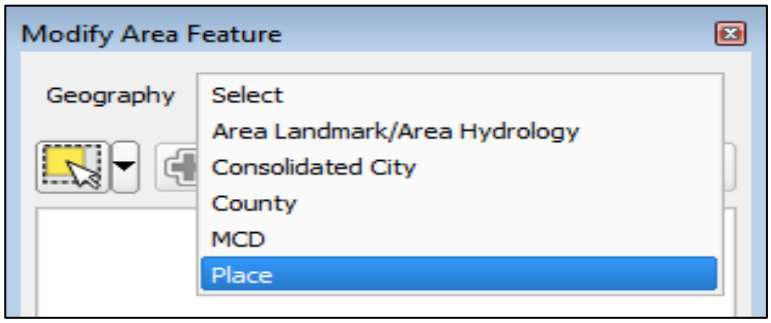
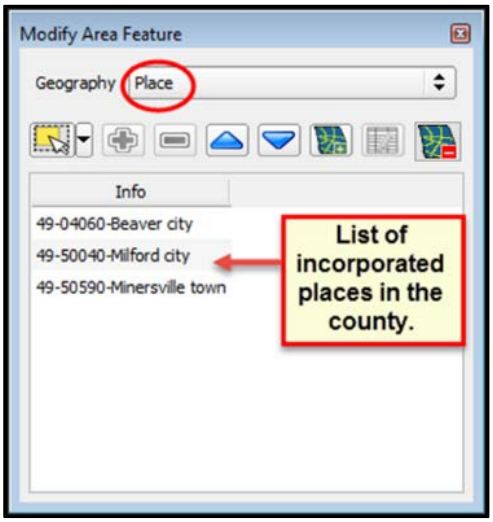
Step	Action and *Result*
Step 11	Click on the icon for '**My Computer**' (or simply '**Computer**' in some Windows versions) to open the directory where the documentation is saved.  The directories display, as shown below. 
Step 12	Select the appropriate directory in the list and navigate to the file to upload as documentation, then click the file. *The file name appears in the **File name**: field.* To upload the file, click the **Open** button. 

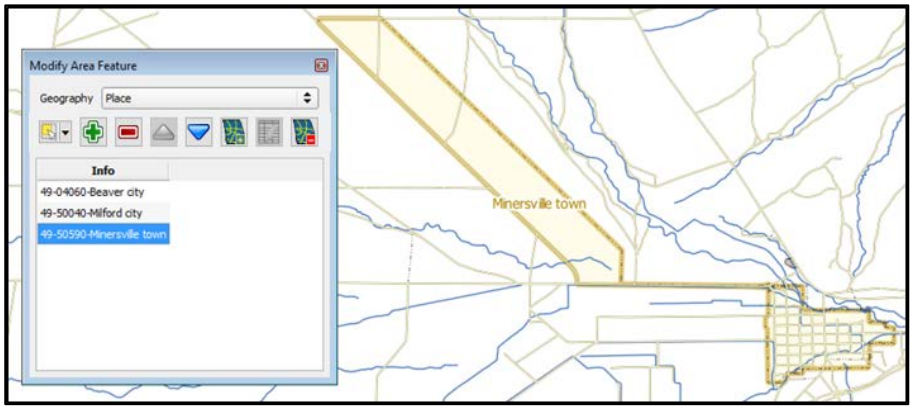
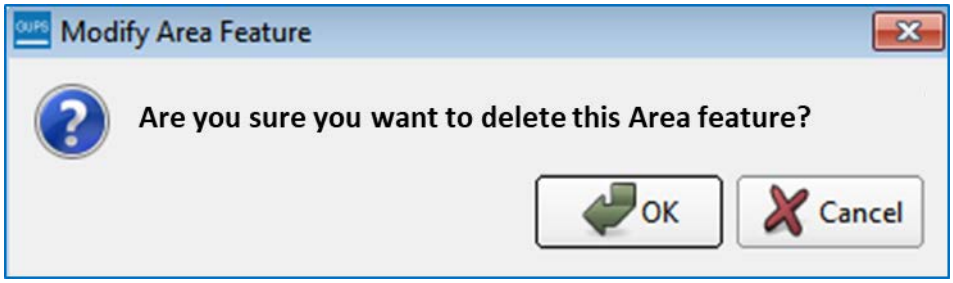
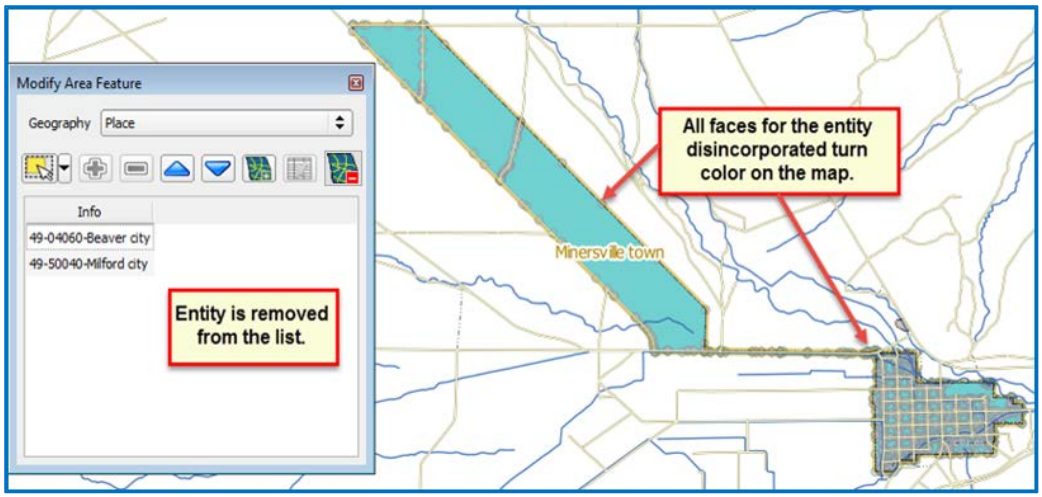
Step	Action and *Result*
Step 13	Once the **Open** button is clicked, the name of the document appears in the **DOCU** field.
Step 14	Click the **OK** button. **Note**: Red asterisks indicate required fields. Required fields must be completed to move forward. If one or more required fields are not completed and the **OK** button is clicked, GUPS will prompt the user to complete the fields. Any required field not completed will highlight in red, as shown below.  Once all required fields are completed and the OK button clicked, *the faces for the new entity turn purple on the map (colors may vary) and the name of the new entity appears in the list of incorporated places in the* ***Modify Area Feature*** *dialog box.* 
	Once the Census Bureau verifies the new entity, it will assign it a FIPS code. The code preceding the new entity name in the list is ***not*** a FIPS code and ***should not be used for any official purpose***. It is only a placeholder until the official FIPS code can be assigned.
Step 15	To make additional changes to the map, simply make a new selection in the **Modify Area Feature** dialog box **Geography** field and continue work. Save changes as they are made or wait until all work on the map is finished. Saving as changes are completed, however, is recommended to avoid losing work in the event of a power outage or system interruption.
	New Entity that Crosses a County Boundary If the new entity crosses a county boundary, the new entity must be added in both counties separately. After making the change in the working county, return to **Map Management**, select the other county as the working county, and proceed to add the new entity in this county as well. If the added entity crosses more than one county boundary, complete the addition in each county affected.

6.1.4 Deleting a Government (Disincorporation)

Follow the steps in the table below to record a disincorporation. In this example, a fictitious disincorporation for Minersville, Utah is shown.

Table 29: Record a Disincorporation

Step	Action and *Result*
Step 1	Open in **Map View** the county that contains the entity to delete. Be sure that all layers needed are checked in the **Layers Panel**.
Step 2	Click the Modify Area Feature button on the BAS toolbar. The **Modify Area Feature** dialog box opens. 
Step 3	Click the drop-down arrow next to the **Geography** field, and select '**Place**' in the drop-down menu.  Place appears in the **Geography** field and a list of all incorporated places in the county appears in the **Info** list. 

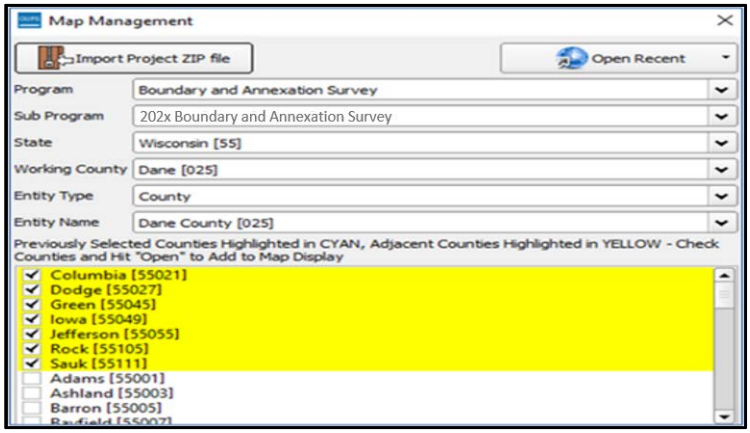
Step	Action and *Result*
Step 4	Click the entity in the list to show the disincorporation (here Minersville). *The map zooms to Minersville.* 
Step 5	Click the **Delete** button on the toolbar inside the **Modify Area Feature** dialog box. A pop-up asks 'Are you sure you want to delete this Area feature?' 
Step 6	Click **OK**. The disincorporated entity turns green on the map (color may vary), and it is removed from the list of incorporated places in the county. 
Step 7	To make additional changes to the map, simply make a new selection in the **Modify Area Feature** dialog box **Geography** field and continue work.

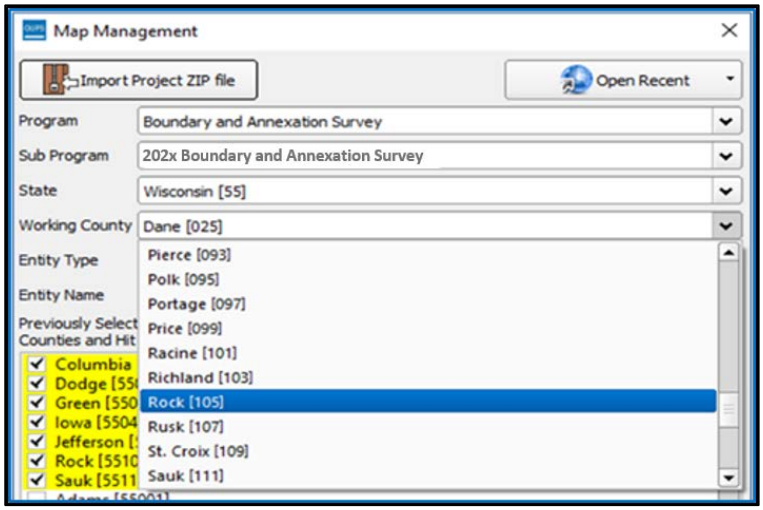
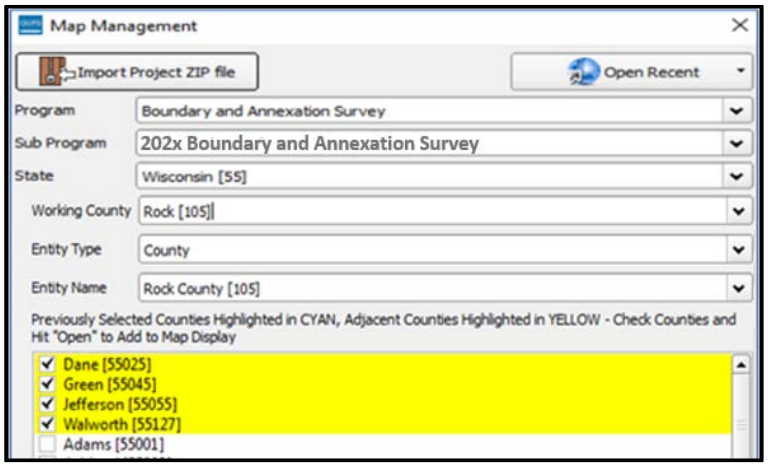
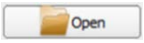
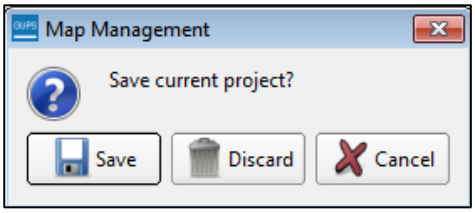
Step	Action and *Result*
	Deleted Entity that Crosses a County Boundary If the deleted entity crosses a county boundary, the entity must be deleted in both counties separately. After making the change in the working county, return to **Map Management**, select the other county as the working county, and proceed to delete the entity in this county as well. If the deleted entity crosses more than one county boundary, complete the deletion in each county affected.

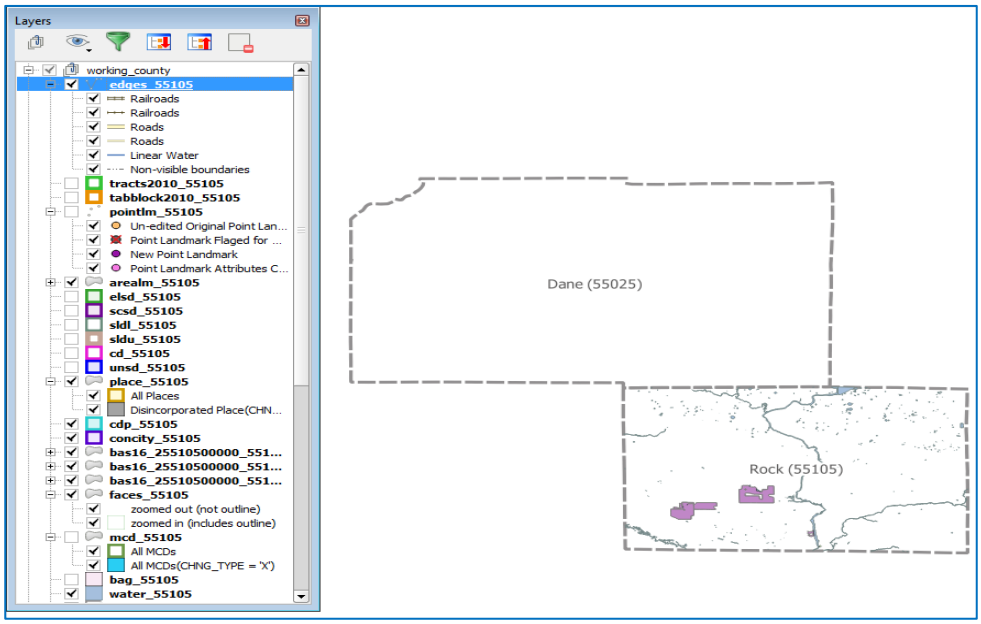
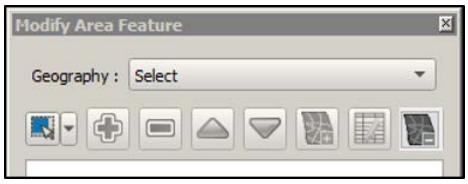
6.1.5 Making a Boundary Update on a County Line

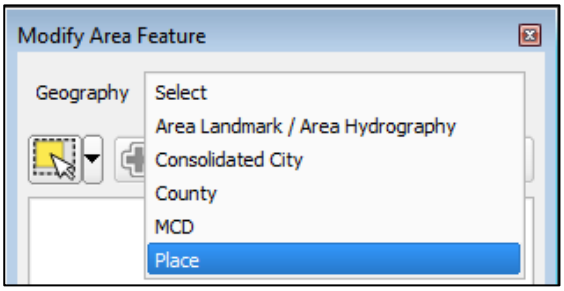
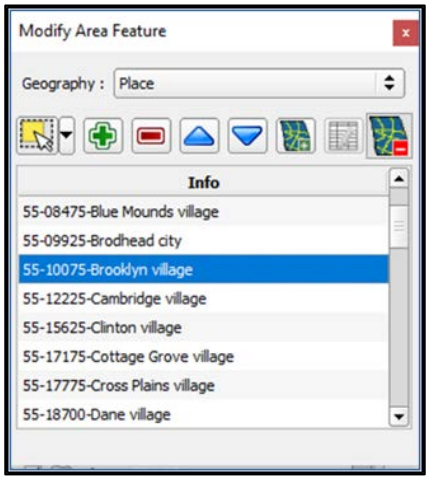
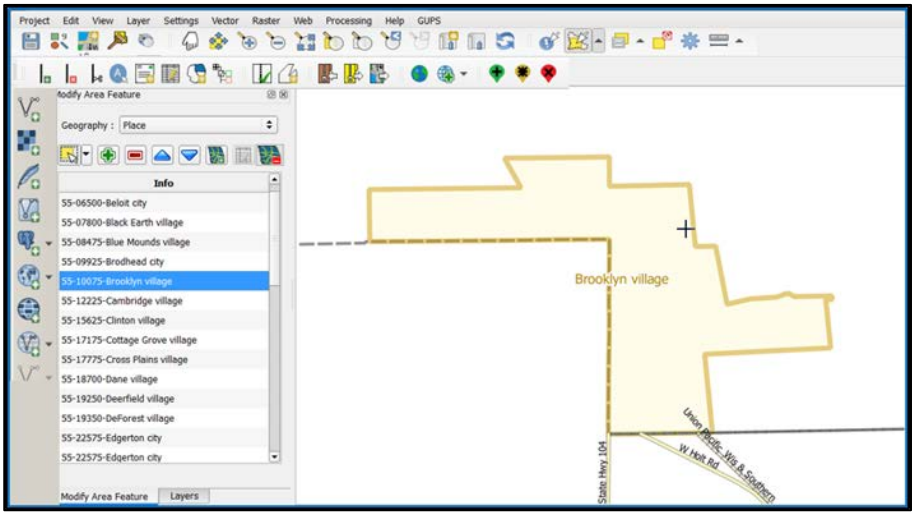
Users reporting on behalf of an incorporated place may make changes across county boundaries for their place. The steps in **Table 30** provide an example for an annexation by a place that crosses a county boundary. The fictitious example uses Brooklyn Village, in Dane County, Wisconsin. It has annexed land in adjacent Rock County.

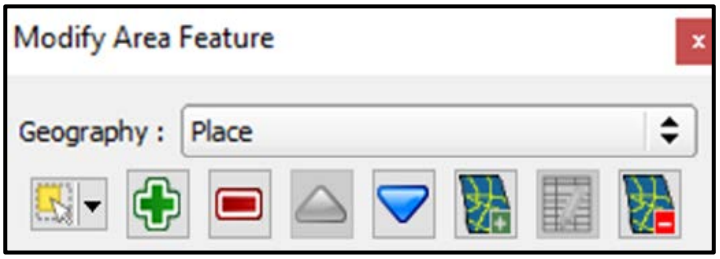
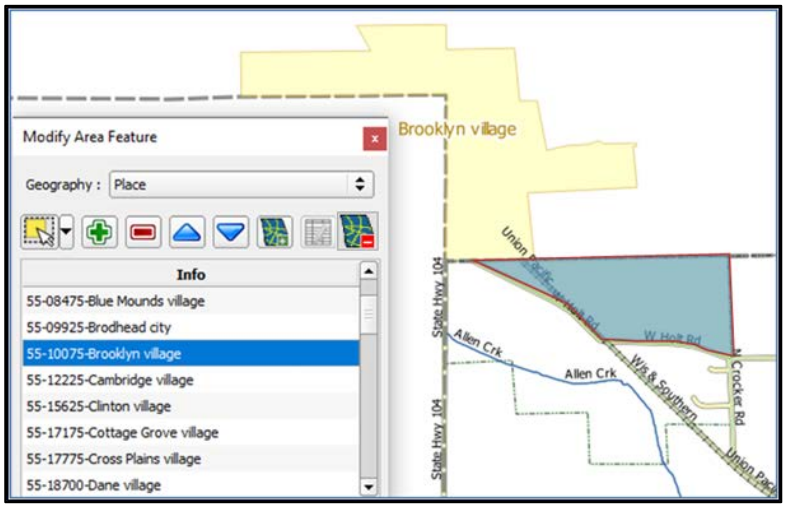
Table 30: Record an Annexation in an Adjacent County

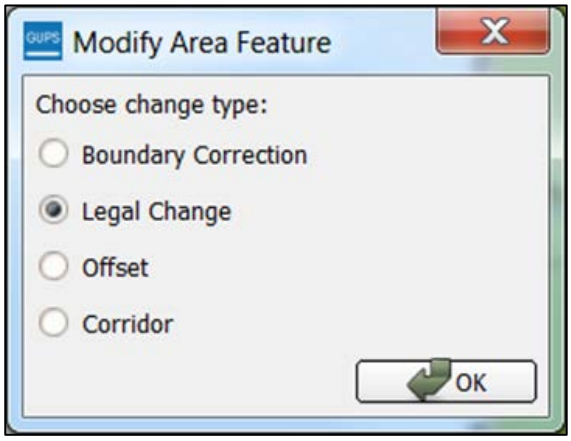
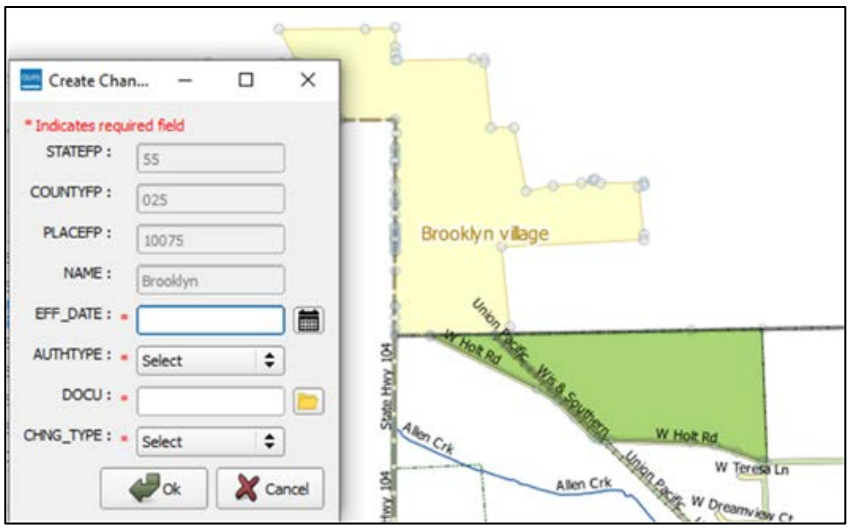
Step	Action and Result
	Independent City Users: Users reporting for independent cities (cities independent of any county and treated by the Census Bureau as county equivalents) should follow the steps described below to show annexations/deannexations between the city and surrounding counties. ***County Users***: When updating a county boundary, the user must switch the working county to add/remove area located in the other county. To update a boundary, use the instructions below, but in Step 6, select County instead of Place in the Geography drop-down menu, and in Step 7, click in the **Info** list on the name of the county to add or remove the area.
Step 1	To show a boundary change that crosses a county boundary, change the working county to the county in which the added faces are located. This example assumes that Dane County is the working county and is already displayed in **Map View**. To switch the working county: Click the Map Management button on the Standard toolbar. The **Map Management** dialog box opens showing the program, state, working county, entity type, and entity name selected earlier. A list of adjacent counties, highlighted in yellow, displays near the bottom of the dialog box. 

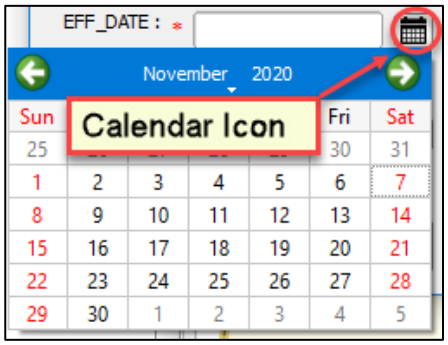
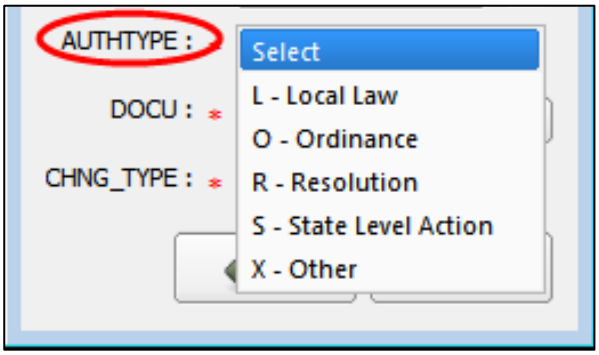
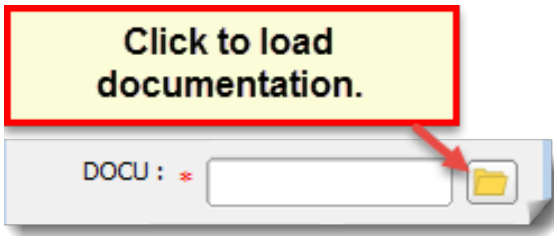
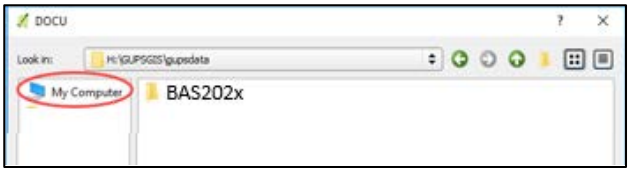
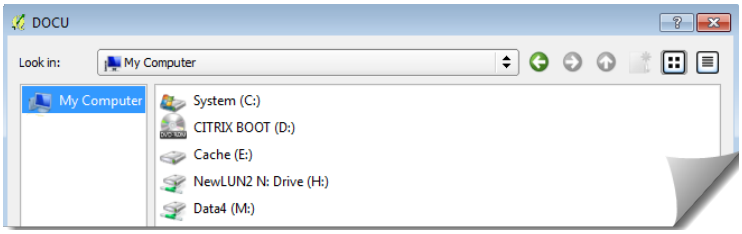
Step	Action and Result
Step 2	To change the working county, click the down arrow for the **Working County** field to open the drop-down menu and select Rock County from the list. Select County from the **Entity Type** field.  The list of adjacent counties repopulates to show the counties adjacent to Rock County. 
Step 3	Unclick the checkbox for all counties except Dane. Then click the **Open**  button at the bottom of the **Map Management** dialog box. *A **Save current project** pop-up box asks if the user would like to save their current project.* 

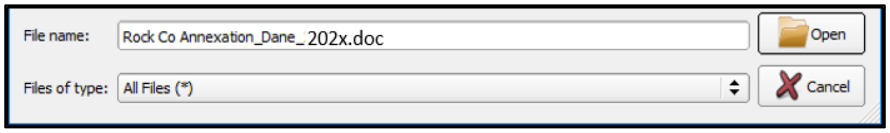
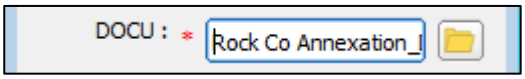
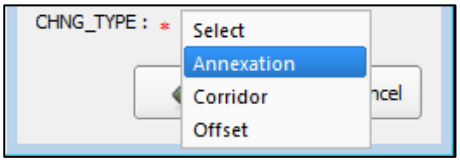
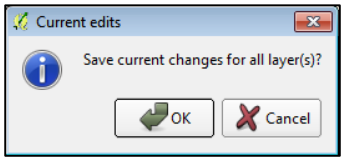
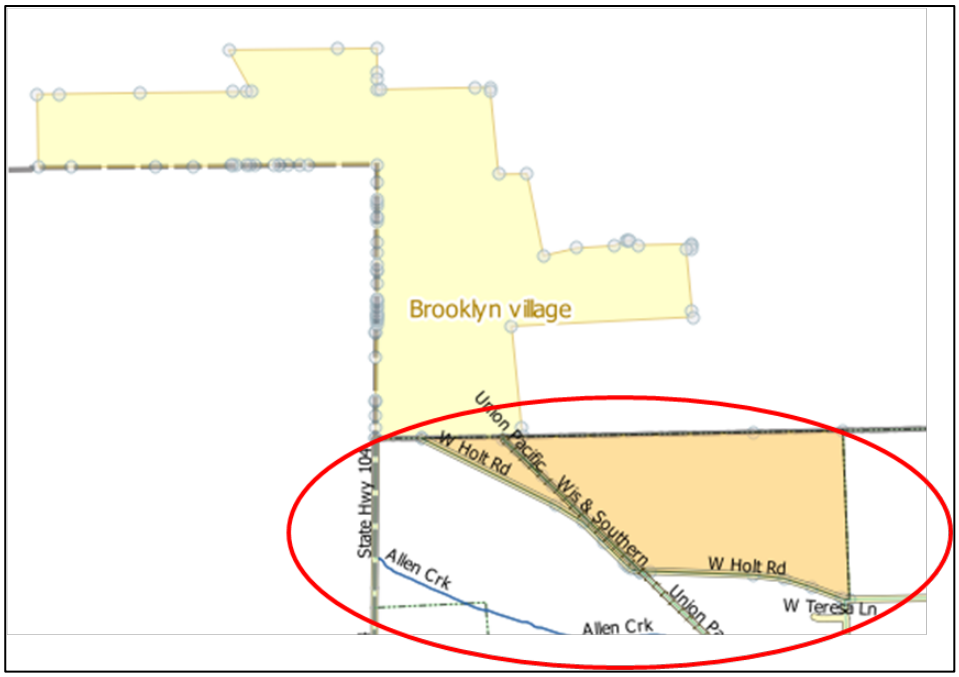
Step	Action and Result
Step 4	Click the **Save** button in order not to lose any previously made changes to the Dane County shapefile. The **Map View** displays both Dane and Rock Counties and the **Layers Panel** displays the layers for the new working county (Rock County). 
Step 5	To select the entity within Dane County to which one wants to add the area that is within Rock County, click the **Modify Area Feature** button on the **BAS toolbar**. The **Modify Area Feature** dialog box opens. 

Step	Action and Result
Step 6	In the **Geography** field drop-down menu, select the entity type to which the annexed land should be assigned. Because Brooklyn Village is an incorporated place, select '**Place**'.  A list of all incorporated places in both Rock and Dane Counties appears in the **Info** list at the bottom of the dialog box. The list includes Brooklyn Village. 
Step 7	Scroll down the list and click the row for 'Brooklyn village'. The map zooms to the portion of the county boundary where Brooklyn Village is located. 

Step	Action and Result
Step 8	Zoom in to the faces to be annexed, then click the **Select Features** button on the dialog box toolbar once. 
Step 9	Click the face on the map to be added, if there is only one. To add additional faces, hold down the **CRTL** key and continue to click on faces until done. *The selected faces turn cyan.* 
	Because all geographic areas consist of faces, a participant may need to "split" a face to accurately reflect an entity's boundary. To split a face, digitize a new line that represents the boundary's location (click on **Table** 33 for instructions to add a linear feature) and assign it the appropriate MTFCC. This splits the original face into two faces. The face can now be selected to add to the new entity.

Step	Action and Result
Step 10	To add the faces selected within Rock County to the incorporated place Brooklyn Village, click the **Add Area** button on the dialog box toolbar. The Modify Area Feature Choose change type dialog box opens.  Click the radio button next to '**Legal Change**' to indicate that this is a legal boundary change. Then click **OK**.
Step 11	The selected faces turn green (colors may vary) and the **Create Change Polygons** dialog box opens. GUPS automatically fills the FIPS codes, and name fields for Brooklyn Village. 

