



ORDNANCE SURVEY GB

OS MASTERMAP WATER NETWORK LAYER – GETTING STARTED GUIDE

Version history

| Version | Date | Description |
|---------|---------|--|
| 1.0 | 06/2015 | Initial release. |
| 1.1 | 01/2022 | Introduction of vector tiles and GeoPackage formats to the product. Formatting updates to the document. |

Purpose of this document

This document provides information about and insight into the OS MasterMap Water Network Layer product and its potential applications. For information on the contents and structure of OS MasterMap Water Network Layer, please refer to the Overview and Technical Specification.

The terms and conditions on which OS MasterMap Water Network Layer is made available to you and your organisation are contained in that Ordnance Survey customer contract. Please ensure your organisation has signed a valid current customer contract to be able to use OS MasterMap Water Network Layer.

We may change the information in this document at any time, giving you the notice period set out in your contract. We do not accept responsibility for the content of any third-party websites referenced or accessed in or through this document.

This document has been screened according to Ordnance Survey's Equality Scheme. If you have difficulty reading this information in its current format and would like to find out how to access it in a different format (braille, large print, computer disk or in another language), please contact us on: +44 (0)3456 05 05 05.

Copyright in this document

© Ordnance Survey Limited 2022. This document (including for the avoidance of doubt, any mapping images reproduced within it) is protected by copyright and apart from the rights expressly granted within this document to use the content, all rights are reserved. Any part of this document may be copied for use internally in your organisation or business so that you can use OS MasterMap Water Network Layer under the terms of your licence (but not otherwise).

No part of this document may be reproduced or transmitted in any form or by any means (including electronically) for commercial exploitation, onward sale or as free promotional material without getting the written consent of Ordnance Survey beforehand.

Trademarks

Ordnance Survey, OS, the OS Logos, OS MasterMap, OS Terrain, OS MasterMap Highways Network and TOID are registered trademarks, and OS MasterMap Water Network Layer is a trademark of Ordnance Survey, Britain's mapping agency.

Contact details

[OS website 'Contact us' page \(https://www.ordnancesurvey.co.uk/contact-us\)](https://www.ordnancesurvey.co.uk/contact-us).

Contents

| | |
|---|-----------|
| 1. Introduction to the product..... | 4 |
| 2. Product applications..... | 5 |
| 3. Requirements for using the data..... | 6 |
| 3.1 System requirements..... | 6 |
| 3.2 Backup provision of the product..... | 6 |
| 3.3 Typical data volumes | 6 |
| 4. Structure of the supplied data..... | 7 |
| 4.1 Data structure..... | 7 |
| 4.2 Area of interest order type | 7 |
| 4.3 Data ordering and download..... | 7 |
| 4.4 Download contents | 7 |
| 5. Loading the data (GML format) into a GIS..... | 8 |
| 5.1 QGIS..... | 8 |
| 5.1.1 Loading OS MasterMap Water Network Layer GML into QGIS | 8 |
| 5.1.2 Exporting OS MasterMap Water Network Layer to different GIS formats using QGIS..... | 11 |
| 5.2 FME..... | 12 |
| 5.2.1 Viewing and translating data in FME | 12 |
| 5.2.2 Viewing the data using FME Data Inspector before translation..... | 14 |
| 5.2.3 Translating GML in FME | 15 |
| 5.3 ESRI ArcMap..... | 19 |
| 5.3.1 Loading OS MasterMap Water Network Layer GML into ESRI ArcMap..... | 19 |
| 5.3.2 Loading translated GML into ESRI ArcMap | 23 |
| 5.4 MapInfo Professional..... | 25 |
| 5.4.1 Translating GML into MapInfo Professional..... | 25 |
| 5.4.2 Loading translated GML files into MapInfo Professional..... | 29 |
| 5.5 Cadcorp SIS Map Modeller | 31 |
| 5.5.1 Translating GML using Cadcorp SIS Map Modeller..... | 31 |
| 6. Loading the data (GeoPackage and vector tiles formats) into a GIS | 34 |
| 7. Creating a water network using ESRI software..... | 35 |
| 7.1 Building a geometric network | 35 |
| Annex A: Product support links..... | 44 |

I. Introduction to the product

OS MasterMap Water Network Layer is a digital representation of the watercourses in Great Britain as a series of connected features. The data represents the approximate central alignment of watercourses and is attributed to provide a range of information about the section of watercourses they represent.

The product has two core feature types:

- **WatercourseLink:** A WatercourseLink feature represents the alignment of a watercourse. The majority have been derived from Ordnance Survey detailed topographic data, made available to customers as the [OS MasterMap Topography Layer product](http://os.uk/topo) (<http://os.uk/topo>).
- **HydroNode:** A HydroNode feature explicitly represents the start, junctions and end of each watercourse, as well as places where there's a change in the real-world-related attribution.

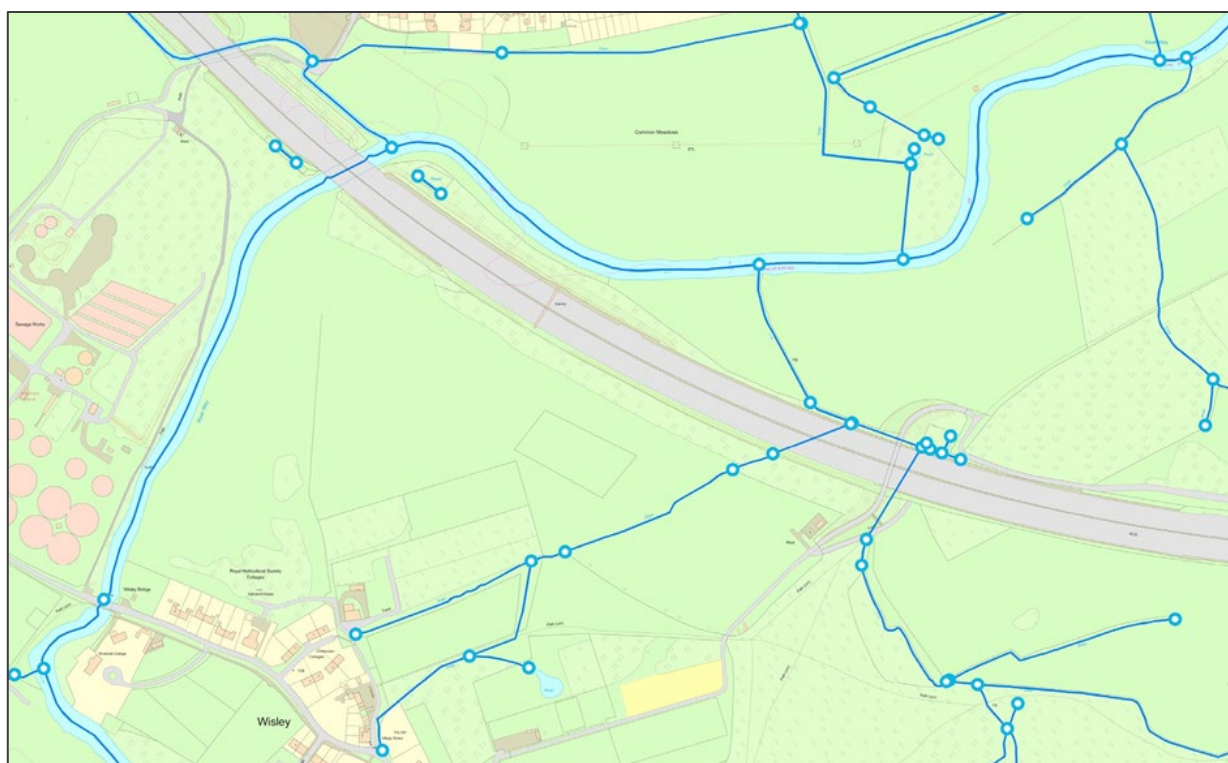


Figure 1: Example extract from OS MasterMap Water Network Layer showing WatercourseLink and HydroNode features.

2. Product applications

OS MasterMap Water Network Layer supports a wide range of customers' applications. The product can be used alone or in combination with other Ordnance Survey products, such as OS MasterMap Topography Layer, OS MasterMap Imagery Layer and OS Terrain 5. It will significantly enhance systems used to manage waterways and rivers and the flood risk they pose.

The OS MasterMap Water Network Layer product can be used for applications such as:

- Understanding flood risk
- Flood risk mitigation planning
- Flood response planning and execution
- Detailed flood modelling for insurance and land and property
- Environmental impact analysis
- Tracking water flows and any contamination
- Asset management and protection
- The management of statutory directives relating to watercourses
- Ecology studies, for example, species migration
- Analytics and visual interpretation, particularly when used in combination with other Ordnance Survey products, for example, OS Terrain 5

3. Requirements for using the data

3.1 System requirements

OS MasterMap Water Network Layer is designed for use in a geographic information system (GIS). For details of Ordnance Survey's Licensed Partners who can assist you with incorporating the product in their systems, please see the ['Software for mapping' page on the Ordnance Survey website](https://www.ordnancesurvey.co.uk/business-government/tools-support/gis/software) (<https://www.ordnancesurvey.co.uk/business-government/tools-support/gis/software>).

Ordnance Survey does not recommend specific suppliers or software products, as the most appropriate system will depend on many factors, for example, the amount of data being taken, resources available within the organisation, the existing and planned information technology infrastructure, and, ultimately, the applications that the data will be used for. However, as a minimum, the following elements will be required in any system:

- A means of reading the data, either in its native format, or by translating it into a file format or for storage in a database.
- A means of storing and distributing the data, perhaps in a database or through a web-based service.
- A way of visualising and / or querying the data, typically a GIS.

3.2 Backup provision of the product

You are advised to copy the supplied data to a backup medium before following the steps outlined in this getting started guide.

3.3 Typical data volumes

For reading purposes, it is recommended that users store the data on a single hard disc. This will speed up the ability of your computer to read the data. Compressed file sizes for the full supply of England, Scotland and Wales are as follows:

- **Geography Markup Language (GML):** The compressed file size for Great Britain is approximately 1.25Gb.
- **GeoPackage:** The compressed file size for Great Britain is approximately 1.8Gb.
- **Vector tiles:** The compressed file size for Great Britain is approximately 1.5Gb.

4. Structure of the supplied data

4.1 Data structure

OS MasterMap Water Network Layer is supplied in three formats: Geography Markup Language (GML 3.2.1), GeoPackage and vector tiles. All formats are compressed into a regular zip file (.ZIP).

Before loading the data, you will need to unzip it by using any of the regular zip programs available or via the facility within the Windows 10 operating system.

4.2 Area of interest order type

Tiled dataset will be provided in 5 x 5km square tiles and will contain all features present in the tile(s) ordered.

The data is supplied as 'hairy tiles', in that no feature is broken at the tile edge but is included across the tile boundary if it extends into an adjacent tile. As such, a data holding comprising more than one 5km² tile will contain duplicate features which may need to be removed depending upon the user requirement.

The GeoPackage and vector tiles formats will be available for Great Britain coverage only.

The file naming convention will be as follows:

- GML: 5km² tile ID. gz, for example: HP4500.gz
- GeoPackage: MMNWGB.gpkg
- Vector tiles: MMNWGB.mbtiles

4.3 Data ordering and download

- Direct customers and Partners, please contact your account manager or Business Enquiries.
- For PSGA customers, the product is available to you through the PSGA contract.

The data is available as an online download via the [OS Data Hub](https://osdatahub.os.uk/) (<https://osdatahub.os.uk/>).

4.4 Download contents

The data is supplied in a .zip archive, which contains a parent folder with two sub-folders entitled DATA and DOC, and an additional readme file.

| <u>Sub-folder</u> | <u>Contents</u> |
|-------------------|----------------------------------|
| DATA | (Zipped files) |
| DOC | Disc_contents.txt Licence.txt |
| ----- | |
| readme.txt | |

5. Loading the data (GML format) into a GIS

Geography Markup Language (GML) is an XML dialect, which can be used to model geographic features. It was designed by the Open Geospatial Consortium (OGC) as a means for people to share information regardless of the particular applications or technology that they use. In the first instance, GML was used to overcome the differences between different geographic information system (GIS) applications by providing a neutral file format as an alternative to proprietary formats.

The data can be loaded into several GIS. This section describes how to translate the GML and load it into some commonly used GIS. For more information about other GIS that OS MasterMap Water Network Layer is compatible with, please speak to your Relationship Manager.

The common software covered in this section are as follows:

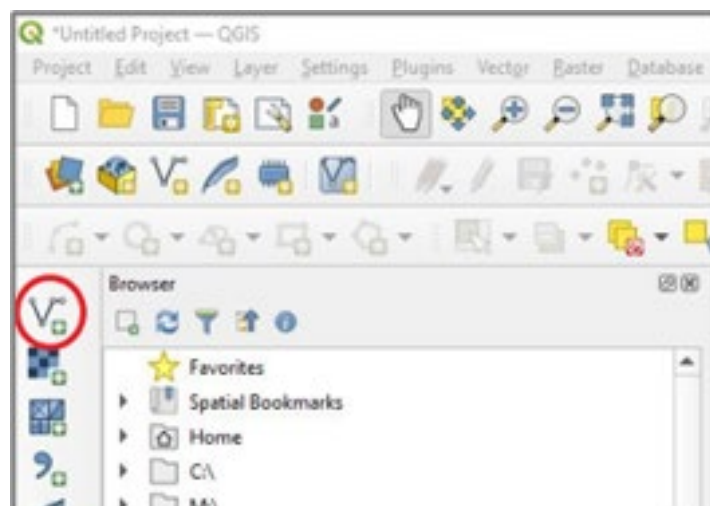
- QGIS
- FME
- ERSI ArcMap
- MapInfo Professional
- Cadcorp Map Modeller

5.1 QGIS

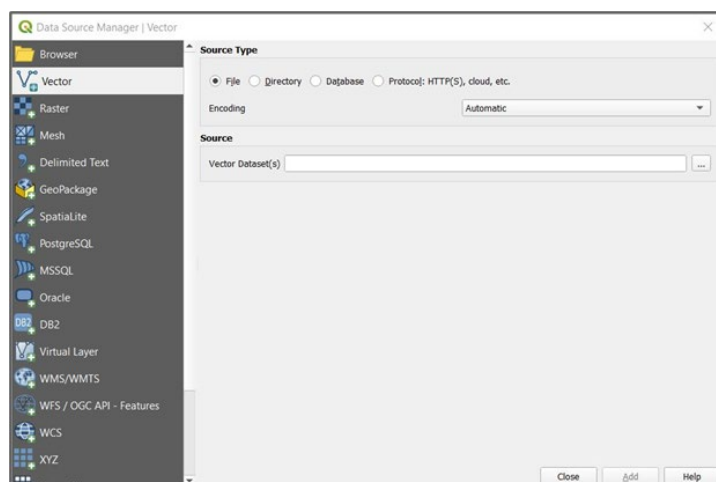
The following step-by-step instructions outline how to load OS MasterMap Water Network Layer into QGIS using the GML file(s) you have received. They have been prepared using version 3.16.7 of QGIS Desktop – an open-source GIS in which you can create, edit and visualise and publish geographic information. You can download QGIS for free from the '[Download QGIS for your platform](http://www.qgis.org/en/site/forusers/download.html)' page of the [QGIS website](http://www.qgis.org/en/site/forusers/download.html) (<http://www.qgis.org/en/site/forusers/download.html>).

