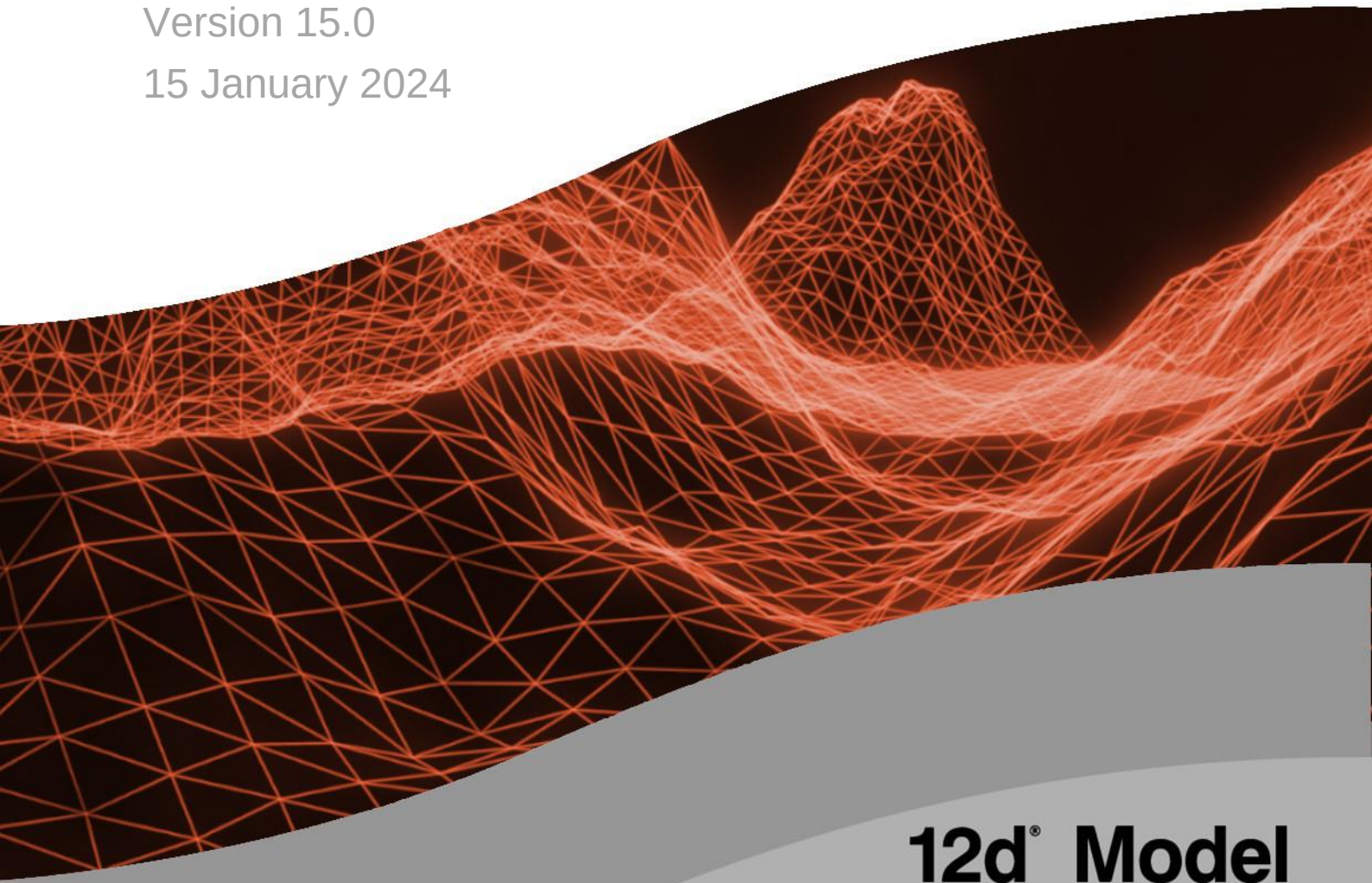
12d Model
Civil and Surveying Software

12d New GIS Interface Options

Version 15.0

15 January 2024



12d Model
Do More With Your Software.

ROADS AND HIGHWAYS | LAND DEVELOPMENT | RAIL | DRAINAGE, SEWER AND SERVICES | AIRPORT INFRASTRUCTURE | PORTS AND DREDGING | MINING INFRASTRUCTURE | SURVEYING | OIL AND GAS | RIVERS, DAMS AND HYDROLOGY | CONSTRUCTION | ENVIRONMENTAL

12d Model V15.0 GIS Interface Manual

V15.0 January 24

Disclaimer

12d Model is supplied without any express or implied warranties whatsoever.

No warranty of fitness for a particular purpose is offered.

No liabilities in respect of engineering details and quantities produced by 12d Model are accepted.

While every effort has been taken to ensure that the advice given in this manual and the program 12d Model is correct, no warranty is expressed or implied by 12d Solutions Pty Ltd.

Copyright

Table of Contents

1.0 NEW GIS FEATURES

1.1 Overview

There are a number of new features within V15 C1k and above, which enables users to download (a snap shot in time of the GIS data) and import this information into 12d, including attributes, Rasters, line work etc

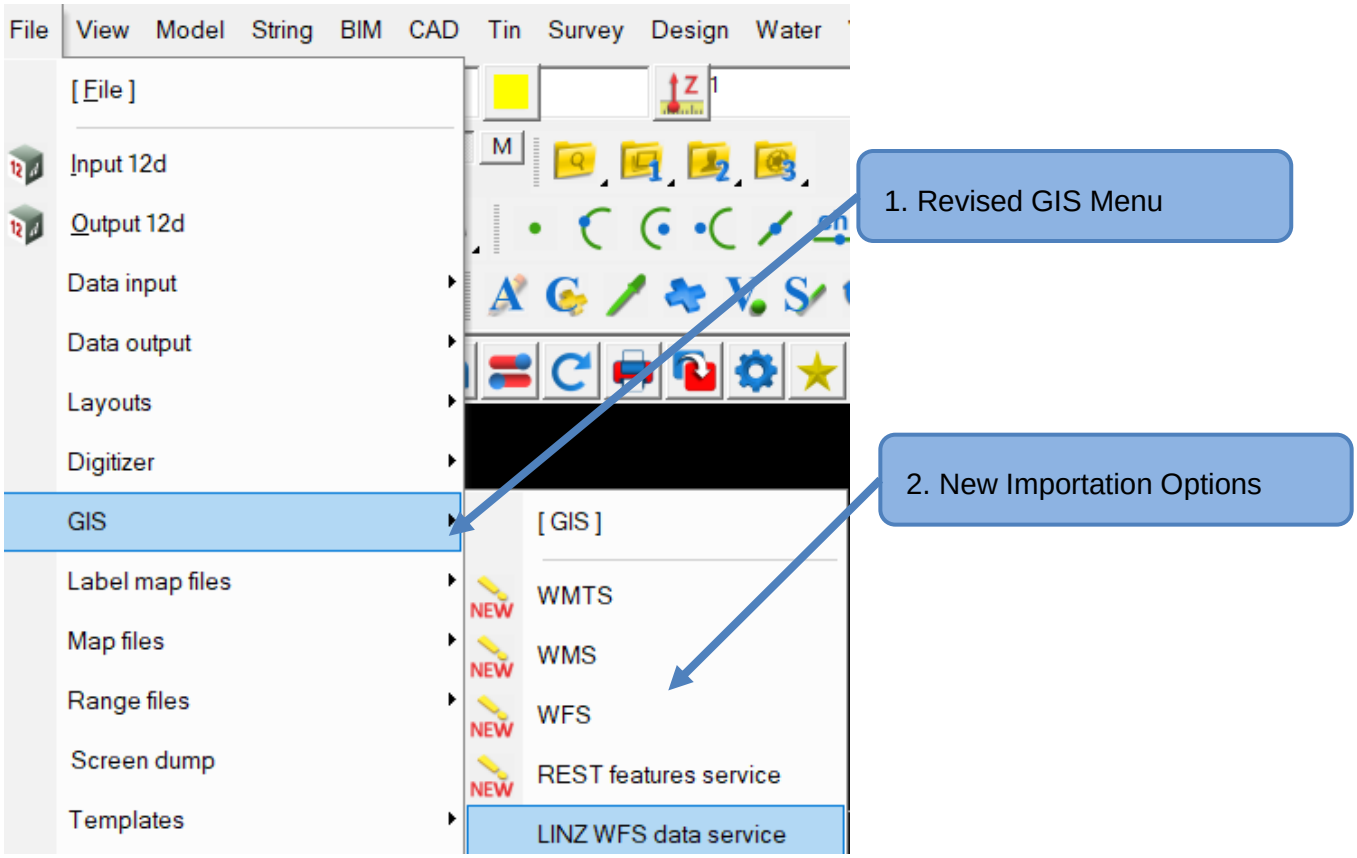
These options are still **under development** and 12d is working on extending the GIS import interface.

The features are free for those on maintenance

1.2 Different GIS Options

- There are a number of new importation options with v15, as shown in the screen shot below

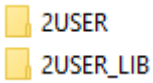
File > GIS



1.3 Required Files

As this is a new feature between a major version release, number of files need to be coped into the 12d folder User folder, these are contained within a zip folder, which can be downloaded here.

Files in the 2User, and 2User_Lib folders need to be copied in to your respective $User folders.



Styles – 12d NZ has created a number of new symbols for the GIS import, which need to be copied into the $User/Styles folder and the $User/ user_symbols.4d file need to be edited to add the following lines (the first two might already be within the file). Otherwise, the supplied chain will not run and provide a number of error when applying the mapfile.

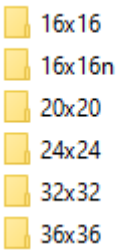
#include "Styles\Xtra_symbols_12dNZ.4d"

#include "Styles\Xtra_symbols_drainage.4d"

#include "Styles\Xtra_symbols_MetaConnex.4d"

#include "Styles\Xtra_symbols_LINZ_WFS.4d"

- Images – As V15 uses the concept of Theme's, this does require copying the supplied icons (all of the different sizes) into the correct images folders.

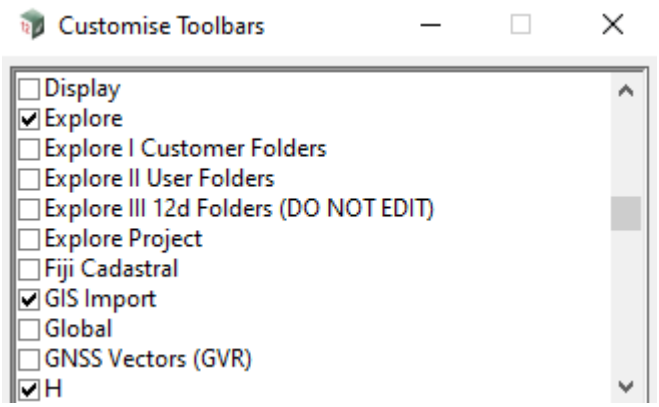


- Toolbar - A new GIS tool bar has been created to speed up the import process for the different work flows, these are linked to the suppled example chains

  User need to add supplied file contained within the 2User/Toolbars folder AND add the following line to the $User/user_toolbars.4d file

  #include "Toolbars\Xtra_GIS_Import.4d"

View >Toolbars > GIS Import



If you can't see the images within the toolbar above, please see the section on images folder location

2.0 LINZ DATA SERVICES (LDS) WEBSITE

Access

Before beginning, users will need to create a login within the LINZ Data Services (LDS) website. This is free to do; just requires an email account.