Step	Action and Result
Step 12	Click the calendar icon next to the **EFF_DATE** field to select an effective date for the annexation. 
Step 13	Select an authority type for the annexation in the **AUTHTYPE** field drop-down menu. 
Step 14	Type in the ordinance or other legal documentation number authorizing the change or upload legal documentation. To upload a document, click on the folder icon to the right of the **DOCU** field.  When the ***DOCU*** window opens, click on the icon for 'My Computer' (or simply 'Computer' in some Windows versions) to open the directory where the documentation is saved.  The directories display, as shown below. 

Step	Action and Result
Step 15	Select the appropriate directory and navigate to the file to upload. Click the file. Then, to upload it, click the **Open** button at the bottom of the **DOCU** window.  The file name appears in the **DOCU** field in the **Create Change Polygons** box. 
Step 16	Finally, use the **CHNG_TYPE** drop-down menu to select the type of legal change being made, here an annexation.  Then click **OK**.
Step 17	Click the **Save** button on the **Standard toolbar**. The **Current edits** pop-up box asks to "Save the changes for all layers? ".  Click **OK**. The changes are saved and the selected faces turn brown, as shown below. (**Note**: If the Dane County map is reopened now, the faces will appear as part of Brooklyn Village.) 

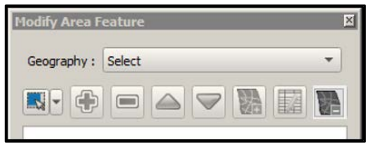
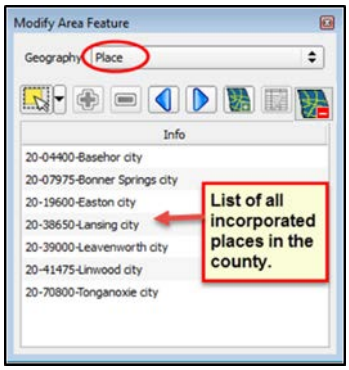
6.1.6 Making a Legal Boundary Change for a Consolidated City

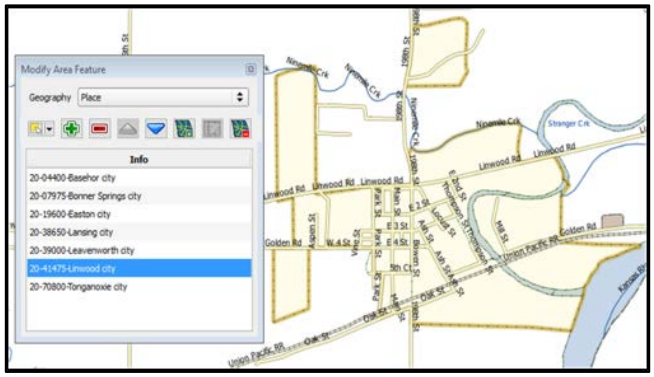
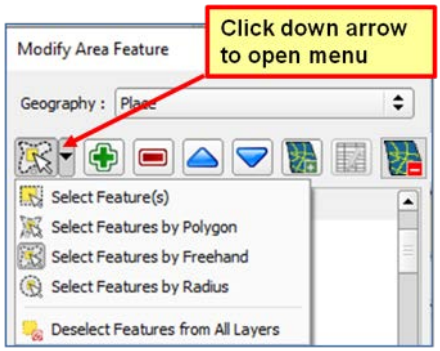
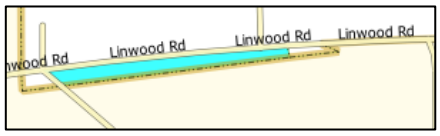
Users who represent consolidated cities (i.e., cities that share a consolidated government with a county or minor civil division) should follow the steps described in **Table 30** in **6.1.5, Making a Boundary Update on a County Line** to show boundary changes between the city and any county adjacent to it. To show boundary changes between the consolidated city itself and the government or governments with which it shares a government, proceed as any incorporated place user would. That is, to annex land from another government within the consolidated government area, treat it as one would any annexation within a county.

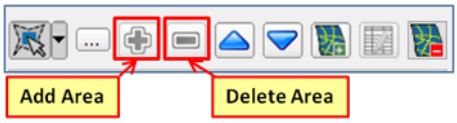
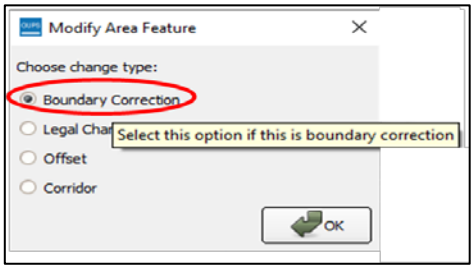
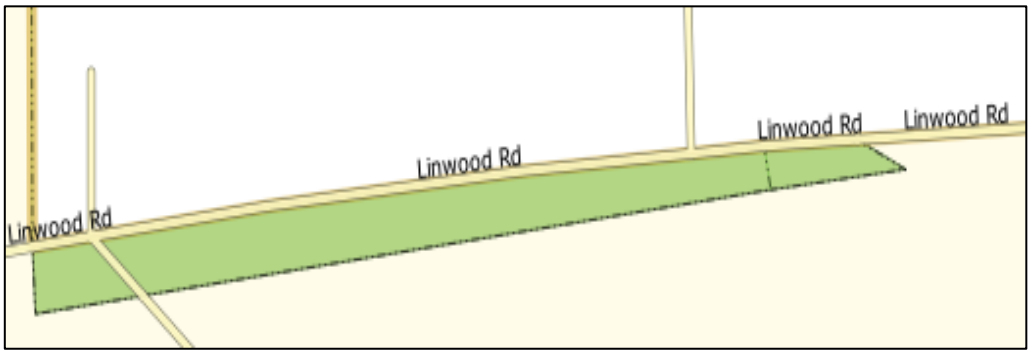
6.1.6.1 Making a Boundary Correction (Add Area/Remove Area)

To make a boundary correction that adds or removes area from a government, follow the steps in **Table 31**. In this fictitious example, a boundary correction is made to the city limits of Linwood, Kansas.

Table 31: Making a Boundary Correction

Step	Action and *Result*
Step 1	Open in **Map View** the county that contains the legal entity to add or remove area. Be sure all layers needed on the map are checked in the **Layers Panel**.
Step 2	Click the Modify Area Feature button on the BAS toolbar. The **Modify Area Feature** dialog box opens. 
Step 3	Click the arrow next to the **Geography** field and select in the drop-down menu the entity type for adding or removing area. In this example, '**Place**' is selected. *The **Info** list populates with all incorporated places in the county for the geography chosen.* 

Step	Action and *Result*
Step 4	Click on the row in the list for the place that is adding/removing area (here Linwood). *The map zooms to the place selected.* 
Step 5	Click the down arrow next to the **Select Features** button to select the face(s) to add or remove for the boundary correction. *The **Select Features** drop-down menu opens.*  In this example, three small faces that are difficult to select are being added, so the best option is to '**Select Features by Freehand**'. This method allows placing the cursor inside the first face and drawing a tiny line. *The selected face turns cyan.*  To select the other faces, press the **CTRL** key, and while holding it down, repeat the action for the two remaining faces. *All three faces turn color.*
	Note: To add area, the area must be outside the selected place. To remove area, the area must be within the selected place.

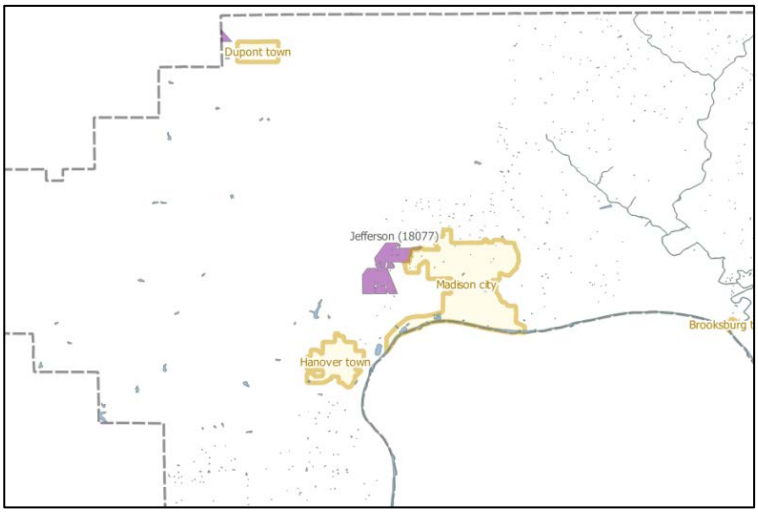
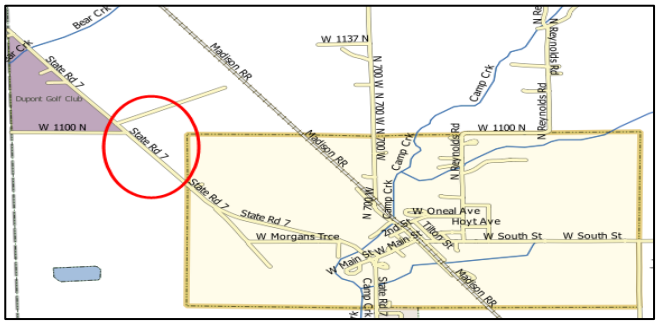
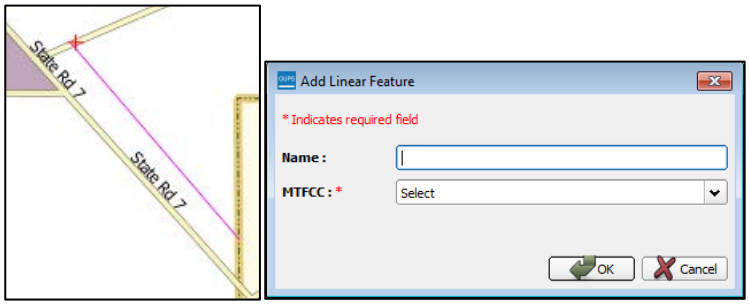
Step	Action and *Result*
Step 6	On the **Modify Area Feature** toolbar, click on the **Add** button (to add area to the entity) or on the **Remove** button (to remove area from the entity).  The **Modify Area Feature Choose change type** pop-up box opens and asks to choose the change type. 
Step 7	Since this example is not making a legal boundary change, but rather a boundary correction, click the radio button next to '**Boundary Correction**'. Then click OK. *The added faces turn green on the map (color may vary) and are added to the legal entity boundary.* 
	Removing area from a boundary is conducted following the same steps, the only difference being that the **Remove** button on the **Modify Area Feature** toolbar is clicked. Once the faces are selected and the **Remove** button clicked, the same **Modify Area Feature Choose change type** pop-up box displays. Select '**Boundary Correction**' and the faces will turn green.

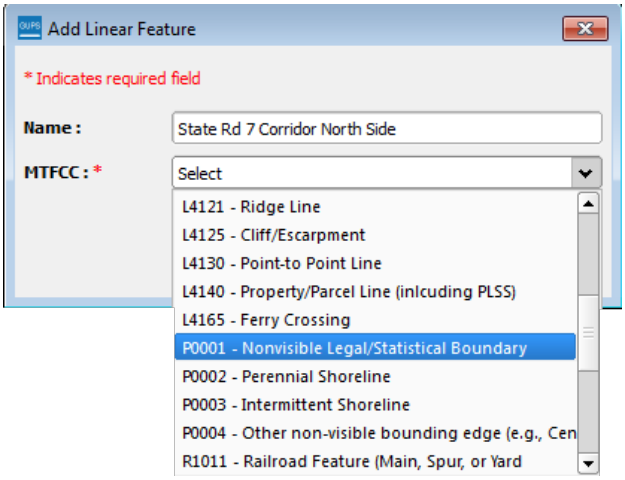
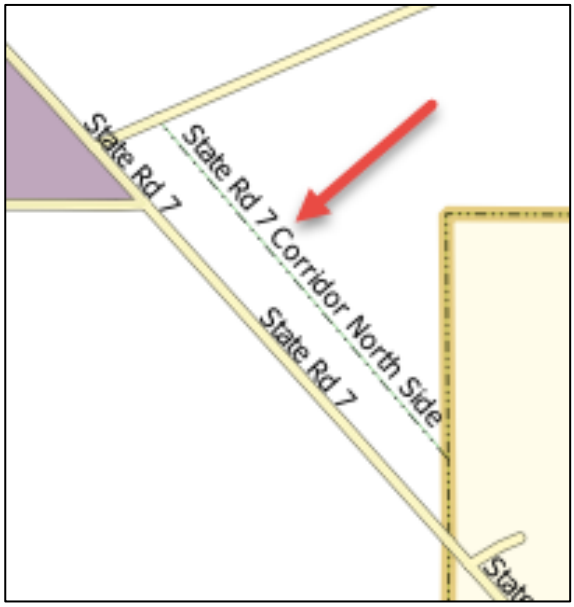
6.1.7 Adding a Geographic Corridor

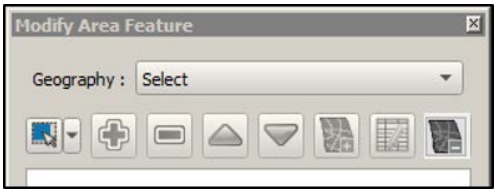
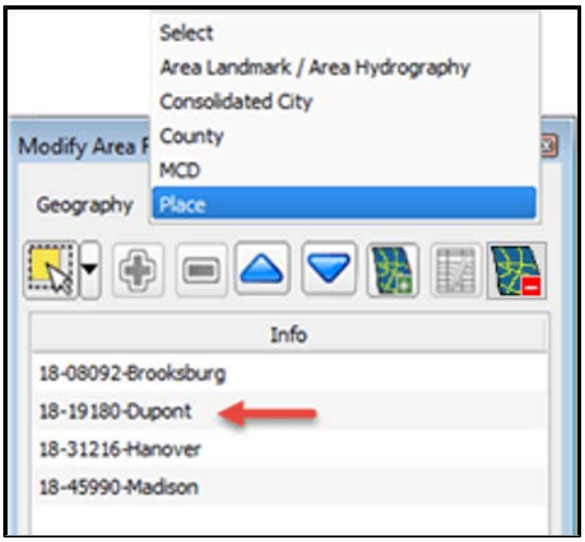
The steps to add a geographic corridor are shown in the table below. The fictitious example provided uses in Dupont, Indiana. The steps in this table show how the city would mark the annexation of a geographic corridor along State Road 7, which in the example leads to a newly built golf course that is part of the town.

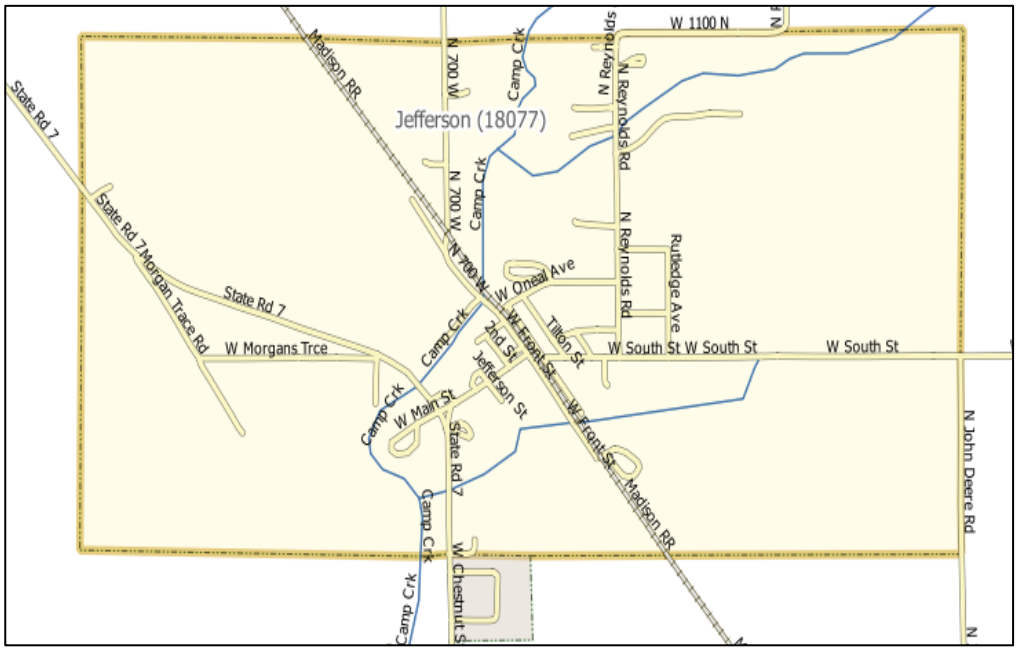
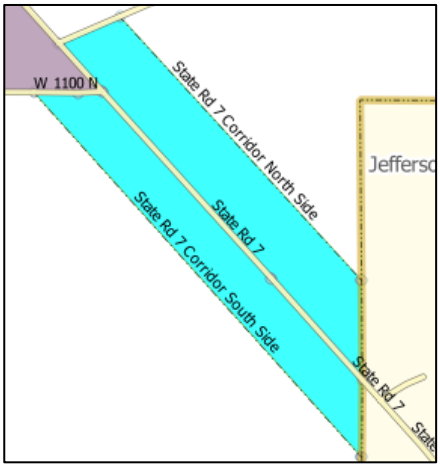
Table 32: Adding a Geographic Corridor

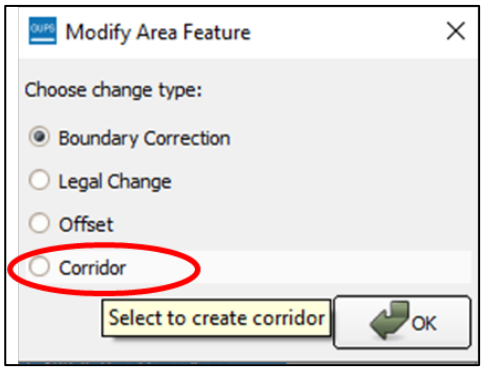
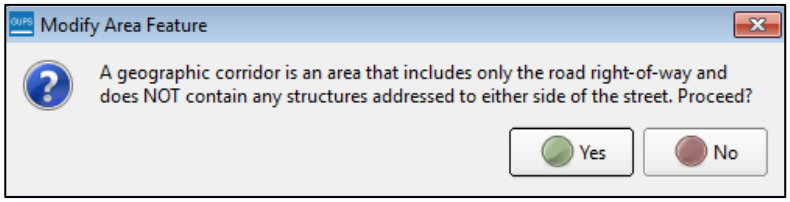
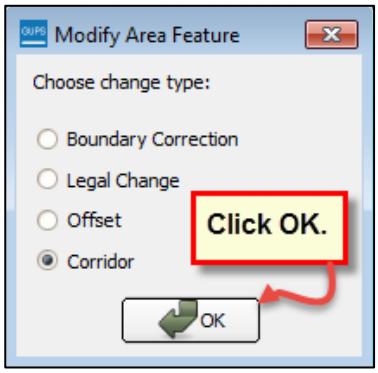
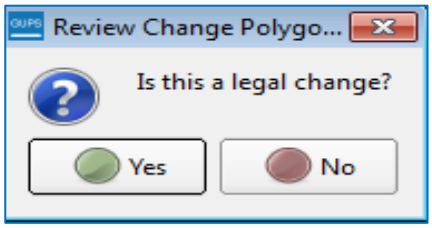
Step	Action and *Result*
	Creating a geographic corridor requires two actions: first split the faces on either side of the road (if edges do not already exist), then add the area.

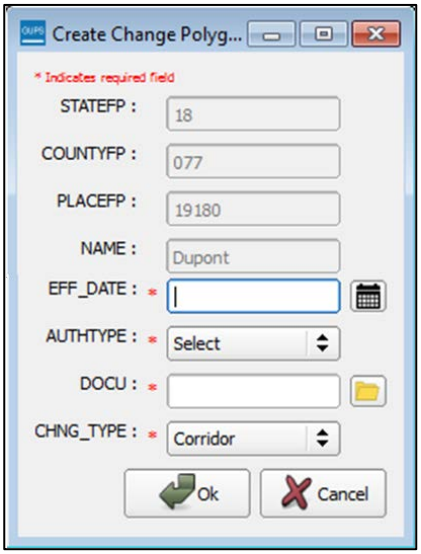
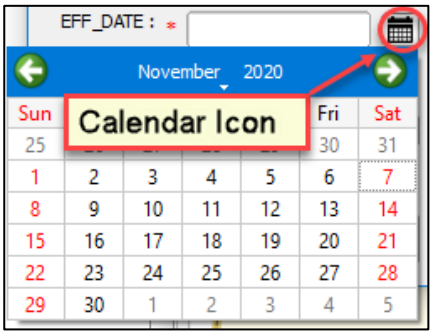
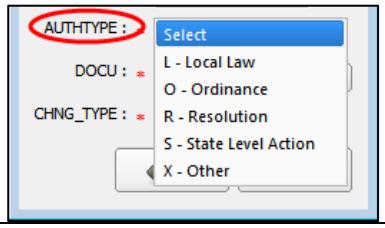
Step	Action and *Result*
Step 1	Load the data for the county (in this example, Jefferson County, Indiana). 
Step 2	Pan to the location of the geographic corridor (here State Road 7). 
Step 3	Click the Add Linear Feature button on the BAS toolbar.
Step 4	Left-click on the map at the beginning point of the first line and drag the cursor to create the line marking the first half of the corridor. Left-click at the end of the line, then right-click to tell GUPS one has finished drawing. *The line appears on the map, and the* ***Add Linear Feature*** *dialog box opens.* 

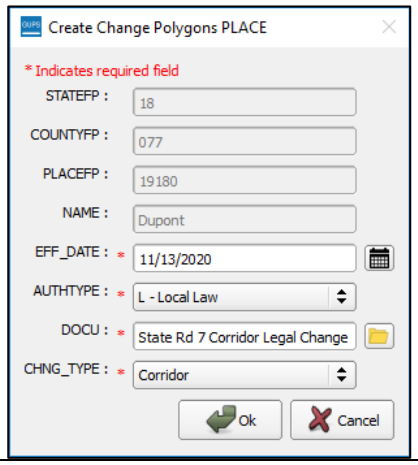
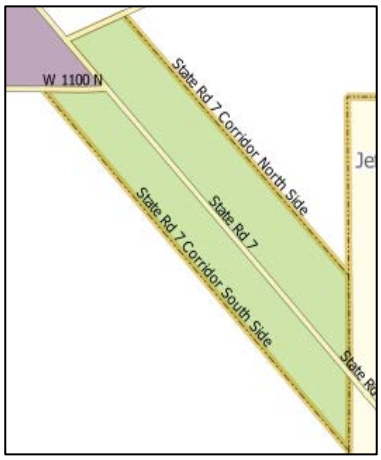
Step	Action and *Result*
Step 5	Type a name if desired in the **Name** field, then select the appropriate MTFCC code in the **MTFCC** drop-down list. In this example, 'P0001 – Nonvisible Legal/Statistical Boundary' is selected.  The **MTFCC** field populates with the selection.
Step 6	Click the **OK** button. The line turns from purple to dark green (colors may vary) and the name, if provided, is added to the map. 

Step	Action and *Result*
Step 7	Add a line on the opposite side of the road using the same instructions provided in Steps 4 through 6. (**Note**: There is no need to click the **Add Linear Feature** button again; it is still active.) *When finished, the map should display the two corridor faces created, as shown below.*
Step 8	To add the area: click the **Modify Area Feature** button on the **BAS toolbar**. The **Modify Area Feature** dialog box opens. 
Step 9	In the **Geography** field drop-down menu, select the entity type (in this case, 'Place'). A list of all incorporated places in Jefferson County (including Dupont) populates the **Info** list at the bottom of the dialog box. 

Step	Action and *Result*
Step 10	Click on the row for Dupont in the list. *The map zooms to the Town of Dupont.* 
Step 11	Pan to the location of the new corridor drawn on the map. Then click the **Select Feature(s)** button on the small toolbar near the top of the **Modify Area Feature** dialog box.
Step 12	Left click inside one of the corridor faces, then drag the cursor across the road. Once the cursor is released, the faces on either side of the road will have been selected and turn cyan. 

Step	Action and *Result*
Step 13	To record the corridor, click the **Add** button on the **Modify Area Feature** dialog box toolbar. The Modify Area Feature Choose change type dialog box opens. 
Step 14	Click the radio button next to **Corridor**. A box opens giving an explanation of what a geographic corridor is and asking if the user wants to proceed. Click **Yes**. The user is returned to the **Modify Area Feature Choose change type** box. 
Step 15	Click the **OK** button at the bottom of the box. 
Step 16	The **Review Change Polygons** pop-up box opens and asks whether this is a legal change. 

Step	Action and *Result*
Step 17	If the geographic corridor is not part of a legal change, click **No**. *The change is automatically added as a boundary correction.* If the geographic corridor is a legal change, click **Yes**. *The **Create Change Polygons** dialog box opens.* 
Step 18	Click on the calendar icon next to the **EFF_DATE** field to select an effective date for the change. 
Step 19	Use the **AUTHTYPE** drop-down menu to select an authority type. 

Step	Action and *Result*
Step 20	In the **DOCU** field, either type in the documentation number, or upload legal documentation of the change. To upload a document, click on the folder icon, navigate to the directory where the document is stored, and double-click the file. *The file uploads to GUPS and the name of the file appears in the **DOCU** field.* 
Step 21	In the **CHNG_TYPE** field, select '**Corridor**' in the drop-down list. Corridor fills the **CHNG_TYPE** field as shown in the screenshot above.
Step 22	Click **OK**. The faces marking the corridor turn green on the map (color may vary). The corridor has been added. 

6.1.8 Adding a Geographic Offset

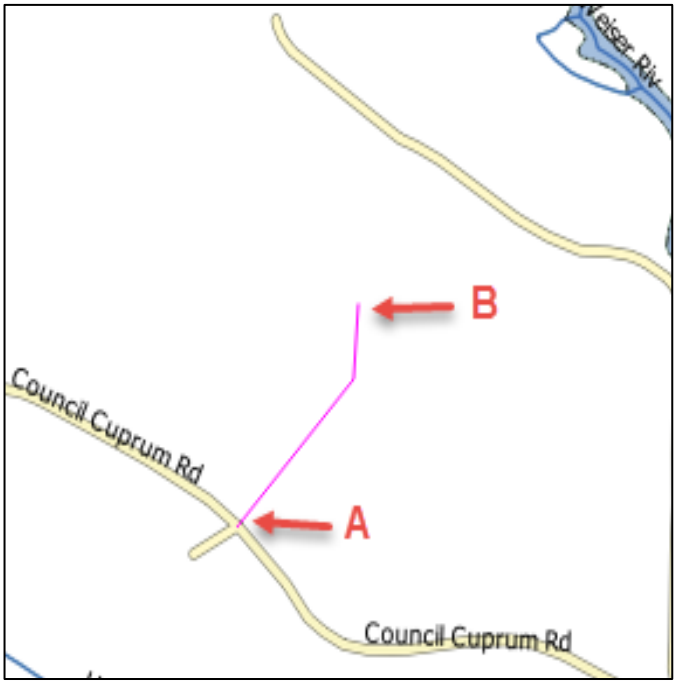
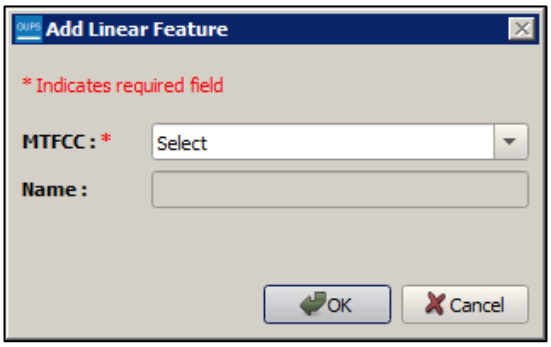
To create a geographic offset, follow the same steps as for a corridor (**Table 32**). The only difference is that geographic offsets are only on one side of the road.

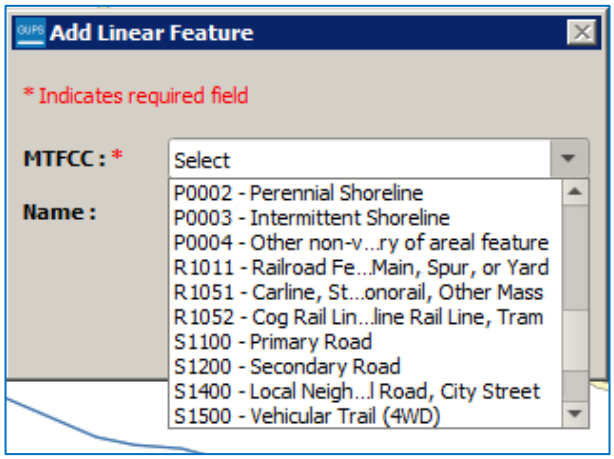
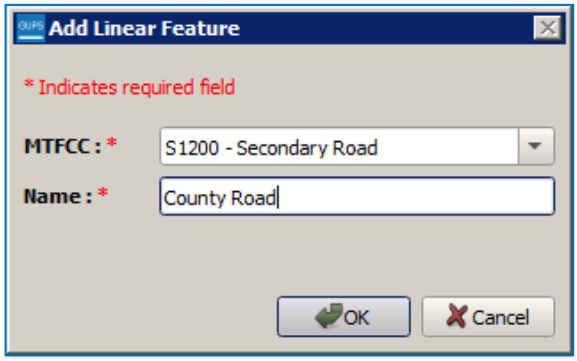
6.2 How to Update Linear Features

6.2.1 Adding a Linear Feature

Follow the steps in **Table 33** to add a linear feature.

Table 33: Adding a Linear Feature

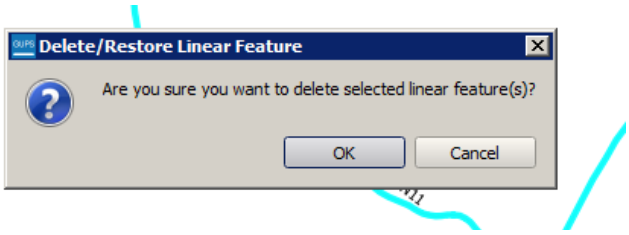
Step	Action and Result
Step 1	Open in **Map View** the county that contains the entity where a linear feature will be added. Be sure the edges layer is checked in the **Layers Panel**. Then zoom to the location on the map the feature will be added.
Step 2	Click on the **Add Linear Feature** button on the **BAS toolbar**.
Step 3	Left-click the mouse at the starting point of the line (A) and continue to left-click the mouse at each vertex (shape) point of the line. When the new line is completed, right-click the mouse (B). The right-click tells GUPS to finish drawing.  The **Add Linear Feature** dialog box opens. 

Step	Action and Result
Step 4	In the **MTFCC** field drop-down menu, choose the appropriate code for the feature. 
Step 5	Type the name of the new linear feature in the **Name** field if the feature is named; otherwise, leave blank. Be sure when entering the feature name either to spell out the feature type (e.g., street, road, avenue), or to select an approved abbreviation from the list provided in **Appendix D**. 
Step 6	Click the **OK** button at the bottom of the **Add Linear Feature** dialog box. *The added linear feature and the name assigned appear on the map.*
	Adding a linear feature coincident with a boundary – GUPS will not allow one linear feature to be placed over another. For example, if attempting to add a road overlaying a legal boundary line, a pop-up box will warn 'Added Line Overlays an Existing line'. If adding a linear feature coincident with a boundary, follow the instructions for updating linear feature attributes instead (for instructions refer to **Table 36**). Once a street is added on a boundary edge, update the MTFCC in the **Update Attributes** pop-up to one of the "S" class feature codes (e.g., S1400) and add a name in the **FULLNAME** field.

