

Ordnance Survey

# OS MASTERMAP® WATER NETWORK

Getting Started Guide

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# 1 Preface

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## 2 Purpose

OS MasterMap Water Network 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.

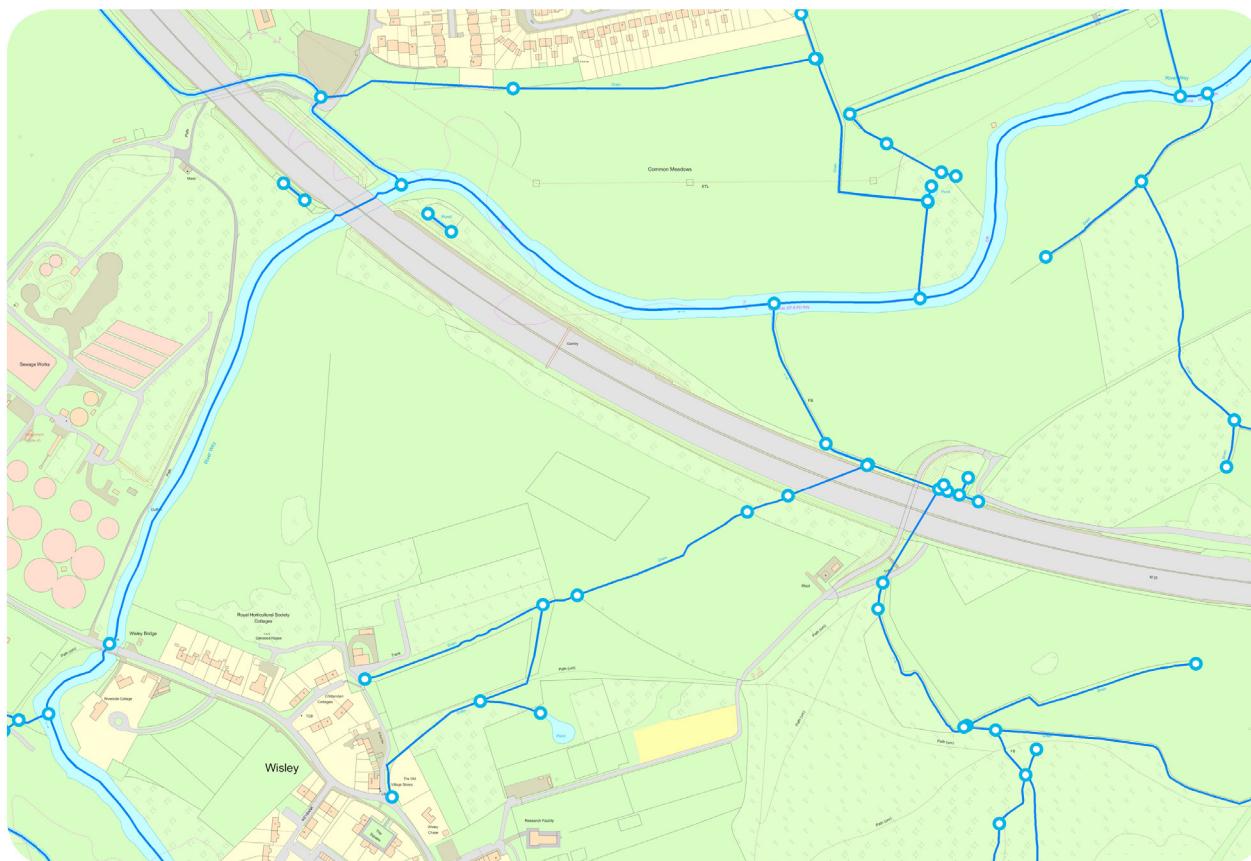
The feature types within the product are:

- **WatercourseLink**

A WatercourseLink feature represents the alignment of a watercourse and the majority have been derived from Ordnance Survey detailed topographic data, made available to customers as the OS MasterMap Topography Layer.

- **HydroNode**

A HydroNode feature explicitly represents the start, end, junctions of watercourses and places where the real world related attribution recorded changes. The nodes exist only at the end points of a WatercourseLink feature.



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### 3 Applications

OS MasterMap Water Network supports a wide range of customers applications.

The product can be used stand alone or combined with other Ordnance Survey products such as OS MasterMap Topography Layer, OS MasterMap Imagery Layer and OS Terrain® 5.

OS MasterMap Water Network enables:

- Flood risk understanding
- Flood risk mitigation planning
- Flood response planning and execution
- Environmental impact analysis
- Tracing of contamination
- Asset management and protection
- Detailed flood modelling for insurance and land & property



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## 4 What do I need to use this data?

### 4.1 System requirements

OS MasterMap Water Network is designed for use in a geographical 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:

<http://www.os.uk/business-and-government/public-sector/mapping-agreements/software-for-our-products.html>

Ordnance Survey does not recommend either suppliers or software products, as the most appropriate system will depend on many factors, such as the amount of data being taken, resources available within the organisation, the existing and planned information technology infrastructure and last but by no means least, 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; and
- a way of visualising and/or querying the data, typically a GIS.

### 4.2 Backup provision of the product

You are advised to copy the supplied data to a backup medium before following the steps in this *Guide*.

### 4.3 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. Uncompressed file sizes for the full supply of England, Scotland and Wales are as follows:

#### 4.3.1 Compressed Geography Markup Language (GML)

The Compressed file size for Great Britain is approximately 1.25GB.

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## 5 Structure of the supplied data

### 5.1 Data structure

OS MasterMap Water Network is supplied in GML 3.2.1, which adheres to INSPIRE standards.

### 5.2 File naming convention

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. A data holding comprising of more than one 5km<sup>2</sup> tile will contain duplicate features which may need to be removed depending upon the user requirement.

The file naming convention will be as follows:

5km<sup>2</sup> tile ID. gz, for example:

**HP4500.gz**

### 5.3 Data Ordering

**Direct customers and Partners:** Please contact your account manager or Business Enquiries.

**For PSMA customers,** the product is available to you through the Evaluation Licence agreement.

**For OSMA customers,** your Public Sector Licence agreement entitles you to download and use data from anywhere in Scotland.

### 5.4 Disc Contents

The data is supplied in a .zip archive containing a parent folder with two sub folders entitled **DATA** and **DOC** and an additional readme file.

#### Sub Folder    Contents

**Data**       (Zipped gml files)

**Doc**       Disc\_contents.txt  
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-----  
readme.txt

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## 6 How do I load the OS MasterMap Water Network into a GIS?

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 GIS applications by providing a neutral file format as an alternative to proprietary formats.

The data can be loaded into several geographic information systems (GIS). This chapter 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 is compatible with, please speak to your Relationship Manager.

The common software covered in this chapter are:

- QGIS®
- FME®
- ESRI®
- MapInfo® Professional
- Cadcorp® Map Modeller

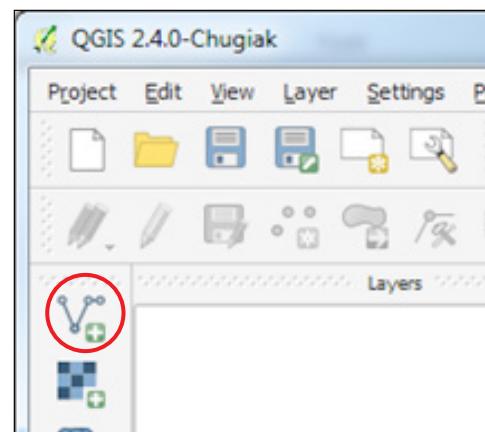
### 6.1 QGIS

These notes outline how to load OS MasterMap Water Network into QGIS using the GML file(s) you have received. They have been prepared using version 2.4.0 of QGIS Desktop – an open source GIS in which you can create, edit and visualise and publish geographic information. You can download it from the link below:

<http://www.qgis.org/en/site/forusers/download.html>

#### 6.1.1 Loading OS MasterMap Water Network GML into QGIS

- Open QGIS.
- The OS MasterMap Water Network data can be loaded into QGIS either zipped or unzipped. **To load the data click on ‘Add Vector Layer’ icon .**



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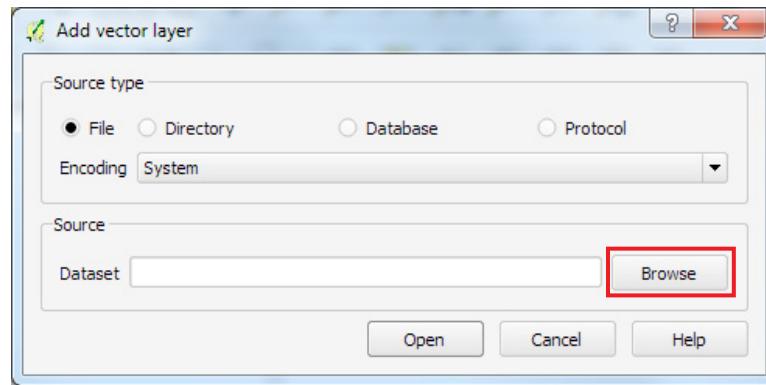
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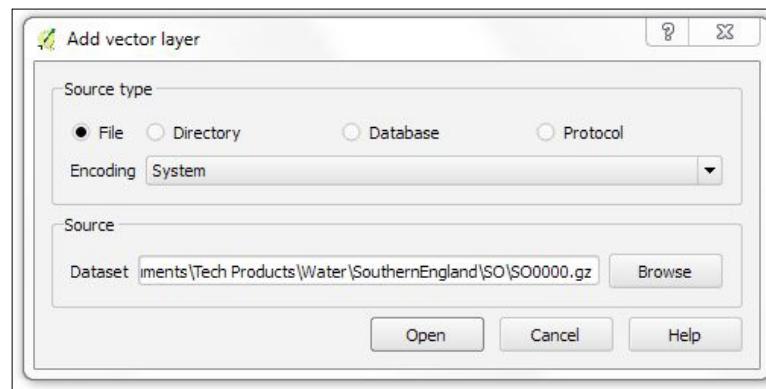
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- The ‘Add vector layer’ window opens. In ‘Source’ – ‘Dataset’ click on Browse button on the right and navigate to the GZ/GML file you wish to import.



- When selected click ‘Open’.



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

- This will open a dialogue box which allows you to select the objects you wish to add to the GIS. If you wish to add all two Water objects click ‘Select All’ in ‘Select vector layers to add’ window. Then confirm by clicking ‘OK’:

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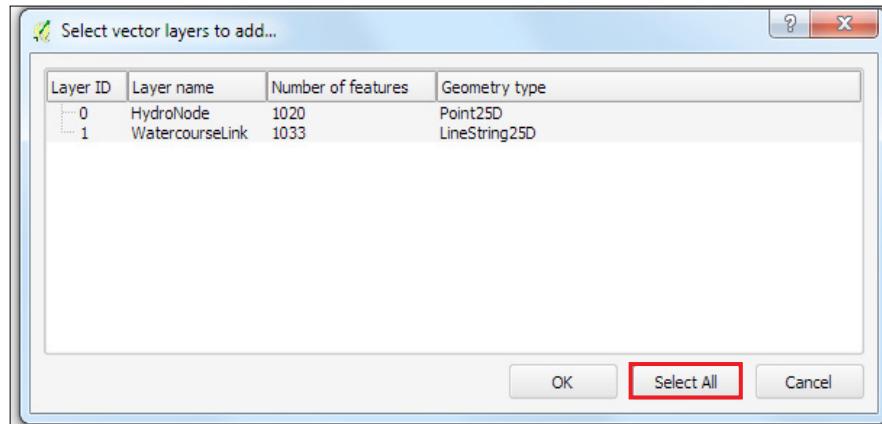
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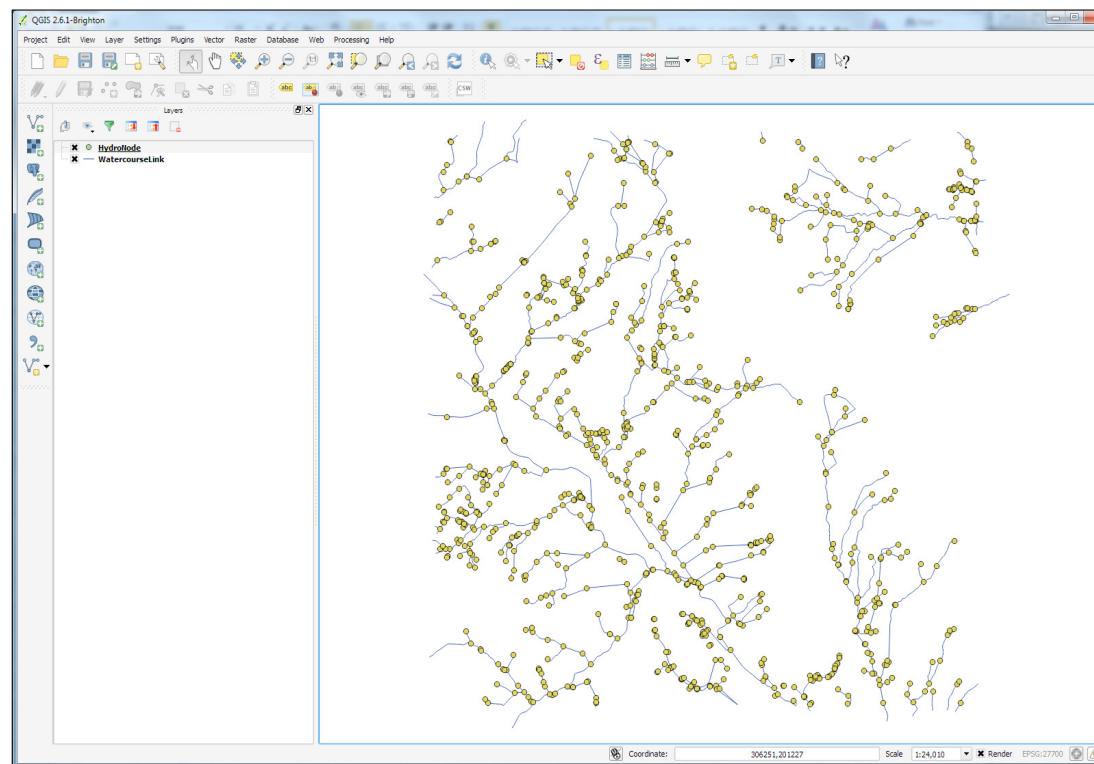
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- This adds the two layers to the canvas: HydroNode and WatercourseLink.



- You can add additional layers of OS MasterMap, for example OS MasterMap Topography Layer, to give context to the OS MasterMap Water Network.

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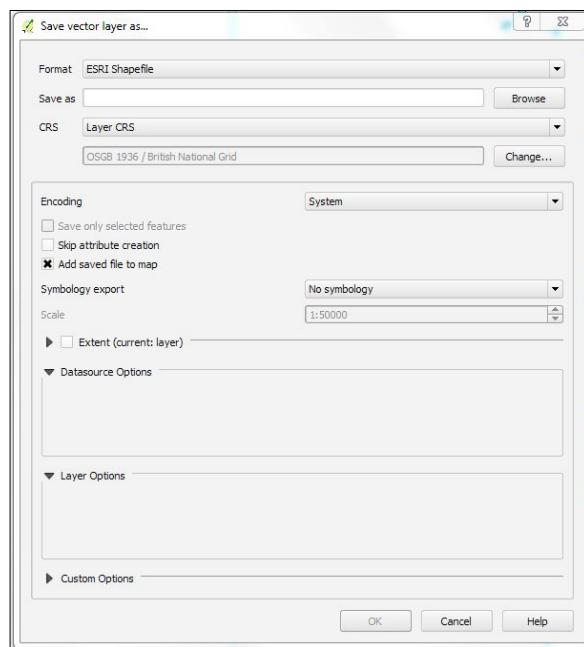
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### 6.1.2 Exporting OS MasterMap Water Network to different GIS formats using QGIS:

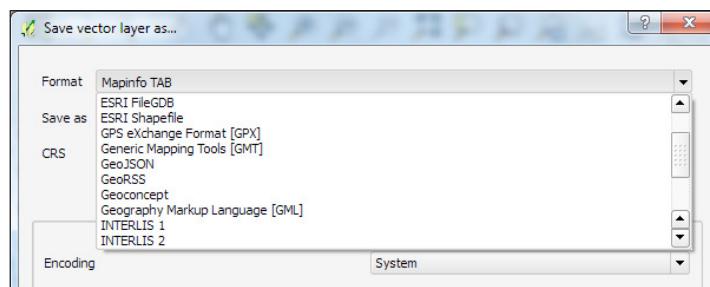
You can also use QGIS to export the OS MasterMap Water Network data in many different common GIS formats. This will allow you to open the files in many other GIS applications.

- Right click on the layer you want to translate and select ‘Save as’.



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

- The ‘Save vector layer as’ window opens.
- In ‘Format’ using the drop-down select your chosen format for further analysis, for example Mapinfo TAB or ESRI Shapefile.



- When selected, by clicking on the ‘Browse’ button, save your file to location of your choice.
- Then click ‘OK’ to save the data in your chosen format.

