MassDEP TMDL Viewer User Guide

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About the Viewer

The Massachusetts Department of Environmental Protection (MassDEP) created a geospatial data layer that synthesizes information related to Total Maximum Daily Load (TMDL) plans. The TMDL Viewer displays drainage areas and associated information for multiple TMDLs that were developed for specific pollutants by the Watershed Planning Program at MassDEP. TMDLs are required by the federal Clean Water Act (CWA) Section 303(d) and approved by the U.S. Environmental Protection Agency (EPA).

Overview

Section 303(d) of the CWA and EPA's Water Quality Planning and Management Regulations (40 CFR Part 130) requires States to develop TMDLs for waterbodies that are not meeting designated uses under technology-based controls. The TMDL process establishes the maximum allowable loading of pollutants that a waterbody can receive and still meet State water quality standards, which designate beneficial uses of surface waters and establish water quality criteria to enhance, maintain, and protect those designated uses. Through this process, States implement water quality-based controls to reduce pollutant loadings from both point and nonpoint sources and restore and maintain the quality of their water resources.

The Watershed Planning Program is organized into five Sections that each have a different technical focus under the CWA. The TMDL Section develops TMDLs as required by the CWA under Section 303(d). The objective of the CWA is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. As one step toward meeting this objective, States list each waterbody or portion thereof, referred to as an assessment unit (AU), in one of five categories. Waters listed in Category 5 constitute **the 303(d) List**. Where waters are determined to be impaired, causes and sources of use impairment are identified. Once a waterbody is identified as impaired by a pollutant, MassDEP is required under Section 303(d) of the CWA to develop a pollutant limit designed to restore the health of the impaired waterbody. The process of developing the pollutant limit or maximum load, includes identifying the cause (type of pollutant) and source (where the pollutant comes from), determining how much of the pollutant is from direct discharges (point sources) or indirect discharges (nonpoint sources), determining the maximum amount of the pollutant that can be discharged to a specific waterbody and still meet water quality standards, and developing a plan to meet that goal. Upon implementation, TMDLs can restore water quality and enable waters to attain their designated uses.

Data Universe

The MassDEP TMDL Viewer provides a geospatial representation of the final, EPA-approved TMDLs MassDEP has completed to date. The information reported to EPA by States is available in Assessment Total Maximum Daily Load (TMDL) Tracking and Implementation System (ATTAINS). This tracking database is the record of approved TMDLs represented geospatially in the TMDL Viewer. The representations are made with the best available data, but TMDL reports should be consulted for specific applicability of each TMDL. The goal of the Viewer is to aid MassDEP staff, permit writers, stormwater managers, conservation commissions, watershed associations, and concerned citizens in identifying waterbody segments and their contributing drainage areas for which TMDLs have been developed. The tool allows users to search a location using an address or coordinates to display information on applicable TMDLs, pollutants of concern that were targeted, and TMDL reports.

Development and Data Sources

The TMDL Viewer is a representation of TMDL coverage areas, but it is only a guide. The TMDL report should be referenced for specific boundary conditions. Multiple sources were used in the development of data layers in the Viewer. If a delineation of the watershed or general TMDL area existed at the time a TMDL was developed, that delineation was used for the TMDL data layer. If a shapefile of the watershed or general TMDL area was not available, the delineation was sourced from the list in Table 1, below. A hierarchy was applied with a preference given to previously published data layers.

The Cape Cod Commission (CCC) created a watershed data layer using the Massachusetts Estuaries Project (MEP) watershed delineations and corresponding technical reports that were the basis for Total Nitrogen TMDLs on the Cape. The CCC data layer was used to represent TMDL watersheds for Total Nitrogen TMDLs.

Sub-basins were not delineated per AU in the development of pathogen TMDLs. Delineations for these TMDLs were developed for purposes of this Viewer and follow the hierarchy mentioned above. Pathogen TMDL delineations are comprised of a combination of sources including MEP watersheds on the Cape and Buzzards Bay. Some watersheds were modified to best represent the contribution to a particular AU.

