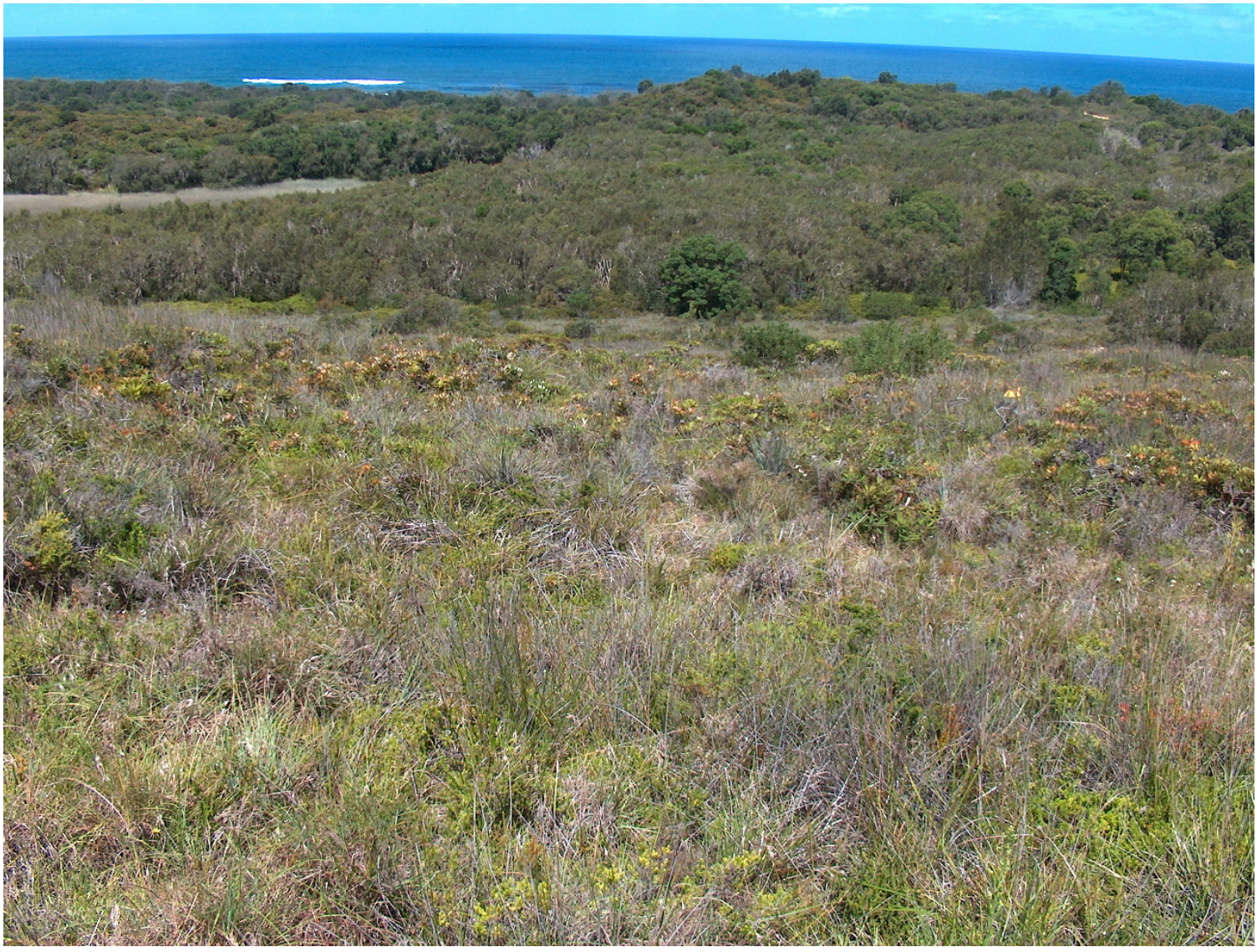
NSW GOVERNMENT

Department of Planning and Environment

How to use BioNet Web Map Services

A Quick Guide



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Introduction

The Department of Planning and Environment publishes map data in a variety of web service formats that may be viewed through standard internet browsers, dedicated map viewers such as SEED (Sharing and Enabling Environmental Data), integrated into specialised geographic information system (GIS) software, or programmed directly into mobile or business applications.

This document provides advice to novice and technical users on how to use and get the most out of map data services and web map browsers:

Part 1 Quick Start Guide

Simple steps to get you started viewing maps in SEED

Part 2 Technical Guide

Detailed options and instructions for browser and GIS users.

SEED is a data portal that allows users to search for environmental data and display it in a built-in map viewer.

The map data services offered by the Department of Planning and Environment are generated using ArcGIS REST Service technology and include Open Geospatial Compliant (OGC) web services including Web Map Service (WMS), Web Feature Service (WFS), and Keyhole Markup Language (KML).

Part 1: Quick Start Guide

Get started by viewing a WMS web service in your internet browser following these simple steps.

Step 1 Locate a Web Map Service in SEED

While there are any number of data catalogues out there, the following instructions are based on SEED:

- use a keyword(s) search to quickly locate the data, e.g. enter ‘SVTM’ to find State Vegetation Type Map (SVTM) products
- select **Show on SEED Map** to display the data directly in the SEED map viewer, or
- select **View Dataset** to access web service ‘resources’ (see Figure 1).

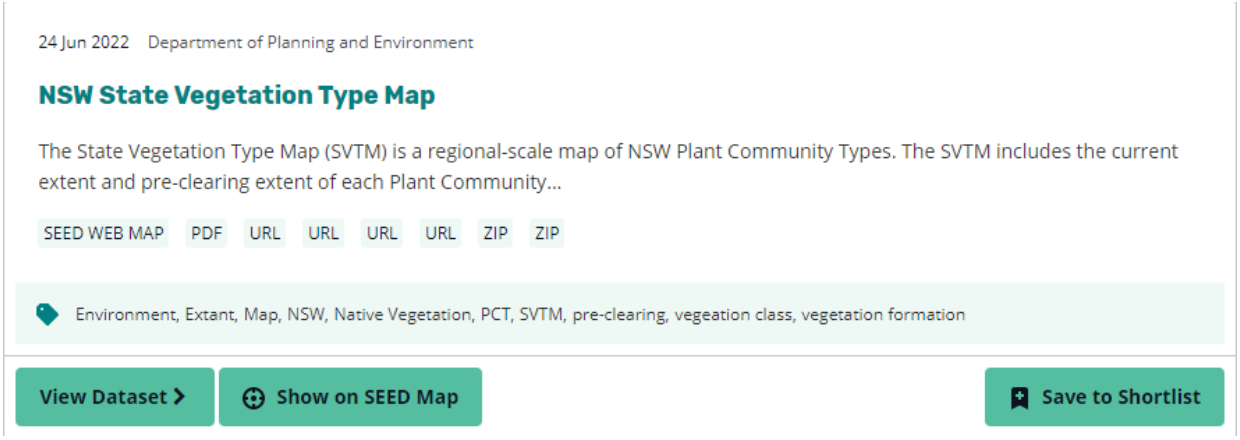


Figure 1 Selecting 'Show on SEED Map' or 'View Dataset'

Step 2 Launch map in a browser

ArcGIS Online Map Viewer is an alternative to the SEED Map and is also suitable for users without GIS Software:

- click on 'View Dataset>', scroll down to 'External Links' and expand
- click on 'ArcGIS REST SERVICE' under 'External Links' (see Figure 2)

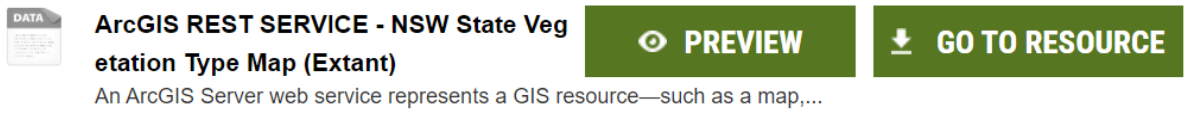


Figure 2 ArcGIS REST Service

- click on the URL for the REST Service

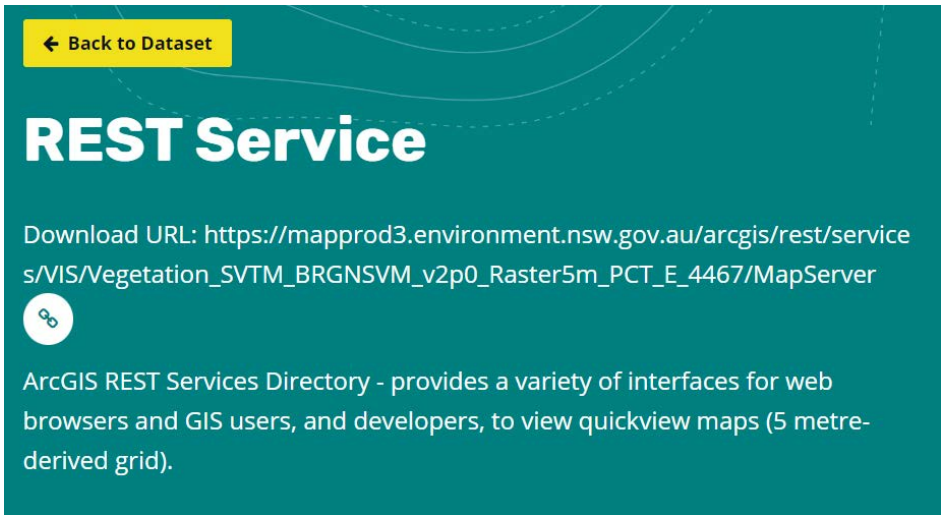


Figure 3 Rest Service URL

- click on 'Acknowledge and Proceed to ARCGIS REST SERVICE'
- click on 'ArcGIS Online Map Viewer'.

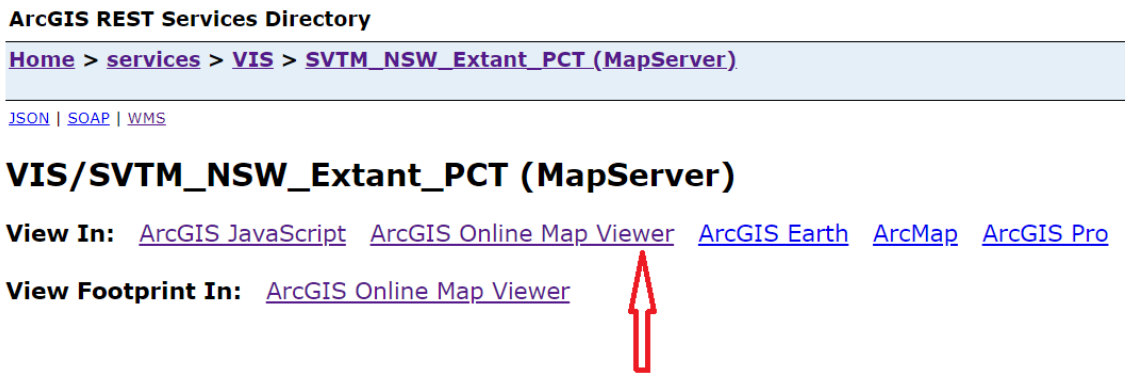


Figure 4 Opening ArcGIS Online Map Viewer

Step 3 Progress to the next level

When you are ready to take it to the next level consider these options:

1. Internet browser users:

Explore the extended functionality of REST Services, ArcGIS Online Map Viewer.

Note that you may need to use Google Chrome or FireFox for superior performance.

2. GIS users:

ArcMap is recommended for users with ArcGIS. It has options that 'automatically' connect to and open the vegetation map. It enables users to spatially inquire (i.e. click on a point to reveal attributes) on the WMS data.

Alternatively, users can manually connect to the service to view the map via a series of steps based on the WMS, see Section 2.6 below.

ArcGIS Online Map Viewer and ArcGIS Earth are free GIS viewing software, available online. Both viewers have restricted functionality and generally only permit map display and zooming between scales. As the internet browser option ArcGIS Online Map Viewer provides many of these options, including the ability to combine multiple map data services, and to search on properties, ArcGIS Online Map Viewer is recommended for users without GIS software.

QGIS is a free and open source GIS system and is a direct alternative to ArcGIS/ArcMap software for GIS users. While detailed instructions on how to use QGIS are beyond the scope of this guide, information is provided on how to connect to WMS or WFS in QGIS.

Table 1 summarises the various browsers and GIS applications, and their capabilities.

Table 1 Browsers and software for WMS

Browser/software	Zoom (in/out)	Layer legend	Modify transparency	Add data	Display attributes	Spatial query	Save map
ArcGIS JavaScript	✓						
ArcGIS Online Map	✓	✓	✓	✓	✓		✓
ArcGIS Earth	✓		✓	✓			
Google Earth	✓		✓	✓			
ArcGIS Pro	✓	✓	✓	✓	✓	✓	✓
ArcMap	✓	✓	✓	✓	✓	✓	✓
QGIS	✓	✓	✓	✓	✓	✓	✓

WMS is a standard protocol for georeferenced images served over the internet. The images are sourced from a GIS server. The images may be constructed from several GIS layers. The image format restricts the user to map display and basic queries, depending on the functionality of the browser or application. WMS is commonly used to maximise performance over the internet.

Part 2: Technical Guide

2.1 SEED

The following is a brief introduction to using SEED for displaying and working with BioNet map data.

As described in Part 1, enter a search term in the search box (see Figure 5).

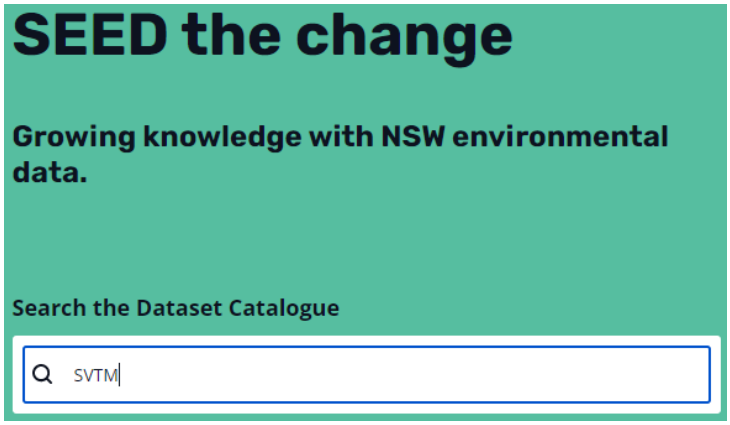


Figure 5 Keyword search box in SEED

Select **Show on SEED Map** to view the dataset in the built-in map (see Figure 6).

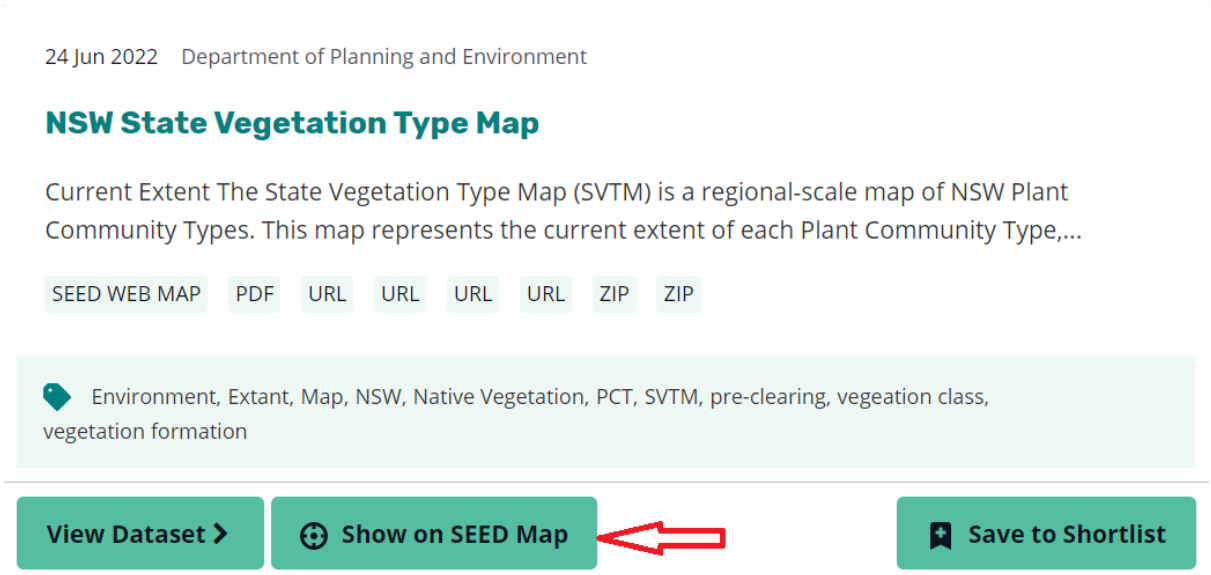


Figure 6 'Show on SEED Map' button in SEED

Click **ok** for any notifications. The map will display. Under **Legend**, select the **Panel Actions Menu**, then **Show Layer List** (see Figure 7).

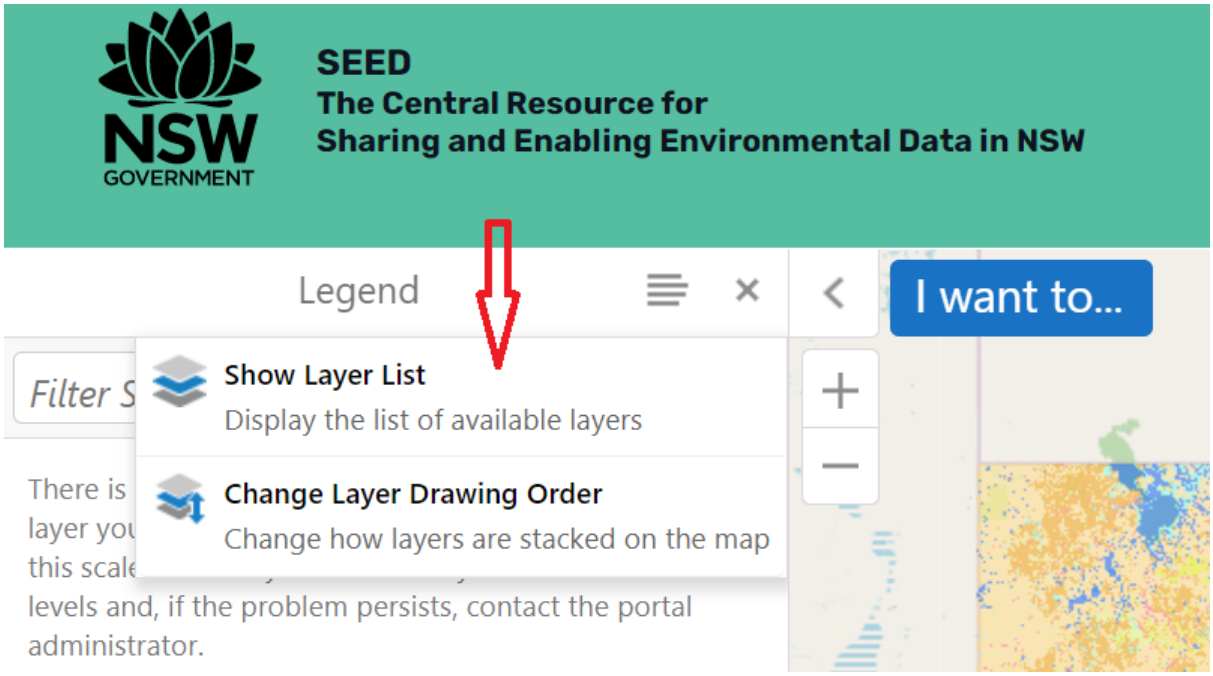


Figure 7 Selecting 'Show Layer List'

The Layer List now shows the WMS for the BioNet SVTM map, and the layers used to construct it. Each layer is built from a separate data (map) source. In Figure 8, the NSW Plant Community Type 5 m raster is displayed based on the zoom scale.

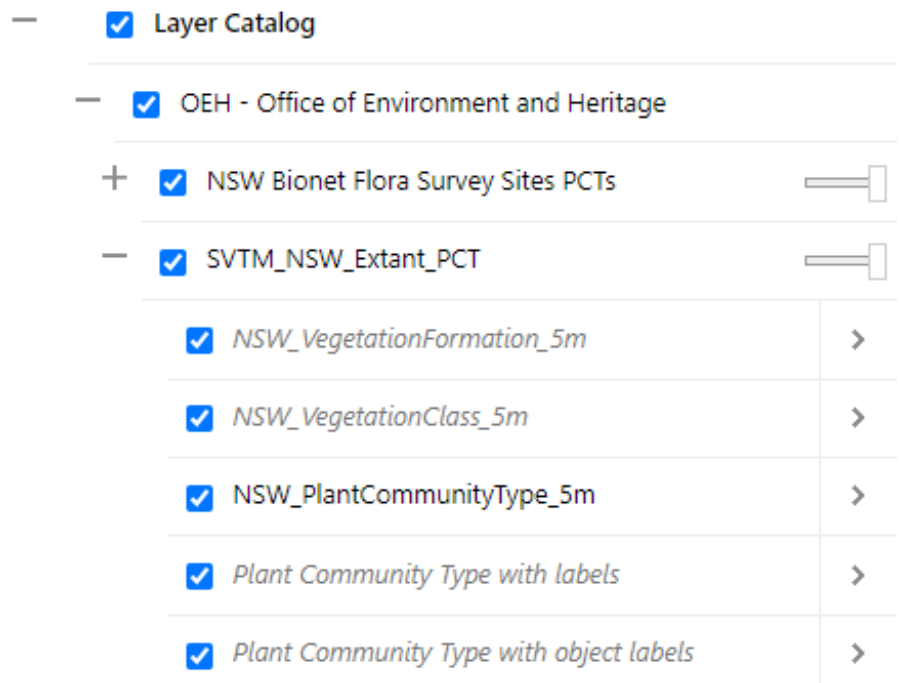


Figure 8 SVTM layers list

Zoom in to progressively display the other layers, or select the arrow next to a layer, then zoom to visible scale. In the examples below, the zoom scale will be set so that plant community type (PCT) label points are visible (Figure 9); however, first ensure the map is centred in the viewer, or that you have zoomed to the full extent of the map. This will help prevent zooming in to the desired scale, but in an area away from the map data.