6.2.2 Deleting a Linear Feature

To delete a linear feature, follow the steps in **Table 34.**

Table 34: Deleting a Linear Feature

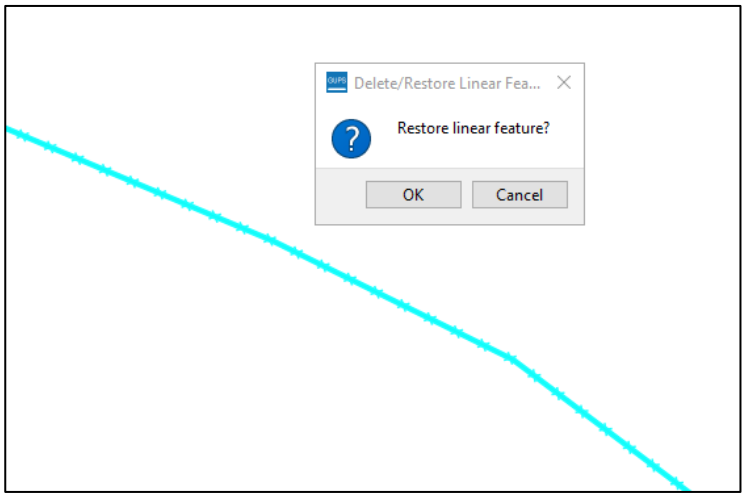
Step	Action and *Result*
Step 1	Open in **Map View** the county containing the entity where the linear feature will be deleted. Be sure that the edges layer is checked in the **Layers Panel**. Then zoom to the location on the map where the feature will be deleted.
Step 2	Click on the **Delete/Restore Linear** Feature button on the **BAS toolbar**.
Step 3	Left click the linear feature to be deleted. In the example below, an unnamed road was clicked. The clicked linear feature turns cyan and the **Delete/Restore Linear Feature** pop-up box appears, asking for confirmation to delete the feature. 
Step 4	Click **OK**. The line is deleted in the attribute table. The cyan color is removed from the line and the line now appears with x's through it.
	When a linear feature is deleted, it is not actually removed from the Census Bureau shapefile. GUPS assigns a Delete Line flag to the feature in the attribute table, and the feature is later processed for deletion when the Census Bureau receives the BAS file. **Note**: If there are multiple linear features to delete, click the **Delete/Restore Linear Feature** button on the toolbar once, then press **CTRL** and click each of the features to delete. GUPS will delete all the linear features selected. The cursor can also be dragged over multiple linear features to select them.

6.2.3 Restoring a Deleted Linear Feature

To restore a deleted linear feature, follow the steps in **Table 35**.

Table 35: Restoring a Deleted Linear Feature

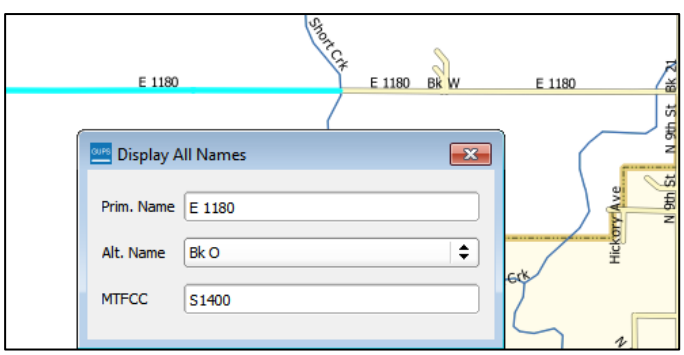
Step	Action and Result
Step 1	Open in **Map View** the county that contains the deleted linear feature. Be sure the edges layer is checked in the **Layers Panel**. Then zoom to the location on the map where the deleted feature is located.

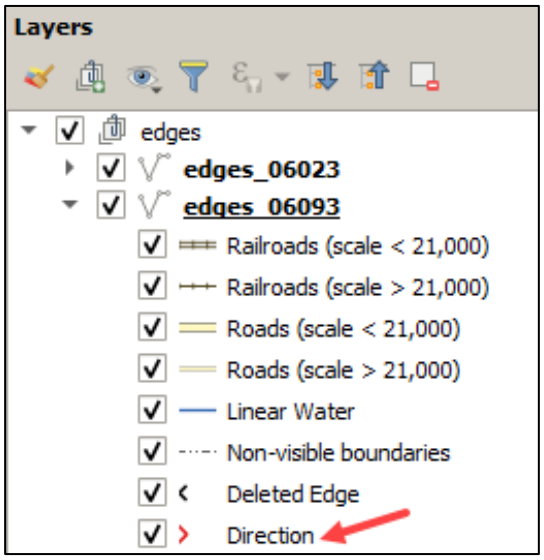
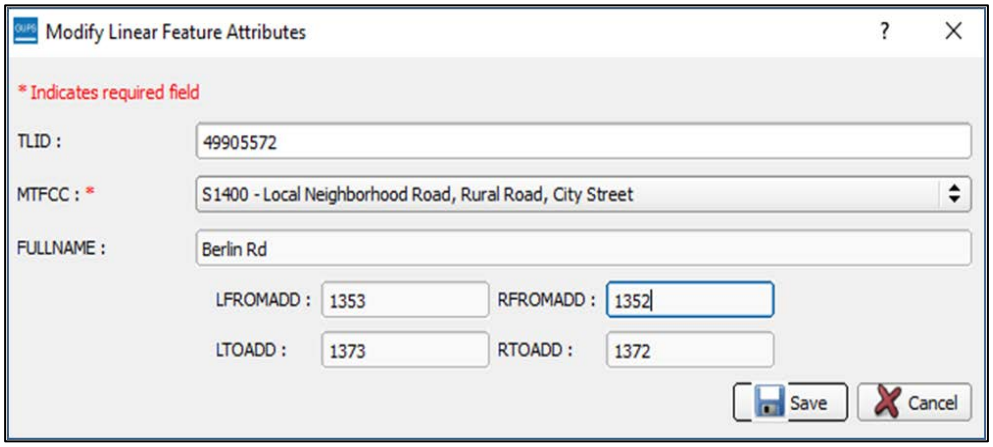
Step	Action and Result
Step 2	Select the Delete/Restore Linear Feature Tool. Left click on the deleted feature. *The deleted feature turns cyan and the **Delete Linear Feature** dialog box opens. The box asks to confirm restoring the linear feature.* 
Step 3	To restore the linear feature, click the **OK** button. *The **Delete Line flag** is removed from the attribute table and the line is restored.*

6.2.4 Changing the Attributes of a Linear Feature

Follow the steps in **Table 36** to change the attributes (e.g., the name, MTFCC, or address range) of a linear feature.

Table 36: Changing the Attributes of a Linear Feature

Step	Action and *Result*
Step 1	If planning to change the name of a linear feature, check first to see if it has an alternate name. To do this, click the **Display All Names** button on the **BAS toolbar**. Then click on the linear feature on the map. *The selected feature turns cyan and the **Display All Names** dialog box opens, showing the primary name in the **Prim. Name** field and the alternate name, if one is present, in the **Alt. Name** field.*  To see any additional alternate names, click the drop-down arrow to the right of the **Alt. Name** field. If no alternate name exists, 'NULL' appears in the **Alt. name** field.

Step	Action and *Result*
Step 2	If providing an address range for a linear feature, check the checkbox next to > **Direction** in the **Edges** field in the **Layers Panel**. *This activates the arrows that indicate the FROM and TO nodes for line segments.* 
Step 3	Click on the Modify Linear Feature Attributes button on the BAS toolbar.
Step 4	Click the linear feature on the map with attributes to be edited. *The **Modify Linear Feature Attributes** dialog box opens with the TIGER Line Feature ID (TLID) of the feature selected. The **FULLNAME** field populates if the feature is named. If the feature is not named, the field is blank. The **MTFCC, LTOADD, RTOADD, LFROMADD,** and **RFROMADD** fields show the assigned values for each.* 
Step 5	Update the **FULLNAME** field. If the field is blank, type in the new name. If the field is already populated, highlight the existing name and hit the **Delete** key on the keyboard. It is also possible to backspace over the name to clear the field. Then type in the new name.
Step 6	If correcting the **MTFCC**, click on the down arrow to the right of the field to open the drop-down menu and select the correct MTFCC from the menu.

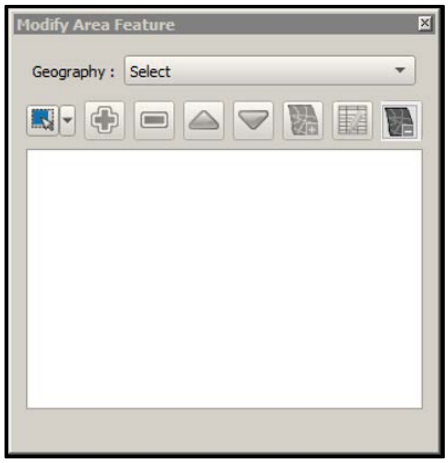
Step	Action and *Result*
Step 7	Change the address range for the linear feature, if necessary. Type in potential address ranges in the **LTOADD** (left to address); **RTOADD** (right to address); **LFROMADD** (left from address); **RFROMADD** (right from address) fields based on the directional arrows. The directional arrows show the origin node (FROM) and the end node (TO).
Step 8	Click **Save** button at the bottom of the **Modify Linear Feature Attributes** dialog box.
	The address ranges for all features are blank in the geographic partnership shapefiles because the ranges are stored in tables separate from the shapefiles. Address ranges can be provided in these fields but be aware that the Census Bureau may already have address ranges. It is important to note which node is the FROM node and which is the TO node (based on the red directional arrows) so that the address ranges are associated with the correct side of the street and the correct census block. **Note:** Provide potential address ranges for block sides, such as 0-98, 100-198, etc., for even parity and 1-99, 101-199, etc., for odd parity address ranges. Do not provide actual address ranges.

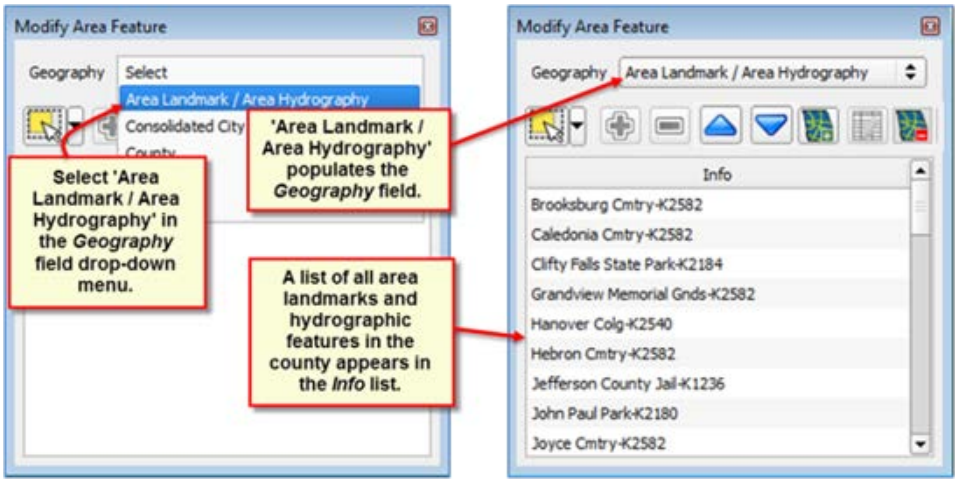
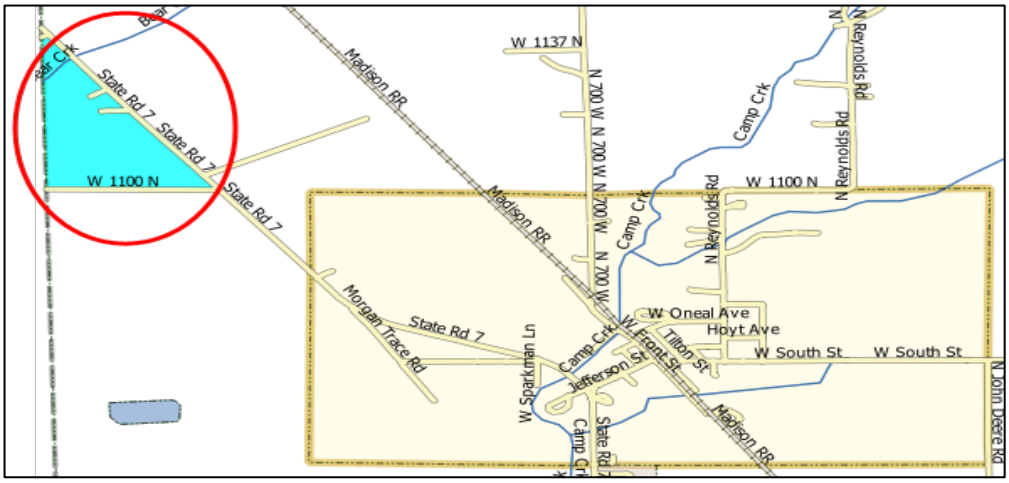
6.3 How to Update Area Landmarks and Hydrographic Areas

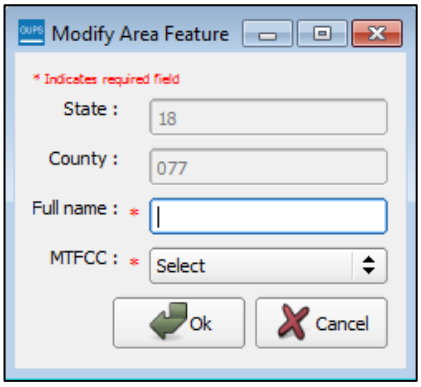
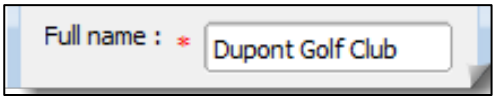
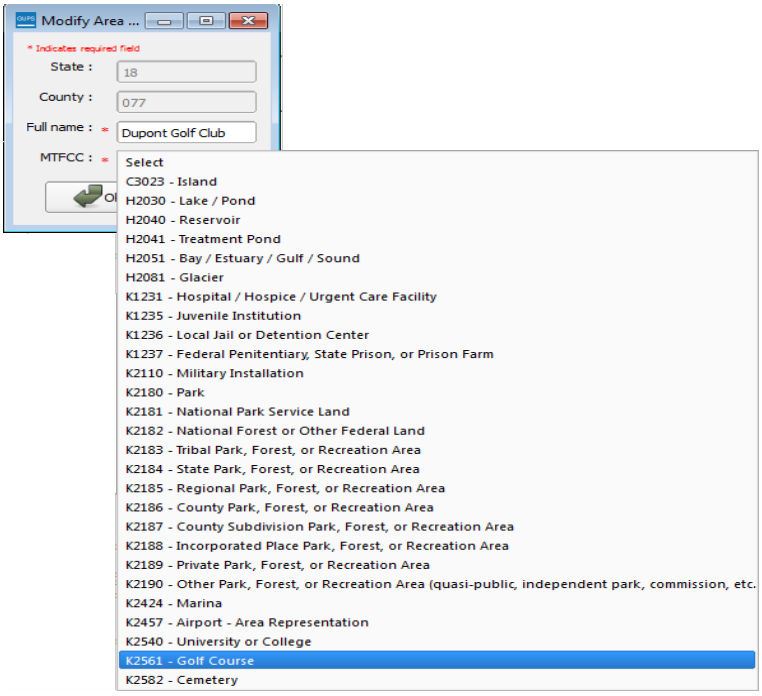
6.3.1 Adding a New Area Landmark/Hydrographic Area

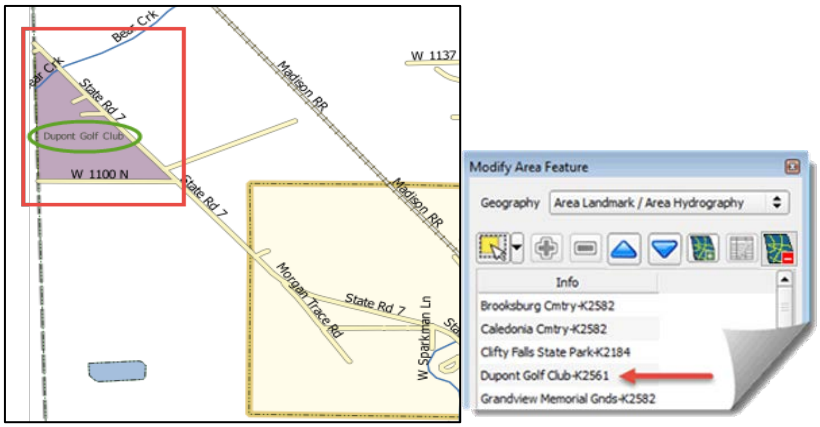
To create a new landmark or hydrographic area, follow the steps in **Table 37**. In this fictitious example, a golf course is added in Jefferson County, Indiana, located northwest of Dupont Town.

Table 37: Creating a New Area Landmark/Hydrographic Area

Step	Action and *Result*
Step 1	Open in **Map View** the county where the new area landmark or hydrographic area will be added. Be sure the 'arealm' layer is checked in the **Layers Panel**. Then zoom to the location on the map where the landmark or hydrographic will be added.
Step 2	Click the Modify Area Feature button on the BAS toolbar. *The **Modify Area Feature** dialog box opens.* 

Step	Action and *Result*
Step 3	In the **Geography** field drop-down menu, select ***'Area Landmark/Area Hydrography'***. *'Area Landmark/Area Hydrography' populates the* ***Geography*** *field and a list of area landmarks and hydrographic areas in the county appears in the* ***Info*** *list.* 
Step 4	Click on the yellow **Select Feature(s)** button on the **Modify Area Feature** toolbar.
Step 5	Then click on the first face on the map to select it. To select more than one face, depress the **CTRL** key, and while holding it down, click on the additional faces. In this example, two faces are selected, one on either side of Bear Creek. *The selected faces turn cyan.* 

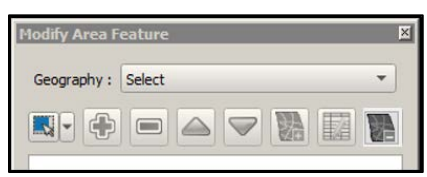
Step	Action and *Result*
Step 6	Click on the **Add Entity** button on the **Modify Area Feature** toolbar. The Modify Area Feature box opens. 
Step 7	In the **Modify Area Feature** box, type in the name of the new area landmark in the **Full name** field.  Then select the appropriate code in the **MTFCC** field drop-down list, as shown below. 

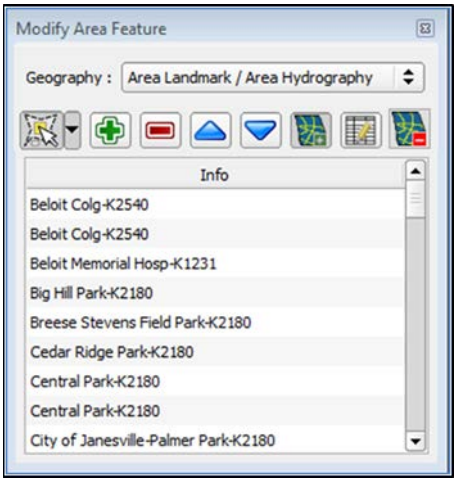
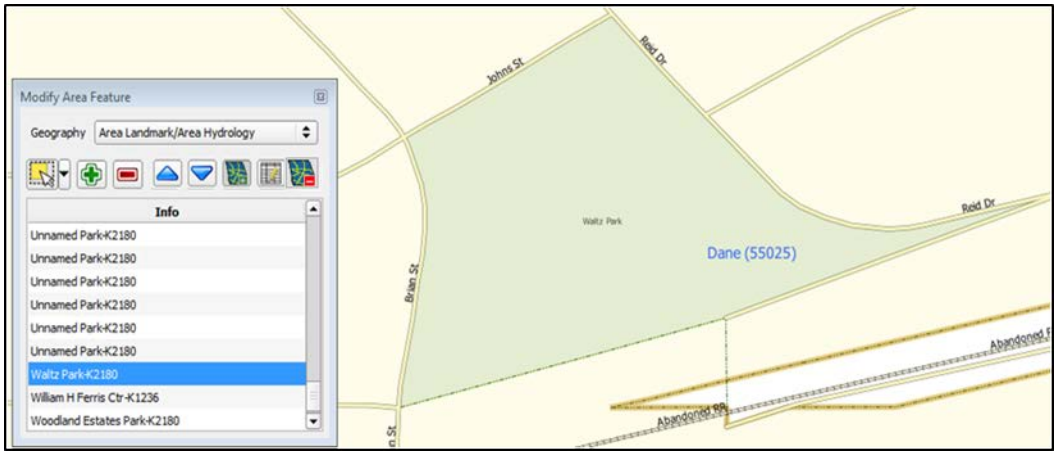
Step	Action and *Result*
Step 8	Click **OK**. The faces selected for the new entity now display in purple (color may vary). The name of the added landmark also appears within the change polygon on the map (see green circle), and the name of the new entity appears in the **Info** list. 
	Because all geographic areas consist of faces, the user may need to "split" a face to accurately reflect an entity's boundary. To split a face, digitize a new line that represents the boundary's location (click on **Table** 33 for instructions to add a linear feature) and assign it the appropriate MTFCC. This splits the original face into two faces. One can now select the face to add to the new entity.

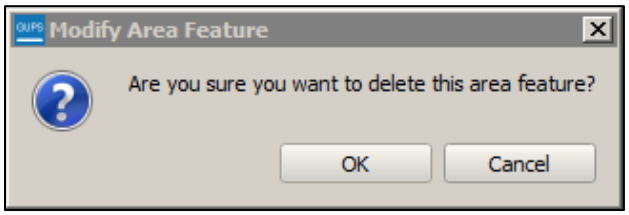
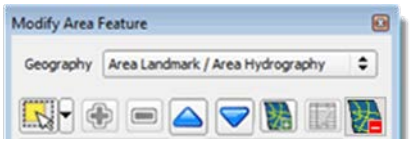
6.3.2 Deleting an Area Landmark/Hydrographic Area

To delete an area landmark or hydrographic area, follow the steps in **Table 38**.

Table 38: Deleting an Area Landmark/Hydrographic Area

Step	Action and Result
Step 1	Open in **Map View** the county in which one wants to delete an area landmark or hydrographic area. Be sure the '**arealm**' layer is checked in the **Layers Panel**.
Step 2	Click the Modify Area Feature button on the BAS toolbar. The **Modify Area Feature** dialog box opens. 

Step	Action and Result
Step 3	In the **Geography** field drop-down menu, select '**Area Landmark/Area Hydrography**'. 'Area Landmark/Area Hydrography' populates the **Geography** field and a list of area landmarks and hydrographic areas in the county appears in the **Info** list. 
Hint	To view all the area landmarks and hydrographic areas in the **Info** list, use the scroll bar located to the far right-hand side of the **Modify Area Feature** dialog box. To move up and down within the list, use the blue navigation arrows located on the small toolbar near the top of the dialog box.
Step 4	In the **Info** list, click on the area landmark/hydrographic area one wants to delete. The selected entry is highlighted in the **Info** list and the map zooms directly to the selected feature. 

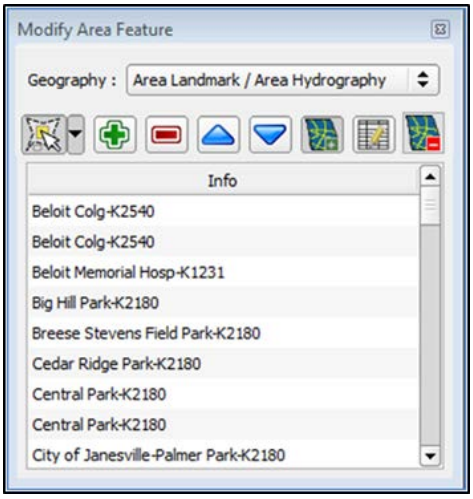
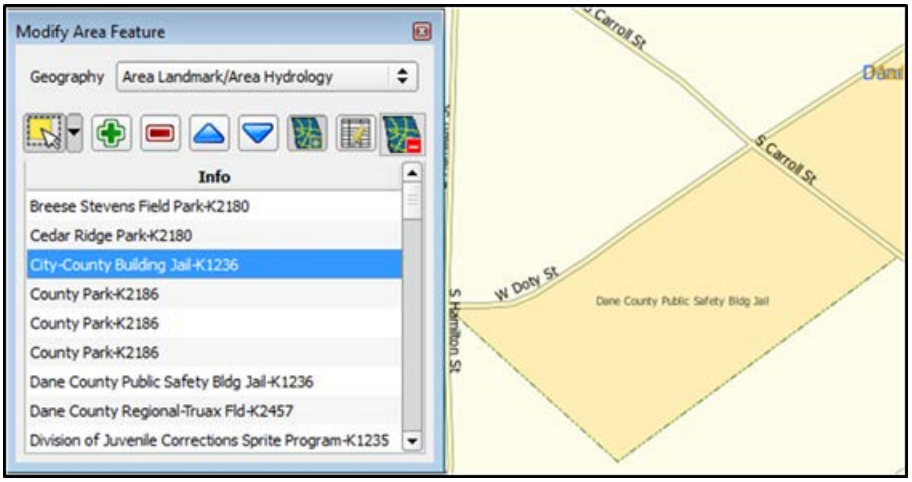
Step	Action and Result
Step 5	Click the **Delete Area Feature** button on the **Modify Area Feature** dialog toolbar. A pop-up box opens and asks to confirm the deletion of the feature. 
Step 6	To delete the area landmark/area hydrography, click **OK**. The linear feature turns gray (color may vary) on the map, and its name disappears from the **Info** list.
Step 7	Not ready to delete? Click **Cancel** to be returned to the **Modify Area Feature** dialog. 
Step 8	Once ready to delete the area landmark/area hydrography, click on the feature name in the **Info** list. *The buttons will reactivate* and click the **Delete Area Feature** button.

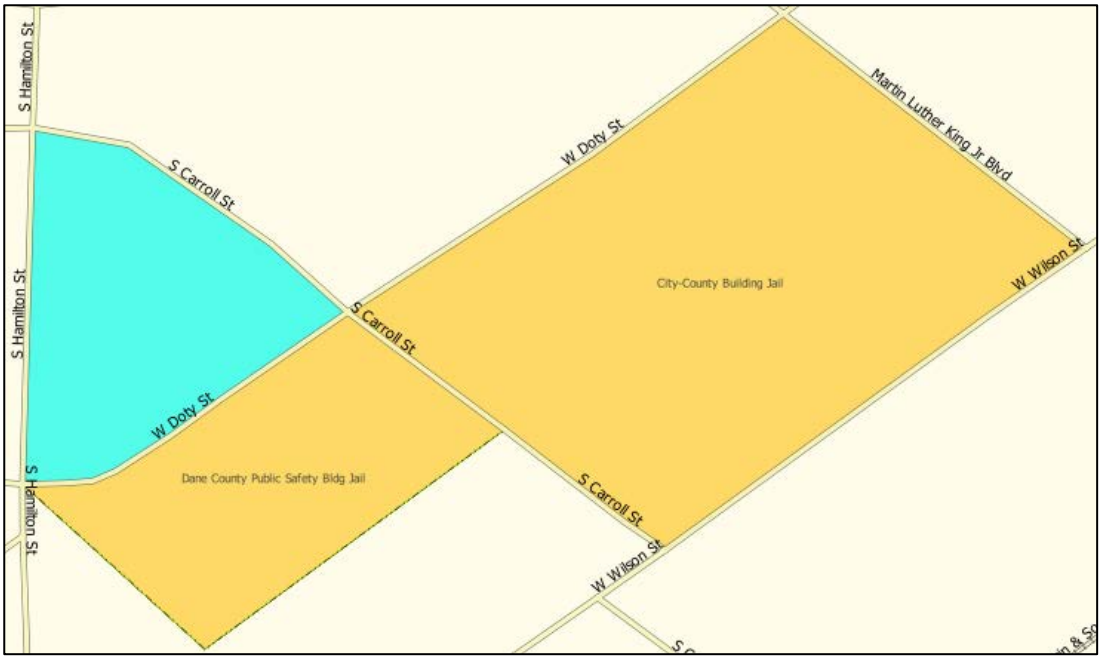
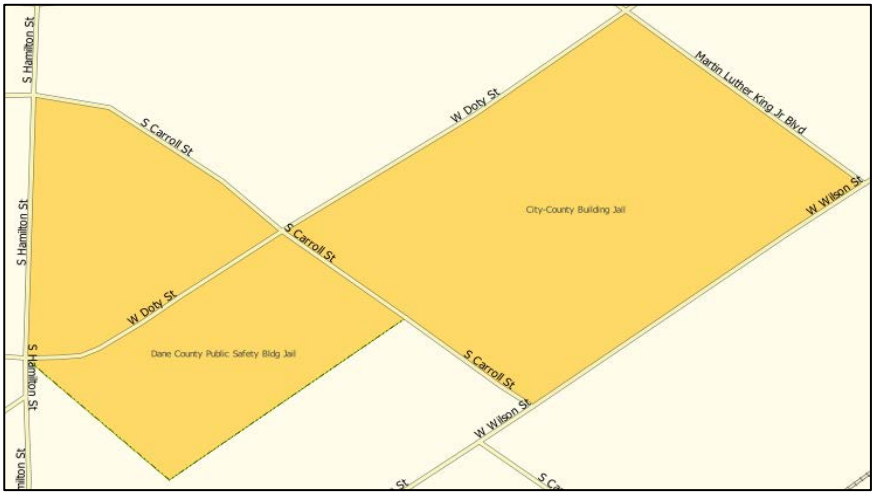
6.3.3 Adding Area to an Area Landmark or Hydrographic Area

Follow the steps in **Table 39** to add area to an area landmark or hydrographic area.

Table 39: Adding Area to an Area Landmark/Hydrographic Area

Step	Action and *Result*
Step 1	Open in **Map View** the county that contains the area landmark or hydrographic area to which area will be added. Be sure the '**arealm** layer is checked in the **Layers Panel**.
Step 2	Click the Modify Area Feature button on the BAS toolbar. The **Modify Area Feature** dialog box opens.

Step	Action and *Result*
Step 3	Click the down arrow next to the **Geography** field and select '**Area Landmark/Area Hydrography**' in the drop-down menu. The selection populates the **Geography** field and a list of area landmarks/hydrographic areas in the county appears in the **Info** list. 
Step 4	Click the row in the list for the area landmark/hydrographic area to which area will be added. *The selected entity is highlighted in the **Info** list and the map zooms to its location.* 

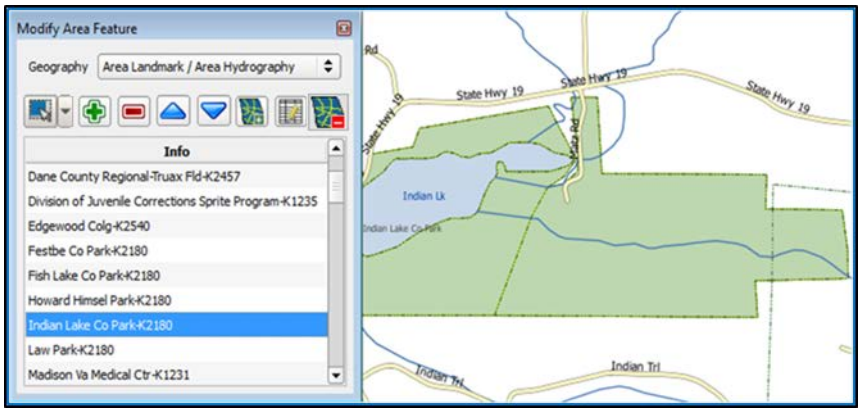
Step	Action and *Result*
Step 5	To select the face(s) to add to the area landmark, click the **Select Feature** button on the **Modify Area Feature** toolbar. Then click the face to be added to the area feature. *The added face turns cyan.* (**Note**: To select more than one face, depress the **CTRL** key, and while holding it down, click the other faces.) 
Step 6	To add the face(s) selected, click the **Add Area** button on the **Modify Area Feature** dialog box toolbar. The selected face is added to the area landmark and turns the same color as the other face(s) that make up the area landmark. The map also now shows the full extent of the area landmark. 