Accessing the LDS website

Creating a LINZ Data Services Website API Key

Only registered users of the LDS can create API keys, most layers can be access via a single API key.

LINZ has created a guide to the API keys

Once you have created your key, if you are logged into LDS and select a web service URL, your web service key is automatically populated in the URL for you to easily copy and paste into your application.

Entering the API Key into the WFS 12d chain

Ever company/user needs to add their own API Key into the LINZ_LDS_WFS.chain,

The quickest option is editing the file within Notepad ++

Using Notepad++

Open the $User_Lib folder, file need to be edited

GIS_LINZ_LDS_WFS.pvf

You need to replace the XXXXXXX with the LDS API key and then save the file

```
 </String_Parameter>
 <Text_Parameter>
   <Name>"APIKey"</Name>
   <Comment>""</Comment>
   <Value>"XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX"</Value>
 </Text_Parameter>
/Chain_Parameters>
```

2.1 LINZ Data Services Website Workflow

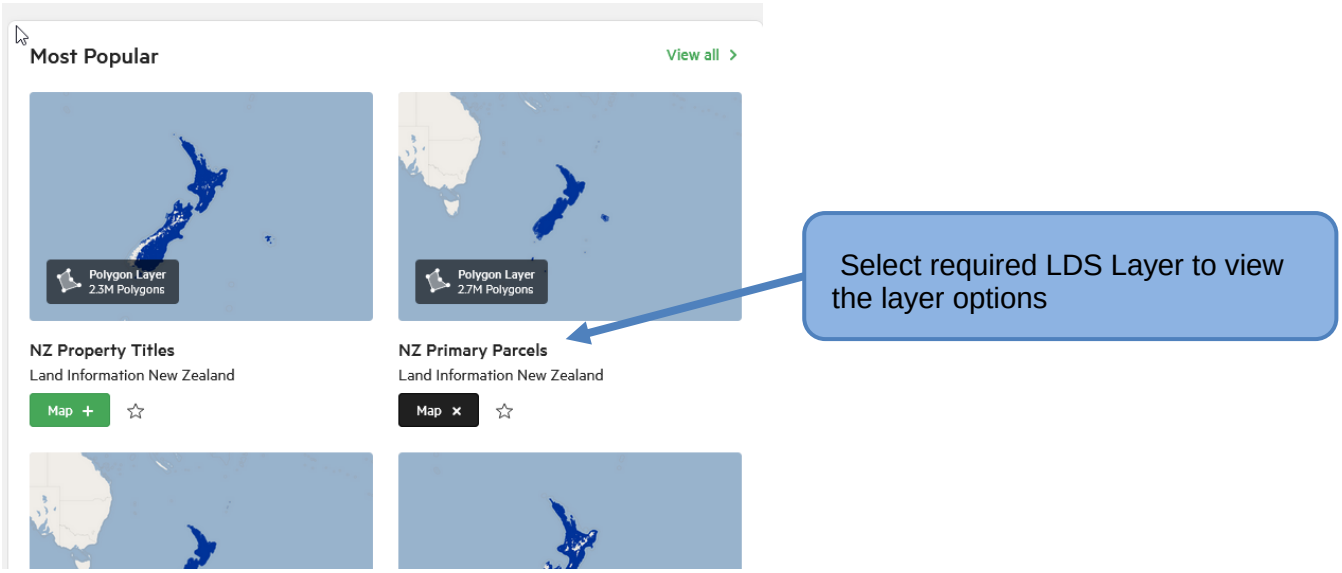
Historically, most new projects have two options to bring boundary information into 12d, either via a Land on Line XML or a file from the LINZ Data services website (for example a CAD, Raster or Shapefile).

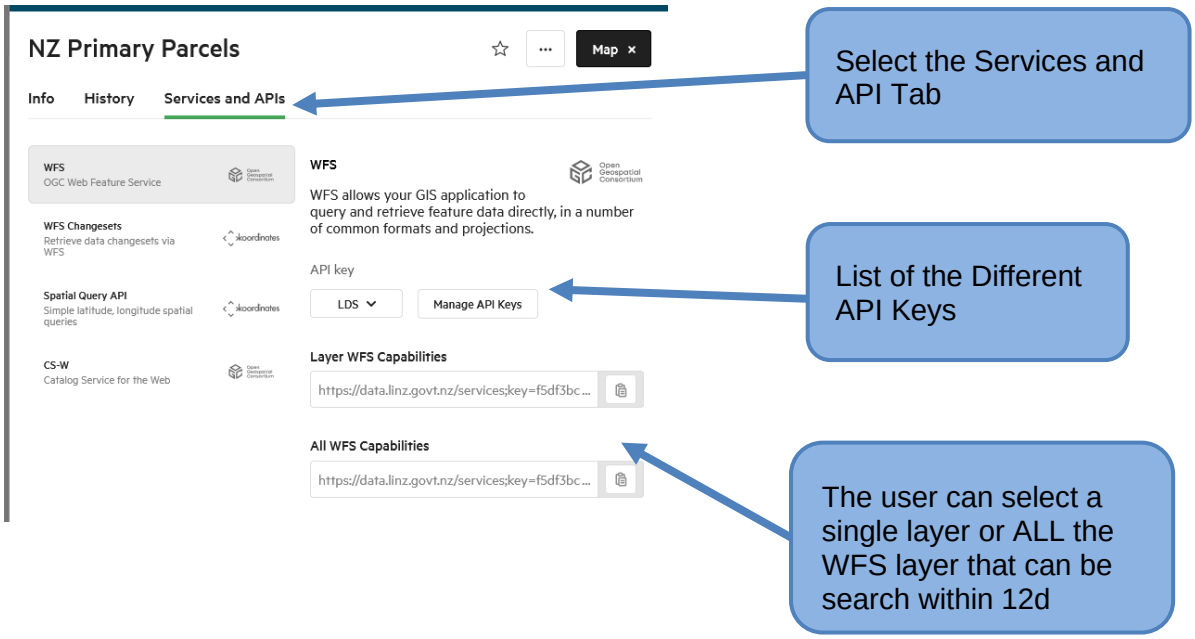
The new LINZ WFS option, allows 12d users to directly consume published layers from the LDS website, which also includes attribute data (something that was not available when importing a CAD file) and then the user can apply an Attribute Manipulator file or an Attribute label mapfile.

Selecting a Layer within LINZ Data Services Website

Once the user has signed into the LDS website and created an API key, they can search layers as normal within the LDS Website. Under the Data Tab, the user can select the layer box to view more information about the different layer's features

Using the LINZ Data Service Website, the user has the option of viewing a single layer or all of the available layers





LDS has the option of Change Sets

A changeset outlines what has been added, updated or deleted in a particular dataset. You can use a changeset to update your data without having to download the entire dataset from scratch.

A changeset contains an additional “change” attribute, describing whether a row has been inserted, updated or deleted.

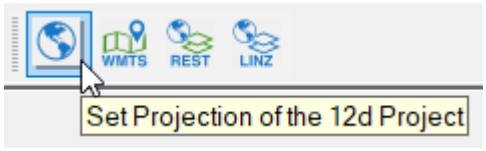
This option has not been implemented within 12d yet

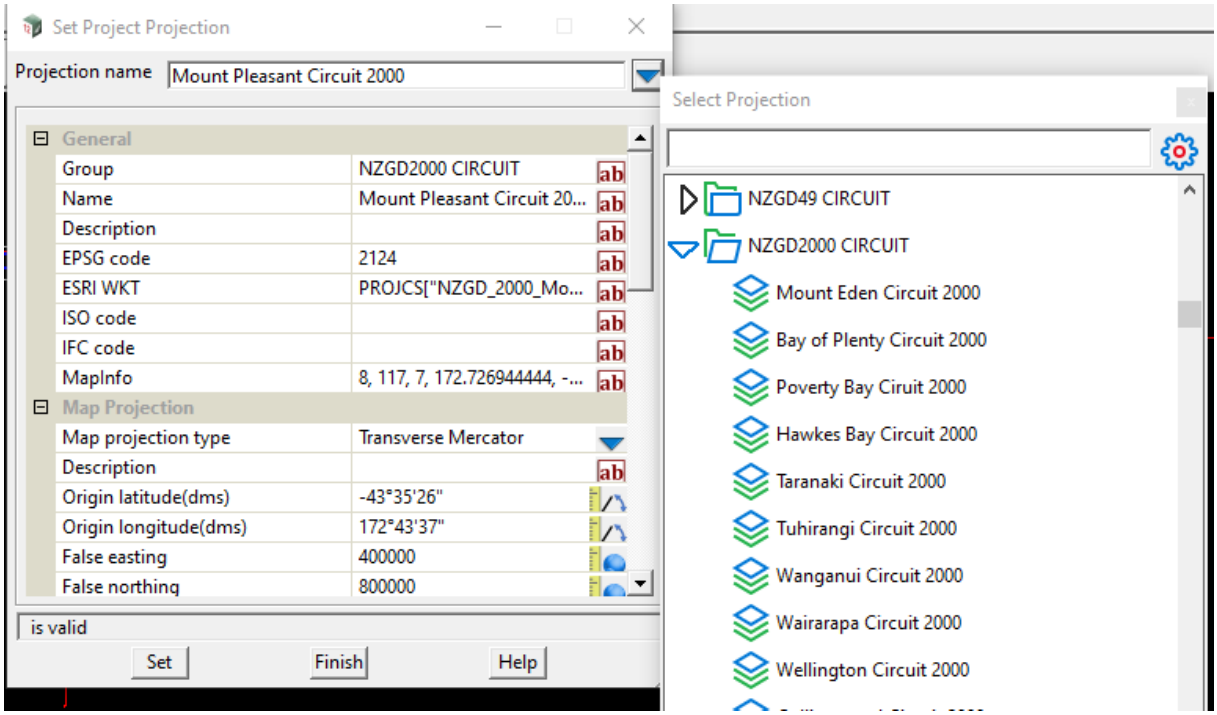
Location Polygon

12d does require a predefine polygon which is used within the search of the GIS system, the user needs to create a polygon which covers required location.

