Contents

Contents 1
Introduction 2
Scenario 2
What will I learn? 3
What data do I need? 4
Marine Download 4
Unzip data files 5
Download file Contents 6
Map projections 6
Add HydroView chart data to ArcMap 9
Save your project 11
Add Gridded Bathymetry data 12
Add HydroSpatial One vector data 14
Check other sources of data 16
Scottish Government 16
The Crown Estate 17
Add new data 18
Change projection 18
Map symbology 20
Use Symbol Selector 20
Use attribute data 21
Online Web Mapping Services 23
Scottish Natural Heritage WMS 23
Digimap OpenStream WMS 26
Map display 29
Note on Open Stream projection 29

Introduction

This guide contains instructions for viewing geospatial data in ArcGIS. The source of the data is Marine Digimap, Crown Estates and Scottish Natural Heritage.

You will need access to ArcGIS software to complete this guide. No prior knowledge of ArcGIS is required. However, an understanding of the basic GIS terms such as raster and vector would be good. This information can be found in the following online learning object:

http://edina.ac.uk/digimap/support/digimapelearning/index.html

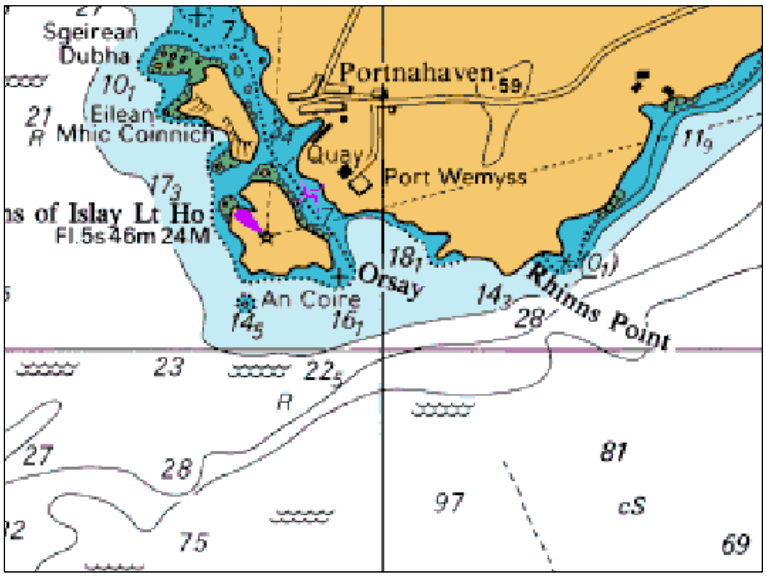
The instructions and images have been prepared using ArcGIS version 10.1.

Scenario

There are a number of renewable energy projects currently in various stages of planning around the cost of Islay, including tide, wind and wave projects.

One of these projects is for a large wind farm off the west coast.

Permission to construct a met mast (a wind measurement tower) on Orsay Island, in the Rhinns of Islay, was granted to Scottish and Southern Energy (SSE) in September 2013.



Map images: Crown Copyright/SeaZone Solutions. All Rights Reserved. 052006.001. Not to be used for Navigation.

This exercise aims to simulate how different datasets would be pulled together:

1. to analyse the siting of such a mast
2. to create various maps that would be used in support of such an application.

You can see the application and supporting documentation of the SSE website:

http://www.sse.com/Islay/

What will I learn?

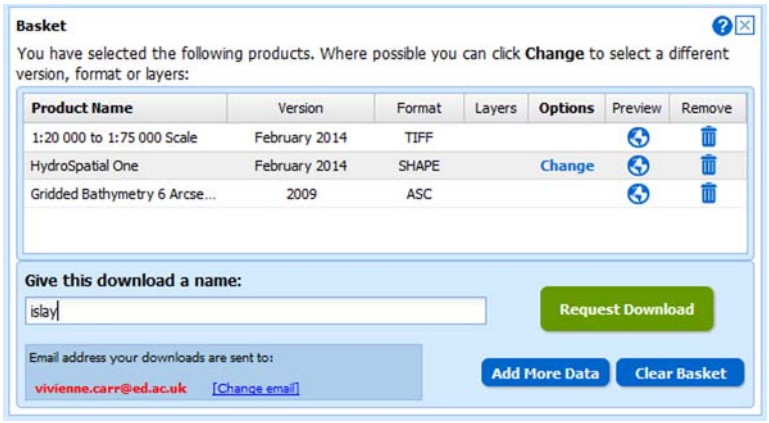
- The key applications used in ArcGIS desktop software
- How to:
    - add raster and vector map data to ArcMap
    - amend map projections so all map data is in same projection
    - add Web Map Streaming services to ArcMap
    - find sources of environmental mapping data
    - change map symbols

What data do I need?

For this exercise you will need some map data from Marine Digimap. The licence does not permit us to supply you with the data. You will need to download it.

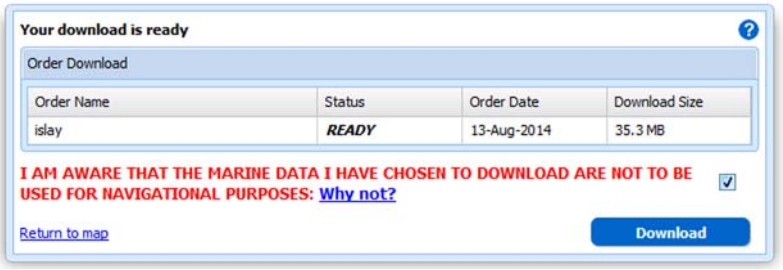
Marine Download

1. Login to Digimap
2. Select Marine > Download… > Marine Download
3. Search for Islay, select Islay (Argyll and Bute)
4. Step 1 - Click Select Visible Area
5. Step 2
    a. Check the box in Vector data, next to HydroSpatial One
    b. Check the box in HydroView Charts, next to 1:20000 to 1:75000 scale
    c. Check the box next to Gridded Bathymetry 6, in Bathmetry
6. Click Add to Basket at the bottom left of the screen
7. Name the order
8. Click Request Download



You will now receive 2 emails from Digimap

9. Click on the link in the second email
10. Check the box to agree the data is not to be used for navigation
11. Click Download



12. Save the file **data.zip** to a suitable folder on your computer. **We recommend renaming the file to Islay.**

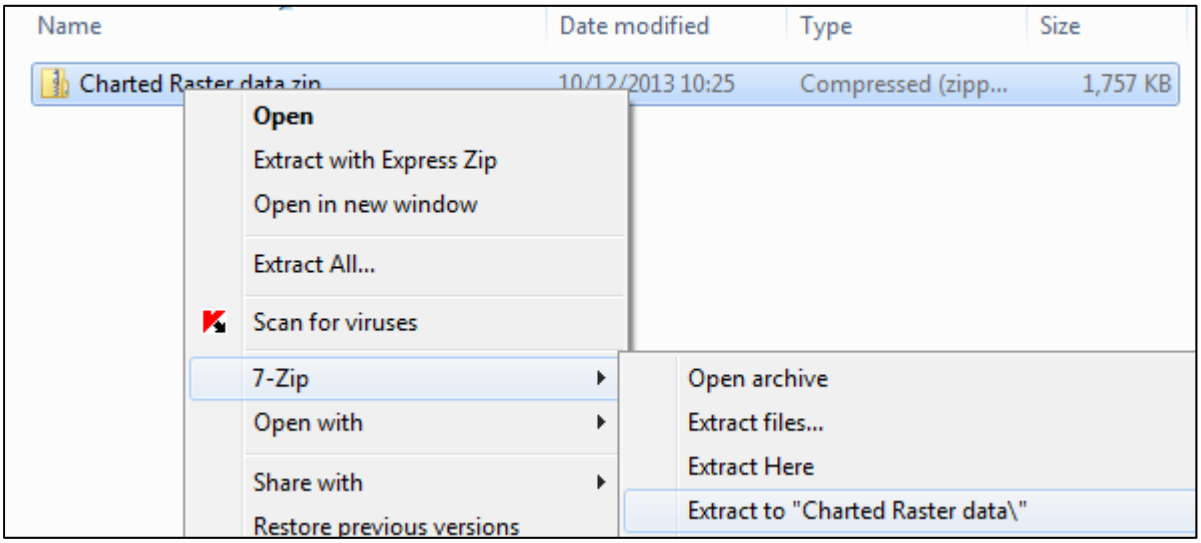
Unzip data files

To access the map data, you need to unzip the data files you have downloaded.

This step will vary depending on the software available on your computer. The following steps describe the process on a Windows desktop computer.

1. Open Windows Explorer or your file manager
2. Find the zip file
3. Right click on it
4. Look for Extract all or Unzip
5. Unzip the contents of the file to a new folder

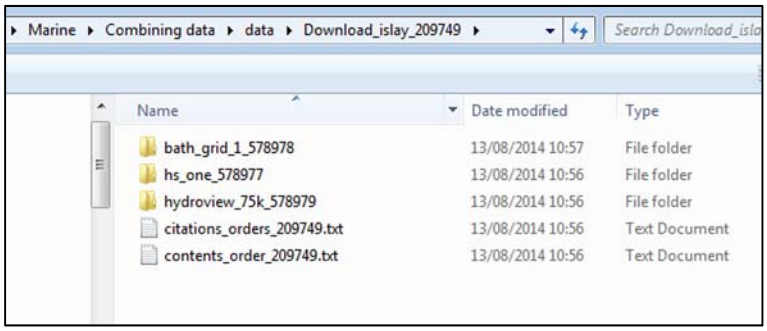
This image shows a computer that uses software called 7-Zip to unzip compressed files.



Download file Contents

You should see 3 sub-folders within your download file.