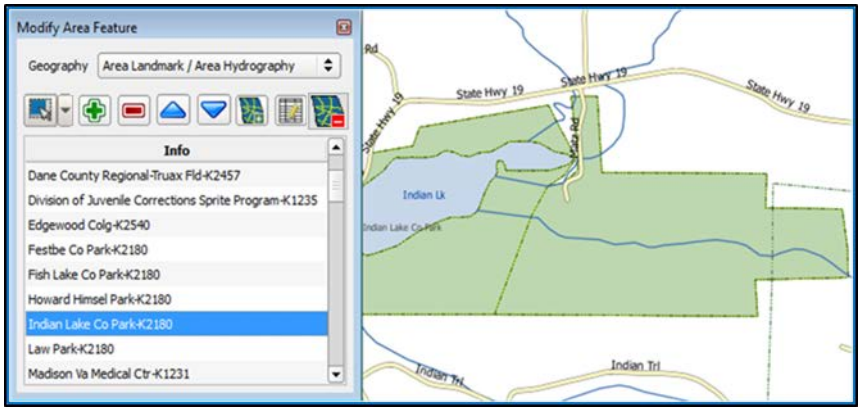
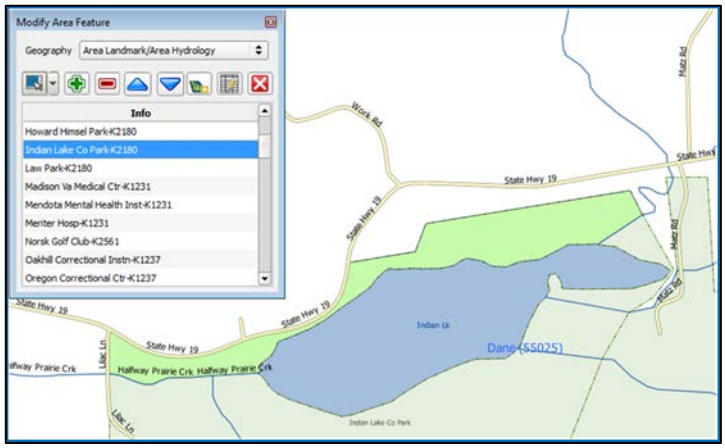
Step	Action and *Result*
	Because all geographic areas consist of faces, the user may need to "split" a face to accurately reflect an entity's boundary. To split a face, digitize a new line that represents the boundary's location (see **Table** 33 for instructions to add a linear feature) and assign it the appropriate MTFCC. This splits the original face into two faces. One can now select the face to add to the new entity.

6.3.4 Removing Area from an Area Landmark/Hydrographic Area

Follow the steps in **Table 40** to remove area from an area landmark or hydrographic area.

Table 40: Removing Area from an Area Landmark/Hydrographic Area

Step	Action and *Result*
Step 1	Open in **Map View** the county that contains the area landmark or hydrographic area from which area will be removed. Be sure the '**arealm**' layer is checked in the **Layers Panel**.
Step 2	Click the Modify Area Feature button on the BAS toolbar. The **Modify Area Feature** dialog box opens.
Step 3	In the **Geography** field drop-down menu, select '**Area Landmark/Area Hydrography**'. 'Area Landmark/Area Hydrography' populates the **Geography** field and a list of area landmarks and hydrographic areas in the county appears in the **Info** list. 

Step	Action and *Result*
Step 4	Select the area landmark/hydrographic area from which area will be removed. *The selected entity is highlighted in the **Info** list and the map zooms to its location*. In this example, Indian Lake County Park is chosen. 
Step 5	To select the face(s) to remove from the area landmark, click the **Select Feature** button on the **Modify Area Feature** dialog box toolbar. Then click on the first face to remove. To select additional faces, depress the **CTRL** key, and while holding it down, click the additional faces.
Step 6	To remove the face(s) selected, click the **Remove Area** button on the **Modify Area Feature** dialog box's internal toolbar. The selected face turns light green (color may vary) on the map and is removed from the area landmark or hydrographic area. 
	Because all geographic areas consist of faces, the user may need to "split" a face to accurately reflect an entity's boundary. To split a face, digitize a new line that represents the boundary's location (refer to

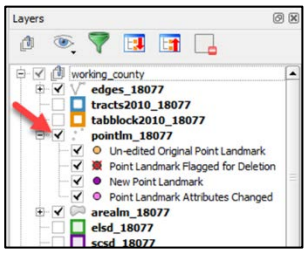
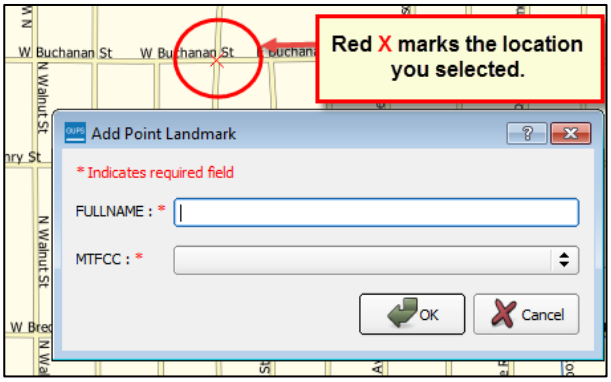
Step	Action and *Result*
	Table 33 for instructions to add a linear feature) and assign it the appropriate MTFCC. This splits the original face into two faces. One can now select the face to add to the new entity.

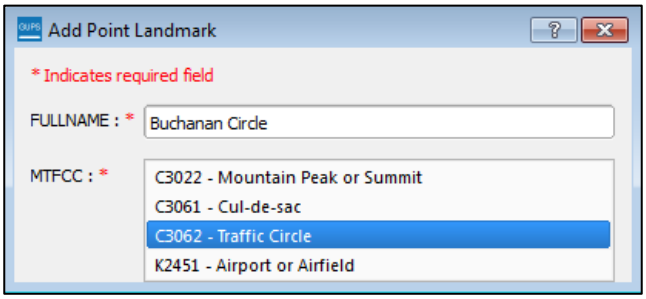
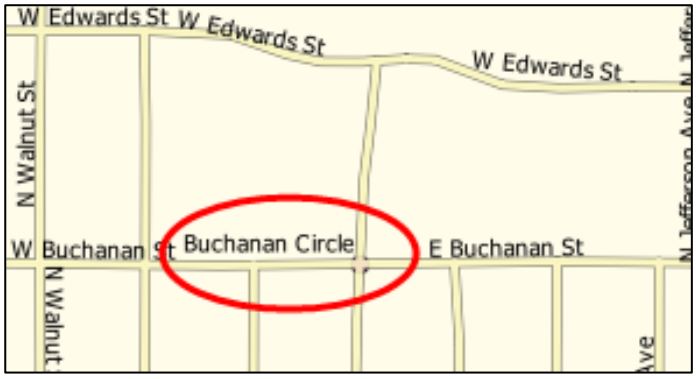
6.4 How to Update Point Landmarks

6.4.1 Adding a Point Landmark

To add a point landmark, follow the steps in **Table 41**.

Table 41: Adding a Point Landmark

Step	Action and *Result*
Step 1	Open the project in **Map View**. Be sure the '**Point Landmark**' layer is checked in the **Layers Panel** (**pointlm_18077** in this example). 
Step 2	Click the Add Point Landmark button on the BAS toolbar.
Step 3	Click on the map. 

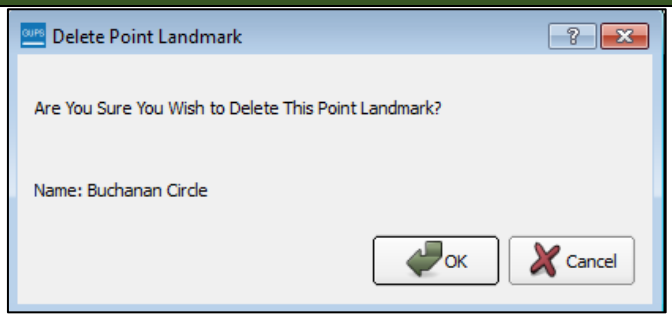
Step	Action and *Result*
Step 4	Type in the name for the new point landmark in the **FULLNAME**: field. Then click the down arrow next to the **MTFCC**: field to open the drop-down menu. 
Step 5	Select the MTFCC, then click the **OK** button at the bottom of the box. *The map updates to show the added point landmark.* In this case a traffic circle was added and named Buchanan Circle. 

6.4.2 Deleting a Point Landmark

To delete a point landmark, follow the steps in **Table 42**.

Table 42: Deleting a Point Landmark

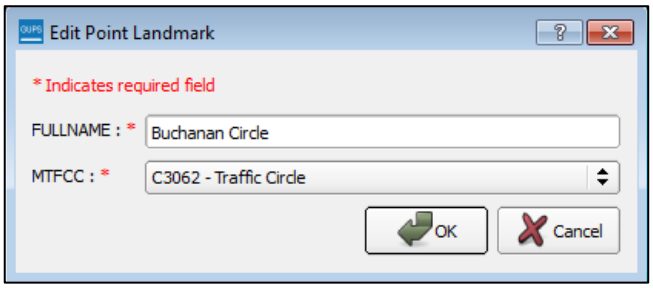
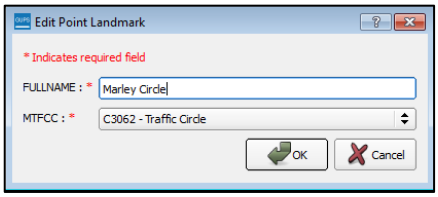
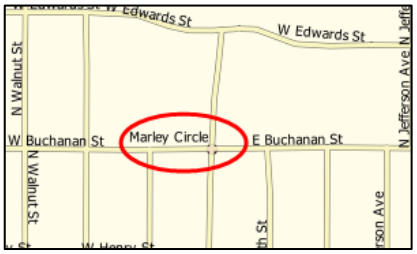
Step	Action and *Result*
Step 1	Zoom to the area on the map where a point landmark will be deleted. In this example, the traffic circle named Buchanan Circle will be deleted.
Step 2	Click the Delete Point Landmark button on the BAS toolbar.
Step 3	On the map, click on the point landmark to delete (Buchanan Circle). The **Delete Point Landmark** dialog box opens and asks to confirm the deletion of the point landmark.

Step	Action and *Result*
	
Step 4	Click **OK**. The point landmark shows a red x over it and marked in the attribute table.

6.4.3 Changing the Attributes of a Point Landmark

To change the attributes of a point landmark (e.g., its name, MTFCC), follow the steps in **Table 43**.

Table 43: Changing the Attributes of a Point Landmark

Step	Action and *Result*
Step 1	Zoom to the area on the map where the point landmark is located and click on the landmark. In this example, the name of Buchanan Traffic Circle is changed.
Step 2	Click on the Edit Point Landmark button on the BAS toolbar.
Step 3	On the map, click on Buchanan Circle. The **Edit Point Landmark** dialog box opens. 
Step 4	To change the name, backspace over the name appearing in the **FULLNAME**: field, then type in the new name. In this example, the name to Marley Circle is changed. 
Step 5	Click **OK**. The new name of the point landmark appears on the map. 

6.5 How to Use GUPS Review and Validation Tools

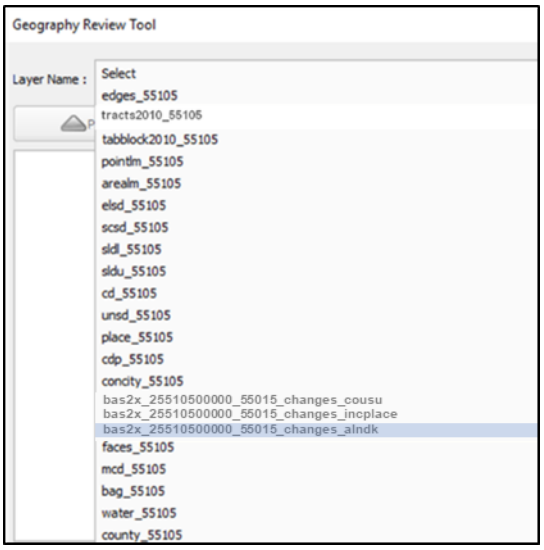
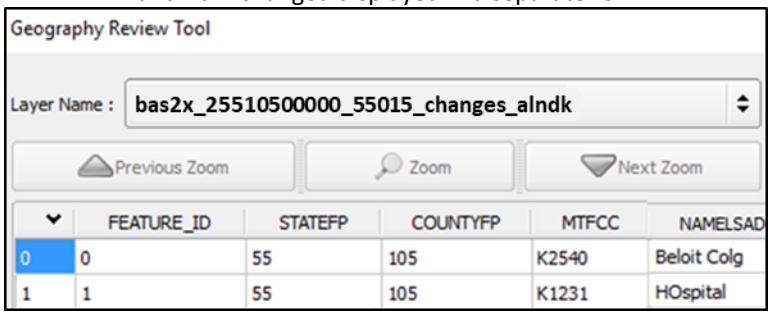
GUPS provides two tools—the **Geography Review** tool and the **Review Change Polygons** tool to help users review and validate the updates made in the system.

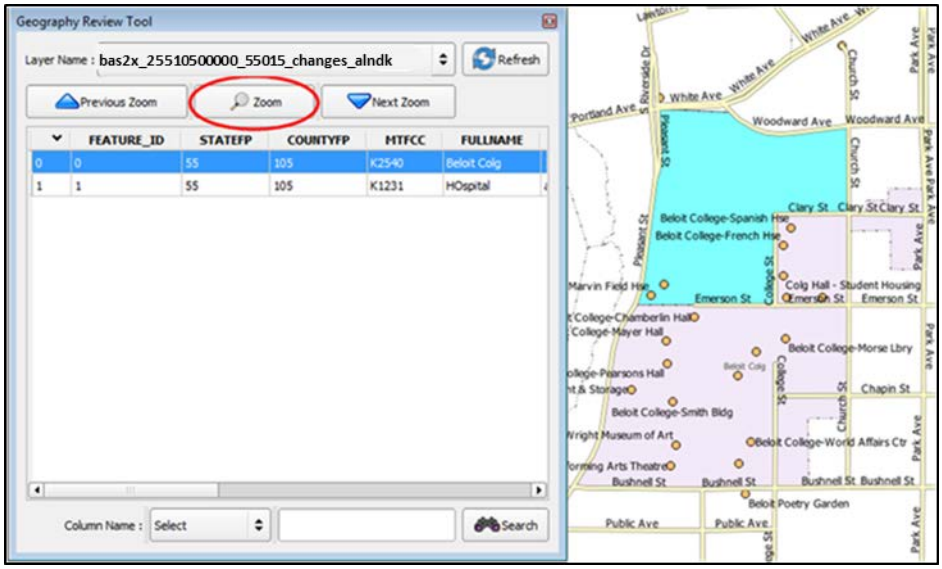
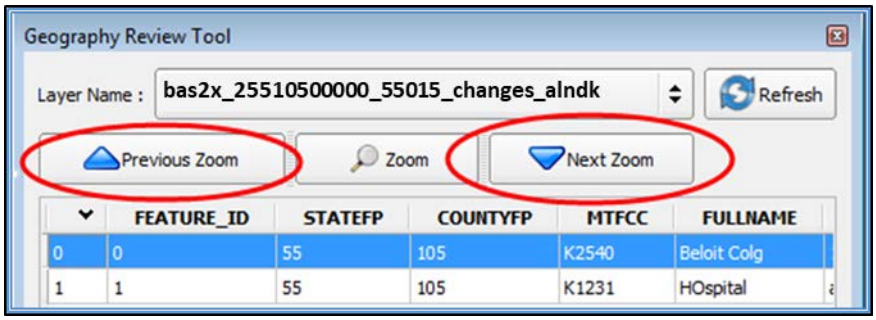
6.5.1 Geography Review Tool

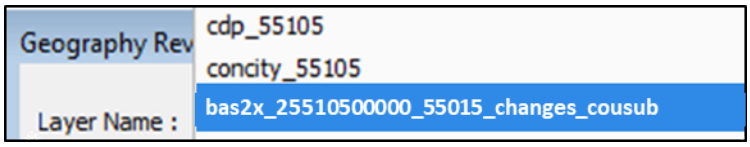
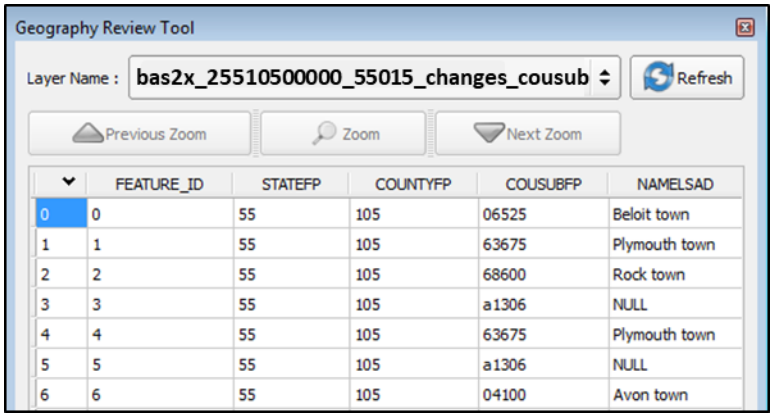
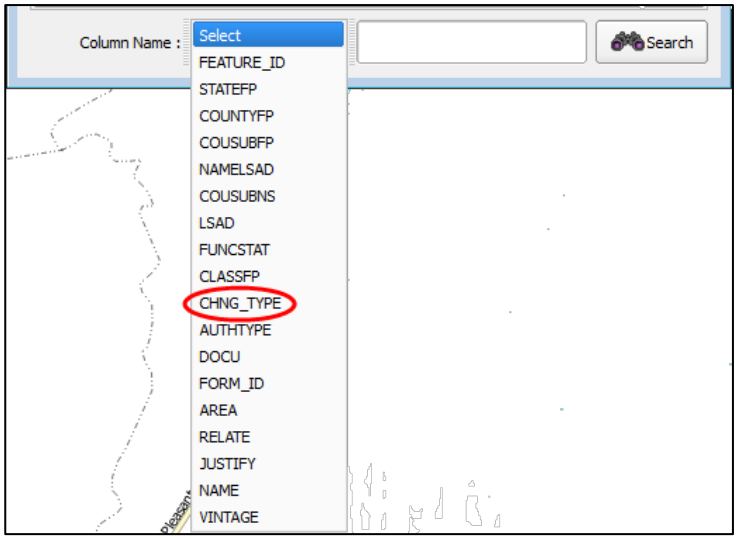
The **Geography Review** tool filters the map layers based on various fields in the attribute table. This tool can check the changes made to linear features, area landmarks, point landmarks, and legal boundaries anywhere within a county. It can also be used to view the attributes of governments, features, landmarks, and boundaries not changed. **Note***: Although this tool*

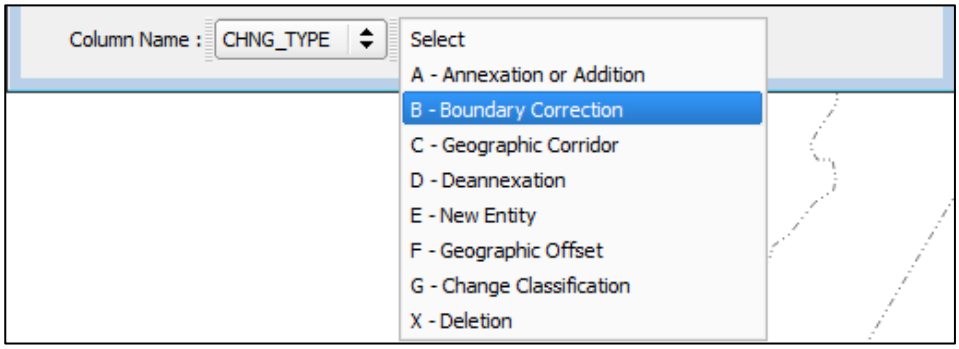
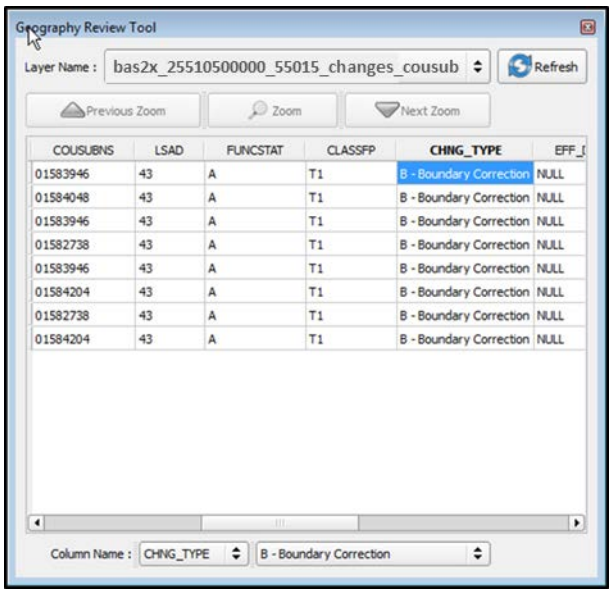
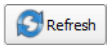
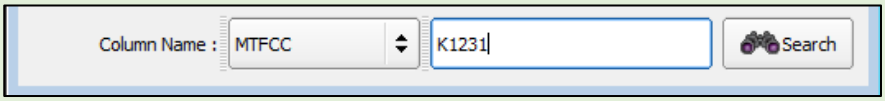
allows users to review changes, it cannot be used to edit them. Instructions for how to use the **Geography Review** tool information appear in **Table 44**.

Table 44: Using the Geography Review Tool

Step	Action and *Result*
Step 1	Click on the **Geography Review** button on the **BAS toolbar**. The **Geography Review** Tool dialog box opens.
Step 2	In the **Layer Name**: field drop-down menu, select the data layer to view:  In this example, the file “bas2x_25510500000_55105_changes_alndk” was selected. This is the transaction data output file for the area landmark layer (note the word “changes” in the file name to indicate the layer has been updated).
Step 3	Once a selection is made, the attribute table for the layer opens, with the attributes for each area landmark changed displayed in a separate row. 

Step	Action and *Result*
	If not all the columns in the attribute data table are visible, drag the edge of the dialog box outward to widen the view. Users may also move the dialog box to another location by clicking inside the box and dragging it.
Step 4	To see an area landmark on the map, click its row in the attribute table, then click the **Zoom** button (the row is highlighted and the map automatically zooms to the landmark selected, which is highlighted and shows changes made in cyan. 
Step 5	To view other area landmarks listed in the table rows, use the **Previous Zoom** and **Next Zoom** buttons. *The previous or next row highlights and the system zooms to the map for that row*. 
Step 6	Use the **Search** feature at the bottom of the dialog box to filter the table layers by specific attributes (e.g., full name, MTFCC, change type, etc.).

Step	Action and *Result*
Step 7	First, select the layer to view (in this example, the county subdivision layer is selected).  For each feature changed for a county subdivision, the attributes of the changed feature display in the table rows. Each column gives the name of the attribute.  FEATURE_ID STATEFP COUNTYFP COUSUBFP NAMELSAD 0 0 55 105 06525 Beloit town 1 1 55 105 63675 Plymouth town 2 2 55 105 68600 Rock town 3 3 55 105 a1306 NULL 4 4 55 105 63675 Plymouth town 5 5 55 105 a1306 NULL 6 6 55 105 04100 Avon town
Step 8	In the **Column Name** drop-down menu, select the attribute by which to filter.  In this example, change type (**CHNG_TYPE**) was selected.

Step	Action and *Result*
Step 9	Finally, in the **Select** drop-down, select the attribute value by which to filter, then click the **Search** button. In this example, 'Boundary Correction' is selected.  After clicking **Search**, the attribute table is filtered to show the rows for all boundary corrections made in the county subdivision layer. 
Step 10	To view an individual boundary correction, click on its row and click the **Zoom** button.
Step 11	To return to the attribute table to see the full (**unfiltered**) county subdivision layer, click the **Refresh**  button in the upper right-hand corner of the dialog box.
	Note that when filtering the table by some attributes (e.g., state and county FIPS code or MTFCC), no drop-down list appears from which to make a selection. This is because some attribute codes are too numerous to make scrolling through a list practicable. Instead one will receive a blank box in which they may type the search value. For example, if filtering the area landmarks layer by MTFCC and one wants to see hospitals in the layer, type in the MTFCC for hospitals (K1231), as shown below, then click **Search**. 

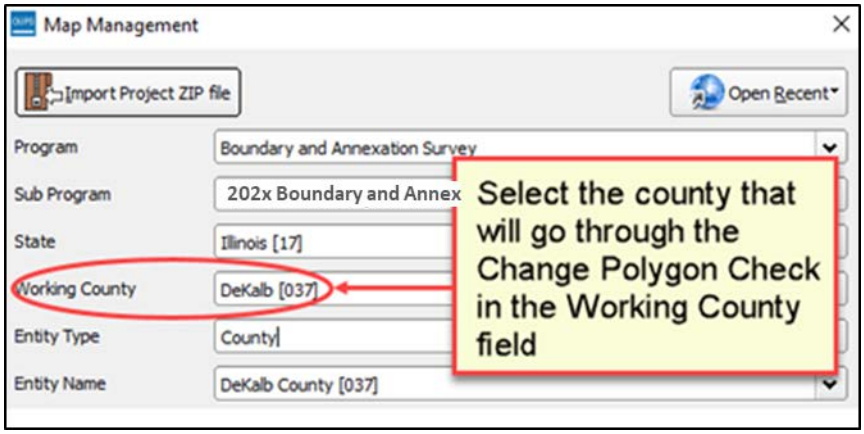
6.5.2 Review Change Polygons Tool

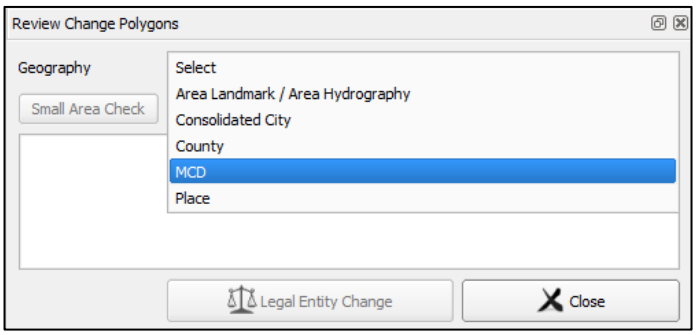
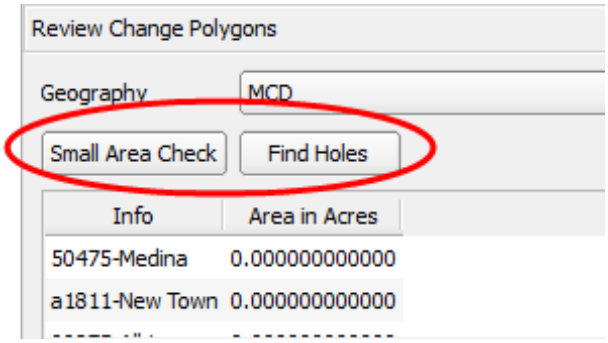
The **Review Change Polygons** tool allows users to view the transactions created from the edits made to legal governments, as well as to area landmarks and hydrographic areas. Users can review the transaction polygons that represent boundary changes, as well as new incorporations and disincorporations. The tool also allows users to make corrections to change polygons.

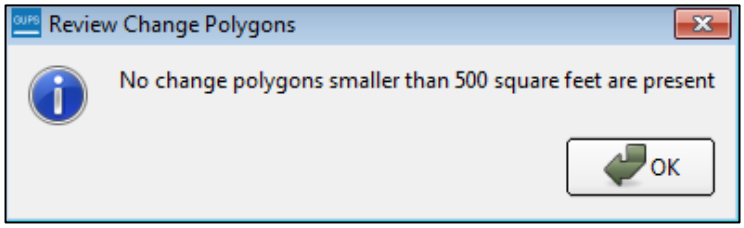
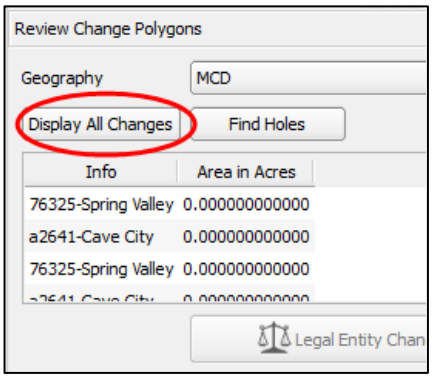
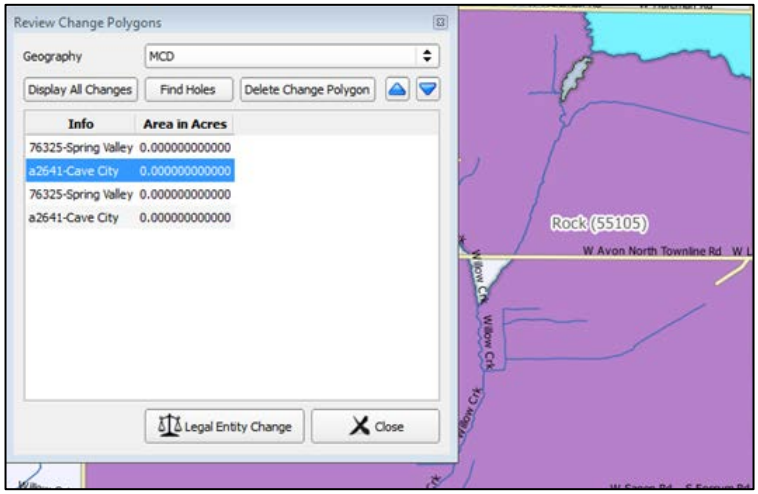
> ***Notes on Reviewing Change Polygons***
>
> The **Review Change Polygons** tool must be run before the GUPS will export a file. The **Review Change Polygons** tool must be run for each county worked. For example, if changes were made to the working county, and changes were also made to an adjacent county when annexing land for the working county, the change polygon check must be run on **both** counties.