Enter the Projection details

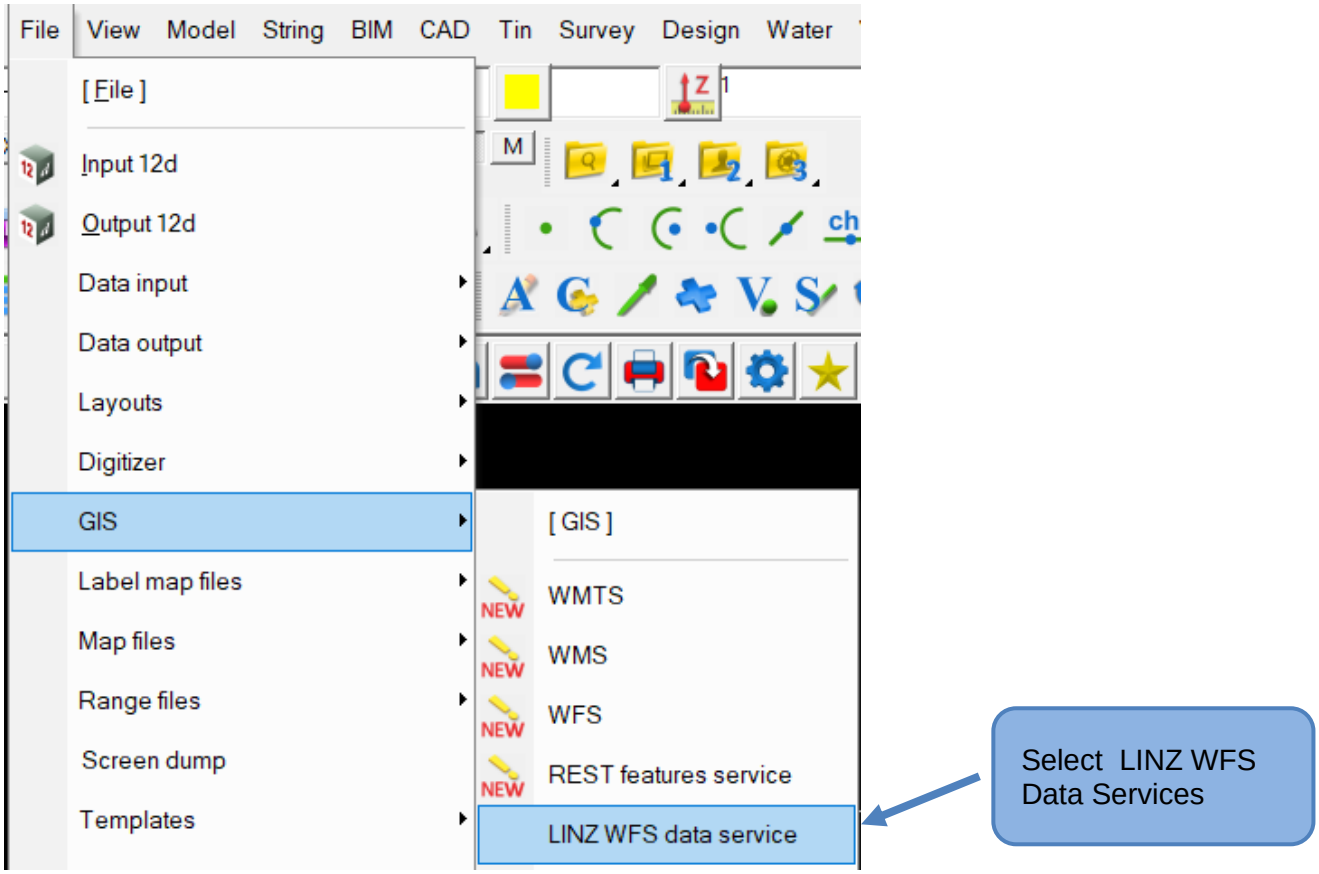
As the LINZ Data services and most GIS system store the data within NZTM, but surveyors work in the different local circuits, the user will need to set the projection within 12d, the first icon on the GIS Toolbar set the projection within12d.



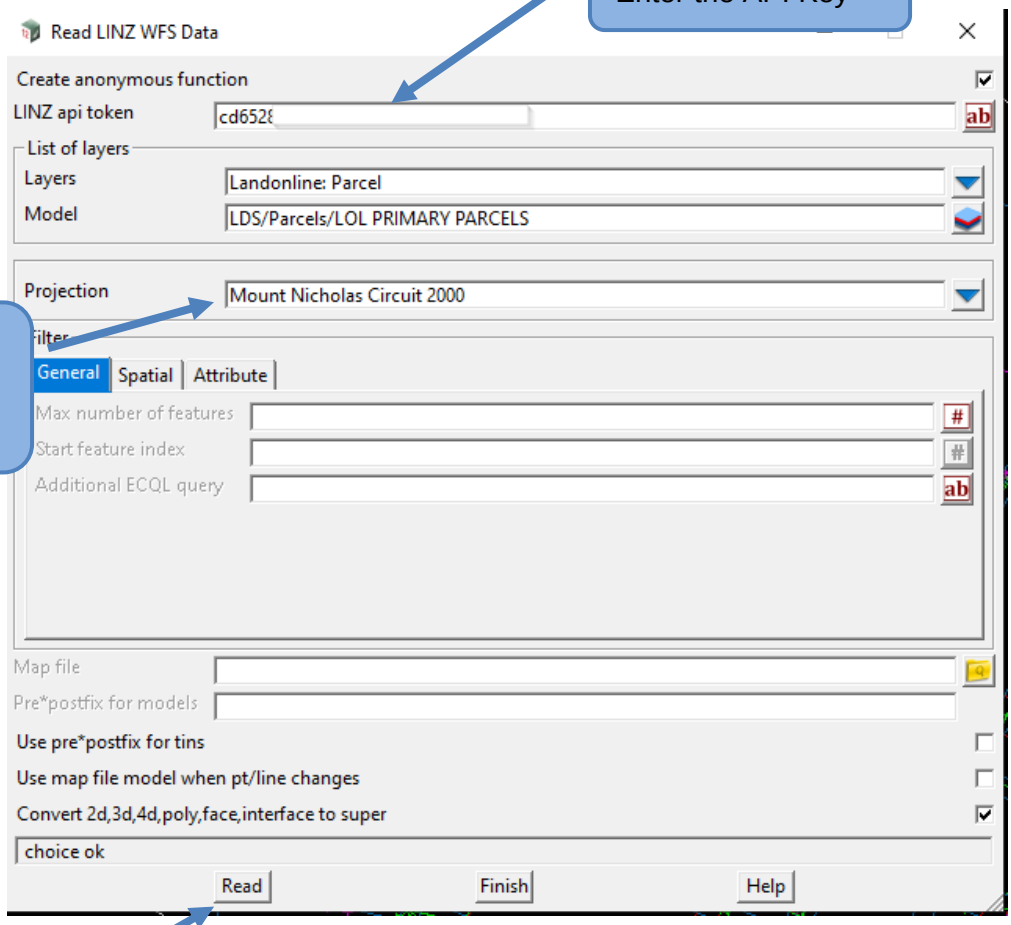


Make sure to select the NZGD Projections, as these contain the EPSG code that the GIS system uses to reproject into the correct coordinate system

Importing a LINZ WFS Layer into 12d



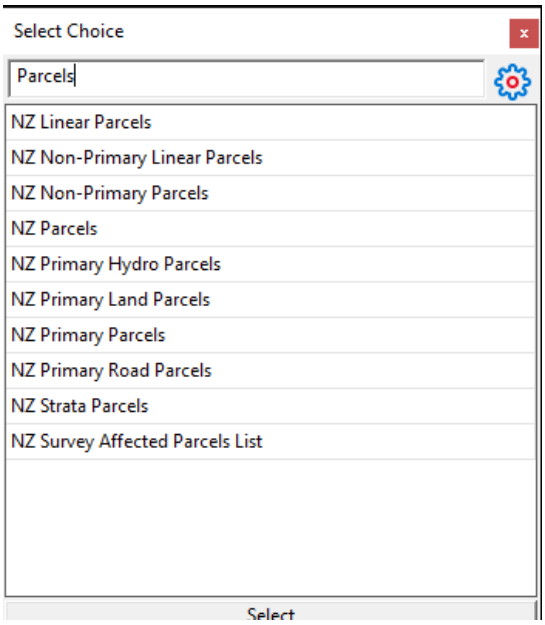
Enter the API Key



Select The project projection

Select the Dropdown Arrow to view the different Layers

Select Read to Import the Dataset

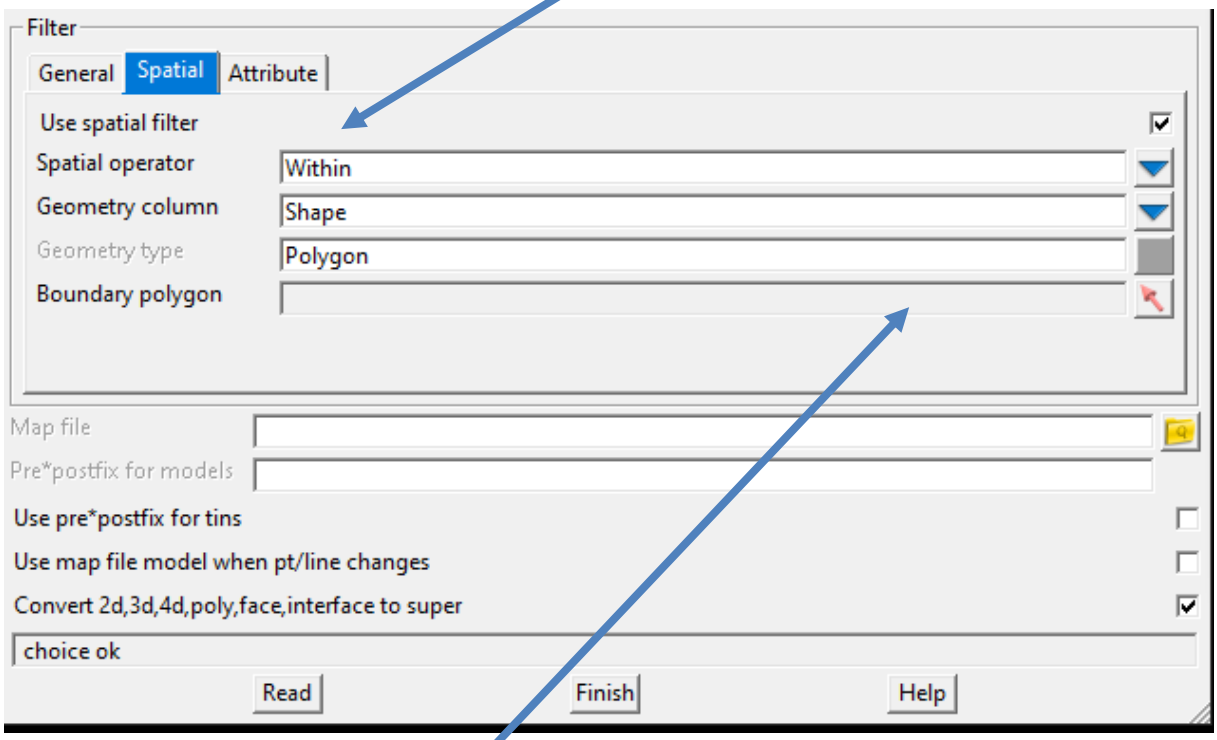


F.Y.I.