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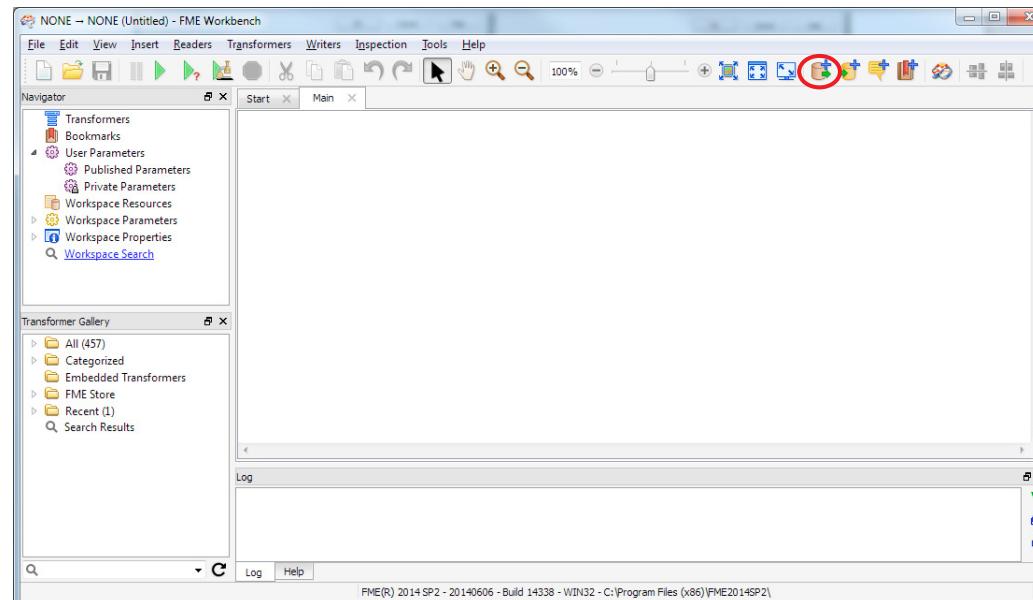
## 6.2 FME®:

The following section details how to load OS MasterMap Water Network into FME using the GML file you have received. This will allow you to view the data and translate into the most appropriate format for your software.

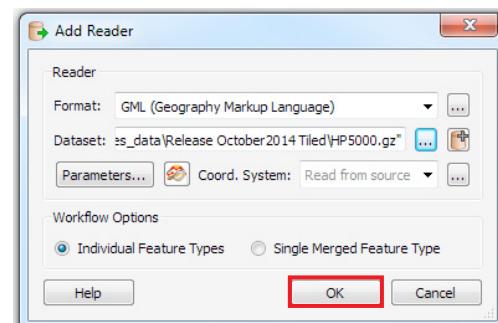
They have been prepared using FME 2014.

### 6.2.1 Viewing and translating data in FME:

- Open FME Workbench and select ‘Blank workspace’ in the Getting Started box.
- Click the ‘Add Reader’ icon in the main toolbar to add a Reader. This will open the ‘Add Reader’ dialogue box.



- In ‘Format’ select ‘GML’ (Geography Markup Language).
- Use the Browse button next to Dataset to navigate to your files and select them.
- Leave the Parameters as default and the Workflow options as ‘Individual Feature Types’ and select ‘OK’ to add the Reader.



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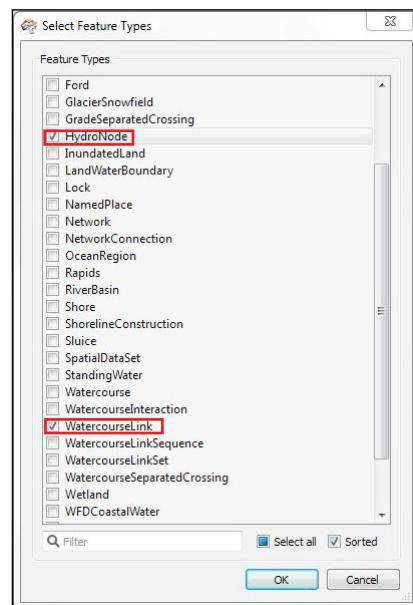
- Once the Reader has been added successfully, the log window will display ‘Mapping File Generation was SUCCESSFUL’ and the ‘Select feature type’ window will open.

*Note: If FME cannot find the appropriate schema file for use in Translation this can be downloaded from Ordnance Surveys Schema Repository:*

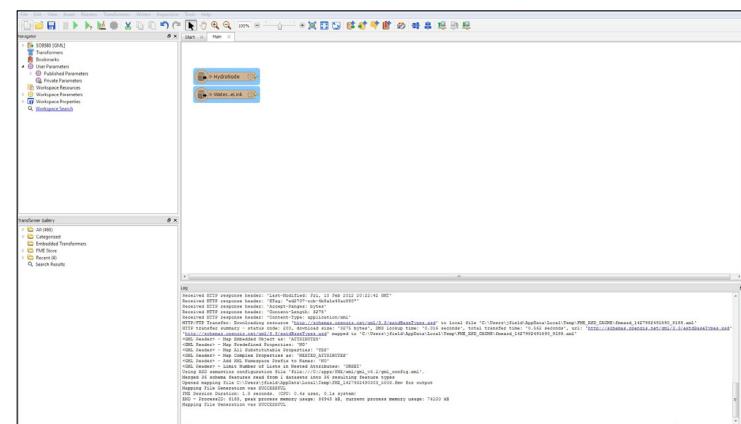
<http://www.os.uk/xml/schema/waternetwork/v1/index.html>

- Select the feature types that you wish to translate, or use the Select All option to add all objects.

*Note: OS MasterMap Water Network only contains the feature types WatercourseLink and HydroNode. FME will give you additional options inherited with INSPIRE.*



- This will add the OS MasterMap Water Network objects to the canvas.



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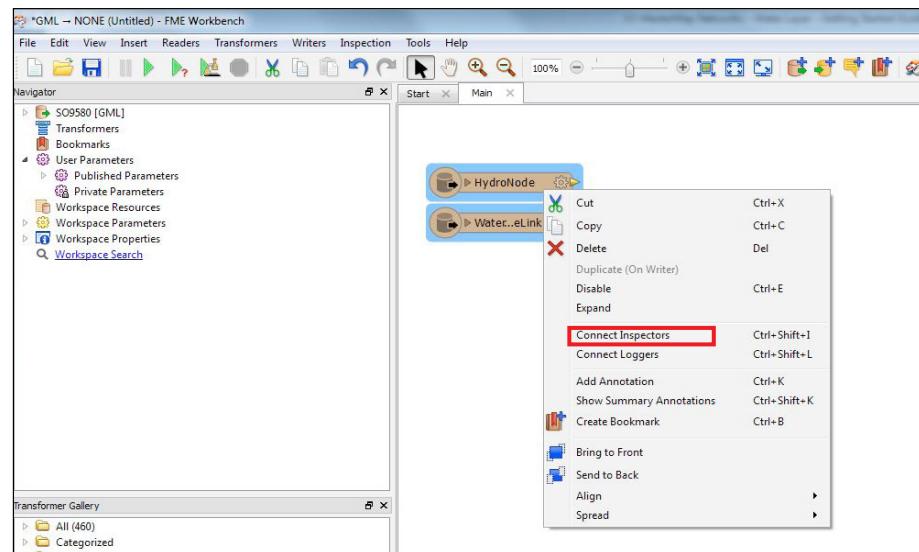
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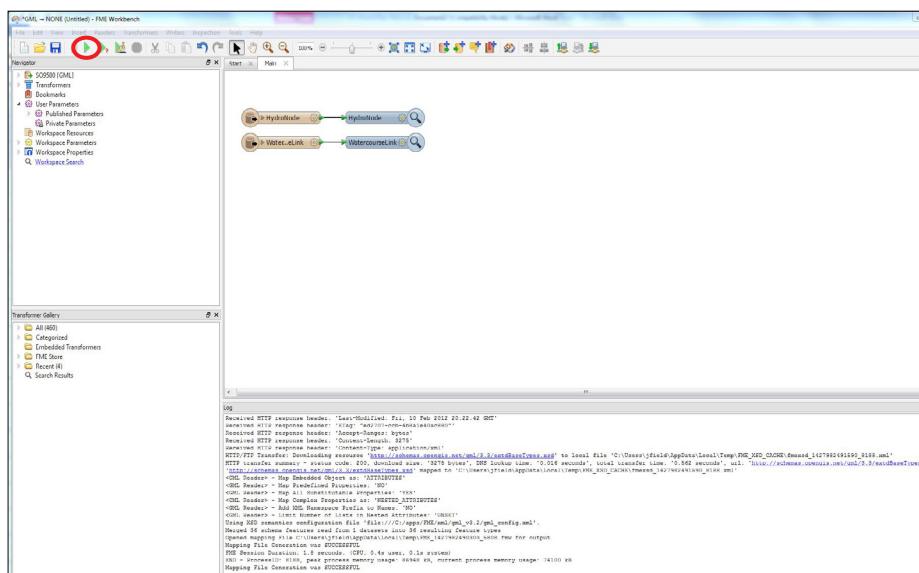
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### 6.2.2 Viewing the data using FME Data Inspector before translation

- Before translating the data, FME allows users to view the data. This process is faster than translation and allows a quick interrogation before translation is started.
- Highlight all of the feature types you wish to view by either selecting them individually or drawing a box around them. Right click on one of the features and select ‘Connect Inspectors’.



- Run the workspace with the Inspectors connected in order to view the data in FME Data Inspector.



- When finished, an ‘FME Data Inspector’ window will open visualising the two layers of OS MasterMap Water Network.

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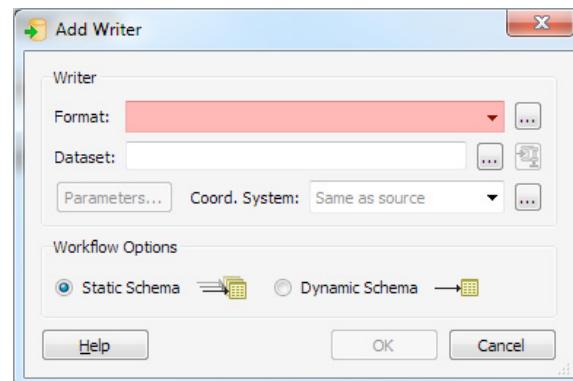
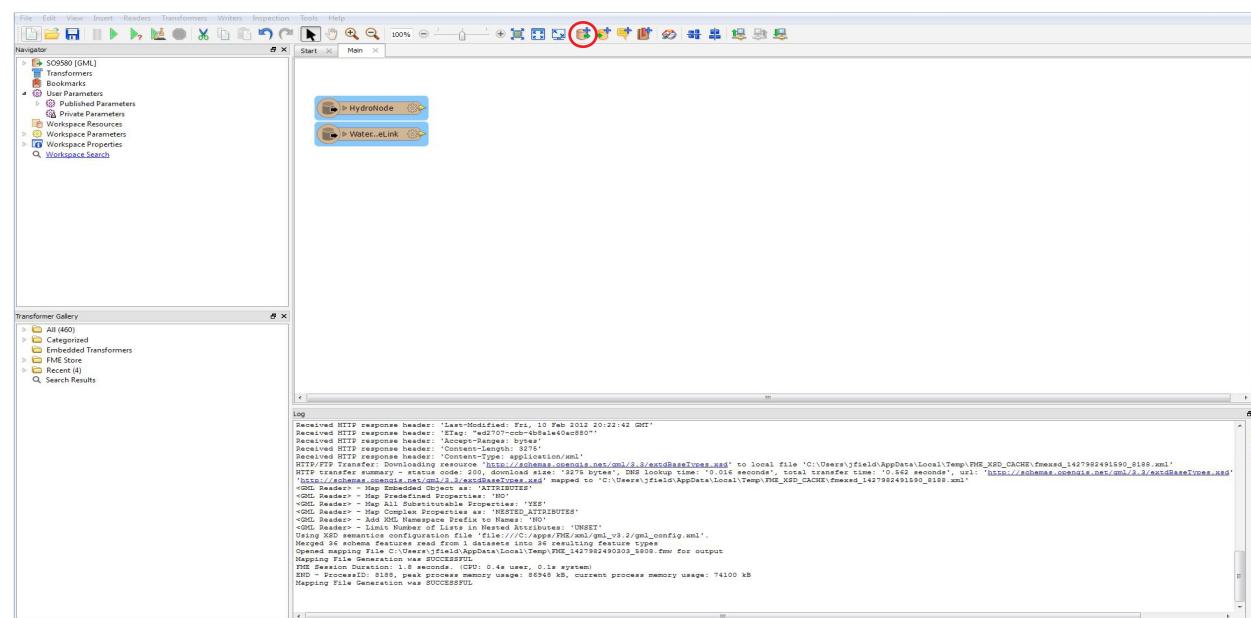
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### 6.2.3 Translating GML in FME

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

- In the main FME window remove the Inspectors you have connected, if you have chosen to carry out this first step. You can do this by clicking and deleting each of them separately, or selecting them all and deleting them together.
- Click on the ‘Add Writer’ icon in the main toolbar. This will open the ‘Add Writer’ dialogue box.



- In ‘Format’ select the format you are translating into, for example, Esri Shapefile.
- In ‘Dataset’ navigate to the folder you want to save the translated data to.
- Leave the Parameters set to default and the Workflow Options set to ‘**Static Schema**’
- Click ‘OK’ to add the Writer.

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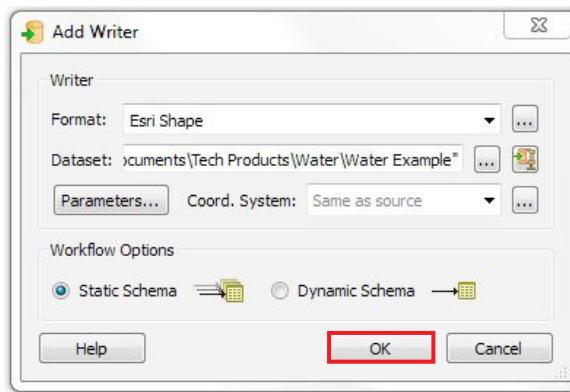
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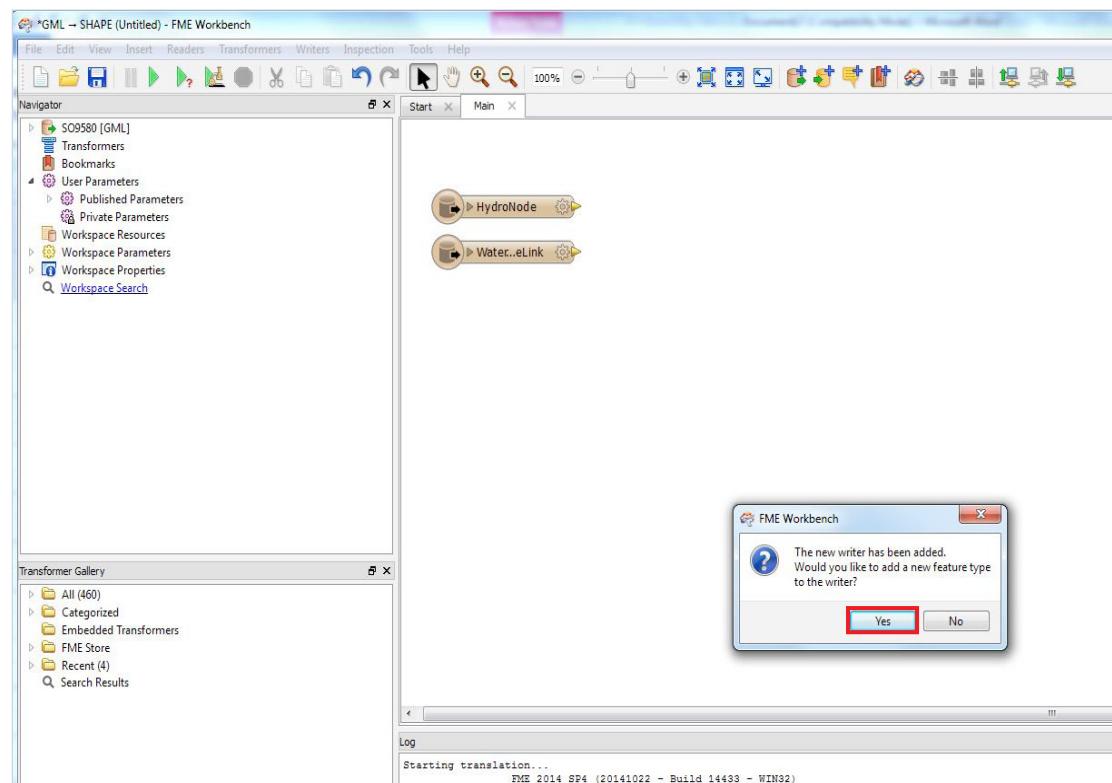
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- A dialogue box will open prompting you to add a feature type to the Writer you have created.



- Click 'Yes' to add a new feature type. This will open the 'Feature Type Properties' dialogue box.

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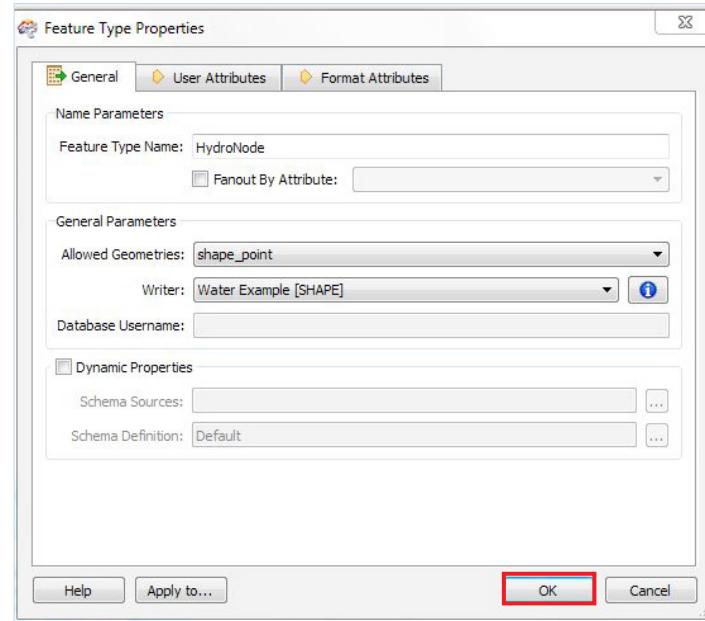
MapInfo Professional

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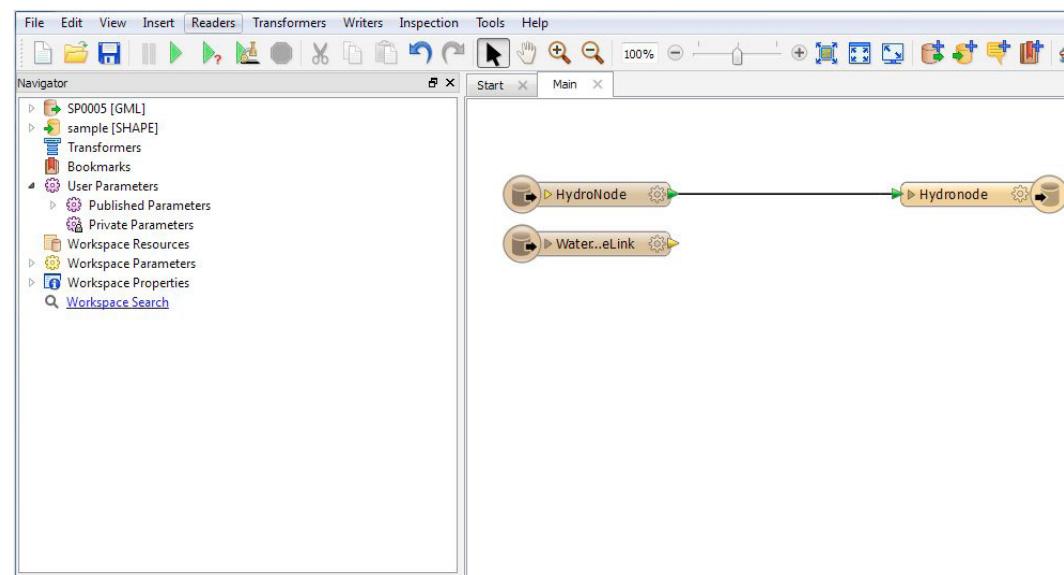
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- Enter a name for the feature type in the ‘Feature type name’ box (for example, HydroNode) and choose the appropriate geometry from the ‘Allowed geometries’ drop-down (either polyline or point in this case).