1. **Hs_one** contains the HydroSpatial One vector data
2. **Bath_grid** contains the bathymetry data
3. **Hydroview_75k** contains your marine charts



There are two text files:

1. Citations_orders - copy and paste the contents to your bibliography.
2. Contents_order – details everything you ordered in this download.

Map projections

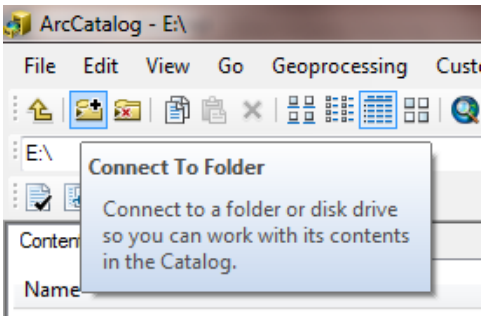
The first thing we want to do is add the chart covering the Islay area to the map. You should have downloaded the chart from Marine Digimap's Marine Download service. If you don't have it, go back to the **What data do I need?** section of this document and follow the instructions.

Before we add data, it's important to decide in which geographic projection you want to display the data. Every marine chart from Marine Download has its own projection. The larger scale (more detailed) charts are in Transverse Mercator. All of the Hydrospatial vector data is in WGS84 projection.

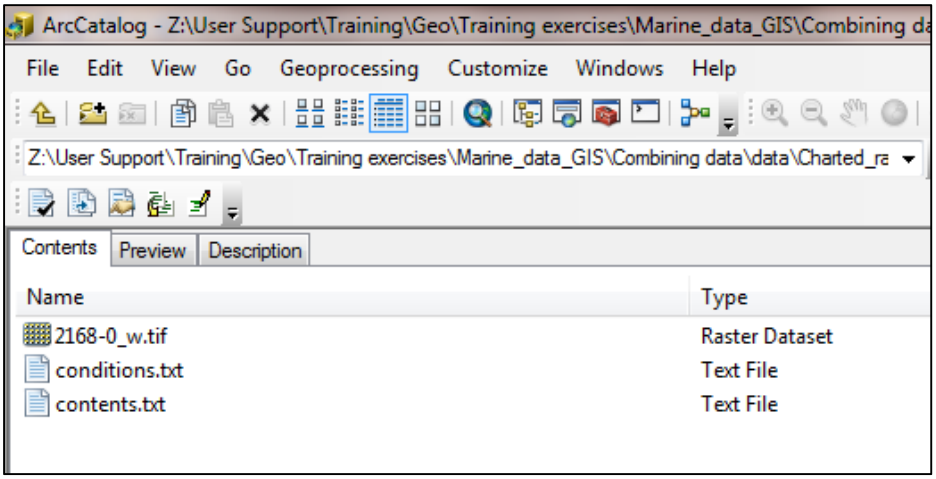
For this example we will use **WGS 84 Mercator 56 degree north standard parallel** as this is the projection of the chart that covers the Islay area.

NOTE: if we set the projection for the first data set that we add to ArcMap, any subsequent data sets that we add to that project will be converted by ArcMap to be in the same projection.

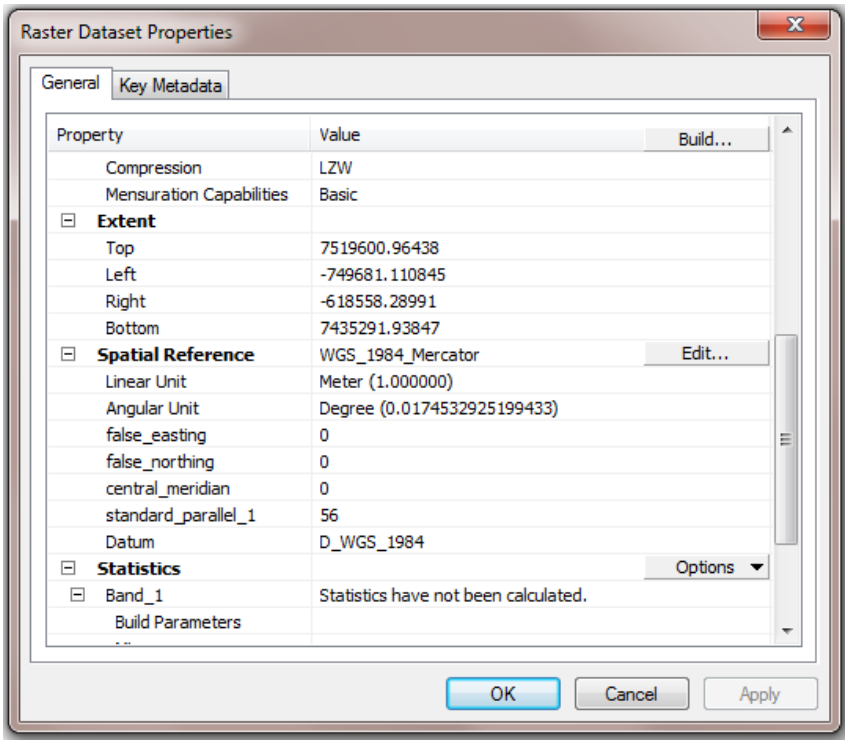
1. Note: Because of a bug in ArcGIS, we need to edit our projection, or spatial reference, for our chart
    a. Open ArcCatalog from your programs list
    b. Locate our chart: Click the Connect to folder button:



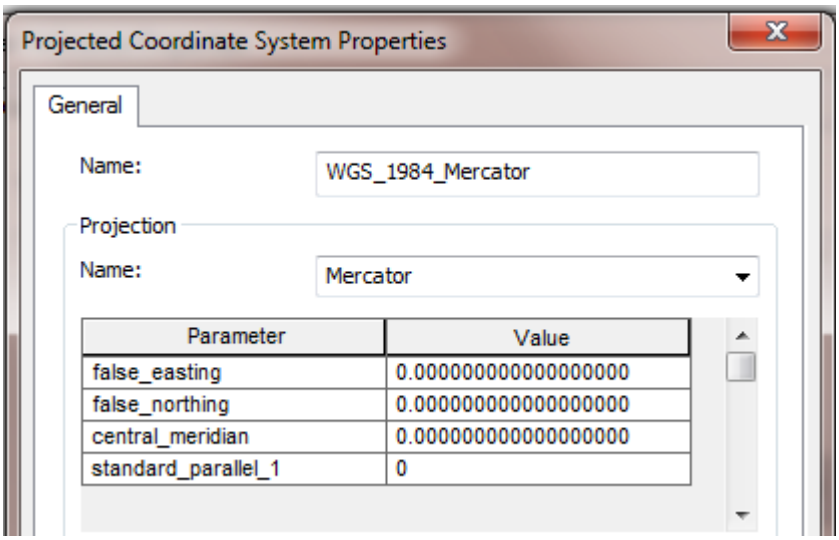
c. Navigate to the **Hydroview** folder
d. There are several charts. We are interested in **2168-0_w.tif.**



e. Right-click **2168-0_w.tif.** and select Properties
f. Scroll down until you see Spatial Reference
g. Click on Edit... next to Spatial Reference:



h. Double click on WGS_1984_Mercator
i. Change the Value next to standard_parallel_1 to 0



j. Click OK, OK, OK

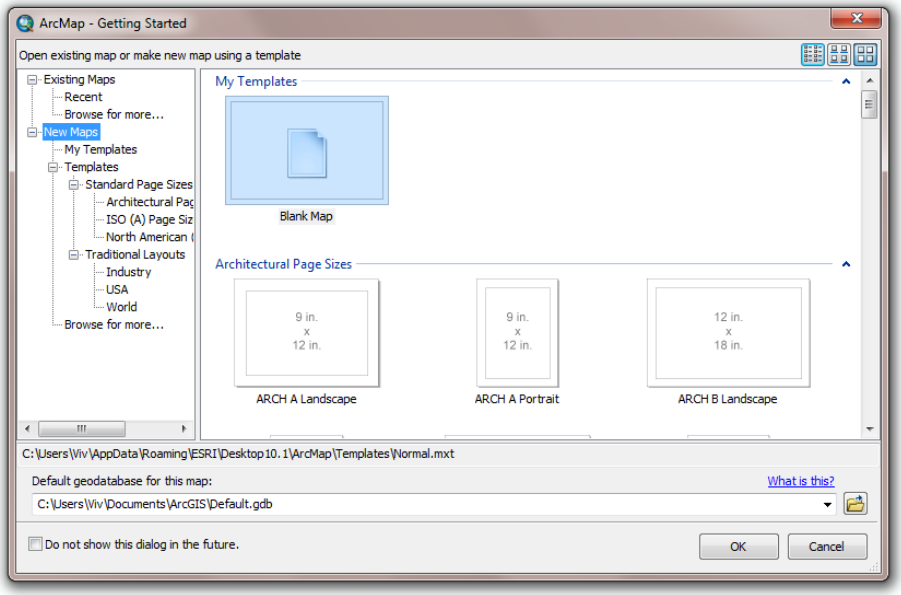
Add HydroView chart data to ArcMap

Now let's add that chart and view it in ArcMap.