Hierarchy	Watershed Source	Description
1	Existing delineations developed for TMDL report	These shapefiles were used to develop the TMDL and are saved within the MassDEP TMDL data archives. Examples include shapefiles developed during the MEP Project[1] and the Statewide Coastal and Inland Pathogen TMDLs.
2	305(b) Watersheds	The 305(b) Watersheds are internal, unpublished, data layers developed by MassDEP's Watershed Planning Program based on USGS StreamStats. The layers are continuously updated with the development and retirement of AUs. Source layers associated with the 305(b) Watersheds include: USGS StreamStats Delineations, MassGIS Sub-Basins, MassGIS Major Basins, and NHD HUC12's. (MassDEP, Undated 1)
3	Geosyntec Lake Watersheds	This data layer contains watersheds for lakes above 5 acres and was created by Geosyntec for MassDEP in 2015. (MassDEP, Undated 2)
4	SWMI Watersheds	The Sustainable Water Management Initiative (SWMI) Interactive GIS map contains information on approximately 1,400 Massachusetts subbasins. The subbasins were delineated by the U.S. Geologic Survey (USGS) in their "Mass. Indicators" report (SIR 2009-5272). (MassDEP, Undated 3)
5	MassGIS Sub-basin Boundaries	This is a statewide data layer of the approximately 2300 sub-basins as defined and used by the USGS Water Resources Division and the Massachusetts Water Resources Commission, as modified by EOEEA (MassGIS, 2007).
6	USGS WBD HUC12 Dataset	The USGS Watershed Boundary Dataset (WBD) is a seamless, national hydrologic unit dataset. WBD contains eight levels of progressive hydrologic units identified by unique 2- to 16-digit codes. The dataset is complete for the United States to the 12-digit hydrologic unit. (USGS, 2020).
7	Watershed Organizations	If no formally published watershed delineations exist for a TMDL waterbody, watershed delineations will be georeferenced from mapping developed by relevant watershed organizations such as Nantucket Land Council (NLC, 2022).
8	USGS StreamStats	If no existing watershed delineation can be associated with a TMDL developed for a waterbody, the USGS SteamStats Spatial Analysis Tool will be utilized to delineate the watershed (USGS, 2019)
9	Manual Delineation	If no existing watershed delineation can be associated with a TMDL developed for a waterbody, and the USGS StreamStats Tool is unavailable in the region of the waterbody, then the watershed will be manually delineated based upon available topographic data and orthophotography.

1- Watersheds developed by the MEP located within the Cape Cod Major Basin are sourced from the Cape Cod Commission's watersheds data layer (CCC, 2021) that aggregates all the MEP delineations into a single layer.

Targeted Use

TMDLs are implemented through permitted and voluntary actions. The TMDL Viewer was developed with multiple users in mind. Applicants for permits can use the TMDL Viewer to easily identify whether a parcel on which work is being proposed is located within the drainage area of a waterbody segment with a TMDL. With updates to the Stormwater Handbook, and the newly proposed Standard 11 "Addressing TMDLs" in the Wetlands Protection Act, the Viewer directly allows end users to pinpoint areas requiring optimized stormwater treatment for pollutants of concern for which TMDLs have been developed.

Primary Users:

- MS4 permittees
- Wetlands permittees
- Stormwater managers
- Developers
- Conservation commissions
- MassDEP staff
- Watershed associations
- Concerned citizens

Maintenance

Updates to the MassDEP TMDL Viewer

MassDEP issues several new TMDL reports annually. Approved TMDLs are tracked in EPA's ATTAINS database. The TMDL Viewer will require updates to reflect the latest information on TMDLs in Massachusetts. It is anticipated that updates to the Viewer will occur once per year.

For questions regarding TMDLs and associated content in the TMDL Viewer, contact Matthew Reardon or Holly Brown at dep.wpp@mass.gov in the TMDL Section, Watershed Planning Program, MassDEP.
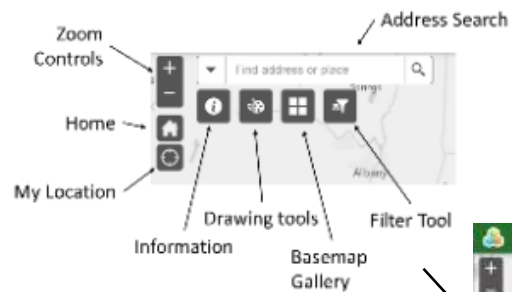
Attributes

ATTRIBUTE	DESCRIPTION
TMDL Name	Formal name of TMDL Report
Control Number of TMDL Report	Control Number of TMDL Report (e.g., CN 157.1)
MassDEP Documents Link	Link to TMDL Report on MassDEP Website
EPA Approval Year	Year that EPA approved TMDL
TMDL Pollutant	Pollutant that is subject to the TMDL