- When completed, click ‘OK’.
- One feature type will now be added to the canvas. To add additional feature types to this Writer select ‘Add Feature Type’ from the ‘Writers’ drop-down in the toolbar. Enter the appropriate name to each ‘feature Type Properties’ dialogue box that opens.



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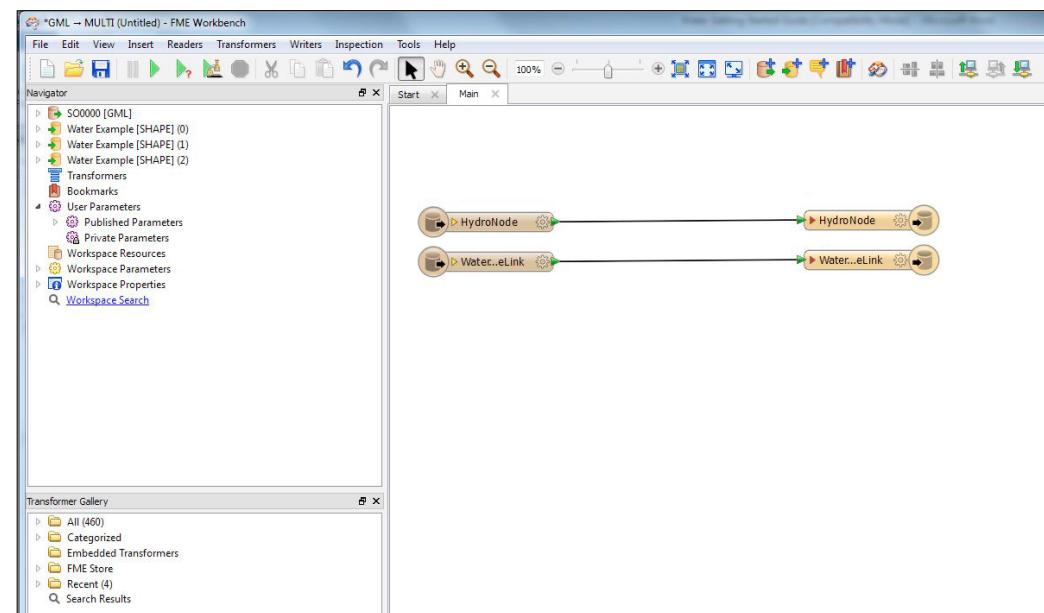
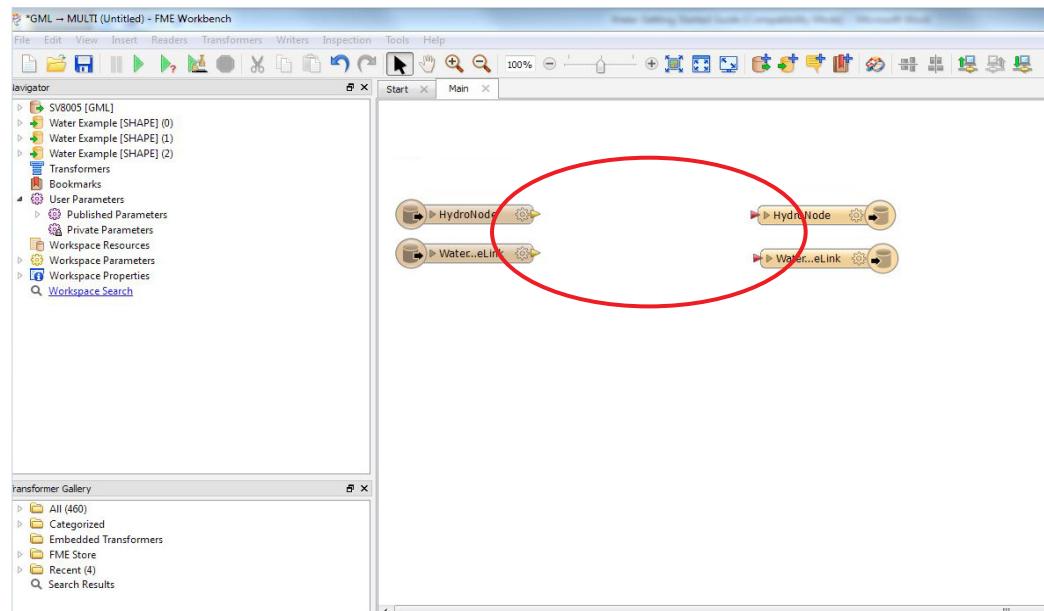
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- Connect the Readers with Writers you have created by dragging the yellow triangle on the Reader and connecting it to the red triangle on the corresponding Writer.



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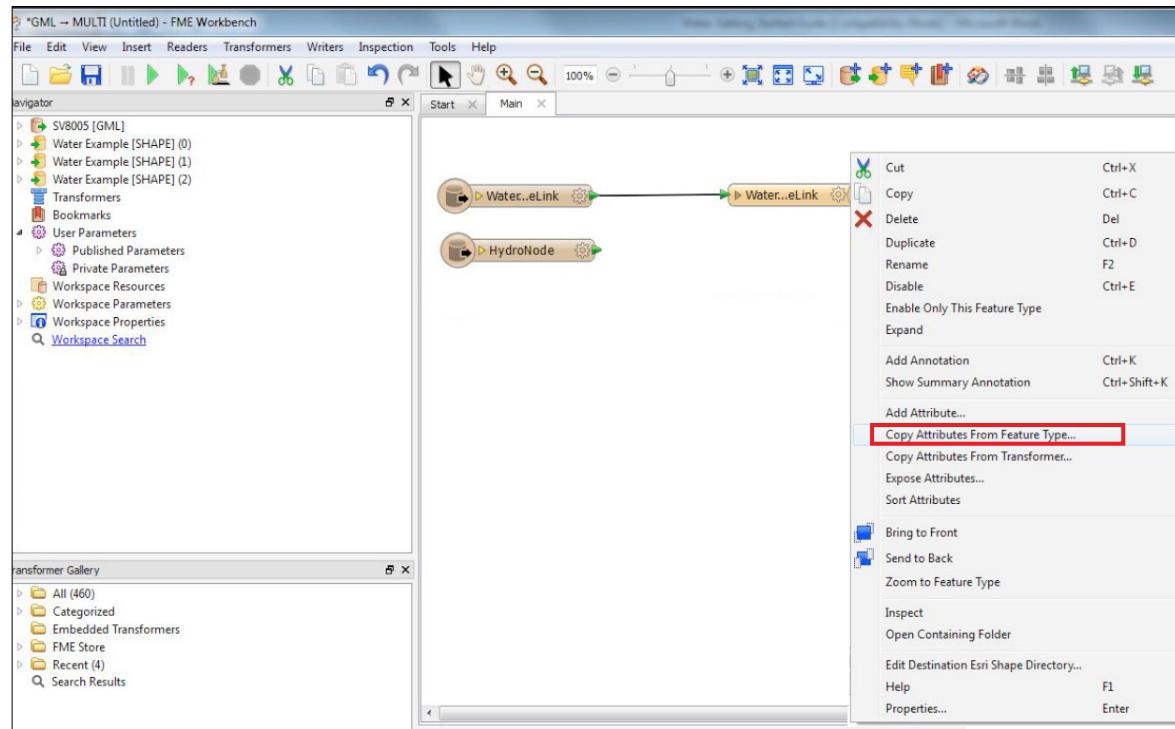
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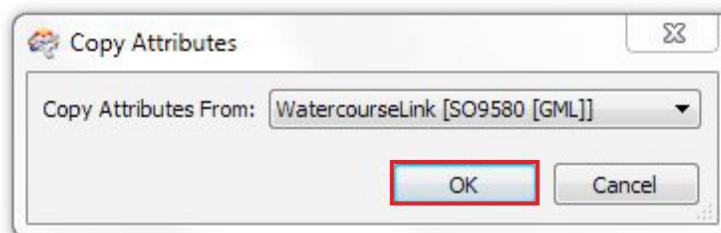
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- You can copy the attributes of the Readers to the Writers by clicking on each writer and selecting '**Copy Attributes From Feature Type**'.



- This opens the 'Copy Attributes' window. In '**Copy Attributes From**' select the appropriate Reader from drop-down menu and click '**OK**'.



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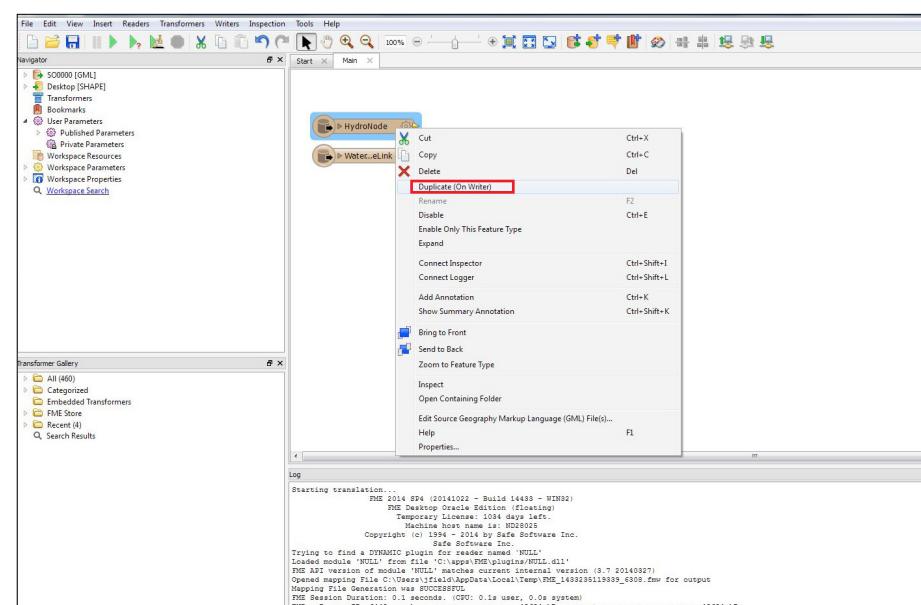
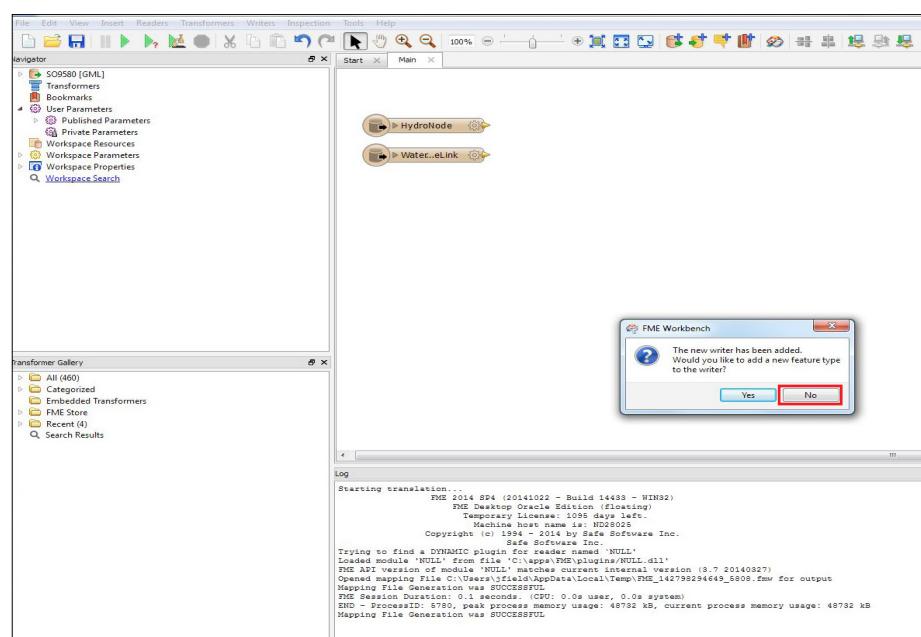
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**Note:** You can carry out this step by choosing '**No**' when prompted to add the feature type to the Writer. Then right-click on a reader feature and select '**Duplicate on Writer**'. This will add the Writer feature type to the canvas, with the attributes of the Reader feature already mapped across the Writer.



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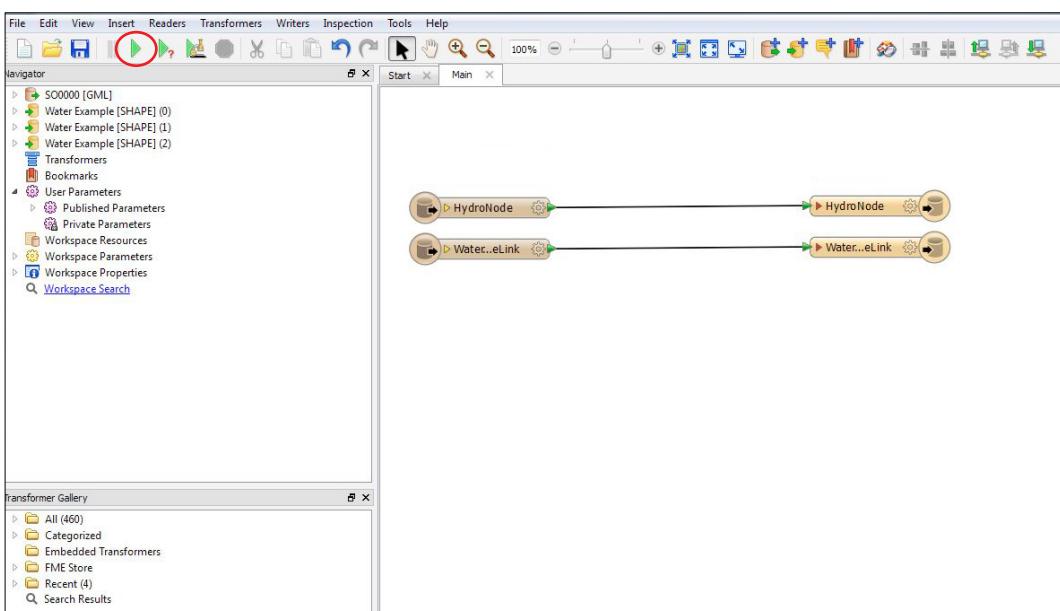
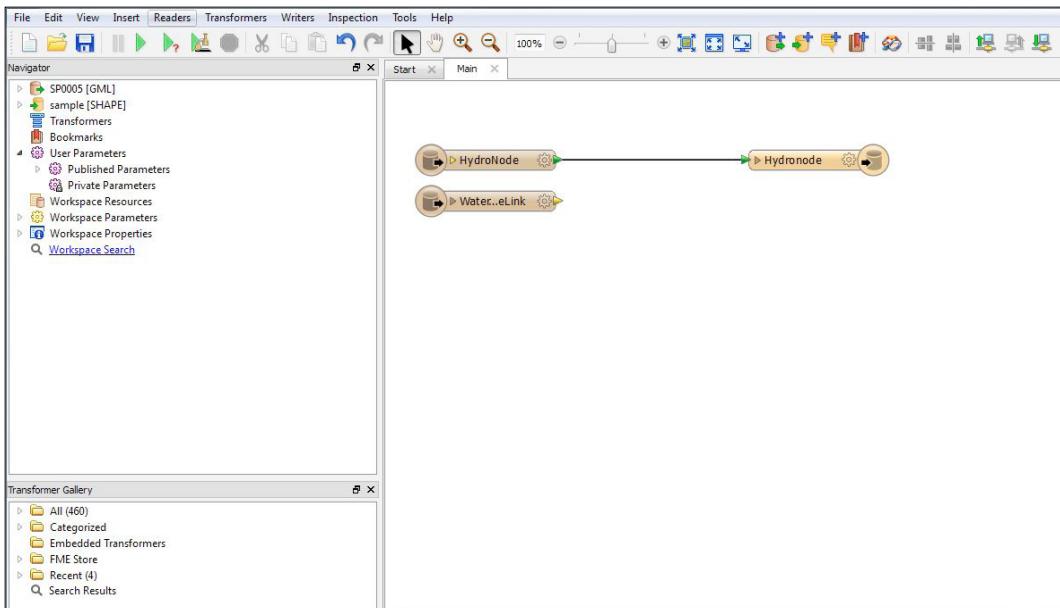
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- Once the workspace has been set up run the translation by choosing the '**Run Translation**' icon.

*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.*

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## 6.3 ESRI ArcMap

These notes outline how to load OS MasterMap Water Network into ESRI ArcMap. They have been prepared using Version 10.2.

