# WISE-Inspector: data preparation tool for WISE-Decade CBAS

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# What is the WISE-Inspector?

The Consolidated Boundary Annexation Survey (CBAS) module of the WISE-Decade platform requires county ward data to be submitted in a specific way. The WISE-Inspector, an add-in module for ArcMap 10.1, .2, and .3 (10.4 to follow soon), was developed by Legislative Technology Services Bureau (LTSB) to assist in preparing this data for CBAS submission. It is not required to be used in the submission process but is meant to streamline data preparation by assisting in checking the geometry and the required fields as well as facilitate inspection of the data.

This module can be obtained from LTSB's website: http://legis.wisconsin.gov/ltsb/gis/wise-decade. To install the add-in, make sure that ArcMap is not open and double-click on the file "WISE_Inspector.esriAddIn". A screen will pop-up asking if you do in fact want to install the software and select "Install". Open up ArcMap and right-click on the top of the page and you should see a drop-down list of all the toolbars you can add; scroll down to "WISE-Inspector" and make sure it is checked. A small icon should appear , click on this to open up the WISE-Inspector.

If you have the first version of WISE-Inspector installed, you should be able to install the new version on top of the old version by simply double clicking on the add-in file. However, if this fails and you still only see the first version then select "Add-In Manager" from the "Customize" dropdown tab. Select WISE-Inspector from the menu and click delete. You may need to delete several versions. Close ArcMap and then double click on the second version of the add-in file and it should be set up appropriately. If this still doesn't work contact the LTSB-GIS team.

The WISE-Inspector tool performs several basic checks to make sure the required data is present and in the proper format for the CBAS module. Data is required to have a valid projection and be in polygon vector format. Additionally, the CBAS module requires three fields to be present and populated within the input ward layer. These are:

- WardID, the ward number for that municipality,
- COUSUBFP, the census code defining the municipality, and
- SuperID, the identification code for the county supervisory districts.

The aldermanic district can also be submitted to CBAS and used in WISE-Inspector, but this is not required. (If present, the aldermanic district must be submitted to CBAS titled AlderID.) WISE-Inspector checks for these fields when you import your data and assists in populating these fields. If these fields are populated and your data's geometry is satisfactory then using WISE-Inspector is not necessary and you can zip up your ward shapefile and submit it to the WISE-Decade platform.

WISE-Inspector is organized into two different windows. The first is called Field Populator and is for checking geometry and populating the required fields. The second window is the Inspect window and is for inspecting the information contained within the ward layer.

# Field Populator Window

To begin preparing your data with WISE-Inspector, open the WISE-Inspector menu from the toolbar. This first window is the Field Populator window (and yes, I know that populator isn't a real word). You will see four different sections, numbered 1 through 4, on the menu; each of these steps is explained below.

## 1. Input Ward Layer

In the first section, input your data by clicking the browse button [...], and navigate to your ward file, which can be a shapefile or a feature class within a file geodatabase; your data will automatically be loaded. You should see your ward layer added to the map, and you should see some information about the projection of your input layer; WISE-Inspector will say "Projection good" or "Projection check failed!" Once you load your data, WISE-Inspector checks the fields in the data, looking for the required fields. Then it checks to see whether those fields are populated and if they are it will give you a message saying which required fields have been found. You may see that WISE-Inspector has recognized one or more of your fields as being the required fields and the text has changed telling you so.  If you have submitted required fields but the tool is not recognizing them, this could be because it found too many records that were empty or had zeroes. Populating required fields is discussed further below. When data is loaded into WISE-Inspector, the program makes a copy of that data and stores it in a working folder titled "WISE_DECADE_WORKSPACE", which is put on the root of the C drive, i.e., "C:\WISE_DECADE_WORKSPACE". If the application is not able to make a folder in this location, a folder is created in your temporary directory ("C:\Users\<username>\AppData\Local\Temp\<tempfoldername>"). All the data that is manipulated and used in the program is copied to this folder and stored there. This folder is cleaned out whenever WISE-Inspector is started. You will also be asked to select your county. This information will be used in the next phase of the WISE-Inspector application.