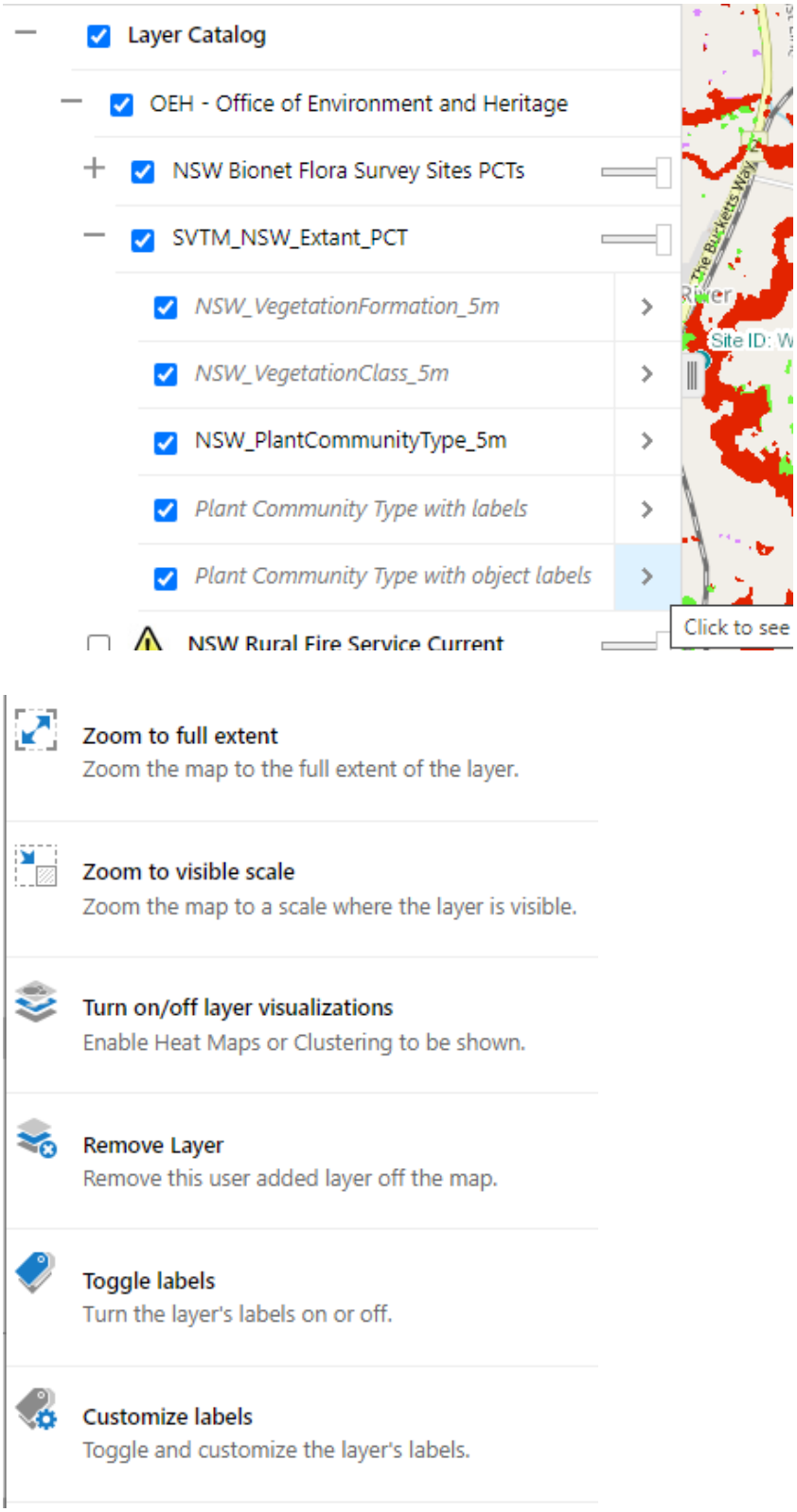


Figure 9 Selecting ‘Zoom to visible scale’

Figure 10 shows PCTs and labels. Click anywhere on the map to reveal the attributes for that point.

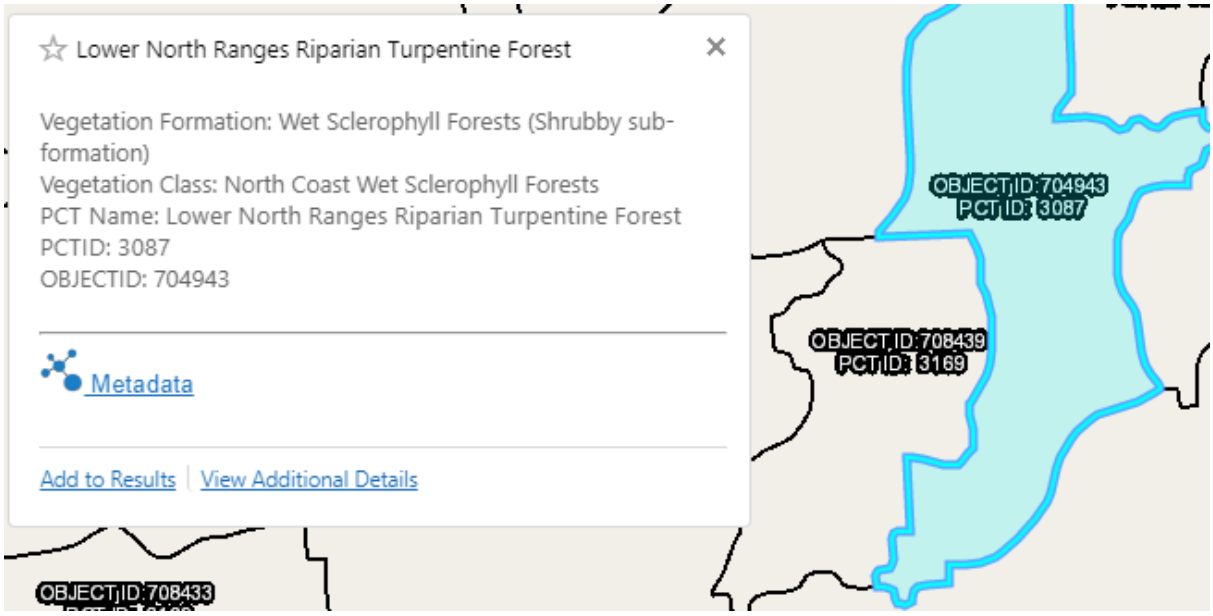


Figure 10 PCTs, labels and attributes

Other map data may be added to the view by selecting ***I want to***… then **Layer Catalog** (or **Search for Datasets on Map**) (see Figure 11).

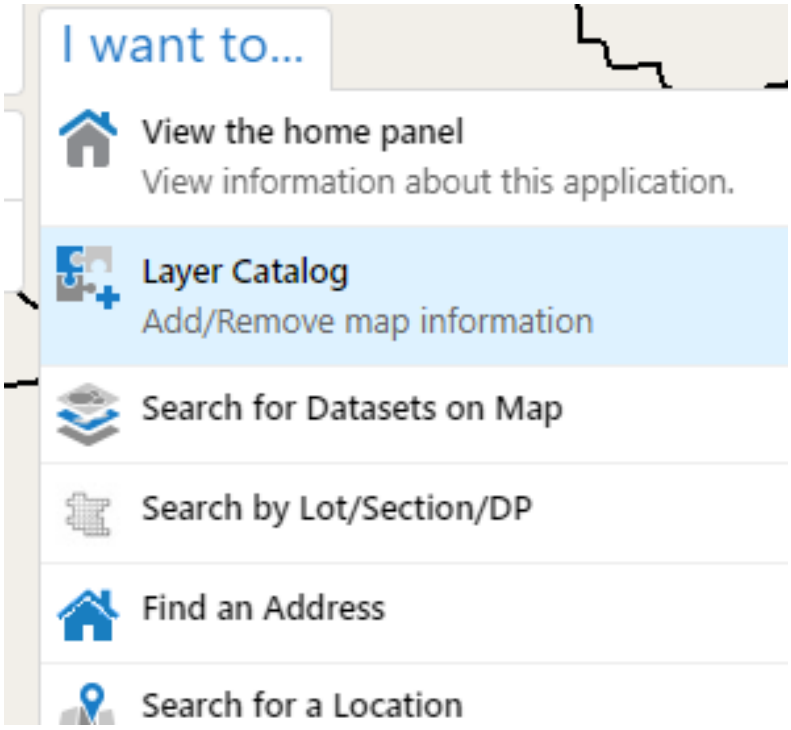


Figure 11 Adding a layer

If, for instance, you would like to determine what PCTs are on a property, you can select **Lot** from the list of available layers (see Figure 12). (Note the nested structure that must be progressively opened to reach the **Lot** checkbox.) Click **OK**.

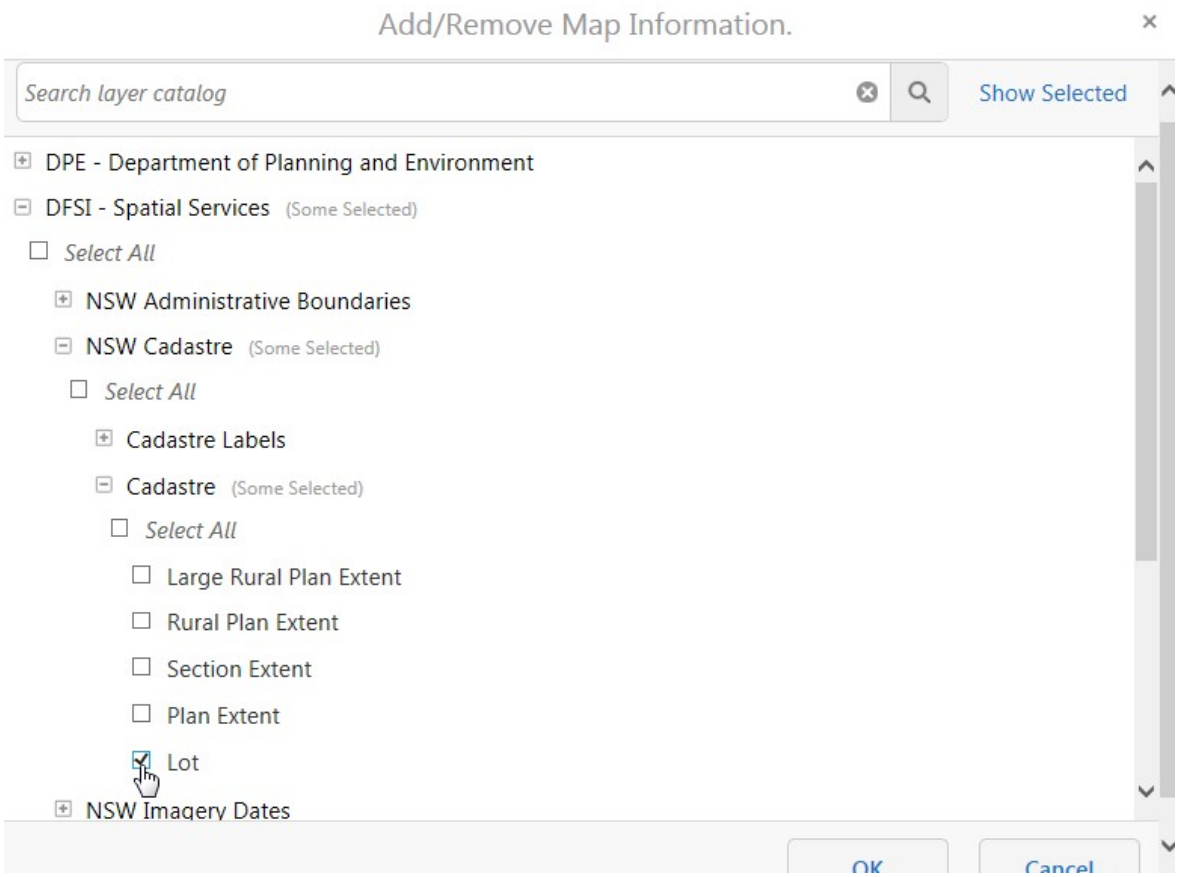


Figure 12 Selecting 'Lot' from 'NSW Cadastre'

After the layer is added to the viewer, you can click on the map to reveal the attributes of the map layers. In Figure 13, the Lot number is shown.

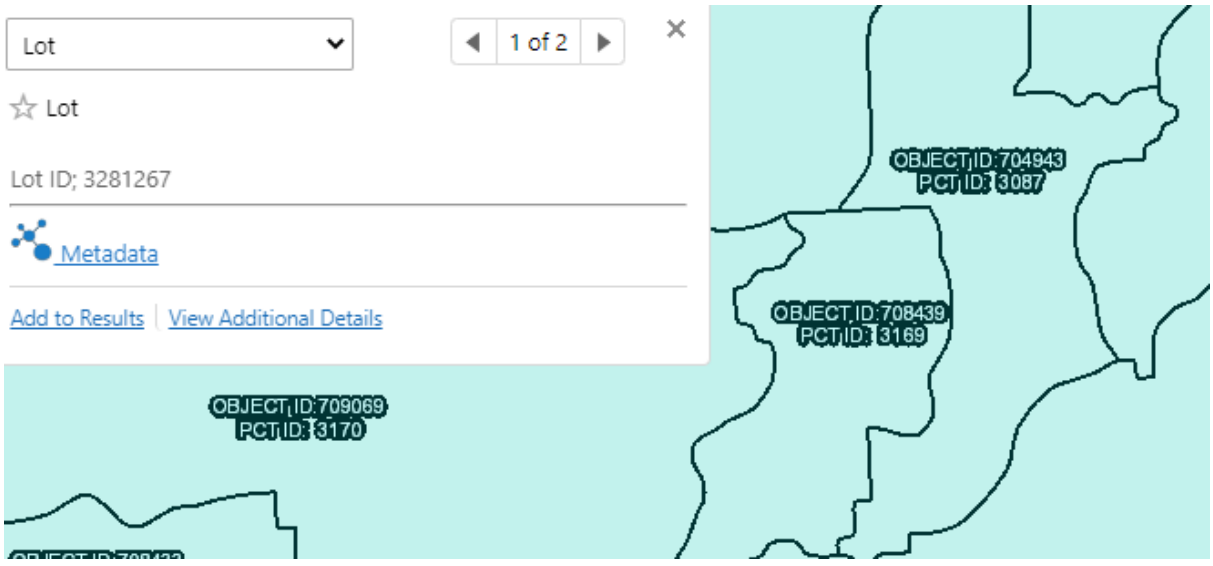


Figure 13 Attributes for 'Lot'

To toggle between layer attributes, select the drop-down list beside **Lot**. Select the name of the PCT to show the information about it (see Figure 14).

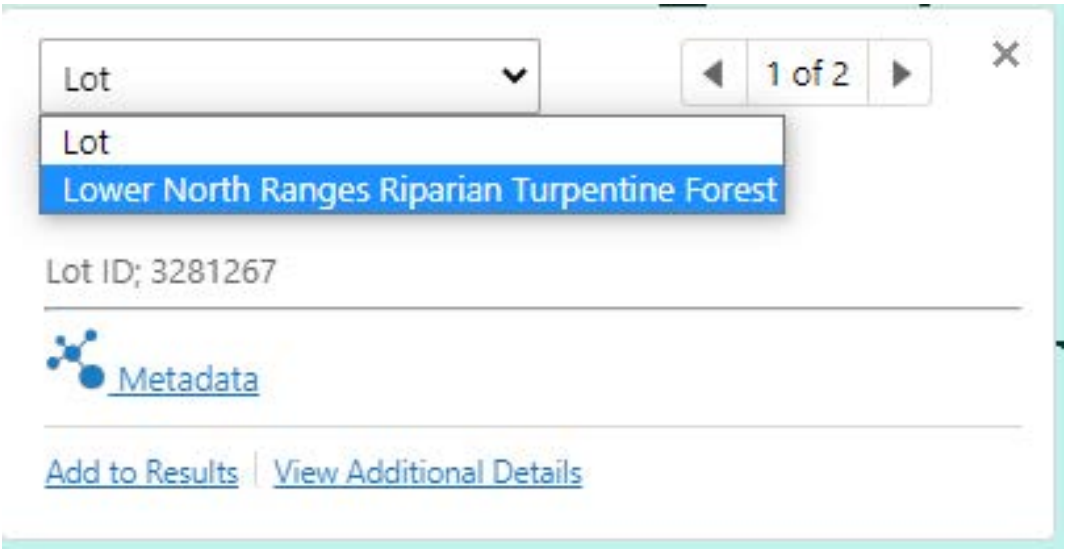


Figure 14 Toggling between map layers

Click on **Need help?** to discover more about what you can do with SEED.

There are numerous ways to find data in SEED. The ‘Finding data in SEED’ webpage provides more detailed search options along with a video link to explain how to find data.

2.2 Internet browser using ArcGIS JavaScript

This is the most basic of viewers that is restricted to map display and zoom/pan functionality.

First, you may need to ensure that JavaScript is enabled in your browser and that the security settings are not blocking display. The ‘Enable JavaScript’ webpage has instructions for how to do this in various browsers.

By clicking on the JavaScript option, the map should display in a new browser window. In the example in Figure 15, the map will display to the full data extent, showing NSW extant PCTs.

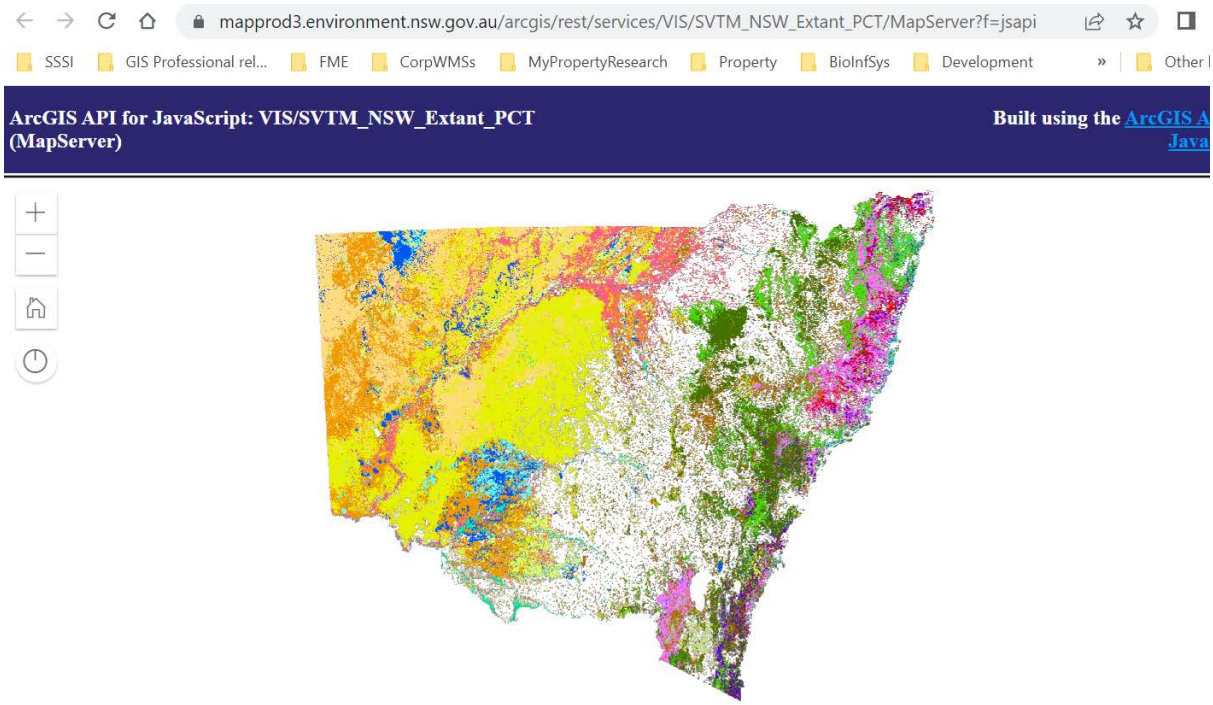


Figure 15 ArcGIS JavaScript

By clicking on the zoom arrow, the symbology will progressively change to indicate NSW formation, (Keith) classes, then PCTs and labels appear.