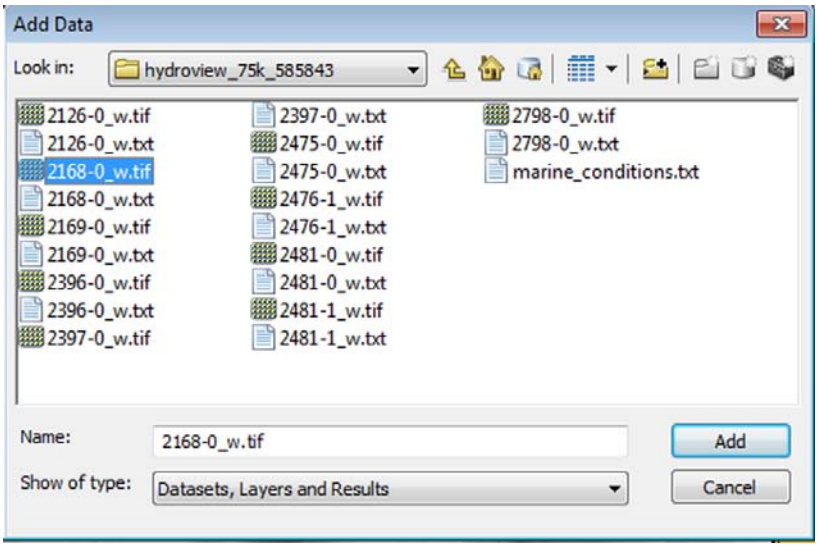
All charts from Marine Digimap are provided as GeoTIFFs. These are TIFF image files with additional georeferencing information embedded within them. This means that if you open up a GeoTIFF in an appropriate software package such as a GIS or CAD package, the software knows where to place the TIFF image geographically.

Warning: Editing the GeoTIFF in any software program incapable of reading the spatial referencing information, such as a graphics package, will cause the georeferencing element to be lost.

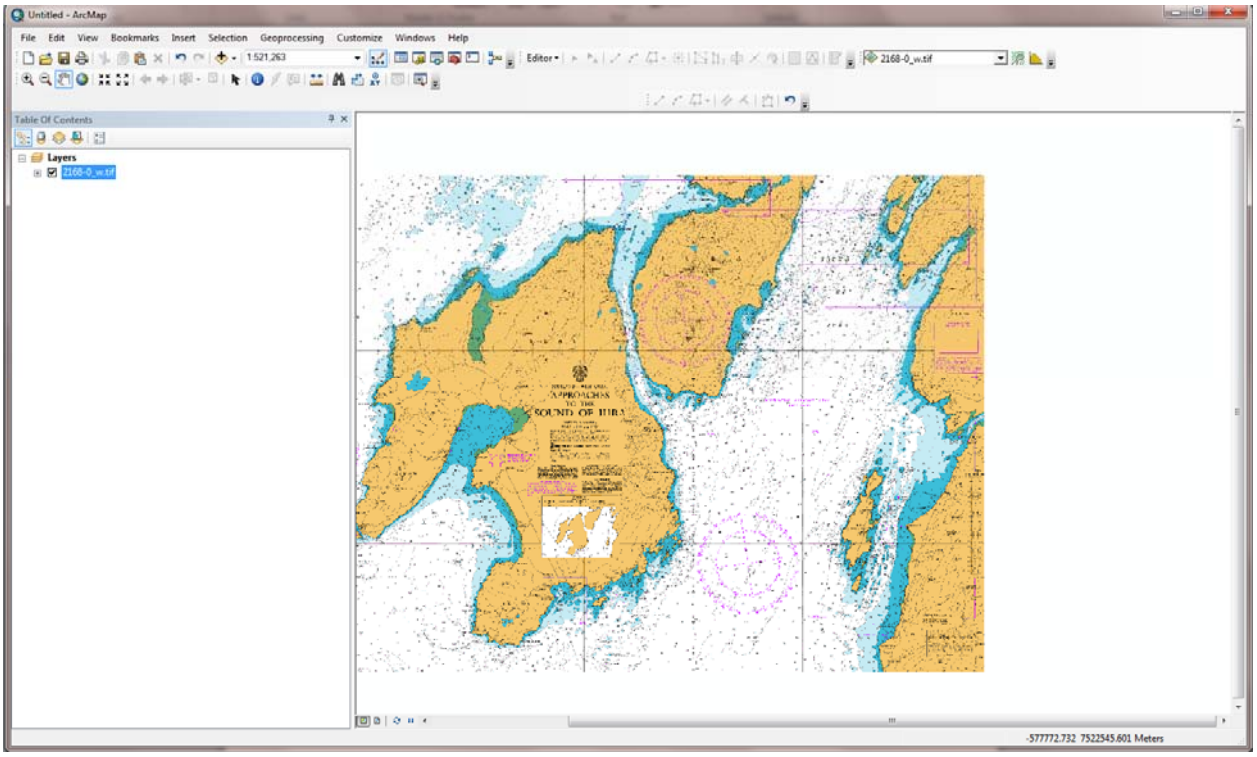
1. Open ArcMap
2. Select New Maps > Blank Map
3. Click OK



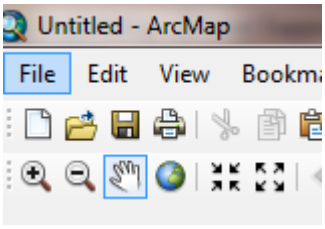
4. Click the Add Data icon
5. Navigate to the Hydroview folder
6. Click the chart **2168-0_w.tif**
7. Click Add



8. Your chart should be loaded. You should be able to see the chart name in your Table of Contents on the left and your map window should show the chart:



9. You can explore the chart using the pan and zoom tools on the toolbar, as shown in the image below:



Save your project

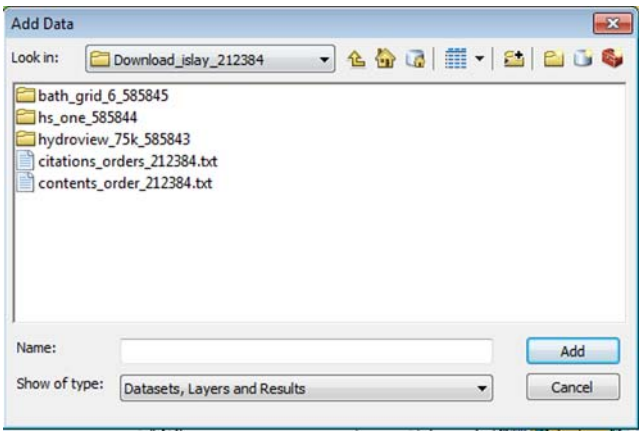
1. Click File > Save as.
2. Place the ArcMap project file in an appropriate folder.
3. Give it a meaningful name.
4. Click Save.

Add Gridded Bathymetry data

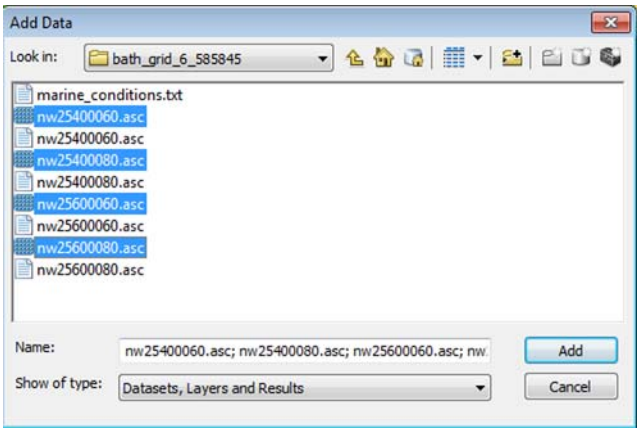
We can add the Gridded Bathymetry to give some context to the map, in particular information about the nature of the seabed. This is particularly important when dealing with locating structures offshore in tidal waters.

This data is provided in ASCII format from Marine Digimap.

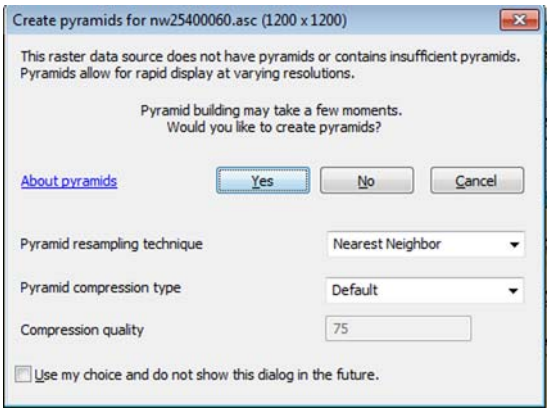
1. Click the Add Data icon
2. Navigate to the **Bath_grid6** folder and double click on it.



3. Ctrl-click on all 4 ASC files
4. Click Add



When asked to create pyramids, say Yes.


Create pyramids for nw25400060.asc (1200 x 1200)
This raster data source does not have pyramids or contains insufficient pyramids.
Pyramids allow for rapid display at varying resolutions.
Pyramid building may take a few moments.
Would you like to create pyramids?
About pyramids
Yes
No
Cancel
Pyramid resampling technique
Nearest Neighbor
Pyramid compression type
Default
Compression quality
75
Use my choice and do not show this dialog in the future.

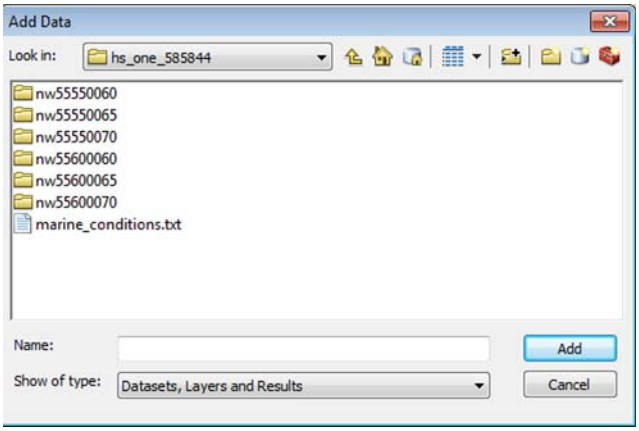
Add HydroSpatial One vector data

Hydrospatial One vector data has many layers of marine information and provides the largest scale vector data that is available. Most of the data has been digitised from marine charts but there are also other sources of data such as lists of wrecks.