5.1.1 Loading OS MasterMap Water Network Layer GML into QGIS

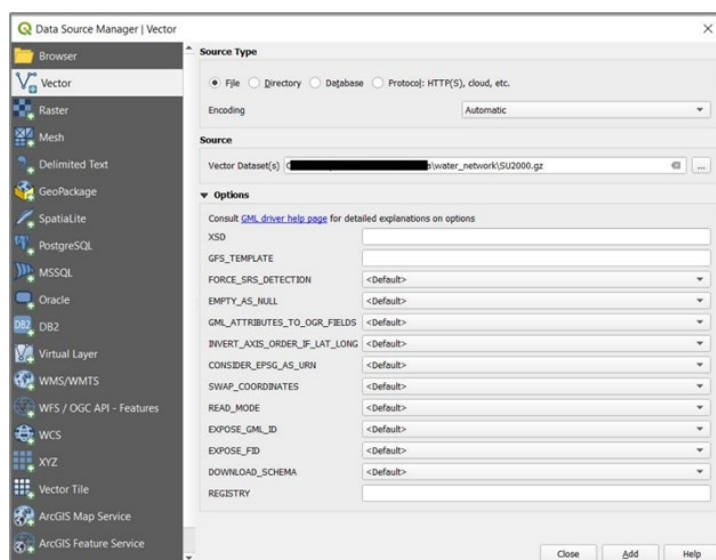
1. Launch QGIS.
2. OS MasterMap Water Network Layer data can be loaded into QGIS either zipped or unzipped. To load the data, click on *Add Vector Layer button* from the left-hand toolbar.



3. The Data Source Manager dialog box will open. In the Source section, click on the [...] button to the right of the Vector Dataset(s) field and navigate to the GZ or GML file you wish to import.

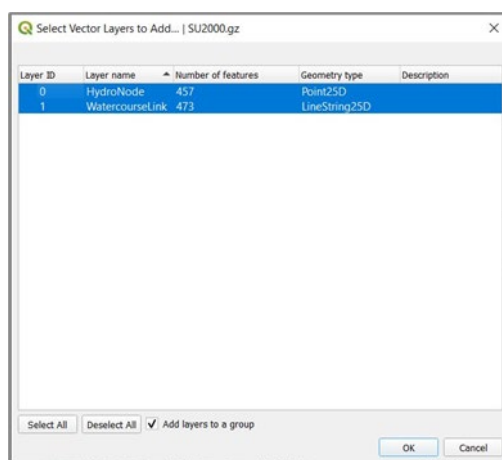


4. When you've selected the file you wish to import, click Add.

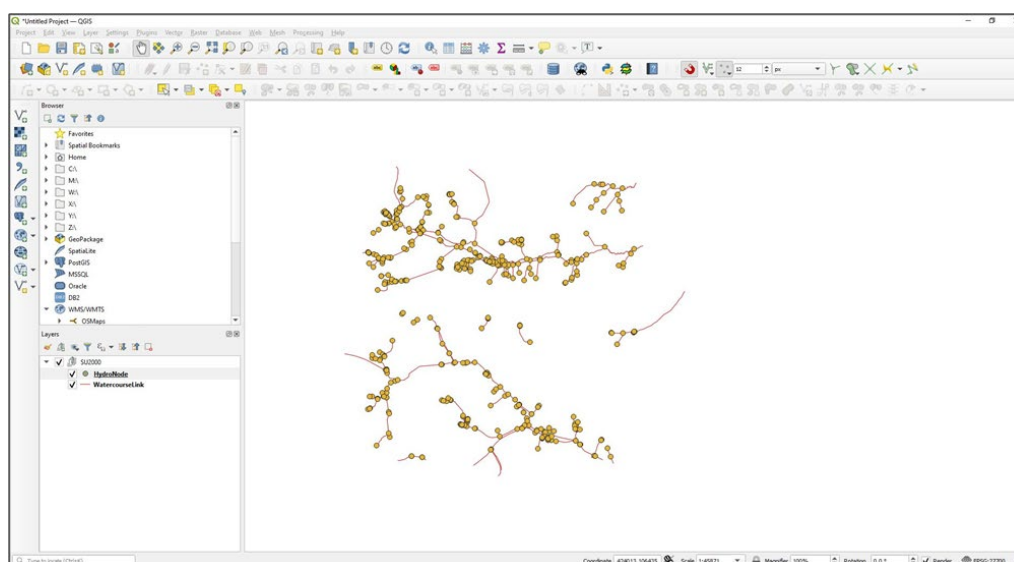


Note: Alternatively, you can load the file by dragging and dropping the GZ or GML file into a blank canvas.

5. This will open a Select Vector Layers to Add... dialog box in which you can select the layer(s) you wish to add to the GIS. If you wish to add both water layers (i.e. HydroNode and WatercourseLink), click *Select All*. Confirm your choice by clicking *OK*:



6. The HydroNode and WatercourseLink layers will be added to the canvas in the main map window.



7. You can add additional layers of OS MasterMap (for example, OS MasterMap Topography Layer) to give context to OS MasterMap Water Network Layer data.

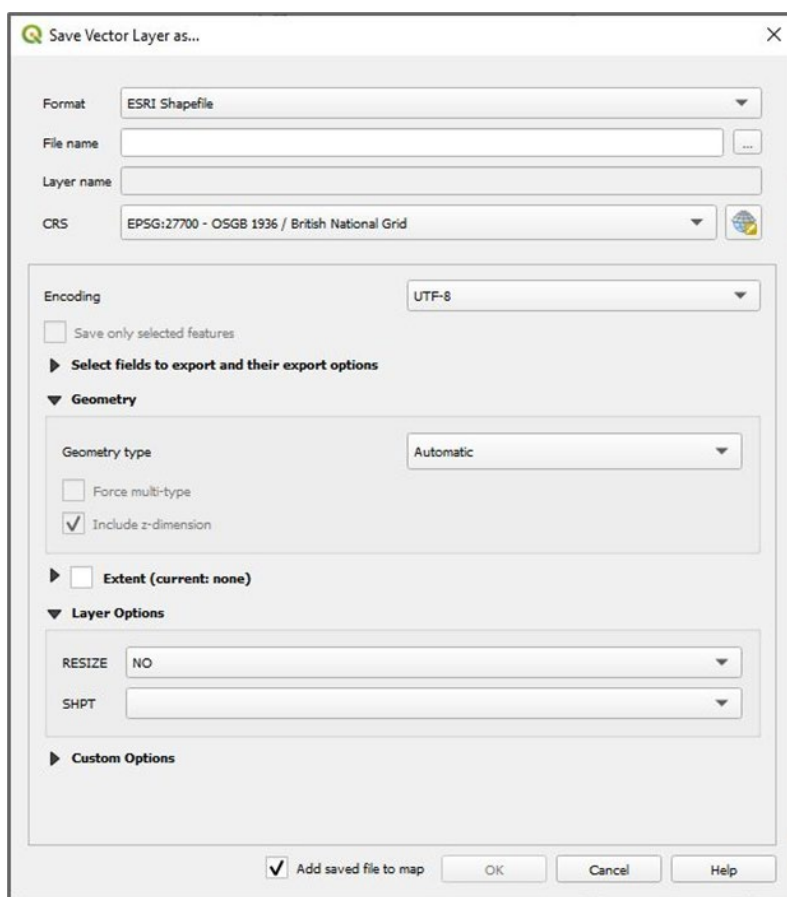
5.1.2 Exporting OS MasterMap Water Network Layer to different GIS formats using QGIS

You can also use QGIS to export OS MasterMap Water Network Layer data into many different common GIS formats. This will allow you to open the files in many other GIS applications.

1. Right click on the layer you want to translate, then select *Export* and *Save Feature As...*

Note: If you are trying to save layers for more tiles or a national dataset, you will have to save them separately as there is no option for grouping layers.

2. In the Save Vector Layer as... dialog box that opens, use the *dropdown arrow* in the Format field to select your chosen format for further analysis, for example, MapInfo TAB or ESRI Shapefile.
3. Click on the *Browse button* to save your file to a location of your choice.
4. Click *OK* to save the data in your chosen format.

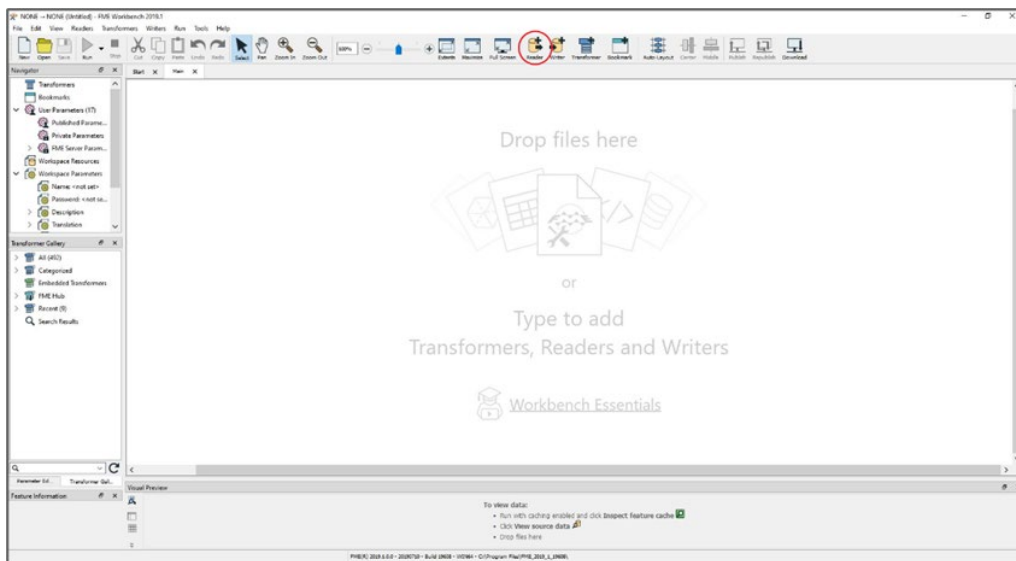


5.2 FME

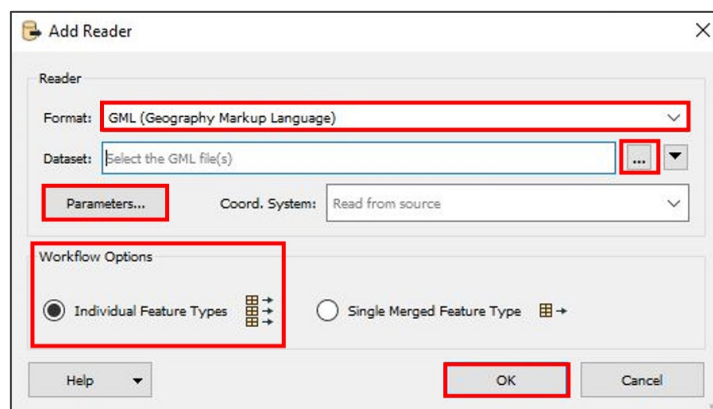
The following section details how to load OS MasterMap Water Network Layer into FME using the GML file you have received. Doing so will allow you to view the data and then translate it into the most appropriate format for your software. The step-by-step instructions have been prepared using FME 2019.1.

5.2.1 Viewing and translating data in FME

1. Open FME Workbench and select *New* in the Getting Started box.
2. Click the *Add Reader* button from the main toolbar to add a Reader.



3. In the Add Reader dialog box that opens, select *GML (Geography Markup Language)* from the dropdown list for Format.
4. Use the *Browse [...]* button next to the Dataset field to navigate to your files and select them.
5. Leave the Parameters... as *default* and the Workflow Options as *Individual Feature Types*.
6. Select *OK* to add the Reader.



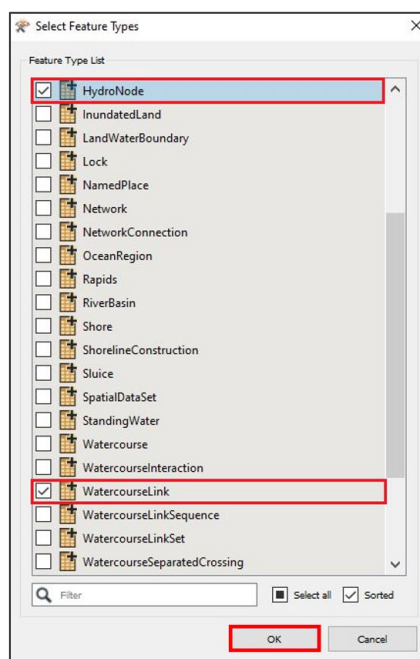
7. Once the Reader has been added successfully, the log window will display the text 'Mapping File Generation was SUCCESSFUL' and the Select Feature Types dialog box will open.

Note: If FME cannot find the appropriate schema file for use in translation, the [OS MasterMap Water Network Layer XML schema v1 file](http://www.os.uk/xml/schema/waternetwork/v1/index.html) (<http://www.os.uk/xml/schema/waternetwork/v1/index.html>) can be downloaded from the schema repository on the OS website.

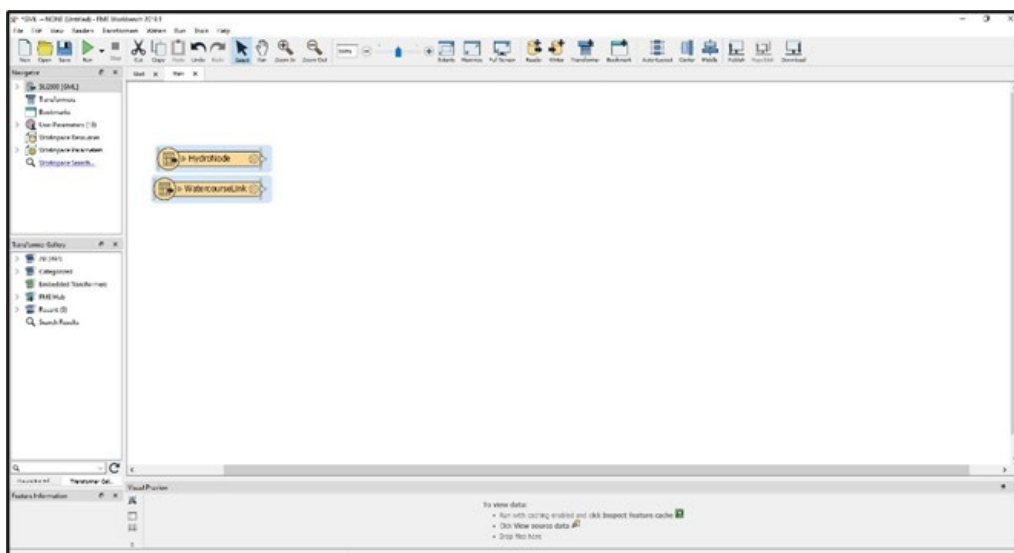
8. In the Select Feature Types dialog box, select the feature types that you wish to translate from the list or use the Select All option to add all objects.

Note: OS MasterMap Water Network Layer currently only contains the feature types of WatercourseLink and HydroNode. FME will give you additional feature type options inherited from INSPIRE.

9. Click OK.



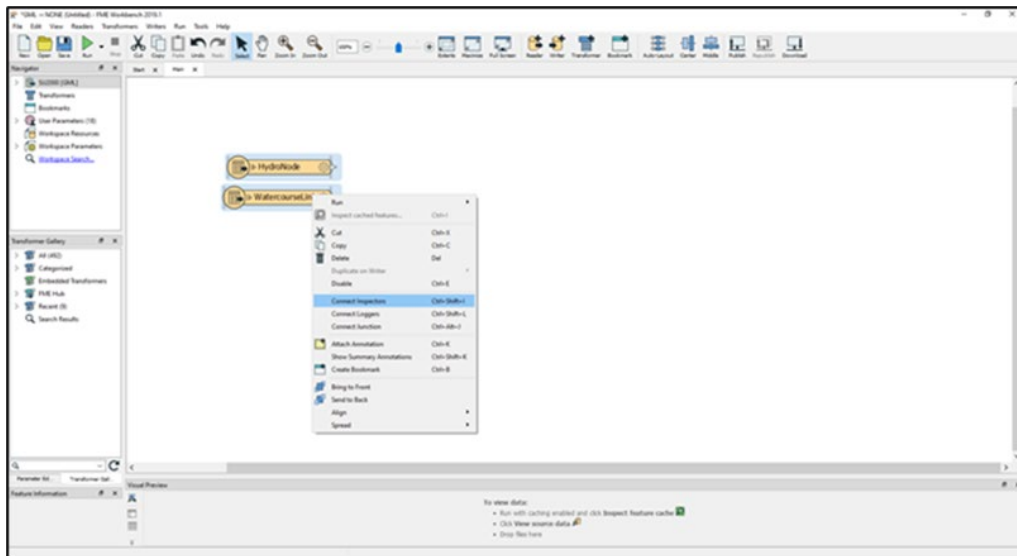
10. OS MasterMap Water Network Layer objects will have been added to the canvas.