2.3 Internet browser using ArcGIS Online Map Viewer

ArcGIS Online Map Viewer (from ArcGIS.com) provides users with a wide variety of basic functionality; for example, you can change the base map (satellite, topographic), measure, and view the map legend (and labels). You can also search for and add layers, as well as search for properties.

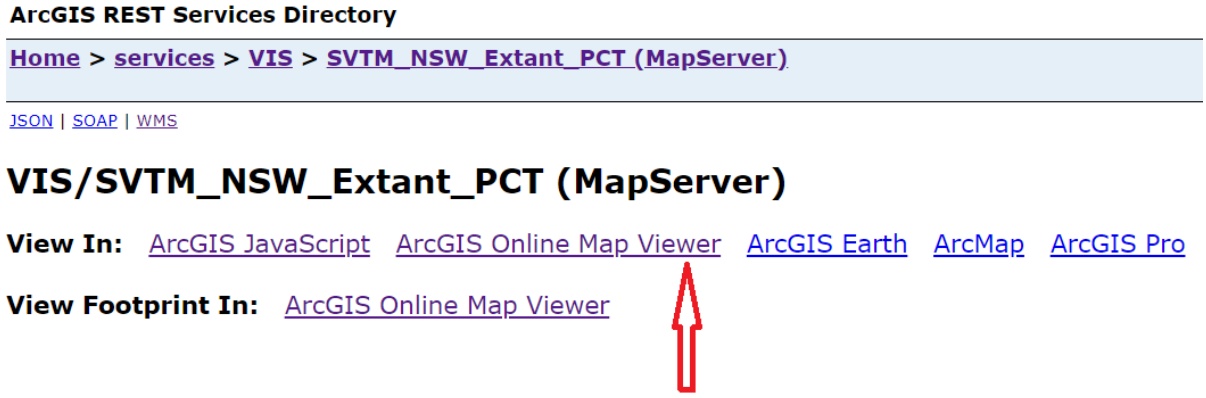


Figure 16 Opening ArcGIS Online Map Viewer

After clicking on the 'ArcGIS Online Map Viewer' link as shown in Figure 16, a new browser window opens to show the full extent of the map (see Figure 17).

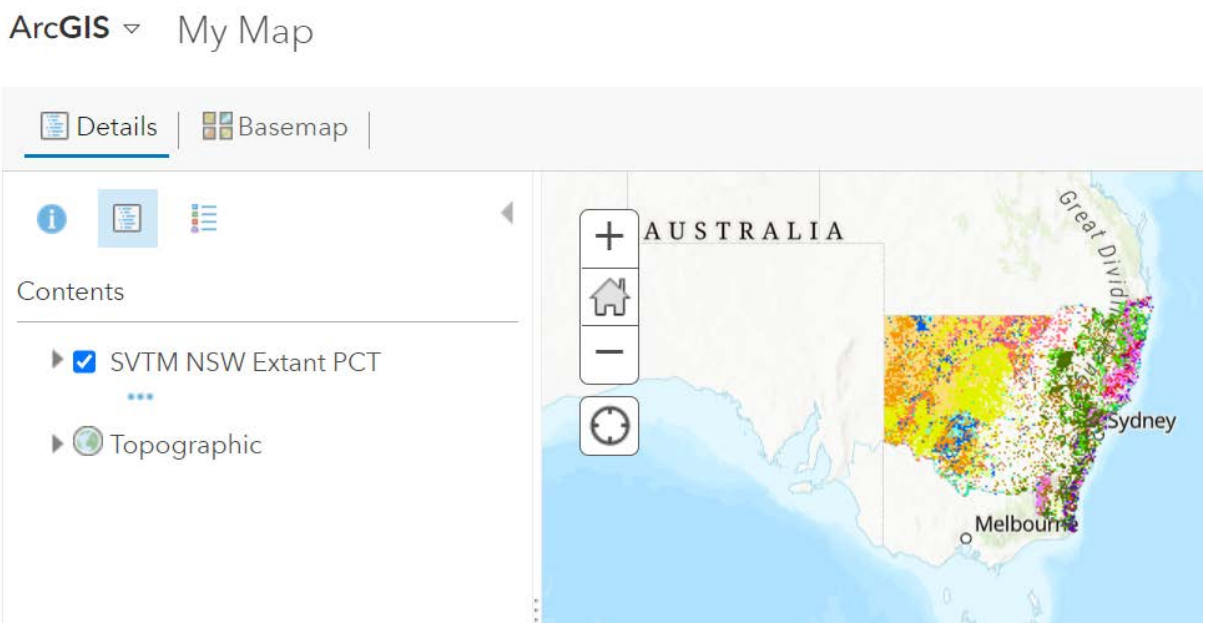


Figure 17 ArcGIS Online Map Viewer

Click on the expansion arrow beside **SVTM NSW Extant PCT** to see the layer list (Figure 18).

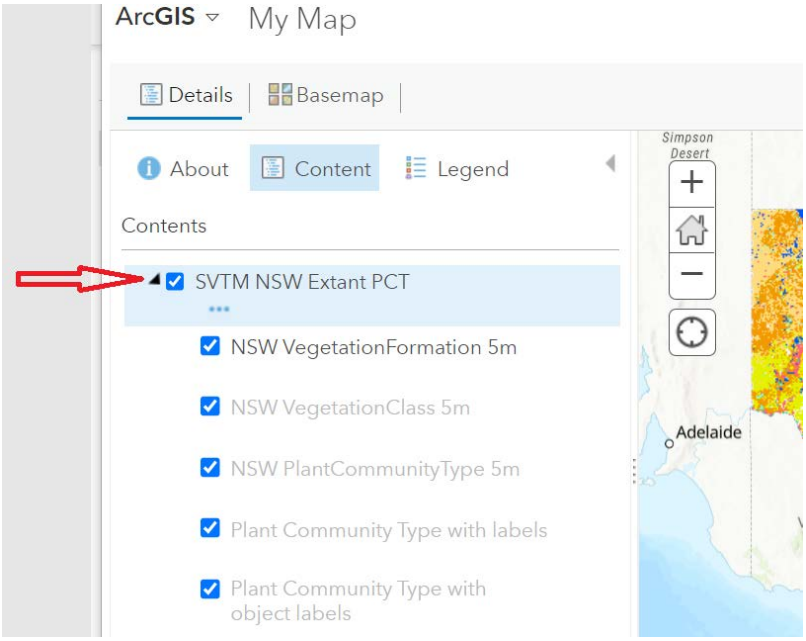


Figure 18 Expanding the layer list

By zooming in, the data layers that make up the WMS are displayed at different zoom levels. You can see the individual map layers by clicking on the arrow symbol next to the map in the 'Contents' window (see Figure 19).

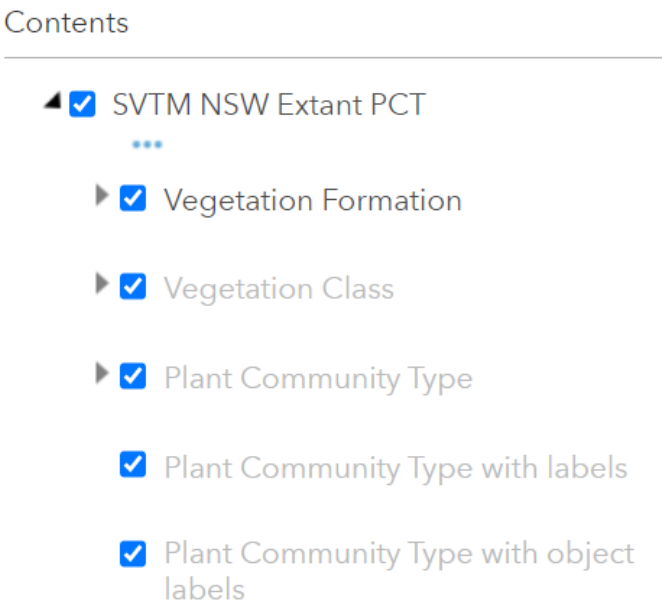


Figure 19 Example of WMS in the 'Contents' window

Inactive layers are greyed out based on the zoom level in map view. Clicking on the checkbox will toggle a layer's visibility on/off.

As you zoom in, inactive layers are progressively displayed and change to active status in the layer list (see Figure 20).

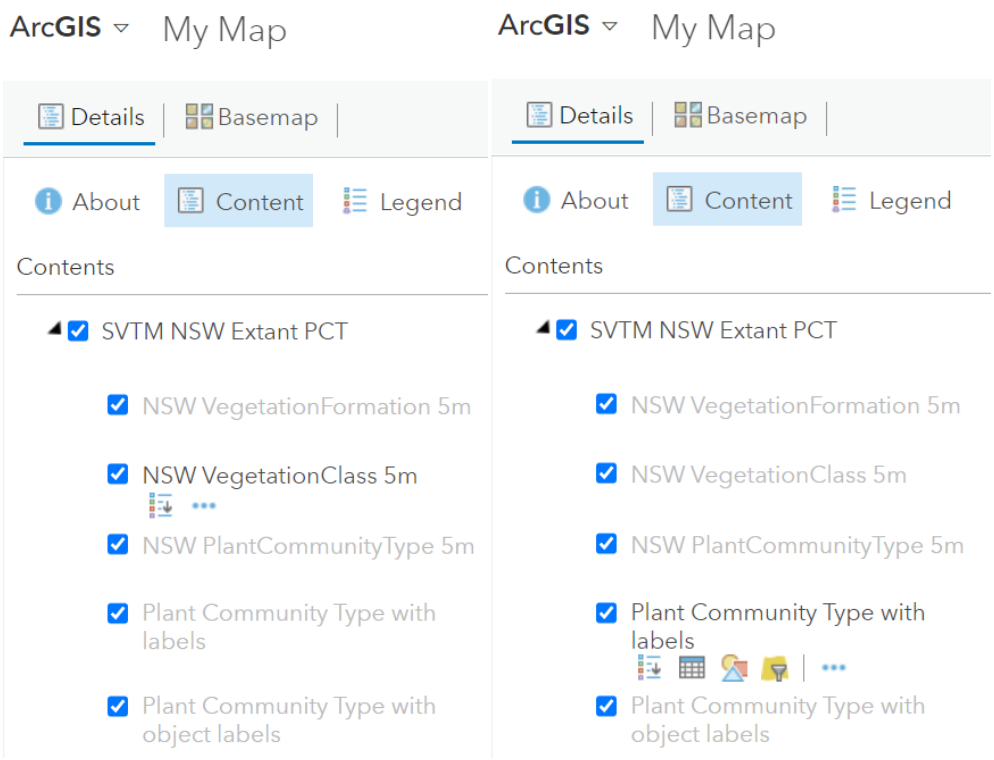


Figure 20 Active (displayed) layers in the 'Contents' window

Under each layer are options that permit legend display, table display (vector data), and vector data query via a filter (see Figure 21).

Figure 21 Layer options

Note that for vector data, if there are many features the table display option (see Figure 22) may take some time to display or may not display at all.

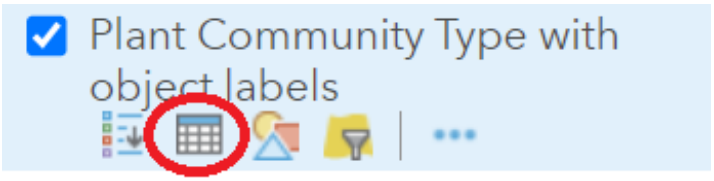


Figure 22 Attribute table option

Use the filter option to search and display (within the table) data values (see Figure 23).

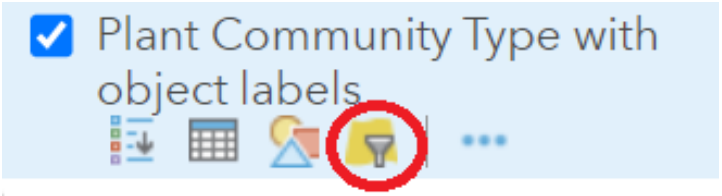


Figure 23 Filter option

The following example shows how a filter turns other records on or off. Figure 24 shows PCTs in an area before a filter is applied.

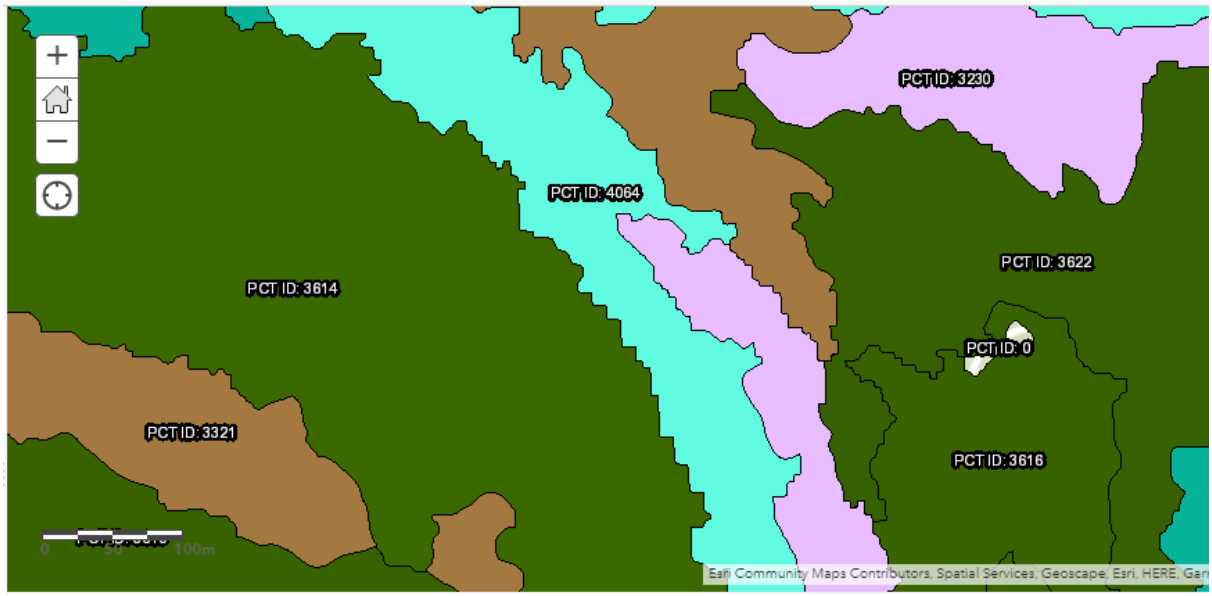


Figure 24 Map display with all records showing

The example in Figure 25, Figure 26 and Figure 27 shows a query based on label records with a PCT ID of 3614 (i.e. PCT number 3614).

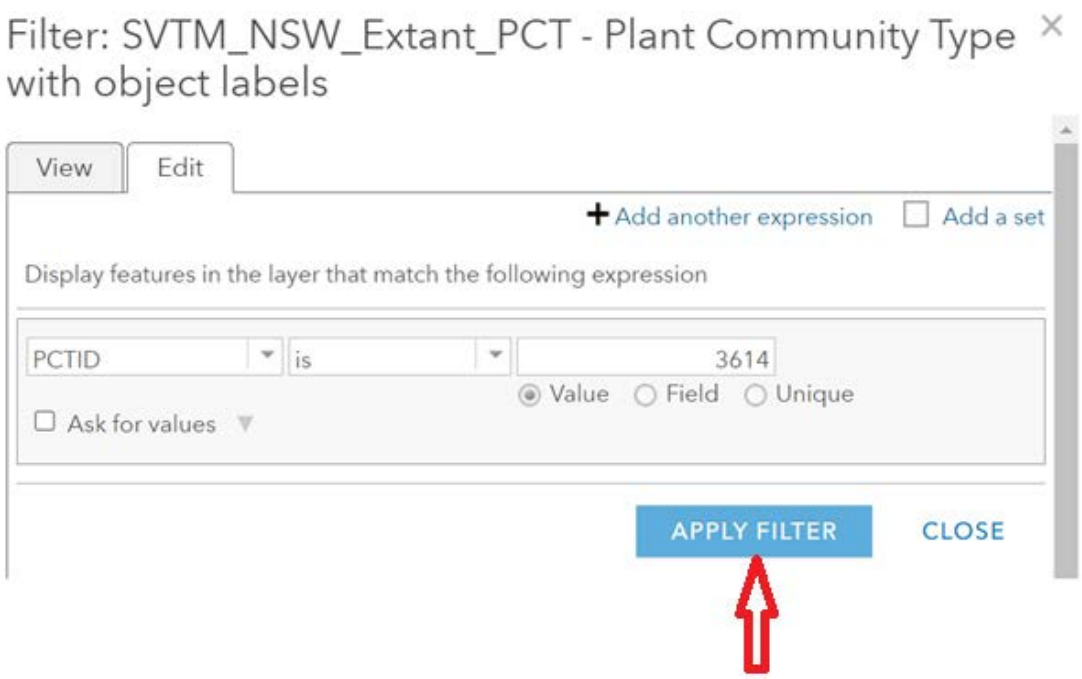


Figure 25 Selecting 'APPLY FILTER' to complete the query

The results of this example are shown in Figure 26.

Plant Community Type with object labels (Features: 1632, Selected: 0)

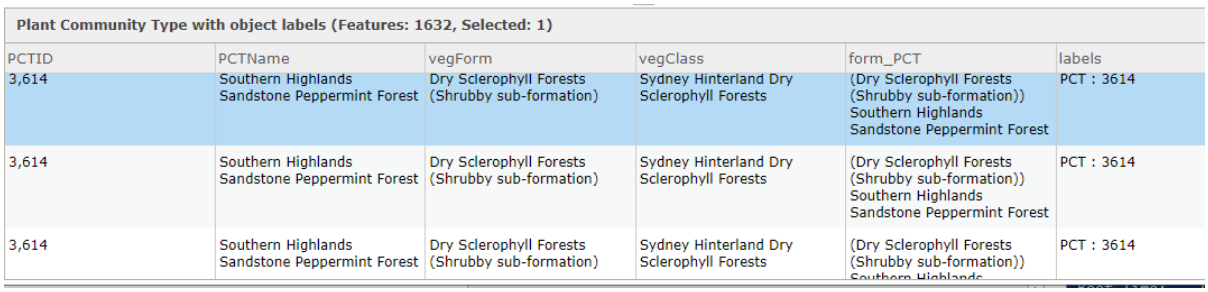
PCTID	PCTName	vegForm	vegClass	form_PCT	labels
3,614	Southern Highlands Sandstone Peppermint Forest	Dry Sclerophyll Forests (Shrubby sub-formation)	Sydney Hinterland Dry Sclerophyll Forests	(Dry Sclerophyll Forests (Shrubby sub-formation)) Southern Highlands Sandstone Peppermint Forest	PCT : 3614
3,614	Southern Highlands Sandstone Peppermint Forest	Dry Sclerophyll Forests (Shrubby sub-formation)	Sydney Hinterland Dry Sclerophyll Forests	(Dry Sclerophyll Forests (Shrubby sub-formation)) Southern Highlands Sandstone Peppermint Forest	PCT : 3614

Figure 26 Query results

By selecting a PCT value of 3614 and applying the filter, the other PCTs are no longer displayed (see Figure 27).

Figure 27 Map display after query filter has been applied

If you click on a table record, you can then zoom to the corresponding polygon on the map. The example in Figure 28 shows a record being selected.



Plant Community Type with object labels (Features: 1632, Selected: 1)

PCTID	PCTName	vegForm	vegClass	form_PCT	labels
3,614	Southern Highlands Sandstone Peppermint Forest	Dry Sclerophyll Forests (Shrubby sub-formation)	Sydney Hinterland Dry Sclerophyll Forests	(Dry Sclerophyll Forests (Shrubby sub-formation)) Southern Highlands Sandstone Peppermint Forest	PCT : 3614
3,614	Southern Highlands Sandstone Peppermint Forest	Dry Sclerophyll Forests (Shrubby sub-formation)	Sydney Hinterland Dry Sclerophyll Forests	(Dry Sclerophyll Forests (Shrubby sub-formation)) Southern Highlands Sandstone Peppermint Forest	PCT : 3614
3,614	Southern Highlands Sandstone Peppermint Forest	Dry Sclerophyll Forests (Shrubby sub-formation)	Sydney Hinterland Dry Sclerophyll Forests	(Dry Sclerophyll Forests (Shrubby sub-formation))	PCT : 3614

Figure 28 Selecting a table record

Click on the **Options** pull-down menu and choose **Center on Selection** (see Figure 29).