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

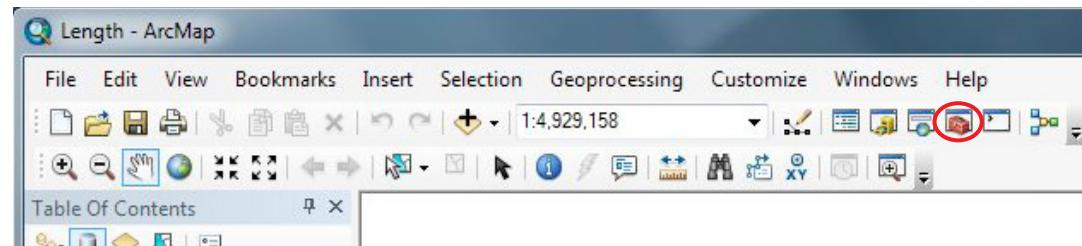
*Note: If your version of ArcMap is older than 10.2 and you do not have a licence for ‘Data Interoperability’, you will have to use translation tools available in FME or QGIS (explained in the earlier chapters) to first translate the GML data into ESRI shapefiles, before you can load them in ArcMap. Please go to section 6.3.2 for Loading translated OS MasterMap Water Network GML into ESRI.*

You can find more information about Quick Import on:

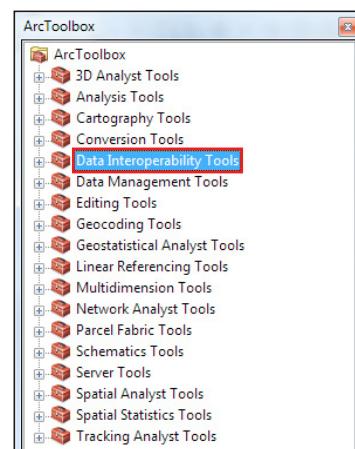
<http://www.esri.com/software/arcgis/extensions/datainteroperability>

### 6.3.1 Loading OS MasterMap Water Network GML into ESRI ArcMap:

- Open ArcMap.
- Click on ‘ArcToolbox window’ icon.



- ‘ArcToolbox’ opens



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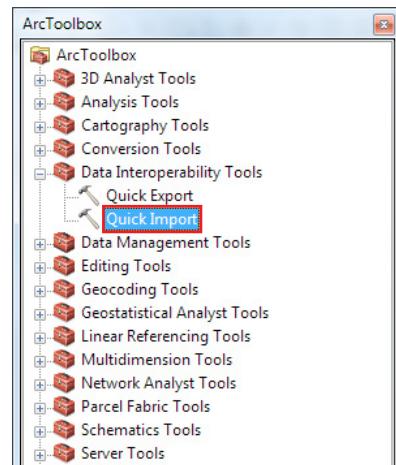
MapInfo Professional

Cadcorp Map Modeller

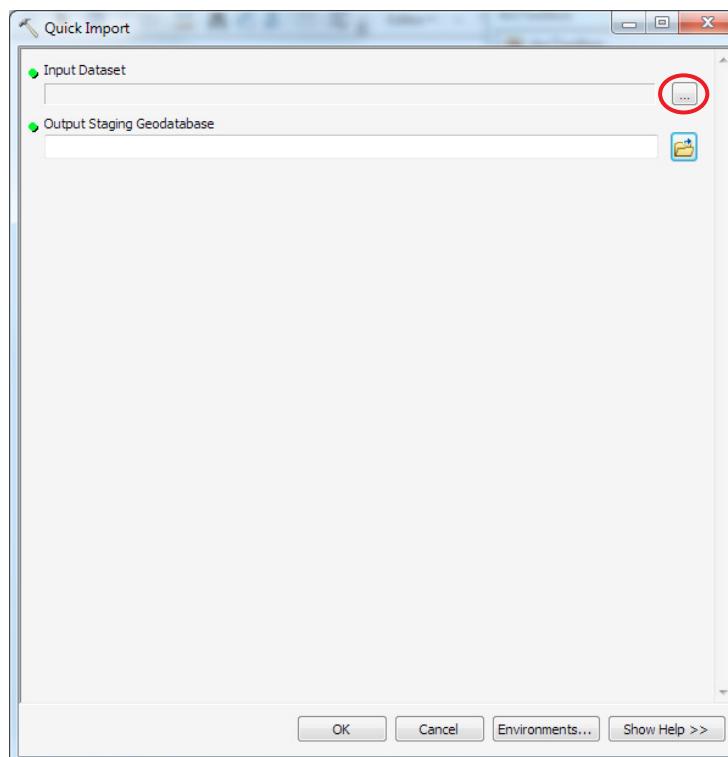
Creating a water network using  
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Further information

- Click on the plus sign next to ‘Data Interoperability Tool’ and double click on ‘**Quick Import**’



- ‘Quick Import’ window opens
- In ‘Input Dataset’ click on the button on the right



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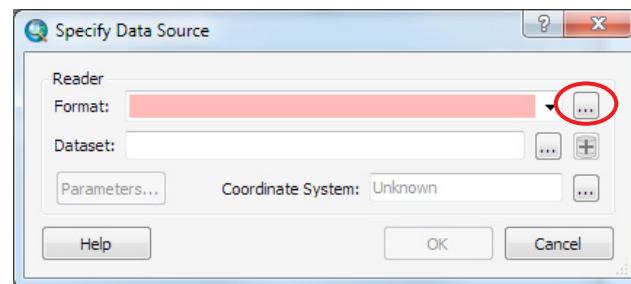
MapInfo Professional

Cadcorp Map Modeller

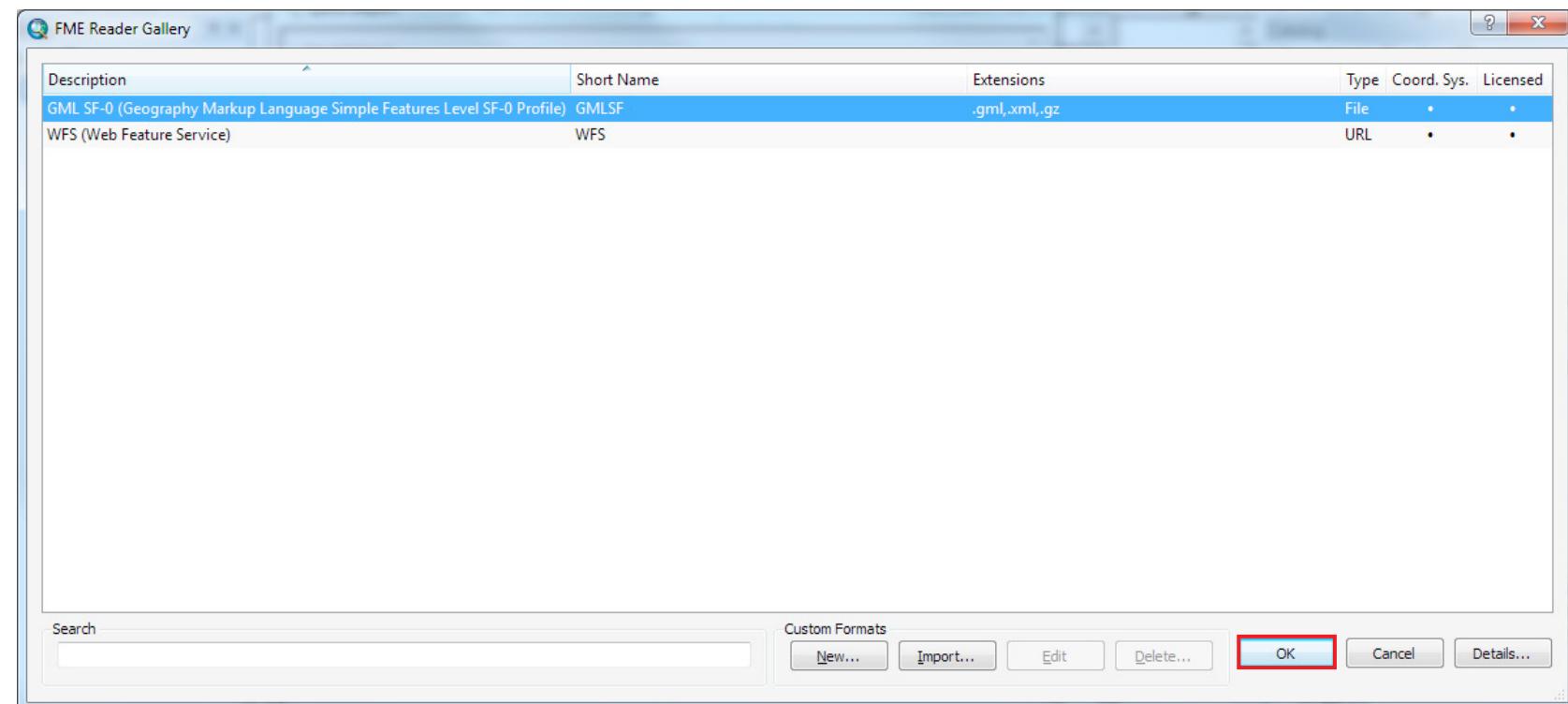
Creating a water network using  
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Further information

- ‘Specify Data Source’ window opens
- In ‘Format’ click on button on the right



- ‘FME Reader Gallery’ window opens
- Select GML SF-0 (Geography Markup Language Simple Features Level SF-0 Profile) and click ‘OK’



- In ‘Dataset’ navigate to the folder where you saved your GZ file, select it and click ‘Open’. Make sure that extensions available to load are \*.gz/\*.gml

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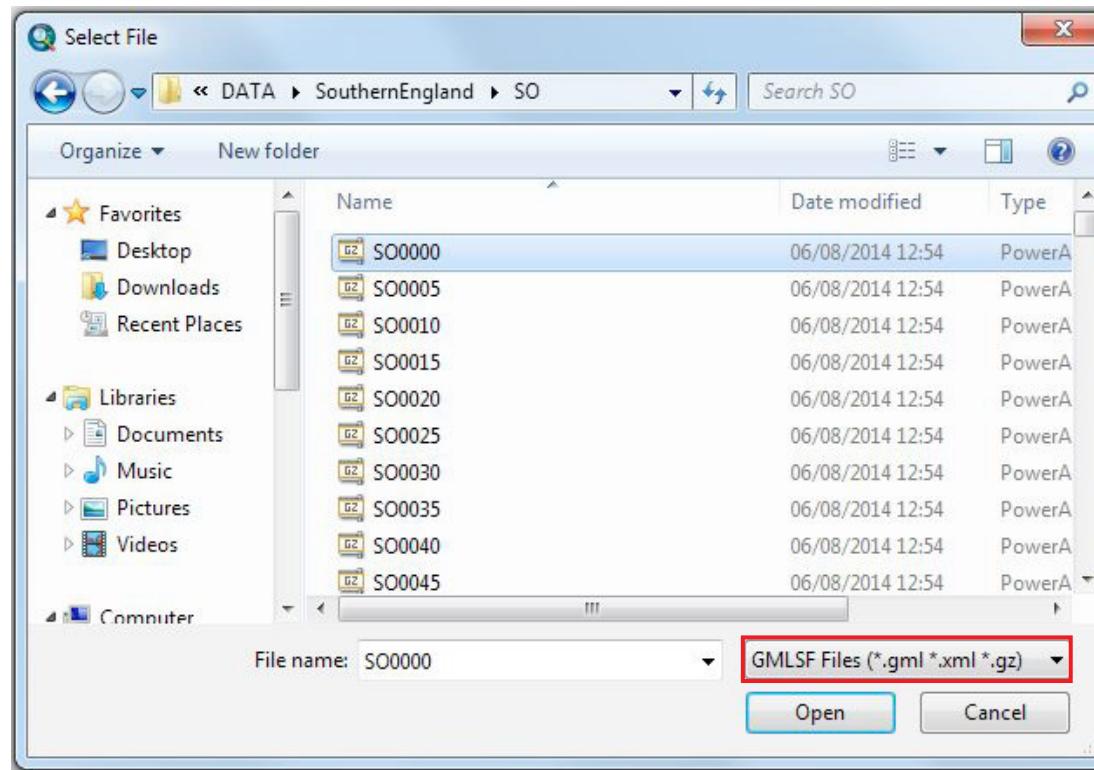
Esri ArcMap

MapInfo Professional

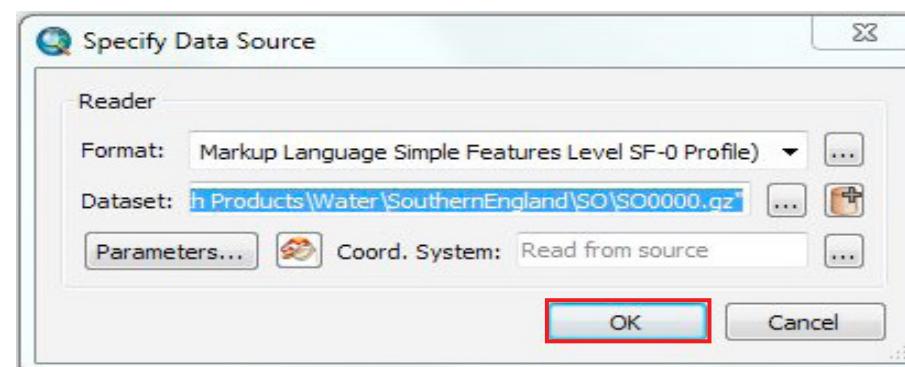
Cadcorp Map Modeller

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- Please leave the rest of the settings as default and click 'OK' in 'Specify Data Source' window



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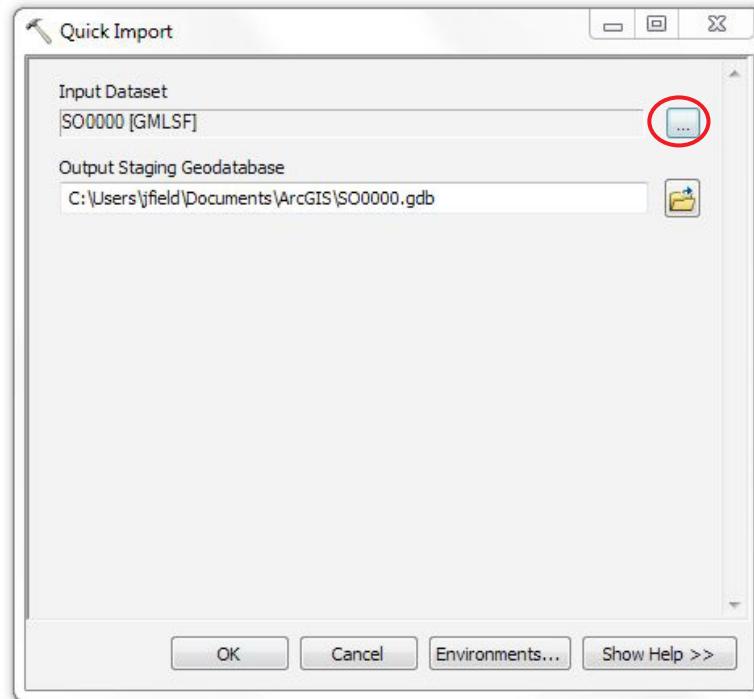
MapInfo Professional

Cadcorp Map Modeller

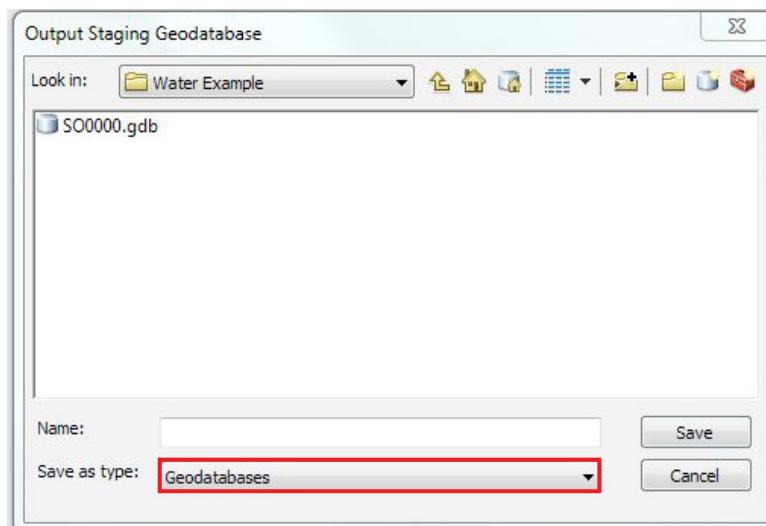
Creating a water network using  
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Further information

- In 'Quick Import' window click on the folder icon on the right of 'Output Staging Geodatabase'



- Navigate to the folder and select the output Geodatabase for the feature classes to be stored in. Make sure you're saving it as Geodatabase. Click '**Save**'.