## 2. Geometry Check

The next step after loading your data is checking the geometry. By clicking on the geometry button, WISE-Inspector will check your data's geometry for several different issues; it checks:

- to make sure the data can be run through a geoprocessor and
- to see if there are any gaps between wards.

You will see your ward layer turn hollow, with light grey lines after clicking this button. If the first of these checks fails then WISE-Inspector will tell you the geometry check failed. If this occurs it is likely that there are serious geometry errors in your data; if you don't know what to do, contact the LTSB. Wards should cover the entire county, in other words every place in the county should be within a ward. The gap check of WISE-Inspector tests to see if any small spaces between wards can be found. It *does not* fix any gap issues that may be present; if they are found they are colored red and returned to you in a layer. Note that this is only a check for gaps and is not an exhaustive catalogue of gaps within your data.
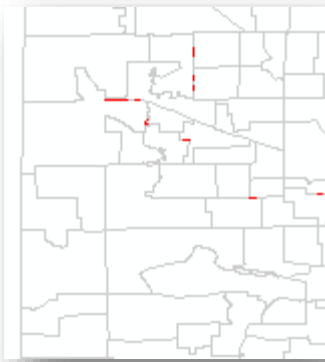
Gaps in your data do not mean you cannot submit your data to WISE-Decade, but they are an issue that should be addressed. The LTSB does not attempt to change or rectify any part of the geometry. The below shows what section 2 would look like after running a successful geometry check; note that if gaps were not found then this notice will not show up.
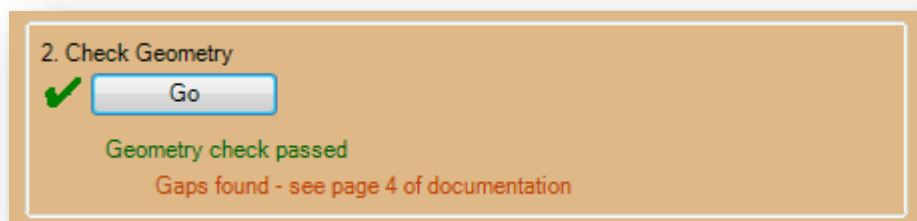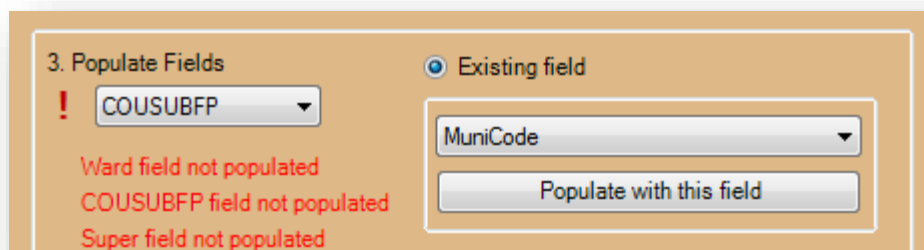


## 3. Populate Fields

The main goal of the Consolidated Boundary Annexation Survey (CBAS) is to derive and maintain an up-to-date statewide layer of municipal and county data. This information includes wards, municipal boundaries, municipal aldermanic districts, and county supervisor districts. All of these boundaries are based on wards and so can be derived from a code to specify which municipality, supervisory district and aldermanic district the ward belongs to. All of these boundaries can be created with just one layer of geometry, the ward boundaries, by dissolving on the attribute data relating to that layer. As mentioned earlier in this document, the WISE-Decade system requires submission of ward boundaries to have fields related to the three items above, WardID, COUSUBFP, and SuperID (AlderID is not required), which are required to be named in exactly this way. The WISE-Inspector Field Populator was constructed and designed for easily populating these fields within a ward file.

In section 3, "Populate Fields", underneath the heading you will see a drop-down menu that contains the required fields, as well as several options for how to populate these fields, and some messages indicating if a field has been populated or not. If you have loaded a ward layer that already has one or more of the required fields populated, you will notice a message in green letting you know that WISE-Inspector has found it populated (see below if this does not happen).
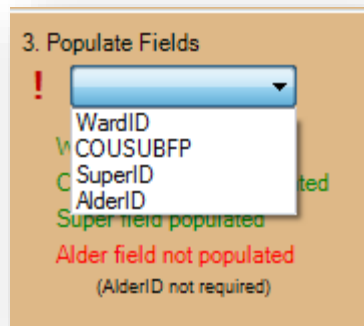
All of the required fields (and AlderID) are present within the drop-down menu. If the field is already populated you will see a green check mark and if it is not yet populated you will see a red exclamation point. To populate a required field, select it from the drop-down menu; the field selected is the field that will be populated using one of the options on the right of section 3.

