PM Designations Mapping Tool User Documentation

United States Environmental Protection Agency
July 2013

The US Environmental Protection Agency (EPA) developed and introduced the PM Designations Mapping Tool in the spring of 2013 to assist air agencies in developing their area designation and nonattainment boundary recommendations for the 2012 Revised Primary Annual Fine Particle National Ambient Air Quality Standard (NAAQS). In the guidance on "Initial Area Designations for the 2012 Revised Primary Annual Fine Particle National Ambient Air Quality Standard" that EPA signed April 16, 2013, EPA recommended that states and tribes base their boundary recommendations on an evaluation of information relevant to five factors: air quality data, emissions and emissions-related data, meteorology, geography/topography, and jurisdictional boundaries.

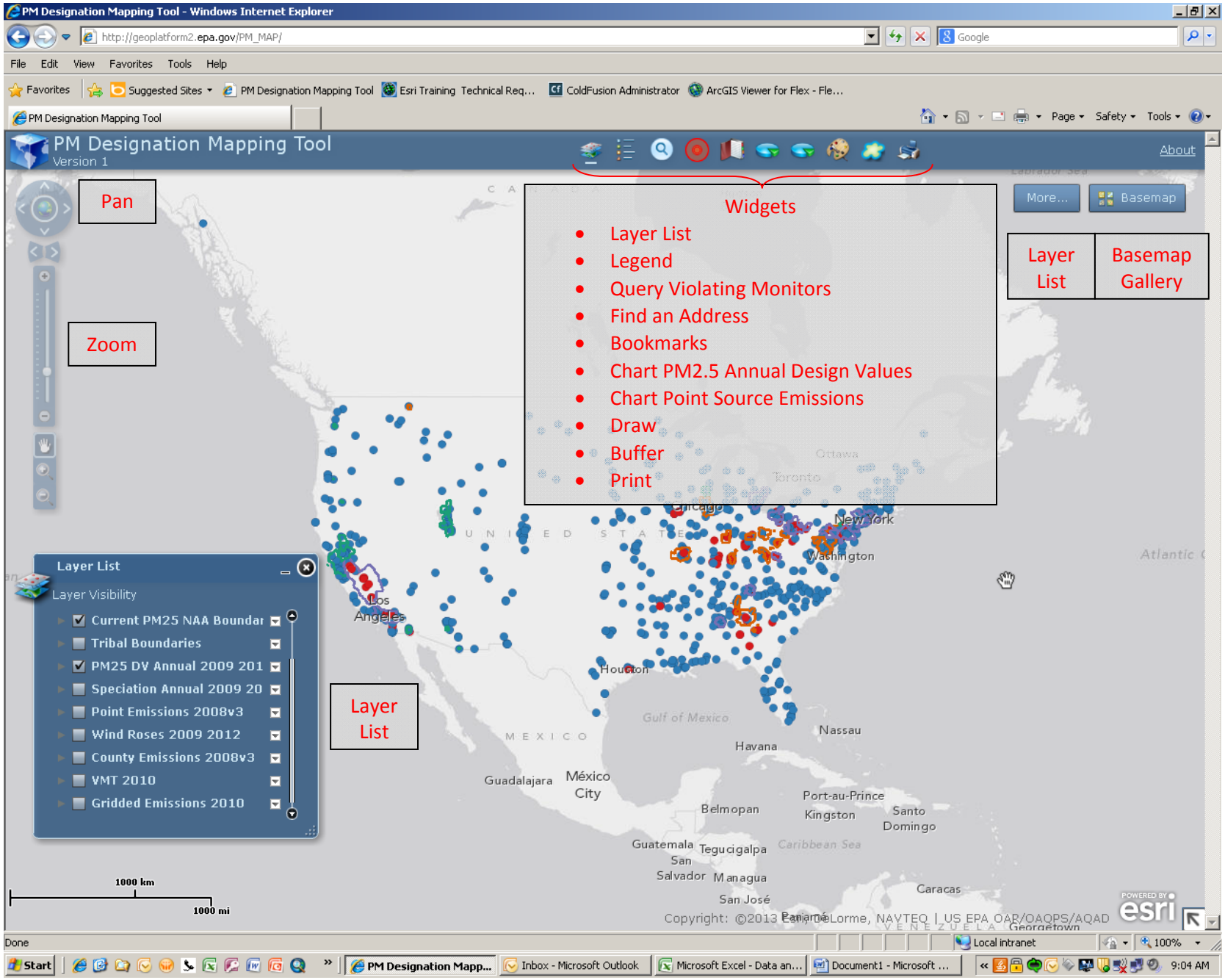
EPA has posted links to some of the datasets that we will use and/or develop as part of the five factor analysis within the initial area designations effort. These links are on the "Designations Guidance and Data" webpage (http://www.epa.gov/pmdesignations/2012standards/techinfo.htm), which is part of the main PM Designations webpage for the 2012 Annual Fine Particle ($PM_{2.5}$) NAAQS (http://www.epa.gov/pmdesignations/2012standards/index.htm). The PM Designations Mapping Tool allows air agencies, EPA regional offices, and other interested parties to visualize the datasets used as part of the five factor analysis.