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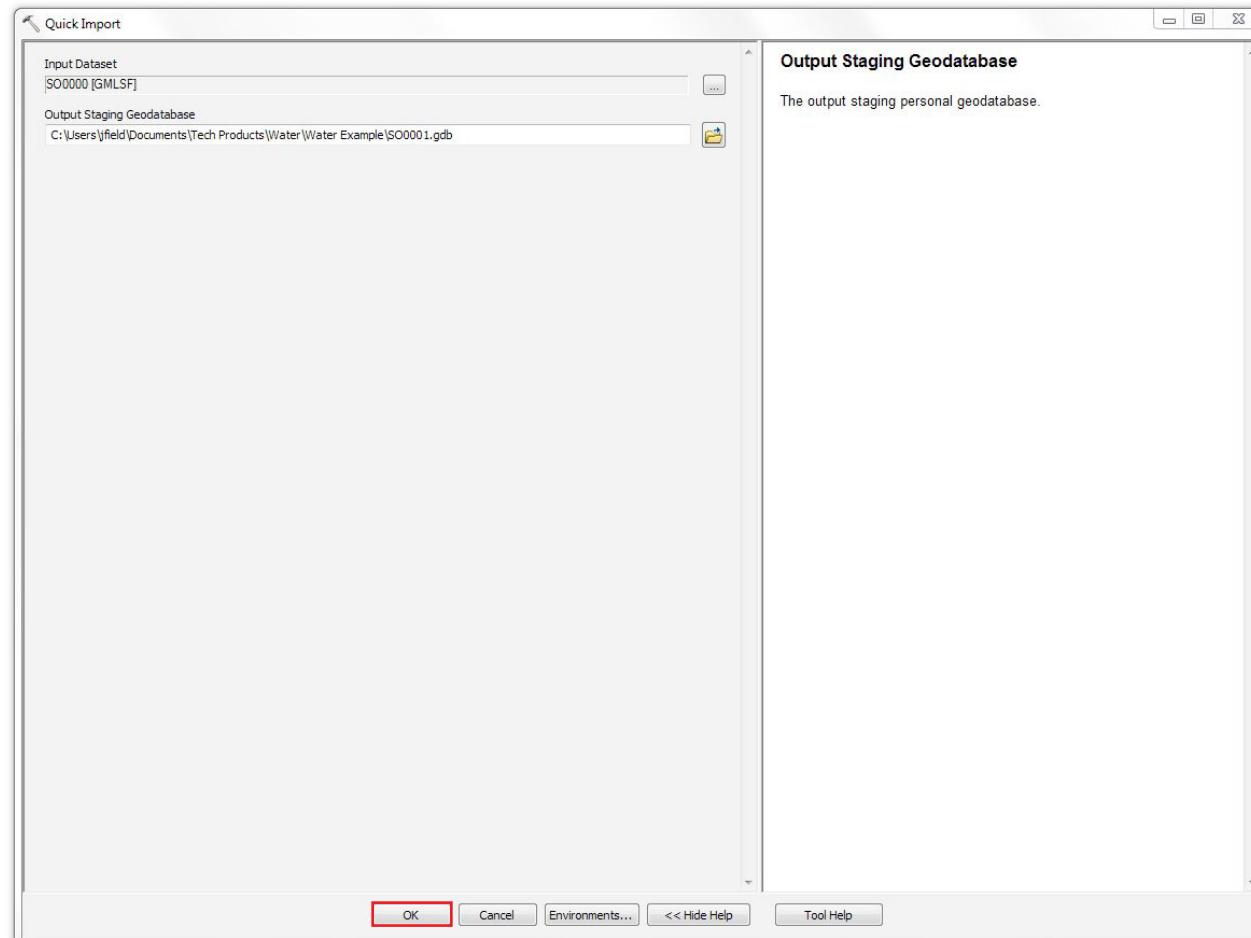
MapInfo Professional

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- Next click 'OK' in Quick Import' window



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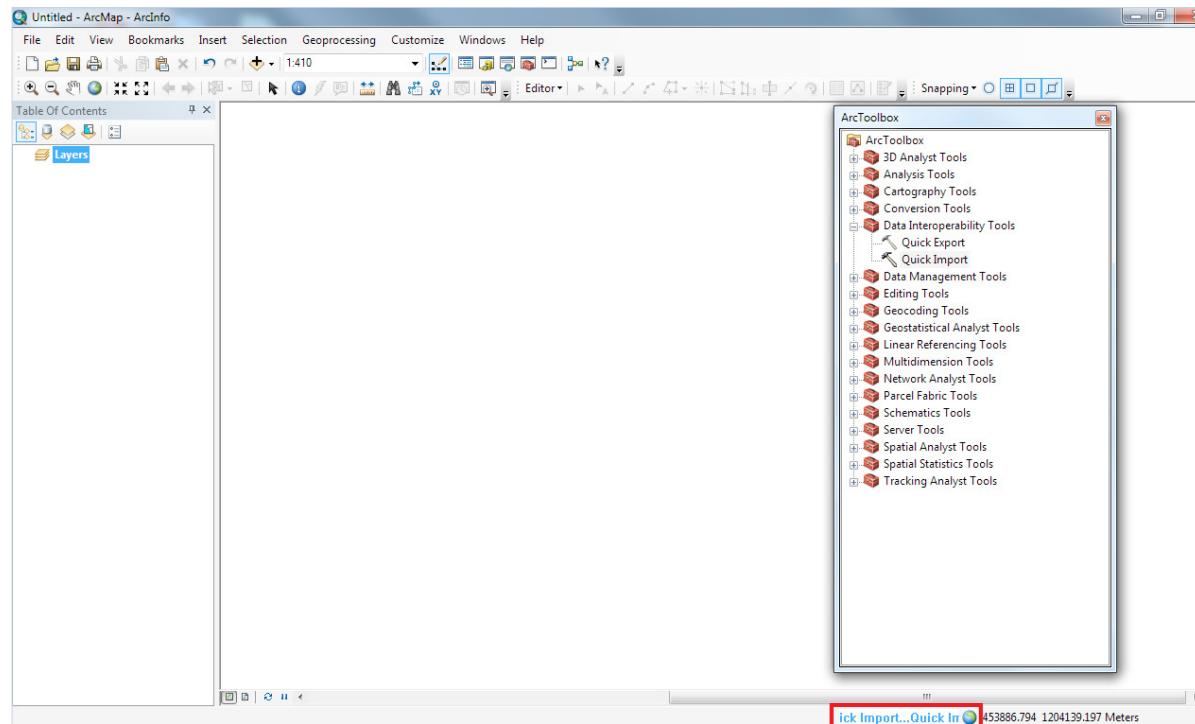
MapInfo Professional

Cadcorp Map Modeller

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- Once the process is started, you will see the process running notification on the bottom of the screen.



- When successfully completed you will notice a popup window in the bottom right corner of the screen



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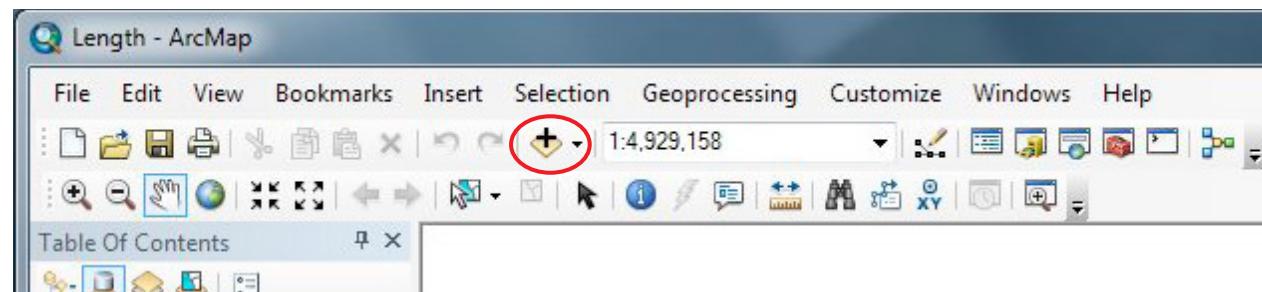
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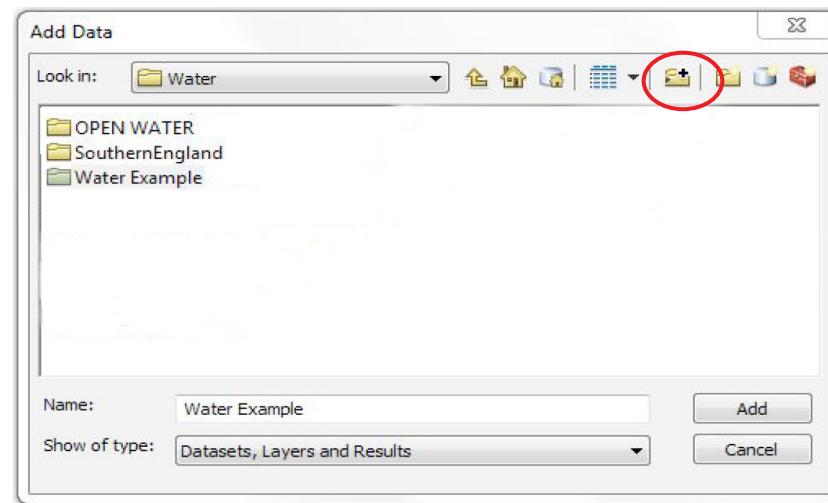
### 6.3.2 Loading translated GML into ESRI

If your version of ArcMap is older than 10 or if you do not have access to the Quick Import (Data interoperability) extension, you will have to use translation tools available in QGIS or FME (explained in [section 6.1](#) and [section 6.2](#)) to first translate the GML data into ESRI shapefiles, before you can load them into ArcMap.

- Open ArcMap.
- To load a shapefile into ArcMap, click on the '**Add Data**' button in the main tool bar.



- The 'Add Data' window will open.
- Connect to the folder where you saved your translated OS MasterMap Water Network data.
- To do this, click the '**Connect to Folder**' button



- The 'Connect to Folder' window will open. Navigate to your folder and click '**OK**'.

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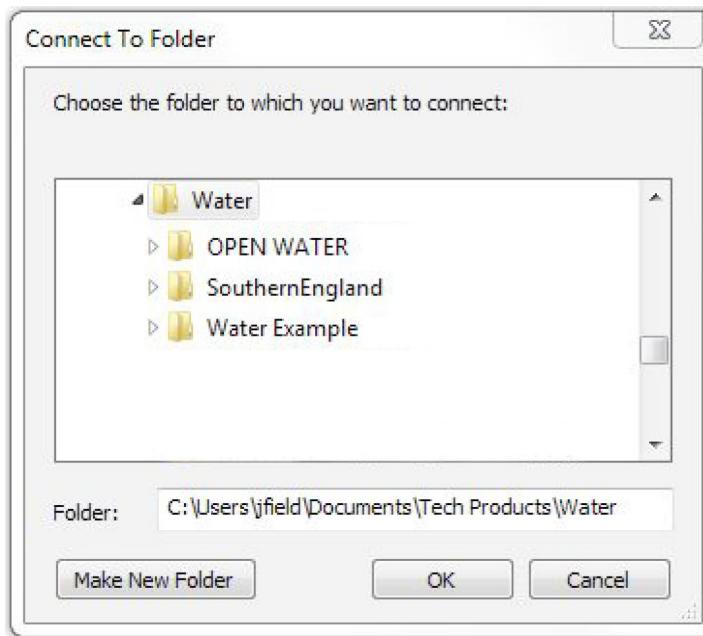
Esri ArcMap

MapInfo Professional

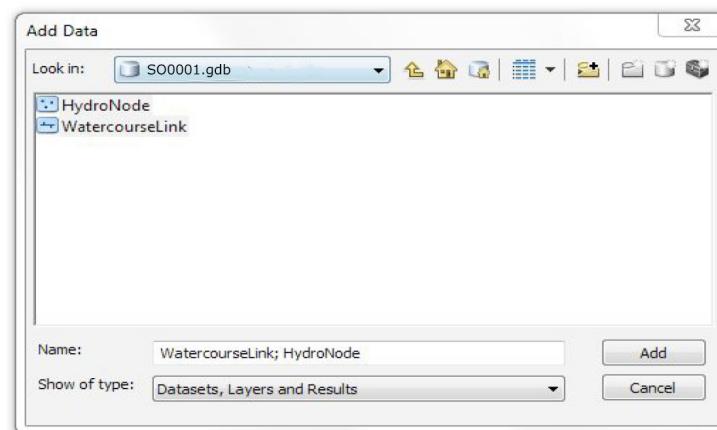
Cadcorp Map Modeller

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- Select the WatercourseLink and HydroNode shapefiles in 'Add Data' window and click 'Add'.



- The two OS MasterMap Water Network features will be added to the ArcMap.

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## 6.4 MapInfo Professional®

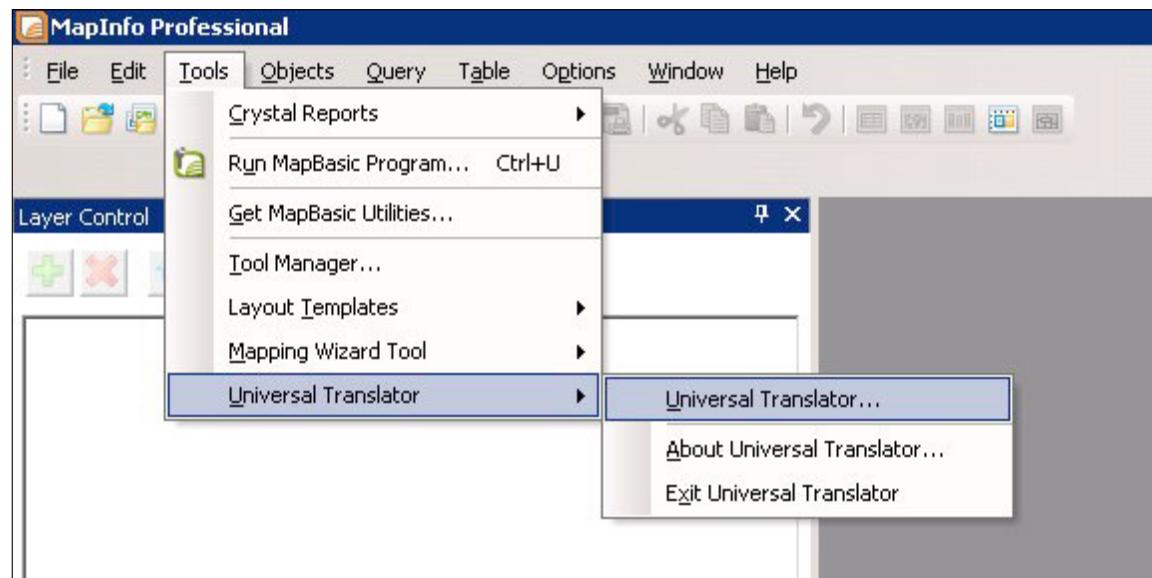
These notes outline how to load OS MasterMap Water Network GML into MapInfo Professional. They have been prepared using version 12.5 of MapInfo. This new version of MapInfo allows you to convert GML data using Tool called Universal Translator.

*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 it into MapInfo. If you are bringing in already translated TAB files please see [section 6.4.2](#).

### 6.4.1 Translating GML into MapInfo Professional®

- Open MapInfo Professional.
- On the main toolbar select Tools>Universal Translator> Universal Translator.



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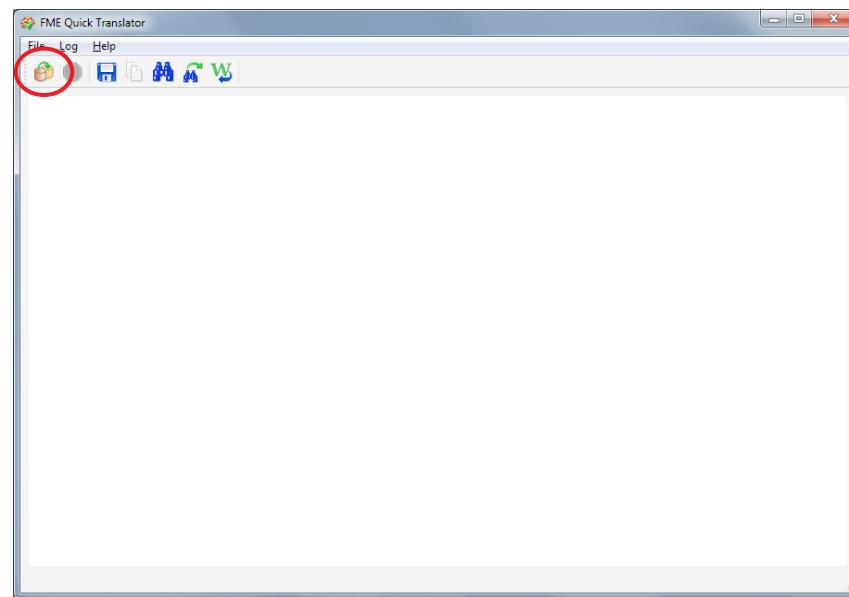
MapInfo Professional

Cadcorp Map Modeller

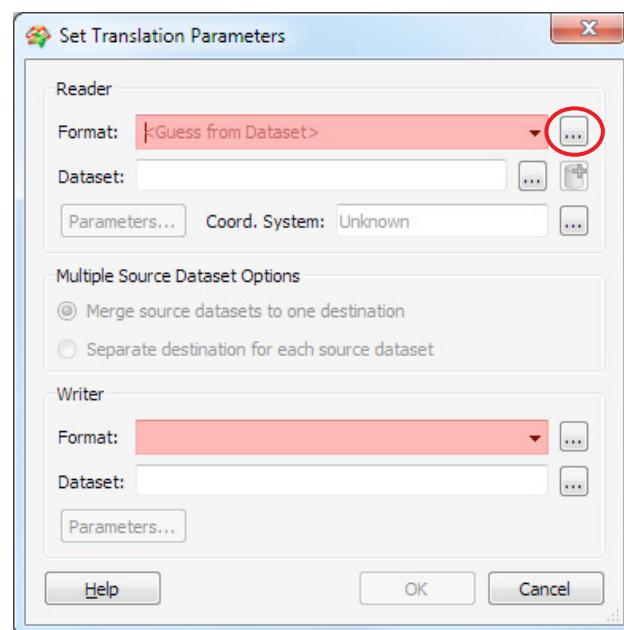
Creating a water network using  
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Further information

- FME Quick Translator window opens.
- Go to File>Translate or click on the Translate Data icon.



- Set Translation Parameters window opens.
- In Reader section click on the button next to Format. Reader Gallery window opens.