The LDS website contains a large amount of information and multiple layers that look the same, BUT the attribute information is different.

There are a number of different Spatial Operators that have been defined within a GIS system, Section 8.8.5.1 of the help guide goes into detail of the different options

The Spatial Tab



For Most users, selecting the “Within” Operator will work in most situations. Ie import all the information on a layer that contained within a Boundary Polygon

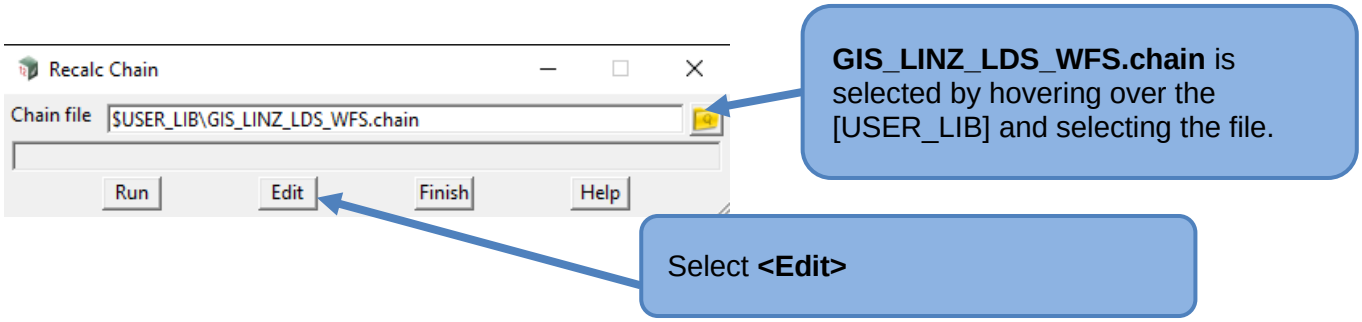
Every time the user selects the different layers, 12d will go to the LDS to request the information.

Depending on your internet connection speed, this could take from a few second to a minute.

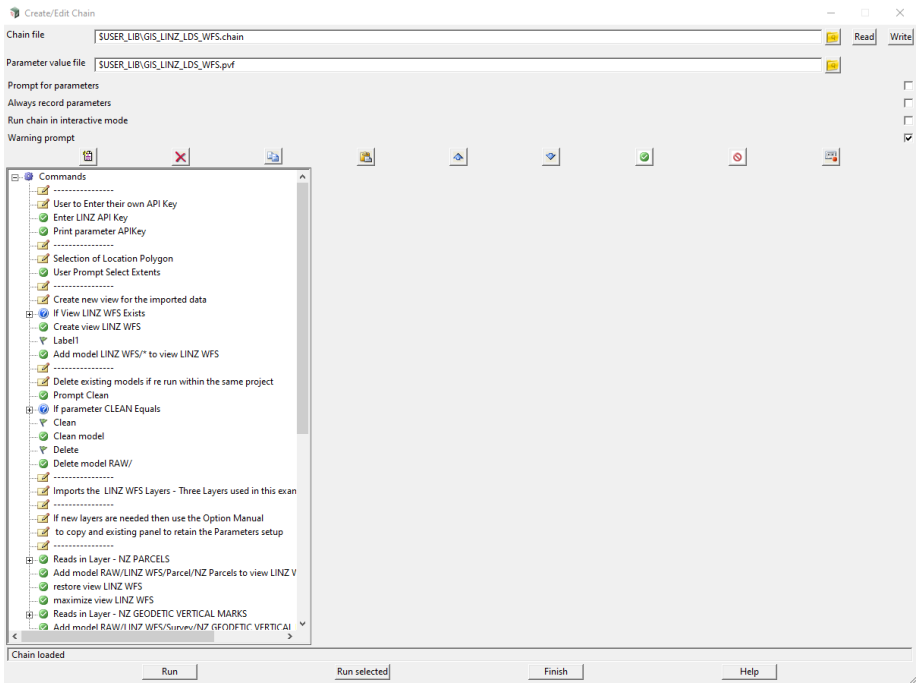
LINZ WFS Importation Chain

Currently, the import process is a single layer at a time, this limitation, is perfect for creating a processing chain.

Within the $USER_LIB there is an example chain, that can be customised for your needs. In the supplied Example, the chain only imports three layers, this can be edited to import more layers, but copying an existing command and the editing the path to the required Layer, by using the Option Manual Command



The chain uses parameters to pass a user entered extents of import (Polygon) down to the different layers, therefore saving the user the need to keep reselecting the area

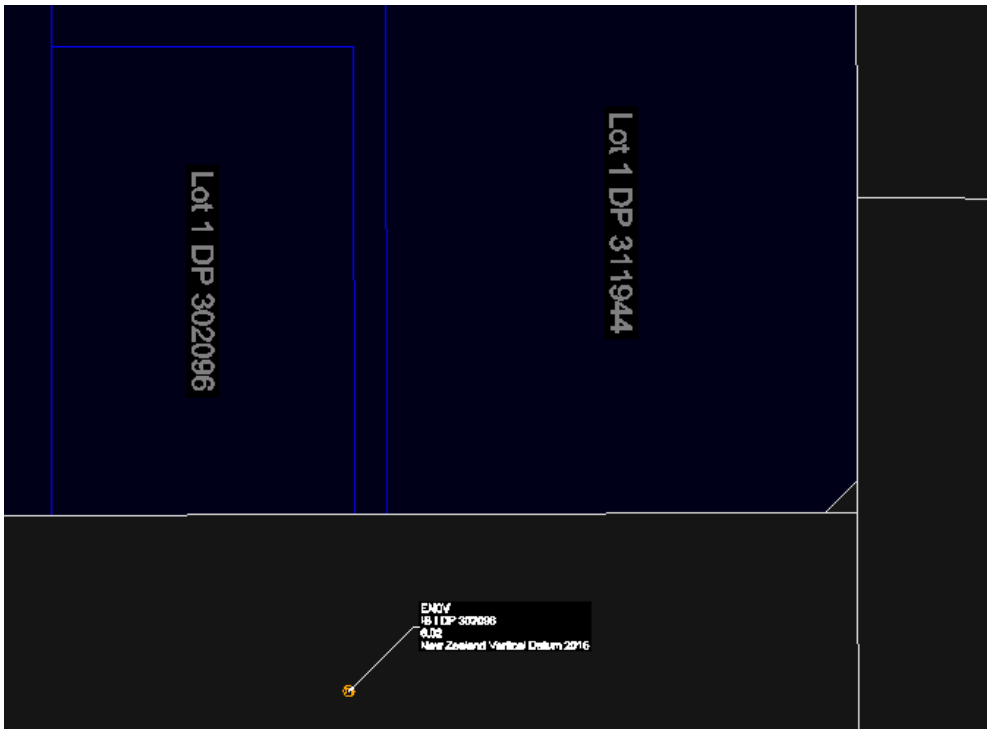


Chain Process

The chain runs a step-by-step process to import the data into 12d.

- User must enter the LINZ API Key (see above)
- Uses Parameters to prompt the user for a polygon to define the location for the import, which is then used by each layer as part of the import process.
- The chain will prompt the user, if they wish to clean the existing models.
- The example imports three layers, the chain can edited to add more layers
- Creates a new view called LINZ WFS
- Then applies a mapfile and an Attribute Manipulator File to the imported dataset
- Finally, creates labels using the Attribute Label Map file

Example Output



More information about chain

More information about the power of 12d chains, can be found using the links below

Introduction to Chains

Advanced Chains

3.0 REST FEATURES

Most council within NZ publish their Three Water and other assets within an GIS, and most users would access this information via some sort of GIS viewing software. But getting this data out with (including attributes) could be problematic.

The new REST features allow 12d users, to take a snap shot of the GIS data, including attributes.

GIS Rest Sources

Below are a number of links to the different council GIS REST services.

QLDC - https://gis.qldc.govt.nz/server/rest/services

Auckland Council - https://services1.arcgis.com/n4yPwebTjJCmXB6W/arcgis/rest/services

Christchurch - https://gis.ccc.govt.nz/arcgis/rest/services/CorporateData

Canterbury Maps - https://gis.ecan.govt.nz/arcgis/rest/

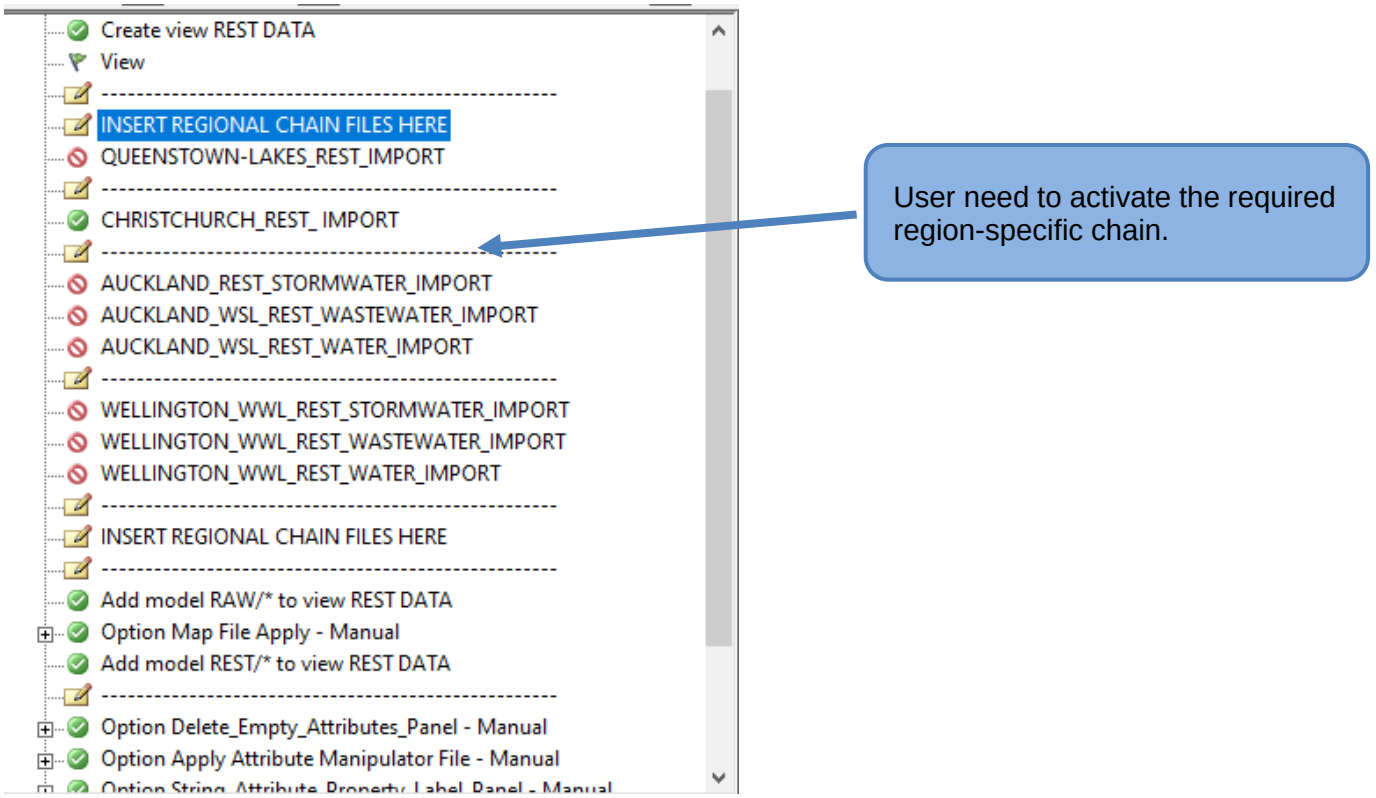
Wellington - https://gis.wellingtonwater.co.nz/server1/rest/services/Councils

Every REST service provider (Layer names and Attribute data) are **different** and will require different setup for each service.