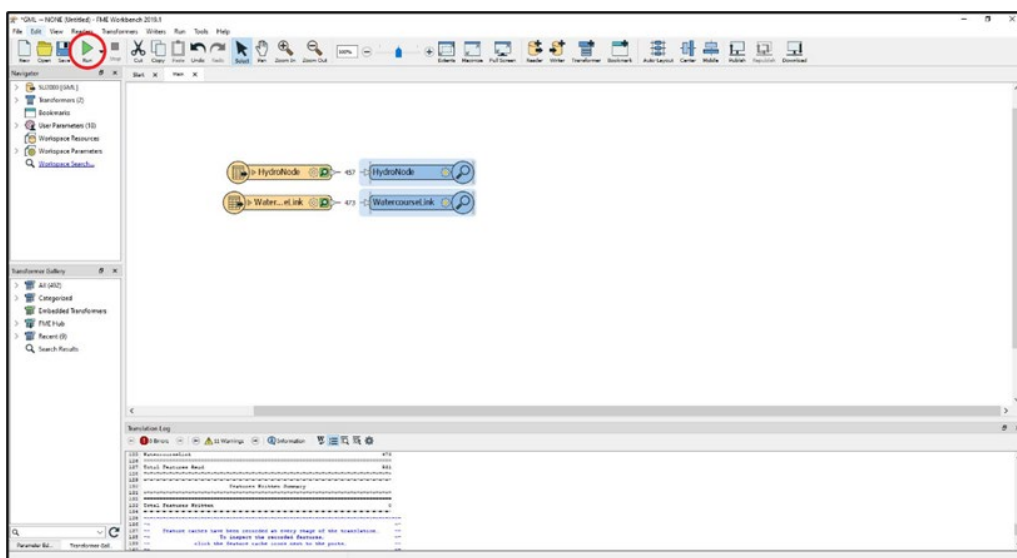
5.2.2 Viewing the data using FME Data Inspector before translation

Before translating the data, FME allows you to view the data. The viewing process is faster than translation and allows you to quickly interrogate the data before you start translating it.

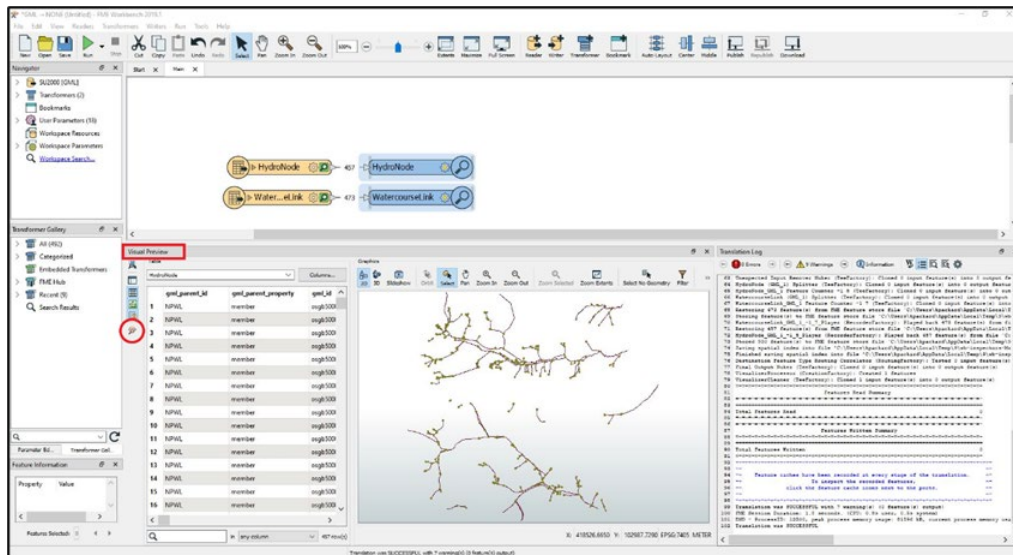
1. Highlight all of the feature types you wish to view by either selecting them individually or drawing a box around them.
2. Right-click on one of the feature types and select *Connect Inspectors*.



3. Run the workspace (click the *Run* button on the main toolbar) with the Inspectors connected in order to view the data in FME Data Inspector.



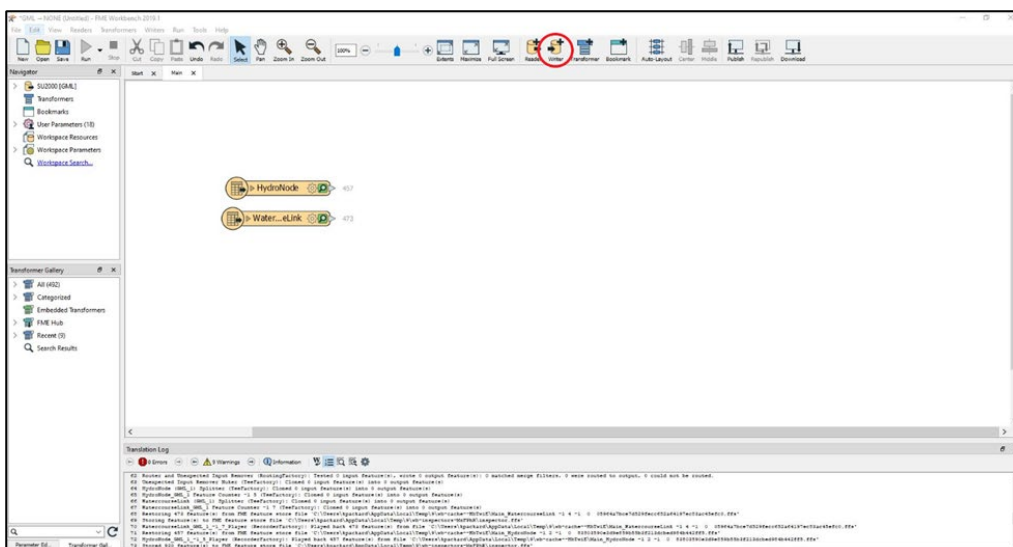
- When finished, the two layers of OS MasterMap Water Network Layer will be viewable in the Visual Preview window. You can open this window in a separate FME Data Inspector window by clicking the *FME Data Inspector* button.



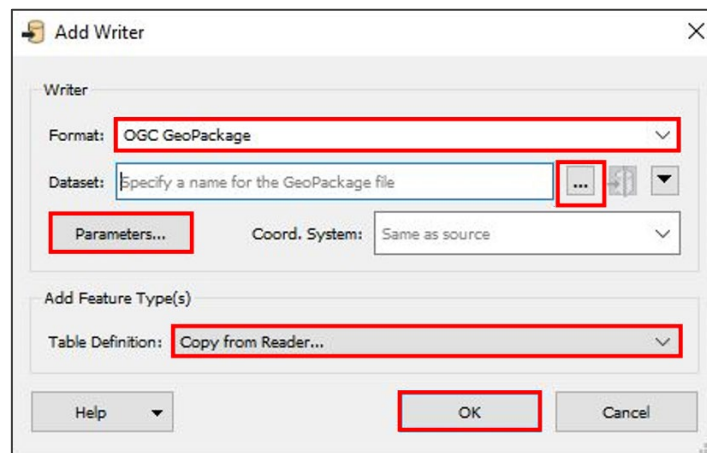
5.2.3 Translating GML in FME

You can use FME to translate the files from GML to any other format supported by FME (for example, TAB, SHP, GPKG or a spatial database).

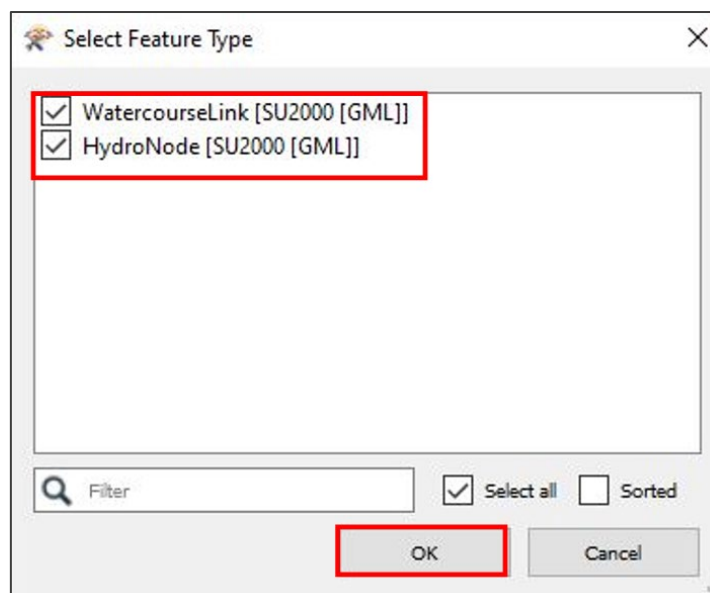
- In the main FME window, remove the Inspectors you have connected if you have chosen to use FME Data Inspector to view and interrogate the data. You can do this by clicking and deleting each Inspector separately or by selecting all of them and deleting them together.
- Click on the *Add Writer* button from the main toolbar.



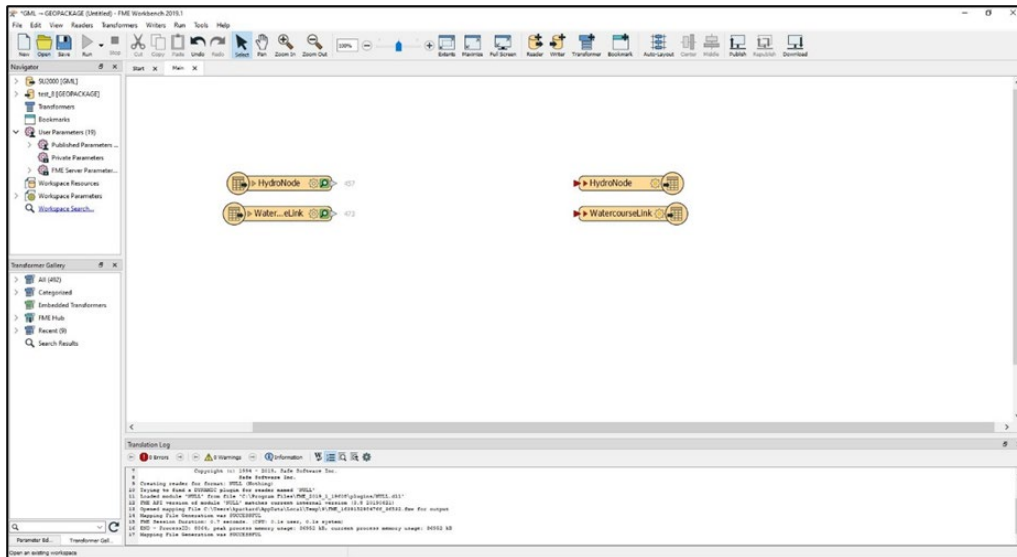
3. In the Add Writer dialog box that opens, select the format you are translating into from the dropdown list for Format, for example, OGC GeoPackage or File GeoDatabase.
4. Use the *Browse [...] button* next to the Dataset field to navigate to the folder where you want to save the translated data.
5. Leave the Parameters... set to *default*.
6. Under the Add Feature Type(s) section, set Table Definition to *Copy from Reader*. This will enable the new Writer to inherit the schema of the Reader feature types.
7. Click *OK* to add the Writer.



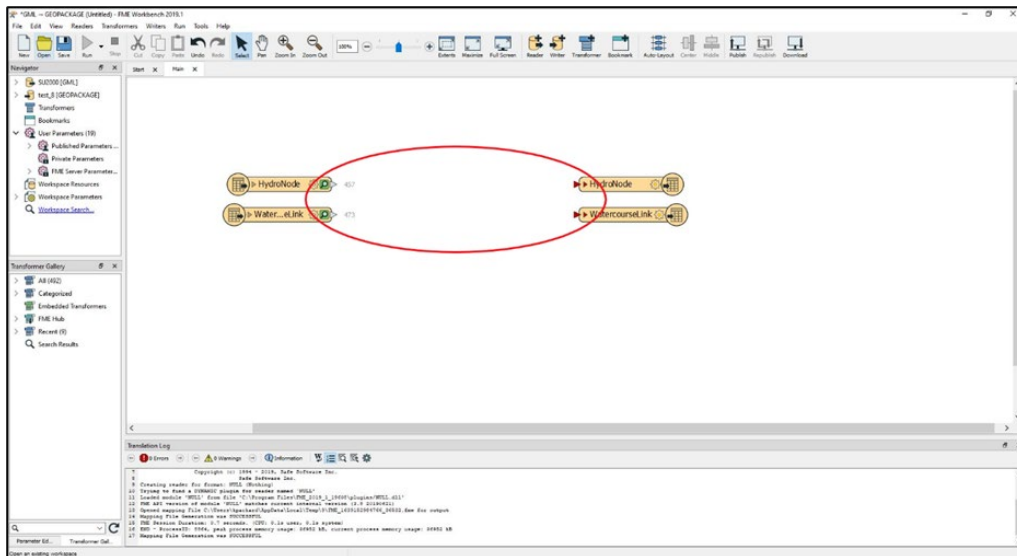
8. A Select Feature Type dialog box will appear prompting you to select which existing feature type(s) to copy. Select both the *WatercourseLink* and *HydroNode* feature types, then click *OK*.



9. The Writer feature types will now be added to the canvas. The new Writer feature types will have inherited the schema of the Reader feature types.

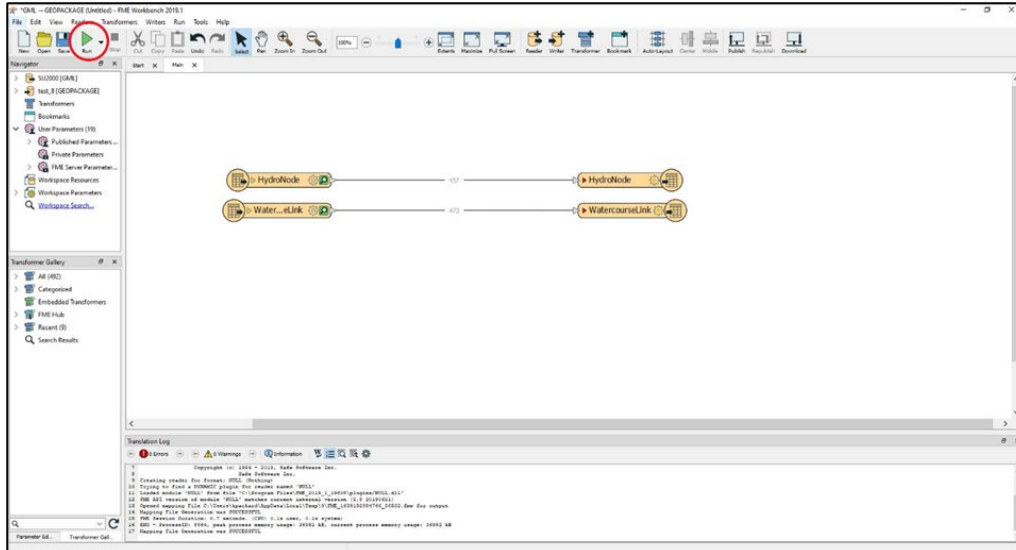


10. Connect the Readers to the Writers by dragging the triangle on the Reader and connecting it to the red triangle on the corresponding Writer.