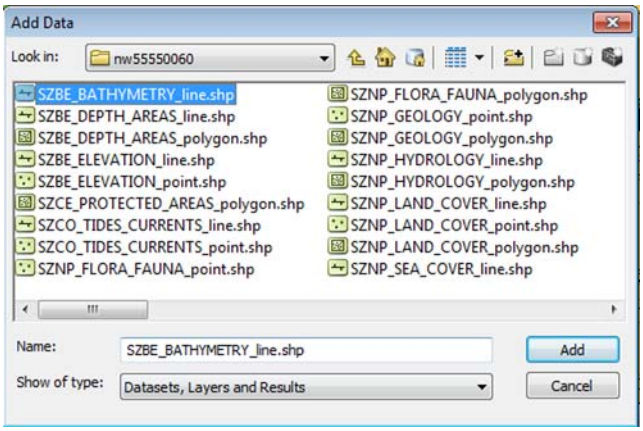
Adding the Hydrospatial One data can be useful to identify and wreck or obstructions, the nature of the seabed, restricted areas, offshore installations etc.

For now, we are only interested in adding the bathymetry contours to our project.

1. Click the Add Data icon.
2. Navigate to the folder containing your Hydrospatial One data.
3. Select the first sub-folder in the list, in the image below it is nw555060 – you may have a different list, depending on what you downloaded.

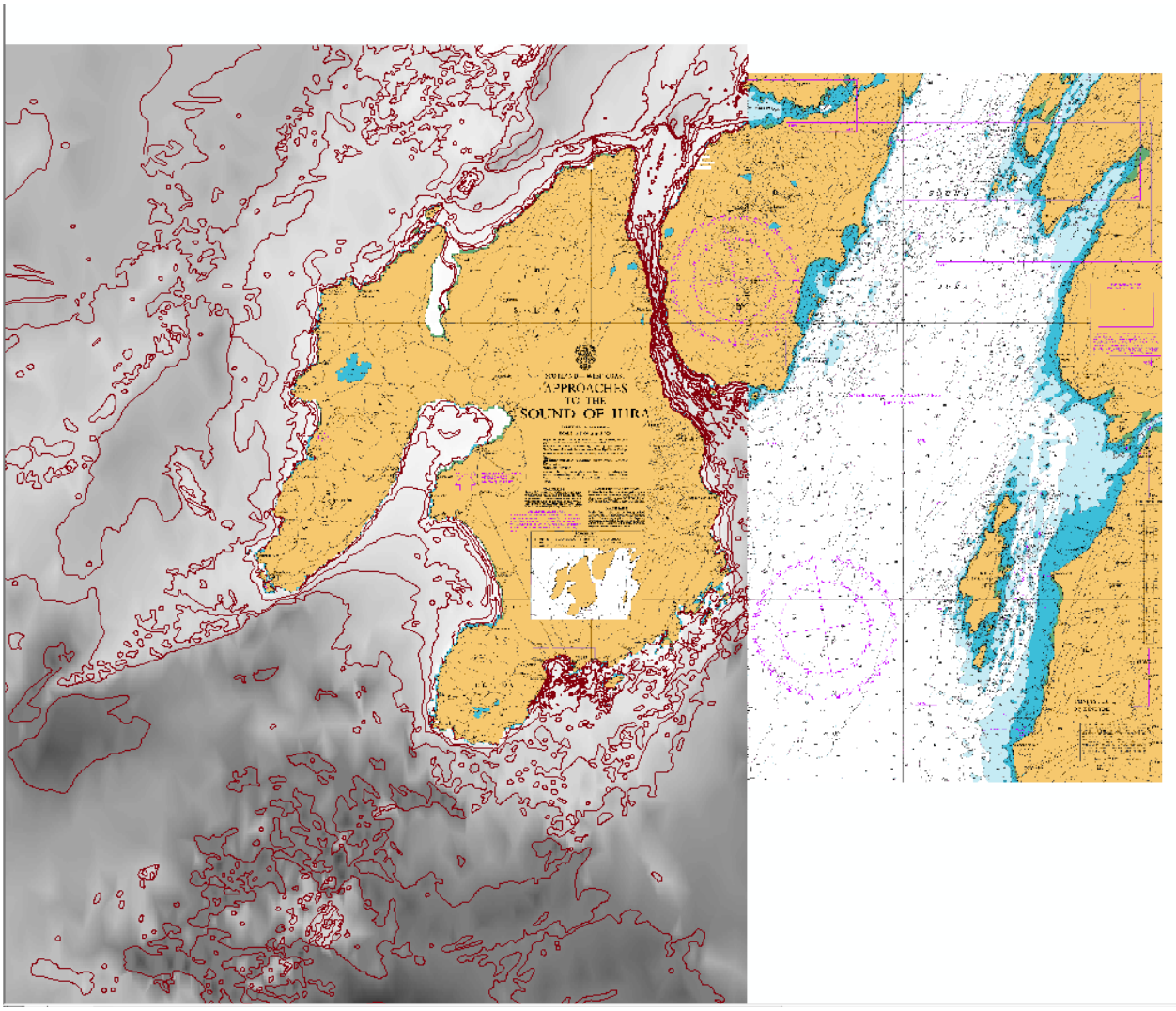


4. Click the Bathymetry line shapefile.
5. Click Add.



6. Repeat this step for all the sub-folders, adding the Bathmetry line shapefile from each sub-folder.

Your map window should look similar to the image below.


APPROACHES
TO THE
SOUND OF JURA

Check other sources of data

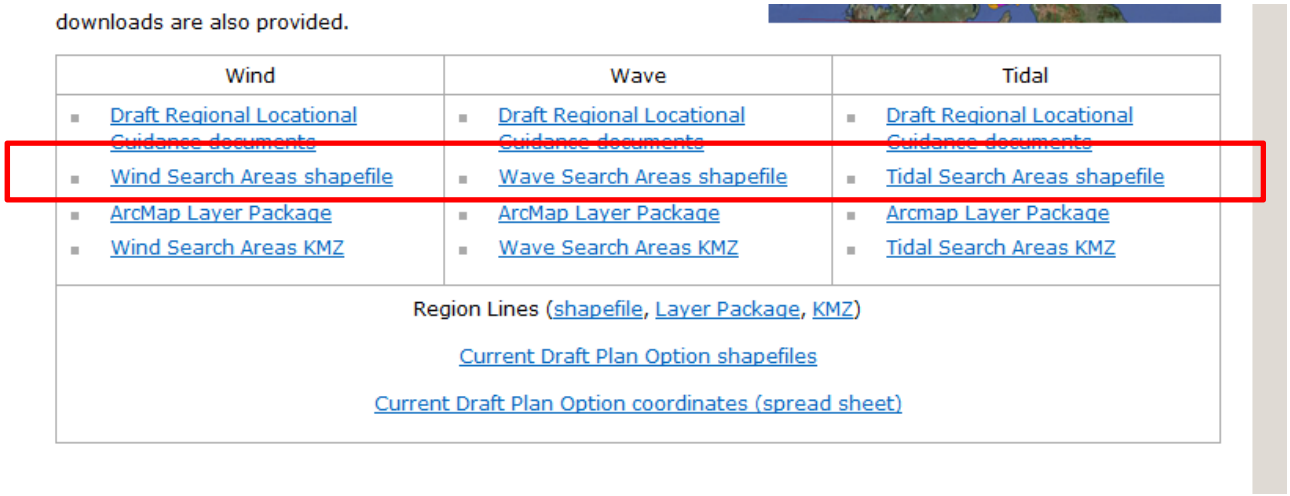
Let's find some other useful data to add in to our project.

Scottish Government

The Scottish Government provides guidance and data relating to search areas for future offshore wind, wave and tidal energy plans.

http://www.scotland.gov.uk/Topics/marine/science/MSInteractive/Themes/msp

1. Create a folder called Scottish Government data
2. Download the shape files for Wind Search, to the Scottish Government data folder
3. Download the shape file for Wave Search, to the Scottish Government data folder
4. Download the shape file for Tidal Search, to the Scottish Government data folder



downloads are also provided.

Wind	Wave	Tidal
Draft Regional Locational Guidance documents	Draft Regional Locational Guidance documents	Draft Regional Locational Guidance documents
Wind Search Areas shapefile	Wave Search Areas shapefile	Tidal Search Areas shapefile
ArcMap Layer Package	ArcMap Layer Package	Arcmap Layer Package
Wind Search Areas KMZ	Wave Search Areas KMZ	Tidal Search Areas KMZ

Region Lines (shapefile, Layer Package, KMZ)

Current Draft Plan Option shapefiles

Current Draft Plan Option coordinates (spread sheet)

5. Go to Windows Explorer, or equivalent.
6. Go to the Scottish Government data folder.
7. Right click each zip file in turn and extract the data to a new folder of the same name using an unzip utility, for example 7Zip or WinZip:

The Crown Estate

1. Create a new folder, Crown Estate data
2. Go to this webpage - http://www.thecrownestate.co.uk/coastal/downloads/maps-and-gis-data/

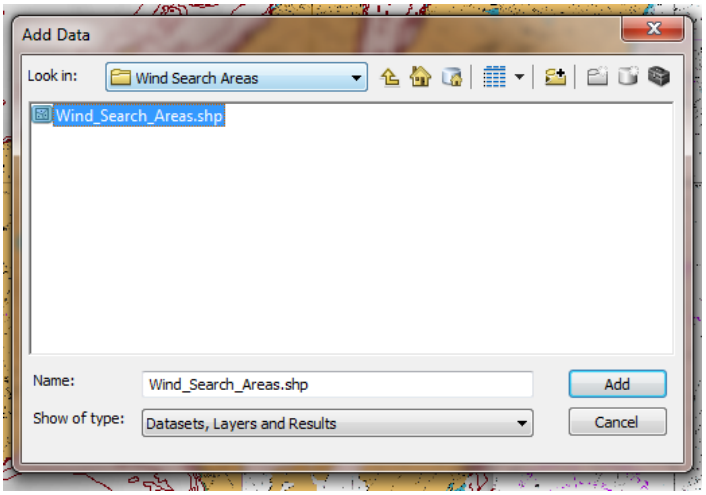
3. Scroll to the bottom of the page until you see the section GIS datasets, as shown in this image

4. Download the file **All offshore activity (UK) shapefiles,** to the Crown Estate data folder.
5. Go to Windows Explorer, or equivalent.
6. Go to the Crown Estate data folder.
7. Right click each zip file in turn and extract the data to a new folder of the same name using an unzip utility, for example 7Zip or WinZip.