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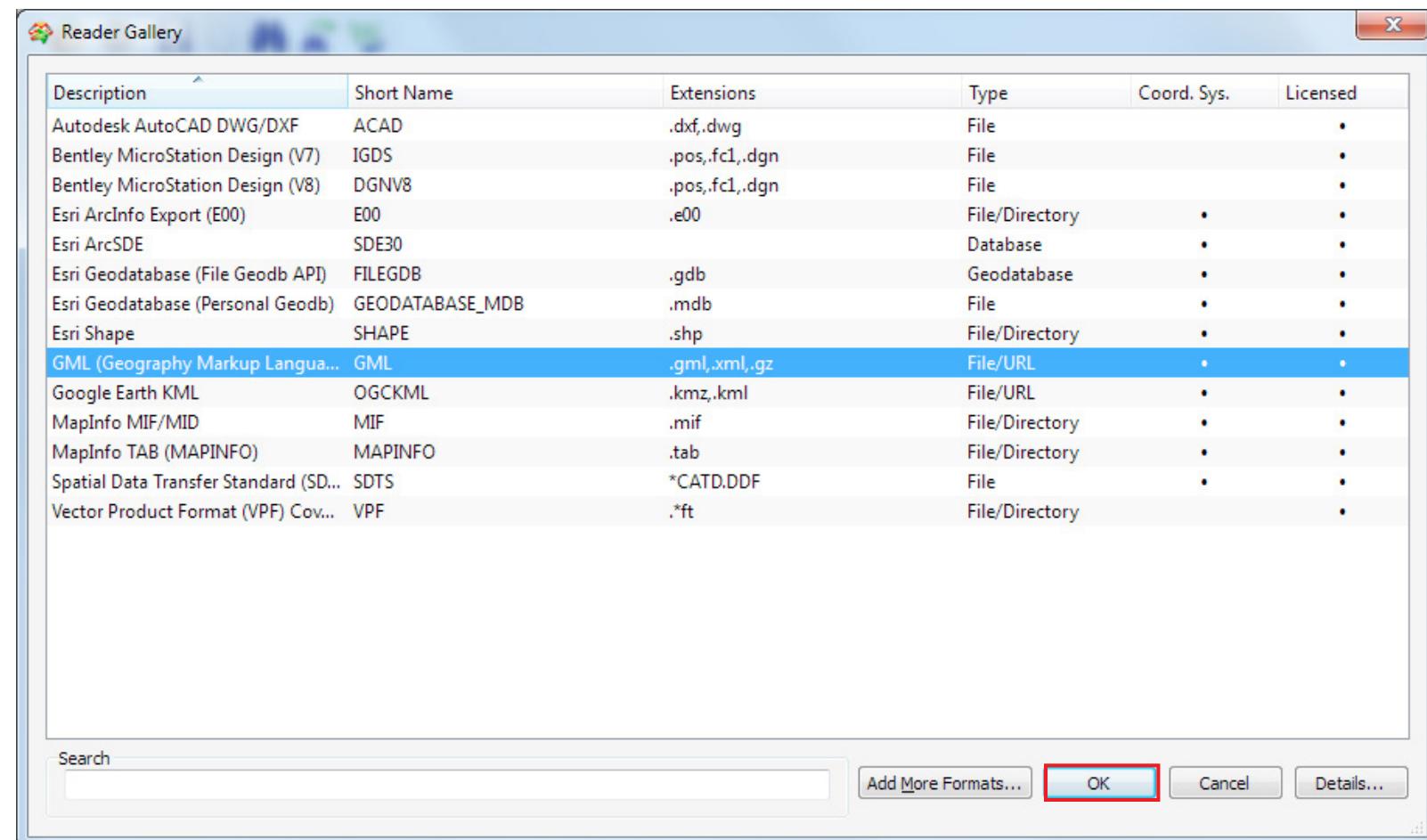
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- Select GML (Geography Markup Language) and click 'OK'.



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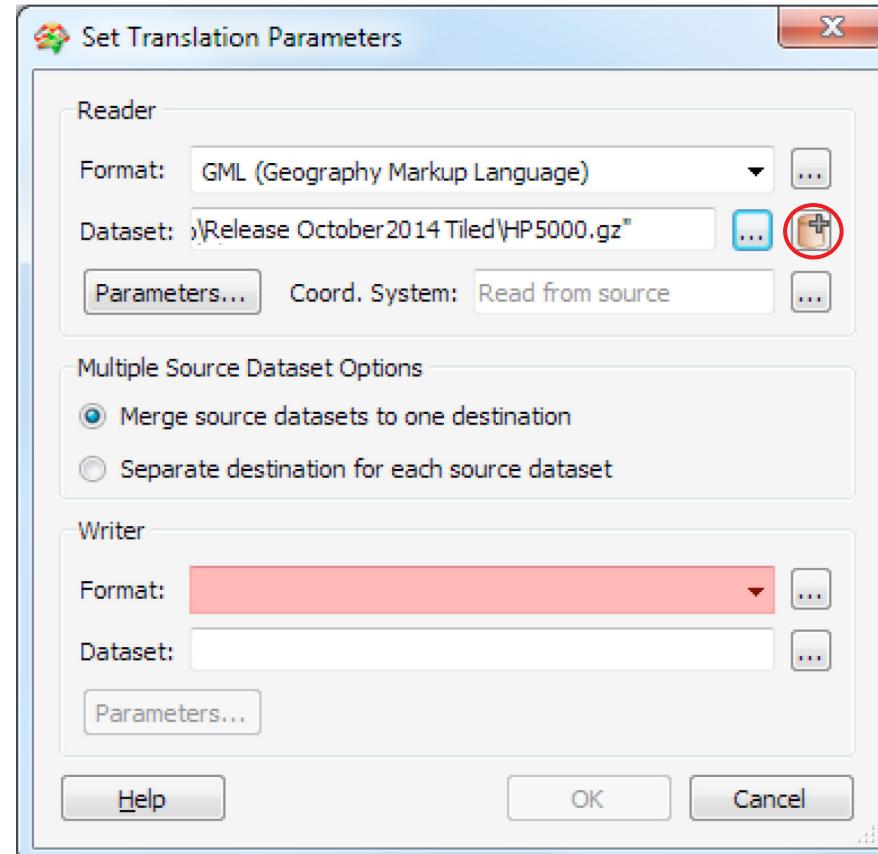
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Further information

- In Reader Dataset navigate to the folder where you saved your GML files.



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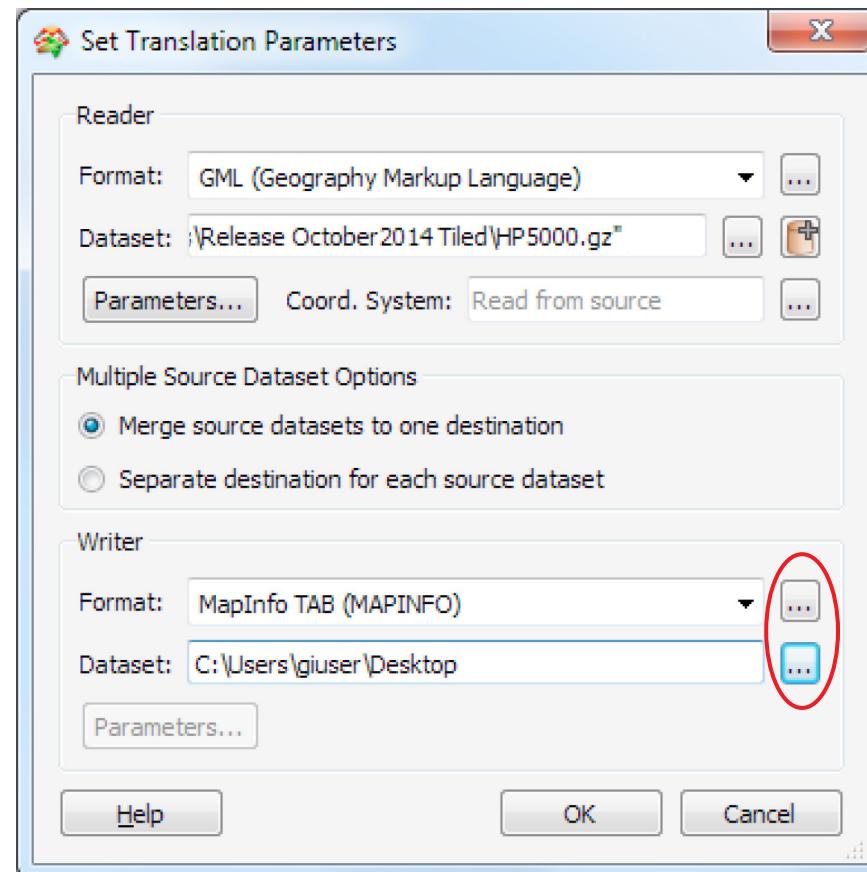
MapInfo Professional

Cadcorp Map Modeller

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Further information

- In Writer click on the button next to format and select MapInfo TAB.
- In Writer Dataset navigate to the folder where you want your TAB file to be saved.
- You can leave the rest of the settings as default.



- Click 'OK'.

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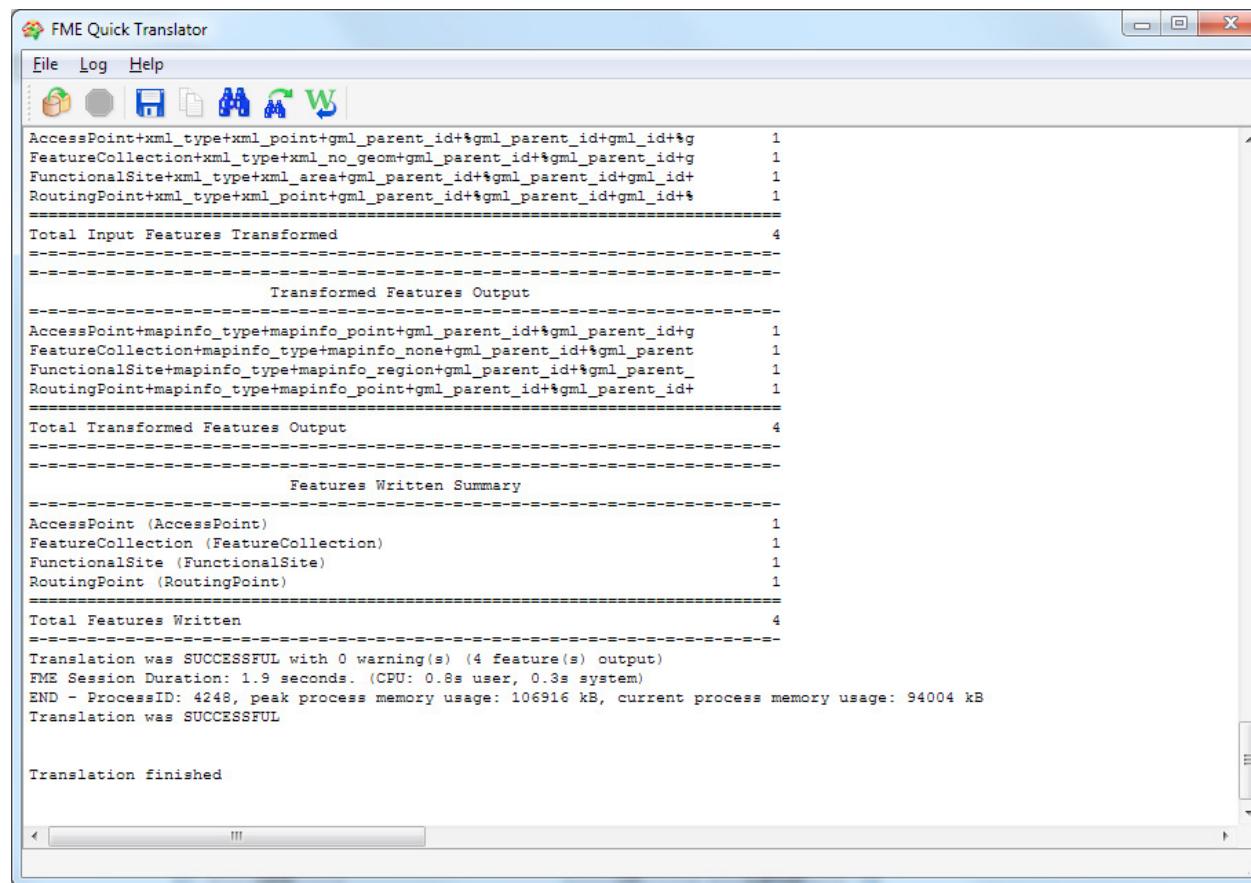
MapInfo Professional

Cadcorp Map Modeller

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Further information

- The translation started. You will notice commands appearing in FME Quick Translator window.
- When completed you will see the information that the ‘Translation was successful’. Close the window.



- The GML files have successfully been translated into MapInfo TAB files.

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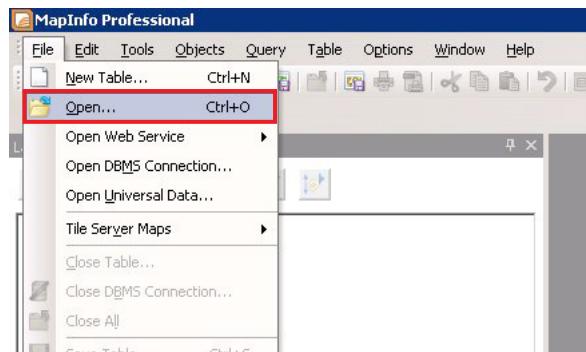
Cadcorp Map Modeller

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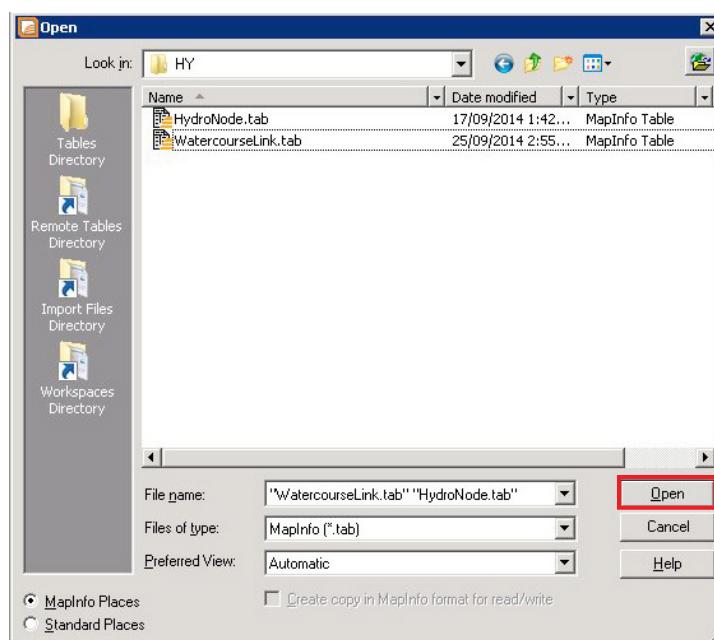
Further information

#### 6.4.2 Loading translated GML files into MapInfo

- To load translated files select File>Open on the main toolbar



- 'Open' window opens.
- In 'Look in' navigate to the folder where you saved your TAB files.
- If you don't see your files, in the 'Files of type' drop-down menu select MapInfo (\*.tab).
- Select WatercourseLink and HydroNode and click '**Open**'.



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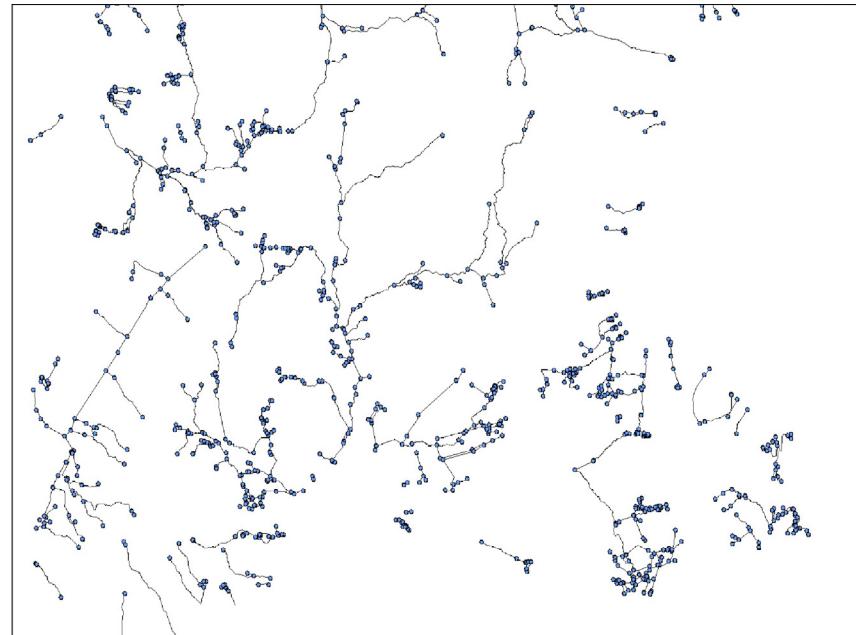
MapInfo Professional

Cadcorp Map Modeller

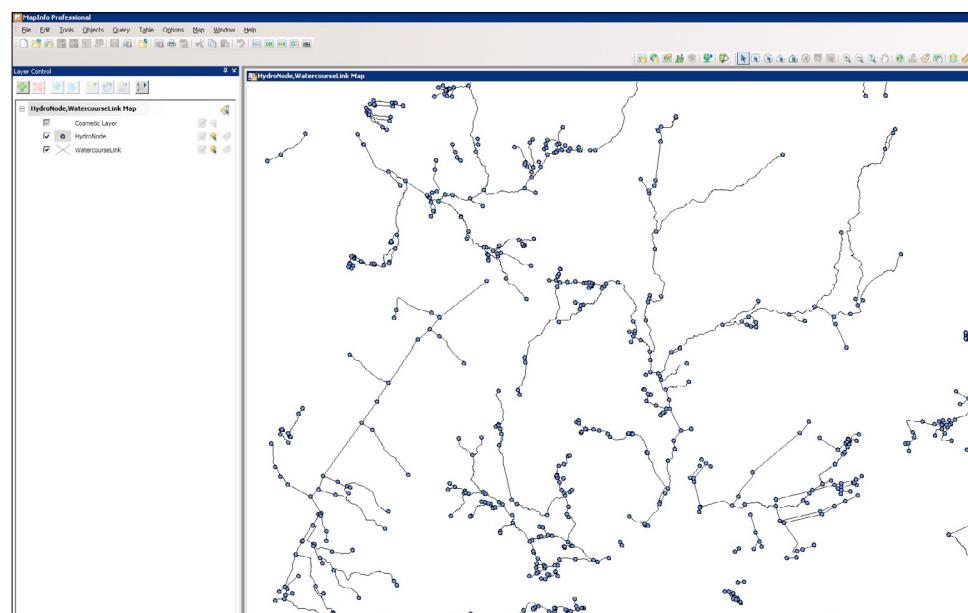
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- The data will now load into MapInfo.