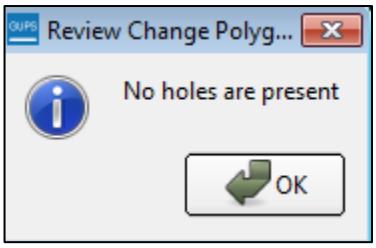
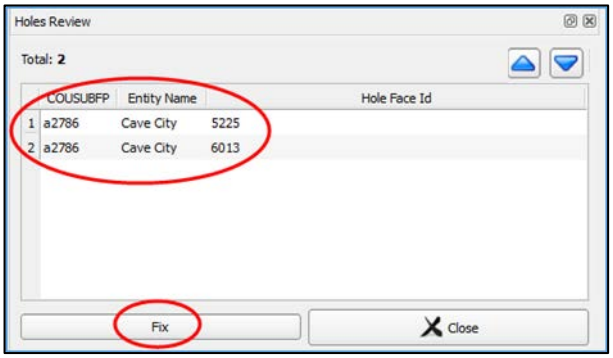
To use the **Review Change Polygons** tool, follow the steps in **Table 45**.

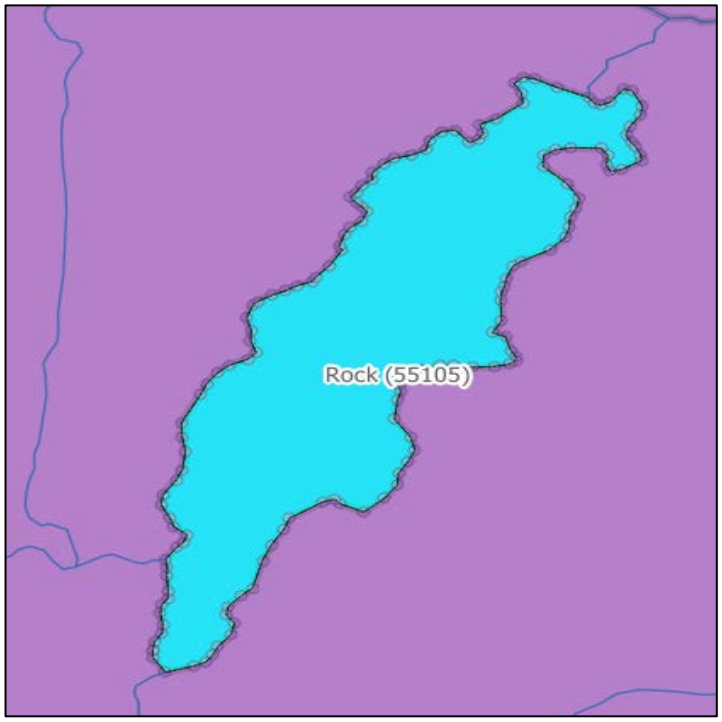
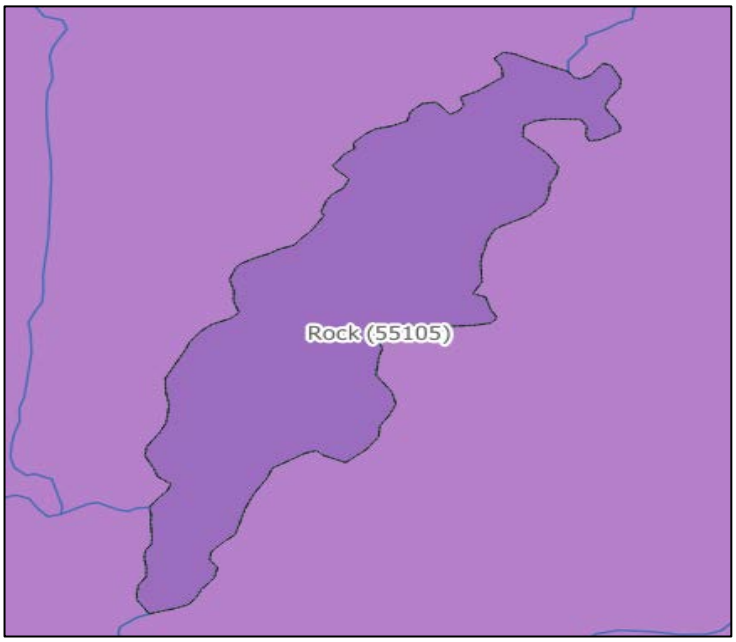
Table 45: Reviewing Change Polygons

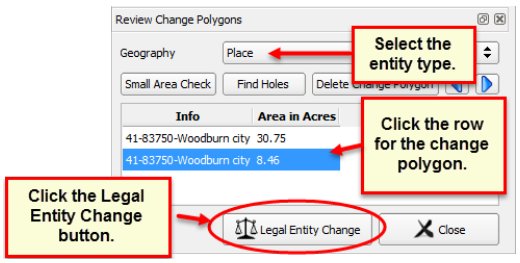
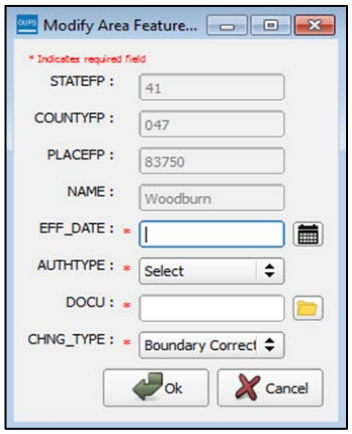
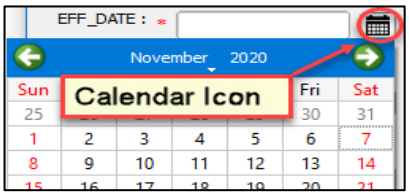
Step	Action and *Result*
Step 1	In the **Map Management** dialog box, make sure the county for which the check is to be run appears in the **Working County** field.  Once the **Open** button at the bottom of the dialog box is clicked and the map opens in **Map View**, the **Review Change Polygons** check is ready to run.
	If changes in more than one county were made, the check must be run for ***each*** county worked. This means that after completing the check for one county one must return to **Map Management** and select the additional county which was worked as the working county. Then run the check on it. Repeat this process until the check is run for all counties in which changes were made. If no changes were made in another county, only run the check for the one county worked.

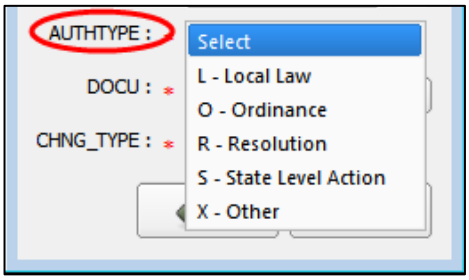
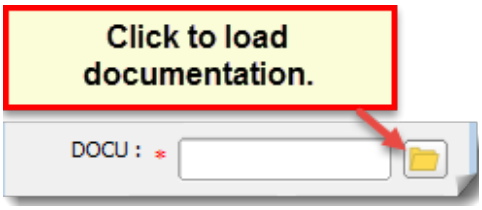
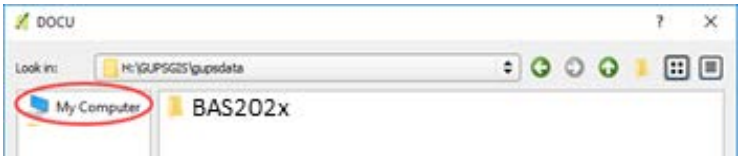
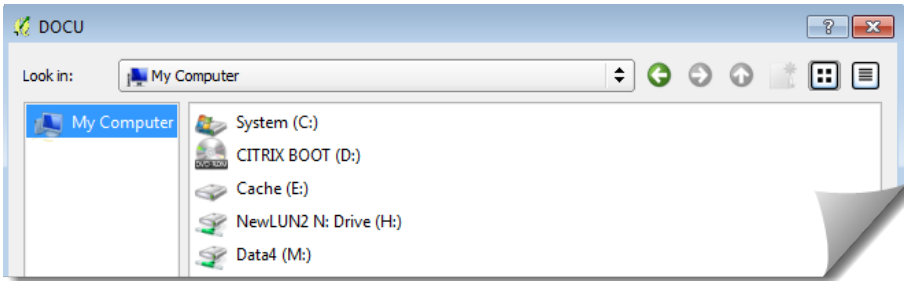
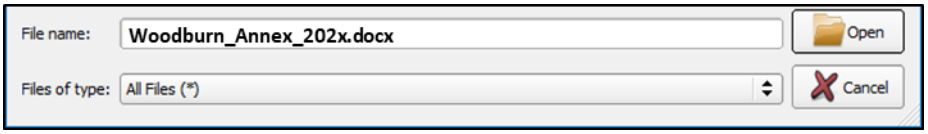
Step	Action and *Result*
Step 2	Once the working county is loaded, begin the change polygons review. Click on the Review Change Polygons button on the BAS toolbar. The **Review Change Polygons** dialog box opens just below the **Layers Panel**. **Note**: This box can be dragged anywhere on the screen and docked.
Step 3	Use the **Geography** drop-down menu shown below to select the geography to review. In this example, 'MCD' has been selected. 
Step 4	After selecting an entity type, the **Small Area Check** and **Find Holes** buttons become active and all change polygons for the entity type selected appear in the **Info** list at the bottom of the box. 

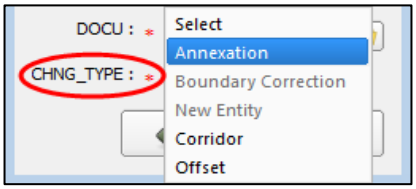
Step	Action and *Result*
Step 5	To check for small area change polygons, click the **Small Area Check** button. If all change polygons are of sufficient size, a pop-up box informs the user of this. 
Step 6	If there are small area polygons within an MCD in the working county, they appear in the **Info** list with their acreage noted in the **Area in Acres** column. The **Display All Changes** button also becomes active (this button allows one to toggle back to see all change polygons in the list). 
Step 7	To view a polygon on the map, click the row for the polygon in the **Info** list. The polygon is highlighted and the map zooms to the location of the polygon.  Note in the illustration above, the **Review Change Polygons** box was moved to sit over the map. As stated earlier, one may move the box anywhere on the page and dock it.

Step	Action and *Result*
Step 8	Next, review the polygons for holes (that is, two or fewer small faces missed when creating a change polygon). While still in the **Review Change Polygons** dialog box, select a geography type from the **Geography** drop-down menu. For this example, '**MCD**' is again selected. *A list of change polygons for MCDs in the county populates the **Info** list and the **Display All Changes** button replaces the Small Area button (since this check has already run). The **Find Holes** button remains in its original location.*
Step 9	Click on the row for the polygon in the **Info** list to see it on the map, then click the **Find Holes** button. *If no holes are present, a pop-up box informs the user of this.* 
Step 10	If holes are found, a list of polygons with holes appears in the **Holes Review** box and the **Fix** button activates at the bottom of the box. 

Step	Action and *Result*
Step 11	To correct a change polygon, click on its row to highlight it. *The map zooms to its location and displays all holes in cyan.* 
Step 12	Click the **Fix** button to repair the hole. The change polygon is corrected, and the correction displays on the map (i.e., the hole is changed to the same color as the remainder of the polygon). 
Step 13	Before the **Find Holes** check is complete, repeat the steps above ***for each*** geography type for which change polygons were created.

Step	Action and *Result*
Step 14	After reviewing for small areas and holes, use the **Review Change Polygons** tool to check the general accuracy of the change polygons. To do so, select the entity type in the **Geography** drop-down menu. *A full list of change polygons for the geography type selected displays in the **Info** list.*
Step 15	Click on the row for each polygon to see it on the map and to review changes. If there is a mistake on the map (e.g., a new incorporated place was created that was supposed to have six faces, but only five were selected), click on the **Modify Area Feature** button on the **BAS toolbar** and make the correction.
Step 16	To review boundary changes, select the entity type to review in the **Geography** drop-down menu at the top of the **Review Change Polygons** dialog box. In this example, '**Place**' was selected. *All boundary change polygons for the entity type selected populate the **Info** list.* To review a boundary change, click on the change polygon in the list, then click the **Legal Entity Change** button at the bottom of the **Review Change Polygons** dialog box, shown below.  The map zooms to where the change was made and a box opens displaying the information that was entered when the change was coded. Here, because the change was a boundary correction, the effective date, authority type, and documentation fields are not filled.  If this change was mistakenly coded as a boundary correction, and should have been a legal change instead, the error may be corrected here. In this example a change polygon mistakenly coded as a boundary correction rather than an annexation was corrected.
Step 17	Click the calendar icon next to the **EFF_DATE** field to select an effective date for the annexation. 

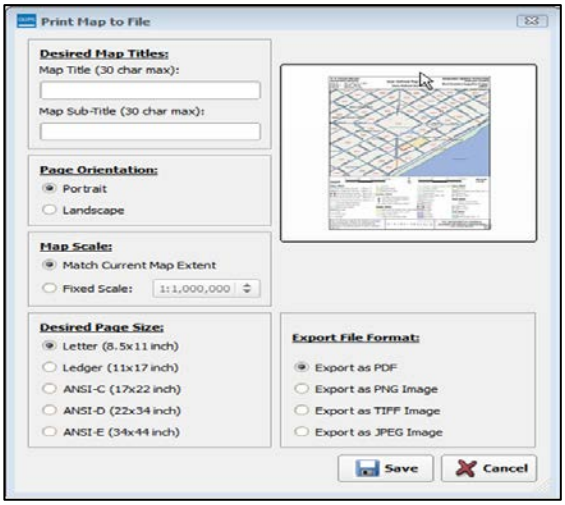
Step	Action and *Result*
Step 18	Use the drop-down menu for the **AUTHTYPE** field to select the authority type for the change. 
Step 19	In the **DOCU** field, type in the ordinance or other legal documentation number authorizing the annexation or upload legal documentation for the change. To upload documentation, click the folder icon next to the **DOCU** field.  When the ***DOCU*** window opens, click on the icon for 'My Computer' (or simply 'Computer' in some Windows versions) to open the directory where the documentation was saved.  The directories display, as shown below.  Select the appropriate directory and navigate to the file to upload. Click the file. Then, to upload it, click the **Open** button at the bottom of the **DOCU** window.  GUPS uploads the file and the file name appears in the DOCU field.

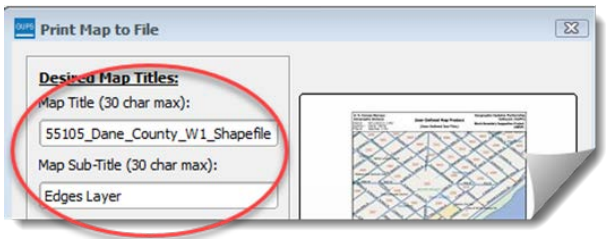
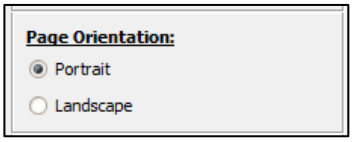
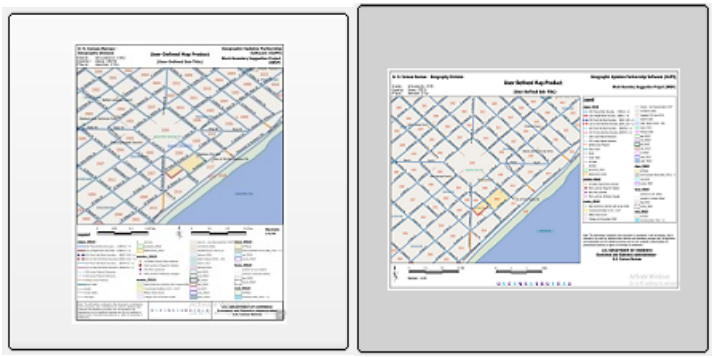
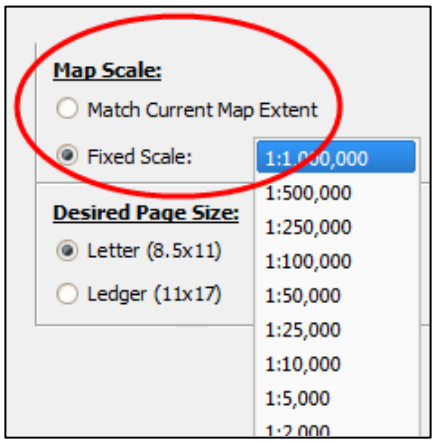
Step	Action and *Result*
Step 20	Finally, in the **CHNG_TYPE** field drop-down menu, change 'Boundary Correction' to the correct change type ('Annexation', 'Corridor', or 'Offset'). Here 'Annexation' is selected. 
Step 21	Click the **OK** button. *The correction is made.*
Step 22	When *all reviews* (for small areas, holes, and boundary changes) have been completed for all *entity types*, and any corrections needed have been made, click the **Save** button on the **BAS toolbar**. *All corrections are saved. The Review Change Polygons check is complete*.
Step 23	If changes were made in more than one working county, return to **Map Management**, select the additional county as the working county, and repeat the steps above. Repeat this process as many times as needed until the **Review Change Polygons** check has been run on all the counties in which changes were made.

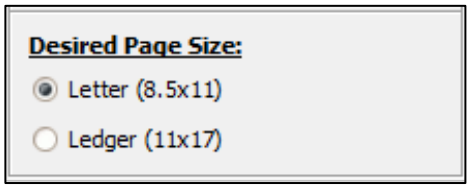
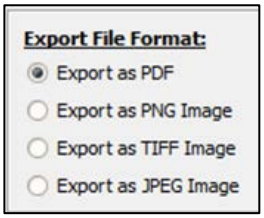
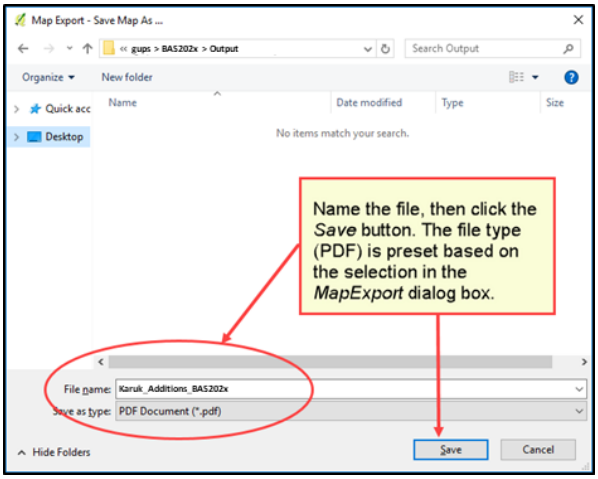
6.6 Exporting a Printable Map

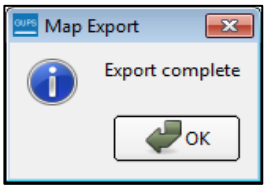
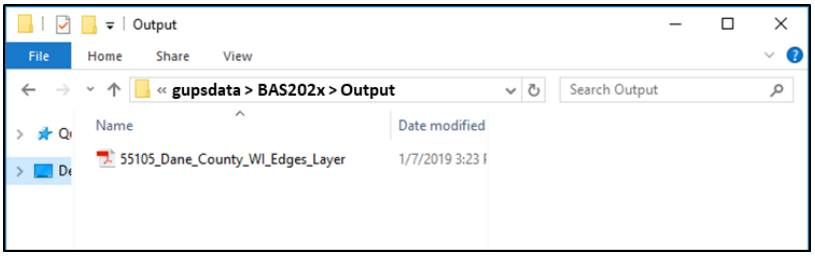
GUPS allows the user to generate printable maps in four formats (.pdf, .png, .tiff, and .jpeg). The maps can be created in portrait or landscape view, on letter or ledger (legal) size paper, and at various scales. To export a printable map from GUPS, follow the steps in **Table 46**.

Table 46: Export a Printable Map

Step	Action and *Result*
Step 1	Click on the **Print Map to File** button on the **BAS toolbar**. The **Print Map to File** dialog box opens. 

Step	Action and *Result*
Step 2	In the **Desired Map Titles** section, type in a map title and sub-title. 
Step 3	Under **Page Orientation**, click the radio button next to 'Portrait' or 'Landscape' to select the map's orientation on the page when printed.  The map orientation in the preview pane to the right changes to reflect the selection.  Portrait View (left) and Landscape View (right)
Step 4	Under **Map Scale**, click the appropriate radio button to select the map scale (one may use the current map extent or set a fixed scale). To select a fixed scale, click the radio button next to 'Fixed Scale', then click the down arrow to open the drop-down menu. In the drop-down list, click on the scale desired. 

Step	Action and *Result*
Step 5	Under **Desired Page Size**, click the radio button next to the desired page size. 
Step 6	When ready to export the file, under **Export File Format**, click the radio button next to the desired format. One may export the file in .pdf, .png, .tiff, or .jpeg format. 
Step 7	Click the **Save** button. The **Map Export – Save Map As…** window opens. **Note**: GUPS automatically selected the "output" folder for BAS202x as the save location. This folder was created by the GUPS installer. To save the file to a different location, navigate to the location first before saving.
Step 8	After selecting the location, type in a name for the file, then click **Save**. 

Step	Action and *Result*
Step 9	The file is saved and the user receives a pop-up message confirming that the export is complete. 
Step 10	To save the file, click **OK**. The file is saved either in the default BAS2021 output location or in the alternate location the user specified. Here the file was saved in the default location. 

6.6.1 How to Export ZIP Files to Share/Submit

When creating ZIP files to export, users have two options—exporting the file to share with other users or exporting the file for submission to the Census Bureau. In either case, GUPS automatically names the output ZIP file. It packages all the files required by the Census Bureau (including any documentation uploaded) into the ZIP file and saves it in a preset location created by GUPS during the installation process.

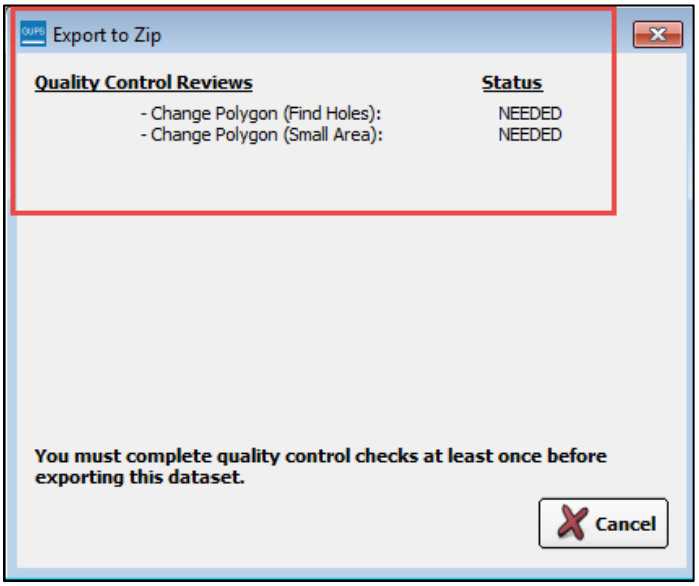
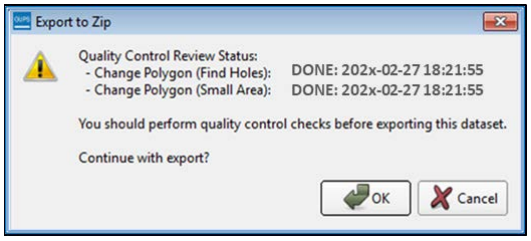
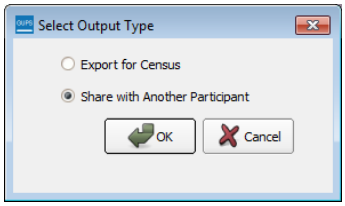
> ***Important Note***
> If changes are made to more than one working county, a separate ZIP file for each county is required for export.

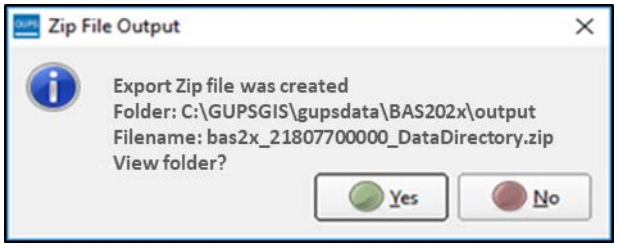
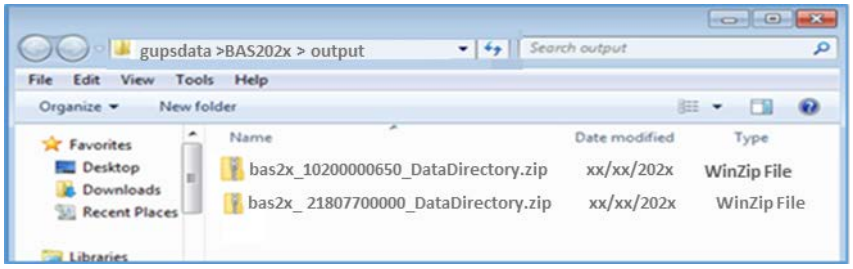
6.6.2 Exporting a File to Share

To export a file to share with another user, follow the steps in **Table 47**.

Table 47: Exporting Files to Share with Another User

Step	Action and *Result*
Step 1	Click on the **Export to ZIP** button on the **BAS toolbar**.

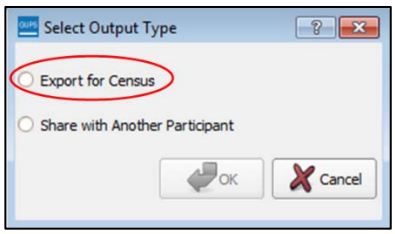
Step	Action and *Result*
Step 2	After clicking the **Export to Zip** button, one of two results may occur, depending on whether the changes were validated using the **Review Change Polygons** tool. If the tool was not used to check the work, the **Export to ZIP** pop-up box appears and lists the specific checks that need to be run before the file can be exported.  If this message appears, click the **Cancel** button and run the **Review Change Polygons** check. Then repeat the initial export steps again.
Step 3	If the **Review Change Polygon** check **was already run**, the **Export to ZIP** pop-up box displays the status of the checks and the date and time they were made, as shown below. 
Step 4	Look carefully at the run times listed. If any additional changes were made after these times, click **Cancel** and run the **Review Change Polygons** check again. Then repeat the export steps.
Step 5	The **Select Output Type** dialog box opens.  To prepare ZIP file to be shared with another user, select the “Share with Another Participant” radio button. Click **OK**.

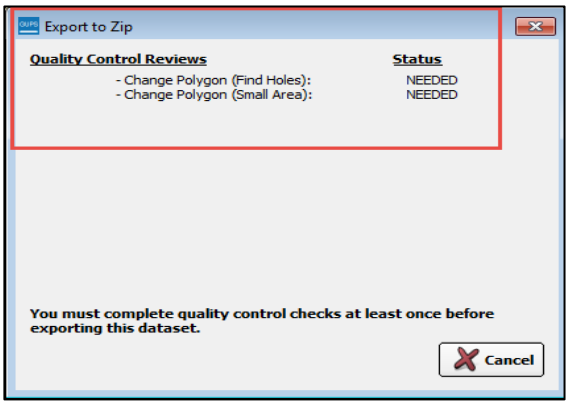
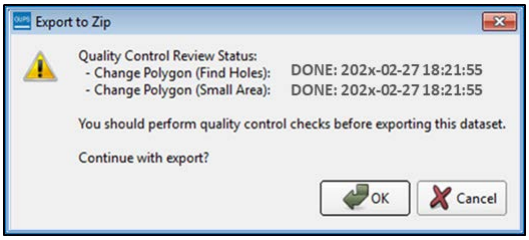
Step	Action and *Result*
Step 6	The **ZIP File Output** dialog box opens. It informs the user that the ZIP file was created and asks if they want to view the folder. 
Step 7	*If **Yes** is clicked, the directory opens and displays the folder location where GUPS placed the file.* **Note**: GUPS automatically saves the file to an output folder that the GUPS installer created during the installation process.) 
Step 8	The file may now be shared with another user.

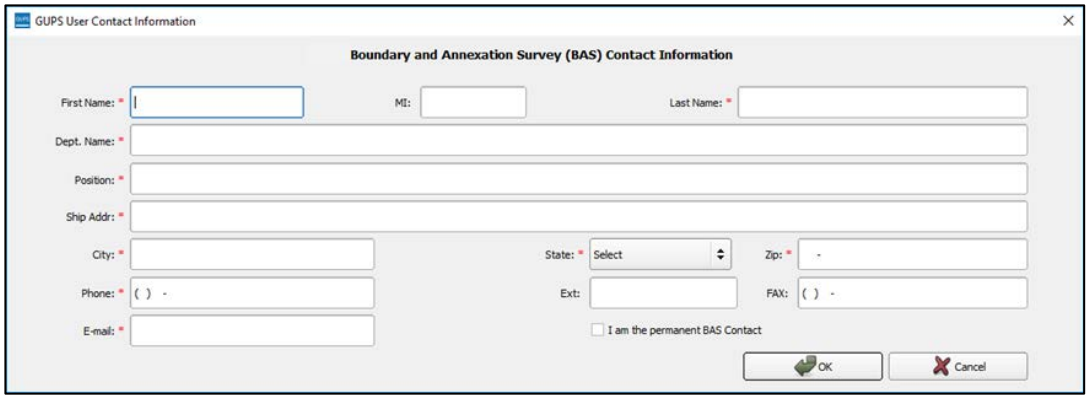
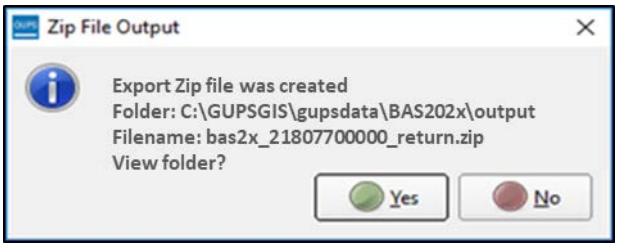
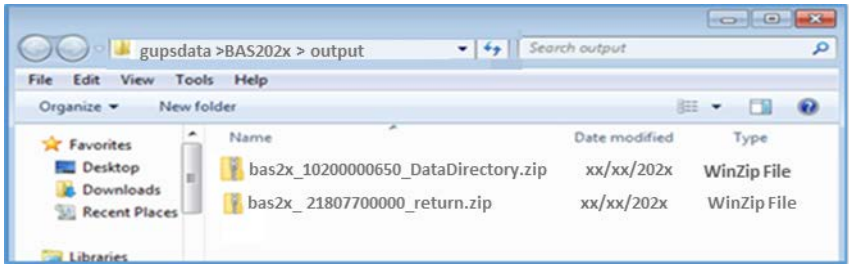
6.6.3 Exporting a File to Submit to the Census Bureau

To export a file to submit to the Census Bureau, follow the steps in **Table 48**.

Table 48: Exporting Files for Submission to the Census Bureau

Step	Action and *Result*
Step 1	Click on the **Export to ZIP** button on the **BAS toolbar**. The **Select Output Type** dialog box opens.  Click the **Export for Census** radio button. Then click **OK**.

Step	Action and *Result*
Step 2	After clicking the **OK** button, one of two results may occur, depending on whether the changes were validated using the **Review Change Polygons** tool. If the tool was not used to check the work, the **Export to ZIP** pop-up box appears and lists the specific checks that need to be run before the file can be exported. 
Step 3	If this message appears, click the **Cancel** button and run the **Review Change Polygons** check. Then repeat the initial export steps again.
Step 4	If the **Review Change Polygon** check was already run, the **Export to ZIP** pop-up box displays the status of the checks and the date and time they were made, as shown below. 
Step 5	Look carefully at the run times listed. If any additional changes were made after these times, click **Cancel** and run the **Review Change Polygons** check again. Then repeat the export steps.