Add new data

Let's add some of that data to our project.

1. Click the Add Data icon
2. Navigate to the folder containing the Wind Search areas file from the Scottish Government
3. Select the file Wind_Search_Areas.shp
4. Click Add

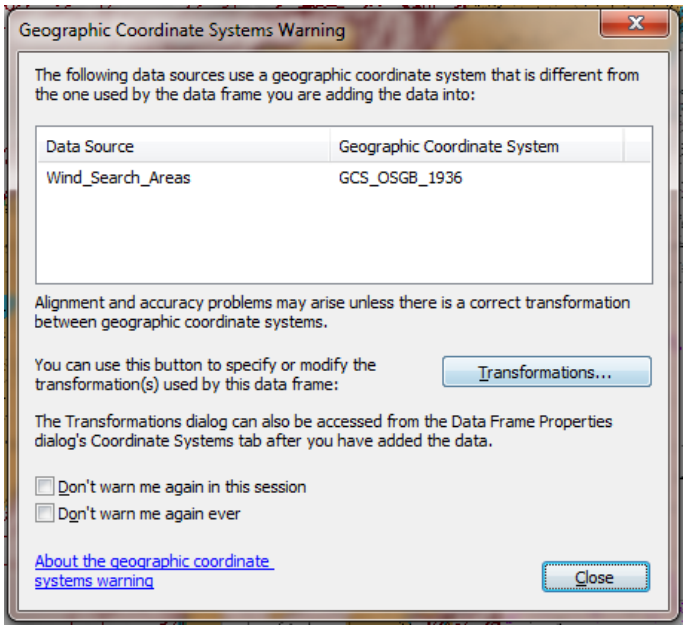


Change projection

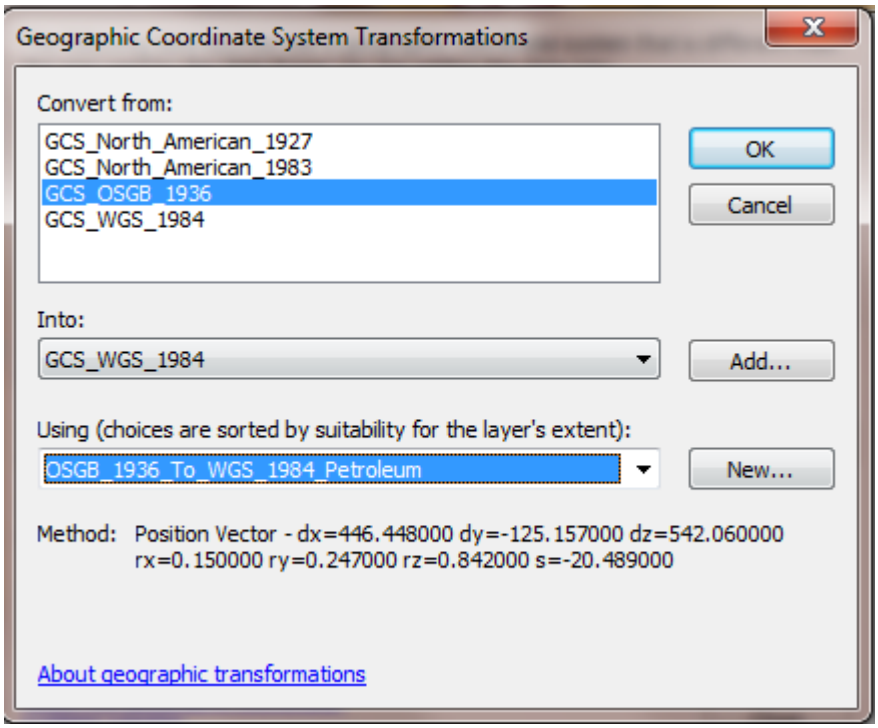
The data from the Scottish Government is in British National Grid (GCS_OSGB_1936).

ArcMap should recognise that the data you are adding is in a different projection and will prompt you to transform your data to the same coordinate system as the project.

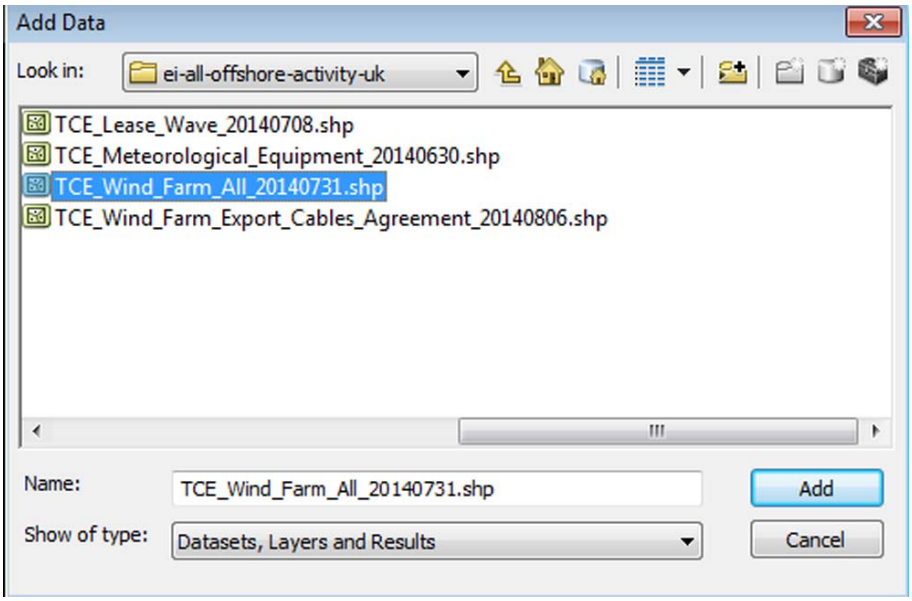
5. Click Transformations:



6. Select Transformations...
7. Select GCS_OSGB_1936 to Convert from.
8. Select GCS_WGS_1984 to Convert Into.
9. Select Using OSGB_1936_To_WGS_1984_Petroleum from the drop down.
10. Select OK.



11. Select Close.
12. Now add in another layer to your map, following the above steps.
13. From the Crown Estate data, add in the shapefile TCE_Wind_Fam_All_20140731. The name of the file may vary slightly, depending on when you download it.



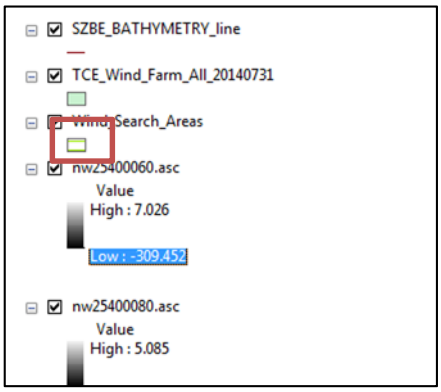
Map symbology

We now have several datasets in our project. Let's change the style of some of the map layers, so that all of our map data is visible.

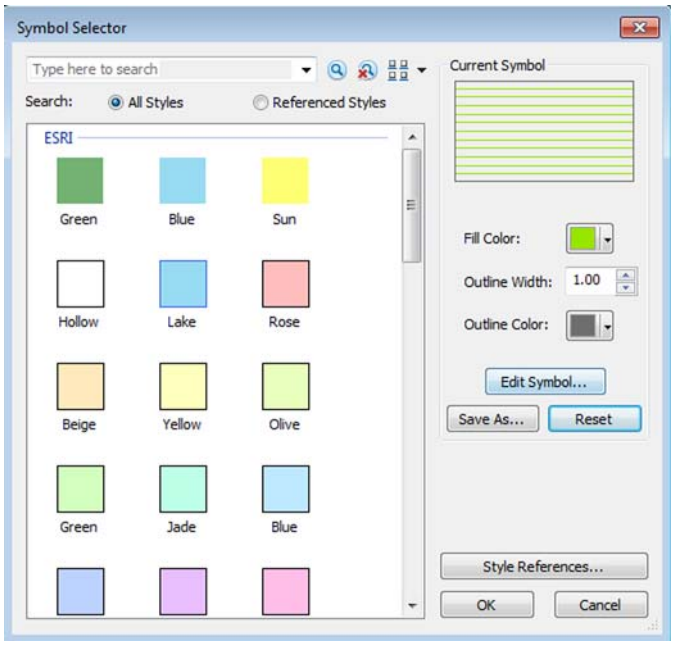
Use Symbol Selector

A quick way to change the style of a line or symbol used on your map is to click on the symbol in the Table of Contents.