This "PM Designations Mapping Tool User Documentation" provides screen shots from the PM Designations Mapping Tool and a description of the functions within the tool. This guide is intended to aid users as they "visualize" factors influencing the air quality in areas within their jurisdiction.

Additional questions regarding use of this tool and/or the initial area designations process for the 2012 Revised Primary Annual Fine Particle NAAQS may be directed to the following contacts within EPA's Office of Air Quality Planning and Standards:

- Doug Solomon (solomon.douglas @ epa.gov, 919-541-4132) – PM Designations Mapping Tool
- Beth Palma (palma.elizabeth @ epa.gov, 919-541-5432) – Designations Process and Policy
- Martha Keating (keating.martha @ epa.gov, 919-541-9407) – Designations Process and Policy

PM Designations Mapping Tool Overview



PM Designations Mapping Tool Description of Functions

Widget

A Widget is a software application (presented in the PM Designations Mapping Tool as icons) that does something useful with information and data gathered from other websites.

Pan

The Pan function moves the map without changing the scale. Users can “pan” by clicking on the pan tool in the direction you want to move the map or by holding down the left mouse button and moving the mouse in the direction you want the map to move.

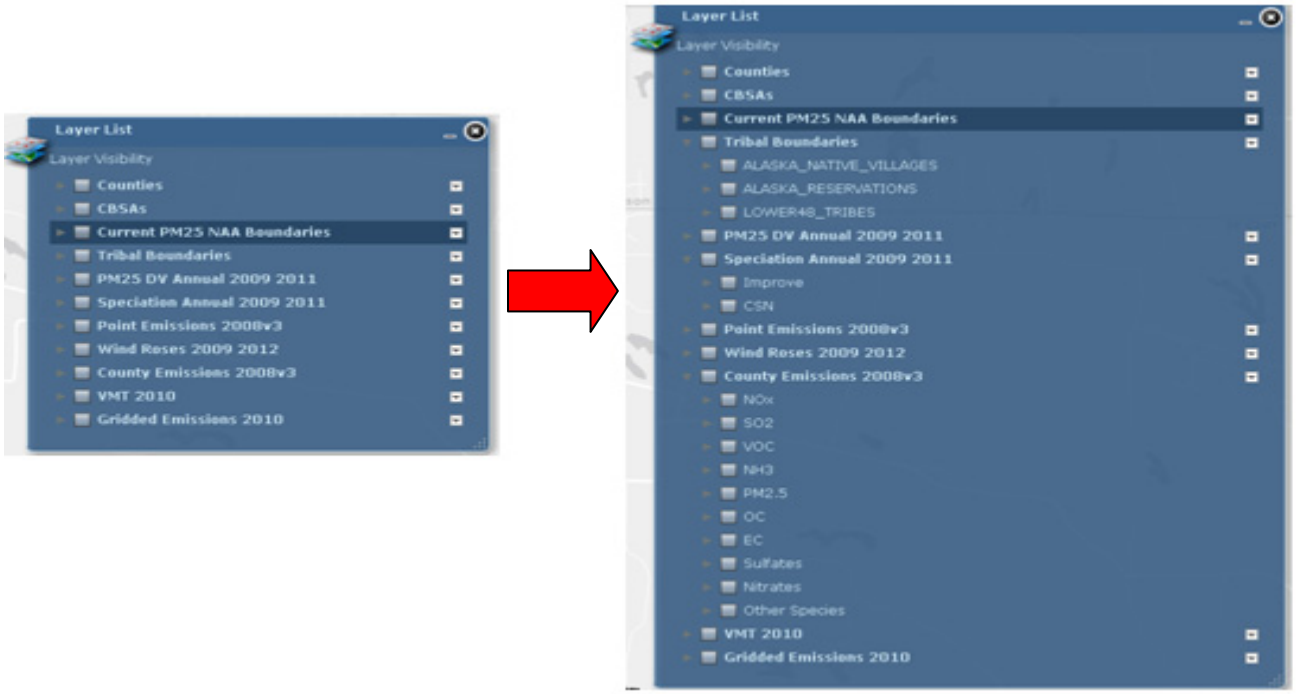