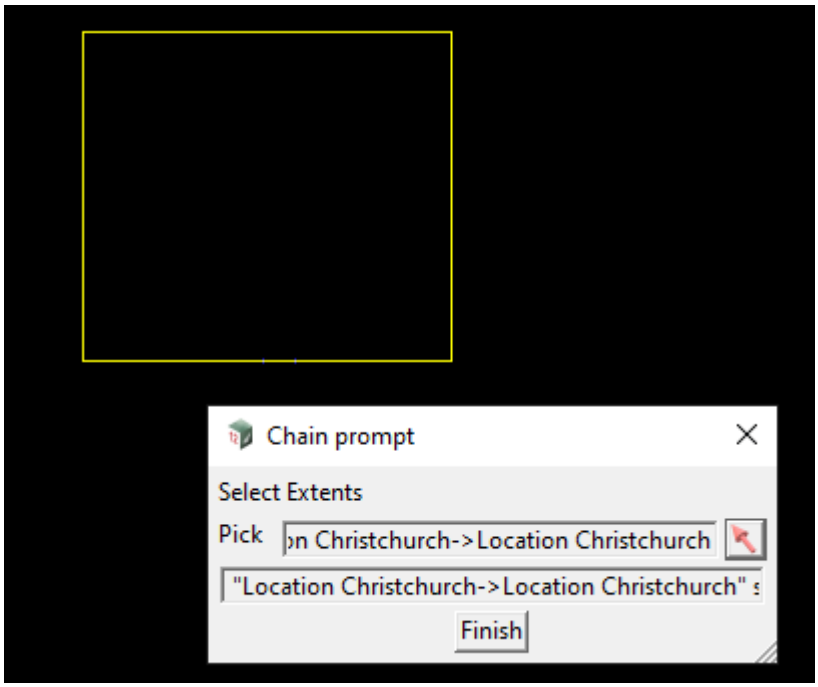
12d NZ has created a number of EXAMPLE chains, these don't cover evert assets type, therefore the user must building upon the supplied example.

Every Layer is read into 12d on demand, so this could take some time depending on your Internet speed.

Via the toolbar, 12d NZ has created an overall chain that then calls region specific sub chain to import the required information from the GIS system.



Like the LINZ Importation tool, the REST function requires a location for import.



The input, passed the location parameter into the different layer, creates a view called “REST Features”.

Each Layer will be read into 12d one at a time, then added to the “REST Features “ view PRIOR to the applying the mapfile and label mapfile.

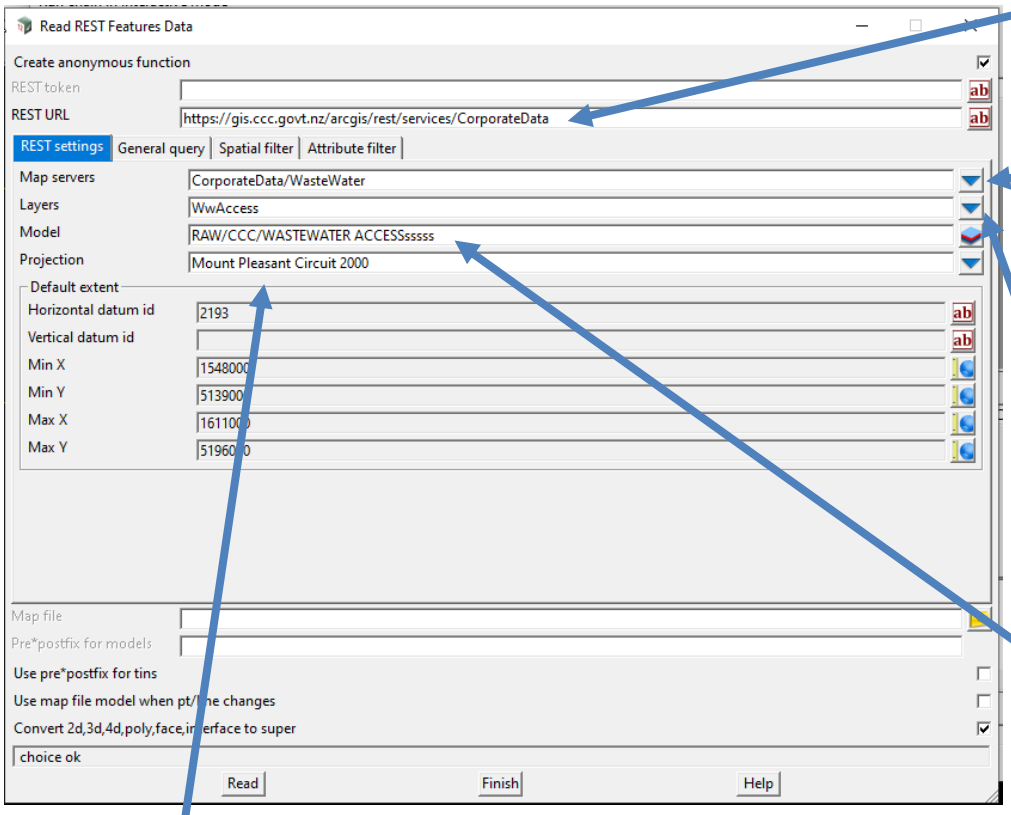
Some Councils GIS REST service have importation limit on the amount single asset classes that can be imported at one time.

Auckland Council has a 2,000 limits. User might need to reduce the extents of the importation.

Region Specific Sub-Chains

As pointed out above, the overall REST chain applies a regional specific sub-chain, these chains are EXAMPLE only and user MUST undertake some QA to confirm that all of the required assets have been imported into 12d.

In the CCC chain, each asset class is imported one at a time. User can either edit an existing line within the chain or copy an existing line to read an new asset class.



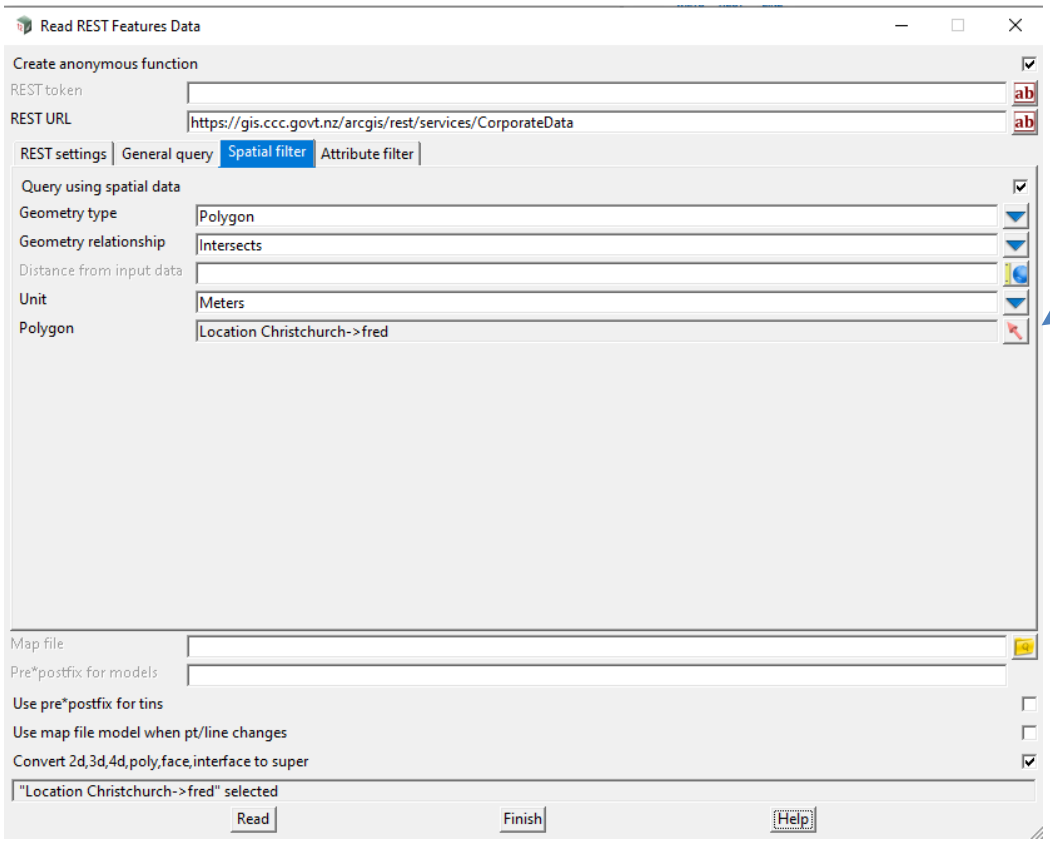
URL to the REST service

The drop down allows users to select the different assets at the highest level

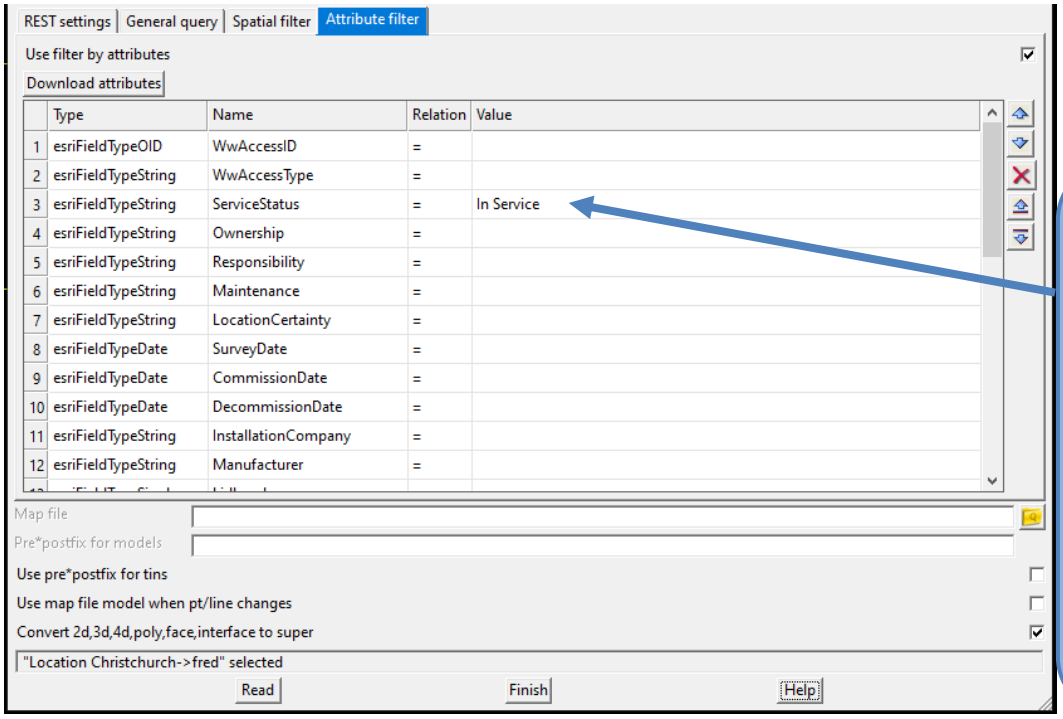
The drop down allows users to select different asset classes

Name of model for the imported asset class, NOTE the RAW model refix, the chain will remove this model prefix

Projection will be supplied by the chain parameter



Polygon selection will be supplied by the chain parameter



12d scans the data prior to import, in this example.