11. Once the workspace has been set up, run the translation by clicking the *Run Translation* button.

Note: This is a basic translation of the data, and within FME workbench you could manipulate the data further if needed. However, you can use the software just as a translator and open the data in other GIS software for analysis.



5.3 ESRI ArcMap

The following step-by-step instructions outline how to load OS MasterMap Water Network Layer GML data into ESRI ArcMap. The instructions were prepared using ESRI ArcMap version 10.6.1.

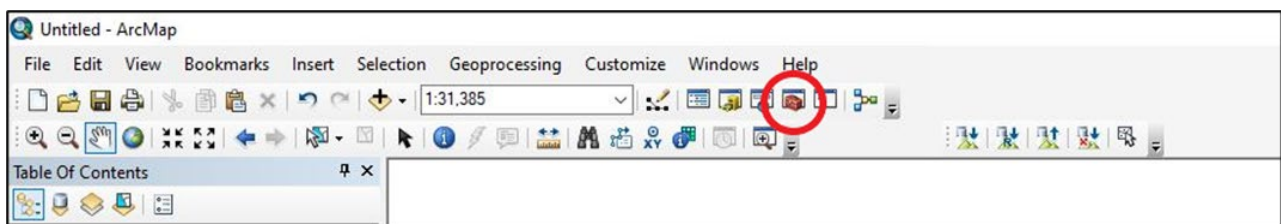
GML data can be now imported as zipped GML (GZ) directly into ESRI ArcMap using the Data Interoperability extension called Quick Import. The Data Interoperability extension is now available at no cost as a part of ArcMap from version 10.2. You will require Internet access when using the Quick Import tool so that the data can access the schema attached to the file.

Note: If your version of ArcMap is older than 10.2 and you do not have a licence for Data Interoperability, you will have to use translation tools available in QGIS or FME (explained in [Section 5.1](#) and [Section 5.2](#), respectively) to first translate the GML data into ESRI shapefiles, before you can load them in ArcMap. Please go to [Section 5.3.2](#) for instructions on loading translated GML into ESRI ArcMap.

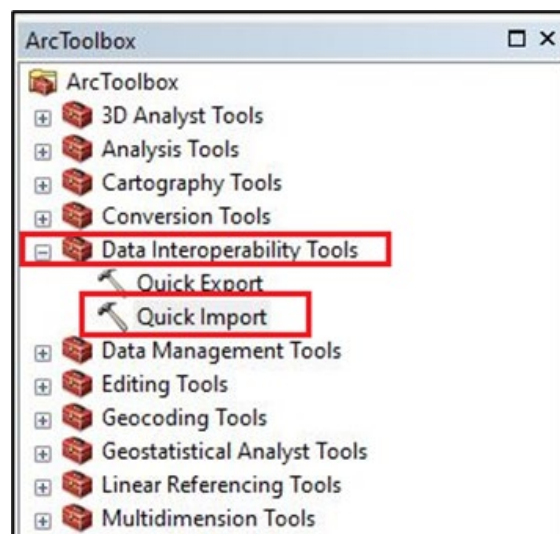
You can find more information about Quick Import on the [ArcGIS Data Interoperability page of the ESRI website](https://www.esri.com/en-us/arcgis/products/arcgis-data-interoperability/overview) (<https://www.esri.com/en-us/arcgis/products/arcgis-data-interoperability/overview>).

5.3.1 Loading OS MasterMap Water Network Layer GML into ESRI ArcMap

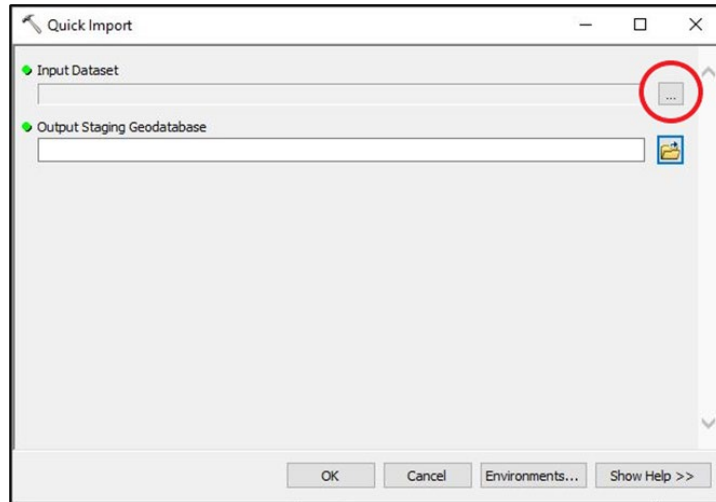
1. Launch ArcMap.
2. Click on the *ArcToolbox window button* in the main toolbar.



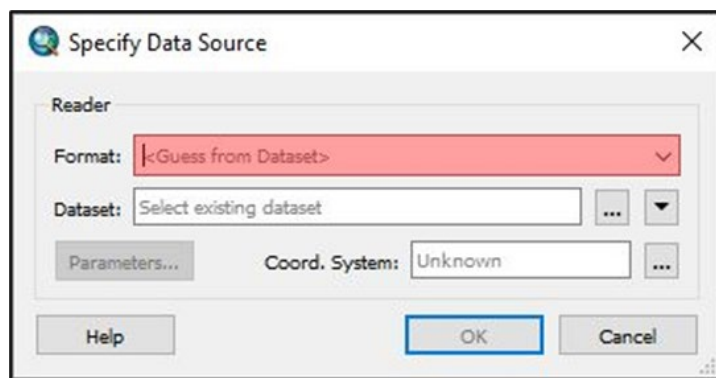
3. In the ArcToolbox window that opens, click on the *plus sign* next to Data Interoperability Tools, then double-click on *Quick Import*.



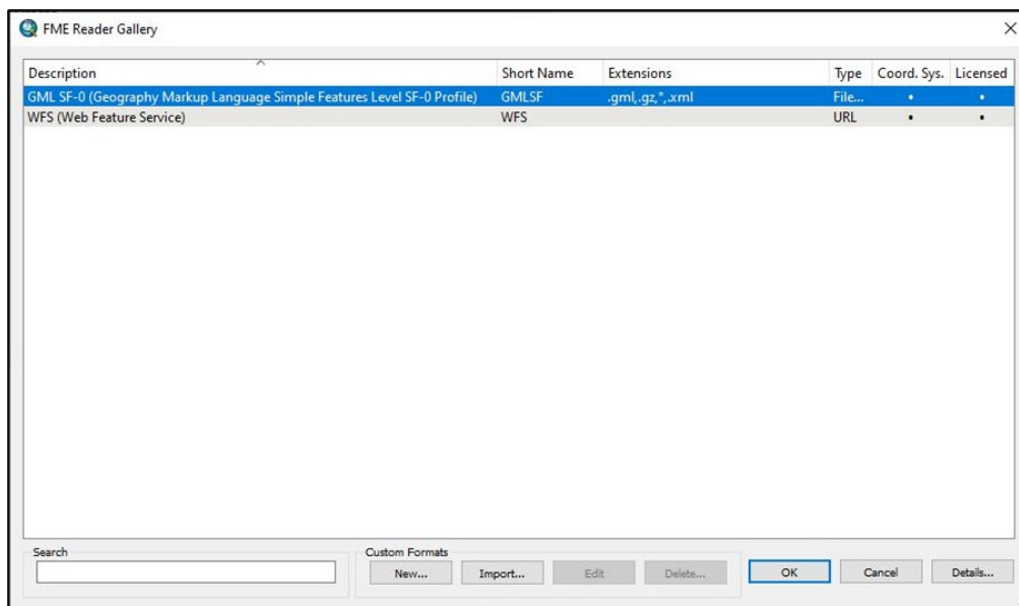
4. In the Quick Import dialog box that opens, click on the [...] button next to the Input Dataset field.



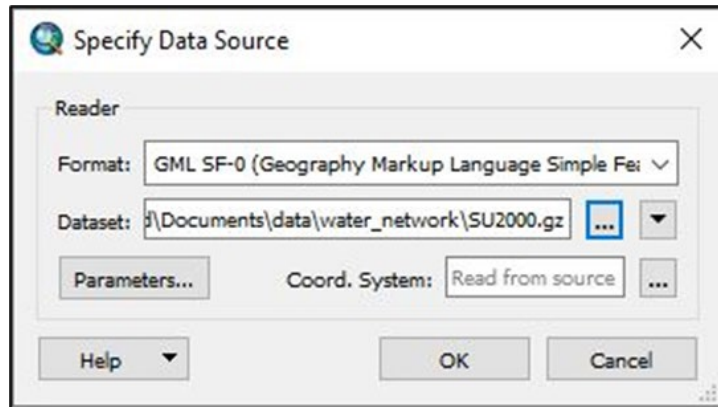
5. In the Specify Data Source dialog box that opens, click on the dropdown arrow in the Format field and select *More Formats*.



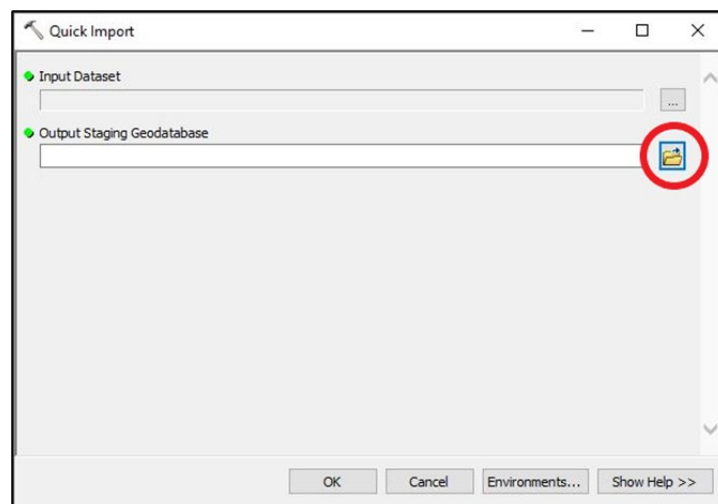
6. In the FME Reader Gallery dialog box that opens, select *GML SF-0 (Geography Markup Language Simple Features Level SF-0 Profile)* from the list of options, then click OK.



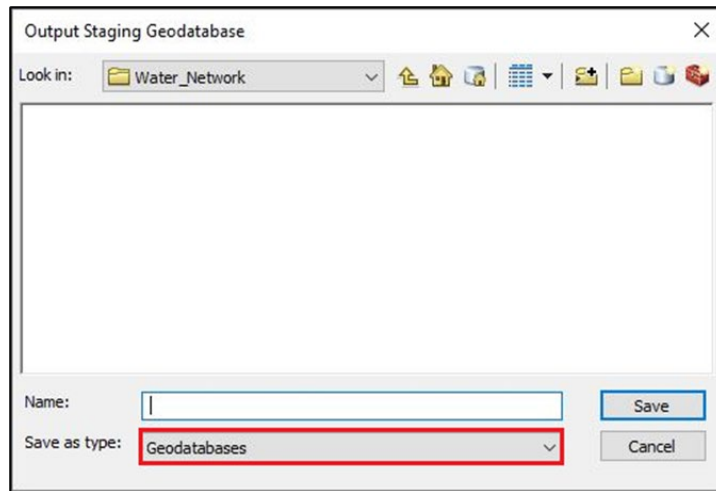
7. Back in the Specify Data Source dialog box, use the [...] button next to the Dataset field to navigate to the folder where you saved your GZ file; select the folder and click *Open*. Make sure that extensions available to load are *.gz / *.gml.
8. Leave the rest of the settings as default and click *OK*.



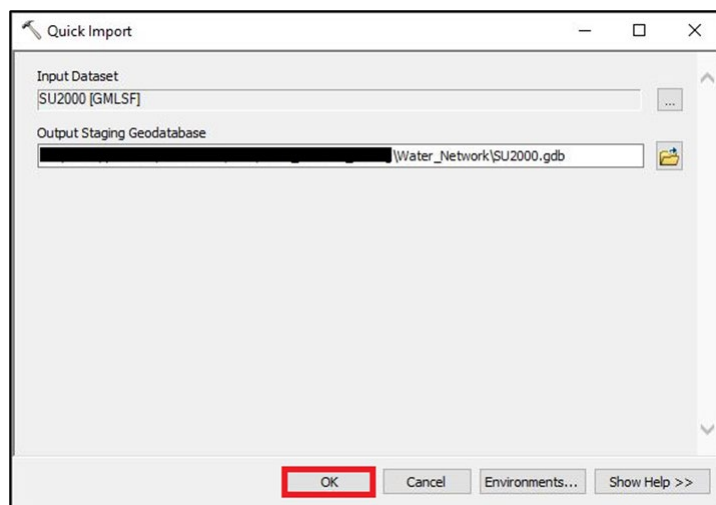
9. Back in the Quick Import dialog box, click on the folder button to the right of the Output Staging Geodatabase field.



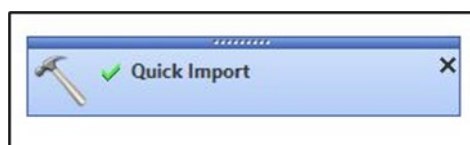
10. In the Output Staging Geodatabase dialog box that opens, navigate to the correct folder and select the output geodatabase for the feature classes to be stored in.
11. Select *Geodatabases* from the dropdown options for Save as type.
12. Click *Save*.



13. Once you have made your selections for the Input Dataset and Output Staging Geodatabase fields, you can click *OK* at the bottom of the Quick Import dialog box.



14. As soon as the import process has started, you will see a process running notification at the bottom of your screen. When the import process has successfully completed, the following popup window should appear in the bottom right-hand corner of your screen:

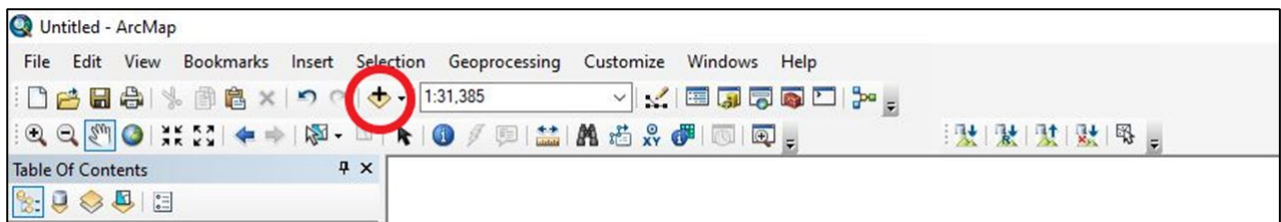


5.3.2 Loading translated GML into ESRI ArcMap

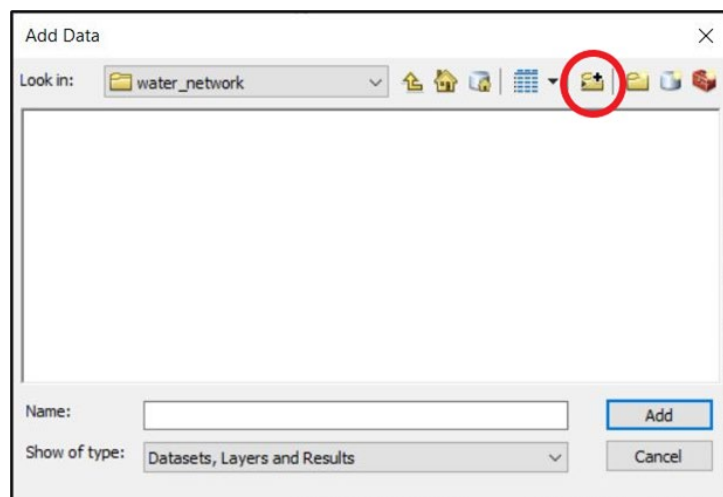
If your version of ArcMap is older than version 10 or if you do not have access to the Quick Import (Data Interoperability) extension, you will have to use the translation tools available in QGIS or FME (explained in [Section 5.1](#) and [Section 5.2](#), respectively) to translate the GML data into ESRI shapefiles first, before you can load them into ArcMap.