Zoom

The Zoom function moves the map by changing the scale. Users can “zoom” by moving the slider on the zoom tool or by positioning the mouse pointer on the map and double clicking the left mouse button.

Layer List

The Layer List widget provides PM Designations Mapping Tool users with the ability to turn map services (and their layers) on and off. The list of layers that appear in the widget are the operational layers listed in the Viewer application's main configuration file.

In the following screen shot, eleven operational layers are available in the widget. Each layer has a check box that allows end users to easily turn the layer visibility on and off. Most of the operational layers have expansion arrows indicating that they contain sublayers. The second screen shot displays the sublayers for the Tribal Boundaries, Speciation Annual 2009-2011, and County Emissions 2008v3 layers. Visibility for the sublayers can also be set in this widget.

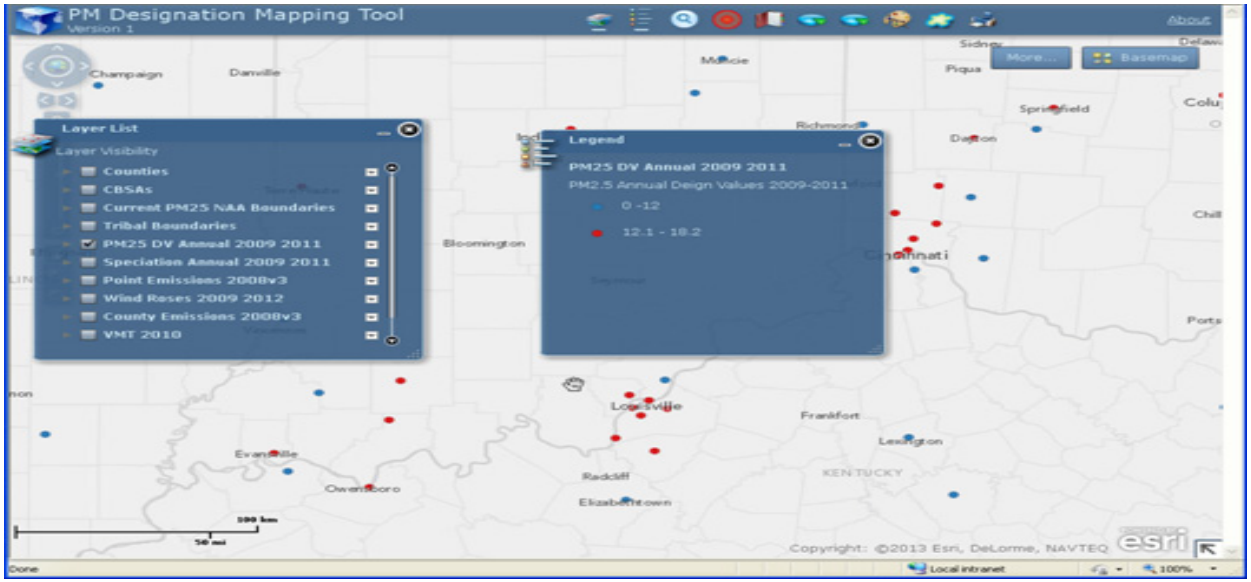


Legend

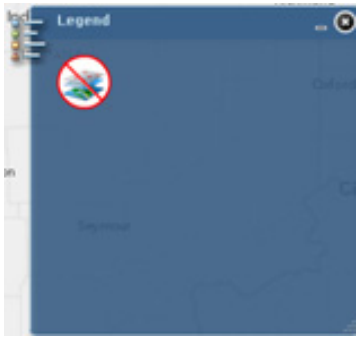
A Legend conveys the meaning of the symbols used to represent features on the map to a map reader. Legends consist of map symbols with labels containing explanatory text. The Legend widget provides a dynamic legend for the PM Designations Mapping Tool and automatically updates if the visibility of a layer or sublayer changes.