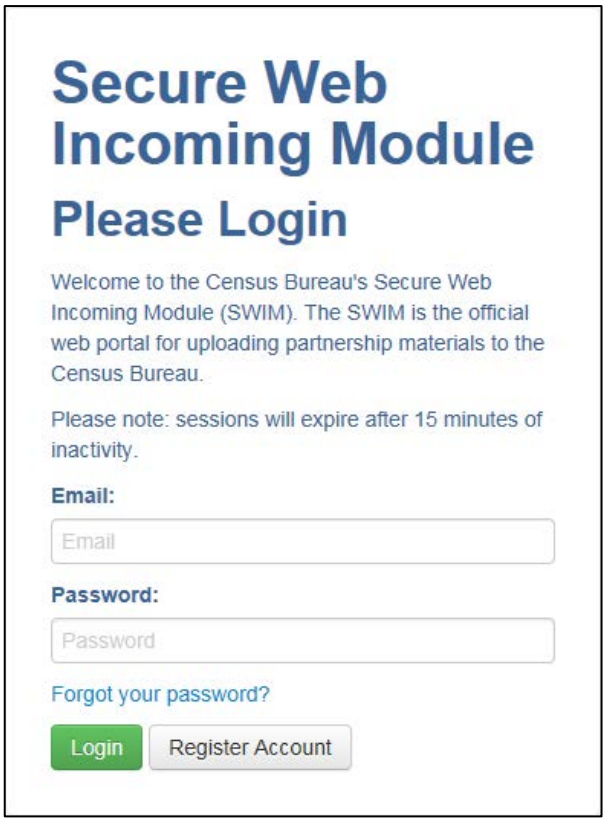
Step	Action and *Result*
Step 6	Otherwise, click **OK**. *The **GUPS User Contact Information** dialog box opens up*. Complete the required fields and click **OK**.  The **ZIP File Output** dialog box opens. It informs the user that the ZIP file was created and asks if they want to view the folder. 
Step 7	*If **Yes** is clicked, the directory opens* and displays the folder location where GUPS placed the file. **Note**: GUPS automatically saves the file to an output folder that the GUPS installer created during the installation process. 
Step 8	The file is now ready to upload to the Census Bureau through the SWIM. Refer to **Section 7 Submitting Files to the Census Bureau through SWIM**

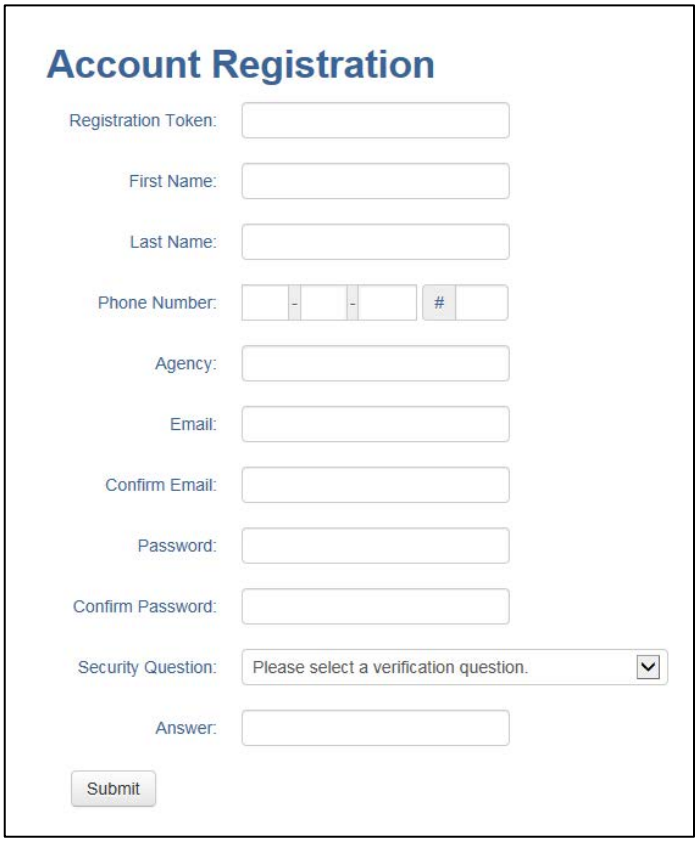
SECTION 7. SUBMITTING FILES TO THE CENSUS BUREAU THROUGH SWIM

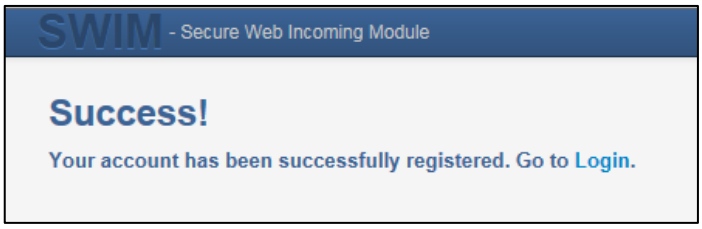
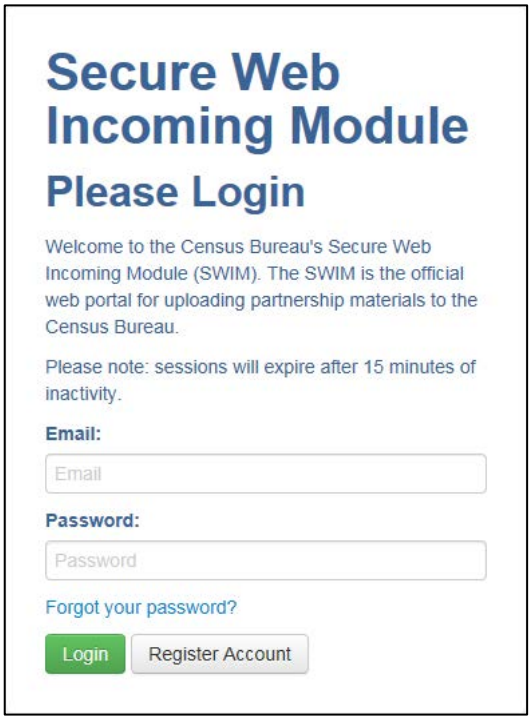
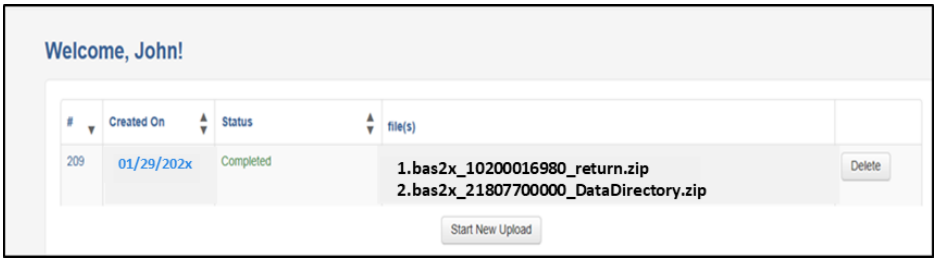
To upload and transmit update files to the Census Bureau, participants must access their accounts in the SWIM, as shown in **Table 49**.

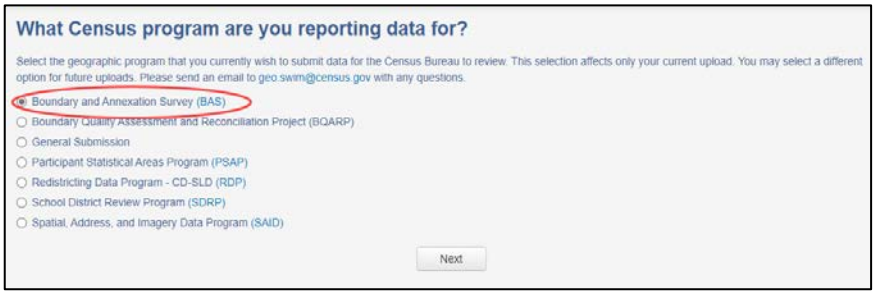
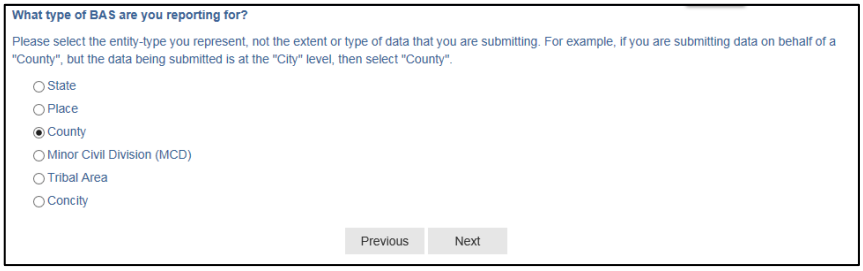
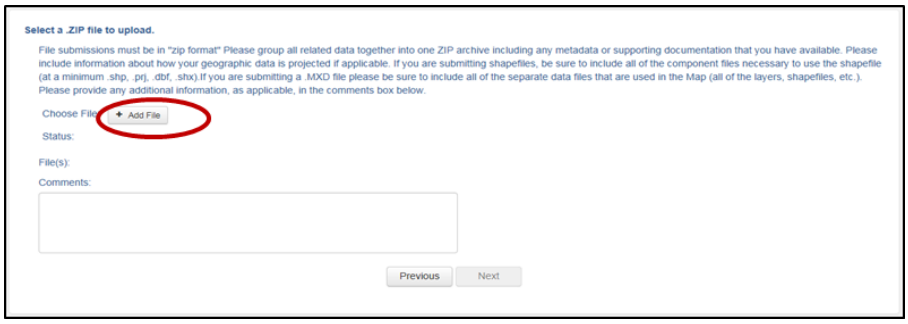
Note: Participants **with existing SWIM accounts** should use their user name (email address) and password. If participants indicated on their BAS Annual Response Form that they wished to receive or use the GUPS application, they automatically receive the SWIM URL and a registration token via email. The email should arrive five days after the Annual Response is completed online (or five business days after the Census Bureau receives the paper form. Participants **without existing SWIM accounts**, should contact the Census Bureau at <geo.bas@census.gov> to obtain a 12-digit registration token needed to create an account. Once a token has been assigned, participants can create their SWIM accounts.

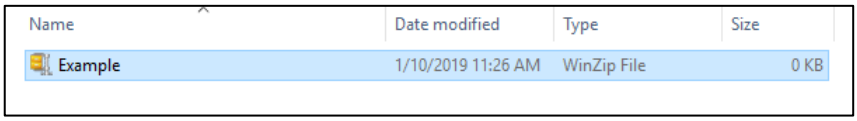
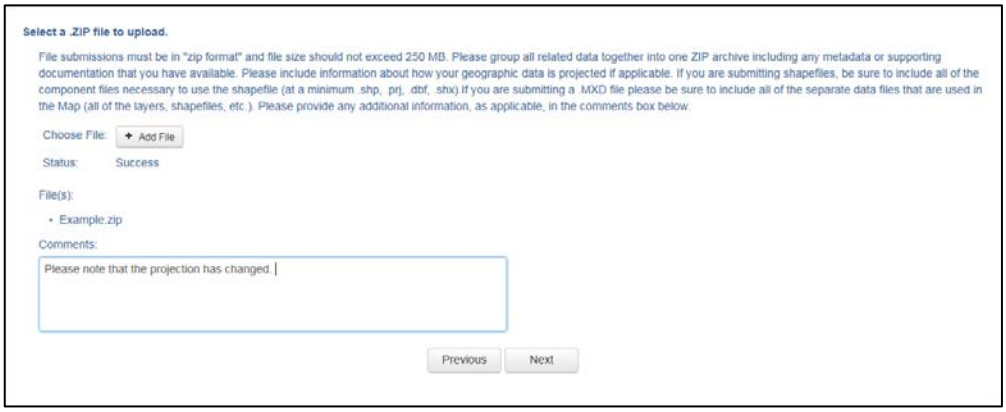
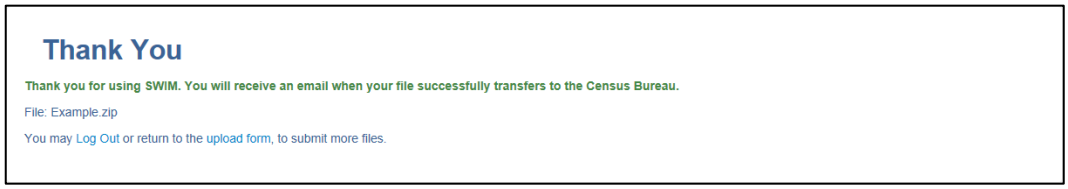
Table 49: Transmitting Files to the Census Bureau Using SWIM

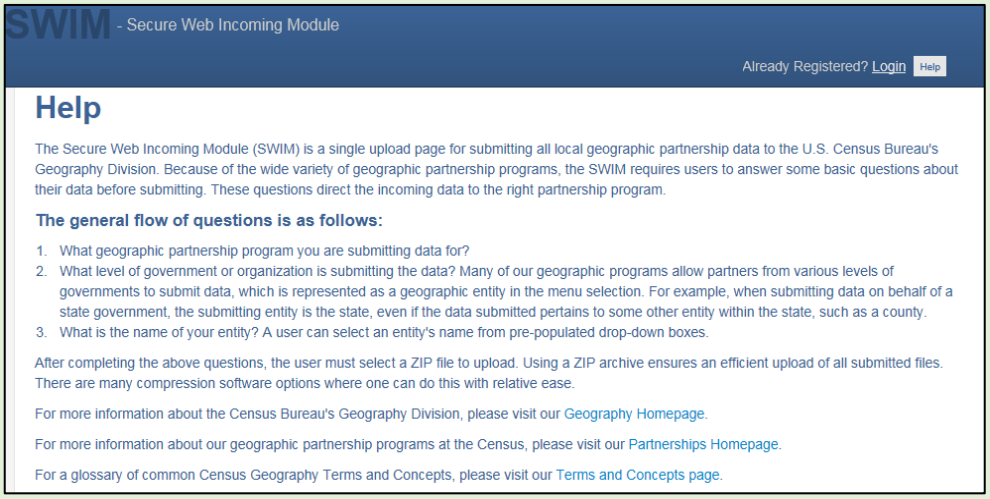
Step	Action and *Result*
Step 1	Open a new browser window and enter the URL <https://respond.census.gov/swim/>. The SWIM login screen opens. 
Step 2	Users that already have a SWIM account should enter their case sensitive email address and password. Click the **Login** button. *The **Welcome** screen opens*. **Go to Step 8.**

Step	Action and *Result*
Step 3	Users without a SWIM account must register. Click the **Register Account** button. *The **Account Registration** screen opens.* 
	All fields on the **Account Registration** screen are required.
Step 4	On the **Account Registration** screen, first, enter the 12-digit token provided by the Census Bureau. Then enter contact name, agency, and email in the appropriate fields.
Step 5	Create a password. The passwords must meet the five criteria below: 1. It must be at least 8 characters in length 2. It must have at least one upper case character 3. It must have at least one lower case character 4. It must have at least one number 5. It must have at least one special character (valid special characters are: #, !, $, *, &, ?, ~). **Note**: The commas shown immediately above are to separate the special characters listed. A comma is not a valid character for the password.

Step	Action and *Result*
Step 6	Set up a security question (click the arrow on the right of the Security Question box and select a question in the drop-down list, then enter an answer in the Answer box). Click the Submit button when finished. *A screen opens to confirm that the account has been successfully registered.*  On the Confirmation screen, click Login, and *be returned to the Login screen.*
Step 7	Login screen. 
Step 8	On the **Login** screen, enter the email and password then click the green **Login** button. The **Welcome** screen opens. A list of files the participant has previously uploaded, the creation date of the file, the name of the file, and its corresponding zip size. If one needs to make modifications, click on the file to edit, then select the **Start New Upload** button. 

Step	Action and *Result*
Step 9	To begin an upload, click the **Start New Upload** button. Select the **Boundary Annexation Survey (BAS)** radio button, and then click **Next** at the bottom of the screen. 
Step 10	*A screen opens asking "**What type of BAS you are reporting for?**"* Click the radio button next to the governmental unit for which data is being submitted, then click the **Next** button. In this example, **County** is selected. 
Step 11	*A screen opens that allows selection of the state and the entity (in this case county) for which data is being reported.* For this example, North Carolina in the State field drop-down menu and the county in the **County** field drop-down menu are selected. Select the **Next** button.
Step 12	**The Select a .ZIP file to upload** screen opens. Choose a zip file to upload. **Note**: All files must be a zip file. The zip file cannot contain another zip file. To upload a file, click the **+ Add File** button on the screen. 

Step	Action and *Result*
Step 13	The Choose File to Upload window opens.  Locate the ZIP file to be uploaded then double-click it. **Note**: Only one file at a time can be added.
Step 14	Once the file upload is complete, the **Status** field shows '**Success**.' The name of the file appears in the **File(s)** field. To add another file, click the **+ Add File** and the upload process will repeat. In this example, there are two files uploaded. 
Step 15	After uploading the file(s), type any comments (including pertinent information about data projection or supporting documentation for shapefiles) in the **Comments** field. Click **Next**.
Step 16	The **Thank You** screen appears and confirms the receipt of the submission. 
Step 17	To submit files for a different entity, click on the '**Upload Form**' link in the phrase "You may Log Out or return to the upload form, to submit more files." This choice returns the user to the **Welcome** screen. To log out, click on **Log Out**. The Census Bureau will acknowledge the receipt of the uploaded file.

Step	Action and *Result*
	SWIM sessions deactivate after 15 minutes of inactivity. **Note**: While working in SWIM, the participant may obtain help by clicking on the **Help** button on any screen. When the button is clicked, a screen opens with links to help resources. 

APPENDICES

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APPENDIX A APPENDIX ITEM

Table 50: BAS Contact Information and Resources

Action/Question	Resource	Contact
Request shapefiles on DVD	Geography Division	Call: 1-800-972-5651 Email: <geo.bas@census.gov>
BAS materials questions	Geography Division	Call: 1-800-972-5651 Email: <geo.bas@census.gov>
Legal boundary questions	Geography Division	Call: 1-301-763-1099 Email: <geo.bas@census.gov> Fax: 1-800-972-5652
Ask guidance on areas under legal dispute	Census Bureau Legal Office	Call: 1-301-763-9844
GUPS technical support	Geography Division	Call: 1-800-972-5651 Email: <geo.bas@census.gov> Be sure to have the number for the version of GUPS currently installed. To find this number, go to the **Help** tab on the main **Menu** in GUPS and click 'About GUPS' in the drop-down menu. A pop-up box will provide the number.
SWIM token questions	Geography Division	Call: 1-800-972-5651 Email: <geo.bas@census.gov>
SWIM technical support	Geography Division	<geo.swim@census.gov>
Submit output files on DVD (if the participant does not have Internet access)	National Processing Center	Send to: U.S. Census Bureau National Processing Center ATTN: BAS Returns, Bldg 63E 1201 East 10th Street Jeffersonville, IN 47132

APPENDIX B TERMS

Areal Feature - is a prominent and identifying feature of a landscape significant enough to warrant name recognition, such as a lake, park, school, military base, or cemetery, etc. This type of feature class is only assigned to a face geometry. Any face can be assigned to multiple features. For example, a water body can also be part of a park.

Edge - is a one-dimensional object (legacy 1-cell), bounded by two nodes: a start node and an end node. Its geometry is distinguished by the coordinates of the start and end nodes, and additional coordinates that are ordered and serve as vertices (or shape points) between the two nodes. An edge is a primitive feature in the Oracle database.

Effects of having **Edge** features in the MAF/TIGER System:

- Represents an invisible boundary line for various geometry, geographic, and statistical data and can stand alone.
- A linear feature always occupies the same space as an edge and there are attributes on an edge that are lone relevant when a linear feature exists.

Face - is a two-dimensional object (legacy 2-cell) bounded by two or more edges. Its boundary includes not only the edges that separate it from other faces, but also any interior edges (two-dimensional topological primitives) contained within the area of the face.

Geographic Area - is a demarcated area used for the collection and/or tabulation of Census Bureau data.

Geographic Corridor - is an area that includes only a road (or other feature's) right-of-way and does not contain any structures. **Figure 13. Annexed Area Corridor and Unincorporated** shows a corridor that has been created where an incorporated place annexed the road right-of-way, but not the housing units assigned to either side of the road (these belong instead to an unincorporated area). If it is important to the incorporated place that its ownership and/or maintenance of the road and/or its right-of-way be displayed on Census Bureau's maps, a geographic corridor should be created. However, the Census Bureau does not require places to report rights-of-way: maintaining geographic corridors in a nationwide database is difficult and impractical, and the right-of-way should only be included if it is crucial to the place, or if state or local laws require it. The Census Bureau would prefer that the area not be assigned to the place.

Figure 14 shows an example where the right-of-way belongs in an unincorporated area, while the housing units along it are included in an incorporated place (shown in color). While depicting this corridor may be important for local purposes, it is not relevant for Census Bureau tabulations and is not easy to depict in the Census nationwide database. This type of corridor should not be included in a BAS response.

Please note that the Census Bureau does not require places to display rights-of-way or road maintenance corridors that do not contain or potentially contain housing or population. If local or state law does not require depiction of these geographic features, the Census Bureau prefers that they be left off BAS submissions. However, if it is necessary for the place to depict them, then they must be submitted as a geographic corridor.

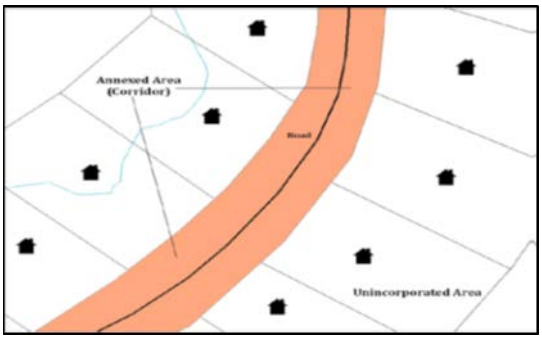


Figure 13. Annexed Area Corridor and Unincorporated Area
A corridor that has been created where an incorporated place annexed the road right-of-way, but not the housing units assigned to either side of the road.

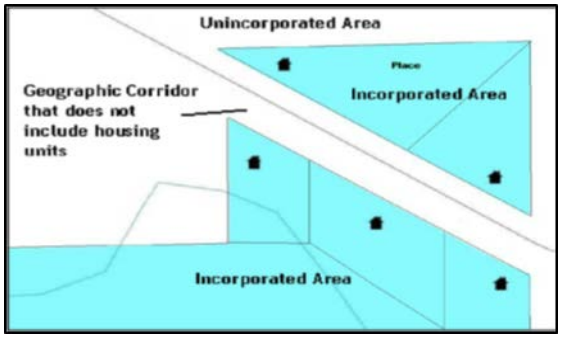


Figure 14. Incorporated Area and Unincorporated Area
The right-of-way belongs in an unincorporated area, while the housing units along it are included in an incorporated place.

To recap, when a participant has a case where a road right-of-way is legally included in the boundary, but the adjacent parcels/houses are not, there are two options. One should either not include the area in the place at all (Scenario A in **Figure 15**), or include it in the place and flag it as a corridor (Scenario C in **Figure 15**). What one should never do is include such areas within the place boundary without flagging them as corridors
(Scenario B in **Figure 15**).

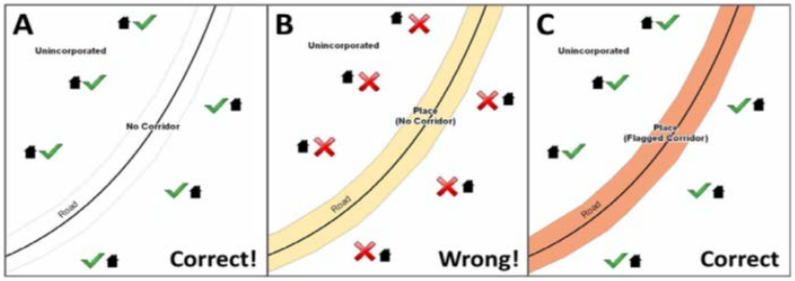


Figure 15. Participant Responses

(A): The respondent did not include place ownership of the road or the right-of-way, allowing houses along the road to be geocoded correctly. (B): The respondent chose to show place ownership of the road, but did not flag it as a corridor, causing houses along the road to be incorrectly geocoded. (C): The respondent chose to show place ownership of the road, and flagged that ownership as a corridor, allowing the houses to be geocoded correctly. Both A and C are acceptable.

Geographic Offsets

A geographic offset is an area (either within or outside of a geographic area) that is only on one side of a road (unlike corridors, which involve both sides of the road) and does not include structures addressed to that side of the road. Much of the same guidelines regarding corridors also holds true for offsets.

The Census Bureau is aware that many governments base their legal boundaries on cadastral (parcel-based) right-of-way mapping. Census Bureau maps are based on spatial data that is topologically integrated which makes maintenance of geographic offsets inefficient. Using the road centerline wherever possible will help to establish more accurate population counts. If a boundary follows a front-lot-line, the Census Bureau strongly prefers that the road centerline be used as the boundary. If a boundary is at the rear of a lot, then it should be depicted as such. If it is unclear whether a particular line is a front-lot-line or something else, please contact the BAS team for assistance. As a rule, if a house or building could not conceivably be built in the area between the potential line and the centerline of the road, then the line can be considered a front-lot-line. **Figure 16** depicts a cadastral (parcel-based) boundary map and **Figure 17** shows how the boundary should be represented when it is sent to the Census Bureau.

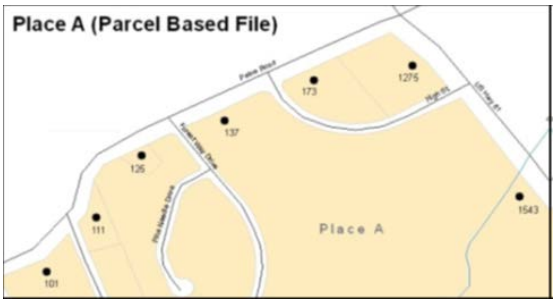


Figure 16. A Cadastral (Parcel-Based) Boundary Map

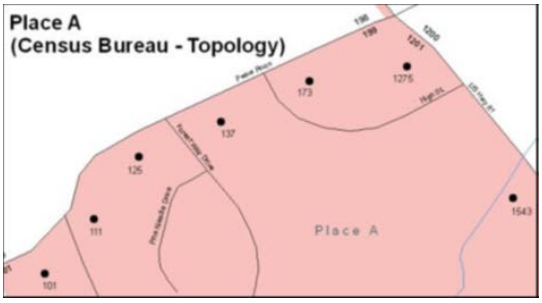


Figure 17. How a Boundary Should be Represented When Sent to the Census Bureau

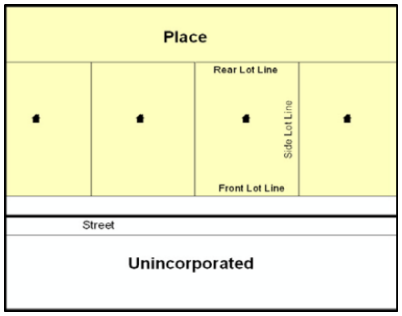


Figure 18. Place Boundary – Front-Lot-Line

Shows a situation in which the place boundary is along the front-lot-line. In this example, the respondent must either use the road centerline as the boundary (preferred), or create an offset.

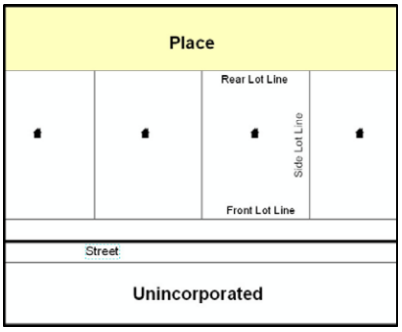


Figure 19. Place Boundary – Rear-Lot-Line

The place boundary is on the rear-lot-line, so the respondent should not use the road centerline or create an offset, but should rather digitize in a new boundary following the rear-lot-line.

The Census Bureau has included an "offset" shapefile in the BAS materials (bas_2021_offset_<ssccc>.shp), so that a jurisdiction can be checked for any existing corridors or offsets. While the Census Bureau prefers that new offsets are not created (see **Figure 17** and **Figure 18**), this information can be helpful in determining if current boundaries are correct.

Linear Feature - is a single dimension feature (Road/Path, Hydro, Rail, or Miscellaneous) along one or more edges.

Point Feature - is an isolated node not connected to an edge. The XY coordinate point is where a structure resides. Point Feature structures include housing units and legacy point landmark of public facilities such as libraries, police stations, schools, churches, malls, and some monuments.

APPENDIX C MTFCC DESCRIPTIONS

The MAF/TIGER Feature Classification Code (MTFCC) is a five-digit code assigned by the Census Bureau to classify and describe geographic objects or features in Census Bureau MAF/TIGER products.

Table 51: MTFCC Descriptions

MTFCC	Feature Class	Feature Class Description
C3022	Mountain Peak or Summit	A prominent elevation rising above the surrounding level of the Earth's surface.
C3023	Island	An area of dry or relatively dry land surrounded by water or low wetland [including archipelago, atoll, cay, hammock, hummock, isla, isle, key, moku and rock].
C3024	Levee	An embankment flanking a stream or other flowing water feature to prevent overflow.
C3026	Quarry (not water-filled), Open Pit Mine or Mine	An area from which commercial minerals are or were removed from the Earth; not including an oilfield or gas field.
C3027	Dam	A barrier built across the course of a stream to impound water and/or control water flow.
C3061	Cul-de-sac	An expanded paved area at the end of a street used by vehicles for turning around. For mapping purposes, the Census Bureau maps it only as a point feature.
C3062	Traffic Circle	A circular intersection allowing for continuous movement of traffic at the meeting of roadways.
C3066	Gate	A movable barrier across a road.
C3067	Toll Booth	A structure or barrier where a fee is collected for using a road.
C3070	Tower/Beacon	A manmade structure, higher than its diameter generally used for observation, storage, or electronic transmission.
C3071	Lookout Tower	A manmade structure, higher than its diameter, used for observation.
C3072	Transmission Tower including cell, radio and TV	A manmade structure, higher than its diameter, used for electronic transmission.
C3073	Water Tower	A manmade structure, higher than its diameter, used for water storage.
C3074	Lighthouse Beacon	A manmade structure, higher than its diameter, used for transmission of light and possibly sound generally to aid in navigation.
C3075	Tank/Tank Farm	One or more manmade structures, each higher than its diameter, used for liquid (other than water) or gas storage or for distribution activities.