There are three options for populating fields using WISE-Inspector. The first option, "Existing field," is for when the data for a required field, say COUSUBFP, are contained *within* the loaded layer in a field titled something other than COUSUBFP; for example this may be titled MuniCode. If this is the case, select the "Existing field" radio button. You can then select the field from which the data can be found from the dropdown menu, in our example MuniCode, and click the button titled "Populate with this field". The data will then transferred from one field (MuniCode) to the required field (COUSUBFP). This option is available for all of the fields.



The second option, "From external layer", should be used when the data for a required field is found within a different layer; for example a layer of the county supervisor districts might be used to populate the field SuperID. To transfer the data from the external layer, select the browse button and navigate to this external file, which can be a shapefile or a layer within a geodatabase. Then, from the drop-down, select the field from which the required field information can found, for example the district supervisor might be contained within the DistNum field, then select "Populate".
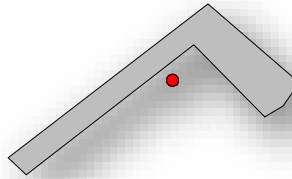
The data in the external layer are transferred to the ward layer by spatial join, specifically this tool uses the centroid, the center point of the ward feature, to extract the information from the external layer. Normally this works well but sometimes the centroid (which is calculated as the "balancing" point of the shape, see the red dot in the image) does not fall within the ward feature. We try to correct for this by finding a point that does fall within the shape's boundary to extract the relevant information. If this happens, the ward will be 'Flagged' for later inspection.
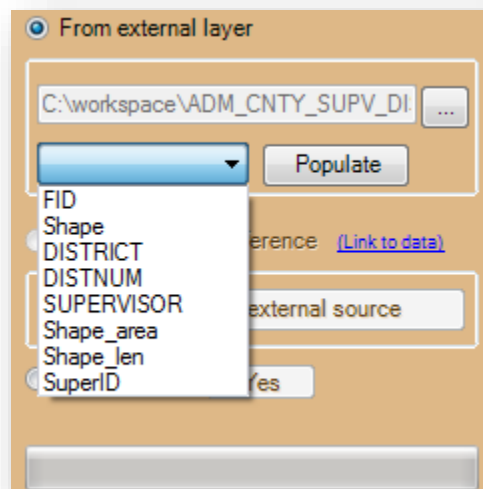


The third option, "From LTSB web reference", uses a reference layer on the web to assign information to each ward. This web layer, which can found by clicking on the link on the WISE-Inspector menu, is the layer collected from the previous CBAS submission. As of this writing that is the layer from January 2016. This information is obtained from previous submissions, so if there were errors in previous submissions then *these errors will be carried forward*. Just like the previous option, "From previous submission" does this by calculating the centroid of each ward layer, then extracting the attribute of interest from the reference layer found on the web. If the previous collection layer is not active you will instead see the button read "Populate from 2010 Blocks Layer". This means that there is an issue connecting to the previous submission layer and you will instead be using LTSB's block reference layer. More attention is needed in the inspection stages if you use this option when pulling information from

the block layer as it is more out of date. If you do not have an internet connection or if both of these layers are down, then this section will be disabled.

The previously described issues with property assignments based on centroids hold true for this option as well; after this tool populates the required field, do a quick check for assignment errors. This method cannot be used for the AlderID field.
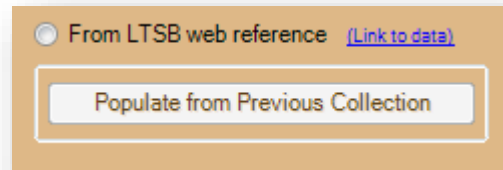


If you submitted a ward layer with a required field already populated but the message has not indicated this, it likely means a number of the rows in the field were not found to contain any data. If you would like to proceed with submitting this data, then you can select the fourth button in this section, marked "Already exists". Select this button and then "Yes" button next to it and you should see the text change to green. This will likely be the course of action for aldermanic districts, where many towns may not have aldermen.