The Legend widget supports dynamic, tiled, and feature layer types. An image is of a Legend widget follows:

In the following example, the $PM_{2.5}$ Design Value Annual 2009-2011 operational layer is displayed in the map, so the Legend widget shows its different symbology. Since the other operational layers are not currently rendered in the Viewer map display, they are not shown in the Legend widget. If they were rendered, their symbologies would be immediately added to the Legend widget contents.



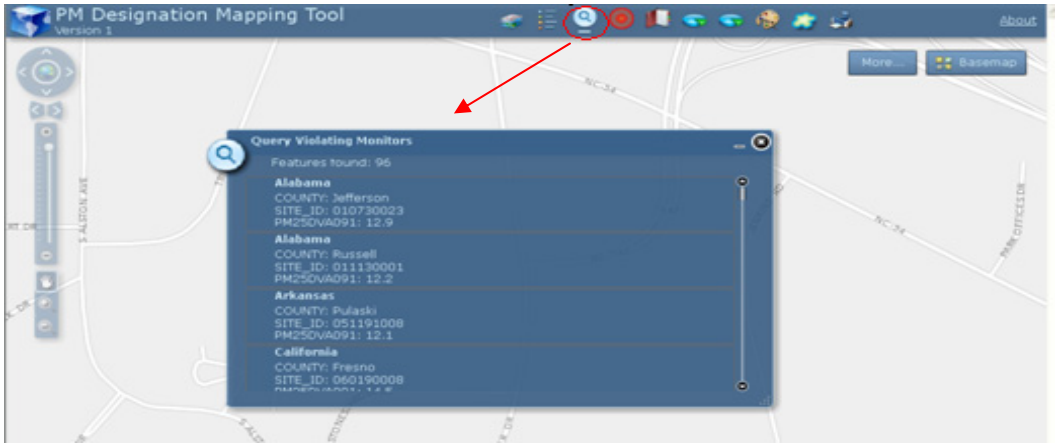
When no operational layers are rendered in the map, the Legend widget will show a No layers present icon in its dialog window as shown in the following screen shot:



Basemaps are not shown in the Legend widget by default. The order in which layers appear in the Legend widget corresponds to the layer order in the Viewer configuration file. The widget can also be set to highlight scale dependencies that are set for different layers in the map by showing their legend properties with 50 percent transparency. This can be a useful indicator to map readers that additional data layers are present in the Viewer but are currently not displayed in the map because of scale dependencies.

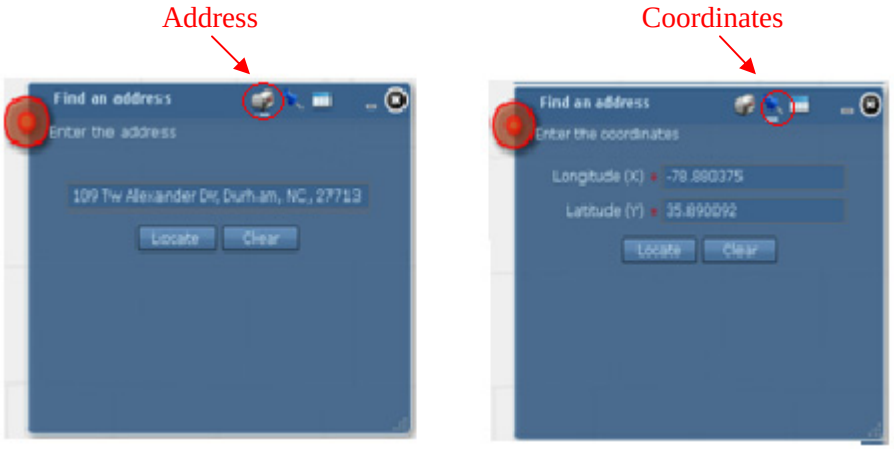
Query Violating Monitors

The Query Violating Monitors widget enables users to query information from a map service by executing a predefined query. In this case the query returns a list of all monitors with an annual $PM_{2.5}$ Design Value greater than 12.0 micrograms per cubic meter ($\mu g/m^3$), the level of the 2012 Revised Primary Annual $PM_{2.5}$ NAAQS. Clicking on any of the returned items on the list and the map will automatically zoom to that monitor.