Note: The following instructions were prepared using ESRI ArcMap version 10.6.1.

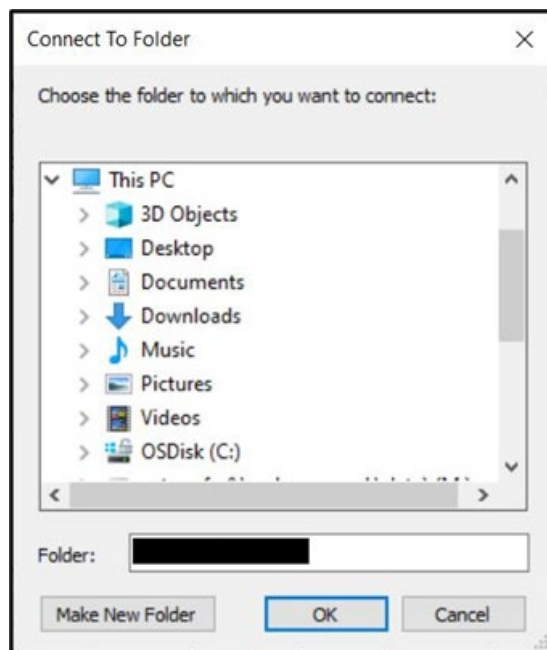
1. Launch ArcMap.
2. To load a shapefile into ArcMap, click on the *Add Data* button in the main toolbar.



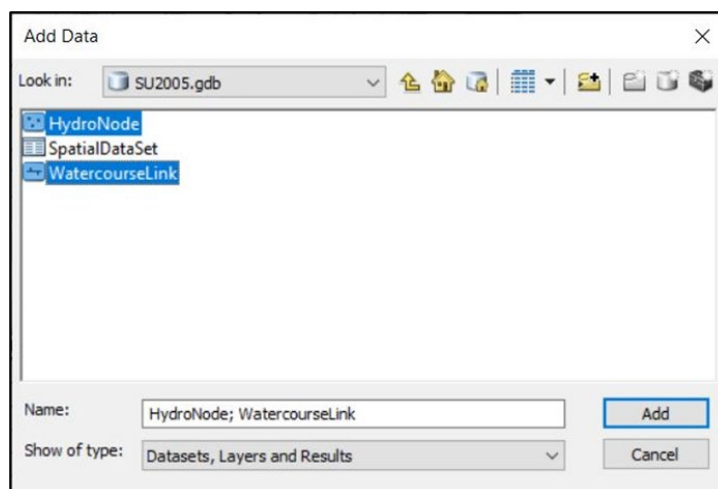
3. In the Add Data dialog box that opens, click the *Connect To Folder* button.



4. In the Connect To Folder dialog box, navigate to the folder where you saved your translated OS MasterMap Water Network Layer data, then click OK.



5. Back in the Add Data dialog box, select the *WatercourseLink* and *HydroNode* shapefiles that will now be in the list of options, then click Add.



6. The two OS MasterMap Water Network Layer features should now have loaded into the map window of ArcMap.

5.4 MapInfo Professional

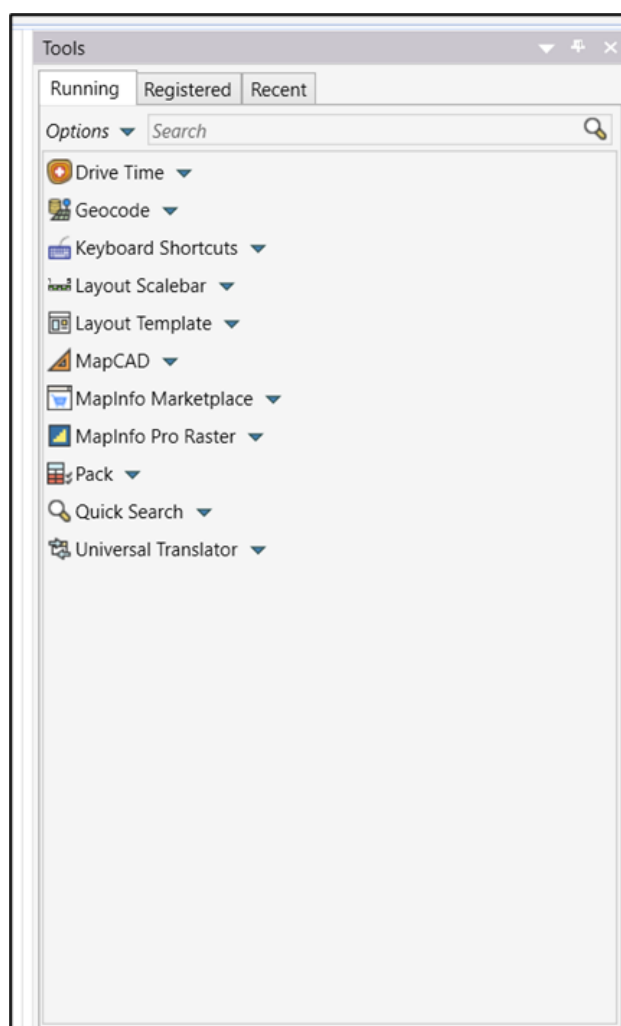
The following instructions outline how to load OS MasterMap Water Network Layer GML into MapInfo Professional. They have been prepared using version 12.5 of MapInfo. This new version of MapInfo allows you to convert GML data using a tool called Universal Translator.

Note: These instructions refer to the 64Bit version. The Universal Translator window is the same in the 32Bit version; however, the MapInfo menus are slightly different.

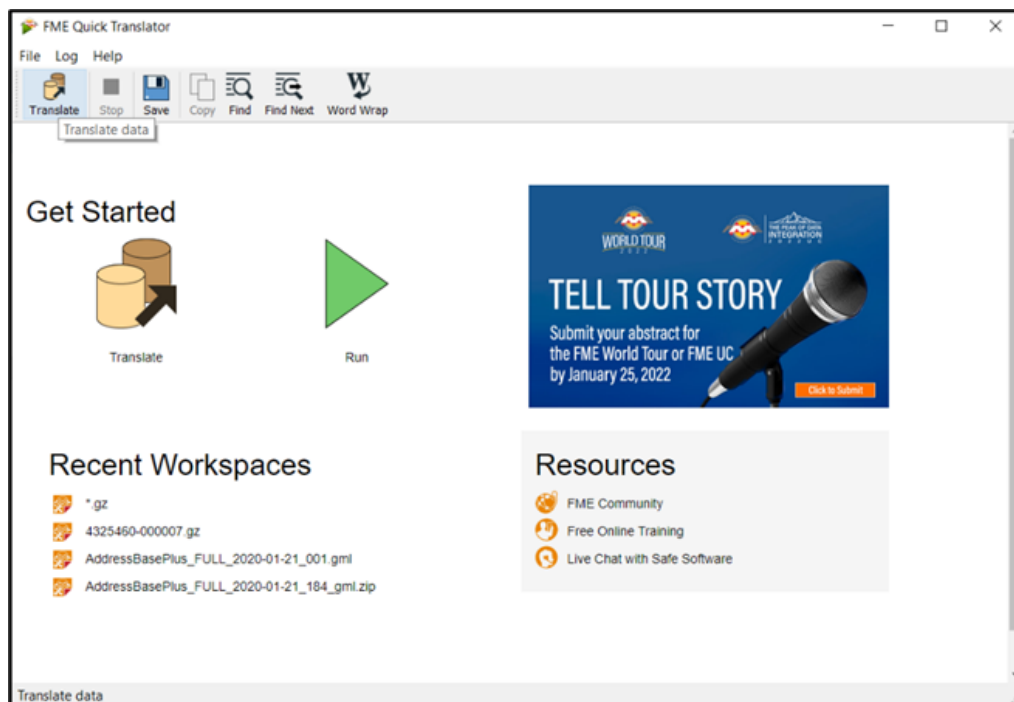
If your version of MapInfo is 12.0.2 or older, you will have to use translation tools available in FME or QGIS to translate the GML data into MapInfo TAB before you can load the data into MapInfo. If you are bringing in already translated TAB files, please see [Section 5.4.2](#) on 'Loading translated GML files into MapInfo'.

5.4.1 Translating GML into MapInfo Professional

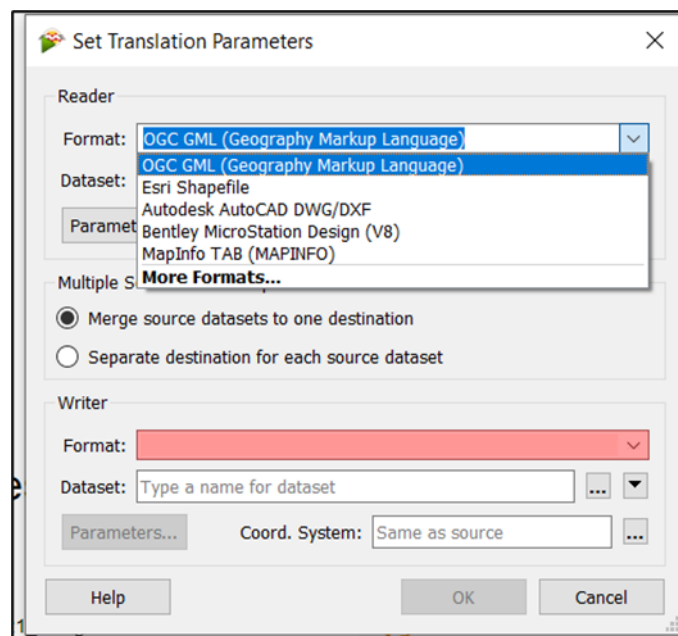
1. Open MapInfo Professional.
2. On the main toolbar, select *Tools > Universal Translator > Universal Translator*.



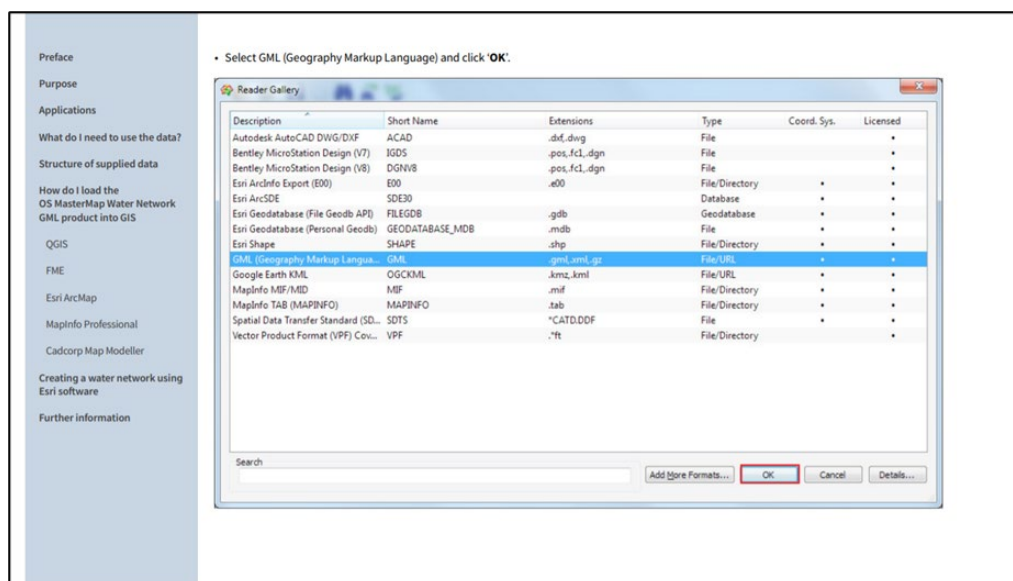
3. In the FME Quick Translator dialog box that opens, select *File > Translate* or click on the *Translate data* button.



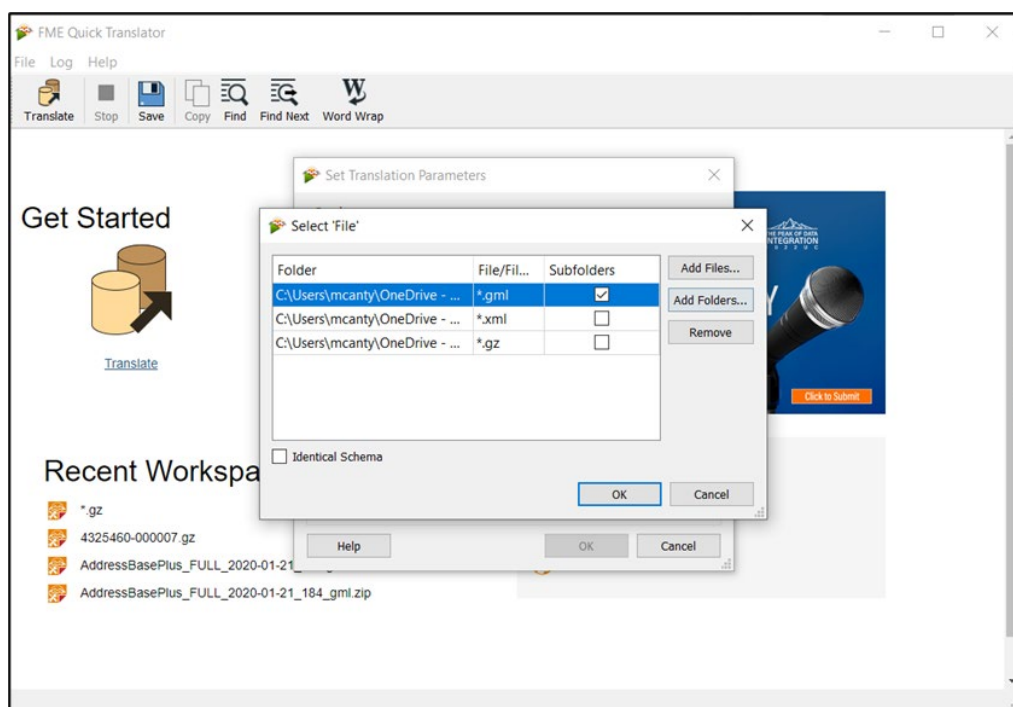
4. The Set Translation Parameters dialog box will open. In the Reader section, click on the *dropdown button* next to Format.



- The Reader Gallery dialog box will open. Select *GML (Geography Markup Language)* from the list of options, then click OK.

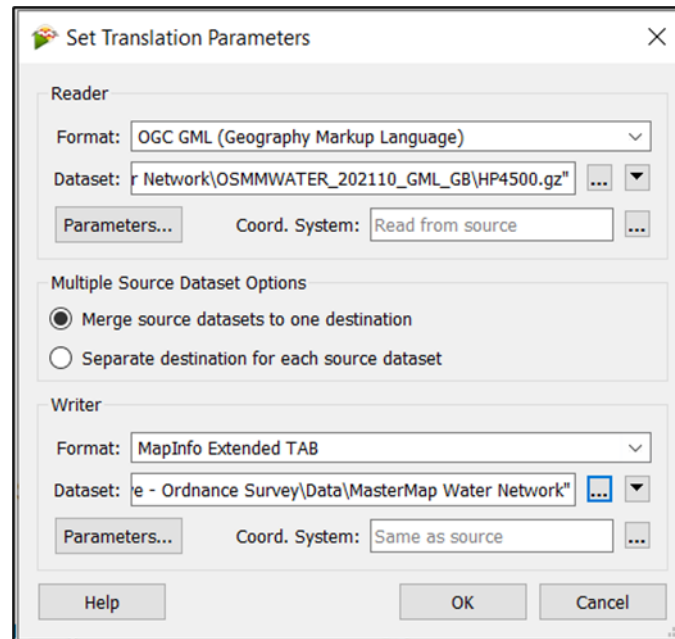


- In the Reader section within the Set Translation Parameters dialog box, navigate to the folder where you saved your GML files under the Dataset option. A Select 'File' dialog box will appear. Once you've located the folder and selected it, click OK.