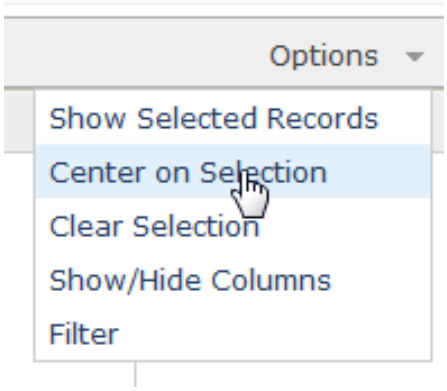
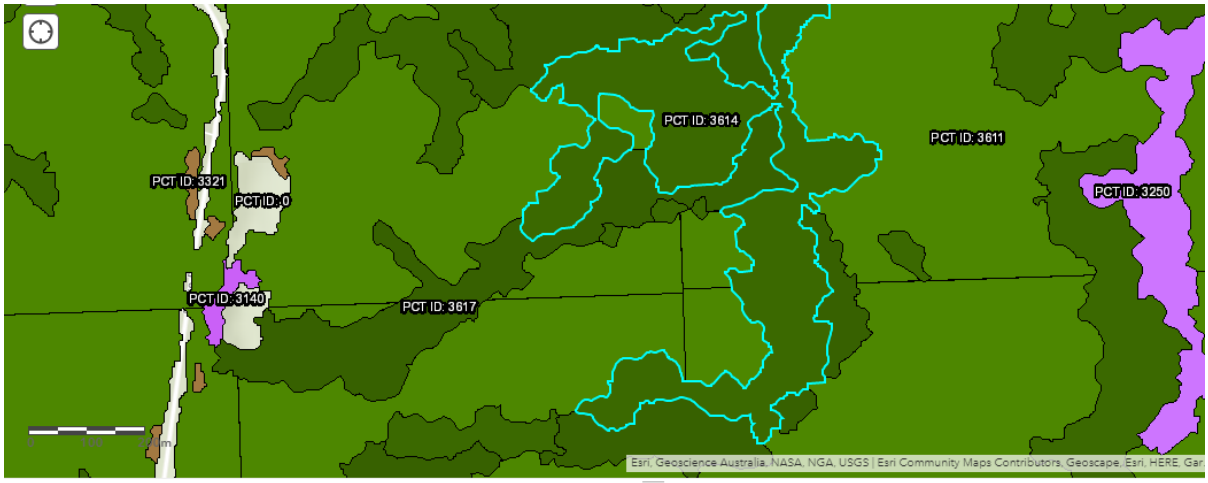


Figure 29 Choosing 'Center on Selection' in the 'Options' pull-down menu

The selected record is now shown on the map (see Figure 30).



Plant Community Type with object labels (Features: 1632, Selected: 1)

PCTID	PCTName	vegForm	vegClass	form_PCT	labels
3,614	Southern Highlands Sandstone Peppermint Forest	Dry Sclerophyll Forests (Shrubby sub-formation)	Sydney Hinterland Dry Sclerophyll Forests	(Dry Sclerophyll Forests (Shrubby sub-formation)) Southern Highlands Sandstone Peppermint Forest	PCT : 3614
3,614	Southern Highlands Sandstone Peppermint Forest	Dry Sclerophyll Forests (Shrubby sub-formation)	Sydney Hinterland Dry Sclerophyll Forests	(Dry Sclerophyll Forests (Shrubby sub-formation)) Southern Highlands Sandstone Peppermint Forest	PCT : 3614
3,614	Southern Highlands Sandstone Peppermint Forest	Dry Sclerophyll Forests (Shrubby sub-formation)	Sydney Hinterland Dry Sclerophyll Forests	(Dry Sclerophyll Forests (Shrubby sub-formation))	PCT : 3614

Figure 30 Display zoomed in on the selected record

To search for and add new layers, click on **Modify Map** at the top-right of the browser window (see Figure 31).

Figure 31 'Modify Map' button

This will generate an **Add** button at the top-left of the window (see Figure 32).

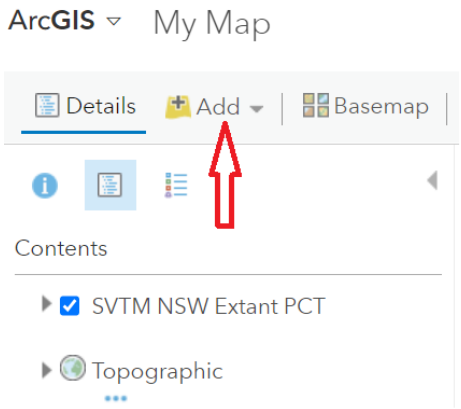


Figure 32 Selecting the 'Add' button for more data options

The following example demonstrates how to search for and retrieve the NSW cadastre layer. First, select **Search for Layers** from the **Add** pull-down menu (see Figure 33).

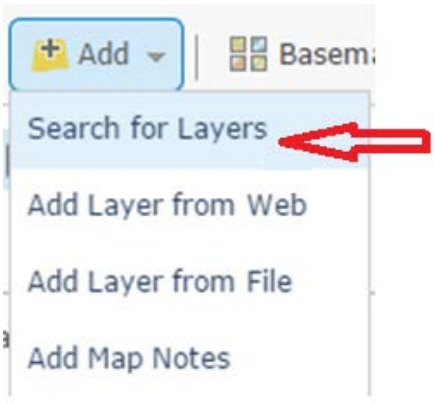


Figure 33 Selecting 'Search for Layers' from the 'Add' pull-down menu

Enter the details as shown in Figure 34 then click on the filter button to open the **Filter** window (arrow on left). Now turn on 'Only show content within map area' (arrow on right) to restrict the search to the state of NSW.

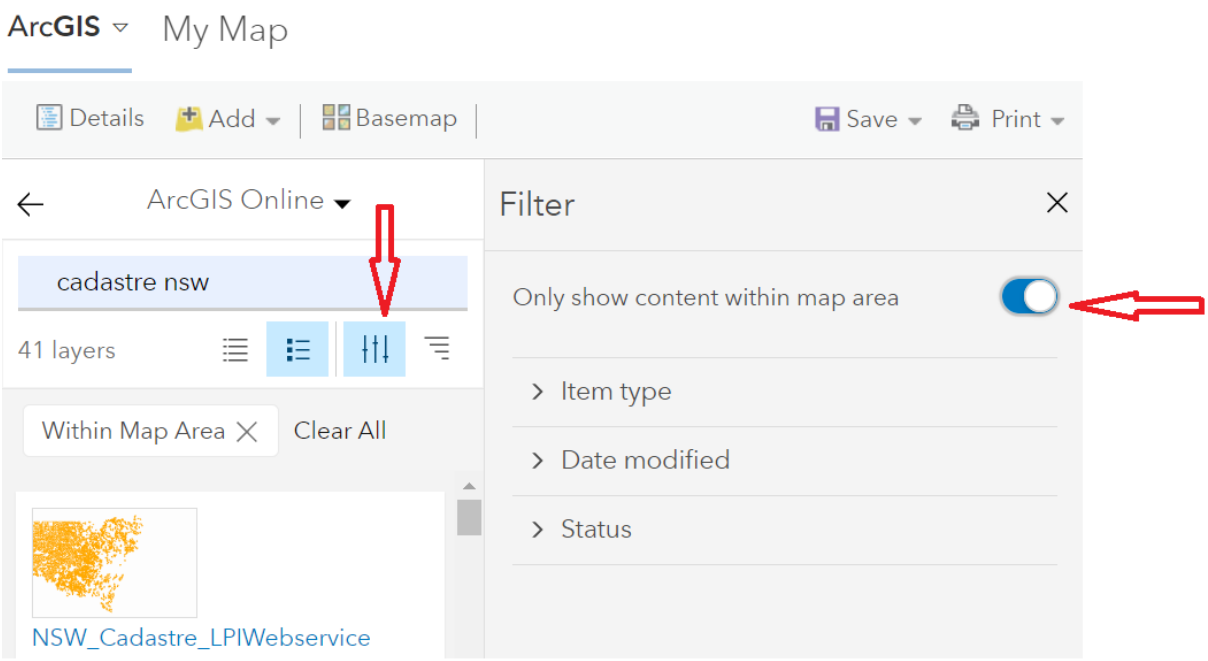


Figure 34 Example of a data search for the NSW cadastre layer

This will generate a list of available layers. Select a layer of interest by clicking on the plus symbol (see Figure 35).

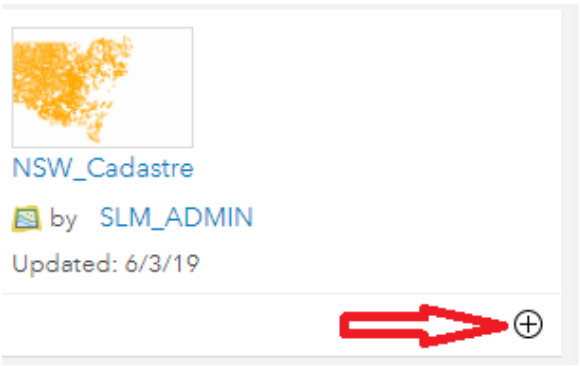


Figure 35 Results of the data search

Click on the back arrow (see Figure 36).

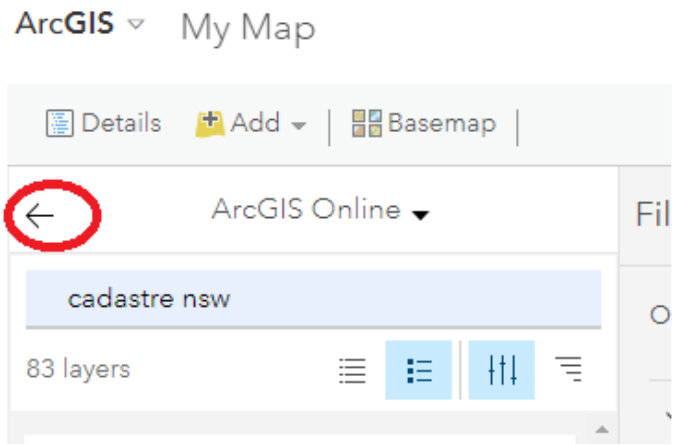


Figure 36 Clicking the back arrow

The cadastre layer should now be visible in the **Contents** pane and the map display (see Figure 37).

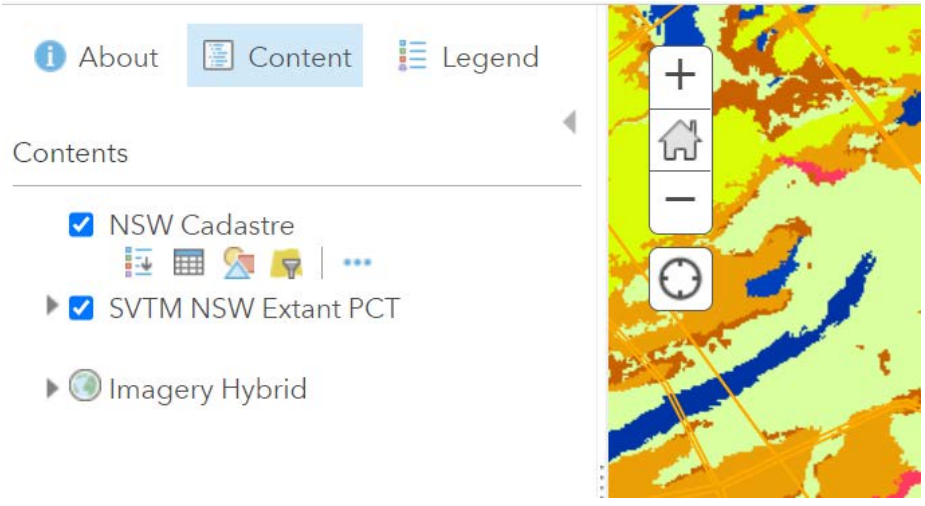


Figure 37 Example of a layer (NSW Cadastre) added to the 'Contents' pane

Building on the previous example where a cadastre layer was added, now enter an address in the search box near the top-right of the browser window and click on the magnifying glass.

The map will centre on the chosen property and provide a box with the search result (see Figure 38).

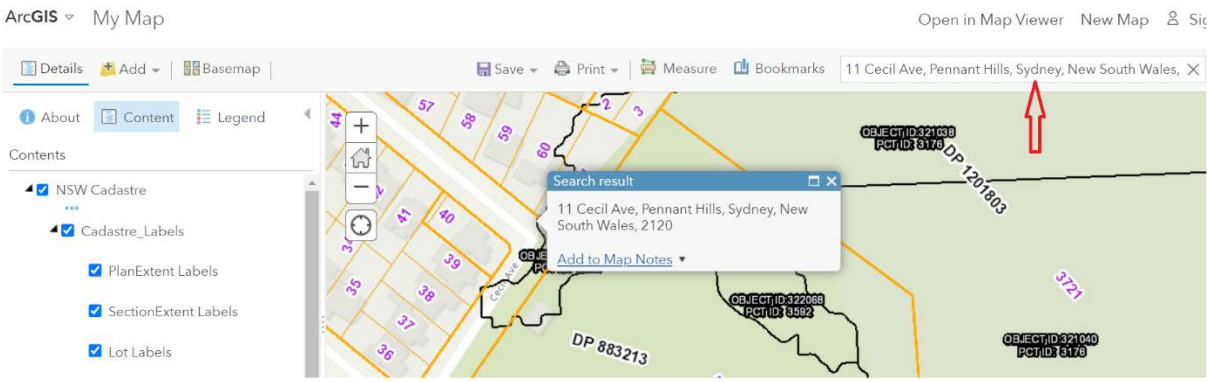


Figure 38 Searching for a property by entering its address

By using the cadastre boundary, you now have an indication of what vegetation types exist on the property. In this example, there are 2 PCTs – PCT IDs 1281 and 1776.

Choosing to **Sign In** using the button at the top-right of the screen (see Figure 39) provides additional functionality, such as the ability to save your map.

Figure 39 Clicking on the 'Sign In' button

Once signed in, you are presented with the option of saving your map (see Figure 40).

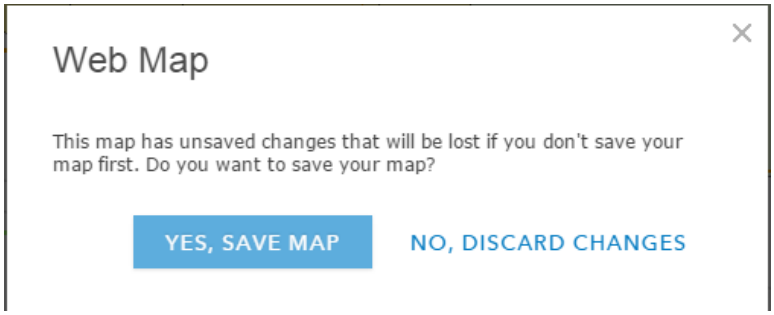


Figure 40 Saving the map

If you decide to save your map, you need to fill in the form, ensuring that an appropriate tag (e.g. 'vegetation') is included.

By saving your map you can edit it later. You may also share it with others.

Rather than searching for and adding a WMS from the map viewer, an alternative is to navigate to the ArcGIS Online Map website and add the WMS URL to the viewer from there.

First, copy the WMS URL from **ArcGIS REST Services**. Note that in the example in Figure 41, WFS is not available as this is a raster-based service.

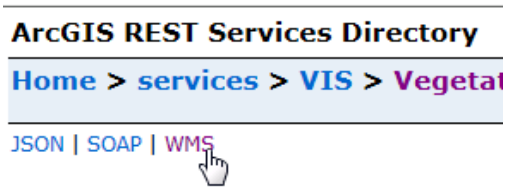


Figure 41 Connecting to WMS from the ArcGIS REST Services Directory

Select and copy the URL (see Figure 42).

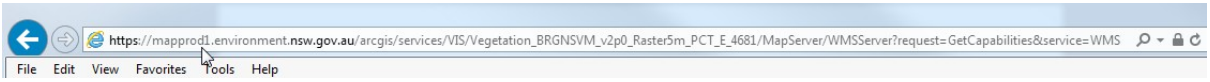


Figure 42 URL of WMS

Select **Modify Map** to activate the **Add** button, then choose **Add Layer from Web** from the pull-down menu (see Figure 43).

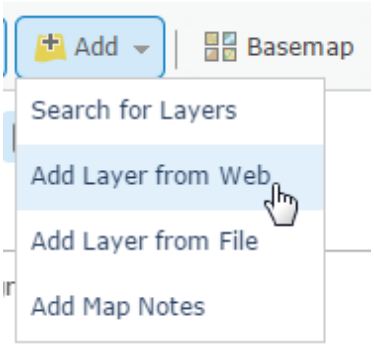


Figure 43 Selecting 'Add Layer from Web'

In response to 'What type of data are you referencing?' select **A WMS OGC Web Service** (see Figure 44) (OGC = Open Geospatial Consortium).

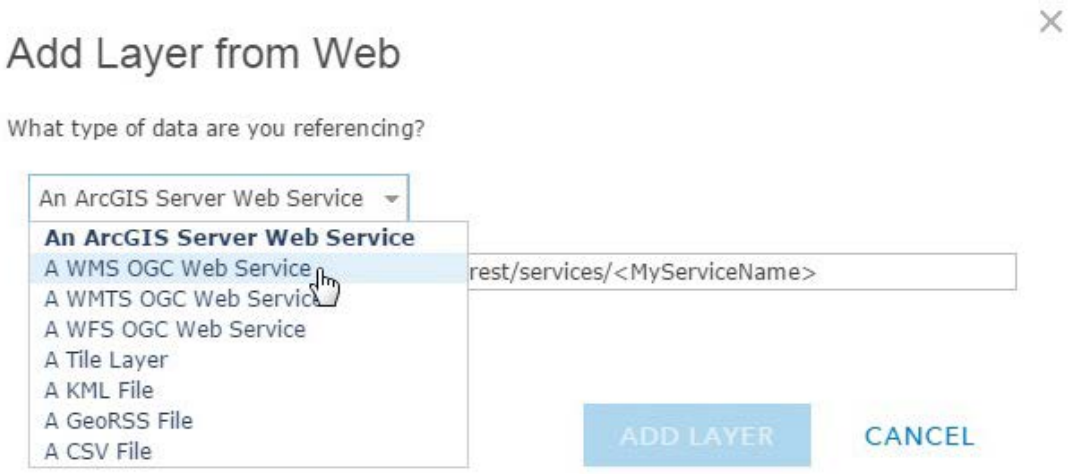


Figure 44 Selecting 'A WMS OGC Web Service'

Paste the WMS URL into the box and click the **ADD LAYER** button (see Figure 45).

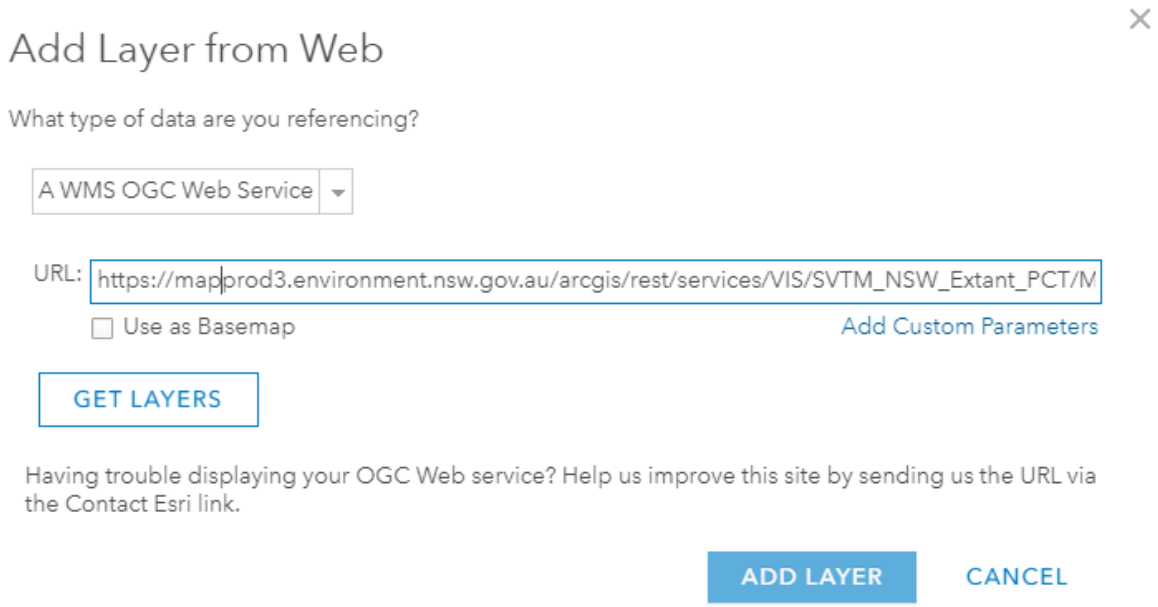


Figure 45 Adding a WMS layer using a URL

2.4 ArcGIS Earth

ArcGIS Earth is an interactive 3D experience to plan, visualise and evaluate events on the globe. ArcGIS Earth provides situational awareness on desktop and mobile devices for improved decision-making. Ingest data in different formats, including 3D models; Keyhole Markup Language (KML), KML zipped (KMZ) files; TXT; and open services from ArcGIS or with a URL, to explore areas of interest in 3D. Manipulate KML in its entirety to understand changing circumstances. ArcGIS Earth is a free and easy-to-use tool to quickly fuse, manipulate and collaborate with 3D data.

Select the **ArcGIS Earth** option from the **ArcGIS REST Service** page (Figure 46).