When you run one of the options for a required field you will notice that WISE-Inspector is adding layers to the map. This is to illustrate what is happening to the fields of the loaded ward layer. A unique value renderer is applied with random colors to the required field of the ward layer; this results in a thematic map based on the required field. For example, when populating the COUSUBFP via the web reference, the resulting map is colored by municipality, which can then be examined for accuracy. When populating from an external layer, the external layer's symbology is changed to make the polygons hollow, no color, and the outside lines to be heavy and black. The loaded ward layer is colored based on the required field and so glaring issues can be found easily. Issues can also be addressed in the Inspect window.

## 4. Continue to Next Section

Click "Continue to Inspection" when you have completed populating your required fields. You will see a warning window if you have not selected your county or checked your geometry or if any of the required fields are not populated. If any required fields are not populated you cannot continue to the next window.

## Inspect Window

The second window is called Inspect and it facilitates checking over the attribute data of your ward layer. In the previous window, WISE-Inspector may have flagged some wards. If you were transferring data between layers (i.e., using "From external layer" or "From LTSB reference") then WISE-Inspector was looking for places where it may have made mistakes in assigning data to the ward layer. These cases include where the centroid lands outside of the boundaries of the polygon or if the polygon is small. These wards are added to what we are calling a "Flag List", a list of flagged of wards that need to be checked over. The Inspect window works by highlighting the flagged ward so you can verify that it was assigned the proper attribute data. To help you verify the data are accurate reference layers are symbolized and labeled and the required field attributes are easily editable.

After you click the "Continue to Inspection" button on the first window, the layers in your ArcMap window will be cleared and replaced with other layers. At the very minimum there will be three layers in

ArcMap's table of contents but more likely there will be at least four and there could be up to eight. One of the layers will be your ward layer, which will be present, symbolized by one of the required fields.
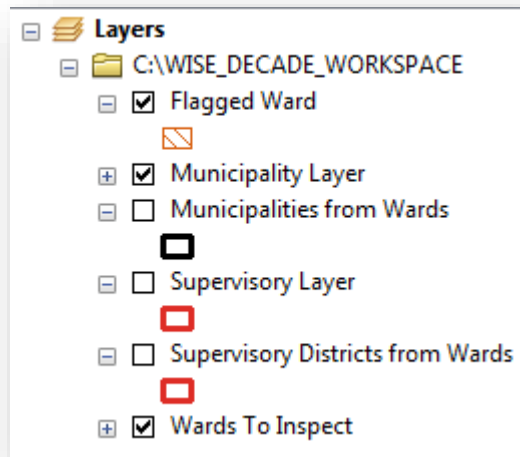


The first layer listed will be "Flagged Ward". This will be the first ward in the flag list. It will appear with a reddish-orange boundary with diagonal hatching. To better visualize where this is located you can click the "Flash" button in the upper right-hand corner, this will flash or temporarily highlight the flagged ward. It will not zoom to the layer. Note that if no wards were flagged, a pop-up window will appear telling you that nothing was flagged. You can continue to check your data, or you can navigate to the "Finish" section.

There will also be reference layers added to your map. These reference layers are meant to help you find mistakes in assignment. Some of these layers have been derived from your ward layer: a municipality layer and a supervisory layer and if AlderID has been included you will also see this in your table of contents. Derived layers have been created by dissolving your ward layer, these will have "from Wards" in the name of the layer. For example, the municipality layer derived from the ward layer using COUSUBFP will be named "Municipalities from Wards". These derived layers will appear hollow and labeled by the required field. Beneath these will be your ward layer symbolized by one of the required fields and labeled by the contents of the WardID field.

If you used external layers to populate the required fields, these will also be displayed in the table of contents. If a supervisory district layer was used to populate SuperID this will be named "Supervisory Layer" and if a layer of municipalities was used to populate COUSUBFP then this layer will be titled "Municipality Layer."