1. Click on the square under Wind_Search_Areas.



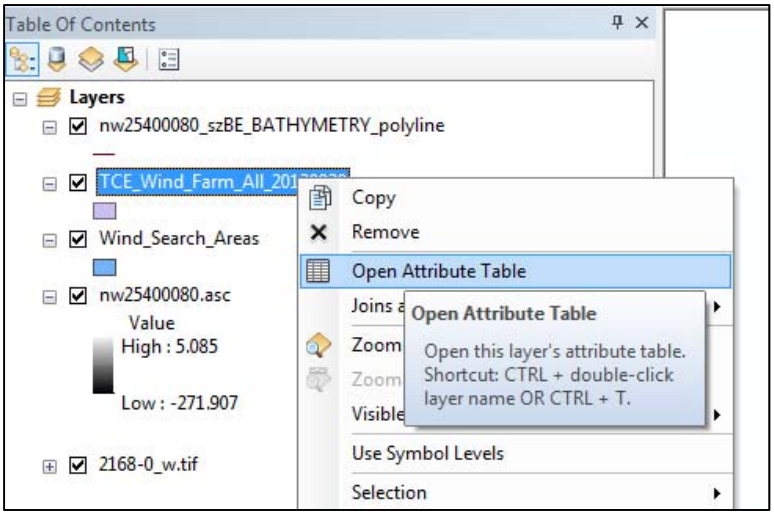
2. We want to have a symbol that is hatched lines rather than a solid colour.
3. Click Edit Symbol.
4. Click on the arrow next to type.
5. Select Line Fill Symbol.
6. Select a colour.
7. Select any other options you wish.
8. Click OK.
9. Click OK at the Symbol Selector box.



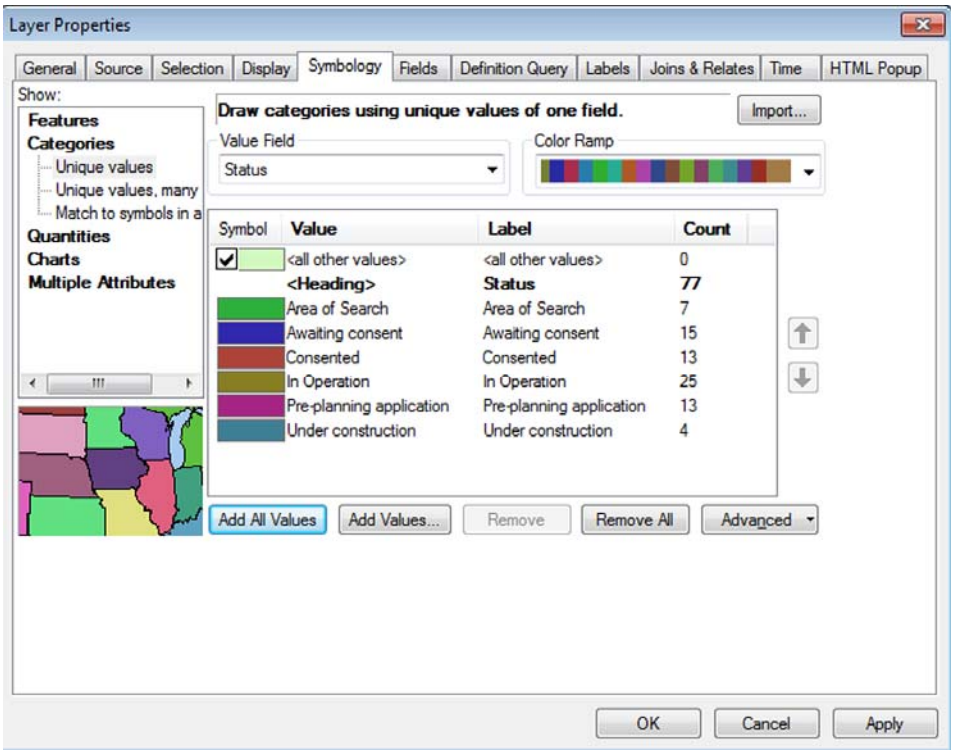
Use attribute data

You can also use the information provided with some layers to apply a style. For example, we can apply different colours to the Crown Estate wind farm data based on the stage they are at, e.g. consented, under construction and so on.

1. Right-click the layer TCE_Wind_Farm.
2. Select Open Attribute Table.



3. Have a look at the field Status – this contains status categories that we will use to style our layer.
4. Close the Attribute Table.
5. Right-click the TCE_Wind_Farm layer in the Table of Contents.
6. Select Properties.
7. Select the Symbology tab.
8. On the left, select Categories > Unique Values.
9. From the Value_Field drop down, select Status.
10. Click Add all values – you should see the box populate with the different status categories.
11. Select a colour ramp on the right.
12. Click Apply.
13. Click OK.


Layer Properties
General
Source
Selection
Display
Symbology
Fields
Definition Query
Labels
Joins & Relates
Time
HTML Popup
Show:
Features
Categories
Unique values
Unique values, many
Match to symbols in a
Quantities
Charts
Multiple Attributes
Draw categories using unique values of one field.
Import...
Value Field
Status
Color Ramp
Symbol
Value
Label
Count
<all other values>
<all other values>
0
<Heading>
Status
77
Area of Search
Area of Search
7
Awaiting consent
Awaiting consent
15
Consented
Consented
13
In Operation
In Operation
25
Pre-planning application
Pre-planning application
13
Under construction
Under construction
4
Add All Values
Add Values...
Remove
Remove All
Advanced
OK
Cancel
Apply

Online Web Mapping Services

Now let's add in some web mapping services (WMS) to our project. The main advantage in using a WMS is that you do not need to download, store and process data; it is streamed directly to your project.

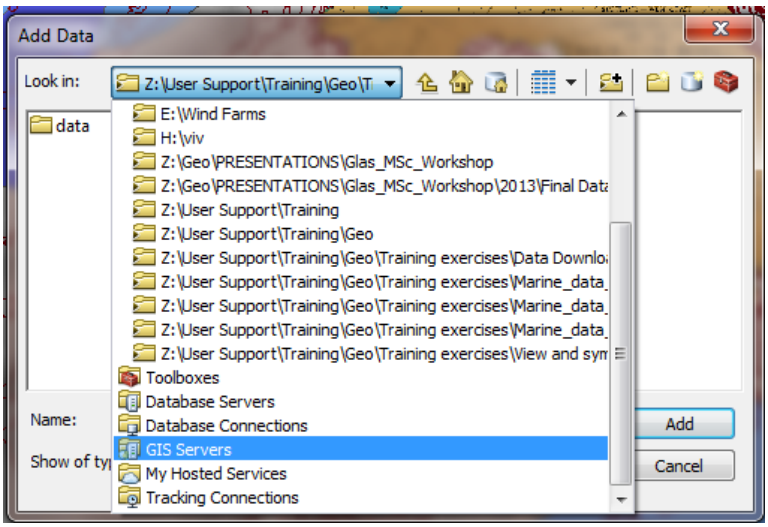
Scottish Natural Heritage WMS

This WMS provides lots of data, for example: Sites of Special Scientific Interest, World Heritage Sites, Marine Conservation Areas, Special Protection Areas and more.

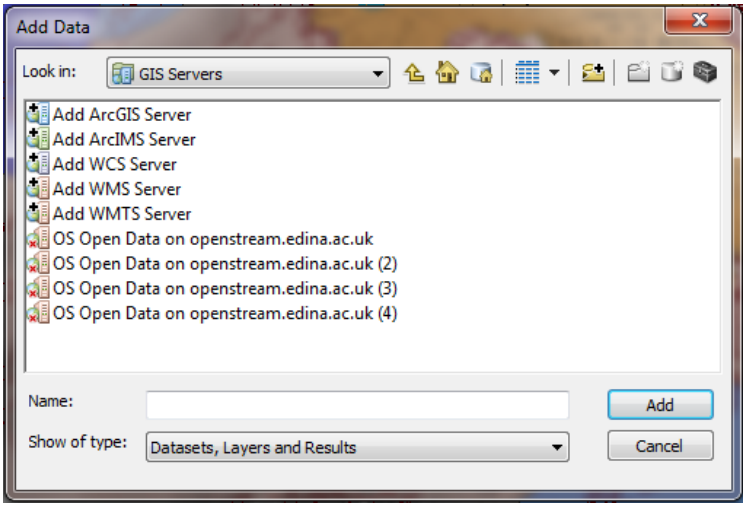
1. Register for the Scottish Natural Heritage WMS.
   https://gateway.snh.gov.uk/natural-spaces/wms.jsp

   Once registered you can use the following URL to access the WMS:
   http://mapgateway.snh.gov.uk/ServicesWMS/SNH_Protected_Areas/MapServer/WMSServer?

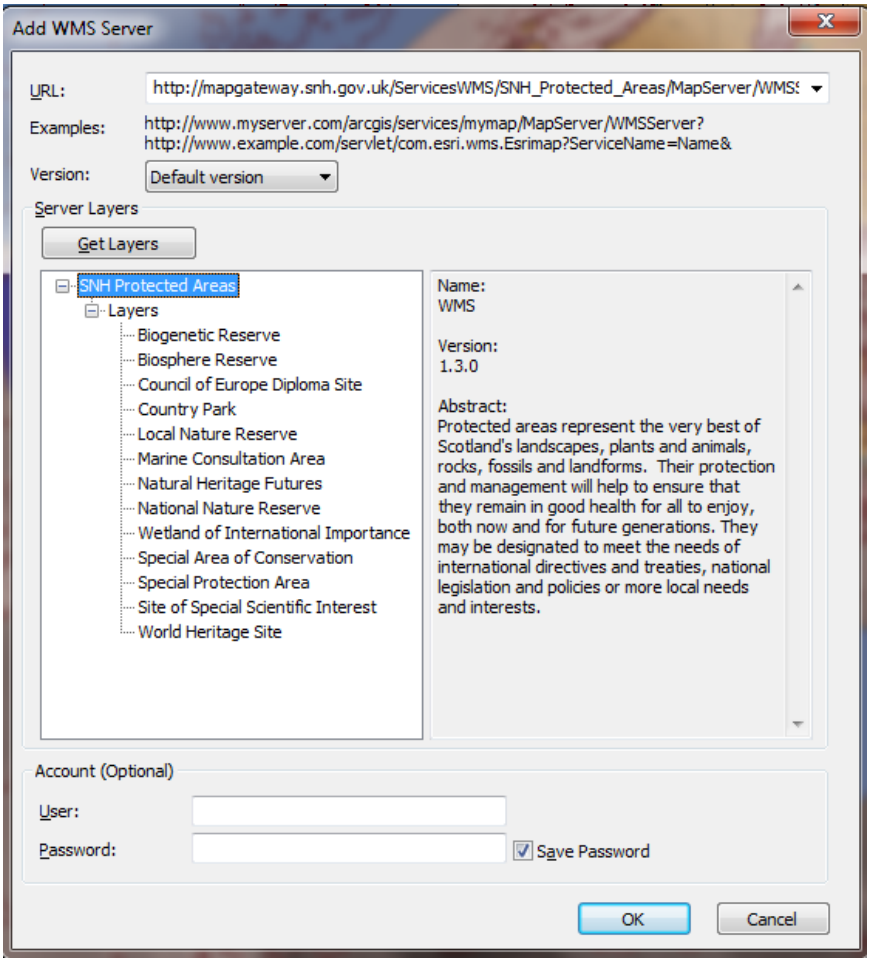
2. Add the Scottish Natural Heritage WMS to ArcGIS
   1. Click Add Data
   2. Select GIS Servers from the drop down…you may have to scroll down to see this option.