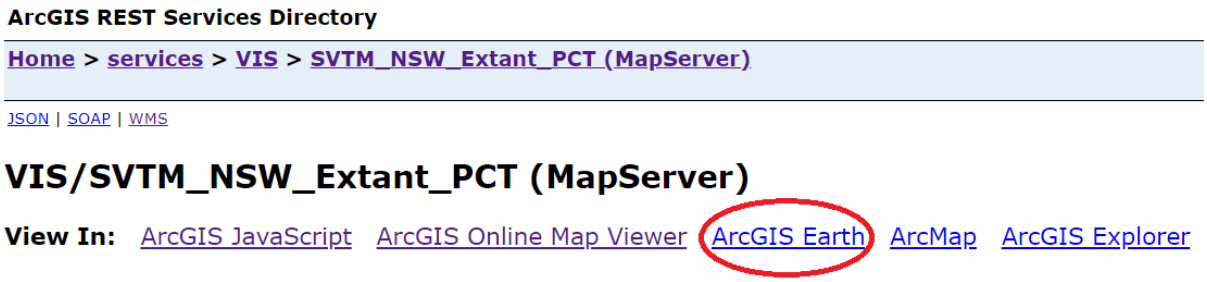


Figure 46 ArcGIS Earth link to download KMZ file for ArcGIS Earth application

A message appears like the one shown in Figure 47. Open with the default (ArcGIS Earth). You can also save to file then open within ArcGIS Earth.

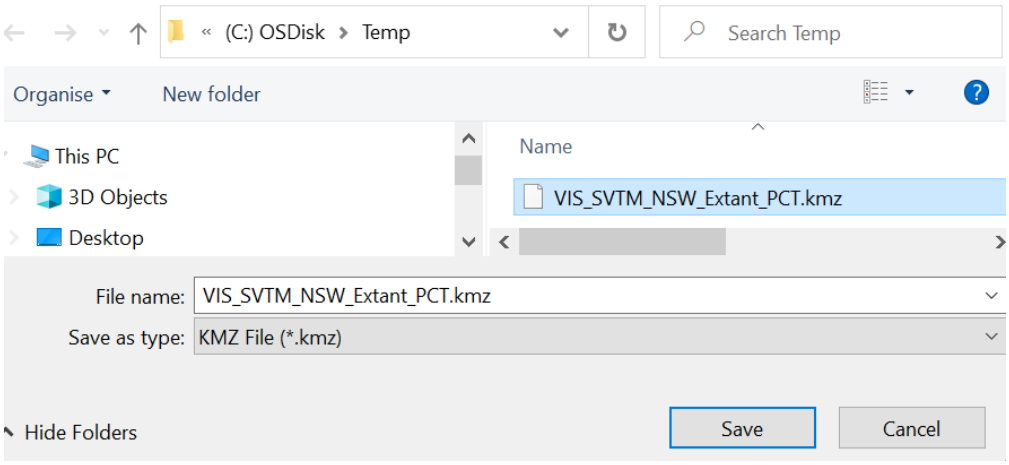


Figure 47 Saving a KMZ file to your local drive

In ArcGIS Earth click on the '+' symbol to add the downloaded KMZ file as shown in Figure 48.

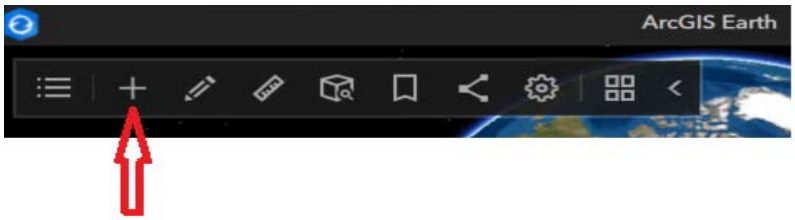


Figure 48 Adding a layer in ArcGIS Earth

Click on the hamburger button at the left of the panel and you can see a Data and Legend panel as shown in Figure 49.

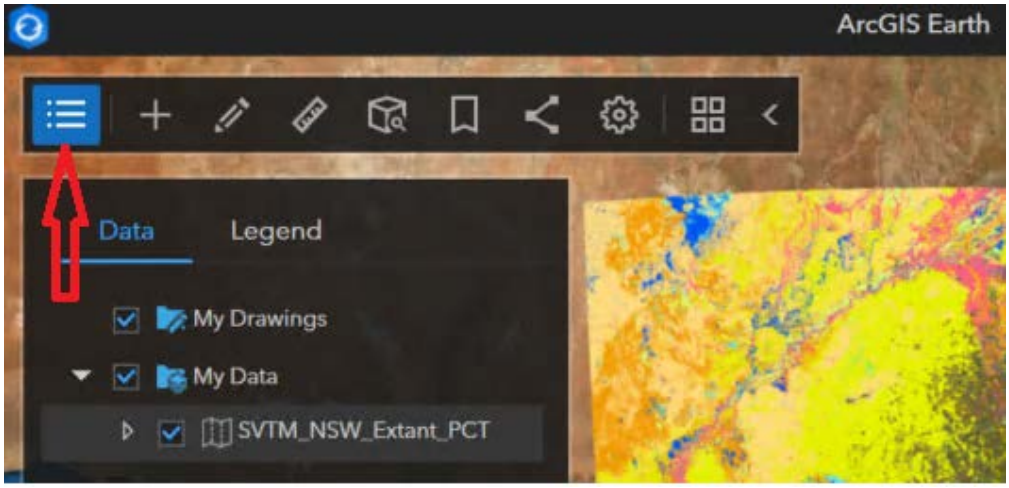


Figure 49 Accessing the 'Data' and 'Legend' panel

You can now zoom in-out, pan and analyse map or add your mark ups using the tools available in the application.

2.5 Google Earth

Google Earth Pro on desktop is free for users and has advanced features. Import and export GIS data, and go back in time with historical imagery. It is available on PC, Mac or Linux.

Note that Google Earth Pro uses data services formatted in KML\KMZ, and there are limitations with KML layers (see 'KML' webpage for further information.

Open Google Earth Pro on your system and select 'Open' from the **File** menu (Figure 50).

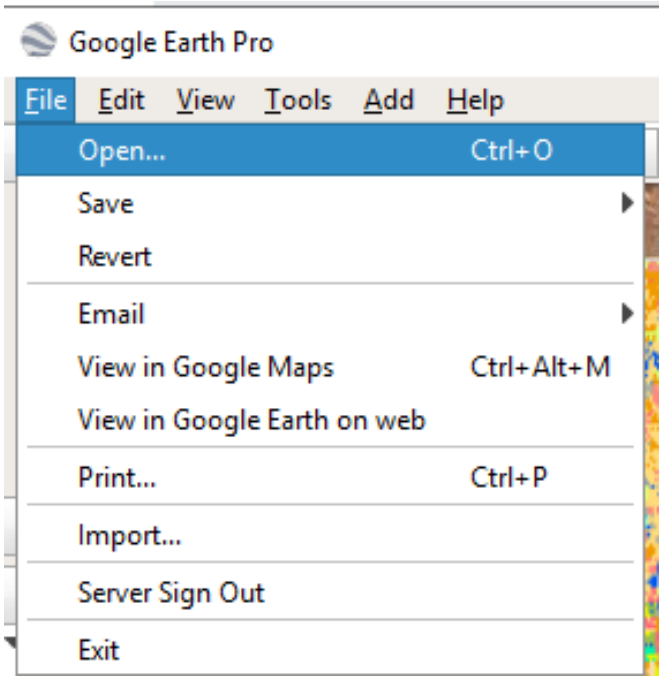


Figure 50 Opening a saved file in Google Earth Pro

Navigate to the KMZ file downloaded in previous step and open it (see Figure 47). The layer (VIS_SVTM_NSW_Extant_PCT.kmz in this example) is now added to Google Earth Pro (Figure 51).

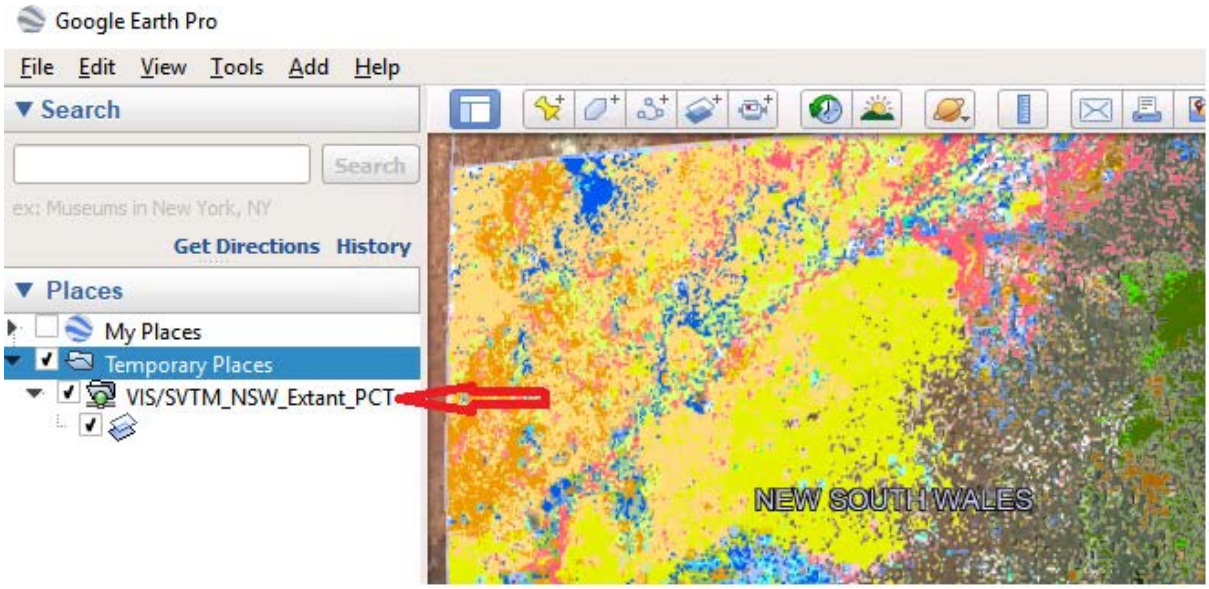


Figure 51 SVTM_NSW_Extant_PCT layer in Google Earth Pro

Use **View** on the menu bar to turn display options on or off. Use the zoom slider bar to zoom in so that the other data layers appear. Note that Google Earth may not show vector data if the data are too complex.

There are not many tools in Google Earth for querying data – for much richer query functionality use SEED view or add WMS into your GIS system.

2.6 ArcMap

The ArcMap option will allow a user to open ArcMap (if installed) and display the WMS. Choose the **ArcMap** option from **ArcGIS REST Services** (see Figure 52).

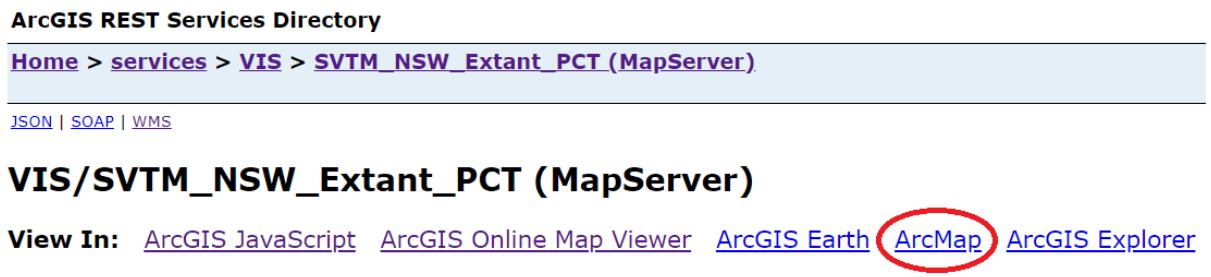


Figure 52 Choosing the 'ArcMap' option from ArcGIS REST Services

If you select **Open** from the window shown in Figure 53, ArcMap should open with the WMS map layer, depending on the program associated with the file type (you may need to set the file type via **Control Panel**). Alternatively, you may save the layer file and add to an ArcMap session.

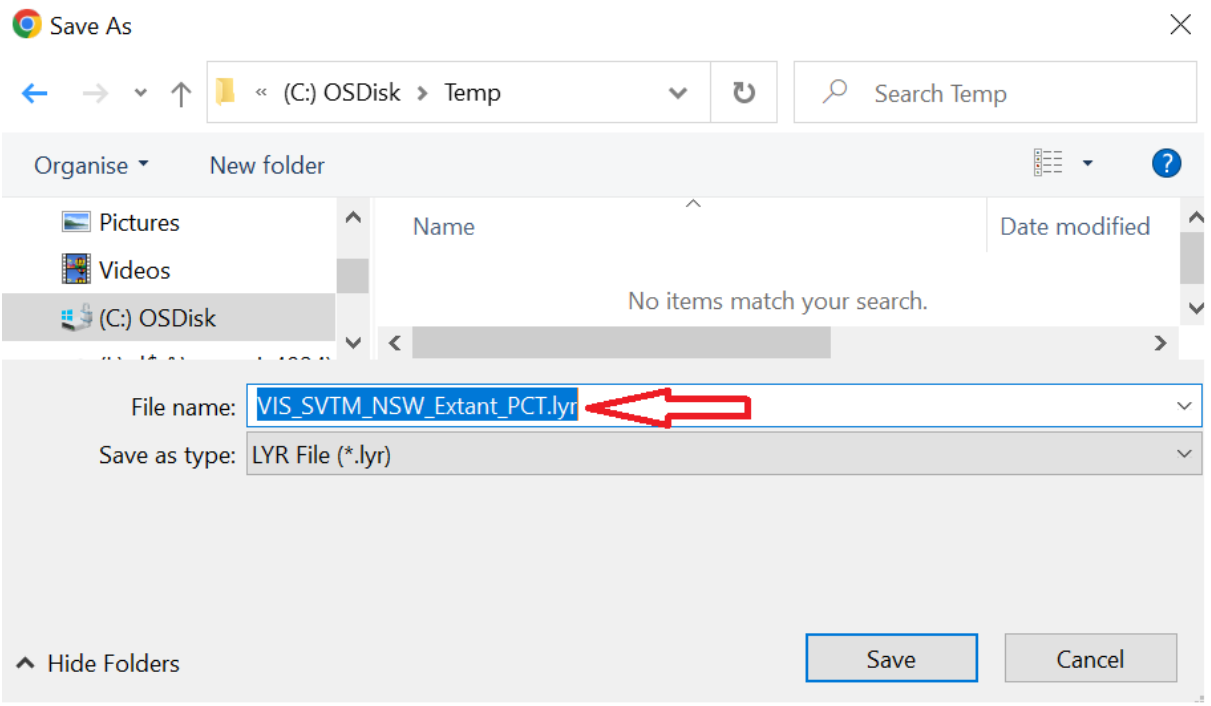


Figure 53 Opening or saving a map in ArcMap

In ArcMap, the WMS should appear in the **Table of Contents** (TOC). If there is a broken link, you will need to manually add the WMS as described later in this section.

Click on the plus symbol in the TOC to reveal the layers that comprise the layer file (see Figure 54).

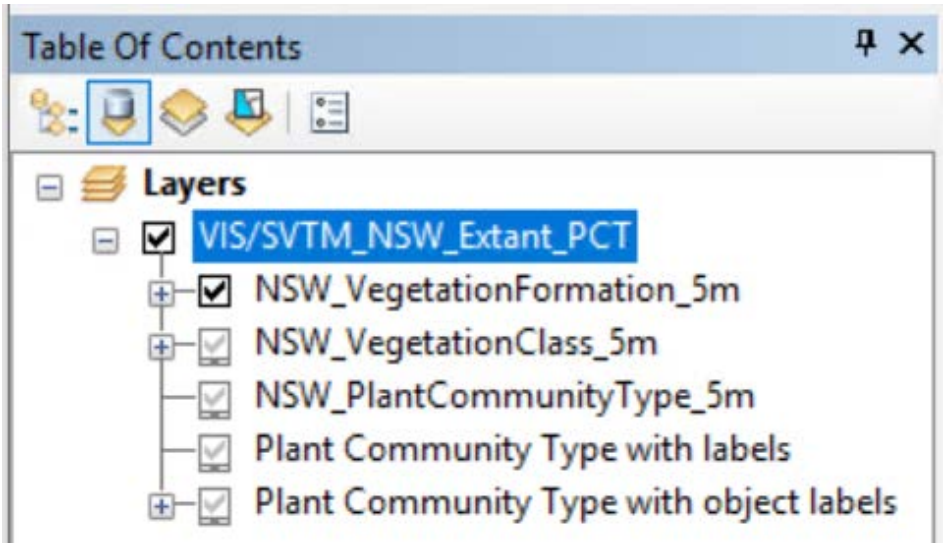


Figure 54 WMS showing in the 'Table of Contents'

Instead of using the zoom button to view layers, you can right-click on a layer of interest and zoom directly to that layer, as shown in Figure 55.

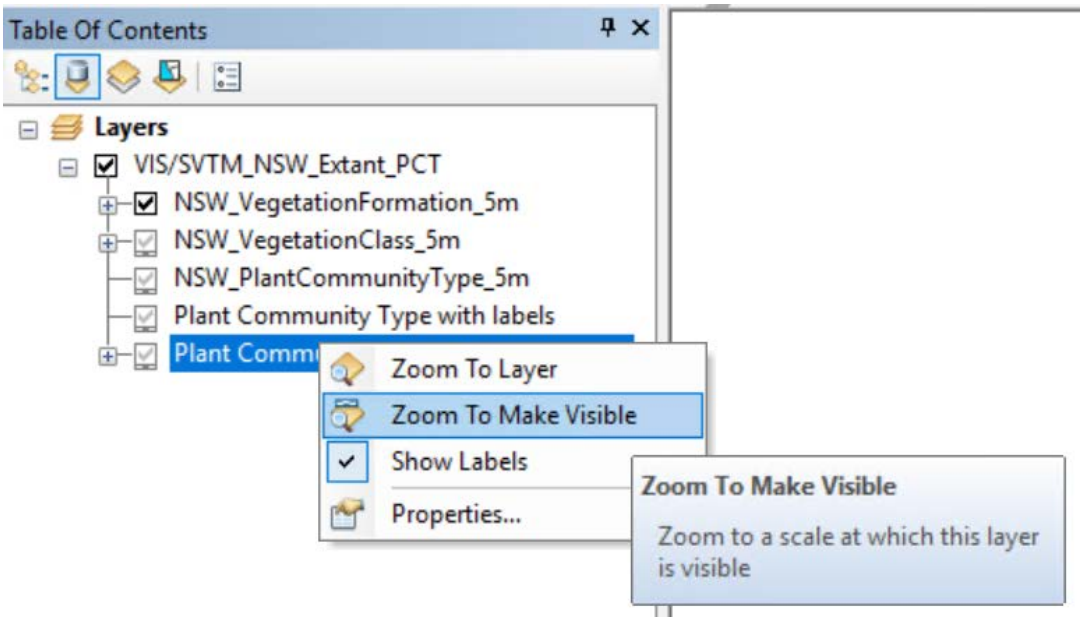


Figure 55 Zooming to a layer in a WMS

The ArcMap **Identify** tool can be used to click on a point within a layer to reveal the attributes for that location. The attributes may be for a polygon or a raster cell (as shown in Figure 56).

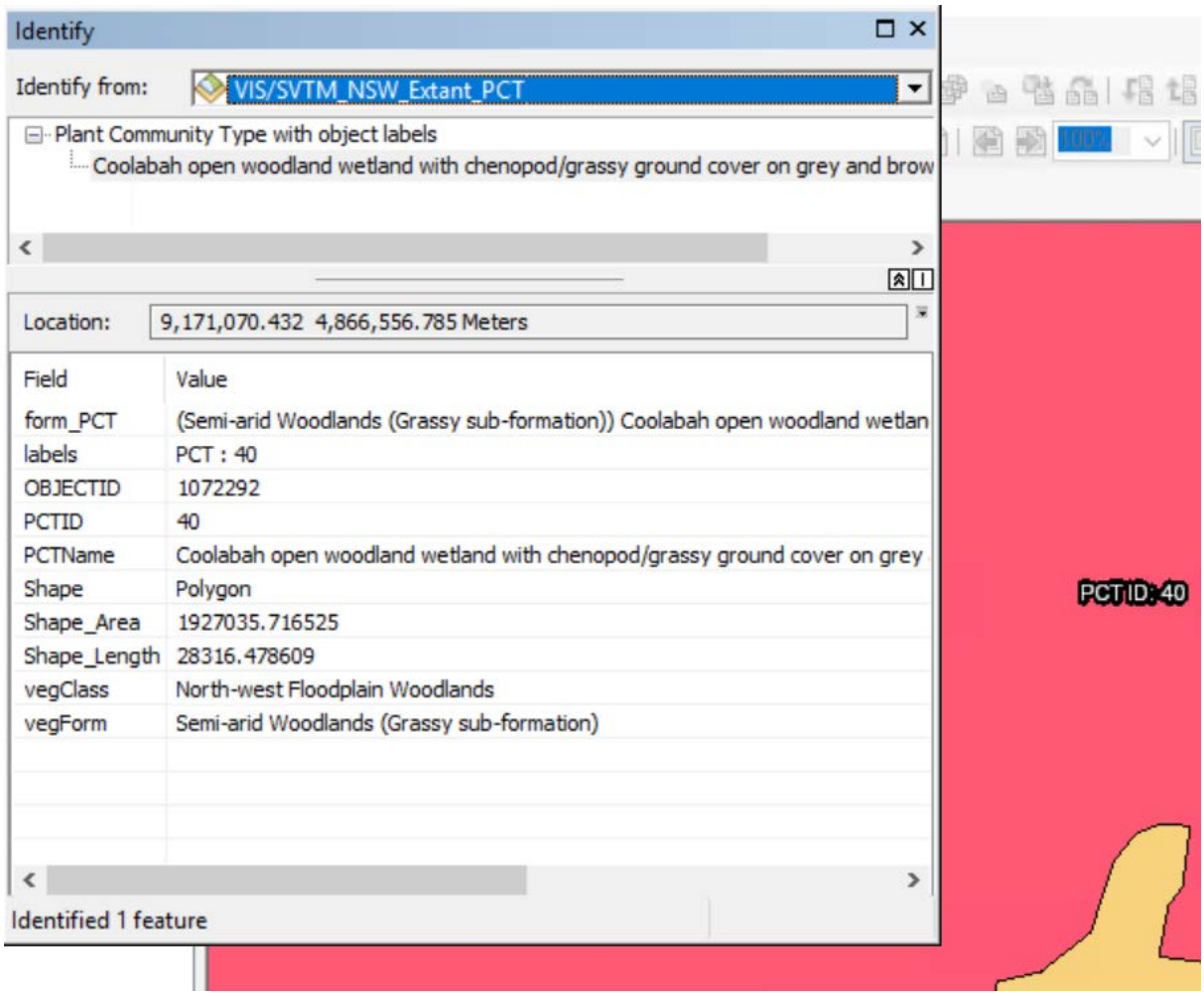


Figure 56 Using the 'Identify' tool in ArcMap

Alternatively, you may add the WMS service to an ArcMap session.