ATTRIBUTE	DESCRIPTION
TMDL Type	Type of Action (Restorative, Preventative, or Alternative). The development and implementation of the TMDL establishes the link between water quality standards assessment and water quality-based control actions. Restorative TMDL requires reductions from sources to meet water quality target in an impaired waterbody; Preventative TMDL may require source reductions to meet *hydrologically connected* water quality target(s) and/or continuing control measures to maintain current water quality target for identified AU; an Alternative TMDL requires reductions from sources, similar to a restorative TMDL, and is an alternative restoration plan that is expected to meet water quality more efficiently than through the development of a TMDL.
AU ID	Assessment Unit identification code (AU ID) of the waterbody subject to the TMDL.
AU Name	Name of the MassDEP Assessment Unit that is subject to the TMDL
AU Type	Assessment Unit waterbody type: River (including streams, brooks, etc.), Lake (including ponds, reservoirs, etc.), or Estuary.
Major Basin	Name of the major basin where the Assessment Unit is located within.
Pollutant Group	Map Display Category of TMDL pollutant. (Nitrogen, Phosphorus, Pathogens, or Metals)

Navigating the App

This application is a simple viewer meant to allow the user to view TMDL information in Massachusetts. In this viewer the user can navigate to a specified location using a search tool and can easily identify whether the Massachusetts Department of Environmental Protection has developed a TMDL for a specific pollutant for the identified location. This information is meant to be useful in identifying management approaches that optimize the treatment of runoff to restore the Commonwealth's waters.
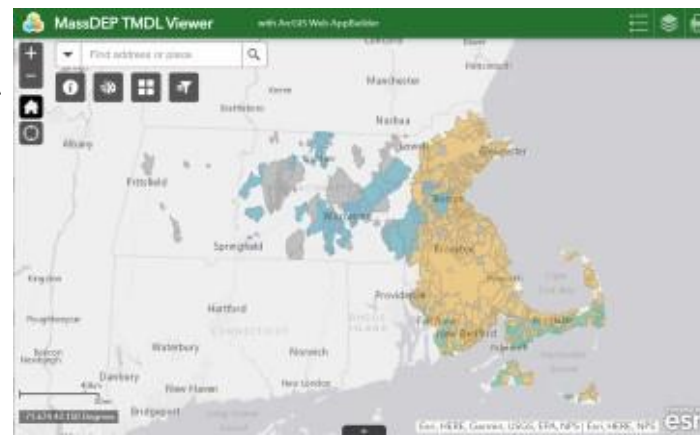
After you accept the terms and conditions on the splash screen you will see the map interface below (Figure 1). From there you can navigate and explore the different features on the map.

Zoom Controls

Address Search

Home

My Location

Information

Drawing tools

Basemap Gallery

Filter Tool

Legend : Shows the symbology for each active layer (some layers will only draw at certain scales, zoom in to see more!)

Layer List: Allows the user to control some of the display settings and turn layers on and off.

Scale Bar and Map Coordinates: The cross hairs on the left of the coordinates will display the XY coordinates for a specific point on the map. To activate click on the cross hairs and then select the location you want on the map. You can click multiple times to move the marker to the locations you want. The coordinates will freeze to that location until you click the crosshairs off again.

If you use the application more than once you may see this icon popup on your screen. Your browser can remember the extent you visited last time and if you click this icon you can zoom to the last place you viewed with the layer settings still intact!

Opens the attribute table

Figure 1. Navigating the interface of the TMDL Viewer.

Finding a location ◎

To find a specific address or feature you can use the address search bar [▼ Find address or place 🔍] on the top right of your screen or use the Find My Location Tool ◎ near the top left corner of the screen. The find my location tool will use your browser's location settings but may not always find the exact location you are in.
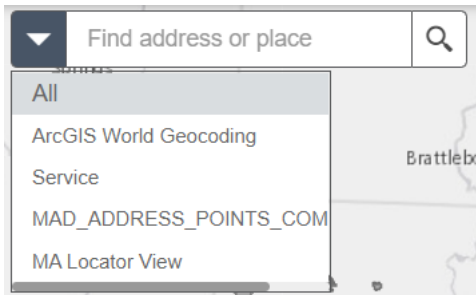
In the search bar, you can enter an address, coordinates, or the name of a specific location (i.e., John's Pond) and the geocoder can attempt to find it. When using the search tool using complete addresses will always work best. You can also click the drop-down arrow on the left side of the search bar to select a different dataset to use in the search (Figure 2). The default is the MAD_ADDRESS locator provided by MassGIS.