Only assets with an attribute of “ServiceStatus” that has an value of equal to “In Service” will be imported into 12d.

Other values will not be imported, ie removed

This allows user’s to restrict, unwanted asset being read into 12d, ie removed or abandoned assets.

Currently, 12d does not scan the attribute values prior to import the GIS layer, if users want to undertake Attribute filtering prior to importation, a workflow could be, to export the assets

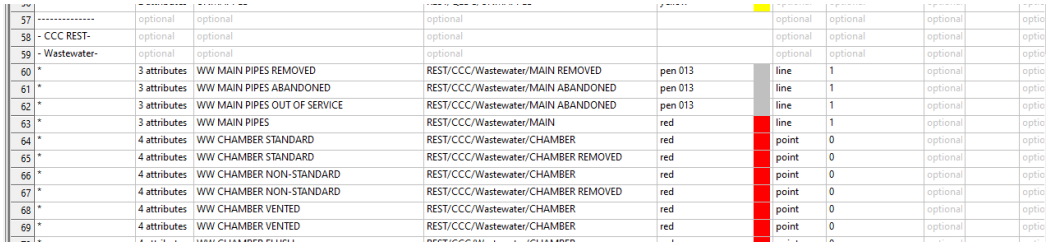
class attributes to an CSV and then order the list based on the different attribute values and then enter the filters attribute values, like the above example.

Mapfile

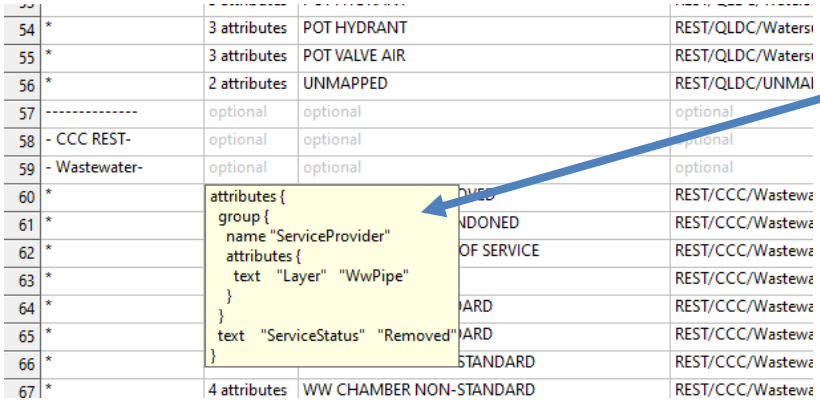
GIS systems don't use the concept of string names, therefore, GIS data must be filtered use the imported attributes and use the Att Key, before applying a string name.

"$USER_LIB\MF_GIS_Import.mapfile"

12d applies the imported attr



57	----------	optional	optional	optional	optional		optional	optional	optional	
58	- CCC REST-	optional	optional	optional	optional		optional	optional	optional	
59	- Wastewater-	optional	optional	optional	optional		optional	optional	optional	
60	*	3 attributes	WW MAIN PIPES REMOVED	REST/CCC/Wastewater/MAIN REMOVED	pen 013		line	1	optional	
61	*	3 attributes	WW MAIN PIPES ABANDONED	REST/CCC/Wastewater/MAIN ABANDONED	pen 013		line	1	optional	
62	*	3 attributes	WW MAIN PIPES OUT OF SERVICE	REST/CCC/Wastewater/MAIN ABANDONED	pen 013		line	1	optional	
63	*	3 attributes	WW MAIN PIPES	REST/CCC/Wastewater/MAIN	red		line	1	optional	
64	*	4 attributes	WW CHAMBER STANDARD	REST/CCC/Wastewater/CHAMBER	red		point	0	optional	
65	*	4 attributes	WW CHAMBER STANDARD	REST/CCC/Wastewater/CHAMBER REMOVED	red		point	0	optional	
66	*	4 attributes	WW CHAMBER NON-STANDARD	REST/CCC/Wastewater/CHAMBER	red		point	0	optional	
67	*	4 attributes	WW CHAMBER NON-STANDARD	REST/CCC/Wastewater/CHAMBER REMOVED	red		point	0	optional	
68	*	4 attributes	WW CHAMBER VENTED	REST/CCC/Wastewater/CHAMBER	red		point	0	optional	
69	*	4 attributes	WW CHAMBER VENTED	REST/CCC/Wastewater/CHAMBER	red		point	0	optional	



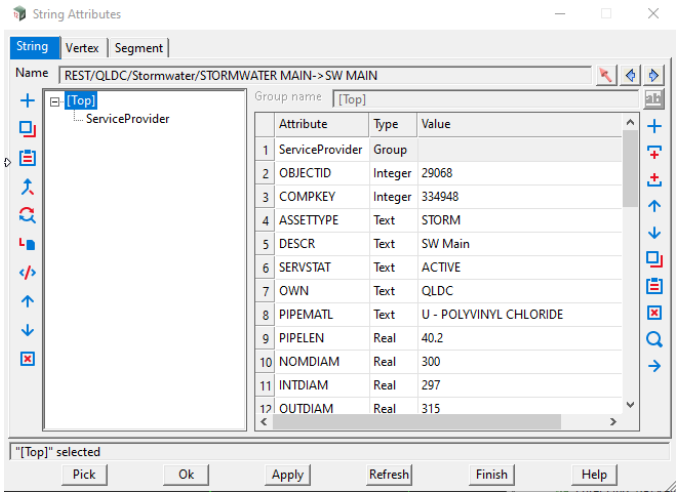
54	*	3 attributes	POT HYDRANT	REST/QLDC/Waters
55	*	3 attributes	POT VALVE AIR	REST/QLDC/Waters
56	*	2 attributes	UNMAPPED	REST/QLDC/UNMAI
57	----------	optional	optional	optional
58	- CCC REST-	optional	optional	optional
59	- Wastewater-	optional	optional	optional
60	*			REST/CCC/Wastewa
61	*		NDONED	REST/CCC/Wastewa
62	*		OF SERVICE	REST/CCC/Wastewa
63	*			REST/CCC/Wastewa
64	*		ARD	REST/CCC/Wastewa
65	*		ARD	REST/CCC/Wastewa
66	*		STANDARD	REST/CCC/Wastewa
67	*	4 attributes	WW CHAMBER NON-STANDARD	REST/CCC/Wastewa

```
attributes {
  group {
    name "ServiceProvider"
    attributes {
      text   "Layer"   "WwPipe"
    }
  }
  text   "ServiceStatus"   "Removed"
}
```

Using the Att Key only objects that match the entered attribute values fill be assigned the string correct string name

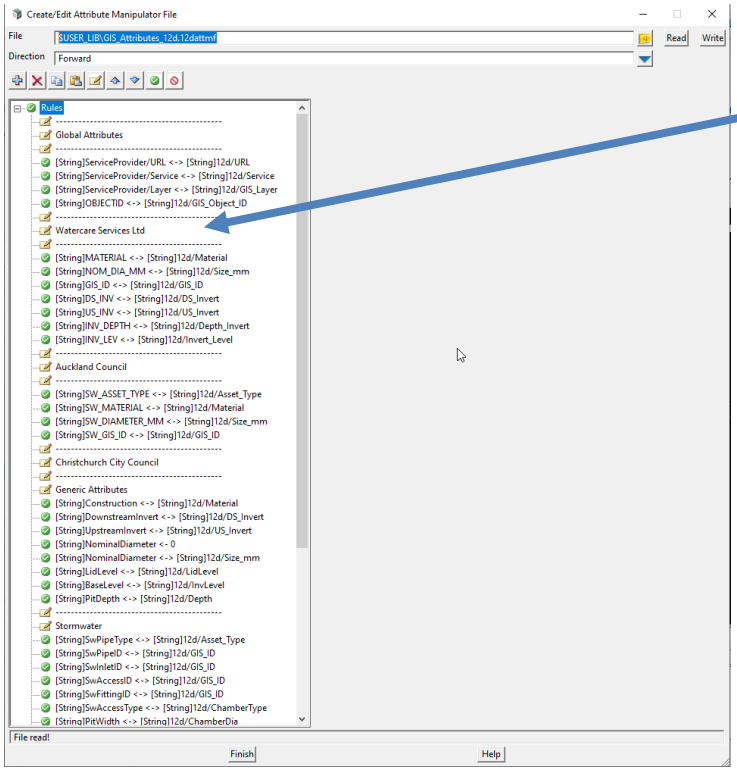
Apply Attribute Manipulator File

Users can apply an Attribute Manipulator file, if required, to manipulate data such as using the pipe diameter to create a pipe string. BUT, historic Three Water might not contain this information and the Attribute Manipulator file might fail to run. It is best to review the supplied dataset before creating an Attribute Manipulator file.