As shown previously in Section 2.3, copy the WMS URL from **ArcGIS REST Services** (see Figure 57 to Figure 61).

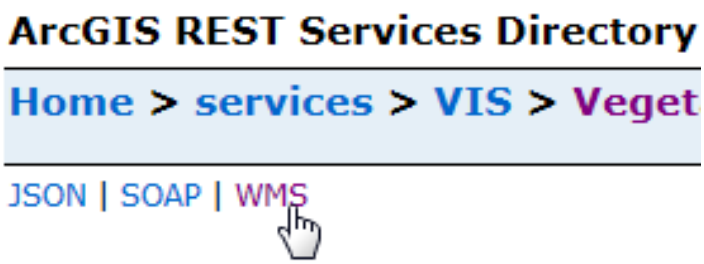


Figure 57 Connecting to WMS from the ArcGIS REST Services Directory

Go to **Catalog** and navigate to **GIS Servers**, then double-click **Add WMS Server** (see Figure 58).

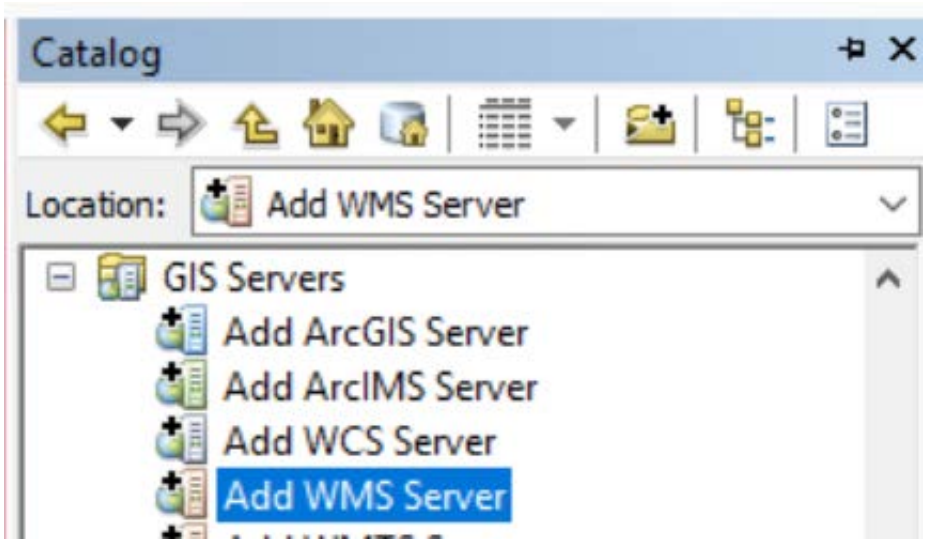


Figure 58 Adding a WMS in ArcMap

The **Add WMS Server** form opens. Paste the WMS URL into the box and remove any POST requests (i.e. all text after '/WMSServer?' – see the highlighted text in Figure 59). The URL should follow the syntax in the example on the form. Refer to the 'POST Method' webpage for further information about POST requests.

Click on the **Get Layers** button.

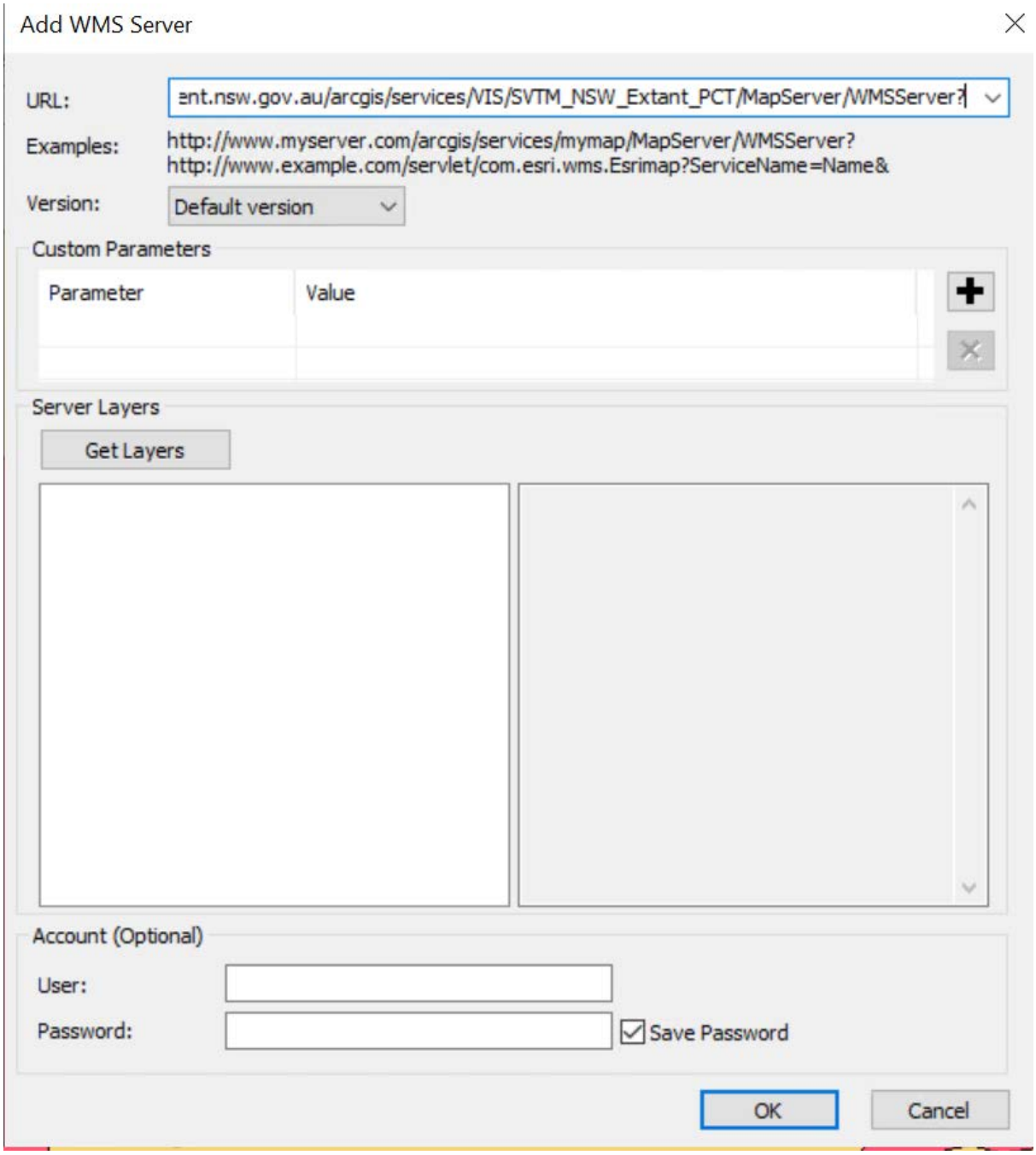


Figure 59 Removing a POST request from the WMS URL

The layers that comprise the WMS are listed (see Figure 60). Note the information shown for each layer as selected, such as the display scale. Click **OK**.

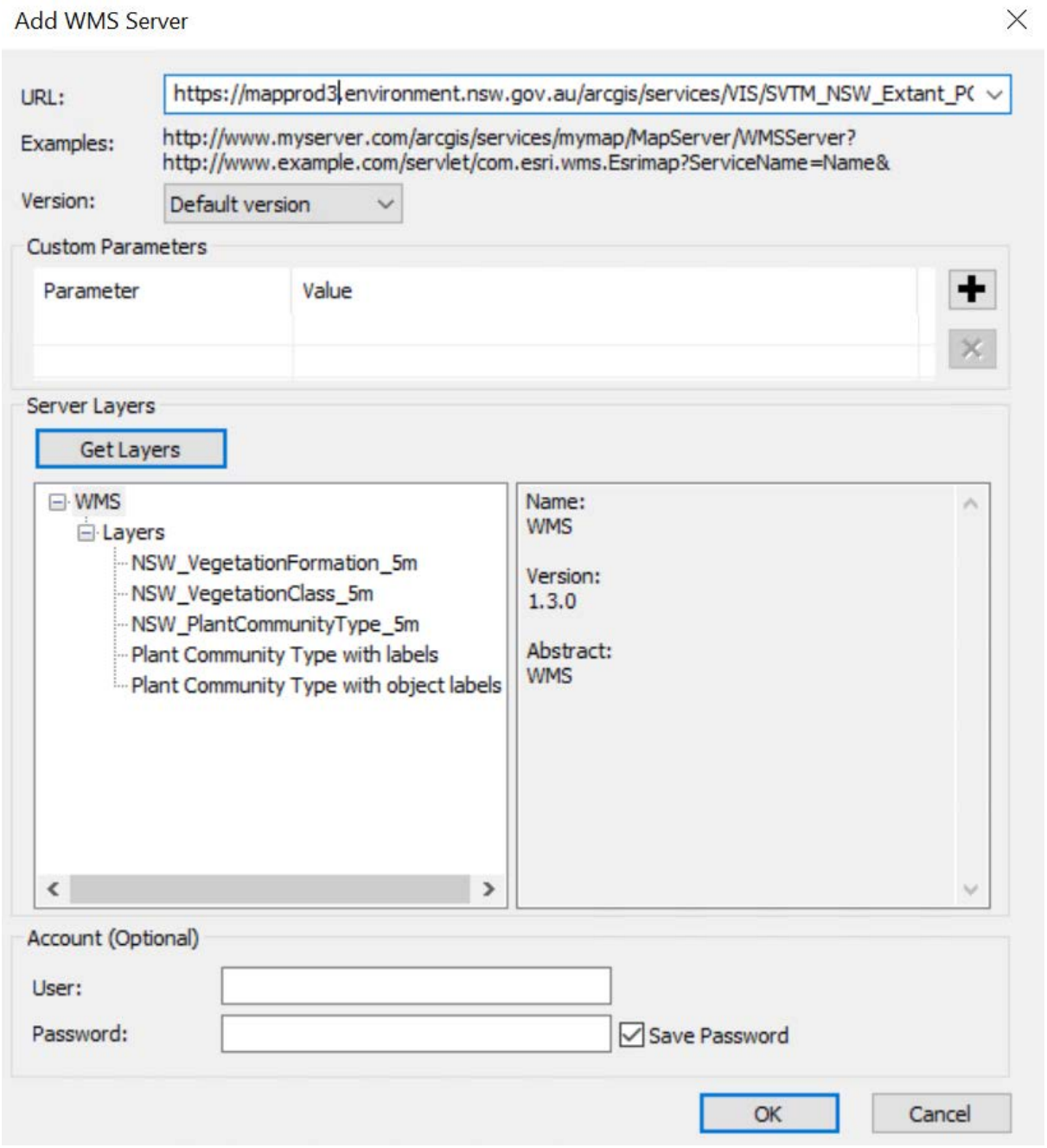


Figure 60 Layers showing for a WMS and clicking the 'OK' button

The WMS and its layers now appear under **GIS Servers** (see Figure 61).

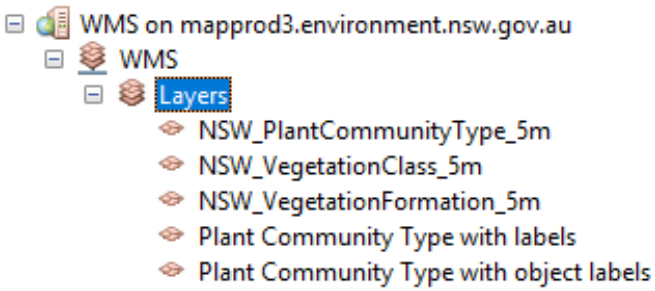


Figure 61 GIS Servers showing WMS layers

In ArcMap, select the **Catalog** button (see Figure 62).

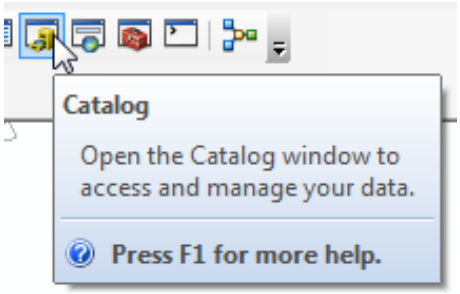


Figure 62 Selecting the 'Catalog' button

Now click on **GIS Servers** > double click on **WMS on mapprod3.environment.nsw.gov.au**, and expand connections (Figure 63 and Figure 64).

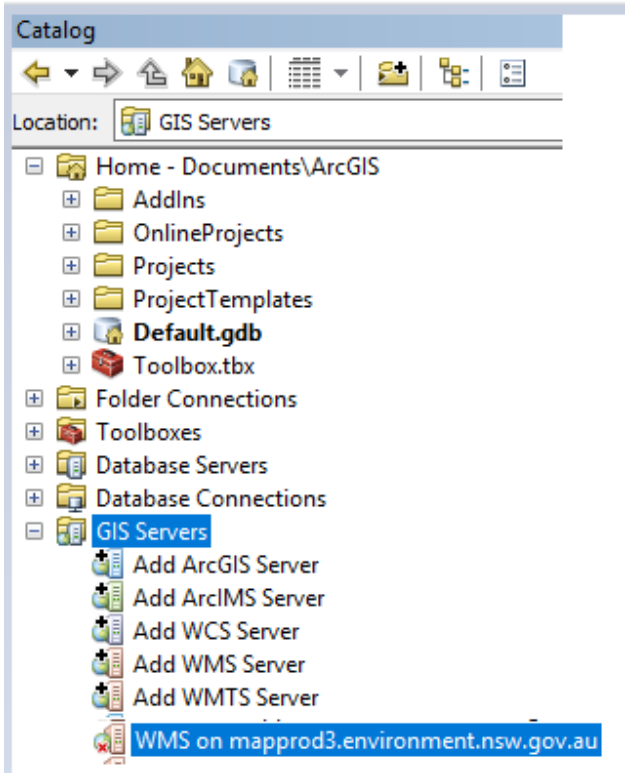


Figure 63 Expanded 'GIS servers' connections

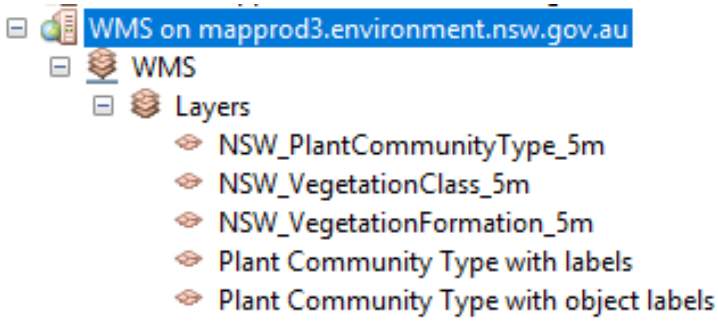


Figure 64 Expanded WMS and Layers

Drag layers from the **Catalog** into your ArcMap session (Figure 65).

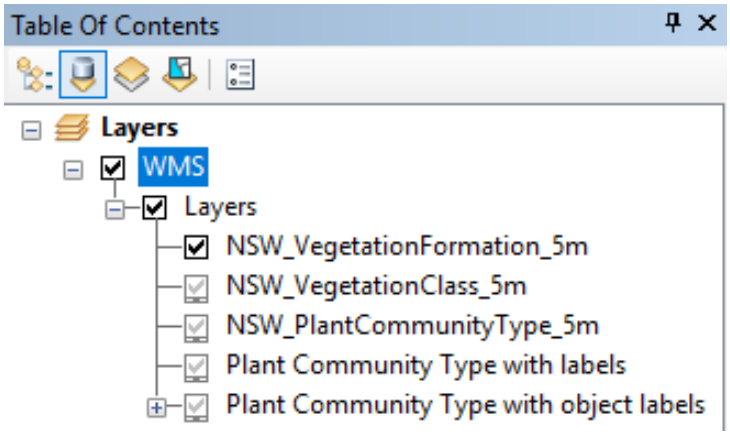


Figure 65 WMS layers in your ArcMap Session

Click and expand WMS and you will see layers listed. Right-click on each layer and select **Zoom To Make Visible** (Figure 66). You will now see the data displayed.

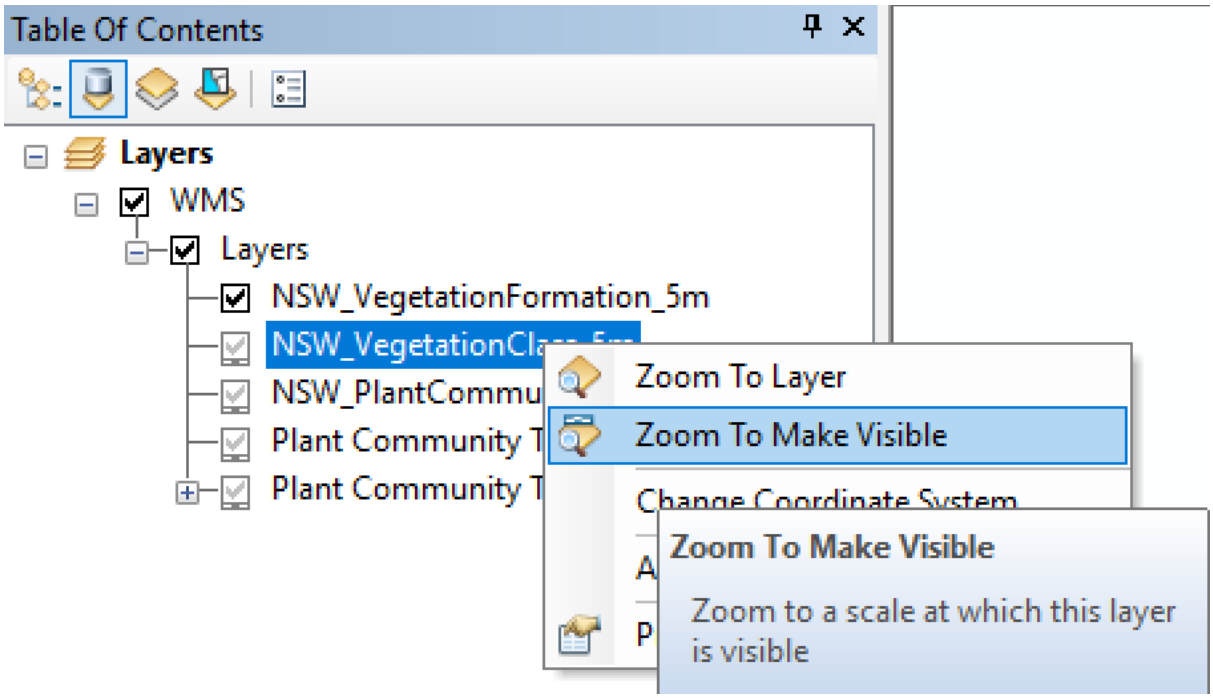


Figure 66 Zooming to visible scale

In line with this example, the WMS for the NSW Vegetation Formation, Class and PCT datasets are listed in the TOC and the map should look like Figure 67.