Figure 2. Using the address search bar.

Displaying Popup Information

Pop-up windows will appear when you click on a feature in the map, for example a drainage area that has an approved TMDL. These popups display relevant information for each layer in the map (Figure 3). Most layers in the map that are not related to TMDLs have their popup windows disabled by default. However, you can activate or deactivate popups for any layer in the app using the options in the layer list 🗇.
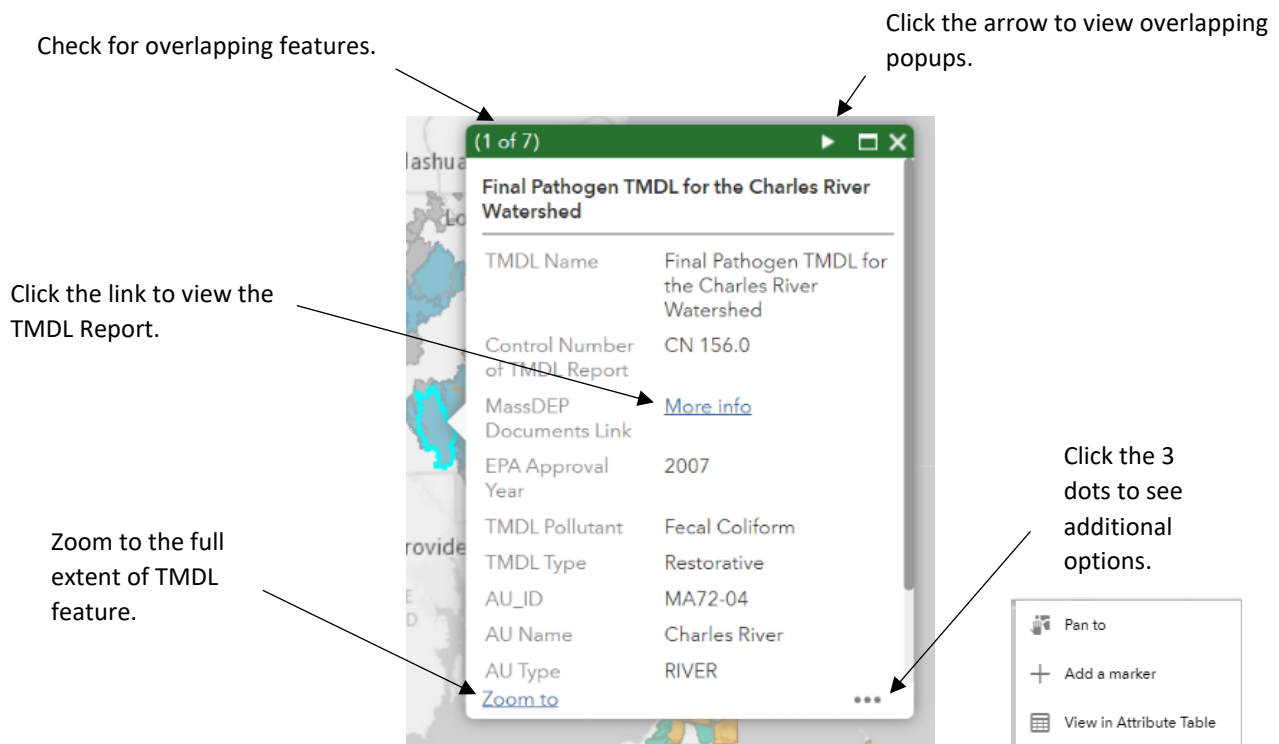

Figure 3. Popup window and its features for a map layer.

Please note: When you click on a location you may be getting information about more than one TMDL Watershed Area at a time - information about each watershed will show in separate overlapping popups - to look at the information on each watershed area you must click the arrow in the upper right-hand corner of the popup to see the next feature's information. Please see the layer list description for more information.