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



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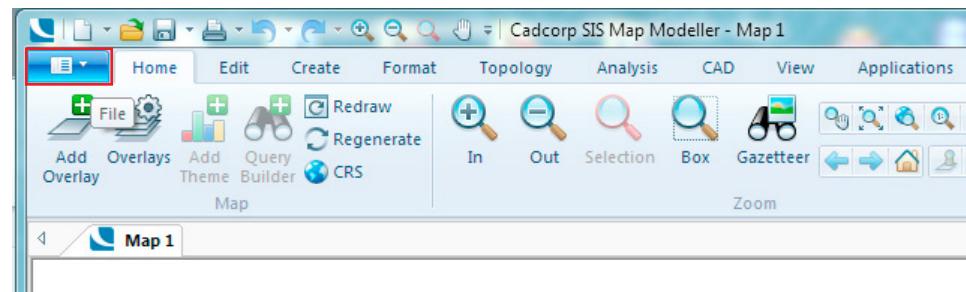
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## 6.5 Cadcorp Map Modeller®

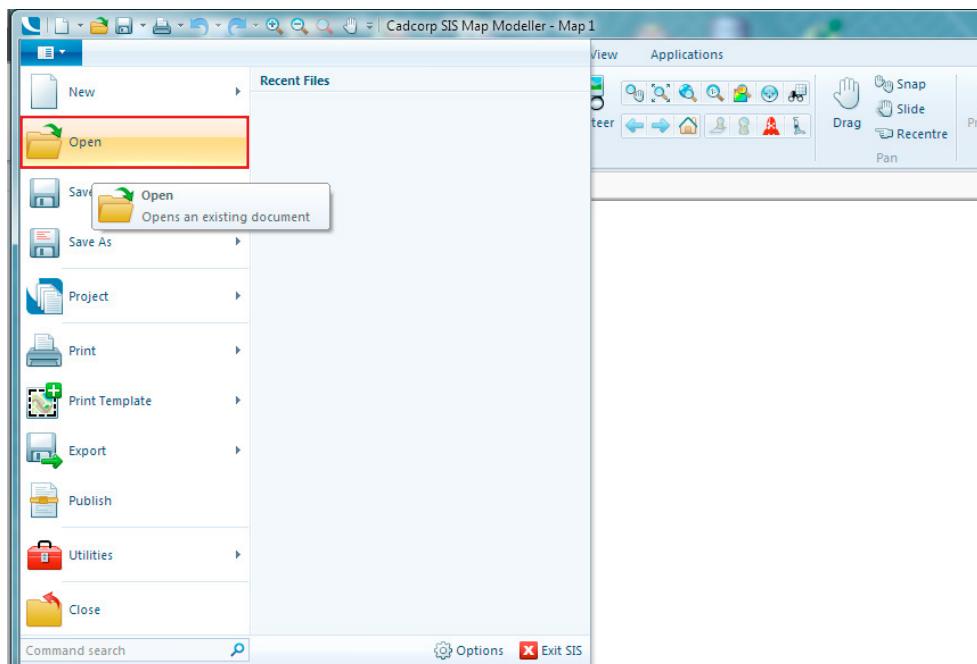
These notes outline how to load OS MasterMap Water Network GML into Cadcorp. They have been prepared using Cadcorp SIS Map Modeller version 8.0 (x64).

### 6.5.1 Translating GML using Cadcorp Map Modeller

- Open Map Modeller.
- Select the ‘File’ icon on main menu toolbar.



- Click the ‘Open’ icon.



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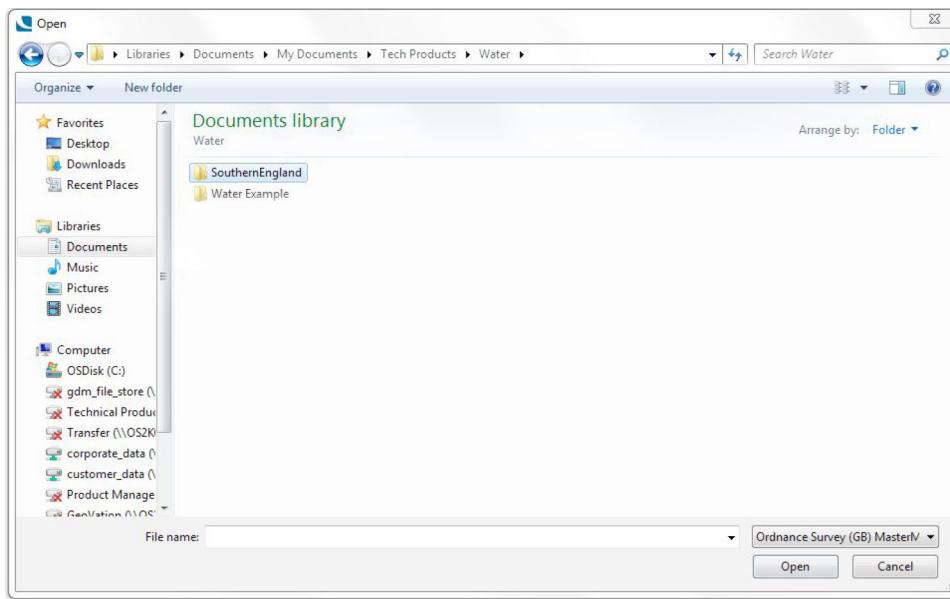
MapInfo Professional

Cadcorp Map Modeller

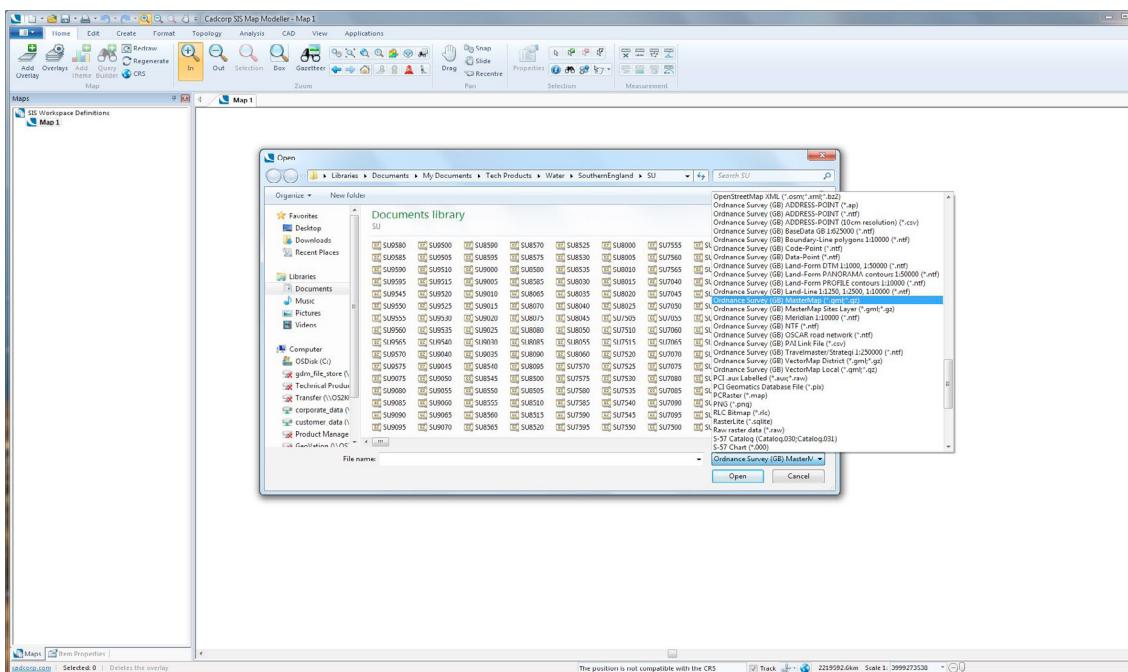
### Creating a water network using Esri software

### Further information

- This will open the ‘Open’ window.



- Navigate to the folder you have saved the GML data in.
- In the bottom right-hand corner change the files from ‘All files (\*.\*)’ into ‘Ordnance Survey (GB) MasterMap layer (\*.gml, \*.gz)’.



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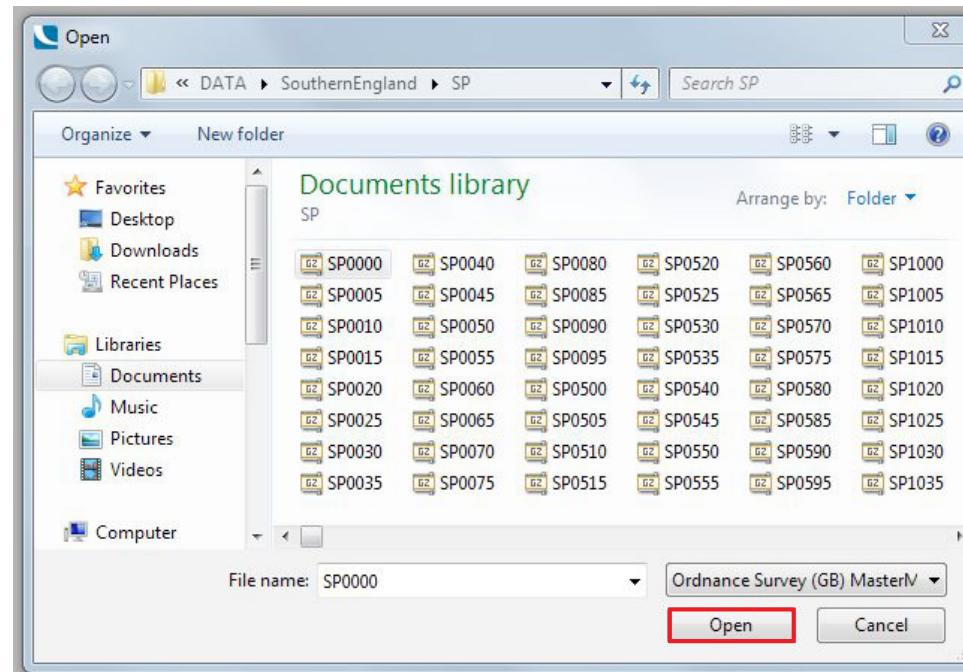
MapInfo Professional

Cadcorp Map Modeller

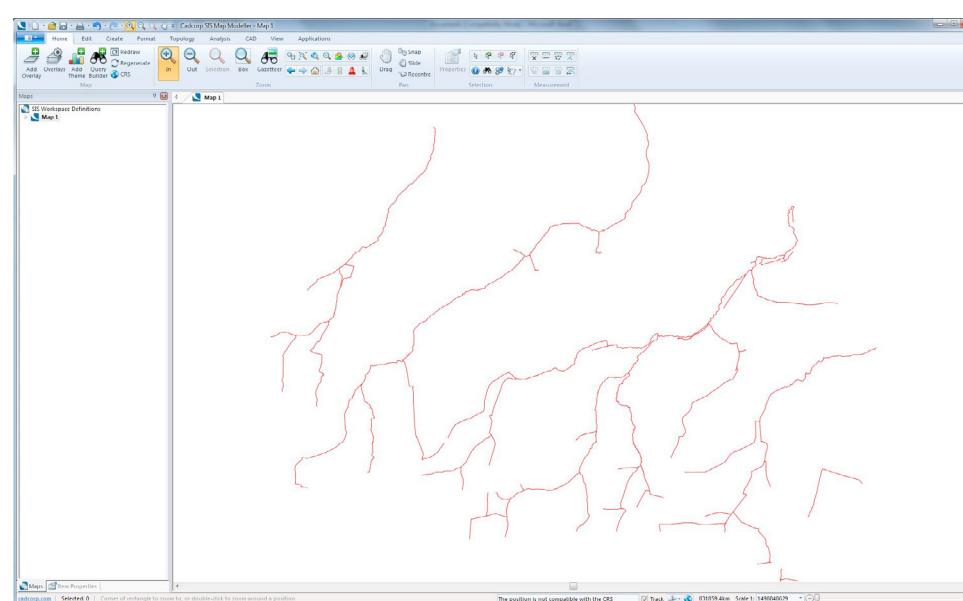
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- In the main window select the file(s) and click ‘Open’.



- OS MasterMap Water Network features have been added to the Map window.



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## 7 Creating a water network using ESRI software

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

### 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 all examples of resource flows that can be modeled and analyzed using a geometric network.

A Geometric network can be set up easily and 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.

This requires a Network Analyst License. You can build simple networks but for more complicated networks will require 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 6.3.1](#)). The feature classes in the feature dataset are used as the data sources for network junctions and edges.

- Open ArcCatalog
- Navigate to your geodatabase in your Folder Connections.
- Expand the geodatabase.

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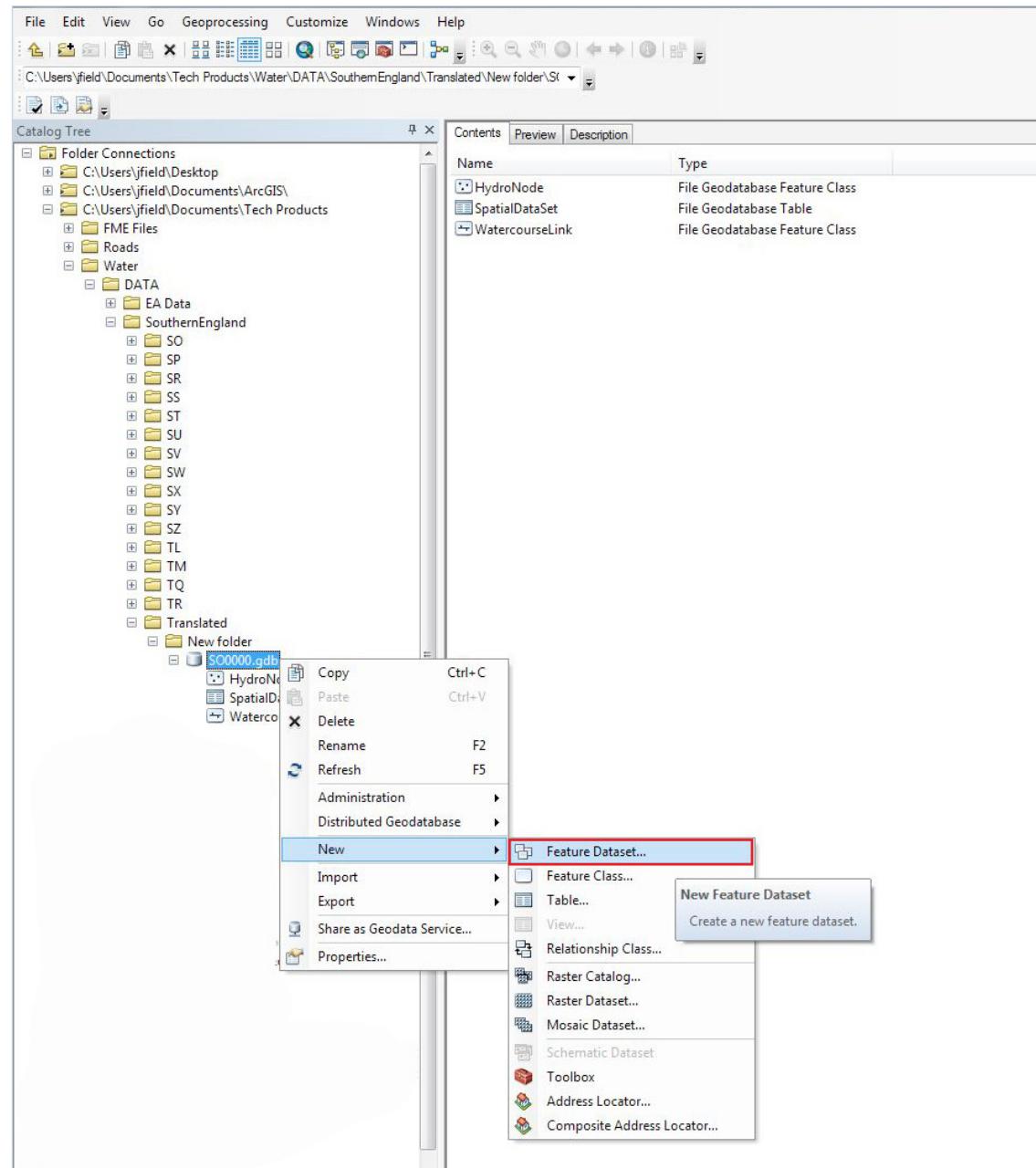
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- Right-click, point to **New**, the click **Feature Data Set**



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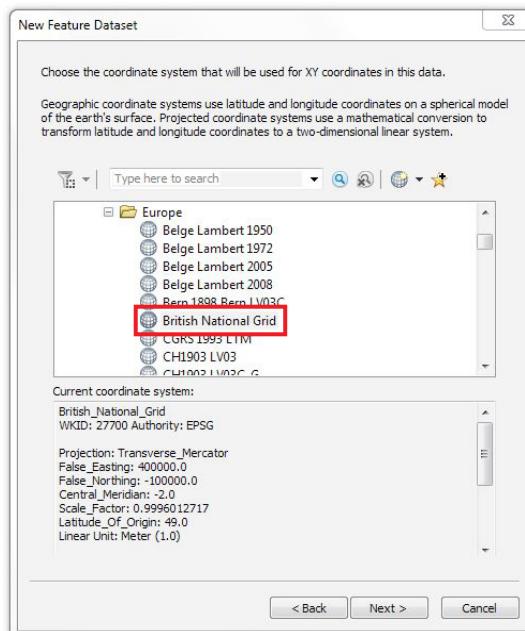
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- Give your new Feature Dataset a name and click **Next**.



- Set your coordinate system that will be used for the XY coordinates in the data (British National Grid EPSG:27700).