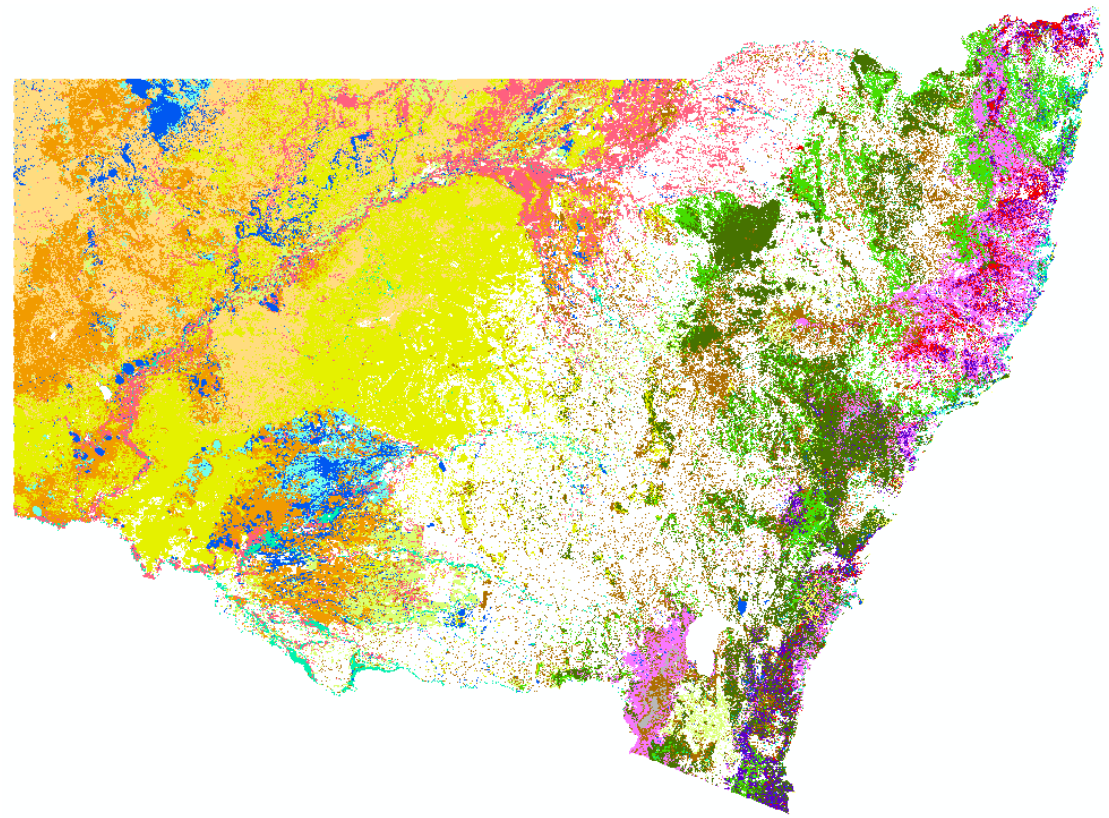


Figure 67 Example of an initial display of WMS features

Note that the visible scale of each dataset is different – as you zoom in or out, the relevant dataset will be turned on or off based on the zoom scale (Figure 68 to Figure 72).

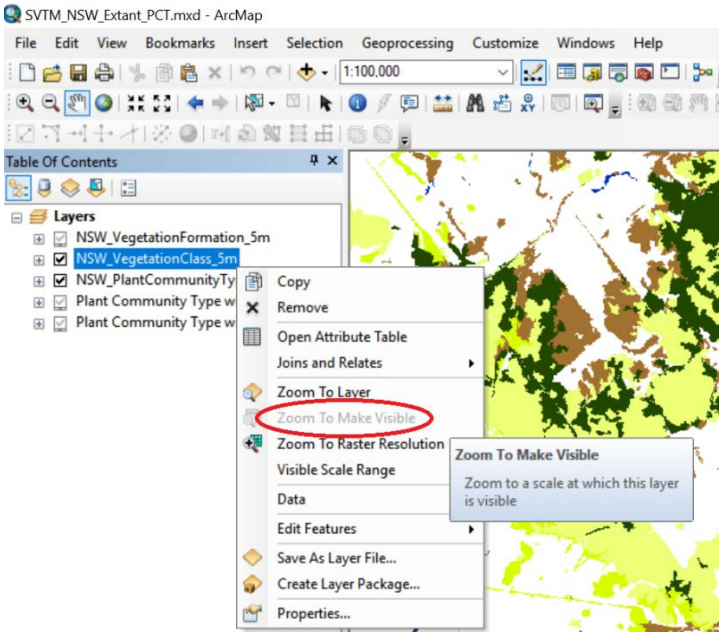


Figure 68 Example of 'NSW_VegetationClass_5m' layer display of WMS features

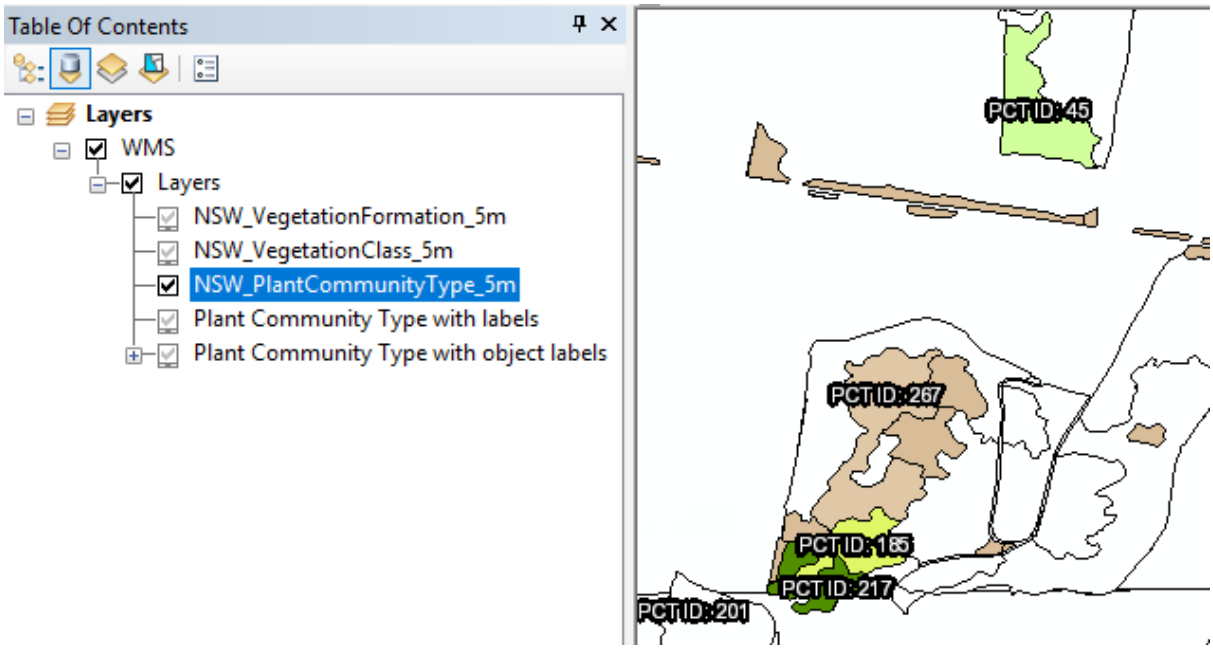


Figure 69 Example of 'NSW_PlantCommunityType_5m' layer display of WMS features

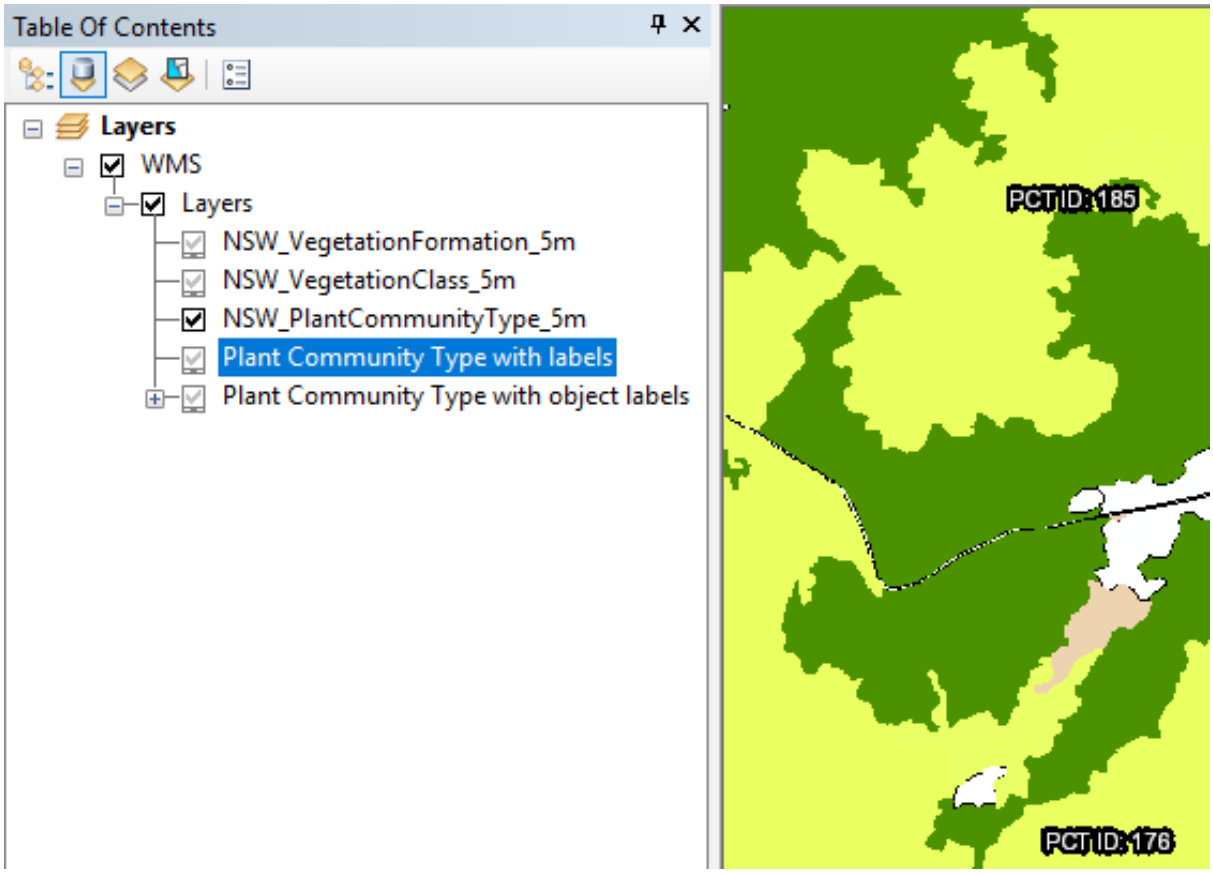


Figure 70 Example of 'Plant Community Type with labels' layer display of WMS features

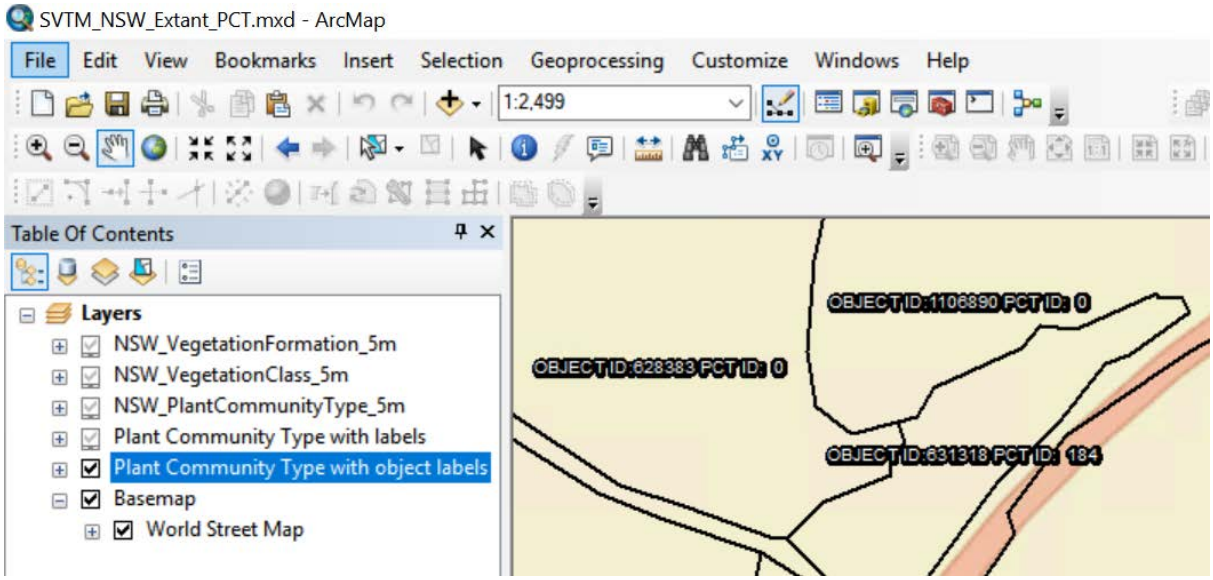


Figure 71 Example of 'Plant Community Type with object labels' layer display of WMS features

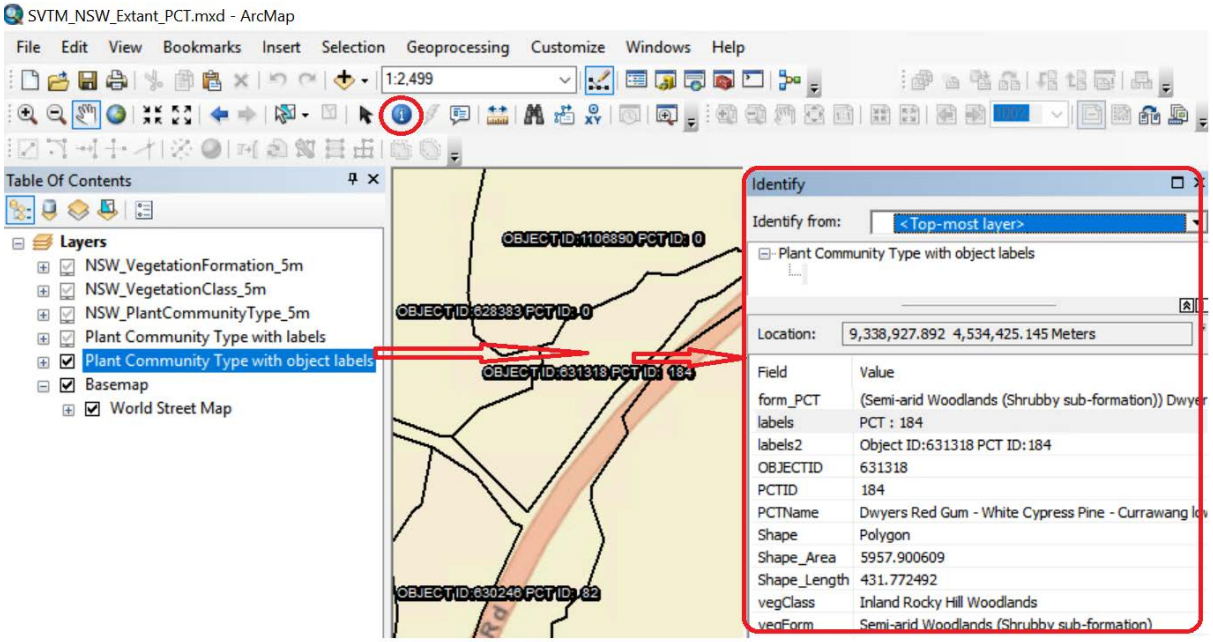


Figure 72 Example of 'Plant Community Type with object labels' layer query result

2.7 ArcGIS Pro

ArcGIS Pro is a free viewer previously available from the ESRI website. If you have this legacy viewer installed, you can select the ArcGIS Explorer option from the **ArcGIS REST Services** page. You can then open the application to display the WMS, or save to file (see Figure 73).

If there is a broken link, you will need to manually add the WMS as described later in this section.

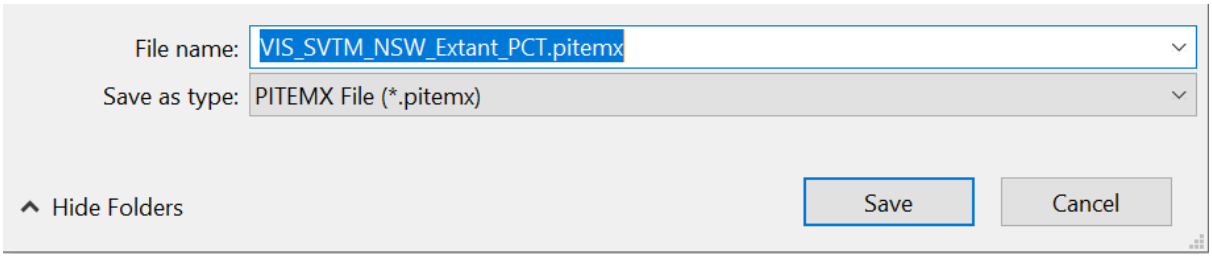


Figure 73 Saving an ArcGIS Pro project file to your system

Double-click on the above saved file from file explorer and it will open up in your ArcGIS Pro if you have installed the software in your system.

Tick the checkbox to turn on the layer (Figure 74) and the map display will appear.

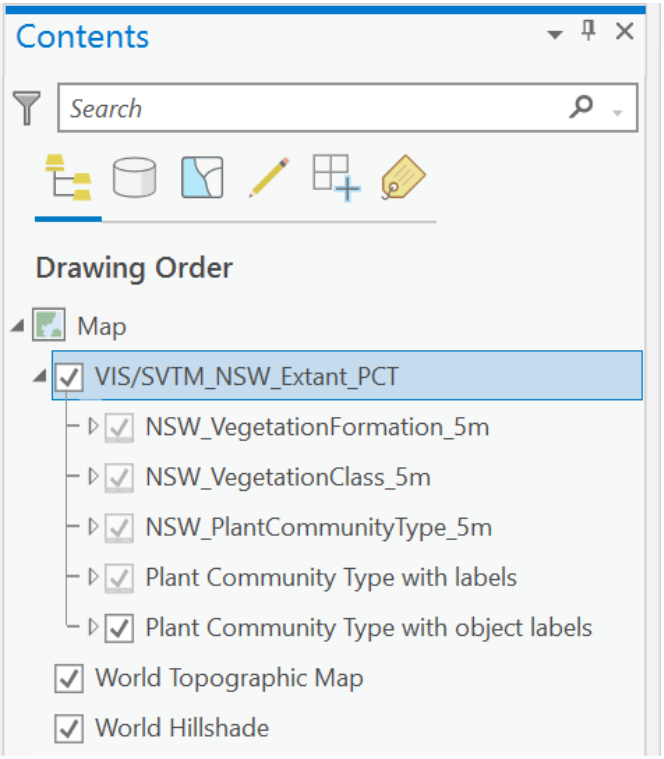


Figure 74 ArcGIS Pro 'Contents' panel showing the SVTM_NSW_Extant_PCT data added for display

Now you can zoom in to your area of interest, and as you zoom in, each of the above listed layers will turn on depending on the zoom scale. You will see the rest of the layers ticked but greyed out, which means they are out of zoom level (Figure 75).

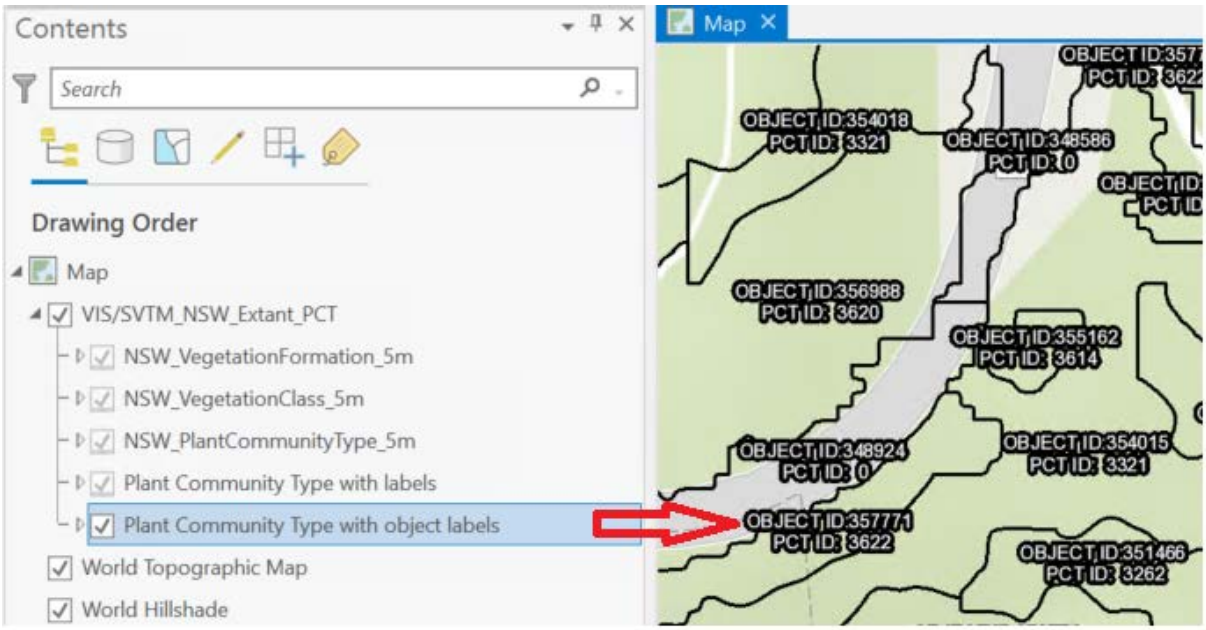


Figure 75 Display zoomed in to features, showing 'Plant Community Type with Object labels'

2.8 QGIS

QGIS is a free and open source GIS. It is effective to use with both WMS and WFS.

After opening QGIS, it is recommended you first add a WMS, then zoom in to a smaller geographical area, before adding the WFS layer. This should restrict the volume of data served over the internet.

The WMS URL can be copied by clicking on **WMS** at the top of the **ArcGIS REST Services Directory** window, then copying the web address from the new window (see Figure 76).

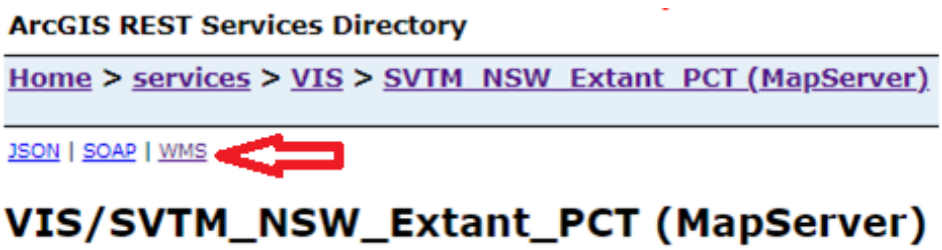


Figure 76 Connecting to WMS from the ArcGIS REST Services Directory

Open the QGIS software and in the **Browser** panel, click on the **Add WMS/WMTS Layer** icon (see Figure 77).

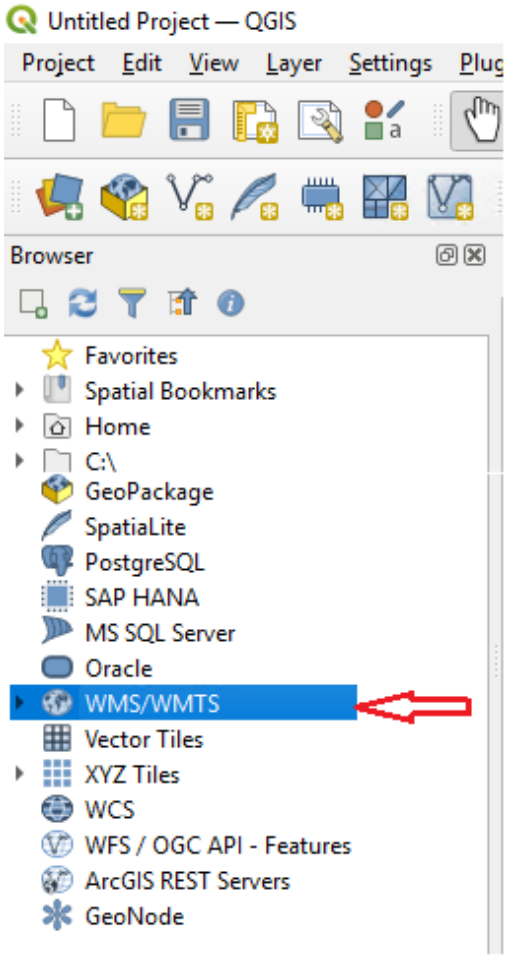


Figure 77 QGIS table of content 'Browser' panel

Right click on **WMS/WMTS** and select **New Connection** as shown in Figure 78.

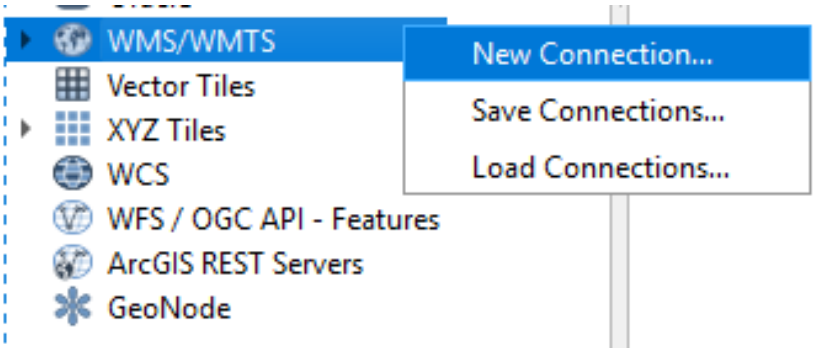


Figure 78 Adding a WMS

A new form opens. Enter a name for the WMS connection, then copy and paste the URL. Click **OK** (see Figure 79).

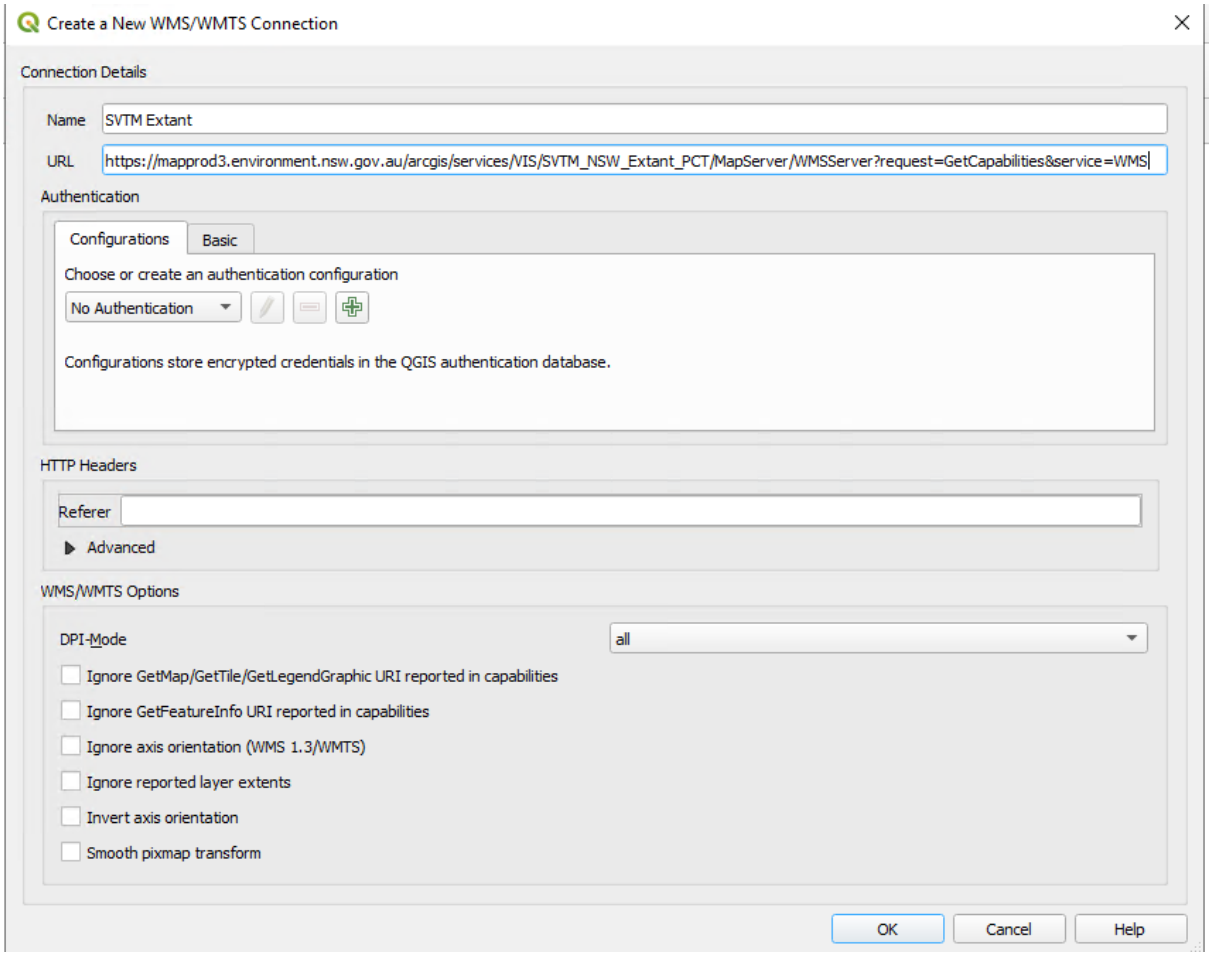


Figure 79 Entering a name and URL for the new WMS connection

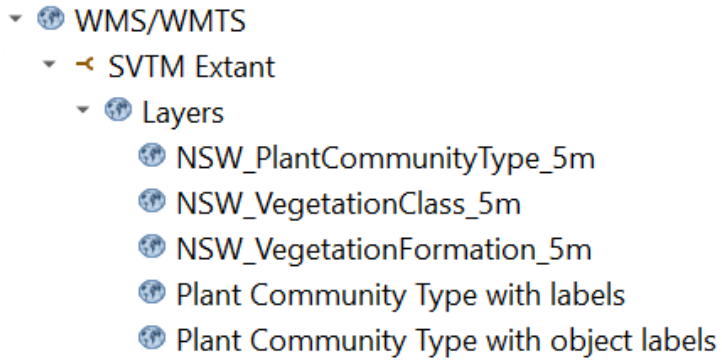


Figure 80 WMS service is successfully connected and layers are listed under WMS/WMTS

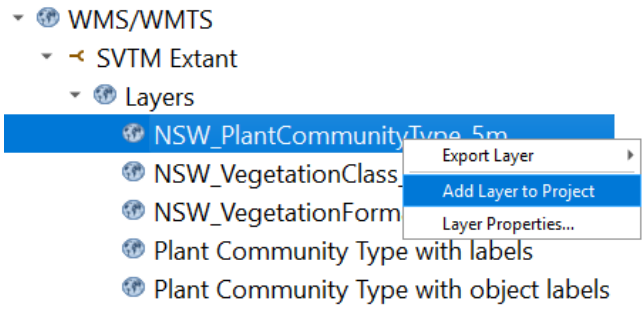


Figure 81 'Add Layer to Project'

Right-click on each of the layers and select **Add Layer to Project** to add it. Alternatively, left-click multiple layers while holding down the shift key to select them.

The layer at the top of the **Layers** panel (or TOC) will display first, in this case, vegetation formations (see Figure 82 and Figure 83).

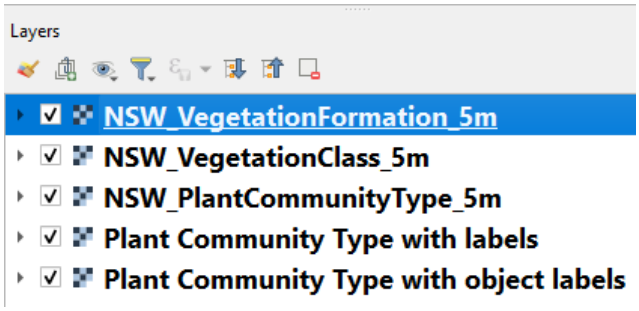


Figure 82 'Layers' panel showing WMS layers

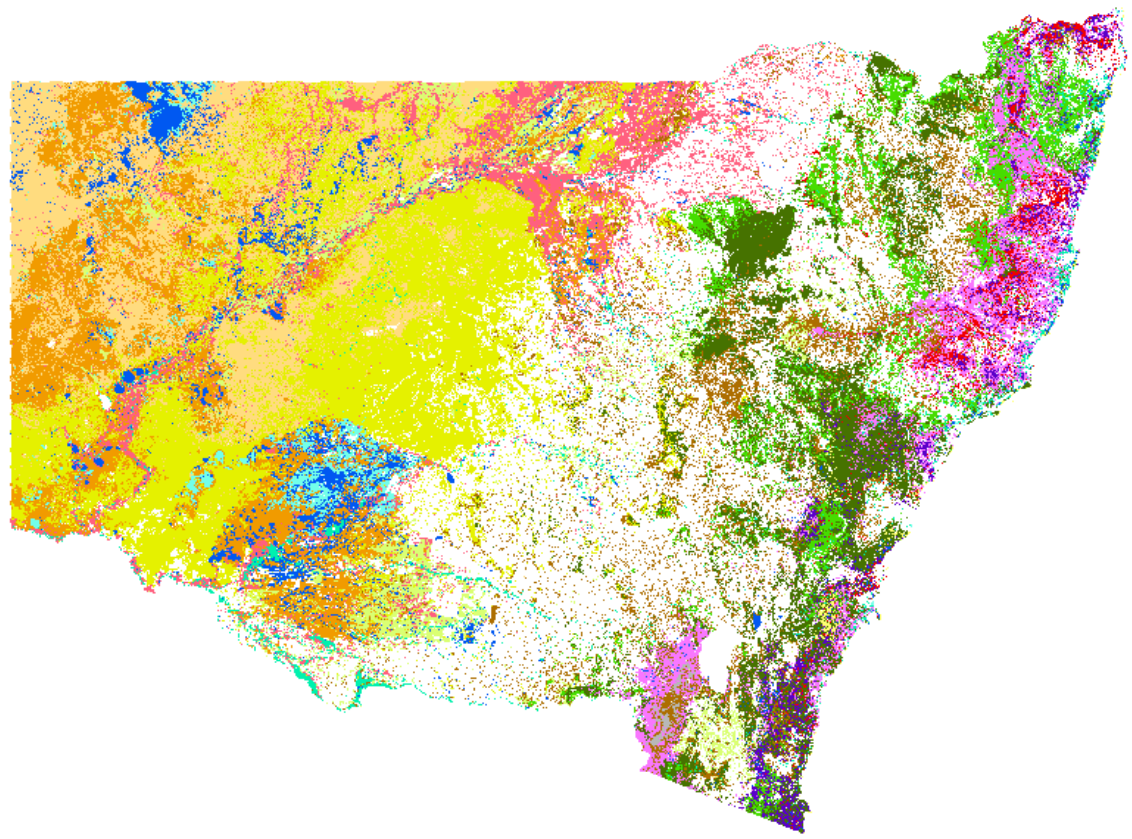


Figure 83 Map showing vegetation formations

Adjust the zoom scale according to the ranges in Table 2 as needed to visualise the data. Note that **Plant Community Type with labels** and **Plant Community Type with object labels** are the lowest level information.

Table 2 Layer names and scale range

Layer name	Scale range
NSW_VegetationFormation_5m	1:1,000,000 to <None>
NSW_VegetationClass_5m	1:100,000 to 1:1,000,000
NSW_PlantCommunity Type_5m	1:20,000 to 1:100,000
Plant Community Type with labels	1:20,000 to 1:2,500
Plant Community Type with Object labels	<None> to 1:2,499

The display should resemble the one in Figure 84.

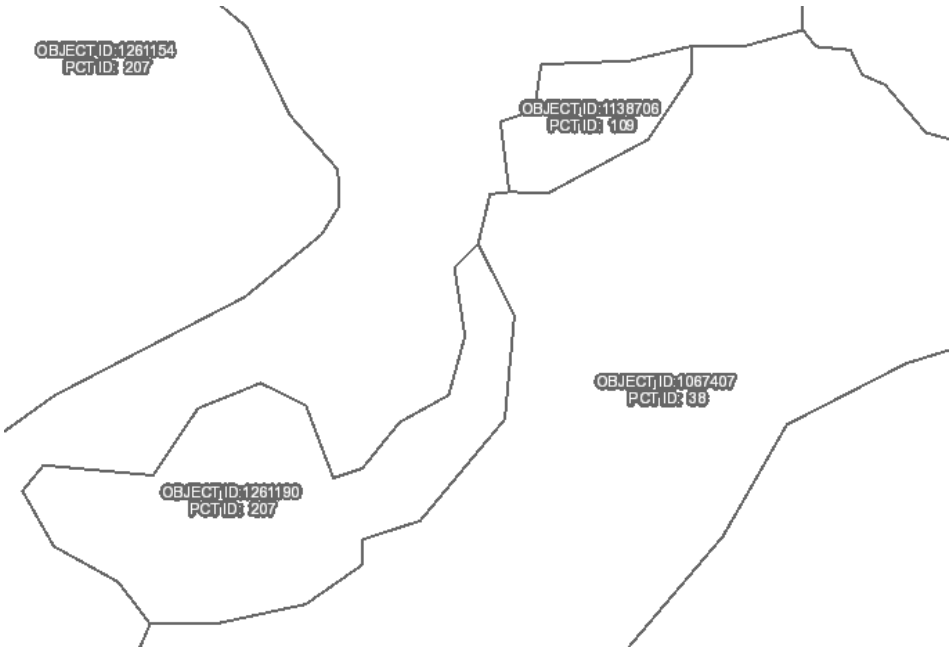


Figure 84 PCTID with OBJECTID labels

The WMS feature can be used in GIS analysis; for example, you may use the **Identify Features** tool to click on the display to reveal the attributes at that location (see Figure 85).

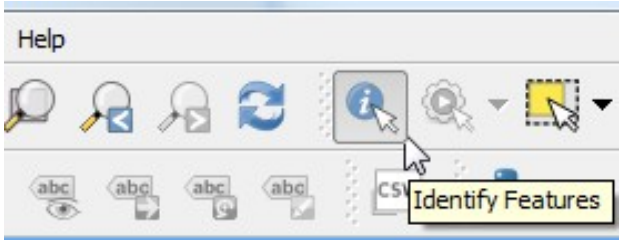


Figure 85 Selecting the 'Identify Features' tool

Figure 86 shows the attributes for a polygon after clicking on an area on the map.

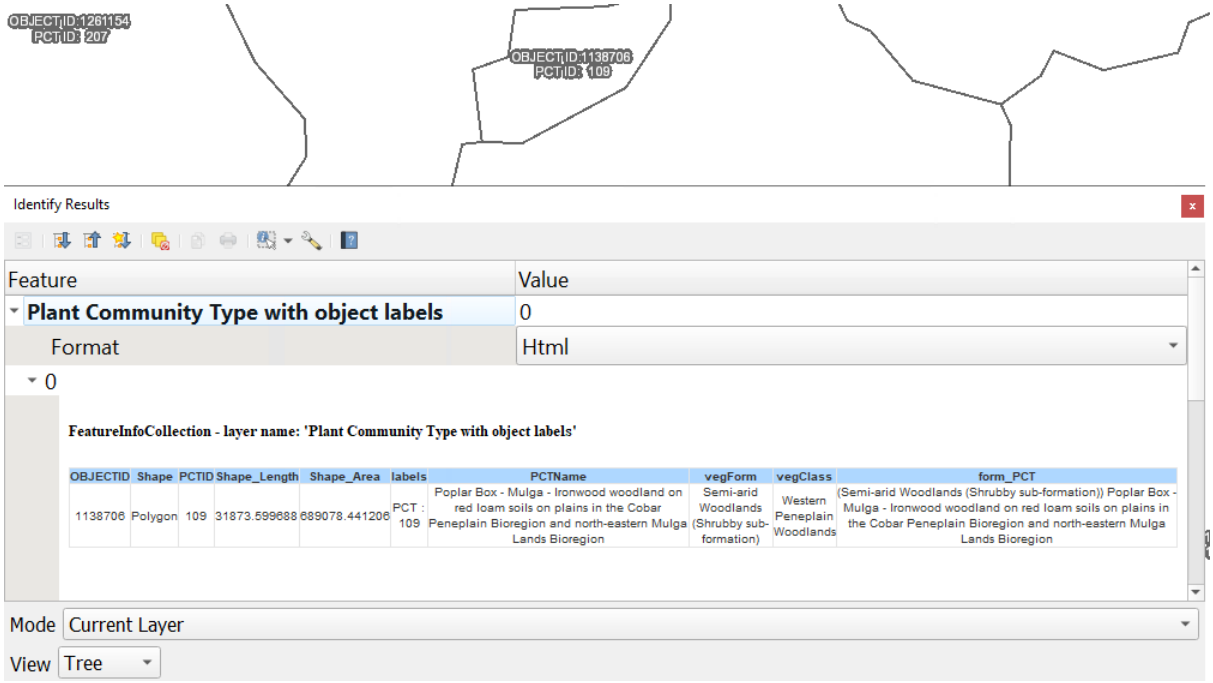


Figure 86 Attributes for a polygon of a WMS layer

The above is only a subset of GIS tasks that can be performed. For more information, please refer to the ‘QGIS Tutorials and Tips’ webpage.

Glossary

ArcGIS REST Service – REST is the acronym for Representational State Transfer, which is an architecture for sharing information through the use of simple HTTP protocols. ArcGIS is a geographic information system (GIS) software package.

Keyhole Markup Language (KML) – a file format for the display of geographical data in browsers such as Google Earth.

Open Geospatial Compliant (OGC) web services – web services that are compliant with OGC standards. Software developers use these standards for their products and services.

Quickview maps – simplified versions of the vegetation maps that only contain a subset of the attributes available. They are easier to navigate than the more detailed vegetation maps. They cover the entire region, whereas the vegetation maps are supplied as 1:100,000 map sheets.

Web Feature Service (WFS) – a protocol for serving geographical features over the web. This includes feature geometry and attributes.

Web Map Service (WMS) – a simple HTTP interface for serving geo-registered map images from a geospatial database.

More information

- ArcGIS Online Map Viewer
- ArcGIS JavaScript
- ArcGIS Explorer Desktop legacy viewer
- ArcGIS REST Services
- ArcMap
- Enable JavaScript
- Finding data in SEED
- How do I use SEED?
- KML
- Open Geospatial Consortium Web Map Service
- POST Method
- QGIS
- QGIS Tutorials and Tips
- SEED (Sharing and Enabling Environmental Data)
- SEED dataset search
- SVTM_NSW_Extant WMS
- SVT_NSW_1750 WMS