In the screenshot below, you can see the municipality layer with a black border, and the COUSUBFP labels in black on top of the ward layer that has been symbolized by municipality. The Flagged Ward layer is shown in orange hatching.
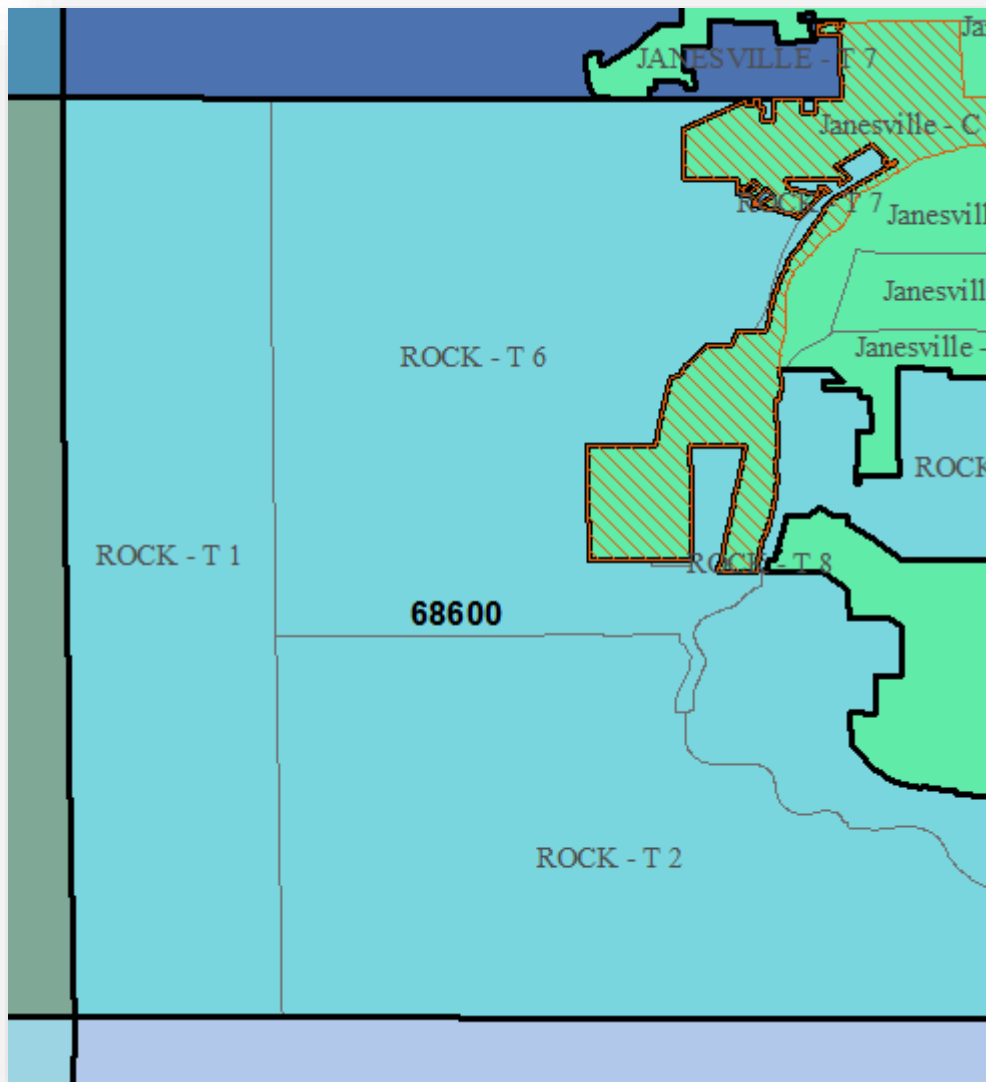
       The Inspect window consists of three sections, with the bulk of the functionality in the first section. At the top of these sections are two buttons, "Help" which opens a help document and "Flash" which will temporarily highlight the selected ward. What follows is a description of the different components contained in the Inspect window, described with an eye towards the intended workflow.

## Section A. Field Information

       This section represents the main functionality of the Inspect window. Displayed in section A are four blue text boxes, each one corresponds to one of the required fields (and AlderID). The attribute data from the flagged ward are displayed in each of these text boxes.