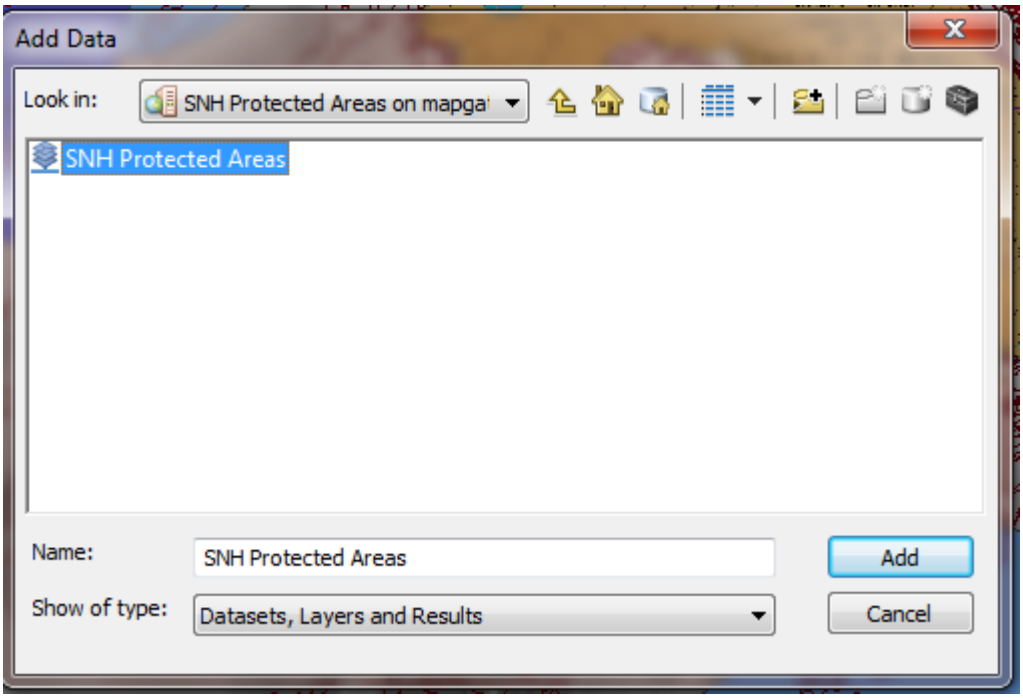
   3. Select add WMS Server
   4. Click Add



5. Input http://mapgateway.snh.gov.uk/ServicesWMS/SNH_Protected_Areas/MapServer/WMSServer?
6. Click Get Layers
7. Click OK

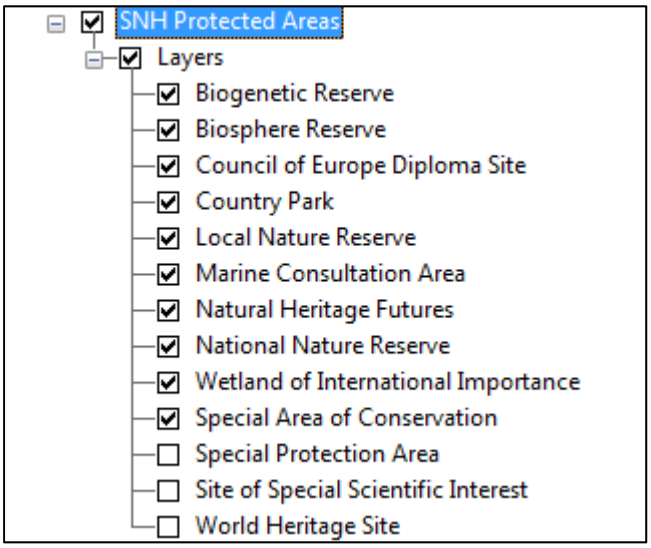


8. Click Add to add SNH Protected Areas...
9. Select SNH Protected Areas and click Add



You should see an extra layer in your Table of Contents, SNH Protected Areas.

3. Click the plus sign next to SNH Protected Areas to open it and see all layers within it.



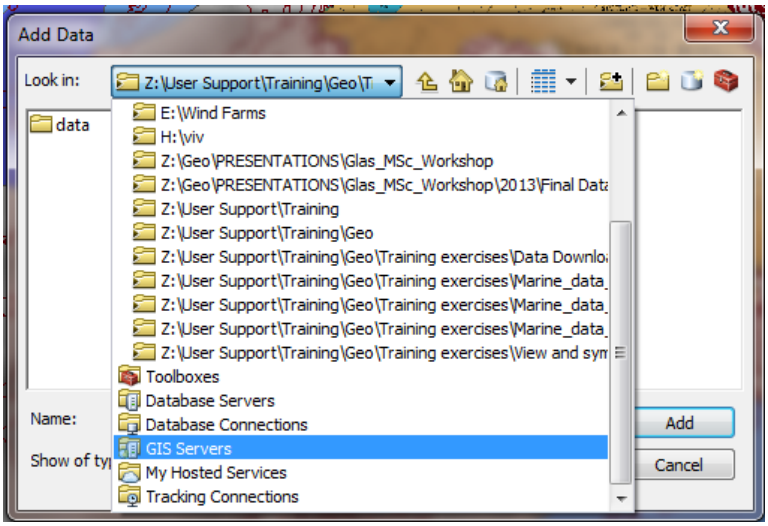
4. Uncheck all other layers.
5. Select the Marine Consultation Area and Site of Special Scientific Interest.

This will show some of the areas that are restricted in terms of development, so will have limited where SSE are able to build onshore masts and construction sites.

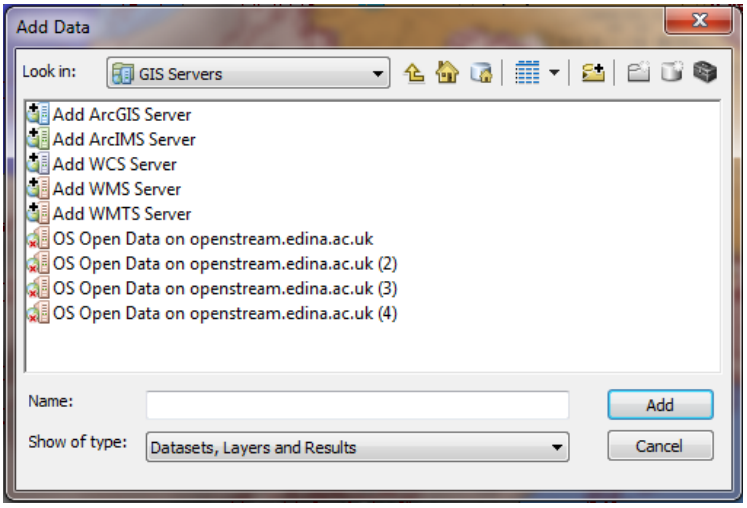
Digimap OpenStream WMS

To get more details of the land we can display some Ordnance Survey Open Data. This can be useful if looking at both offshore and onshore locations.

1. Register for Digimap Open Stream: http://openstream.edina.ac.uk/registration/
2. Copy and paste your API key to notepad, Word, or another text editor.
3. Click Add Data.
4. Select GIS Servers from the drop down…you may have to scroll down to see this option.