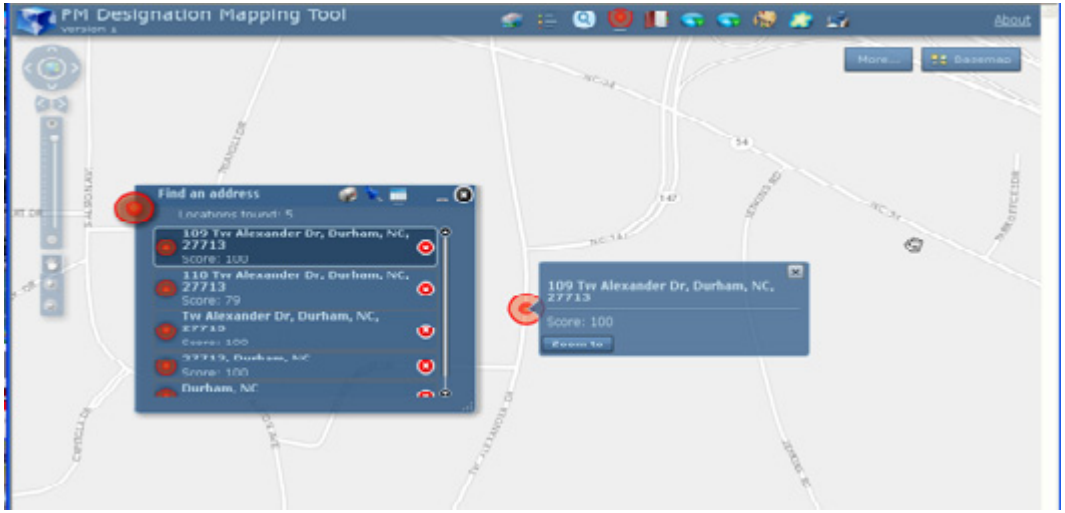


Find an Address

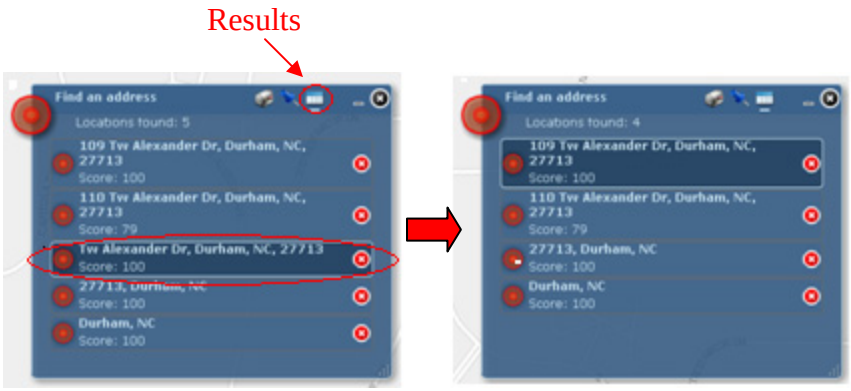
The Find an Address widget (a.k.a., geocoding widget) enables end users to find a location on the displayed map content in the Viewer. The Find an Address widget provides two ways to find a location: entering an address or longitude/latitude coordinate values. ArcGIS users will note that the Find an Address function works primarily with geocoding services from ArcGIS for Server.



The matching geocoded results are returned as a list in the widget, under the **Results** tab. Their list order is based on their geocoding match scores, with the highest scoring result at the top. When a location matches with a score of 100, the map display zooms to its location. A locate symbol is placed on the map along with an Info pop-up window for the matching record as shown in the screen shot below.



Each result in the geocoded result list has a red circle X icon. Clicking it removes the returned result from the list.