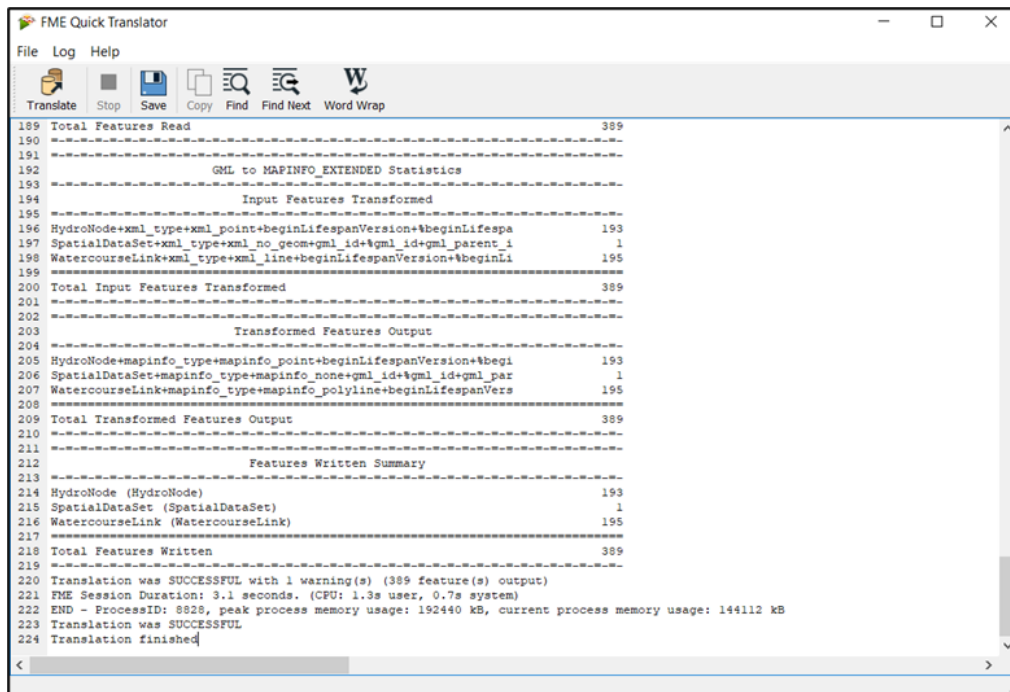


- In the Writer section within the Set Translation Parameters dialog box, click on the *dropdown button* next to Format and select *MapInfo TAB*.
- Again in the Writer section, within the Dataset option, navigate to the folder where you want your TAB file to be saved.
- You can leave the rest of the settings as default.

10. Click OK.



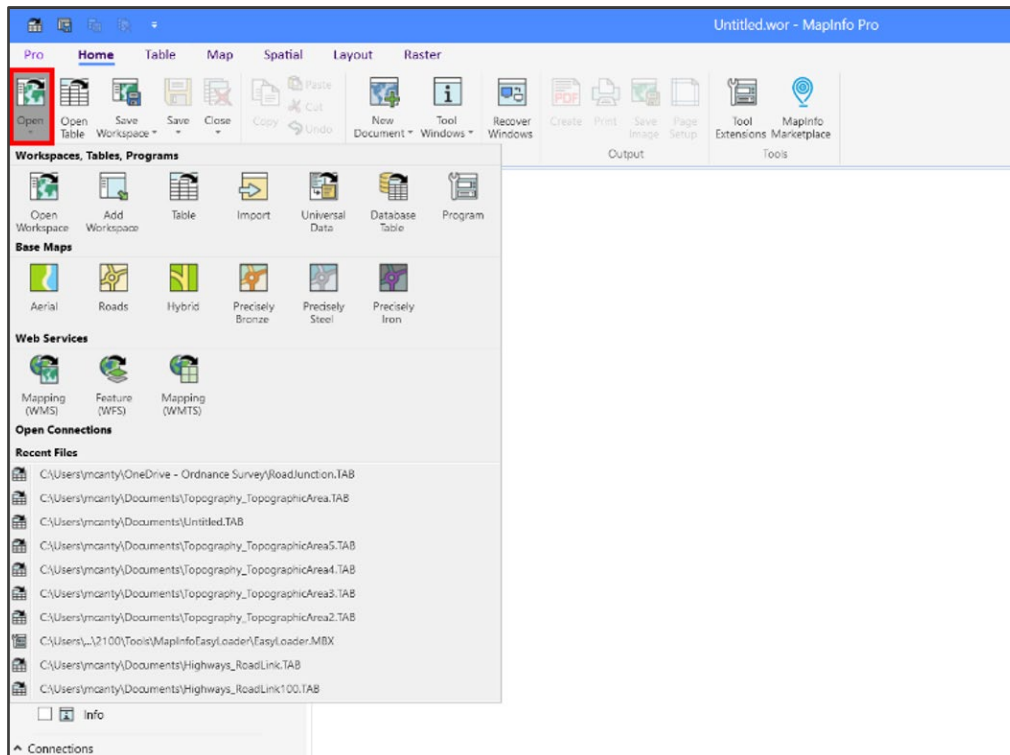
11. The translation will start. You will notice commands appearing in the FME Quick Translator dialog box.
12. When the translation has completed, you will see a line of text saying: 'Translation was SUCCESSFUL'. Close the FME Quick Translator dialog box.



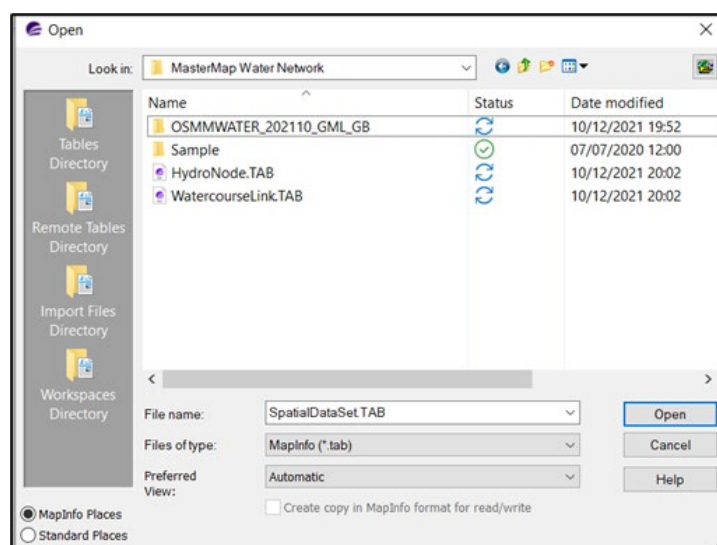
13. The GML files will have been successfully translated into MapInfo TAB files.

5.4.2 Loading translated GML files into MapInfo Professional

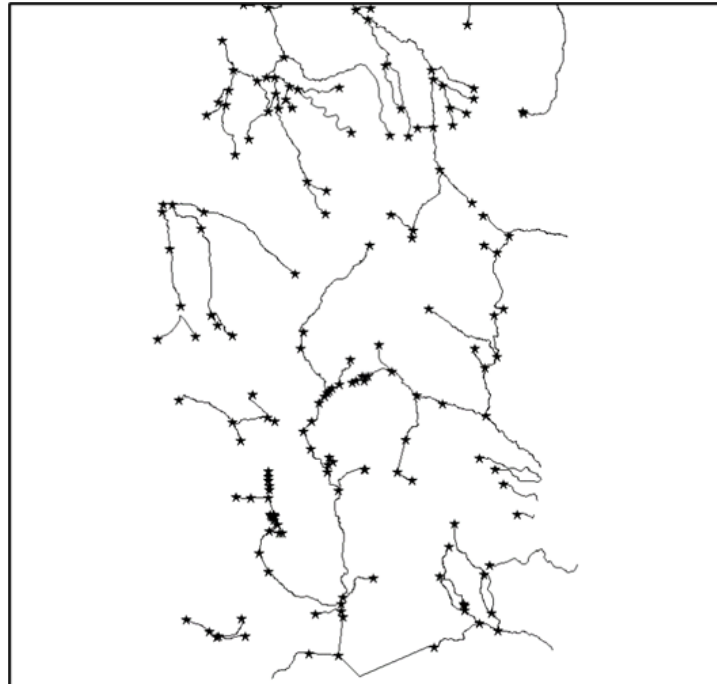
1. Open MapInfo Professional.
2. To load translated files, select *Home > Open* on the main toolbar.



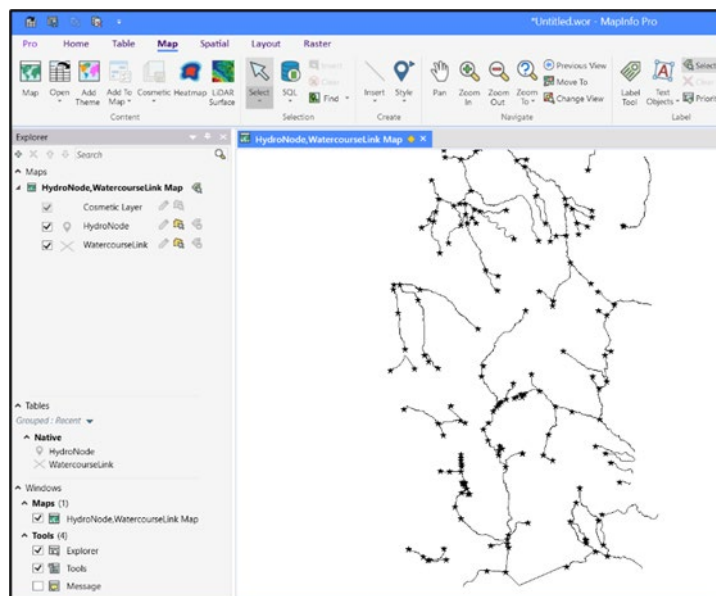
3. The Open dialog box will open. In the Look in option, navigate to the folder where you saved your TAB files.
4. If you don't see your files, select *MapInfo (*.tab)* from the Files of type dropdown menu.
5. Select *WatercourseLink* and *HydroNode*, then click *Open*.



6. The data will now load into MapInfo.



7. To add the Layers window, right-click in the main window and select *Layer Control*. This will display the two OS MasterMap Water Network Layer objects that you have loaded: WatercourseLink and HydroNode.

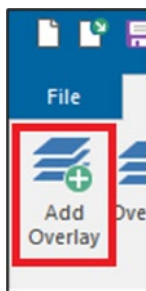


5.5 Cadcorp SIS Map Modeller

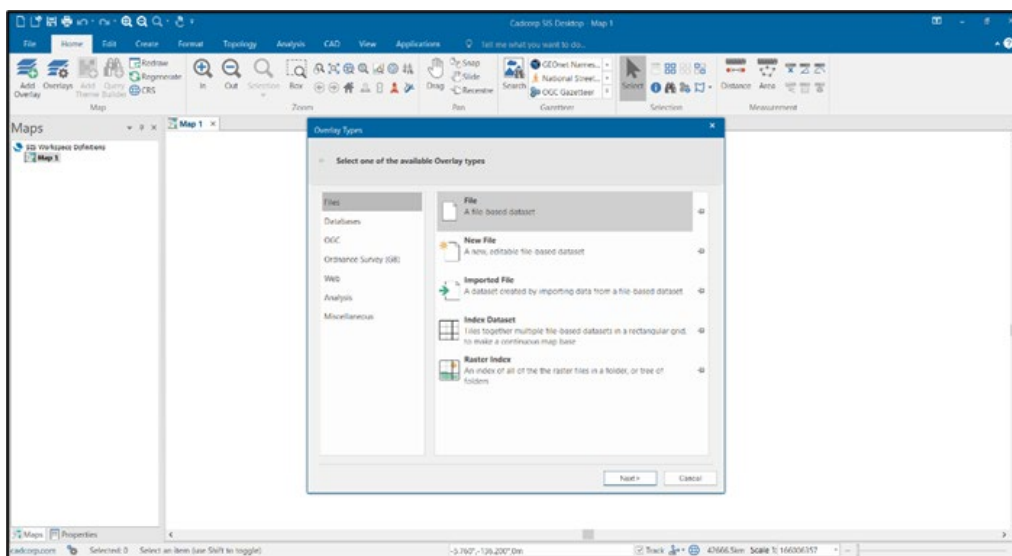
The following instructions outline how to load OS MasterMap Water Network Layer GML into Cadcorp SIS Map Modeller. They have been prepared using Cadcorp SIS Map Modeller version 8.0 (x64).

5.5.1 Translating GML using Cadcorp SIS Map Modeller

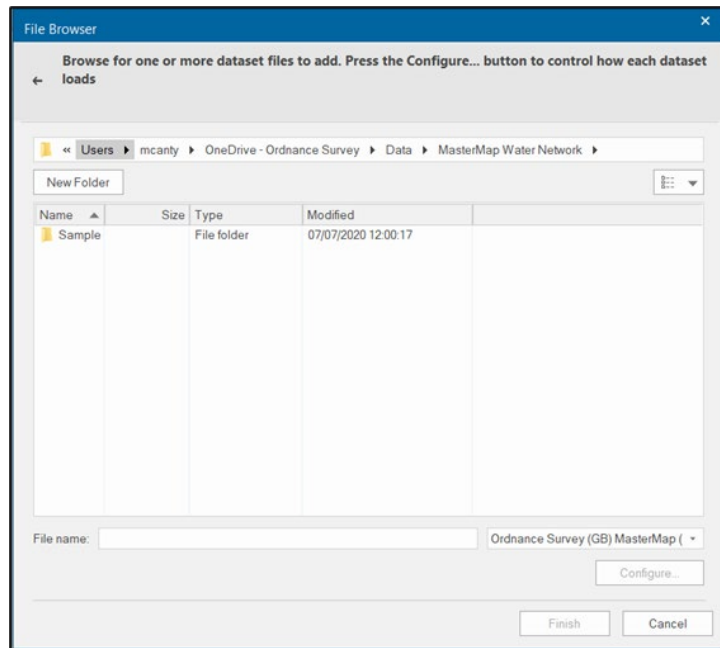
1. Launch Cadcorp SIS Map Modeller.
2. Select the *Home* tab on main menu toolbar, then click the *Add Overlay* button.