5. Select Add WMS Server.
6. Click Add.



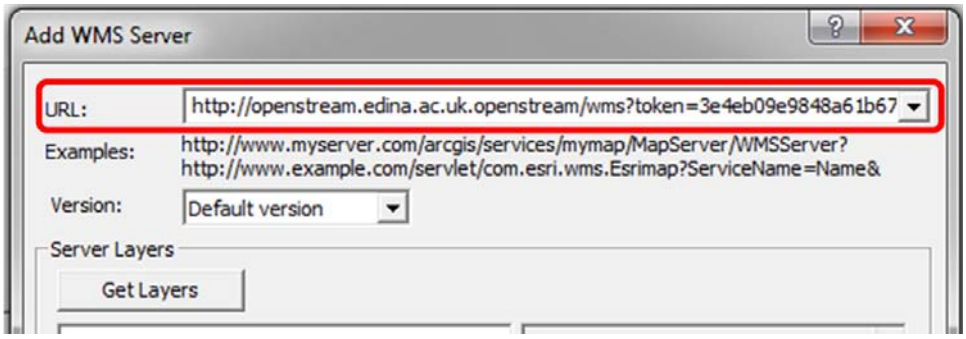
7. In the URL box, change the URL to the following, replacing [YOUR_API_KEY] with your own API key, available after you register for OpenStream:

   http://openstream.edina.ac.uk/openstream/wms?token=[YOUR_API_KEY]

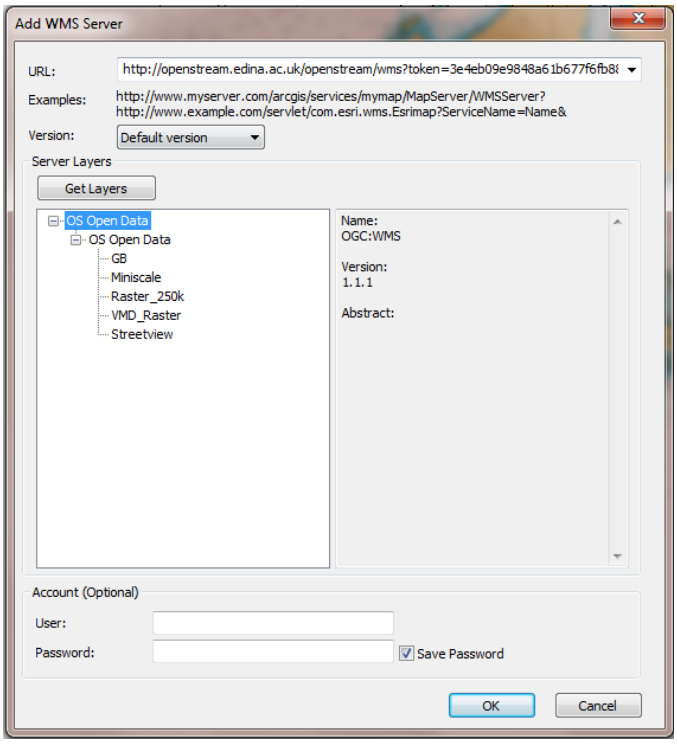
   Tip: it is easier to do this if you copy and paste the URL into a text editor and add your API key to it and then copy and paste the whole string into the URL field.

   It should look similar to the following:

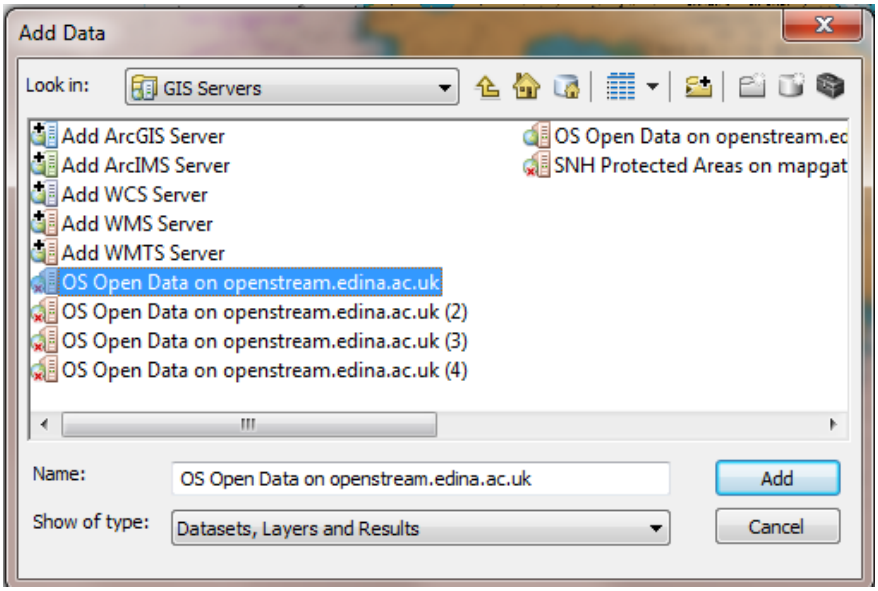
   http://openstream.edina.ac.uk/openstream/wms?token=8c0e792e28ffab921fcff0f2c717



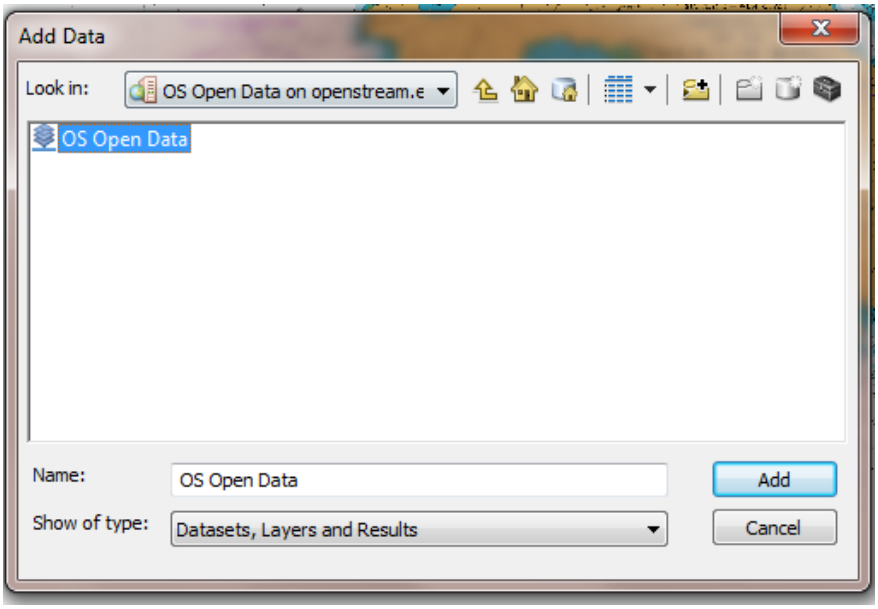
8. Click Get Layers.
9. Click OK.



10. Click OS Open Data on openstream.edina.ac.uk.
11. Click Add.

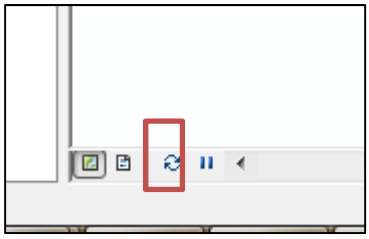


12. Click OpenData.
13. Click Add.



You should now have the OpenStream WMS as an additional layer.

14. Try zooming in and out of your map to see the different scales of data available. Remember this takes longer to draw as the request is going to the Edina servers.
15. If your map stops drawing, you can try the redraw button at the bottom left of the map area:



Map display

The OpenStream layer may be covering over other layers of data, making them invisible.

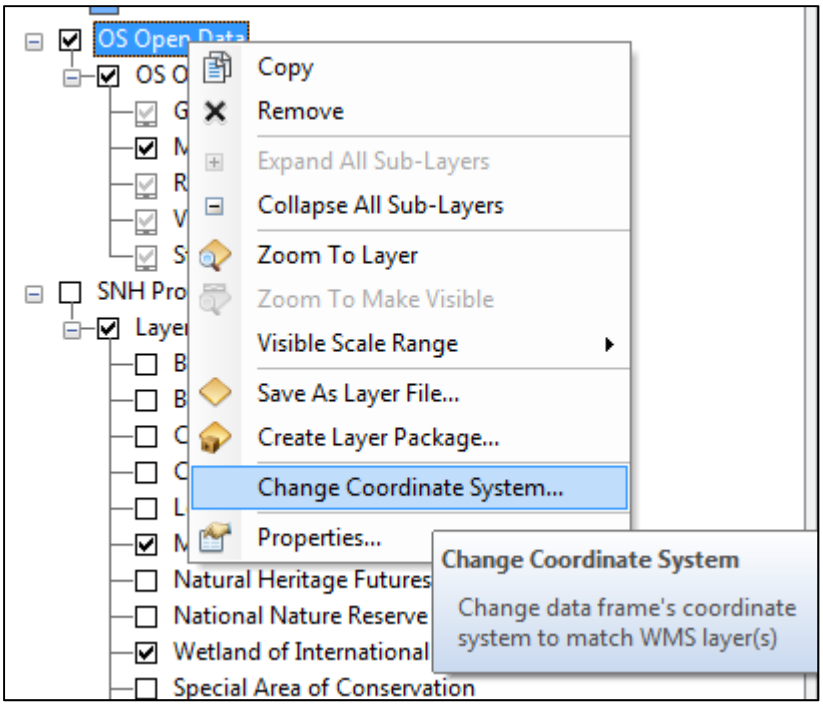
1. Collapse all layers by clicking on the minus signs next to them, in the Table of Contents.
2. Click and drag the Open Data layer to the bottom of the list.
3. Make sure the chart is also near the bottom – this will allow you to view your other layers on top of the raster layers.
4. NOTE: you can make raster layers transparent. Go to the layer Properties > Display and select a transparency percentage.
5. Depending on which layers you want to display, you may want to change some of your symbols to make them transparent.

Note on Open Stream projection

Note: the OpenStream data initially displays in the map projection WGS 84. For this project, that is ok as we are already using that projection. However, the OS OpenData should be projected in British National Grid. You will see that the data, when projected in WGS84, tilts slightly.

In different projects, if you want to change the OS OpenData to British National Grid, you can take the following steps.

1. Right-click the Open Data layer in the Table of Contents.
2. Select Change Coordinate System.


OS Open Data
OS O
SNH Pro
Layer
Natural Heritage Futures
National Nature Reserve
Wetland of International
Special Area of Conservation
Copy
Remove
Expand All Sub-Layers
Collapse All Sub-Layers
Zoom To Layer
Zoom To Make Visible
Visible Scale Range
Save As Layer File...
Create Layer Package...
Change Coordinate System...
Properties...
Change Coordinate System
Change data frame's coordinate system to match WMS layer(s)