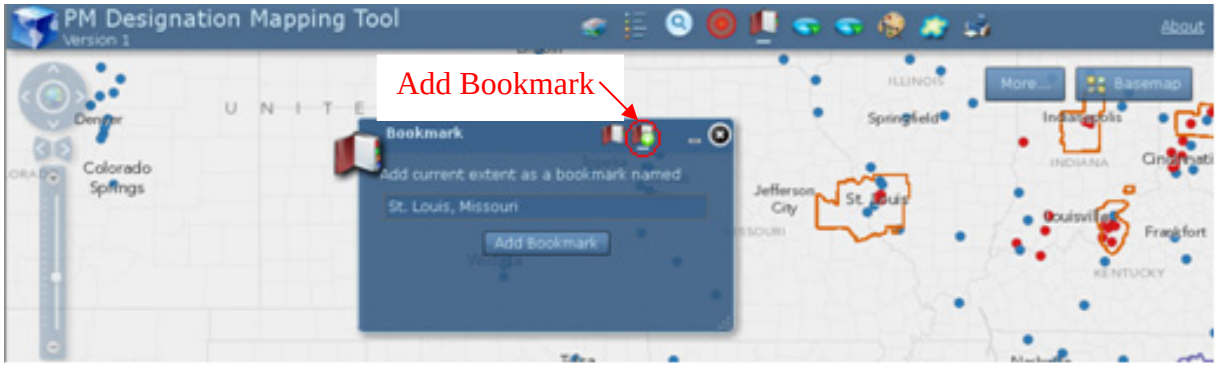


Bookmarks

Bookmarks enable users to create and add their own spatial bookmarks.

The Bookmarks button displays the list of spatial bookmarks. The list can be customized by editing the Bookmark widget configuration file—for example, individual bookmarks can be added, removed, and reordered.

Clicking the Add Bookmark button enables end users to define and add their own custom spatial bookmark, which is based on the current view extent in the map display. These bookmarks are cached locally for a specific computer and user profile.



Spatial bookmarks created by users appear at the bottom of the bookmark list in the order they are created. Users cannot reorder or sort the bookmark list. Clicking the red circle with the x symbol for an end user-defined bookmark will remove it from the list.

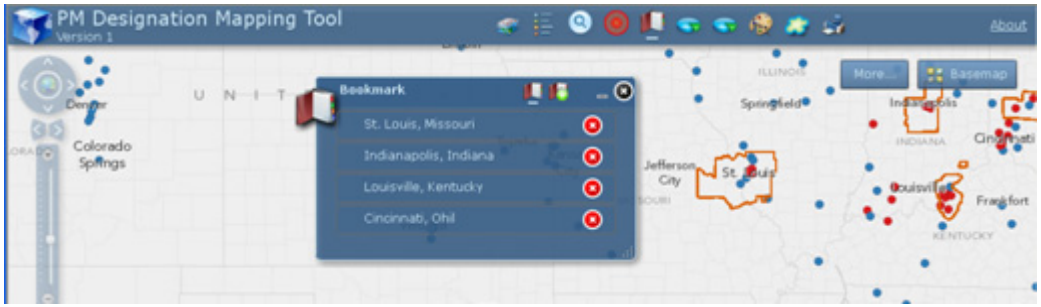


Chart $PM_{2.5}$ Annual Design Values and Chart Point Source Emissions

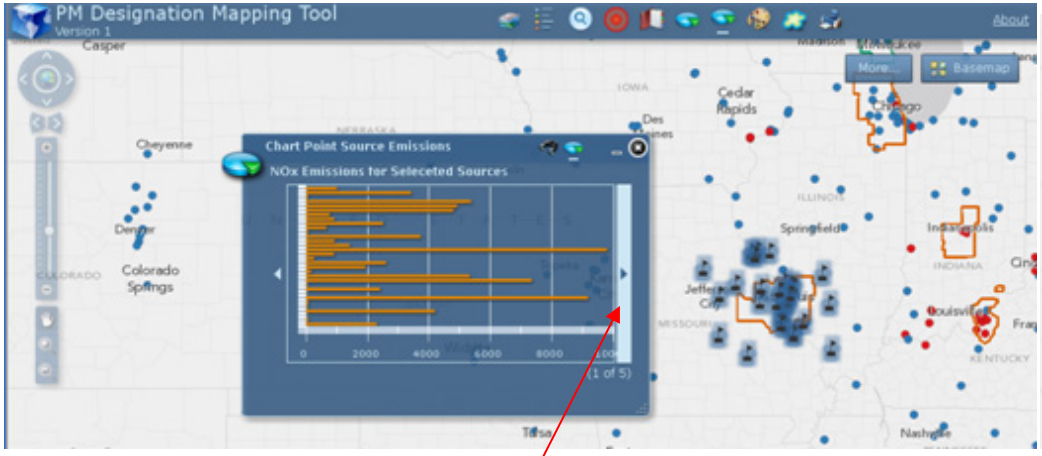
The Chart widget displays quantitative attributes from a map layer as a graphical representation of data. The Chart widget is designed to make it easy for users to observe possible patterns and trends in quantitative attribute data, as charts can usually be read more quickly than the raw data from which they are produced.