Below these text boxes are a large button titled "Update Fields" and smaller buttons titled "Back" and "Next". This constitutes the driving seat of the Inspect window. The "Back" and "Next" buttons are for moving forward and backward through the list of flagged wards. Between these buttons is a progress window that shows you the total number wards on the flag list as well as the currently selected ward, which is also shown in the map as the "Flagged Ward" layer. As you use click "Next" and "Back" notice that the blue text boxes above will be populated by that ward's data and the "Flagged Ward" layer will be updated in the map and you will be zoomed to the "Flagged Ward". If you notice that a ward has been assigned to the wrong district or municipality edit the appropriate text box with the correct information. (When you edit the box you will see the box turn red, this just indicates it has been changed.) If you have made changes you must click the "Update Fields" button to store this information or it will be lost if you move to the next ward. When you click "Update Fields" you will be prompted to confirm that you actually want to change your data. Similarly, you will be prompted with a text box when you have made changes to one of the fields and have not clicked the update button, you will be asked if you want to discard the changes you have made. Thus the heart of the Inspect window: navigate forward and backward with the "Next" and "Back" buttons, edit changes to the text boxes of the fields when they are incorrect and then click "Update Fields" to save these changes.

## Section B. Flag Additional Wards

This section is for adding other wards to the flag list. When moving through the flag list you may notice that some wards are miscoded but are not on the flag list. Click the "Add Ward to List" button to enter a mode where you can add other wards to this list. You will see the municipality name and ward number of the ward you have added to the flag list. You can only add one ward at a time. When you are finished flagging additional wards you can click the same button, now titled "Stop Adding". You will see that the total number in the progress window has increased. Also in this section is a button titled "Add All Wards", unsurprisingly this button adds all of the wards in your county to the flag list. Note that you cannot undo this. If a ward is already on the flag list and you click on it in the "Add…" mode this will select that ward and bring up its attribute data. It will not drop it from the flag list.
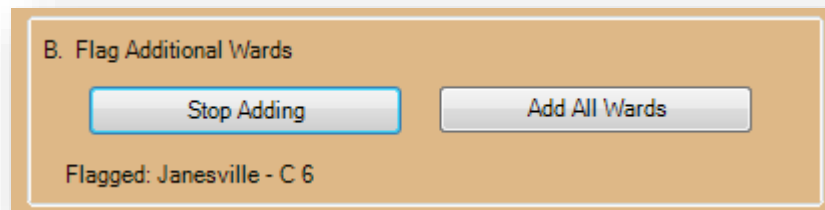




## Section C. Finish

The last section of the Inspect window is when you are finished checking over your data. When you are finished, you can click "Go" and you will be prompted for where you would like to save your data. This involves several more checks on the data, including if the status of the geometry check and if the required fields are populated. This step will also check to see if the WardID is unique among the wards; if this check fails the layer can still be submitted to the WISE-Decade platform but it may mean that there are multipart polygons or an incorrect assignment of COUSUBFP or WardID. If this step seems to run for a while, it may be because there were certain fields had reserved words as their title and WISE-Inspector is renaming them. These reserved words are part of Structured Query Language (SQL) and would likely cause errors when submitted to the WISE-Decade platform. The end product of this step is a compressed file of the ward shapefile, which can be uploaded into the WISE-Decade system.
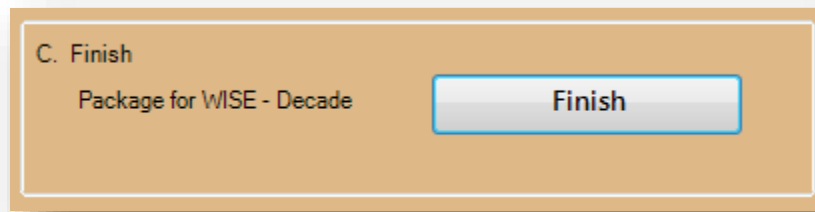
## Help and Comments

WISE-Inspector is meant to help streamline and assist you in your submission so if there are any issues, problems, or bugs please contact the LTSB-GIS team. We also welcome any ideas and suggestions about how to improve this application.

LTSB-GIS:

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