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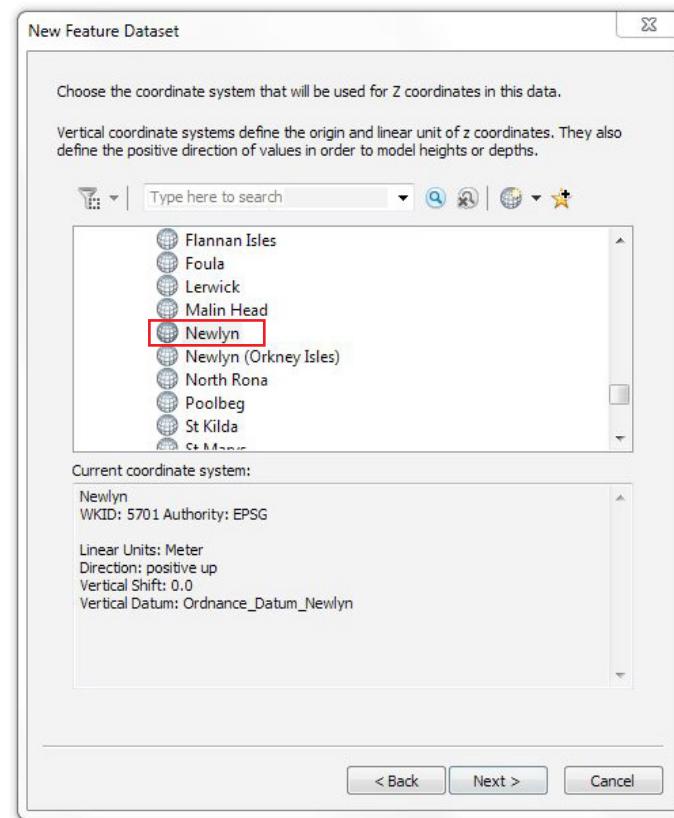
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- Set your coordinate system that will be used for the Z coordinates in the data (ODN – Ordnance Datum Newlyn) is our national coordinate system for heights above mean sea level (orthometric heights).



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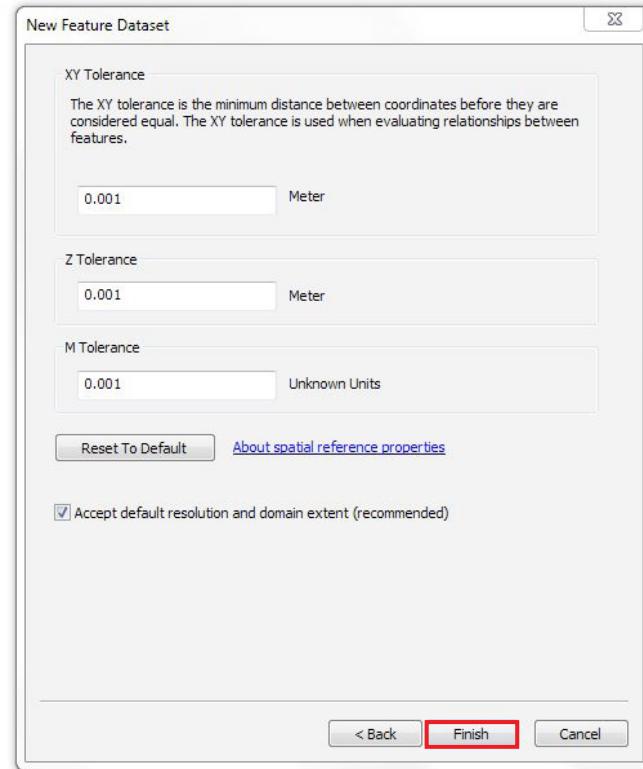
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- Leave your XY tolerance as the default settings and click finish.



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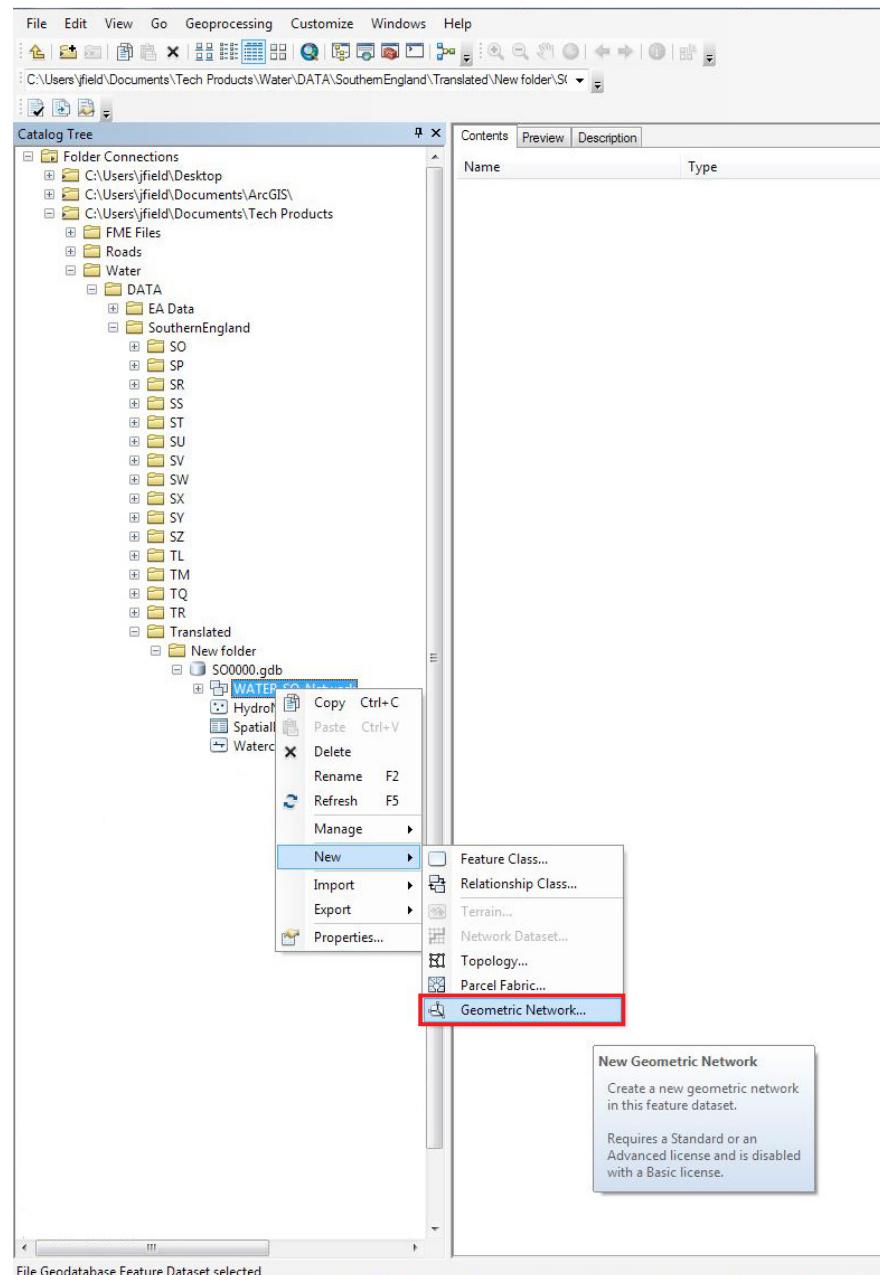
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- Right-click the Water feature dataset in the geodatabase, point to New, then click Geometric Network.



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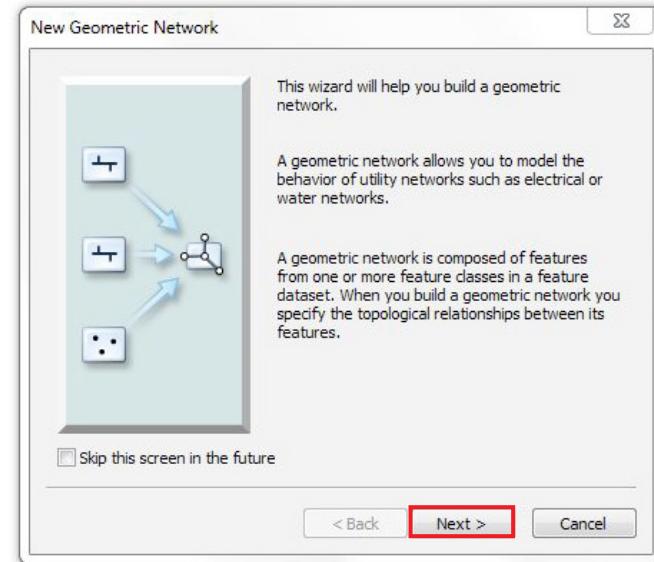
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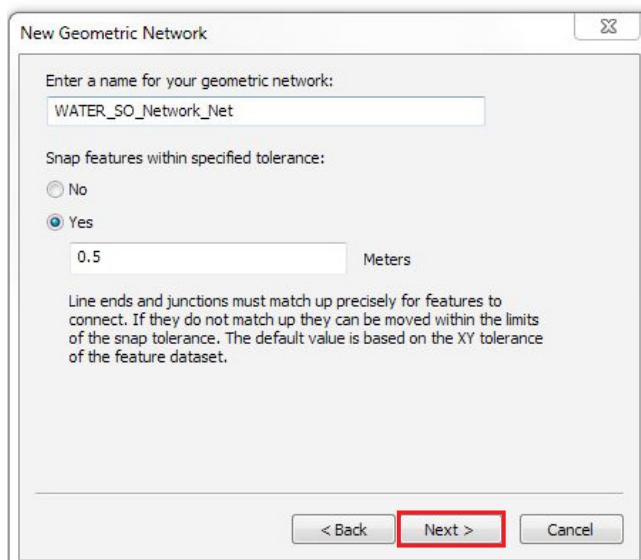
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Further information

- The New Geometric Network wizard opens.



- Click **Next**.
- Type the name of your geometric network.
- Click **Yes** to snap features.
- Type 0.5 in the text box next to **meters**.
- Click **Next**.



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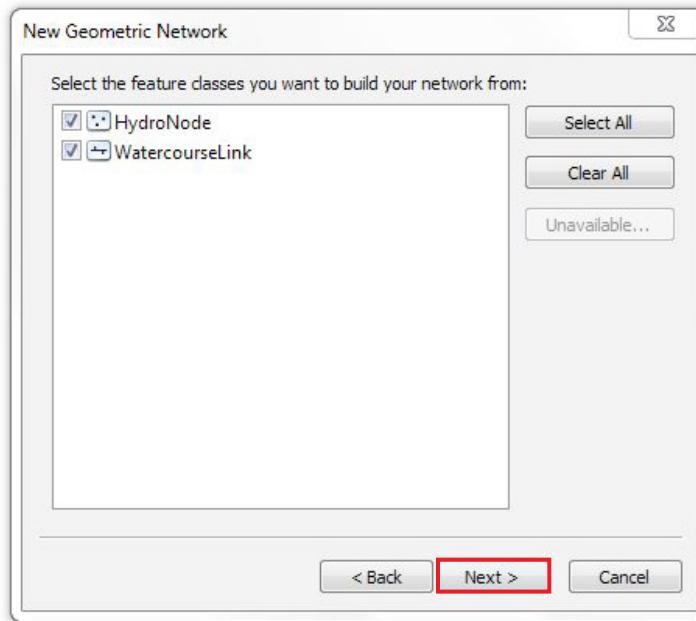
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Further information

- You must now 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.
- Click **Next**.



- The option to exclude features with certain attributes makes it easier to manage the network.

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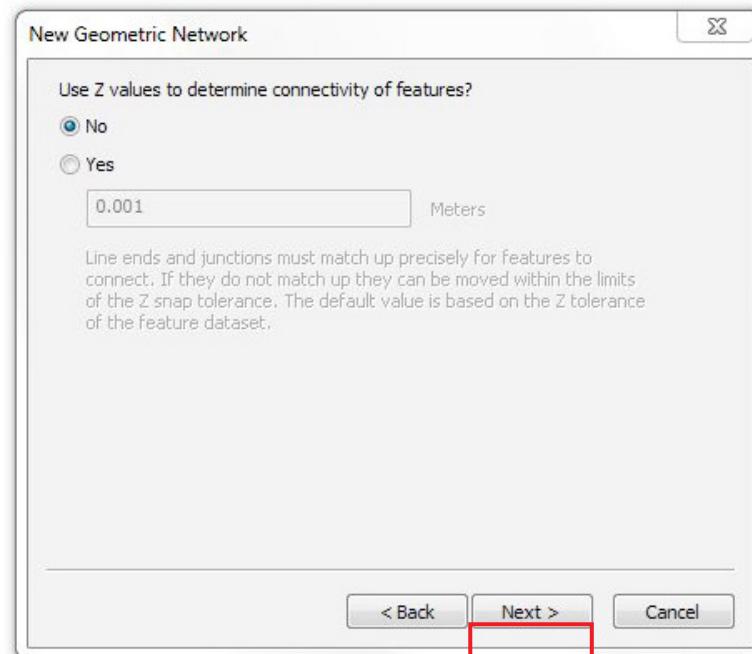
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- On the next panel, you will opt not to exclude features.
- Click ‘No’, so that all features will participate in the geometric network.



- Click ‘Next’.
- On 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. On 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.

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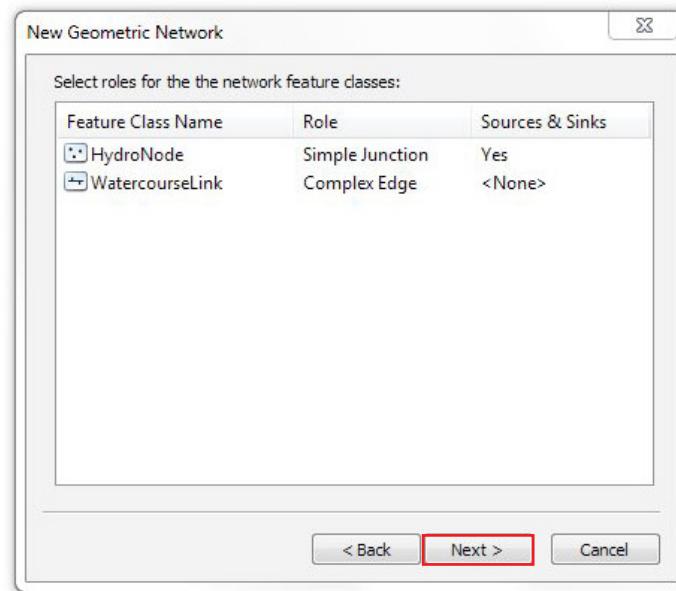
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Cadcorp Map Modeller

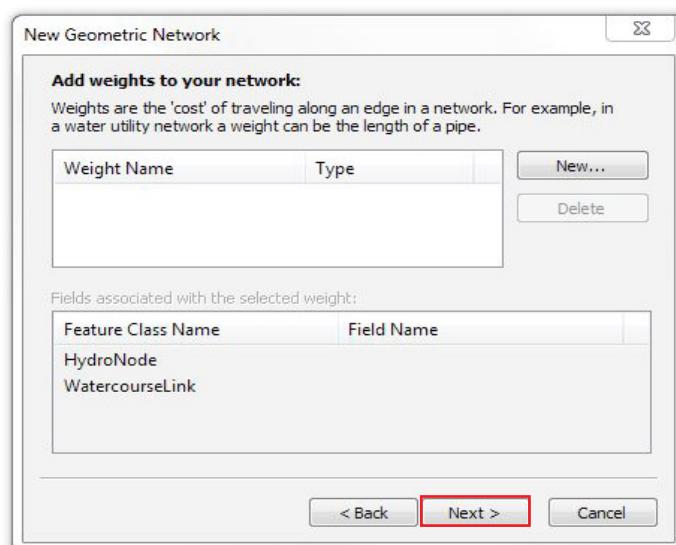
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- In the row for the HydroNode, click **Simple Junction** under the **Role** column.
- In the row for the WatercourseLink choose **Complex edge** from the list.
- In the row for the HydroNode feature class, click the drop-down menu under **Sources & Sinks**, then click **Yes**.
- Click **Next**.



- This geometric network does not require weights, which is the default, so click **Next**.



- Clicking **Next** opens a summary page.

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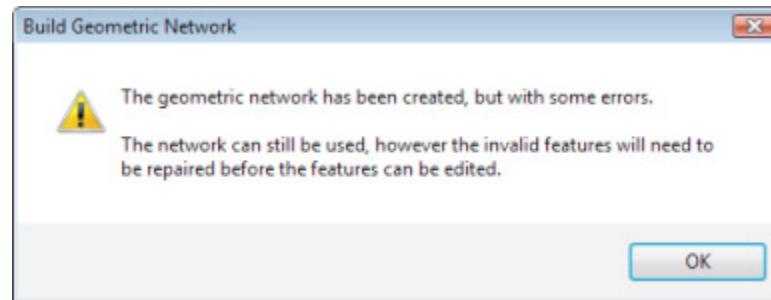
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- Click Finish after you review the summary page. A progress indicator appears displaying the progress for each stage of the network-building process. You will receive an error message indicating the network built, but with errors.



- Click **OK** to close the message box.
- You can see what errors occurred while building the geometric network by previewing the WaterNet\_BUILDERR table.
- Click the WaterNet\_BUILDERR table in the Catalog tree and click the **Preview** tab to view the entries in this table.
- 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 are edited).
- If you received more than two errors, delete the geometric network and repeat the steps to create it again.

You can then proceed to load the data into ArcMap.

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Further information

## 8 Further information

Further information about the OS MasterMap Water Network can be found on the Ordnance Survey website:

<http://www.os.uk/business-and-government/products/water-layer.html>

**Technical Specification:**

<http://www.os.uk/docs/technical-specifications/os-mastermap-water-network-technical-specification.pdf>

**Product Guide:**

<http://os.uk/docs/product-guides/os-mastermap-water-network-product-guide.pdf>

**Ordnance Survey:**

<http://os.uk>

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OS MASTERMAP  
WATER NETWORK



GETTING  
STARTED  
GUIDE