Using the attribute table

To open the attribute table, click the tab in the bottom center of the map screen (Figure 4). When looking at the table you can see tabs at the top for the available layers and options to control how the data is filtered in this view (Figure 5). "Filter by map extent" is enabled by default. This means that the data you see in the attribute table only includes the information you see in your map window. If you have zoomed in to a parcel you may only see the data for one feature in the map.
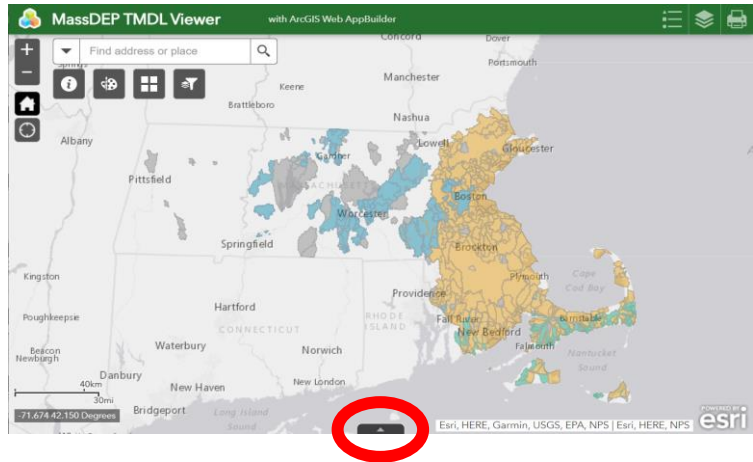

Figure 4. Opening the attribute table from the map interface.

If you want to see the full dataset without zooming out, you can turn this off by clicking the "Filter by map extent" button in the drop down menu of the attribute table (Figure 5). Each column name can also be sorted by clicking on the column name.

TMDL Name ▲	Control Number of TMDL Document	MassDEP Documents Link	EPA Approval Year	TMDL Pollutant	TMDL Type	AU_ID
Addendum: Pathogen TMDL for the Cape Cod Watershed	CN 252.5	https://www.mass.go to-final-cape-cod-pathogen-tmdl-report-march-2012/download	2012	Fecal Coliform	Restorative	MA96-83
Addendum: Pathogen TMDL for the Cape Cod	CN 252.5	https://www.mass.go to-final-cape-cod-pathogen-tmdl-	2012	Fecal Coliform	Restorative	MA96-80

577 features 0 selected

Figure 5. Layout of the attribute table and the "filter by map extent" button in blue.

For more advanced users:

With the attribute table opened you can see attribute tables for all the available layers in tabs. Under options you can set filters on the data using Structured Query Language (SQL) expressions. Click the Options menu in the attribute table and select filter (Figure 6).
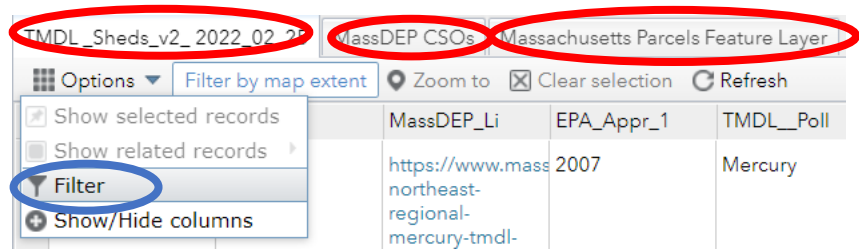

Figure 6. Tabs for three different layers in red and options to filter the dataset in blue.
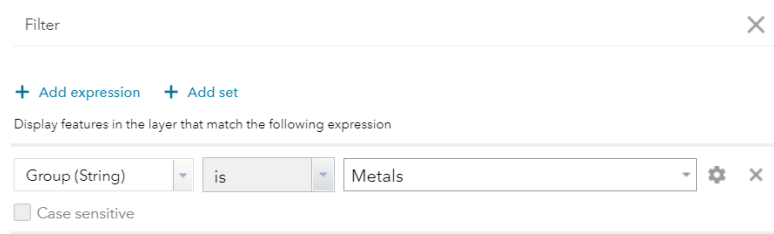

Figure 7: Attribute table filter options

After opening the filter window, you can click "Add expression" to set a query expression on the currently viewed table. Click the gear on the right to select input type to 'Unique' and set the fields seen on the image to the right. Now you can filter the TMDL layer by pollutant group type.