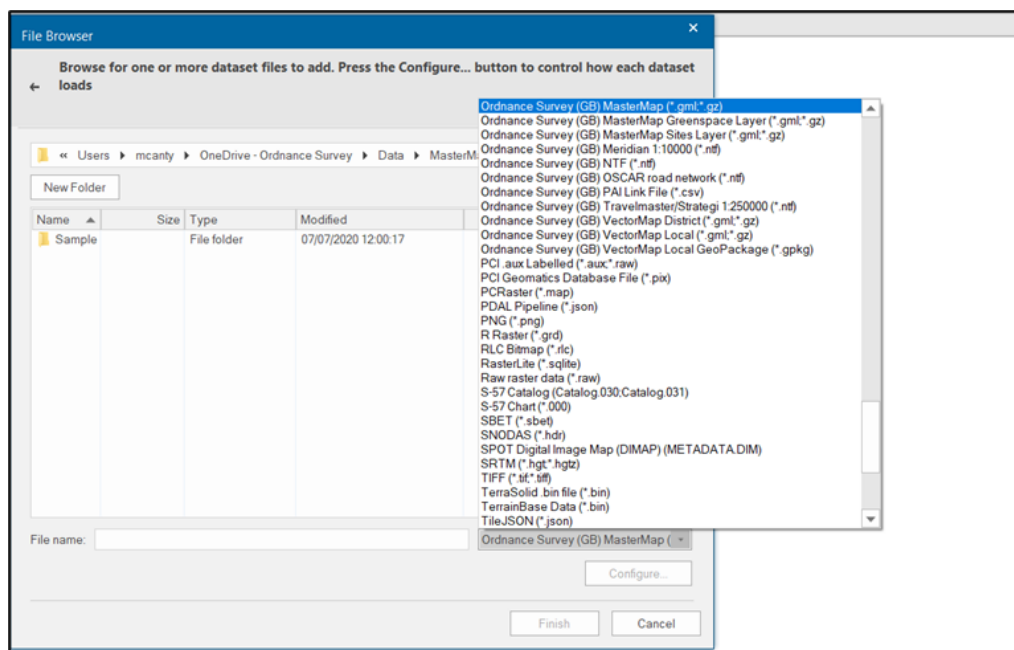
3. In the Overlay Types dialog box that opens, select *Files > File > Next*.



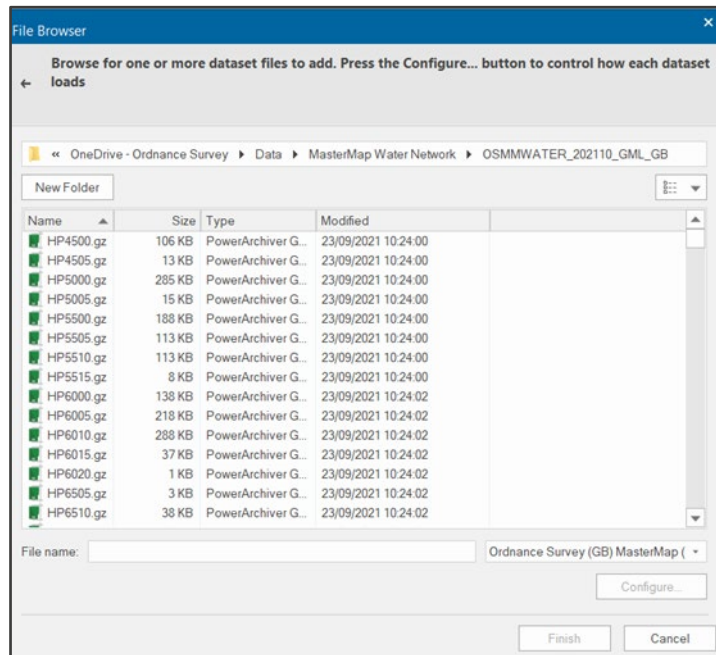
4. This will open the File Browser dialog box. Navigate to the folder you have saved the GML data in.



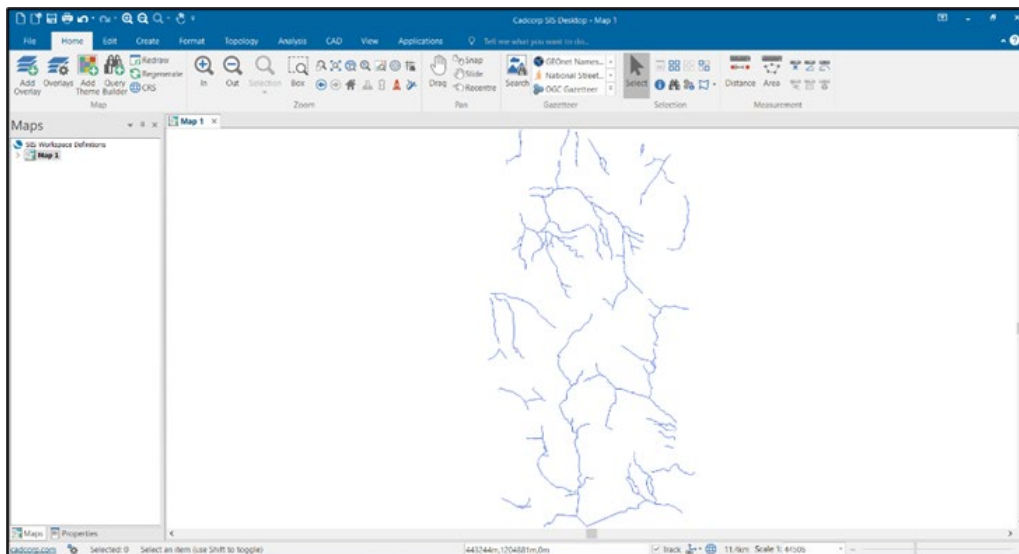
5. In the bottom right-hand corner of the File Browser dialog box, change the files from *All files (*.*)* to *Ordnance Survey (GB) MasterMap layer (*.gml, *.gz)*.



6. Back in the File Browser dialog box, select the file(s) and click *Finish*.



7. OS MasterMap Water Network Layer features will have been added to the main map window.



6. Loading the data (GeoPackage and vector tiles formats) into a GIS

This getting started guide focuses solely on using the product in GML format. For guidance on using the product in GeoPackage or vector tiles formats, please see the following two getting started guides, which are available on the Ordnance Survey website:

- [Getting Started with GeoPackage guide](https://www.ordnancesurvey.co.uk/documents/getting-started-with-geopackage.pdf) (<https://www.ordnancesurvey.co.uk/documents/getting-started-with-geopackage.pdf>)
- [Getting Started with Vector Tiles guide](https://www.ordnancesurvey.co.uk/documents/user-guides/getting-started-with-vector-tiles-v1.0.pdf) (<https://www.ordnancesurvey.co.uk/documents/user-guides/getting-started-with-vector-tiles-v1.0.pdf>)

7. Creating a water network using ESRI software

The OS MasterMap Water Network Layer data can be used in two types of networks.

Geometric network

Geometric networks offer a way to model common networks and infrastructures found in the real world. Water distribution and water flow in a stream are two examples of resource flows that can be modelled and analysed using a geometric network.

A geometric network can be set up easily, does not need additional license and has some functionality (tracing up / down stream, for example) provided by the Utility Network Analyst Toolbar.

Note: A geometric network cannot be published in ArcGIS server.

Network analyst

Network analyst is the mathematical processing of the geometry of a link / node layer, enabling the identification of all possible routes around that network, along with the distances and times involved. Put simply, this means that, using an accurate road data layer, the computer can identify possible routes between two locations and calculate the shortest route.

This requires a Network Analyst License. You can build simple networks, but more complicated networks will require you to have detailed knowledge of networks to set up attributes and elevators.

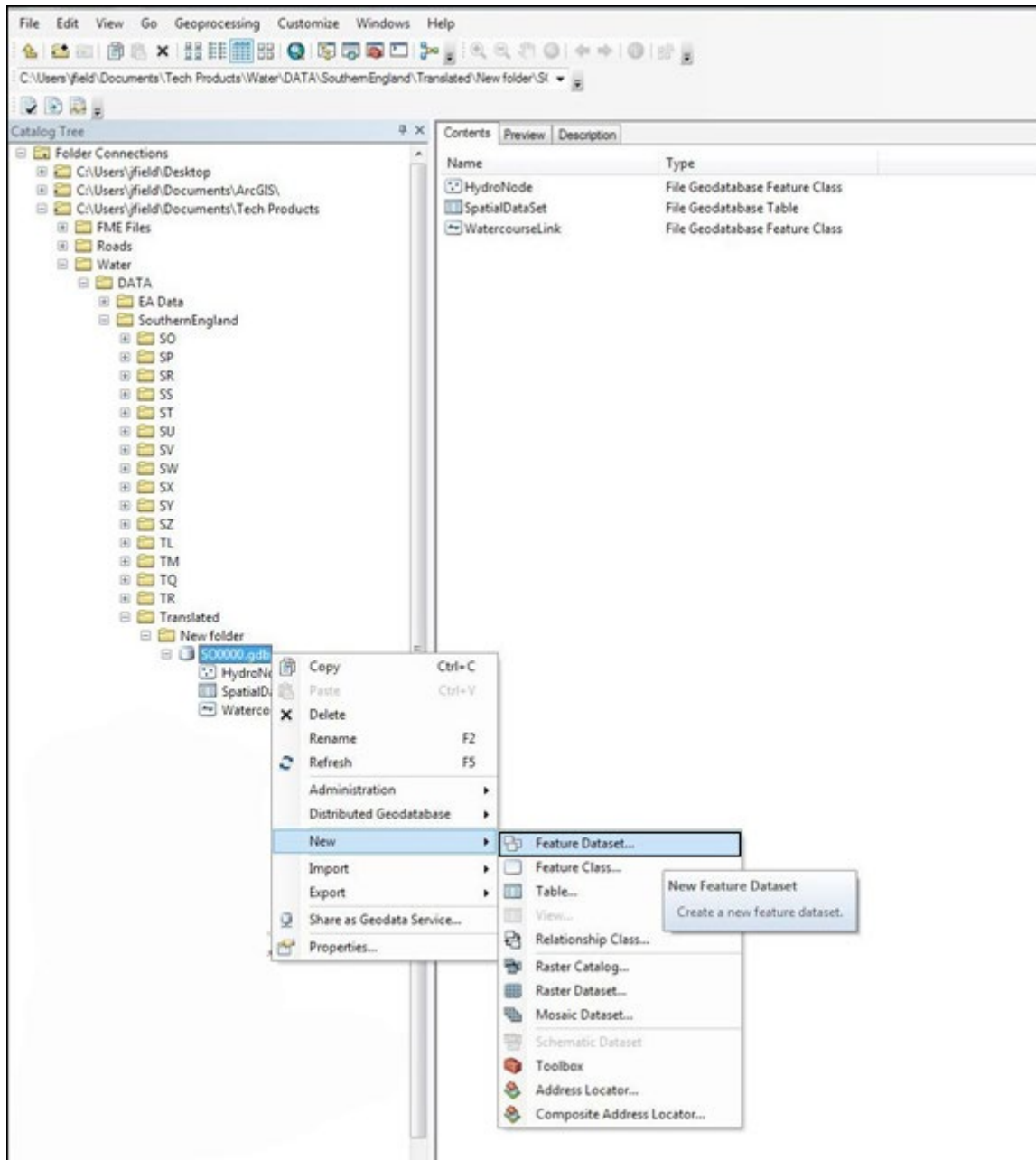
Note: This guide will only cover a geometric network.

7.1 Building a geometric network

A geometric network is built within a feature dataset in the geodatabase ([see Section 5.3](#)). The feature classes in the feature dataset are used as the data sources for network junctions and edges. The following step-by-step instructions will guide you through building a geometric network; they have been prepared using ArcMap version 10.6.1.

1. Open ArcCatalog.
2. Navigate to your geodatabase in your Folder Connections.
3. Expand the geodatabase.

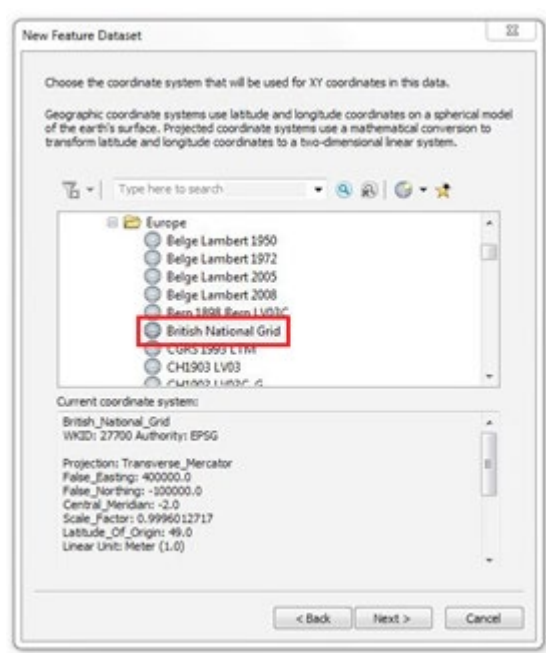
4. Right-click on the geodatabase, select **New** from the list of options, then click *Feature Dataset...*



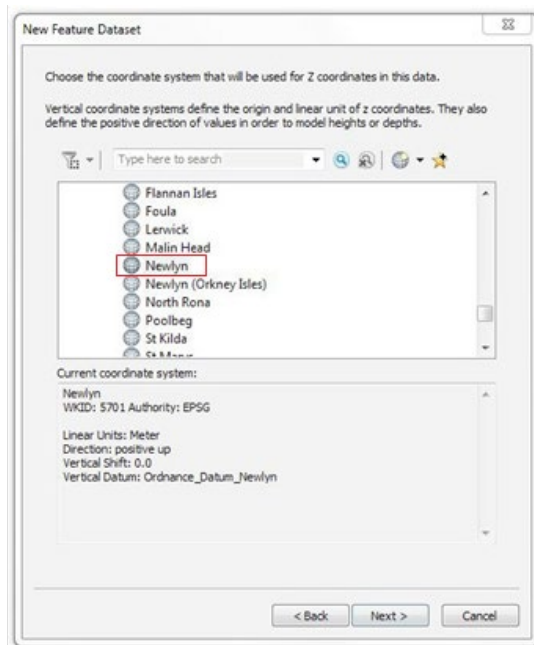
5. Give your new Feature Dataset a name, then click *Next*.



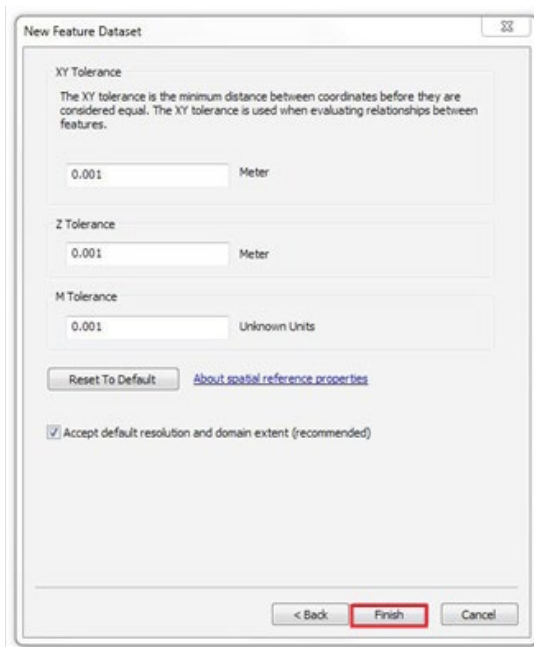
6. Set your coordinate system that will be used for the XY coordinates in the data (British National Grid EPSG:27700), then click *Next*.



7. Set your coordinate system that will be used for the Z coordinates in the data (Newlyn). Ordnance Datum Newlyn (ODN) is our national coordinate system for heights above mean sea level (orthometric heights).
8. Click *Next*.

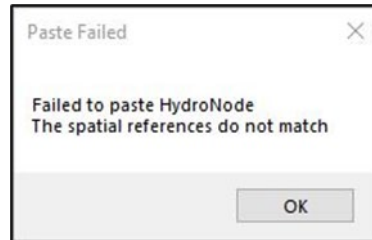


9. In the next panel, leave your XY tolerance as the default settings and click *Finish*. A new Feature Dataset will appear in the geodatabase.