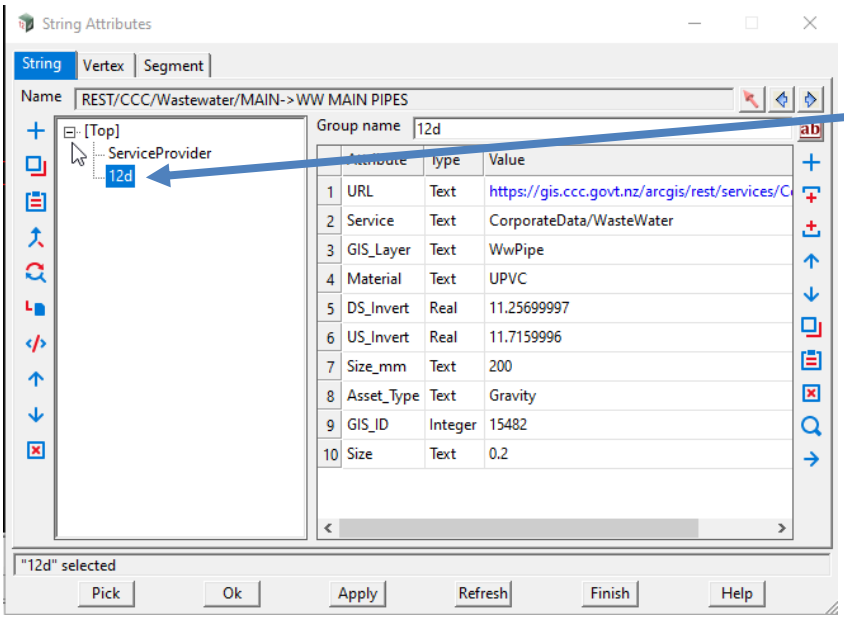


Label Attribute Mapfile

As each GIS system has different attribute names, 12d NZ has create an Attribute Manipulator file ($USER_LIB\GIS_Attributes_12d.12dattmf) which converts the attribute values into an attribute branch called “12d” this allows the user to apply a common label attribute mapfile.

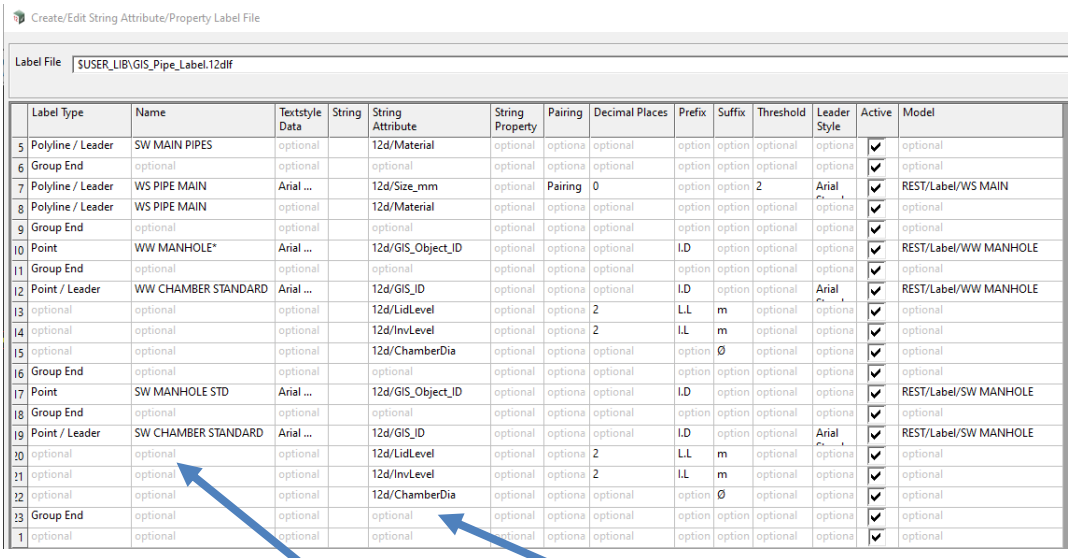


Each GIS major systems have been split into different regions within the file



Att Man file creates a new attribute branch called “12d”

The chain the runs Attribute Label Mapfile ($USER_LIB\GIS_Pipe_Label.12dlf) to create the labels using the 12d attribute branch.



Full path to the required attribute to be labelled

String Name for each asset to be labelled

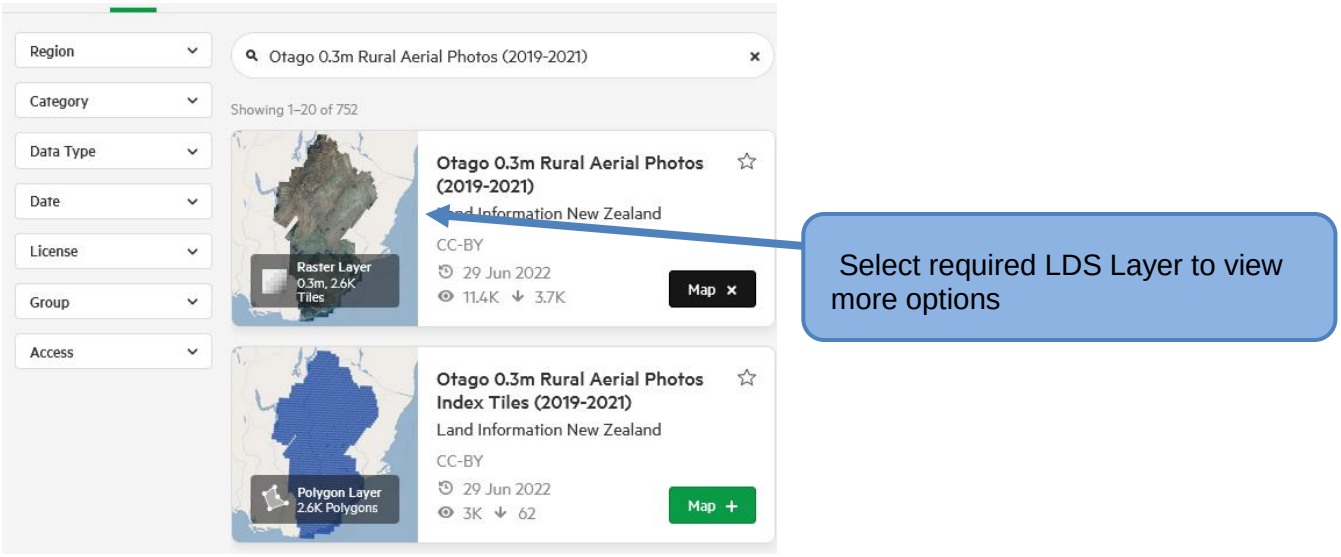
4.0 WMTS

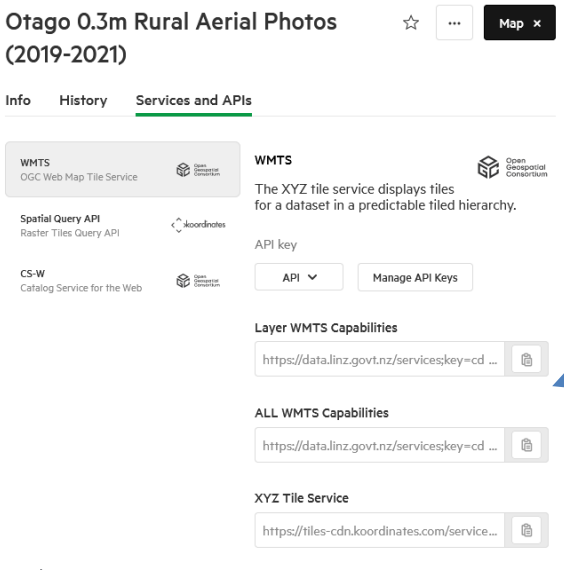
WMTS services are useful if you want to make your cached map or image services available in an open, recognized way across different platforms and clients.

Most GIS imagery is now suppled using the WMTS, such as the Linz Data Services or council GIS system.

Selecting a Layer within LINZ Data Services Website

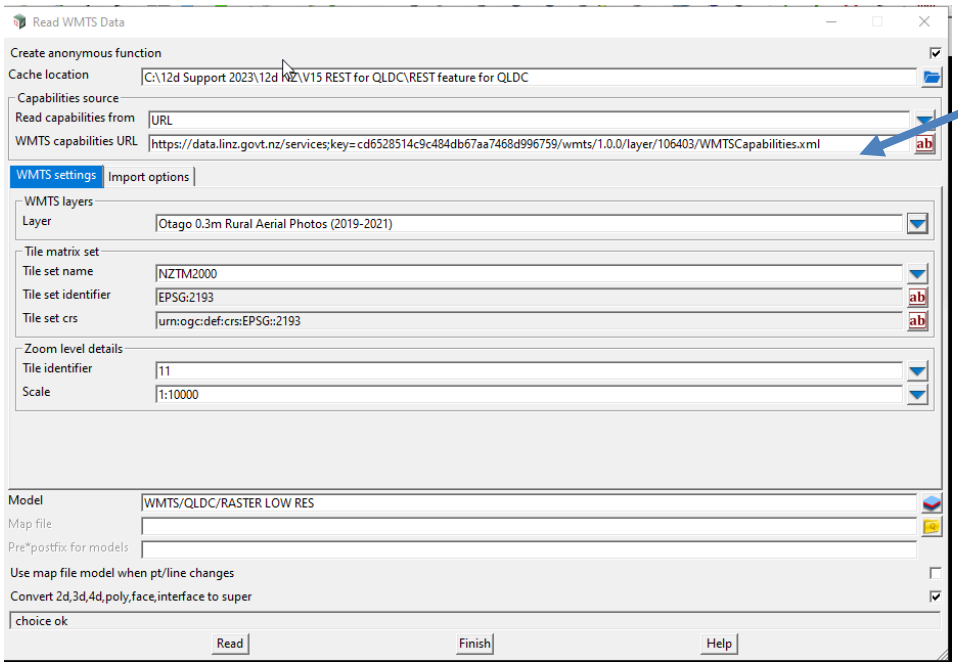
Using the LINZ Data Service Website, the user has the option of viewing a single layer or all of the available layers



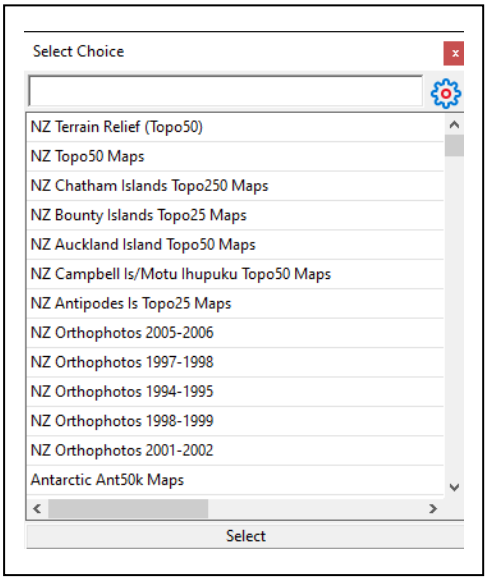


The user can select a single layer or ALL the WFS layer that can be search within 12d

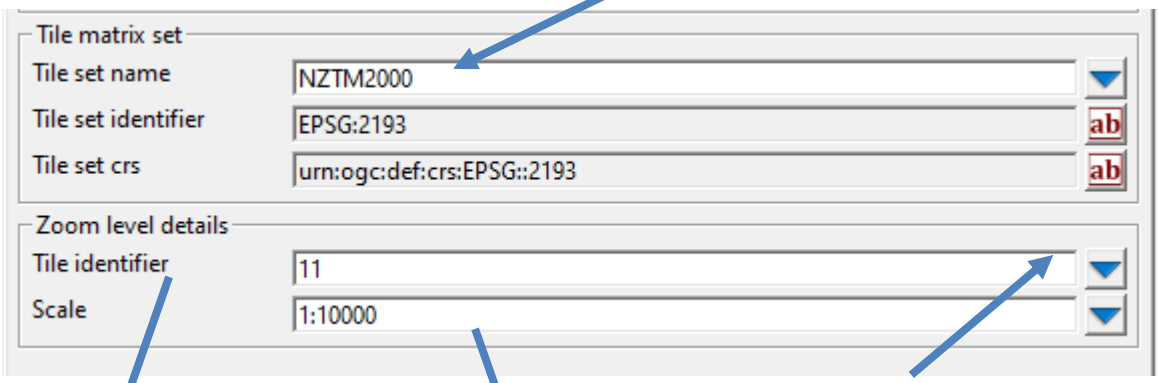
Unlike the WFS layers (details below) the WMTS layer are only saved within NZTM, therefore the location polygon needs to be within NZTM. Once imported the model can reprojected within 12d to the correct local circuit.