Using the Layer List

Clicking the three dots next to a layer name will allow you to control some of the display properties for that layer (Figure 8). Features with greyed out names indicate they are not shown at the current map scale – you will need to zoom in to view them. As you zoom in, you'll see additional layers appear on the map. Checking and unchecking the blue box on the left of a layer name will turn the layer on or off, i.e., make it visible or not.
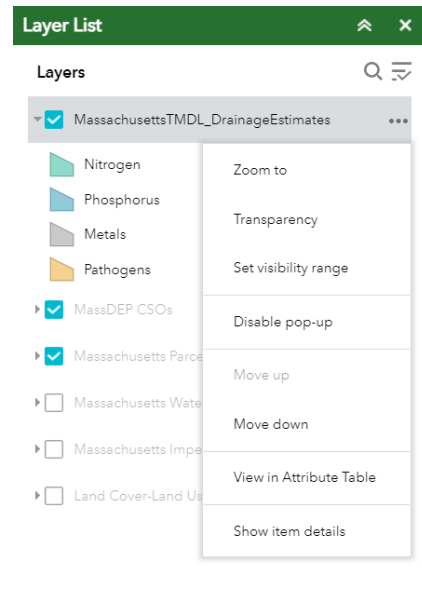

Figure 8. Controlling the Layer List and display of different map layers.

Using the Drawing Tools

The drawing tool allows you to make annotations on the map. These map annotations are not saved to the map if you close the map window on your browser but will appear on any PDF you make using the Export to PDF tool. With the available tools you can make markings (points, arrows, polygons, text, etc.) on areas of interest within a certain map extent by selecting a draw mode. When you first open the window, you may not be able to see all the available options but using the icon on the bottom right of the window you can resize the window, so it fits better on your screen. Undo and clear options are available at the bottom of the window. Also note that you can display the length of line features you draw on the map. Don't forgot to change your units.
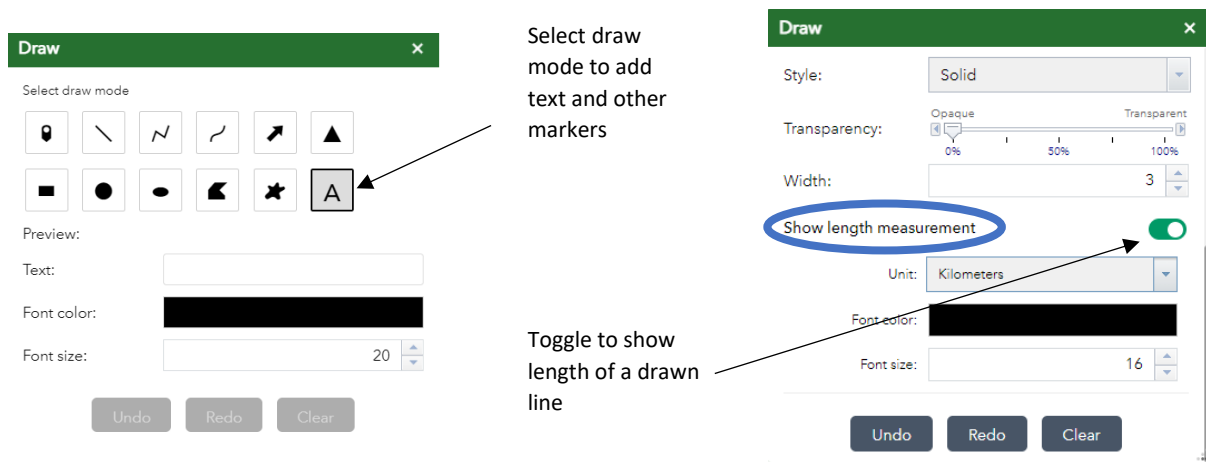