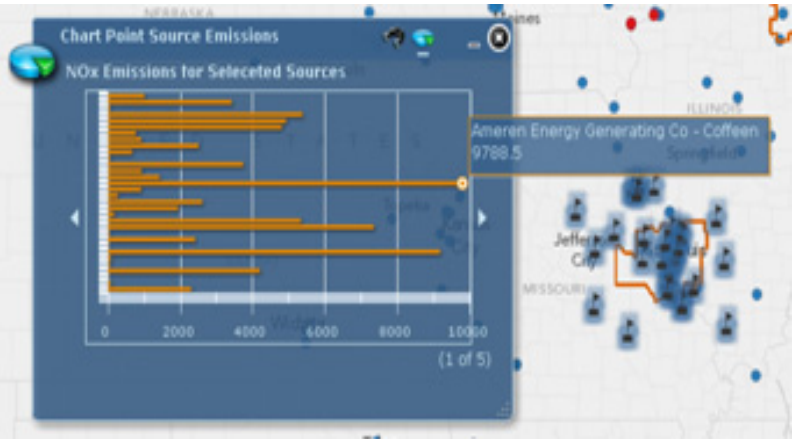
When a user activates the Chart widget, s/he needs to provide the following two inputs:

1. Select the data layer from which to retrieve the data.
2. Select a graphical spatial search tool and provide an input selection on the map display.

In the graphic below, the Chart Point Source Emissions layer and the Draw Freehand Polygon spatial search tool are selected. The graphical region surrounding the St. Louis, Missouri area was selected in the map by right clicking the mouse and expanding the size of the polygon as desired.

Clicking Results or releasing the mouse will display the Chart widget results. In this example, the PM Designations Mapping Tool displays the point sources within the selected geographic region and the Chart widget displays a bar chart displaying emissions for the sources within the selected geographic region. Clicking the Window Advance arrow displays the emissions for the next pollutant. Hover the pointer over each individual bar to display the source name and the emissions total in tons per year as extracted from the EPA's National Emissions Inventory.





Window Advance

Draw

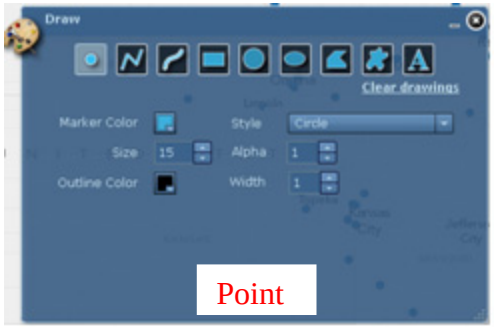
The Draw widget enables users to draw simple graphics and add text onto the map display. It also provides basic sketching and redlining functionality. For example, to snap a node to a node of another feature, press the ***Ctrl*** key to enable snapping. It also provides some measurement capability by displaying measurement values (if activated) for drawn features: lengths for lines, and areas and perimeters for polygons. When the widget is initially activated, the end user is presented with a dialog box that contains nine feature creation tools. From left to right, they are as follows:

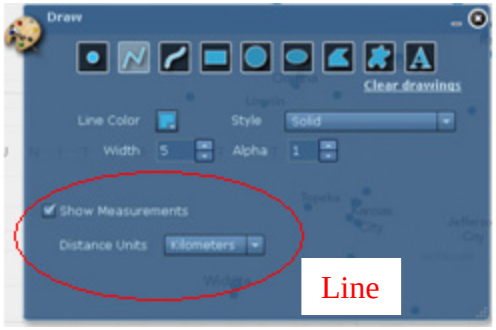
- point
- polyline
- freehand line
- rectangle
- circle
- ellipse
- polygon
- freehand polygon
- text