MTFCC	Feature Class	Feature Class Description
C3076	Windmill Farm	One or more manmade structures used to generate power from the wind.
C3077	Solar Farm	One or more manmade structures used to generate power from the sun.
C3078	Monument or Memorial	A manmade structure to educate, commemorate, or memorialize an event, person, or feature.
C3079	Boundary Monument Point	A material object placed on or near a boundary line to preserve and identify the location of the boundary line on the ground.
C3080	Survey Control Point	A point on the ground whose position (horizontal or vertical) is known and can be used as a base for additional survey work.
C3081	Locality Point	A point that identifies the location and name of an unbounded locality (e.g., crossroad, community, populated place or locale).
C3085	Alaska Native Village Official Point	A point that serves as the core of an Alaska Native village and is used in defining Alaska Native village statistical areas.
C3088	Landfill	A disposal facility at which solid waste is placed on or in the land.
G2100	American Indian Area	A legally defined state- or federally recognized reservation and/or off-reservation trust land (excludes statistical American Indian areas).
G2101	American Indian Area (Reservation Only)	American Indian Area (Reservation Only)
G2102	American Indian Area (Off-Reservation Trust Land Only)	American Indian Area (Off-Reservation Trust Land Only)
G2120	Hawaiian Homeland	A legal area held in trust for the benefit of Native Hawaiians.
G2130	Alaska Native Village Statistical Area	A statistical geographic entity that represents the residences, permanent and/or seasonal, for Alaska Natives who are members of or receiving governmental services from the defining legal Alaska Native Village corporation.
G2140	Oklahoma Tribal Statistical Area	A statistical entity identified and delineated by the Census Bureau in consultation with federally recognized American Indian tribes that have no current reservation but had a former reservation in Oklahoma.
G2150	State-designated Tribal Statistical Area	A statistical geographic entity identified and delineated for the Census Bureau by a state-appointed liaison for a state-recognized American Indian tribe that does not currently have a reservation and/or lands in trust.
G2160	Tribal Designated Statistical Area	A statistical geographic entity identified and delineated for the Census Bureau by a federally recognized American Indian tribe that does not currently have a reservation and/or off-reservation trust land.

MTFCC	Feature Class	Feature Class Description
G2170	American Indian Joint Use Area	An area administered jointly and/or claimed by two or more American Indian tribes.
G2200	Alaska Native Regional Corporation	Corporate entities established to conduct both business and nonprofit affairs of Alaska Natives pursuant to the Alaska Native Claims Settlement Act of 1972 (Public Law 92-203). There are twelve geographically defined ANRCs and they are all within and cover most of the State of Alaska (the Annette Island Reserve-an American Indian reservation-is excluded from any ANRC). The boundaries of ANRCs have been legally established.
G2300	Tribal Subdivision	Administrative subdivisions of federally recognized American Indian reservations, off-reservation trust lands, or Oklahoma tribal statistical areas (OTSAs). These entities are internal units of self-government or administration that serve social, cultural, and/or economic purposes for the American Indians on the reservations, off-reservation trust lands, or OTSAs.
G2400	Tribal Census Tract	A relatively small and permanent statistical subdivision of a federally recognized American Indian reservation and/or off-reservation trust land, delineated by American Indian tribal participants or the Census Bureau for the purpose of presenting demographic data.
G2410	Tribal Block Group	A cluster of census blocks within a single tribal census tract delineated by American Indian tribal participants or the Census Bureau for the purpose of presenting demographic data.
G3100	Combined Statistical Area	A grouping of adjacent metropolitan and/or micropolitan statistical areas that have a degree of economic and social integration, as measured by commuting.
G3110	Metropolitan and Micropolitan Statistical Area	An area containing a substantial population nucleus together with adjacent communities having a high degree of economic and social integration with that core, as measured by commuting. Defined using whole counties and equivalents.
G3120	Metropolitan Division	A county or grouping of counties that is a subdivision of a Metropolitan Statistical Area containing an urbanized area with a population of 2.5 million or more.
G3200	Combined New England City and Town Area	A grouping of adjacent New England city and town areas that have a degree of economic and social integration, as measured by commuting.
G3210	New England City and Town Metropolitan and Micropolitan Statistical Area	An area containing a substantial population nucleus together with adjacent communities having a high degree of economic and social integration with that core, as measured by commuting. Defined using Minor Civil Divisions (MCDs) in New England.
G3220	New England City and Town Division	A grouping of cities and towns in New England that is a subdivision of a New England City and Town Area containing an urbanized area with a population of 2.5 million or more.

MTFCC	Feature Class	Feature Class Description
G3500	Urban Area	Densely settled territory that contains at least 2,500 people. The subtypes of this feature are Urbanized Area (UA), which consists of 50,000 + people and Urban Cluster, which ranges between 2,500 and 49,999 people.
G4000	State or Equivalent Feature	The primary governmental divisions of the United States. The District of Columbia is treated as a statistical equivalent of a state for census purposes, as is Puerto Rico.
G4020	County or Equivalent Feature	The primary division of a state or state equivalent area. The primary divisions of 48 states are termed County, but other terms are used such as Borough in Alaska, Parish in Louisiana, and Municipio in Puerto Rico. This feature includes independent cities, which are incorporated places that are not part of any county.
G4040	County Subdivision	The primary divisions of counties and equivalent features for the reporting of Census Bureau data. The subtypes of this feature are Minor Civil Division, Census County Division/Census Subarea, and Unorganized Territory. This feature includes independent places, which are incorporated places that are not part of any county subdivision.
G4050	Estate	Estates are subdivisions of the three major islands in the United States Virgin Islands (USVI).
G4060	Subbarrio (Subminor Civil Division)	Legally defined divisions (subbarrios) of minor civil divisions (barrios-pueblo and barrios) in Puerto Rico.
G4110	Incorporated Place	A legal entity incorporated under state law to provide general-purpose governmental services to a concentration of population. Incorporated places are generally designated as a city, borough, municipality, town, village, or, in a few instances, have no legal description.
G4120	Consolidated City	An incorporated place that has merged governmentally with a county or minor civil division, but one or more of the incorporated places continues to function within the consolidation. It is a place that contains additional separately incorporated places.
G4210	Census Designated Place	A statistical area defined for a named concentration of population and the statistical counterpart of an incorporated place.
G4300	Economic Census Place	The lowest level of geographic area for presentation of some types of Economic Census data. It includes incorporated places, consolidated cities, census designated places (CDPs), minor civil divisions (MCDs) in selected states, and balances of MCDs or counties. An incorporated place, CDP, MCD, or balance of MCD qualifies as an economic census place if it contains 5,000 or more residents, or 5,000 or more jobs, according to the most current data available.
G5020	Census Tract	Relatively permanent statistical subdivisions of a County or equivalent feature delineated by local participants as part of the Census Bureau's Participant Statistical Areas Program.

MTFCC	Feature Class	Feature Class Description
G5030	Block Group	A cluster of census blocks having the same first digit of their four-digit identifying numbers within a Census Tract. For example, block group 3 (BG 3) within a Census Tract includes all blocks numbered from 3000 to 3999.
G5040	Tabulation Block	The lowest-order census defined statistical area. It is an area, such as a city block, bounded primarily by physical features but sometimes by invisible city or property boundaries. A tabulation block boundary does not cross the boundary of any other geographic area for which the Census Bureau tabulates data. The subtypes of this feature are Count Question Resolution (CQR), current, and census.
G5200	Congressional District	The 435 areas from which people are elected to the U.S. House of Representatives. Additional equivalent features exist for state equivalents with nonvoting delegates or no representative. The subtypes of this feature are 106th, 107th, 108th, 109th, and 111th Congressional Districts, plus subsequent Congresses.
G5210	State Legislative District (Upper Chamber)	Areas established by a state or equivalent government from which members are elected to the upper or unicameral chamber of a state governing body. The upper chamber is the senate in a bicameral legislature, and the unicameral case is a single house legislature (Nebraska).
G5220	State Legislative District (Lower Chamber)	Areas established by a state or equivalent government from which members are elected to the lower chamber of a state governing body. The lower chamber is the House of Representatives in a bicameral legislature.
G5240	Voting District	The generic name for the geographic features, such as precincts, wards, and election districts, established by state, local, and tribal governments for the purpose of conducting elections.
G5400	Elementary School District	A geographic area within which officials provide public elementary grade-level educational services for residents.
G5410	Secondary School District	A geographic area within which officials provide public secondary grade-level educational services for residents.
G5420	Unified School District	A geographic area within which officials provide public educational services for all grade levels for residents.
G6100	Public-Use Microdata Area	A decennial census area with a population of at least 100,000 or more persons for which the Census Bureau provides selected extracts of household-level data that are screened to protect confidentiality.
G6300	Traffic Analysis District	An area delineated by Metropolitan Planning Organizations (MPOs) and state Departments of Transportation (DOTs) for tabulating journey-to-work and place-of-work data. A Traffic Analysis District (TAD) consists of one or more Traffic Analysis Zones (TAZs).

MTFCC	Feature Class	Feature Class Description
G6320	Traffic Analysis Zone	An area delineated by Metropolitan Planning Organizations (MPOs) and state Departments of Transportation (DOTs) for tabulating journey-to-work and place-of-work data.
G6330	Urban Growth Area	An area defined under state authority to manage urbanization that the Census Bureau includes in the MAF/TIGER® System in agreement with the state.
G6340	ZIP Code Tabulation Area (Three-Digit)	An approximate statistical-area representation of a U.S. Postal Service (USPS) 3-digit ZIP Code service area.
G6350	ZIP Code Tabulation Area (Five-Digit)	An approximate statistical-area representation of a U.S. Postal Service (USPS) 5-digit ZIP Code service area.
G6400	Commercial Region	For the purpose of presenting economic statistical data, municipios in Puerto Rico are grouped into commercial regions.
H1100	Connector	A known, but nonspecific, hydrographic connection between two nonadjacent water features.
H2025	Swamp/Marsh	A poorly drained wetland, fresh or saltwater, wooded or grassy, possibly covered with open water [includes bog, cienega, marais, and pocosin].
H2030	Lake/Pond	A standing body of water that is surrounded by land.
H2040	Reservoir	An artificially impounded body of water.
H2041	Treatment Pond	An artificial body of water built to treat fouled water.
H2051	Bay/Estuary/Gulf/Sound	A body of water partly surrounded by land [includes arm, bight, cove and inlet].
H2053	Ocean/Sea	The great body of salt water that covers much of the earth.
H2060	Gravel Pit/Quarry filled with water	A body of water in a place or area from which commercial minerals were removed from the Earth.
H2081	Glacier	A body of ice moving outward and down slope from an area of accumulation; an area of relatively permanent snow or ice on the top or side of a mountain or mountainous area [includes ice field and ice patch].
H3010	Stream/River	A natural flowing waterway [includes anabranch, awawa, branch, brook, creek, distributary, fork, kill, pup, rio, and run].
H3013	Braided Stream	A natural flowing waterway with an intricate network of interlacing channels.
H3020	Canal, Ditch or Aqueduct	An artificial waterway constructed to transport water, to irrigate or drain land, to connect two or more bodies of water, or to serve as a waterway for watercraft [includes lateral].

MTFCC	Feature Class	Feature Class Description
K1121	Apartment Building or Complex	A building or group of buildings that contain multiple living quarters generally for which rent is paid.
K1223	Trailer Court or Mobile Home Park	An area in which parking space for house trailers is rented, usually providing utilities and services.
K1225	Crew-of-Vessel Location	A point or area in which the population of military or merchant marine vessels at sea are assigned, usually being at or near the home port pier.
K1226	Housing Facility/Dormitory for Workers	A structure providing housing for a number of persons employed as semi-permanent or seasonal laborers.
K1227	Hotel, Motel, Resort, Spa, Hostel, YMCA or YWCA	A structure providing transient lodging or living quarters, generally for some payment.
K1228	Campground	An area used for setting up mobile temporary living quarters (camp) or holding a camp meeting, sometimes providing utilities and other amenities.
K1229	Shelter or Mission	A structure providing low-cost or free-living quarters established by a welfare or educational organization for the needy people of a district.
K1231	Hospital/Hospice/Urgent Care Facility	One or more structures where the sick or injured may receive medical or surgical attention [including infirmary].
K1233	Nursing Home, Retirement Home, or Home for the Aged	A structure to house and provide care for the elderly.
K1234	County Home or Poor Farm	One or more structures administered by a local government that serve as living quarters for the indigent.
K1235	Juvenile Institution	A facility (correctional and non-correctional) where groups of juveniles reside; this includes training schools, detention centers, residential treatment centers and orphanages.
K1236	Local Jail or Detention Center	One or more structures that serve as a place for the confinement of adult persons in lawful detention, administered by a local (county, municipal, etc.) government.
K1237	Federal Penitentiary, State Prison, or Prison Farm	An institution that serves as a place for the confinement of adult persons in lawful detention, administered by the federal government or a state government.
K1238	Other Correctional Institution	One or more structures that serve as a place for the confinement of adult persons in lawful detention, not elsewhere classified or administered by a government of unknown jurisdiction.
K1239	Convent, Monastery, Rectory, Other Religious Group Quarters	One or more structures intended for use as a residence for those having a religious vocation.

MTFCC	Feature Class	Feature Class Description
K1241	Sorority, Fraternity, or College Dormitory	One or more structures associated with a social or educational organization that serve as living quarters for college students.
K2100	Governmental	A place where employees are employed in federal, state, local, or tribal government.
K2146	Community Center	A meeting place used by members of a community for social, cultural, or recreational purposes.
K2110	Military Installation	An area owned and/or occupied by the Department of Defense for use by a branch of the armed forces (such as the Army, Navy, Air Force, Marines, or Coast Guard), or a state-owned area for the use of the National Guard.
K2165	Government Center	A place used by members of government (either federal, state, local, or tribal) for administration and public business.
K2167	Convention Center	An exhibition hall or conference center with enough open space to host public and private business and social events.
K2180	Park	Parkland defined and administered by federal, state, and local governments.
K2181	National Park Service Land	Area—National parks, National Monuments, and so forth—under the jurisdiction of the National Park Service.
K2182	National Forest or Other Federal Land	Land under the management and jurisdiction of the federal government, specifically including areas designated as National Forest, and excluding areas under the jurisdiction of the National Park Service.
K2183	Tribal Park, Forest, or Recreation Area	A place or area set aside for recreation or preservation of a cultural or natural resource and under the administration of an American Indian tribe.
K2184	State Park, Forest, or Recreation Area	A place or area set aside for recreation or preservation of a cultural or natural resource and under the administration of a state government.
K2185	Regional Park, Forest, or Recreation Area	A place or area set aside for recreation or preservation of a cultural or natural resource and under the administration of a regional government.
K2186	County Park, Forest, or Recreation Area	A place or area set aside for recreation or preservation of a cultural or natural resource and under the administration of a county government.
K2187	County Subdivision Park, Forest, or Recreation Area	A place or area set aside for recreation or preservation of a cultural or natural resource and under the administration of a minor civil division (town/township) government.
K2188	Incorporated Place Park, Forest, or Recreation Area	A place or area set aside for recreation or preservation of a cultural or natural resource and under the administration of a municipal government.

MTFCC	Feature Class	Feature Class Description
K2189	Private Park, Forest, or Recreation Area	A privately owned place or area set aside for recreation or preservation of a cultural or natural resource.
K2190	Other Park, Forest, or Recreation Area (quasi-public, independent park, commission, etc.)	A place or area set aside for recreation or preservation of a cultural or natural resource and under the administration of some other type of government or agency such as an independent park authority or commission.
K2191	Post Office	An official facility of the U.S. Postal Service used for processing and distributing mail and other postal material.
K2193	Fire Department	Fire Department.
K2194	Police Station	Police Station.
K2195	Library	Library.
K2196	City/Town Hall	City/Town Hall.
K2300	Commercial Workplace	A place of employment for wholesale, retail, or other trade
K2361	Shopping Center or Major Retail Center	A group of retail establishments within a planned subdivision sharing a common parking area.
K2362	Industrial Building or Industrial Park	One or more manufacturing establishments within an area zoned for fabrication, construction, or other similar trades.
K2363	Office Building or Office Park	One or more structures housing employees performing business, clerical, or professional services
K2364	Farm/Vineyard/Winery/Orchard	An agricultural establishment where crops are grown and/or animals are raised, usually for food.
K2366	Other Employment Center	A place of employments not elsewhere classified or of unknown type.
K2400	Transportation Terminal	A facility where one or more modes of transportation can be accessed by people or for the shipment of goods; examples of such a facility include marine terminal, bus station, train station, airport and truck warehouse.
K2424	Marina	A place where privately owned, light-craft are moored.
K2432	Pier/Dock	A platform built out from the shore into the water and supported by piles. This platform may provide access to ships and boats, or it may be used for recreational purposes.
K2451	Airport or Airfield	A manmade facility maintained for the use of aircraft [including airstrip, landing field and landing strip].
K2452	Train Station, Trolley or Mass Transit Rail Station	A place where travelers can board and exit rail transit lines, including associated ticketing, freight, and other commercial offices.

MTFCC	Feature Class	Feature Class Description
K2453	Bus Terminal	A place where travelers can board and exit mass motor vehicle transit, including associated ticketing, freight, and other commercial offices.
K2454	Marine Terminal	A place where travelers can board and exit water transit or where cargo is handled, including associated ticketing, freight, and other commercial offices.
K2455	Seaplane Anchorage	A place where an airplane equipped with floats for landing on or taking off from a body of water can debark and load.
K2456	Airport—Intermodal Transportation Hub/Terminal	A major air transportation facility where travelers can board and exit airplanes and connect with other (i.e. non-air) modes of transportation.
K2457	Airport—Statistical Representation	The area of an airport adjusted to include whole 2000 census blocks used for the delineation of urban areas.
K2458	Park and Ride Facility/Parking Lot	A place where motorists can park their cars and transfer to other modes of transportation.
K2459	Runway/Taxiway	A fairly level and usually paved expanse used by airplanes for taking off and landing at an airport.
K2460	Helicopter Landing Pad	A fairly level and usually paved expanse used by helicopters for taking off and landing.
K2540	University or College	A building or group of buildings used as an institution for post-secondary study, teaching, and learning [including seminary].
K2543	School or Academy	A building or group of buildings used as an institution for preschool, elementary or secondary study, teaching, and learning [including elementary school and high school].
K2545	Museum, Visitor Center, Cultural Center, or Tourist Attraction	An attraction of historical, cultural, educational or other interest that provides information or displays artifacts.
K2561	Golf Course	A place designed for playing golf.
K2564	Amusement Center	A facility that offers entertainment performances or sporting events. Examples include arena, auditorium, theater, stadium, coliseum, racecourse, theme park, fairgrounds, and shooting range.
K2582	Cemetery	A place or area for burying the dead [including burying ground and memorial garden].
K2586	Zoo	A facility in which terrestrial and/or marine animals are confined within enclosures and displayed to the public for educational, preservation, and research purposes.
K3544	Place of Worship	A sanctified place or structure where people gather for religious worship; examples include church, synagogue, temple, and mosque.

MTFCC	Feature Class	Feature Class Description
L4010	Pipeline	A long tubular conduit or series of pipes, often underground, with pumps and valves for flow control, used to transport fluid (e.g., crude oil, natural gas), especially over great distances.
L4020	Powerline	One or more wires, often on elevated towers, used for conducting high-voltage electric power.
L4031	Aerial Tramway/Ski Lift	A conveyance that transports passengers or freight in carriers suspended from cables and supported by a series of towers.
L4110	Fence Line	A man-made barrier enclosing or bordering a field, yard, etc., usually made of posts and wire or wood, used to prevent entrance, to confine, or to mark a boundary.
L4121	Ridge Line	The line of highest elevation along a ridge.
L4125	Cliff/Escarpment	A very steep or vertical slope [including bluff, crag, head, headland, nose, palisades, precipice, promontory, rim and rimrock].
L4130	Point-to-Point Line	A line defined as beginning at one location point and ending at another, both of which are in sight.
L4140	Property/Parcel Line (Including PLSS)	This feature class may denote a nonvisible boundary of either public or private lands (e.g., a park boundary) or it may denote a Public Land Survey System or equivalent survey line.
L4150	Coastline	The line that separates either land or Inland water from Coastal, Territorial or Great Lakes water. Where land directly borders Coastal, Territorial or Great Lakes water, the shoreline represents the Coastline. Where Inland water (such as a river) flows into Coastal, Territorial or Great Lakes water, the closure line separating the Inland water from the other class of water represents the Coastline.
L4165	Ferry Crossing	The route used to carry or convey people or cargo back and forth over a waterbody in a boat.
P0001	Nonvisible Linear Legal/Statistical Boundary	A legal/statistical boundary line that does not correspond to a shoreline or other visible feature on the ground.
P0002	Perennial Shoreline	The more-or-less permanent boundary between land and water for a water feature that exists year-round.
P0003	Intermittent Shoreline	The boundary between land and water (when water is present) for a water feature that does not exist year-round.
P0004	Other non-visible bounding Edge (e.g., Census water boundary, boundary of an aerial feature)	A bounding Edge that does not represent a legal/statistical boundary and does not correspond to a shoreline or other visible feature on the ground. Many such Edges bound area landmarks, while many others separate water features from each other (e.g., where a bay meets the ocean).

MTFCC	Feature Class	Feature Class Description
R1011	Railroad Feature (Main, Spur, or Yard)	A line of fixed rails or tracks that carries mainstream railroad traffic. Such a rail line can be a main line or spur line, or part of a rail yard.
R1051	Carline, Streetcar Track, Monorail, Other Mass Transit	Mass transit rail lines (including lines for rapid transit, monorails, streetcars, light rail, etc.) that are typically inaccessible to mainstream railroad traffic and whose tracks are not part of a road right-of-way.
R1052	Cog Rail Line, Incline Rail Line, Tram	A special purpose rail line for climbing steep grades that is typically inaccessible to mainstream railroad traffic. Note that aerial tramways and streetcars (which may also be called "trams") are accounted for by other MTFCCs and do not belong in R1052.
S1100	Primary Road	Primary roads are generally divided, limited-access highways within the interstate highway system or under state management, and are distinguished by the presence of interchanges. These highways are accessible by ramps and may include some toll highways.
S1200	Secondary Road	Secondary roads are main arteries, usually in the U.S. Highway, State Highway or County Highway system. These roads have one or more lanes of traffic in each direction, may or may not be divided, and usually have at-grade intersections with many other roads and driveways. They often have both a local name and a route number.
S1400	Local Neighborhood Road, Rural Road, City Street	Generally, a paved non-arterial street, road, or byway that usually has a single lane of traffic in each direction. Roads in this feature class may be privately or publicly maintained. Scenic park roads would be included in this feature class, as would (depending on the region of the country) some unpaved roads.
S1500	Vehicular Trail (4WD)	An unpaved dirt trail where a four-wheel drive vehicle is required. These vehicular trails are found almost exclusively in very rural areas. Minor, unpaved roads usable by ordinary cars and trucks belong in the S1400 category.
S1630	Ramp	A road that allows controlled access from adjacent roads onto a limited access highway, often in the form of a cloverleaf interchange. These roads are unaddressable and do not carry a name in the MAF/TIGER System.
S1640	Service Drive usually along a limited access highway	A road, usually paralleling a limited access highway, that provides access to structures along the highway. These roads can be named and may intersect with other roads.
S1710	Walkway/Pedestrian Trail	A path that is used for walking, being either too narrow for or legally restricted from vehicular traffic.
S1720	Stairway	A pedestrian passageway from one level to another by a series of steps.
S1730	Alley	A service road that does not generally have associated addressed structures and is usually unnamed. It is located at the rear of buildings and properties and is used for deliveries.

MTFCC	Feature Class	Feature Class Description
S1740	Private Road for service vehicles (logging, oil fields, ranches, etc.)	A road within private property that is privately maintained for service, extractive, or other purposes. These roads are often unnamed.
S1750	Internal U.S. Census Bureau use	Internal U.S. Census Bureau use.
S1780	Parking Lot Road	The main travel route for vehicles through a paved parking area.
S1820	Bike Path or Trail	A path that is used for manual or small, motorized bicycles, being either too narrow for or legally restricted from vehicular traffic.
S1830	Bridle Path	A path that is used for horses, being either too narrow for or legally restricted from vehicular traffic.
S2000	Road Median	The unpaved area or barrier between the carriageways of a divided road.

Note: The information in this table was last updated in November 2020.

APPENDIX D STANDARD STREET TYPE ABBREVIATIONS

Table 52: Standard Street Type Abbreviations

Street Name Type	Standard Abbreviation
ALLEY	ALY
ANEX	ANX
ARCADE	ARC
AVENUE	AVE
BAYOU	BYU
BEACH	BCH
BEND	BND
BLUFF	BLF
BLUFFS	BLFS
BOTTOM	BTM
BOULEVARD	BLVD
BRANCH	BR
BRIDGE	BRG
BROOK	BRK
BROOKS	BRKS
BURG	BG
BURGS	BGS
BYPASS	BYP
CAMP	CP
CANYON	CYN
CAPE	CPE
CAUSEWAY	CSWY
CENTER	CTR
CENTERS	CTRS
CIRCLE	CIR
CIRCLES	CIRS
CLIFF	CLF
CLIFFS	CLFS
CLUB	CLB
COMMON	CMN
COMMONS	CMNS
CORNER	COR
CORNERS	CORS
COURSE	CRSE
COURT	CT
COURTS	CTS
COVE	CV
COVES	CVS
CREEK	CRK
CRESCENT	CRES

Street Name Type	Standard Abbreviation
CREST	CRST
CROSSING	XING
CROSSROAD	XRD
CROSSROADS	XRDS
CURVE	CURV
DALE	DL
DAM	DM
DIVIDE	DV
DRIVE	DR
DRIVES	DRS
ESTATE	EST
ESTATES	ESTS
EXPRESSWAY	EXPY
EXTENSION	EXT
EXTENSIONS	EXTS
FALL	FALL
FALLS	FLS
FERRY	FRY
FIELD	FLD
FIELDS	FLDS
FLAT	FLT
FLATS	FLTS
FORD	FRD
FORDS	FRDS
FOREST	FRST
FORGE	FRG
FORGES	FRGS
FORK	FRK
FORKS	FRKS
FORT	FT
FREEWAY	FWY
GARDEN	GDN
GARDENS	GDNS
GATEWAY	GTWY
GLEN	GLN
GLENS	GLNS
GREEN	GRN
GREENS	GRNS
GROVE	GRV
GROVES	GRVS
HARBOR	HBR
HARBORS	HBRS
HAVEN	HVN
HEIGHTS	HTS

Street Name Type	Standard Abbreviation
HIGHWAY	HWY
HILL	HL
HILLS	HLS
HOLLOW	HOLW
INLET	INLT
ISLAND	IS
ISLANDS	ISS
ISLE	ISLE
JUNCTION	JCT
JUNCTIONS	JCTS
KEY	KY
KEYS	KYS
KNOLL	KNL
KNOLLS	KNLS
LAKE	LK
LAKES	LKS
LAND	LAND
LANDING	LNDG
LANE	LN
LIGHT	LGT
LIGHTS	LGTS
LOAF	LF
LOCK	LCK
LOCKS	LCKS
LODGE	LDG
LOOP	LOOP
MALL	MALL
MANOR	MNR
MANORS	MNRS
MEADOW	MDW
MEADOWS	MDWS
MEWS	MEWS
MILL	ML
MILLS	MLS
MISSION	MSN
MOTORWAY	MTWY
MOUNT	MT
MOUNTAIN	MTN
MOUNTAINS	MTNS
NECK	NCK
ORCHARD	ORCH
OVAL	OVAL
OVERPASS	OPAS
PARK	PARK

Street Name Type	Standard Abbreviation
PARKS	PARK
PARKWAY	PKWY
PARKWAYS	PKWY
PASS	PASS
PASSAGE	PSGE
PATH	PATH
PIKE	PIKE
PINE	PNE
PINES	PNES
PLACE	PL
PLAIN	PLN
PLAINS	PLNS
PLAZA	PLZ
POINT	PT
POINTS	PTS
PORT	PRT
PORTS	PRTS
PRAIRIE	PR
RADIAL	RADL
RAMP	RAMP
RANCH	RNCH
RAPID	RPD
RAPIDS	RPDS
REST	RST
RIDGE	RDG
RIDGES	RDGS
RIVER	RIV
ROAD	RD
ROADS	RDS
ROUTE	RTE
ROW	ROW
RUE	RUE
RUN	RUN
SHOAL	SHL
SHOALS	SHLS
SHORE	SHR
SHORES	SHRS
SKYWAY	SKWY
SPRING	SPG
SPRINGS	SPGS
SPUR	SPUR
SPURS	SPUR
SQUARE	SQ
SQUARES	SQS

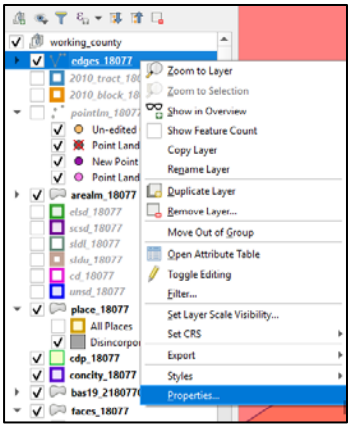
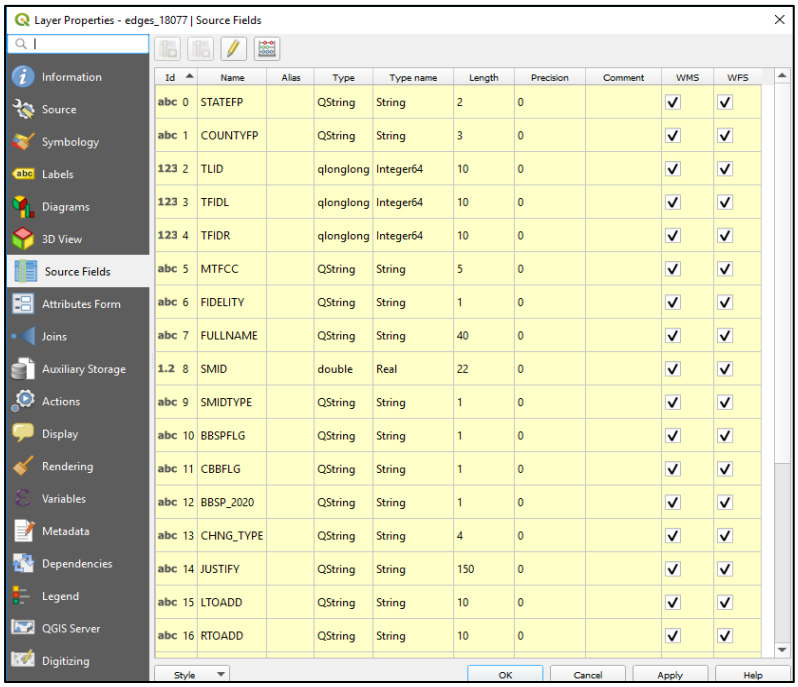
Street Name Type	Standard Abbreviation
STATION	STA
STRAVENUE	STRA
STREAM	STRM
STREET	ST
STREETS	STS
SUMMIT	SMT
TERRACE	TER
THROUGHWAY	TRWY
TRACE	TRCE
TRACK	TRAK
TRAFFICWAY	TRFY
TRAIL	TRL
TRAILER	TRLR
TUNNEL	TUNL
TURNPIKE	TPKE
UNDERPASS	UPAS
UNION	UN
UNIONS	UNS
VALLEY	VLY
VALLEYS	VLYS
VIADUCT	VIA
VIEW	VW
VIEWS	VWS
VILLAGE	VLG
VILLAGES	VLGS
VILLE	VL
VISTA	VIS
WALK	WALK
WALKS	WALK
WALL	WALL
WAY	WAY
WAYS	WAYS
WELL	WL
WELLS	WLS

APPENDIX E GUPS TOOLS

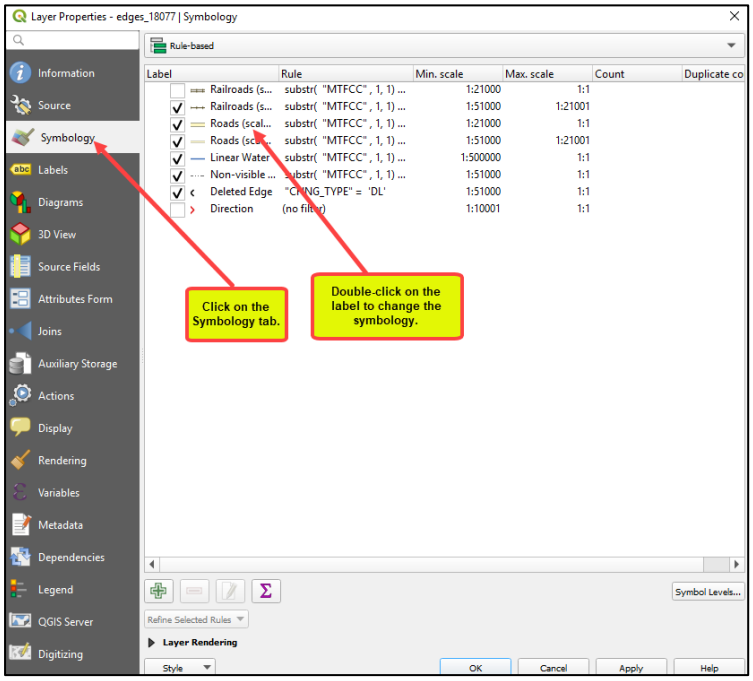
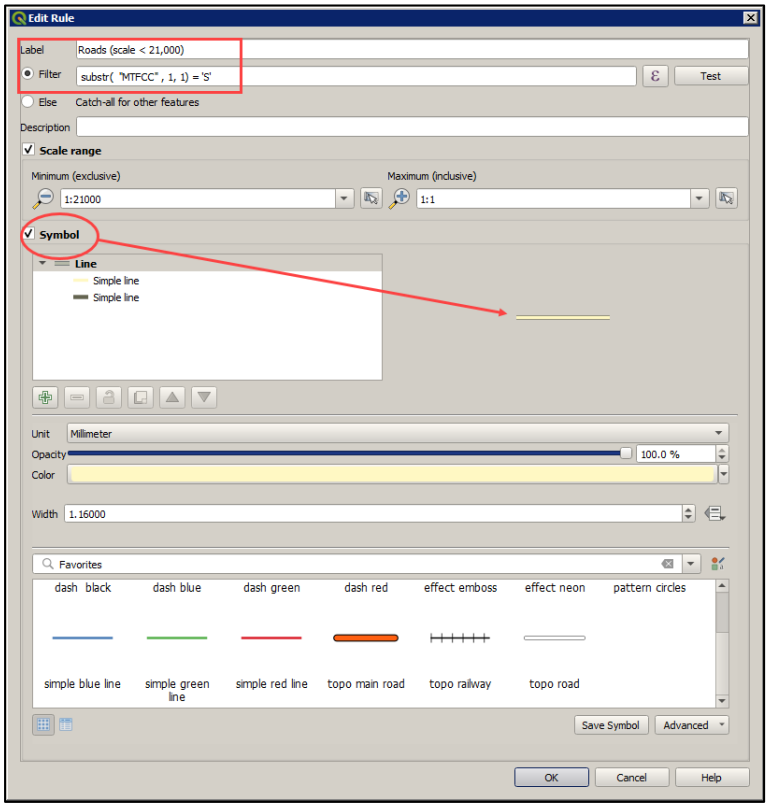
E1 Set Layer Symbology

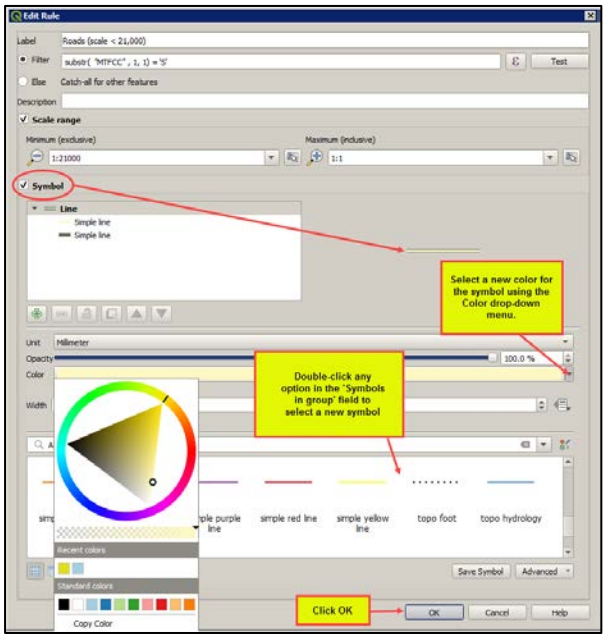
GUPS loads a default layer symbology established for each Census Bureau geographic partnership program. The default symbology can be changed to suit users' preferences. To change the default symbology for a layer in GUPS follow the instructions in **Table 53**.