Figure 9: The drawing tool interface and its options

Filter Tool

The filter tool contains preset filter options to constrain the TMDL layer by the pollutant group, basin, and TMDL type. Simply select the group you want to filter for, and the bottom box will populate with the available fields for that characteristic (Figure 10).
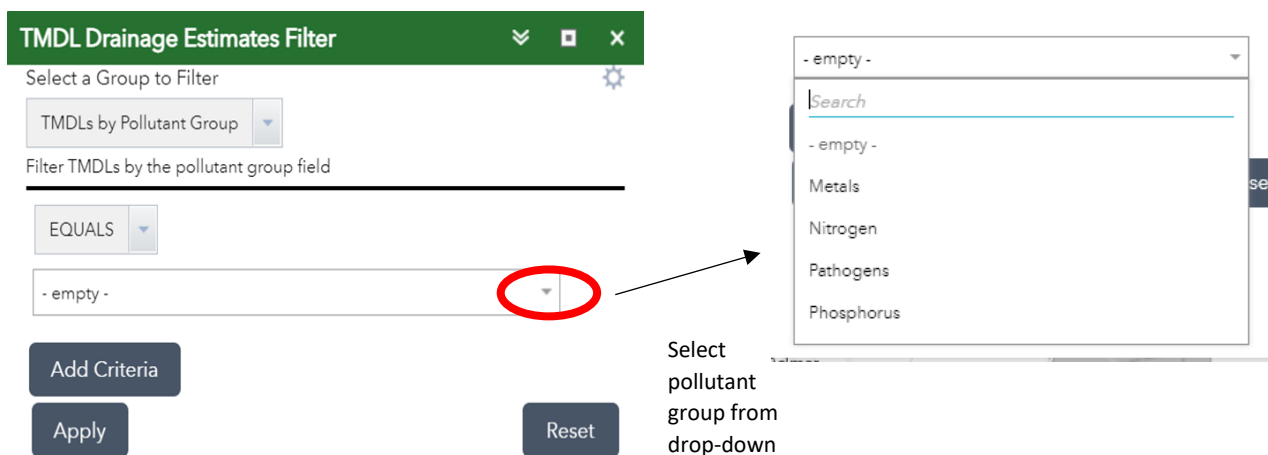

Figure 10: The filter tool interface and its options

Disclaimer

The MassDEP Total Maximum Daily Load (TMDL) Viewer may be used to identify water bodies and their contributing watershed area for which a TMDL has been developed. The viewer is intended for planning purposes only. TMDLs have been developed for waters identified as "impaired" for specific pollutants and are used to restore the health of waters. The TMDL watershed boundaries shown on the data layer are based on the original data obtained during TMDL development, delineations performed using the USGS StreamStats application, or basins identified for the Sustainable Water Management Initiative or as part of the MassGIS subbasin analysis and represent a static version of hydrography and elevation data that may contain errors, omissions, and other inaccuracies.

Nothing in the GIS data layer supersedes what is written in the actual TMDL – the general areas are only a guide and specific boundary descriptions are contained in the TMDL.

This data layer may be updated periodically to reflect additions or changes to the TMDLs for Massachusetts and the region and to correct any errors which may be identified. Some delays are expected in updating this data layer. Users utilize this information at their own risk and MassDEP is not liable for improper or incorrect use of the data described and/or contained herein or for any loss or harm that may result to any person due to any person's use or reliance on the data layer.

The areas delineated in this data layer do not constitute legal advice as to whether a TMDL applies to any facility, municipality, or state agency discharging to a Water of the United States within the Commonwealth and is not to be construed as a "legal description" or for legal purposes. Discharges to waters may have been authorized through a general or individual National Pollutant Discharge Elimination System (NPDES) permit and/or other state surface water discharge (SWD) permit. The NPDES/SWD permitting process determines whether a source is point or nonpoint, and whether a TMDL applies to the water affected by the discharge. TMDLs may also be taken into consideration for stormwater discharges approved through an Order of Conditions, Superseding Order of Conditions, and/or a Section 401 Water Quality Certificate issued pursuant to the Massachusetts Wetlands Protection Act, the state Clean Water Act, and/or regulations promulgated thereunder. All data is provided "as is". By using these applications/data you are agreeing to the terms and conditions herein.

These data were created for planning purposes and represent only the approximate relative location of properties, boundaries, or regulated areas. The dataset does not take the place of a legal survey or other primary source documentation. The Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs (EEA) and MassDEP make no representations or warranties, express or implied, with respect to the accuracy or reliability of the data or cartographic digital files provided herewith, regardless of format or means of transmission, or their suitability or fitness for any particular use or purpose. By using the data, the user accepts the data 'as is' and acknowledges that the appropriate regulatory agency should be contacted regarding the delineation of regulated areas. The Commonwealth of Massachusetts, EEA and MassDEP assume no responsibility for loss or damage incurred as a result of any user's reliance on this dataset.

References

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