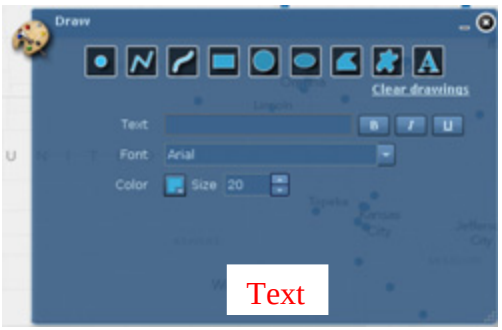
To use the Draw widget:

1. Select a feature creation tool by clicking it. When the feature creation tool is selected, its icon displays with a yellow highlight. Once a tool is selected, specific feature properties for that particular tool appear in the widget. Feature properties vary for different types of features:

- point
- lines (includes polyline and freehand line)
- polygons (includes rectangle, circle, ellipse, polygon, and freehand polygon)
- text

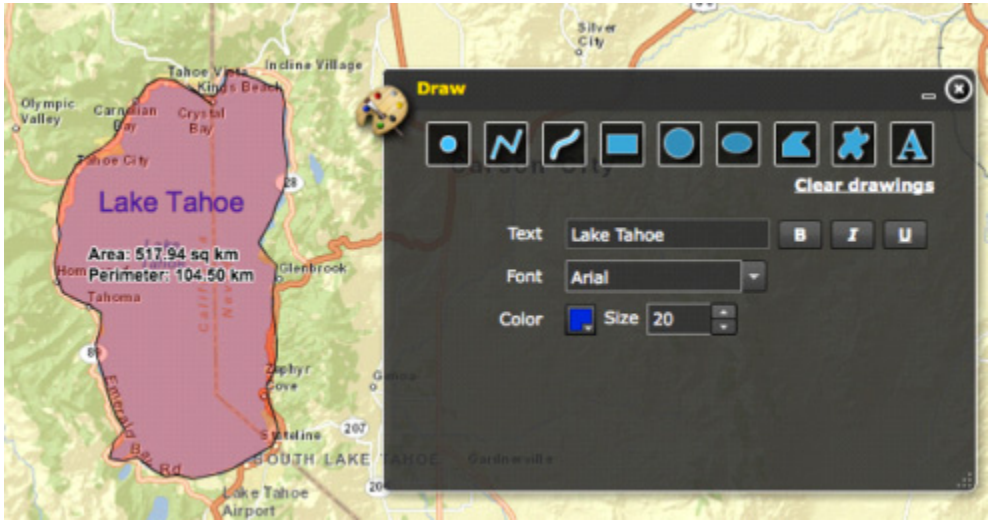






2. Before creating a new feature, end users have the option to customize the feature properties for the feature they create. Note that line and polygon features also support measurement values, which must be activated by checking the Show Measurements check box (see circled area in screen captures above).

3. To add a new feature, click the map at the desired location and define the feature extent, then double-click to finish the feature. In the case of the text tool, the text string needs to be specified in the Text input box first, and then click the map to place the text.



Note:

Measurement options must be set before a feature is created to allow for display on the map. Line features have a length; polygon features have an area and a perimeter.

To remove the newly added feature (or text), click **Clear drawings**.

Caution:

This will remove all features and text from the display.

Created features and text are temporary and only visible when the Draw widget is active or minimized. They are located on a graphics layer that is automatically instantiated when the widget is opened for the first time. They are removed from the map display when the Draw widget is closed. Features and text will reappear when the Draw widget is reactivated.

Print

The Print widget allows users to output their map to a set of output types, such as PDF, PNG, JPG, GIF and SVG.

Basemap

Opens the Basemap Gallery. Basemaps are the canvas upon which you paint your data, the foundation that helps you create a map quickly and easily. Click on the desired Basemap and it will appear as the background layer for your map. Basemaps available in the PM Designations Mapping Tool include: Light Gray Canvas, Imagery, Imagery with Labels, Streets, Topographic, Terrain with Labels, National Geographic, Oceans, and OpenStreetMap. Users may find different Basemaps helpful when developing maps to illustrate specific points within the five-factor analyses. For example, when creating maps showing emissions sources relative to county boundaries, a user might select the “Light Gray Canvas” Basemap. When providing evidence supporting the geography/topography factor, users may choose a Topographic Basemap.