Table 53: Reset Layer Symbology

Step	Action and *Result*
Step 1	Right-click on the layer in the **Layers Panel** (in this example, the Edges layer was selected*). The **Layers** drop-down menu opens.* 
Step 2	In the drop-down menu, choose 'Properties'. *The **Layer Properties** screen opens.* 

Id	Name	Alias	Type	Type name	Length	Precision	Comment	WMS	WFS
abc 0	STATEFP		QString	String	2	0		✓	✓
abc 1	COUNTYFP		QString	String	3	0		✓	✓
123 2	TLID		qlonglong	Integer64	10	0		✓	✓
123 3	TFIDL		qlonglong	Integer64	10	0		✓	✓
123 4	TFIDR		qlonglong	Integer64	10	0		✓	✓
abc 5	MTFCC		QString	String	5	0		✓	✓
abc 6	FIDELITY		QString	String	1	0		✓	✓
abc 7	FULLNAME		QString	String	40	0		✓	✓
1.2 8	SMID		double	Real	22	0		✓	✓
abc 9	SMIDTYPE		QString	String	1	0		✓	✓
abc 10	BBSPFLG		QString	String	1	0		✓	✓
abc 11	CBBFLG		QString	String	1	0		✓	✓
abc 12	BBSP_2020		QString	String	1	0		✓	✓
abc 13	CHNG_TYPE		QString	String	4	0		✓	✓
abc 14	JUSTIFY		QString	String	150	0		✓	✓
abc 15	LTOADD		QString	String	10	0		✓	✓
abc 16	RTOADD		QString	String	10	0		✓	✓

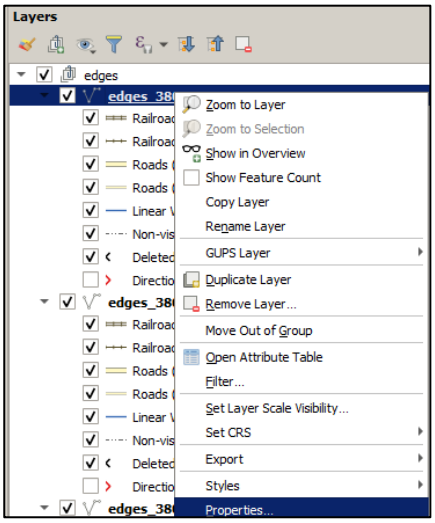
Step	Action and *Result*
Step 3	In the left-hand pane, click on **Symbology**, then double-click the symbol to be edited in the layers list. In this example, 'Roads, substr ("MTFCC, 1,1) = S1100' is selected.  The **Edit Rule** dialog box opens and the **Label** and **Filter** fields display the item chosen. The **Symbol** pane shows the current symbology (yellow line). 

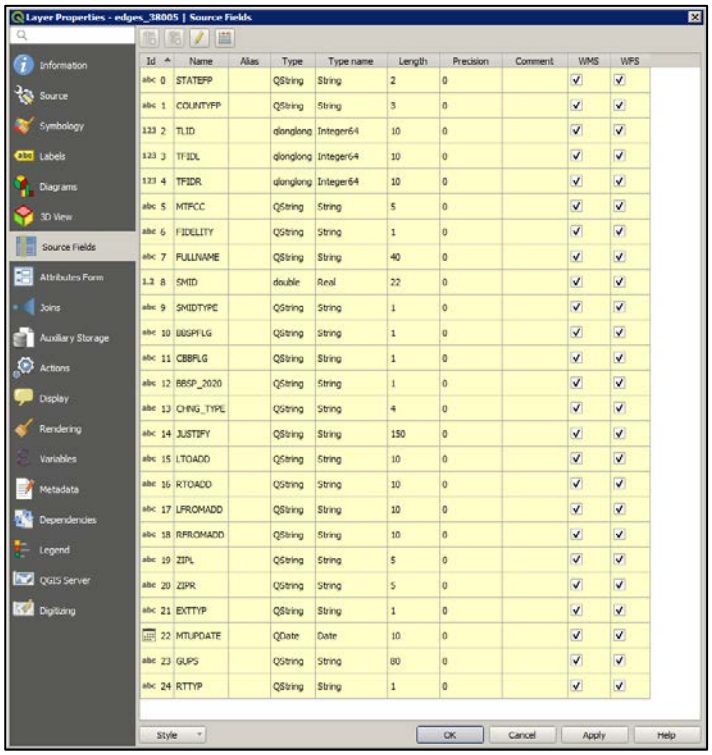
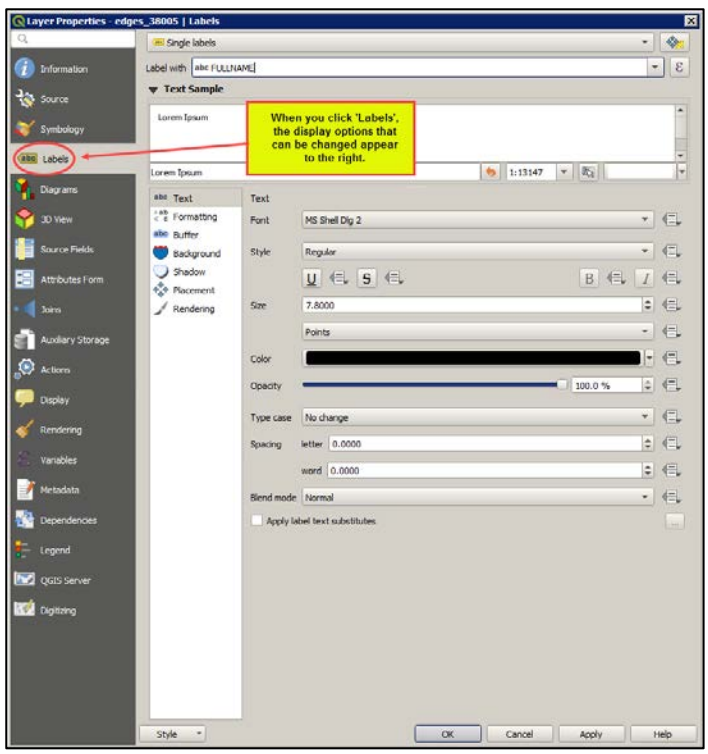
Step	Action and *Result*
Step 4	Choose a new color from the **Color** drop-down menu, or select a different symbol for the layer altogether by double-clicking any symbol in the **Symbols** field. Click **OK**. *The new symbology will display in the **Layers Panel** and in **Map View**.* 

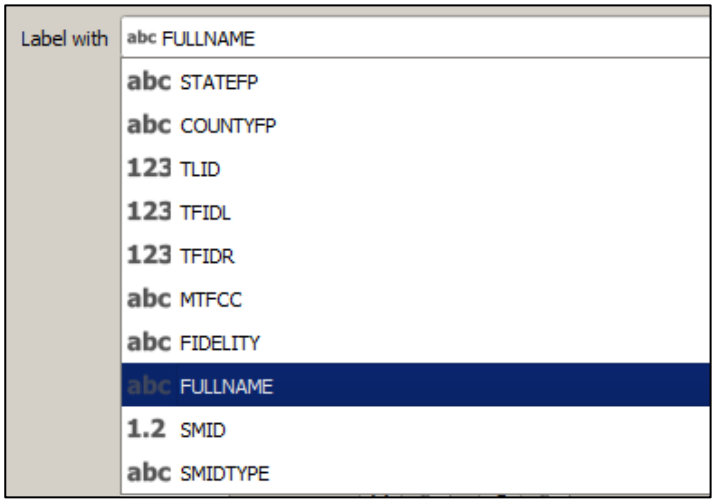
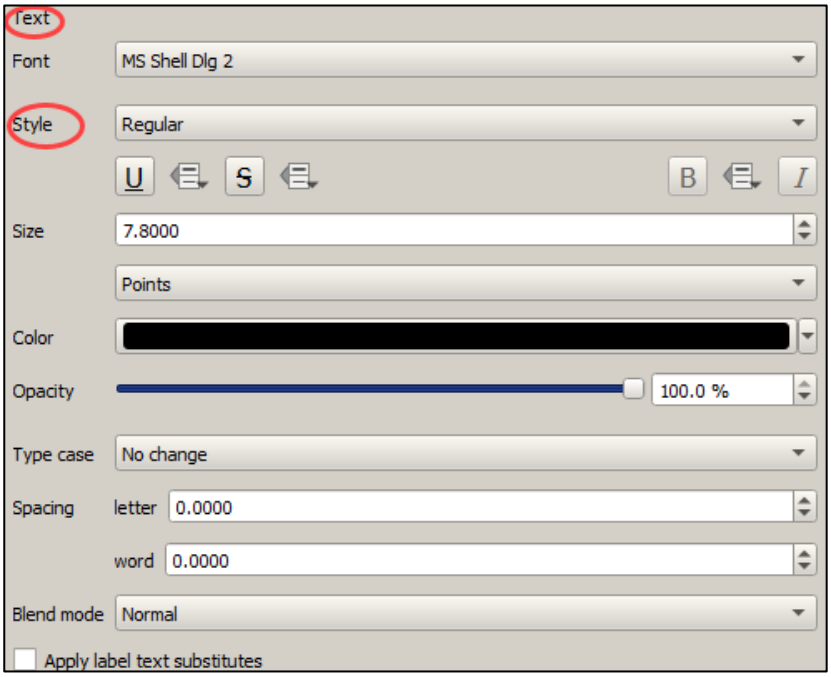
E2 Change Label Display

To change the default labeling for a layer, follow the steps in **Table 54**.

Table 54: Change Default Labeling

Step	Action and *Result*
Step 1	Right click on the layer (the edges layer is being selected) in the **Layers Panel**. *The Layers drop-down menu opens.* 

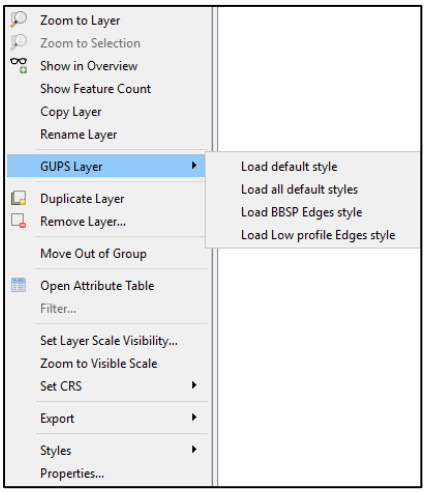
Step	Action and *Result*
Step 2	In the drop-down menu, choose 'Properties'. *The **Layer Properties** dialog box opens.* 
Step 3	In the far left-hand pane, click **Labels**. The options to change the label display properties open in the main window. 

Step	Action and *Result*
Step 4	To change the attribute field, click on the drop-down menu for 'Label this layer with' at the top of the screen, and select the desired option.  **<u>Text style</u>** options allow the user to change the font, style, size, color, transparency, type case, and spacing of layer labels. Shown below are the drop-down options for style. 

E4 Restoring Default Label Display Settings

To restore the default labeling for a layer, follow the steps in **Table 55**.

Table 55: Restoring Default Labeling

Step	Action and *Result*
Step 1	Right-click on the layer that was changed in the **Layers Panel**. *The layer's drop-down menu opens.*
Step 2	In this example, the Edges layer is selected. In the drop-down menu, click on the arrow to the right of '**GUPS Layer**'. Four options appear: '**Load default style**', '**Load all default styles**', '**Load BBSP Edges style**', '**Load Low profile Edges style**'. 
Step 3	Select '**Load default style**' to restore the selected layer's original properties OR select '**Load all default styles**' to reset *ALL* the layers to their original settings.

E5 Using the Layers Panel Toolbar to Manage Layers

Using the buttons on the toolbar located at the top of the Layers Panel, users can add and remove layers or groups, manage layer visibility, filter the legend by map content, expand or contract all sections of the Layers Panel list at once, and group layers.

The Layers Panel toolbar is shown below in **Figure 20**. The function of each of the buttons on the toolbar is described in **Table 56.**

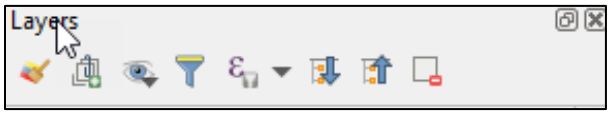
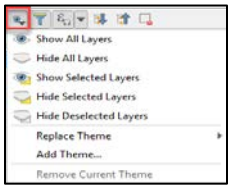
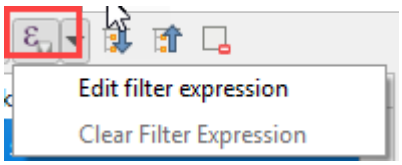


Figure 20. Layers Panel Toolbar

Table 56: Layers Panel Toolbar Buttons

Button	Name	Function/Description
	Open the Layer Styling Panel	Customize symbology and labels of a selected layer.
	Add Group	Allows the user to organize layers in the **Layers Panel** into groups.
	Manage Map Themes	 Allows the user various view options for **Layers**.
	Filter Legend by Map Content	Removes from the **Layers Panel** display any layers that are not currently in the **Map View** extent. This feature ensures that the **Layers Panel** does not contain entries for items not currently in the map view.
	Filter Legend by Expression	 Provides functions which aggregate values over layers and fields.
	Expand All	Expands the **Layers Panel** menus (+) to display all layers under each group's menu.
	Collapse All	Collapses the **Layers Panel** menus (-) to show only groups.
	Remove Layer/Group	Allows the user to remove a layer or group from the **Layers Panel**.

APPENDIX F MAF/TIGER FEATURE CLASSIFICATION

Table 57: MAF/TIGER Feature Classification

MTFCC	FEATURE NAME
S1100	Interstate Highway or Primary Road with limited access
S1200	Primary Road without limited access, US Highway, State Highway, or County Highway, Secondary and connecting roads
S1400	Local Neighborhood Road, Rural Road, City Street
S1500	Vehicular Trail (4WD)
S1630	Ramp
S1640	Service Drive usually along a limited access highway
S1710	Walkway/Pedestrian Trail
S1720	Stairway
S1730	Alley
S1740	Private Road for service vehicles (logging, oil fields, ranches, etc.)
S1750	Private Driveway
H3010	Stream/River
H3013	Braided Stream
H3020	Canal, Ditch or Aqueduct
R1011	Railroad Feature (Main, Spur, or Yard)
R1051	Carline, Streetcar Track, Monorail, Other Mass Transit Rail
R1052	Cog Rail Line, Incline Rail Line, Tram
P0001	Nonvisible Legal/Statistical Boundary
L4010	Pipeline
L4020	Power Transmission Line
L4110	Fence Line
L4121	Ridge Line
L4031	Aerial Tramway/Ski Lift
K2451	Airport or Airfield
L4140	Property/Parcel Line
L4165	Ferry Crossing

APPENDIX G SHAPEFILE NAMES

State Shapefile Names - PVS_20_v2_<layername>_<SS>.shp, where <SS> is the number corresponding to the state, for example, "24" and <layername> is the abbreviation for the shapefile layer, describe in detail below.

Table 58: State Shapefiles Names

Shapefile Layer	<layername>
American Indian Areas (AIA) – Legal	aial
2010 American Indian Areas (AIA) – Legal	aial2010
American Indian Areas (AIA) – Statistical	aias
American Indian Tribal Subdivisions (AITS) - Legal	aitsl
American Indian Tribal Subdivisions (AITS) - Statistical	aitss
Block Area Group	bag
Metropolitan Statistical Area/Metropolitan Statistical Area	cbsa
Congressional Districts	cd
Census Designated Place	cdp
Counties and Equivalent Areas	county
2010 Counties and Equivalent Areas	county2010
Elementary School Districts	elsd
County Subdivisions - Legal	mcd
New England City and Town Areas	necta
Incorporated Places	place
2010 Public Use Microdata Areas	puma2010
Secondary School Districts	scsd
State Legislative Districts Lower	sldl
State Legislative District Upper Chambers	sldu
State	state
Tribal Block Groups	tbg
Tribal Census Tracts	tct
2010 Census Tracts	tracts2010
Urban Area	uac
Unified School District State-Based	unsd

County Shapefile Names - PVS_20_v2_<layername>_<SSCCC>.shp, where <SSCCC> is the number corresponding to the state and county, for example, "24001" and <layername> is the abbreviation for the shapefile layer, describe in detail below.

Table 59: County Shapefiles Names

Shapefile Layer	<layername>
American Indian Areas (AIA) – Legal	aial
American Indian Areas (AIA) – Statistical	aias
American Indian Tribal Subdivisions (AITS) - Legal	aitsl
American Indian Tribal Subdivisions (AITS) - Statistical	aitss
Alaska Native Regional Corporations (ANRC)	anrc
Area Landmark	arealm
Block Area Groups	bag
Block Groups	bg
Metropolitan Statistical Area/Metropolitan Statistical Area	cbsa
Census County Division	ccd
Congressional Districts	cd
Census Designated Place	cdp
Consolidated Cities	concity
Counties and Equivalent Areas	county
Census Tracts - Current	curtracts
All Lines	edges
Elementary School Districts	elsd
Hawaiian Homelands (HHL)	hhl
County Subdivisions - Legal	mcd
New England City and Town Areas	necta
Offsets	offset
Incorporated Places	place
Point Landmarks	pointlm
2010 Public Use Microdata Areas	puma2010
Secondary School Districts	scsd
State Legislative Districts Lower	sldl
State Legislative Districts Upper	sldu
Subbarrios	submcd
Census Blocks - Current	tabblock
2010 Census Blocks	tabblock2010
2010 Traffic Analysis Delineation	tad2010
2010 Traffic Analysis Zones	taz2010
Tribal Block Groups	tbg
Tribal Census Tracts	tct

Shapefile Layer	<layername>
2010 Census Tracts	tracts2010
Census Urban Areas	uac
Urban Growth Area	uga
Hydrography - Area	water
Unified School Districts	unsd
Relationship Tables	
Address Ranges	addr
Topological Faces (2-cells with all geocodes)	faces
Topological Faces - Area Landmark Relationship	areafaces
Topological Faces - Area Hydrography Relationship	hydrofaces
Linear Feature Names - Fielded	allnames

APPENDIX H SHAPEFILE LAYOUTS

Table 60: Edges Shapefile (PVS_20_v2_edges)

Attribute Field	Length	Type	Description
STATEFP	2	String	FIPS state code
COUNTYFP	3	String	FIPS county code
TLID	10	Double	Permanent edge ID
TFIDL	10	Double	Permanent face ID (left)
TFIDR	10	Double	Permanent face ID (right)
MTFCC	5	String	MAF/TIGER Feature Class Code
FIDELITY	1	String	Indication to a respondent when their entity boundary has changed through spatial enhancement
FULLNAME	40	String	Decoded feature name with abbreviated qualifier, direction, and feature type
SMID	22	String	Spatial Theta ID
SMIDTYPE	1	String	SMIDTYPE code
BBSPFLG	1	String	Redistricting data project participant's submitted request of an EDGE for selection as a block boundary
CBBFLG	1	String	Indicates the status of an EDGE for a selection as a block boundary
BBSP_2010	1	String	New BBSP flag
CHNG_TYPE	4	String	Type of linear feature update
JUSTIFY	150	String	Justification of change
LTOADD	10	String	Left To address
RTOADD	10	String	Right To address
LFROMADD	10	String	Left From address
RFROMADD	10	String	Right From address
ZIPL	5	String	Left zip code
ZIPR	5	String	Right zip code
EXTTYP	1	Char	Extension type
MTUPDATE	10	Date	Date of last update to the edge

Table 61: Address Ranges Attribute File (PVS_20_v2_addr)

Attribute Field	Length	Type	Description
OID	8	STRING	Object ID
TLID	22	Integer	TIGER Line ID
STATEFP	2	String	FIPS State Code
COUNTYFP	3	String	FIPS County Code
FROMHN	12	String	From House Number

Attribute Field	Length	Type	Description
TOHN	12	String	To House Number
SIDE	1	String	Side Indicator Flag
ZIP	5	String	5-digit ZIP Code
PLUS4	4	String	ZIP+4 Code
LFROMADD	10	String	Left From Address
LTOADD	10	String	Left To Address
RFROMADD	10	String	Right From Address
RTOADD	10	String	Right To Address
ZIPL	5	String	Left 5-digit ZIP Code
ZIPR	5	String	Right 5-digit ZIP Code
ZIP4L	4	String	Left ZIP+4 Code
ZIP4R	4	String	Right ZIP+4 Code

Table 62: Census Block Shapefile (PVS_20_v2_tabblock2020)

Attribute Field	Length	Type	Description
BLKSZIND	1	String	Block Size Indicator
BLOCK	4	String	Block Number
BLOCKCE	4	String	Tabulation Block Number
BLOCKID	15	String	FIPS State Code, FIPS County Code, Census Tract Code, Block Number
COUNTYFP	3	String	Census County FIPS code
COUNTYFP10	3	String	FIPS County Code
FID	10	Integer	Permanent Face ID
NCELIGBLE	1	String	New Construction Program eligible
PARTFLG	1	String	Part Flag Indicator
Shape	7	String	Type of shape
STATEFP	2	String	Census state FIPS code
STATEFP10	2	String	FIPS State Code
SUFFIX1CE	2	String	Census Block Suffix 1
SUFFIX2CE	2	String	Census Block Suffix 2
TRACTCE10	6	String	Census tract code

Table 63: Census Tract Shapefile (PVS_20_v2_curtracts)

Attribute Field	Length	Type	Description
CHNG_TYPE	2	String	Type of area update
COUNTYFP	3	String	FIPS County Code
EFF_DATE	8	String	Effective Date or Vintage

Attribute Field	Length	Type	Description
FID	10	Integer	Permanent Face ID
JUSTIFY	150	Char	Justification
NAME	100	String	Name
NEW_CODE	2	String	New Congressional District Code
RELATE	120	String	Relationship Description
Shape	7	String	Type of shape
STATEFP	2	String	FIPS State Code
TRACTCE	6	String	Census Tract Code
TRACTID	11	String	FIPS State Code, FIPS County Code, Census Tract Code
TRACTLABEL	7	String	Tract number used for LUCA geocoding
TRACTTYP	1	String	Tract Characteristic Flag
VINTAGE	2	String	Vintage updated with returned data

Table 64: American Indian Areas Shapefile (PVS_20_v2_aial)

Attribute Field	Length	Type	Description
AIANNHCE	4	String	Census AIANNH Code
AIANNHFSR	1	String	Flag Indicating Level of Recognition of an AIA
AIANNHNS	8	String	ANSI numeric identifier for AIA areas
AREA	10	Double	Acreage of Area Update
AUTHTYPE	1	String	Authorization Type (O – Ordinance, R – Resolution, L – Local Law, S – State Level Action, X – Other)
CHNG_TYPE	2	String	Type of Area Update
CLASSFP	2	String	FIPS 55 Class Code Describing an Entity
COMPTYP	1	String	Indicates if Reservation, Trust Land, or both are Present
COUNTYFP	3	String	FIPS County Code
DOCU	120	String	Supporting Documentation
EFF_DATE	8	Date	Effective Date
FID	10	Integer	Permanent Face ID
FORM_ID	4	String	(MTPS and Web BAS Only)
FUNCSTAT	1	String	Functional Status
JUSTIFY	150	Char	Justification
LSAD	2	String	Legal / Statistical Area Description
NAME	100	String	AIA name
NAMELSAD	100	String	Name with Translated LSAD
PARTFLG	1	String	Part Flag Indicator
RELATE	120	String	Relationship description

Attribute Field	Length	Type	Description
Shape	7	String	Type of shape
STATEFP	2	String	FIPS State Code
VINTAGE	2	String	Vintage of the Data

Table 65: County and Equivalent Areas Shapefile (PVS_20_v2_county)

Attribute Field	Length	Type	Description
STATEFP	2	String	FIPS state code
COUNTYFP	3	String	FIPS county code
COUNTYNS	8	String	ANSI feature code for the county or equivalent feature
NAMELSAD	100	String	Name with translated LSAD code
LSAD	2	String	Legal/Statistical Area Description code
FUNCSTAT	1	String	Functional status
CLASSFP	2	String	FIPS 55 class code describing an entity
CHNG_TYPE	2	String	Type of area update
EFF_DATE	8	Date	Effective date or vintage
AUTHTYPE	1	String	Authorization type (O – Ordinance, R – Resolution, L – Local Law, S – State Level Action, X – Other)
DOCU	120	String	Supporting documentation
FORM_ID	4	String	Record ID (GUPS only)
AREA	10	Double	Area of update
RELATE	120	String	Relationship description
JUSTIFY	150	String	Justification of change
NAME	100	String	Entity name
VINTAGE	2	String	Vintage of the data

Table 66: County Subdivisions Shapefile (PVS_20_v2_mcd)

Attribute Field	Length	Type	Description
STATEFP	2	String	FIPS state code
COUNTYFP	3	String	FIPS county code
COUSUBFP	5	String	FIPS 55 county subdivision code
NAMELSAD	100	String	Name with translated LSAD
COUSUBNS	8	String	ANSI feature code for the county subdivision
LSAD	2	String	Legal/Statistical Area Description
FUNCSTAT	1	String	Functional status
CLASSFP	2	String	FIPS 55 class code describing an entity
CHNG_TYPE	2	String	Type of area update

Attribute Field	Length	Type	Description
EFF_DATE	8	Date	Effective date or vintage
AUTHTYPE	1	String	Authorization type (O – Ordinance, R – Resolution, L – Local Law, S – State Level Action, X – Other)
DOCU	120	String	Supporting documentation
FORM_ID	4	String	Record ID (GUPS only)
AREA	10	Double	Area of update
RELATE	120	String	Relationship description
JUSTIFY	150	String	Justification of change
NAME	100	String	Entity name
VINTAGE	2	String	Vintage of the data

Table 67: Incorporated Place Shapefile (PVS_20_v2_place)

Attribute Field	Length	Type	Description
STATEFP	2	String	FIPS state code
COUNTYFP	3	String	FIPS county code
PLACEFP	5	String	FIPS 55 place code
NAMELSAD	100	String	Name with translated LSAD
PLACENS	8	String	ANSI feature code for the place
LSAD	2	String	Legal / Statistical Area Description
FUNCSTAT	1	String	Functional status
CLASSFP	2	String	FIPS 55 class code describing and entity
PARTFLG	1	String	Indicates if only part of a feature is represented
CHNG_TYPE	2	String	Type of area update
EFF_DATE	8	Date	Effective date or vintage
AUTHTYPE	1	String	Authorization type (O – Ordinance, R – Resolution, L – Local Law, S – State Level Action, X – Other)
DOCU	120	String	Supporting documentation
FORM_ID	4	String	Record ID (GUPS only)
AREA	10	Double	Area of update
RELATE	120	String	Relationship description
JUSTIFY	150	String	Justification of change
NAME	100	String	Entity name
VINTAGE	2	String	Vintage of the data