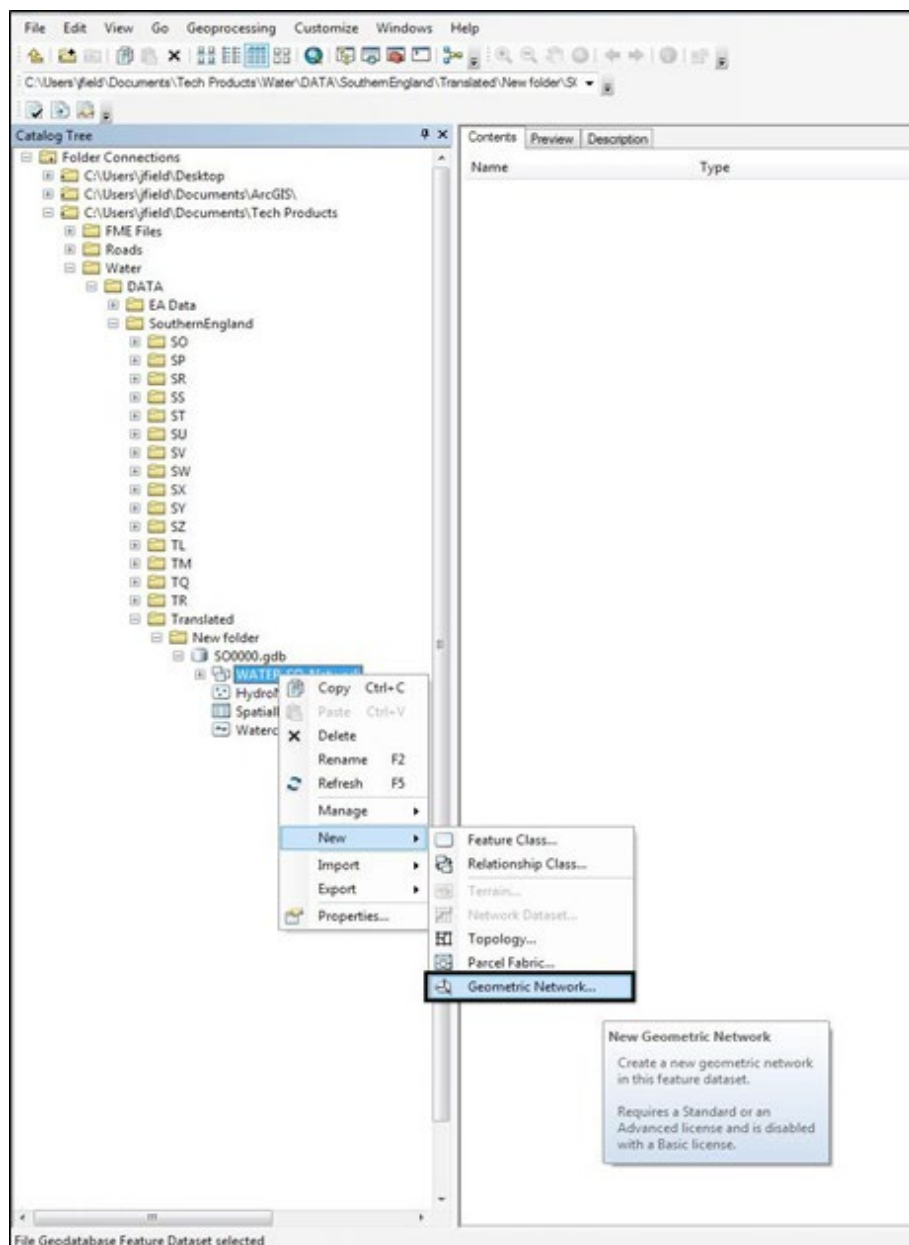


10. Copy the HydroNode and WatercourseLink feature classes into the new Feature Dataset by simply dragging them in.

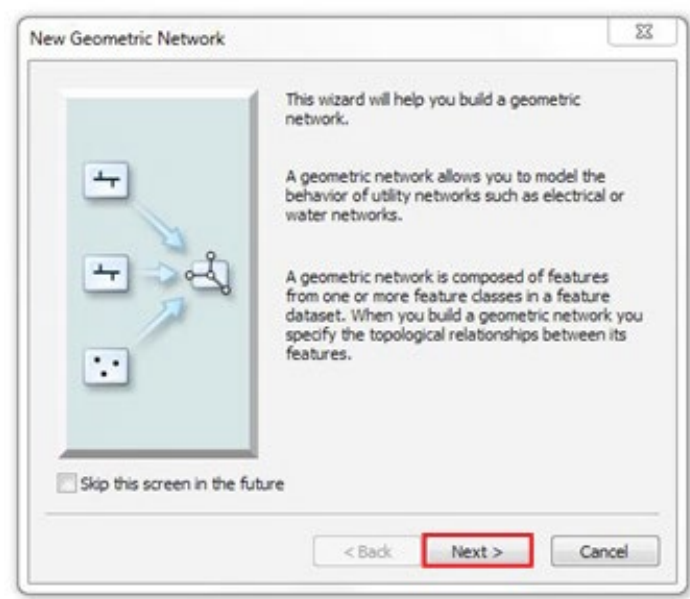
11. You may get an error message if the coordinate systems of the feature classes don't match those of the new Feature Dataset. To resolve this, right-click on each feature class and select *Properties*. Check that the Z coordinate system is set to Newlyn and the XY coordinate system is set to British National Grid, then copy the feature classes into the new Feature Dataset.



12. Right-click the Water feature dataset in the geodatabase, select *New* from the list of options, then click *Geometric Network...*



13. Click *Next* in the New Geometric Network dialog box that opens.

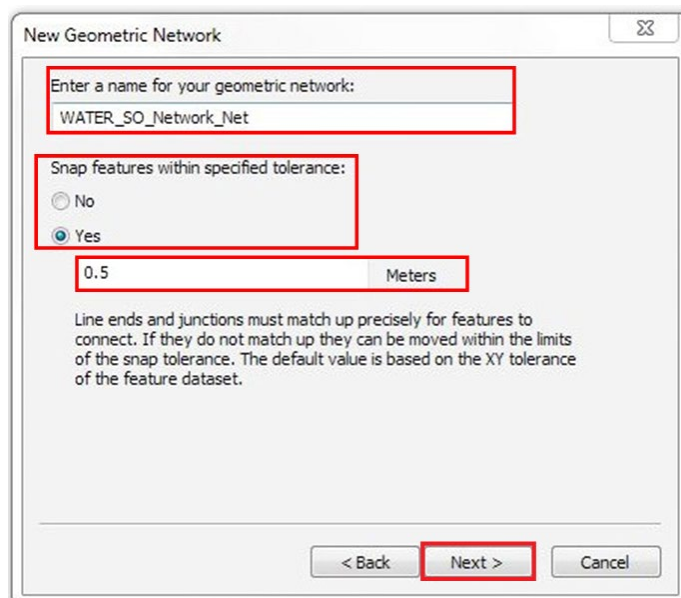


14. Type the name of your geometric network into the text box under the Enter a name for your geometric network section.

15. Select *Yes* for the snap features within specified tolerance option.

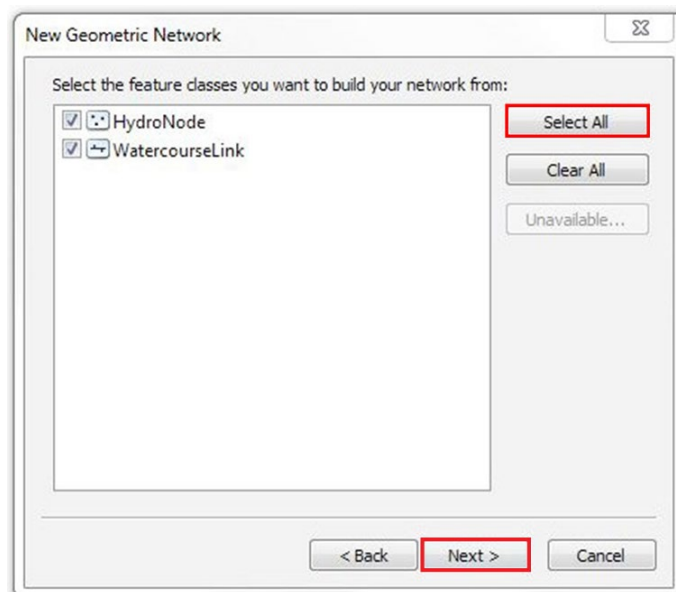
16. Type *0.5* in the text box next to Meters.

17. Click *Next*.



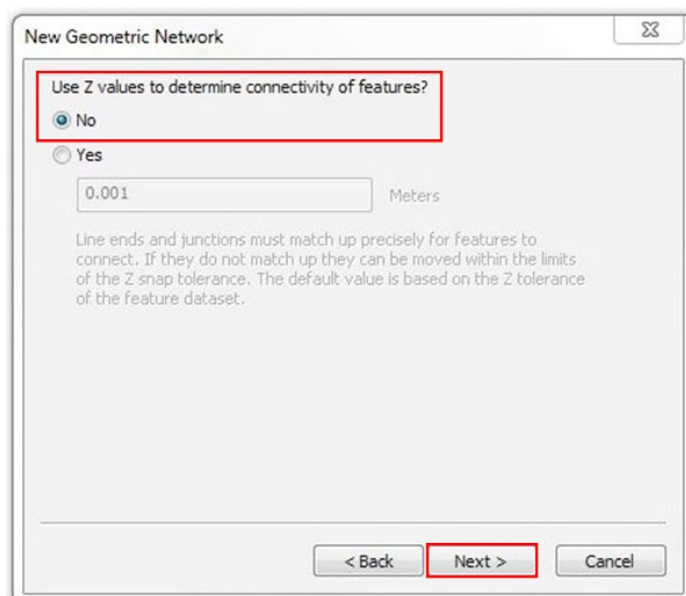
18. In the next panel, you must select which feature classes in the feature dataset will participate in the geometric network. Click *Select All*. All the feature classes in the list will participate in the network.

19. Click *Next*.



20. The option to exclude features with certain attributes makes it easier to manage the network. In the next panel, you need to opt not to exclude features. Click *No*, so that all features will participate in the geometric network.

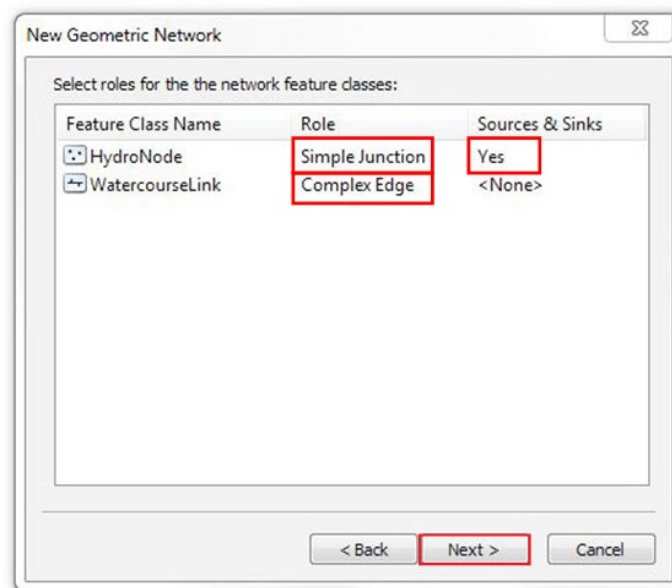
21. Click *Next*.



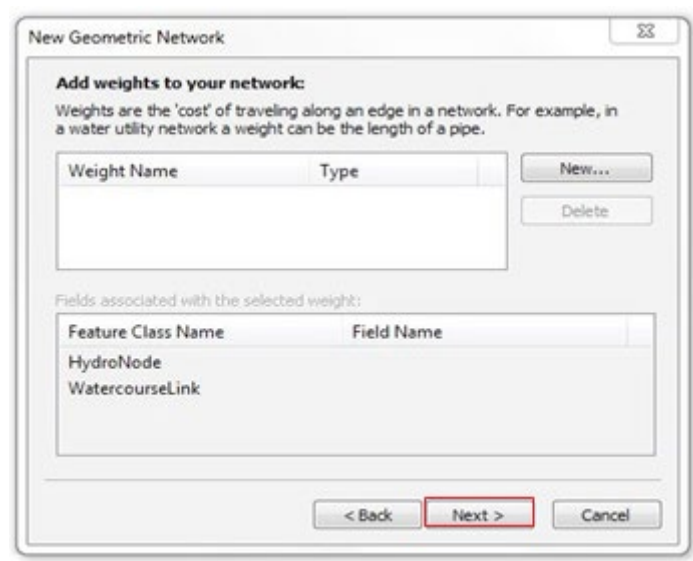
22. In the next dialog box, you must specify which line classes will become complex edge feature classes in the geometric network. Complex edge features are not split into two features by the connection of another feature along their length; thus, they are useful for modeling water mains, which may have multiple laterals connected to them. By default, all line feature classes are simple edge feature classes. In

the same dialog box, you must specify which, if any, of the junction feature classes can act as sources and sinks in the network. Sources and sinks are used to determine the flow direction in the network.

23. In the row for the HydroNode feature class, click *Simple Junction* under the Role column.
24. In the row for the WatercourseLink feature class, choose *Complex Edge* from the list under the Role column.
25. In the row for the HydroNode feature class, click the dropdown menu under the Sources & Sinks column, then click Yes.
26. Click *Next*.

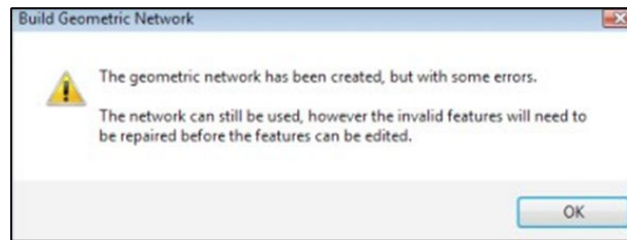


27. This geometric network does not require weights, which is the default, so click *Next* in the following panel:



28. Clicking *Next* opens a summary page. Click *Finish* after you review the summary page.

29. A progress indicator will appear displaying the progress for each stage of the network-building process. You will receive an error message indicating that the network has been built but contains some errors:



30. Click *OK* to close the error message box.
31. You can see what errors occurred while building the geometric network by previewing the *WaterNet_BUILDERR* table.
32. Right-click the *WaterNet_BUILDERR* table in the Catalog and click *Item Description*. Then click the *Preview* tab to view the entries in this table.
33. Features with invalid geometries are identified during the network build progress and recorded in the Network Build Errors Table. (This is user-managed; it does not get updated when the features listed within it are edited.)
34. If you received more than two errors, delete the geometric network and repeat the steps to create it again.
35. You can then proceed to load the data into ArcMap.

Annex A: Product support links

- Further information about the product can be found on the [OS MasterMap Water Network Layer product page on the OS website](http://os.uk/waternetwork) (<http://os.uk/waternetwork>).
- [OS MasterMap Water Network Layer Overview](https://www.ordnancesurvey.co.uk/business-government/tools-support/mastermap-water-support) (<https://www.ordnancesurvey.co.uk/business-government/tools-support/mastermap-water-support>).
- [OS MasterMap Water Network Layer Technical Specification](https://www.ordnancesurvey.co.uk/business-government/tools-support/mastermap-water-support) (<https://www.ordnancesurvey.co.uk/business-government/tools-support/mastermap-water-support>)

Loading the data (GeoPackage format)

The product's Getting Started Guide focuses solely on using the product in Geography Markup Language (GML) format. For guidance on using the product in GeoPackage format, please see the [Getting Started with GeoPackage guide](https://www.ordnancesurvey.co.uk/documents/getting-started-with-geopackage.pdf) (<https://www.ordnancesurvey.co.uk/documents/getting-started-with-geopackage.pdf>), which is available on the OS website.

Loading the data (vector tiles format)

The product's Getting Started Guide focuses solely on using the product in GML format. For guidance on using the product in vector tiles format, please see the [Getting Started with Vector Tiles guide](https://www.ordnancesurvey.co.uk/documents/user-guides/getting-started-with-vector-tiles-v1.0.pdf) (<https://www.ordnancesurvey.co.uk/documents/user-guides/getting-started-with-vector-tiles-v1.0.pdf>), which is available on the OS website.