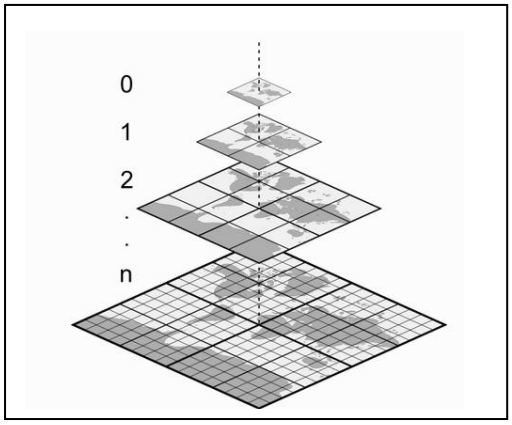


The user can select a single layer or ALL the layer's that can be search within 12d



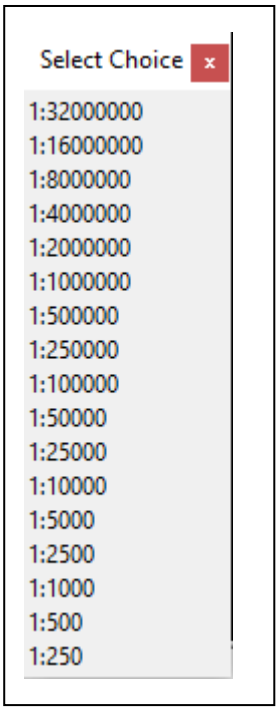
Note the set projection is NZTM





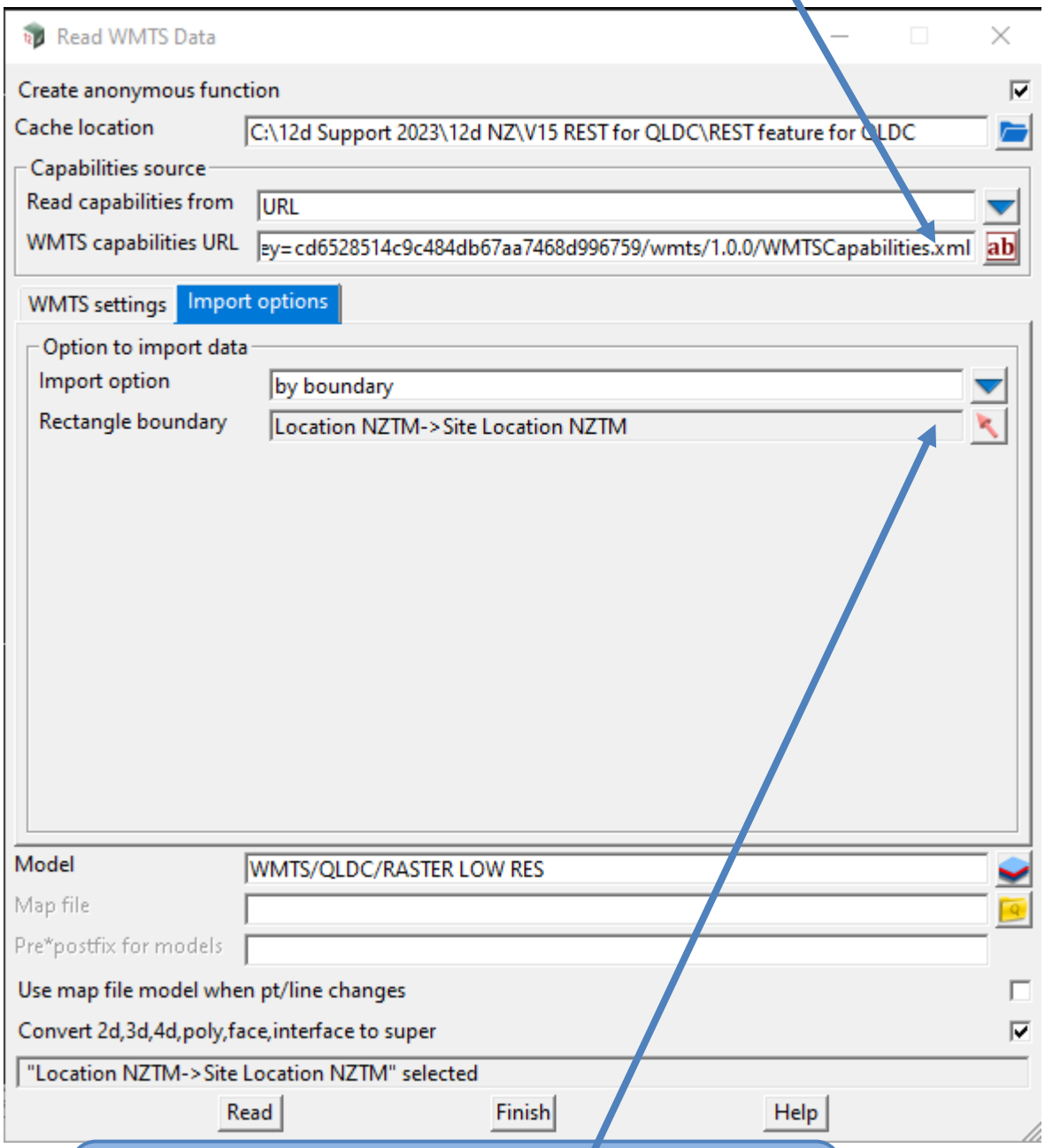
GIS and Google Earth use a software option that allows for different imagery tiles to be shown at different scales, ie then the user scrolls in or out, different raster are shown

This option is not supported within 12d, so the user can select the correct scale



Import Tab

There are a number of different Spatial Operators that have been defined within a GIS system, Section 8.8.5.1 of the Help guide goes into detail of the different options

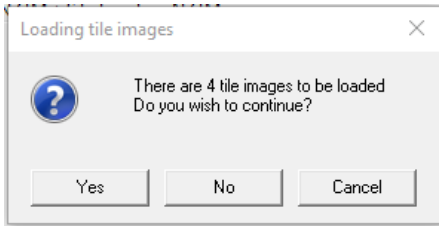


For Most users, selecting the “By Boundary” Operator will work in most situations. Ie import all the information on a layer that contained within a Boundary Polygon

Loading the Tile Images

12d will prompt the user on the number of images that are to be imported into the project folder.

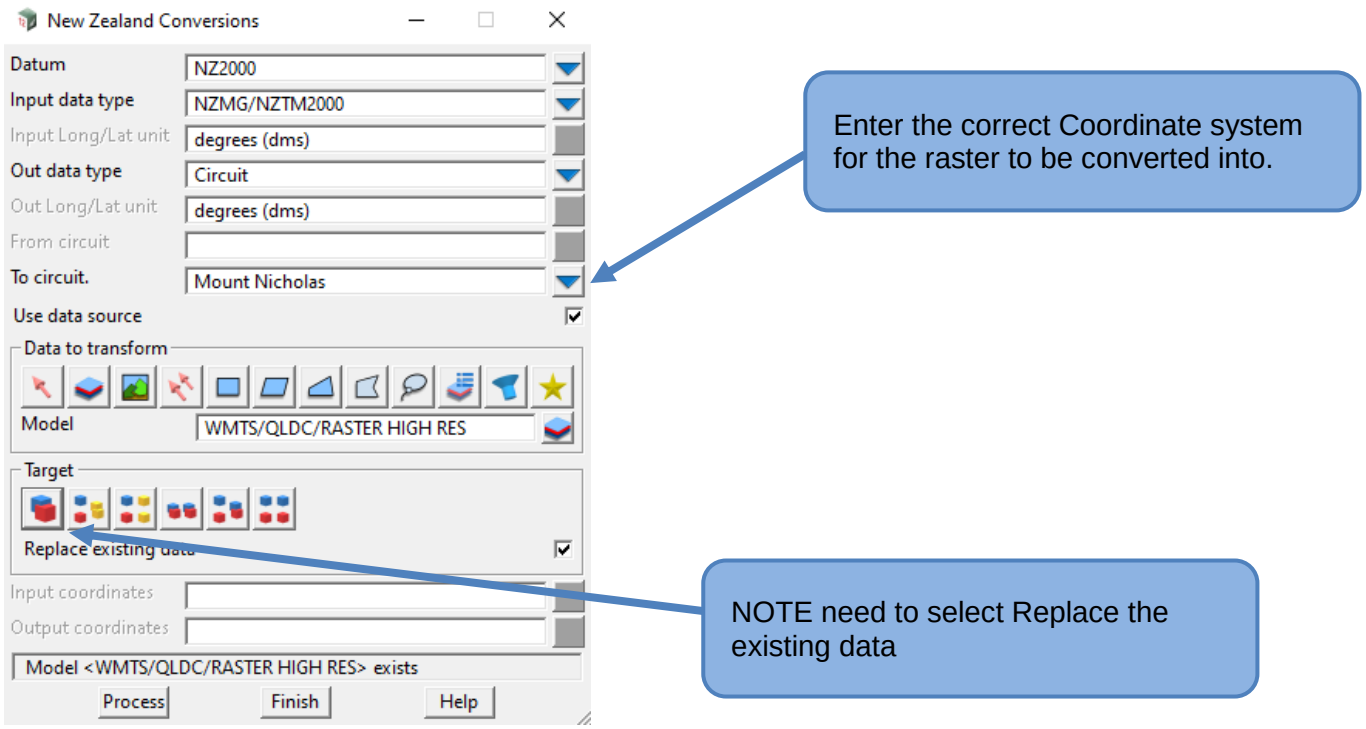
Note the number of tiles increase as the imported scale decreases



Reprojecting the WMTS Layer

Once the raster has been imported into 12d, the user can then covert to local circuit using the flowing option

Survey > Survey > Conversions/Transformations



4.1 WMS

The option has mainly been replaced by GIS software with the WMTS option

4.2 WFS

Some inhouse or council GIS system will publish WFS which can be read into 12d.

The user just needs a valid URL, otherwise this feature is exactly like the LINZ WFS.

NOTES: