

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).





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)



8

ArcGIS REST SERVICE - NSW State Veg etation Type Map (Extant)

An ArcGIS Server web service represents a GIS resource—such as a map,...

Figure 2 ArcGIS REST Service

click on the URL for the REST Service

← Back to Dataset

REST Service

Download URL: https://mapprod3.environment.nsw.gov.au/arcgis/rest/service s/VIS/Vegetation_SVTM_BRGNSVM_v2p0_Raster5m_PCT_E_4467/MapServer

ArcGIS REST Services Directory - provides a variety of interfaces for web browsers and GIS users, and developers, to view quickview maps (5 metrederived grid).

Figure 3 Rest Service URL

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

ArcGIS REST Services Directory

Home > services > VIS > SVTM_NSW_Extant_PCT (MapServer)

JSON | SOAP | WMS

VIS/SVTM_NSW_Extant_PCT (MapServer)

View In: ArcGIS JavaScript ArcGIS Online Map Viewer ArcGIS Earth ArcMap ArcGIS Pro

View Footprint In: <u>ArcGIS Online Map Viewer</u>

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.

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

Table 1Browsers and software for WMS

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).

24 Jun 2022 Department of Planning and Environment

NSW State Vegetation Type Map

Current Extent The State Vegetation Type Map (SVTM) is a regional-scale map of NSW Plant Community Types. This map represents the current extent of each Plant Community Type,...



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.



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

· · · · /		
$\stackrel{\mathrm{A}}{\succ}$ Lower North Ranges Riparian Turpentine Forest	×	
Vegetation Formation: Wet Sclerophyll Forests (Shrubby sub- formation) Vegetation Class: North Coast Wet Sclerophyll Forests PCT Name: Lower North Ranges Riparian Turpentine Forest PCTID: 3087 OBJECTID: 704943		CENECTIDI704943 FCJUDI 6087
Katadata		(FCUID: 63169)
Add to Results View Additional Details		
CEVECTID:708433	ζ	\sim

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).



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**.

Add/Remove Map Info	Add/Remove Map Information.			×
Search layer catalog	۵	Q	Show Selected	^
DPE - Department of Planning and Environment				^
DFSI - Spatial Services (Some Selected)				
Select All				
NSW Administrative Boundaries				
NSW Cadastre (Some Selected)				
Select All				
Cadastre Labels				
□ Cadastre (Some Selected)				
□ Select All				
Large Rural Plan Extent				
Rural Plan Extent				
Section Extent				
Plan Extent				
Lot				
				~
	OK		Cancel	~

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).

Lot	~		1 of 2	•	9
Lot					
Lower North Rai	nges Riparian Turper	ntine For	est		
ot ID; 3281267.					
K <u>Metadata</u>					
	A 101 10 11				
Add to Kesults Vi	ew Additional Details				

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.

ArcGIS REST Services Directory

```
<u>Home > services > VIS > SVTM_NSW_Extant_PCT (MapServer)</u>
```

JSON | SOAP | WMS

VIS/SVTM_NSW_Extant_PCT (MapServer)

View In: ArcGIS JavaScript ArcGIS Online Map Viewer ArcGIS Earth ArcMap ArcGIS Pro

View Footprint In: ArcGIS Online Map Viewer

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).

ArcGIS *¬* My Map



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).

Contents Contents SVTM NSW Extant PCT Vegetation Formation Vegetation Class Plant Community Type Plant Community Type with labels Plant Community Type with object labels

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).

Filter: SVTM_NSW_	Extant_PCT - Plant Community	Туре	×
with object labels	2	5945	

		+ Add another expression	Add a s
Display featu	res in the layer that n	natch the following expression	
PCTID	▼ is	* 3614	
□ Ask for va	ilues 🔻		
		APPLY FILTER	LOSE
		Δ	

Figure 25 Selecting 'APPLY FILTER' to complete the query

The results of this example are shown in Figure 26.

Plant Community Type	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 wi	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)) Southern Highlands	PCT: 3614		

Figure 28 Selecting a table record

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

Options	Ŧ
Show Selected Records	
Center on Selection	
Clear Selection	
Show/Hide Columns	
Filter	

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



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

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).

	📫 Add 👻 📔 🚟 Basema
	Search for Layers
	Add Layer from Web
	Add Layer from File
9	Add Map Notes

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.

ArcGIS マ My Map	
Details 📑 Add 👻 📑 Basemap	🔚 Save 👻 📇 Print 👻
← ArcGIS Online ▼	Filter ×
cadastre nsw	Only show content within map area
Within Map Area X Clear All	> Item type> Date modified
	> Status
NSW_Cadastre_LPIWebservice	

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).

Arc GIS ⊽	Му Мар					
📱 Details	🔁 Add 👻		Basem	nap		
\bigcirc	ArcGIS (Onlin	e 🗸			Fil
cadastre	nsw					0
83 layers		≣	E	łţţ	Ē	
						`

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.

ArcGIS REST Services Directory

Home > services > VIS > Vegetat

JSON | SOAP | WMS

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).

Add Layer from Web		
What type of data are you referencing?		
A WMS OGC Web Service 👻		
URL: https://mapprod3.environment.nsw.gov.au/arcgis/rest/ser	vices/VIS/SVTM_NS	W_Extant_PCT/M
🗌 Use as Basemap	Add Ci	ustom Parameters
GET LAYERS		
Having trouble displaying your OGC Web service? Help us impro the Contact Esri link.	we this site by sendi	ng us the URL via
	ADD LAYER	CANCEL

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).

 ArcGIS REST Services Directory

 Home > services > VIS > SVTM_NSW_Extant_PCT (MapServer)

 JSON | SOAP | WMS

 VIS/SVTM_NSW_Extant_PCT (MapServer)

 Visw In: ArcGIS JavaScript ArcGIS Online Map Viewer ArcGIS Earth ArcMap ArcGIS Explorer

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.

$\leftarrow \rightarrow \cdot \uparrow$	« (C:) OSDisk 🕨 Temp			~	U	2	Search	Temp		
Organise • Nev	w folder								t ▼	?
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🔉 🧊 3D Objects				VIS_	SVTM	_NSW_I	Extant_PC	T.kmz		
> 📃 Desktop		\checkmark	<							>
File name:	VIS_SVTM_NSW_Extant_PCT	kmz	z							~
Save as type:	KMZ File (*.kmz)									~
 Hide Folders 							Save		Cancel	

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).

0	Google	Earth P	ro			
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	Print				Ctrl+P	3
	Import					
	Server S	Sign Ou	ıt			
	Exit					

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).

ArcGIS REST Services Directory

```
<u>Home > services > VIS > SVTM_NSW_Extant_PCT (MapServer)</u>
```

JSON | SOAP | WMS

VIS/SVTM_NSW_Extant_PCT (MapServer)

View In: ArcGIS JavaScript ArcGIS Online Map Viewer ArcGIS Earth ArcMap ArcGIS Explorer

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.

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				>	
File name: VIS_S	VTM_NSW_Extant_PCT.lyr			:	~
Save as type: LYR Fil	le (*.lyr)			;	~
▲ Hide Folders			Save	Cancel	

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).

Table Of Contents	ą	×
8: 📮 🧇 📮 🗄		
🖃 🥌 Layers		
VIS/SVTM_NSW_Extant_PCT		
NSW_VegetationFormation_5m		
— NSW_PlantCommunityType_5m		
— Plant Community Type with labels		
Plant Community Type with object la	bels	5

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).

Identify		×			
Identify from:	VIS/SVTM_NSW_Extant_PCT	- @ .	a 94	661	FR th
Plant Comm	unity Type with object labels h open woodland wetland with chenopod/grassy ground cover on grey and bro	we we	1	100%	
<		>			
Location:	,171,070.432 4,866,556.785 Meters	*			
Field	Value				
form PCT	(Semi-arid Woodlands (Grassy sub-formation)) Coolabah open woodland wetla	an			
labels	PCT : 40				
OBJECTID	1072292				
PCTID	40				
PCTName	Coolabah open woodland wetland with chenopod/grassy ground cover on gre	y			
Shape	Polygon			PC	ID: 40
Shape_Area	1927035.716525				
Shape_Length	28316.478609				
vegClass	North-west Floodplain Woodlands				
vegForm	Semi-arid Woodlands (Grassy sub-formation)	_			
				1	
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dentified 1 fea	ture				

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).

ArcGIS REST Services Directory

Home > services > VIS > Veget

JSON | SOAP | WMS

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.

JRL:	ent.nsw.g	ov.au/arcgis/services/v15/5v1M_N5vv_Extant_PC1/N	apserver/wwwsserverg
Examples:	http://www http://www	.myserver.com/arcgis/services/mymap/MapServer/M .example.com/servlet/com.esri.wms.Esrimap?Service	/MSServer? Name=Name&
/ersion:	Default ve	rsion ~	
Custom Para	ameters		
Parameter		Value	+
Server Laye	rs		
GetLa	iyers		^
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Get La Get La Account (Op	vtional)		

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**.

RL:	https://r	gov.au/arcgis/services/VIS/S	VTM_NSW_Extant_P(
xamples:	http://ww http://ww	ww.myserver.com/arcgis/serv ww.example.com/servlet/com	ices/mymap/MapServer/WMS .esri.wms.Esrimap?ServiceNa	Server? me=Name&
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erver Laye Get La	rs iyers			
₩MS	ers NSW_Vegeta NSW_PlantC Plant Commu Plant Commu	ationFormation_5m ationClass_5m ommunityType_5m nity Type with labels nity Type with object labels	Name: WMS Version: 1.3.0 Abstract: WMS	^
<	Han -D	>		~
Jser:				4

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).



- WMS
 WMS
 Layers
 - NSW_PlantCommunityType_5m
 - NSW_VegetationClass_5m
 - NSW_VegetationFormation_5m
 - Plant Community Type with labels
 - Plant Community Type with object labels

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



- Plant Community Type with labels
- Plant Community Type with object labels

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.

Table Of Contents	Ψ ×
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🖃 🥌 Layers	
🖃 🔽 WMS	
⊢ ⊢ Layers	
—	on_5m
— <mark>── NSW_VegetationClass 5.</mark> — ── NSW_PlantCommu	Zoom To Layer
— 🕎 Plant Community T 🔯	Zoom To Make Visible
🔄 – 💟 Plant Community T	Change Coordinate System
	Zoom To Make Visible
er	P Zoom to a scale at which this layer is visible

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

SVTM_NSW_Extant_PCT.mxd - ArcMap	
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🖃 🥌 Layers	
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🗉 🕎 Plant Community Type with labels	
Plant Community Type with object labels	CEREMICAEDEDEDIGITES (ES)
🖃 🗹 Basemap	

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

SVTM_NSW_Extant_PCT.mxd - ArcMap		
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Table Of Contents 4 ×		Identify 🗆 🤉
Se 🔍 🍣 🖾		Identify from: <a>Top-most layer>
 		□- Plant Community Type with object labels
 	CELEPTID:222396970-0	Location: 9,338,927.892 4,534,425.145 Meters
 Plant Community Type with object labels Basemap World Street Map 	CELECUID/CONTON 123	Field Value form_PCT (Semi-arid Woodlands (Shrubby sub-formation)) Dwye labels PCT : 184
		labels2 Object ID:631318 PCT ID:184 OBJECTID 631318
	\mathcal{A}	PCTID 184 PCTName Dwyers Red Gum - White Cypress Pine - Currawang lo
		Shape Polygon Shape Area 5957.900609
	08120710x32024060710x52	Shape_Length 431.772492 vegClass Inland Rocky Hill Woodlands
		vegForm Semi-arid Woodlands (Shrubby sub-formation)

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.

File name:	VIS_SVTM_NSW_Extant_PCT.pitemx	~
Save as type:	PITEMX File (*.pitemx)	~
∧ Hide Folders	Save Cancel	

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).

ArcGIS REST Services Directory



VIS/SVTM_NSW_Extant_PCT (MapServer)

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.



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

nection	Details		
Name	SVTM Extant		
	https://www.ed.2.environment.com/com/com/com/icen/MC/CV/TM_I	NCM Extent DCT ManCanuer MMCCanuer Jacquest - CatCanabilities Page vice - MMC	1
URL	(https://mapprods.environment.nsw.gov.au/arcgis/services/vis/svim_	vow_extant_PCT/mapserver/wmsserver/request=GetCapabilities@service=wms	2
Authenti	acation		
Con	nfigurations Basic		_
Choo	ose or create an authentication configuration		
No	Authentication 🔻 🥢 📼 🕀		
Conf	figurations store encrypted credentials in the QGIS authentication databa	se.	
ITTP He	eaders		
-			
Refer	rer		
Refer	rer dialacted		
Refer	rer Advanced		
Refer	rer klavanced MTS Options		
Refer A VMS/WI DPI-M	rer dvanced MTS Options Mode	all	
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Figure 79 Entering a name and URL for the new WMS connection

- WMS/WMTS
 - SVTM Extant
 - Iayers
 - MSW_PlantCommunityType_5m
 - MSW_VegetationClass_5m
 - MSW_VegetationFormation_5m
 - Plant Community Type with labels
 - Plant Community Type with object labels

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

- WMS/WMTS
 - SVTM Extant

🝷 🎯 Layers							
NSW_PlantCommunity	Type 5m						
MSW VegetationClass	Export Layer						
	Add Layer to Project						
SW_VegetationForm	Layer Properties						
🐨 Plant Community Type	with labels						
🙆 Diant Canana ita Tura with a biant laba							

Plant Community Type with object labels

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 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></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</none>

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.

OBJECT	ID 1261154 ID 207	3)		L	PETERITORISTOS				$\left\{ \right\}$		_
Identify	Results												x	
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Featu	re							Value					4	•
• Pla	nt Com	mun	ity T	ype wit	h object	abels		0						
F	ormat							Html					*	
~ 0	Featurel	nfoColle	ction -	layer name:	'Plant Comm	unity Type	e with obje	ect labels'						
	OBJECTIC) Shape	PCTID	Shape_Length	Shape_Area	labels		PCTName	vegForm	vegClass	fo	rm_PCT		
	1138706	Polygon	109 3	31873.599688	689078.441206	PCT: 109 Pene	plar Box - M red Ioam so eplain Biore L	lulga - Ironwood woodland on oils on plains in the Cobar egion and north-eastern Mulga ands Bioregion	Semi-arid Woodlands (Shrubby sub- formation)	Western Peneplain Woodlands	(Semi-arid Woodlands (Shi Mulga - Ironwood woodla the Cobar Peneplain Bio Land	ubby sub-formation)) f nd on red loam soils o region and north-east s Bioregion	°oplar Box - n plains in ern Mulga	1
														r
Mode	Curren	t Laye	r										*	
View	Tree	-												

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

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